2013 Snowmobile

SERVICE MANUAL



ARCTIC CAT®

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FOREWORD

This Arctic Cat Service Manual contains service and maintenance information for the Model Year 2013 Arctic Cat Snowmobiles (except the Sno Pro 120). The manual is designed to aid service personnel in service-oriented applications.

This manual is divided into sections. The sections cover specific snowmobile components or systems and, in addition to the standard service procedures, includes assembling, disassembling, and inspecting instructions. When using this manual as a guide, the technician should use discretion as to how much disassembly is needed to correct any given condition.

The service technician should become familiar with the operation and construction of the components or systems by carefully studying the complete manual. This will assist the service technician in becoming more aware of and efficient with servicing procedures. Such efficiency not only helps build consumer confidence but also saves time and labor.

All Arctic Cat publications and snowmobile decals display the words Warning, Caution, and Note to emphasize important information. The symbol ⚠ **WARNING** identifies personal safety-related information. Be sure to follow the directive because it deals with the possibility of severe personal injury or even death. A **CAUTION** identifies unsafe practices which may result in snowmobile-related damage. Follow the directive because it deals with the possibility of damaging part or parts of the snowmobile. The symbol ■ **NOTE:** identifies supplementary information worthy of particular attention.

At the time of publication, all information, photographs, and illustrations were technically correct. Some photographs and illustrations used in this manual are used for clarity purposes only and are not designed to depict actual conditions. Because Arctic Cat Inc. constantly refines and improves its products, no retroactive obligation is incurred.

All materials and specifications are subject to change without notice.

Keep this manual accessible in the shop area for reference.

Product Service and Warranty Department
Arctic Cat Inc.

ISMA
International Snowmobile Manufacturers Association

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COUNTRY CAT®

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COUNTRY CAT®

SECTION 1 — GENERAL INFORMATION/ SPECIFICATIONS

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General Specifications

■NOTE: General specifications for each 2013 Arctic Cat Snowmobile can be accessed from the Arctic Cat Cat Tracker Dealer Communication System online.

Snowmobile Identification

The Arctic Cat Snowmobile has two important identification numbers. The Vehicle Identification Number (VIN) is stamped into the tunnel near the right-side footrest or on top of the tunnel. The decal also displays pertinent production information. The Engine Serial Number (ESN) is stamped into the crankcase of the engine.

These numbers are required to complete warranty claims properly. No warranty will be allowed by Arctic Cat if the engine serial number or VIN is removed or mutilated in any way.

Recommended Gasoline and Oil

CAUTION
Do not use white gas or gasoline containing methanol. Only Arctic Cat approved gasoline additives should be used.

CAUTION
Any oil used in place of the recommended oil may cause serious damage.

RECOMMENDED GASOLINE (500/570/1100 cc Non-Turbo)

The recommended gasoline to use in these snowmobiles is 87 octane regular unleaded. In many areas, oxygenates are added to the gasoline. Oxygenated gasolines containing up to 10% ethanol are acceptable gasolines; however, on the 570 cc models whenever using oxygenated gasolines, the carburetor main jet must be one size larger than the main jet required for regular unleaded gasoline. For example, if a 220 main jet is recommended for regular unleaded gasoline, a 230 main jet must be installed if using an oxygenated gasoline.

When using ethanol blended gasoline, adding a gasoline antifreeze is not necessary since ethanol will prevent the accumulation of moisture in the fuel system.

■NOTE: On 500 cc models for optimum performance, do not exceed the recommended 87 octane gasoline. Using a higher octane gasoline will not increase overall performance.

RECOMMENDED GASOLINE (800/1100 cc Turbo)

The recommended gasoline to use in these snowmobiles is 91 octane (minimum).

■NOTE: If a situation arises in which 91 octane gasoline is not available, 87 octane gasoline can be substituted; however, do not prolong the usage of 87 octane gasoline as it will cause poor engine performance.

In many areas, oxygenates are added to the gasoline. Oxygenated gasolines containing up to 10% ethanol are acceptable gasolines. Do not use gasolines containing methanol.

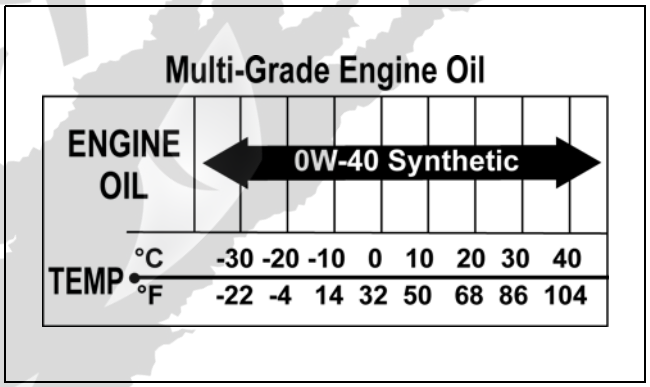
RECOMMENDED OIL (2-Stroke)

The recommended oil to use in the oil-injection system is Arctic Cat Formula 50 Injection Oil for 500/570 cc models or either Arctic Cat APV Synthetic 2-Cycle Oil or Formula SS Semi-Synthetic Oil for 800 cc models. These oils are specially formulated to be used either as an injection oil or as a pre-mix oil (for break-in) and meets all of the lubrication requirements of the Arctic Cat snowmobile engine.

CAUTION
Any oil used in place of the recommended oil could cause serious engine damage.

RECOMMENDED OIL (4-Stroke)

The recommended oil to use is Synthetic 0W-40 Oil in all temperatures and conditions.



OILCHARTJ

After the engine break-in period, the engine oil should be changed every 2500-3000 miles (non-turbo) or 1500-2000 miles (turbo) and before prolonged storage.

Engine Break-In

2-STROKE

The Arctic Cat 2-stroke engine (when new or rebuilt) requires a short break-in period before the engine is subjected to heavy load conditions. Arctic Cat requires that the first tankful of fuel be premixed at a 100:1 ratio in all oil-injection models.

During the break-in period, a maximum of 1/2 throttle is recommended; however, brief full-throttle accelerations and variations in driving speeds contribute to good engine break-in.

CAUTION
DO NOT exceed the one (1) tankful limitation of a 100:1 gas/oil break-in mixture. Continuous use of a gas/oil mixture could cause spark plug fouling and excessive carbon buildup.

4-STROKE

The Arctic Cat 4-stroke engine (when new or rebuilt) requires a short break-in period before the engine is subjected to heavy load conditions.

This engine does not require any pre-mixed fuel during the break-in period.

CAUTION

DO NOT use premixed fuel in the snowmobile gas tank. Engine damage will occur.

To ensure trouble-free operation, careful adherence to the following break-in guidelines will be beneficial.

0-200 miles	1/2 Throttle (45 MPH-max)
200-400 miles	1/2-3/4 Throttle
400-600 miles	1/2-3/4 Throttle *

* With occasional full-throttle operation.

To ensure proper engine break-in, Arctic Cat recommends that the engine oil and filter be changed after 500 miles or after one month, whichever comes first. This service is at the discretion and expense of the snowmobile owner.

Drive Belt Break-In

Drive belts require a break-in period of approximately 25 miles. Drive the snowmobile for 25 miles at 3/4 throttle or less. By revving the engine up and down (but not exceeding 60 mph), the exposed cord on the side of a new belt will be worn down. This will allow the drive belt to gain its optimum flexibility and will extend drive belt life.

■**NOTE: Before starting the snowmobile in extremely cold temperatures, the drive belt should be removed and warmed up to room temperature. Once the drive belt is at room temperature, install the drive belt (see Drive Belt sub-section in Section 6 of this manual).**

CAUTION

Running the engine with the drive belt removed could result in serious engine damage and drive clutch failure.

Genuine Parts

When replacement of parts is necessary, use only genuine Arctic Cat parts. They are precision-made to ensure high quality and correct fit.

Varying Altitude Operation

Operating a snowmobile at varying altitudes requires recalibration of carburetor and/or drive system components.

The altitude information decal is located beneath the hood of the snowmobile on the belt guard on the 500/570/1100 cc non-turbo models. Consult the appropriate specification sheet on Cat Tracker Online for the F/M/XF models.

CAUTION

On the 570 cc, carefully follow the Carburetor Jet Chart recommendations for proper carburetor calibration for altitude, temperature, and gasoline being used.

Following are basic altitude theories for clutching, engine, suspension, and track.

CLUTCHING

On a normally-aspirated engine as altitude changes, engine horsepower changes with it. As you go up in altitude, the engine loses horsepower. Because of this, the continuously variable transmission (CVT) system needs to be calibrated to compensate for the horsepower loss.

At altitudes above 5000 ft, the engine loses peak horsepower but will also lose horsepower at engagement speed. For this reason, calibrating the drive system is usually needed in order to attain acceptable performance. Changing drive clutch engagement speed can be done several ways. Some of the methods will affect other characteristics of CVT operation, so you must be careful what you change. Drive clutch springs are the most common way to increase engagement speed; however, by simply changing the cam arms to a lighter weight from the heavier sea level cam arm, you will gain some engagement speed.

Other more complicated methods exist such as engagement notches and changing the position of the cam arm center of gravity in relation to the roller. This is called "tucking the weight" and can be used, but, like the engagement notch, it can hurt belt life.

The driven clutch will also play a part in CVT tuning for high altitude operation. A steeper helix (torque bracket) angle in the driven clutch will mean a quicker up-shift. A shallower angle will mean a slower up-shift. If the up-shift is too quick, due to a very steep helix, RPM will be pulled down under the peak operating RPM of the engine (where the horsepower is) and performance will suffer. The engine may even bog. If you have a helix that is too shallow, the engine may over-rev or have poor acceleration. Usually, angles shallower than the sea level calibrations work best. The driven spring will also affect driven clutch tuning. Tighten the spring, and RPM will increase. Loosen the spring, and RPM will decrease. The spring should be used to fine-tune and complement the helix selection.

Carburetor calibration changes for high altitude operation will have an effect on the CVT system and how it operates. Understanding the basics of CVT operation is important in order to make the correct high altitude CVT calibration changes.

ENGINE

A normally aspirated engine will generate more horsepower at sea level than it does at higher altitudes. The reason is that the higher you go, less oxygen is available for the engine to use during its combustion process. Less oxygen means it needs less fuel to obtain the correct air/fuel ratio to operate properly. This is why the fuel ratio has to be recalibrated. High altitude engines operate as though they have a lower compression ratio. This, along with less oxygen and less fuel, means that the engine generates less horsepower.

The carbureted models will also have lower pressure applied to the float chamber because of pressure changes in the atmosphere between high altitude and sea level. All of these characteristics will become more evident the higher the altitude.

TURBOCHARGING

Turbocharging is one method of compensating for loss of air density that works extremely well when applied to four-cycle internal combustion engines.

Exhaust gasses are directed through the turbocharger turbine wheel which is attached to the compressor through a common shaft. As the exhaust gasses spin the turbine, the compressor is spun at very high RPM. Inlet air is drawn into the compressor, compressed, and routed to the intake manifold of the engine. Intake pressure, therefore, is maintained at the optimum level as altitude or temperature increases.

The turbocharger output must be regulated to maintain the optimum manifold pressure throughout the designed operating range. This is accomplished by regulating the volume of exhaust gasses passing through the turbine by controlling a diverter valve (waste gate) at the turbocharger turbine inlet. At lower altitudes/temperatures, excessive exhaust gasses are diverted past the turbine and into the exhaust downstream of the turbocharger thus limiting the compressor output to maintain correct manifold pressure.

As altitude increases, the manifold pressure is held constant by diverting less exhaust past the turbine, thus increasing compressor speed. This will continue until the waste-gate is completely closed at which time manifold pressure will start to decrease much the same as a normally aspirated engine.

The waste gate is controlled by a spring/diaphragm mechanism that is connected to the intake manifold by an air line. A mechanical linkage connects the diaphragm to the waste gate control arm.

Air is heated by friction and compression through the turbocharger and air density is lost by heating the air; therefore, an after-cooler is installed between the turbocharger compressor and the intake manifold. This is an air-to-air after-cooler that uses outside air directed through a radiator-type cooler to cool the compressed air prior to entering the intake manifold.

SUSPENSION

The different riding styles of the individual operator, the varying snow conditions, and the type of terrain are all factors that affect the suspension at high altitude. Trail riding versus powder snow riding versus combination riding will all require different suspension settings.

The normal setting for front ski suspension is as little spring pre-load tension as possible for powder snow riding allowing the skis to float across the snow with the least amount of resistance. Trail riding will require more spring tension to carry the varying load more effectively. Many different settings and spring tensions to consider exist when adjusting for riding style and snow conditions.

The rear suspension has a number of spring settings that produce different riding characteristics.

The front arm spring and shock will also affect the ride and handling when either on a trail or in powder snow. A strong spring setting on this shock will cause the snowmobile to tend to "dig" more when riding in the powder snow rather than climbing up on top of the snow. But, it will work more effectively when riding on a trail. A softer spring setting will allow the front of the rear suspension to collapse much quicker and change the angle of the track to the snow. A more gradual angle will tend to raise the snowmobile up on the snow rather than digging into it.

Many possible variables and adjustments to the rear suspension exist depending on snow conditions, riding style, and type of terrain. These adjustments can be made to individualize the snowmobile to the riding style of the operator.

M/XF High Country

As snow cover and riding conditions change, several different adjustments can be made to change the ride and handling characteristics for operator preference. Located on the front suspension arm are limiter straps. They limit the amount of "fallout" the front arm can have. These straps may be adjusted in or out due to conditions and riding style. The more the straps are brought up, the more steering power the operator has due to the amount of ski pressure.

Another adjustment that can be made on the rear suspension is the front arm shock spring tension. As trail conditions change, the spring pre-load may be used to decrease the chance of the front end "bottoming out." With a stiffer spring pre-load, the ride of the snowmobile will improve on the trail but will affect the performance in the deep powder snow. In deep powder snow, the stiffer spring pre-load will cause the front-end to "dig" and possibly take longer for it to plane off. Several different-rate springs are available for different riding styles and terrain conditions.

On the standard models, the front shock springs are also individually adjustable for the terrain conditions and driving style of the operator. The spring adjuster has been set at the factory so the correct amount of threads are exposed between the spring adjuster and the shock housing as an initial setting. Additional ski pressure can be obtained by tightening the spring tension; ski pressure can be decreased by relaxing spring tension. Springs with different spring rates are available for operator choice and snow conditions.

A limit exists as to how far you can pre-load the springs before "coil bind" takes effect where the wire on the spring actually runs into itself and causes binding. Equal adjustments should be maintained on both sides of the snowmobile. On the Sno Pro models with air shocks, they are individually adjustable for the terrain conditions and driving style of the operator. The shocks are preset at the factory (see chart) as an initial setting; however, it is possible to "fine tune" the shocks to match the operator's weight, riding style, and terrain conditions.

Initial Setting Chart		
Model	**Front Shock (Ski)**	**Rear Arm Shock**
M Sno Pro	6.3 kg/cm^2 (90 psi)	10.2-10.6 kg/cm^2 (145-150 psi)
XF Sno Pro	5.3 kg/cm^2 (75 psi)	10.19 kg/cm^2 (145 psi)
XF Cross-Tour	N/A	14.06 kg/cm^2 (200 psi)

Checking and adjusting air pressure must be done at riding temperature (outside). Also, it is advisable to check air pressure when the outside temperature varies more than 25°.

■NOTE: Care should be taken to have equal pressure in the ski shocks before operating the snowmobile.

Finally, track tension should be looked at to make sure that it is within recommended specifications to affect the efficiency of the snowmobile. On models with the torque sensing link, the track is actually tightening as the suspension moves through its range of motion causing the track to sag in the middle and rub on the top part of the rear suspension arm.

TRACK

Carefully matching the riding requirements to the type of track will ensure the maximum use of all available engine power. Lug height and track durometer are the two main concerns when selecting a track for various riding styles.

Tracks exist with lug heights from 0.750" up to 2.6" to accommodate various snow conditions. Generally, the deeper the snow, the taller the lug. It must be noted that the installation of any deep-lug track may reduce top end speed and promote premature wear strip wear in marginal snow conditions.

Durometer is a measurement of how hard a rubber is. The lugs on most tracks range between 60 and 85 durometer. On the durometer scale, the higher the number, the harder the lugs. For riding in deep powder snow, a softer durometer track works best. The softer rubber allows the track to "give" a little and pack the snow creating lift rather than digging its way straight down. When hill-climbing, the harder lug of an 80 durometer track works the best due to penetrating the hard snow creating more bite.

Some tracks come with a dual durometer rating, such as a track with a 80/60 durometer rating. The lugs on this track are 80% 80 durometer rubber, and the top 20% is made of the softer 60 durometer rubber. This track is designed to be a good all-around track for riding mostly in deep powder snow but can climb the occasional hard snow hill.

Preparation For Storage

Prior to storing the snowmobile, it must be properly serviced to prevent corrosion and component deterioration.

1. Clean the seat cushion with a damp cloth and Arctic Cat Vinyl Protectant.
2. Clean the snowmobile thoroughly by hosing dirt, oil, grass, and other foreign matter from the skid frame, tunnel, hood, and belly pan. Allow the snowmobile to dry thoroughly. DO NOT get water into any part of the engine.
3. On the 1100 cc, change the engine oil and replace the air filter on the turbo models if necessary; then proceed to step 6.
4. On the Bearcat/F-Series/T-Series, carefully pry the intake boots partially over the carburetor inlets/throttle body inlets. On the F/M/XF, remove the hood.
5. Place the rear of the snowmobile up on a shielded safety stand; then start the engine and allow to idle. Spray an Engine Storage Preserver into the intakes until the engine exhaust starts to smoke heavily or until the engine starts to drop in RPM. Turn engine off. Install the intake boots.

CAUTION

Do not run the engine without the belt guard in place and secured.

6. Plug the exhaust system outlet with a clean cloth.
7. On the 2-stroke with the ignition switch in the OFF position:
   A. Disconnect the high tension leads from the spark plugs; then remove the plugs, connect them to the leads, and ground them on the cylinder heads.

CAUTION

Never crank the engine over without grounding the spark plugs. Damage to coils and/or ECM may result.

   B. Pour 29.5 ml (1 fl oz) of SAE #30 petroleum-based oil into each spark plug hole and pull the recoil starter handle slowly about 10 times.
   C. Install the spark plugs and connect the high tension leads.

■NOTE: At this point on the 570 cc, drain the gas from each carburetor float chamber.

8. Fill the gas tank to its rated capacity; then add Arctic Cat Fuel Stabilizer to the gas tank following directions on the container for the stabilizer/gasoline ratio. Tighten the gas tank cap securely.
9. On the ACT drive models, flush the gear case and change the lubricant (see Section 6). On the chain drive models with the snowmobile level, check the lubricant level in the chain case. If low, add chain lube through the fill plug hole.
10. Remove the drive belt from the drive clutch/driven clutch (see Section 6). Lay the belt on a flat surface or slide it into a cardboard sleeve to prevent warping or distortion during storage; then clean and inspect the drive clutch and driven clutch.
11. Apply light oil to the upper steering post bushings and to the shafts of the shock absorbers; then lubricate the rear suspension with an all-temperature grease.
12. On the Bearcat/F-Series/T-Series, lubricate the spindles and steering arm with an all-temperature grease.
13. Tighten all nuts, bolts, and cap screws making sure all calibrated nuts, bolts, and cap screws are tightened to specifications. Make sure all rivets holding the components together are tight. Replace all loose rivets.
14. Clean and polish the hood, console, and chassis with Cat Cleaner. DO NOT USE SOLVENTS. THE PROPELLENT WILL DAMAGE THE FINISH.
15. On electric start models, disconnect the battery cables making sure to disconnect the negative cable first; then clean the battery posts and cables.

CAUTION

Sealed batteries require charging if left for extended non-start periods. Arctic Cat recommends trickle charging once a month. Follow the manufacturer's instructions and cautions.

CAUTION

On models with remote start, make sure to leave the battery cables disconnected. Failure to disconnect the battery cables when storing the snowmobile for a prolonged period of time (six weeks or more) will result in a discharged or damaged battery.

16. If possible, store the snowmobile indoors. Raise the track off the floor by blocking up the back end making sure the snowmobile is secure. Loosen the track adjusting bolts to reduce track tension. Cover the snowmobile with a machine cover or a heavy, ventilated tarpaulin to protect it from dirt and dust.

17. If the snowmobile must be stored outdoors, position the snowmobile out of direct sunlight; then block the entire snowmobile off the ground making sure the snowmobile is secure. Loosen the track adjusting bolts to reduce track tension. Cover with a machine cover or a heavy, ventilated tarpaulin to protect it from dirt, dust, and rain.

CAUTION

Avoid storing in direct sunlight and using a plastic cover as moisture may collect on the snowmobile causing corrosion.

Preparation After Storage

Taking the snowmobile out of storage and correctly preparing it for another season will assure many miles and hours of trouble-free snowmobiling. Arctic Cat recommends the following procedure:

CAUTION

On the 570 cc if the gas in each carburetor float chamber was not drained prior to storage, the carburetors must be cleaned before starting the engine.

1. Clean the snowmobile thoroughly. Polish the exterior of the snowmobile.

2. Clean the engine. Remove the cloth from the exhaust system. Check exhaust system and air silencer for obstructions.

3. Inspect all control wires and cables for signs of wear or fraying. Replace if necessary. Use cable ties or tape to route wires and cables away from hot or rotating parts.

4. Inspect the drive belt for cracks and tears. Check belt specifications. Replace if damaged or worn. Install the drive belt (see Section 6).

■NOTE: If the old belt is worn but in reasonable condition, retain it with the snowmobile as a spare in case of emergency.

5. On the 570 cc, inspect the in-line fuel filter and replace if necessary; then adjust the carburetors and choke cable.

⚠ WARNING

Be sure to tighten the swivel adapter jam nuts securely. If a jam nut isn't tightened, the adjuster can rotate out of the carburetor cap causing the piston valve not to return to the full-closed position.

6. Adjust the throttle cable. Inspect all fuel hoses and oil hoses for deterioration or cracks; replace if necessary. Make sure all connections are tight.

7. On the 2-stroke, fill the oil-injection reservoir with the recommended 2-cycle oil; then inspect each spark plug. Replace, gap, or clean as necessary.

■NOTE: On the 2-stroke models after prolonged storage, Arctic Cat recommends one tankful of 100:1 gas/oil mixture be used in conjunction with the oil-injection system to ensure proper lubrication.

8. Tighten all nuts, bolts, and cap screws making sure all calibrated nuts, bolts, and cap screws are tightened to specifications.

9. If not done during preparation for storage, lubricate the rear suspension with an all-temperature grease. On the Bearcat/F-Series/T-Series, lubricate the spindles and steering arm with an all-temperature grease.

10. On liquid cooled models, check the coolant level and all coolant hoses and connections for deterioration or cracks. Add properly mixed coolant as necessary.

11. On the 570 cc, clean the engine cooling fins and vents.

12. On electric start models, charge the battery; then connect the battery cables making sure to connect the positive cable first. Test the electric start system.

13. Inspect the entire brake system, all controls, headlight, taillight, brake light, ski wear bars, and headlight aim; adjust or replace as necessary.

14. Adjust the track to the proper tension and alignment.

After Break-In Checkup/ Checklist

Certain areas require adjustment after the break-in period in order to obtain peak performance. These areas are the following.

CARBURETOR JETTING (570 cc) — Altitude, temperature, and the use of oxygenated gasoline affect the carburetion needed for optimum engine performance. The carburetor main jets must be changed in conjunction with changes in operating altitude, oxygenated gasoline usage, and temperature.

DRIVE BELT DEFLECTION — Drive belt deflection is very important to the snowmobile. Even if it is checked and is correct when the snowmobile is set up, it does change (more so during the break-in period). This is because the rubber engine mounts and the rubber snubber on the torque link will all take a "set" during the first 100 miles allowing the distance between the drive clutch and driven clutch to shorten. When this happens, the snowmobile will appear to have a too long drive belt. To add to this, the drive belt itself wears and stretches somewhat leading to a low-end performance problem and, if not corrected, causes premature drive belt wear.

After the break-in period, drive belt deflection should be checked according to the instructions given in Section 6 of this manual.

DRIVE CLUTCH/DRIVEN CLUTCH ALIGNMENT — The alignment between the drive clutch and driven clutch are set at the factory. Normally, no adjustment is necessary; however, if premature drive belt wear or poor performance is experienced, the drive clutch/driven clutch alignment must be checked.

TRACK TENSION AND ALIGNMENT — A certain amount of stretch occurs on all tracks during the first 500 miles. The track must be inspected/adjusted after the first 50 to 100 miles to the specifications given in the Track Specifications sub-section of this section and periodically thereafter. If these adjustments aren't performed, the track may "derail" which leads to track and slide rail damage.

Along with these major areas, other areas should be checked and adjusted.

Below is a list of items to check after the break-in period. The recommended mileage for this inspection is between 100 and 300 miles.

- ❑ Jet carburetors according to average temperature, type of gasoline being used, and altitude (570 cc)
- ❑ Check drive belt deflection - drive clutch/driven clutch alignment
- ❑ Adjust track tension and alignment
- ❑ Check throttle cable tension
- ❑ Check oil-injection pump adjustment (2-stroke)
- ❑ Check engine idle
- ❑ Check coolant level
- ❑ Check chain case/gear case lubricant level
- ❑ Check engine oil (4-stroke)
- ❑ Check lights (high/low beam, brakelight)
- ❑ Check safety switch operation
- ❑ Check engine compartment for any rubbing components
- ❑ Check steering hardware for tightness
- ❑ Check skid frame and A-arm mounting hardware for tightness
- ❑ Check brake lever travel and adjustment
- ❑ Grease all lubrication points

Engine Specifications

2-Stroke

ITEM		
Engine Model Number	(500 cc) (570 cc) (800 cc)	AX50L9 AA56A9 AB80L4
Displacement	(500 cc) (570 cc) (800 cc)	499 cc 565 cc 794 cc
Bore x Stroke	(500 cc) (570 cc) (800 cc)	71 x 63 73.8 x 66 85 x 70
Compression Ratio	(500 cc) (570 cc) (800 cc)	6.38:1 6.41:1 6.62:1
Cooling System	(500 cc/800 cc) (570 cc)	Liquid Fan
Ignition Timing (Engine Warm)	(500 cc) (570 cc) (800 cc)	13° @ 2000 RPM 0.040” 20° @ 2000 RPM 0.099” 16.5° @ 2000 RPM 0.072”
Spark Plug (NGK)		BR9EYA
Spark Plug Gap		0.028-0.031”
Piston Skirt/Cylinder Clearance	(500 cc/570 cc) (800 cc)	0.0031-0.0041” 0.0041-0.0053”
Piston Ring End Gap	(500 cc) (570 cc/800 cc)	0.008-0.016” 0.012-0.0196”
Cylinder Trueness Limit		0.004”
Piston Pin Diameter	(500 cc/800 cc) (570 cc)	0.8659-0.8661” 0.7085-0.7087”
Piston Pin Bore Diameter	(500 cc/800 cc) (570 cc)	0.8661-0.8665” 0.7087-0.7091”
Connecting Rod Small End Bore	(500 cc/800 cc) (570 cc)	1.0631-1.0634” 0.9056-0.9059”
Connecting Rod Radial Play		0.0001-0.0008”
Crankshaft Runout (t.i.r.)		0.002”
Crankshaft End Play		0.002-0.004”
Reed Stopper Height	(500 cc) (570 cc) (800 cc)	0.315” 0.236” 0.512”

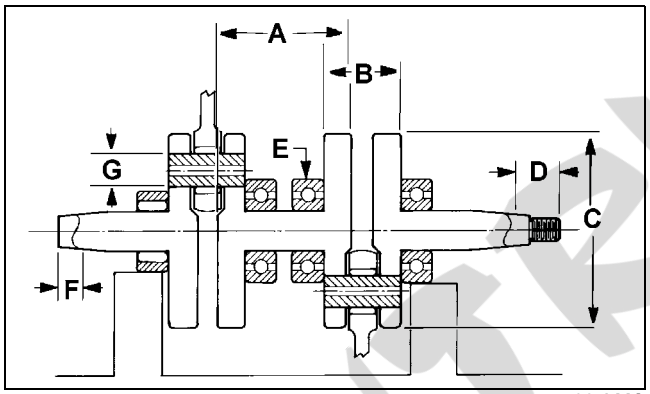
4-Stroke

ITEM		1100 cc
Engine Model Number	(Non-Turbo) (Turbo)	AA11L5 AB11L5
Displacement		1056 cc
Bore x Stroke		98 x 70
Cooling System		Liquid
Spark Plug (NGK)		MR8AI-9
Spark Plug Gap		0.035”
Piston Skirt/Cylinder Clearance	(Non-Turbo) (Turbo)	0.0011-0.0016” 0.0006-0.0010”
Piston Pin Diameter	(Non-Turbo) (Turbo)	0.8658-0.8661” 0.9447-0.9449”
Piston Pin Bore Diameter	(Non-Turbo) (Turbo)	0.8662-0.8664” 0.9449-0.9451”
Piston Pin/Connecting Rod Small End Clearance	(Non-Turbo) (Turbo)	0.0004-0.0010” 0.0004-0.0009”
Piston Ring End Gap	(1st) (2nd) (Oil)	0.0059-0.0138” 0.0118-0.0177” 0.0078-0.0275”
Piston Ring/Groove Clearance	(1st - Top) (1st - Bottom) (2nd) (Oil)	0.0059-0.0074” 0.0008-0.0035” 0.0008-0.0024” 0.0024-0.0059”
Piston Diameter (10 mm from skirt edge)	(Non-Turbo) (Turbo)	3.8568-3.8574” 3.8574-3.8580”
Cylinder/Head Distortion (max)		0.002”
Connecting Rod Small End Bore Inside Diameter	(Non-Turbo) (Turbo)	0.866-0.867” 0.945-0.946”
Cam Lobe Height (Int)	(Non-Turbo) (Turbo)	1.487-1.489” 1.436-1.437”
Cam Lobe Height (Exh)	(Non-Turbo) (Turbo)	1.432-1.433” 1.417-1.418”
Camshaft Journal Outside Diameter		0.8650-0.8658”
Camshaft Journal Bore Diameter		0.8666-0.8670”
Camshaft Journal Clearance		0.0007-0.0020”
Crank Pin Diameter		1.7707-1.7720”
Crankshaft Runout		0.002”
Crankshaft Main Bearing Clearance		0.0007-0.0015”
Crankshaft/Rod Bearing Clearance		0.0016-0.0025”
Crankshaft Thrust Runout (max)		0.0043”
Crankshaft Main/Rod Journals (Bearing Surfaces)		0.0012”
Valve Guide Inside Diameter		0.2165-0.2170”
Valve Guide/Stem Clearance (max)	(Int) (Exh)	0.0015” 0.0022”
Valve Face Width		0.0197”
Valve Clearance - Cold (59°-77° F)	(Int) (Exh - Non-Turbo) (Exh - Turbo)	0.0039-0.0078” 0.0078-0.0118” 0.0118-0.0157”
Valve Seat Contact Width	(Int/Exh)	0.0354-0.0433”
Valve Stem Diameter	(Int) (Exh)	0.2155-0.2161” 0.2147-0.2153”

Crankshaft Runout/ Repair Specifications (2-Stroke)

To use the specifications, first refer to the drawing; then find the letter indicating the specification and refer to the chart below the illustration. Be sure to note the proper engine row.

■NOTE: The proper location for checking crankshaft runout is the very edge of the straight portion of the shaft where the oil seal makes contact. From the illustration, note that three check points are called out: at either end, out on the taper as shown, and also on the center bearing race. The crankshaft is still supported on the outer bearings using V blocks.



728-144A

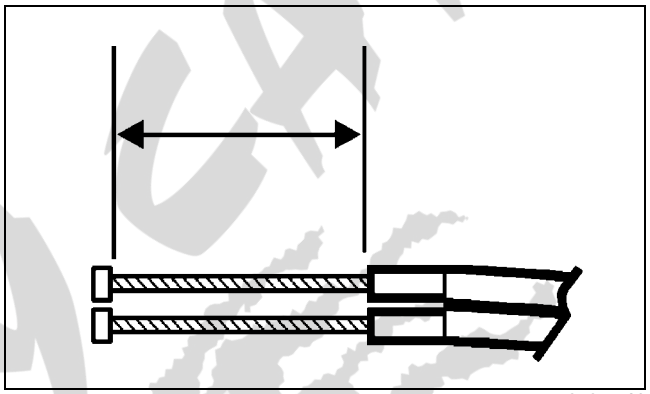
Engine	A ± 0.006	B ± 0.006	C ± 0.015 (except 570)	G	Runout D and F Point ± 0.002	
500 cc	4.515”	2.618”	4.465”	1.062”	D 0.196”	F 0.196”
570 cc	4.70”	2.45”	4.320”	0.945”	D 1.181”	F 0.590”
800 cc	4.751”	2.519”	4.645”	1.181”	D 0.196”	F 0.196”

■NOTE: Measure in from the shaft end the specified amount when checking runout at points D and F. When checking runout in the center, place indicator on center of bearing as shown at point E. Maximum runout at any of the three measuring points is ± 0.002”.

Arctic Power Valve (APV) System Specifications (800 cc)

VALVE POSITION	CYCLE RPM
Mid-Open Full-Open	67-7500 (Low/High Alt) 77-8500 (Low/High Alt)

APV CABLE LENGTH	
CENTER ± 0.039"	1.437"



0735-516

Carburetor Specifications (570 cc)

TYPE	MAIN JET	NEEDLE JET	JET NEEDLE	PILOT JET	CUT-AWAY
VM-34	220	P-4M (961)	6CE25-4	40	3.0

PILOT AIR SCREW (TURNS OUT)	FLOAT HEIGHT (mm)
1 1/2	22-24

■NOTE: The above specifications are production calibrations. For high altitude carburetion and drive system settings, refer to the jet chart on the snowmobile belt guard. For optional tuning components, see the Quick Reference Guide.

Electrical Specifications

Component	Test Value	+ Test Connections -	
Spark Plug Cap	4000-6000 ohms	cap end	cap end
Oil Level Sensor	Less than 1 ohm (float end down)	terminal	terminal
Ignition Switch	Less than 1 ohm (key in OFF position)	terminal	terminal
570 cc (Normally Open Ignition)			
Ignition Coil (Primary) (Secondary)	0.26-0.35 ohm 6800-10,200 ohms	orange high tension wire	black/white high tension wire
Charge Coil (1)	12-18 ohms	brown/white	green/red
Charge Coil (2)	12-18 ohms	black/red	green/red
Ignition Timing Sensor	148-222 ohms	green/white	brown/green
Lighting Coil	0.12-0.18 ohm	yellow	yellow
Voltage Regulator/Rectifier*	10-15 DC Volts 11-14 AC Volts	red/blue yellow	brown brown
500 cc (Normally Open Ignition)			
Ignition Coil (Primary) (Secondary)	0.24-0.36 ohm 6800-10,200 ohms	orange/black high tension wire	orange/red high tension wire
Charge Coil (1)	8.8-13.2 ohms	black/red	green/red
Charge Coil (2)	8.8-13.2 ohms	brown/white	green/red
Lighting Coil	0.08-0.12 ohm	yellow	yellow
Ignition Timing Sensor	80.8-121 ohms	green/white	brown/green
Fuel Injector	10-14 ohms	terminal	terminal
Injection Coil	15.2-22.8 ohms	blue/white	blue/white
Fuel Pump Coil	1.52-2.28 ohms	orange	orange
Chassis Control Unit*	10-15 DC Volts	red/blue (low power) red/black (high power)	black (low power) black (high power)
800 cc (Normally Open Ignition)			
Ignition Coil (Primary) (Secondary)	0.24-0.36 ohm 5040-7560 ohms	black/white high tension wire	white/blue high tension wire
Charge Coil (1)	8.8-13.2 ohms	black/red	green/red
Charge Coil (2)	8.8-13.2 ohms	brown/white	green/red
Lighting Coil	0.08-0.12 ohm	yellow	yellow
Ignition Timing Sensor (1)	148-222 ohms	green/white	brown/green
Ignition Timing Sensor (2)	148-222 ohms	green/white	brown/green
Fuel Injector	10-14 ohms	terminal	terminal
Injection Coil	15.2-22.8 ohms	blue/white	blue/white
Fuel Pump Coil	1.52-2.28 ohms	orange	orange
Servomotor	12 DC Volts	red/black (counterclockwise) black/red (clockwise)	black/red (counterclockwise) red/black (clockwise)
Voltage Regulator/Rectifier*	10-15 DC Volts 11-14 AC Volts	red/blue yellow	brown brown
1100 cc (Normally Closed Ignition)			
Magneto Coil (three tests)	0.2-0.4 ohm	yellow	yellow
Ignition Coil (1)	1.4 ohms	red/green	gray/green
Ignition Coil (2)	1.4 ohms	red/green	brown/green
Fuel Injector	9-12 ohms (non-turbo) 10.5-13 ohms (turbo)	lead lead	lead lead
Crankshaft Position Sensor	173-211 ohms	blue/white	green/white
Injection Coil	3.6 ohms	black/yellow	black
Voltage Regulator/Rectifier*	12-14.5 DC Volts	terminal	terminal
Magneto Coil (no load) (three tests)	36-44 AC Volts	yellow	yellow

* Harness plugged in

The main harness connectors must be unplugged (except on the primary coil and regulator/rectifier or CCU tests), the spark plugs removed and grounded (2-stroke), and by pulling the recoil starter rope briskly.

■**NOTE: Lighting coil output is unregulated voltage.**

⚠ WARNING

Most voltages generated by the ignition system are sufficient to interrupt pacemakers! All technicians, especially those using pacemakers, must avoid contact with all electrical connections when pulling the recoil starter rope or after the engine has been started.

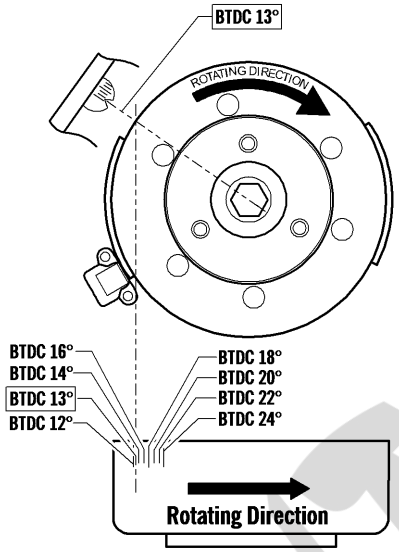
Ignition Timing Specifications (2-Stroke)

■NOTE: Ignition timing shown with engine warm. Ignition timing is not adjustable.

500 cc

BTDC - 13° @ 2000 RPM - 0.040"

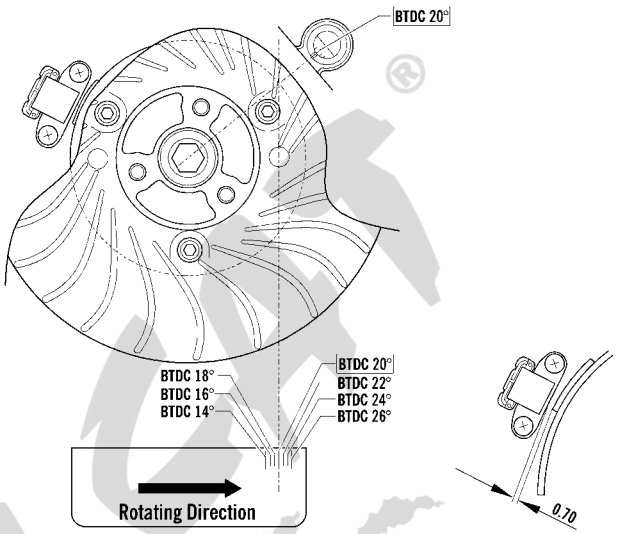
For timing verification, use a dial indicator and scribe a mark on the flywheel for 13° BTDC.



0744-905

570 cc

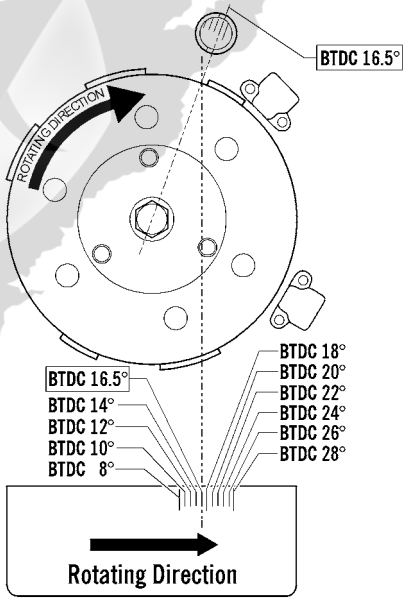
BTDC - 20° @ 2000 RPM - 0.099"



0742-217

800 cc

BTDC - 16.5° @ 2000 RPM - 0.072"



0746-516

1

Drive System Specifications

ACT DRIVE

Model	Altitude	Drive Clutch Spring	Cam Arm	Driven Clutch Spring	Torque Bracket	Drive Belt	Engagement RPM	Peak RPM	Transfer Gear	Input Gear	Ratio
Bearcat 570	0-5000	Black/White	73.0g	Orange	46°/40°	0627-067	27-2900	66-6800	66/34T	54T	54/66
Bearcat 570 XT	0-5000	Black/White	71.5g	Orange	46°/40°	0627-046	27-2900	66-6800	66/34T	54T	54/66
Bearcat Z1 XT/GS	0-5000	Black/White	66.0g	Orange	36°	0627-073	28-3000	82-8400	66/34T	54T	54/66
Bearcat Z1 XT/LTD	0-5000	Black/White	66.0g	Orange	36°	0627-047	28-3000	82-8400	66/34T	54T	54/66
F5	0-5000	Black/Red	57.5g	White	42°/36°	0627-067	33-3500	78-8000	66/34T	54T	54/66
F570	0-5000	Black/Gold	73.0g	Orange	44°/40°	0627-067	31-3300	66-6800	63/34T	57T	57/63
T570	0-5000	Black/Gold	73.0g	Orange	44°/40°	0627-067	31-3300	66-6800	66/34T	54T	54/66
TZ1/LXR	0-5000	Black/Gold	60.0g	Orange	48°/40°	0627-069	28-3000	85-8600	63/34T	57T	57/63
TZ1 Turbo LXR	0-5000	Yellow/White	82.0g	Orange	46°/38°	0627-073	38-4000	76-7800	54/34T	66T	66/54

CHAIN DRIVE

Model	Altitude	Drive Clutch Spring	Cam Arm	Driven Clutch Spring	Torque Bracket	Drive Belt	Engagement RPM	Peak RPM	Top Gear	Bottom Gear	Chain Pitch
F 800/LXR/Sno Pro/LTD/RR	0-5000	Green	73.5g	Black/Blue	44°/40°	0627-083	42-4600	81-8200	21T	38T	84
F 1100 LXR/Sno Pro/LTD	0-5000	Black/Gold	60g	Black/Blue	42°/36°	0627-081	28-3000	85-8600	22T	48T	90
F 1100 Turbo LXR/Sno Pro LTD/RR	0-5000	Yellow/White	85g	Black/Blue	44°/40°	0627-082	38-4000	76-7800	22T	37T	84
M 800/Sno Pro/LTD/HCR	6-9000	Yellow/White	70g	Blue	36°	0627-084	42-4600	81-8200	21T	49T	90
M 1100	6-9000	Black/Gold	52g	Black/Blue	42°/36°	0627-081	28-3000	85-8600	21T	49T	90
M 1100 Turbo 153/Sno Pro/ LTD/HCR	6-9000	Yellow/White	85g	Black/Blue	42°/40°	0627-082	38-4000	76-7800	21T	49T	90
XF 800 LXR/Cross-Tour/ Sno Pro/LTD	0-3000	Yellow/White	73.5g	Blue	42°/40°	0627-083	42-4600	81-8200	22T	48T	90
XF 800 High Country/LTD	6-9000	Yellow/White	70g	Black/Blue	36°	0627-084	42-4600	81-8200	22T	48T	90
XF 1100 LXR/Cross-Tour/ Sno Pro/LTD	0-3000	Black/Gold	60g	Black/Blue	42°/36°	0627-081	28-3000	85-8600	21T	49T	90
XF 1100 Turbo LXR/ Cross-Tour/Sno Pro/LTD	0-3000	Yellow/White	85g	Black/Blue	44°/40°	0627-082	38-4000	76-7800	21T	38T	84
XF 1100 Turbo High Country/ LTD	6-9000	Yellow/White	85g	Black/Blue	42°/40°	0627-082	38-4000	76-7800	22T	48T	90

Drive Clutch/Driven Clutch-Related Specifications

ALIGNMENT BAR			
OFFSET P/N	CENTER-TO-CENTER	OFFSET	FLOAT
0644-496 (ACT Drive)	11.50" (2-Stroke) 10.20" (4-Stroke)	1.507"	None
0644-588 (Chain Drive)	12.10" (2-Stroke) 11.50" (4-Stroke)	1.450"	None

Drive System Components

A list of Drive System components that are available through the Arctic Cat Service Parts Department can be found in the Quick Reference Guide. This information will be useful when doing any fine-tuning on the drive system.

Drive Belt Dimensions

BELT P/N	LENGTH	WIDTH
*0627-046	45.998 ± .178 inch	1.448 inch
*0627-047	43.547 ± .178 inch	1.448 inch
**0627-067	45.394 ± .178 inch	1.406 inch
**0627-069	42.953 ± .178 inch	1.406 inch
**0627-073	43.547 ± .178 inch	1.448 inch
*0627-081	46.378 ± .178 inch	1.448 inch
***0627-082	46.259 ± .178 inch	1.448 inch
**0627-083	47.519 ± .178 inch	1.448 inch
***0627-084	47.519 ± .178 inch	1.448 inch

* High Performance

** Improved Compression Resistance; Improved Heat Resistance

*** Best Compression Resistance; Best Heat Resistance

Gear Case Performance Calibrations

Drive Sprocket	Gear Ratio		Engine RPM														
			6200	6400	6600	6800	7000	7200	7400	7600	7800	8000	8200	8400	8600	8800	9000
			Vehicle Speed (mph)														
9 Tooth (2.52" pitch)	66	54	91	94	97	100	103	106	109	112	114	117	120	123	126	129	132
	65	55	88	91	94	96	99	102	105	108	111	113	116	119	122	125	128
	64	56	85	88	91	93	96	99	102	104	107	110	112	115	118	121	123
	63	57	82	85	88	90	93	96	98	101	103	106	109	111	114	117	119
	62	58	80	82	85	87	90	92	95	98	100	103	105	108	110	113	115
	61	59	77	79	82	84	87	89	92	94	97	99	102	104	107	109	112
	60	60	74	77	79	82	84	86	89	91	94	96	98	101	103	106	108
	59	61	72	74	77	79	81	84	86	88	91	93	95	98	100	102	104
	58	62	70	72	74	76	79	81	83	85	88	90	92	94	97	99	101
	57	63	67	70	72	74	76	78	80	83	85	87	89	91	93	96	98
	56	64	65	67	69	71	74	76	78	80	82	84	86	88	90	92	95
	55	65	63	65	67	69	71	73	75	77	79	81	83	85	87	89	91
	54	66	61	63	65	67	69	71	73	75	77	79	81	83	84	86	88
10 Tooth (2.52" pitch)	66	54	101	104	108	111	114	117	121	124	127	130	134	137	140	143	147
	65	55	98	101	104	107	110	113	117	120	123	126	129	132	136	139	142
	64	56	95	98	101	104	107	110	113	116	119	122	125	128	131	134	137
	63	57	91	94	97	100	103	106	109	112	115	118	121	124	127	130	133
	62	58	88	91	94	97	100	103	106	108	111	114	117	120	123	125	128
	61	59	85	88	91	94	97	99	102	105	108	110	113	116	119	121	124
	60	60	83	85	88	91	93	96	99	101	104	107	109	112	115	117	120
	59	61	80	83	85	88	90	93	95	98	101	103	106	108	111	114	116
	58	62	77	80	82	85	87	90	92	95	97	100	102	105	107	110	112
	57	63	75	77	80	82	84	87	89	92	94	97	99	101	104	106	109
	56	64	72	75	77	79	82	84	86	89	91	93	96	98	100	103	105
	55	65	70	72	74	77	79	81	84	86	88	90	93	95	97	99	102
	54	66	68	70	72	74	76	79	81	83	85	87	89	92	94	96	98
8 Tooth (3.0" pitch)	66	54	96	99	102	106	109	112	115	118	121	124	127	130	134	137	140
	65	55	93	96	99	102	105	108	111	114	117	120	123	126	129	132	135
	64	56	90	93	96	99	102	105	107	110	113	116	119	122	125	128	131
	63	57	87	90	93	95	98	101	104	107	110	112	115	118	121	124	126
	62	58	84	87	90	92	95	98	100	103	106	109	111	114	117	119	122
	61	59	81	84	87	89	92	95	97	100	102	105	108	110	113	116	118
	60	60	79	81	84	86	89	91	94	97	99	102	104	107	109	112	114
	59	61	76	79	81	84	86	88	91	93	96	98	101	103	106	108	111
	58	62	74	76	78	81	83	86	88	90	93	95	97	100	102	105	107
	57	63	71	74	76	78	80	83	85	87	90	92	94	97	99	101	103
	56	64	69	71	73	76	78	80	82	84	87	89	91	93	96	98	100
	55	65	67	69	71	73	75	77	80	82	84	86	88	90	92	95	97
	54	66	64	67	69	71	73	75	77	79	81	83	85	87	89	91	94

Shaded rows indicate existing tooled gear ratios

Chain Case Performance Calibrations

DRIVE SPROCKET	CHAIN SPROCKETS		RATIO	CHAIN PITCH	ENGINE RPM								
					7200	7400	7600	7800	8000	8200	8400	8600	8800
					VEHICLE SPEED								
10 TOOTH (2.52 PITCH)	20	49	0.408	90	77	79	81	83	85	87	90	92	94
	21	49	0.429	90	81	83	85	87	90	92	94	96	99
	22	48	0.458	90	86	89	91	93	96	98	101	103	105
	21	41	0.512	86	96	99	102	104	107	110	112	115	118
	20	38	0.526	84	99	102	104	107	110	113	115	118	121
	21	38	0.553	84	104	107	110	113	115	118	121	124	127
	20	35	0.571	82	107	110	113	116	119	122	125	128	131
	23	40	0.575	86	108	111	114	117	120	123	126	129	132
	22	37	0.595	84	112	115	118	121	124	127	130	134	137
	23	36	0.639	84	120	124	127	130	134	137	140	144	147
	24	35	0.686	84	129	133	136	140	143	147	150	154	158
9 TOOTH (2.86 PITCH)	20	49	0.408	90	78	81	83	85	87	89	91	94	96
	21	49	0.429	90	82	85	87	89	91	94	96	98	101
	22	48	0.458	90	88	90	93	95	98	100	103	105	108
	21	41	0.512	86	98	101	104	106	109	112	115	117	120
	20	38	0.526	84	101	104	107	109	112	115	118	121	123
	21	38	0.553	84	106	109	112	115	118	121	124	127	130
	20	35	0.571	82	110	113	116	119	122	125	128	131	134
	23	40	0.575	86	110	113	116	120	123	126	129	132	135
	22	37	0.595	84	114	117	120	124	127	130	133	136	139
	23	36	0.639	84	123	126	129	133	136	140	143	146	150
	24	35	0.686	84	132	135	139	143	146	150	154	157	161
8 TOOTH (3.0 PITCH)	20	49	0.408	90	72	74	76	78	80	82	84	86	88
	21	49	0.429	90	76	78	80	82	84	86	88	90	92
	22	48	0.458	90	81	83	85	88	90	92	94	97	99
	21	41	0.512	86	90	93	95	98	100	103	105	108	110
	20	38	0.526	84	93	95	98	101	103	106	108	111	113
	21	38	0.553	84	97	100	103	106	108	111	114	116	119
	20	35	0.571	82	101	104	106	109	112	115	118	120	123
	23	40	0.575	86	101	104	107	110	113	115	118	121	124
	22	37	0.595	84	105	108	111	114	116	119	122	125	128
	23	36	0.639	84	113	116	119	122	125	128	131	135	138
	24	35	0.686	84	121	124	128	131	134	138	141	144	148

Suspension Specifications

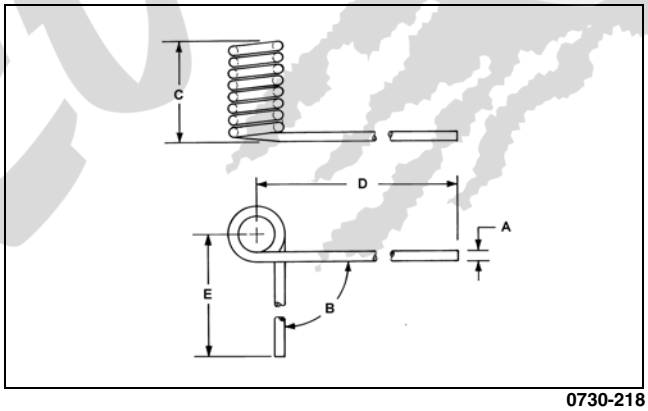
SWAY BARS

Model	Diameter
F5/F570/T570/TZ1	13.5 mm
F 800/XF 800	11.1 mm
F 1100/XF 1100	12.7 mm

SPRINGS

SKI SHOCK (*Active, **Total)					
Model	**Wire Diameter**	**Free Length**	**Rate**	**Coils**	**Tab**
F5/T570/F570	0.331”	11.25”	90 lb/in.	6.2*/8.2**	NO
F 800 LXR/XF 800 LXR	0.312”	13.00”	95 lb/in.	10	NO
Bearcat 570 XT/Z1 XT	0.331”	9.50”	140 lb/in.	7.5	YES
TZ1	0.343”	11.20”	110 lb/in.	9.0	NO
F 1100 LXR/M (STD)/ XF 1100 LXR	0.331”	13.00”	120 lb/in.	9.6	NO
Bearcat 570	0.331”	11.25”	120 lb/in.	9.5	NO
TZ1 Turbo LXR	0.359”	13.00”	145 lb/in.	10.2	NO
FRONT ARM					
Model	**Wire Diameter**	**Free Length**	**Rate**	**Coils**	**Tab**
Bearcat XT	0.343”	9.5”	140 lb/in.	9.7	YES
Bearcat 570/F570/F5/ T570/TZ1/M 800	0.295”	7.75”	110 lb/in.	7.0	NO
F 800/XF 800/F 1100 Turbo/XF 1100/LXR	0.312”	8.25”	90/250 lb/in.	9.8	NO
REAR ARM					
Model	**Wire Diameter**	**Free Length**	**Rate**	**Coils**	**Tab**
M/XF LXR	0.375”	13.00”	175 lb/in.	10.5	NO

REAR ARM (See Illustration Below)					
Model	**Wire Diameter (A)**	**Angle (B)**	**Coil Width (C)**	**Coils**	**Length (D)**
F570/F5	.405"	85°	3.65"	6.75	18.50”
Bearcat 570/T570/TZ1 LXR	.405"	70°	4.00"	6.75	18.50”
F 800/F 1100	.405"	90°	3.65"	6.75	18.50”
Bearcat XT	.437"	75°	4.50"	7.75	18.50”



0730-218

SHOCK ABSORBERS

Below is a list of shock absorbers used on the front and rear suspensions of Arctic Cat snowmobiles. If replacing a shock absorber, always select a shock absorber with the same length, both collapsed and extended.

SKI SHOCK				
Model	**Collapsed Length**	**Extended Length**	**Stroke**	**Piston Depth**
Bearcat 570/F-Series/T570	11.55”	17.50”	5.95”	N/A
Bearcat XT	10.67”	16.00”	5.33”	N/A
TZ1/LXR/Turbo	11.53”	16.72”	5.19”	1.50”
XF (STD)	12.80”	18.70”	5.90”	7.72”
F Sno Pro/XF Sno Pro	12.80”	18.40”	5.60”	7.72”
M (STD)	11.81”	17.90”	6.09”	1.29”
M Sno Pro	12.00”	17.55”	5.55”	6.68”
HCR Turbo	12.30”	17.80”	6.59”	7.36”
F (STD)/F 800 LXR	12.57”	18.36”	5.79”	2.31”
FRONT ARM SHOCK				
Model	**Collapsed Length**	**Extended Length**	**Stroke**	**Piston Depth**
Bearcat XT	8.42”	12.49”	4.07”	N/A
Bearcat 570/T-Series	8.09”	11.78”	3.69”	N/A
F-Series	8.48”	12.53”	4.05”	N/A
F 800/F 1100/M 800 HCR/XF 800/XF 1100	8.17”	11.76”	3.59”	0.58”
M 800/M 1100	8.11”	11.25”	3.14”	0.65”
REAR ARM SHOCK				
Model	**Collapsed Length**	**Extended Length**	**Stroke**	**Piston Depth**
Bearcat 570/T-Series	10.90”	16.69”	5.78”	N/A
Bearcat XT	10.89”	16.67”	5.78”	N/A
F5	10.00”	15.00”	4.99”	N/A
F570	9.92”	15.00”	4.57”	N/A
F Sno Pro	10.13”	14.53”	4.40”	5.70”
F 800 LXR/F 1100/F 1100 Turbo	9.88”	14.37”	4.48”	0.90”
M 800 HCR/M 1100 Turbo HCR	10.90”	16.00”	5.10”	5.95”
M 800 Sno Pro/M 1100 Turbo/M 1100 Turbo Sno Pro	11.10”	16.00”	4.90”	5.75”
XF LXR	10.82”	16.01”	5.19”	1.10”
XF Sno Pro/XF HC	11.10”	16.00”	5.10”	5.95”

Track Specifications

Model	Length	Lug Height	Track Tension	
			Setup	After Break-in
Bearcat 570	151"	1.25"	1.75-2"	2-2.25"
Bearcat 570 XT/ Bearcat Z1 XT	154"	1.38"	1.75-2"	1.75-2.00"
Bearcat Z1 XT GS	156"	1.25"	1.50-1.75"	1.50-1.75"
F-Series/F LXR	128"	1"	1.75-2"	2-2.25"
F Sno Pro	128"	1.25"	1.75-2"	2-2.25"
M Standard	153"/162"	2.25"	2-2.25"	2-2.25"
M Sno Pro/ HCR	153"/162"	2.6"	2-2.6"	2-2.6"
T570/TZ1 LXR	144"	1"	1.75-2"	2-2.25"
TZ1 Turbo LXR	144"	1.25"	1.75-2"	2-2.25"
XF	141"	1.25"	1.75-2"	2-2.25"
XF HC	141"	2.25"	1.75-2"	2-2.25"
XF Sno Pro	141"	1.50"	1.75-2"	2-2.25"

■NOTE: All tracks are 15" wide except for Bearcat XT (20"). All models at 20 lb except M (15 lb), Bearcat 570/Z1 XT (10 lb), and Bearcat GS (20 lb).

Torque Specifications

■NOTE: Torque specifications have the following tolerances:

Torque (ft-lb)	Tolerance
0-15	±20%
16-39	±15%
40+	±10%

DRIVE SYSTEM		
Bearcat/F-Series/T-Series		
Item	**Secured to**	**Torque ft-lb**
Drive Clutch ***	Engine	51
Drive Clutch Cover	Movable Sheave	120 in.-lb
Cam Arm Pin Lock Nut	Cam Arm Pin	11
Cam Arm Set Screw*	Cam Arm	19 in.-lb
Drive Clutch*	Ring Gear	22
Driven Clutch	Input Shaft	32
Movable Sheave	Torque Bracket	72 in.-lb
Gear Case	Chassis	20
Gear Case Cover	Gear Case	12.5
Gear Case Drain/Fill Plug	Gear Case	15
Shift Actuator	Gear Case	41 in.-lb
Output Shaft	Driveshaft	70
Brake Disc	Driveshaft	120
Brake Caliper	Chassis	20
Brakeline	Caliper	10.5
Brakeline	Master Cylinder	21
Speedometer Sensor Bracket	Brake Caliper	17
F/M/XF		
Drive Clutch***	Engine	51
Drive Clutch Cover	Movable Sheave	120 in.-lb
Cam Arm Pin Lock Nut	Cam Arm Pin	11
Cam Arm Set Screw	Cam Arm	19 in.-lb
Driven Clutch	Driven Shaft	20
Top Sprocket	Driven Shaft	25
Movable Sheave	Torque Bracket	72 in.-lb
Chain Case (Cap Screw)	Chassis	96 in.-lb
Chain Case (Torx-Head Screw)	Chassis	12
Chain Case Cover	Chain Case	12
Shift Actuator (1100 cc)	Chain Case Cover	36 in.-lb
Brake Caliper	Chassis	25
Outside Caliper Housing	Inside Caliper Housing	25
Brakeline	Caliper	25
Brakeline	Master Cylinder	25
Brake Caliper	Shield Cover	96 in.-lb
Adapter Sleeve Ring Nut	Driven Shaft	50

STEERING/FRONT SUSPENSION/CHASSIS		
F/M/XF		
Item	**Secured to**	**Torque ft-lb**
Ski	Spindle	35
Ski	Wearbar	96 in.-lb
Ski	Ski Handle	54 in.-lb
Handlebar Adjuster Block (Standard)	Post	15
Handlebar Adjuster (Sno Pro)	Post	15
Steering Support	Mounting Block	96 in.-lb
Steering Post (F/XF/M 1100)	Steering Stop Bracket	43
Steering Tie Rod	Steering Post	35
Steering Tie Rod	Steering Arm	20
Steering Post Cap	Riser Block	120 in.-lb
Steering Post (M 800 SP/HCR)	Mounting Bracket	20
Tie Rod	Steering Post	20
Tie Rod	Steering Tie Rod Bracket	20
Tie Rod	Spindle Arm	32
Steering Support	Spar	12
Steering Support	Upper Console	30 in.-lb
Steering Arm	Chassis	96 in.-lb
A-Arm (Upper)	Chassis	23
A-Arm (Lower)	Chassis (Front)	55
A-Arm (Lower)	Chassis (Rear)	45
A-Arm	Spindle	45
Shock Absorber	Spindle	32
Shock Absorber	Chassis	32
Sway Bar Link	A-Arm/Sway Bar Link	23
Sway Bar Mounting Bracket	Chassis	96 in.-lb
Bearcat/F-Series/T-Series		
Ski	Spindle	32
Ski	Wearbar	108 in.-lb
Ski	Ski Handle	54 in.-lb
Shock Mount Frame	Suspension Mounting Bracket	96 in.-lb
Steering Post*	Suspension Mounting Bracket	35
Steering Tie Rod	Steering Post Arm	35
Tie Rod	Spindle	30
Steering Arm	Suspension Mounting Bracket	20
Drag Link**	Steering Arm	12
Tie Rod	Drag Link	35
Tie Rod End	Drag Link	35
A-Arm	Suspension Mounting Bracket	32
A-Arm (Upper)	Spindle	32
Lower A-Arm Retainer**	Spindle	13
Spindle Arm**	Spindle	30
Sway Bar Mounting Bracket	Suspension Mounting Bracket	120 in.-lb
Shock Absorber	Shock Mounting Frame	32
Upper Bearing Bracket	Support Plate	96 in.-lb
Shock Absorber	Spindle	32
Rear Bumper	Chassis	96 in.-lb
Rear Rack (BC XT)	Tunnel	20
Front Bumper (BC XT)	Suspension Mounting Bracket	32
Front Bumper (BC XT)	Shock Mounting Bracket	120 in.-lb

* w/Green Loctite #609
** w/Blue Loctite #243
*** w/Oil

REAR SUSPENSION		
Bearcat/T-Series		
Item	**Secured to**	**Torque ft-lb**
Wear Strip	Rail	50 in.-lb
End Cap	Rail	80 in.-lb
Mounting Block	Rail	20
Idler Arm	Mounting Block	20
Rear Arm	Rail	40
Rear Arm	Idler Arm	40
Front Arm	Rail	40
Skid Frame	Tunnel	40
Limiter Strap	Rail Support	72 in.-lb
Spring Slide	Rail	20
Front Arm Crosstube	Rail	40
Pivot Arm	Idler Arm	20
Idler Wheel (XT)	Rear Axle	20
Rear Shock (XT)	Rear Shock Pivot	40
Front Shock (XT)	Shock Bracket	40
Rear Shock (XT)	Idler Arm	40
Articulating Skid Frame (XT)	Rail	20
Crosstube (XT)	Rail	20
Front Shock (XT)	Front Arm	40
Spring Tension Block (XT)	Rail	20
Rear Axle (BC 570/T-Series)	Rail	20
Limiter Strap (BC 570/T-Series)	Front Arm	72 in.-lb
Shock Pivot (BC 570/T-Series)	Front Arm	20
Front Shock Axle (BC 570/T-Series)	Rail	40
Track Adjuster Block (BC 570/T-Series)	Rail	120 in.-lb
Rail Support (BC 570/T-Series)	Rail	20
F-SERIES		
Wear Strip	Rail	50 in.-lb
End Cap	Rail	80 in.-lb
Mounting Block	Rail	20
Idler Arm	Mounting Block	20
Rear Arm	Rail	40
Rear Arm	Idler Arm	40
Front Arm	Rail	40
Skid Frame	Tunnel	40
Limiter Strap	Rail Support	72 in.-lb
Spring Slide	Rail	20
Rear Axle	Rail	20
Mounting Block	Idler Arm	20
Shock Pivot	Front Arm	20
Pivot Arm	Idler Arm	20
Front Shock Axle	Rail	40
Limiter Strap	Front Arm	72 in.-lb
Track Adjuster Block	Rail	120 in.-lb
Rail Support	Rail	20
M/XF		
Wear Strip	Rail	50 in.-lb
End Cap	Rail	80 in.-lb
Mounting Block	Rail	20
Rear Wheel Axle	Rail	34
Rear Arm	Rail	20
Idler Arm	Rear Arm	40
Front Shock	Rail	50
Rear Shock	Front Arm/Idler Arm	30
Rail Support	Rail	20
Front Shock	Front Arm	40
Limiter Strap	Rail Support	72 in.-lb
Rail (M Turbo/HCR)	Rail Brace	12
Rear Idler Wheel	Rear Idler Wheel	80 in.-lb
Rear Shock Link	Front Arm/Idler Arm	30
Front Arm	Rail	40
Skid Frame	Tunnel	40

REAR SUSPENSION		
F		
Item	**Secured to**	**Torque ft-lb**
Wear Strip	Rail	50 in.-lb
End Cap	Rail	80 in.-lb
Mounting Block	Rail	20
Rear Arm	Rail	20
Rear Arm	Idler Arm	40
Spring Slide	Rail	20
Front Arm	Rail	40
Coupler Block Axle	Rail	40
Limiter Strap	Rail Support	72 in.-lb
Rear Idler Wheel	Rear Idler Wheel	80 in.-lb
Rear Wheel Axle	Rail	34
Skid Frame	Tunnel	34
Front Shock	Rail	40
Rail Support	Rail	20
Limiter Strap	Front Arm	72 in.-lb

Torque Conversions

ft-lb	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m
1	1.4	26	35.4	51	69.4	76	103.4
2	2.7	27	36.7	52	70.7	77	104.7
3	4.1	28	38.1	53	72.1	78	106.1
4	5.4	29	39.4	54	73.4	79	107.4
5	6.8	30	40.8	55	74.8	80	108.8
6	8.2	31	42.2	56	76.2	81	110.2
7	9.5	32	43.5	57	77.5	82	111.5
8	10.9	33	44.9	58	78.9	83	112.9
9	12.2	34	46.2	59	80.2	84	114.2
10	13.6	35	47.6	60	81.6	85	115.6
11	15	36	49	61	83	86	117
12	16.3	37	50.3	62	84.3	87	118.3
13	17.7	38	51.7	63	85.7	88	119.7
14	19	39	53	64	87	89	121
15	20.4	40	54.4	65	88.4	90	122.4
16	21.8	41	55.8	66	89.8	91	123.8
17	23.1	42	57.1	67	91.1	92	125.1
18	24.5	43	58.5	68	92.5	93	126.5
19	25.8	44	59.8	69	93.8	94	127.8
20	27.2	45	61.2	70	95.2	95	129.2
21	28.6	46	62.6	71	96.6	96	130.6
22	29.9	47	63.9	72	97.9	97	131.9
23	31.3	48	65.3	73	99.3	98	133.3
24	32.6	49	66.6	74	100.6	99	134.6
25	34	50	68	75	102	100	136

NOTES

SECTION 2 — ENGINE

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Engine Removing/ Installing - Bearcat 570/F570/T570

This engine servicing sub-section has been organized to show a progression for the removing/installing of the Arctic Cat 570 cc (Bearcat 570/F570/T570) engine. For consistency purposes, this sub-section shows a complete and thorough progression; however, for efficiency it may be preferable to remove only those components needing to be addressed. Also, some components may vary from model to model. The technician should use discretion and sound judgment.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this engine section.

Description	p/n
Drive Clutch Bolt Tool	0644-281
Drive Clutch Puller	0744-062
Drive Clutch Spanner Wrench	0644-136
Driven Clutch Puller	0644-469

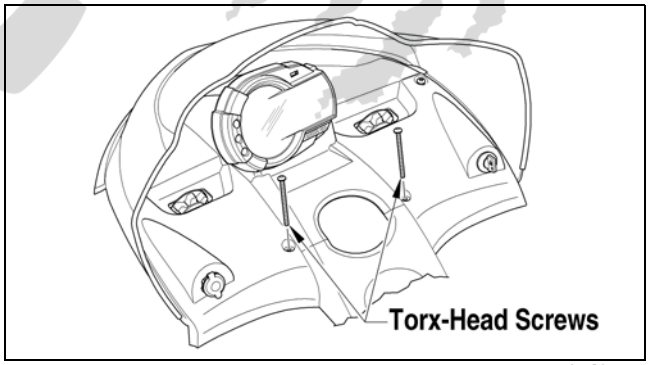
■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

CAUTION

Never attempt to substitute any other drive clutch puller for the recommended puller or severe clutch or crankshaft damage will occur.

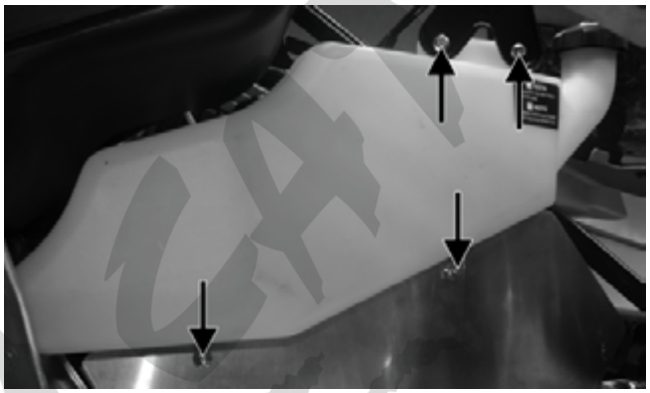
Removing

1. Remove the hood and the left-side and right-side access panels; then remove the torx-head screws securing the console.



0743-777

2. Lift the rear of the console and disconnect the console/main harness plug-in; then remove the console and disconnect the battery.
3. Remove the springs securing the expansion chamber to the exhaust manifold and resonator and remove the expansion chamber; then remove the cap screw, lock nut, and washer securing the resonator to the front upper frame and remove the resonator.
4. On the XT, remove the cap screws and lock nuts securing the oil reservoir to the headlight support bracket and heat shield.

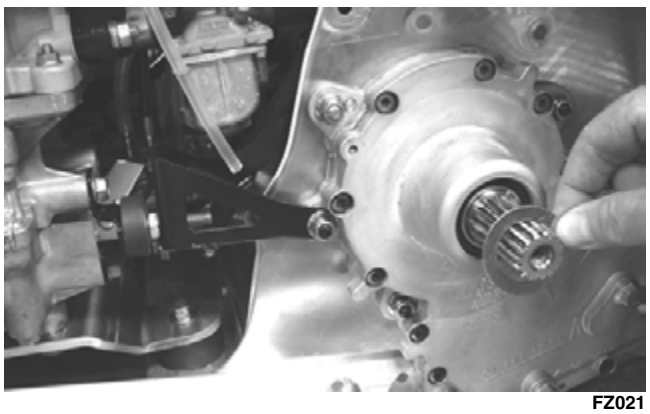


TZ064A

5. Remove the cap screws and lock nuts securing the heat shield to the chassis. Account for the U-nut clip.
6. Remove the cap screws securing the recoil starter. Note the position of the ground wire (for assembling purposes); then move the recoil starter up and out of the way.
7. Remove the two pins securing the belt guard and remove the drive belt; then using Drive Clutch Bolt Tool, remove the cap screw and high-collar washer securing the drive clutch to the crankshaft.
8. Using Drive Clutch Puller and Spanner Wrench, tighten the puller. If the drive clutch will not release, sharply strike the head of the puller. Repeat this step until the clutch releases. Remove the drive clutch and the drive belt. If applicable, account for the two sleeves.

■NOTE: Apply a film of grease to the end of the puller to aid in removal of the drive clutch.

9. Remove the cap screw from the driven clutch and slide the driven clutch off the gear case input shaft. Account for alignment washers (if applicable).



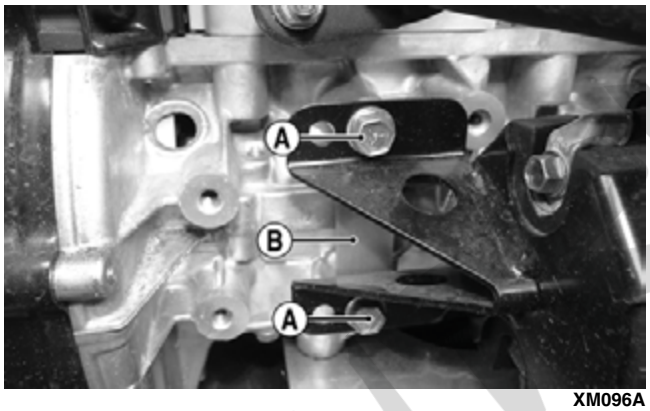
FZ021

10. Remove the nuts and lock washers securing the exhaust manifold to the engine; then remove the manifold and account for the gaskets.



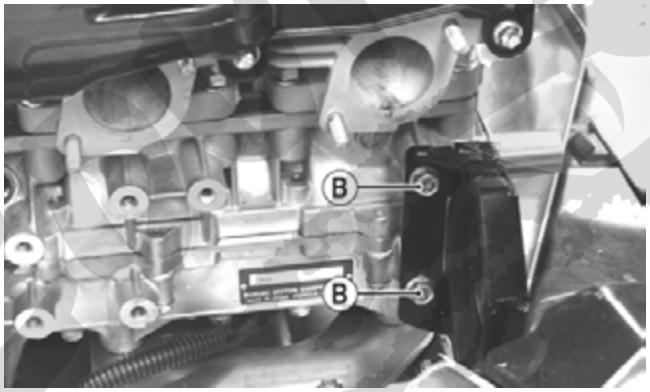
FZ008

11. Remove the ground wire from the starter motor; then remove the two cap screws (A) securing the MAG-side starter motor bracket and shim (B) to the engine. Remove the bracket and starter motor and account for the rubber damper.



XM096A

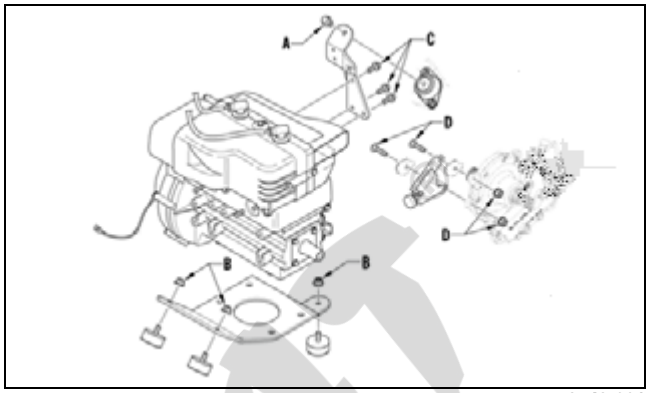
12. Remove the two cap screws (B) securing the PTO-side starter motor bracket to the engine; then remove the bracket and account for the rubber damper.



FZ023A

■NOTE: At this time, route the starter motor ground wire out from the engine plate.

13. Remove the cap screw (A) securing the rear MAG-side engine mounting bracket to the chassis; then remove the three remaining lock nuts (B) securing the engine plate to the chassis.



0743-921

14. Move the engine forward enough to remove the cap screws (C) securing the rear MAG-side engine mounting bracket to the engine; then remove the bracket.

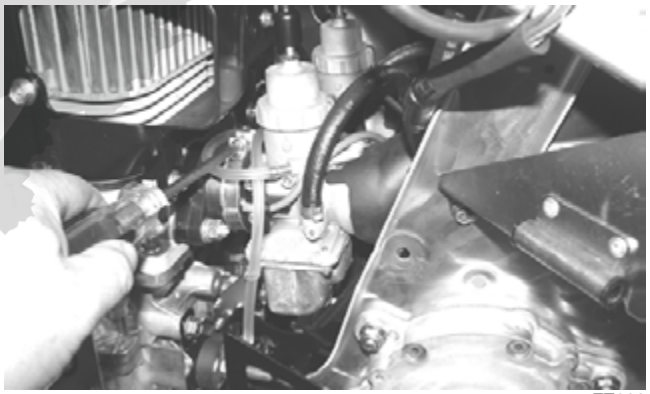
CAUTION

Use care when moving the engine forward not to damage the wiring harness.

15. Remove the lock nuts and cap screws (D) securing the snubber bracket to the chassis; then remove the bracket.

16. Remove the cap screws and lock nuts securing the headlight support bracket to the front upper frame; then remove the bracket and account for the mounting hardware.

17. Loosen the carburetor flange clamps and remove the carburetors from the intake flanges; then remove the clamp and disconnect the impulse line from the crankcase.



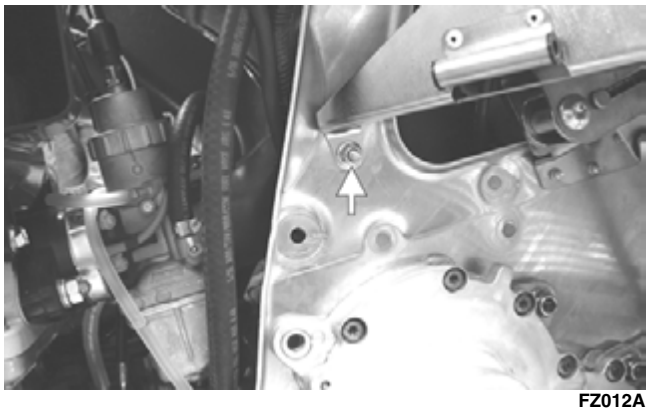
FZ006

CAUTION

After the carburetors have been removed, secure them in an upright position to avoid fuel running out of the vent tubes.

18. Disconnect the oil-injection cable from the oil pump and account for the E-clip and washer; then disconnect the oil supply hoses from the pump and plug the hoses to prevent leakage.

19. Remove the cap screw and lock nut securing the wiring harness clamp to the chassis; then remove the spark plug wires from the spark plugs. Disconnect the coil wire and CDI connectors and route and secure the harness to the engine to avoid damage when removing the engine from the chassis.



FZ012A

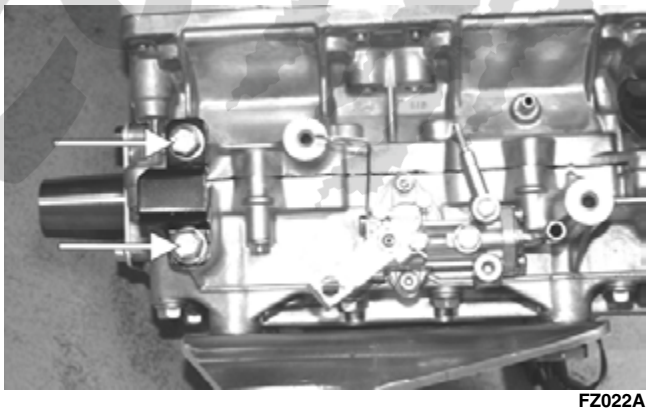
■NOTE: For assembling purposes, note the routing and securing locations of the wiring harness and the routing of the oil hoses and impulse line.

20. Turn the steering all the way to the right; then rotate the engine allowing enough room to lift it up and out of the front of the chassis.



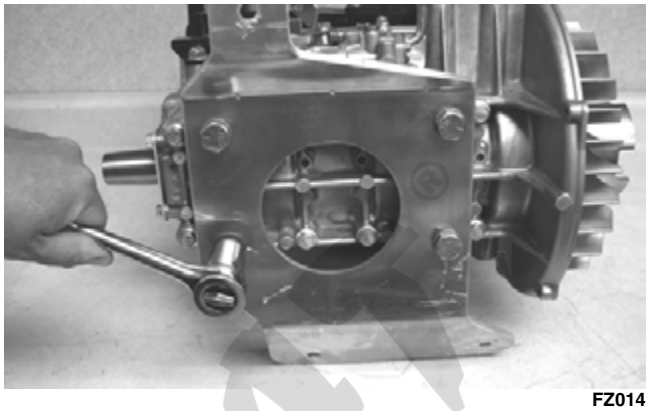
FZ013

21. Remove the two cap screws securing the rear PTO-side crankcase snubber bracket.



FZ022A

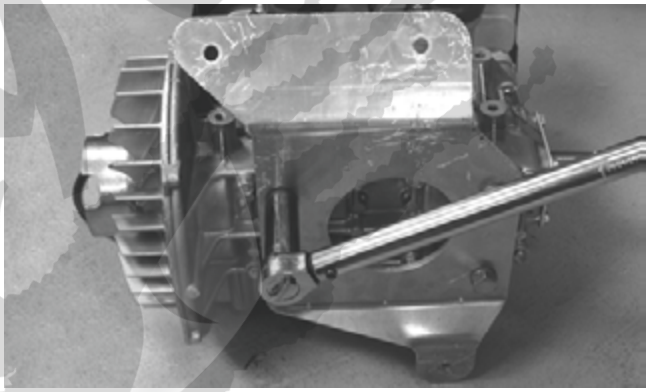
22. Remove the four cap screws securing the engine plate to the engine; then remove the plate.



FZ014

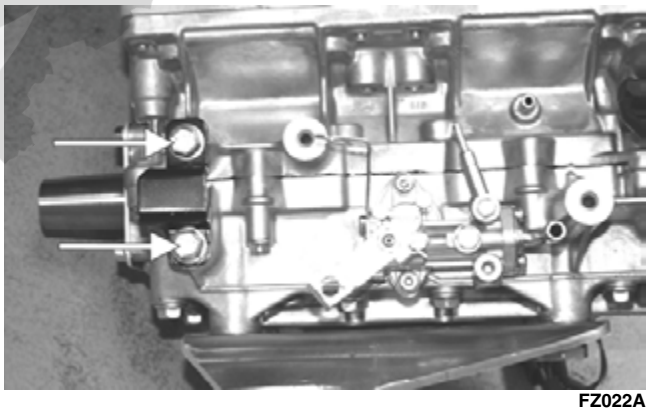
Installing

1. Install the engine plate to the engine with four cap screws. Tighten to 36 ft-lb.



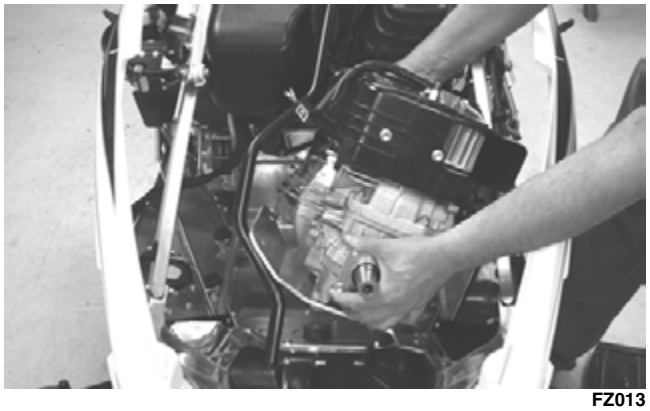
FZ025

2. Install the PTO-side crankcase snubber bracket with two cap screws; then tighten to 20 ft-lb.



FZ022A

3. With the steering turned all the way to the right, install the engine into the chassis and position the engine forward of the mounting locations to access the oil pump and electrical connectors.



FZ013

4. Route the wiring harness as noted during disassembly and connect the plug-ins to the CDI and ignition coil; then connect the main harness plug-in.

■NOTE: Prior to connecting the harness, clean all plug-ins with contact cleaner and apply Dielectric Grease to the connectors.

5. Connect the oil line to the oil-injection pump and secure with the clamp; then with the oil-injection pump cable properly routed, install the cable to the oil-injection pump and secure with the washer and E-clip.

■NOTE: Verify the mark on the control arm is aligned with alignment mark on the oil-injection pump boss in the full-open position. If the marks are not aligned, adjust synchronization by loosening the jam nuts on the adjuster. Rotate the jam nuts/adjuster nut until proper alignment is attained. Tighten jam nuts.

■NOTE: When the cable/linkage adjusting nut is adjusted correctly, the throttle lever will move approximately 1/8 in. before the oil-injection pump arm begins to move.

6. Remove the oil bleed plug from the oil-injection pump. When oil flows from pump free of air bubbles and the hose is full of oil, install the oil bleed plug and tighten.

■NOTE: Place a cloth beneath the oil-injection pump to contain any oil spilled during the bleeding process.

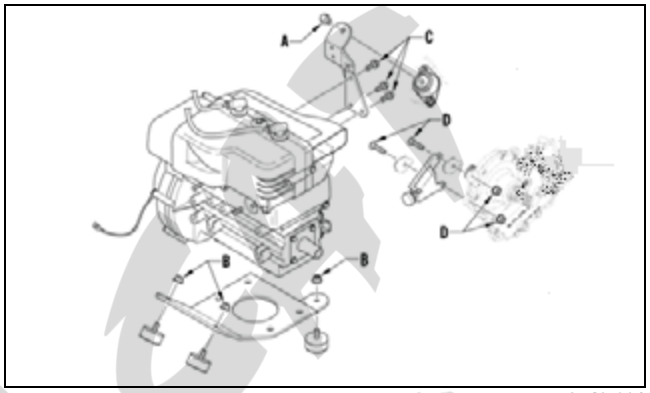
7. With the throttle cable and fuel lines properly routed, install the flange clamps to the intake flanges; then install the carburetors and secure with the clamps.



FZ006

8. Install the headlight support bracket and secure the bracket with the cap screws and lock nuts.

9. Install the rear MAG-side engine mounting bracket to the engine with the three cap screws (C). Tighten to 20 ft-lb; then position the engine to the chassis mounts.

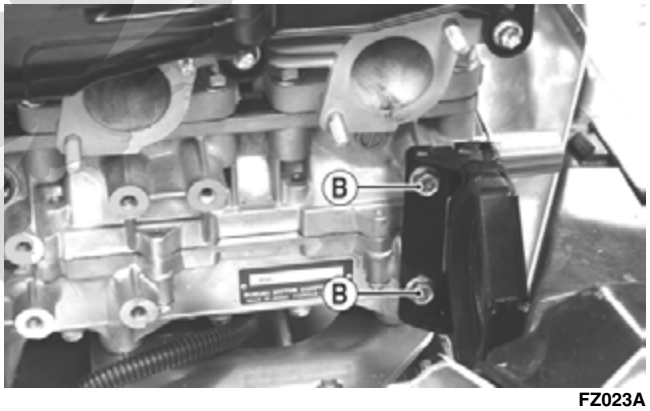


0743-921

10. Install the snubber bracket; then secure the bracket to the chassis with the cap screws and lock nuts (D). Tighten to 20 ft-lb.

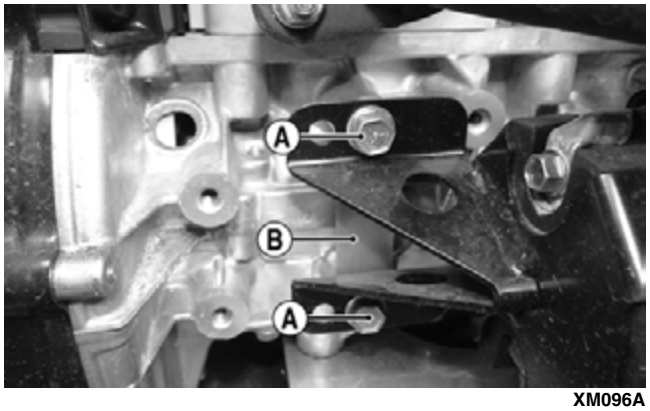
11. Install the three lock nuts (B) securing the engine plate to the chassis and tighten to 20 ft-lb; then install the cap screw (A) securing the rear MAG-side engine bracket to the chassis. Tighten to 20 ft-lb.

12. Carefully work the carburetor boots over the intake bore of the carburetors; then install the PTO-side starter motor bracket to the engine and secure with the two cap screws (B). Tighten to 20 ft-lb.



FZ023A

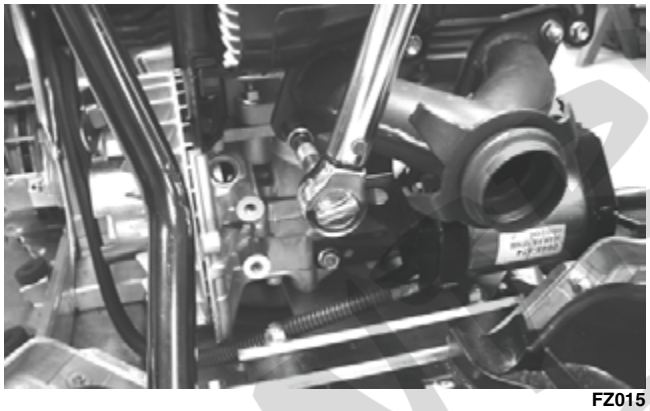
13. With the rubber dampers in place on the brackets, install the starter motor and the MAG-side bracket to the engine with the two cap screws (A) and shim (B) and tighten to 20 ft-lb. Route the ground cable up through the engine plate and secure with cap screw. Tighten securely.



XM096A

14. Apply a thin coat of high-temperature silicone sealant to each exhaust port; then install the exhaust gaskets.

15. Apply a thin coat of high-temperature silicone sealant to the mating surfaces of the exhaust manifold; then install the exhaust manifold and secure with nuts and lock washers. Tighten the nuts to 15 ft-lb.


FZ015

16. Place the recoil starter into position and secure the starter with the cap screws (threads coated with blue Loctite #243). In a crisscross pattern, tighten to 60 in.-lb.

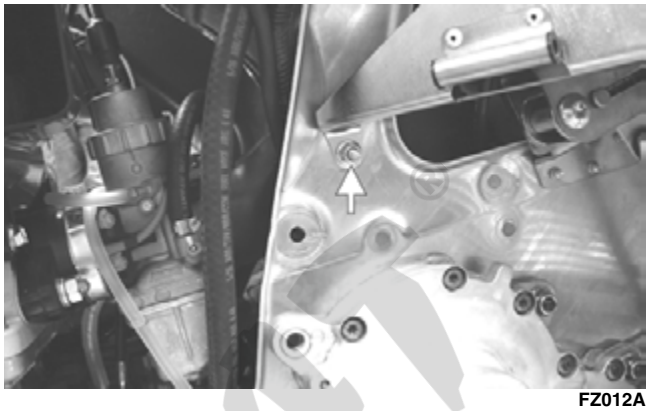
17. Install the ground wire to the proper location as noted during disassembly; then with the U-nut clip in place, install the heat shield and secure the shield with the cap screws and lock nuts.

■NOTE: On the XT, make sure the engine ground wire is on the cap screw securing the heat shield to the suspension mounting bracket.

■NOTE: On the Bearcat 570, make sure the ground wire is on the rear upper stud. After the shield is installed, secure with the wire with the lock nut.

18. Install the oil supply hose and low oil sensor wire to the oil reservoir and install the reservoir. Secure with the cap screws and lock nuts.

19. Secure the wiring harness to the chassis with the wiring harness clamp, cap screw, and lock nut. Tighten securely.


FZ012A

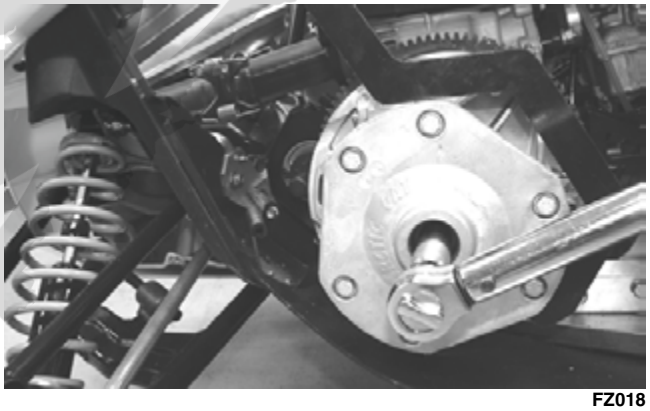
20. Install the grommets into the spark plug opening of the engine shroud; then connect the spark plug wires and install the negative cable to the battery.

21. Apply a few drops of oil to the cap screw threads; then place the drive clutch into position on the crankshaft and secure with the cap screw and lock washer. Tighten to 51 ft-lb.

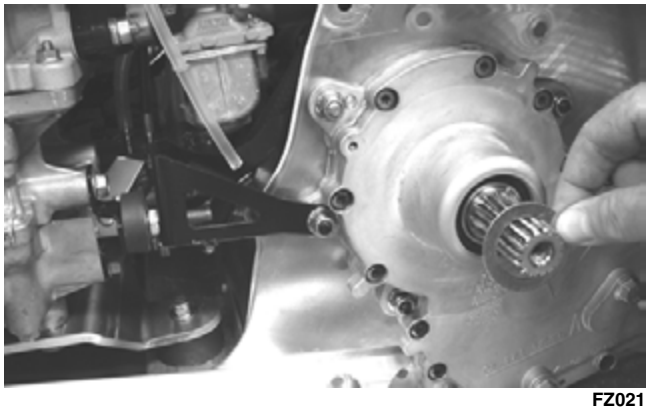
■NOTE: Before installing the drive clutch, be sure to wipe both the crankshaft and clutch mounting taper clean using a clean towel.

CAUTION

When installing the drive clutch, do not tighten the clutch cap screw with any kind of impact tool. Tighten cap screw using a hand torque wrench only. Failure to do so could result in stationary sheave damage.


FZ018

22. Install the alignment washers (if applicable); then install the driven clutch on the gear case input shaft. Tighten the cap screw to 32 ft-lb.


FZ021

CAUTION

Do not allow the driven clutch to "float" on the input shaft. Damage to the driven clutch will occur.



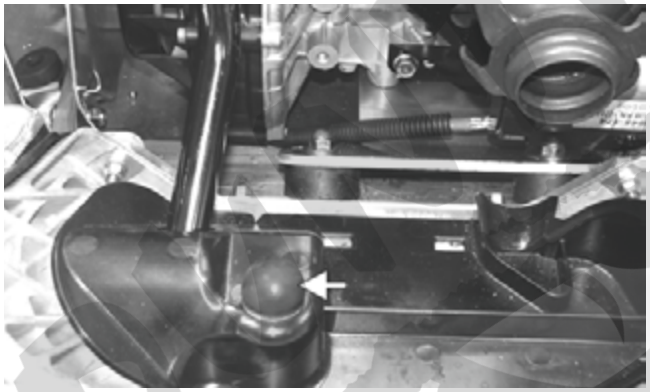
FZ019

CAUTION

Do not apply Loctite to the cap screw or damage to the gear case will occur.

23. Check drive clutch/driven clutch alignment (see Section 6). Install the drive belt. Check belt deflection. Secure the belt guard.

■NOTE: Make sure the rubber exhaust bumper is in position on the close-off cover before installing the expansion chamber.



FZ017A

24. Install the exhaust resonator and secure to the upper frame with the washer, cap screw, and lock nut.

25. Place gaskets on the resonator and exhaust manifold; then install the expansion chamber. Secure the chamber to manifold and resonator with the springs.

■NOTE: When installing the exhaust manifold springs, the long hook portion of the spring must be attached to the exhaust manifold or premature spring failure will result.

26. Place the console into position on the headlight support bracket (do not secure the console with the torx-head screws at this time); then connect the console/main harness plug-in.

27. Install and close the left-side and right-side access panels and the hood; then start the engine and warm up to operating temperature. Verify that all components are functioning properly and that coolant is circulating through the cooling system properly.

CAUTION

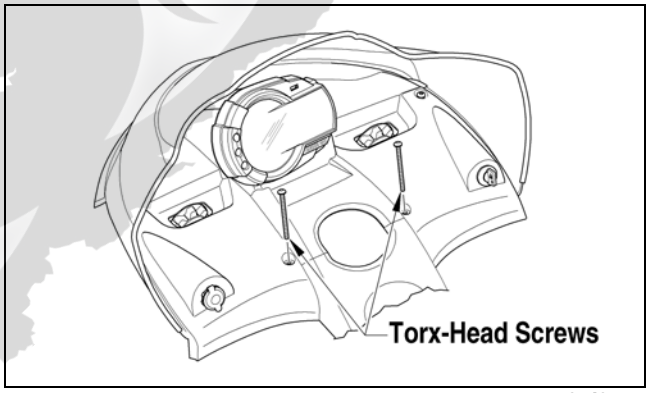
Never run the engine with the hood harness disconnected or damage to the electrical system will result.

CAUTION

After running the engine to the proper operating temperature, shut the engine off; then open the hood and access panels and inspect for any signs of coolant, gasoline, or oil leakage.

28. Verify the tightening torque of the drive clutch.

29. Secure the console to the steering support with the torx-head screws and tighten the screws securely; then close the left-side and right-side access panels and close the hood.



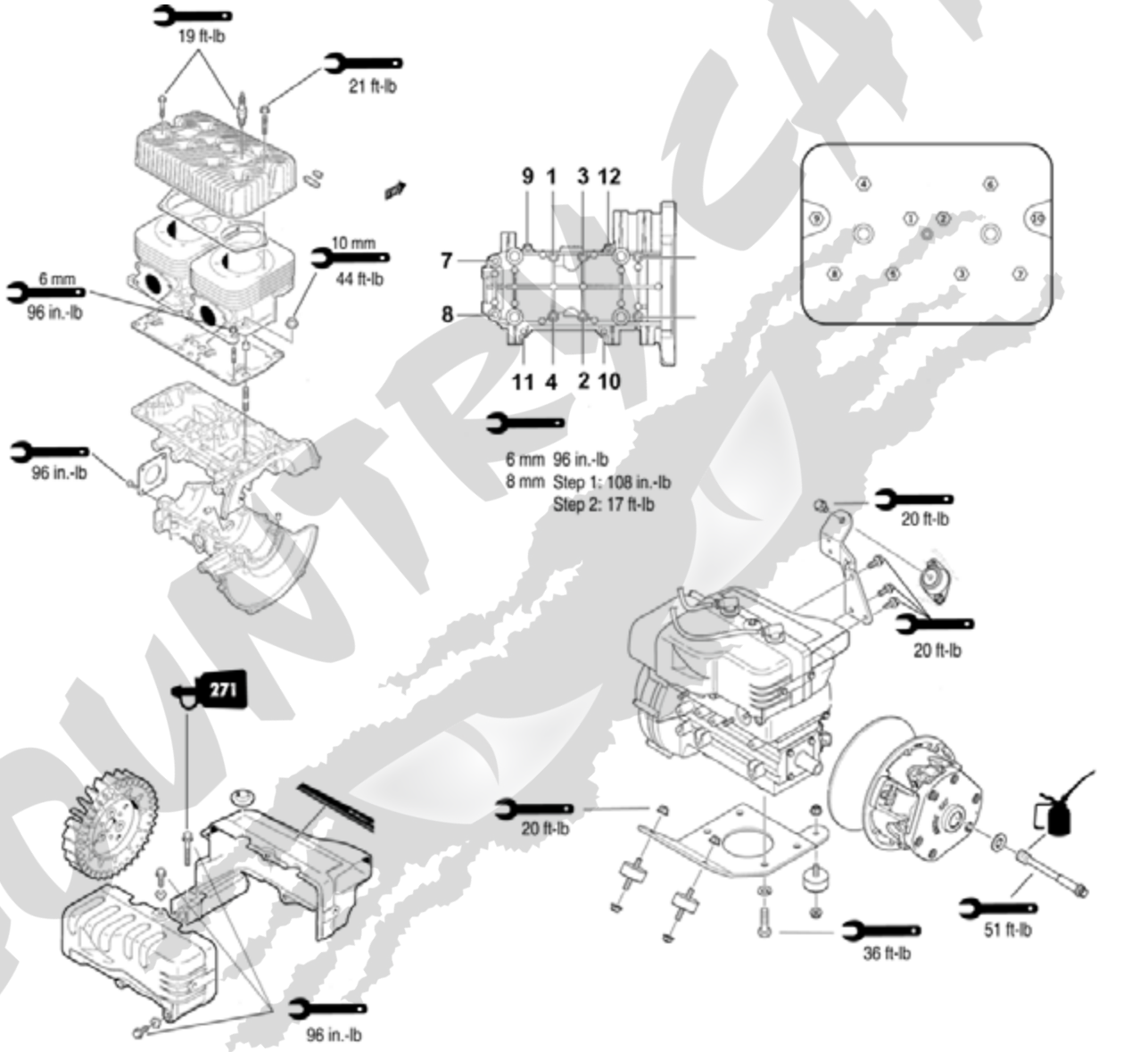
0743-777

CAUTION

If the engine had a major overhaul or if any major component was replaced, proper engine break-in procedures must be followed (see Section 1). If the proper engine break-in procedures are not followed, severe engine damage may result.

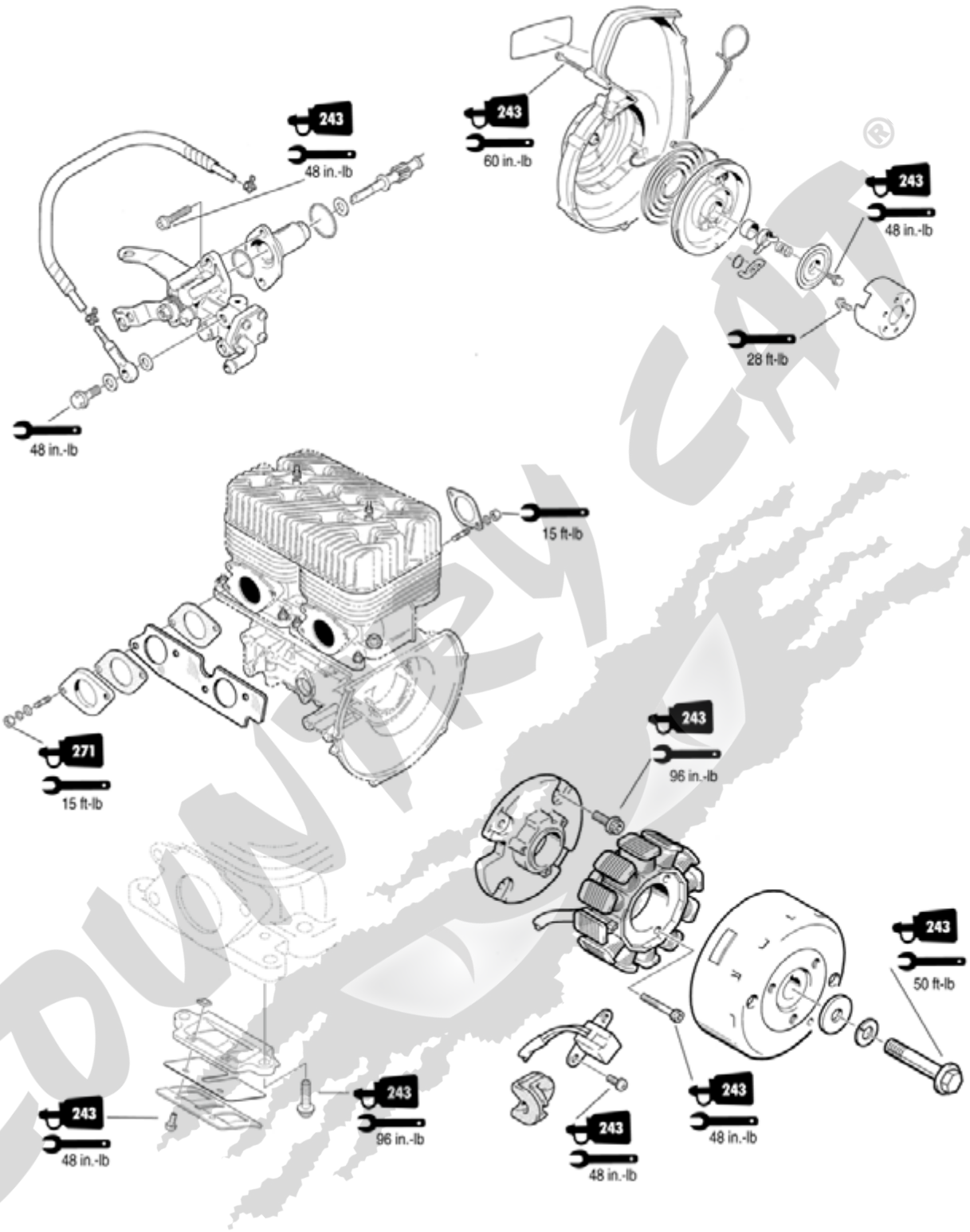
Assembly Schematic - 570 cc

Torque Specification Tolerances	
Torque (ft-lb)	**Tolerance**
0-15	±20%
16-39	±15%
40+	±10%



570-ENG12

COUNTERCAT®


243
48 in.-lb
243
60 in.-lb
243
48 in.-lb
28 ft-lb
48 in.-lb
15 ft-lb
271
15 ft-lb
243
96 in.-lb
243
50 ft-lb
243
48 in.-lb
243
96 in.-lb
243
48 in.-lb
243
48 in.-lb

570ENG12

Engine Removing/ Installing - F5

This engine sub-section has been organized to show a progression for the removing/installing of the Arctic Cat 500 cc (F5) engine. For consistency purposes, this sub-section shows a complete and thorough progression; however, for efficiency it may be preferable to remove only those components needing to be addressed. Also, some components may vary from model to model. The technician should use discretion and sound judgment.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this engine section.

Description	p/n
Drive Clutch Bolt Tool	0644-281
Drive Clutch Puller	0744-062
Drive Clutch Spanner Wrench	0644-136
Driven Clutch Puller	0644-469

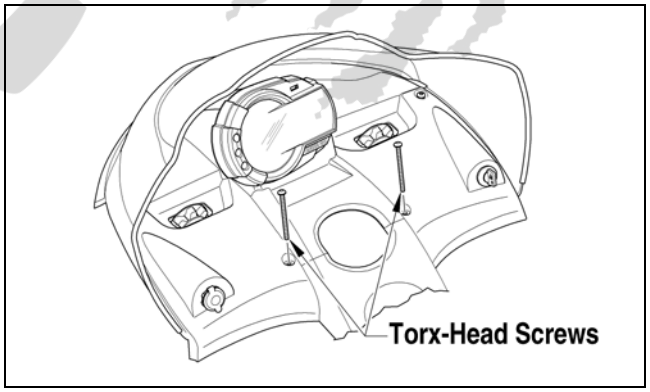
■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

CAUTION

Never attempt to substitute any other drive clutch puller for the recommended puller or severe clutch or crankshaft damage will occur.

Removing

1. Remove the hood and the left-side and right-side access panels; then remove the torx-head screws securing the console.



0743-777

2. Lift the rear of the console and disconnect the console/main harness plug-in; then remove the console.
3. Remove the hairpin clip and all springs securing the expansion chamber and resonator; then remove these components from the engine compartment. Account for the two exhaust gaskets.

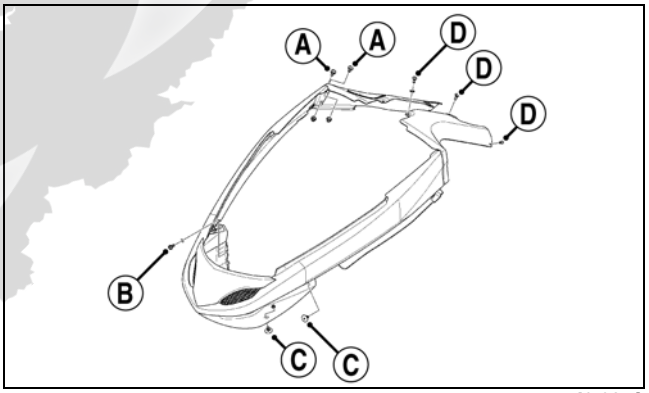
■NOTE: Disconnect the negative cable from the battery.

4. With the seat adjusted to its lowest position, remove the self-tapping screw from the right-side seat adjustment track; then remove the seat.



ZJ100A

5. Remove the torx-head screws securing the handlebar close-off panel; then remove the panel.
6. Remove the lock nuts and torx-head cap screws (A) securing the right-side front and rear spar panels; then remove the torx-head screws (D) securing the left-side rear spar panel to the gas tank and support tube.



742-207A

■NOTE: The right-side rear spar panel will remain secured to the chassis.

7. Remove the cap screw securing the air-silencer duct to the front upper panel; then disconnect the air temperature sensor and remove the duct.
8. Remove the body screws and lock nuts (C) from each side securing the front bumper assembly to the chassis; then remove the two remaining self-tapping screws (B) from each side securing the front bumper assembly. Remove the assembly.

■NOTE: At this point, remove the air-intake silencer and account for the rubber exhaust bumper.

9. Remove the belt guard; then using Drive Clutch Bolt Tool, remove the cap screw and lock washer securing the drive clutch to the crankshaft.

10. Using Drive Clutch Puller and Drive Clutch Spanner Wrench, tighten the puller. If the drive clutch will not release, sharply strike the head of the puller. Repeat this step until the clutch releases. Remove the drive clutch and the drive belt.

11. Remove the cap screw from the driven clutch and slide the driven clutch off the gear case input shaft. Account for alignment washers.



FS192

■NOTE: If the driven clutch is tight on the input shaft, pull the driven clutch off using the Driven clutch Puller.

12. Drain the engine coolant (see Liquid Cooling System - Section 3).

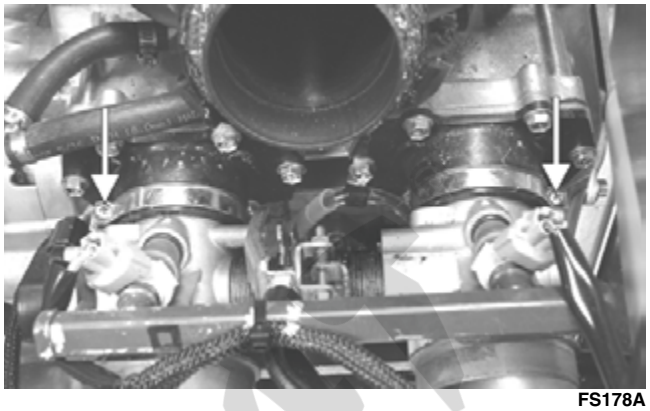
13. Remove the cable tie securing the gasline supply hose to the MAG-side engine mounting bracket; then loosen the clamp and remove the hose from the throttle body assembly. Plug the end of the hose and secure it up and out of the way.

CAUTION

The gasline supply hose may be under pressure. Place an absorbent towel around the connection to absorb gasoline; then remove the hose slowly to release the pressure.

■NOTE: Note the routing and securing locations of the hose for assembling purposes.

14. Loosen the flange clamps securing the throttle body assembly to the flange; then move the throttle body assembly forward and disconnect the oil-injection cable/control rod from the oil-injection pump.

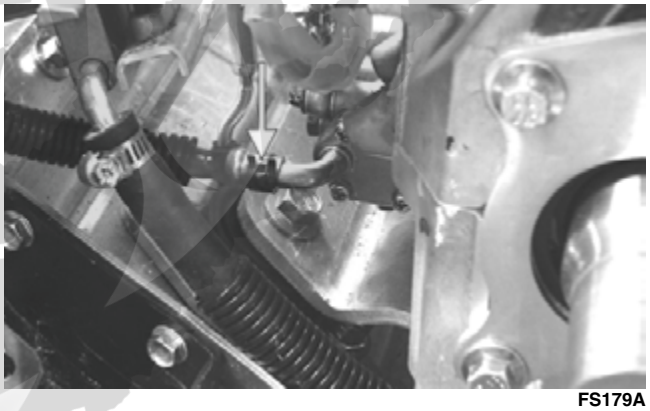


FS178A

■NOTE: Remove the clamps from the intake flanges to avoid damage during engine removing.

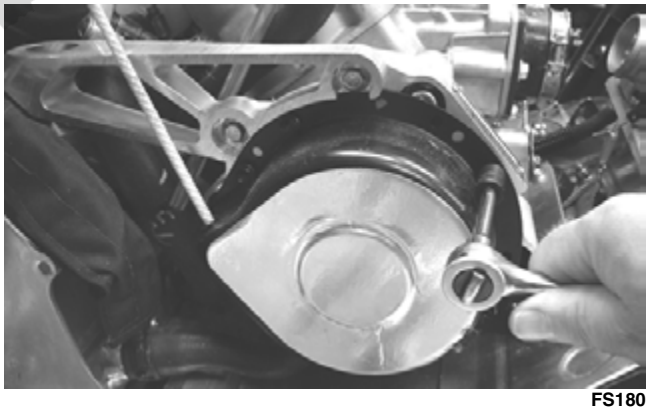
15. Loosen the clamps securing the coolant hoses connected to the cylinders beneath the exhaust port and the throttle body assembly; then remove the vent tube from the top of the cylinder head.

16. Move the throttle body assembly to one side out of the way to a secure position. Disconnect the oil hose from the oil-injection pump; then plug the oil hose.



FS179A

17. Remove the cap screws securing the recoil starter; then secure the recoil starter up and out of the way.



FS180

18. Remove the two set screws securing the flex-drive shaft to the starter motor; then remove the flex-drive shaft from the motor.



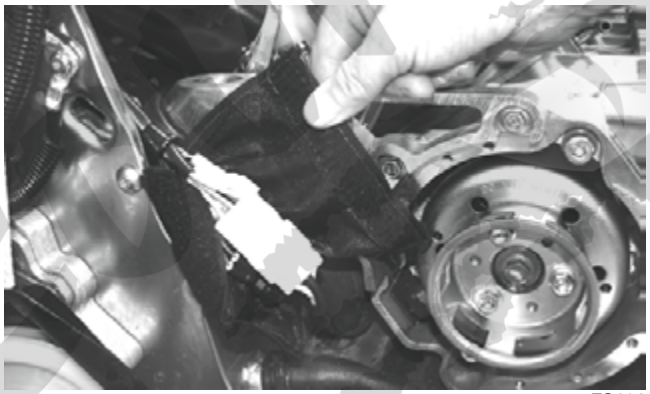
FS177A

19. Remove the spark plug wires from the plugs; then disconnect the two-wire plug-in for the coolant temperature sensor (located below the ignition coil).



FS193A

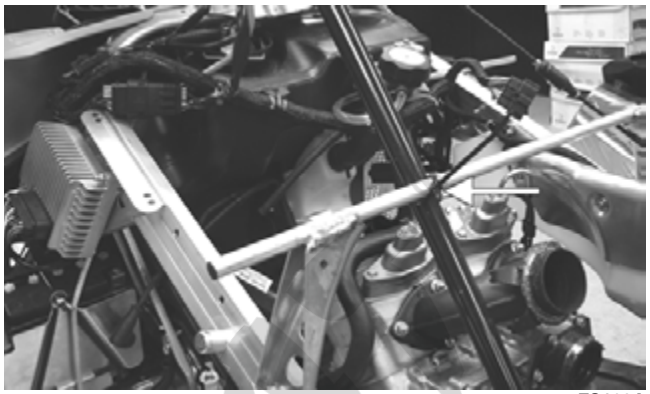
20. Remove the harness wrap and disconnect all ignition/main harness connectors; then remove the cable tie (if applicable) securing the harness to the coolant tank/heat exchanger hose and secure the harness out of the way.



FS181

21. Place an absorbent towel beneath the hose to collect any coolant from the exchanger; then disconnect the front heat exchanger hose.

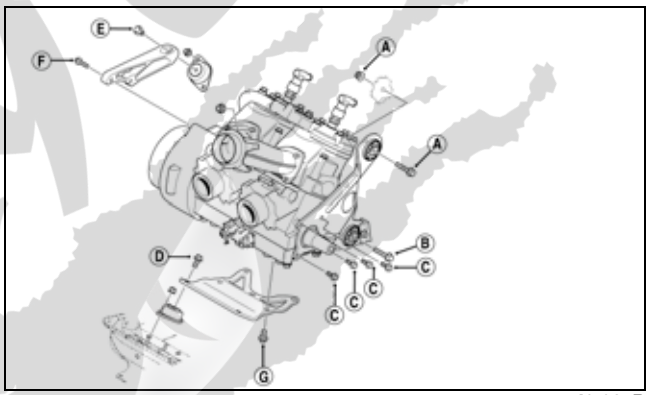
22. Remove the four cap screws securing the upper bearing bracket to the upper support plate (account for the two bracket plates); then secure the steering post to the headlight support bracket.



FS183A

23. Remove the exhaust manifold from the engine. Account for the flange nuts and gaskets.

24. Remove the cap screw and lock nut (A) and lower cap screw (B) securing the PTO-side engine mounting bracket to the chassis.

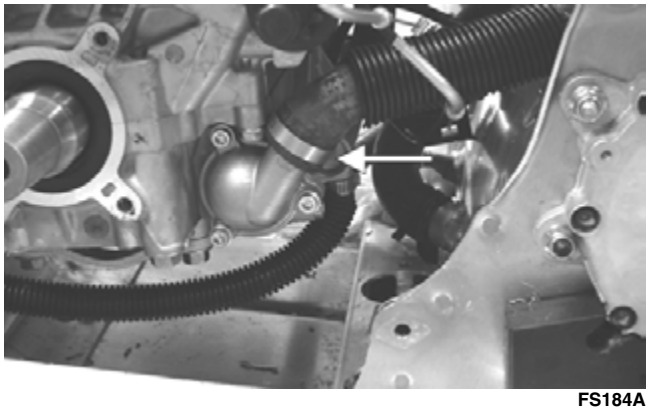


742-205B

25. Remove the four cap screws (C) securing the PTO-side bracket to the engine; then remove the bracket. Account for the torque bumper.

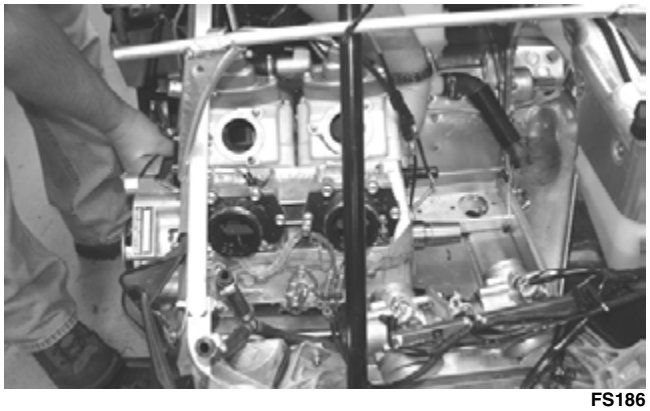
26. Remove the two cap screws (D) securing the front engine plate to the chassis; then remove the cap screw (E) securing the MAG-side engine mounting bracket to the chassis.

27. Tip the engine forward and support the engine in a position to gain access to the clamp securing the coolant hose to the thermostat housing; then loosen the clamp and remove the hose.



FS184A

28. Carefully remove the engine out the MAG-side of the chassis.

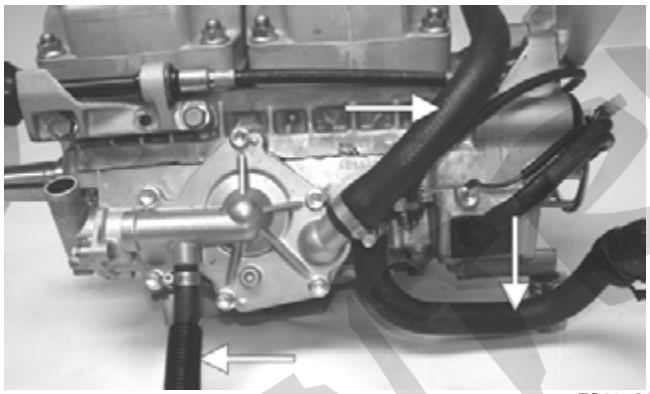


FS186

CAUTION

When removing the engine, take care not to damage the oil pump or the servomotor cables.

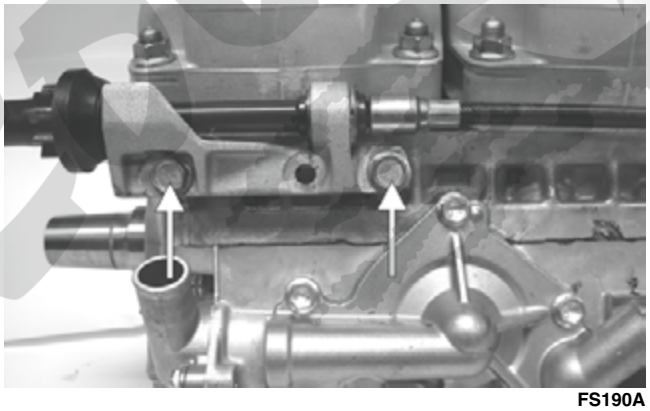
29. Remove the clamps securing the coolant supply hoses to the engine; then remove the hoses.



FS187A

30. Remove the two cap screws (F) securing the MAG-side engine mounting bracket to the engine.

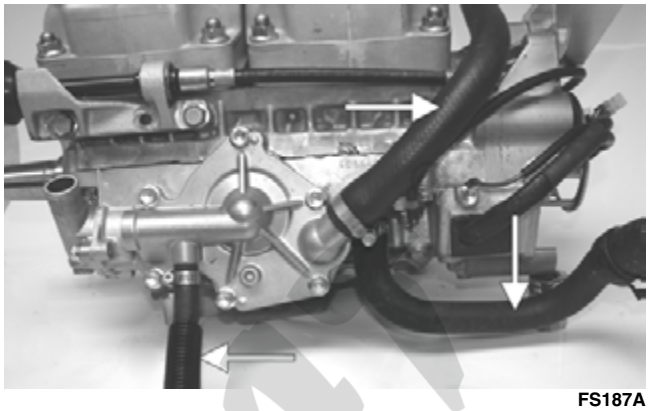
31. Remove the four cap screws (G) securing the front engine plate to the engine; then remove the pinion bracket assembly from the engine.



FS190A

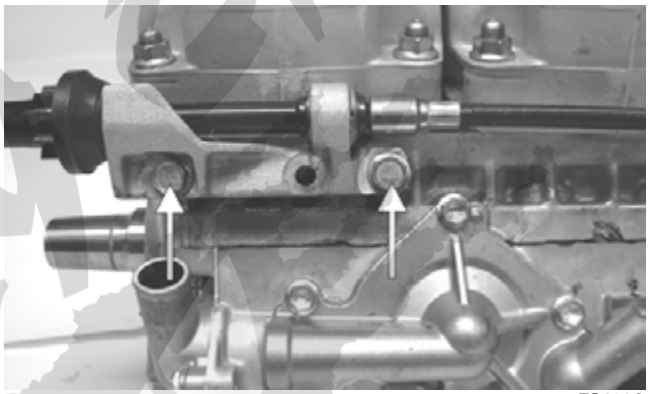
Installing

1. Install the engine coolant hoses to the engine; then secure with the hose clamps.



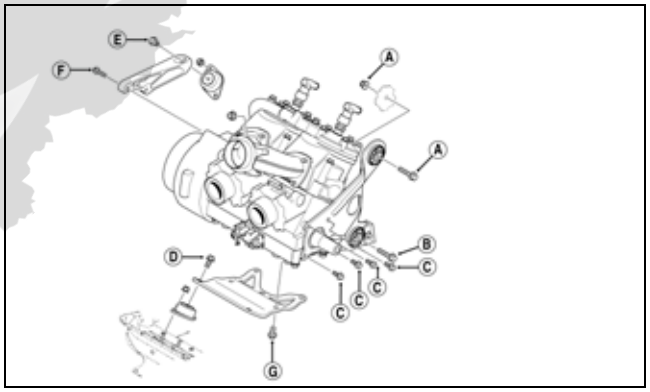
FS187A

2. Install the pinion bracket assembly to the engine with two cap screws (coated with green Loctite #609). Tighten to 20 ft-lb.



FS190A

3. Install the MAG-side engine mounting bracket to the engine with the cap screws (F) (coated with blue Loctite #243). Tighten to 23 ft-lb.



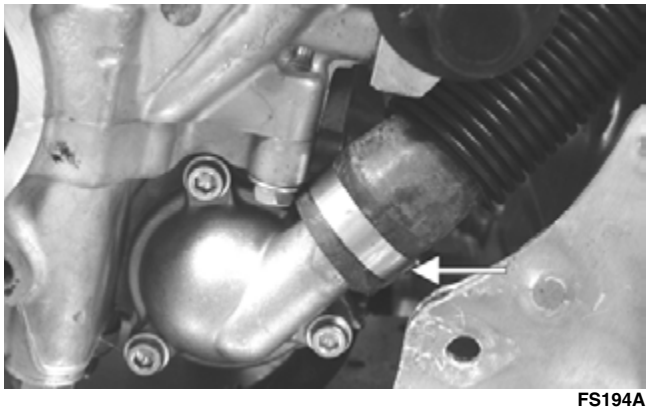
742-205B

4. Install the front lower engine plate to the engine with four cap screws (G) (coated with blue Loctite #243). Tighten to 50 ft-lb.

5. Place the engine into the engine compartment from the MAG-side; then tip the engine forward and support the engine in this position. Connect the coolant hose to the thermostat housing.

CAUTION

Direct the hose clamp screw to the back side of the thermostat housing to avoid contacting the chassis when the engine is lowered and secured.



FS194A

6. Insert the flex-drive shaft into the pinion drive and secure with the two set screws.

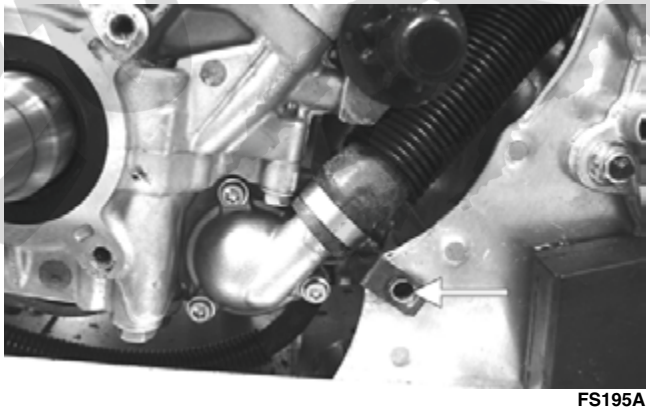


FS177A

7. Position the engine to the chassis mounts. In order, install cap screws (D) securing the engine plate to the front chassis mounts; then install cap screw (E) securing the MAG-side mounting bracket to the chassis and cap screw (D) to the PTO-side mount. Tighten the cap screws to 50 ft-lb.

8. Position the torque bumper against the gear case; then install the PTO-side engine mounting bracket.

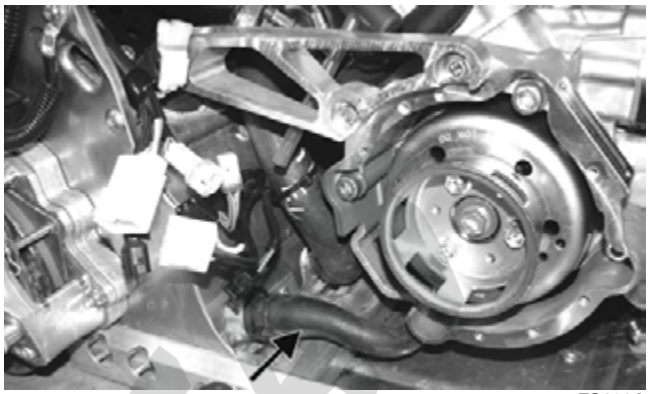
■NOTE: Prior to installing the bracket, assure the U-nut clip is centered in position.



FS195A

9. Using the illustration following step 3, install the cap screw and lock nut (A) and the lower cap screw (B) securing the PTO-side bracket to the chassis; then install the four cap screws (C) (coated with blue Loctite #243) securing the bracket to the engine. Tighten all mounting hardware to 23 ft-lb.

10. Connect the coolant hose to the outlet of the front heat exchanger and secure with the hose clamp.



FS196A

11. Route the ignition harness and the coolant temperature sensor two-wire connector between the coolant tank and the chassis; then connect all ignition/main harness plug-ins and the two-wire connector.



FS197

■NOTE: Prior to connecting the harness, clean all plug-ins with contact cleaner and compressed air.

⚠ WARNING

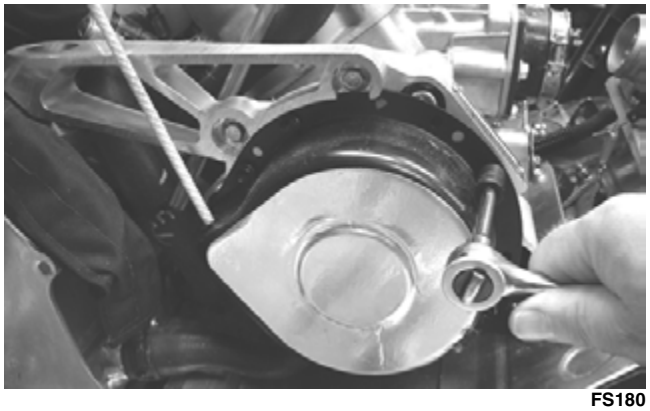
Always wear safety glasses when drying components with compressed air.

12. Secure the ignition harness to the coolant hose with a cable tie in the position as noted in removing; then install the harness wrap.



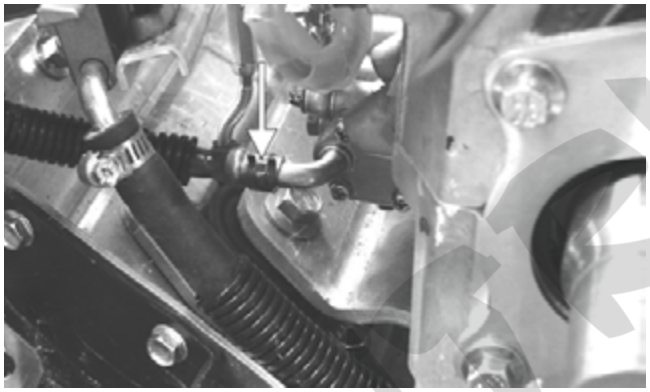
FS181

13. Place the recoil starter into position and secure the starter with the cap screws. In a crisscross pattern, tighten to 96 in.-lb.



FS180

14. Connect the oil supply hose to the oil-injection pump; then remove the oil bleed plug from the oil-injection pump. When oil flows from pump free of air bubbles and the hose is full of oil, install the oil bleed plug and tighten securely.

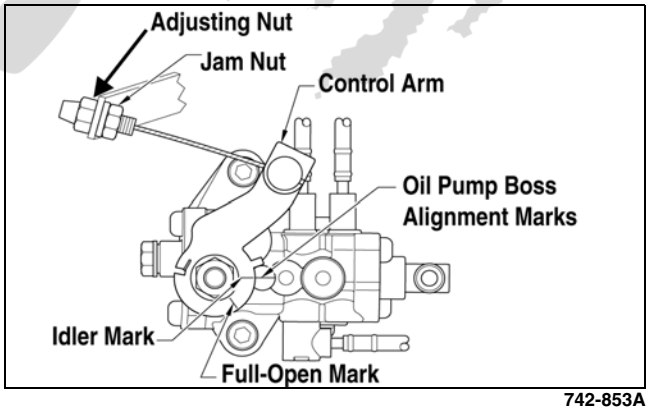


FS179A

■NOTE: Place a cloth beneath the oil-injection pump to contain any oil spilled during the bleeding process.

15. With the flange clamps in place, install the throttle body assembly and connect the oil pump cable; then connect the throttle body coolant hose to the PTO-side throttle body and secure with the clamp.

■NOTE: Verify the mark on the control arm is aligned with alignment mark on the oil-injection pump boss in the full-open position. If the marks are not aligned, adjust synchronization by loosening the jam nut on the adjuster. Rotate the jam nut/adjusting nut until properly aligned. Tighten the nuts.



742-853A

■NOTE: When the cable adjusting nut is adjusted correctly, the throttle lever will move approximately 1/8 in. before the oil-injection pump control arm begins to move.

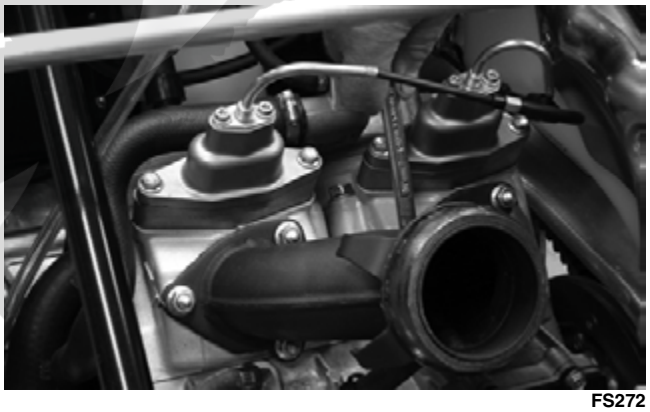
16. Install the two coolant hoses to the MAG-side and PTO-side of the crankcase (below the exhaust ports); then tighten the coolant hose clamps and the throttle body flange clamps.



FS271A

17. Apply a thin coat of high-temperature silicone sealant to each exhaust port; then install the exhaust gaskets.

18. Apply a thin coat of high-temperature silicone sealant to the mating surfaces of the exhaust manifold; then install the exhaust manifold and secure with flange nuts. Tighten the nuts in a crisscross pattern to 17 ft-lb.



FS272

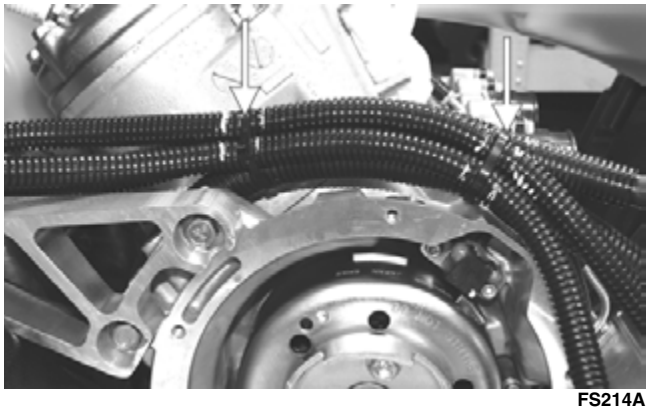
19. Route the gasline hose to the throttle body assembly and secure the hose to the fuel rail. Tighten the clamp securely; then using a cable tie, secure the hose to the MAG-side engine mounting bracket.

CAUTION

When installing the throttle bodies, make sure the gasline hose is properly routed to avoid premature wear and/or contact with exhaust components.

20. Connect the coolant overflow hose to the cylinder head; then connect the spark plug wires to the spark plugs.

21. Secure the coolant hose, gasline hose, and the battery cables together.



FS214A

■**NOTE: Before installing the drive clutch, be sure to wipe both the crankshaft taper and clutch mounting taper clean using a clean towel.**

22. Place the drive clutch into position on the crankshaft; then apply a few drops of oil to the cap screw and secure with the cap screw and lock washer. Tighten to 51 ft-lb.

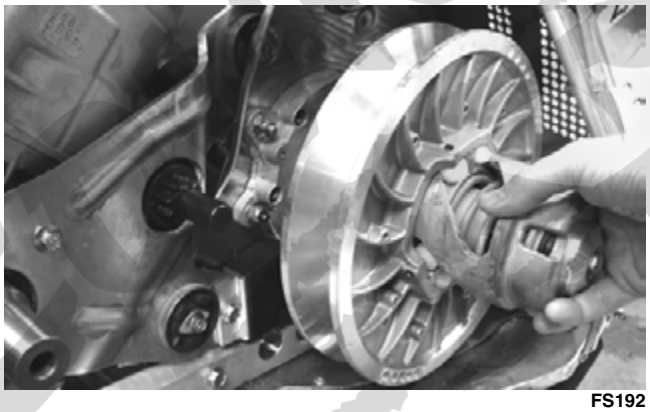
CAUTION

When installing the drive clutch, do not tighten the clutch cap screw with any kind of impact tool. Tighten cap screw using a hand torque wrench only. Failure to do so could result in stationary sheave damage.

23. Install the alignment washers (if applicable); then install the driven clutch on the gear case input shaft. Tighten the cap screw to 32 ft-lb.

CAUTION

Do not allow the driven clutch to "float" on the input shaft. Damage to the driven clutch will occur.



FS192

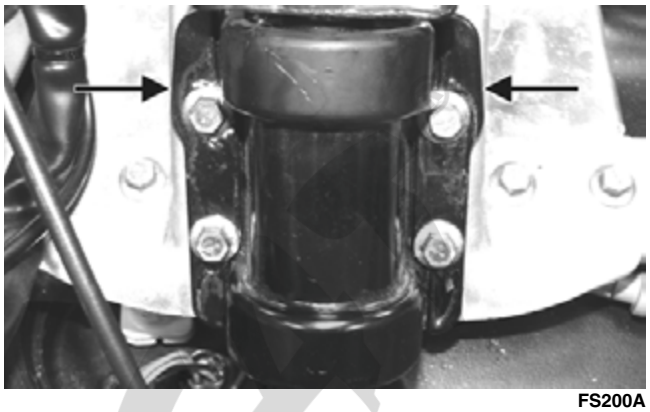
CAUTION

Do not apply Loctite to the cap screw or damage to the gear case will occur.

24. Check drive clutch/driven clutch alignment (see Section 6). Install the drive belt. Check belt deflection. Secure the belt guard (see Section 6).

25. Secure the bearing bracket/steering post assembly to the upper support plate with the bracket plates and cap screws (coated with blue Loctite #243). Tighten the cap screws to 96 in.-lb.

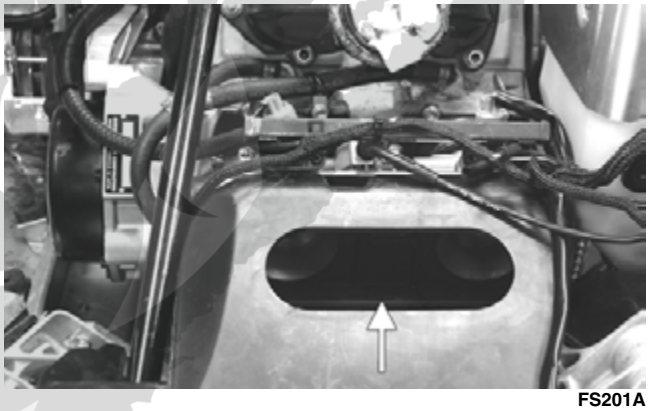
■**NOTE: When installing the bracket plates, the wider end of the plate must be directed up.**



FS200A

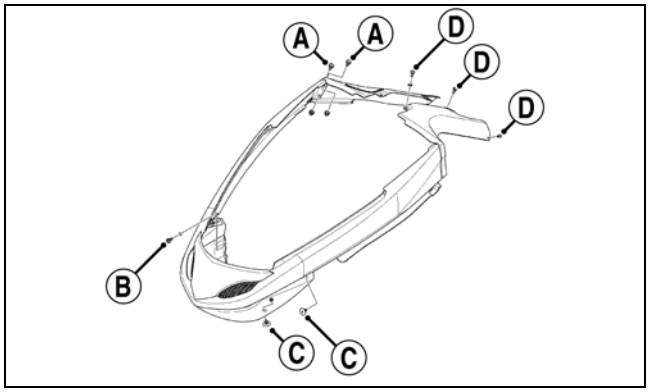
26. Install the air silencer onto the throttle bodies making sure the dual intake boot is properly positioned and seated.

■**NOTE: To aid in installing the air silencer, remove the air silencer cover and work the intake boot over the throttle body from inside the silencer.**



FS201A

27. Place the front bumper assembly (with spar panels) into position on the snowmobile; then secure the front and rear spar panels together with the torx-head cap screws and lock nuts (A). Tighten the lock nuts securely.



742-207A

28. Install the body screws and lock nuts (C) from each side and the self-tapping screws (B) from each side securing the front bumper assembly to the chassis. Tighten all hardware securely.

29. Connect the air temperature sensor and place the sensor harness beneath the air-intake duct; then install the duct into the silencer.

■NOTE: To aid in installing the duct, apply a thin film of WD-40 to the air silencer seal and to work the duct back and forth until the sleeve of the duct is properly seated into the silencer.

CAUTION

Make sure to place the sensor harness beneath the air-intake duct to avoid contact with exhaust components.

30. Secure the air-intake duct to the upper frame with the cap screw. Tighten securely.

31. Using the illustration following step 27, secure the left-side rear spar panel to the gas tank and support tube with the three torx-head screws (D). Tighten the screws securely.

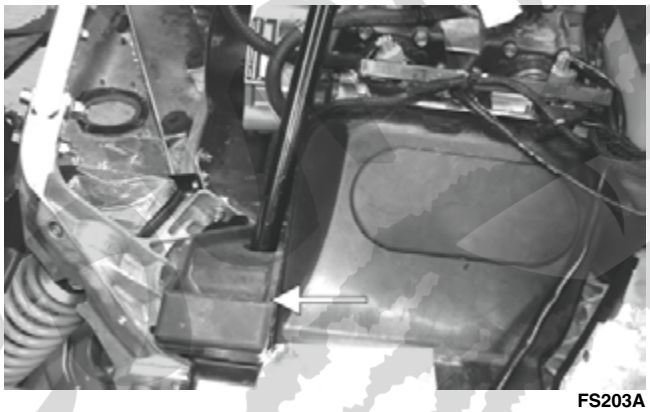
32. Install the seat; then install the machine screw (threads coated with blue Loctite #243) to the right side of the seat support.

CAUTION

Do not tighten the machine screw against the seat support. The screw must be loose enough to be effective as a seat "stop."

33. Fill the cooling system (see Liquid Cooling System in Section 3).

34. Place the rubber exhaust bumper into position on the chassis.



FS203A

35. Secure the negative battery cable to the battery.

36. Install the exhaust resonator and secure to the upper frame with the tab washer and the hairpin clip.

37. Place gaskets on the resonator and exhaust manifold; then install the expansion chamber. Secure the chamber to manifold and upper frame with the springs.

■NOTE: When installing the exhaust manifold springs, the long hook portion of the spring must be attached to the exhaust manifold or premature spring failure will result.

38. Place the console into position on the headlight support bracket (do not secure the console with the torx-head screws at this time); then connect the console/main harness plug-in.

39. Install and close the left-side and right-side access panels and the hood.

40. Start the engine and warm up to operating temperature; then verify that all components are functioning properly and that coolant is circulating through the cooling system properly.

CAUTION

Never run the engine with the console harness disconnected or damage to the electrical system will result.

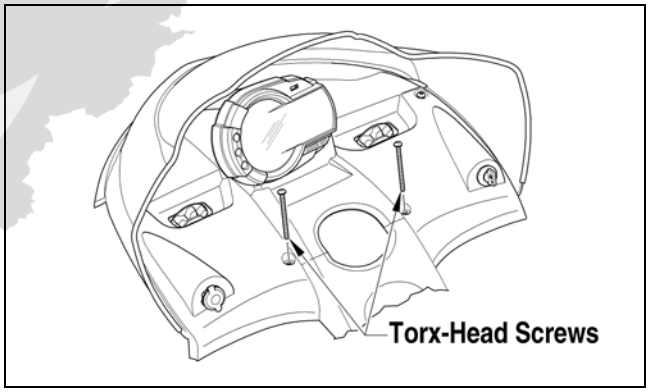
CAUTION

After running the engine to the proper operating temperature, shut the engine off; then open the hood and access panels and inspect for any signs of coolant, gasoline, or oil leakage.

41. Allow the engine to cool; then check the coolant level and add coolant as necessary.

42. Verify the tightening torque of the drive clutch.

43. Secure the console to the steering support with the torx-head screws (from step 38) and tighten the screws securely; then close the left-side and right-side access panels and close the hood.



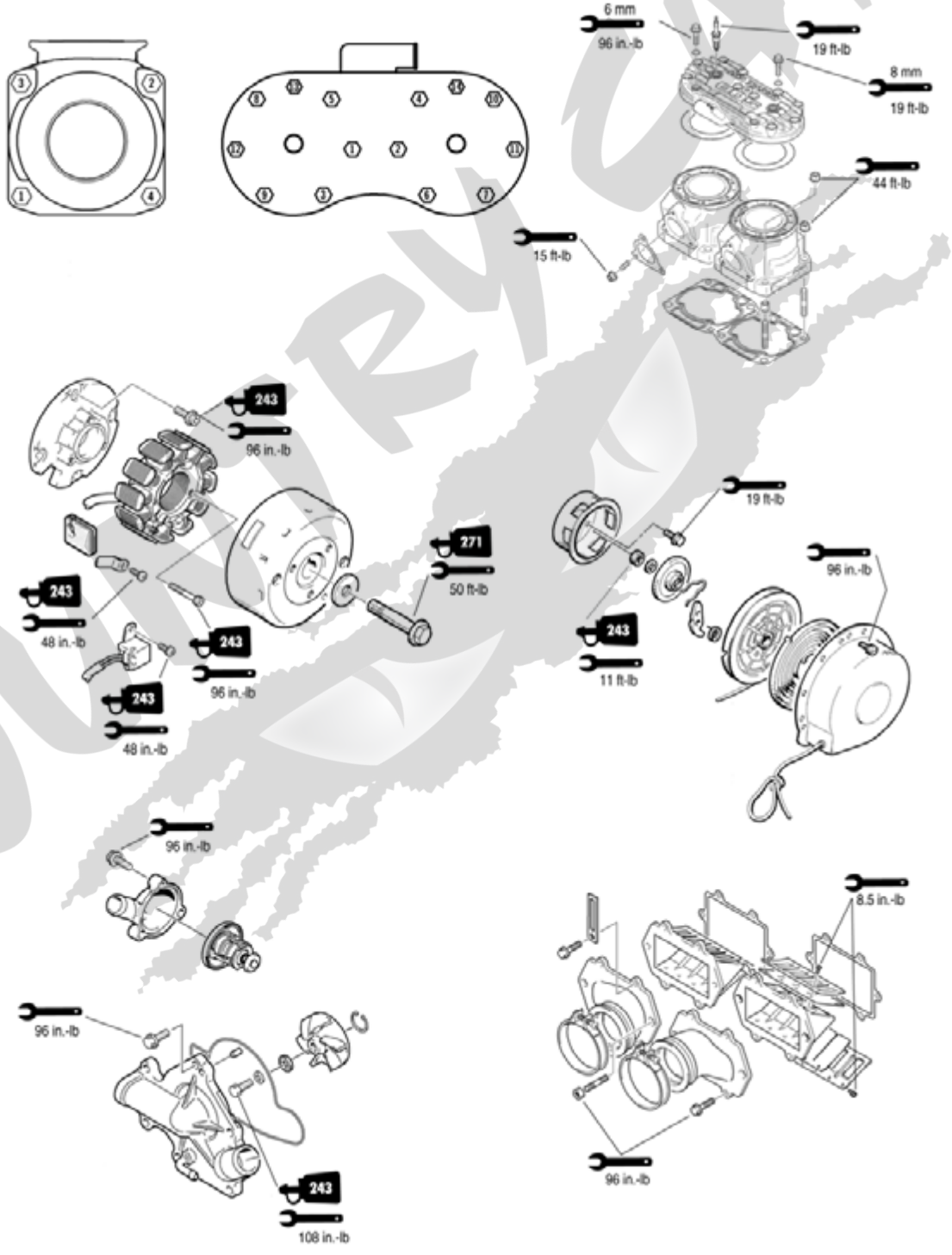
0743-777

CAUTION

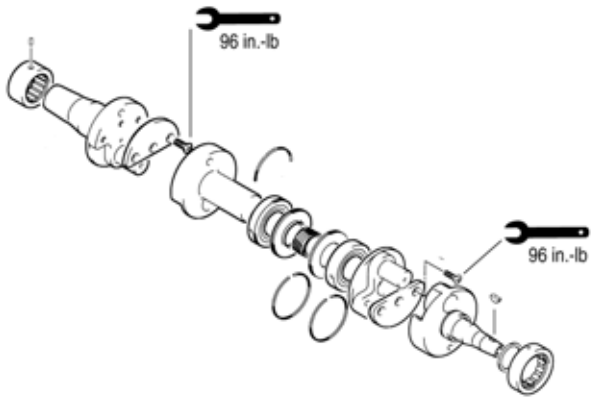
If the engine had a major overhaul or if any major component was replaced, proper engine break-in procedures must be followed (see Section 1). If the proper engine break-in procedures are not followed, severe engine damage may result.

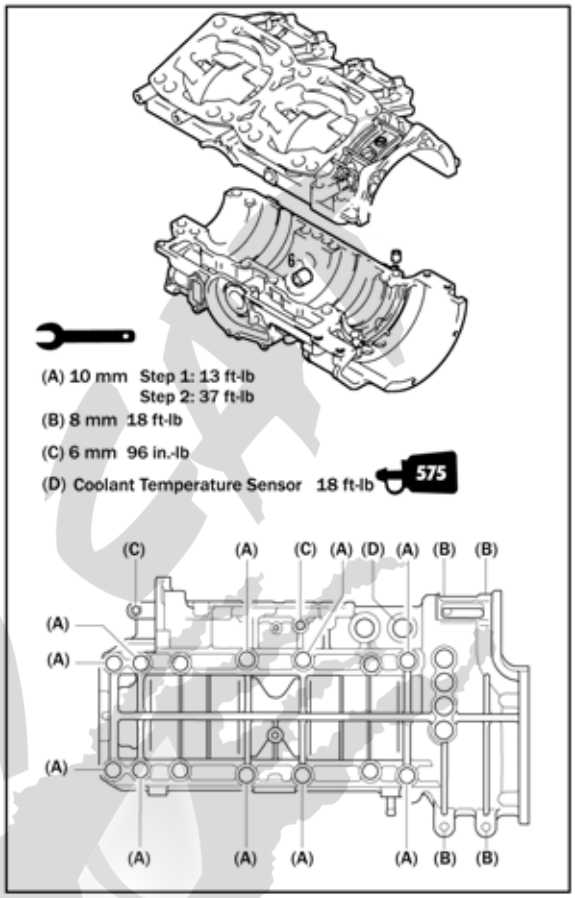
Assembly Schematic - 500 cc

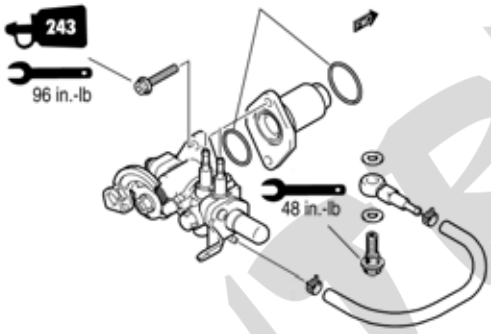
Torque Specification Tolerances	
Torque (ft-lb)	**Tolerance**
0-15	±20%
16-39	±15%
40+	±10%

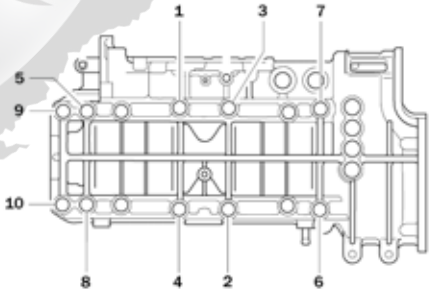


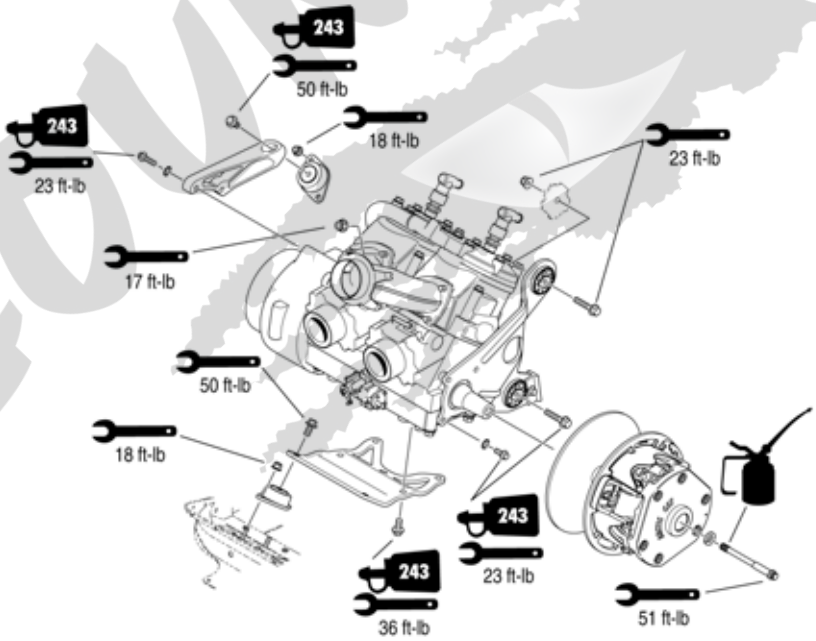
500CC1A12


96 in.-lb
96 in.-lb


(A) 10 mm Step 1: 13 ft-lb
Step 2: 37 ft-lb
(B) 8 mm 18 ft-lb
(C) 6 mm 96 in.-lb
(D) Coolant Temperature Sensor 18 ft-lb
575
(C) (A) (C) (A) (D) (A) (B) (B)
(A)
(A)
(A)
(A) (A) (A) (A) (B) (B)


243
96 in.-lb
48 in.-lb


1 3 7
5
9
10
8 4 2 6


243
50 ft-lb
243
23 ft-lb
18 ft-lb
23 ft-lb
17 ft-lb
50 ft-lb
18 ft-lb
243
23 ft-lb
243
36 ft-lb
51 ft-lb

500CC2A_12

Engine Removing/ Installing - F/M/XF 800

This engine sub-section has been organized to show a progression for the removing/installing of the Arctic Cat 800 cc (F/M/XF) engine. For consistency purposes, this sub-section shows a complete and thorough progression; however, for efficiency it may be preferable to remove only those components needing to be addressed. Also, some components may vary from model to model. The technician should use discretion and sound judgment.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this engine section.

Description	p/n
Drive Clutch Bolt Tool	0644-281
Drive Clutch Puller	0744-062
Drive Clutch Spanner Wrench	0644-136
Hood Harness Extension	1686-660

■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

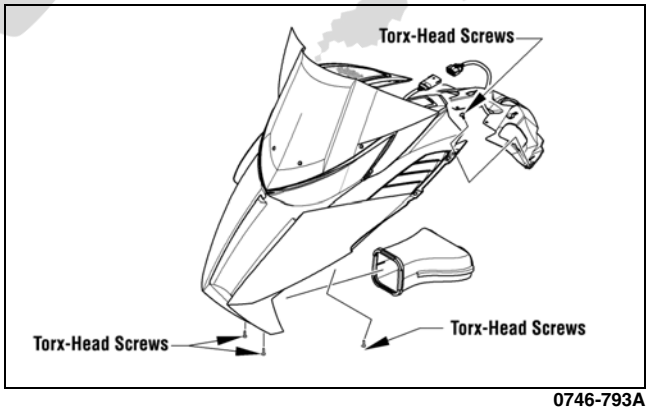
CAUTION

Never attempt to substitute any other drive clutch puller for the recommended puller or severe clutch or crankshaft damage will occur.

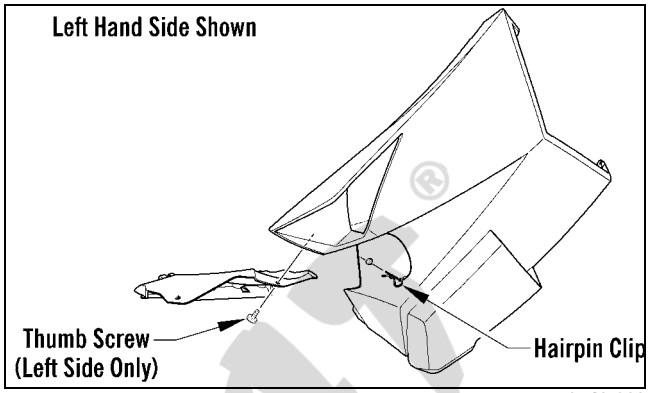
Removing

■NOTE: For assembling purposes, note cable tie locations securing the harness and cables to the chassis.

■NOTE: Prior to removing the engine, disconnect the hood harness and remove the side access panels; then remove the screws securing the hood to the chassis.



0746-793A

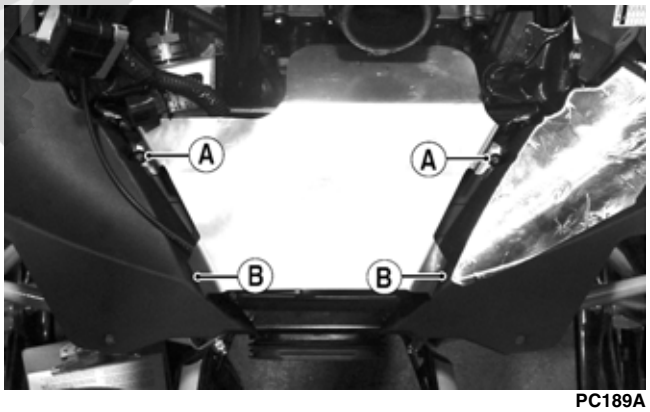


0746-800

1. Remove the rear belt guard; then remove the exhaust temperature sensor from the expansion chamber.
2. Remove all springs securing the expansion chamber and resonator; then remove the expansion chamber and resonator.
3. Remove the cap screw from the driven clutch and slide the driven clutch (along with the drive belt) off the driven shaft. Account for alignment washers.
4. Using Drive Clutch Bolt Tool, remove the torx-head screw and high-collar washer securing the drive clutch to the crankshaft.
5. Using Drive Clutch Puller and Drive Clutch Spanner Wrench, tighten the puller. Remove the drive clutch.

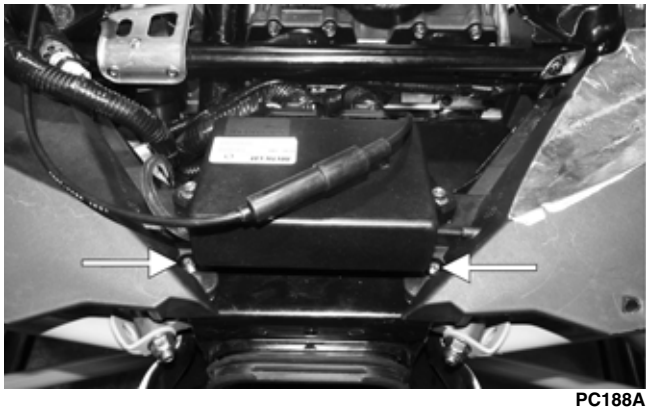
■NOTE: If the drive clutch will not release, sharply strike the head of the puller. Repeat this step until the clutch releases.

6. Remove the two screws (A) securing the heat shield to the chassis; then remove the heat shield from the two front locating pins (B) and remove the heat shield.



PC189A

7. Disconnect the ECM; then remove the screws securing the right and left-side fascia panels to the chassis. Remove the panels and ECM as an assembly.



PC188A

8. Remove the caps screws securing the PTO-side front spar to the steering support and shock mount bracket; then remove the spar.

■**NOTE: Take care to not drop the spar inserts and nuts when removing the spar.**

9. Using a small needle-nose pliers, remove the servomotor cable holder; then pull the cable housings down and out of the servomotor.



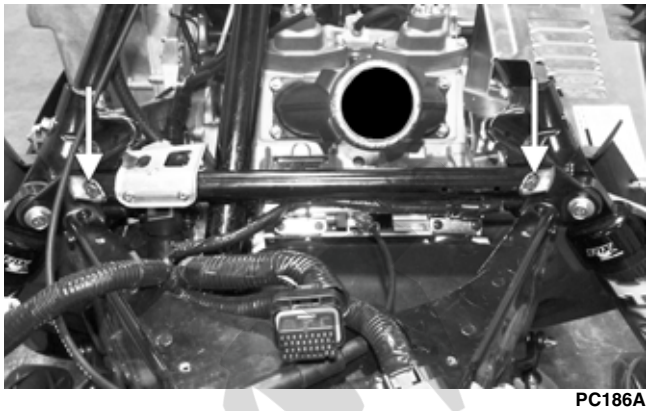
PC187A



PC134

10. Slide each cable end out of the slot of the clutch; then disconnect the connector from the servomotor.

11. Remove the lock nuts securing the shock mount bracket support to the shock mount brackets; then remove the shock mount bracket support.



PC186A

12. Drain the engine coolant (see Liquid Cooling System - Section 3).

13. Loosen the clamp securing the gasline hose to the throttle body and remove the hose; then close-off the hose and secure the hose up and out of the way.



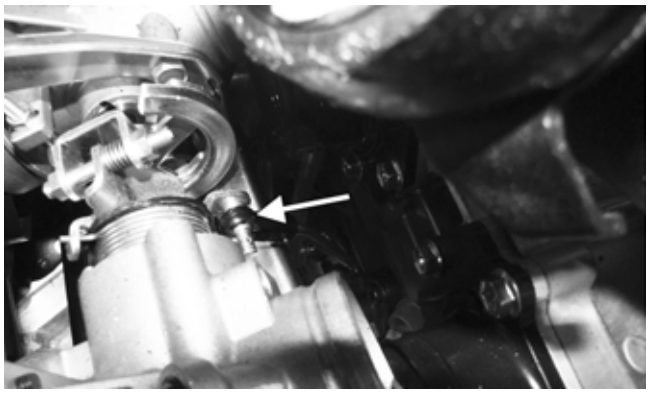
PC135A

⚠ WARNING

The hose may be under pressure; remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb gas.

14. Loosen the clamps securing the air intake boot to the throttle bodies and pull the air intake boot forward enough to gain access to the throttle body assembly. Remove and retain the clamps.

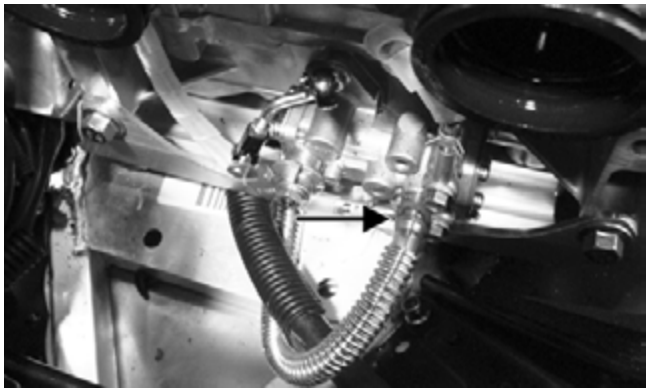
15. Loosen the flange clamps securing the throttle body assembly to the intake flanges and disconnect the oil-injection control rod from the throttle body; then loosen the clamps securing the throttle body coolant hoses. Disconnect the TPS and move the throttle body assembly forward and out of the way.



PC138A

16. Remove the main harness wrap and disconnect the six harness connectors. Secure the harness up and out of the way.

17. Close-off the oil hose with a clamping device; then remove the hose clamp and oil hose from the oil pump.

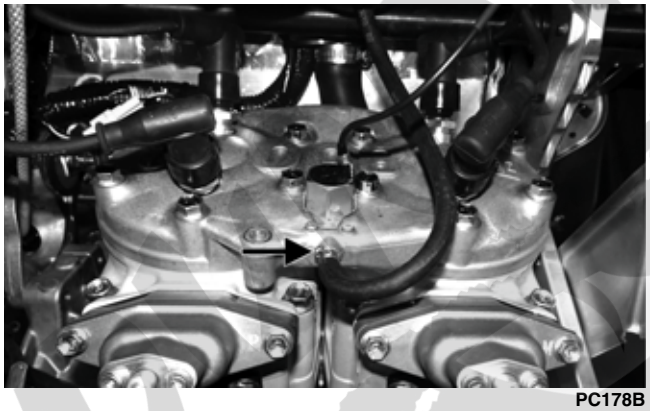


PC139A

18. Remove the recoil starter from the engine. Secure it out of the way.

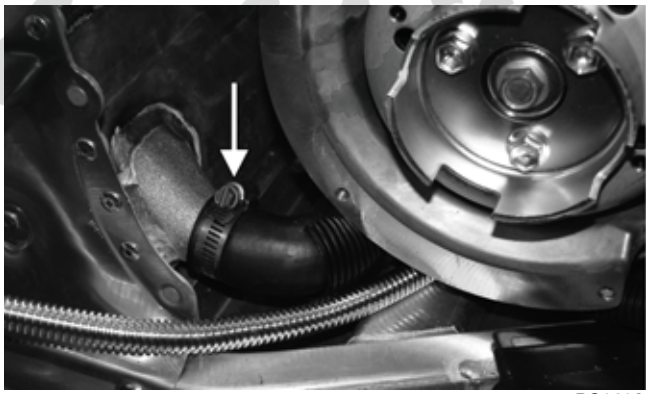
19. Remove the cap screws securing the MAG-side engine mount to the engine. Discard the cap screws.

20. Remove the spark plug caps from the spark plugs; then disconnect the knock sensor and coolant temperature sensor connectors. Remove the cylinder head vent hose.

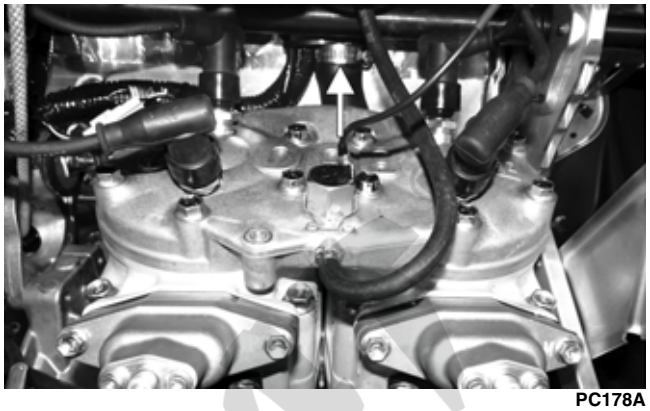


PC178B

21. Disconnect the lower coolant hose from the front heat exchanger; then remove the coolant hose from the heat exchanger at the rear of the engine.



PC141A



PC178A

22. Remove and discard the eleven screws securing the PTO-side engine mounting plate. Account for the spring washer between the rear mount and the tunnel.

■NOTE: Before removing the cap screws, apply a sufficient amount of heat to the cap screws to soften the Loctite.

23. Remove the torx-head screw securing the front belt guard to the skid plate; then remove the three cap screws and carriage bolt nut securing the PTO-side chassis support to the shock mount bracket and chassis. Remove the chassis support and account for the carriage bolt.

24. Remove the torx-head screws securing the access panel to the center belly pan and chassis.

25. Remove the cap screw and two lock nuts securing the engine support plate to the chassis; then lift the engine out of the engine compartment.

■NOTE: If replacing the engine, make sure to remove the engine support plate, exhaust manifold, three coolant hoses, and oil injection control rod for installation on the new engine.

Installing

■NOTE: If the engine was replaced, make sure to install the existing engine support plate, exhaust manifold, three coolant hoses, and oil injection control rod on the new engine. Tighten the exhaust manifold nuts to 17 ft-lb and the six engine support plate cap screws to 25 ft-lb.

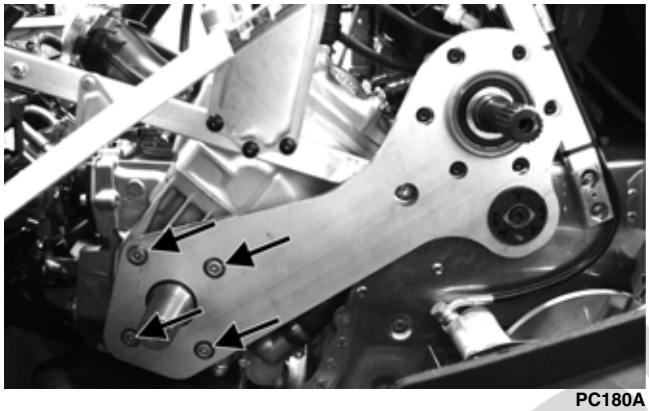
1. Carefully lower the engine into the engine compartment.

2. Install the coolant hose to the heat exchanger at the rear of the engine; then connect the lower coolant hose to the front heat exchanger.

3. Install new MAG-side engine mount “patch-lock” cap screws. Finger-tighten only at this time.

4. Install a new “patch-lock” cap screw and new lock nuts securing the engine support plate to the chassis. Finger-tighten only at this time.

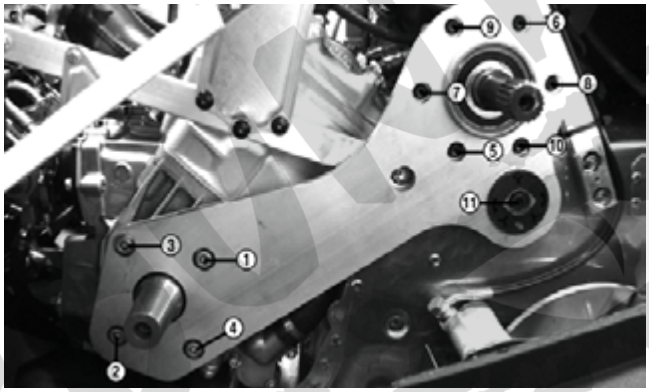
5. Install the PTO-side chassis support to the shock mount bracket and chassis. Secure with the cap screws and carriage bolt nut. Tighten the rear chassis cap screw to 25 ft-lb, the carriage bolt nut to 12 ft-lb, and the front shock mount cap screws to 12 ft-lb.
6. Install the torx-head screw to secure the front belt guard to the skid plate. Tighten securely.
7. Install eleven new "patch-lock" screws securing the PTO-side engine mounting plate starting with the four plate-to-engine screws. Finger-tighten only at this time.



PC180A

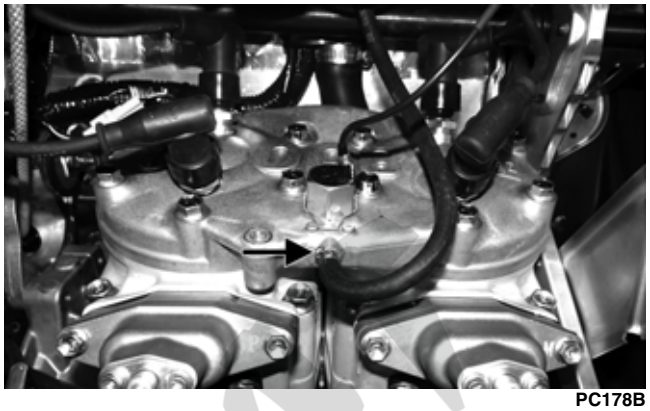
■NOTE: Make sure to install the spring washer between the rear mount and the tunnel.

8. From step 7, tighten the four front screws to 30 ft-lb, the six top rear screws to 14 ft-lb, and the lower rear screw to 25 ft-lb using the following sequence.



PC180B

9. Tighten the cap screw and lock nuts (from step 4) to 25 ft-lb.
10. Install the access panel to the center belly and chassis and secure using the torx-head screws. Tighten securely.
11. Tighten the cap screws (from step 3) to 25 ft-lb.
12. Connect the knock sensor and coolant temperature sensor connectors; then install the spark plug caps. Secure the coolant temperature sensor connector with a cable tie.
13. Install the cylinder head vent hose.



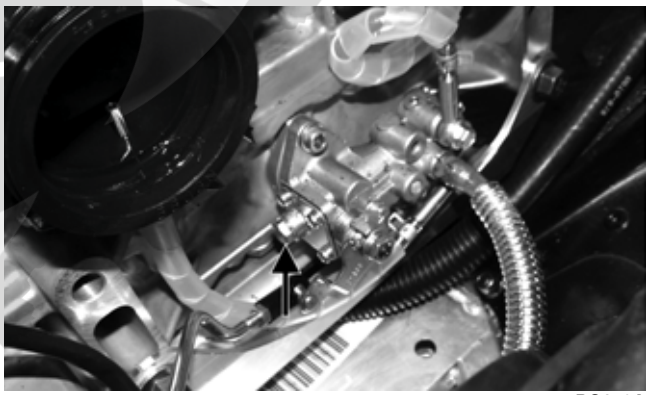
PC178B

14. Place the recoil starter into position and secure with the cap screws. Tighten in a crisscross pattern to 96 in.-lb.
15. Before connecting the wiring harness plug-ins, clean the connectors and apply Dielectric Grease to the seal; then connect all harness connectors making sure all wiring and coolant hoses are routed properly as noted in removing. Install the main harness wrap.

■NOTE: Use cable ties to secure the wiring harnesses as necessary.

16. Connect the oil hose to the oil pump. Secure with the clamp.

■NOTE: After securing the oil hose to the oil pump, remove the bleed screw to allow any air in the hose/ pump to be released.



PC179A

17. Connect the MAG-side throttle body coolant hose; then secure with a clamp.
18. Connect the TPS; then lower the throttle body assembly into the engine compartment.
19. Place the throttle body assembly into position and secure with the flange clamps; then connect the gasline hose to the throttle body assembly and tighten the clamp securely.

CAUTION

When installing the throttle bodies, make sure the gasline hose is properly routed to avoid premature wear and/or contact with exhaust components.

20. Connect the PTO-side throttle body coolant hose; then secure with a clamp.

21. Fill the cooling system (see Liquid Cooling System in Section 3).

22. Install the oil injection control rod to the throttle body; then verify oil-injection pump synchronization (see Section 4).

23. Using the existing clamps, secure the intake flanges to the throttle bodies.

24. With the air intake boot properly positioned on the throttle bodies, secure with the existing clamps.

25. Install the shock mount bracket support; then using new lock nuts, secure the support to the shock mount brackets and tighten to 20 ft-lb.



PC186A

26. Insert the servomotor cable ends into the slot in the clutch; then connect the servomotor connector. Secure the cables with the holder.



PC187A

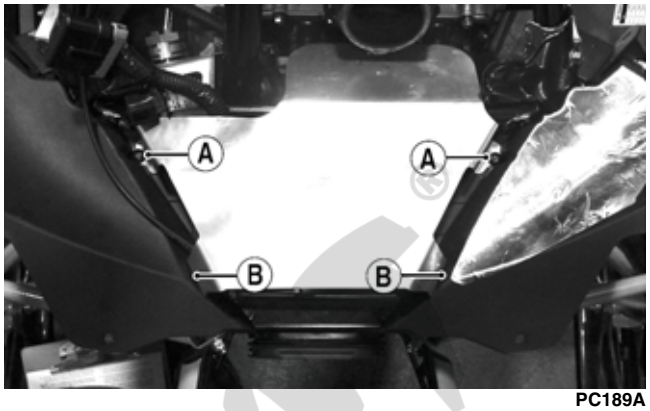
27. Rotate the servomotor clockwise to remove any slack from the cables; then install the servomotor retaining clip. Check APV cable adjustment (see Arctic Power Valve (APV) System in Section 3).

28. Install the PTO-side front spar and secure to the steering post and shock mount bracket using the existing cap screws. Tighten the cap screws to 25 ft-lb.

29. Install the fascia panels (with ECM) and secure to the chassis using the existing screws. Tighten securely. Connect the ECM.

■NOTE: At this point, secure the PDM harness to the shock mount bracket support using a cable tie.

30. Position the heat shield onto the two front locating pins (B); then secure it to the chassis with the two screws (A). Tighten securely.



PC189A

31. Install the resonator and secure with the springs; then place the expansion chamber and gaskets into position and secure to the exhaust manifold and resonator with the springs.

■NOTE: When installing the manifold springs, the long hook portion of the spring must be attached to the exhaust manifold or premature spring failure will result.

32. Install the exhaust temperature sensor into the expansion chamber. Tighten to 34 ft-lb.

33. Place the drive clutch with drive belt into position on the crankshaft and secure with the cap screw (threads coated with oil) and high-collar washer. Tighten to 51 ft-lb.

CAUTION

When installing the drive clutch, do not tighten the clutch cap screw with any kind of impact tool. Tighten cap screw using a hand torque wrench only. Failure to do so could result in stationary sheave damage.

■NOTE: Before installing the drive clutch, be sure to wipe both the crankshaft and clutch mounting tapers clean using a clean towel.

34. Install the driven clutch on the driven shaft; then install the drive belt (see Section 6).

35. Install the driven clutch (see Driven clutch in Section 6); then check drive belt deflection (see Section 6). Install the rear belt guard.

36. Place the hood into position on the front end and secure with the screws; then install the hood harness. Install the side access panels.

CAUTION

Never run the engine with the hood harness disconnected or damage to the electrical system will result.

37. Start the engine and warm up to operating temperature; then verify that all components are functioning properly and that coolant is circulating through the cooling system properly.

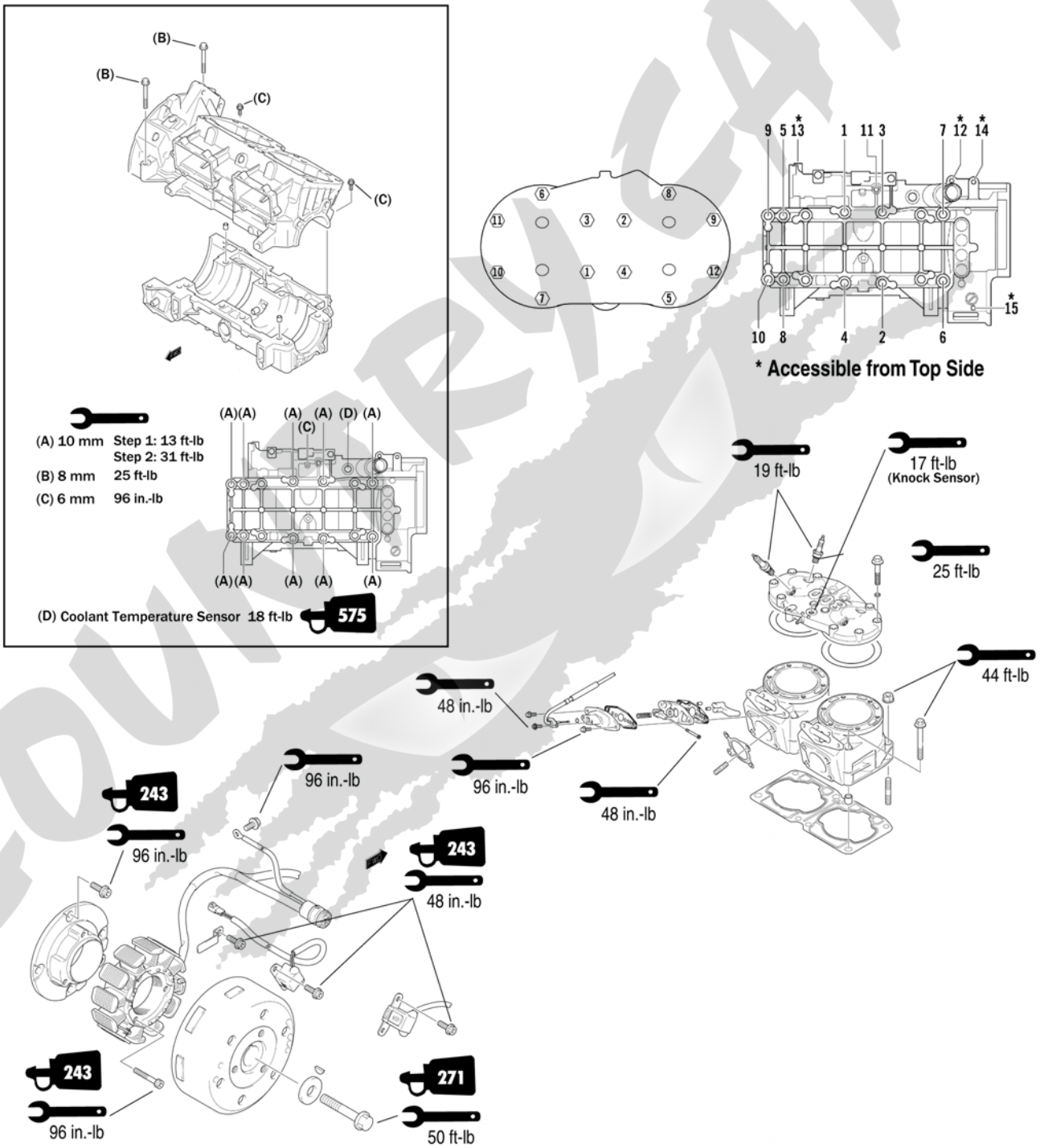
38. After running the engine to the proper operating temperature, shut the engine off; then open the access panels and inspect for any signs of coolant, gasoline, or oil leakage.

39. Allow the engine to cool; then check the coolant level and add coolant as necessary. Verify the tightening torque of the drive clutch.

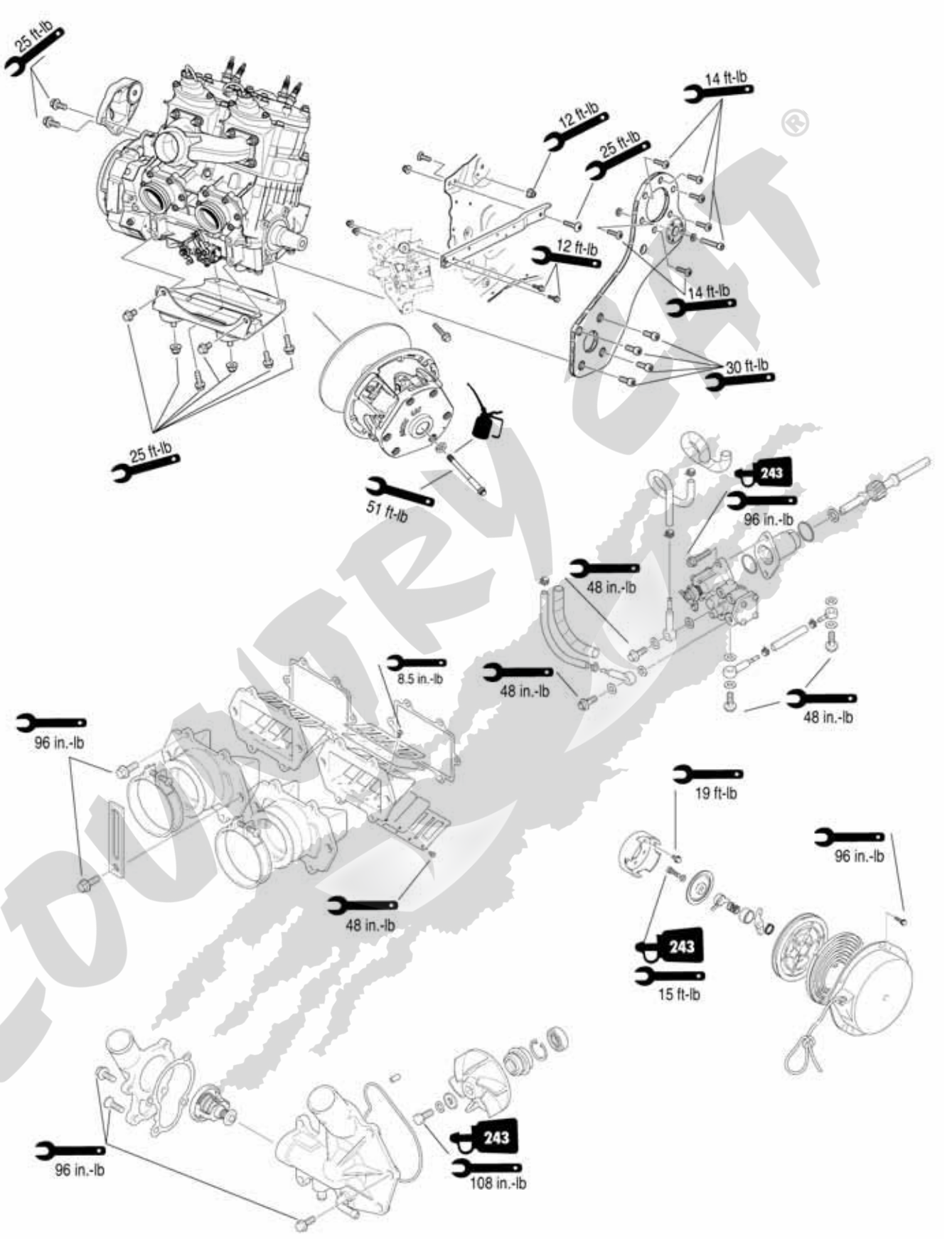
CAUTION
If the engine had a major overhaul or if any major component was replaced, proper engine break-in procedures must be followed (see Section 1) or severe engine damage may result.

Assembly Schematic - 800 cc

Torque Specification Tolerances	
Torque (ft-lb)	**Tolerance**
0-15	±20%
16-39	±15%
40+	±10%



800_12_1


25 ft-lb
14 ft-lb
12 ft-lb
25 ft-lb
12 ft-lb
14 ft-lb
30 ft-lb
25 ft-lb
51 ft-lb
243
96 in.-lb
48 in.-lb
8.5 in.-lb
48 in.-lb
48 in.-lb
96 in.-lb
48 in.-lb
19 ft-lb
96 in.-lb
243
15 ft-lb
96 in.-lb
243
108 in.-lb

800_12_2

Engine Removing/ Installing - Bearcat Z1 XT/TZ1

This engine section has been organized into sub-sections showing a progression for the removing/installing of the Arctic Cat 1100 cc (Bearcat Z1 XT/TZ1) engine. For consistency purposes, this section shows a complete and thorough progression; however, for efficiency it may be preferable to remove only those components needing to be addressed. Also, some components may vary from model to model. The technician should use discretion and sound judgment.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

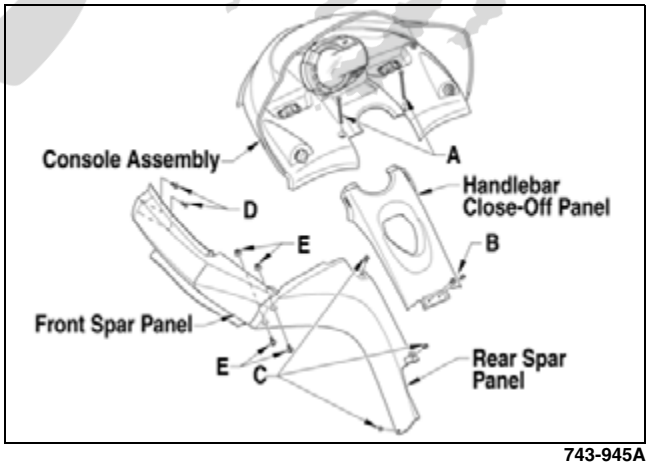
A number of special tools must be available to the technician when servicing the engine.

Description	p/n
Drive Clutch Puller	0744-062
Exhaust Spring Pliers	0644-391
Exhaust Spring Pliers	0644-397
Drive Belt Deflection Tool	0644-412
Drive Clutch Spanner Wrench	0644-136
Drive Clutch Bolt Tool	0644-281

■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

Removing

1. Remove the hood and the right- and left-side access panels.
2. Remove the two torx-head cap screws (A) securing the console to the chassis; then lift up the rearward end of the console and disconnect the console harness plug-in. Remove the console.



743-945A

3. Remove the two screws securing the handlebar close-off panel (B); then remove the three screws (C) securing the left- and right-side rear spar panels to the seat support tubes. Remove the screws (D) securing the front spar panels to the front bumper; then remove the spar panels.

■NOTE: On the turbo model, only the console and cap screws (E) securing the left-front spar panel have to be removed.

4. Remove the seat (see Section 8).
5. Disconnect oxygen sensor connector; then remove the springs securing the exhaust pipe and resonator to the engine and chassis. Remove the exhaust assembly and account for exhaust gaskets and springs.

■NOTE: On the non-turbo models, the hairpin clip and tab washer must be removed to remove the resonator from the chassis.



TZ101A

6. Remove the negative cable from the battery; then remove the positive cable. Remove the hardware securing the battery to the tray; then remove the battery.
7. Remove the hose clamp from the coolant hose (A) connecting the water pump to the right side of the oil cooler; then clamp off the coolant hose. With a drain pan positioned under the coolant hose, remove the hose from the water pump; then release the clamp. Tip the hose downward allowing the coolant to drain completely.



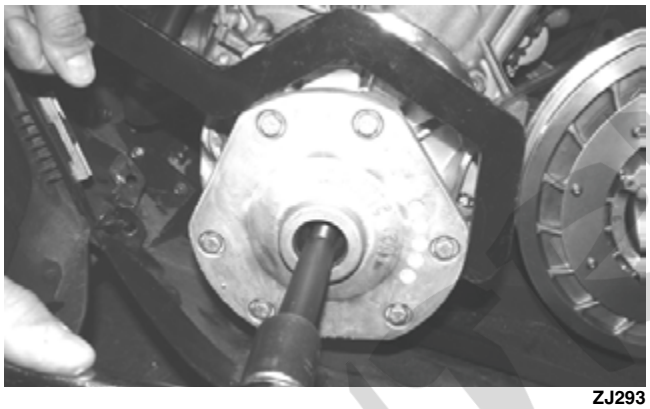
TZ074A

8. Using Drive Clutch Bolt Tool, remove the 12-mm Allen-head cap screw and washer securing the drive clutch to the crankshaft.



ZJ292

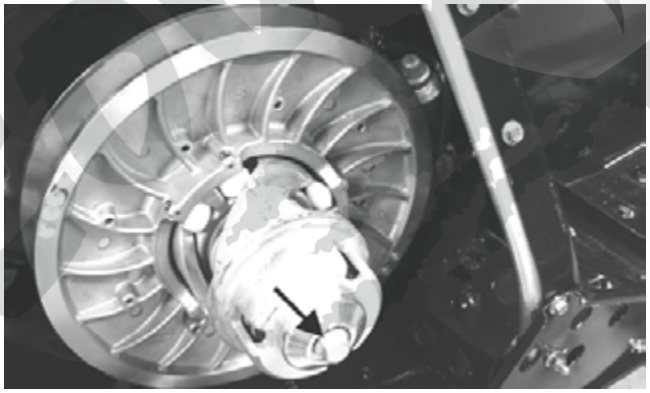
9. Using Drive Clutch Puller and Drive Clutch Spanner Wrench, tighten the puller until the drive clutch releases from the crankshaft. Remove the drive clutch and drive belt.



ZJ293

■NOTE: If the drive clutch will not release, sharply strike the head of the puller. Repeat this procedure until the drive clutch releases.

10. Using a 9/16-in. socket and extension, remove the cap screw securing the driven clutch to the input shaft.



ZJ250A

■NOTE: After removing the driven clutch, account for the cap screw and washers, sheave adjuster, alignment washers, and O-ring from outside the clutch; then from the input shaft, remove any other alignment washers. These washers must be used during installing.

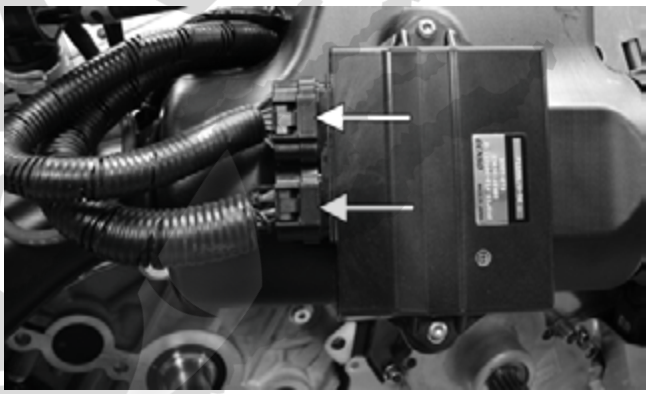
11. Remove the gas tank (see Section 8); then on the non-turbo models, remove the air silencer (see Section 3).

12. Remove the two cap screws securing the headlight support bracket to the right-side upper frame.

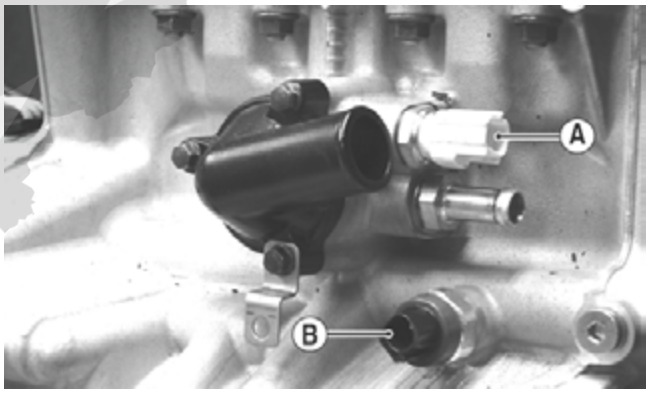


TZ070A

13. Disconnect the ECM harness connectors, the coolant temperature sensor (A), and the oil pressure switch (B); then remove the cable ties and clips securing the harness and gasline hoses to the left-side upper frame.



TZ072A

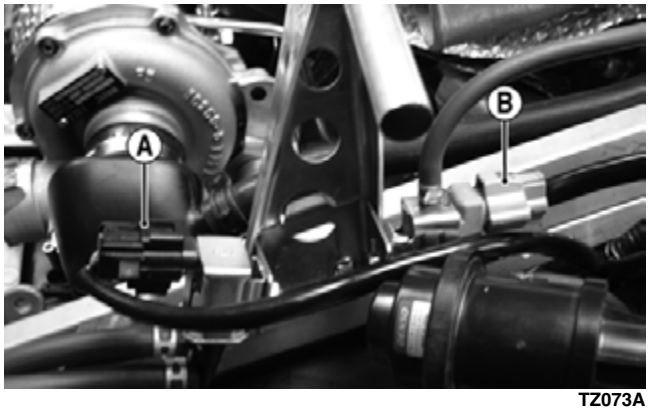


ZJ090A

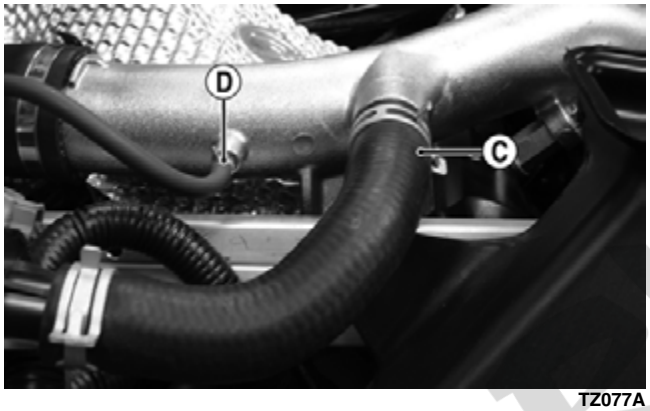
■NOTE: On the non-turbo models, disconnect the straps securing the ECM to the upper frame and remove the ECM.

■NOTE: For installing purposes, note the routing path of the wiring harness and the location of the cable ties securing the wiring harness to the left-side upper frame; then remove the ties.

■NOTE: On the turbo model, disconnect the harness connectors and vacuum hoses from the waste gate control valve (A) and the air bypass control valve (B); then disconnect the air bypass valve (C) and air bypass switch (D) hoses from the intake pipe.



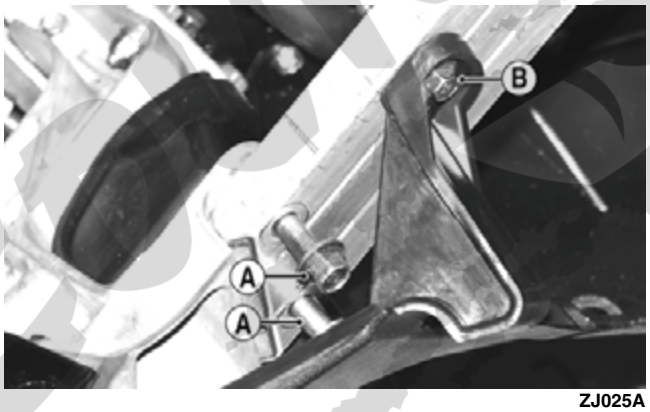
TZ073A



TZ077A

■NOTE: On the non-turbo models, remove the MAP sensor from the left-side upper frame.

14. Remove the two cap screws and lock nuts (A) securing the left-side upper frame to the front end. Remove the one remaining cap screw and lock nut (B) securing the upper frame to the left-side skid plate.



ZJ025A

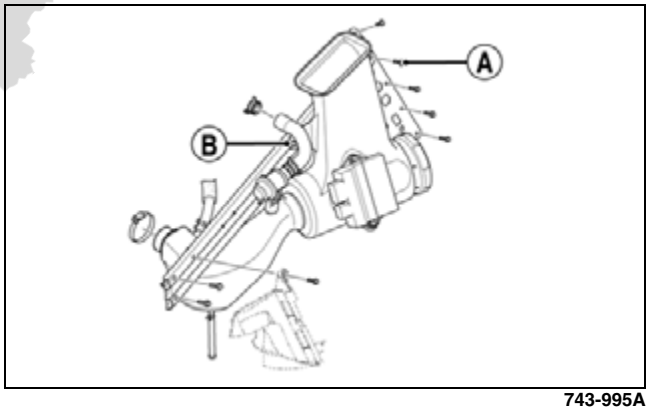
■NOTE: On the turbo model, the cap screw securing the skid plate to the upper frame secures the air intake to the upper frame and has no lock nut.


TZ071A

15. Remove the five cap screws and lock nuts securing the support gusset/left-side upper frame to the steering support; then remove the support bracket and left-side upper frame.

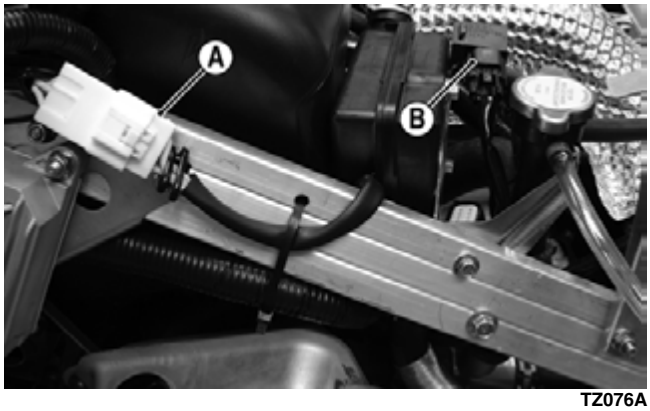

ZJ024A

■NOTE: On the turbo model after removing the five cap screws and lock nuts, account for the clip from the cap screw (A) securing the two gasline hoses and air intake assembly to the steering support; then remove the remaining cap screw and lock nut (B) securing the air intake assembly to the upper frame.



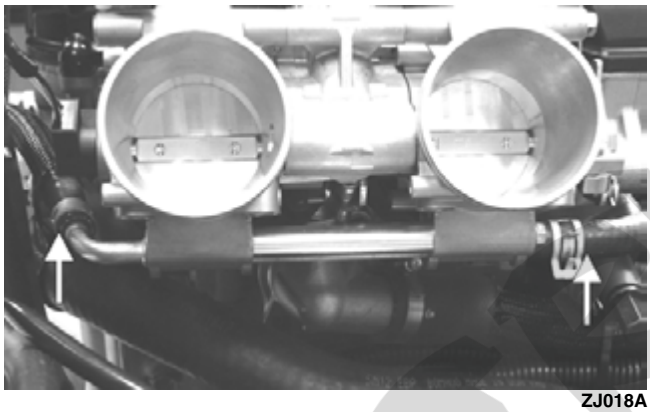
743-995A

16. Disconnect the harness plug-in (A) from the regulator/rectifier; then remove the air pressure sensor (B) from the bracket on the right-side upper frame.



TZ076A

17. On the non-turbo models, remove the two coolant hoses from the throttle bodies.



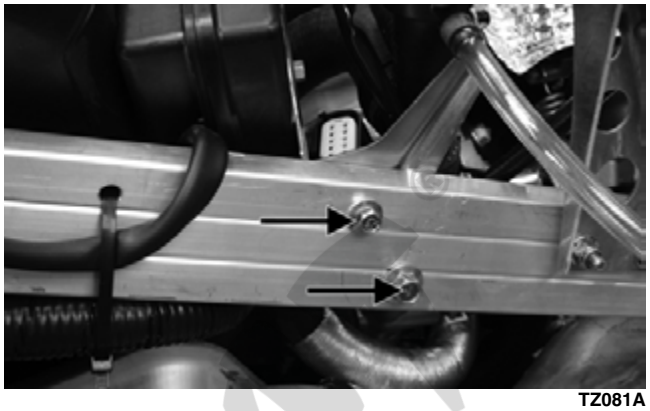
ZJ018A

18. On the turbo model, remove the coolant hoses from the throttle body; then on all model, disconnect and remove the coolant hoses from the thermostat housing.



TZ075A

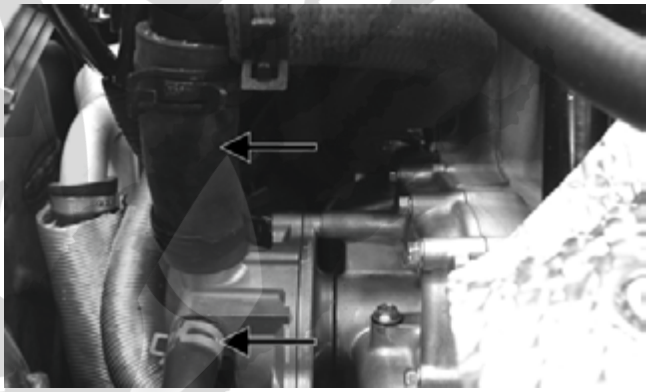
19. On the turbo model and the non-turbo TZ1, remove the two cap screws and lock nuts securing the coolant separator tank assembly; then disconnect the two remaining hoses from the separator tank.



TZ081A

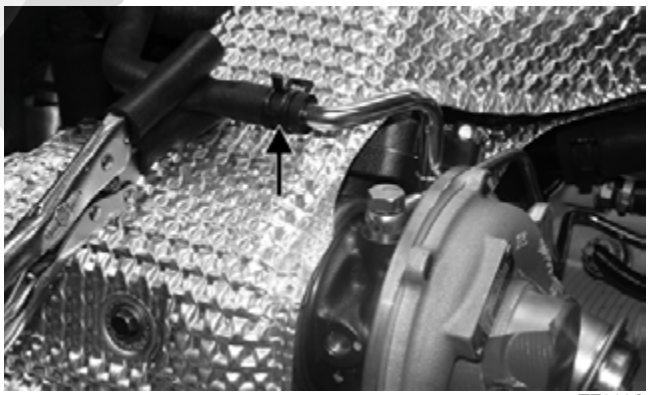
■NOTE: On the non-turbo TZ1, note the location of the resonator mounting pin for installing purposes.

20. Remove the separator tank assembly from the right-side upper frame; then disconnect the two coolant hoses from the water pump.



TZ079A

21. On the turbo model, use a suitable clamping device to close off the coolant return hose and remove it from the turbocharger.



TZ060A

22. On the turbo model, loosen the clamps securing the intercooler hoses from the intake pipe and the turbocharger; then remove the hoses and carefully pry up on the intercooler until it releases from the bracket.



TZ083A



TZ084A

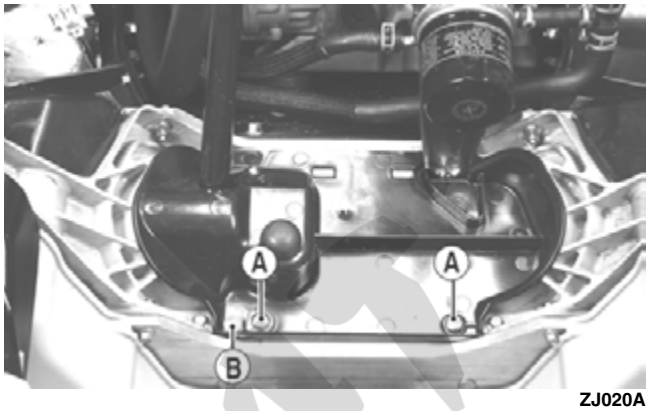
CAUTION

Any time hoses are removed from the turbocharger, always close-off the inlets and outlets of the turbo to avoid dirt or foreign objects from entering the turbocharger.



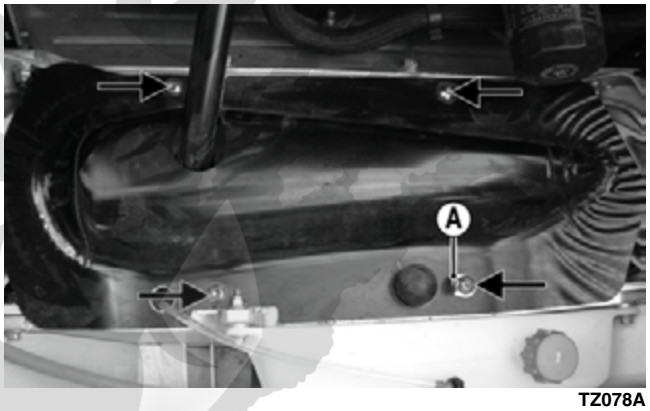
TZ086A

23. Remove the two cap screws (A) securing the close-off cover to the front end; then remove the cover and on the non-turbo models, account for the exhaust pipe mounting tab (B) from the right-side cap screw.



ZJ020A

■**NOTE: On the Bearcat Z1 XT, remove the four cap screws securing the close-off panel and account for the exhaust pipe mounting tab (A) from the left front cap screw.**



TZ078A

24. With the cover removed, move the steering post assembly to the right side of the engine compartment.

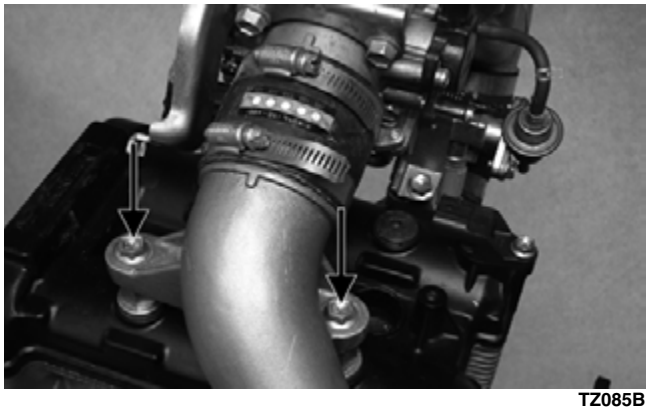
■**NOTE: Steps 25-30 are for the turbo model only.**

25. Loosen the clamps securing the hose to the intake pipe and throttle body.



TZ085A

26. Remove the two cap screws securing the intake pipe to the cylinder head cover; then remove the remaining cap screw securing the pipe to the left side of the cylinder head.

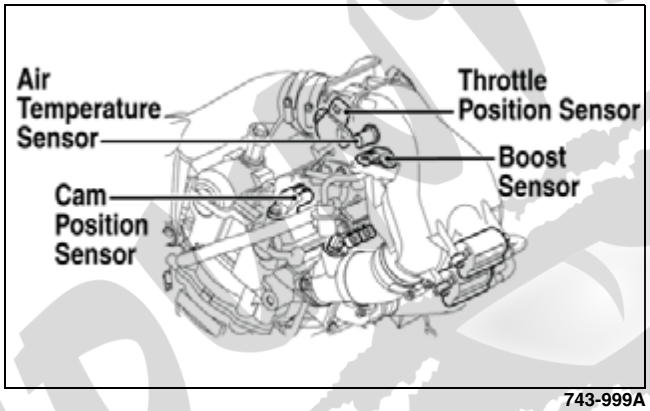


TZ085B



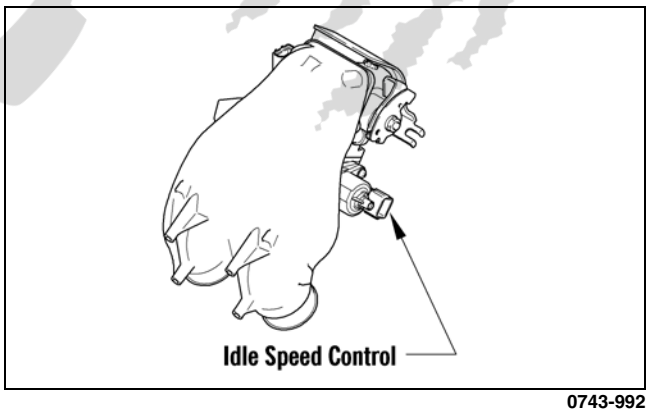
TZ099A

27. Disconnect the throttle position sensor, air temperature sensor, boost sensor, and cam position sensor.



743-999A

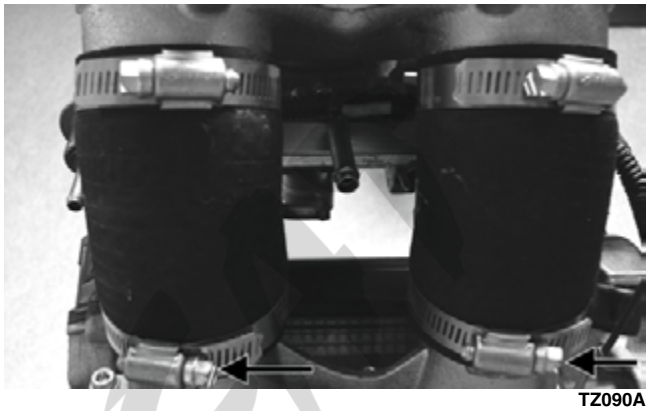
28. From the opposite side of the throttle body, disconnect the idle speed control and the throttle cable.



0743-992

29. Remove the spark plug wires from the spark plugs.

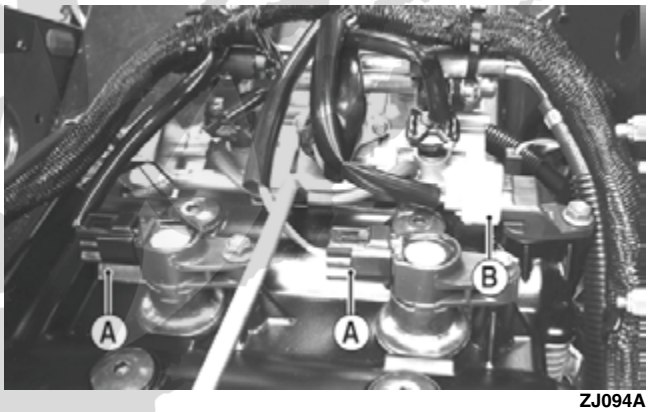
30. Loosen the flange clamps securing the intake manifold to the cylinder head; then remove the manifold and throttle body assembly along with the two flanges.



TZ090A

31. Remove the positive cable from the starter motor.

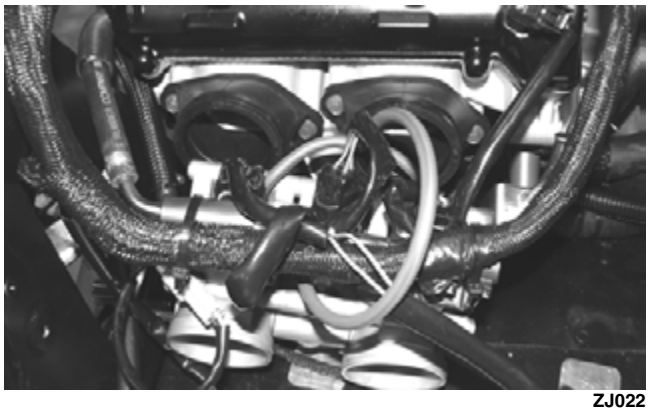
32. On the non-turbo models, disconnect the harness plug-ins from the ignition coils (A) and camshaft timing sensor (B).



ZJ094A

■NOTE: With the main harness plug-ins disconnected, secure the harness up and out of the way from the engine.

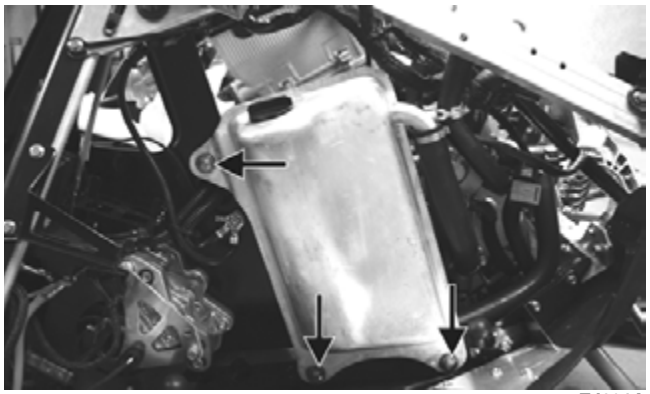
33. On the non-turbo models, loosen the clamps securing the throttle body assembly to the intake flanges; then remove the assembly and allow it to lie on the tunnel.



ZJ022

■NOTE: Close off the intake ports of the cylinder head to avoid any foreign objects or components from falling into the engine.

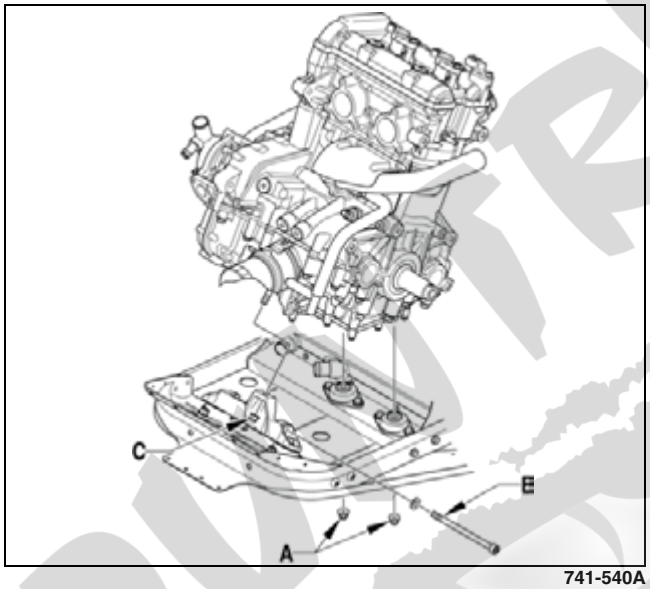
34. Remove the three cap screws securing the oil reservoir to the chassis.



ZJ021A

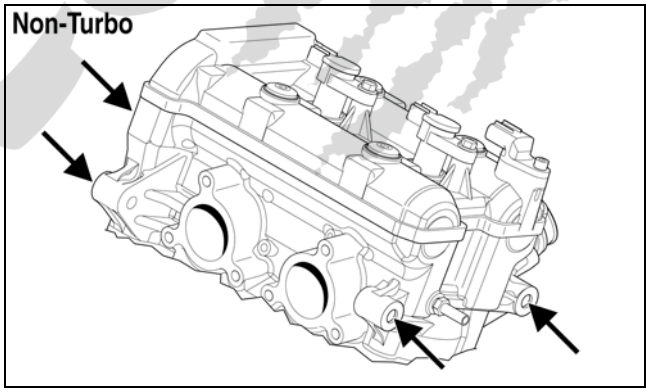
■**NOTE: The oil reservoir will be removed with the engine.**

35. Remove the two lock nuts (A) from under the chassis skid plate; then remove the through-bolt (B) and the lock nut (C) from the forward engine mount.

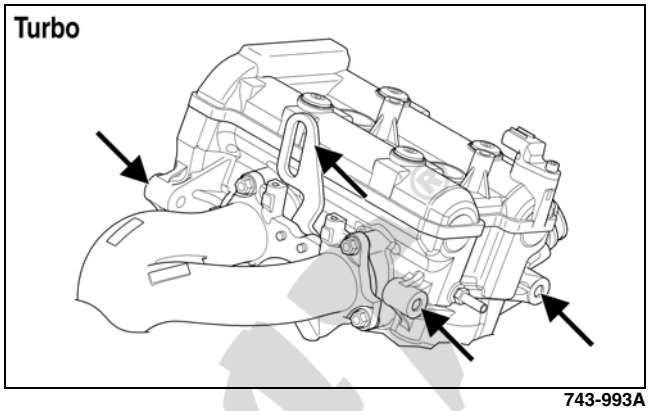


741-540A

36. Using an appropriate engine hoist, lift the engine (from the proper lift points) with oil reservoir from the chassis.



741-658A



743-993A

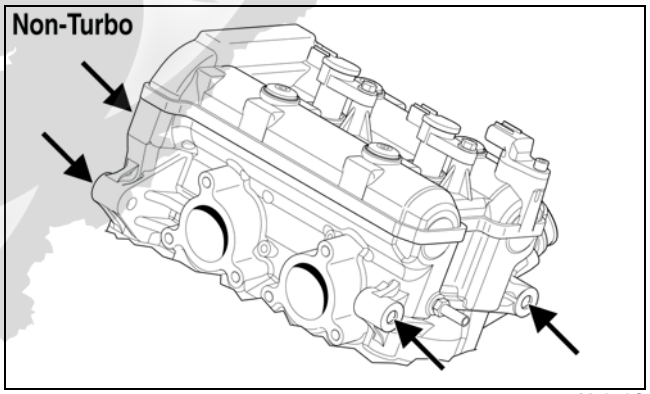
■**NOTE: Lift the engine at an angle (with the PTO-side upward) to allow clearance for the oil reservoir to be removed from the chassis with the engine.**

CAUTION

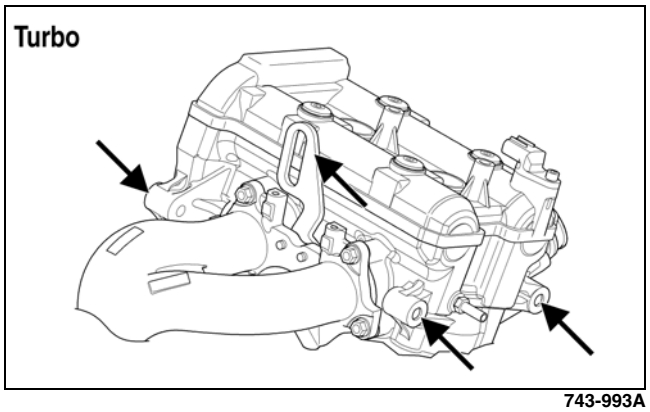
When lifting the engine out of the chassis, make sure that all harness connectors are disconnected and the harness is free and clear of the engine.

Installing

■**NOTE: Engine lift points consist of the four threaded holes on the front and rear corners of the cylinder head or on the exhaust manifold.**



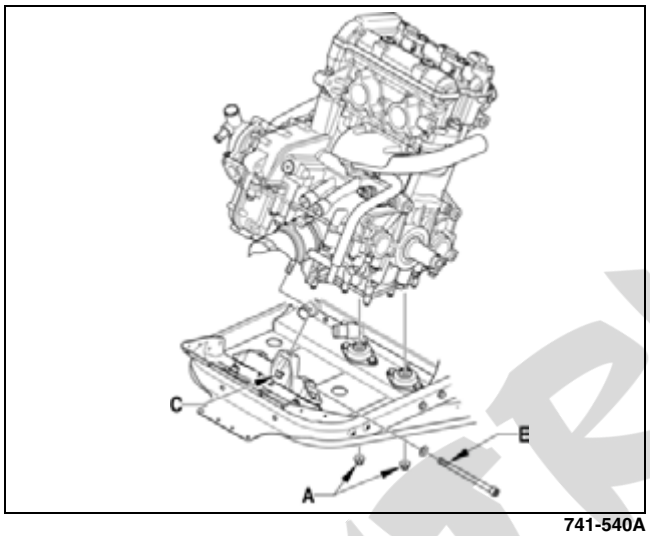
741-658A



743-993A

■**NOTE: Install the engine with the PTO-side directed upward at an angle to allow proper clearance for the oil reservoir to be positioned into the chassis.**

1. Using an appropriate engine hoist, carefully lower the engine into the engine compartment until the rear mount studs are into the rear mounts just far enough to hold the engine in place.
2. Pry the front engine mount forward until the engine and mount are in proper alignment; then lower the engine completely into the chassis.
3. Secure the engine to the chassis with lock nut (C) and long through-bolt (B) on the front engine mount; then install the two lock nuts (A) to the rear engine mounts. Tighten the mounting hardware to the following torque values:



741-540A

A. Rear mount lock nuts: 37 ft-lb.

B. Through-bolt: 30 ft-lb.

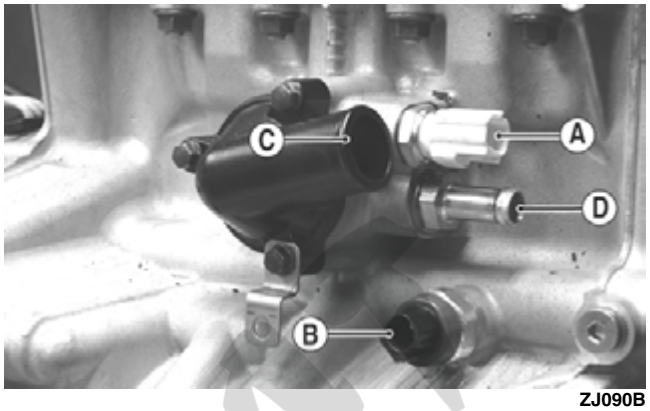
C. Front mount lock nut: 30 ft-lb.

4. Secure the oil reservoir to the chassis with three cap screws; then tighten securely.


ZJ021A

■NOTE: At this point if the oil filter was removed, install the new oil filter; then tighten to 15 ft-lb.

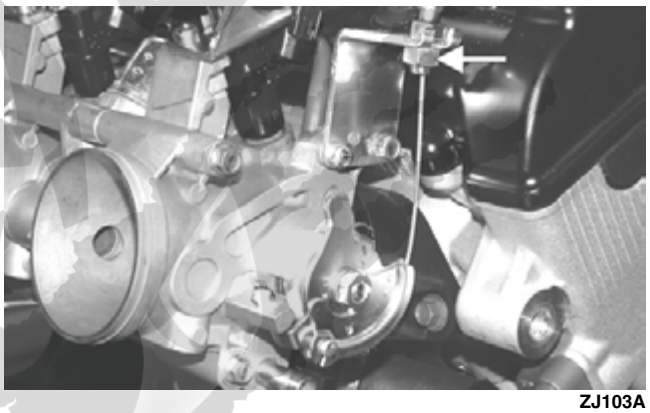
5. Install the starter motor cable with cap screws; then tighten securely.
6. Connect the wiring harness connectors to the coolant temperature sensor (A) and the oil pressure sensor (B); then install the heat exchanger coolant hose to the thermostat outlet (C) and oil cooler hose to the outlet (D) with the clamps. Tighten securely.



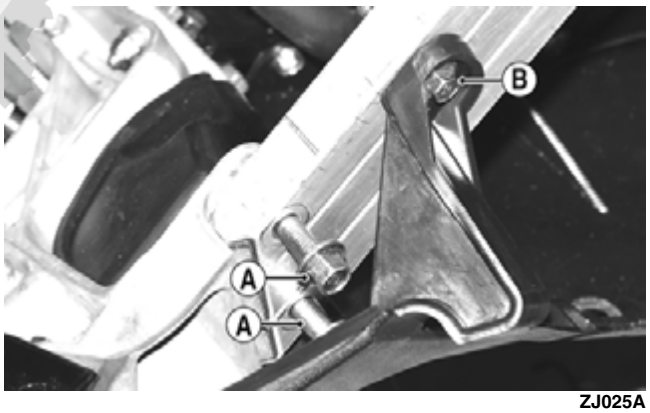
ZJ090B

■NOTE: Steps 7-10 are for the non-turbo models only.

7. Install the throttle bodies and secure with clamps; then install the throttle cable to the throttle bodies.

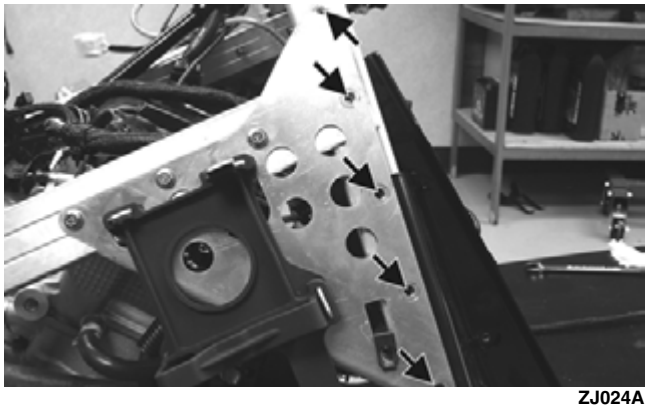

ZJ103A

8. Install the left-side upper frame to the chassis by installing the two cap screws and lock nuts (A) securing the frame to the front end; then installing the remaining cap screw and lock nut (B) securing the upper frame to the skid plate.



ZJ025A

9. Install the five cap screws and lock nuts securing the upper frame/support gusset to the steering support; then secure the headlight support bracket to the right-side upper frame with the two cap screws and lock nuts. Tighten all lock nuts securely.



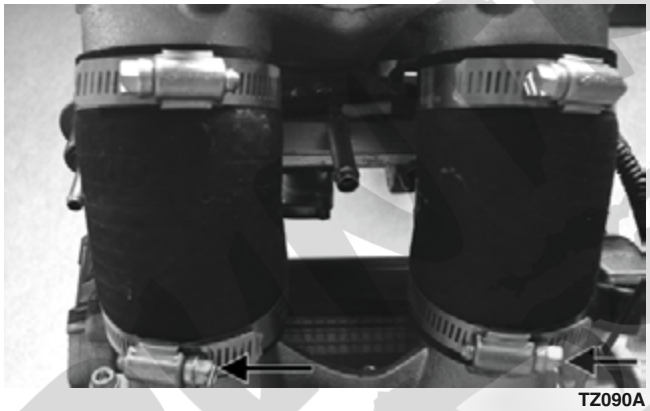
ZJ024A

■**NOTE: Prior to securing the left-side upper frame to the steering support, make sure the ECM harness is directed below the upper frame.**

10. Install the ECM to the left-side upper frame and secure with the hold-down strap; then install the MAP sensor to the bracket.

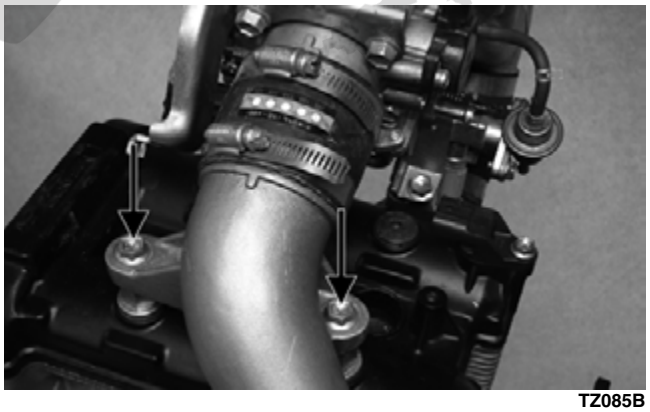
■**NOTE: Steps 11-15 are for the turbo model only.**

11. Install the flanges to the manifold adapter assembly and secure with the clamps; then install the manifold and throttle body assembly and secure with the two upper clamps.



TZ090A

12. Install the intake hose to the throttle body and slide the intake pipe into the hose; then secure the pipe to the cylinder head and cylinder head cover with the three cap screws. Tighten the two cap screws to the cover to 18 ft-lb and the remaining cap screw to the head to 37 ft-lb; then tighten the intake hose clamps securely.

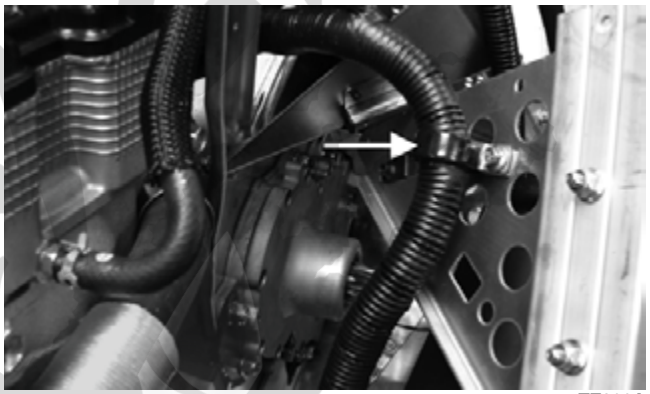


TZ085B



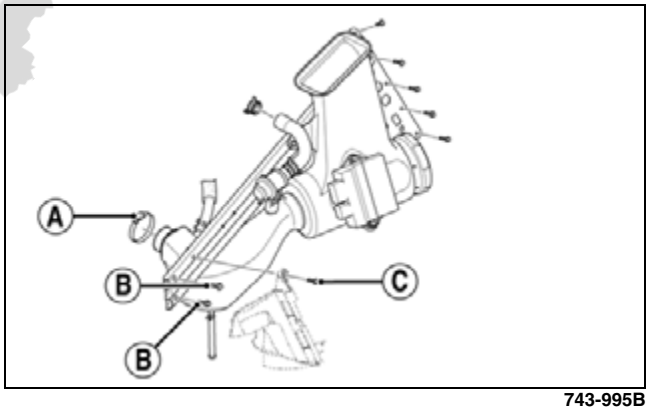
TZ099A

■**NOTE: Place the upper frame into position and install the clip securing the wire harness to the steering support gusset.**



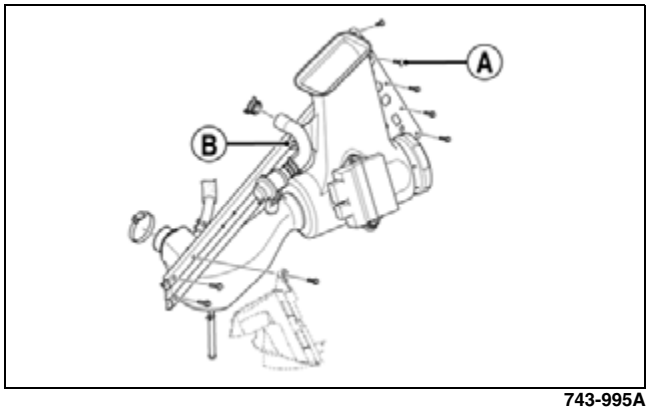
TZ098A

13. Install the lower air silencer to the turbocharger and tighten the hose clamp (A) securely; then with the upper frame in position between the steering support and the front end, install the two cap screws and lock nuts (B) securing the frame to the front end. Install the remaining cap screw (C) securing the air silencer and skid plate two the upper frame.



743-995B

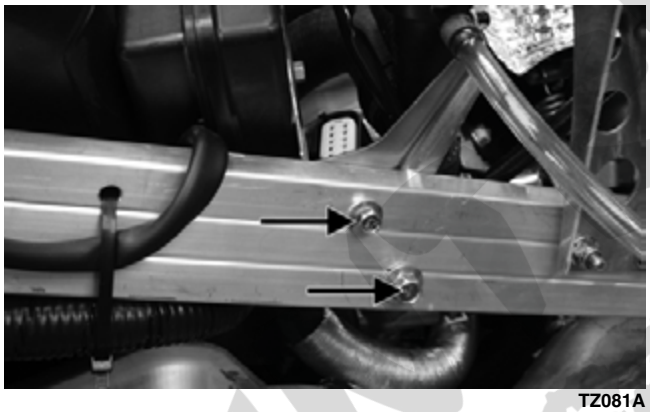
14. Install the gas hoses into the clip and with the upper air silencer in place, install cap screw (A) securing the upper frame, gas hose clip, and air silencer to the steering support; then install the remaining cap screw (B) securing the air silencer to the upper frame.



743-995A

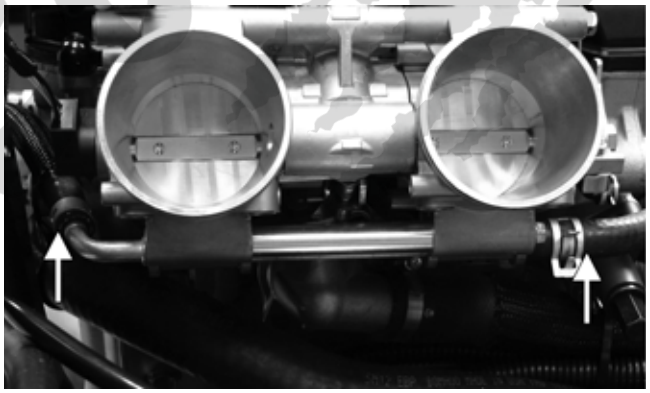
15. Install the four remaining cap screws securing the upper frame/support gusset to the steering support.

16. Install the coolant/separator tank assembly and secure to the right-side upper frame with cap screw and two lock nuts. Tighten securely; then install the hoses to the proper locations on the tank assembly and water pump as noted during removing. Secure with clamps.



TZ081A

■NOTE: At this time, make sure the coolant hoses from the coolant tank to the throttle body assemblies and throttle bodies to the left-side cylinder head are secured and properly routed. On the turbo model, make sure the throttle body coolant return hose is secured.

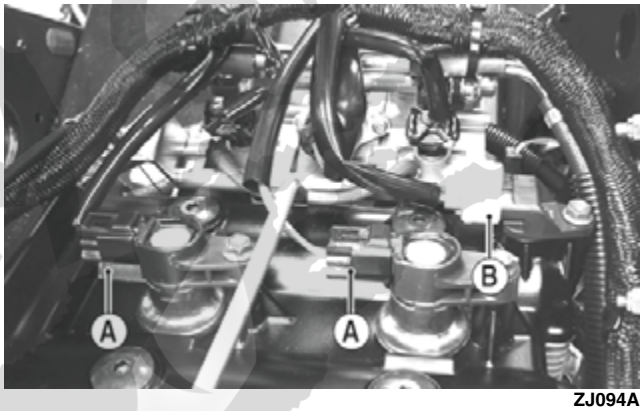


ZJ018B



TZ075A

17. Connect the harness plug-ins to the ignition coils (A) and camshaft sensor (B); then route the main harness to the proper connector locations and secure with cable ties as noted during removing.



ZJ094A

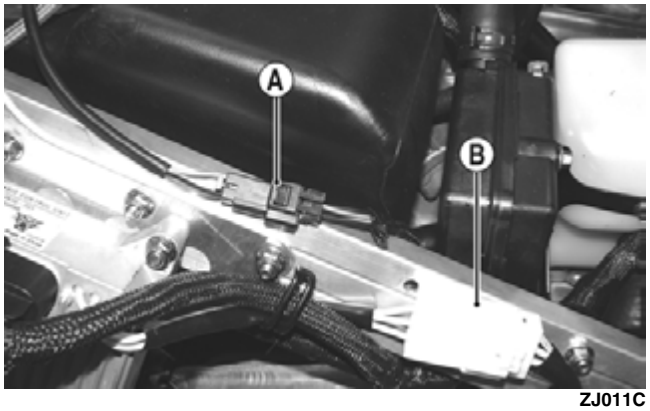
CAUTION

Make sure the harness is routed away from the exhaust or any moving parts.

18. On the turbo model, install the spark plug wires and the throttle cable to the throttle body clutch and bracket; then tighten the jam nuts securely.

19. On the non-turbo models, install the air silencer (see Section 3); then on all models, install the gas tank (see Section 8).

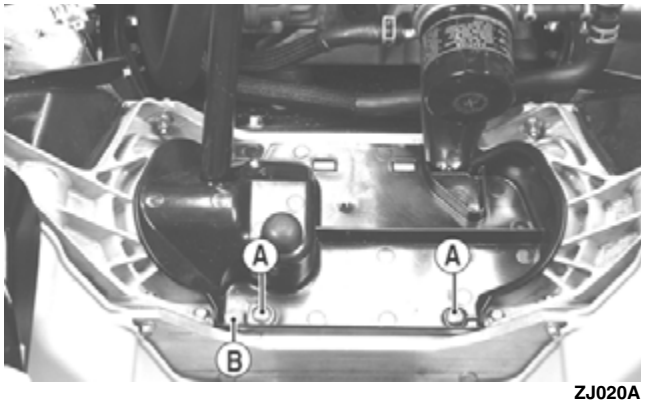
20. Connect the fuel pump four-wire connectors (A); then connect the harness plug-in (B) to the regulator/ rectifier.



ZJ011C

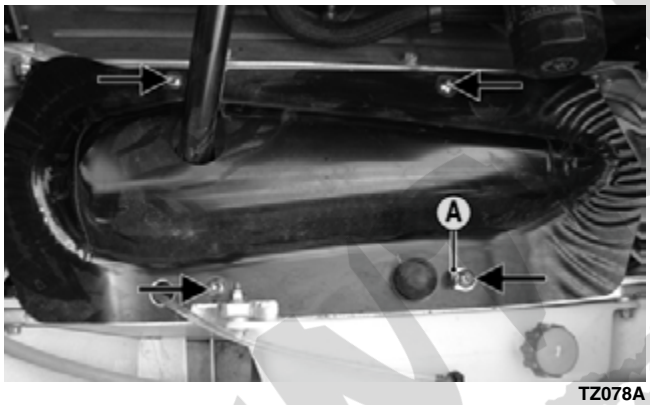
21. With the harness connected, install the air pressure sensor to the bracket on the right-side upper frame.

22. Install the close-off cover to the front end with the two cap screws (A) noting the mounting tab (non-turbo only) (B) is installed with the right-side cap screw. Tighten cap screws securely.



ZJ020A

■NOTE: On the Bearcat Z1 XT, install the close-off panel; then with the mounting tab (A) on the left front cap screw, secure the panel with the four cap screws.



TZ078A

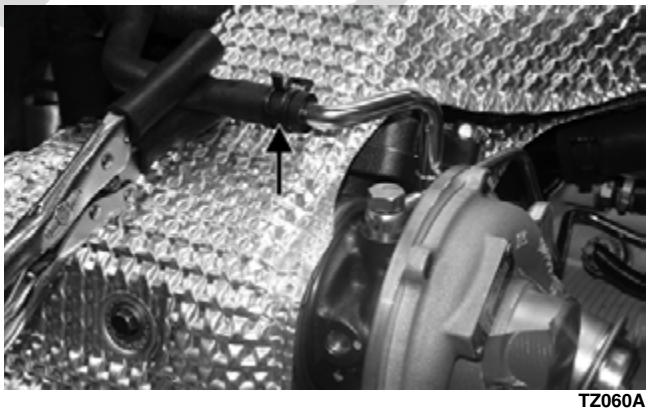
23. Place the resonator into position in the chassis and install the two springs securing the resonator to the chassis; then install the exhaust pipe and secure to the manifold and resonator with six springs.

■NOTE: On the non-turbo models, secure the resonator to the upper frame with the tab washer and hairpin clip.

24. Connect the harness plug-in for the oxygen sensor.

■NOTE: Steps 25-28 are for the turbo model only.

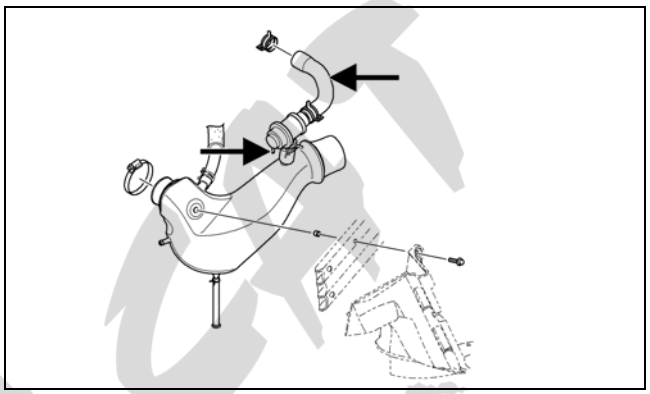
25. Install the upper heat shield; then connect the coolant return hose to the turbo and secure with the hose clamp.



TZ060A

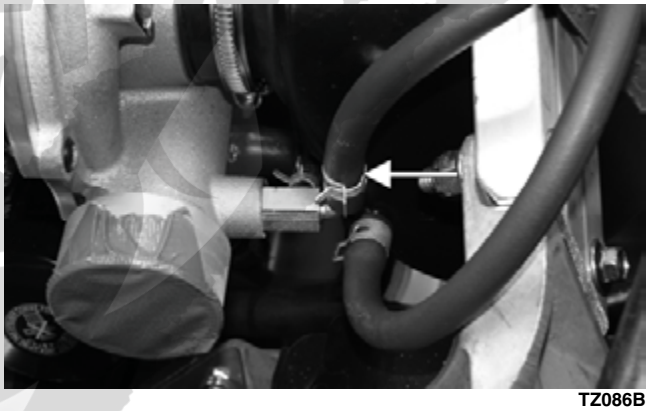
■NOTE: To aid in coolant bleeding procedure, do not secure the upper heat shield to the manifold at this point.

26. Connect the air bypass hose and the air bypass control valve hose to the intake pipe and secure with the clamps.



743-983A

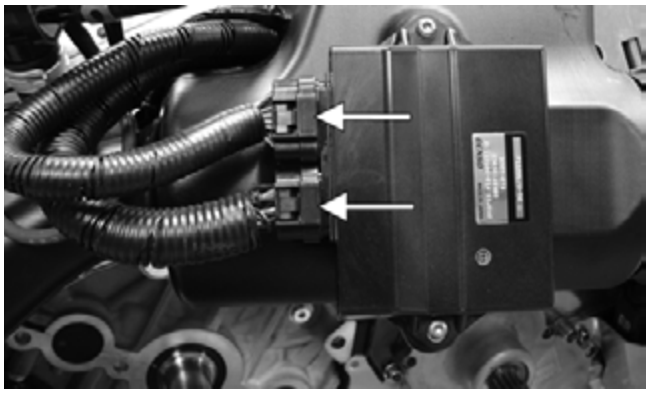
27. Install the hose from the waste gate control valve to the elbow fitting of the turbocharger and secure with the clamp.



TZ086B

28. Position the intercooler into the grommets of the mounting bracket; then connect the intercooler hoses to the turbo and to the intake plenum. Tighten all hose clamps securely.

29. Connect the harness connector to the ECM.

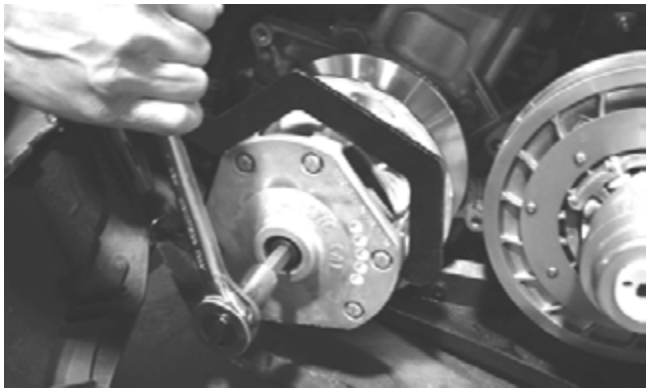


TZ072A

■NOTE: Before installing the drive clutch, be sure to wipe both the crankshaft taper and clutch mounting taper clean using a clean towel.

30. Place the drive clutch into position on the crankshaft and secure with the cap screw and lock washer. Tighten to 51 ft-lb.

■NOTE: To aid in proper tightening of the drive clutch cap screw, apply a few drops of oil to the threads of the cap screw prior to installing.



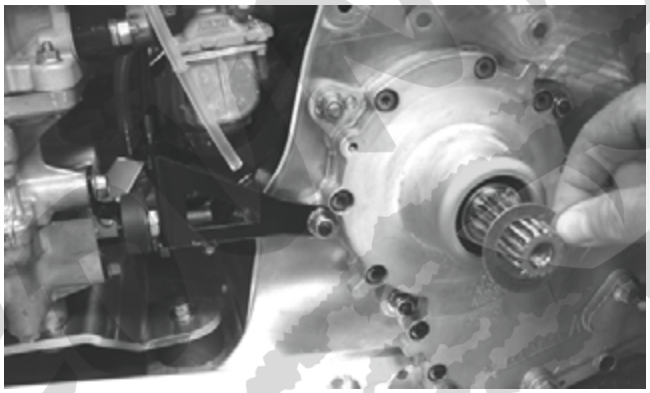
ZJ294

CAUTION

When installing the drive clutch, do not tighten the clutch cap screw with any kind of impact tool. Tighten cap screw using a hand torque wrench only. Failure to do so could result in stationary sheave damage.

■NOTE: Apply a coat of Anti-Seize Thread Compound to the splines of the input shaft.

31. Install the driven clutch on the gear case input shaft making sure the alignment washers (if applicable) are in place.



FZ021

CAUTION

Do not allow the driven clutch to "float" on the input shaft. Damage to the driven clutch will occur.

32. Secure the driven clutch with components and hardware as noted in removing. Tighten to 32 ft-lb.



FZ019

CAUTION

Do not apply Loctite to the cap screw or damage to the gear case will occur.

33. Check drive clutch/driven clutch alignment.

34. Install the drive belt (so the part number can be read); then install the belt guard.

⚠ WARNING

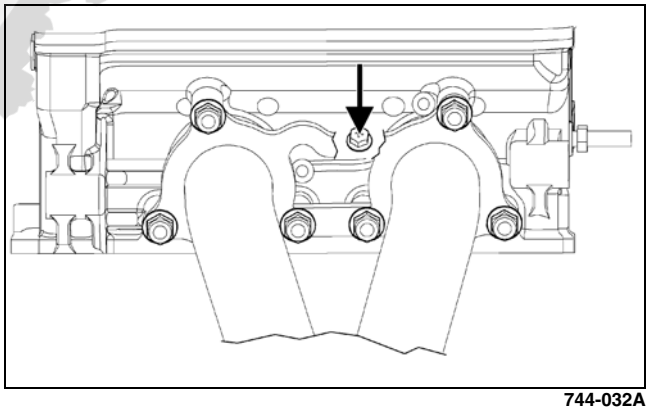
Never run the engine without the belt guard secured.

35. Install the battery; then secure with the hold-down plate. Connect the positive cable and then the negative cable.

⚠ WARNING

Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

36. With all coolant hoses installed and secured as noted during disassembling, loosen the bleed screw and add coolant into the filler neck until coolant is visible at the bleed screw; then tighten the bleed screw and add coolant to the coolant reservoir Full-Cold line.

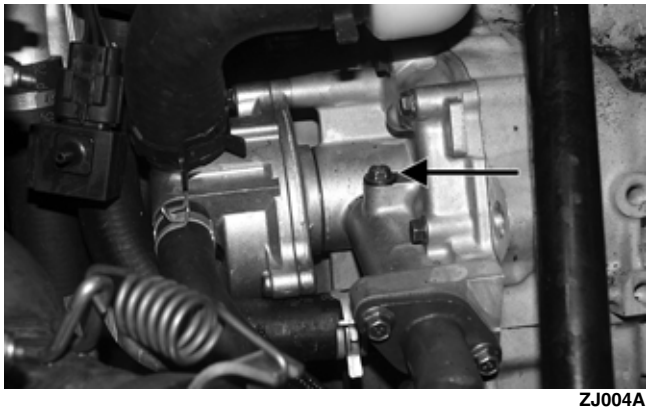


744-032A

37. If the engine oil was drained, remove the filler cap from the oil reservoir and add the recommended amount of oil using the following procedure. If the engine oil was not drained, start the engine and allow it to run for 5 minutes. Inspect for any signs of coolant leaks; then proceed to step 38.

    A. Pour 2.9 l (3 U.S. qt) of the recommended engine oil into the oil reservoir.

    B. Open the air bleed bolt located on the oil pump (beneath coolant tank) to purge air from the oil hose.



ZJ004A

■NOTE: When air can no longer be heard purging from oil pump bleed, tighten the bleed bolt to 7.5 ft-lb.

C. Without starting the engine, place the handlebar emergency stop switch to the RUN position and the ignition switch to the ON position. The Oil Pressure Warning Light should illuminate.

D. If the warning light illuminates (from step C), start the engine. The warning light should go out within five seconds. If it does, proceed to step E.

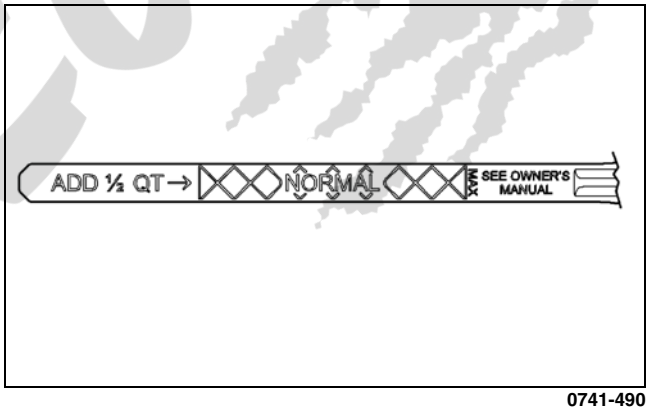
■NOTE: If the warning light does not go out, shut the engine off immediately and repeat step B; then place the ignition switch to the ON position and repeat step D.

E. Shut the engine off and pour the remaining amount (0.9 l or 1 U.S. qt) of recommended oil into the oil reservoir; then proceed to check engine oil level.

F. Start the engine and allow it to warm up for 5-10 minutes.

G. Shut the engine off; then remove the oil level stick from the oil reservoir. Wipe the stick clean.

H. Insert the oil level stick into the oil reservoir without threading it in and remove. Read the oil level shown on the stick. The oil level should be near the middle of or on the high end of the NORMAL range on the stick.



0741-490

CAUTION

After running the engine to the proper operating temperature, shut the engine off; then open the hood and access panels and inspect for any signs of coolant, gasoline, or oil leakage.

38. With the engine cool, loosen the bleed screw and allow the coolant level in the filler neck to drop; then with the bleed screw loose, add coolant into the filler neck until no air is visible or heard at the bleed screw. Tighten the bleed screw and add coolant to the reservoir if necessary.

■NOTE: If the coolant level in the filler neck suddenly drops when the bleed screw is loosened, an air-lock occurred in the cylinder head. Add coolant to the filler neck until full before starting the engine.

CAUTION

Running the engine with low coolant level can cause severe engine damage.

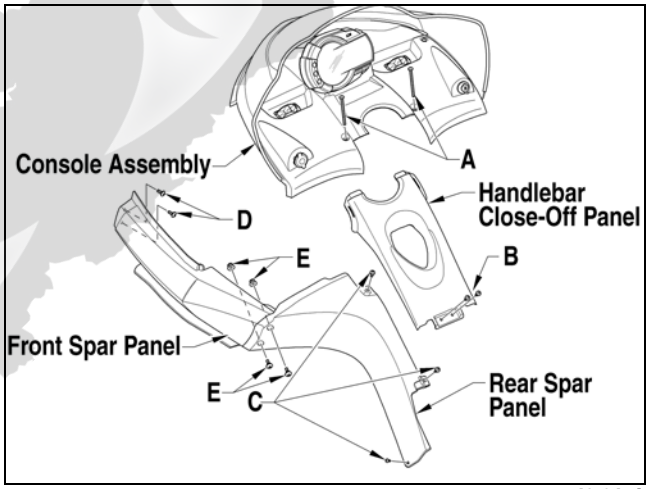
39. Start the engine and allow it to run for five minutes. Inspect for any signs of coolant leaks in the engine compartment; then shut the engine off and allow it to cool.

40. Repeat steps 38-39 at least two more times (more if necessary) until no air is in the cooling system.

CAUTION

Operating the snowmobile with air in the cooling system will cause severe damage to the engine.

41. Install the front/rear upper side panels; then secure the panels with the five torx-head cap screws for each side.



743-945A

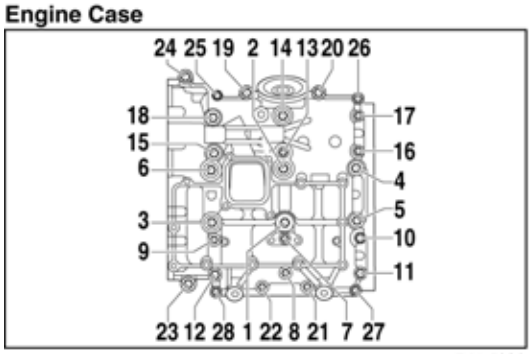
42. Install the handlebar close-off panel; then secure the panel with the two torx-head cap screws. Position the console assembly on the headlight support bracket; then connect the console/main harness. Secure the console with the two torx-head cap screws.

■NOTE: Recheck the tightening torque of the drive clutch cap screw.

43. Install the hood; then install the side access panels and secure with existing mounting hardware.

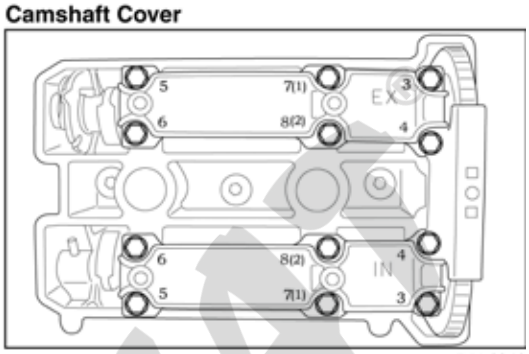
Engine Torque Patterns (1100 cc)

Engine Case



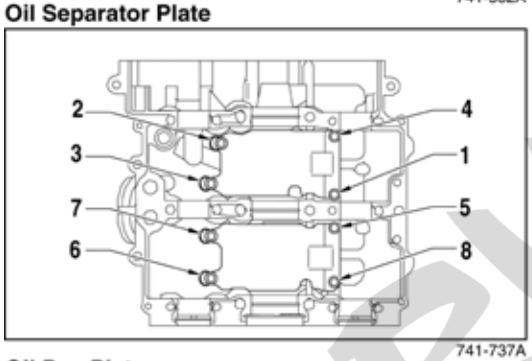
741-582A

Camshaft Cover



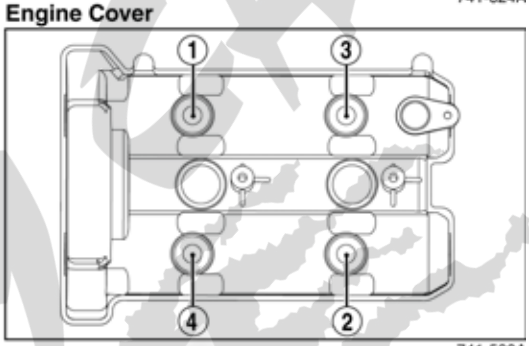
741-624A

Oil Separator Plate



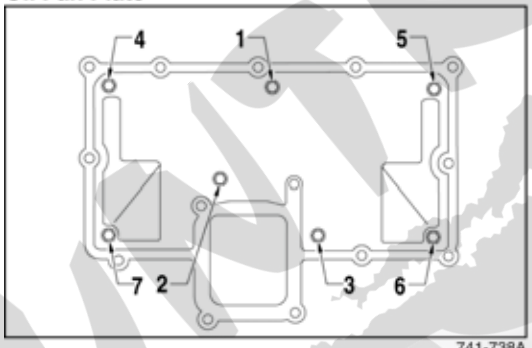
741-737A

Engine Cover



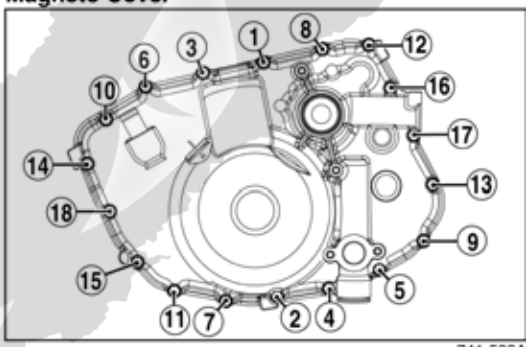
741-580A

Oil Pan Plate



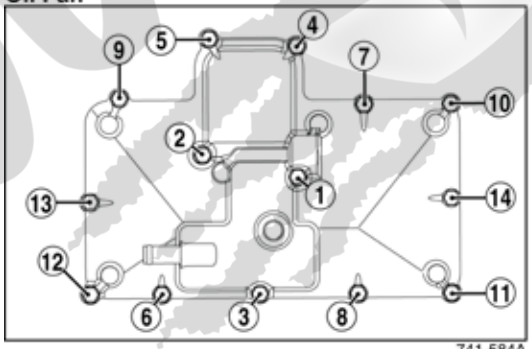
741-738A

Magneto Cover



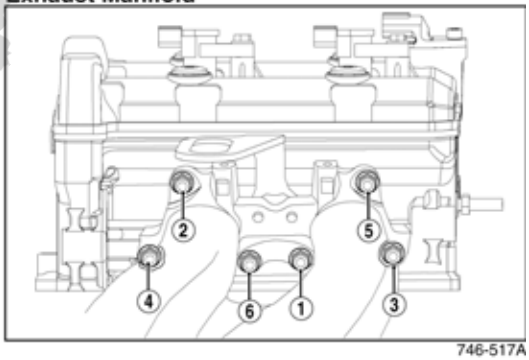
741-583A

Oil Pan



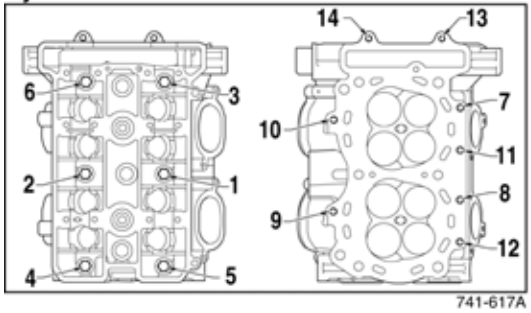
741-584A

Exhaust Manifold



746-517A

Cylinder Head

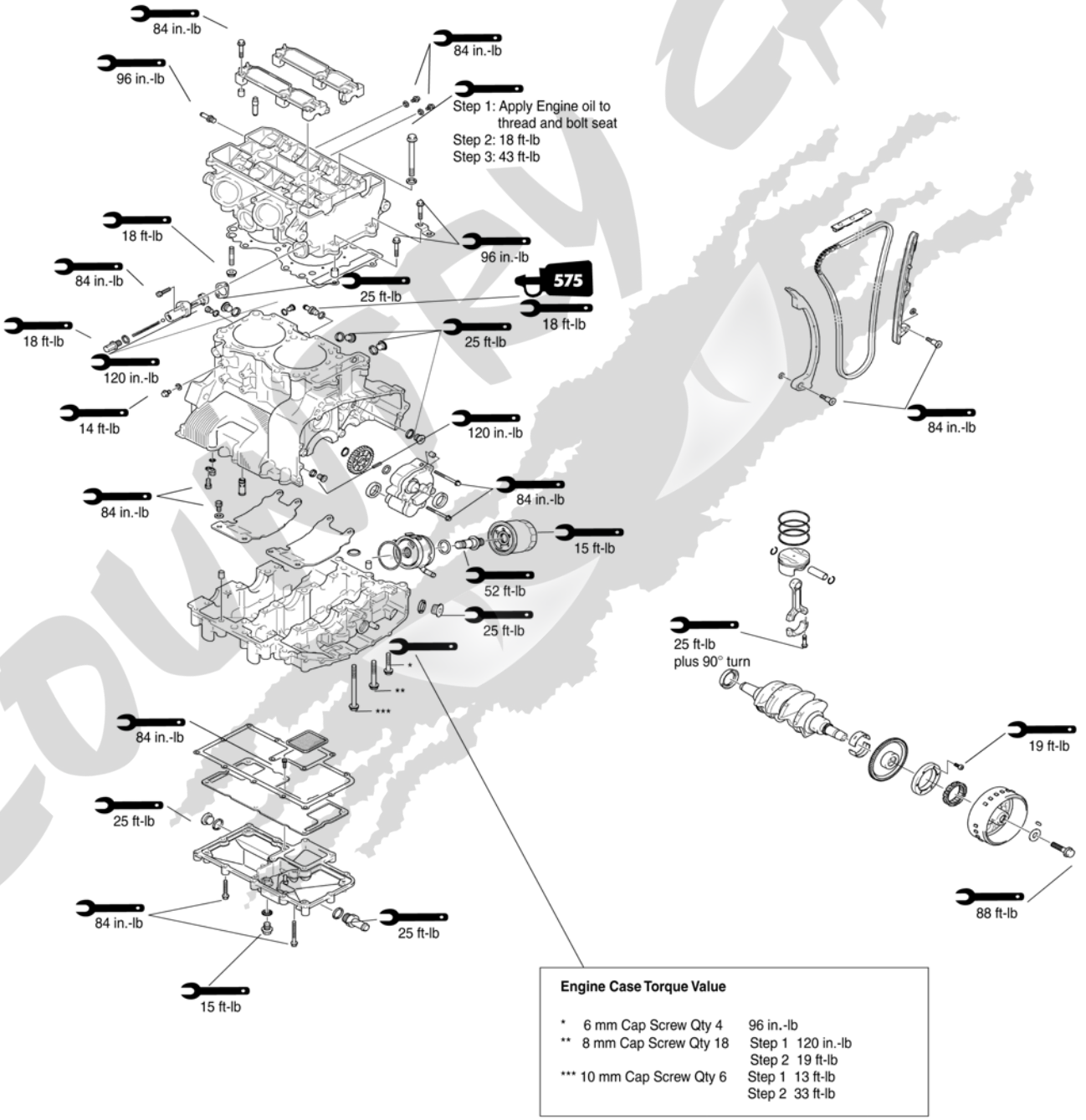


741-617A

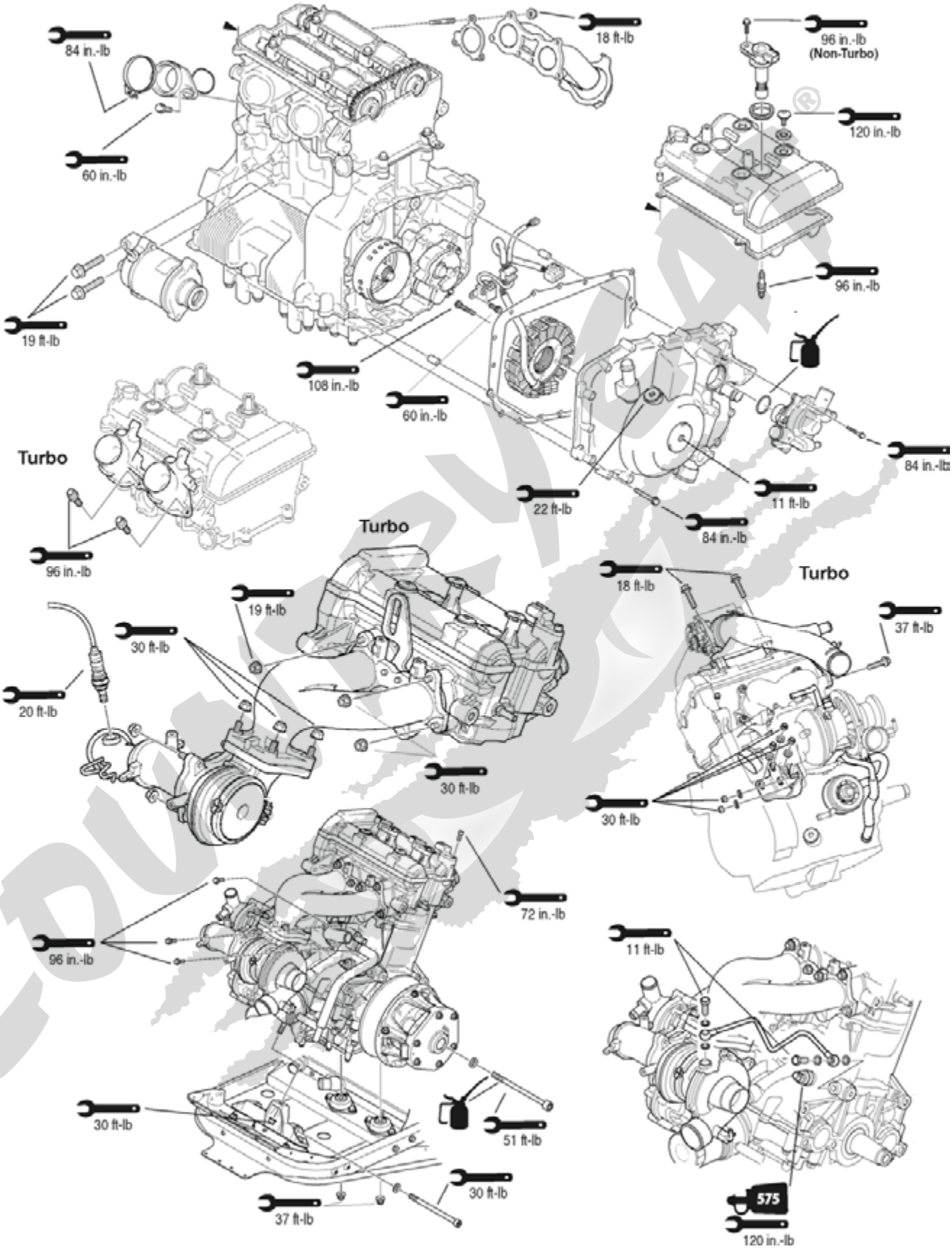
1100TorquePattern12

Assembly Schematic - 1100 cc

Torque Specification Tolerances	
Torque (ft-lb)	**Tolerance**
0-15	±20%
16-39	±15%
40+	±10%



1100ccJAG12



1100ccZ1RV10

Engine Removing/ Installing - F/M/XF 1100

This engine sub-section has been organized to show a progression for the removing/installing of the Arctic Cat 1100 cc (F/M/XF) engine. For consistency purposes, this subsection shows a complete and thorough progression; however, for efficiency it may be preferable to remove only those components needing to be addressed. Also, some components may vary from model to model. The technician should use discretion and sound judgment.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this engine section.

Description	p/n
Drive Clutch Bolt Tool	0644-281
Drive Clutch Puller	0744-062
Drive Clutch Spanner Wrench	0644-136
Engine Lift Plate	0744-073
Hood Harness Extension	1686-659

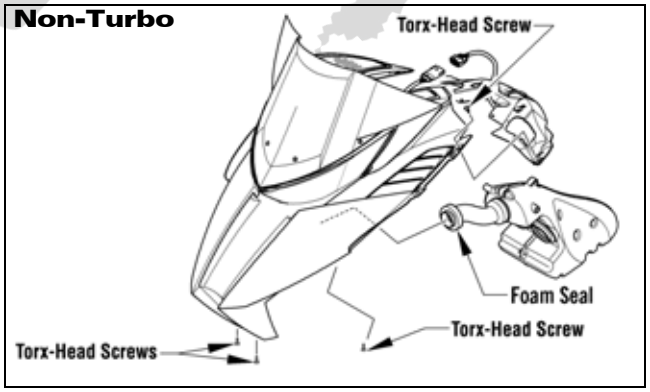
■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

CAUTION

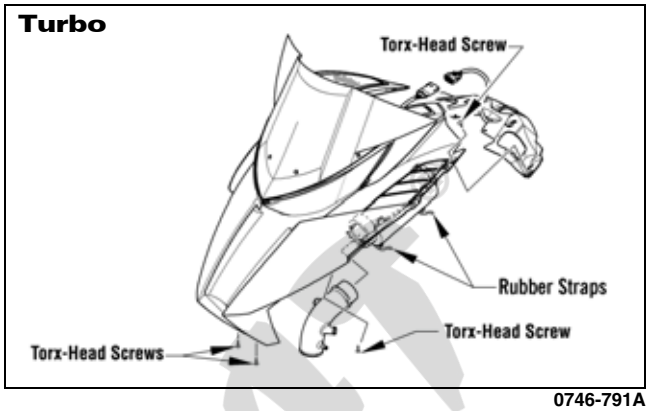
Never attempt to substitute any other drive clutch puller for the recommended puller or severe clutch or crankshaft damage will occur.

Removing

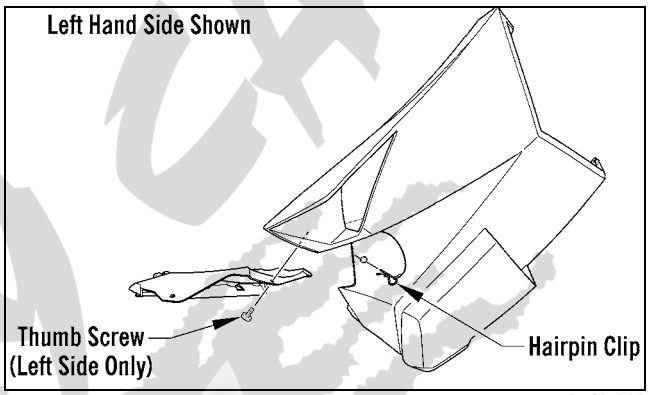
■NOTE: Prior to removing the engine, disconnect the hood harness and the air intake connector from the air silencer; then remove the cables and pins securing the hood to the front end, remove the hood, and remove the access panels.



0746-792A



0746-791A



0746-800

■NOTE: At this point if the technician's objective is to service Top-Side Components, the engine does not have to be removed from the chassis. Proceed to Servicing Top-Side Components.

1. Remove the seat (see Section 8); then disconnect the battery cables (negative cable first) and solenoid harness.

■NOTE: On the LXR/LTD models, disconnect the seat heater harness connector.

2. Remove the retaining nut from the neck of the gas tank and the two screws securing the upper console and disconnect the wires from the reverse alarm; then loosen the ¼ turn screws securing the lower console to the skid plate and remove both upper and lower consoles.

■NOTE: On the LXR/LTD models, disconnect the seat heater harness from the seat heater switch.

3. Remove the gas tank (see Section 4).

4. Disconnect the two harness connectors from the ECM; then remove the rear belt guard and ECM.

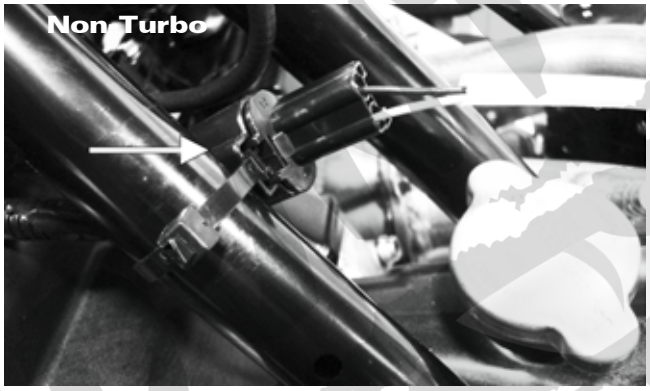


PC027A

5. Remove the cap screw from the driven clutch and slide the driven clutch (along with the drive belt) off the driven shaft. Account for alignment washers and sheave adjuster.
6. Using Drive Clutch Bolt Tool, remove the cap screw and high-collar washer securing the drive clutch to the crankshaft.
7. Using Drive Clutch Puller Drive Clutch Spanner Wrench, tighten the puller. Remove the drive clutch.

■NOTE: If the drive clutch will not release, sharply strike the head of the puller. Repeat this step until the clutch releases.

8. Disconnect the oxygen sensor and remove the spring securing the resonator to the chassis.



PC024A

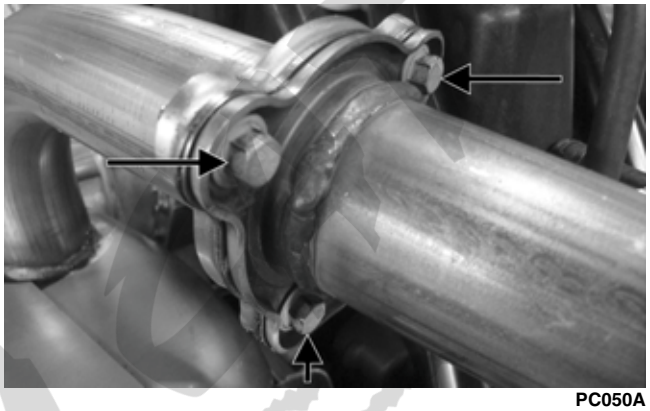


PC227

■NOTE: Before removing the cap screws and nuts securing the resonator, be sure to apply a small amount of penetrating oil to the threads of the cap screws.

9. On the non-turbo models, remove the flange nuts securing the MAG- and PTO-side exhaust pipes to the engine and remove the exhaust and resonator pipes from the chassis.

■NOTE: On the turbo models, remove the three cap screws and lock nuts securing the exhaust resonator to the exhaust pipe; then remove the resonator.



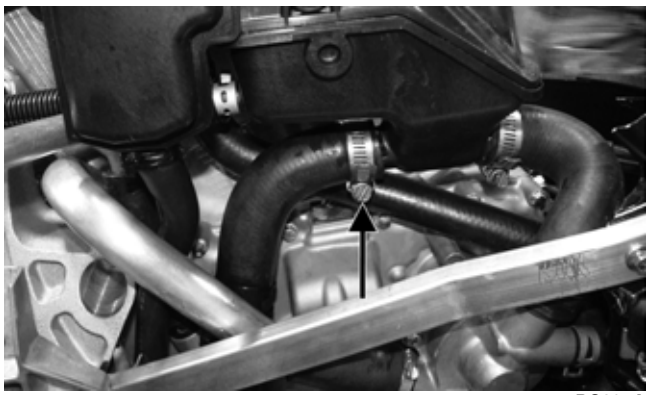
PC050A

10. With a funnel in position between the oil reservoir and the exhaust opening of the skid plate, remove the drain plug from the oil reservoir. After the oil has drained, install the drain plug with a new O-ring (if necessary) and tighten to 15 ft-lb.



PC065

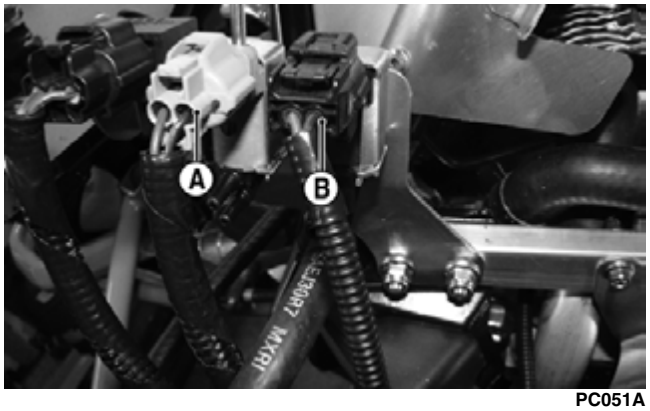
11. Using a suitable vacuum pump, remove the coolant from the coolant/oil separator tank; then loosen the clamp and remove the hose from the tank and the lower heat exchanger. Remove the coolant from the lower exchanger.



PC025A

■NOTE: Steps 12-16 are for the turbo models only.

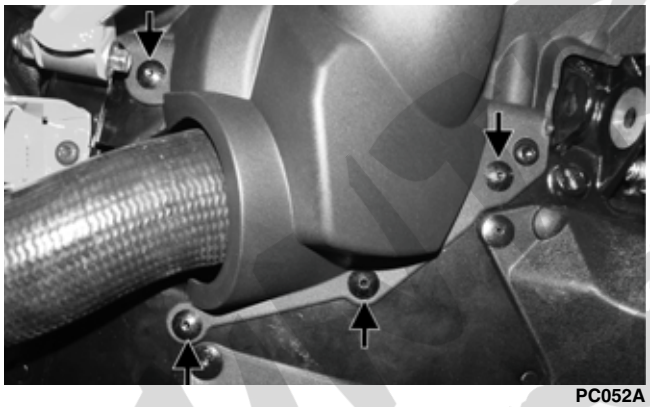
12. Disconnect the harness connectors and hoses from the air bypass control valve (A) and waste gate control valve (B).



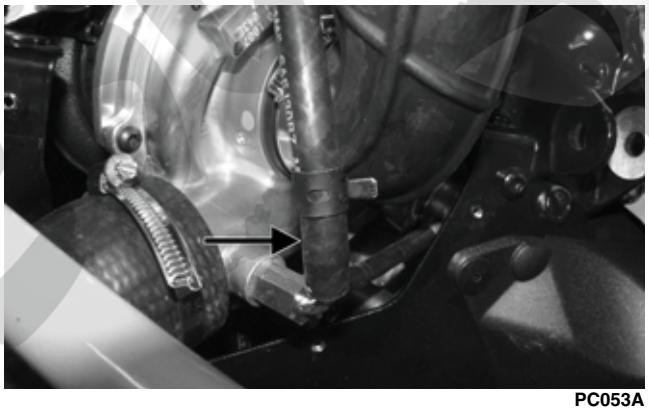
PC051A

■NOTE: For installing purposes, note the location and routing of the harness connectors and hoses.

13. Remove the screws and turbocharger cover; then remove the waste gate control valve hose from the turbocharger noting the location of the clamp for installing purposes.

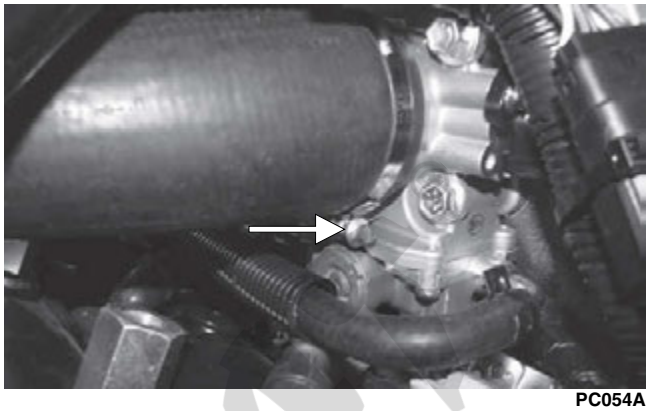


PC052A

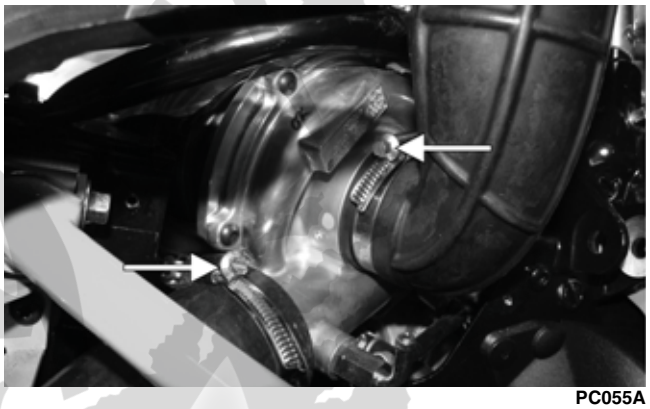


PC053A

14. Loosen the clamp securing the intercooler hose to the throttle body; then loosen the clamps securing the air intake and intercooler hose to the turbocharger.



PC054A



PC055A

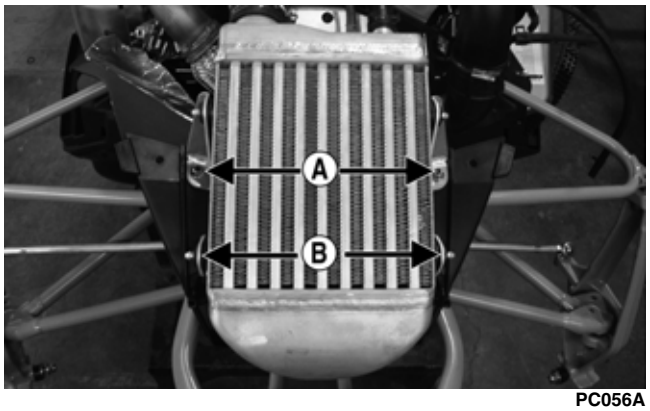
CAUTION

Seal the turbocharger with tape to avoid any dirt or foreign objects from falling into the turbocharger.



PC059A

15. Remove the lock nuts and screws (A) securing the rear intercooler brackets to the chassis and remove the brackets from the intercooler; then carefully pry the intercooler out from the front brackets (B) and remove the intercooler with the air bypass valve and hoses.



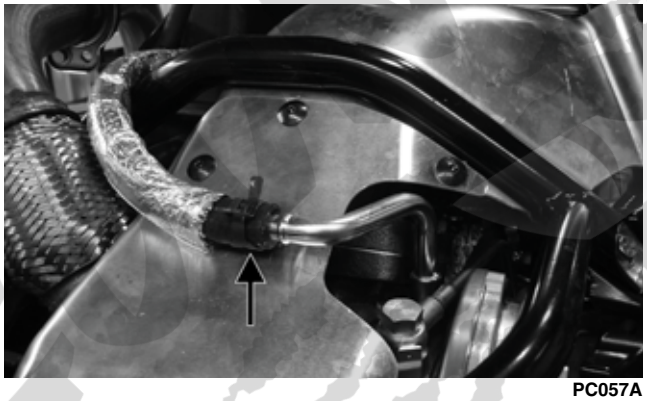
PC056A

■**NOTE: At this point, removing the front fascia will aid in engine removal.**

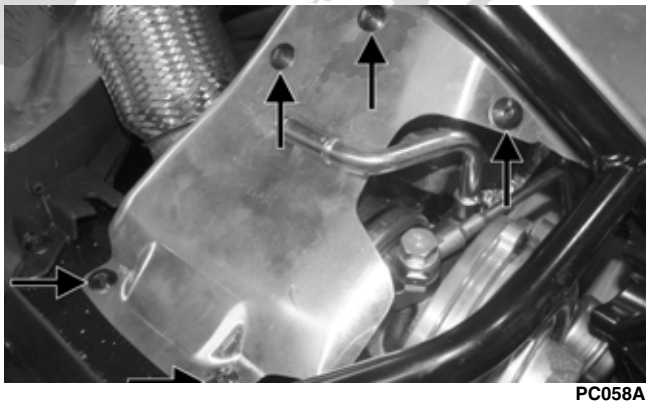


PC540A

16. Remove the coolant return hose from the turbocharger; then remove the screws securing the front heat shield to the chassis and rear heat shield.

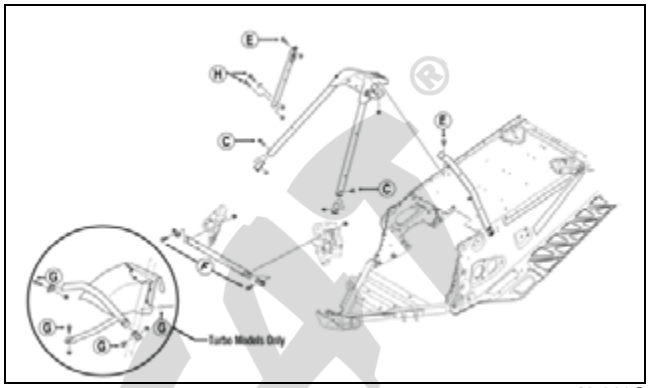


PC057A



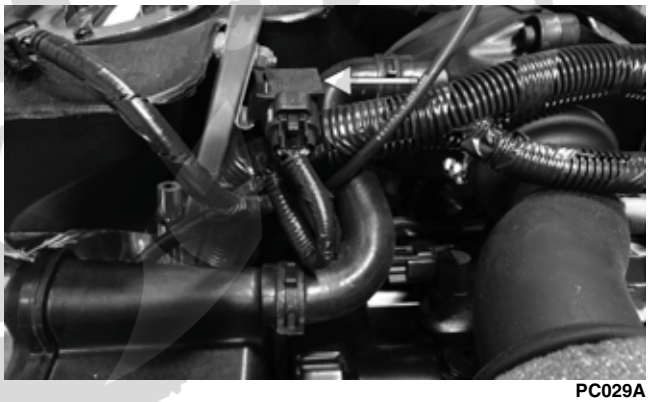
PC058A

17. Remove the cap screws (E) and (H) securing the side supports; then remove the supports noting the position of the cable ties and harnesses.



746-292C

■**NOTE: On the non-turbo models before removing the MAG-side support, the MAP sensor must be removed and the cable ties securing the wire harness and vent hose must be removed.**



PC029A

18. Remove the cap screws and nuts securing the front spars to the steering support; then remove the torx-head screws securing the steering post bracket to the steering support. Remove the steering support.



PC030

19. Remove the cap screws (F) or (G) securing the shock mounting bracket support to the shock mounting brackets; then remove the cap screws (C) securing the lower front spars to the shock mounting brackets. Remove the shock mounting bracket support and front spars accounting for the spar inserts.

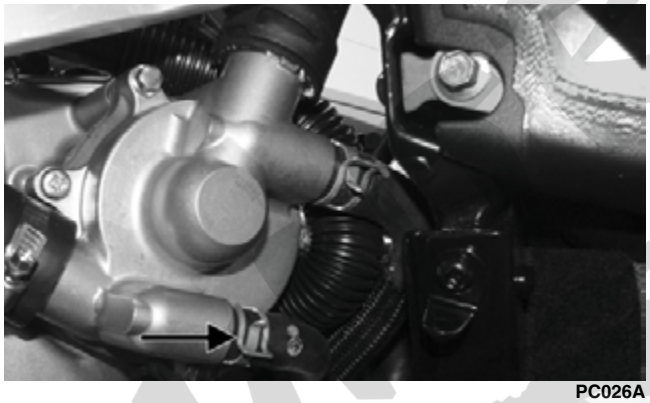
■**NOTE: On the turbo models, the shock mounting bracket support, left front spar, and heat shield are removed as an assembly.**

20. Remove the MAG-side chassis support. Account for and note the location and orientation of the resonator spring tab and resonator support bracket.



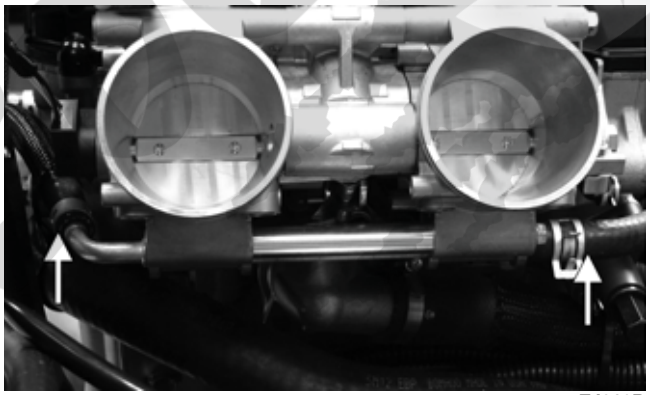
PC210A

21. Clamp off the coolant bypass hose and remove the hose from the water pump; then add a length of hose to the bypass hose and route the hose out of the exhaust opening of the skid plate. Drain the remaining coolant.



PC026A

22. Remove the throttle body coolant hoses.



ZJ018B



PC211A

23. Disconnect the harness connectors from the coolant temperature sensor (A), oil pressure switch (B), and air pressure sensor (C).



PC028A

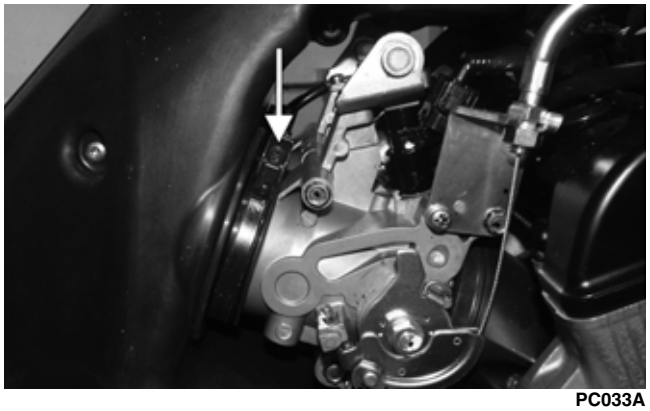
24. Loosen the clamps and remove the drain and vent hoses and the throttle body coolant hose from the coolant/oil separator tank; then remove the tank from the bracket on the engine.



PC032

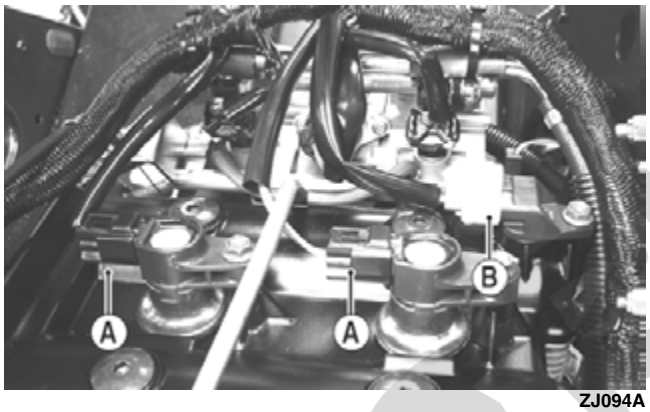
■**NOTE: Steps 25-27 are for the non-turbo models only.**

25. Loosen the clamps securing the air silencer to the throttle bodies; then disconnect the harness connector from the air temperature sensor and remove the air silencer.



PC033A

26. Disconnect the harness plug-ins from the ignition coils (A) and camshaft timing sensor (B).



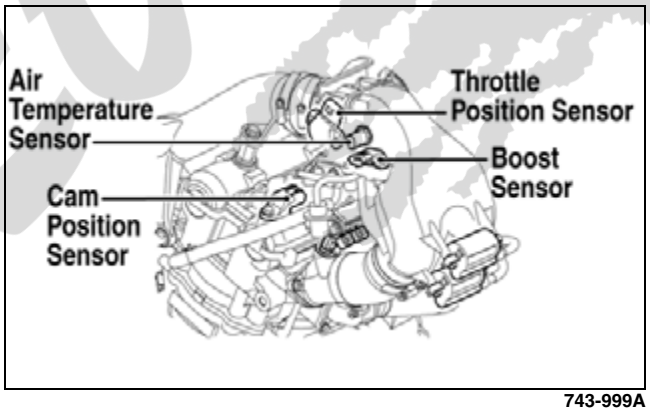
ZJ094A

■**NOTE: With the main harness plug-ins disconnected, secure the harness up and out of the way from the engine.**

27. Loosen the clamps securing the throttle body assembly to the intake flanges; then remove the assembly and allow it to lie on the tunnel.

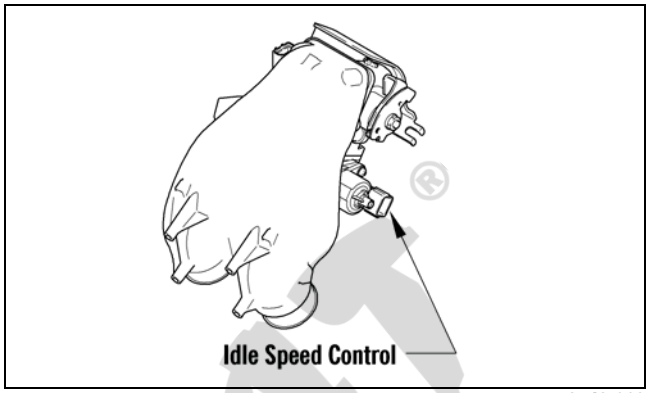
■**NOTE: Steps 28-30 are for turbo models only.**

28. Disconnect the throttle position sensor, air temperature sensor, boost sensor, and cam position sensor.



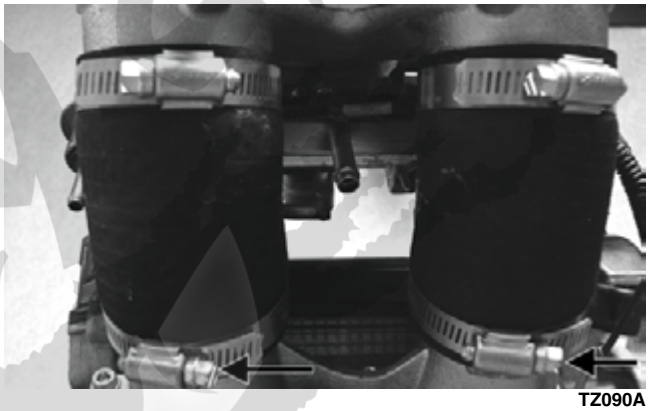
743-999A

29. From the opposite side of the throttle body, disconnect the idle speed control and the throttle cable; then remove the spark plug caps from the spark plugs.



0743-992

30. Loosen the flange clamps securing the intake manifold to the cylinder head; then remove the manifold and throttle body assembly along with the two flanges.

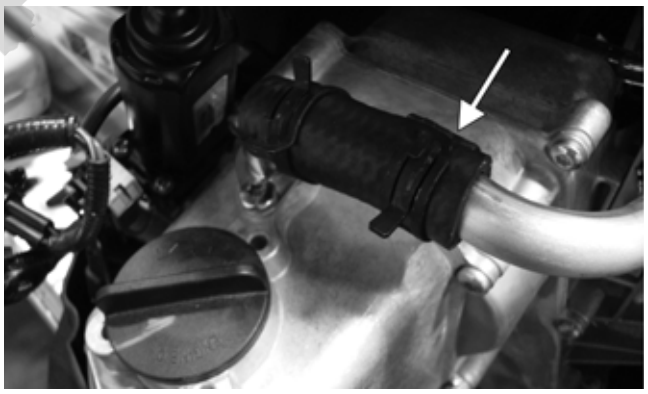


TZ090A

CAUTION

Seal the intakes with tape to avoid any dirt or foreign objects from falling into the intakes.

31. Loosen and remove the oil tank/engine breather hose; then remove the cap screws securing the oil return hose from the engine. Remove the oil return hose.

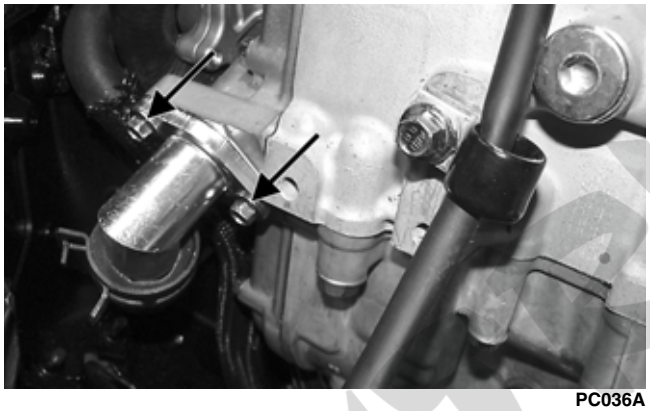


PC034A



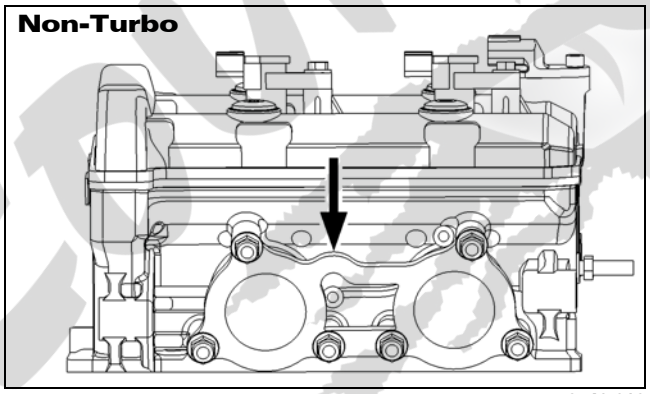
PC243

32. Remove the two cap screws securing the elbow fitting of the oil supply hose to the engine; then secure the hose and fitting up and out of the way.

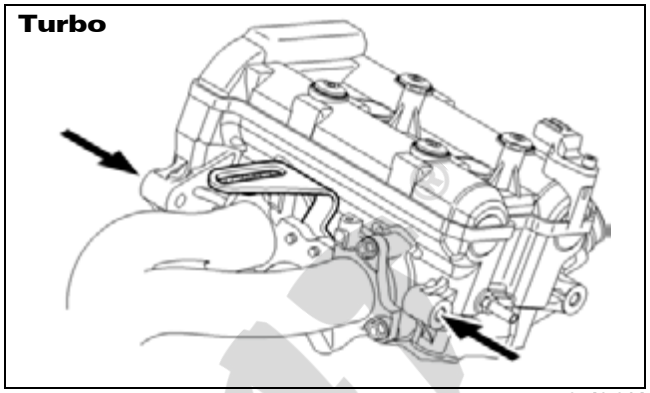


PC036A

■NOTE: On the non-turbo, install Engine Lift Plate. On the turbo models, secure a suitable length of chain of adequate strength to each side of the cylinder head with two 10 mm cap screws threaded through the mounting hole of the cylinder head.



0746-313



0746-314

■NOTE: Before removing the mounting hardware securing the engine to the chassis, remove the weight of the engine from the chassis using a suitable lift or hoist.

33. On the turbo models, remove the front bumper.

34. Remove the front belly pan cap screws; then remove the belly pan. Remove the cap screws securing the access panel to the chassis; then remove the access panel.

35. Remove the two lock nuts securing the front engine mount to the chassis.

36. Remove the cap screws securing the MAG-side rear engine to chassis mount; then remove the mount.

37. Remove the screw securing the front belt guard to the skid plate, then remove the cap screws, lock nuts, and carriage bolt securing the PTO-side chassis support. With the fuse block out of the bracket, remove the support with the front belt guard.

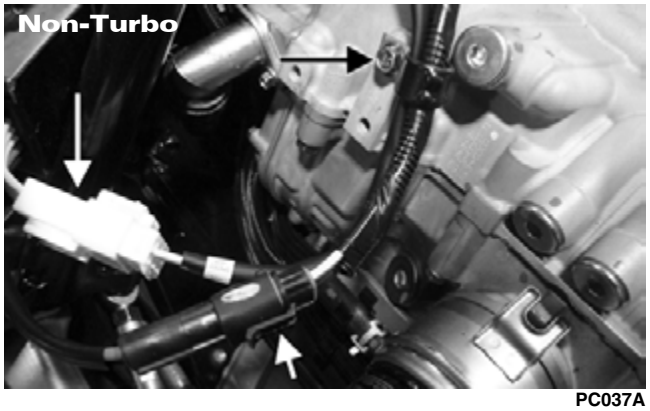
■NOTE: After removing the PTO-side chassis support, re-install the cap screw securing the rear PTO-side engine to chassis mount (bearing bracket) to secure the bearing.



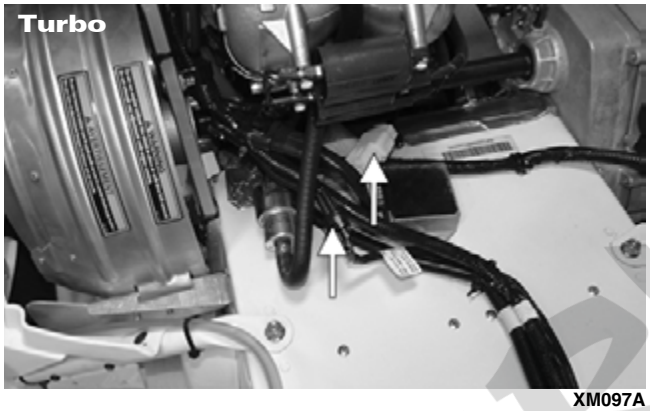
PC209A

38. Remove the cap screws securing the PTO-side engine to chassis mount (bearing bracket).

39. Disconnect the harness connectors from the regulator/rectifier and magneto; then remove the cap screws securing the routing clamp to the engine (non-turbo models) and secure the wire harness up and out of the way.

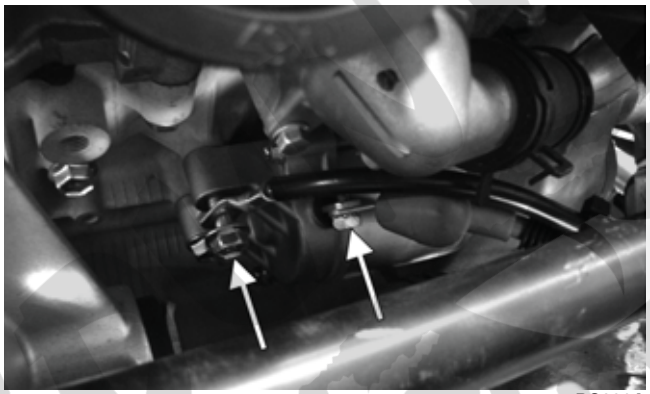


PC037A



XM097A

40. Raise the engine up and tip the engine forward enough to remove the cables from the starter motor and the rear engine/heat exchanger coolant hose.



PC038A



PC039A

■NOTE: At this time, verify all components connecting the engine to the chassis are disconnected and out of the way.

41. Raise the engine until the studs of the lower front engine to chassis mount clear the chassis; then rotate the engine clockwise enough to clear the PTO-side engine to chassis mount and carefully lift the engine up and out of the chassis.

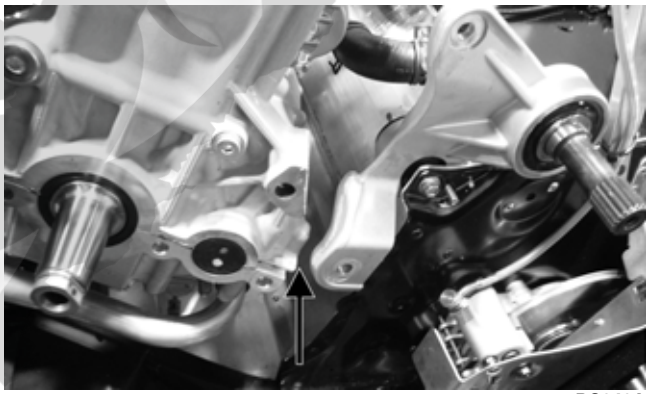


PC040A

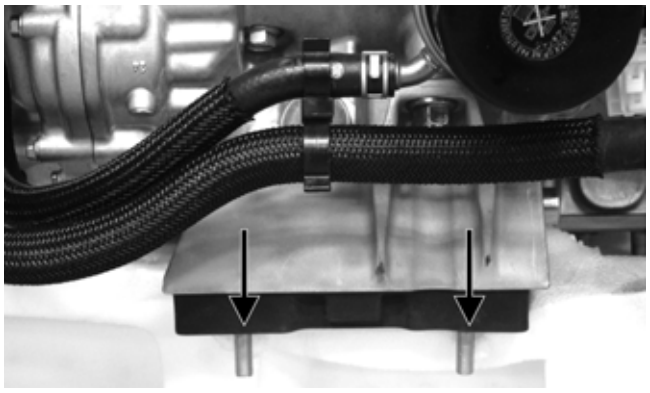
2

Installing

1. Carefully lower the engine into the chassis positioning the engine so it clears the PTO-side rear engine/chassis mount and on the turbo models, the turbo charger clears the front of the chassis; then lower the engine until the studs of the lower front engine/chassis mount are into the mounting holes of the chassis.

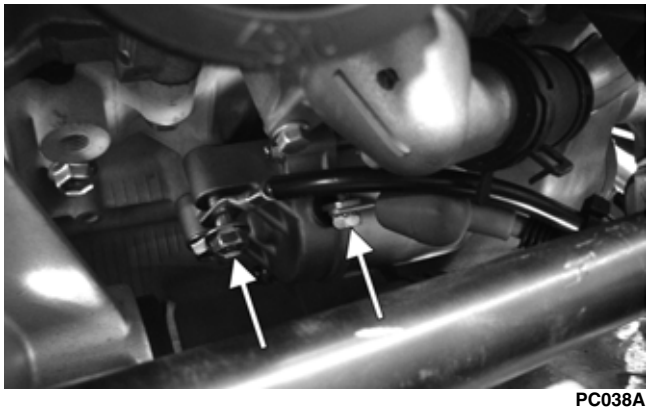


PC040A



PC047A

2. Tip the engine forward enough to install the cables to the starter motor and tighten the ground cable to 19 ft-lb and the positive cable to 42 in.-lb.



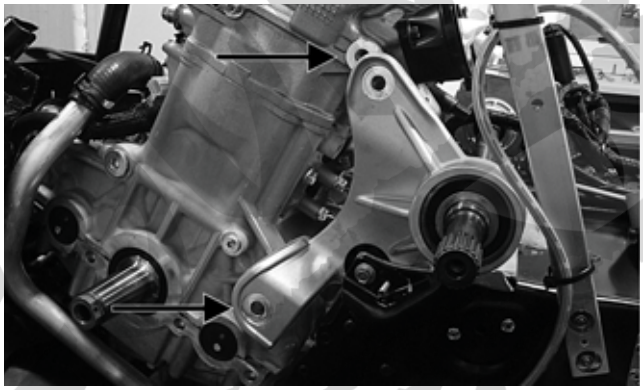
PC038A

3. Install the coolant hose and clamp to the tunnel heat exchanger and secure the clamp.



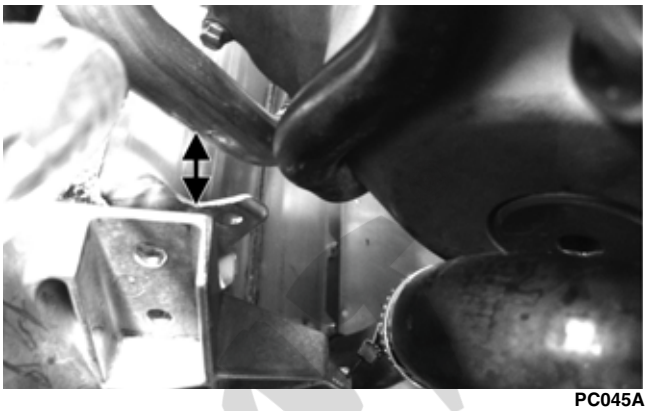
PC039A

4. With the front engine/chassis mount into position, lower the engine back until the engine is in line with the PTO-side engine/chassis mount (bearing bracket).



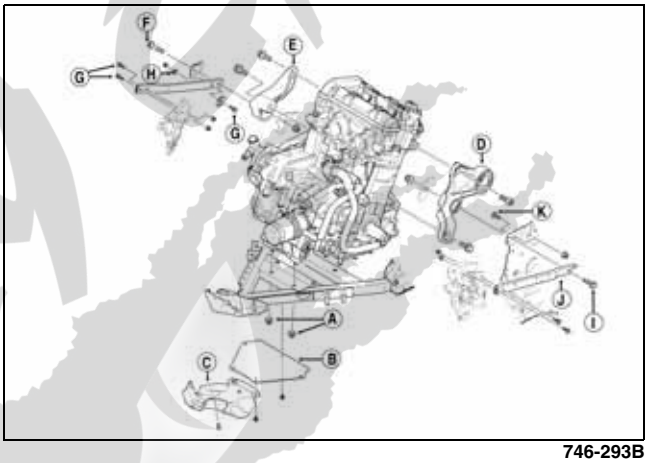
PC044A

■NOTE: When lowering the engine back, make sure the engine/heat exchanger coolant tube is to the inside of the MAG-side engine mount bracket of the chassis.



PC045A

■ NOTE: To secure the engine to the chassis, use steps 5-9 and the following illustration.



746-293B

5. Secure the lower front engine mount to the chassis using new lock nuts (A) and tighten to 25 ft-lb; then secure the access panel to the chassis with the three screws (B). Tighten securely.

6. Install the belly pan and secure with four screws (C) tightened securely; then secure the PTO-side engine to chassis mount (bearing bracket) with two screws (coated with blue Loctite #243) (D). Tighten the both screws to 100 ft-lb.

7. Secure the MAG-side engine to chassis mount using the two cap screws (coated with blue Loctite #243) (E). Tighten the upper screw to 40 ft-lb and the lower screw to 50 ft-lb.

8. Install the MAG-side chassis support and secure with the cap screws (coated with blue Loctite #243) (F) (G) (H). Tighten the rear cap screws to 25 ft-lb and the front cap screws to 12 ft-lb.

■NOTE: Note the location and orientation of the resonator spring tab and bracket support.



PC210A

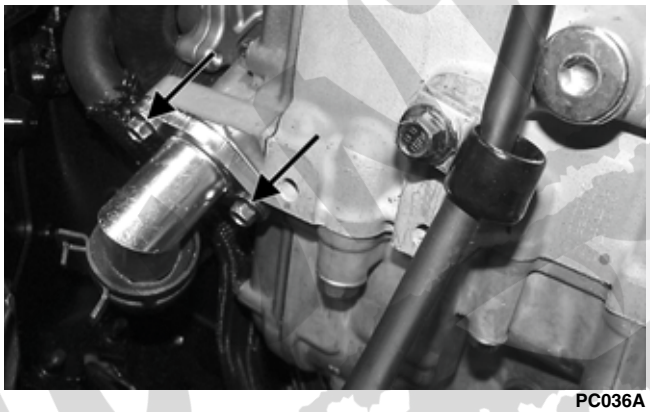
9. Secure the PTO-side chassis support to the chassis using the cap screws (I), carriage bolt (K), and lock nuts (J). Tighten the cap screws to 25 ft-lb and the carriage bolt and lock nuts to 12 ft-lb.

■NOTE: It may be necessary to pry against the backside of the carriage bolt until the nut becomes snug.

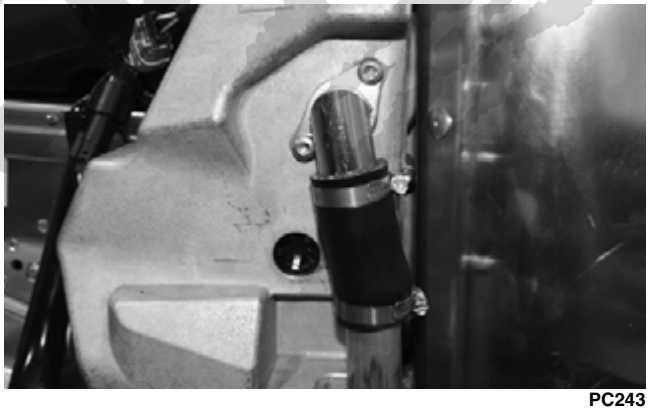
10. With the engine installed, remove the hardware used to remove and install the engine.

11. Install the screw securing the front belt guard to the skid plate.

12. Install the oil supply elbow fitting and cap screws to the engine and tighten the cap screws to 96 in.-lb; then install and secure the oil return hose and oil breather hose to the engine.



PC036A



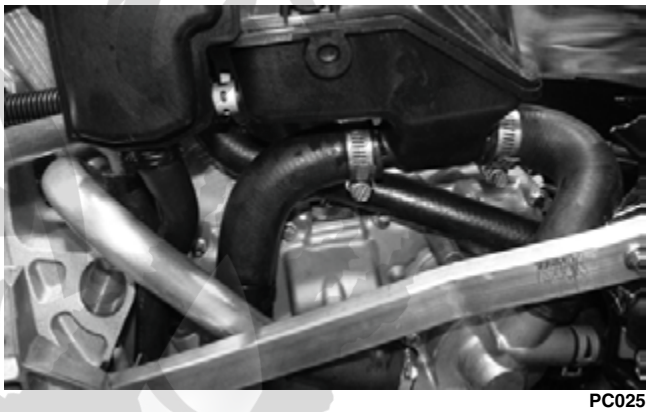
PC243

■NOTE: Make sure the O-rings are in place before installing the oil hoses.

13. Install the coolant/oil separator tank to the bracket on the engine; then install the hoses with clamps to the coolant/oil separator tank and secure the clamps.

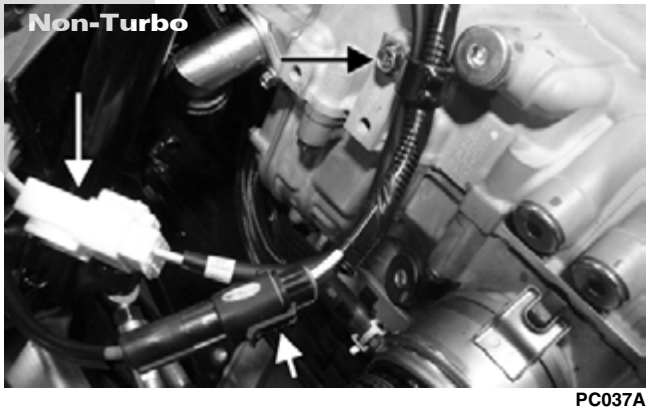


PC032B

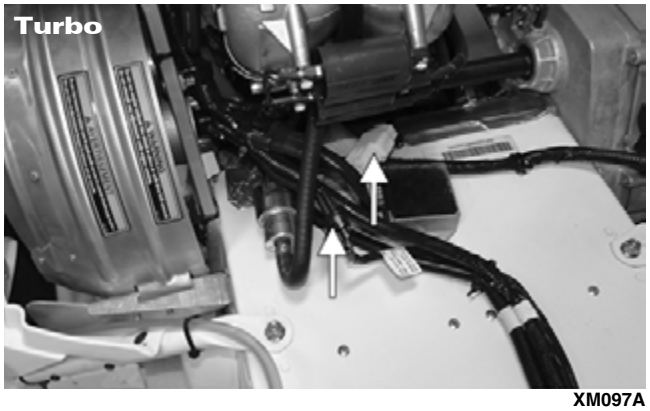


PC025

14. Connect the harness connectors to the regulator/rectifier and magneto and with the harness properly routed, secure the harness to the engine with cap screw and routing clamp; then tighten the cap screw securely.



PC037A



XM097A

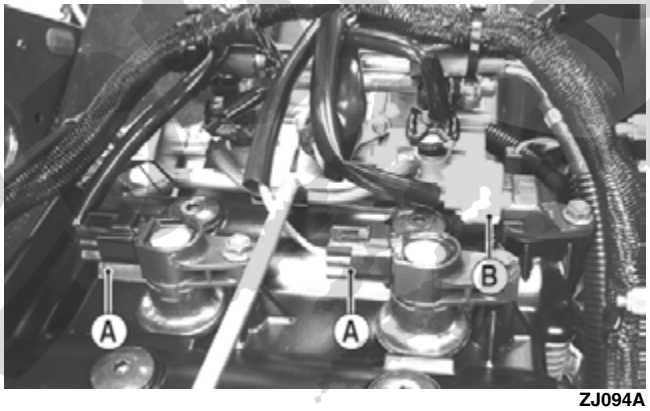
■**NOTE: Steps 15-17 are for non-turbo models only.**

15. Install the throttle bodies and secure with the clamps; then install and secure the throttle body/coolant tank and the throttle body/cylinder head hoses.



ZJ018A

16. Connect the harness plug-ins to the ignition coils (A) and camshaft sensor (B); then route the main harness to the proper connector locations and secure with cable ties as noted during removing.

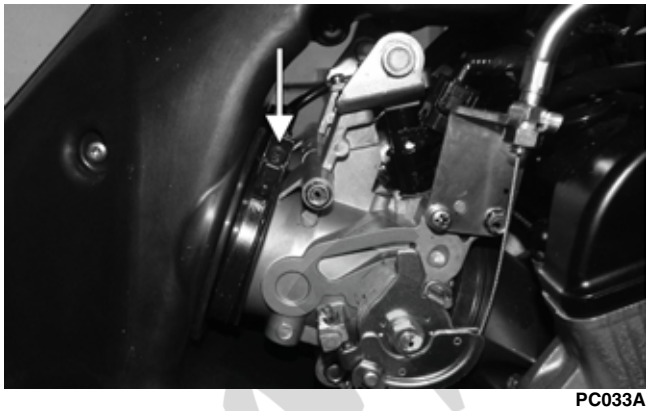


ZJ094A

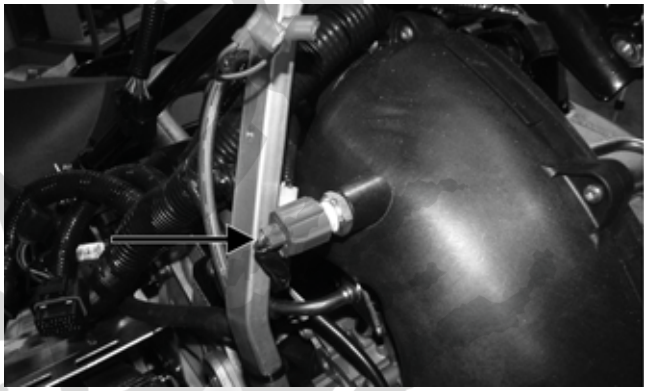
CAUTION

Make sure the harness is routed away from the exhaust or any moving parts.

17. Install and secure air silencer and clamps to the throttle bodies; then connect the air temperature sensor to the air silencer.



PC033A



PC046A

■**NOTE: Steps 18-22 are for the turbo models only.**

18. Install the flanges to the manifold adapter assembly and secure with the clamps; then install the manifold and throttle body assembly and secure with the two upper clamps.

■**NOTE: Remove any tape sealing the intakes.**

19. Install and secure the throttle body coolant hoses to the coolant tank and cylinder head.

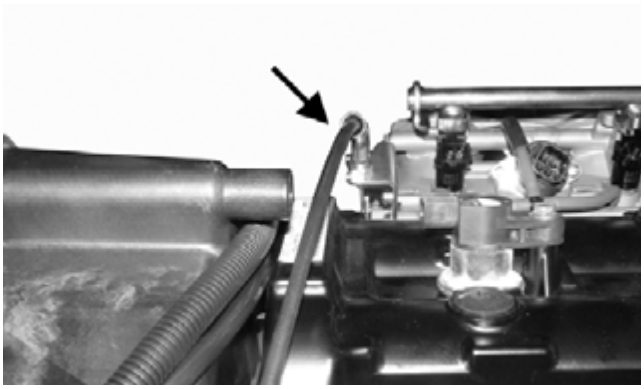


PC211A

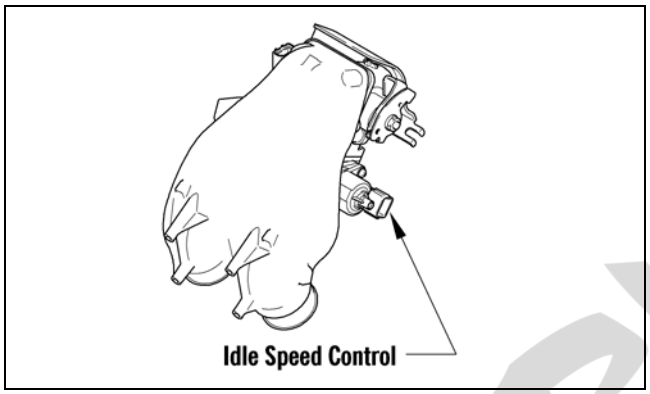
20. With the spark plug wires routed properly, install the spark plug caps to the spark plugs.

■**NOTE: Make sure the caps are firmly seated on the plugs.**

21. Install and secure the throttle cable to the bracket and clutch noting the routing of the cable; then connect the idle speed control.

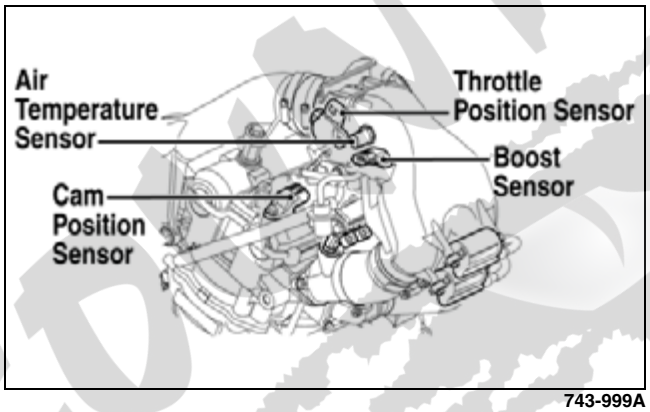


SNO-741A



0743-992

22. With the wire harness properly routed, install the harness connectors to the throttle position sensor, air temperature sensor, boost sensor, and cam position sensor.



743-999A

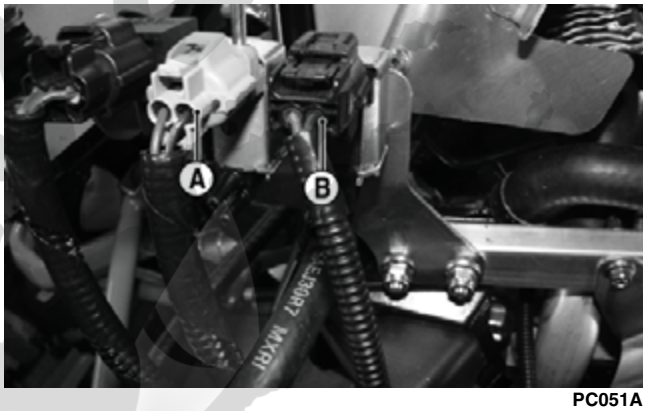
■NOTE: At this time, secure the wire harness to the locations noted during disassembly.

23. Secure the harness connectors to the oil pressure switch (A) and the coolant temperature sensor (B) and install the air pressure sensor (C) to the bracket of the side support.

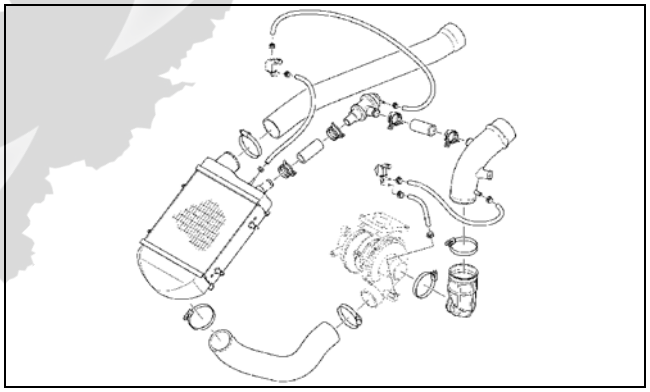


PC028A

■NOTE: On the turbo models, install the harness connectors and vacuum hoses to the air bypass control valve (A) and the waste gate control valve (B) to the bracket of the PTO-side chassis support.



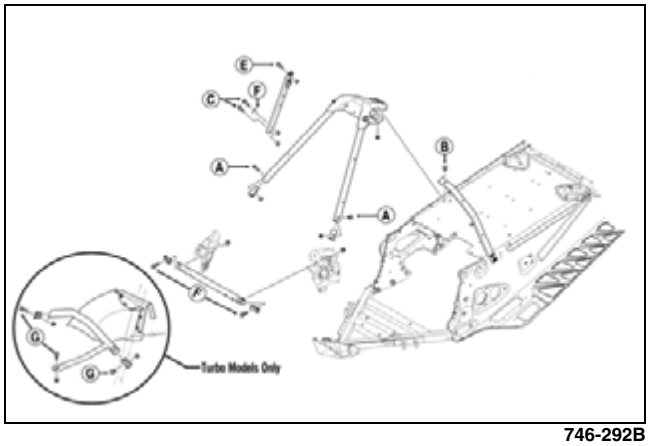
PC051A



SNO-231C

24. With the battery cables and solenoid harness properly positioned in the channel of the gas tank assembly, install the gas tank (see Section 4).

25. Install the upper chassis components using the following sequence and illustration:



746-292B

■NOTE: For assembling purposes apply a small amount of silicone or tape to keep the inserts secured into the spar tubes and use new lock nuts and cap screws when securing the spars to the chassis.

A. Secure the front spars with the steering bracket to the shock mounting brackets using two cap screws, inserts, and new lock nuts. Tighten to 23 ft-lb.

■NOTE: On the turbo models, install the PTO-side front spar with heat shield and shock mounting bracket as an assembly. Tighten the shock mounting bracket cap screws (G) to 20 ft-lb.

B. PTO-side steering support to the steering bracket = 1 cap screw and lock nut. Tighten to 23 ft-lb.

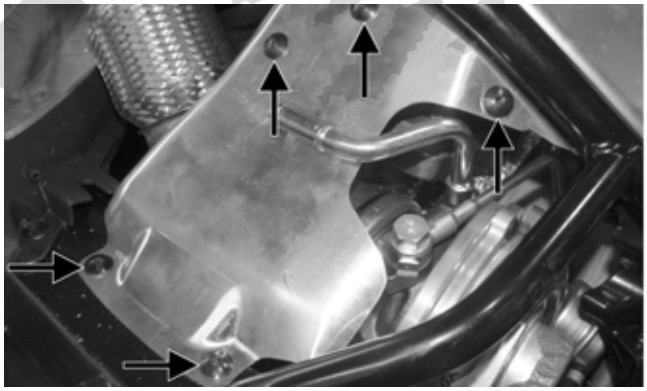
C. MAG-side steering support to chain case. Tighten to 12 ft-lb.

■NOTE: Install the ground wire to the upper cap screw (C) when securing the steering support to the chain case.

E. MAG-side steering support to the steering bracket = 1 cap screw and lock nut. Tighten to 23 ft-lb.

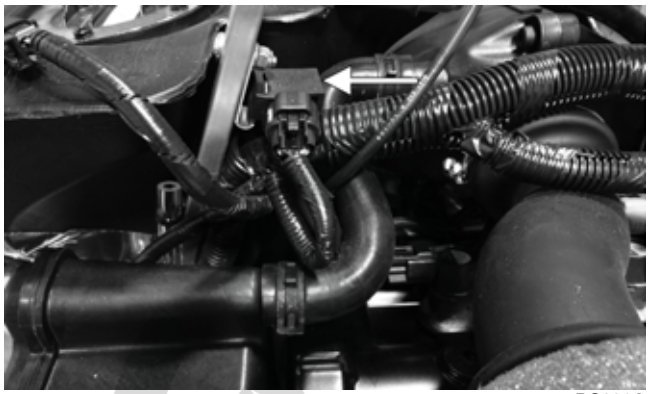
F. Shock mounting bracket support to shock mounting brackets (non-turbo) = 2 cap screws, inserts, and 2 lock nuts. Tighten to 20 ft-lb.

■NOTE: On the turbo models, secure the front heat shield to the chassis with the screws.



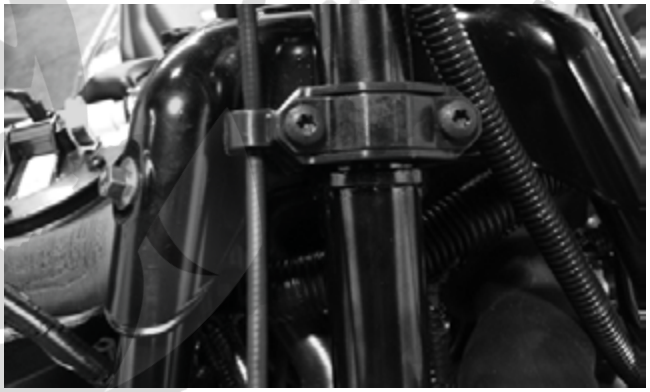
PC058A

■NOTE: On the non-turbo models, install the MAP sensor to the bracket on the MAG-side steering support.



PC029A

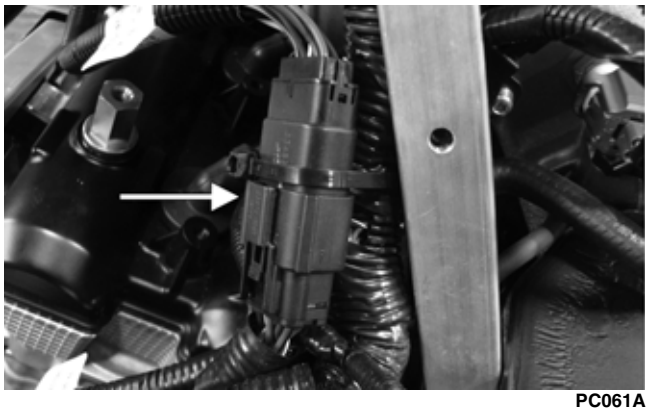
26. With the throttle cable in place, install and secure the steering post to the steering bracket with the mounting blocks, cap screws, and lock nuts. Tighten to 96 in.-lb.



PC030

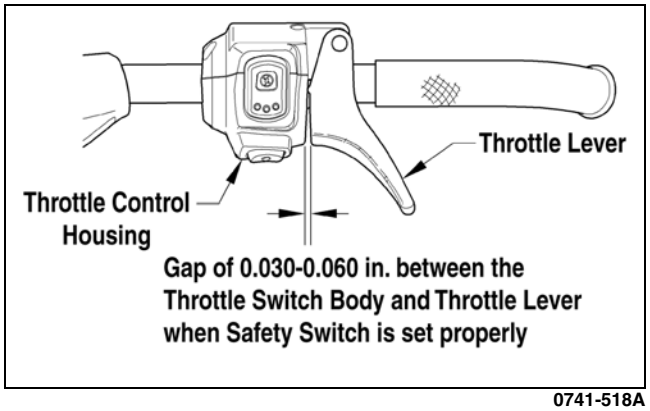
27. Install and secure the handlebar to the steering post with the caps and four cap screws. Tighten the cap screws to 15 ft-lb.

■NOTE: Connect the handlebar harness to the main harness connector and secure the connectors to the harness at the PTO-side steering support.



PC061A

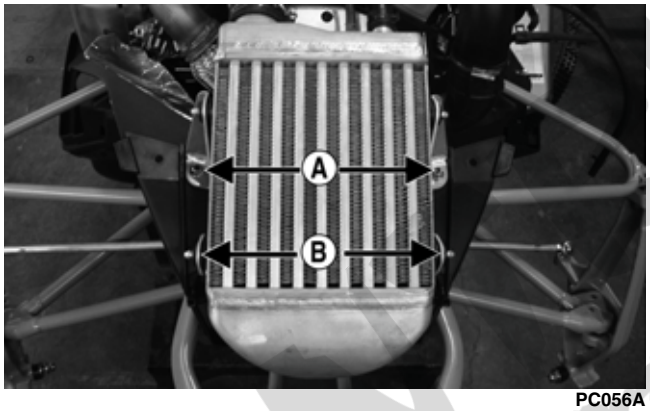
28. Install the throttle cable into the lever; then verify the throttle lever free-play is within specification.



0741-518A

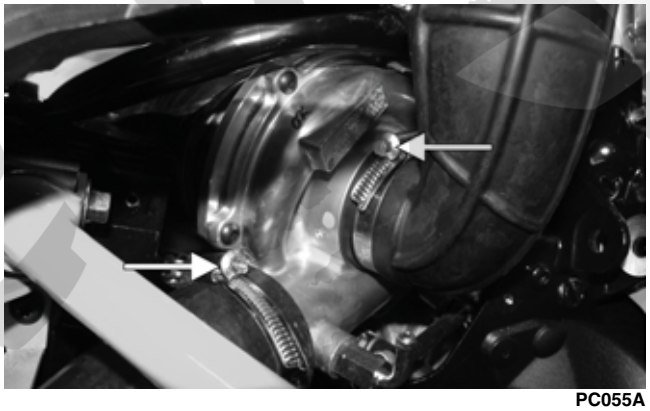
■**NOTE: Steps 29-32 are for the turbo models only.**

29. Install the fascia and install the front pins (B) of the intercooler into the brackets; then install the rear brackets (A) to the pins of the intercooler and secure the brackets to the chassis with cap screws and lock nuts. Tighten securely.

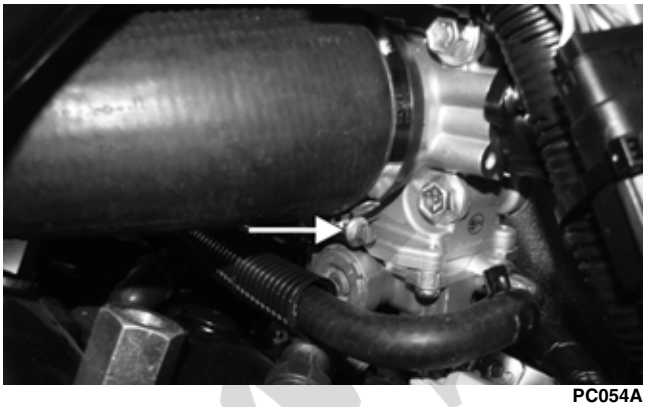


PC056A

30. Install and secure the turbocharger/intercooler hose and air intake hose; then secure the intercooler hose to the throttle body.



PC055A



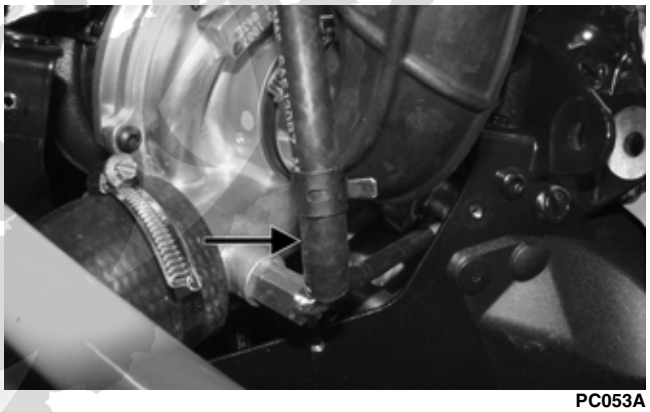
PC054A

■**NOTE: Remove any tape sealing the turbocharger.**

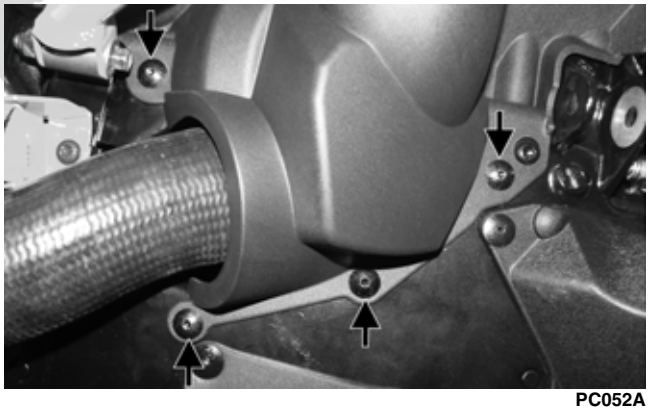
CAUTION

Make sure there are no obstructions in the intake and intercooler side of the turbocharger before installing the intercooler hose.

31. Install the waste gate control valve hose to the turbocharger and install the clamp as noted during removing; then install the side cover and secure with the screws.



PC053A



PC052A

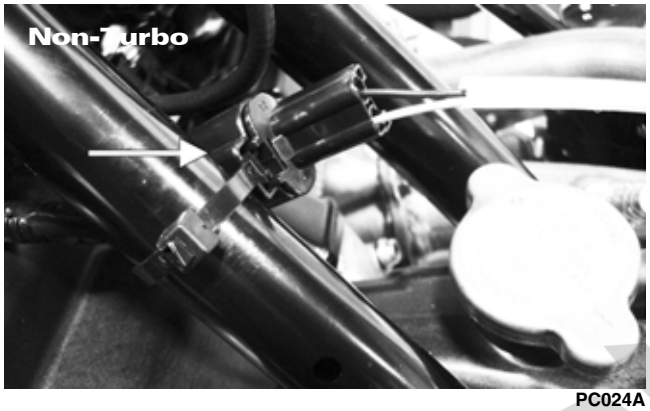
32. Install the exhaust resonator to the chassis support and secure with the spring; then secure the resonator to the exhaust pipe and tighten the cap screws and flange nuts to 12 ft-lb.

■**NOTE: Steps 33-34 are for the non-turbo models only.**

33. Position the exhaust pipes and resonator into the chassis and install and secure the MAG and PTO exhaust flanges (with new gaskets) to the cylinder head with the flange nuts. Tighten evenly to 17 ft-lb.

34. With the resonator properly installed to the chassis support, install the spring securing the resonator to the mounting tab.

■NOTE: With the exhaust system installed, connect the oxygen sensor to the harness connector.



PC024A



PC241A

35. Install and secure the drive clutch with the cap screw (lightly coated with oil); then tighten the cap screw to 51 ft-lb.

CAUTION

When installing the drive clutch, do not tighten the clutch cap screw with any kind of impact tool. Tighten cap screw using a hand torque wrench only. Failure to do so could result in stationary sheave damage.

36. Install the drive belt (see Section 6); then install and secure the driven clutch (see Section 6).

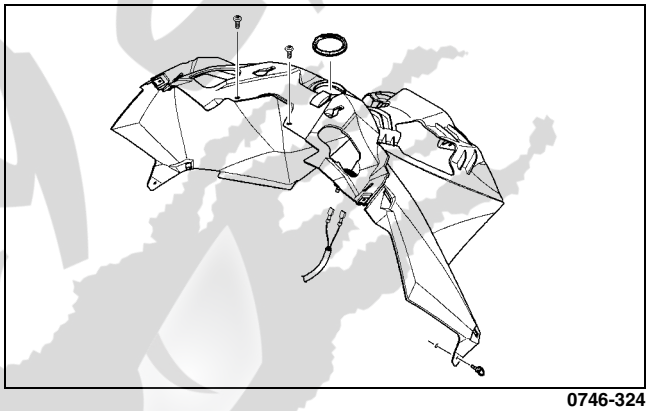
37. Install the rear belt guard and connect the two harness connectors to the ECM; then lock the fuse block into the bracket of the front belt guard.

38. Install the gas tank (see Section 4).



PC027A

39. Install and secure the lower console to the skid plate with the ¼ turn screws; then install the upper console over the gas tank and install and tighten the retaining nut to the neck of the gas tank.

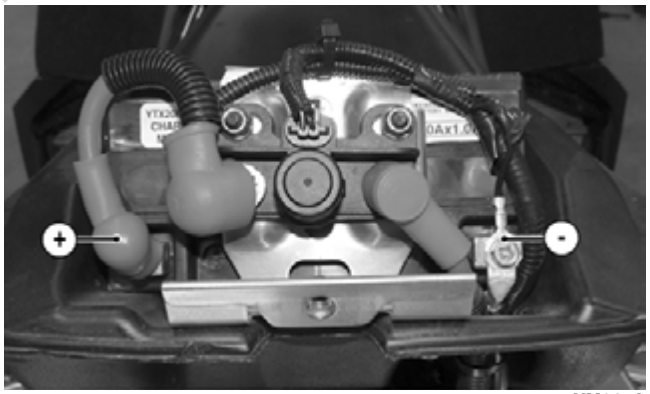


0746-324

40. Connect the wires to the reverse alarm; then install the two screws securing the console to the steering bracket.

■NOTE: On the LXR/LTD models, connect the harness connector to the seat heater switch before securing the upper console.

41. Connect the battery cables (positive first) and the ground wire to the battery; then connect the solenoid harness to the solenoid.



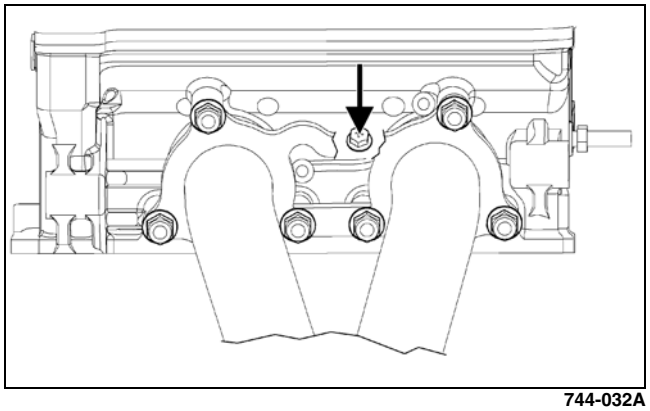
XM015A

■NOTE: On the LXR/LTD models, connect the seat heater harness connector.

42. Install the seat (see Section 8).

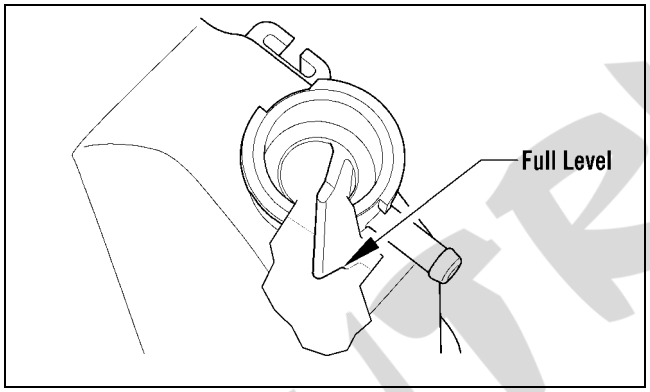
43. Elevate the front of the snowmobile until the tunnel heat exchangers are angled upward towards the engine.

44. Open the coolant bleed screw on the cylinder head; then add coolant to the reservoir until coolant is visible at the bleed screw.



744-032A

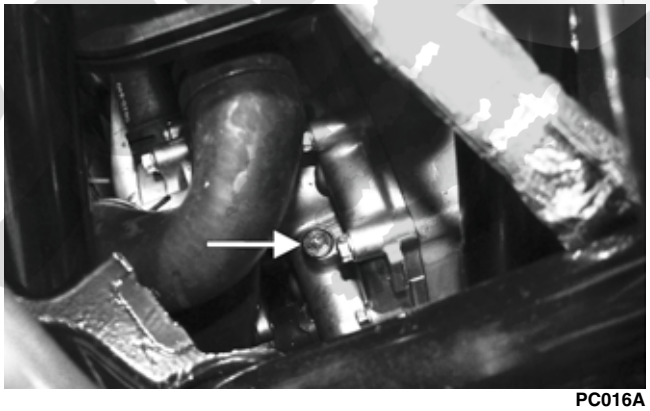
45. Tighten the bleed screw; then add coolant until coolant is at the tab of the coolant tank.



0746-117

46. With the oil filter installed and tightened to 15 ft-lb, pour the recommended quantity of the recommended oil into the oil reservoir.

47. Open the air bleed screw until no air is heard purging from the oil pump. Tighten the bleed screw to 96 in.-lb.



PC016A

CAUTION

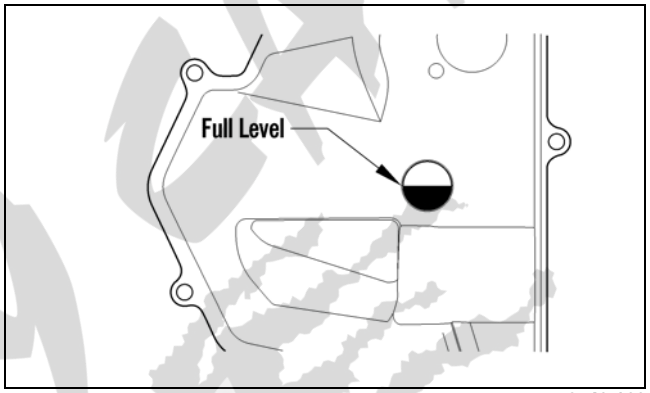
Never start the engine with the bleed screw open.

48. Place the emergency stop switch in the RUN position and the ignition switch to the ON position. Start the engine. The warning icon should go out within five seconds.

■NOTE: If the warning icon does not go out, shut the engine off immediately and repeat step 47; then repeat step 48.

49. Start the engine and allow it to run to operating temperature; then shut the engine off and allow it to cool.

50. Add oil to the oil reservoir until oil is visible halfway up in the sight glass.



0746-166

■NOTE: At this time, connect Hood Harness Extension to the hood and connect the main harness connector to the extension.

CAUTION

After running the engine to the proper operating temperature, shut the engine off; then inspect for any signs of coolant, gasoline, or oil leakage.

51. With the engine cool, loosen the bleed screw and allow the coolant level in the filler neck to drop; then with the bleed screw loose, add coolant into the filler neck until no air is visible or heard at the bleed screw. Tighten the bleed screw and add coolant to the reservoir if necessary.

■NOTE: If the coolant level in the filler neck suddenly drops when the bleed screw is loosened, an air-lock occurred in the cylinder head. Add coolant to the filler neck until full before starting the engine.

52. Start the engine and allow it to run for five minutes. Inspect for any signs of coolant leaks in the engine compartment; then shut the engine off and allow it to cool.

53. Repeat steps 51-52 (at least two more two times) until no air is in the cooling system.

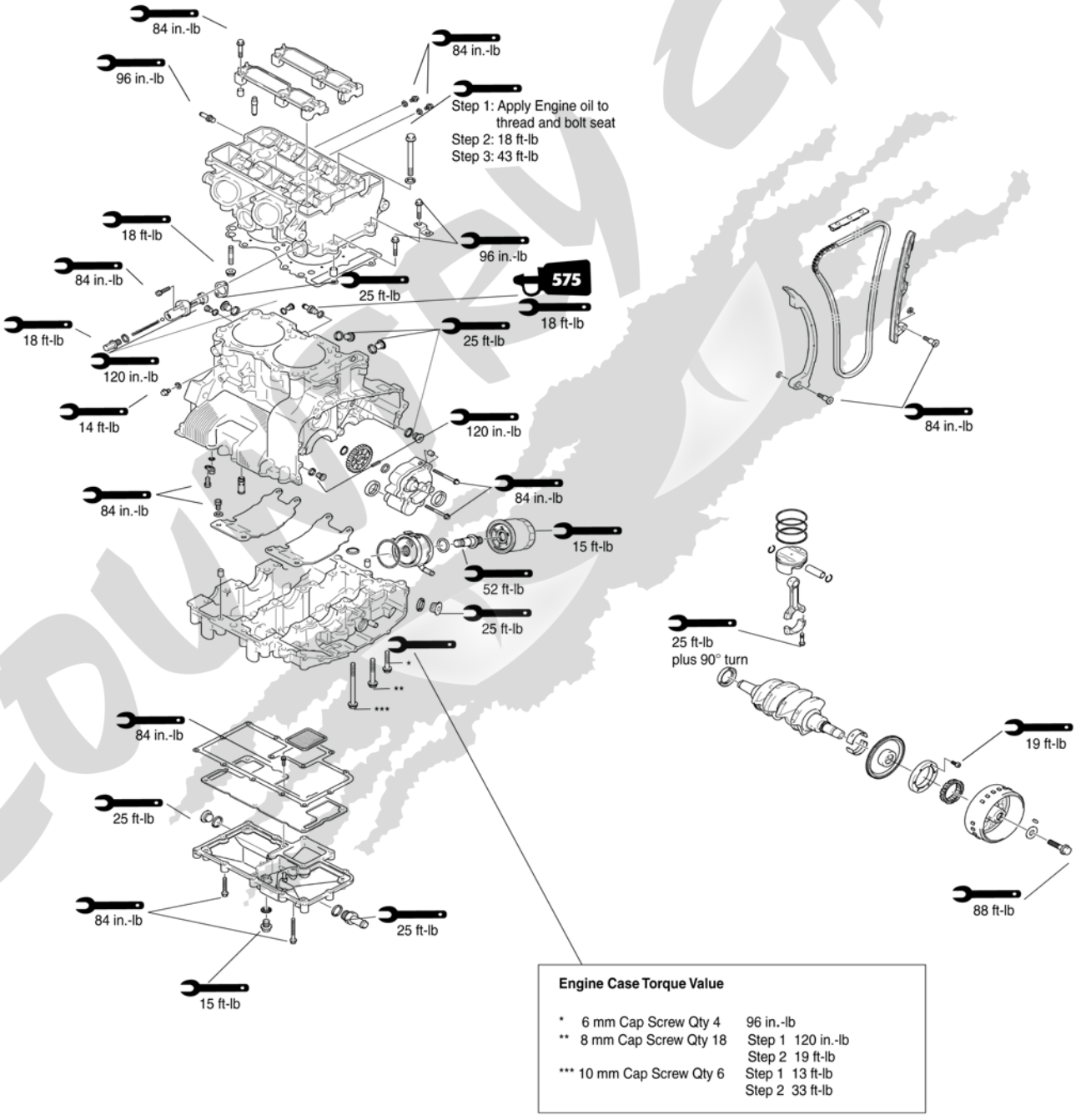
CAUTION

Operating the snowmobile with air in the cooling system will cause severe damage to the engine.

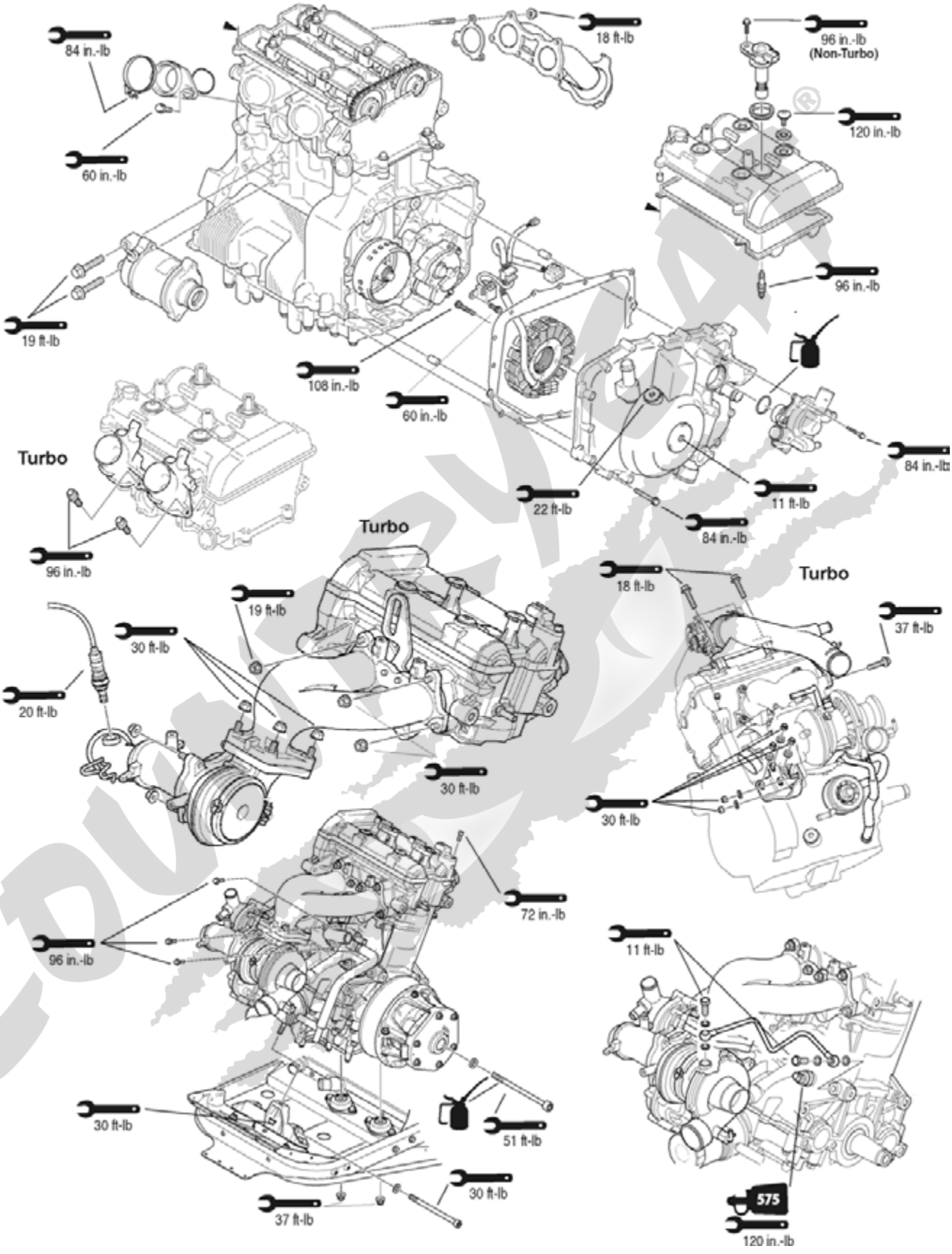
54. Disconnect the hood harness extension; then install the hood and side panels.

Assembly Schematic - 1100 cc

Torque Specification Tolerances	
Torque (ft-lb)	**Tolerance**
0-15	±20%
16-39	±15%
40+	±10%



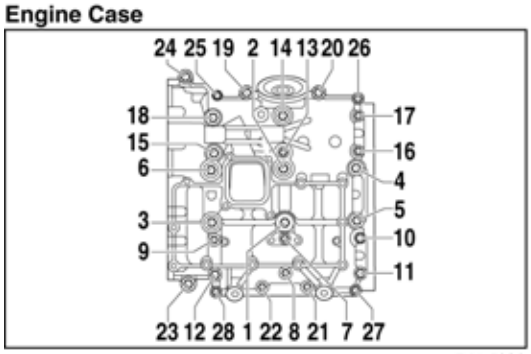
1100ccJAG12



1100ccZ1RV10

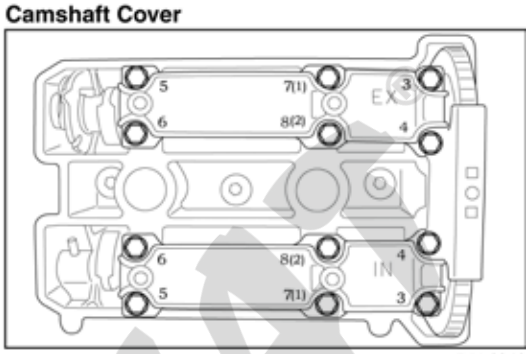
Engine Torque Patterns (1100 cc)

Engine Case



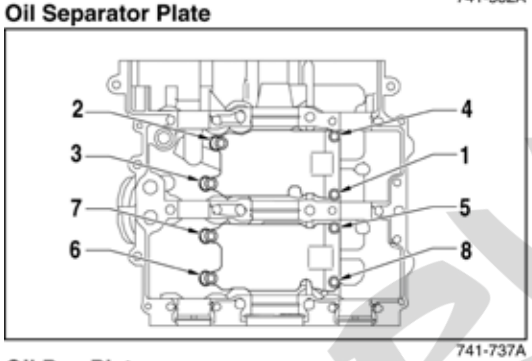
741-582A

Camshaft Cover



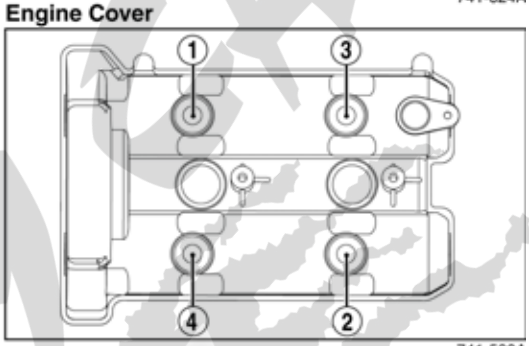
741-624A

Oil Separator Plate



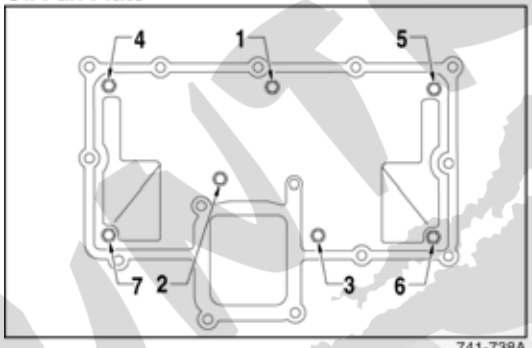
741-737A

Engine Cover



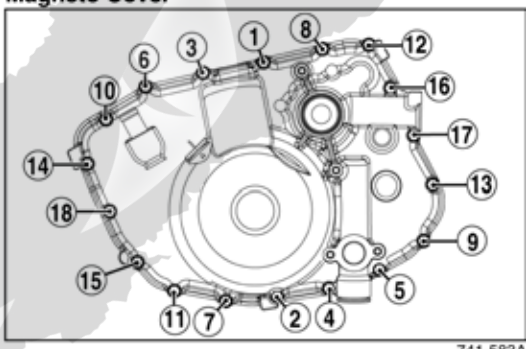
741-580A

Oil Pan Plate



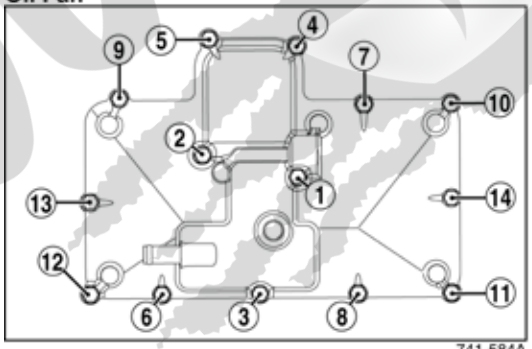
741-738A

Magneto Cover



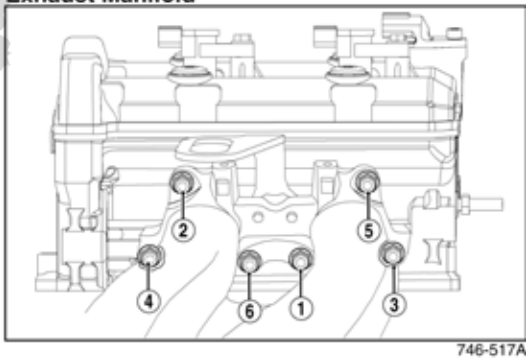
741-583A

Oil Pan



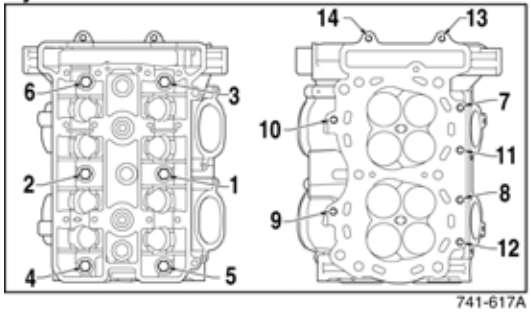
741-584A

Exhaust Manifold



746-517A

Cylinder Head



741-617A

1100TorquePattern12

Engine Servicing - 570 cc

This engine sub-section has been organized to show a progression for servicing of the Arctic Cat 570 cc engine. For consistency purposes, this sub-section shows a complete and thorough progression; however, for efficiency it may be preferable to disassemble only those components needing to be addressed. Also, some components may vary from model to model. The technician should use discretion and sound judgment.

■NOTE: Critical torque specifications can be found in Section 1 of this manual.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

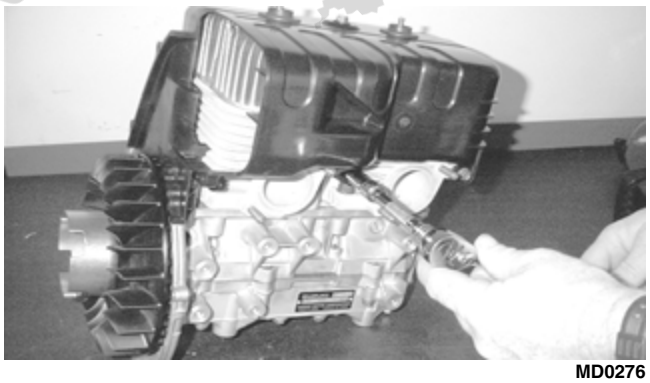
A number of special tools must be available to the technician when performing service procedures in this engine section.

Description	p/n
Ball Hone	0644-292
Crankshaft Bearing Remover	0144-302
Flywheel Spanner Wrench	0144-007
Flywheel Puller	0744-040
Piston Pin Puller	0644-328
Surface Plate	0644-016
V Blocks	0644-535
Vacuum Test Pump	0644-131

■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

Disassembling

1. Remove the nuts, lock washers, and washers securing the intake flange assembly. Account for the gaskets, insulators, and the heat deflector.
2. Remove the five cap screws securing the front (exhaust-side) shroud to the cylinder head. Account for the special washers.



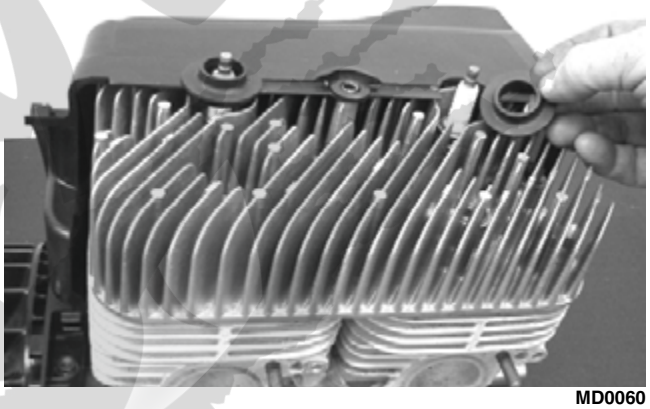
MD0276

■NOTE: Keep the special mounting hardware with the shrouds for assembling purposes. Cap screws securing the front and rear shrouds use special washers.



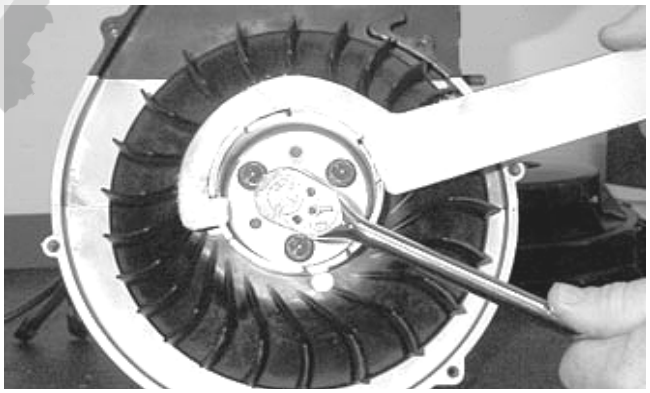
MD0065

3. Remove the spark plug grommets.



MD0060

4. Using Flywheel Spanner Wrench to hold the starter clutch, remove the cap screw securing the flywheel to the crankshaft and account for the flat washer and lock washer.



MD0282

5. Using Flywheel Spanner Wrench to hold the starter clutch, remove the three cap screws securing the starter clutch to the flywheel assembly.



MD0275

CAUTION

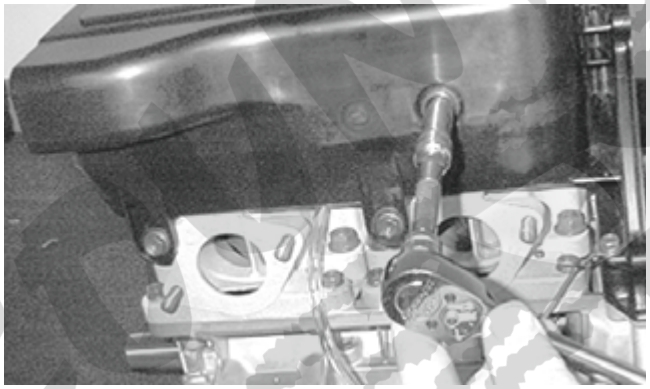
To prevent damage to the crankshaft, install a protective insert into the end of the crankshaft. The puller must bottom on the insert and not on the crankshaft. Also, do not thread puller bolts more than five threads into the flywheel. Damage to the stator coils may result.

6. Using Flywheel Puller, remove the flywheel.

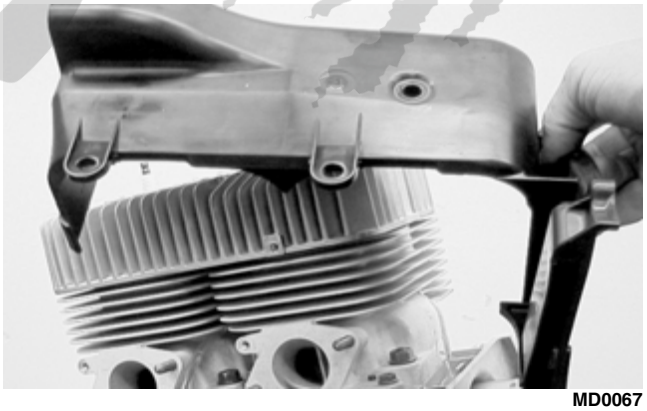
■NOTE: To ensure the cleanliness of the flywheel magnets, place the flywheel (with the magnets facing upward) on a clean bench.

■NOTE: Do not remove the fan from the flywheel assembly. If any damage or failure occurs with the fan or the flywheel, it must be replaced as an assembly.

7. Remove the six cap screws securing the rear (intake-side) shroud; then remove the shroud. Account for the special washers.



MD0277

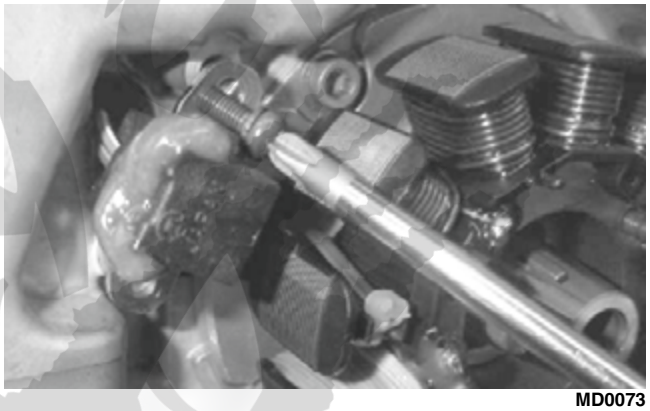


MD0067

8. Remove the rubber insulator grommet from the crankcase; then remove two Phillips-head cap screws securing the ignition timing sensor.

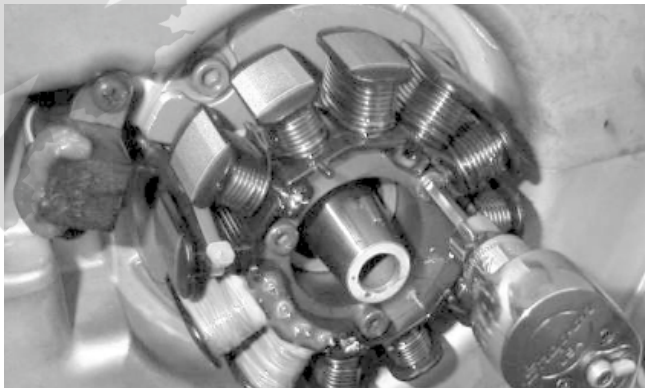


MD0075

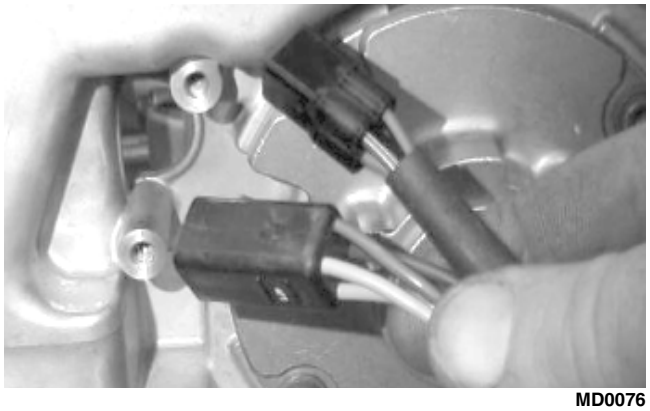


MD0073

9. Remove the three Allen-head cap screws securing the stator and remove it along with the timing sensor; then carefully pull the wires through the hole in the crankcase.



MD0072



MD0076

10. Remove the four Allen-head cap screws securing the stator plate. Remove the stator plate.

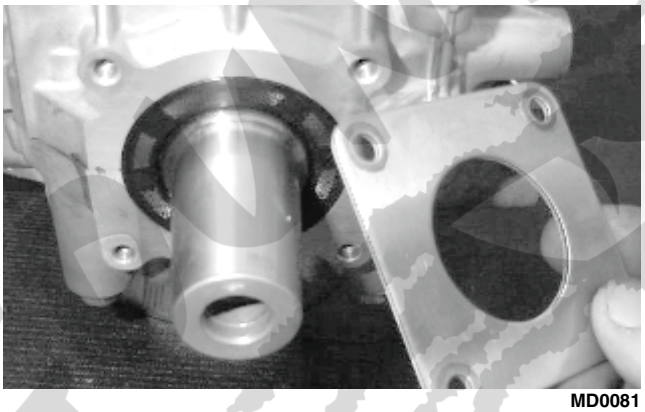


MD0255



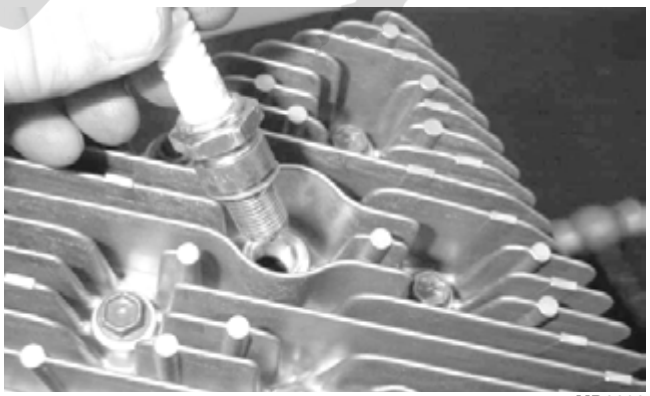
MD0078

11. Remove the four cap screws securing the seal retainer plate on the PTO-side; then remove the plate.



MD0081

12. Remove the spark plugs.



MD0083

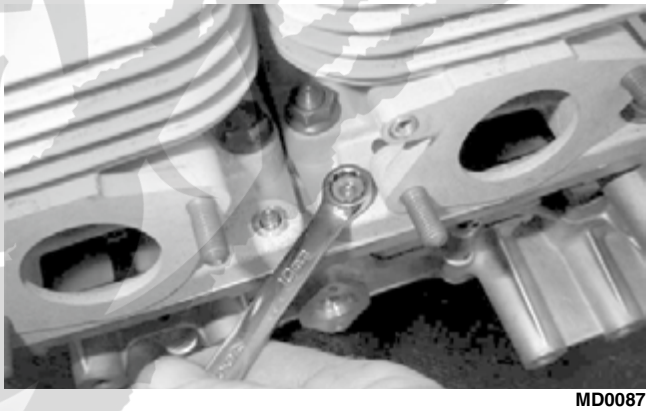
13. Remove the eight cap screws, two nuts, and two washers securing the cylinder head to the cylinders; then remove the cylinder head. Discard the cylinder head gasket.



MD0289

14. Remove the four 6 mm nuts and eight 10 mm nuts securing the cylinders to the crankcase.

■NOTE: Using a felt-tip marker, mark the cylinders as to MAG-side and PTO-side for assembling. Also, mark the pistons at this time.



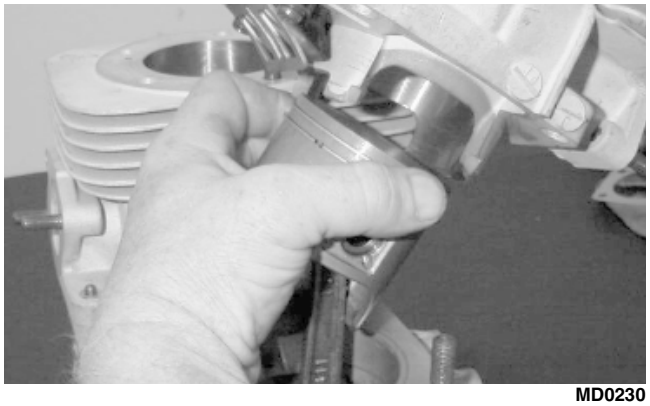
MD0087



MD0086

15. Remove the cylinders making sure to support the pistons so they are not damaged. Account for four dowel pins.

CAUTION
When removing a cylinder, make sure to support the piston so it will not be damaged.



MD0230



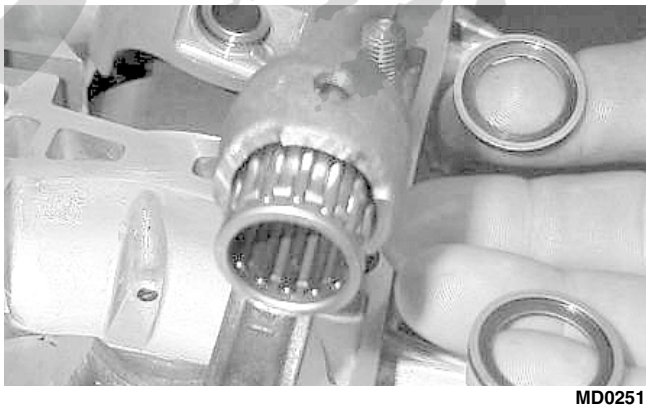
MD0096

16. Using an awl, remove the outside piston-pin circlip and remove the piston pin using Piston Pin Puller.



MD0094

■NOTE: The shoulder sides of the piston pin bearing washers must seat to the bearing.

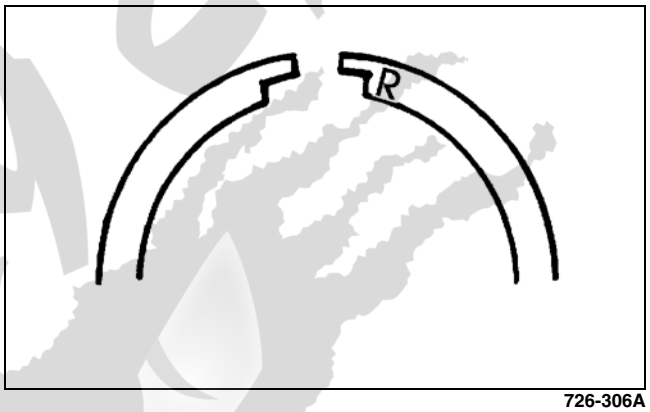


MD0251

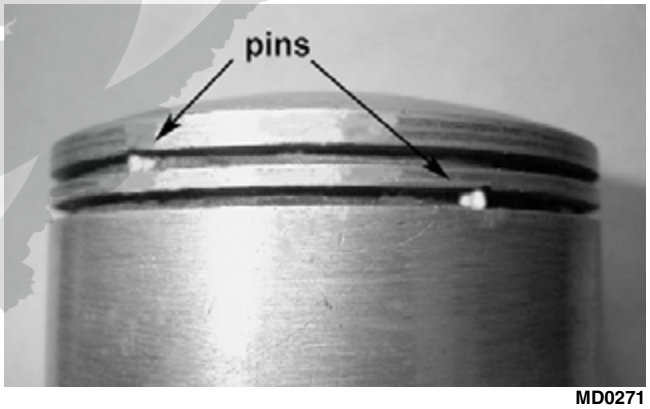


MD0208

■NOTE: Always replace with new piston rings and as a complete set. Note the identification on the tapered side of each ring for installation purposes.

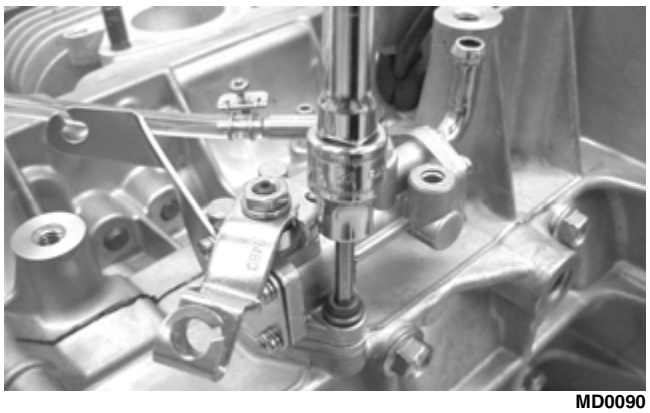


726-306A

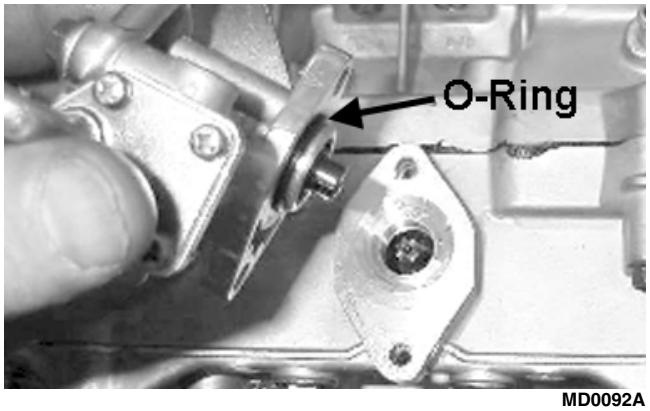


MD0271

17. Remove the two Allen-head cap screws securing the oil-injection pump; then remove the pump. Account for an O-ring.

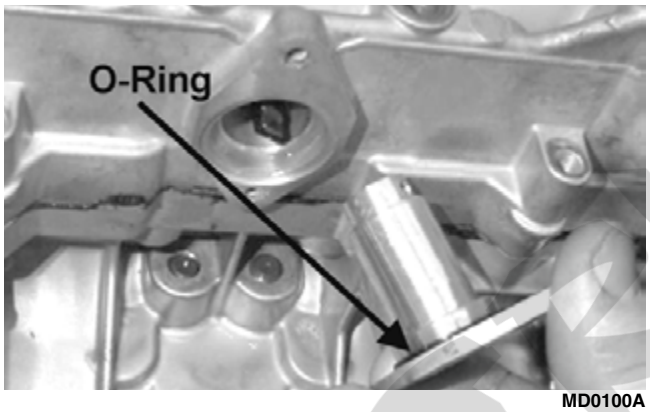


MD0090



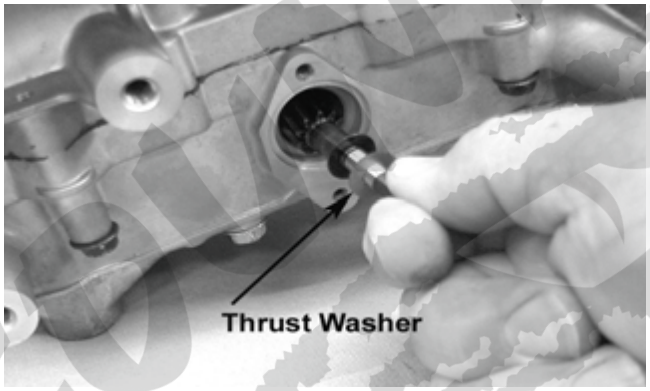
MD0092A

18. Remove the oil-injection pump driveshaft retainer. Account for an O-ring.



MD0100A

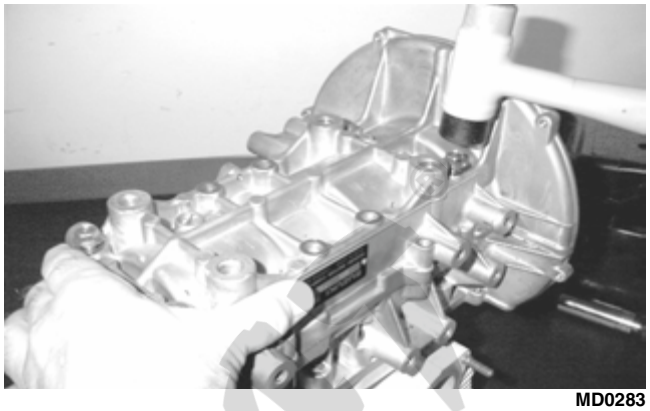
19. Remove the oil-injection pump driveshaft. Account for a thrust washer.



MD0101

20. Place the crankcase (with its bottom side up) on two blocks of wood. Remove the 12 cap screws securing the crankcase halves. Note the location of the different-sized cap screws.

21. Separate the crankcase halves by installing two of the cap screws in opposite corners leaving the heads approximately 1/4 in. out. Using a plastic mallet, tap on each cap screw until the crankcase halves separate. Account for four dowel pins.



MD0283



MD0204

22. Remove the two cap screws; then remove the crankshaft assembly from the upper crankcase half making sure to hold both ends of the crankshaft to keep the bearings and seals from falling off. Account for bearings and a C-ring.

CAUTION

To prevent damage to the crankshaft, crankshaft bearings, or seals, be sure to always lift the crankshaft from both ends.

Cleaning and Inspecting

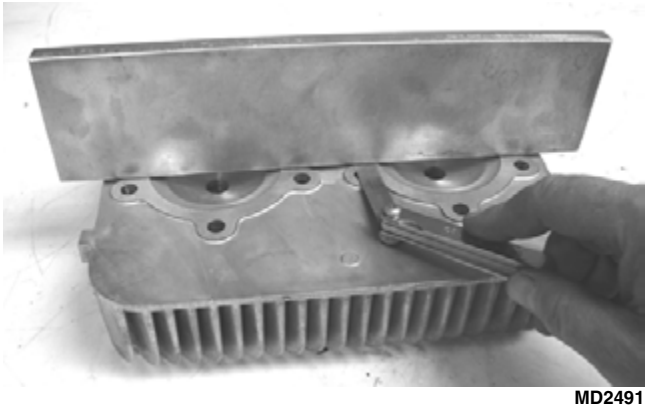
CYLINDER HEAD

1. Using a non-metallic carbon removal tool, remove any carbon buildup from the combustion chambers being careful not to nick, scrape, or damage the combustion chambers or the sealing surfaces.

2. Inspect the spark-plug holes for any damaged threads.

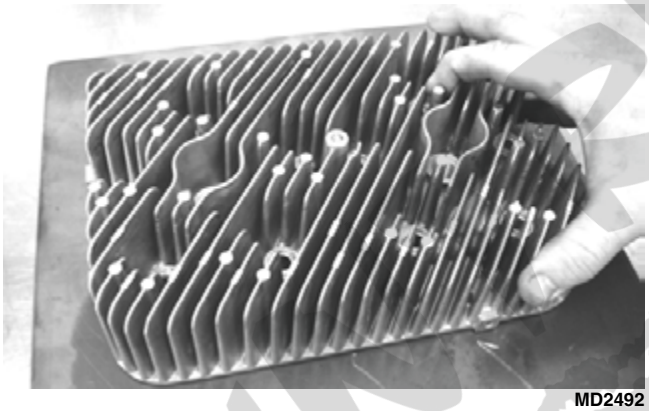
3. Inspect the cylinder head for flatness using a straightedge and a feeler gauge. Acceptable warpage must not exceed 0.002 in.

■NOTE: If the warpage exceeds specification, resurface the cylinder head using procedures identified in step 4.



MD2491

4. Place the cylinder head on a Surface Plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move each cylinder head in a figure eight motion. Inspect the sealing surface for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots before assembly by continuing to move the cylinder head in a figure eight motion until a uniform bright metallic finish is attained.



MD2492

CAUTION

Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

CYLINDERS

1. Using a non-metallic carbon removal tool, remove carbon buildup from the exhaust ports.
2. Wash the cylinders in parts-cleaning solvent.
3. Inspect the cylinders for pitting, scoring, scuffing, and corrosion. If marks are found, repair the surface with a Ball Hone and honing oil.

■NOTE: To produce the proper 45° crosshatch pattern, maintain a low drill RPM. If honing oil is not available, use a lightweight, petroleum-based oil. Thoroughly clean the cylinders and reed valves after honing using detergent soap and hot water and dry with compressed air; then immediately apply oil to the cylinder bores. If a bore is severely damaged or gouged, the cylinder must be replaced.

4. Place the head surface of each cylinder on the surface plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move each cylinder in a figure eight motion. Inspect the surface for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots before assembly by continuing to move the cylinder in a figure eight motion until a uniform bright metallic finish is attained.

CAUTION

Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

PISTON ASSEMBLY

1. Using a non-metallic carbon removal tool, remove the carbon buildup from the dome of each piston.
2. Take an old piston ring and snap it into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

CAUTION

Improper cleaning of the ring-grooves by the use of the wrong type of ring-groove cleaner will result in severe damage to the piston.

3. Inspect each piston for cracks in the piston pin and skirt areas.
4. Inspect each piston for seizure marks or scuffing. If scuffing or seizure marks are too deep, replace the piston.
5. Inspect the perimeter of each piston for signs of excessive "blowby." Excessive "blowby" indicates worn piston rings or an out-of-round cylinder.

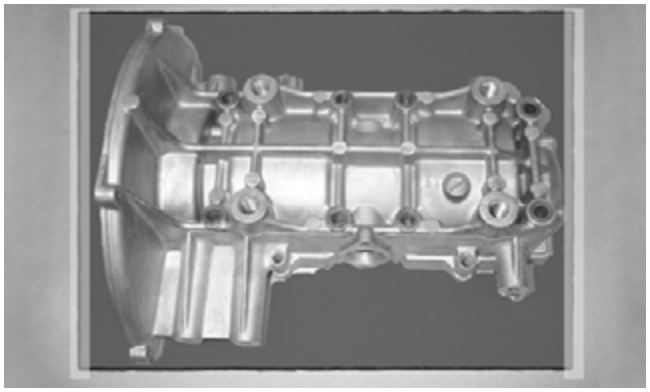
CRANKCASE

1. Wash the crankcase halves in parts-cleaning solvent.

■NOTE: Before washing the crankcase halves, make sure the four bearing dowel pins have been removed and accounted for.

2. Inspect the crankcase halves for scoring, pitting, scuffing, or any imperfections in the casting.
3. Inspect all threaded areas for damaged or stripped threads.
4. Inspect the bearing areas for cracks or excessive bearing movement. If evidence of excessive bearing movement is noted, the crankcase must be replaced.
5. Inspect the bearing dowel pins for wear.
6. Inspect the sealing surfaces of the crankcase halves for trueness by placing each crankcase half on the surface plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move each half in a figure eight motion. Inspect the sealing surfaces for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots by continuing to move the half in a figure eight motion until a uniform bright metallic finish is attained.

■**NOTE: Care must be taken not to remove an excessive amount of aluminum, or the crankcase must be replaced. If excessive aluminum is removed, too much pre-load will be exerted on the crankshaft bearings when assembled.**



MD0200A

CAUTION

Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

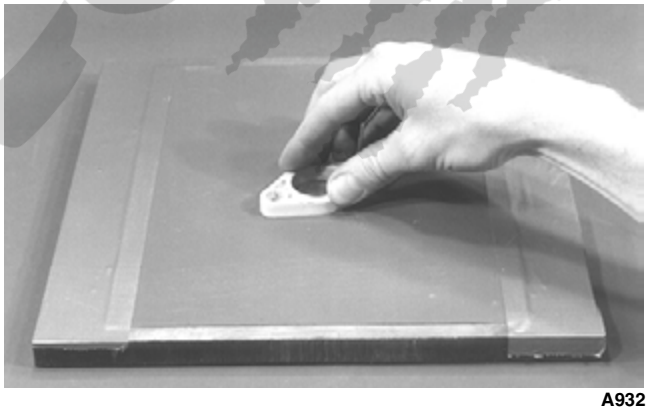
INSULATOR PLATES

1. Inspect for cracks, scoring, pitting, imperfections, or warping.
2. Inspect the sealing surfaces for trueness by placing each on the surface plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move both sides in a figure eight motion. Inspect the sealing surface for any indication of high spots or warping. Correct high spots by continuing to move each side in a figure eight motion. Warped components must be replaced.

■**NOTE: In order to inspect insulator plate trueness, it will be necessary to remove the studs.**

CAUTION

Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surfaces may result.

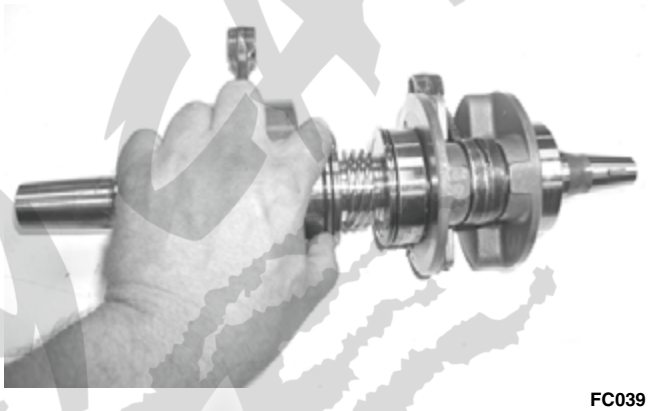


A932

CRANKSHAFT

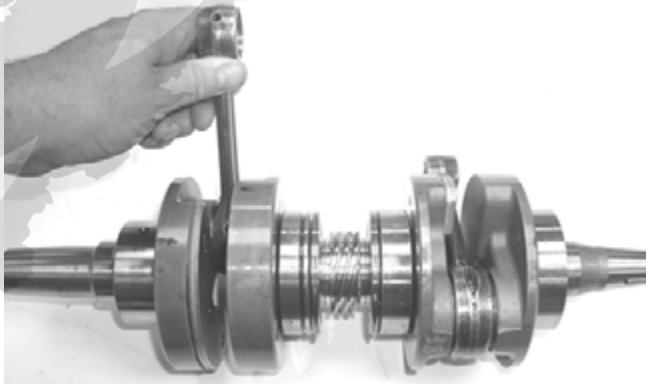
■**NOTE: If any servicing of the connecting rods, center bearings, or oil-injection pump drive gear is necessary, take the crankshaft to a qualified machine shop for that service.**

1. Wash the crankshaft with bearings in parts-cleaning solvent.
2. Inspect the bearings for wear, scoring, scuffing, damage, or discoloration. Rotate the bearings. Bearings must rotate freely and must not bind or feel rough. If any abnormal condition is noted, replace the bearing.



FC039

3. Inspect the connecting-rod bearings by rotating them. The bearings must rotate freely and must not bind or feel rough. If a connecting-rod bearing must be replaced, the connecting rod and crank pin must also be replaced.



FC040

4. Inspect the oil-injection pump drive gear for any signs of worn or chipped teeth. If either condition exists, replace the gear.

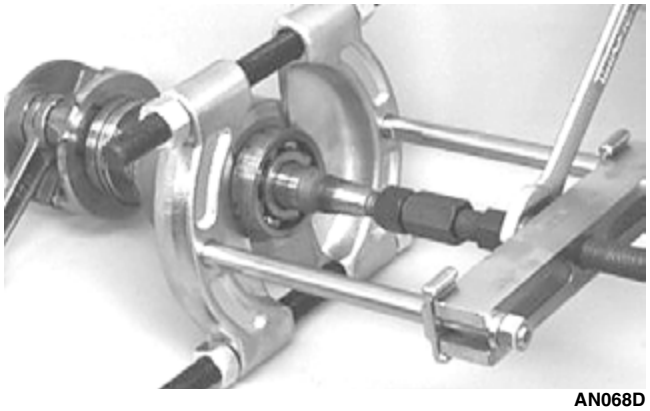
■**NOTE: Lubricate bearings thoroughly prior to assembly.**

REMOVING OUTER CRANKSHAFT BEARINGS

■**NOTE: Steps 1-2 are for removing the MAG-side bearing.**

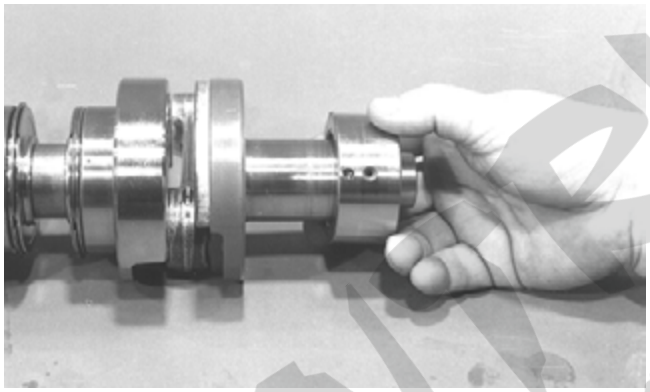
1. Place the crankshaft in a suitable support; then install Crankshaft Bearing Remover between the journal and the MAG-side bearing.

2. Place the protective cap on the crankshaft end; then remove the bearing from the end of the crankshaft. Account for any shim(s). Note the position of the dowel pin hole.



AN068D

3. The PTO-side bearing may be removed simply by sliding the bearing off the PTO end.



AN151A

4. Inspect the crankshaft bearing area for wear. If any wear is noted on either end, replace the crankshaft end.

INSTALLING OUTER CRANKSHAFT BEARINGS

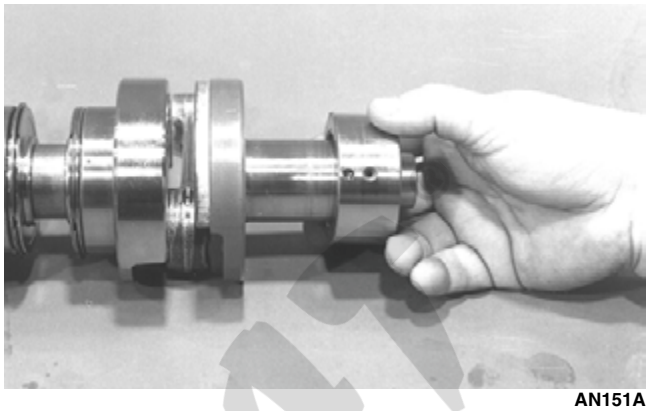
■NOTE: Steps 1-3 are for installing the MAG-side bearing.

1. Wrap a thick towel around the crankshaft; then secure the crankshaft vertically in a vise.
2. Heat the bearing either by placing the entire bearing in a pan of oil on a hot plate or by squirting oil into the bearing and using a propane torch to heat the inner race of the bearing until a slight smoke is noted coming from the bearing.

CAUTION

DO NOT overheat the bearing.

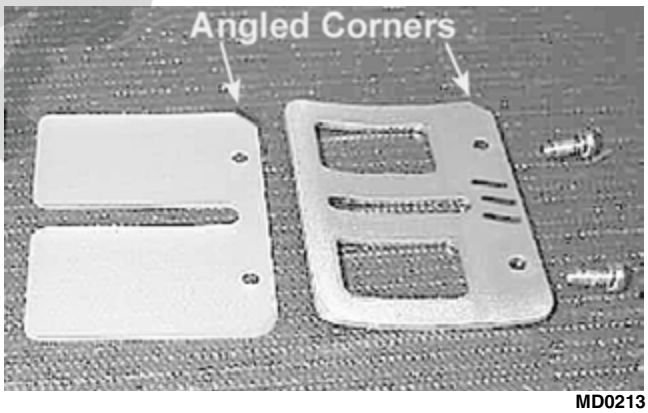
3. Place any shims removed during disassembly onto the crankshaft; then slide the bearing onto the crankshaft making sure the dowel-pin hole in the outer race is properly positioned and will align with its hole and pin in the crankcase.
4. Slide the PTO-side bearing onto the PTO end making sure the dowel-pin hole will align with the hole and pin in the crankcase.



AN151A

REED VALVE ASSEMBLY

1. Inspect the reed valves, stoppers, and cages for cracks or any deterioration.
2. Wash the reed valves, stopper, and cage assembly in parts-cleaning solvent and blow dry.
3. Inspect the reed stopper height. Using a caliper, measure the distance from the seat to the bottom outer tip edge of the stopper. Measurement must not exceed 0.236 in. If measurement is not within specifications, either bend or replace the reed stopper.
4. Inspect the reed-to-seat clearance. Using a feeler gauge, measure the clearance. Clearance must be less than 0.008 in. If clearance is not within specifications, replace the reed valve.
5. To assemble, place the reed valves on the cage with its angled corner positioned to the lower right hand corner of the cage. Place the reed stopper assembly into position and secure with the three machine screws coated with blue Loctite #243. Tighten the machine screws to 48 in.-lb.



MD0213

CAUTION

Do not over-tighten the machine screws when installing the reed valves and reed valve stoppers.

6. When installing the reed valve cage, use blue Loctite #243 on the cap screws and tighten to 96 in.-lb.

Measuring Critical Components

■NOTE: Critical engine specifications chart can be found in Section 1 of this manual.

CYLINDER HEAD VOLUME (Squish-Gap Method)

To check the squish gap, a micrometer and two heavy pieces of solder will be needed.

1. Remove the spark plugs from the engine.
2. Simultaneously insert two pieces of solder down through the spark plug hole and push them up against the inner cylinder bore towards the MAG-side and PTO-side of the cylinder.
3. Pull the recoil rope and crank the engine over several times while the solder is being held firmly in place.
4. Remove both pieces of solder from the cylinder. Using the micrometer, measure the very end of the squeezed solder piece. Record the reading.

■NOTE: If the solder hasn't been squeezed by the piston, a larger piece of solder must be used. Repeat procedure.

5. Using the opposite end of the solder pieces, insert them down through the spark plug hole towards the PTO-side and MAG-side of the cylinder. Push on the solder until they contact the inner cylinder bore.
6. Pull the recoil rope and crank the engine over several times. Remove both pieces of solder from the cylinder and measure the opposite squeezed ends with a micrometer. Record reading.

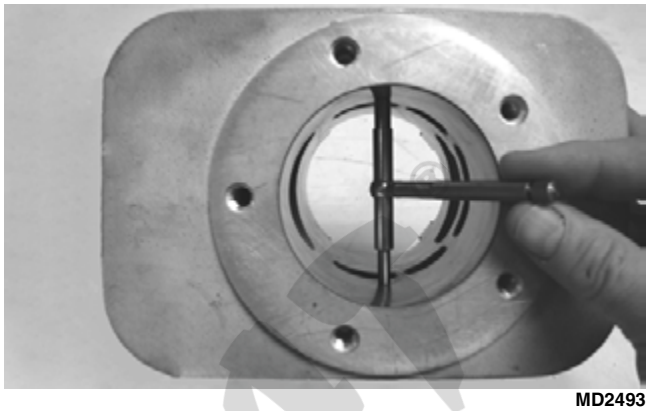
■NOTE: Measure from PTO to MAG-side of the piston to accurately measure the squish gap. Never measure across piston, exhaust to carburetor side, as the piston will rock and the reading won't be accurate.

Readings may vary from side to side.

■NOTE: Make sure the smaller reading is 0.066 in. or less.

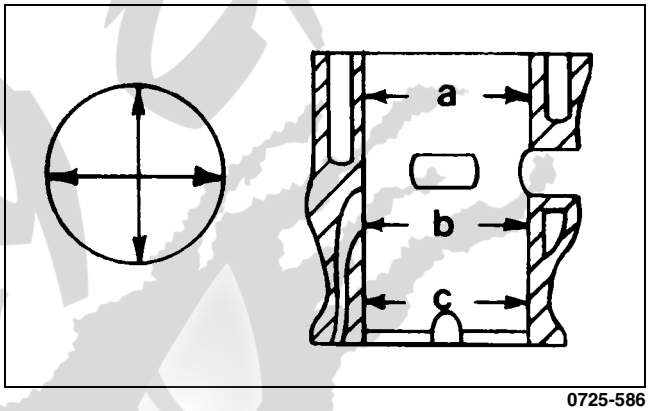
CYLINDER TRUENESS

1. Measure each cylinder in the three locations from front to back and side to side for a total of six readings.



MD2493

2. The trueness (out-of-roundness) is the difference between the highest and lowest reading. Maximum trueness (out-of-roundness) must not exceed 0.004 in.



0725-586

PISTON SKIRT/CYLINDER CLEARANCE

1. Measure each cylinder front to back about 1 in. from the bottom of each cylinder.
2. Measure the corresponding piston skirt diameter at a point 1 cm above the piston skirt at a right angle to the piston-pin bore. Subtract this measurement from the measurement in step 1. The difference (clearance) must be within 0.0031-0.0041 in.

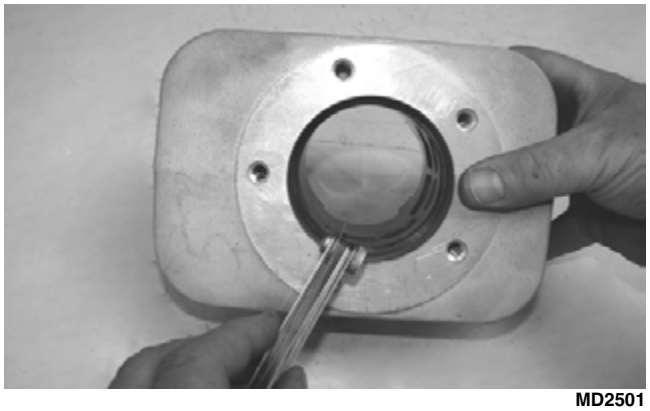


AC091

PISTON-RING END GAP

1. Place each piston ring in the wear portion above the exhaust port of its respective cylinder. Use the piston to position each ring squarely in each cylinder.

2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within 0.0120-0.0196 in.



MD2501

PISTON PIN AND PISTON-PIN BORE

1. Measure the piston pin diameter at each end and in the center. Acceptable piston pin measurement must be within 0.7085-0.7087 in. If any measurement varies by more than 0.001 in., the piston pin and bearing must be replaced as a set.



IO012

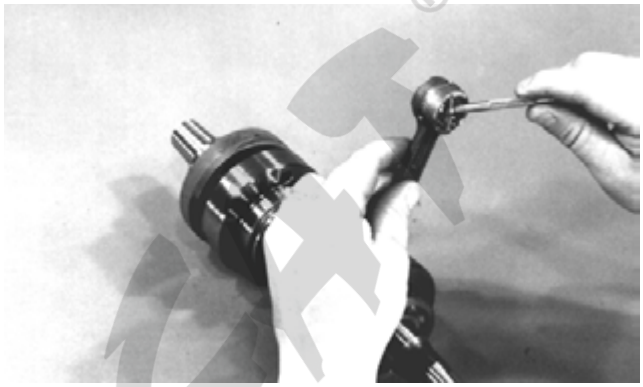
2. Insert a snap gauge into each piston-pin bore; then remove the gauge and measure it with a micrometer. The diameter measurement must be within 0.7087-0.7091 in. Take two measurements to ensure accuracy.



AC092

CONNECTING-ROD SMALL END BORE

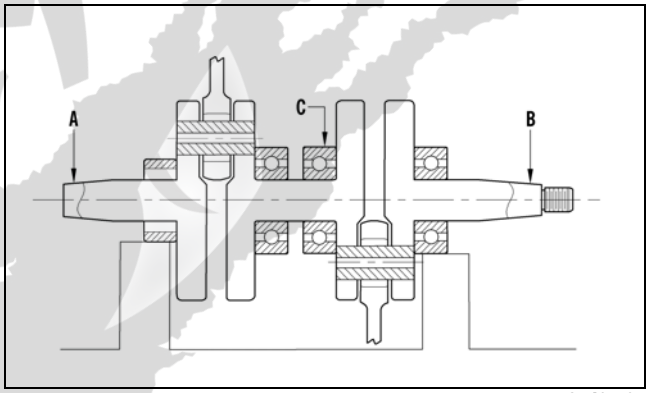
1. Insert a snap gauge into each connecting-rod small end bore; then remove the gauge and measure it with a micrometer.



AN061

2. The diameter measurement must be within 0.9056-0.9059 in.

CRANKSHAFT RUNOUT



0742-727

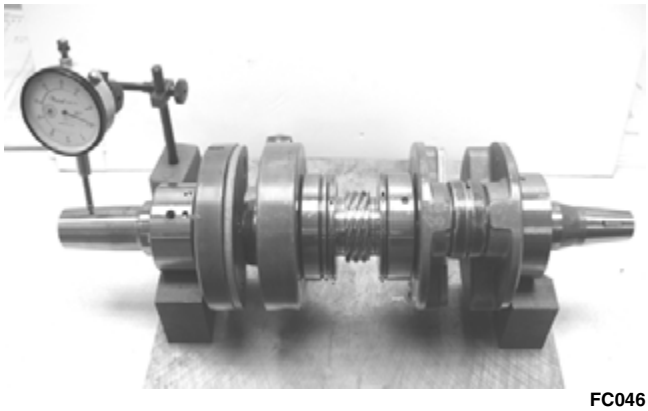
1. Using V Blocks, support the crankshaft on the surface plate.

■NOTE: The V blocks should support the crankshaft on the outer bearings.

2. Mount a dial indicator and base on the surface plate. Position the indicator contact point against the crankshaft location point A (PTO-end) from the crankshaft end. Zero the indicator and rotate the crankshaft slowly. Note the amount of crankshaft runout (total indicator reading).

■NOTE: For runout location point specifications, see Crankshaft Runout/Repair Specifications in Section 1 of this manual.

3. Position the indicator contact point against the crankshaft location point B (MAG-end) from the crankshaft end. Zero the indicator and rotate the crankshaft slowly. Note the amount of crankshaft runout (total indicator reading).



FC046

4. Position the indicator contact point against the crankshaft at location point C (center). Zero the indicator and rotate the crankshaft slowly. Note the amount of crankshaft runout (total indicator reading).
5. If runout exceeds 0.002 in. at any of the checkpoints, the crankshaft must be either straightened or replaced.

Assembling

■NOTE: Use new gaskets and seals when assembling the engine.

■NOTE: Prior to assembling the engine, use parts cleaning solvent and compressed air and thoroughly clean the threaded holes of the crankcase and cylinders to properly tighten.

⚠ WARNING

Always wear safety glasses when drying components with compressed air.

■NOTE: When the use of a lubricant is indicated, use recommended Arctic Cat Injection Oil.

1. Place the upper crankcase half (with its bottom side up) on two blocks of wood.

CAUTION

To prevent damage to the crankshaft, crankshaft bearings, or seals, make sure to always lift the crankshaft from both ends.

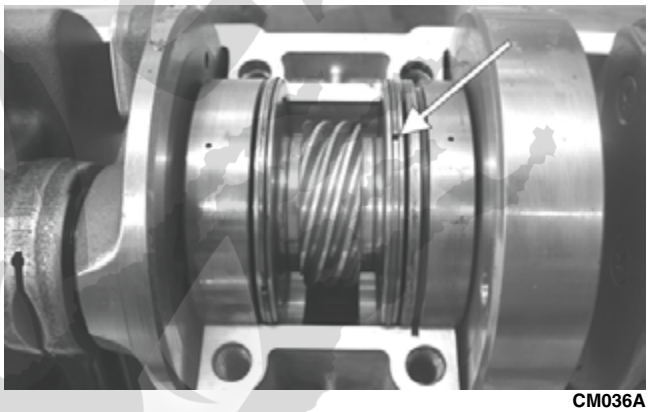
2. Lightly grease the inner lips of the crankshaft seals; then slide them onto the crankshaft.
3. Apply oil to the crankshaft bearings; then install the crankshaft into the upper crankcase half. Be sure the alignment hole in each bearing is positioned over its respective dowel pin in the crankcase; then seat the crankshaft.

■NOTE: To check the bearing for proper position, place the point of a sharp tool into the dimple found in the bearing race. Strike the tool with the palm of the hand in either direction. If the bearing moves, it isn't positioned correctly and must be rotated until it drops onto the dowel pin.

CAUTION

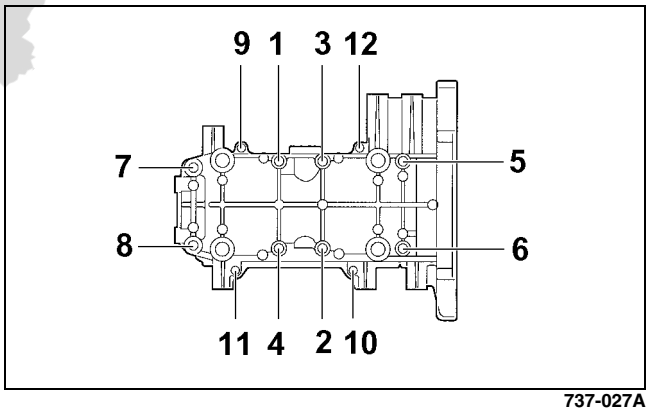
If the bearings are not properly seated during assembly, the crankcase halves will not seal tightly and severe engine damage will result.

■NOTE: Position the two center seal rings with their end gaps 180° apart (up on one and down on the other); then apply a thin coat of High-Temp Sealant to the entire bottom half of the crankcase sealing surface.



CM036A

4. Install the four crankcase dowel pins.
5. Install crankcase lower half. Install eight 8 mm and four 6 mm cap screws.
6. Tighten the 8 mm cap screws in two steps to 17 ft-lb and the 6 mm cap screws to 96 in.-lb using the pattern shown.



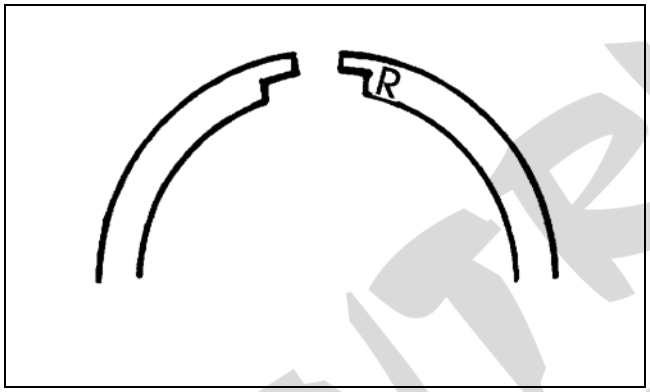
737-027A



MD0212

■**NOTE: Check the reed valve on each cylinder. Make sure they are clean and closing completely.**

7. Install the piston rings on each piston so the letter on the top (inclined surface) of each ring faces the dome of the piston.

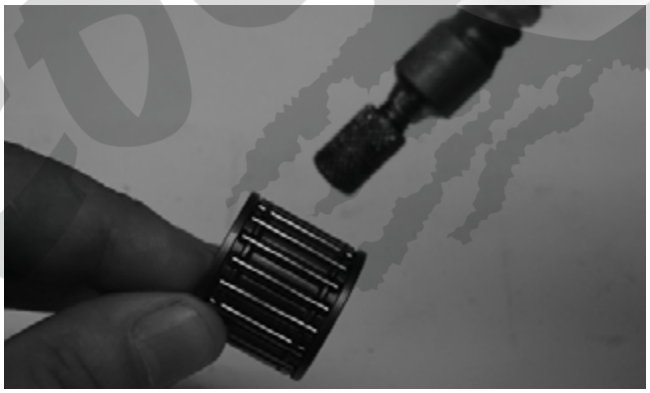


726-306A

CAUTION

Incorrect installation of the piston rings will result in engine damage. Always replace rings as a complete set.

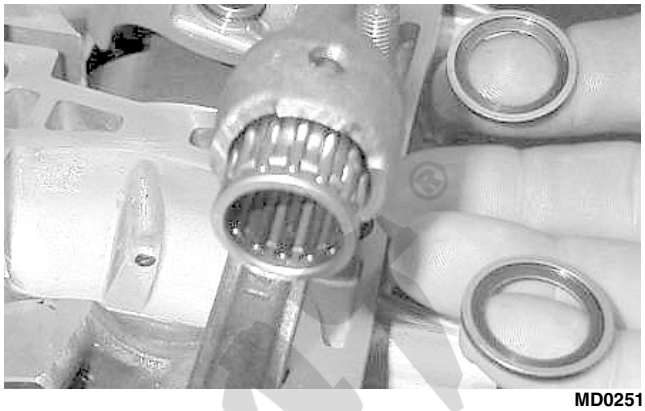
8. Lubricate the piston pin bearings and install them into the connecting rods.



TZ068

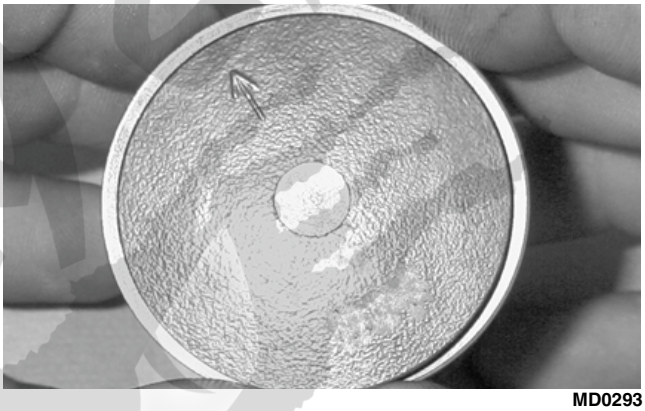
9. Install piston pin bearing washers on each side of the bearing with the shoulder side facing the bearings.

■**NOTE: The shoulder side of the piston pin bearing washers must face the bearing.**



MD0251

10. Place pistons over the connecting rods with the arrow (or indicator dot) pointing toward the exhaust port; then secure with an oiled piston pin. Install new piston pin circlips with the open ends up or down.



MD0293

■**NOTE: To aid in the circlip installation, install the circlip to the inside of the piston before installing the connecting rod.**



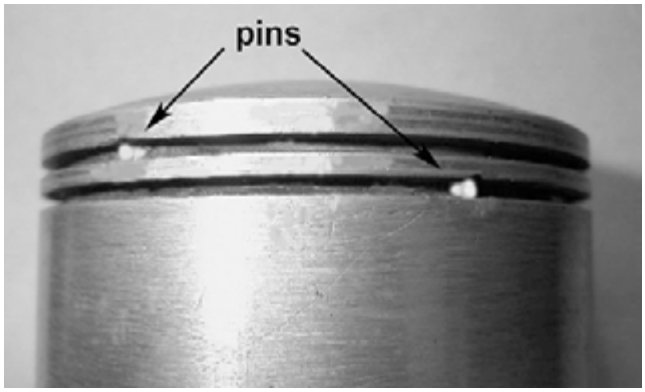
MD0248

CAUTION

Make sure the new circlips are firmly seated in their grooves and the open ends are pointed up or down before continuing with assembly.

11. Place the cylinder base gasket into position on the crankcase making sure the gasket is properly oriented so the dowel pins will fit through the holes easily.

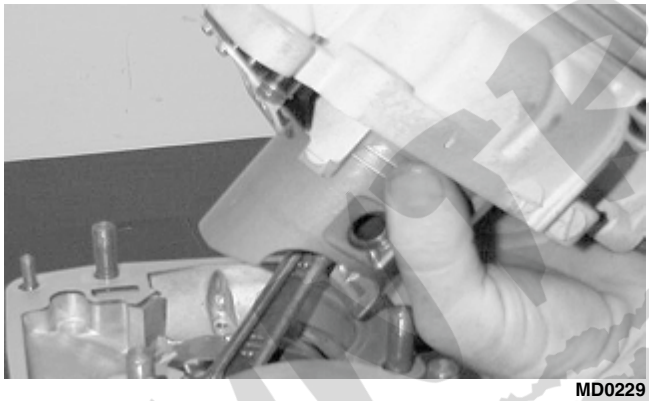
12. Rotate each piston ring until the ring ends are properly positioned with the pins in the ring grooves; then apply oil to the piston assemblies and cylinder bores. Using a ring compressor or the fingers, compress the rings and slide the cylinder over the piston. Seat the cylinder firmly onto the crankcase.



MD0271

CAUTION

The cylinders should slide on easily. DO NOT force them on or component damage may occur.

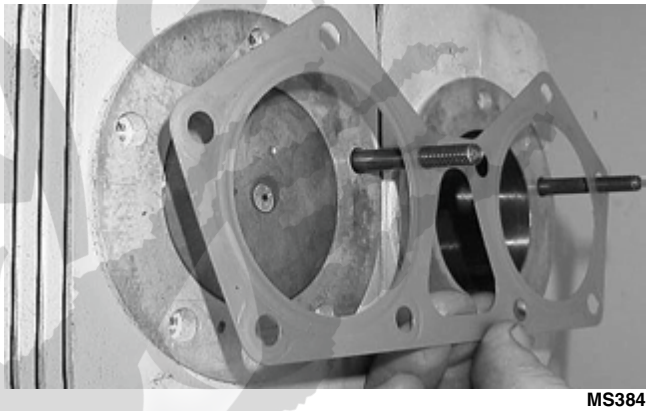

MD0229

13. Secure each cylinder by installing the four 6 mm and eight 10 mm nuts. Tighten the 10 mm nuts in a criss-cross pattern to 44 ft-lb and the 6 mm nuts to 96 in.-lb.

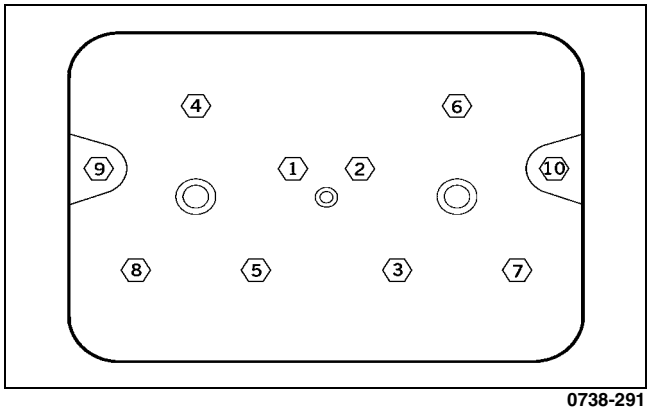

MD0086


MD0087

14. Install a new cylinder head gasket and the cylinder head; then install the eight cap screws and two flange nuts. Tighten the cap screw in three steps to 19 ft-lb using the pattern shown; then tighten the flange nuts to 21 ft-lb.

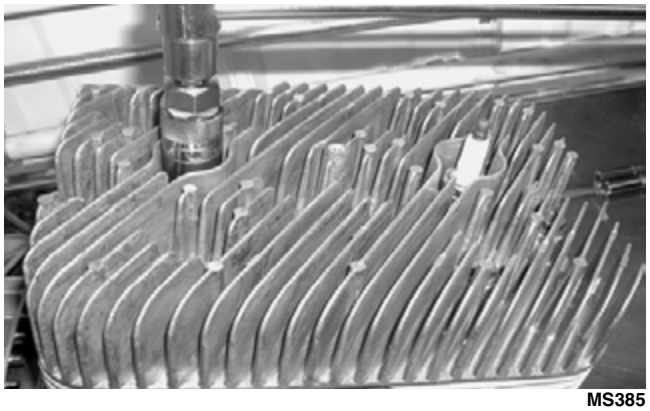

MS384


MS384



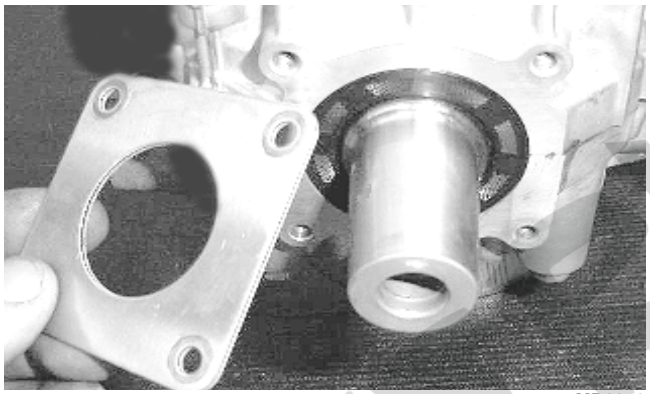
0738-291

15. Install the spark plugs. Pressure test the engine (see Section 3).

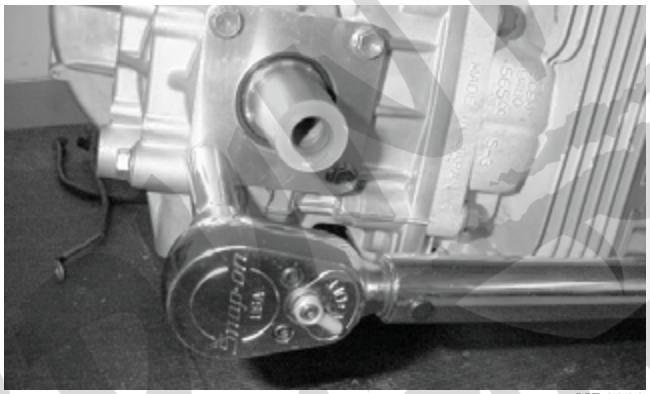


MS385

16. Position the seal retainer plate on the PTO-side; then install the four cap screws. Tighten the cap screws to 96 in.-lb.



MD0253



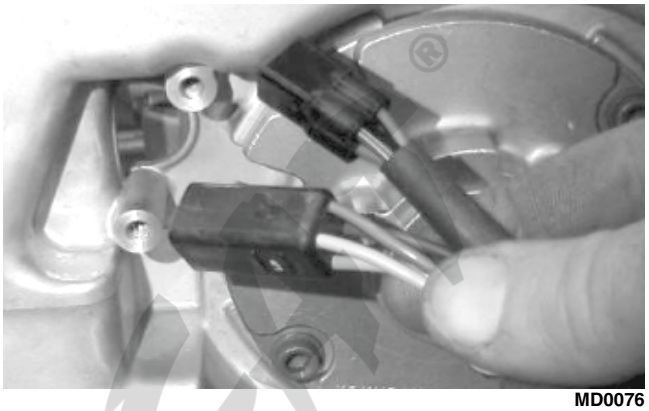
MD0292

17. Install the stator plate so the ignition wire cut-out is in the upper left position. Lightly coat the four Allen-head cap screws with blue Loctite #243; then install and tighten them to 96 in.-lb.

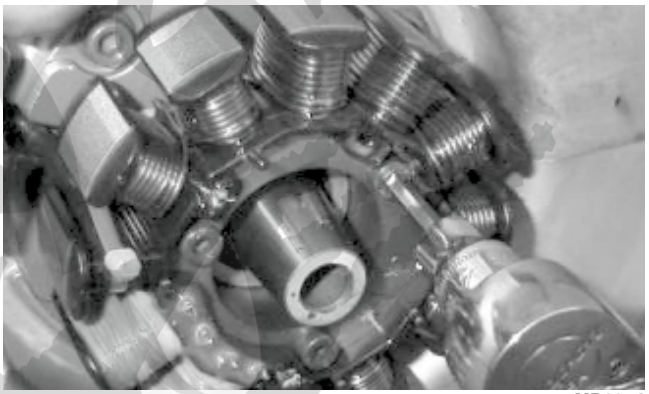


MD0255

18. Place the stator wiring through the hole in the crankcase; then install the stator. Lightly coat the three Allen-head cap screws with blue Loctite #243; then tighten to 48 in.-lb.

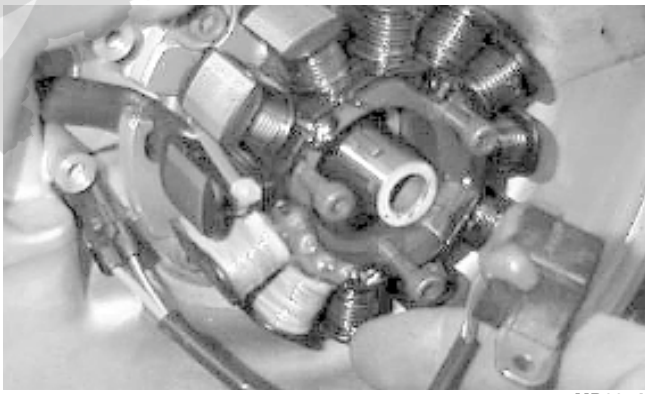


MD0076

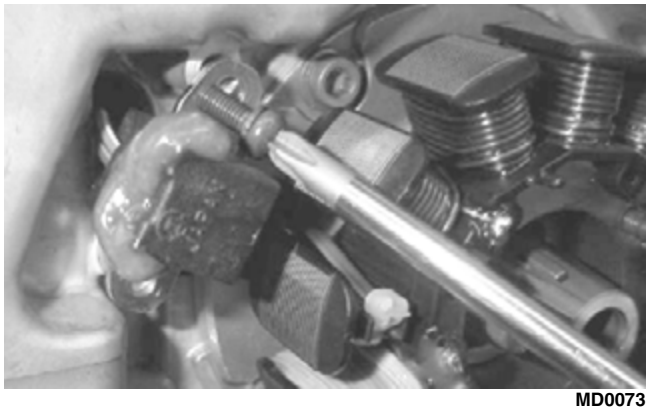


MD0274

19. Place the ignition timing sensor wiring through the hole in the crankcase; then position the ignition timing sensor and install two Phillips-head cap screws (coated with blue Loctite #243). Tighten the cap screws to 48 in.-lb.



MD0074



MD0073

20. Install the rubber insulator grommet into the crankcase.



MD0262

21. Place the starter clutch into position on the flywheel assembly; then tighten the cap screws only until snug.

22. Install the key; then install the flywheel and cap screw (threads coated with blue Loctite #243) w/lock washer and flat washer; then using Flywheel Spanner Wrench to hold the starter cup, tighten the flywheel cap screw to 50 ft-lb.



MD0264



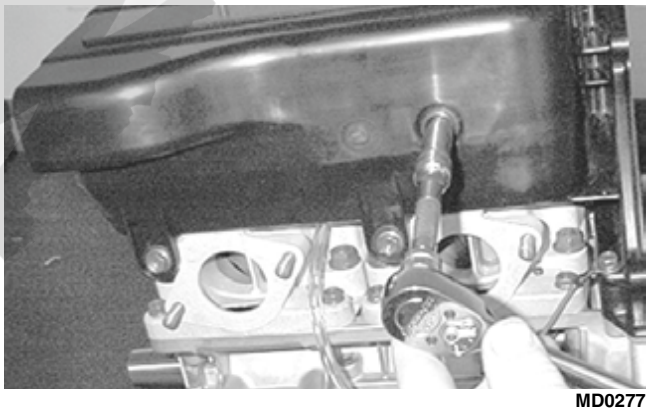
MD0278

23. Using Flywheel Spanner Wrench to hold the starter cup, tighten the three cap screws (from step 21) to 28 ft-lb.



TZ067A

24. Using the six cap screws and the special washers, install the rear (intake-side) shroud. Tighten the cap screws (coated with red Loctite #271) to 96 in.-lb.



MD0277

25. Using the five 6 mm cap screws and the special washers, install the front (exhaust-side) cooling shroud and tighten to 96 in.-lb. Install the rubber spark plug grommets; then tighten the cap screws securely.



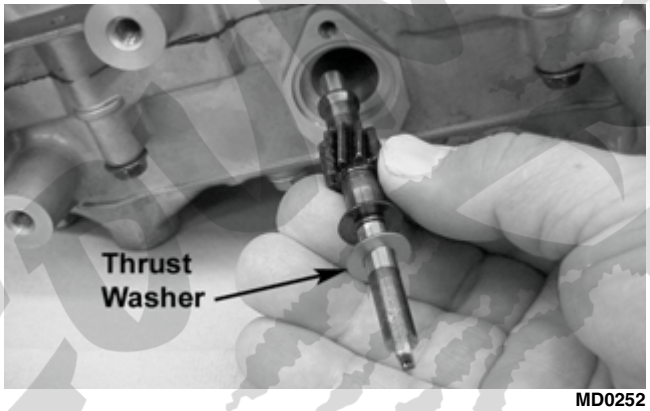
MD0269



MD0268

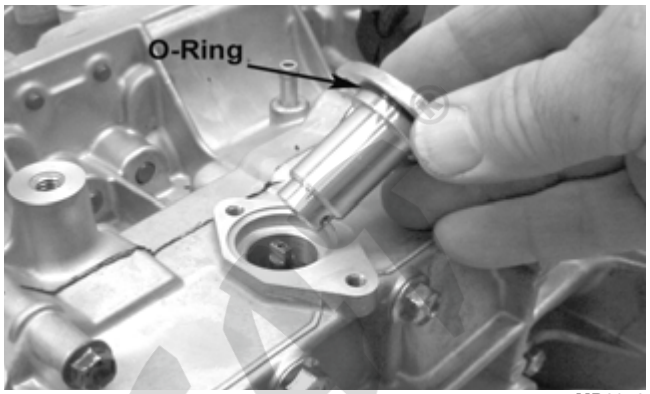
26. Lubricate the oil-injection pump driveshaft; then while rotating the driveshaft, install it and the thrust washer into the lower crankcase half.

■NOTE: When installing the oil-injection pump driveshaft, make sure the thrust washer is installed.



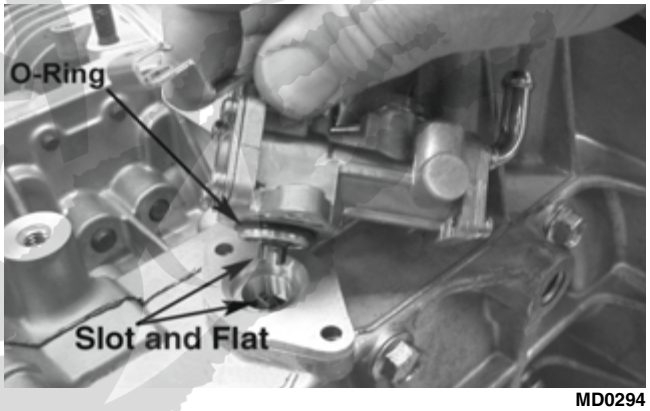
MD0252

27. With a new O-ring (lightly coated with oil) in place, install the oil-injection pump driveshaft retainer.



MD0273

28. With a new O-ring (lightly coated with oil) in place, install the oil-injection pump aligning the slot on the oil pump with the flat on the end of the oil-injection pump driveshaft. Tighten the Allen-head cap screws (coated with blue Loctite #243) to 48 in.-lb.



MD0294

29. Install the first set of intake gaskets (coated with High-Temp Sealant), heat deflector, remaining gaskets, insulators, and flanges. Secure with nuts and washers and tighten the nuts (threads coated with red Loctite #271) to 15 ft-lb.

Engine Servicing - 500 cc

This engine sub-section has been organized to show a progression for servicing of the Arctic Cat 500 cc engine. For consistency purposes, this sub-section shows a complete and thorough progression; however, for efficiency it may be preferable to disassemble only those components needing to be addressed. Also, some components may vary from model to model. The technician should use discretion and sound judgment.

■NOTE: Critical torque specifications can be found in Section 1 of this manual.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this engine section.

Description	p/n
Ball Hone	0644-292
Flywheel Spanner Wrench	0144-007
Flywheel Puller	0744-040
Flywheel Puller Insert	0644-179
Oil Seal Protector Tool	0644-219
Piston Pin Puller	0644-328
Surface Plate	0644-016
Water Pump Bearing and Seal Tool Kit	0644-557
Vacuum Test Pump	0644-131
V Blocks	0644-535

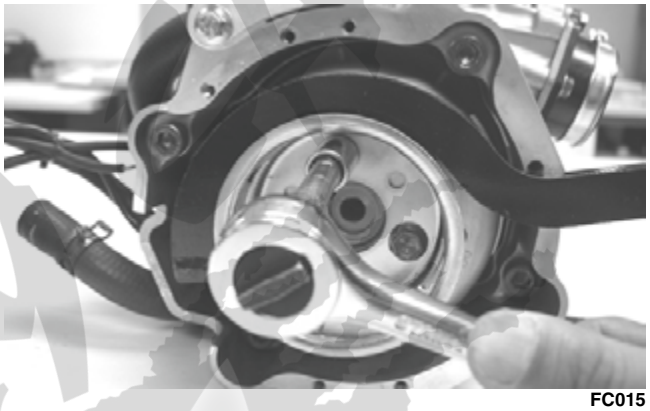
■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

Disassembling

1. Remove the exhaust manifold from the engine. Account for flange nuts and gaskets; then remove the clamp securing the coolant supply hose from the cylinder head to the water pump. Remove the hose from the engine.
2. Using the Flywheel Spanner Wrench to secure the flywheel, remove the flywheel cap screw and flat washer; then remove the three starter clutch cap screws and remove the clutch.

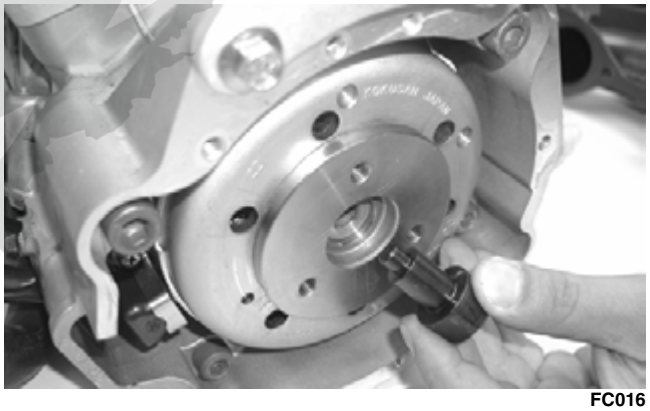


FC014



FC015

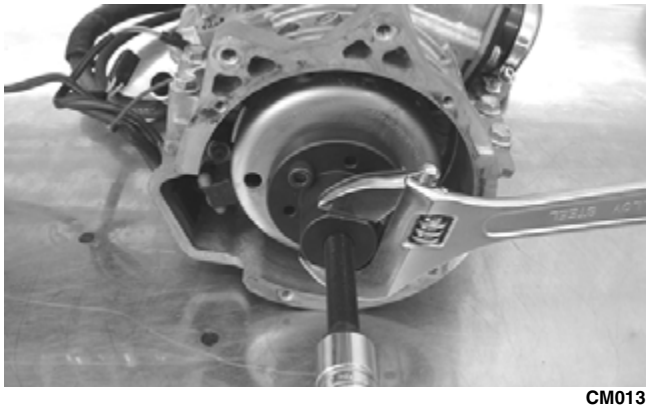
3. Install Flywheel Puller Insert onto the end of the crankshaft; then using Flywheel Puller, remove the flywheel from the crankshaft by tightening the puller bolt, striking the head of the puller bolt with a hammer, and tightening again. Repeat this procedure until the flywheel is free. Account for the key.



FC016

CAUTION

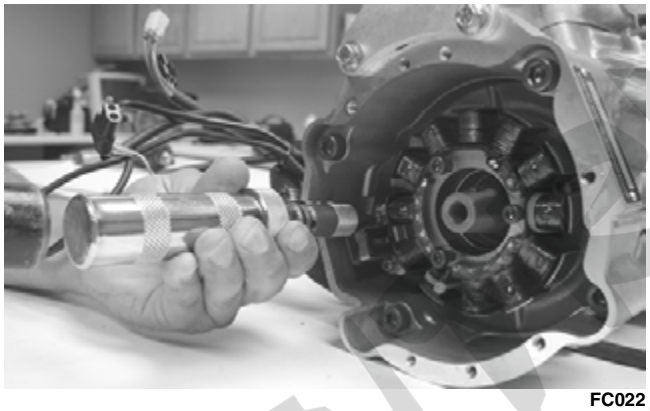
To prevent damage to the crankshaft, do not thread puller bolts more than 1/2 in. into the flywheel. Damage to the coils may result.



CM013

■**NOTE: To ensure the cleanliness of the flywheel magnets, place the flywheel (with the magnets facing upward) on a clean bench.**

4. Remove the ignition timing sensor and clamp.



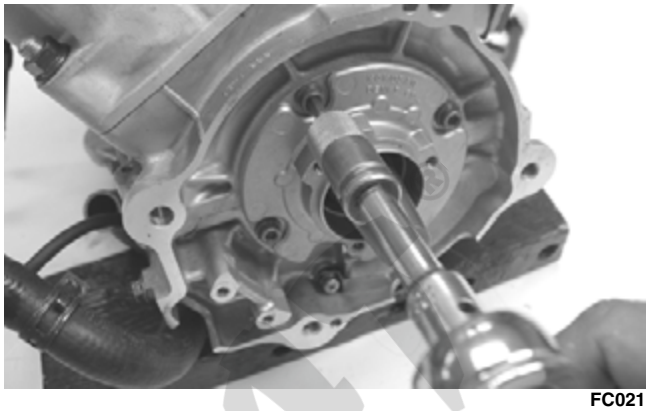
FC022

5. Remove the Allen-head cap screws securing the stator to the stator plate. Move the stator to the side to access the Phillips-head cap screw securing the stator lead wire; then remove the cap screw.

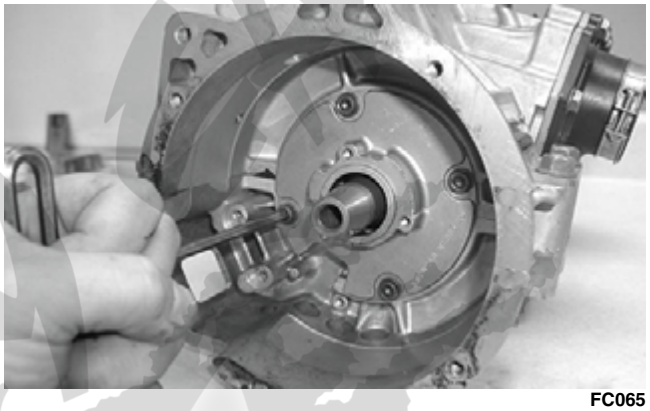


FC018

6. Remove the stator plate from the engine.



FC021



FC065

■**NOTE: The stator plate screws had Loctite applied to the threads during assembly. Using an impact driver, apply a sharp blow to the head of each screw to break the Loctite loose before removal.**

7. Remove the spark plugs.
8. Remove the cap screws with O-rings securing the cylinder head; then separate from the cylinders. Account for the O-rings.
9. Remove the oil-injection hose from each flange and the crankcase nozzle.



FC026

■**NOTE: When removing the cylinders, place the engine on its intake flanges on a drain tray to allow residual coolant to drain from the cylinder/crankcase water jacket.**

10. Remove the eight nuts securing the cylinders to the crankcase; then using a rubber hammer, gently tap the cylinders and remove from the crankcase by lifting them straight up off their studs. Account for gasket(s) and any alignment pins.

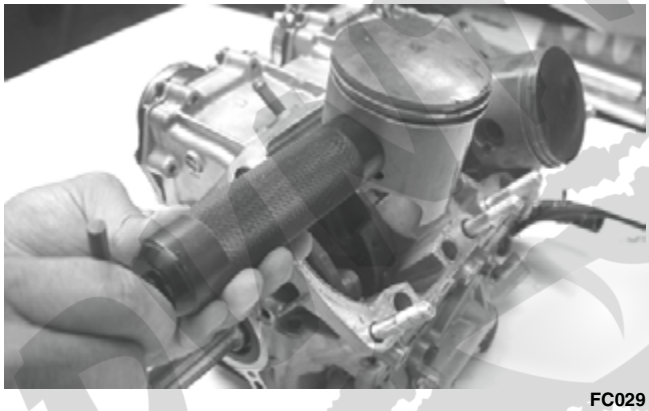
11. Remove the PTO-side piston-pin circlip from the PTO-side piston; then remove the MAG-side piston-pin circlip from the MAG-side piston. Discard the circlips.



CM149

12. Using Piston Pin Puller, remove the piston pins from both pistons.

■NOTE: For proper assembly, keep all MAG-side components and all PTO-side components separated. Assemble them on their proper sides.

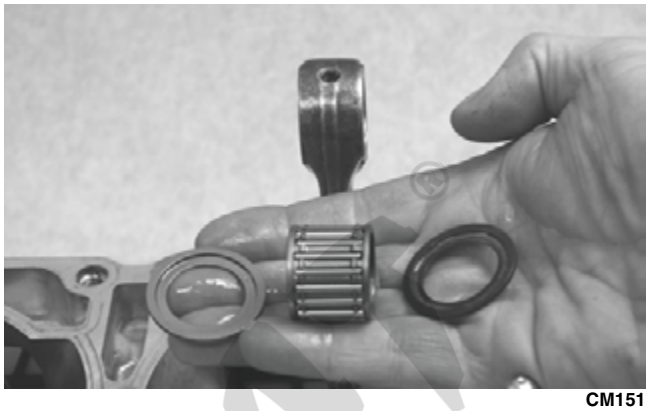


FC029

CAUTION

DO NOT use any type of punch to drive the piston pin free of the piston; damage may result. Use a piston pin puller only.

13. Lift the pistons clear of the connecting rods and remove the small-end connecting-rod bearings (account for two washers); then remove the piston rings. Keep each piston with its rings; keep each piston pin and bearing together as a set.

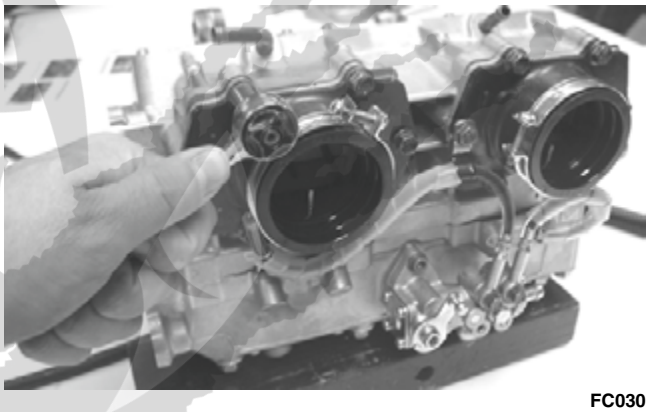


CM151

CAUTION

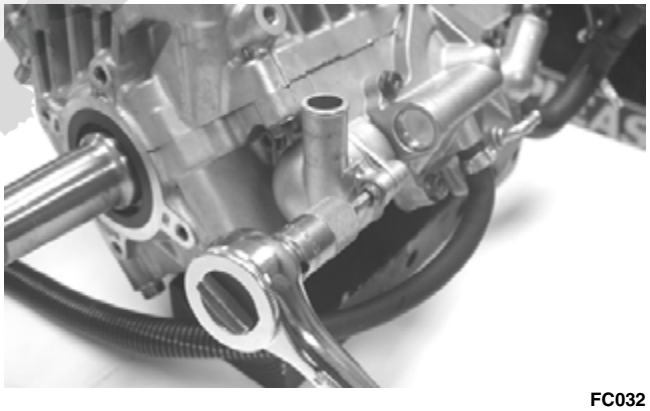
Place rubber bands over the connecting rods and around the cylinder studs to prevent the connecting rods from damaging the crankcase.

14. Remove the intake flanges and reed valve assemblies.



FC030

15. Remove the three cap screws securing the thermostat cap; then remove the cap, gasket, and thermostat.

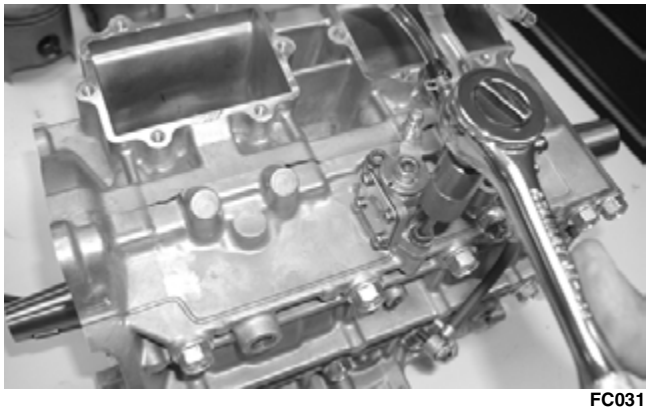


FC032

16. Remove the six screws securing the water pump cover to the crankcase and remove the cover. Account for the O-ring gasket and the alignment pins.

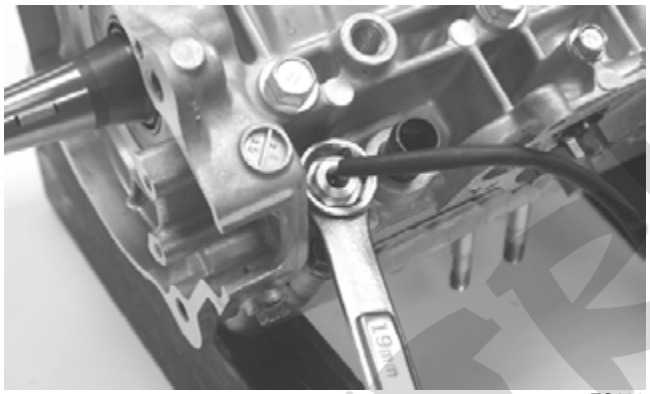
17. Remove the cap screw securing the water pump impeller; then slide the impeller free of the shaft.

18. Remove either lower union cap screw securing the lower check valve assembly; then remove the two screws securing the oil-injection pump to the crankcase. Remove the pump, retainer, and O-ring.



FC031

19. Turn the engine upside down on support blocks and remove the coolant temperature sensor (if necessary).



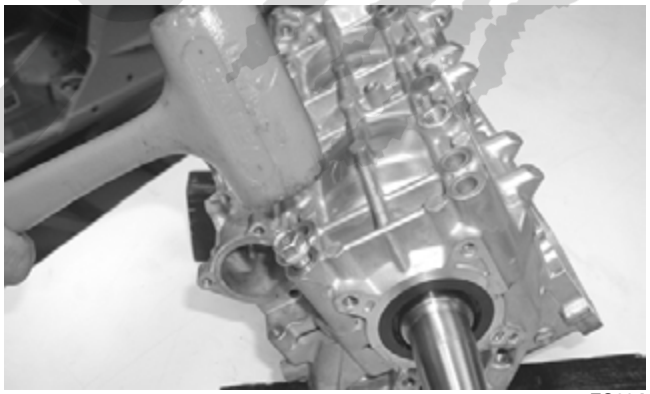
FC033

20. With its bottom side up on two support blocks, remove the cap screws securing the crankcase halves.

21. Separate the crankcase halves by installing two crankcase cap screws in opposite corners leaving the heads approximately 1/4 in. out. Using a plastic hammer and lifting on the ends of the crankshaft, tap on each cap screw head until the case halves separate. Remove the cap screws.

CAUTION

DO NOT drive any tool between halves to separate the crankcase. Damage to the sealing surfaces will result.



FC034

22. Lift the bottom half of the crankcase off the top half.

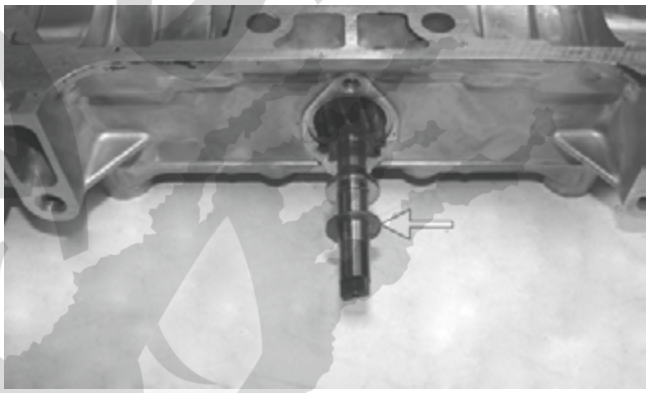
CAUTION

Care must be taken to not allow the connecting rods to drop onto the sealing surface of the bottom case half.

23. Lift the crankshaft free from the top half of the crankcase and slide the crankshaft oil seals off the crankshaft. Account for the C-ring. Remove the bearing retaining pins and account for the crankcase dowel pins.

■NOTE: The end bearings are not pressed onto the crankshaft. After removing the seals, use care not to allow the bearings to slide off the crankshaft.

24. Remove the oil-injection pump/water pump driveshaft from the lower crankcase half. Account for the thrust washer on the outer end of the shaft.



CM159A

■NOTE: When replacing the inner water pump seals, use the recommended Water Pump Bearing and Seal Tool Kit only.

25. Place the crankcase on the bench with the water pump side down. Using the long seal driver, drive the mechanical water pump seal from the crankcase.

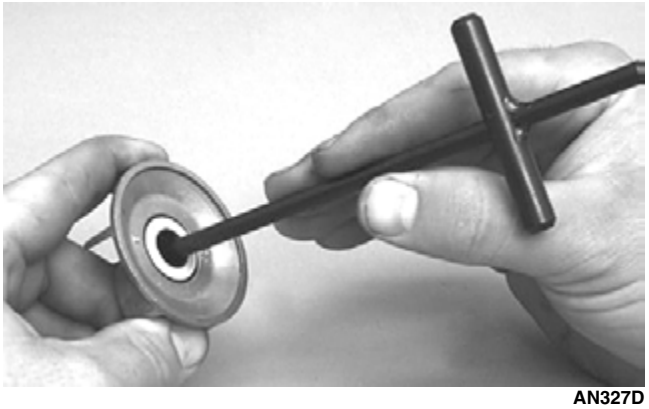


FC036

26. Using a pair of snap ring pliers, remove the snap ring securing the inner seal in the crankcase.

27. Using the hooked end of the tool, pull the inner seal free of the crankcase.

28. Using the hooked end of the tool, pry the seal ring from the backside of the water pump impeller.



AN327D

Cleaning and Inspecting

CYLINDER HEAD

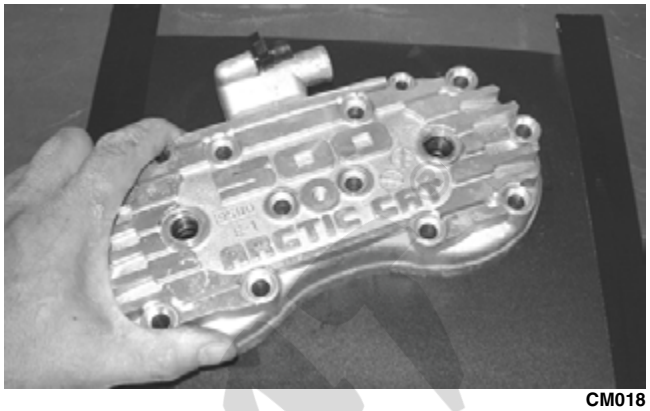
1. Using a non-metallic carbon removal tool, remove any carbon buildup from the combustion chambers being careful not to nick, scrape, or damage the combustion chambers or the sealing surfaces.
2. Inspect the spark-plug holes for any damaged threads.
3. Inspect the cylinder head for flatness using a straightedge and a feeler gauge. Acceptable warpage must not exceed 0.002 in.

■NOTE: If the warpage exceeds specification, resurface the cylinder head using procedures identified in step 4.



FS270

4. Place the cylinder head on a Surface Plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move each cylinder head in a figure eight motion. Inspect the sealing surface for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots before assembly by continuing to move the cylinder head in a figure eight motion until a uniform bright metallic finish is attained.



CM018

CAUTION

Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

CYLINDERS

1. Using a non-metallic carbon removal tool, remove carbon buildup from the exhaust ports.
2. Wash the cylinders in parts-cleaning solvent.
3. Inspect the cylinders for pitting, scoring, scuffing, and corrosion. If marks are found, repair the surface with a Ball Hone and honing oil.

■NOTE: To produce the proper 45° crosshatch pattern, maintain a low drill RPM. If honing oil is not available, use a lightweight, petroleum-based oil. Thoroughly clean the cylinders after honing using detergent soap and hot water and dry with compressed air; then immediately apply oil to the cylinder bores. If a bore is severely damaged or gouged, the cylinder must be replaced.

4. Place the head surface of each cylinder on the surface plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move each cylinder in a figure eight motion. Inspect the surface for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots before assembly by continuing to move the cylinder in a figure eight motion until a uniform bright metallic finish is attained.

CAUTION

Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

PISTON ASSEMBLY

1. Using a non-metallic carbon removal tool, remove the carbon buildup from the dome of each piston.

2. Snap an old piston ring into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

CAUTION

Improper cleaning of the ring-grooves by the use of the wrong type of ring-groove cleaner will result in severe damage to the piston.

3. Inspect each piston for cracks in the piston pin and skirt areas.
4. Inspect each piston for seizure marks or scuffing. Repair with #400 grit wet-or-dry sandpaper and water or honing oil.



AN135

■NOTE: If scuffing or seizure marks are too deep to correct with the sandpaper, it will be necessary to replace the piston.

5. Inspect the perimeter of each piston for signs of excessive "blowby." Excessive "blowby" indicates worn piston rings or an out-of-round cylinder.

■NOTE: If synthetic oil is being used, a certain amount of "blowby" may be visible under normal use.

CRANKCASE

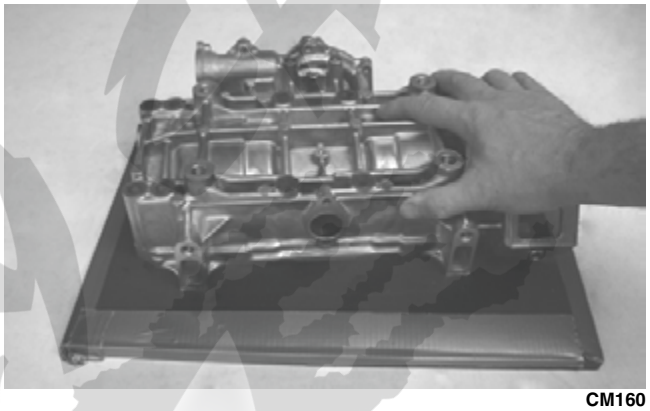
■NOTE: The coolant temperature sensor must be removed for this procedure.

1. Wash the crankcase halves in parts-cleaning solvent.

■NOTE: Before washing the crankcase halves, make sure the four bearing dowel pins have been removed and accounted for.

2. Inspect the crankcase halves for scoring, pitting, scuffing, or any imperfections in the casting.
3. Inspect all threaded areas for damaged or stripped threads.
4. Inspect the bearing areas for cracks or excessive bearing movement. If evidence of excessive bearing movement is noted, the crankcase must be replaced.
5. Inspect the bearing dowel pins for wear.
6. Inspect the sealing surfaces of the crankcase halves for trueness by placing each crankcase half on the surface plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move each half in a figure eight motion. Inspect the sealing surfaces for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots by continuing to move the half in a figure eight motion until a uniform bright metallic finish is attained.

■NOTE: Care must be taken not to remove an excessive amount of aluminum, or the crankcase must be replaced. If excessive aluminum is removed, too much pre-load will be exerted on the crankshaft bearings when assembled.



CM160

CAUTION

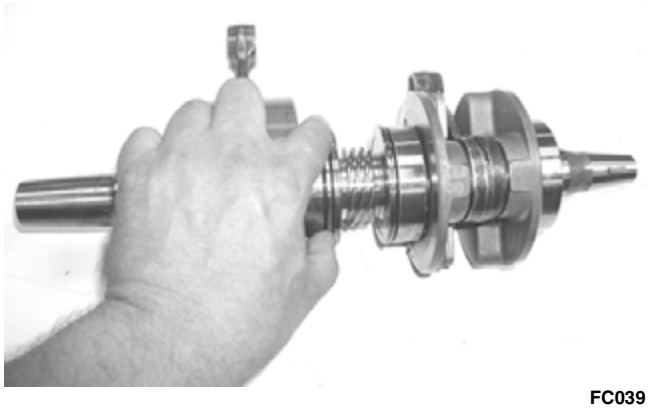
Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

■NOTE: At this point, install the coolant temperature sensor (threads coated with white Loctite #575) and tighten to 18 ft-lb.

CRANKSHAFT

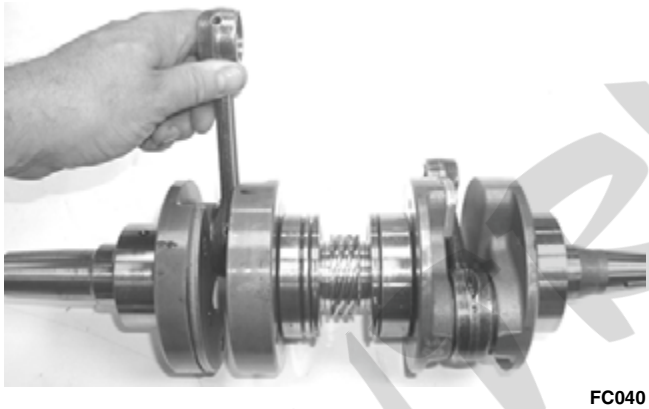
■NOTE: If any servicing of the connecting rods, center bearings, or oil-injection pump drive gear is necessary, Arctic Cat recommends the crankshaft be taken to a qualified machine shop for that service.

1. Wash the crankshaft with bearings in parts-cleaning solvent.
2. Inspect the bearings for wear, scoring, scuffing, damage, or discoloration. Rotate the bearings. Bearings must rotate freely and must not bind or feel rough. If any abnormal condition is noted, replace the bearing.



FC039

3. Inspect the connecting-rod bearings by rotating them. The bearings must rotate freely and must not bind or feel rough. If a connecting-rod bearing must be replaced, the connecting rod and crank pin must also be replaced.



FC040

4. Inspect the oil-injection pump drive gear for any signs of worn or chipped teeth. If either condition exists, replace the gear.

■NOTE: Lubricate bearings thoroughly prior to assembly.

REMOVING/INSTALLING OUTER CRANKSHAFT BEARINGS

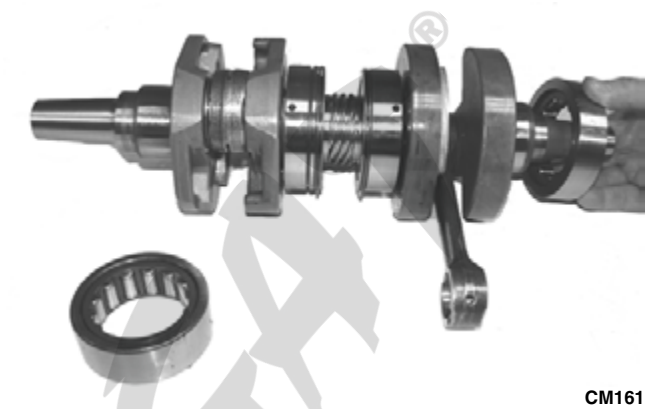
■NOTE: The end bearings are not pressed onto the crankshaft. The bearings can be removed simply by sliding them off the crankshaft.



CM161

Inspect the crankshaft bearing area for wear. If any wear is noted on either end, replace the crankshaft end.

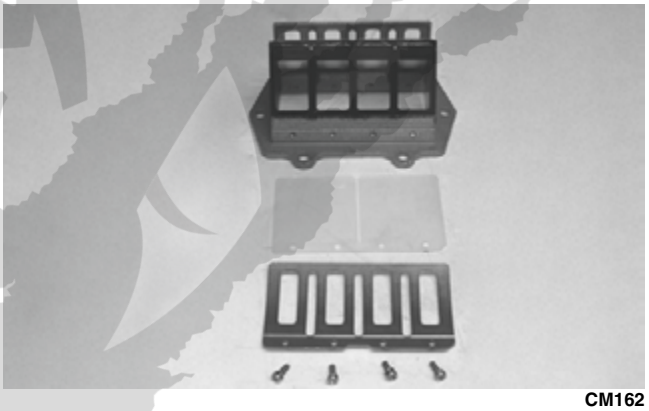
■NOTE: Install the bearings by sliding each bearing onto the crankshaft making sure the dowel-pin hole in the outer race is properly positioned and will align with its hole and pin in the crankcase.



CM161

REED VALVE ASSEMBLY

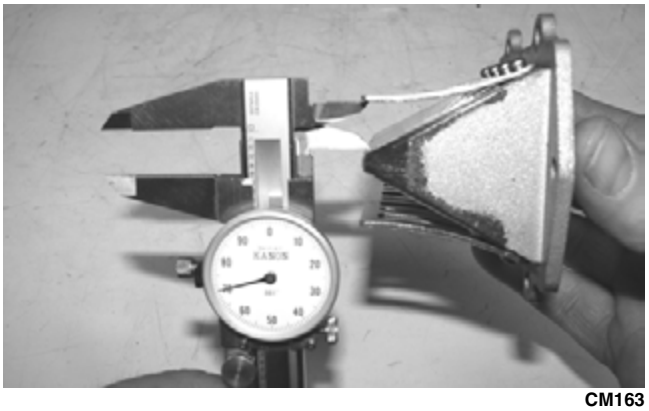
1. Inspect the reed valves, stoppers, and valve blocks for cracks or any deterioration.



CM162

2. Wash the reed valves, stopper, and cage assembly in parts-cleaning solvent and blow dry.

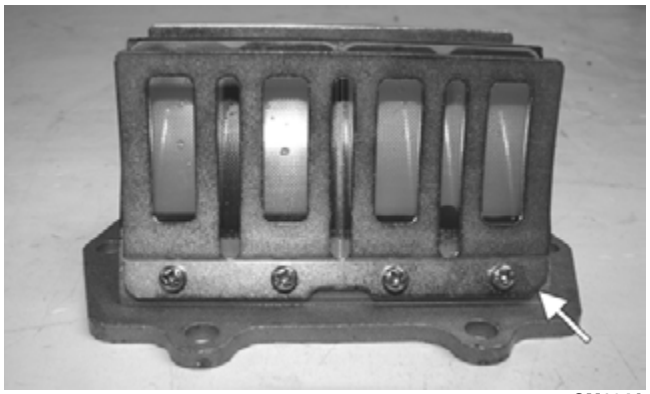
3. Inspect the reed stopper height. Using a caliper, measure the distance from the seat to the bottom outer tip edge of the stopper. Measurement must not exceed specifications. If measurement is not within specifications, either bend or replace the reed stopper.



CM163

4. Inspect the reed-to-seat clearance. Using a feeler gauge, measure the clearance. Clearance must be less than 0.008 in. If clearance is not within specifications, replace the reed valve.

5. To assemble, place the reed valves on the cage with its clipped corner positioned to the lower right hand corner of the cage. Place the reed stopper assembly into position and secure with the screws tightened to 8.5 in.-lb.



CM164A

Measuring Critical Components

■NOTE: Critical engine specifications chart can be found in Section 1 of this manual.

CYLINDER HEAD VOLUME (Squish-Gap Method)

To check the squish gap, a micrometer and two heavy pieces of solder will be needed.

1. Remove the spark plugs from the engine.
2. Simultaneously insert two pieces of solder down through the spark plug hole and push them up against the inner cylinder bore towards the MAG-side and PTO-side of the cylinder.
3. Pull the recoil rope and crank the engine over several times while the solder is being held firmly in place.
4. Remove both pieces of solder from the cylinder. Using the micrometer, measure the very end of the squeezed solder piece. Record the reading.

■NOTE: If the solder hasn't been squeezed by the piston, a larger piece of solder must be used. Repeat procedure.

5. Using the opposite end of the solder pieces, insert them down through the spark plug hole towards the PTO-side and MAG-side of the cylinder. Push on the solder until they contact the inner cylinder bore.
6. Pull the recoil rope and crank the engine over several times. Remove both pieces of solder from the cylinder and measure the opposite squeezed ends with a micrometer. Record reading.

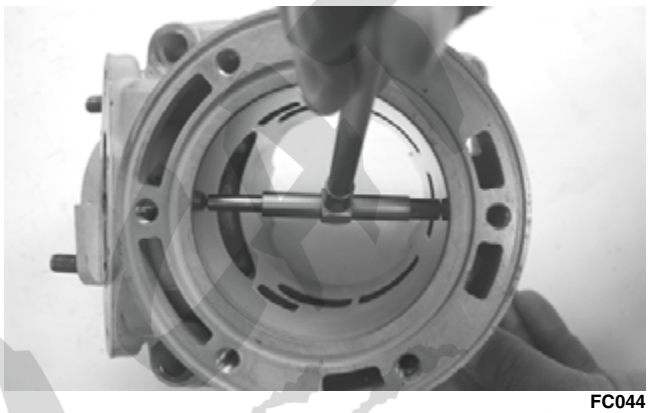
■NOTE: Measure from PTO to MAG-side of the piston to accurately measure the squish gap. Never measure across piston, exhaust side to opposite side, as the piston will rock and the reading won't be accurate.

Readings may vary from side to side.

■NOTE: Make sure the smaller reading is 0.059 in. or less.

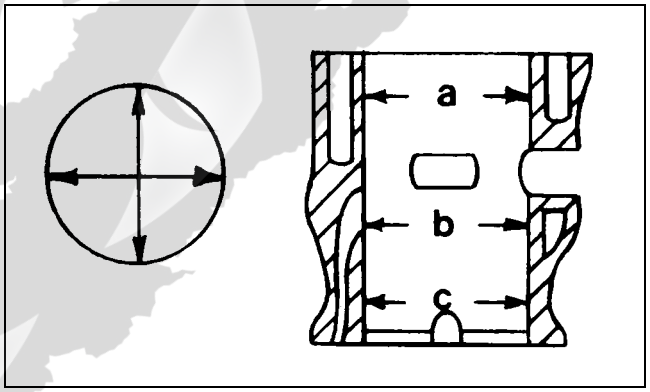
CYLINDER TRUENESS

1. Measure each cylinder in the three locations from front to back and side to side for a total of six readings.



FC044

2. The trueness (out-of-roundness) is the difference between the highest and lowest reading. Maximum trueness (out-of-roundness) must not exceed 0.004 in.



0725-586

PISTON SKIRT/CYLINDER CLEARANCE

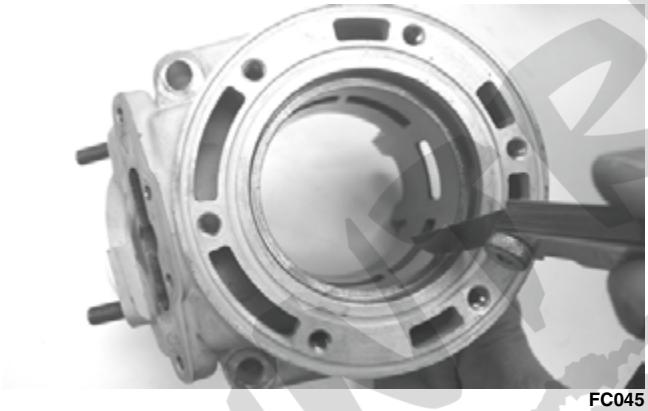
1. Measure each cylinder front to back about 1 in. from the bottom of each cylinder.
2. Measure the corresponding piston skirt diameter at a point 1 cm above the piston skirt at a right angle to the piston-pin bore. Subtract this measurement from the measurement in step 1. The difference (clearance) must be within 0.0031-0.0041 in.



AC091

PISTON-RING END GAP

1. Place each piston ring in the wear portion above the exhaust port of its respective cylinder. Use the piston to position each ring squarely in each cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within 0.008-0.016 in.



FC045

PISTON PIN AND PISTON-PIN BORE

1. Measure the piston pin diameter at each end and in the center. Acceptable piston pin measurement must be within 0.8659-0.8661 in. If any measurement varies by more than 0.001 in., the piston pin and bearing must be replaced as a set.



IO012

2. Insert a snap gauge into each piston-pin bore; then remove the gauge and measure it with a micrometer. The diameter measurement must be within 0.8661-0.8665 in. Take two measurements to ensure accuracy.



AC092

CONNECTING-ROD SMALL END BORE

1. Insert a snap gauge into each connecting-rod small end bore; then remove the gauge and measure it with a micrometer.



AN061

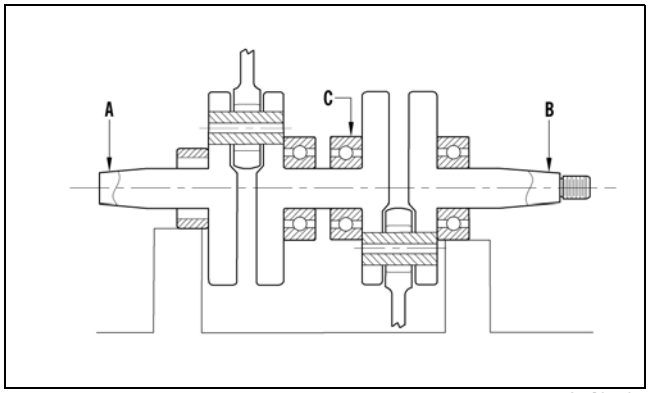
2. The diameter measurement must be within 1.0631-1.0634 in.

CRANKSHAFT RUNOUT

1. Using the V Blocks, support the crankshaft on the surface plate.

■NOTE: The V blocks should support the crankshaft on the outer bearings.

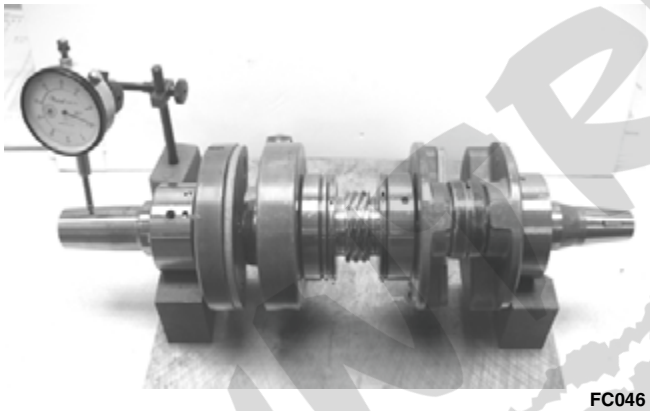
2. Mount a dial indicator and base on the surface plate. Position the indicator contact point against the crankshaft location point A (PTO-end) from the crankshaft end. Zero the indicator and rotate the crankshaft slowly. Note the amount of crankshaft runout (total indicator reading).



0742-727

■**NOTE: For runout location point specifications, see Crankshaft Runout/Repair Specifications in Section 1 of this manual.**

3. Position the indicator contact point against the crankshaft location point B (MAG-end) from the crankshaft end. Zero the indicator and rotate the crankshaft slowly. Note the amount of crankshaft runout (total indicator reading).



FC046

4. Position the indicator contact point against the crankshaft at location point C (center). Zero the indicator and rotate the crankshaft slowly. Note the amount of crankshaft runout (total indicator reading).
5. If runout exceeds 0.002 in. at any of the checkpoints, the crankshaft must be either straightened or replaced.

Assembling

■**NOTE: The use of new gaskets and seals is recommended when assembling the engine.**

■**NOTE: Prior to assembling the engine, use parts cleaning solvent and compressed air and thoroughly clean the threaded holes of the crankcase and cylinders to properly tighten.**

⚠ WARNING

Always wear safety glasses when drying components with compressed air.

■**NOTE: When the use of a lubricant is indicated, use Arctic Cat Synthetic APV 2-Cycle Oil.**

1. Apply a thin coat of grease to the inner seal lips of the water pump seal.
2. Using the seal driver, position the inner water pump shaft seal onto the seal driver and gently tap the seal down into position.

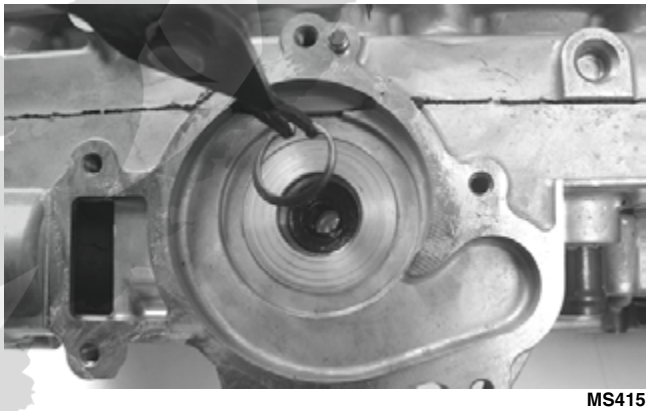
■**NOTE: Grease must be applied to the lips of the inner seal before installation.**



MS986A

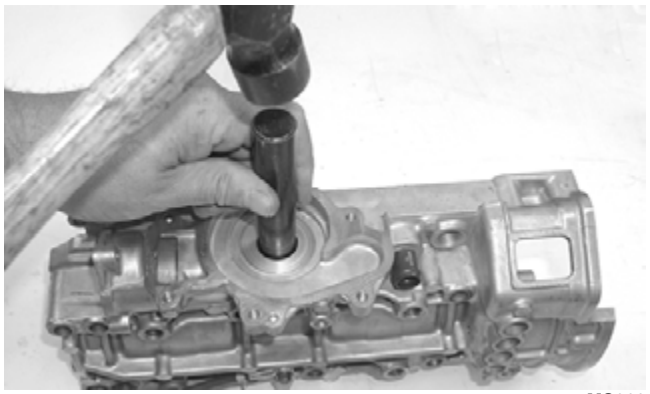
■**NOTE: The seal must be installed with its spring side towards the crankshaft.**

3. Install the snap ring securing the inner seal in the crankcase.



MS415

4. Using the seal driver, carefully install the outer water pump seal. Gently tap the seal down into position until it seats itself against its flange.

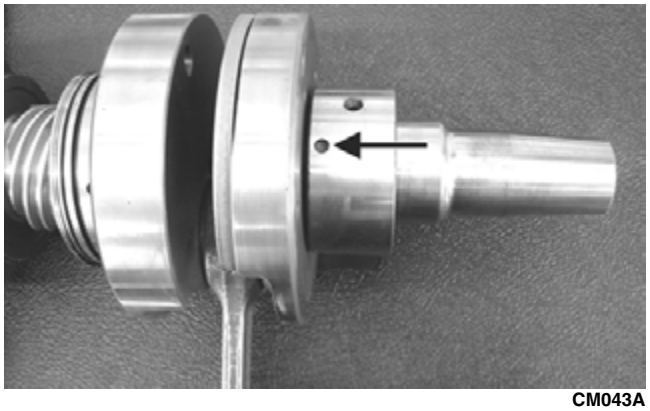


MS988

5. Position the upper crankcase half upside-down on two wooden blocks; then install the C-ring, the four bearing retaining pins, and the two crankcase dowel pins.

6. Place the PTO-side crankshaft bearing into position making sure the bearing retaining pin hole is positioned inward.

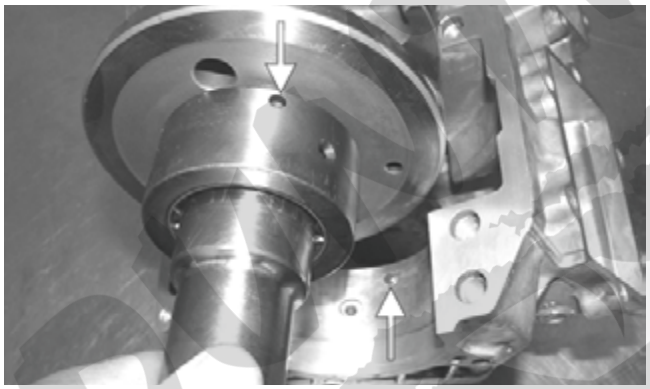
■NOTE: The bearing retaining pin hole is the hole that doesn't go entirely through the bearing case.



CM043A

7. Lubricate the inner lips of the crankshaft oil seals with grease; then slide the seals onto the crankshaft making sure the spring side of each seal faces the center of the crankshaft.

8. Apply oil to the crankshaft bearings; then install the crankshaft into the upper crankcase half. Be sure the alignment hole in each bearing is positioned over its respective dowel pin in the crankcase; then seat the crankshaft.



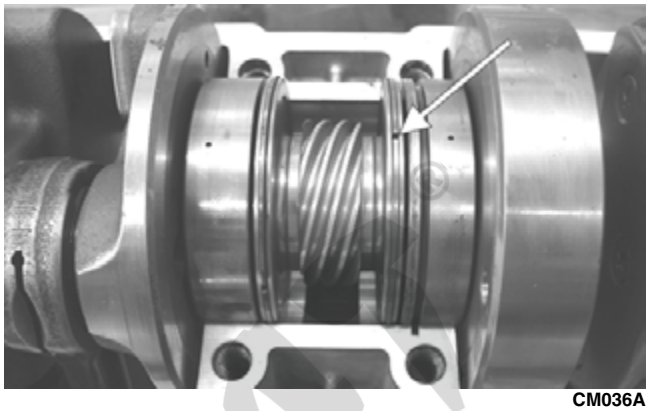
CM045A

■NOTE: To check the bearing for proper position, place the point of a sharp tool into the dimple found in the bearing race. Strike the tool with the palm of the hand in either direction. If the bearing moves, it isn't positioned correctly and must be rotated until it drops onto the dowel pin.

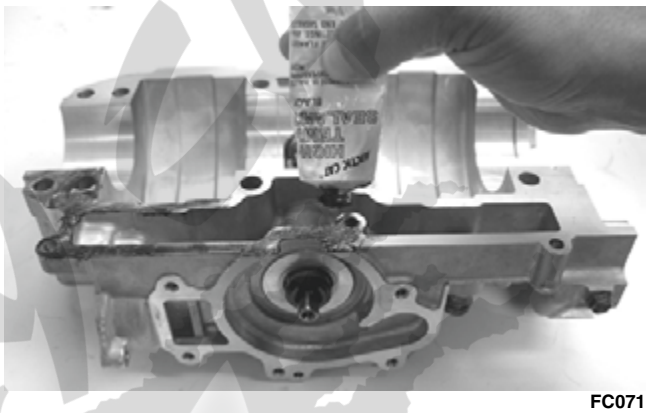
CAUTION

If the bearings are not properly seated during assembly, the crankcase halves will not seal tightly and severe engine damage will result.

9. Position the two center seal rings with their end gaps 180° apart (up on one and down on the other); then apply a thin coat of High-Temp Sealant to the entire bottom half of the crankcase sealing surface.



CM036A



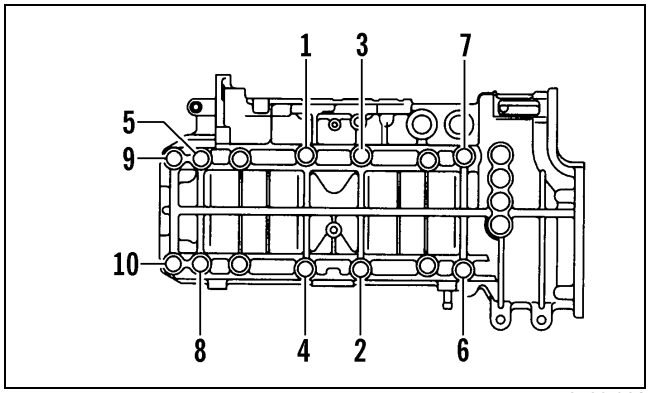
FC071

■NOTE: At this point if the coolant temperature sensor was removed, install the sensor (threads coated with white Loctite #575) and tighten to 18 ft-lb.

10. Assemble the crankcase halves making sure the crankshaft gear and oil-injection pump driveshaft gears mesh. Rotate the crankshaft one full turn to align the crankshaft gear and pump driveshaft.

11. Install the crankcase cap screws securing the crankcase halves.

12. Tighten the 6 mm cap screw to 96 in.-lb, the 8 mm cap screws to 18 ft-lb, and the ten 10 mm cap screws in two steps from 13 ft-lb to 37 ft-lb using the pattern shown.



0738-201

■NOTE: After tightening the crankcase, turn the engine right side up and tighten the four MAG-housing cap screws in a crisscross pattern to 18 ft-lb.

■**NOTE: Secure the connecting rods with rubber bands on the cylinder studs.**

13. Apply a thin coat of grease to the sealing surface of the oil-injection pump/water pump driveshaft; then place the Oil Seal Protector Tool at the end of the shaft.

CAUTION

Be very careful not to damage the seals when installing the oil pump driveshaft. Twist the driveshaft clockwise as it enters the seal area and while pushing it through the seals.



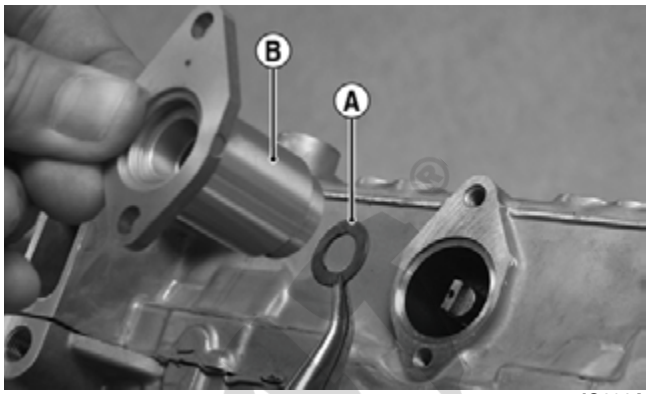
FS191

14. Rotate the oil-injection pump/water pump driveshaft while carefully pushing it through the oil and water pump seals until the driveshaft and crankshaft gears engage; then remove the oil seal protector tool (A) from the end of the shaft.



IO025A

15. Position the shim (A) on the oil-injection pump end of the driveshaft; then with a new O-ring (lightly coated with oil) in place, install the oil-injection pump retainer (B).



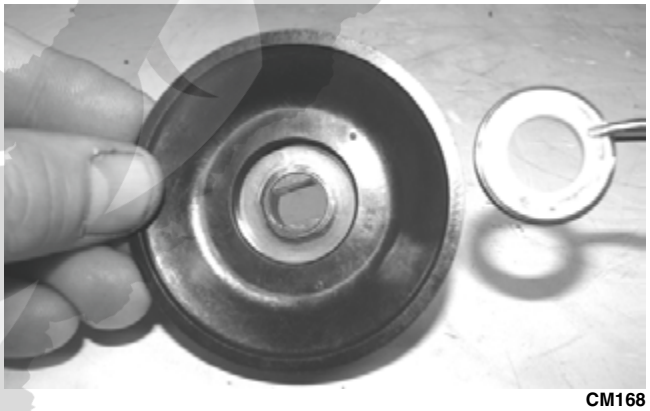
IO026A

16. With a new O-ring (lightly coated with oil) in place, install the oil-injection pump making sure the pump shaft slot and pump driven gear shaft align. Secure with two screws (coated with blue Loctite #243). Tighten the two screws to 96 in.-lb.

CAUTION

Be sure the oil-injection pump/water pump driveshaft is properly aligned with the slot of the oil-injection pump to avoid damage.

17. Position the ceramic/rubber seal retainer and seal into the back side of the water pump impeller with the ceramic face of the seal directed out.



CM168

18. Using a suitable tool, press the seal into position making sure its marked side is positioned towards the rubber seal cup; then apply a thin coat of grease to the seal outer surface.



IO050A

CAUTION

When installing the ceramic/rubber seal into the impeller, never touch the ceramic part of the seal. Make sure components are clean and free of any dirt or contaminants.

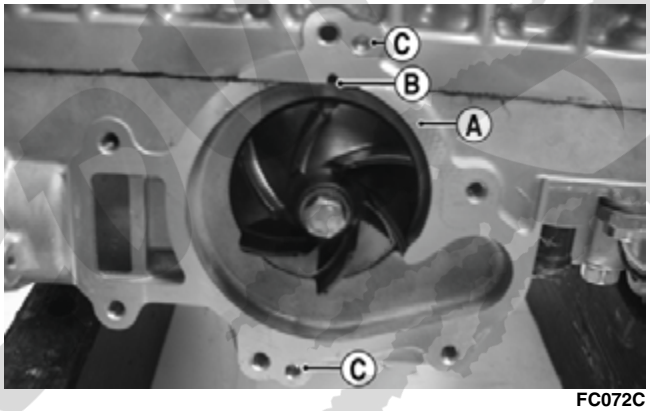
19. Place the impeller into position and secure with a cap screw and washer. Be sure the rubber side of the washer is lubricated with a light coat of grease and directed toward the impeller. Apply blue Loctite #243 to the threads of the cap screw and tighten to 108 in.-lb.

■NOTE: For assembling purposes, lubricate the rubber side of the washer before installing.

CAUTION

If the rubber side of the washer is not positioned toward the impeller, a coolant leak will result.

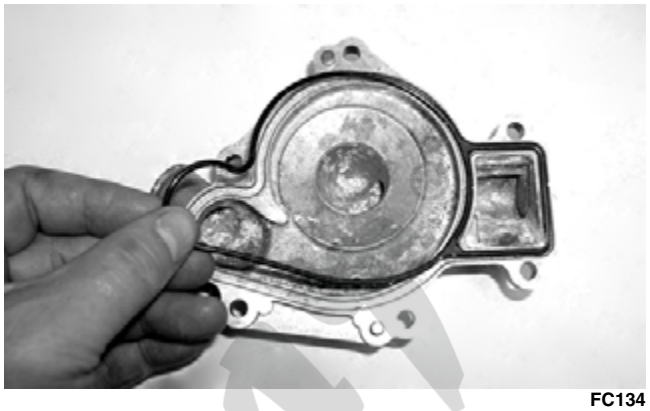
20. Apply High-Temp Sealant to the crankcase/water pump cover seam (A); then install the dowel pins (C) into the crankcase.



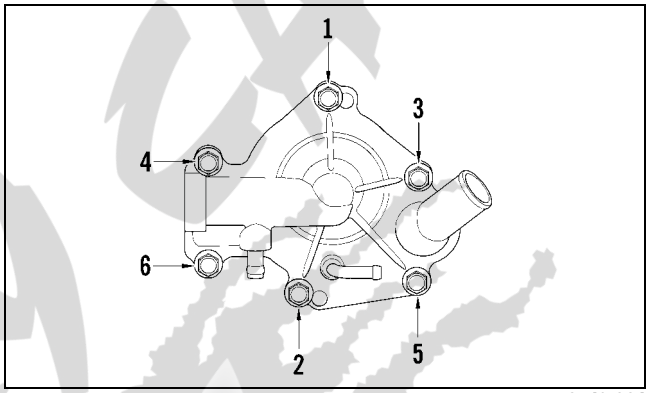
FC072C

■NOTE: Do not allow sealant into the breather hole (B) in the crankcase. If sealant gets into the hole, carefully remove before proceeding.

21. Position the O-ring (lightly coated with oil) into the water pump cover; then install the cover. Secure with six screws; then using the pattern shown, tighten to 96 in.-lb.

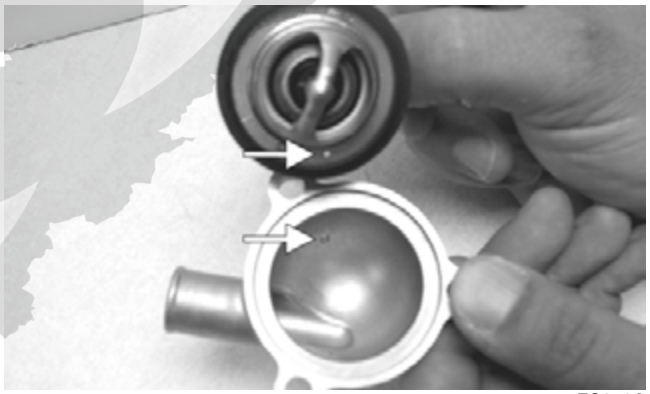


FC134

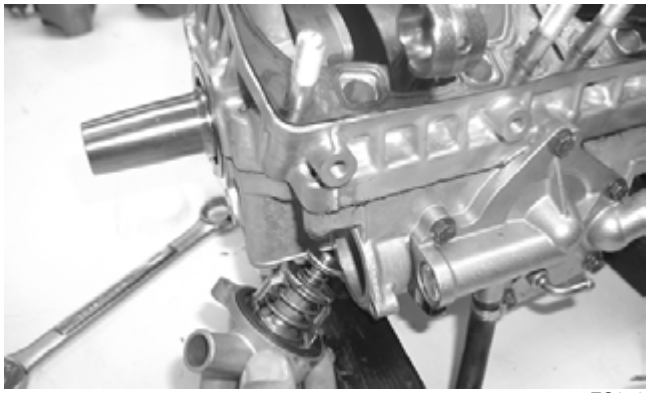


0742-304

22. Noting the alignment dots, install the thermostat housing with thermostat. Secure the housing with cap screws and tighten to 96 in.-lb.



FC078A

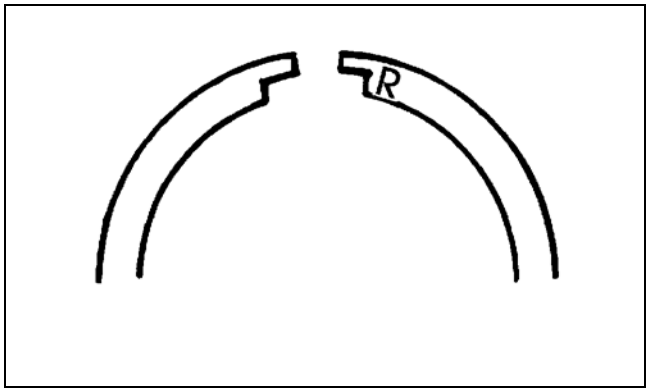


FC073

23. With new gaskets, install the reed valve assemblies; then secure the intake flanges to the crankcase. Tighten in a crisscross pattern to 96 in.-lb.

24. Install the dowel pins into the crankcase; then place the cylinder base gasket into position on the crankcase.

25. Install the piston rings on each piston so the letter on the top (inclined surface) of each ring faces the dome of the piston.

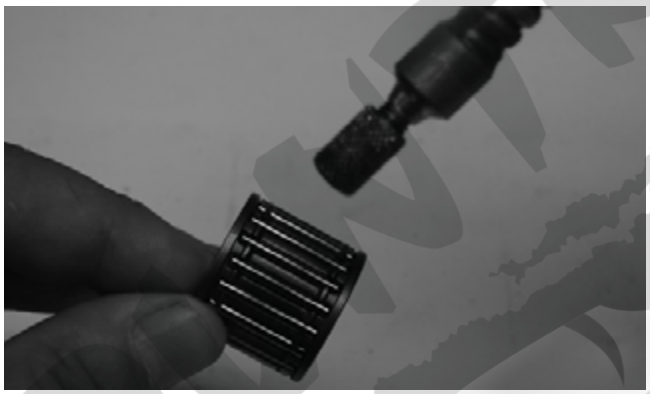


726-306A

CAUTION

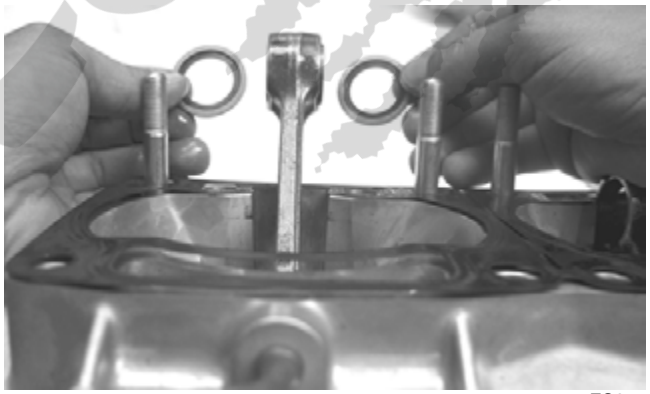
Incorrect installation of the piston rings will result in engine damage.

26. Apply oil to the connecting-rod small end bearings; then install the small-end bearings. Install a washer on each side of the connecting rod.



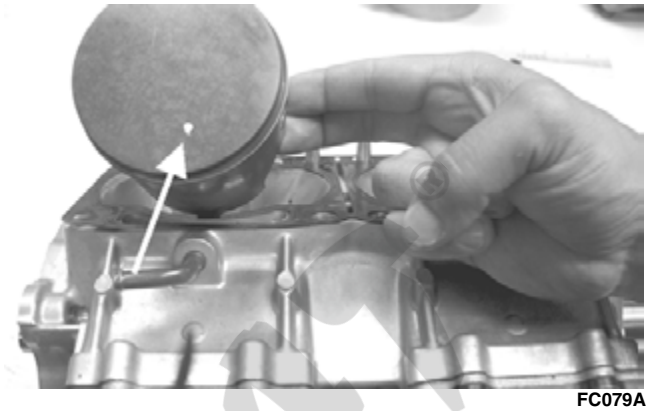
TZ068

■NOTE: The shoulder side of the washer must seat to the needle bearing.



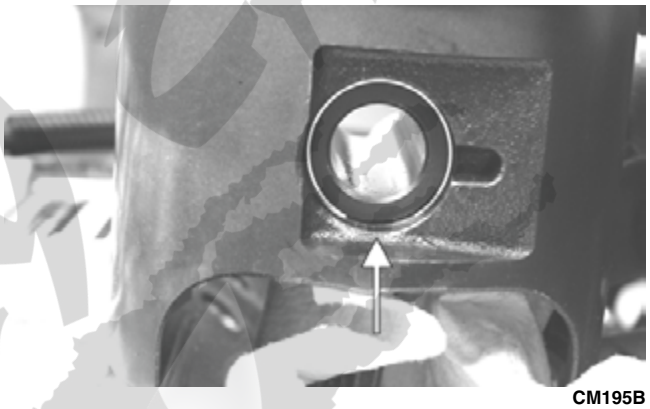
FC075

27. Place each piston over the connecting rod so the indicator dot on each piston will point toward the intake/exhaust ports; then secure with an oiled piston pin.



FC079A

28. Install the new circlips so the open end is directed either up or down.



CM195B

■NOTE: Install the circlip to the inside of the piston before installing the connecting rod.

CAUTION

Make sure the circlips are firmly seated before continuing with assembly.

29. Rotate each piston ring until the ring ends are properly positioned on either side of the ring keeper; then apply oil to the piston assemblies and cylinder bores. Remove the rubber bands or hoses from the connecting rods.

30. In turn on each cylinder, place a piston holder (or suitable substitute) beneath the piston skirt and square the piston in respect to the crankcase; then using a ring compressor or fingers, compress the rings and slide the cylinder over the piston. Remove the piston holder and seat the cylinder firmly onto the crankcase.

■NOTE: The cylinders should slide on easily. DO NOT force the cylinders on.

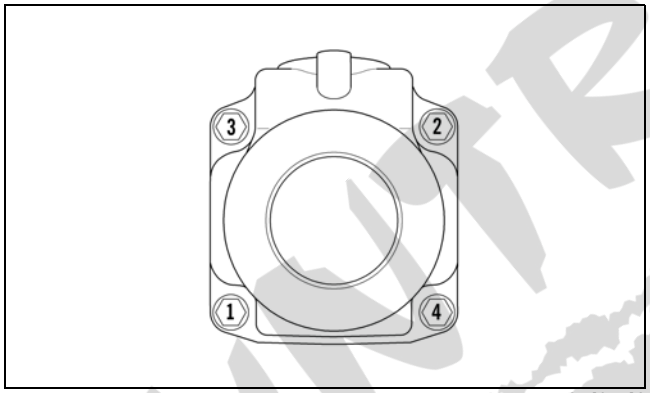


FC076

31. Secure each cylinder by installing the eight nuts. DO NOT TIGHTEN AT THIS TIME.

32. Install the oil-injection hoses and secure with the clamps; then place the lower check-valve assembly into position and secure with the gaskets and union cap screw. Tighten to 48 in.-lb.

33. Secure the cylinders (from step 31) by tightening the cylinder base nuts to 44 ft-lb in three steps using the pattern shown.



0742-746

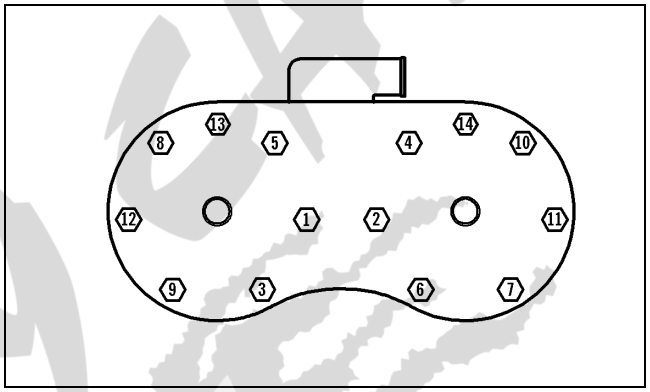
34. Install the two cylinder O-rings (lightly coated with oil) on the top of each cylinder making sure they are correctly positioned in the grooves.



FC077

35. Place new O-rings (lightly coated with oil) onto each of the head cap screws. Place four of these cap screws into the cylinder head. Thread the spark plugs in part way; then while holding the head above the cylinder, carefully start and finger-tighten all four cap screws while observing the cylinder O-rings to make sure they remain in position. Slowly place the head into position on top of the O-rings. Start and finger-tighten the remaining cap screws being very careful not to move the cylinder head.

36. From step 35 in two steps, tighten the 8 mm cap screws to 19 ft-lb using the appropriate pattern shown. Install the spark plugs.

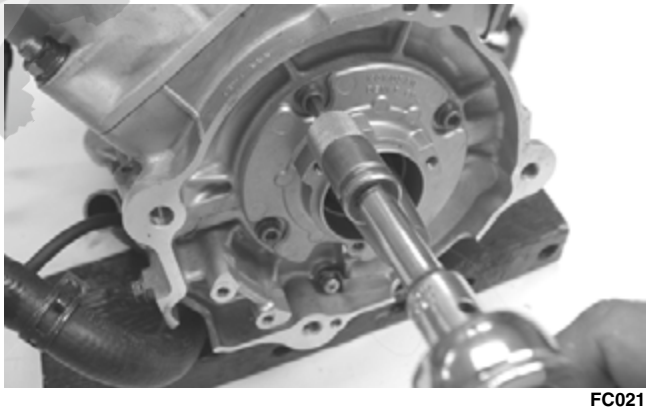


0738-204

■NOTE: After tightening the 8 mm cap screws, tighten the two remaining 6 mm cap screws to 96 in.-lb.

■NOTE: At this point, pressure test the engine (see Section 3).

37. Secure the stator plate to the crankcase with the Allen-head cap screws (coated with blue Loctite #243) and tighten to 96 in.-lb.



FC021

38. Secure the ignition timing sensor with screws coated with blue Loctite #243. Tighten to 48 in.-lb. Install the stator assembly with wires and a grommet into the crankcase and secure with the Allen-head screws (coated with blue Loctite #243). Tighten to 96 in.-lb.



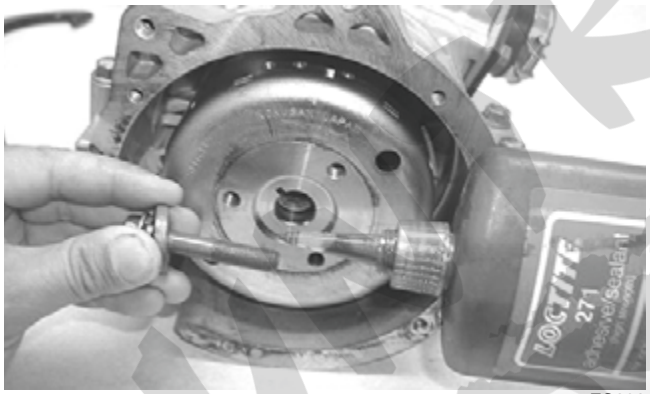
FC018

39. Install the key in the crankshaft.

40. Thread two puller bolts into the flywheel; then slide the flywheel onto the crankshaft making sure the keyways match. Remove the puller bolts.

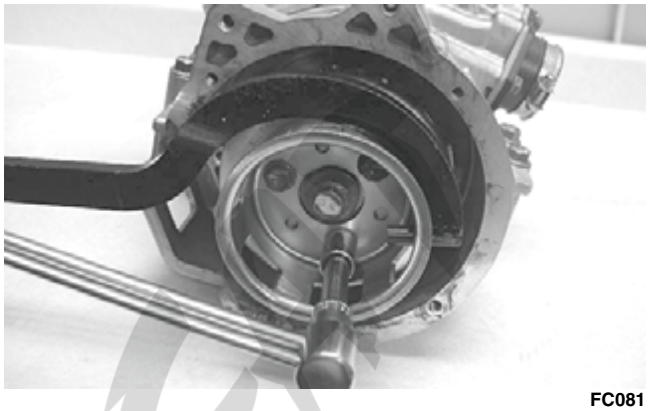
■NOTE: Before installing the flywheel, be sure to wipe the crankshaft and flywheel tapers clean using a clean towel.

41. Apply red Loctite #271 to the threads of the flywheel cap screw; then finger-tighten with a large flat washer. DO NOT TIGHTEN AT THIS TIME.



FC080

42. Secure the starter clutch to the flywheel with three cap screws and using the spanner wrench, tighten the cap screws evenly to 19 ft-lb; then tighten the flywheel cap screw (from step 41) to 50 ft-lb.



FC081

43. Install the coolant supply hose to the water pump and cylinder hose; then install the overflow hose and secure with the clamps.

44. Install the exhaust manifold using new gaskets and the existing flange nuts. Tighten to 17 ft-lb.

Engine Servicing - 800 cc

This engine sub-section has been organized to show a progression for servicing of the Arctic Cat 800 cc engine. For consistency purposes, this sub-section shows a complete and thorough progression; however, for efficiency it may be preferable to disassemble only those components needing to be addressed. Also, some components may vary from model to model. The technician should use discretion and sound judgment.

■NOTE: Critical torque specifications can be found in Section 1 of this manual.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

A number of special tools must be available to the technician when performing service procedures in this engine section.

Description	p/n
Ball Hone	0644-294
Flywheel Spanner Wrench	0144-007
Flywheel Puller	0744-040
Flywheel Puller Insert	0644-568
Extractor Nut (Medium)	0643-074
Oil Seal Protector Tool	0644-219
Piston Pin Puller	0644-328
Surface Plate	0644-016
Water Pump Bearing and Seal Tool Kit	0644-557
V Blocks	0644-535
Vacuum Test Pump	0644-131

■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

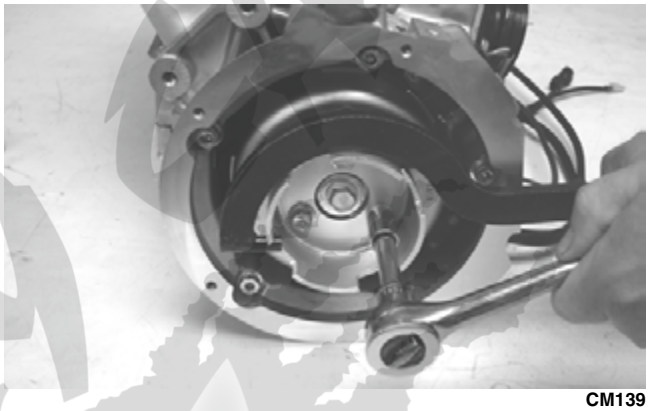
Disassembling

■NOTE: When disassembling top-side components, mark MAG-side and PTO-side components for assembling purposes.

1. Using the Flywheel Spanner Wrench to secure the flywheel, remove the flywheel cap screw and washer; then remove the three starter clutch cap screws and remove the clutch.



CM138



CM139

2. Install the Flywheel Puller Insert onto the end of the crankshaft.

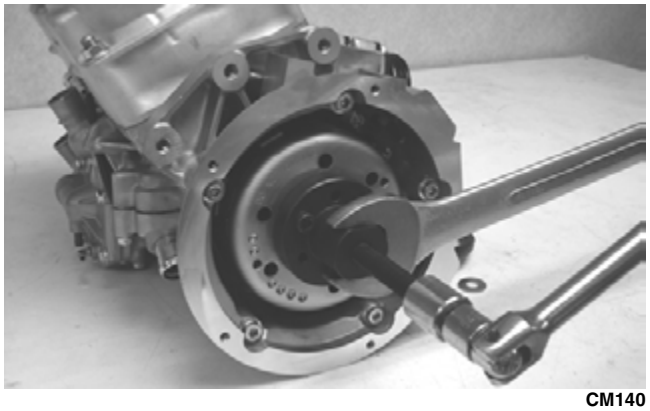


IO013

3. Using Flywheel Puller or suitable substitute, remove the flywheel from the crankshaft by tightening the puller bolt, striking the head of the puller bolt with a hammer, and tightening again. Repeat this procedure until the flywheel is free. Account for the key.

CAUTION

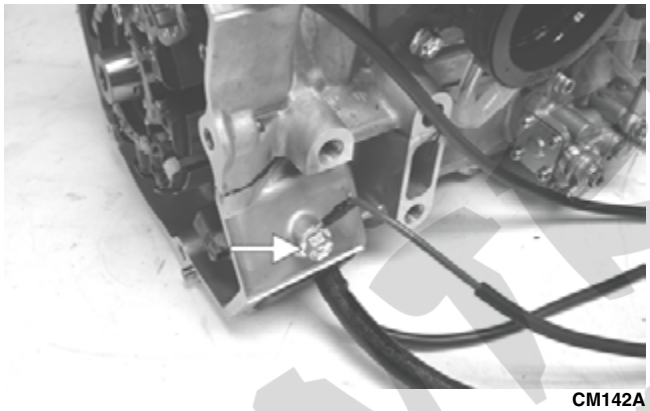
To prevent damage to the crankshaft, do not thread puller bolts more than 1/2 in. into the flywheel. Damage to the coils may result.



CM140

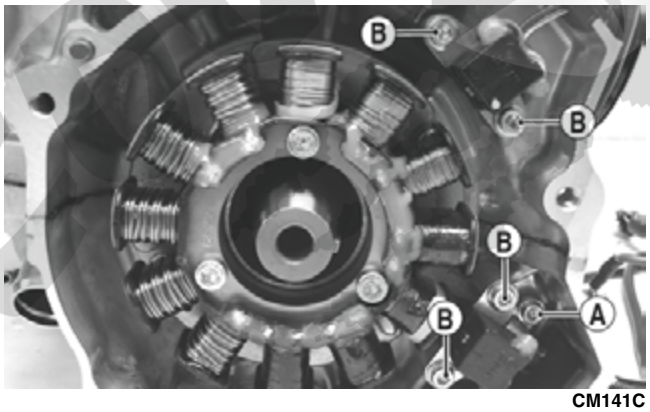
■NOTE: To ensure the cleanliness of the flywheel magnets, place the flywheel (with the magnets facing upward) on a clean bench.

4. Remove the cap screw securing the ground wire to the crankcase.



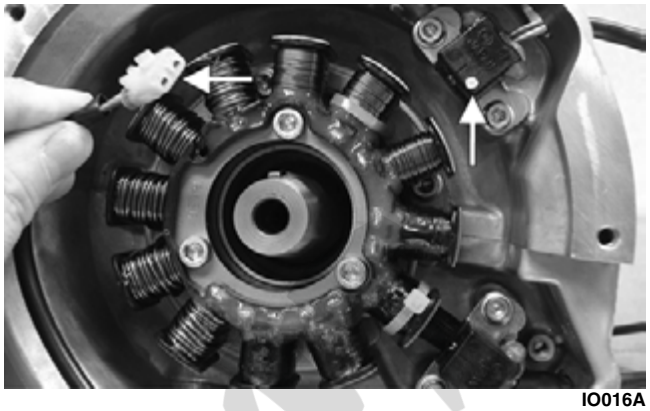
CM142A

5. Remove the Allen-head cap screw (A) securing the stator lead wire plate to the crankcase; then remove the Allen-head cap screws (B) securing the timing sensors, remove the sensors, and account for the harness grommets.



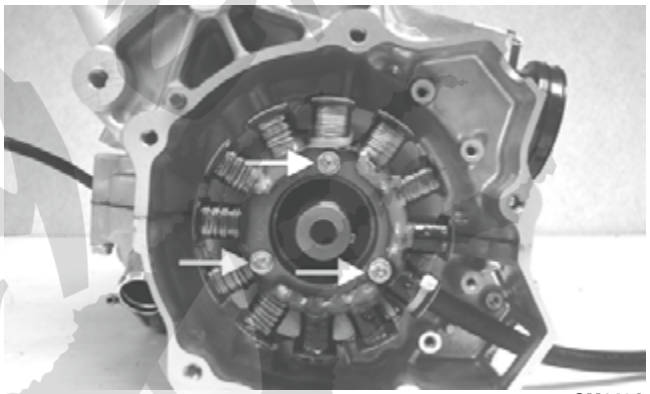
CM141C

■NOTE: For assembling purposes, note the timing sensor with the white dot (white connector) is located in the upper mounting location of the crankcase.



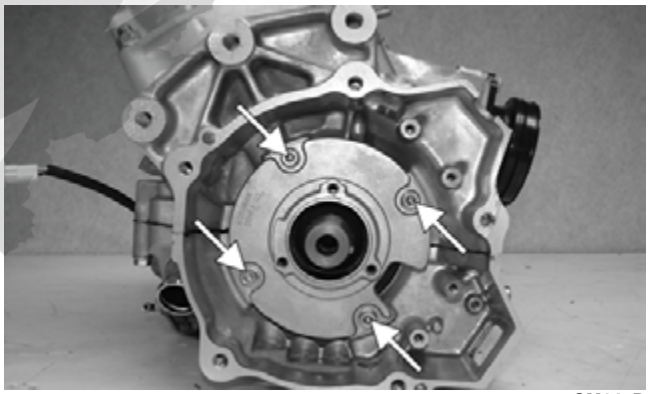
IO016A

6. Remove the Allen-head cap screws securing the stator to the stator plate. Route the stator lead wire out of the crankcase; then remove the stator assembly.



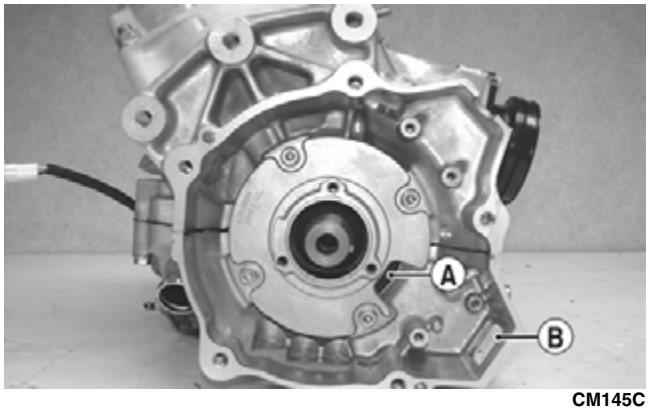
CM143A

7. Remove the cap screws securing the stator plate to the engine; then remove the plate.



CM145D

■NOTE: For assembling purposes, note the indentation (A) of the stator plate is aligned with the harness opening (B) in the crankcase.

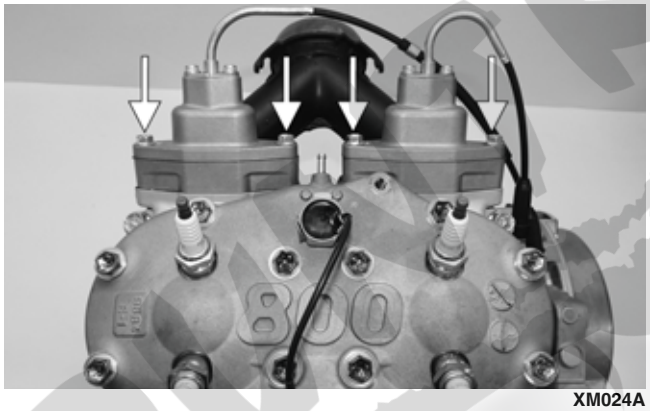


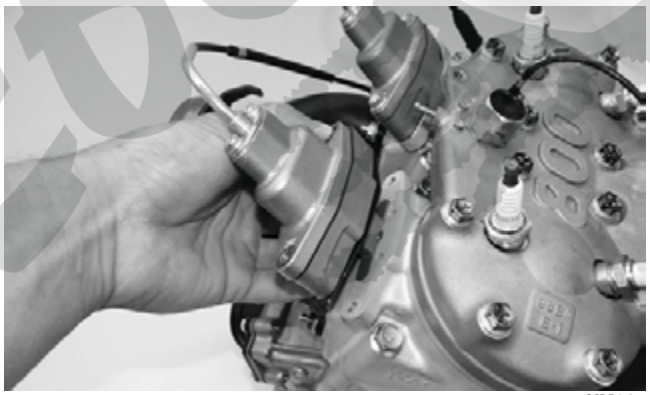
CM145C

■**NOTE: The stator plate screws had Loctite applied to the threads during assembly. Using an impact driver, apply a sharp blow to the head of each screw to break the Loctite loose before removal.**

8. Remove the cap screws securing the APV assemblies to the cylinders; then remove the APV assemblies and set them aside.

■**NOTE: For assembling purposes, note that the APV exhaust valves and gaskets are directional and marked (M) for magneto cylinder and (P) for PTO cylinder.**

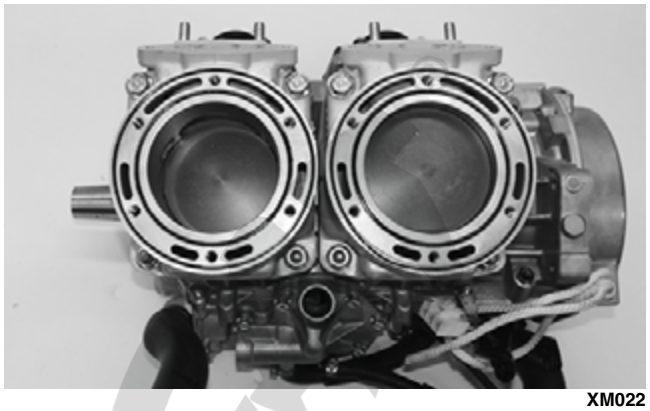

XM024A


XM017

9. Remove the spark plugs.

■**NOTE: At this point, remove the knock sensor and lock plate from the cylinder head by bending the lock plate tabs down and unthreading the sensor.**

10. Remove the cap screws with O-rings securing the cylinder head; then separate from the cylinders. Account for the O-rings.


XM022

■**NOTE: When removing the cylinders, place the engine on its intake flanges on a drain tray to allow residual coolant to drain from the cylinder/crankcase water jacket.**

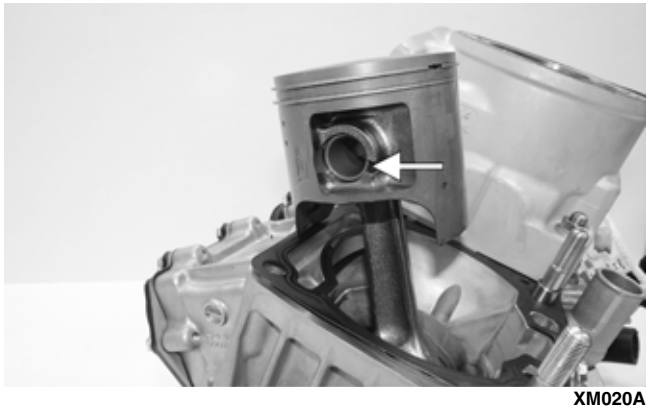
11. Remove the four nuts and four cap screws securing the cylinders to the crankcase; then using a soft hammer, gently tap the cylinders and remove from the crankcase by lifting them straight up off their studs. Account for gasket(s) and alignment pins.

CAUTION

When removing a cylinder, be sure to support the piston to prevent damage to the crankcase and piston.


XM018

12. Remove the PTO-side piston-pin circlip from the PTO-side piston; then remove the MAG-side piston-pin circlip from the MAG-side piston.


XM020A

13. Using Piston Pin Puller and medium Extractor Nut, remove the piston pins from both pistons.

■NOTE: For proper assembly, keep all MAG-side components and all PTO-side components separated. Assemble them on their proper sides.

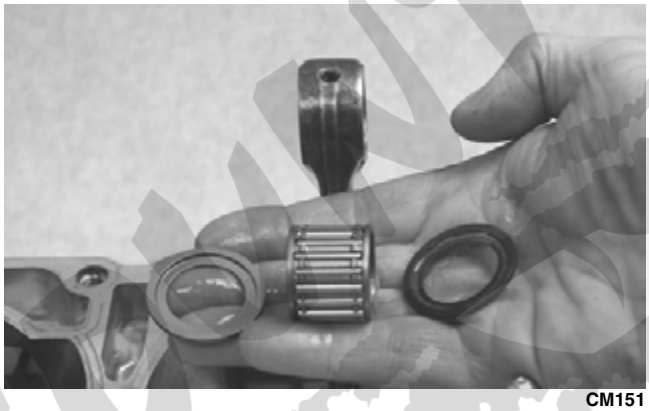


CM150

CAUTION

DO NOT use any type of punch to drive the piston pin free of the piston; damage may result. Use a piston-pin puller only.

14. Lift the pistons clear of the connecting rods and remove the small-end connecting-rod bearings (account for two washers); then remove the piston rings. Keep each piston with its rings; keep each piston pin and bearing together as a set.



CM151

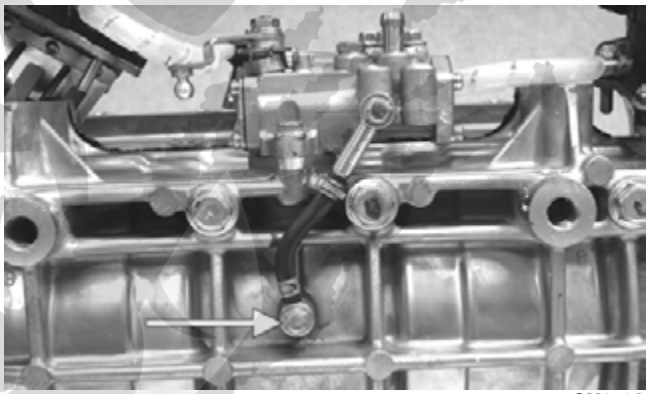
■NOTE: Place a suitable length of rubber hose around the connecting rods to prevent the connecting rods from damaging the crankcase.

15. Disconnect the intake flange oil lines from the oil pump; then remove the cap screws securing the intake flanges. Remove the intake flanges and reed valve assemblies.



IO014

16. Remove the lower union cap screw securing the lower check valve assembly to the crankcase; then remove the two screws securing the oil-injection pump to the crankcase. Remove the pump, retainer, and O-ring and account for the two gaskets from the lower union.

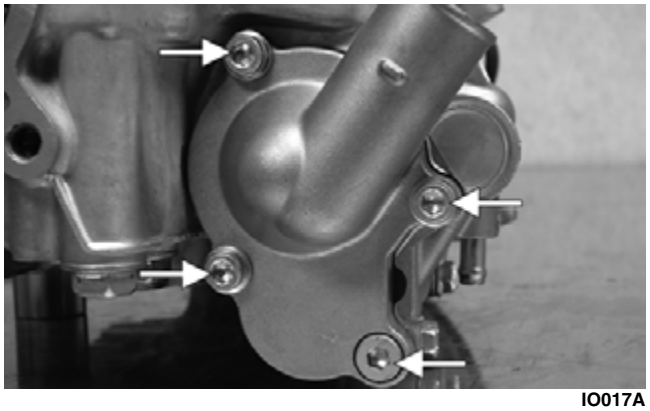


CM153A



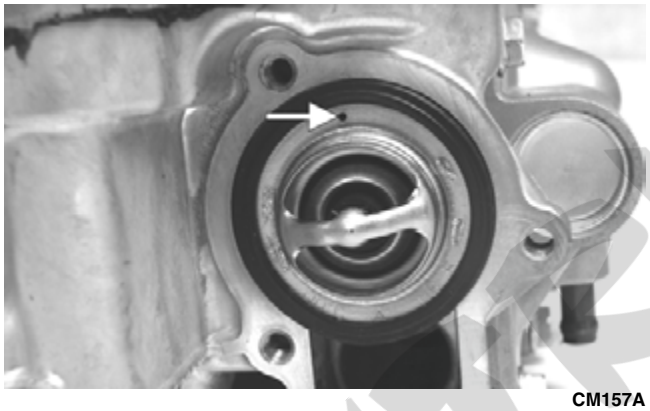
IO015A

17. Remove the four cap screws securing the thermostat cap; then remove the cap, gasket, and thermostat.



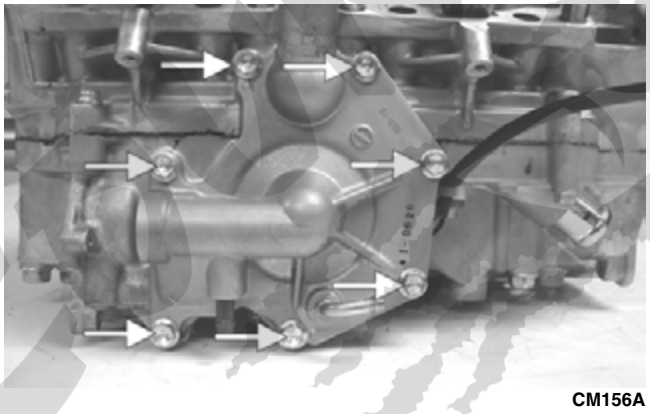
IO017A

■**NOTE: For assembling purposes, note that the positioning of the bypass/check valve is directed up.**



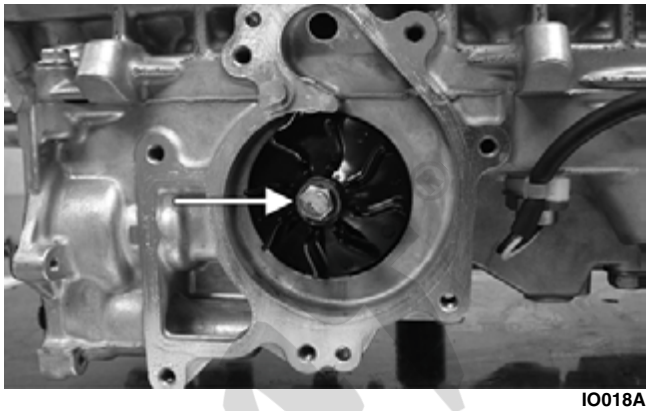
CM157A

18. Remove the seven screws securing the water pump cover to the crankcase and remove the cover. Account for the O-ring gasket and the alignment pins.



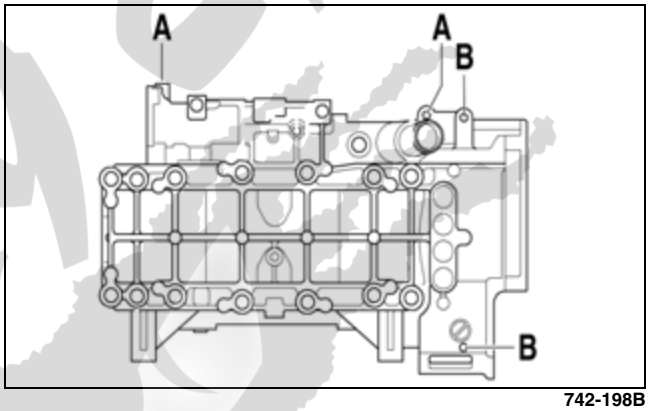
CM156A

19. Remove the cap screw securing the water pump impeller; then slide the impeller free of the shaft. Account for the washer and gasket.



IO018A

20. Prior to turning the engine upside down, remove the two crankcase cap screws (A) from the water pump side of the engine; then remove the two cap screws (B) from the magneto housing.



742-198B

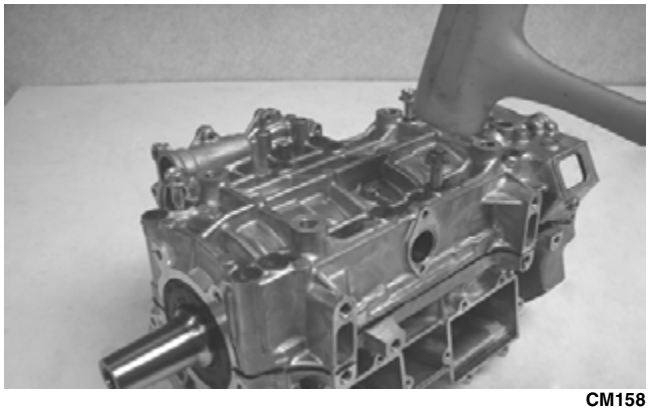
21. Turn the engine upside down on support blocks, cut the cable tie, and remove the coolant temperature sensor switch.

22. With its bottom side up on two support blocks, remove the cap screws securing the crankcase halves.

23. Separate the crankcase halves by installing two crankcase cap screws in opposite corners leaving the heads approximately 1/4 in. out. Using a plastic hammer and lifting on the ends of the crankshaft, tap on each cap screw head until the case halves separate. Remove the cap screws.

CAUTION

DO NOT drive any tool between halves to separate the crankcase. Damage to the sealing surfaces will result.



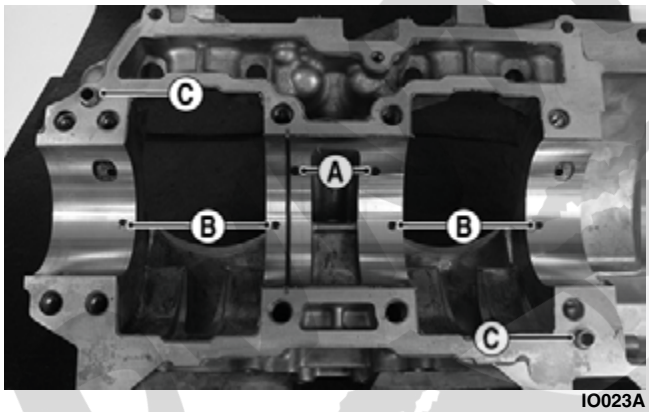
CM158

24. Lift the bottom half of the crankcase off the top half.

CAUTION

Care must be taken to not allow the connecting rods to drop onto the sealing surface of the bottom case half.

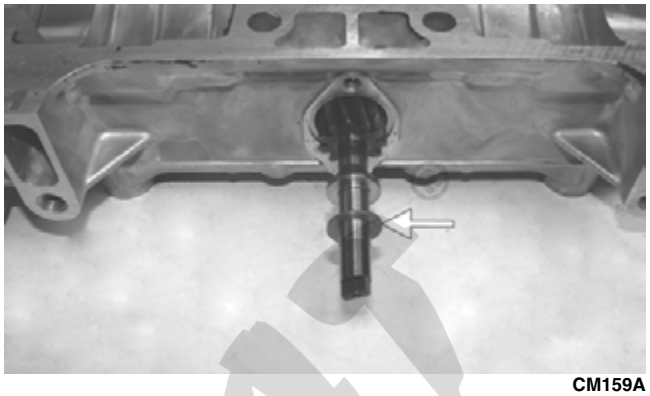
25. Lift the crankshaft free from the top half of the crankcase and slide the crankshaft oil seals off the crankshaft. Account for the C-ring (A). Remove the bearing retaining pins (B) and account for the crankcase dowel pins (C).



IO023A

■NOTE: The end bearings are not pressed onto the crankshaft. After removing the seals, use care not to allow the bearings to slide off the crankshaft.

26. Remove the oil-injection pump/water pump driveshaft from the lower crankcase half. Account for the thrust washer on the outer end of the shaft.



CM159A

■NOTE: When replacing the inner water pump seals, use the recommended Water Pump Bearing and Seal Tool Kit only.

27. Place the crankcase on the bench with the water pump side down. Using the long seal driver, drive the mechanical water pump seal from the crankcase.

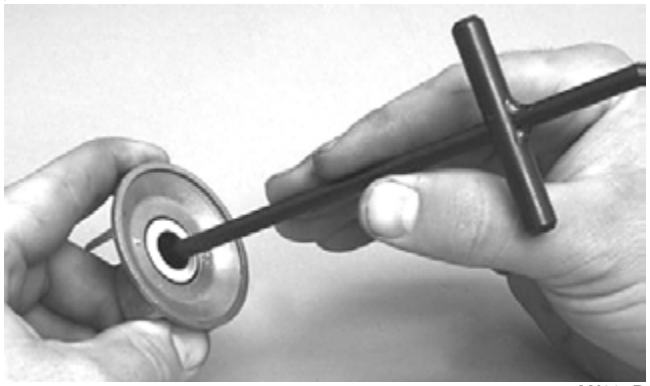


FC036

28. Using a pair of snap ring pliers, remove the snap ring securing the inner seal in the crankcase.

29. Using the hooked end of the tool, pull the inner seal free of the crankcase.

30. Using the hooked end of the tool, pry the seal ring from the backside of the water pump impeller.



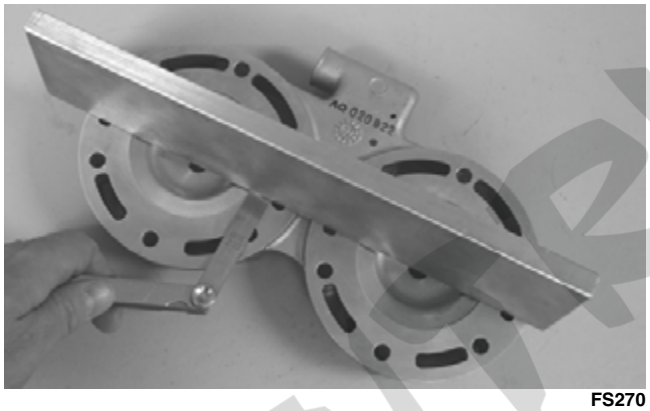
AN327D

Cleaning and Inspecting

CYLINDER HEAD

1. Using a non-metallic carbon removal tool, remove any carbon buildup from the combustion chambers being careful not to nick, scrape, or damage the combustion chambers or the sealing surfaces.
2. Inspect the spark-plug holes for any damaged threads.
3. Inspect the cylinder head for flatness using a straightedge and a feeler gauge. Acceptable warpage must not exceed 0.002 in.

■NOTE: If the warpage exceeds specification, resurface the cylinder head using procedures identified in step 4.



FS270

4. Place the cylinder head on a Surface Plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move each cylinder head in a figure eight motion. Inspect the sealing surface for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots before assembly by continuing to move the cylinder head in a figure eight motion until a uniform bright metallic finish is attained.

CAUTION

Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

CYLINDERS

1. Using a non-metallic carbon removal tool, remove carbon buildup from the exhaust ports.
2. Wash the cylinders in parts-cleaning solvent.
3. Inspect the cylinders for pitting, scoring, scuffing, and corrosion. If marks are found, repair the surface with the Ball Hone and honing oil.

■NOTE: To produce the proper 45° crosshatch pattern, maintain a low drill RPM. If honing oil is not available, use a lightweight, petroleum-based oil. Thoroughly clean the cylinders after honing using detergent soap and hot water and dry with compressed air; then immediately apply oil to the cylinder bores. If a bore is severely damaged or gouged, the cylinder must be replaced.

4. Place the head surface of each cylinder on the surface plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move each cylinder in a figure eight motion. Inspect the surface for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots before assembly by continuing to move the cylinder in a figure eight motion until a uniform bright metallic finish is attained.

CAUTION

Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

PISTON ASSEMBLY

1. Using a non-metallic carbon removal tool, remove the carbon buildup from the dome of each piston.
2. Snap an old piston ring into two pieces; then grind the end of the old ring to a 45° angle and to a sharp edge. Using the sharpened ring as a tool, clean carbon from the ring-grooves. Be sure to position the ring with its tapered side up.

CAUTION

Improper cleaning of the ring-grooves by the use of the wrong type of ring-groove cleaner will result in severe damage to the piston.

3. Inspect each piston for cracks in the piston pin and skirt areas.
4. Inspect each piston for seizure marks or scuffing. Repair with #400 grit wet-or-dry sandpaper and water or honing oil.



AN135

■NOTE: If scuffing or seizure marks are too deep to correct with the sandpaper, it will be necessary to replace the piston.

5. Inspect the perimeter of each piston for signs of excessive "blowby." Excessive "blowby" indicates worn piston rings or an out-of-round cylinder.

■NOTE: If synthetic oil is being used, a certain amount of "blowby" may be visible under normal use.

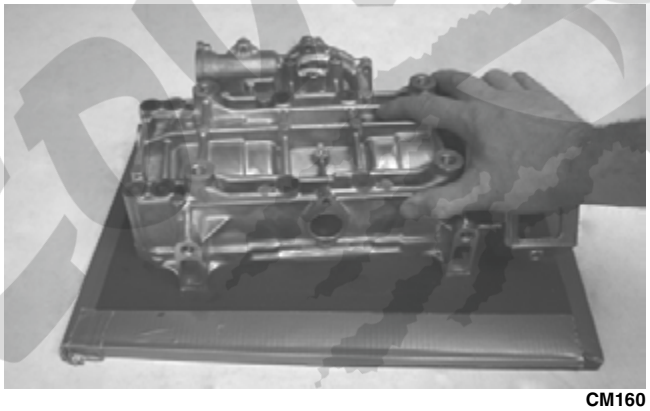
CRANKCASE

1. Wash the crankcase halves in parts-cleaning solvent.

■NOTE: Before washing the crankcase halves, make sure the four bearing dowel pins have been removed and accounted for.

2. Inspect the crankcase halves for scoring, pitting, scuffing, or any imperfections in the casting.
3. Inspect all threaded areas for damaged or stripped threads.
4. Inspect the bearing areas for cracks or excessive bearing movement. If evidence of excessive bearing movement is noted, the crankcase must be replaced.
5. Inspect the bearing dowel pins for wear.
6. Inspect the sealing surfaces of the crankcase halves for trueness by placing each crankcase half on the surface plate covered with #400 grit wet-or-dry sandpaper. Using light pressure, move each half in a figure eight motion. Inspect the sealing surfaces for any indication of high spots. A high spot can be noted by a bright metallic finish. Correct any high spots by continuing to move the half in a figure eight motion until a uniform bright metallic finish is attained.

■NOTE: Care must be taken not to remove an excessive amount of aluminum, or the crankcase must be replaced. If excessive aluminum is removed, too much pre-load will be exerted on the crankshaft bearings when assembled.



CM160

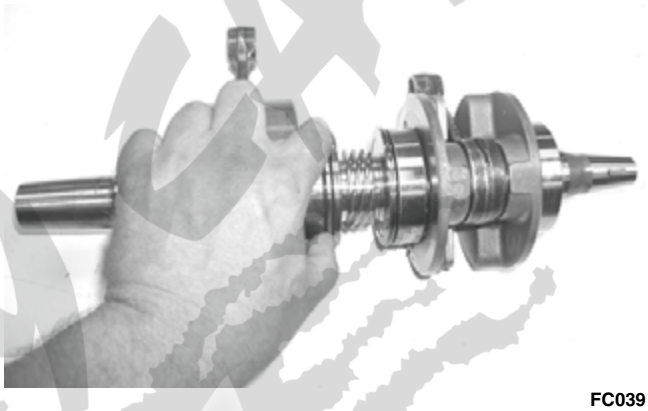
CAUTION

Water or parts-cleaning solvent must be used in conjunction with the wet-or-dry sandpaper or damage to the sealing surface may result.

CRANKSHAFT

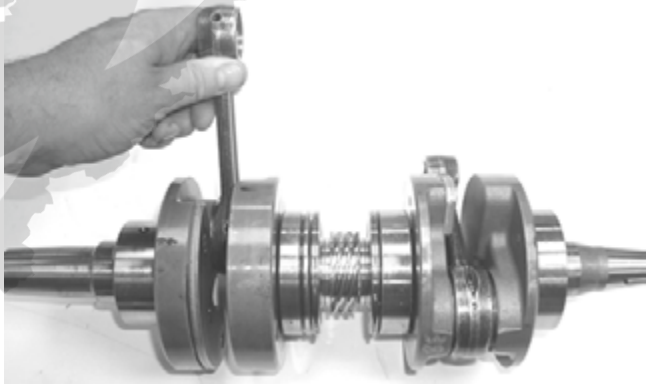
■NOTE: If any servicing of the connecting rods, center bearings, or oil-injection pump drive gear is necessary, Arctic Cat recommends the crankshaft be taken to a qualified machine shop for that service.

1. Wash the crankshaft with bearings in parts-cleaning solvent.
2. Inspect the bearings for wear, scoring, scuffing, damage, or discoloration. Rotate the bearings. Bearings must rotate freely and must not bind or feel rough. If any abnormal condition is noted, replace the bearing.



FC039

3. Inspect the connecting-rod bearings by rotating them. The bearings must rotate freely and must not bind or feel rough. If a connecting-rod bearing must be replaced, the connecting rod and crank pin must also be replaced.



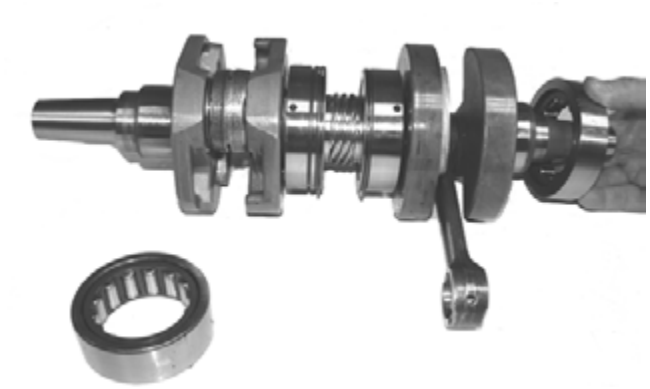
FC040

4. Inspect the oil-injection pump drive gear for any signs of worn or chipped teeth. If either condition exists, replace the gear.

■NOTE: Lubricate bearings thoroughly prior to assembly.

REMOVING/INSTALLING OUTER CRANKSHAFT BEARINGS

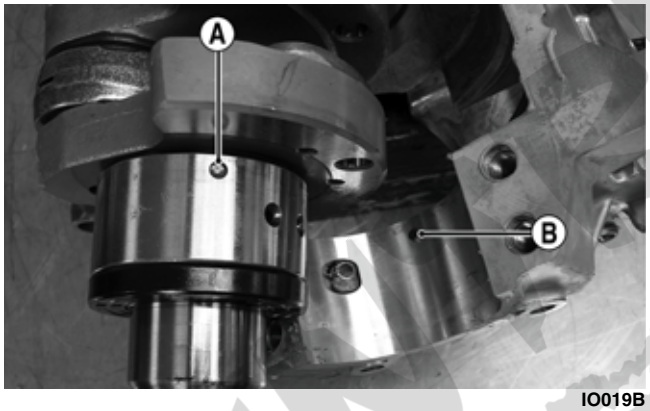
■NOTE: The end bearings are not pressed onto the crankshaft. The bearings can be removed simply by sliding them off the crankshaft.



CM161

Inspect the crankshaft bearing area for wear. If any wear is noted on either end, replace the crankshaft end.

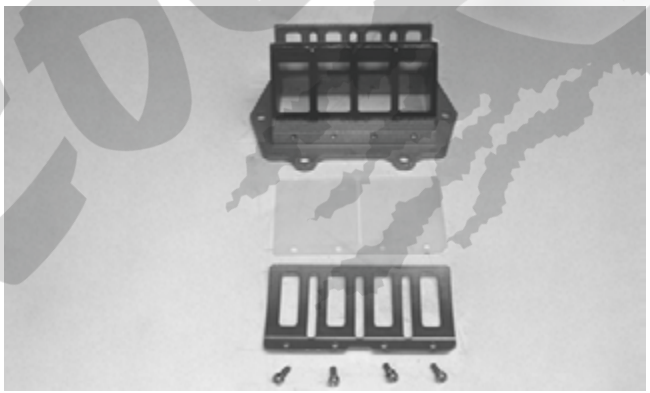
■NOTE: Install the bearings by sliding each bearing onto the crankshaft making sure the retaining pin hole (A) in the outer race of the bearing is properly positioned and will align with the retaining pin (B) in the crankcase.



IO019B

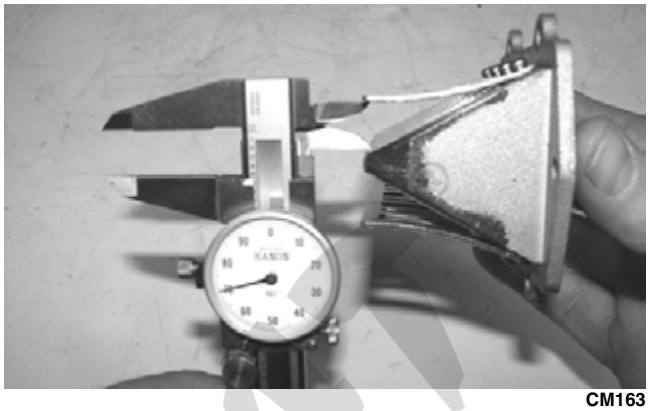
REED VALVE ASSEMBLY

1. Inspect the reed valves, stoppers, and valve blocks for cracks or any deterioration.



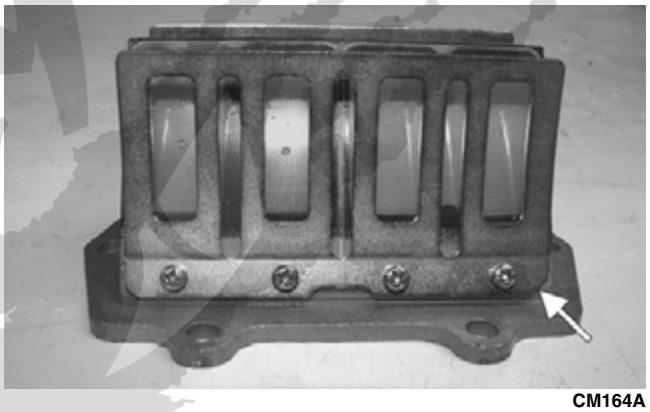
CM162

2. Wash the reed valves, stopper, and cage assembly in parts-cleaning solvent and blow dry.
3. Inspect the reed stopper height. Using a caliper, measure the distance from the seat to the bottom outer tip edge of the stopper. Measurement must not exceed specifications. If measurement is not within specifications, either bend or replace the reed stopper.



CM163

4. Inspect the reed-to-seat clearance. Using a feeler gauge, measure the clearance. Clearance must be less than 0.008 in. If clearance is not within specifications, replace the reed valve.
5. To assemble, place the reed valves on the cage with its clipped corner positioned to the lower right hand corner of the cage. Place the reed stopper assembly into position and secure with the screws tightened to 8.5 in.-lb.



CM164A

Measuring Critical Components

■NOTE: Critical engine specifications chart can be found in Section 1 of this manual.

CYLINDER HEAD VOLUME (Squish-Gap Method)

To check the squish gap, a micrometer and two heavy pieces of solder will be needed.

1. Remove the spark plugs from the engine.
2. Simultaneously insert two pieces of solder down through the spark plug hole and push them up against the inner cylinder bore towards the MAG-side and PTO-side of the cylinder.
3. Pull the recoil rope and crank the engine over several times while the solder is being held firmly in place.
4. Remove both pieces of solder from the cylinder. Using the micrometer, measure the very end of the squeezed solder piece. Record the reading.

■**NOTE: If the solder hasn't been squeezed by the piston, a larger piece of solder must be used. Repeat procedure.**

5. Using the opposite end of the solder pieces, insert them down through the spark plug hole towards the PTO-side and MAG-side of the cylinder. Push on the solder until they contact the inner cylinder bore.
6. Pull the recoil rope and crank the engine over several times. Remove both pieces of solder from the cylinder and measure the opposite squeezed ends with a micrometer. Record reading.

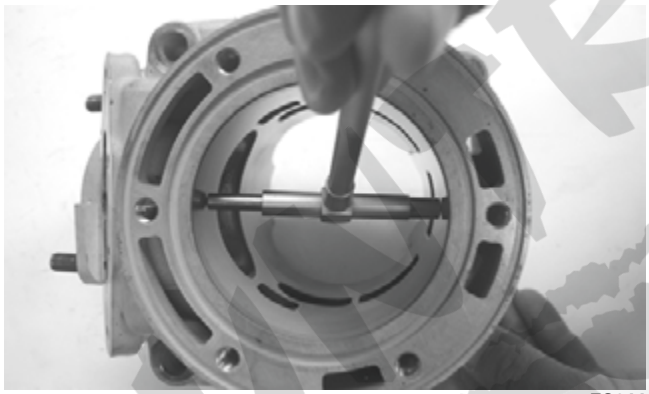
■**NOTE: Measure from PTO to MAG-side of the piston to accurately measure the squish gap. Never measure across piston, exhaust side to opposite side, as the piston will rock and the reading won't be accurate.**

Readings may vary from side to side.

■**NOTE: Make sure the smaller reading is 0.059 in. or less.**

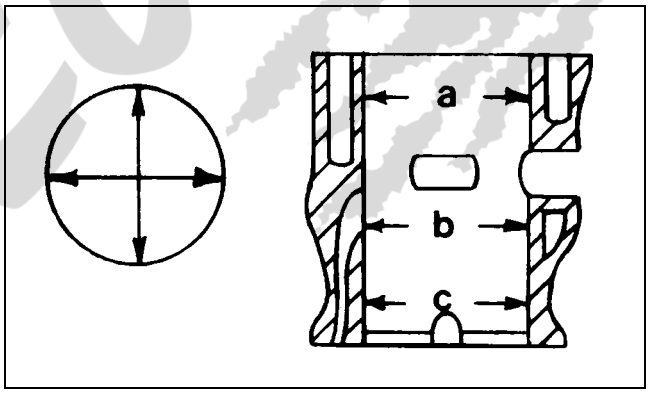
CYLINDER TRUENESS

1. Measure each cylinder in the three locations from front to back and side to side for a total of six readings.



FC044

2. The trueness (out-of-roundness) is the difference between the highest and lowest reading. Maximum trueness (out-of-roundness) must not exceed 0.004 in.



0725-586

PISTON SKIRT/CYLINDER CLEARANCE

1. Measure each cylinder front to back about 1 in. from the bottom of each cylinder.
2. Measure the corresponding piston skirt diameter at a point 1 cm above the piston skirt at a right angle to the piston-pin bore. Subtract this measurement from the measurement in step 1. The difference (clearance) must be within 0.0041-0.0053 in.



AC091

PISTON-RING END GAP

1. Place each piston ring in the wear portion above the exhaust port of its respective cylinder. Use the piston to position each ring squarely in each cylinder.
2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within 0.0120-0.0196 in.



FC045

PISTON PIN AND PISTON-PIN BORE

1. Measure the piston pin diameter at each end and in the center. Acceptable piston pin measurement must be within 0.8659-0.8661 in. If any measurement varies by more than 0.001 in., the piston pin and bearing must be replaced as a set.



IO012

2. Insert a snap gauge into each piston-pin bore; then remove the gauge and measure it with a micrometer. The diameter measurement must be within 0.8661-0.8665 in. Take two measurements to ensure accuracy.



AC092

CONNECTING-ROD SMALL END BORE

1. Insert a snap gauge into each connecting-rod small end bore; then remove the gauge and measure it with a micrometer.



AN061

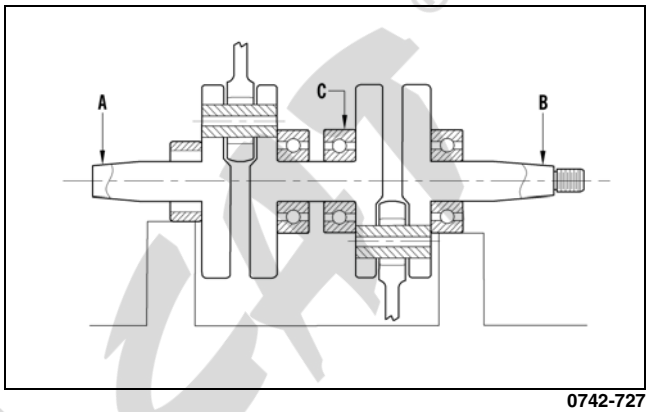
2. The diameter measurement must be within 1.0631-1.0634 in.

CRANKSHAFT RUNOUT

1. Using the V Blocks, support the crankshaft on the surface plate.

■NOTE: The V blocks should support the crankshaft on the outer bearings.

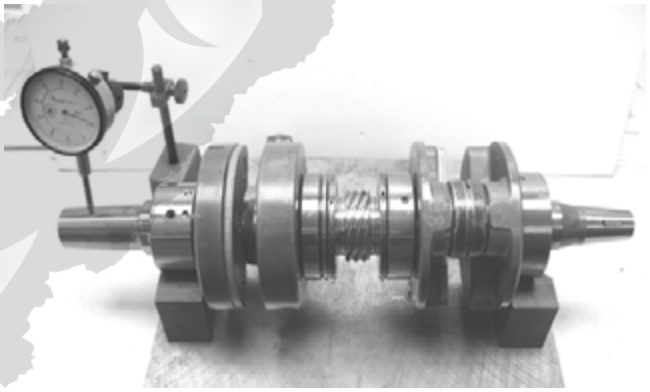
2. Mount a dial indicator and base on the surface plate. Position the indicator contact point against the crankshaft location point A (PTO-end) from the crankshaft end. Zero the indicator and rotate the crankshaft slowly. Note the amount of crankshaft runout (total indicator reading).



0742-727

■NOTE: For runout location point specifications, see Crankshaft Runout/Repair Specifications in Section 1 of this manual.

3. Position the indicator contact point against the crankshaft location point B (MAG-end) from the crankshaft end. Zero the indicator and rotate the crankshaft slowly. Note the amount of crankshaft runout (total indicator reading).



FC046

4. Position the indicator contact point against the crankshaft at location point C (center). Zero the indicator and rotate the crankshaft slowly. Note the amount of crankshaft runout (total indicator reading).

5. If runout exceeds 0.002 in. at any of the checkpoints, the crankshaft must be either straightened or replaced.

Assembling

■NOTE: The use of new gaskets and seals is recommended when assembling the engine.

■NOTE: Prior to assembling the engine, use parts cleaning solvent and compressed air and thoroughly clean the threaded holes of the crankcase and cylinders to properly tighten.

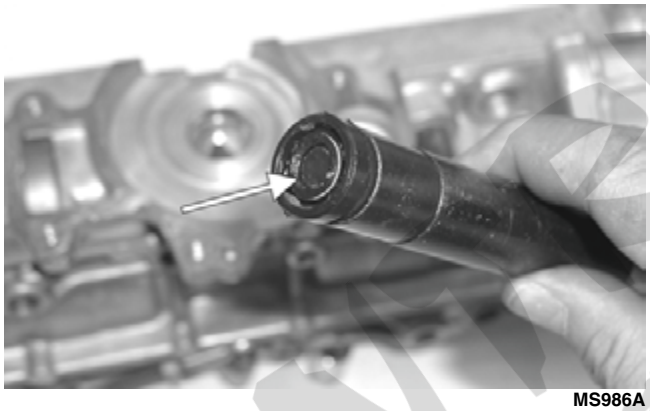
⚠ WARNING

Always wear safety glasses when drying components with compressed air.

■NOTE: When the use of a lubricant is indicated, use Arctic Cat Synthetic APV 2-Cycle Oil.

1. Apply a thin coat of grease to the inner seal lips of the water pump seal.
2. Using the seal driver, position the inner water pump shaft seal onto the seal driver and gently tap the seal down into position.

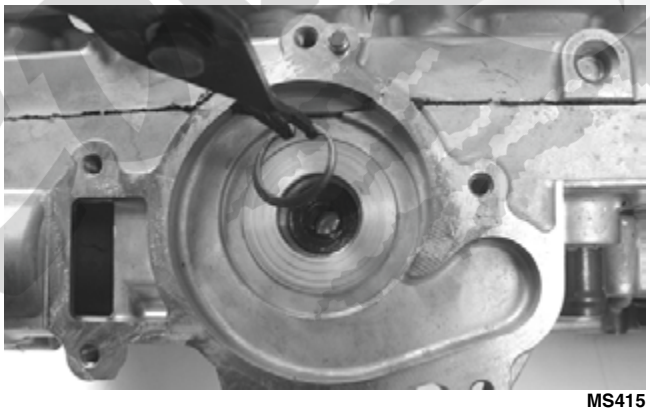
■NOTE: Grease must be applied to the lips of the inner seal before installation.



MS986A

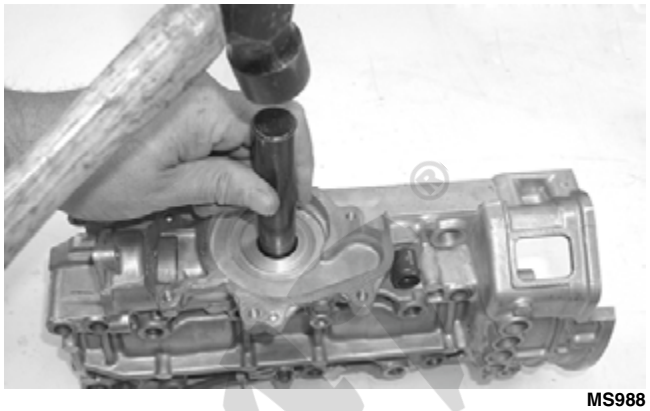
■NOTE: The seal must be installed with its spring side towards the crankshaft.

3. Install the snap ring securing the inner seal in the crankcase.



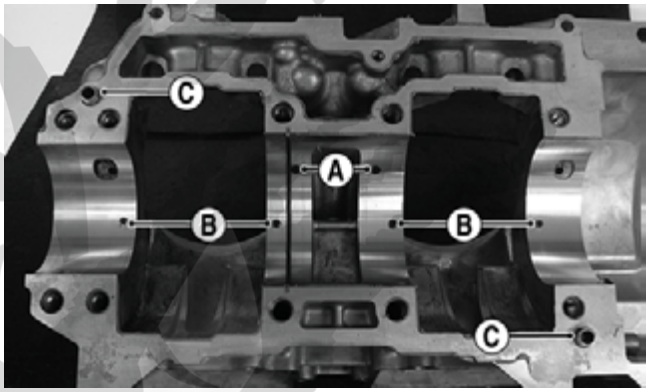
MS415

4. Using the seal driver, carefully install the outer water pump seal. Gently tap the seal down into position until it seats itself against its flange.



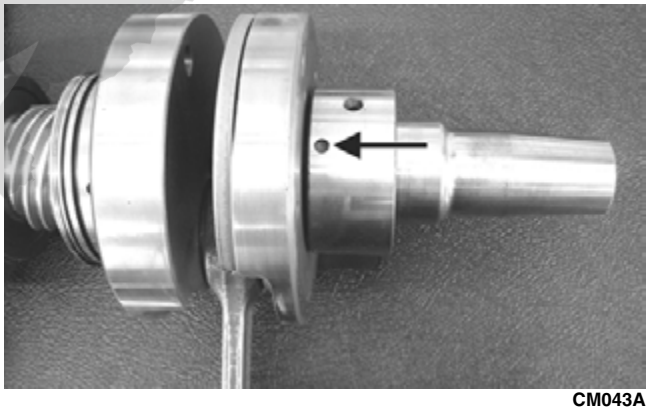
MS988

5. Secure the upper crankcase half upside-down on a suitable support; then install the C-ring (A), the four bearing retaining pins (B), and the two crankcase dowel pins (C).



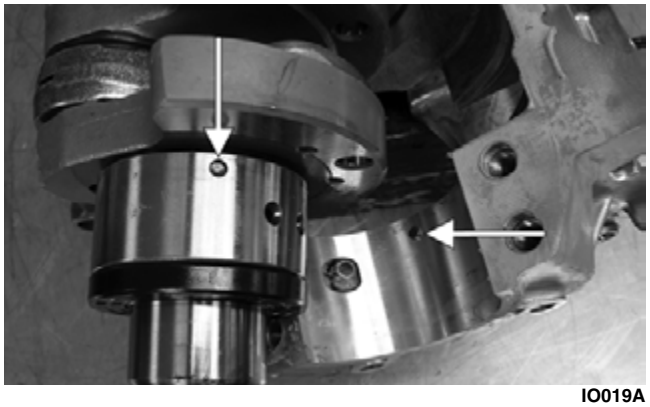
IO023A

6. Place the crankshaft end bearings into position making sure the bearing retaining pin hole is positioned inward.



CM043A

7. Lubricate the inner lips of the crankshaft oil seals with grease; then slide the seals onto the crankshaft making sure the spring side of each seal faces inward.
8. Apply oil to the crankshaft bearings; then install the crankshaft into the upper crankcase half. Be sure the alignment hole in each bearing is positioned over its respective retaining pin in the crankcase; then seat the crankshaft.



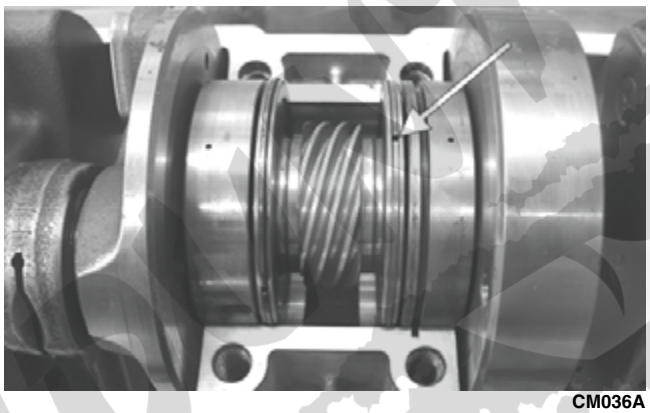
IO019A

■**NOTE: To check the bearing for proper position, place the point of a sharp tool into the dimple found in the bearing race. Strike the tool with the palm of the hand in either direction. If the bearing moves, it isn't positioned correctly and must be rotated until it drops onto the retaining pin.**

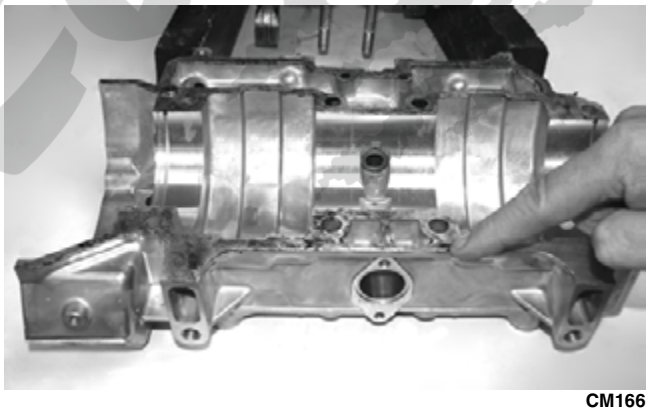
CAUTION

If the bearings are not properly seated during assembly, the crankcase halves will not seal tightly and severe engine damage will result.

9. Position the two center seal rings with their end gaps 180° apart (up on one and down on the other); then apply a thin coat of High-Temp Sealant to the entire bottom half of the crankcase sealing surface.



CM036A

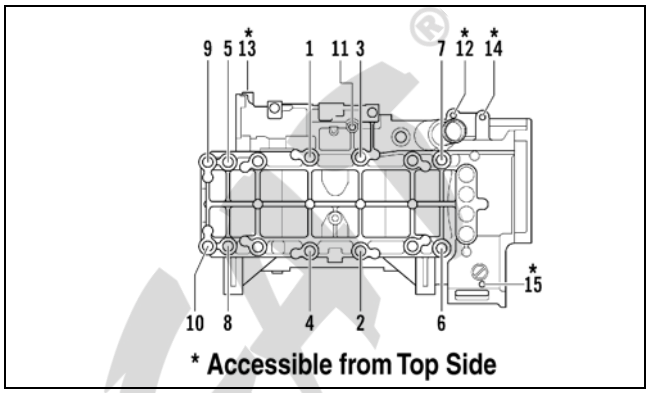


CM166

10. Assemble the crankcase halves making sure the crankshaft gear and oil-injection pump driveshaft gears mesh. Rotate the crankshaft one full turn to align the crankshaft gear and pump driveshaft.

11. Install the crankcase cap screws securing the crankcase halves.

12. Tighten cap screws (1-10) in two steps from 13 ft-lb to 31 ft-lb using the pattern shown.



742-198A

13. Tighten cap screw (11) to 96 in.-lb; then turn the engine right-side up and tighten cap screws (12-15) in two steps to 25 ft-lb.

14. Apply a thin coat of grease to the sealing surface of the oil-injection pump/water pump driveshaft; then place the Oil Seal Protector Tool at the end of the shaft.

CAUTION

Be very careful not to damage the seals when installing the oil pump driveshaft. Twist the driveshaft clockwise as it enters the seal area and while pushing it through the seals.



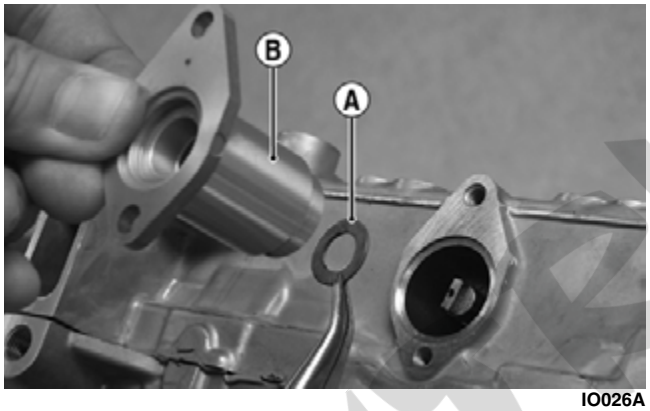
FS191

15. Rotate the oil-injection pump/water pump driveshaft while carefully pushing it through the oil and water pump seals until the driveshaft and crankshaft gears engage; then remove the oil seal protector tool (A) from the end of the shaft.



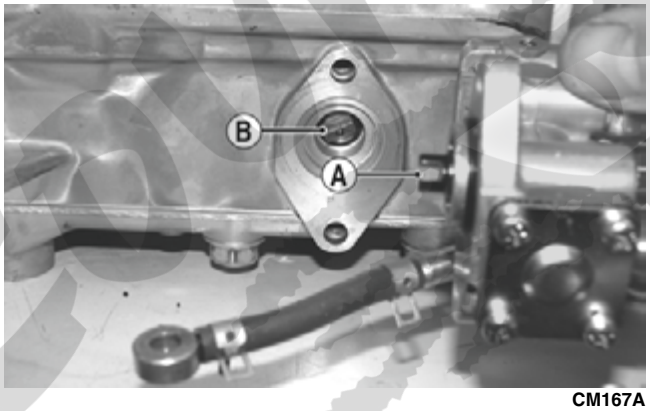
IO025A

16. Position the shim (A) on the oil-injection pump end of the driveshaft; then install the oil-injection pump retainer (B) with a new O-ring.



IO026A

17. With the new O-ring (lightly coated with oil) in place, install the oil-injection pump making sure the pump shaft slot (A) and pump driven gear shaft (B) align. Secure with two screws (coated with blue Loctite #243). Tighten the two screws to 96 in.-lb.

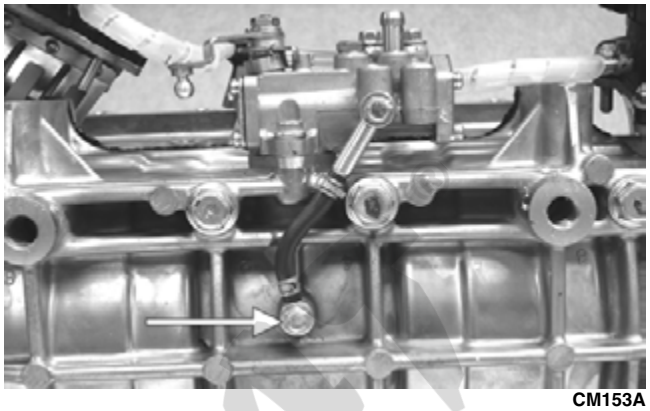


CM167A

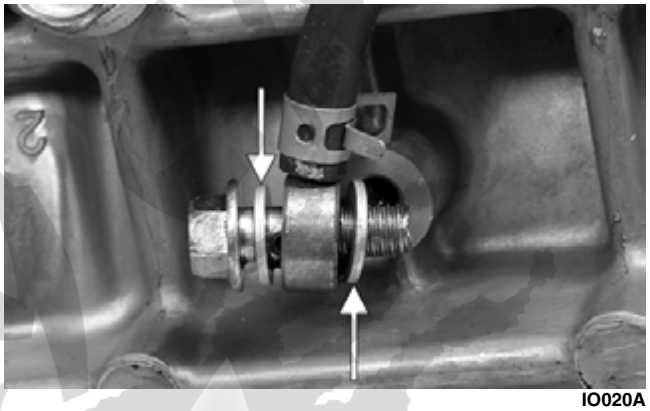
CAUTION

Be sure the oil-injection pump/water pump driveshaft is properly aligned with the slot of the oil-injection pump. The pump will be damaged if these two components are not aligned.

18. Place the lower union assembly (with new gaskets) into position and secure with the gaskets and union cap screw. Tighten to 48 in.-lb.



CM153A

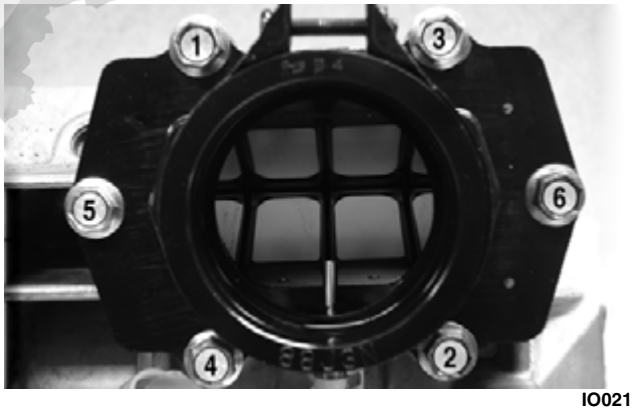


IO020A

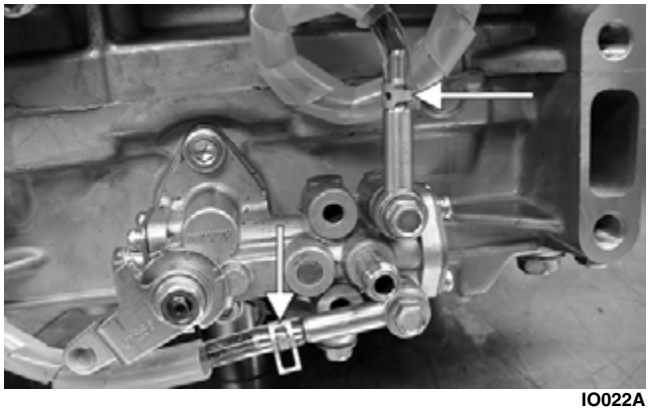
CAUTION

Always use new gaskets and assure that a gasket is in place on each side of the union prior to securing the union cap screw to the crankcase.

19. With new gaskets, install the reed valve assemblies and intake flanges using the pattern shown. Tighten to 96 in.-lb; then secure the intake flange oil hoses to the oil pump and secure with the clamps.

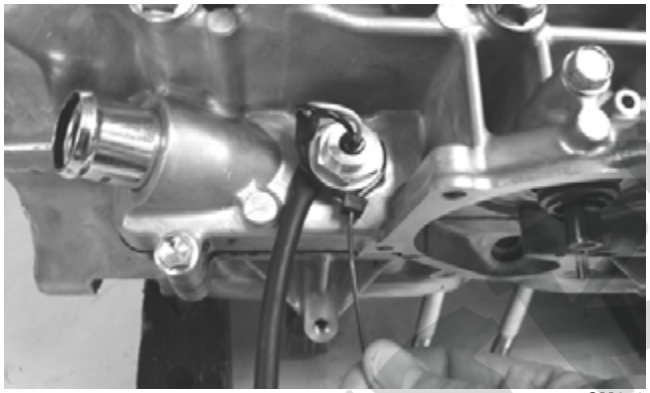


IO021A



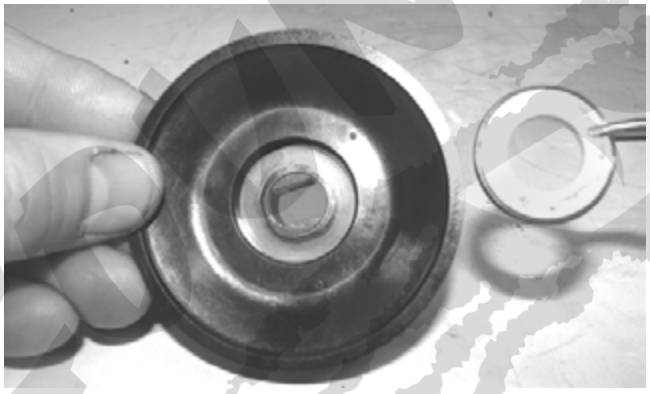
IO022A

20. Install the coolant temperature sensor (threads coated with white Loctite #575) and tighten to 18 ft-lb; then secure the sensor wire to the sensor with a cable tie.



CM172

21. Position the ceramic/rubber seal into the back side of the water pump impeller with the ceramic face of the seal directed out.



CM168

22. Using a suitable tool, press the seal into position making sure its marked side is positioned towards the rubber seal cup; then apply a thin coat of grease to the seal outer surface.



IO050A

CAUTION

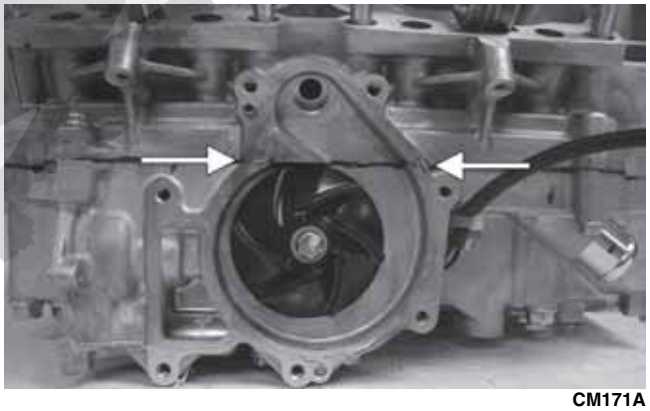
When installing the ceramic/rubber seal into the impeller, never touch the ceramic part of the seal. Make sure components are clean and free of any dirt or contaminants.

23. Place the impeller into position and secure with a cap screw and washer. Be sure the rubber side of the washer is lubricated with a light coat of grease and directed toward the impeller. Apply blue Loctite #243 to the threads of the cap screw and tighten to 108 in.-lb.

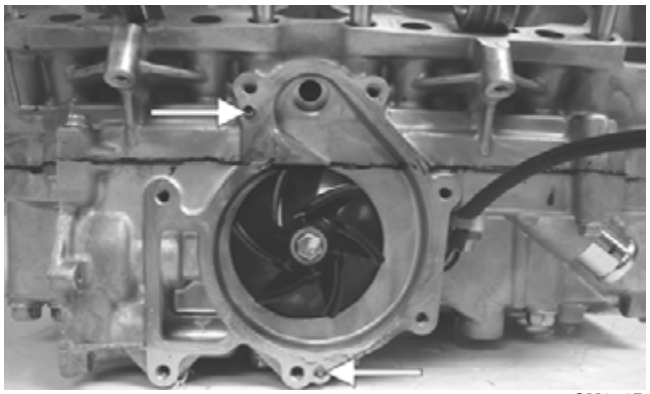
CAUTION

The rubber side of the washer securing the impeller must be positioned toward the impeller. If installed incorrectly, a coolant leak will result.

24. Apply High-Temp Sealant to the crankcase/water pump cover seam; then install the dowel pins into the crankcase.

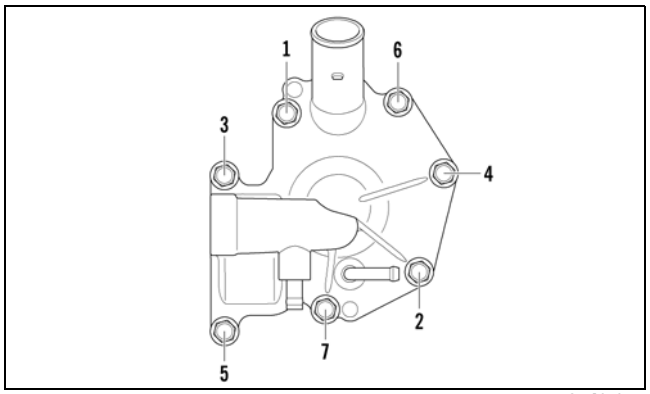


CM171A



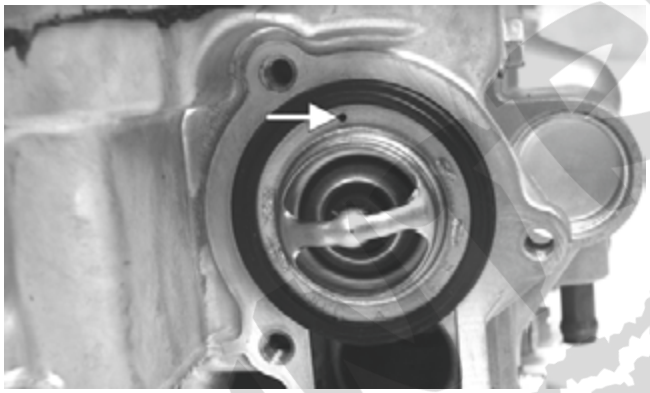
CM171B

25. Apply a thin film of low-temp grease to the water pump cover O-ring; then position the O-ring into the water pump cover. With the alignment pins in place, install the cover. Secure with the screws using the pattern shown. Tighten to 96 in.-lb.

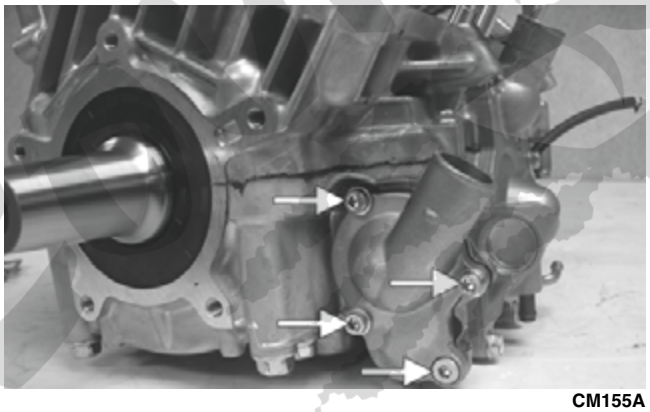


0742-257

26. With the bypass valve of the thermostat directed to the 12 o'clock position, install the thermostat and housing; then in a crisscross pattern, tighten the cap screws to 96 in.-lb.



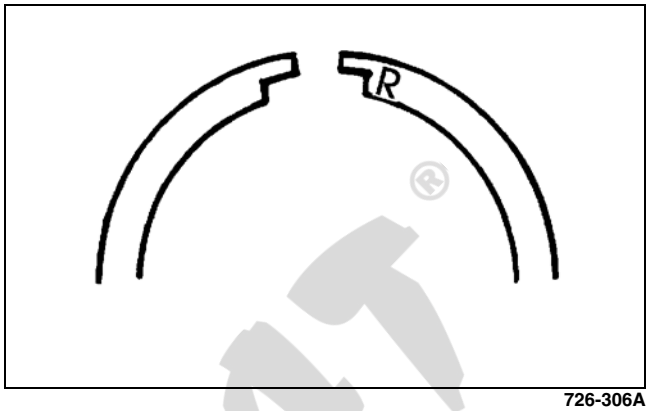
CM157A



CM155A

27. Install the dowel pins into the crankcase; then place the cylinder base gasket into position on the crankcase.

28. Install the piston rings on each piston so the letter on the top (inclined surface) of each ring faces the dome of the piston.

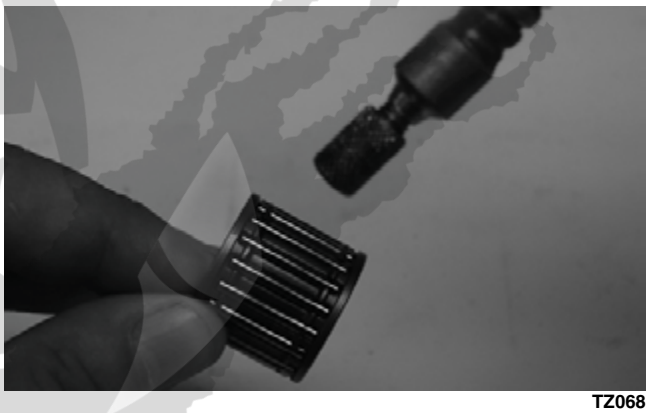


726-306A

CAUTION

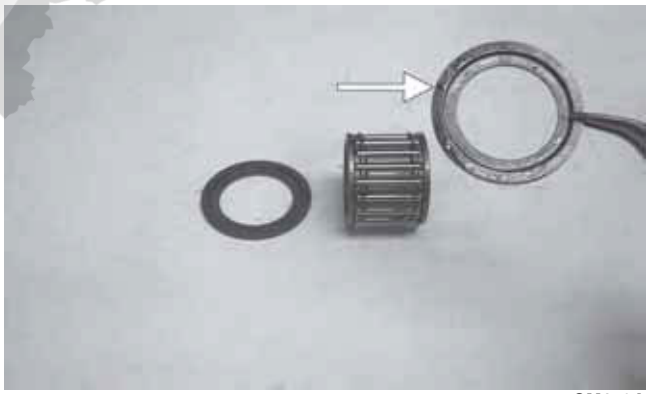
Incorrect installation of the piston rings will result in engine damage.

29. Apply oil to the connecting-rod small end bearings; then install the small-end bearings. Install a washer on each side of the connecting rod.



TZ068

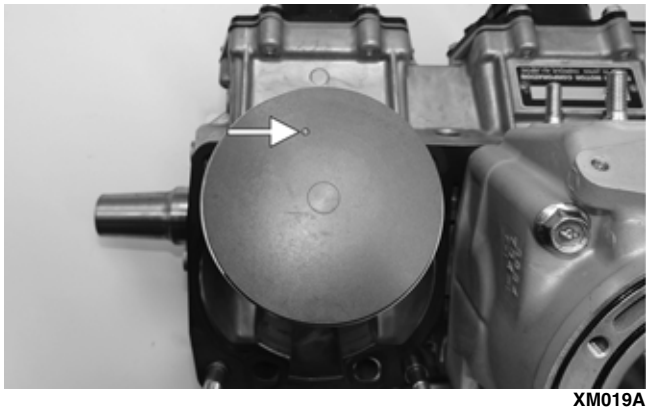
■NOTE: The shoulder side of the washer must seat to the needle bearing.



CM172A

30. Place each piston over the connecting rod so the indicator dot on each piston will point toward the intake/exhaust ports; then secure with an oiled piston pin.

■NOTE: The indicator dot is found on the piston dome.



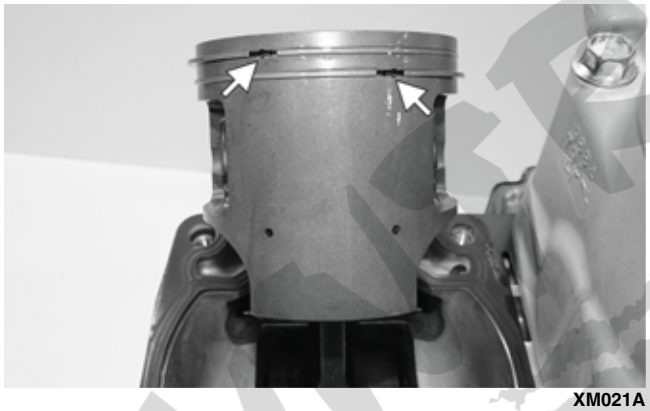
XM019A

31. Install the new circlips so the open end is directed either up or down.

CAUTION

Make sure the circlips are firmly seated before continuing with assembly.

32. Rotate each piston ring until the ring ends are properly positioned on either side of the ring keeper; then apply oil to the piston assemblies and cylinder bores.



XM021A

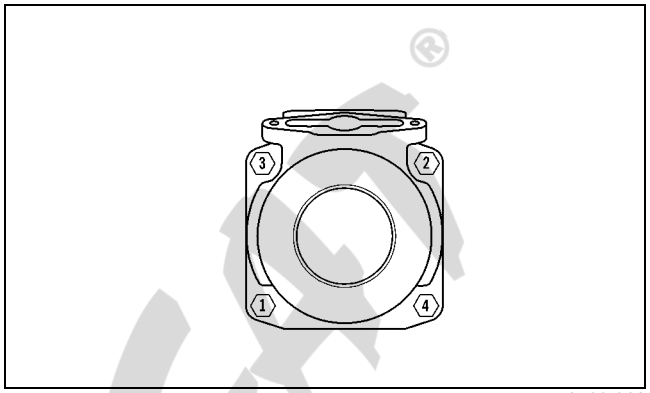
33. In turn on each cylinder, place a piston holder (or suitable substitute) beneath the piston skirt and square the piston in respect to the crankcase; then using a ring compressor or fingers, compress the rings and slide the cylinder over the piston. Remove the piston holder and seat the cylinder firmly onto the crankcase.

■NOTE: The cylinders should slide on easily. DO NOT force the pistons into the cylinders.



XM018

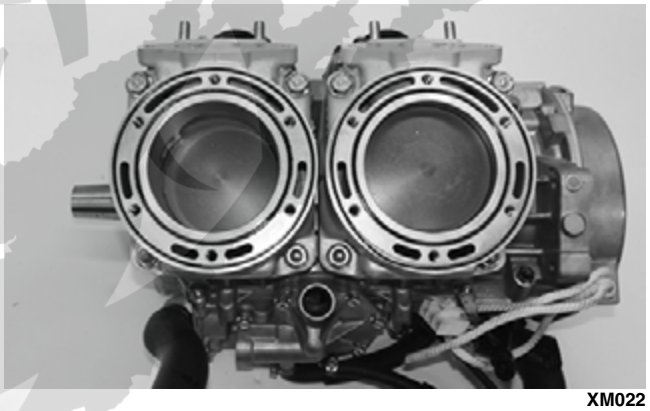
34. Install each cylinder with the four nuts and four new cap screws; then secure the cylinders by tightening the cylinder base nuts and cap screws to 44 ft-lb in three steps using the pattern shown.



0738-206

■NOTE: Always use new cap screws when installing the cylinders.

35. Install the two cylinder O-rings (lightly coated with oil) on the top of each cylinder making sure they are correctly positioned in the grooves.



XM022

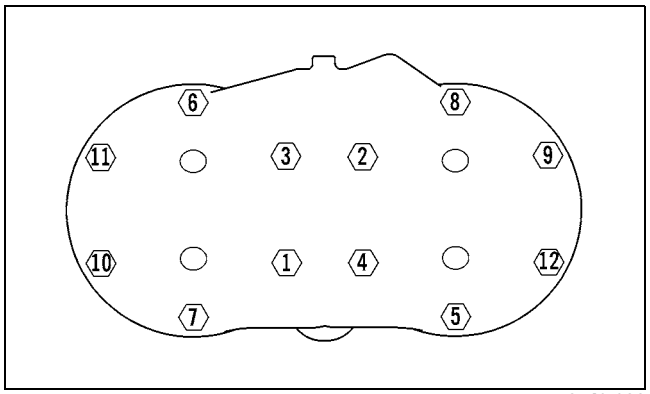
36. Place new O-rings (lightly coated with oil) onto each of the head cap screws. Place four of these cap screws (from opposite end of each other) into the cylinder head. Thread the spark plugs in part way; then while holding the head above the cylinder, carefully start and finger-tighten all four cap screws while observing the cylinder O-rings to make sure they remain in position. Slowly place the head into position on top of the O-rings.



XM016

■NOTE: To install the remaining cap screws, the spark plugs must be removed.

37. Start and finger-tighten the remaining cap screws being very careful not to move the cylinder head; then tighten the cap screws in two steps to 25 ft-lb using the pattern shown.

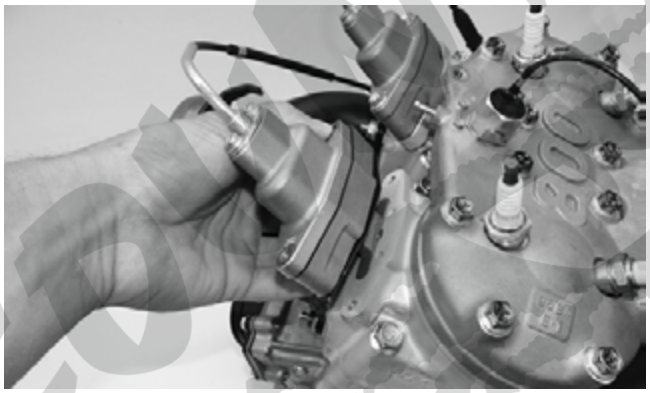


0742-200

■NOTE: At this point, install the spark plugs; then install the knock sensor with the new lock plate, tighten the sensor to 17 ft-lb, and bend the lock plate tabs up.

■NOTE: At this point, pressure test the engine (see Section 3).

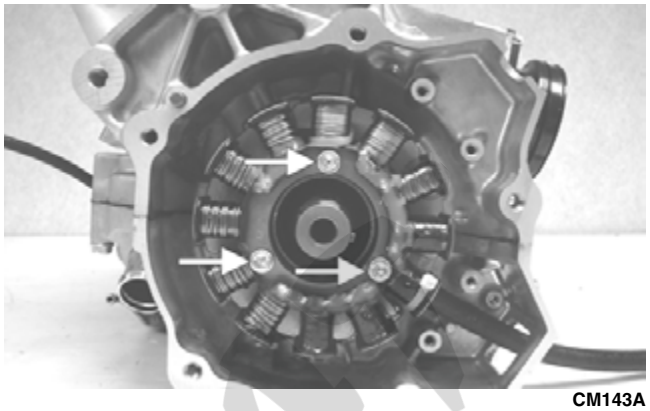
38. With the raised edge of the valve aligned with the channel of the cylinder, slide the APV assemblies into position in the cylinders; then secure with cap screws. Tighten to 96 in.-lb.



XM017

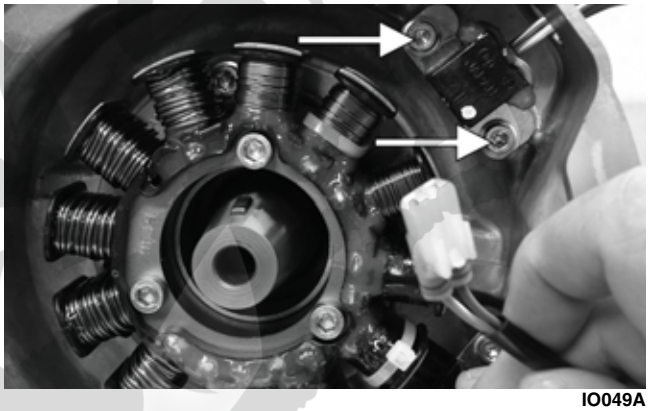
39. Secure the stator plate to the crankcase with the Allen-head cap screws (coated with blue Loctite #243) and tightened to 96 in.-lb.

40. Route the stator harness through the opening in the crankcase; then secure the stator to the stator plate with the Allen-head cap screws (coated with blue Loctite #243). Tighten to 96 in.-lb.



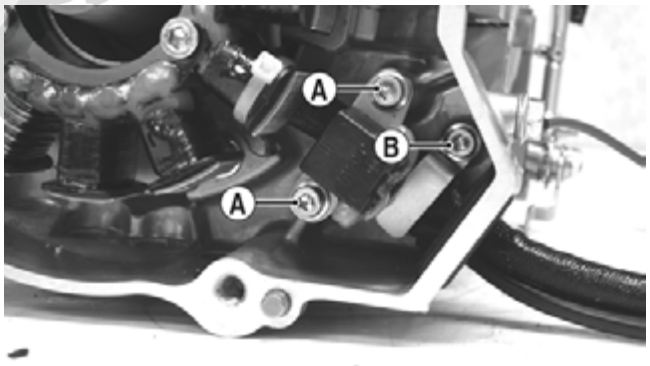
CM143A

41. Secure the upper ignition timing sensor (white dot/ connector) with cap screws (coated with blue Loctite #243). Tighten to 48 in.-lb; then install the wiring grommet into the notch of the crankcase.



IO049A

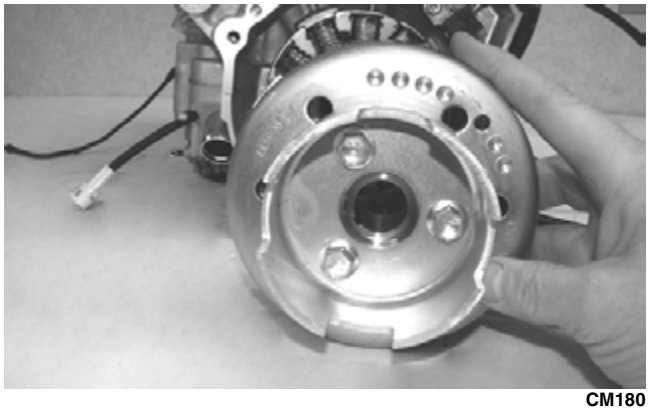
42. Secure the lower ignition timing sensor with two cap screws (A) (coated with blue Loctite #243). Tighten to 48 in.-lb; then install the grommet. With the stator harness properly positioned, install the plate and cap screw (B) (coated with blue Loctite #243). Tighten to 48 in.-lb.



CM177A

43. Install the key in the crankshaft.

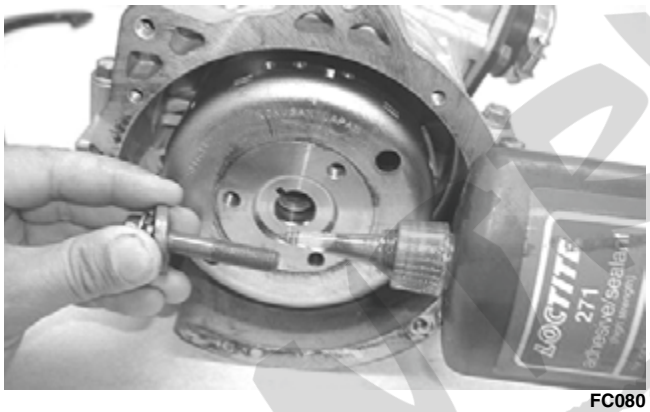
44. Place the starter clutch in position on the flywheel; then secure the starter clutch with three cap screws and tighten only until snug. While holding the starter clutch, slide the flywheel onto the crankshaft making sure the keyways match.



CM180

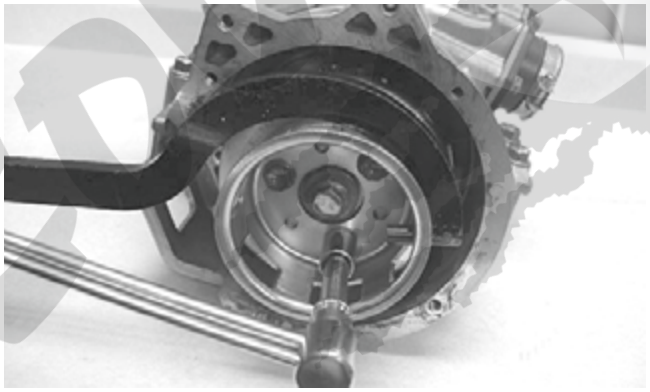
■**NOTE: Before installing the flywheel, be sure to wipe the crankshaft and flywheel tapers clean using a clean, lint-free towel.**

45. Apply red Loctite #271 to the threads of the flywheel cap screw; then finger-tighten with a large flat washer. DO NOT TIGHTEN AT THIS TIME.



FC080

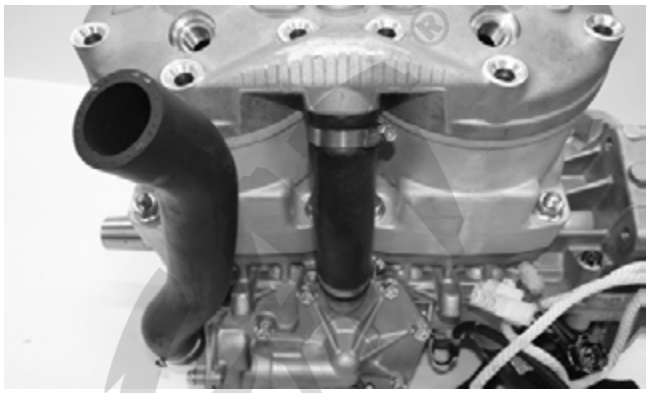
46. Secure the starter clutch while using the spanner wrench and tighten the three cap screws (from step 45) evenly to 19 ft-lb.



FC081

47. Using the spanner wrench, tighten the flywheel cap screw (from step 45) to 50 ft-lb.

48. Install the coolant inlet hose to the cylinder head and water pump; then tighten the hose clamps securely.

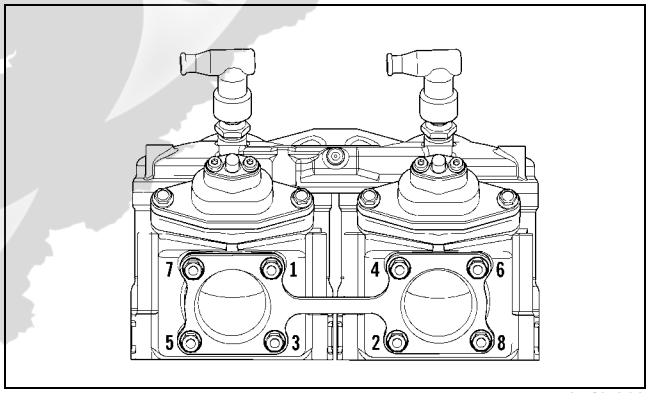


XM023

■**NOTE: At this time if the coolant temperature sensor was removed, install the sensor (threads coated with blue Loctite #243) and tighten to 18 ft-lb.**

49. Apply a thin coat of high-temperature silicone sealant to each exhaust port; then install the exhaust gaskets.

50. Apply a thin coat of High-Temp Sealant to the mating surfaces of the exhaust manifold; then install the exhaust manifold and secure with the eight nuts. Tighten the nuts using the pattern shown to 17 ft-lb.



0742-292

Engine Servicing - 1100 cc

This engine sub-section has been organized to show a progression for servicing of the Arctic Cat 1100 cc engines. For consistency purposes, this sub-section shows a complete and thorough progression; however, for efficiency it may be preferable to disassemble only those components needing to be addressed. Also, some components may vary from model to model. The technician should use discretion and sound judgment.

■NOTE: Critical torque and engine specifications can be found in Section 1 of this manual.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

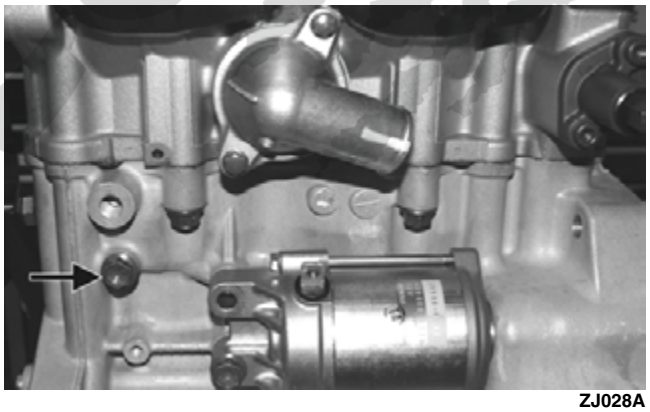
A number of special tools must be available to the technician when performing service procedures in this engine section.

Description	p/n
Ball Hone	0644-532
Flywheel Spanner Wrench	0144-007
Flywheel Puller	0644-480
Piston Pin Puller	0644-328
V Blocks	0644-535
Drive Clutch Spanner Wrench	0644-136
Ring Compressor	0644-378

■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

Disassembling

1. With the engine secured to a suitable engine stand, remove the coolant drain plug allowing the remaining coolant to drain from the engine.

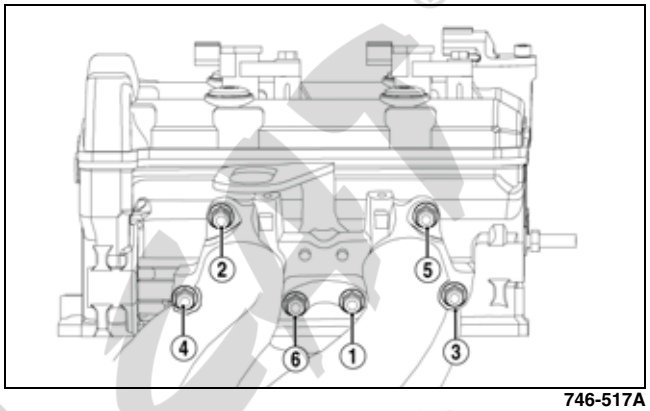


ZJ028A

2. Remove the remaining coolant hoses; then remove the clamps and hoses connecting the oil reservoir to the engine.

■NOTE: For assembling purposes, note the location of the oil and coolant hoses.

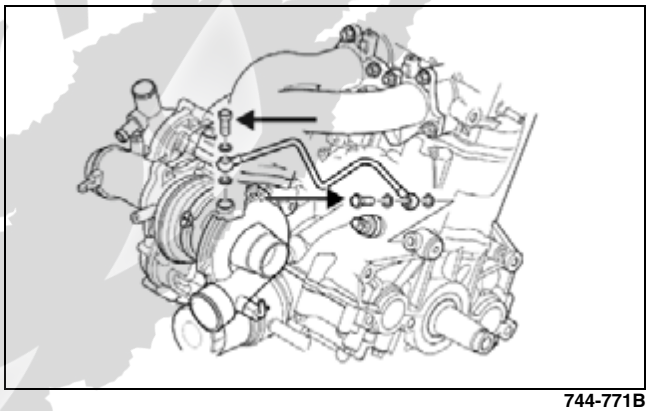
3. Remove the six flange nuts securing the exhaust pipes to the cylinder head; then remove the pipes and discard the gaskets.



746-517A

■NOTE: Steps 4-6 are for the turbo models only.

4. Remove the banjo bolts securing the oil feed pipe to the turbocharger and engine. Discard the crush washers.



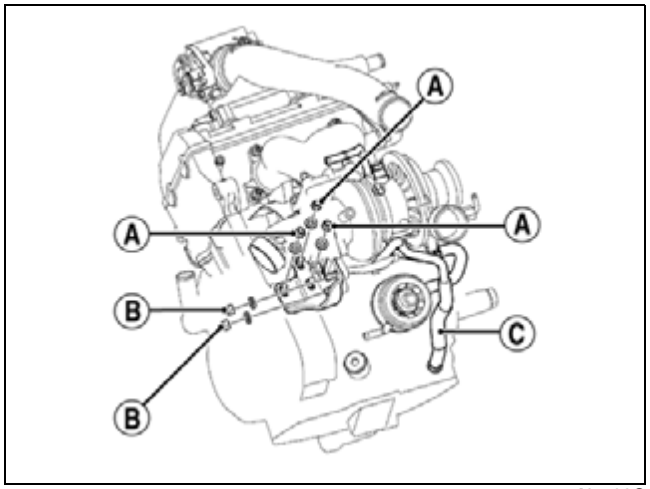
744-771B

■NOTE: For assembling purposes, note the size of the oil port and thread taper of the banjo bolts.



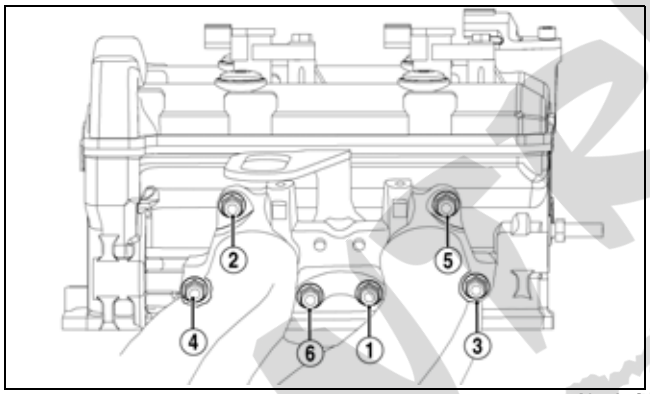
IO028

5. Remove the three lock nuts and washers (A) securing the bracket of the turbocharger to the engine; then loosen the lock nuts (B) securing the bracket to the turbocharger. Remove the oil drain hose (C).



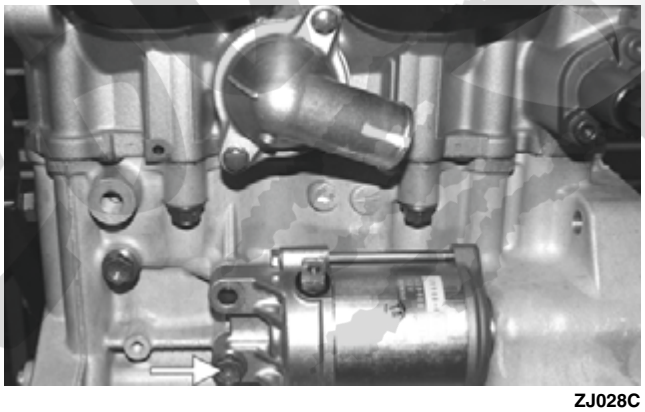
743-780C

6. Remove the lock nuts and washers securing the exhaust pipes to the cylinder head; then carefully remove the turbocharger and exhaust pipes assembly. If needed remove the cap screws securing the lower heat shield to the exhaust pipes and turbocharger.



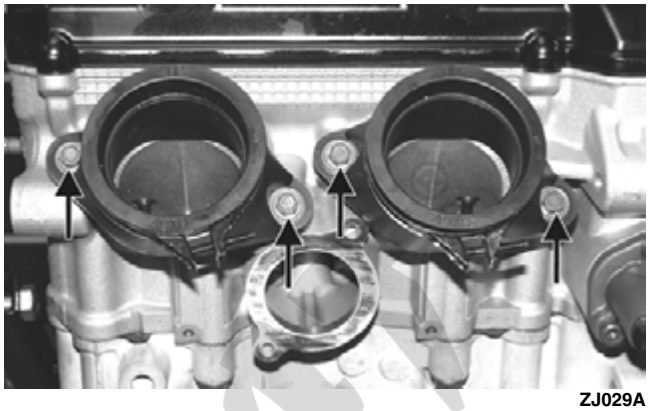
746-517A

7. Remove the cap screws securing the starter motor to the engine. Remove the starter motor.



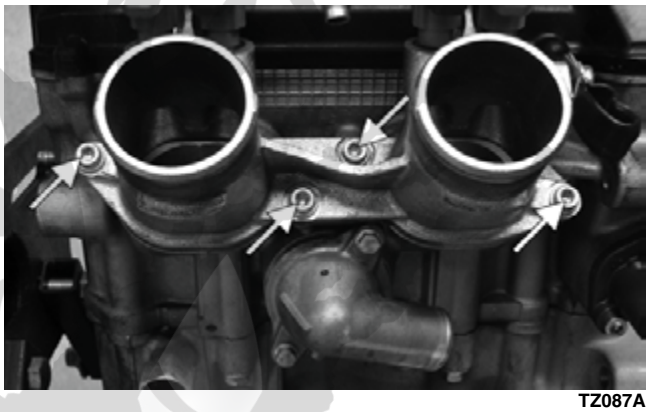
ZJ028C

8. On the non-turbo models, remove the cap screws securing the two intake flanges to the cylinder head; then remove the flanges.



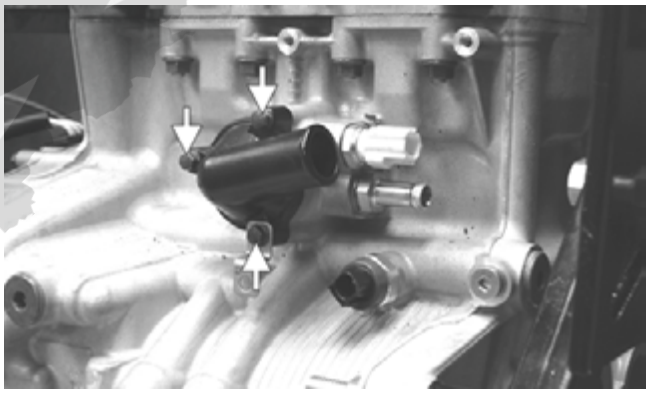
ZJ029A

9. On the turbo models, remove the four cap screws securing the manifold adapter assembly; then remove the manifold.



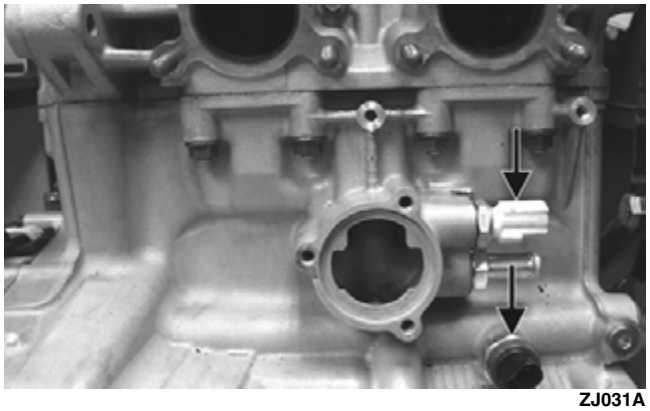
TZ087A

10. Remove the three cap screws securing the thermostat cap to the engine; then remove the cap and thermostat.



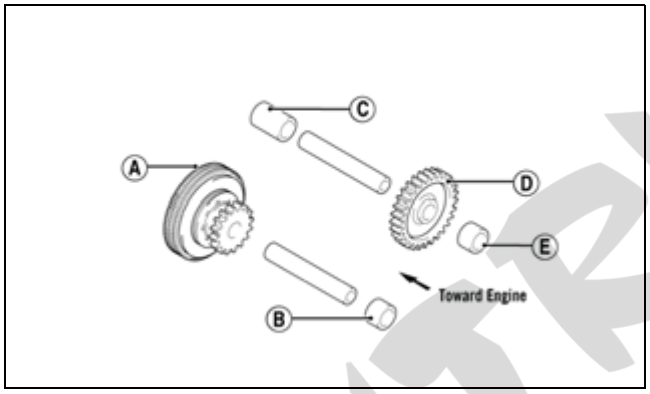
ZJ030A

■**NOTE: If engine case cleaning or replacing is necessary, remove the coolant and oil sensors from the engine case.**



ZJ031A

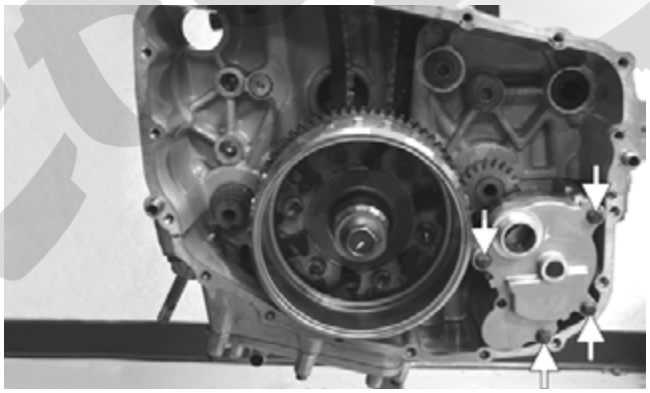
11. Remove the eighteen cap screws securing the magneto cover to the engine; then remove the cover and account for the starter torque limiter (A), spacer (B), idler gear (D), inner spacer (C), and outer spacer (E).



742-002A

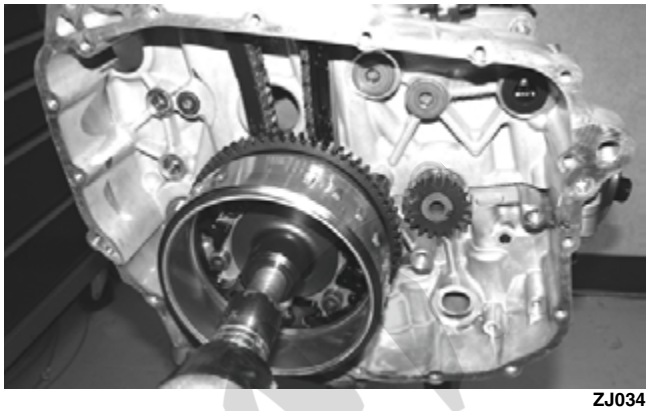
■NOTE: Care must be taken when removing the magneto cover not to tip the cover downward. Tipping the cover downward will allow the starter torque limiter/ idler gear assembly to slide out of the cover.

12. Remove the four cap screws securing the oil scavenge pump to the engine; then remove the pump and account for the remaining oil seal.



ZJ033A

13. To remove the flywheel, first remove the cap screw and washer securing the flywheel to the crankshaft; then using Flywheel Puller, remove the flywheel.



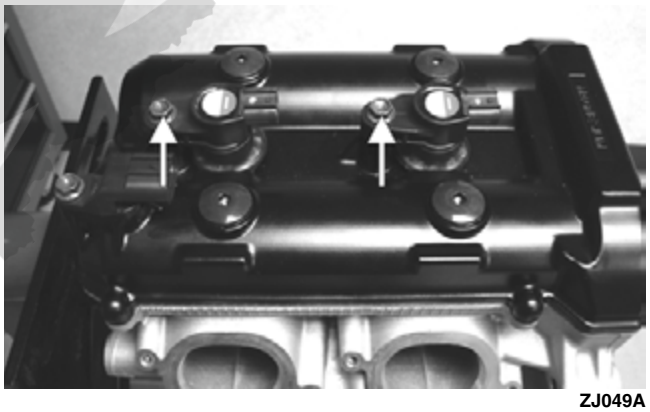
ZJ034

14. Remove the flywheel key from the crankshaft; then remove the starter gear.



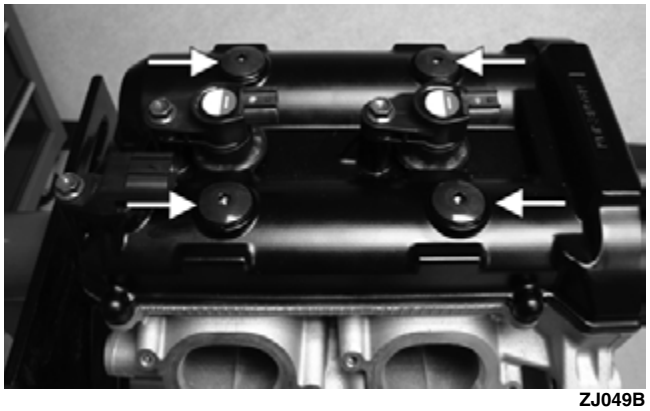
ZJ036A

15. On the non-turbo models, remove the cap screws securing the two cylinder ignition coils to the cylinder head cover and remove the coils.



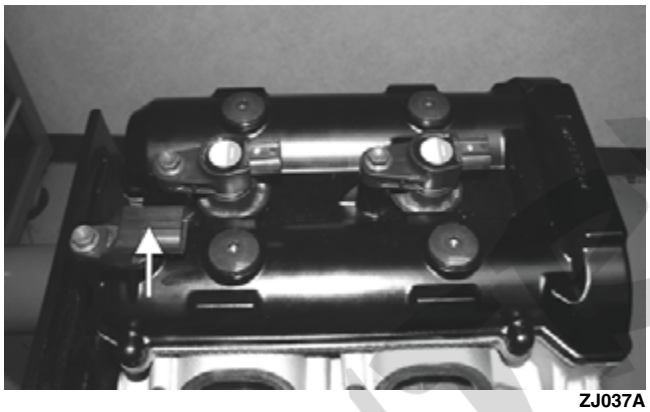
ZJ049A

16. Remove the four cap screws securing the cylinder head cover to the cylinder head; then remove the cover.



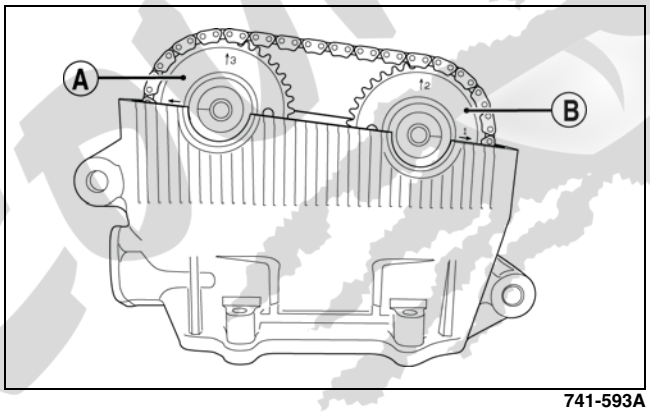
ZJ049B

■**NOTE: If cleaning or replacing the cylinder head cover is necessary, the cam position sensor must be removed.**



ZJ037A

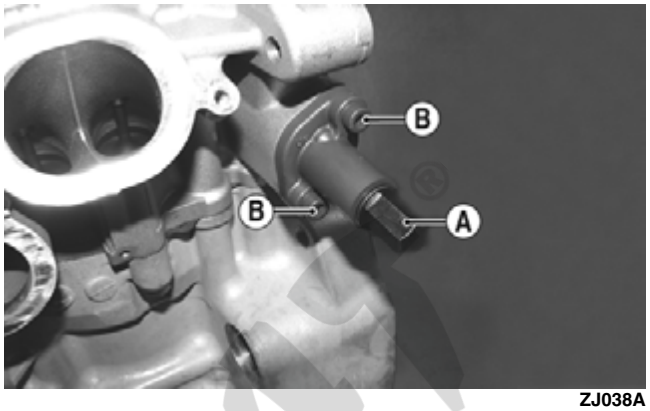
17. Obtain top-dead-center by rotating the crankshaft until the arrows on the intake camshaft face (A) are in the 12 o'clock and 9 o'clock positions and the arrows on the exhaust camshaft face (B) are in the 12 o'clock and 3 o'clock positions.



741-593A

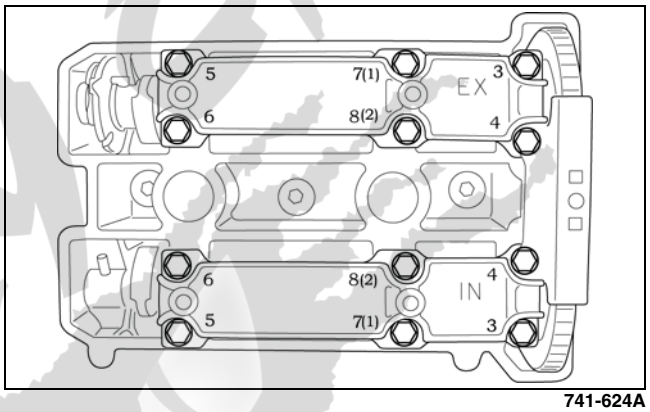
■**NOTE: At this point if the technician's objective is to service the valves, see Servicing Components - Valves in this sub-section.**

18. Loosen but do not remove the tension adjuster bolt and washer (A) from the chain tensioner assembly. Remove the two cap screws (B) securing the assembly to the engine. Remove the assembly.



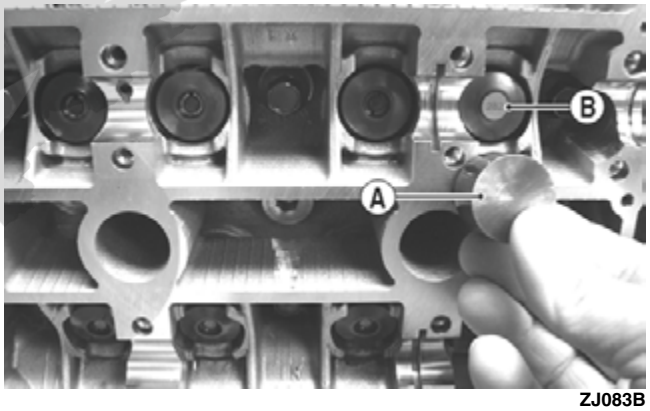
ZJ038A

19. Remove the cap screws securing the camshaft covers to the cylinder head; then remove the covers. Remove both camshafts. Account for the dowel pins.



741-624A

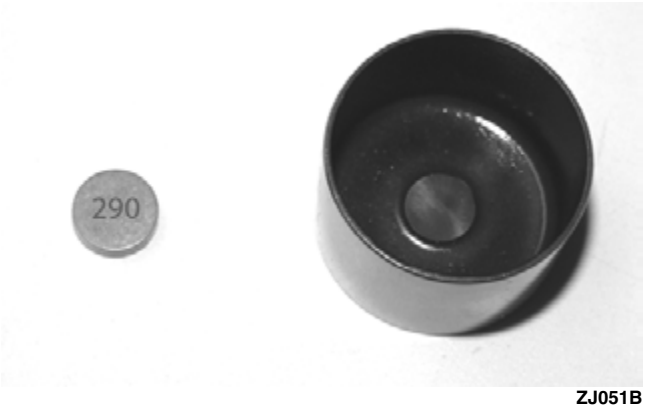
20. Using a magnet or needle-nose pliers, carefully remove the tappets (A) from the cylinder head and account for the shims (B).



ZJ083B

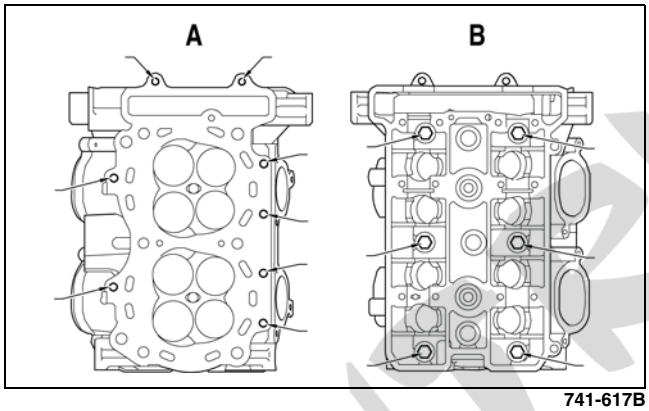
CAUTION

When removing the tappets, note the location of the tappet, the valve from which the tappet was removed, and the shim number of the tappet or severe engine damage may occur.



ZJ051B

21. Remove the six nuts and two cap screws (A) from outside the cylinder head; then remove the six cap screws (B) from inside the cylinder head. Remove the head and account the gasket and two dowel pins.



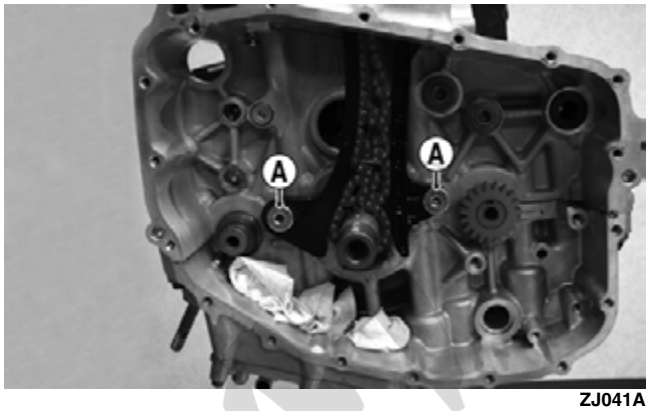
741-617B

■NOTE: If removing the oil cooler, remove the union bolt securing the cooler to the engine; then remove the oil cooler and account for a washer and an O-ring.



ZJ040

22. Remove the Allen-head cap screws (A) securing the front and back timing chain tension guides to the engine; then remove the guides and account for the timing chain and the washers located between the tension guides and engine.



ZJ041A

23. Remove the fourteen cap screws securing the oil pan to the engine; then remove the oil pan and note the location of the different-length cap screws for assembling purposes.

24. Tip the engine upside down; then remove the 28 cap screws securing the upper and lower crankcase halves. Using a soft hammer, gently tap around the bottom half until it separates.

■NOTE: Note the location of the different-length cap screws for assembling purposes.

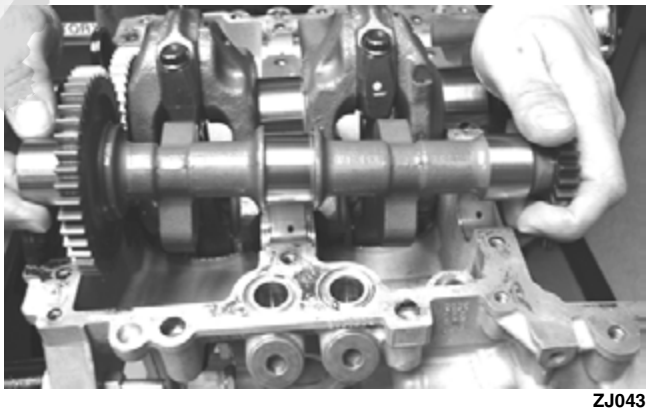
CAUTION

DO NOT drive any tool between halves to separate the crankcase. Damage to the sealing surfaces will result.

25. After separating the crankcase halves, account for two O-rings and three dowel pins.

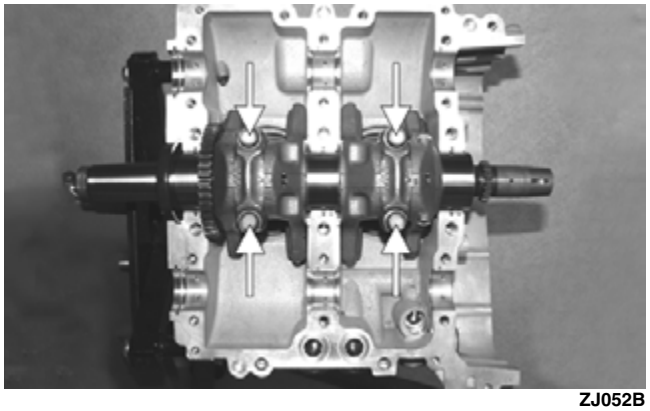
26. For easier access to components, rotate the crankshaft to the bottom-dead-center position (connecting rod caps straight up).

27. Remove the front and rear crank balancers from the engine and account for the two end seals.



ZJ043

28. On each connecting rod, remove the two connecting rod cap screws; then remove the connecting rod cap. Account for the two connecting rod bearings.

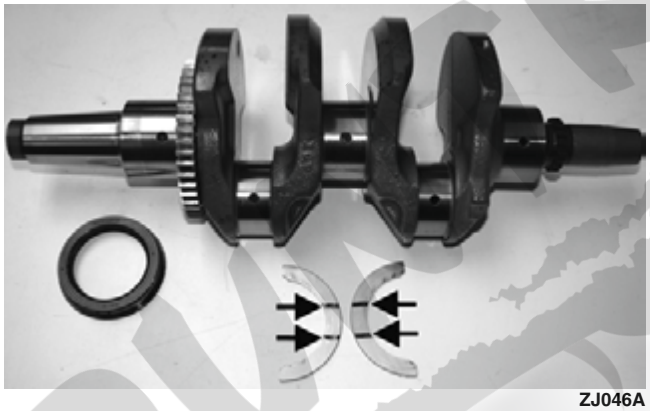


ZJ052B

■**NOTE: Because the connecting rods and connecting rod caps are unique, note the I.D. marks and keep all associated parts together for assembling purposes.**

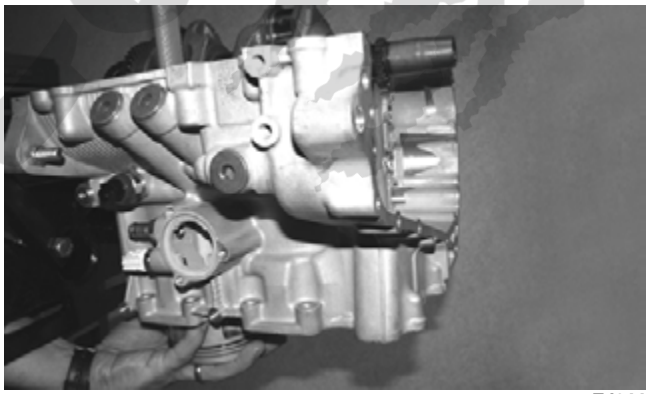
29. Carefully remove the crankshaft from the engine; then account for the PTO-side end seal, the two thrust bearings, and three bearing halves.

■**NOTE: For assembling purposes, note the oil grooves of the thrust bearings face the counterweights of the crankshaft. Mark the MAG-side bearing for assembly purposes.**



ZJ046A

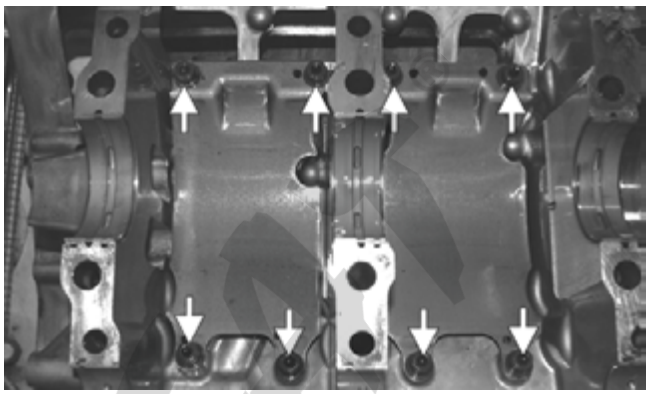
30. Reinstall the connecting rod caps with cap screws into the rods; then using a soft hammer, gently tap the piston assembly out the top side of the cylinder.



ZJ044

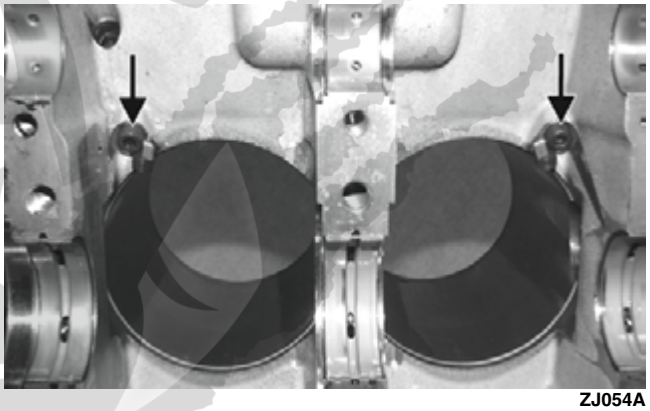
CAUTION
Pistons can be removed from the top side of the cylinder only.

31. Remove the oil separator plates for the lower crankcase half and account for the eight Allen-head cap screws.

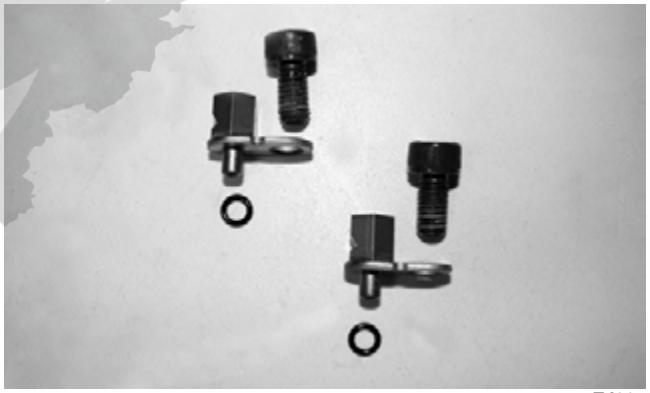


ZJ047A

32. Remove the Allen-head cap screws securing the piston cooling jets to the upper crankcase half; then remove the jets and account for the O-rings.

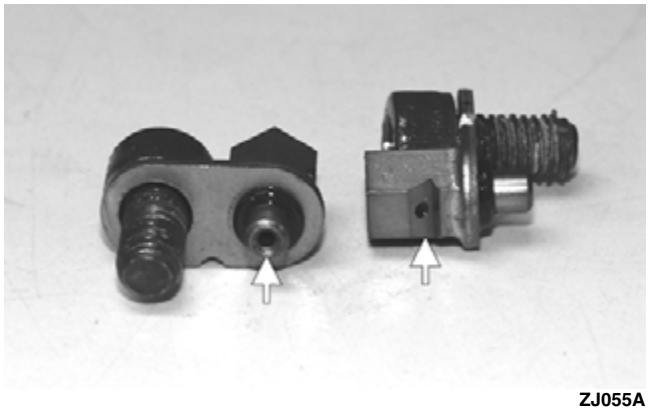


ZJ054A



ZJ035

■**NOTE: For assembling purposes, ensure the orifices in the piston cooling jets are cleared of any dirt and/or debris.**



ZJ055A

Servicing Components

Thoroughly clean all non-electrical components in parts-cleaning solvent; then remove any carbon buildup from the cylinder head and piston dome.

Visually inspect all engine components for wear or damage.

VALVES

CAUTION

If any valve is discolored or pitted or if the seating surface is worn, the valve must be replaced. Do not attempt to grind a valve or severe engine damage may occur.

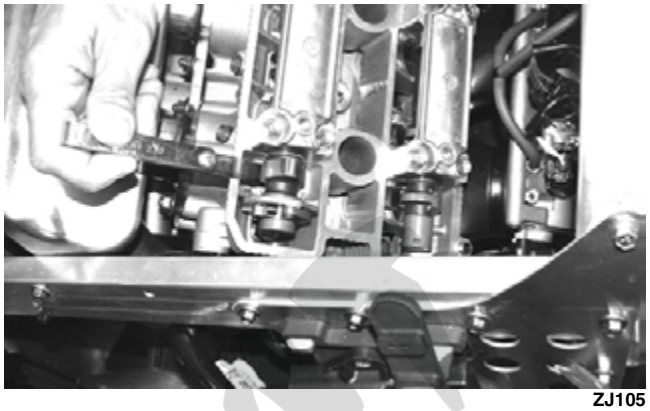
If valves, valve guides, or valve seats require servicing or replacement, Arctic Cat recommends the components be taken to a qualified machine shop for servicing.

1. Install the drive clutch; then using Drive Clutch Spanner Wrench, rotate the engine two full revolutions.

■NOTE: Rotating the engine two full revolutions will ensure that any oil trapped in the tappet/shim is purged to maintain an accurate clearance reading.

2. Rotate the engine until the camshaft lobe of the valve being measured is directly away from the tappet.
3. Using an appropriate thickness gauge, measure and record the intake and exhaust valve clearance of the cylinder that is on the compression stroke; then rotate the engine 360° and measure and record the valve clearance of the other cylinder. Valve clearance must be within specifications.

Valve Clearance (Cold)	
15°-25° C (59°-77° F)	Intake: 0.0039-0.0078 in.
	Exhaust: 0.0078-0.0118 in. (Non-Turbo)
	Exhaust: 0.0118-0.0157 in. (Turbo)



ZJ105

■NOTE: When measuring valve/tappet clearance on the exhaust valves, rotate the engine until the decompression pin of the valve/tappet is activated; then using a flat-nosed punch, carefully tap the decompression arm until the decompression pin releases the tappet.



IO051A



IO052B

■NOTE: At this point if valve/tappet clearances are within specifications, servicing is complete. If any valve/tappet clearance is not within specifications, complete steps 18-20 of Disassembling before proceeding to step 4.

4. To select the correct replacement shim for an out-of-specification clearance, note the three-digit number on the surface of the existing shim; then refer to the appropriate Tappet Shim Selection Table (Exhaust or Intake) in this sub-section and use this procedure:

   A. Find the Measured Tappet Clearance (from step 3) in the left-side vertical column of the table.

TAPPET SHIM SELECTION TABLE (EXHAUST)
TAPPET SHIM SET (p/n 3402-931)

MEASURED TAPPET CLEARANCE (mm) \ SUFFIX NO. / PRESENT SHIM SIZE (mm)	230 / 2.30	235 / 2.35	240 / 2.40	245 / 2.45	250 / 2.50	255 / 2.55	260 / 2.60	265 / 2.65	270 / 2.70	275 / 2.75	280 / 2.80	285 / 2.85	290 / 2.90	295 / 2.95	300 / 3.00	305 / 3.05	310 / 3.10	315 / 3.15	320 / 3.20	325 / 3.25	330 / 3.30	335 / 3.35	340 / 3.40	345 / 3.45	350 / 3.50
0.00–0.04					2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30
0.05–0.09				2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35
0.10–0.14			2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
0.15–0.19		2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
0.20–0.30	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED																								
0.31–0.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50	
0.36–0.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50		
0.41–0.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50			
0.46–0.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50				
0.51–0.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50					
0.56–0.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50						
0.61–0.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50							
0.66–0.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50								
0.71–0.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50									
0.76–0.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50										
0.81–0.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50											
0.86–0.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50												
0.91–0.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50													
0.96–1.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50														
1.01–1.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50															
1.06–1.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																
1.11–1.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																	
1.16–1.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																		
1.21–1.25	3.30	3.35	3.40	3.45	3.50	3.50																			
1.26–1.30	3.35	3.40	3.45	3.50	3.50																				
1.31–1.35	3.40	3.45	3.50	3.50																					
1.36–1.40	3.45	3.50	3.50																						
1.41–1.45	3.50	3.50																							
1.46–1.50	3.50																								

How to use this chart:

I. Measure tappet clearance when the engine is cold.
II. Measure present shim size.
III. Match clearance in vertical column with present shim size in horizontal column.

Example:

Tappet clearance is	0.38 mm
Present shim size	2.90 mm
Shim size to be used	3.05 mm

TAPPET SHIM SELECTION TABLE (INTAKE)
TAPPET SHIM SET (p/n 3402-931)

MEASURED TAPPET CLEARANCE (mm) \ SUFFIX NO. / PRESENT SHIM SIZE (mm)	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350
	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50
0.00–0.04			2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
0.05–0.09		2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
0.10–0.20	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED																								
0.21–0.25	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50	
0.26–0.30	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50		
0.31–0.35	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50			
0.36–0.40	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50				
0.41–0.45	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50					
0.46–0.50	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50						
0.51–0.55	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50							
0.56–0.60	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50								
0.61–0.65	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50									
0.66–0.70	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50										
0.71–0.75	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50											
0.76–0.80	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50												
0.81–0.85	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50													
0.86–0.90	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50														
0.91–0.95	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50															
0.96–1.00	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																
1.01–1.05	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																	
1.06–1.10	3.25	3.30	3.35	3.40	3.45	3.50	3.50																		
1.11–1.15	3.30	3.35	3.40	3.45	3.50	3.50																			
1.16–1.20	3.35	3.40	3.45	3.50	3.50																				
1.21–1.25	3.40	3.45	3.50	3.50																					
1.26–1.30	3.45	3.50	3.50																						
1.31–1.35	3.50	3.50																							
1.36–1.40	3.50																								

How to use this chart:

I. Measure tappet clearance when the engine is cold.
II. Measure present shim size.
III. Match clearance in vertical column with present shim size in horizontal column.

Example:

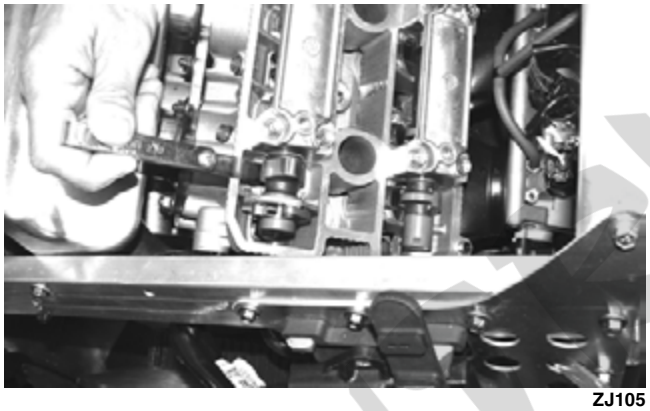
Tappet clearance is	0.23 mm
Present shim size	2.70 mm
Shim size to be used	2.80 mm

B. Find the Present Shim Size (three-digit-number) at the top-side horizontal column of the table.

C. Match the clearance in the vertical column with the present shim size to obtain the recommended replacement shim.

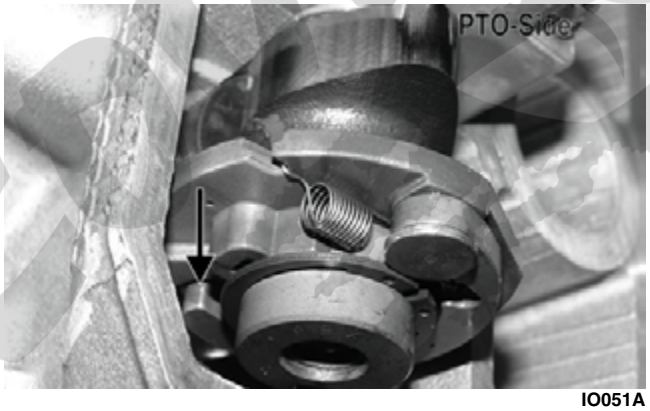
■NOTE: At this point, complete steps 33-40 of Assembling in this sub-section before proceeding to step 5.

5. Rotate the engine until the camshaft lobe of the valve being measured is directly away from the tappet.
6. With the engine at top-dead-center, measure the valve/tappet clearance of the cylinder that is on the compression stroke; then rotate the engine another 360° and measure the clearances of the other cylinder.

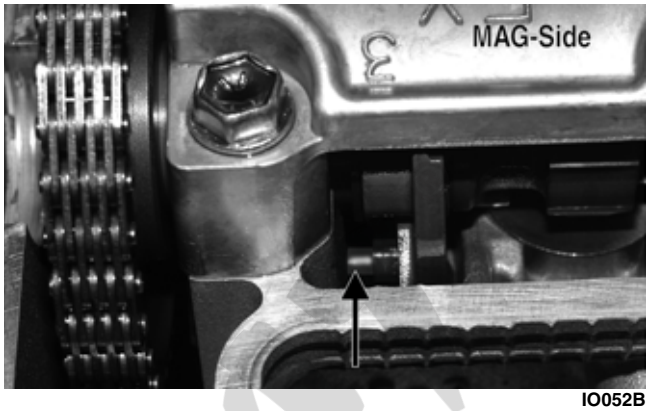


ZJ105

■NOTE: When measuring valve/tappet clearance on the exhaust valves, rotate the engine until the decompression pin of the valve/tappet is activated; then using a screwdriver, carefully tap the decompression arm until the decompression pin releases the tappet.



IO051A



IO052B

7. After verifying proper valve/tappet clearance, install the timing inspection plug to the magneto case and tighten to 22 ft-lb.

■NOTE: At this time, remove the items used to close off the intake ports of the cylinder head.

PISTON ASSEMBLY

■NOTE: Whenever a piston, rings, or pins are out of tolerance, they must be replaced.

Cleaning/Inspecting Piston

1. Using a non-metallic carbon removal tool, remove any carbon buildup from the dome of the piston.
2. Inspect the piston for cracks in the piston pin, dome, and skirt areas.
3. Inspect the piston for seizure marks or scuffing.

■NOTE: If seizure marks or scuffing is detected, the piston must be replaced.

4. Inspect the perimeter of each piston for signs of excessive "blowby." Excessive "blowby" indicates worn piston rings or an out-of-round cylinder.

Removing Piston Rings

1. Starting with the top ring, slide one end of the ring out of the ring-groove.
2. Remove each ring by working it toward the dome of the piston while rotating it out of the groove.

■NOTE: If the existing rings will not be replaced with new ones, note the location of each ring for proper installation. When installing new rings, install as a complete set only.

Cleaning/Inspecting Piston Ring Grooves

Using a ring groove cleaning tool, clean carbon from the ring grooves. Be sure to position the ring with the letter side up.

CAUTION
Improper cleaning of the ring grooves by the use of the wrong type of ring groove cleaner will result in severe damage to the piston.

Measuring Piston-Ring End Gap (Installed)

1. Place each piston ring in the wear portion of the cylinder. Use the piston to position each ring squarely in the cylinder.

■NOTE: Remove any carbon; then clean the top of the cylinder bore before inserting the piston rings.

2. Using a feeler gauge, measure each piston-ring end gap. Acceptable ring end gap must be within the following specifications.

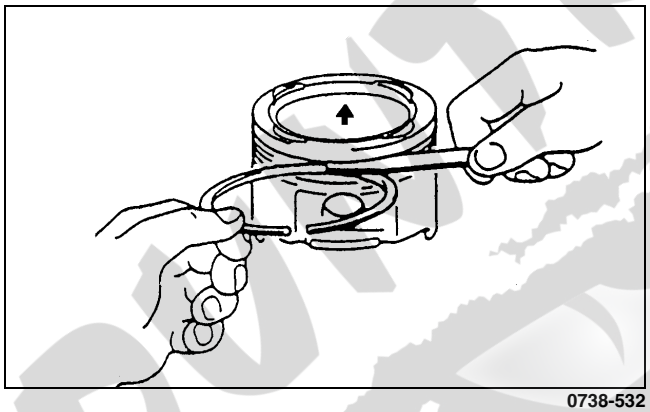
1st Ring	0.0059-0.0138 in.
2nd Ring	0.0118-0.0177 in.
Oil Rings	0.0078-0.0275 in.

Piston Ring/Groove Clearance

■NOTE: Before checking, piston grooves must be clean, dry, and free of carbon.

Fit new piston ring into piston groove and measure clearance between ring and ringland by using feeler gauge. Measurement must be within the following specifications. If clearance is out of specification, replace piston.

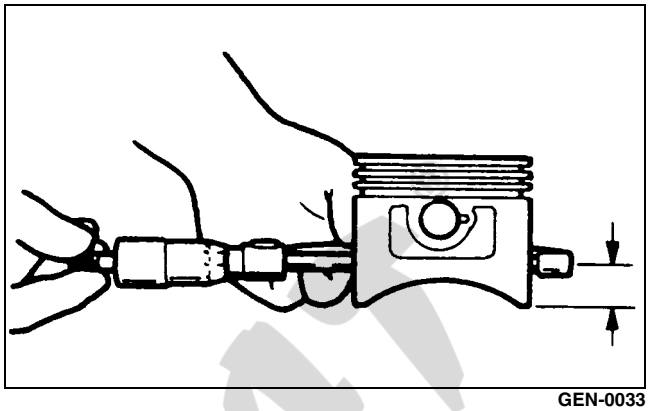
1st Ring	0.0008-0.0035 in.
2nd Ring	0.0008-0.0024 in.
Oil Rings	0.0024-0.0059 in.



0738-532

Measuring Piston Skirt/Cylinder Clearance

1. Measure the cylinder front to back in six places using a cylinder bore gauge. Record the largest number.
2. Measure the diameter of the corresponding piston at a point 10 mm from the piston skirt edge at a right angle to the piston-pin bore. Piston diameter must be within 3.8568-3.8574 in. for the non-turbo and 3.8574-3.8580 in. for the turbo. If not, the piston must be replaced. Subtract this measurement from the measurement in step 1. Measurement must be within 0.0011-0.0016 in. for the non-turbo and 0.0006-0.0010 in. for the turbo. If the determined wear exceeds the limit indicated and the piston is within tolerance, the cylinder block must be replaced.

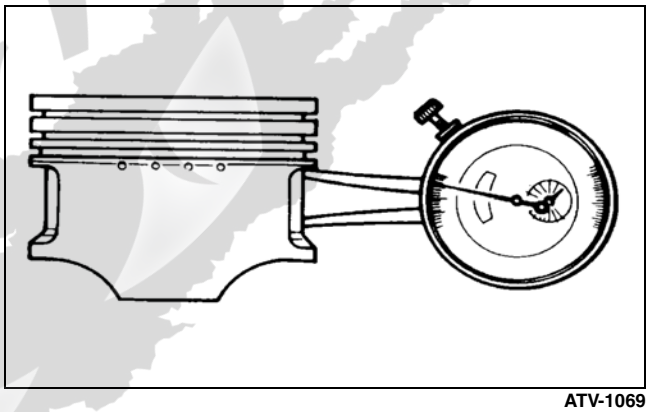


GEN-0033

Measuring Piston Pin Bore Diameter

■NOTE: It may be necessary to use Piston Pin Puller to remove the piston pins.

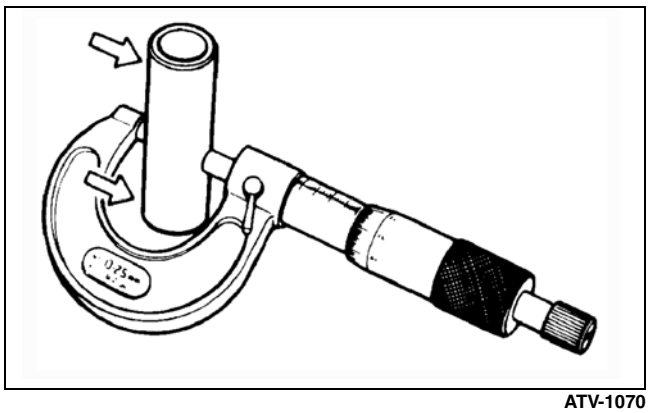
1. Insert an inside dial indicator into the piston-pin bore. Take two measurements to ensure accuracy.
2. Piston pin bore must be within 0.8662-0.8664 in. for the non-turbo and 0.9449-0.9451 in. for the turbo.



ATV-1069

Measuring Piston Pin Diameter

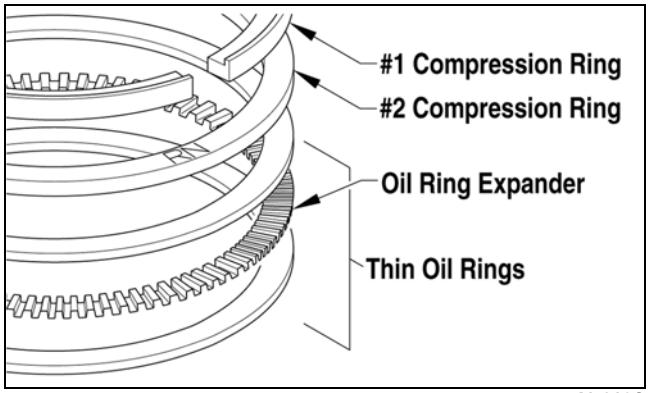
Measure the piston pin diameter at each end and in the center. Measurement must be within 0.8658-0.8661 in. for the non-turbo and 0.9447-0.9449 in. for the turbo. If measurement is not within specifications, the piston pin must be replaced.



ATV-1070

Installing Piston Rings

1. Install a thin oil ring, oil ring expander, and thin oil ring in the bottom groove of the piston. Stagger the end gaps of the upper and lower thin oil rings until they are on directly opposite sides of the piston.



741-619A

2. Install the #2 compression ring so the letters on the top surface of the ring face the dome of the piston.
3. Install the #1 compression L-ring into the top groove with the face of the ring directed upward.
4. Rotate the rings until the ring end gaps are 120° from one another.

CAUTION

Incorrect installation of the piston rings will result in engine damage.

MEASURING CONNECTING ROD SMALL END BORE INSIDE DIAMETER

1. Using a small bore gauge, measure the connecting rod small end bore inside diameter.
2. Measurement must be within 0.866-0.867 in. for the non-turbo and 0.945-0.946 in. for the turbo.

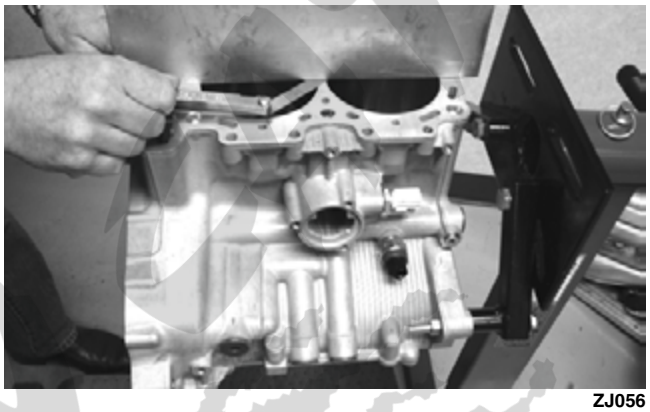


ZJ057

■NOTE: Check piston pin, connecting rod small end bore, and piston bore for wear or damage paying particular attention to condition of small end bore bushing. If pin, connecting rod small end bore, or piston bore is badly worn or damaged, replace pin, connecting rod, or piston.

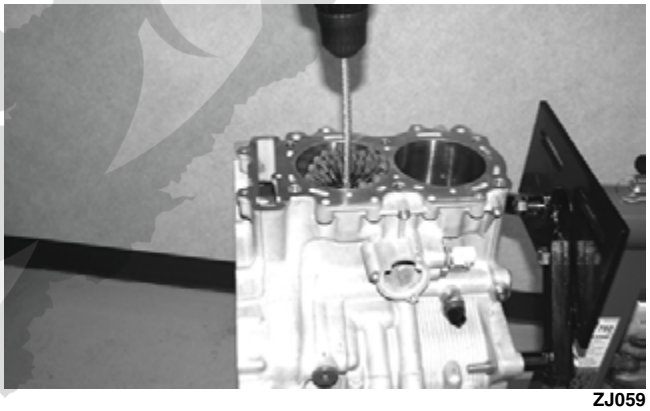
Cleaning/Inspecting/Measuring Cylinder Block

1. Wash the cylinder block in parts-cleaning solvent.
2. Check the head gasket surface of the cylinder for distortion.
3. Using a straightedge and feeler gauge, check surface at a total of 6 locations. If distortion limit exceeds 0.002 in., replacement of the block will be necessary.



ZJ056

4. Inspect the cylinder bore for minor scoring or scuffing.
5. Hone the cylinder to produce a 45° crosshatch using the appropriate Ball Hone and honing oil.



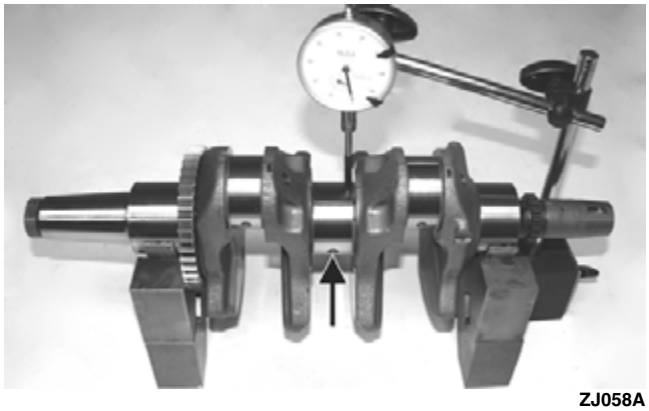
ZJ059

6. Wash the cylinder block thoroughly with hot soapy water; then rinse with hot water.
7. Blow dry the cylinder block with compressed air and immediately apply oil to all of the cylinder surfaces.

CRANKSHAFT RUNOUT

1. Support the crankshaft using a set of V Blocks; use a dial indicator to read crankshaft runout.

■NOTE: The contact point of the dial indicator should be on either side of the oil port hole of the center crankshaft journal and to the outside of the oil port hole on the MAG and PTO end of the crankshaft.

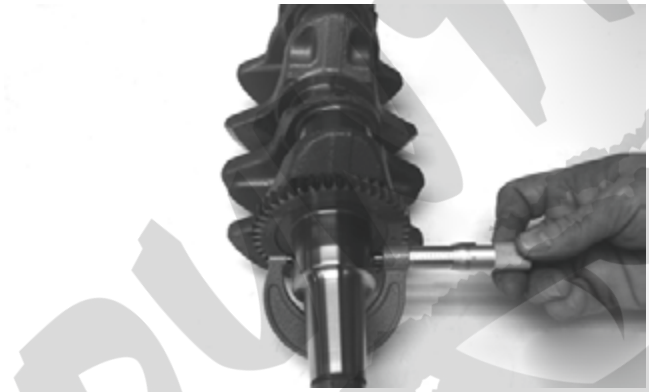


ZJ058A

2. Rotate the crankshaft slowly.
3. The reading must be 0.002 in. or crankshaft repairing/replacing will be necessary.

MEASURING CRANKSHAFT MAIN/ ROD JOURNALS (Bearing Surfaces)

1. Using a micrometer, measure each main and connecting rod bearing journal from along its length and 90° from the first measurement. Measurement must be within 0.0012 in.
2. If any journal is badly damaged or has wear that is not within specifications, the crankshaft must be replaced.



ZJ062

MAIN BEARINGS

Check the main bearings for signs of pitting, scratches, wear, or damage. If any of these conditions are found, the bearings must be replaced.

CAUTION

Always replace the bearings as a set; never replace one side only or severe engine damage will occur

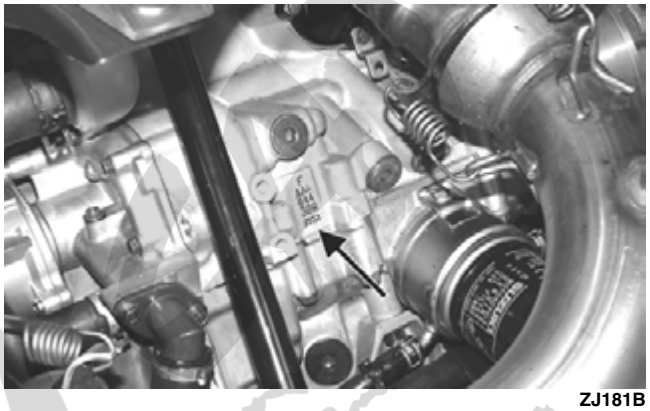
CONNECTING ROD/MAIN BEARING SELECTION

■NOTE: This information is needed only if the crankshaft or the engine cases have been replaced or if the connecting rod and main bearings are out of specifications.

Bearing Selection Charts

To select the correct main or balancer shaft bearing insert, read the letter stamped for the bearing location on the crankcase; then read the letter stamped on the crankshaft or balancer shaft corresponding to the same bearing location.

■NOTE: The corresponding letters on the upper engine case are located to the upper-left of the oil filter.



ZJ181B

■NOTE: Always correspond the letters of the engine case with the case right-side-up and from left to right (MAG to PTO). Each row of letters is to be referred to the following:

Top Row	Front Balancer Shaft
Center Row	Crankshaft
Bottom Row	Rear Balancer Shaft

Crankcase Stamping

Right Front Balancer (A or B)	Center Front Balancer (A or B)	Left Front Balancer (A or B)
Right Main (A or B)	Center Main (A or B)	Left Main (A or B)
Right Rear Balancer (A or B)	Center Rear Balancer (A or B)	Left Rear Balancer (A or B)

Crankshaft Stamping

Left Rod Journal (1, 2, or 3)		Right Rod Journal (1, 2, or 3)
Left Main Journal (A or B)	Center Main Journal (A or B)	Right Main Journal (A or B)

Balancer Shaft Journal Stamping

L	Left Journal (A or B)	Center Journal (A or B)	Right Journal (A or B)	R

Refer to the proper chart and select the correct bearing.

Main Bearing Selection

Crankcase Mark	Crankshaft Mark	
	A	B
A	Green p/n 3007-121	Black p/n 3007-122
B	Black p/n 3007-122	Brown p/n 3007-123

Balancer Shaft Bearing Selection

Crankcase Mark	Balancer Mark	
	A	B
A	Green p/n 3007-135	Black p/n 3007-136
B	Black p/n 3007-136	Brown p/n 3007-137

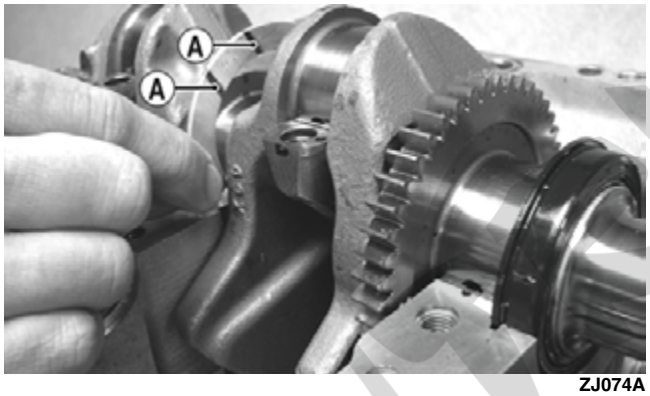
To select the correct rod bearing insert, read the number stamped on the crankshaft counterweight; then read the number stamped on the connecting rod cap. Refer to the following chart to select the correct bearing.

Connecting Rod Bearing Selection

Rod	Crankshaft		
	1	2	3
1	Green p/n 3007-109	Black p/n 3007-110	Brown p/n 3007-111
2	Black p/n 3007-110	Brown p/n 3007-111	Yellow p/n 3007-112

To select the correct thrust bearing for proper crankshaft end clearance, use the following procedure.

1. Install the main bearing upper half inserts in the crankcase; then place the crankshaft into position.
2. Select a thrust bearing (blue or green) and install making sure the oil relief (A) is directed toward the crankshaft.



ZJ074A

■NOTE: Always install the correct thrust bearing (from above) on MAG-side; then use proper bearing from the following chart on the PTO-side of the main bearing journal to obtain clearance.

Thrust Bearing Selection

Feeler Gauge Reading	Color
0.100-0.102 in.	White
0.099-0.100 in.	Yellow
0.098-0.099 in.	Green
0.097-0.098 in.	Blue
0.096-0.097 in.	Black
0.095-0.096 in.	Red

3. Using a feeler gauge, measure between the crankcase and crankshaft on the side opposite the thrust bearing.


ZJ111A

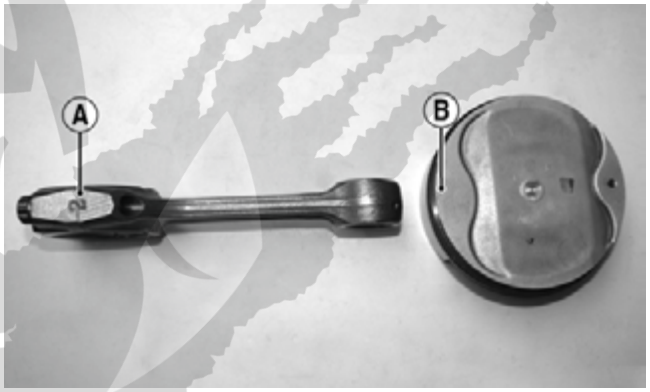
4. Use the reading obtained to select the correct thrust bearing from the chart.
5. Install the selected thrust bearing; then using a feeler gauge, check that the clearance is as specified.

Assembling

■NOTE: Arctic Cat recommends that new gaskets, seals, and O-rings be installed whenever assembling the engine.

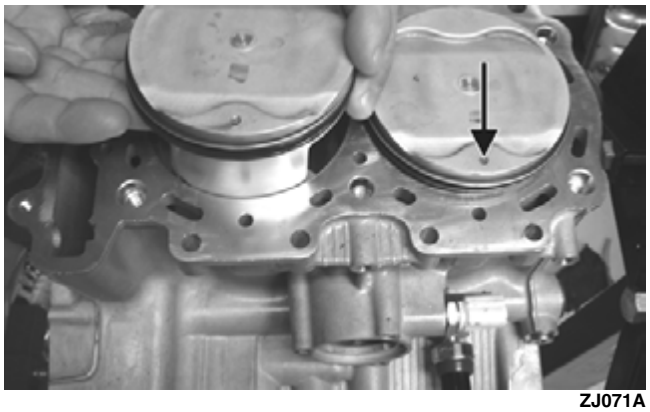
■NOTE: For assembling purposes, use oil-dissolvable molybdenum disulfide grease as engine-assembly grease.

1. Install one piston pin circlip into one of the pistons making sure the open end is directed either up or down. Place the connecting rod in position making sure the identification number on the rod cap (A) is aligned with the intake side of the piston (B).



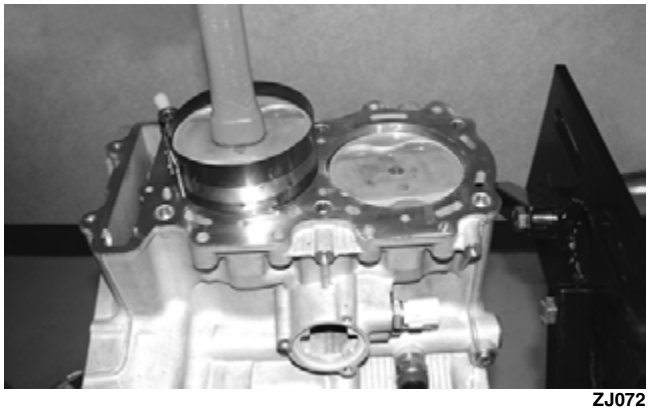
ZJ070A

2. Install the piston pin and piston pin circlip making sure the open end is directed either up or down. Repeat for the other piston/connecting rod assembly.
3. With the piston rings installed, lubricate each piston and cylinder with engine oil; then with the dots on the top of the pistons directed towards the exhaust side of the engine, install the piston assemblies into the cylinder.


ZJ071A

■NOTE: Prior to installing the pistons, make sure the oil ring end gaps are on directly opposite sides of the piston, and the compression ring end gaps are 90° from one another.

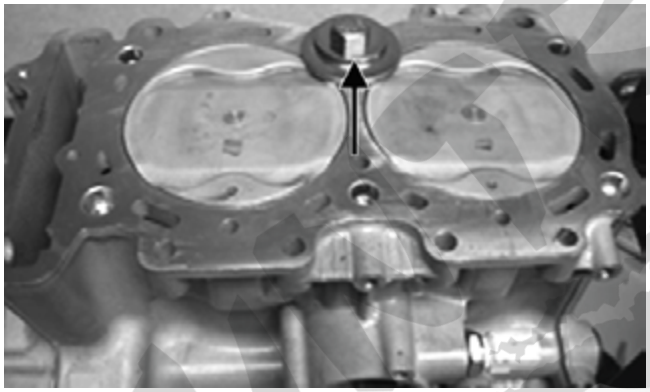
4. Using Ring Compressor and a soft hammer/hammer handle, carefully drive each piston into the cylinder until the top of the piston is flush with the engine case.



ZJ072

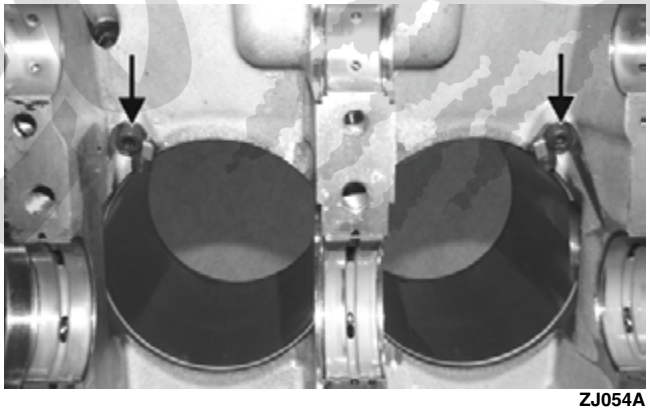
5. Rotate the engine to the upside down position for installing the crankshaft and counterbalancers.

■NOTE: Install a cap screw and large washer to the cylinder head cap screw hole between pistons to avoid any chance of the pistons sliding out of the cylinder.



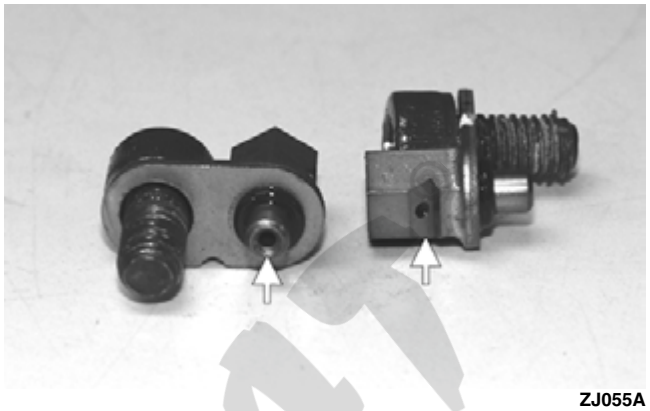
ZJ073A

6. With new O-ring, install the piston cooling jets with Allen-head cap screws; then tighten to 84 in.-lb.



ZJ054A

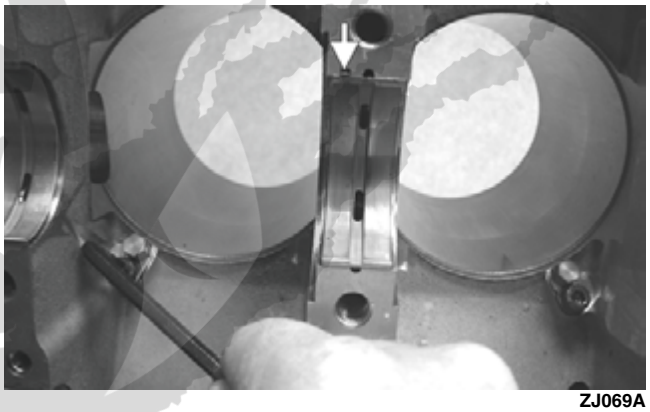
■NOTE: Prior to installing the jets, make sure the orifices are clear of any debris or contaminants.



ZJ055A

7. With the proper bearings selected, install the half-bearings into the upper engine case; then lubricate the bearing faces liberally with engine-assembling grease taking care not to get any grease between the engine case and bearing.

■NOTE: Make sure the tabs of the bearings are properly seated to the notches in the upper engine case.



ZJ069A

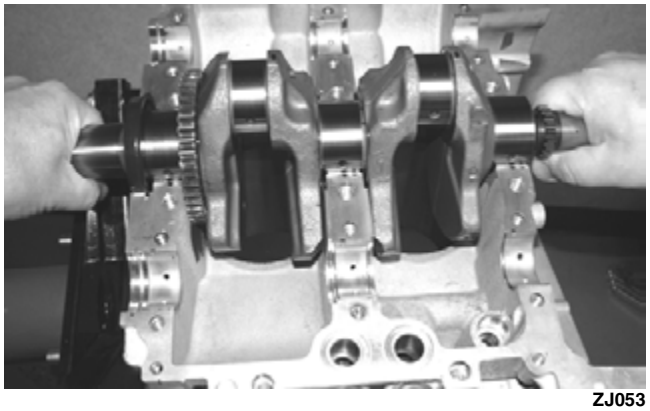
CAUTION

Prior to lubricating the bearings and journals, make sure all surfaces are cleaned thoroughly and dried with compressed air to avoid contaminants between the bearings and shaft surface.

■NOTE: At this point, remove the connecting rod caps.

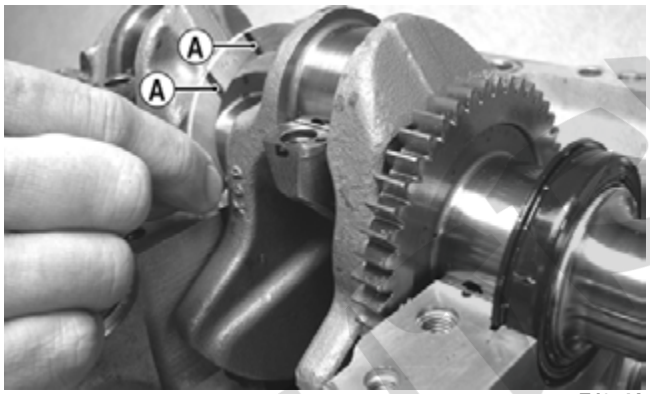
8. Lubricate the lips of the crankshaft seal with grease and install the crankshaft seal over the PTO end of the crankshaft with the spring side of the seal directed toward the crankshaft; then install the crankshaft.

■NOTE: Position the crankshaft at bottom-dead-center for assembling purposes.



ZJ053

9. Lubricate the thrust bearings with engine oil; then with the grooved side of the bearings (A) facing outward towards the crankshaft counterweights, install the first bearing and roll it into place. Push the crankshaft towards the installed bearing and install the remaining bearing.



ZJ074A

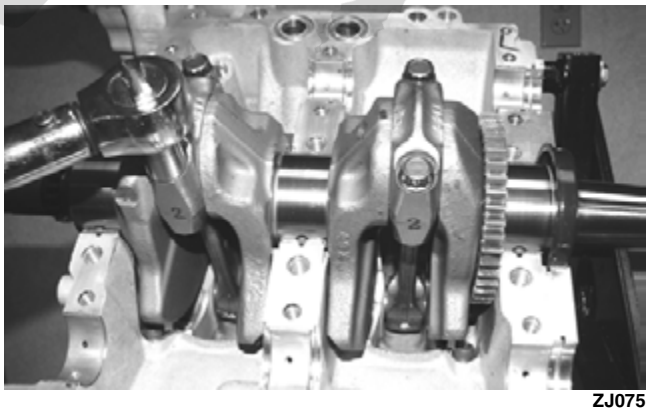
CAUTION

Failure to install the crankshaft thrust bearings properly could result in severe engine damage.

10. Install the bearing halves to the connecting rods and caps; then lubricate the bearing surfaces and connecting rod journals of the crankshaft.

11. Seat the connecting rods to the crankshaft; then install the rod caps and cap screws and tighten only until snug.

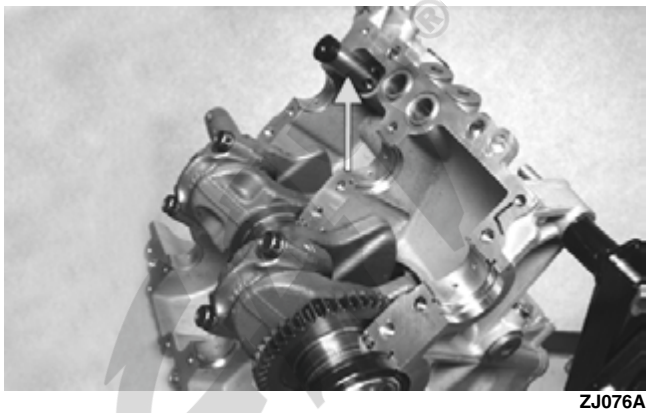
12. Alternately, tighten each of the connecting rod cap screws evenly to 25 ft-lb; then in turn tighten each cap screw an additional 90° turn to obtain the final recommended torque value.



ZJ075

■NOTE: Rotate the crankshaft one revolution to verify free movement.

13. With the O-ring lubricated with engine oil, install the oil-relief valve.



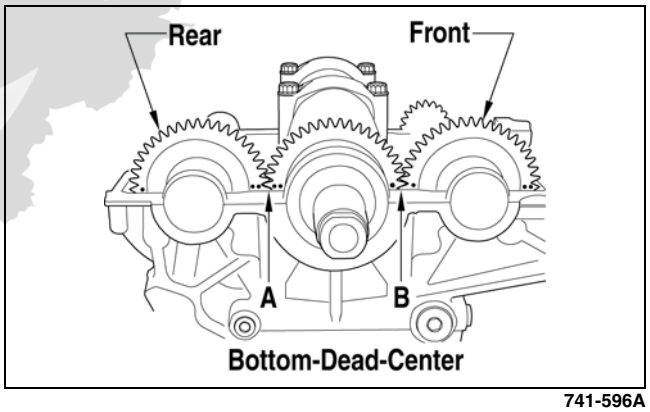
ZJ076A

■NOTE: Prior to installing the oil-relief valve, make sure the valve is free and clear of any contaminants.

14. With proper bearings selected, install the counterbalancer bearing halves into the upper engine case; then apply a light film of engine-assembly grease to the bearing surfaces.

15. Rotate the crankshaft to the bottom-dead-center position; then install the rear counterbalancer with the two dots (A) on the face of the crankshaft and balancer gears directly in line with each other at the sealing surface of the engine case.

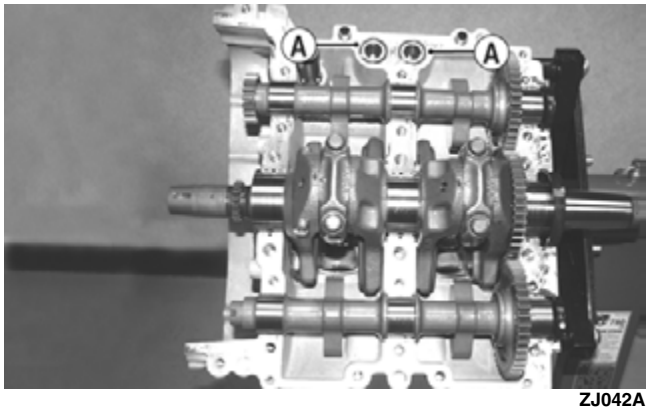
■NOTE: The front counterbalancer has the oil pump drive gear.



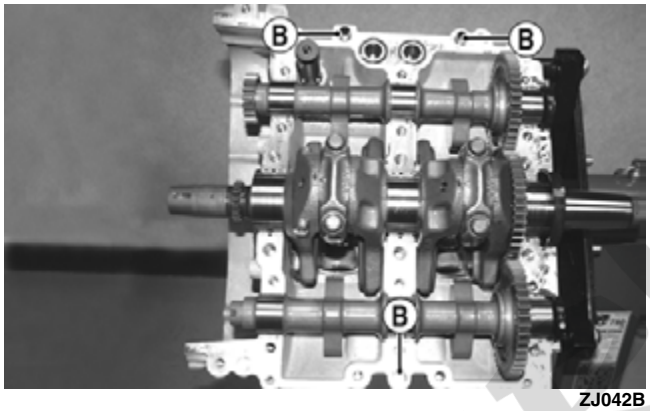
741-596A

16. With the crankshaft at bottom-dead-center, install the front counterbalancer with the single dot (B) on the face of the crankshaft and balancer gears directly in line with each other at the sealing surface of the engine case.

17. Place the oil-passage O-rings (A) into place in the upper engine case; then install the three alignment pins (B) into the case.

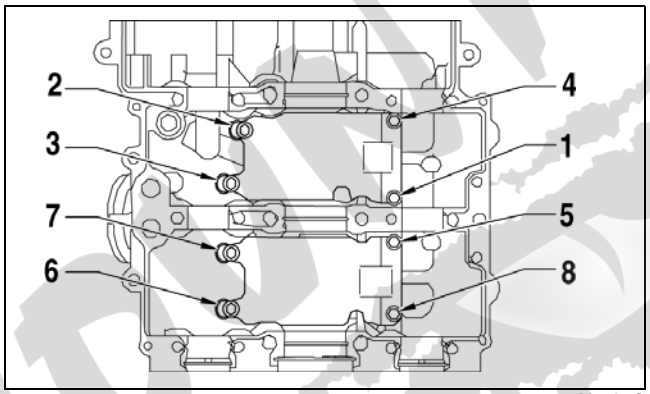


ZJ042A



ZJ042B

18. Secure the separator plates to the lower crankcase using the cap screws (coated with blue loctite #243); then using the pattern shown, tighten to 84 in.-lb.



741-737A

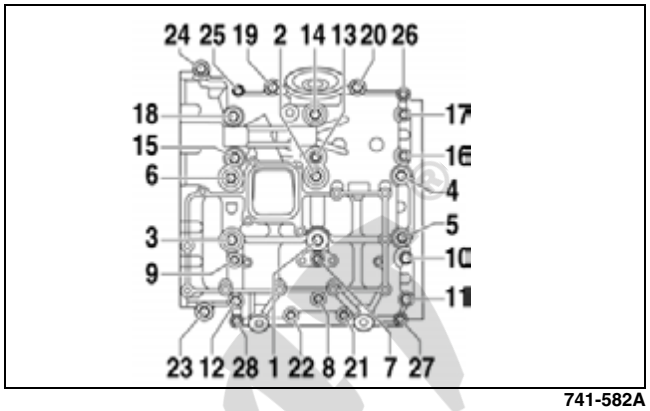
19. Install the crankshaft and counterbalancer bearing halves to the lower crankcase; then apply a light film of engine-assembly grease to the bearing surfaces.

■NOTE: Make sure the bearings are properly seated to the grooves of the crankcase.

20. Using Three Bond Sealant, apply a light film of sealant onto the sealing surfaces of the upper and lower engine cases.

21. Install the lower crankcase half to the upper engine case; then verify the cases are properly seated together.

22. Install the 10 mm, 8 mm, and 6 mm cap screws into the proper locations in the crankcase; then with the torque pattern shown as numbered on the case, tighten the cap screws only until snug.



741-582A

23. For initial tightening of the engine case cap screws, use this sequence:

    A. Cap screws 1-6 (10 mm) to 13 ft-lb.

    B. Cap screws 7-24 (8 mm) to 120 in.-lb.

    C. Cap screws 25-28 (6 mm) to 96 in.-lb.

24. For final tightening of the engine case cap screws, use this sequence:

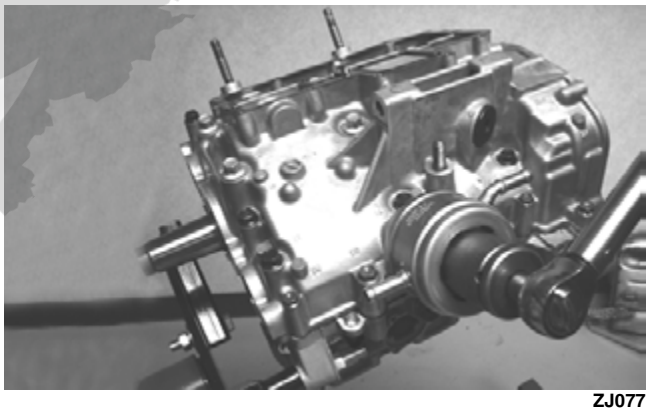
    A. Cap screws 1-6 to 33 ft-lb.

    B. Cap screws 7-24 to 19 ft-lb.

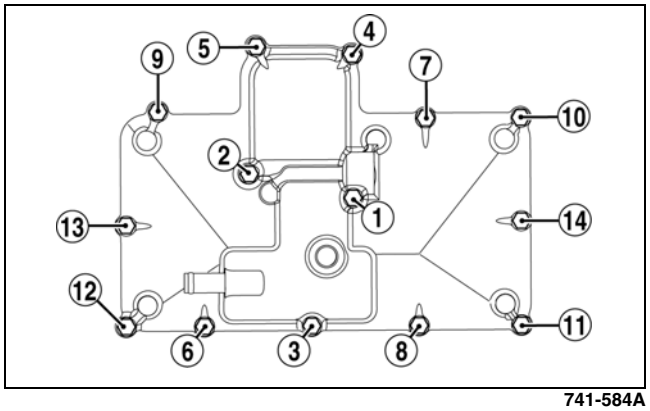
■NOTE: Cap screws 25-28 have only the one torque value.

■NOTE: After the tightening sequence, rotate the crankshaft one revolution to verify free movement.

25. With a new O-ring, install the oil cooler, washer, and the union bolt; then tighten to 52 ft-lb.


ZJ077

26. With a new gasket, install the oil pan and install the different-length cap screws (as noted in disassembling). Using the pattern shown, tighten the cap screws to 84 in.-lb.



741-584A

■**NOTE: Prior to installing the oil pan, ensure the oil strainer is cleaned thoroughly.**

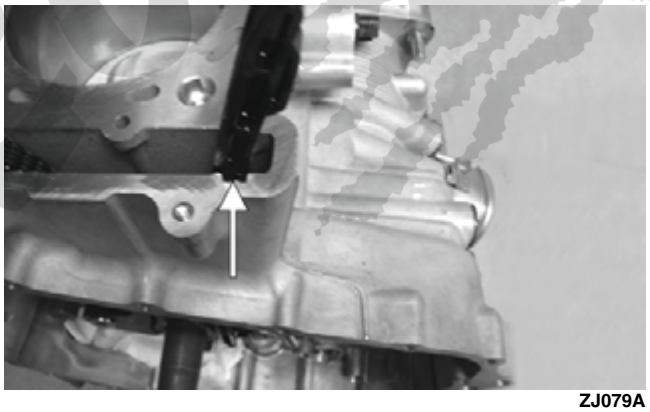


ZJ078A

■**NOTE: If the oil pan drain plug was removed, always install new drain plug and reservoir washers.**

■**NOTE: Rotate the engine to the upright position; then, if applicable, remove the cap screw and washer securing the pistons in the cylinder.**

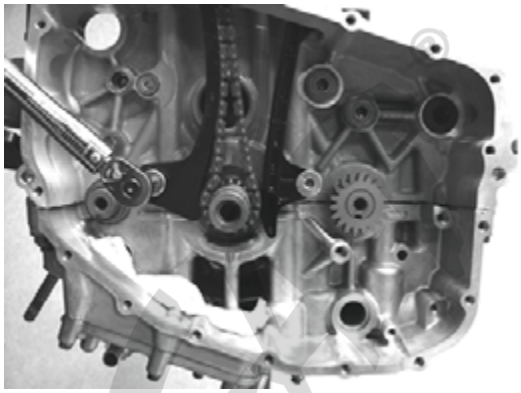
27. Install the cam chain onto the sprocket on the crankshaft and route the chain up through the engine case; then install the front-side cam chain guide number one properly seating it into the groove in the engine case.



ZJ079A

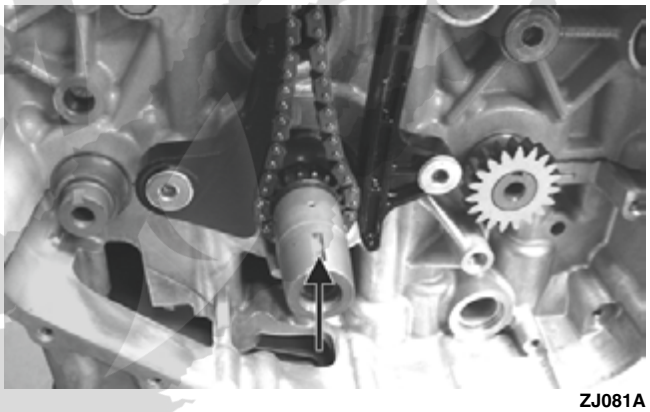
■**NOTE: Prior to installing the cam chain tensioner, assure the chain is properly seated to the gear on the crankshaft.**

28. Install the cam chain tensioner; then install the washers between the engine case and guide/tensioner and secure with two Allen-head cap screws (coated with blue Loctite #243). Tighten to 84 in.-lb.



ZJ080

29. Position the pistons at the top-dead-center position by rotating the crankshaft until the keyway on the crankshaft is directed upward and aligned with the cylinder.

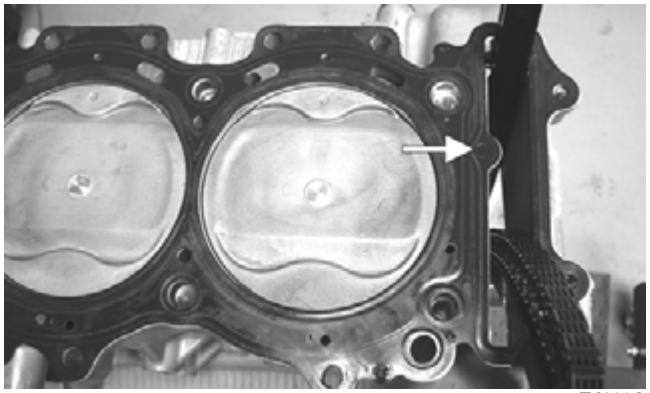


ZJ081A

30. Install the alignment pins into the top of the engine; then install the new head gasket.

CAUTION

Make sure the oil-port hole of the head gasket is unrestricted or severe engine damage may occur.



ZJ102A

31. With the head gasket and dowel pins in place, install the cylinder head by carefully tilting the head to the front side of the engine allowing the cam chain guide to slide into the passage in the cylinder head; then work the head back and forth until the head is properly seated to the engine.

32. Install the flange nuts and cap screws (cap screws 1-6 threads coated with oil); then using the pattern shown, tighten in the following sequence:

    A. Cap screws 1-6 initially to 18 ft-lb.

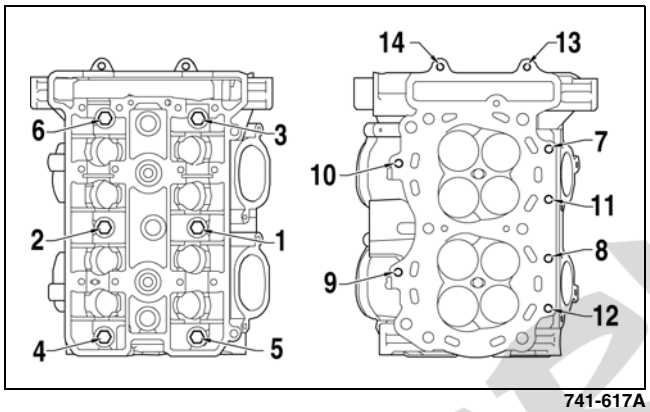
    B. Flange nuts 7-8 to 18 ft-lb.

    C. Flange nuts 9-10 to 10 ft-lb.

    D. Flange nuts 11-12 to 18 ft-lb.

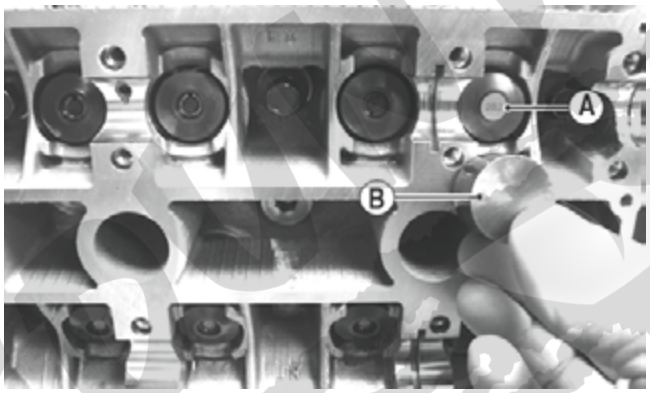
    E. Cap screws 13-14 to 96 in.-lb.

    F. Cap screws 1-6 in two steps from 18 ft-lb to 43 ft-lb.



741-617A

33. With a light film of engine-assembly grease applied to the tappets, install the correct shim (A) and tappet (B) to each valve of the cylinder head as noted during disassembling.



ZJ083A

■NOTE: Prior to installing the camshaft, apply engine-assembling grease to the camshaft journals and lobes.

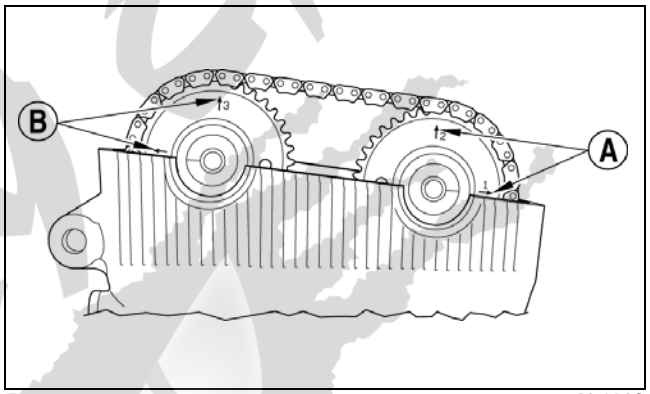
34. With the crankshaft rotated to the top-dead-center position, place the cam chain over the sprocket of the exhaust camshaft.

■NOTE: The exhaust camshaft must be installed first. When installing the cam chain to the gear of the exhaust camshaft, position the chain so no slack between the crankshaft gear and exhaust camshaft exists when the camshaft is installed. All slack in cam chain must be on the side of the tension adjuster.



ZJ084

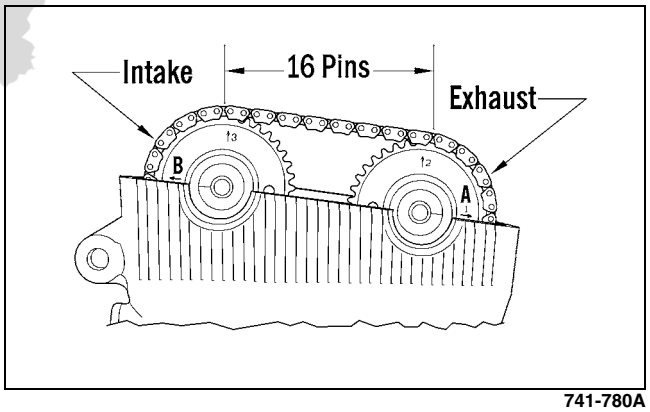
35. With the timing marks (A) on the face of the camshaft gear properly aligned, place the camshaft into position on the cylinder head.



741-801A

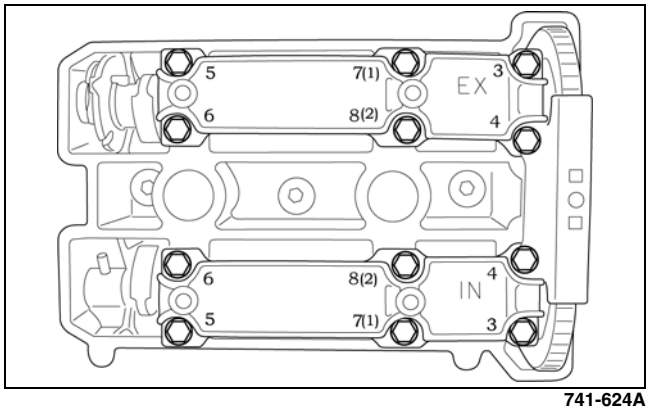
36. With the cam chain properly seated to the gears of the crankshaft and exhaust camshaft, install the intake camshaft noting the timing marks (B) are properly aligned.

■NOTE: With the camshafts and cam chain in place, there should be exactly 16 pins from intake cam mark 3 to exhaust cam mark 2.



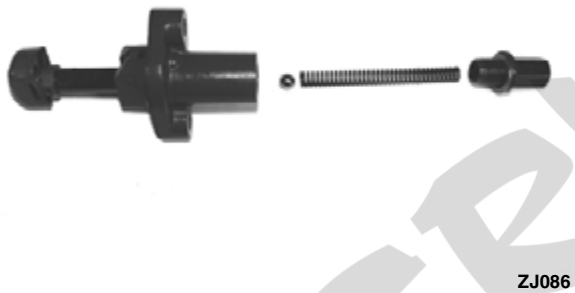
741-780A

37. With the camshafts in position and properly timed and the dowel pins in place, install the camshaft covers along with cam chain tensioner guide number two; then using the pattern shown, tighten the twelve cap screws to 84 in.-lb.



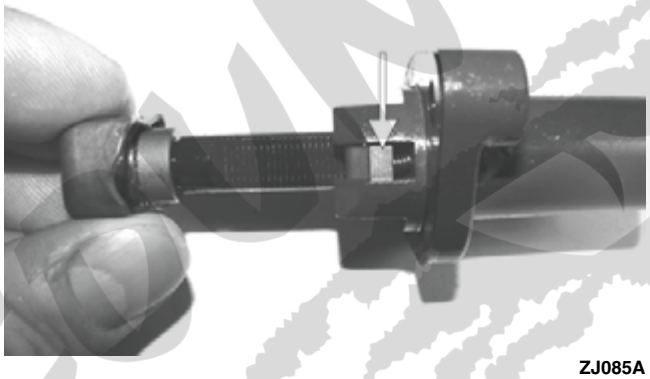
741-624A

38. Remove the tensioner ball, spring, and bolt.



ZJ086

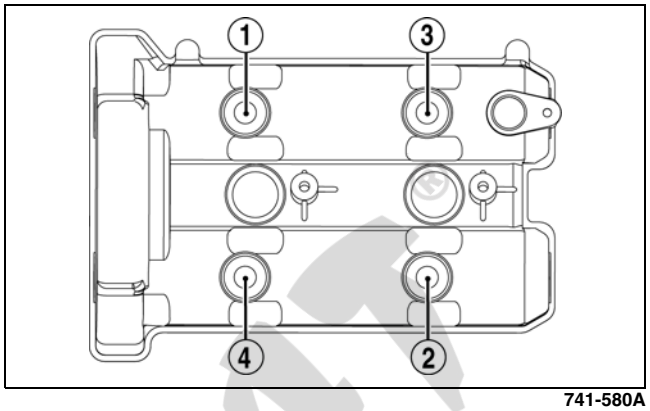
39. Install the cam chain tensioner adjuster by first compressing the locking clip; then by pushing in the tensioner shaft until completely compressed.



ZJ085A

40. Install the tensioner and secure with two Allen-head cap screws; then tighten to 84 in.-lb. Install the ball, spring, and tensioner bolt and tighten to 18 ft-lb.

41. Install the engine cover alignment pins; then install the engine cover and secure with four cap screws and plastic washers. Using the pattern shown, tighten the cap screws to 120 in.-lb.



741-580A

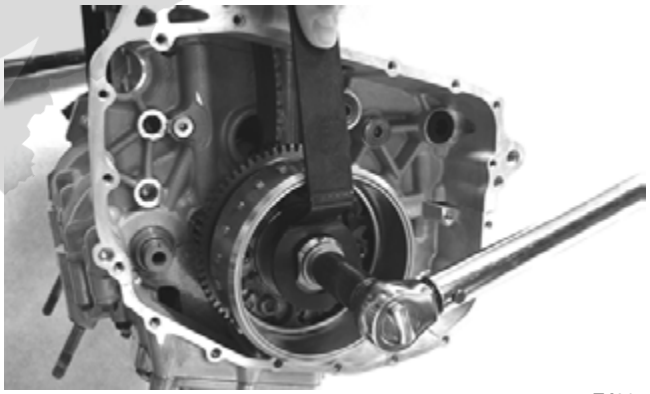
■**NOTE: At this point, install the spark plugs.**

42. Place the starter gear on the crankshaft; then install the flywheel key.



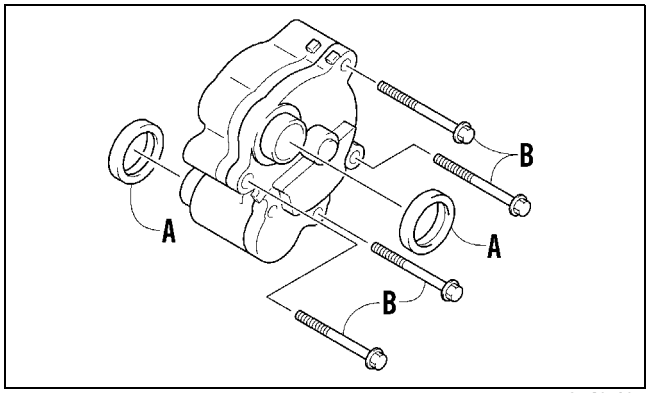
ZJ036A

43. Install the flywheel with the cap screw and washer. Using the flywheel holder wrench from Flywheel Puller, tighten the cap screw to 88 ft-lb.



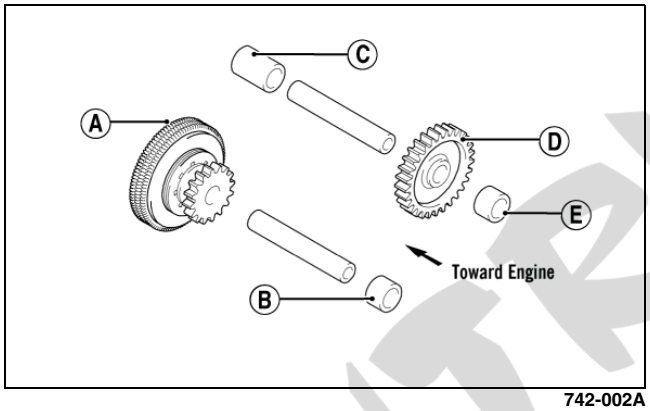
ZJ087

44. Install the oil scavenge pump alignment pins in the engine case; then with the inner and outer seals (A) in place on the pump, install the pump and secure with the four cap screws (B). Tighten to 84 in.-lb.



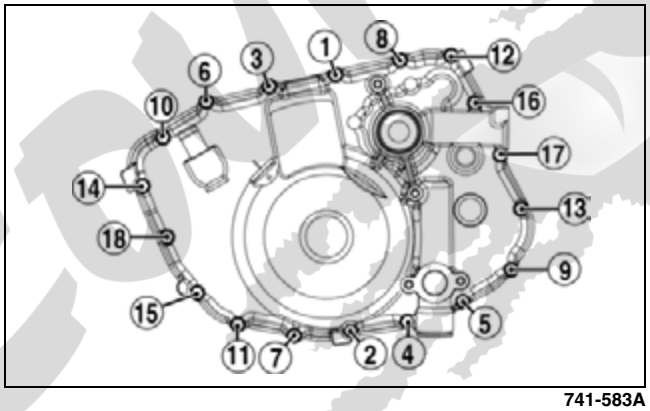
0742-125

45. With the two pins installed in the engine case, first install the starter torque limiter (A) and spacer (B); then install the inner spacer (C), idler gear (D), and outer spacer (E).



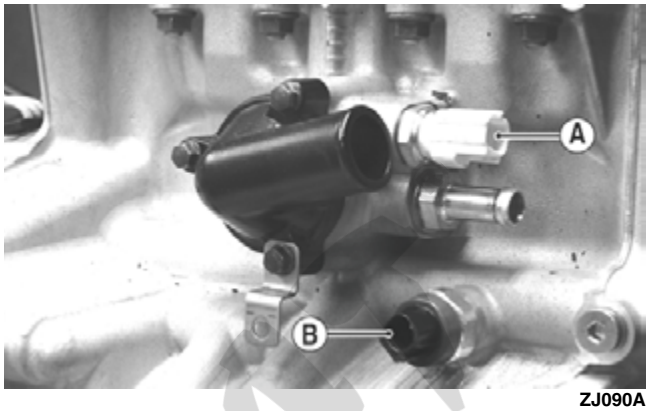
742-002A

46. Install the two alignment pins in the engine for the magneto cover; then with a new gasket, install the cover and with the pattern shown, tighten the 18 cap screws to 84 in.-lb.



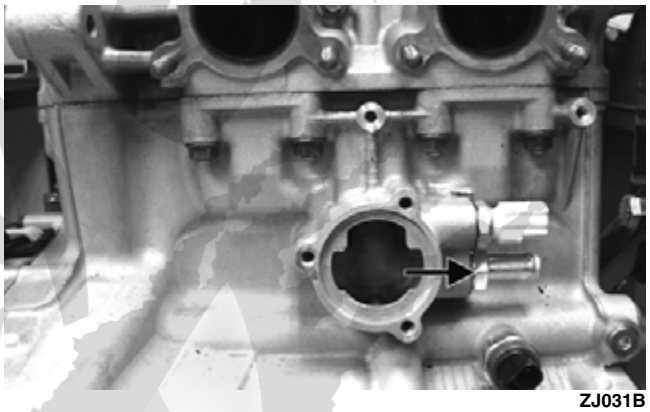
741-583A

■NOTE: If the coolant temperature and oil pressure sensors were removed, install the sensors and tighten in the following sequence: (A) coolant temperature sensor to 15 ft-lb and (B) oil pressure sensor to 10 ft-lb.



ZJ090A

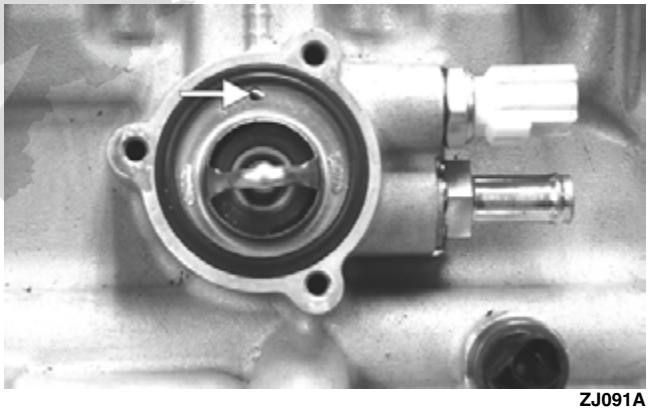
47. Install the coolant hose inlet fitting and secure with the two cap screws. Tighten to 84 in.-lb.



ZJ031B

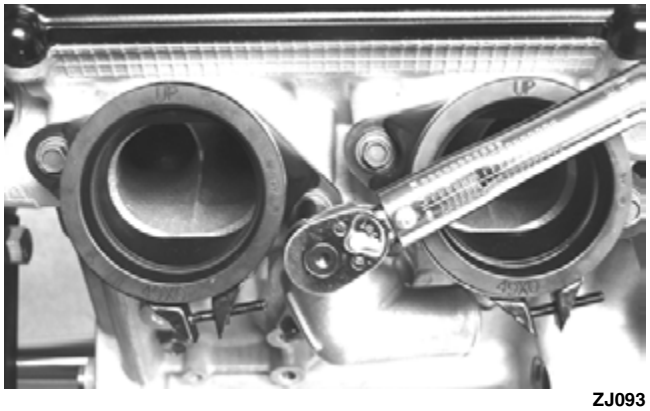
48. Install a new thermostat; then install the cover and secure with the two cap screws. Tighten to 84 in.-lb.

■NOTE: Make sure to install the thermostat with the bypass/check valve directed in the up position.



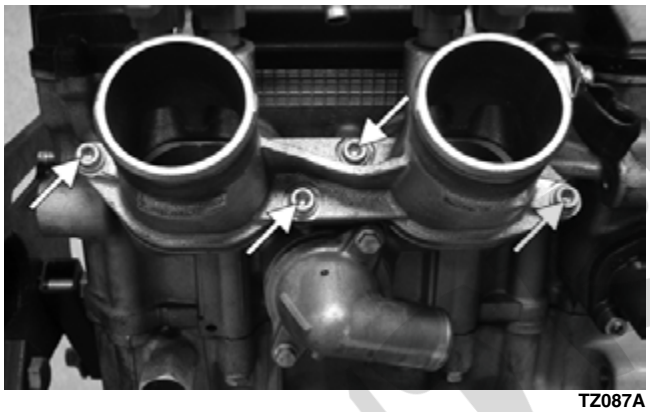
ZJ091A

49. On the non-turbo models, install the two intake flanges; then secure with the four cap screws. Tighten to 60 in.-lb.



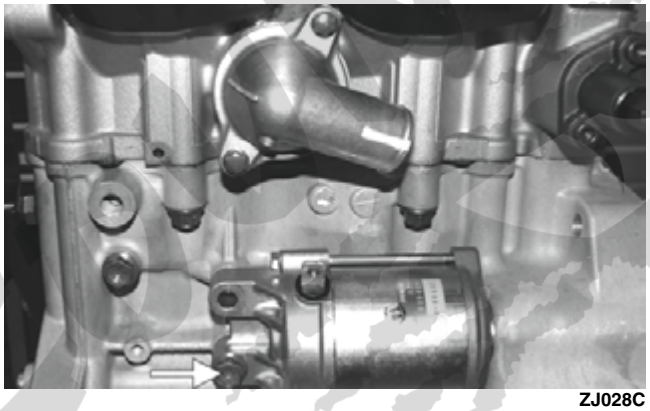
ZJ093

■**NOTE: On the turbo models, install the intake flange assembly; then tighten the cap screws evenly to 96 in.-lb.**



TZ087A

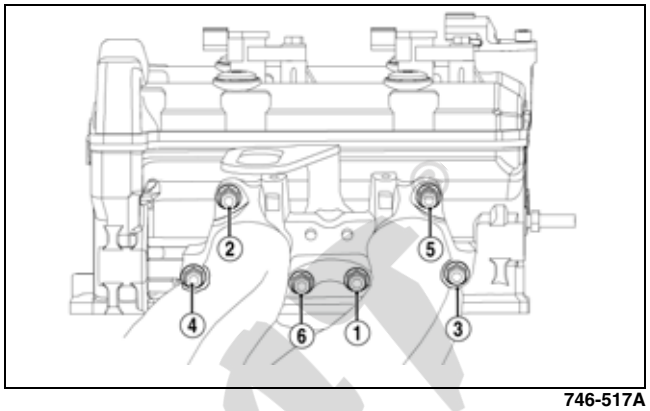
50. Install the starter motor; then secure with the cap screw. Tighten to 19 ft-lb.



ZJ028C

51. Install the coolant hoses onto the proper inlets/outlets of the engine; then install the oil hoses/oil reservoir onto the proper inlets/outlets. Secure with clamps.

52. On the non-turbo models, install the exhaust pipes; then using the pattern shown, secure the pipes with the six flange nuts. Tighten to 18 ft-lb.



746-517A

■**NOTE: At this point, assembly of the non-turbo engine is complete.**

■**NOTE: Steps 53-59 are for the turbo models only.**

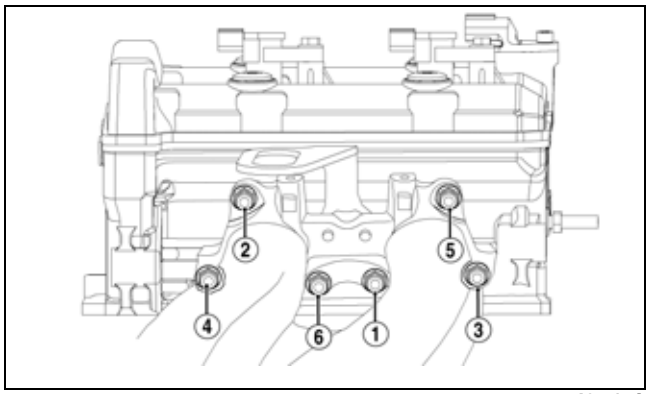
53. If removed, install the mounting bracket to the turbocharger; then with the backing plate properly positioned as noted during disassembling, secure the bracket to the turbo with the lock nuts and finger tighten only.



TZ063A

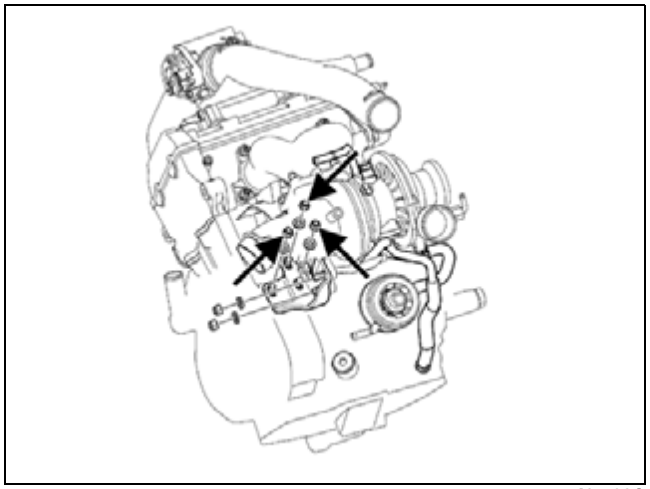
54. Install the lower heat shield onto the turbocharger and exhaust manifold with the cap screws. Tighten to 60 in.-lb.

55. With the gaskets in place, install the exhaust pipes and turbocharger assembly to the engine; then using the pattern shown, tighten the exhaust pipes to 19 ft-lb.



746-517A

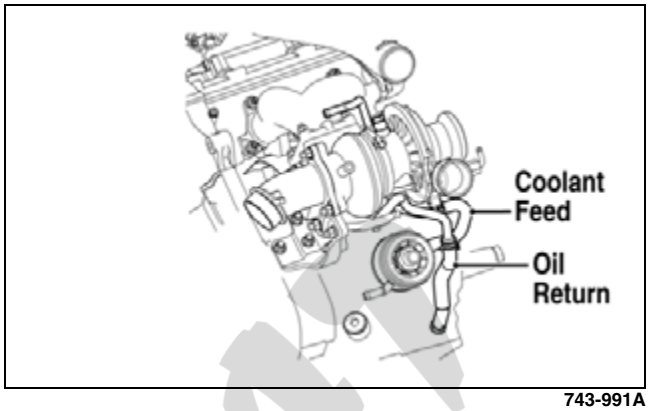
56. Install the three lock nuts securing the turbocharger mounting bracket to the engine and tighten to 30 ft-lb. Bend the washer tabs to secure the nuts.



743-780A

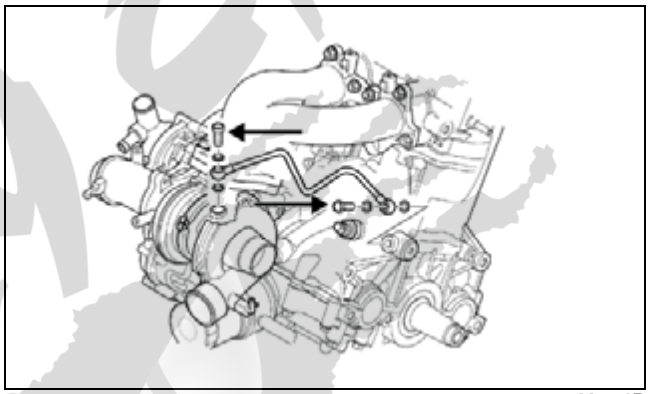
57. Tighten the two lock nuts (from step 53) to 30 ft-lb.

58. Connect the coolant feed hose and oil return hose to the turbocharger, release the clamps, and secure the hoses with the hose clamps.



743-991A

59. With the turbocharger secured, install the oil feed pipe with the banjo bolts and two new crush washers on each side of the union. Tighten to 11 ft-lb.



744-771B

■NOTE: Make sure when installing the oil feed pipe that the correct banjo bolt is securing the pipe to the engine and turbocharger (as noted in disassembling).

COUNTRY

Troubleshooting Engine (2-Stroke Carbureted)

Problem: Engine Does Not Start (No Spark at Spark Plugs)	
Condition	**Remedy**
1. **Ignition switch** malfunctioning — not in RUN position	1. Replace ignition switch — turn switch to RUN position
2. **Wiring harness** shorting — connection poor	2. Repair — connect — replace wiring harness
3. **Emergency stop switch knob** in DOWN position — malfunctioning	3. Move knob to UP position — replace throttle switch
4. **Throttle/ignition monitor switch** adjusted too tight — malfunctioning	4. Adjust (loosen) throttle cable — replace throttle switch
5. **Carburetor safety switches** adjusted incorrectly — malfunctioning	5. Adjust — replace carburetor safety switches
6. **Spark plugs** fouled — damaged	6. Clean — gap — replace spark plugs
7. **Spark-plug caps** damaged — leaking — shorting	7. Replace spark-plug caps
8. **High tension wires/coil** loose — grounded — faulty	8. Service — replace high tension wires/coil
9. **CDI unit** faulty	9. Replace CDI unit
10. **Charge coil (1)** faulty	10. Replace coil
11. **Charge coil (2)** faulty	11. Replace coil
12. **Flywheel magnets** weak	12. Replace flywheel
13. **Flywheel key** sheared	13. Replace key

Problem: Engine Does Not Start (No Fuel at Cylinders)	
Condition	**Remedy**
1. **Gas tank** empty	1. Fill tank
2. **Shut-off valve** closed	2. Open shut-off valve
3. **Fuel hose** broken — pinched	3. Replace — service hose
4. **Gas-tank vent — hose** obstructed	4. Remove obstruction — replace vent — hose
5. **In-line fuel filter** obstructed — damaged	5. Remove obstruction — replace in-line fuel filter
6. **Fuel pump** malfunctioning — faulty	6. Replace — repair — clean fuel pump
7. **Impulse hose** cracked — broken — pinched — disconnected	7. Replace — connect impulse hose
8. **Carburetors** adjusted incorrectly — dirty — damaged	8. Troubleshoot — clean — replace carburetors
9. **Primary compression (crankcase)** absent	9. Repair — replace damaged — worn engine components

Problem: Engine Overheats	
Condition	**Remedy**
1. **Spark plug heat range** too hot	1. Install lower heat-range spark plugs
2. **Coolant** low — absent	2. Add coolant
3. **Carburetors** adjusted incorrectly — jetted incorrectly — dirty	3. Troubleshoot — clean carburetors — jet correctly
4. **Carburetor-to-cylinder air** leak	4. Replace — repair gaskets — intake flanges — service intake ports
5. **Heat exchangers** no snow for cooling	5. Select new trail — install ice studs to chew up hard packed snow and ice
6. **Rings/grooves** carboned	6. Clean — replace rings — pistons
7. **Exhaust ports** obstructed	7. Remove obstruction
8. **Muffler** obstructed	8. Remove obstruction
9. **Gas/air mixture** incorrect	9. Replace jets — adjust jet needle E-clip position
10. **Oil-injection pump** malfunctioning — adjusted incorrectly	10. Replace — bleed — adjust oil-injection pump
11. **Primary compression (crankcase)** low — absent	11. Repair — replace damaged — worn engine components
12. **Ignition timing** adjusted incorrectly	12. Time ignition
13. **Gasoline octane** too low	13. Use 87 minimum octane gasoline
14. **Water pump — thermostat** damaged — faulty	14. Replace — rebuild water pump — replace thermostat

Problem: Engine Backfires	
Condition	**Remedy**
1. **Throttle/ignition monitor switch** adjusted incorrectly	1. Adjust throttle cable free-play — service spring
2. **Spark plugs** fouled — damaged	2. Clean — gap — replace spark plugs
3. **Spark plug heat range** too hot	3. Install lower heat-range spark plugs
4. **High tension wires/coil** shorting	4. Service — replace high tension wires/coil
5. **Carburetor-to-cylinder** air leak	5. Repair — replace gaskets — intake flanges service intake ports
6. **Carburetors** adjusted incorrectly — dirty — damaged — loose	6. Troubleshoot — tighten carburetors
7. **Gas/air mixture** incorrect — too lean	7. Adjust jetting
8. **Oil-injection pump** malfunctioning — adjusted incorrectly	8. Replace — bleed — adjust oil-injection pump
Problem: Engine Four-Cycles (Floods Excessively)	
Condition	**Remedy**
1. **Carburetors** adjusted incorrectly — dirty — damaged	1. Troubleshoot — clean carburetors
2. **Gas/air mixture** incorrect	2. Adjust jetting
3. **Oil-injection pump** malfunctioning — adjusted incorrectly	3. Replace — bleed — adjust oil-injection pump
4. **Air silencer** obstructed	4. Remove obstruction
Problem: Engine Stops Gradually	
Condition	**Remedy**
1. **In-line fuel filter** obstructed — damaged	1. Remove obstruction — replace in-line fuel filter
2. **Fuel hose** obstructed — broken — pinched	2. Remove obstruction — replace — repair fuel hose
3. **Head gasket(s)** burned out	3. Replace head gasket(s) — service cylinders — head
4. **Cylinder head** loosening	4. Tighten cylinder head cap screws
5. **Spark plugs** loose	5. Tighten spark plugs
6. **Impulse hose** cracked	6. Replace impulse hose
7. **High tension wires/coil** faulty	7. Service — replace high tension wires/coil
Problem: Engine Stops Suddenly	
Condition	**Remedy**
1. **In-line fuel filter** obstructed — damaged	1. Remove obstruction — replace in-line fuel filter
2. **Fuel hose** obstructed — broken — pinched	2. Remove obstruction — repair — replace fuel hose
3. **CDI unit** faulty	3. Replace CDI unit
4. **Ignition coil** faulty	4. Replace ignition coil
5. **Charge coil (1)** faulty	5. Replace coil
6. **Charge coil (2)** faulty	6. Replace coil
7. **Gas-tank vent — hose** obstructed — damaged	7. Remove obstruction — replace vent — hose
8. **Engine** seized	8. Service engine
9. **Throttle/ignition monitor switch** faulty — throttle cable adjusted incorrectly	9. Replace throttle control — adjust throttle cable free-play — adjust — connect — replace carburetor safety switches
Problem: Engine Fails to Stop (Continues to Run, Even with All Switches Off)	
Condition	**Remedy**
1. **CDI unit** shorted to ground	1. Replace CDI unit
2. **Main wiring harness four-prong connector** disconnected	2. Connect four-prong connector

Troubleshooting Engine (2-Stroke EFI)

Problem: Engine Does Not Start (No Spark at Spark Plugs)	
Condition	**Remedy**
1. **Ground connections** dirty — loose	1. Check all ground connections — clean and tight
2. **Throttle/ignition monitor switch** malfunctioning — ignition switch not on	2. Replace faulty switch — turn switch on
3. **Wiring harness** shorting — disconnected	3. Repair — replace — connect wiring harness
4. **Emergency stop switch** in DOWN position — malfunctioning	4. Move switch to UP position — replace throttle control
5. **Throttle/ignition monitor switch** malfunctioning	5. Adjust throttle cable tension — replace throttle body assembly
6. **Spark plugs** fouled — damaged	6. Clean — replace spark plugs
7. **Spark-plug caps** damaged — leaking — shorting	7. Replace spark-plug caps
8. **High tension leads/coil** loose — grounded — faulty	8. Service — replace high tension leads/coil
9. **ECM/CCU** faulty	9. Replace ECM/CCU
10. **Ignition timing sensor** faulty	10. Replace sensor
Problem: Engine Does Not Start (No Fuel at Cylinders)	
Condition	**Remedy**
1. **Gas tank** empty	1. Fill tank
2. **Injector dropping resistor** faulty	2. Replace dropping resistor
3. **Fuel pressure regulator** faulty	3. Replace regulator — hose
4. **Check valve** faulty	4. Replace check valve
5. **Fuel pump** faulty	5. Service — replace fuel pump — connections — wires
6. **Fuel hose** broken — pinched	6. Replace — service hose
7. **Gas-tank vent — hose** obstructed	7. Remove obstruction — replace vent — hose
8. **Pick-up valve(s)** obstructed — damaged	8. Remove obstruction — replace pick-up valve(s)
9. **Primary compression** absent	9. Repair — replace damaged — worn engine components
10. **ECM/CCU** faulty	10. Replace ECM/CCU
Problem: Engine Does Not Start (Fuel Does Not Ignite)	
Condition	**Remedy**
1. **ECM/CCU LED** trouble code	1. Service — replace problem component
2. **Spark** absent	2. Check for spark — see No Spark at Spark Plugs sub-section
3. **Gasoline** contaminated	3. Replace gasoline
4. **Primary compression** low	4. Service engine
5. **Secondary compression** low	5. Service engine
6. **Engine** flooded	6. Clear engine (hold throttle full-open)
7. **Gasoline** contaminated	7. Clean tank and entire fuel system
Problem: Engine Does Not Idle	
Condition	**Remedy**
1. **ECM/CCU LED** trouble code	1. Service — replace problem component
2. **Injector(s)** faulty	2. Replace injector(s)
3. **Fuel pressure regulator** faulty	3. Replace regulator — hose
4. **Air silencer** obstructed	4. Clean air-intake silencer
5. **TPS** faulty	5. Replace throttle body assembly (under warranty) - replace TPS (out of warranty)
6. **Throttle body** idle adjustment incorrect	6. Replace throttle body assembly (under warranty) - adjust idle RPM to specifications (out of warranty)

Problem: Engine Loses Power or Runs on One Cylinder	
Condition	**Remedy**
1. **Sensor** faulty	1. Check LED for trouble code — repair — replace problem circuit or sensor
2. **Spark plug** fouled	2. Replace spark plugs
3. **External coil** faulty	3. Service — replace coil
4. **Gas tank vent — hose** obstructed	4. Service — replace vent hose
5. **Secondary compression** low	5. Service engine
6. **Fuel pressure regulator** faulty	6. Replace regulator
7. **Pick-up valve(s)** obstructed — out of position	7. Replace — relocate pick-up valve(s)
8. **Oil-injection pump** malfunctioning — adjusted incorrectly	8. Replace — bleed — adjust oil-injection pump
9. **Throttle bodies** out of synchronization	9. Replace throttle bodies from a similar engine — if problem is corrected, replace the original assembly
10. **Injector** faulty	10. Replace injector
11. **Dropping resistor** faulty	11. Test resistor — replace as necessary
Problem: Engine Backfires	
Condition	**Remedy**
1. **ECM/CCU LED** trouble code	1. Service — replace problem component
2. **Throttle/ignition monitor switch** adjusted incorrectly	2. Adjust throttle cable tension — service spring
3. **Spark plugs** fouled — damaged	3. Clean — replace spark plugs
4. **High tension leads/coil** shorting	4. Service — replace high tension leads/coil
5. **ECM/CCU** faulty — damaged	5. Replace ECM/CCU
6. **Fuel mixture** lean	6. Repair fuel regulator — injector(s)
7. **Oil-injection pump** malfunctioning — adjusted incorrectly	7. Replace — bleed — adjust oil-injection pump
Problem: Engine Four-Cycles (Floods Excessively)	
Condition	**Remedy**
1. **ECM LED** trouble code	1. Service — replace problem component
2. **Fuel pressure** too high	2. Replace regulator — hose
3. **Injector** faulty	3. Replace injector
4. **Throttle position sensor** faulty	4. Replace throttle body assembly
5. **Air silencer** obstructed	5. Remove obstruction
Problem: Engine Stops Suddenly	
Condition	**Remedy**
1. **Gas tank** empty	1. Fill tank
2. **Spark** absent	2. See No Spark at Spark Plugs sub-section
3. **ECM/CCU LED** trouble code	3. Service — replace problem component
4. **Fuel filter(s)** obstructed	4. Replace filter(s)
5. **Fuel pressure** low	5. Replace regulator — hose
6. **Fuel pump** faulty	6. Service — replace fuel pump
7. **Fuel pump** relay faulty	7. Replace relay
8. **Gas tank vent hose** obstructed	8. Service vent hose
9. **ECM/CCU** faulty	9. Replace ECM/CCU
10. **Fuel hose** obstructed — broken — pinched	10. Remove obstruction — repair — replace fuel hose
11. **Ignition coil** faulty	11. Replace ignition coil
12. **Engine** seized	12. Service engine
13. **Throttle/ignition monitor switch — throttle cable tension** faulty — adjusted incorrectly	13. Replace throttle control — adjust throttle cable
Problem: Engine Fails to Stop (Continues to Run, Even with All Switches Off)	
Condition	**Remedy**
1. **ECM/CCU** shorted to ground	1. Replace ECM/CCU
2. **Engine wiring harness connections** wet	2. Clean — dry connections

Problem: Engine Overheats	
Condition	**Remedy**
1. **Spark plug heat range** too hot	1. Install lower heat-range spark plugs
2. **Coolant** low — absent	2. Add coolant
3. **Heat exchanger** obstructed	3. Remove obstruction
4. **Intake flange to cylinder air** leak	4. Replace — seal intake flange(s)
5. **Drive system (drive clutch — driven clutch — track — drive belt)** adjusted incorrectly — worn — damaged	5. Troubleshoot — adjust drive system
6. **Rings/grooves** carboned	6. Clean — replace rings — pistons
7. **Exhaust ports** obstructed	7. Remove obstruction
8. **Expansion chamber** obstructed	8. Remove obstruction
9. **Oil-injection pump** malfunctioning — adjusted incorrectly	9. Replace — bleed — adjust oil-injection pump
10. **Primary compression** low — absent	10. Repair — replace damaged — worn engine components
11. **Gasoline octane** too low	11. Use recommended minimum octane gasoline
12. **Water pump — thermostat** damaged — faulty	12. Replace water pump — thermostat

Troubleshooting Engine (4-Stroke)

Problem: Engine Does Not Start (No Spark at Spark Plugs)	
Condition	**Remedy**
1. **Ground connections** dirty — loose	1. Check all ground connections — clean and tight
2. **Wiring harness** shorting — disconnected	2. Repair — replace — connect wiring harness
3. **Emergency stop switch** in DOWN position — malfunctioning	3. Move switch to UP position — replace throttle control
4. **Throttle/ignition monitor switch** malfunctioning	4. Adjust throttle cable tension — replace throttle body assembly
5. **Spark plugs** fouled — damaged	5. Clean — replace spark plugs
6. **Idle speed control (ISC valve)** not functioning	6. Turn ignition switch ON and OFF — listen for stepping motor (ISC valve) operation
7. **ECM** faulty	7. Replace ECM
8. **Ignition timing sensor** faulty	8. Replace sensor
Problem: Engine Does Not Start (No Fuel at Cylinders)	
Condition	**Remedy**
1. **Gas tank** empty	1. Fill tank
2. **Gasoline** contaminated	2. Replace gasoline
3. **Fuel pump** faulty	3. Service — replace fuel pump — connections — wires
4. **Fuel hose** broken — pinched	4. Replace — service hose
5. **Gas-tank vent** — **hose** obstructed	5. Remove obstruction — replace vent — hose
6. **Pick-up valve(s)** obstructed — damaged	6. Remove obstruction — replace pick-up valve(s)
7. **Compression** absent	7. Repair — replace damaged — worn engine components
8. **ECM** faulty	8. Replace ECM
Problem: Engine Does Not Start (Fuel Does Not Ignite)	
Condition	**Remedy**
1. **ECM Check Engine light** failed	1. Check codes — repair as necessary
2. **Spark** absent	2. Check for spark — see No Spark at Spark Plugs sub-section
3. **Compression** low	3. Service engine
4. **Engine** flooded	4. Clear engine (hold throttle full-open)
5. **Gasoline** contaminated	5. Clean tank and entire fuel system
Problem: Engine Does Not Idle	
Condition	**Remedy**
1. **ECM** trouble code	1. Service — replace problem component
2. **Throttle cable** too tight	2. Adjust throttle cable to specifications*
3. **Injector(s)** faulty	3. Replace injector(s)
4. **Fuel pressure regulator** faulty	4. Replace regulator — hose
5. **Air silencer** obstructed	5. Clean air silencer
6. **ISC valve** faulty	6. Replace valve

Problem: Engine Loses Power	
Condition	**Remedy**
1. **Sensor** faulty	1. Check engine light for trouble code — repair — replace problem circuit or sensor
2. **Spark plug** fouled	2. Replace spark plugs
3. **External coil** faulty	3. Service — replace coil
4. **Gas tank vent — hose** obstructed	4. Service — replace vent hose
5. **Compression** low	5. Service engine
6. **ECM** faulty	6. Replace ECM
7. **Fuel pressure regulator** faulty	7. Replace regulator
8. **Check Engine light** illuminated	8. Check codes — repair as necessary
9. **Injector** faulty	9. Replace injector
Problem: Engine Overheats	
Condition	**Remedy**
1. **Coolant** low — absent	1. Add coolant
2. **Heat exchanger** obstructed	2. Remove obstruction
3. **Drive system (drive clutch — driven clutch — track — drive belt)** adjusted incorrectly — worn — damaged	3. Troubleshoot — adjust drive system
4. **Rings/grooves** carboned	4. Clean — replace rings — pistons
5. **Exhaust** obstructed	5. Remove obstruction
6. **Compression** low — absent	6. Repair — replace damaged — worn engine components
7. **Water pump — thermostat** damaged — faulty	7. Replace water pump — thermostat
Problem: Engine Backfires	
Condition	**Remedy**
1. **Check Engine light** illuminated	1. Check codes — replace problem component
2. **Spark plugs** fouled — damaged	2. Clean — replace spark plugs
Problem: Engine Stops Suddenly	
Condition	**Remedy**
1. **Gas tank** empty	1. Fill tank
2. **Spark** absent	2. See No Spark at Spark Plugs sub-section
3. **Check Engine light** illuminated	3. Check codes — replace problem component
4. **Fuel filter(s)** obstructed	4. Replace filter(s)
5. **Fuel pressure** low	5. Replace regulator — hose
6. **Fuel pump** faulty	6. Service — replace fuel pump
7. **Fuel pump relay** faulty	7. Replace relay
8. **Gas tank vent hose** obstructed	8. Service vent hose
9. **ECM** faulty	9. Replace ECM
10. **Fuel hose** obstructed — broken — pinched	10. Remove obstruction — repair — replace fuel hose
11. **Ignition coil** faulty	11. Replace ignition coil
12. **Engine** seized	12. Overhaul engine
13. **Throttle/ignition monitor switch — throttle cable tension** faulty — adjusted incorrectly	13. Replace throttle control — adjust throttle cable
14. **Oil pressure** low	14. Check oil level/engine
15. **Engine coolant temperature** above normal	15. Inspect cooling system

SECTION 3 — ENGINE-RELATED ITEMS

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Engine-Related Items

■NOTE: Critical torque specifications can be found in Section 1 of this manual.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

A number of special tools must be available to the technician when servicing the engine-related items.

Description	p/n
Blind-Hole Bearing Puller	0644-500
Coolant Cap	0644-156
Drive Clutch Spanner Wrench	0644-136
Valve and Spring Retainer Tool	0644-448
Fan Spanner Wrench	0644-340
Water Pump Bearing and Seal Tool Kit	0644-557
Oil Seal Protector Tool	0644-219
Engine Leak-Down Test Kit	0644-522
Vacuum Test Pump	0644-131
Hood Harness Extension	1686-659
Hood Harness Extension	1686-660
Oil Filter Wrench	0644-551

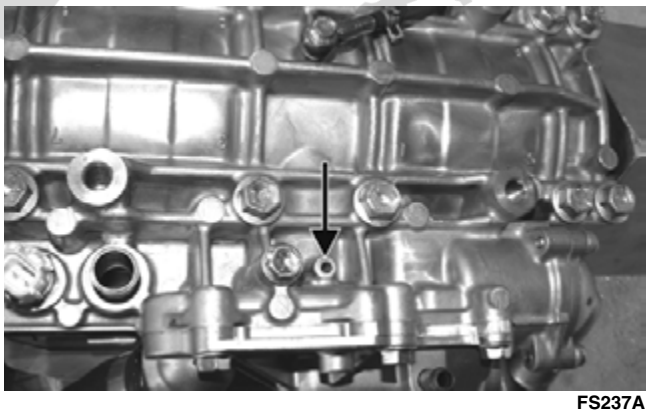
■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

Water Pump (500 cc)

DISASSEMBLING

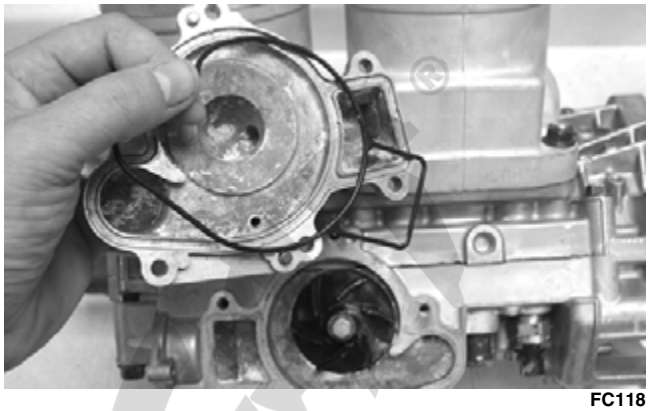
■NOTE: The engine must be removed for this procedure (see Section 2).

■NOTE: A bleed hole is located in the crankcase beneath the water pump housing. If any signs of coolant leakage from the bleed hole exist, the water pump seals must be replaced. When servicing the water pump, use Water Pump Bearing and Seal Tool Kit.



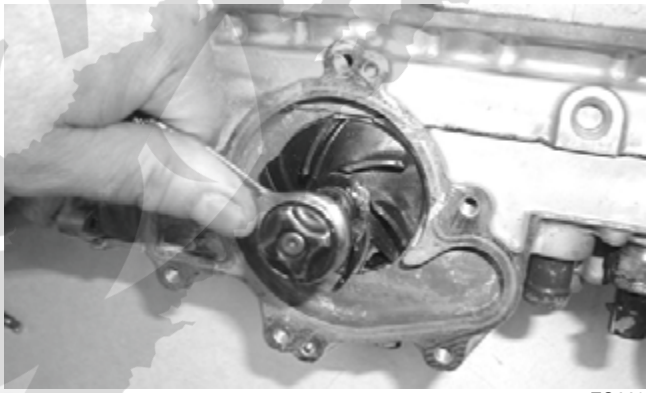
FS237A

1. Remove the cap screws securing the water pump cover; then remove the cover and account for the O-ring seal.



FC118

2. Remove either lower union cap screw securing the lower check valve assembly. Remove the two cap screws securing the oil-injection pump and pull the oil pump from the engine. Leave the pump hose and cable attached.
3. Remove the cap screw securing the impeller. Account for the rubber washer behind the cap screw.



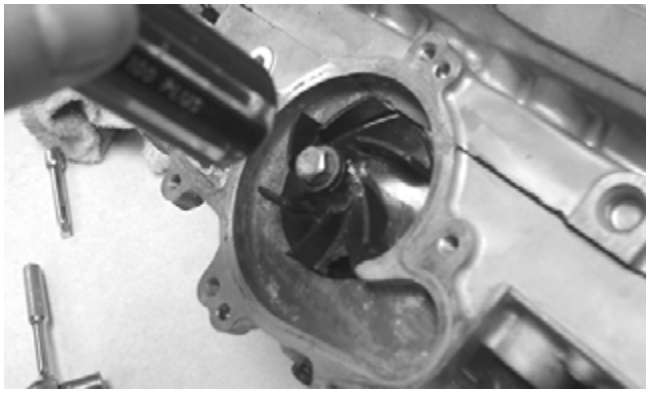
FC119

4. Remove the impeller from the shaft.



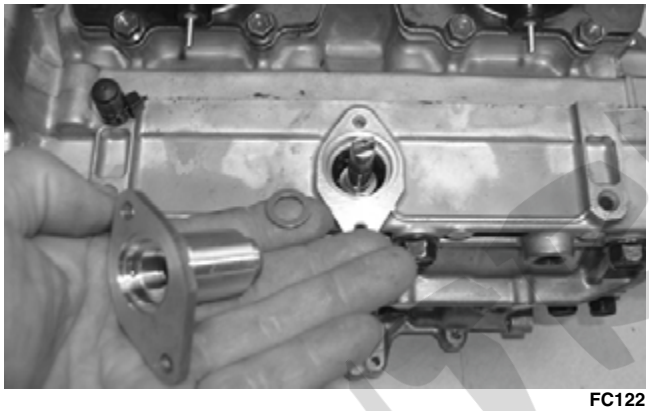
FC120

■NOTE: If the impeller will not slide off the shaft, start the cap screw into the shaft and tap on the cap screw driving the shaft back out of the impeller.



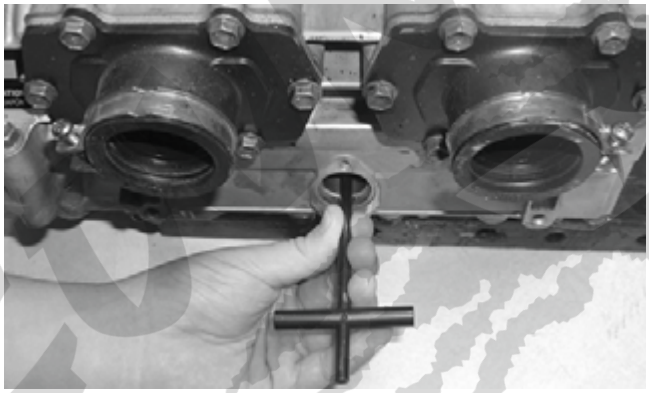
FC121

5. Remove the oil-injection pump retainer and shaft from the opposite side of the crankcase. Account for the thrust washer located between the retainer and shaft flange.



FC122

6. Using the long seal driver, drive the water pump mechanical seal from the crankcase.



FC123

7. Using a pair of snap ring pliers, remove the snap ring securing the inner seal in the crankcase.

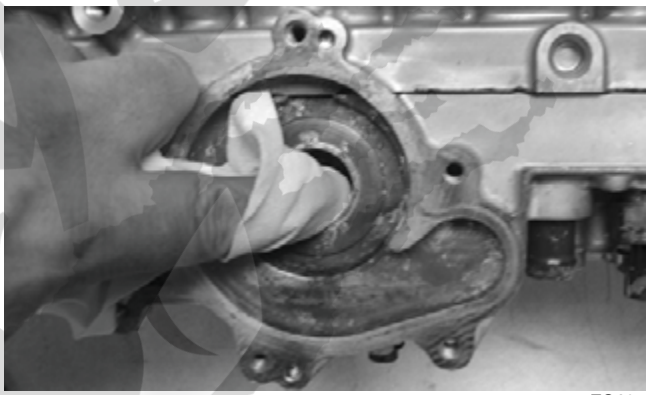


FC124

8. Using the hooked end of the long seal driver, pull the inner seal free of the crankcase.

ASSEMBLING

1. Wipe the seal area clean using a clean rag.



FC125

2. Position the inner seal onto the seal driver (spring side towards the crankshaft). Gently tap into position.



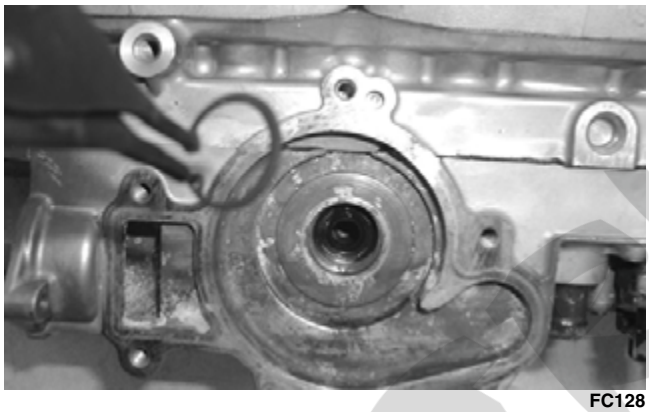
FC126A

3. Using a small screwdriver, apply a light coat of grease to the inner seal lips.



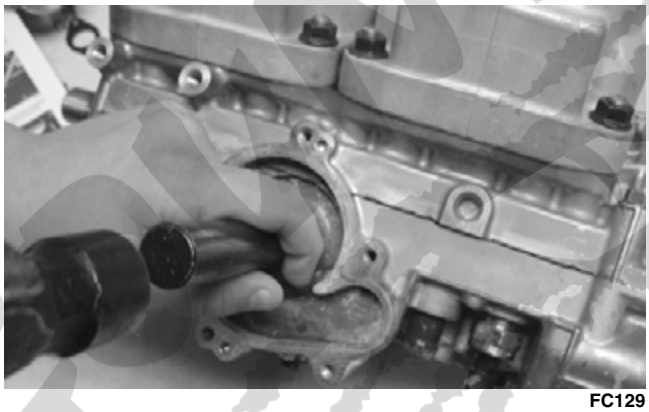
FC127

4. Using a pair of snap ring pliers, install the snap ring securing the inner seal in the crankcase.



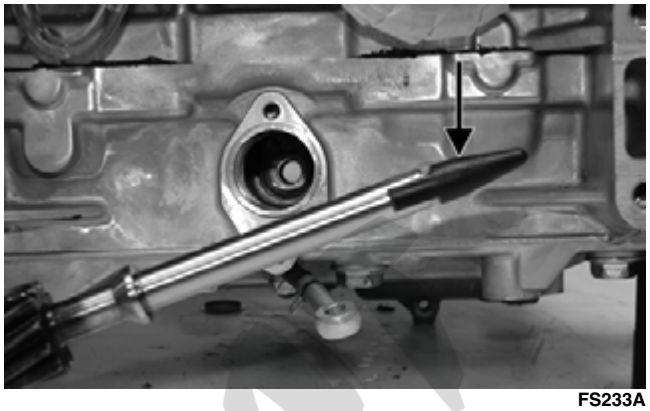
FC128

5. Using the seal driver, carefully install the outer water pump mechanical seal. Gently tap the seal down into position until it seats itself against its flange.



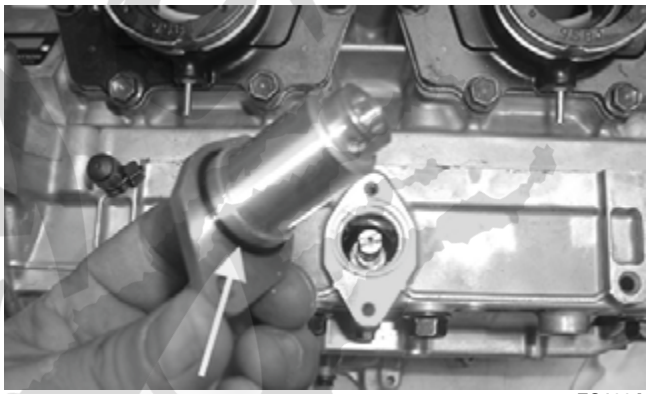
FC129

6. Apply a light coat of grease to the sealing surface of the oil-injection pump driveshaft; then install Oil Seal Protector Tool at the end of the shaft. Twist the shaft while pushing it through the oil and water pump seals; then remove the tool.



FS233A

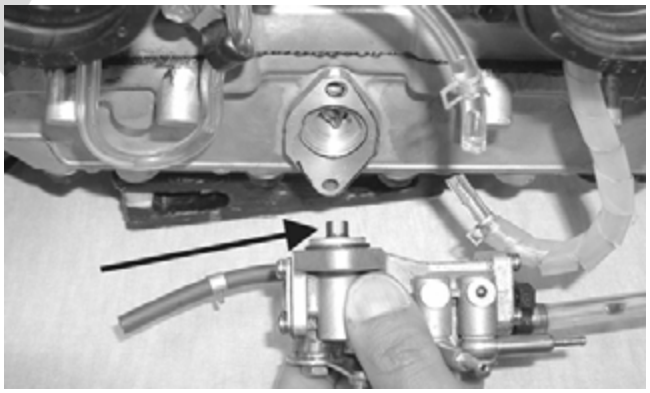
7. Position the shim on the oil pump end of the shaft; then with the O-ring installed on the retainer, install the oil-injection pump retainer.



FC130A

■NOTE: For assembling purposes, always use new O-rings lubricated with oil on the oil injection pump and retainer.

8. With the O-ring in place on the oil-injection pump, align the pump with the shaft; then install the pump. Secure with two cap screws (coated with blue Loctite #243). Tighten the two cap screws to 96 in.-lb.

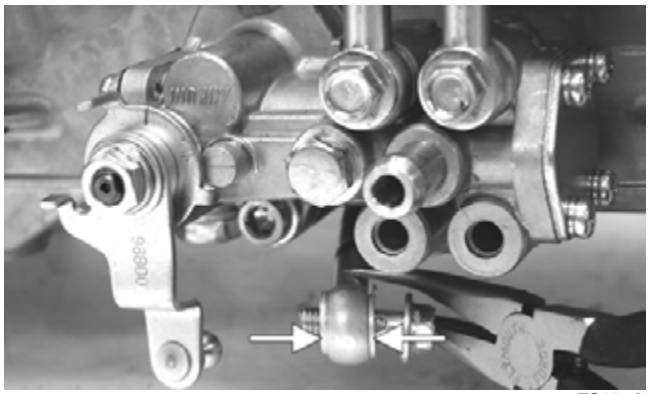


FC131A

■NOTE: After the oil pump has been secured, assure that the oil hoses from the pump and intake flanges are routed properly.

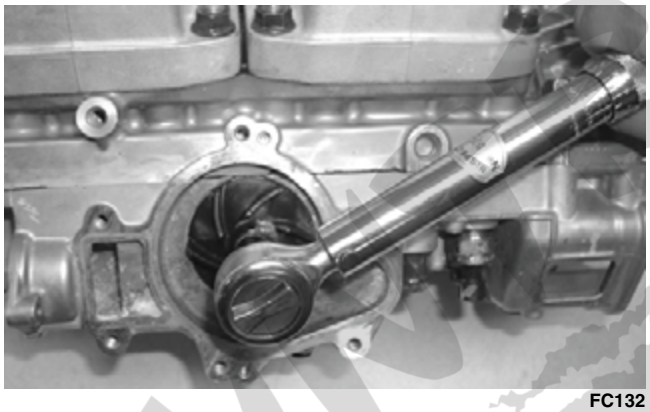
9. Place the lower check valve into position; then secure with the washer gaskets and union cap screw. Tighten securely.

■**NOTE: When installing the lower check valve, assure that the washer gaskets are installed on each side of the valve.**



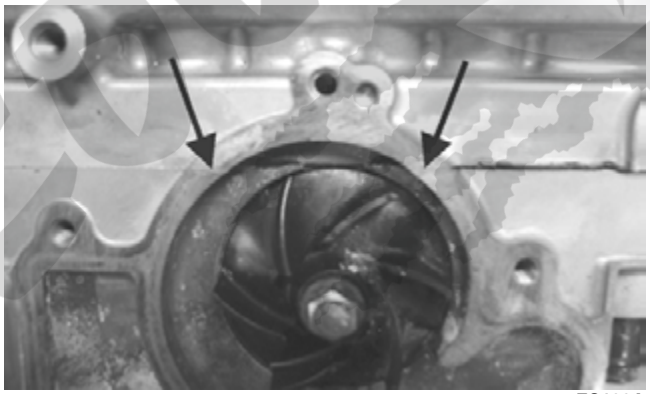
FS235A

10. Place the impeller into position and secure with a cap screw and washer. Be sure the rubber side of the washer is lubricated with a fine coat of oil and directed towards the impeller. Apply blue Loctite #243 to the threads of the cap screw and tighten to 108 in.-lb.



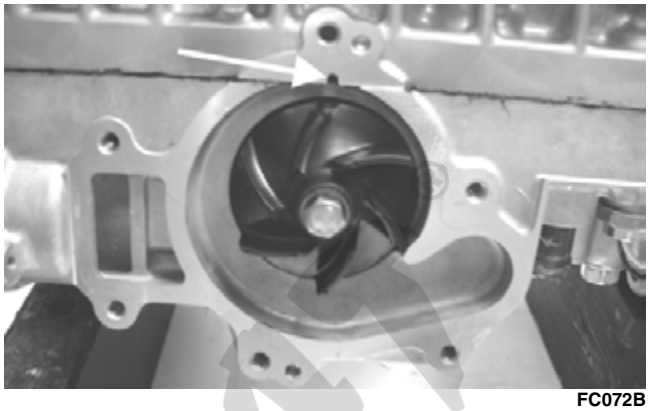
FC132

11. Apply sealant to the crankcase seam; then install the alignment pins into the crankcase (if removed).



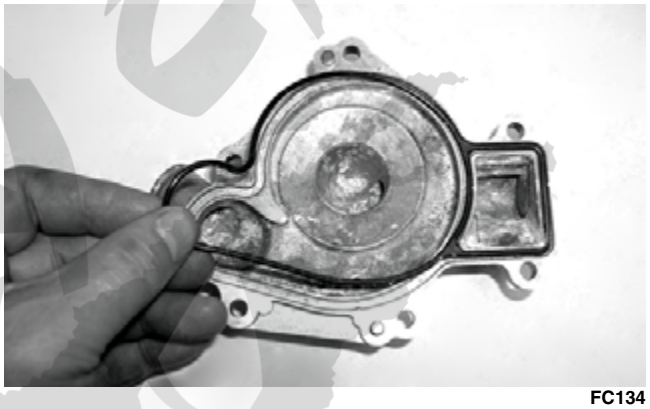
FC133A

■**NOTE: Do not allow sealant into the breather hole in the crankcase. If sealant gets into the hole, carefully remove before proceeding.**

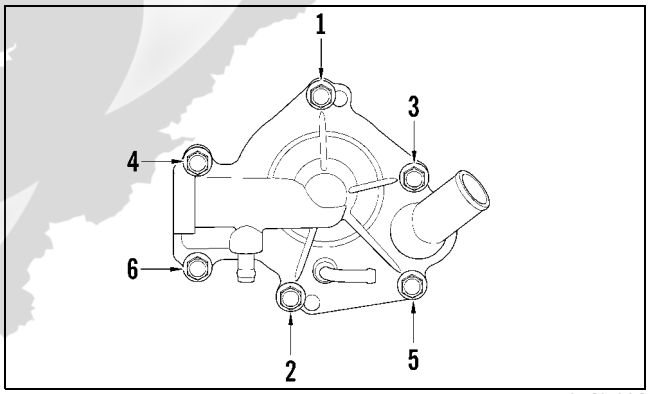


FC072B

12. Position the O-ring into the water pump cover; then install the cover. Install the cap screws; then using the pattern shown, tighten to 96 in.-lb.



FC134



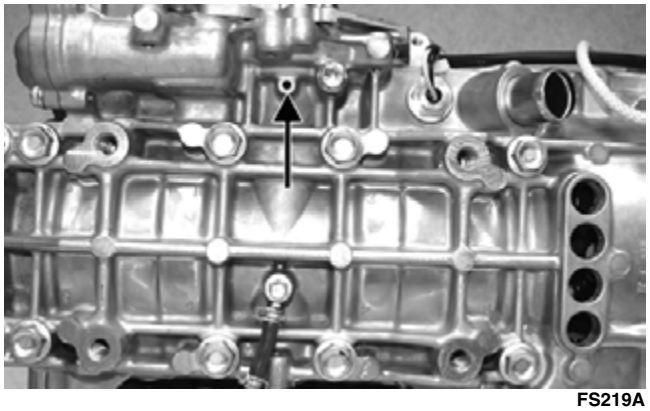
0742-304

Water Pump (800 cc)

DISASSEMBLING

■**NOTE: The engine must be removed for this procedure (see Section 2).**

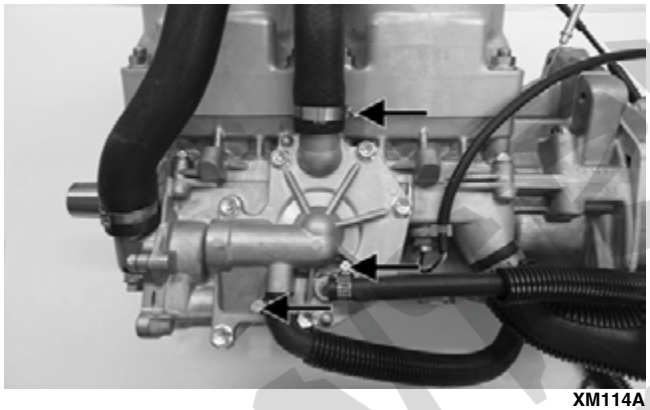
■**NOTE: A bleed hole is located in the crankcase beneath the water pump housing. If any signs of coolant leakage from the bleed hole exist, the water pump seals must be replaced.**



FS219A

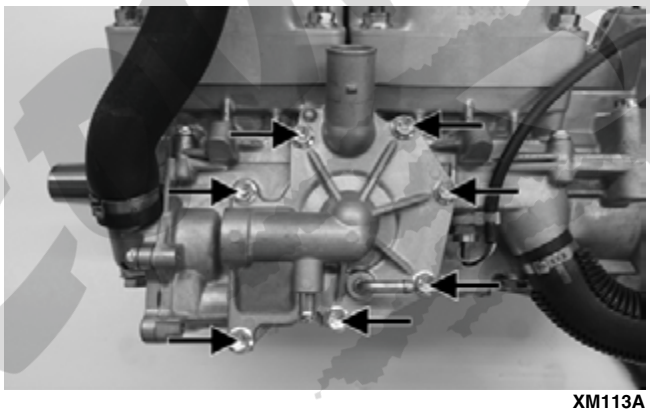
■NOTE: When servicing the water pump, use Water Pump Bearing and Seal Tool Kit and Oil Seal Protector Tool.

1. Loosen the clamps securing the coolant hoses to the water pump; then remove the hoses.



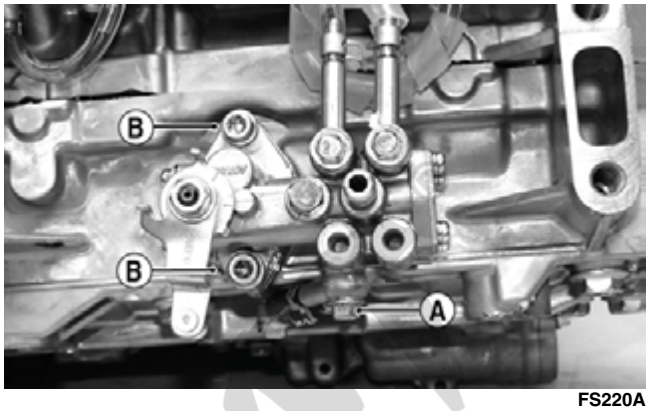
XM114A

2. Remove the seven cap screws securing the water pump cover; then remove the cover and account for the O-ring seal and two dowel pins.



XM113A

3. Remove the cap screw (A) securing the lower check valve to the oil pump and account for the two gaskets; then remove the two cap screws (B) securing the oil pump to the engine. Remove the pump.



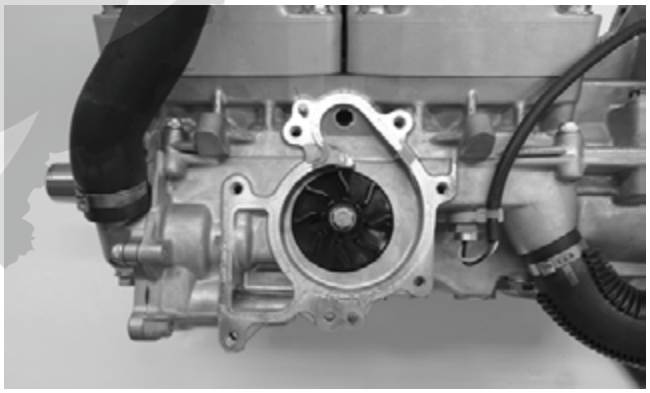
FS220A

■NOTE: Leave the two upper check valves secured to the pump.



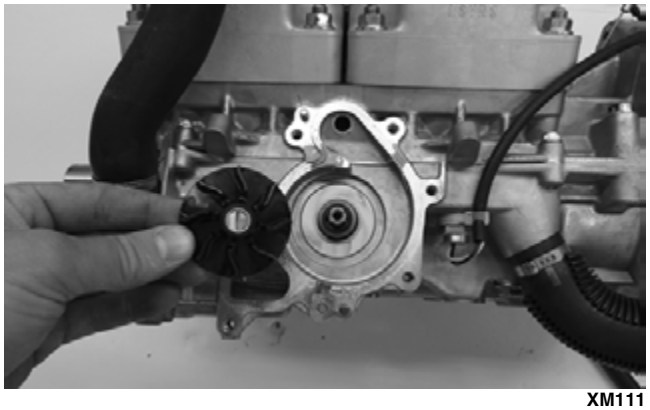
FS221A

4. Remove the cap screw securing the impeller. Account for the rubber washer and gasket behind the cap screw.



XM112

5. Remove the impeller from the shaft.



XM111

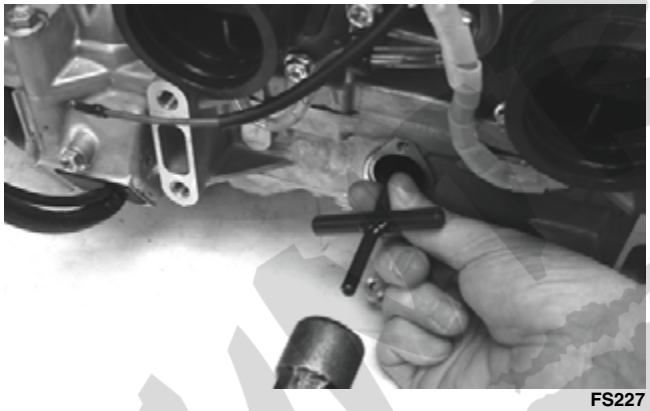
■**NOTE: If the impeller will not slide off the shaft, start the cap screw into the shaft and tap on the cap screw driving the shaft back out of the impeller.**

6. Remove the oil-injection pump retainer and shaft from the opposite side of the crankcase. Account for the shim located between the retainer and shaft flange.



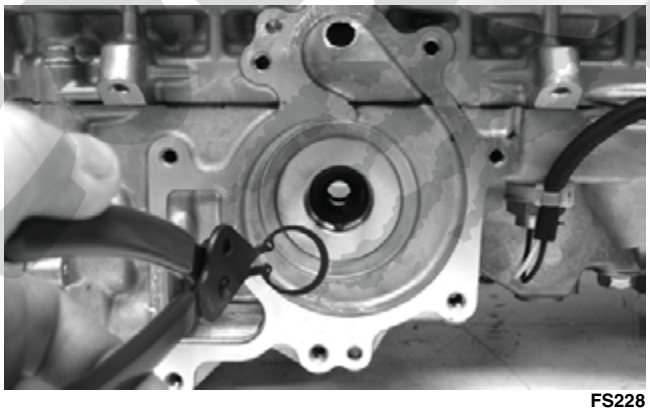
FS226

7. Using the long seal driver, drive the water pump mechanical seal from the crankcase.



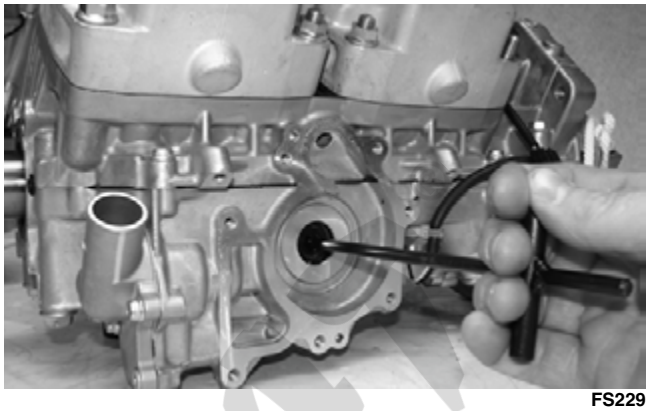
FS227

8. Using a pair of snap ring pliers, remove the snap ring securing the oil seal in the crankcase.



FS228

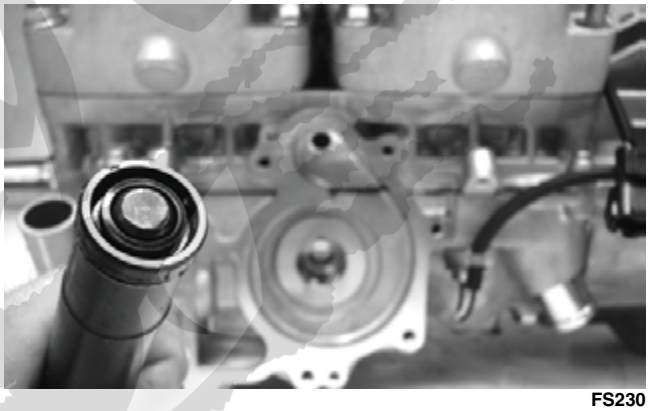
9. Using the hooked end of the long seal driver, pull the inner seal free of the crankcase.



FS229

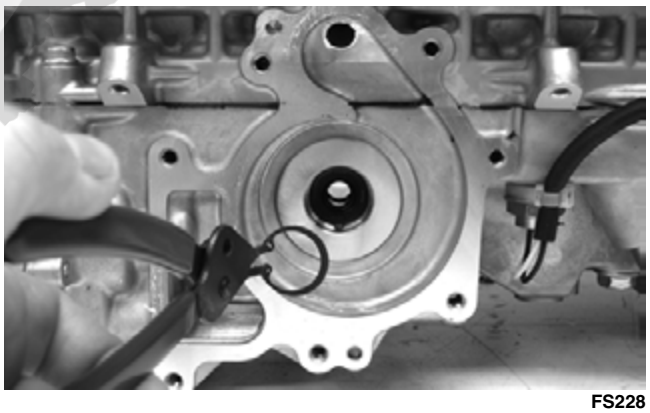
ASSEMBLING

1. Thoroughly clean the seal surfaces of the crankcase.
2. Position the oil seal onto the seal driver (spring side towards the crankshaft). Gently tap into position.



FS230

3. Apply a small amount of grease to the oil seal lips.
4. Using a pair of snap ring pliers, install the snap ring securing the oil seal in the crankcase.



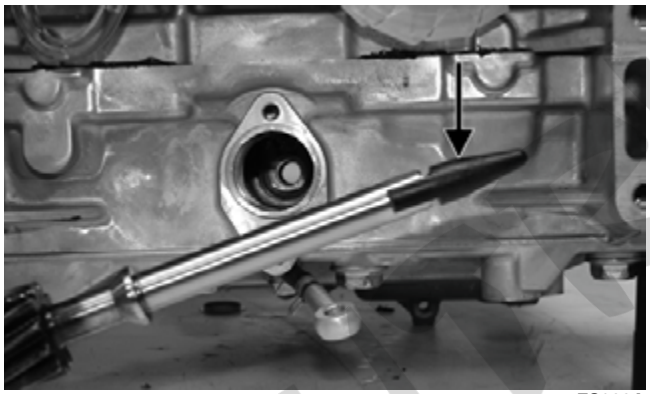
FS228

5. Using the seal driver, carefully install the outer water pump mechanical seal. Gently tap the seal down into position until it seats itself against the crankcase.

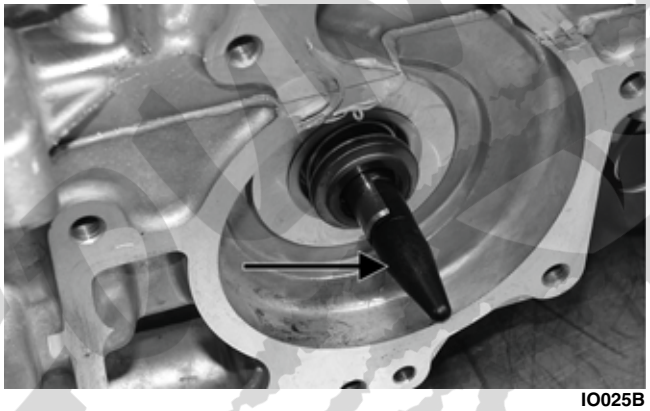


FS232

6. Apply a light coat of grease to the sealing surface of the oil-injection pump driveshaft; then install Oil Seal Protector Tool at the end of the shaft. Twist the shaft while pushing it through the oil and water pump seals until the shaft gear engages with the drive gear of the crankshaft; then remove the tool.

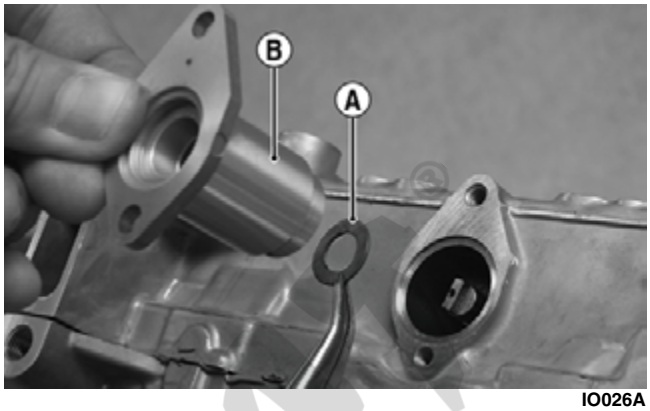


FS233A



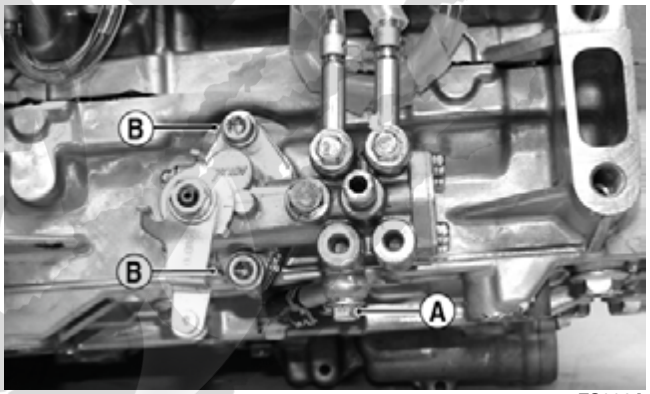
IO025B

7. Position the shim (A) on the oil pump end of the shaft; then with the O-ring in place on the retainer (B), install the oil-injection pump retainer.



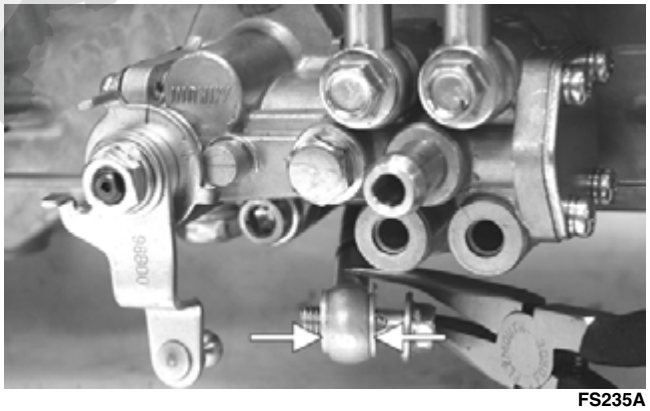
IO026A

8. With the O-ring in place on the oil-injection pump, align the pump with the shaft; then install the pump. Secure with the cap screws (coated with blue Loctite #243) (B) and tighten to 96 in.-lb. Place the lower check valve into position; then secure with the gaskets and cap screw (A). Tighten to 48 in.-lb.



FS220A

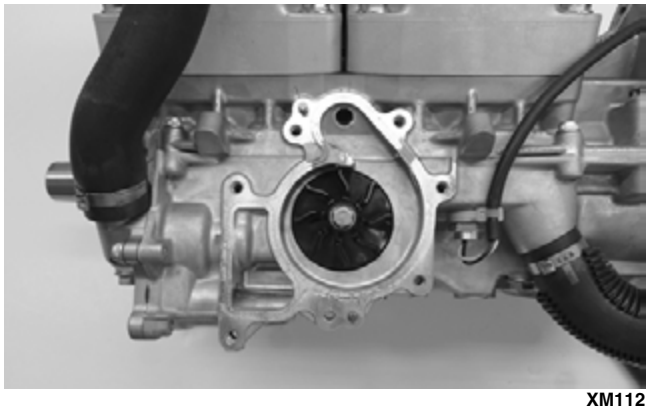
■**NOTE: When installing the lower check valve, assure that the gaskets are installed on each side of the valve.**



FS235A

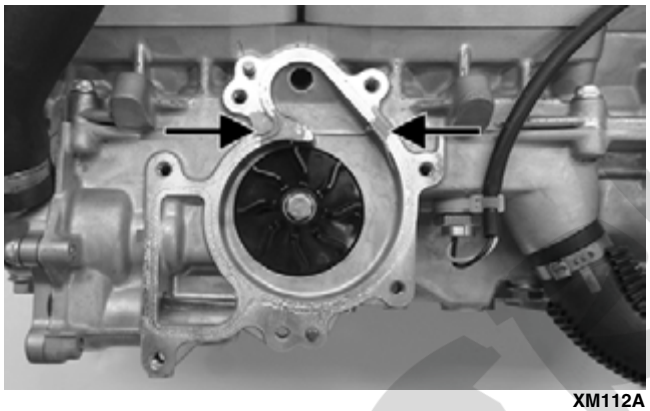
■**NOTE: After the oil pump has been secured, assure that the oil hoses from the pump to the intake flanges are routed properly.**

9. Place the impeller into position and secure with a cap screw and washer. Be sure the rubber side of the washer is directed towards the impeller. Apply blue Loctite #243 to the threads of the cap screw and tighten to 48 in.-lb.



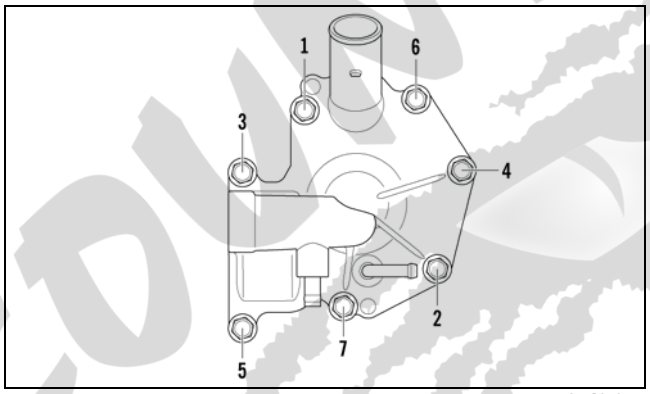
XM112

10. Apply sealant to the crankcase seam; then install the alignment pins into the crankcase (if removed).



XM112A

11. Position the O-ring into the water pump cover; then install the cover. Install the cap screws; then using the pattern shown, tighten to 96 in.-lb.



0742-257

12. Secure the hoses to the water pump cover.

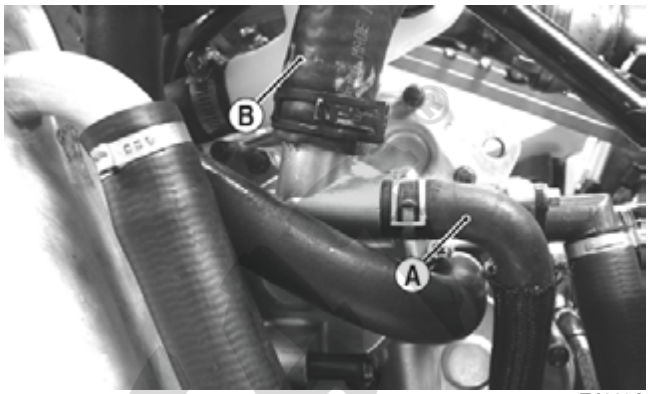
Water Pump (1100 cc)

⚠ WARNING

When servicing the water pump, disconnect the negative battery cable to avoid injury.

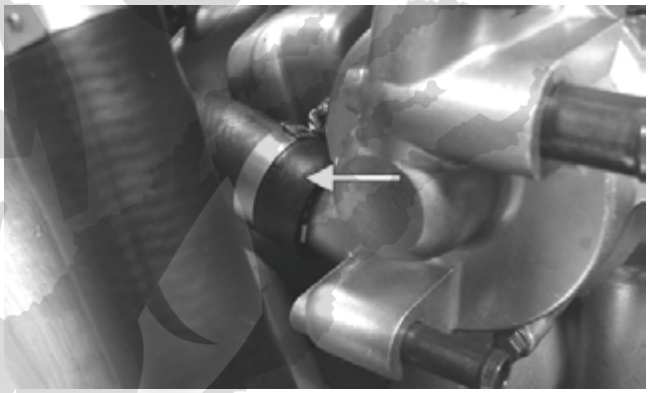
REMOVING

1. Drain the engine coolant (see the appropriate Liquid Cooling System in this section).
2. Remove the water bypass hose (A); then remove the coolant tank/engine hose (B).



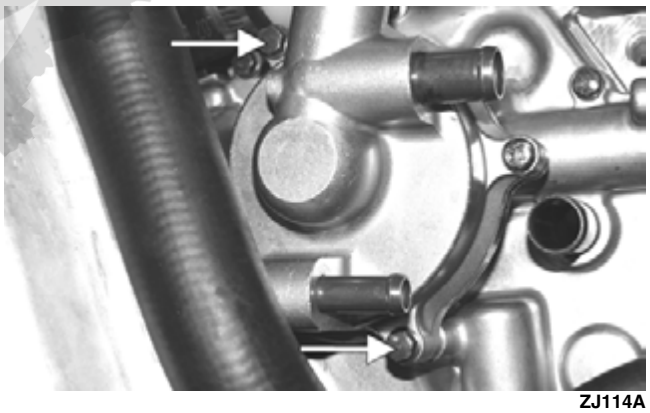
ZJ112A

3. Remove the separator tank breather hose to gain access to the water pump; then remove the water inlet hose from the water pump.



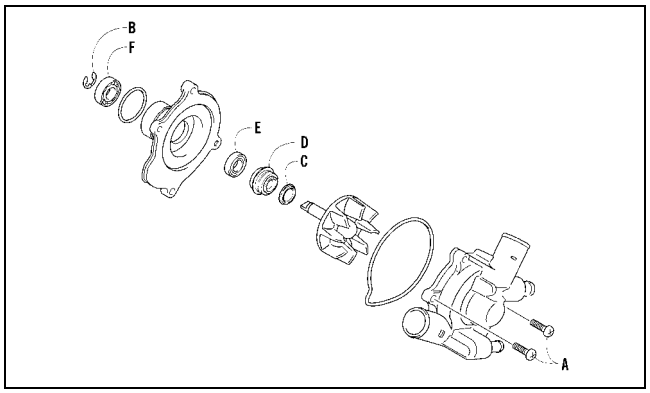
ZJ113A

4. Remove the two cap screws securing the water pump to the engine; then remove the pump and account for the O-ring.



ZJ114A

DISASSEMBLING/ASSEMBLING



0742-104

1. Secure the water pump in a suitable support device; then remove the two Phillips-head screws (A) securing the inner/outer pump housings.
2. Separate the inner/outer pump housings; then remove the E-clip (B) from the impeller shaft, remove the shaft from the inner housing, and remove the ceramic seal (C) from the shaft.
3. With the inner housing secured in a suitable clamping device and using Blind-Hole Bearing Puller, remove the mechanical seal (D); then remove the oil seal (E).

■NOTE: Apply heat to the housing to aid in removing the seals.

CAUTION

Do not apply excessive heat to the housing or the bushing next to the bearing may be damaged.

4. Using the bearing puller, remove the bearing (F) from the inner housing.

■NOTE: Apply heat to the housing to aid in removing the bearing.

CAUTION

Do not apply excessive heat to the housing or the bushing next to the bearing may be damaged.

5. Clean the inner and outer housings with parts-cleaning solvent; then dry with compressed air.

⚠ WARNING

Always wear safety glasses when drying components with compressed air.

■NOTE: For assembly, use Water Pump Bearing and Seal Tool Kit.

6. Using the appropriate-sized installation tool, install the bearing (F) into the inner housing.
7. Using the appropriate-sized installation tool, install the oil seal (E) with the spring side facing the bearing.
8. Place the mechanical seal (D) into the inner housing; then using the appropriate-sized installation tool, drive the seal into the housing until the lip of the seal is properly seated.
9. Install the ceramic seal (C) onto the impeller shaft with the ceramic face of the seal facing away from the impeller.
10. Install the impeller shaft into the inner housing and secure with the E-clip (B); then with a new O-ring properly positioned in the outer housing, place the water pump halves together.

■NOTE: Apply a light coat of grease on the O-ring to aid in keeping it properly positioned.

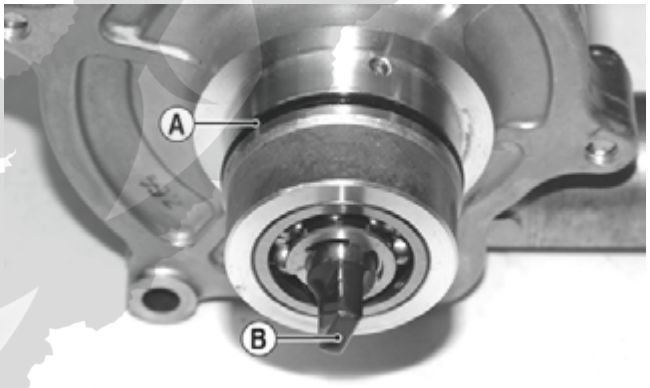
11. Secure the housings with the two Phillips-head screws (A); then tighten the screws with an impact driver.

CAUTION

Care should be taken not to over-tighten the screws with the impact driver or damage to the housings may occur.

INSTALLING

1. With a new O-ring (A) in place on the inner housing and the water pump shaft (B) properly aligned with the oil-feed pump shaft, install the water pump.



ZJ123A

2. With the water pump properly positioned, secure the pump with two cap screws and tighten to 84 in.-lb.
3. Install the water inlet hose and secure with the clamp; then install the separator tank breather hose and the remaining coolant hoses. Secure with the clamps.
4. Fill the cooling system (see appropriate Liquid Cooling System in this section).

Pressure Testing Engine

■NOTE: This engine leak-down test kit will aid in diagnosing internal engine mechanical problems. By introducing regulated compressed air into the cylinder, air leakage at the exhaust, throttle body, carburetor, and/or oil filler cap can be detected. Air bubbles in the cooling system can also be detected.

Typical Air Leakage/Air Bubbles/ Related Causes

- Exhaust System = Leaking Exhaust Valve
- Air Intake, Throttle Body, or Carburetor = Leaking Intake Valve
- Oil Filler Cap Leakage = Problem With Piston and/ or Piston Rings
- Air Bubbles in Cooling System = Leaking Head Gasket, Cracked Cylinder Head, or Cracked Engine Block

Preparation for Testing

1. If possible, make sure the engine is at operating temperature.
2. Remove the oil filler cap.
3. Remove the radiator cap.

CAUTION

Do not remove the radiator cap immediately after turning off the engine. Allow the engine to cool for several minutes; then with a towel over the radiator cap, slowly release the cap.

Testing Procedure

1. Remove all spark plugs from the engine.
2. Place and hold #1 cylinder at top-dead-center (TDC) on the compression stroke.
3. Install the tester hose into the spark plug hole.
4. Rotate the regulator knob on the tester several turns counterclockwise.
5. Connect an air hose to the tester and adjust the regulator knob clockwise to the **SET** position on the leakage gauge.

■NOTE: The gauge assembly has a special calibrated orifice in the connector. This connector MUST be utilized for the gauge to read accurately. It may be necessary to purchase a "quick-connect stud" to match an air chuck used in your shop. Secure the quick connect stud to the tester connector threads.

6. Connect the tester to the hose installed on the cylinder; then read the indication on the gauge.

■NOTE: The reading must be in the green range. If reading is in the yellow range, the engine will be down on power or hard to start. If in the red range, the engine must be repaired.

7. Repeat the test on the remaining cylinder(s) (if applicable).

■NOTE: Be sure to refer to the information in Typical\ Air Leakage/Air Bubbles/Related Causes to determine the specific problem and its related cause.

Checking Compression (1100 cc)

■NOTE: Prior to this test procedure, verify the battery is fully charged and the console is positioned over the support bracket with the hood/main harness plugged in.

■NOTE: This test must be done with the engine at operating temperature and "full-cranking RPM" and the decompression system active.

With the spark plugs removed, install the compression tester gauge with adapter into the spark plug hole; then with the throttle valve in the full-open position, crank the engine over to get the psi reading. Compression should be 120 psi.

CAUTION

Do not ground the spark plug on the cylinder head cover. The cover is made of magnesium and any contact with spark or electrical arc will severely pit the surface.

■NOTE: Verify both cylinder compression readings are within 10% of each other.

Changing Oil/Filter (F/M/XF 1100 cc)

⚠ WARNING

Care must be taken if a hot drain plug is removed by hand. Burning could occur.

■NOTE: For this procedure, disconnect the hood harness and the air intake connector from the air silencer; then remove the cables and pins securing the hood to the front end, remove the hood, and remove the access panels.

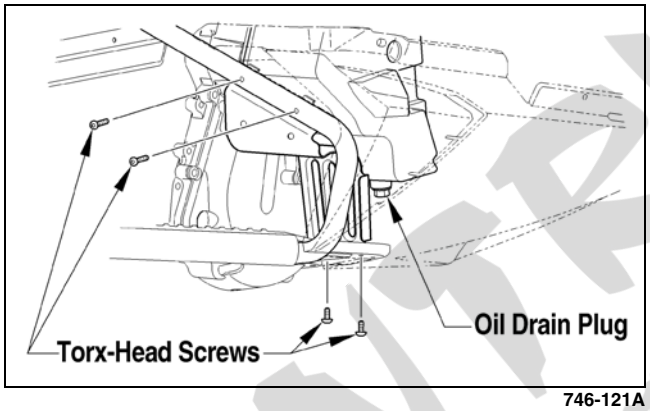
1. Park the snowmobile on a level surface; then start the engine and allow it to warm up for 5-10 minutes, or if the snowmobile was operated, allow the engine to idle for approximately 30 seconds. Shut the engine off.
2. Remove the torx-head screws and the access plate from beneath the snowmobile.
3. Place a drain pan beneath the engine oil pan drain plug; then remove the plug and allow the oil to drain completely.



PC010A

4. Install the engine oil drain plug with a new gasket; then tighten the plug to 16 ft-lb.

5. Remove the four torx-head screws securing the right-side footrest to the tunnel and the support; then with a drain pan in position, remove the drain plug from the oil reservoir.



746-121A

■NOTE: To aid in draining the oil from the reservoir, position a funnel between the reservoir and the opening of the tunnel running board.

6. After the oil has drained completely, install the drain plug with a new O-ring and tighten to 16 ft-lb.

7. Using Oil Filter Wrench, loosen (but do not remove) the oil filter and allow the oil to drain from the filter into the drain pan; then remove the filter.

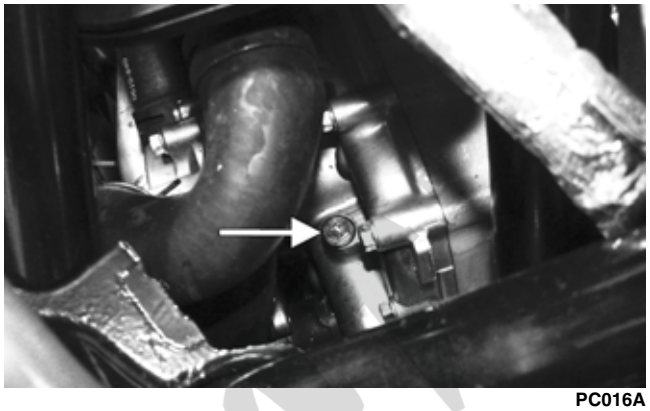
■NOTE: On the turbo models, the oil filter is accessible between the front opening of the chassis and the lower intercooler hose.

8. Apply a light coat of fresh engine oil to the seal of the new oil filter.

9. Install the new oil filter by turning the oil filter by hand until the seal has contacted the oil filter mounting surface; then tighten the oil filter to 15 ft-lb. Remove the drain pan.

10. Pour 2.9 l (3 U.S. qt) of the recommended engine oil into the oil reservoir.

11. Open the air bleed bolt located on the oil pump (beneath the coolant tank) to purge air from the oil hose.



PC016A

■NOTE: When air can no longer be heard purging from oil pump bleed, tighten the bleed bolt to 7.5 ft-lb.

CAUTION

Do not attempt to start the engine with the bleed bolt open.

12. Without starting the engine, place the handlebar emergency stop switch to the RUN position and the ignition switch to the ON position. The Oil Pressure Warning Icon should illuminate immediately on the standard gauge or after the three seconds on the premium gauge.

■NOTE: If the warning icon does not illuminate, place the ignition switch in the OFF position and repeat step 11; then place the ignition switch in the ON position and repeat step 12.

13. If the warning icon illuminates (from step 12), start the engine. The warning icon should go out within five seconds. If it does, let the engine run for 5-10 minutes; then proceed to step 14.

■NOTE: If the warning icon does not go out, shut the engine off immediately and repeat step 11; then place the ignition switch to the ON position and repeat step 13.

14. Shut the engine off; then add oil to the oil reservoir until oil is visible halfway up in the sight glass.

15. Install the access plate and torx-head screws beneath the snowmobile; then install the hood and access panels.

Changing Oil/Filter (Bearcat/T-Series 1100 cc)

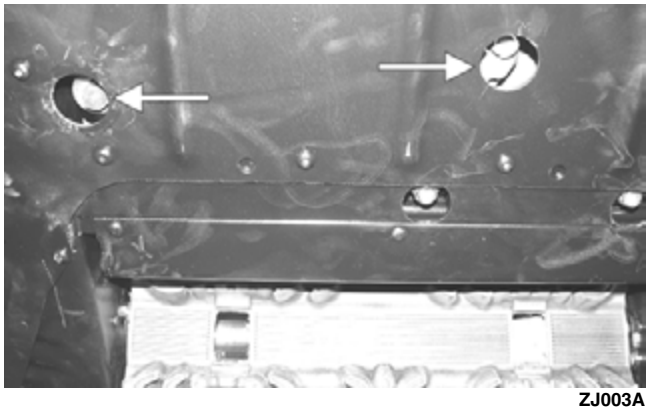
⚠ WARNING

Care must be taken if a hot drain plug is removed by hand. Burning could occur.

1. Using a putty knife, remove the belly pan plug.

2. Park the snowmobile on a level surface; then start the engine and allow it to warm up for 10-15 minutes, or if the snowmobile was operated, allow engine to idle for approximately 30 seconds.

3. Shut the engine off; then place drain pans beneath both engine oil drain plugs (crankcase and oil reservoir).



ZJ003A

4. Remove the drain plugs and allow the oil to drain completely. Remove the strainer from the oil reservoir to allow the oil to drain completely.

5. Install the oil strainer, drain plugs, and new washers and tighten to 15 ft-lb.

6. Install a new belly pan plug.

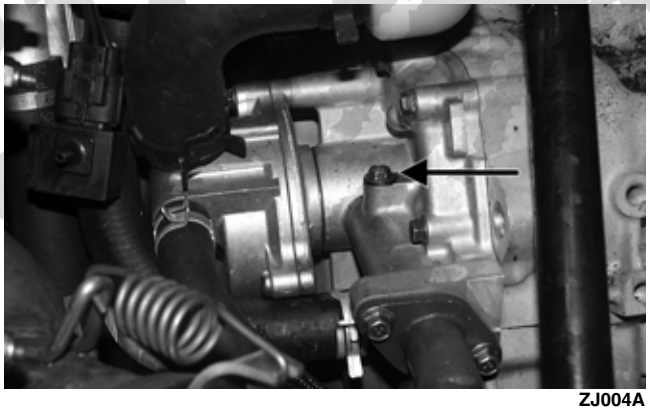
7. Using Oil Filter Wrench, loosen (but do not remove) the oil filter and allow the oil to drain from the filter; then remove the filter.

8. Apply a light coat of fresh engine oil to the seal of the new oil filter.

9. Install the new oil filter by turning the oil filter by hand until the seal has contacted the oil filter mounting surface; then tighten the oil filter to 15 ft-lb.

10. Pour 2.9 l (3 U.S. qt) of the recommended engine oil into the oil reservoir.

11. Open the air bleed bolt located on the oil pump (beneath the coolant tank) to purge air from the oil hose.



ZJ004A

■NOTE: When air can no longer be heard purging from oil pump bleed, tighten the bleed bolt to 96 in.-lb.

12. Without starting the engine, place the handlebar emergency stop switch to the RUN position and the ignition switch to the ON position. The Oil Pressure Warning Light should illuminate.

13. If the warning light illuminates (from step 12), start the engine. The warning light should go out within five seconds. If it does, proceed to step 14.

■NOTE: If the warning light does not go out, shut the engine off immediately and repeat step 11; then place the ignition switch to the ON position and repeat step 13.

14. Shut the engine off and pour the remaining amount (0.9 l or 1 U.S. qt) of recommended oil into the oil reservoir; then proceed to check the oil level to verify and finalize the procedure.

Testing Oil Pressure (1100 cc)

The Low Oil Pressure Warning Light indicates engine oil pressure, not the oil level; however, if the oil level is low, it may affect oil pressure. The light should illuminate each time the ignition switch is turned to RUN or START, and it should go out when the engine starts. If the light stays illuminated or it illuminates while the engine is running, oil pressure has been lost and the engine will automatically shut off.

If oil pressure is lost, first verify oil level is correct. After adding oil, oil pressure should be normal. If not proceed to step 1.

1. Locate the oil pressure sensor below the thermostat coolant hose; then disconnect the plug-in connector from the sensor.



ZJ128B



PC239A

2. Using a 24 mm wrench, remove the oil pressure sensor from the engine.
3. Using an oil pressure gauge and adapter, thread the adapter into the oil pressure sensor hole and tighten securely.
4. Start the engine, run at 4000 RPM, and observe the oil pressure. The engine oil pressure specification is 29 psi ± 20%.

■NOTE: This test must be done with the engine at running temperature.

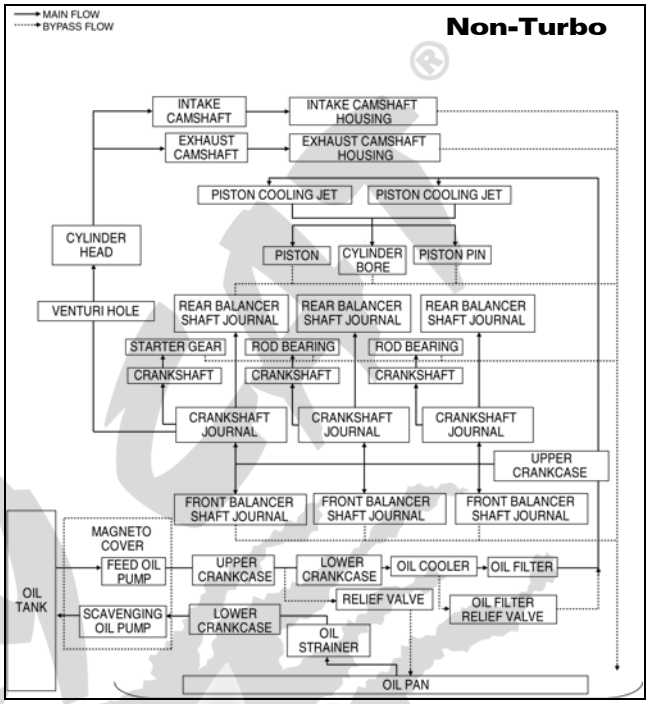
5. After verifying oil pressure, remove the adapter and gauge from the engine, install the sensor, and tighten to 120 in.-lb. Start the engine and check for oil leaks.

■NOTE: Before installing the sensor, it may be necessary to apply thread sealant or teflon tape to the sensor threads.

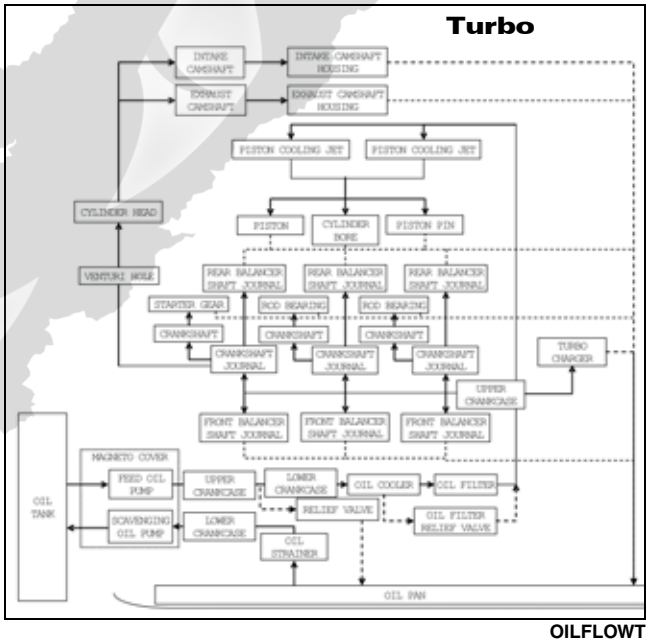
CAUTION

Take care not to allow thread sealant or teflon tape into the oil passage or severe engine damage will occur.

Oil Flow Chart (1100 cc)



SNO2170



OILFLOWT

Liquid Cooling System (500/800 cc)

The liquid cooling system consists of heat exchangers, water pump, coolant temperature sensor, and thermostat. The system should be inspected for leaks or damage whenever an overheating problem is experienced.

DRAINING COOLING SYSTEM (800 cc)

1. Remove the right- and left-side panels; then disconnect the hood harness and remove all torx-head screws and quarter turn securing the hood. Remove the hood.
2. With the engine cool, remove the coolant cap; then using a suitable coolant vacuum pump, remove as much coolant as possible from the filler neck.



PC225A

3. Remove all springs securing the expansion chamber; then with the expansion chamber removed, loosen the clamp securing the lower coolant hose behind the engine. Remove as much coolant as possible using the coolant vacuum pump.



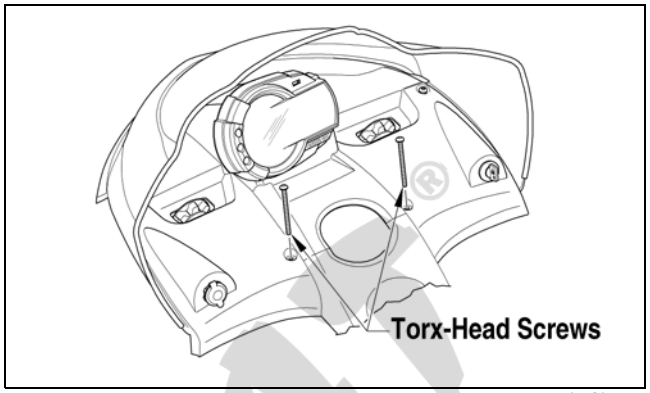
PC226A

■NOTE: Raising the rear end of the snowmobile will aid in removing all coolant from the heat exchangers.

4. Once the coolant has completely drained, secure the lower coolant hose using the existing clamp.

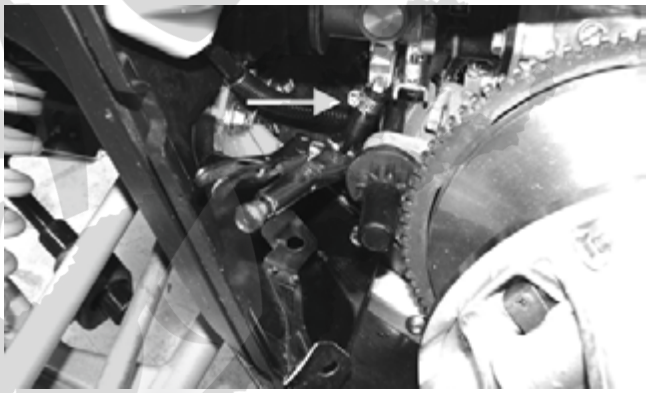
DRAINING COOLING SYSTEM (500 cc)

1. Open the hood and remove the left-side access panel and the belt guard; then remove the torx-head screws securing the console.



0743-777

2. Lift the rear of the console and disconnect the console/main harness plug-in; then remove the console.
3. Using a small vise-grip pliers, clamp off the coolant hose connected to the PTO-side throttle body; then loosen the hose clamp.



FS236A

4. Place a towel beneath the coolant hose and remove the hose from the throttle body.
5. Using Vacuum Test Pump and proper-sized hoses, connect the pump to the throttle body coolant hose.
6. Remove the vise-grip pliers from the coolant hose and the cap from the coolant tank; then pump the coolant from the system.

FILLING COOLING SYSTEM

1. Elevate the front of the snowmobile 30-60 cm (12-14 in.).
2. Remove the coolant tank cap and check coolant level. The coolant tank should be filled to the coolant level line.
3. Install the coolant tank cap; then start the engine. Run the engine at 3000-3500 RPM until the bottom heat exchangers become hot to the touch. Stop the engine and allow the system to cool.

■NOTE: On the F-Series prior to starting the engine, connect the console/main harness plug-in and place the console in position. Do not secure the console with the torx-head screws at this time.

4. Lower the front of the snowmobile and elevate the rear of the snowmobile 12-14 in. Repeat the procedures in step 3.

5. Check the coolant level. Add coolant as required to the coolant tank (coolant tank should be filled to coolant level line). Repeat procedure until coolant level stabilizes in the coolant tank.

CAUTION

The cooling system must be properly filled. If the system isn't properly filled, piston damage will occur.

■NOTE: If coolant is required, mix coolant for a temperature of -36°C (-34°F). Follow mixing recommendations of the manufacturer of the coolant.

■NOTE: At this point on the F-Series, secure the console with the torx-head screws.

INSPECTING COOLANT HOSES AND CLAMPS

All coolant hoses and connections should be checked annually for deterioration, cracks, and wear.

All coolant hoses and clamps should be replaced every four years.

INSPECTING THERMOSTAT

1. Inspect the thermostat for corrosion, wear, or spring damage.
2. Using the following procedure, inspect the thermostat for proper operation.
   a. Suspend the thermostat in a container filled with water; then heat the water and monitor the temperature with a thermometer.
   b. The thermostat should open at 30°C (86°F). Once the thermostat starts to open, remove the thermostat and allow it to cool down verifying it has returned to the fully closed position.

CAUTION

Never heat the thermostat to the fully open position or damage to the thermostat may occur.

Liquid Cooling System (1100 cc)

The liquid cooling system consists of a heat exchanger, water pump, and thermostat. The system should be inspected for leaks or damage whenever an overheating problem is experienced.

DRAINING COOLING SYSTEM

1. Open the right-side access panel.
2. Remove the hardware securing the exhaust resonator; then remove the resonator.
3. Remove the hose clamp from the coolant hose (A) connecting the water pump to the right side of the oil cooler. Clamp off the coolant hose; then with a drain pan positioned under the coolant hose, remove the hose from the water pump and tip the hose downward allowing the coolant to drain completely.



SNO-728A

4. Apply 5-8 psi to the coolant system through the coolant overflow tube and continue until the coolant stops draining from the system.

FILLING/BLEEDING COOLING SYSTEM

1. Remove the left- and right-side access panels and hood; then on the Bearcat/T-Series, remove the torx-head screws securing the console.

■NOTE: On F/M/XF models, place the hood along side the snowmobile; then using Hood Harness Extension, connect the hood to the main harness.

2. On the Bearcat/T-Series, move the console up and forward; then with the harness connected, securely position the console on the snowmobile.

CAUTION

Use care not to allow the console harness to come into contact with the exhaust pipe during this procedure.

3. On Bearcat models, remove the headlight support bracket/heat shield.
4. On the T-Series Turbo model, loosen the cap screws securing the heat shield to the exhaust manifold/turbocharger; then using a deep socket and hammer, tap the washers making sure that the washers are free from the head of the cap screws. Remove the cap screws and move the heat shield to access the bleed screw.

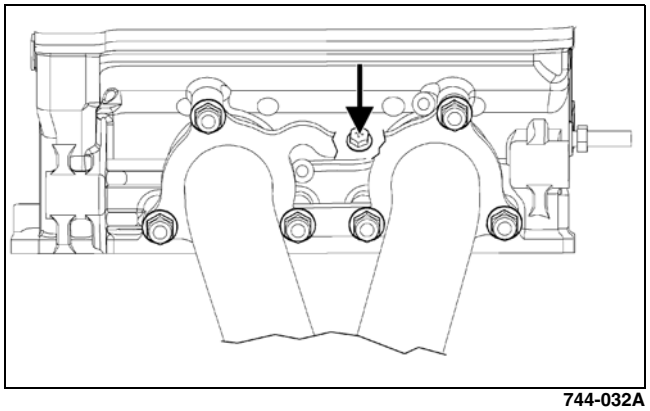
CAUTION

Make sure the washers are free from the heat shield cap screws or damage to the heat shield will occur.

5. Loosen the bleed screw and add coolant into the filler neck until coolant is visible at the bleed screw; then tighten the bleed screw and add coolant to the coolant reservoir Full-Cold line.

CAUTION

The cooling system must be properly filled. If the system isn't properly filled, engine damage will occur.



744-032A

6. Start the engine and allow it to run for five minutes.
7. With the engine cool, loosen the bleed screw and allow the coolant level in the filler neck to drop; then with the bleed screw loose, add coolant into the filler neck until no air is visible or heard at the bleed screw. Tighten the bleed screw and add coolant to the reservoir if necessary.

■NOTE: If the coolant level in the filler neck suddenly drops when the bleed screw is loosened, an air-lock occurred in the cylinder head. Add coolant to the filler neck until full before starting the engine.

CAUTION

Running the engine with low coolant level can cause severe engine damage.

8. Start the engine and allow it to run for five minutes; then shut the engine off and allow it to cool.
9. Repeat steps 7-8 at least two more times (more if necessary) until no air is in the cooling system.

CAUTION

Operating the snowmobile with air in the cooling system will cause severe damage to the engine.

10. On the Bearcat models, install the headlight support bracket/heat shield.
11. On the T-Series Turbo model, place the heat shield into position and secure with the cap screws. Tighten the cap screws to 96 in.-lb.

■NOTE: Apply a film of anti-seize to the threads of the heat shield cap screws before installing.

12. On the Bearcat/T-Series, secure the console using the existing torx-head screws and install the hood and side panels.
13. On the F/M/XF, install the hood and both side panels.

INSPECTING COOLANT HOSES AND CLAMPS

All coolant hoses and connections should be checked annually for deterioration, cracks, and wear.

All coolant hoses and clamps should be replaced every four years.

INSPECTING THERMOSTAT

1. Inspect the thermostat for corrosion, wear, or spring damage.
2. Using the following procedure, inspect the thermostat for proper operation.
   A. Suspend the thermostat in a container filled with water; then heat the water and monitor the temperature with a thermometer.
   B. The thermostat should open at 75° C (167° F). Once the thermostat starts to open, and allow it to cool down verifying it has returned to the fully closed position.

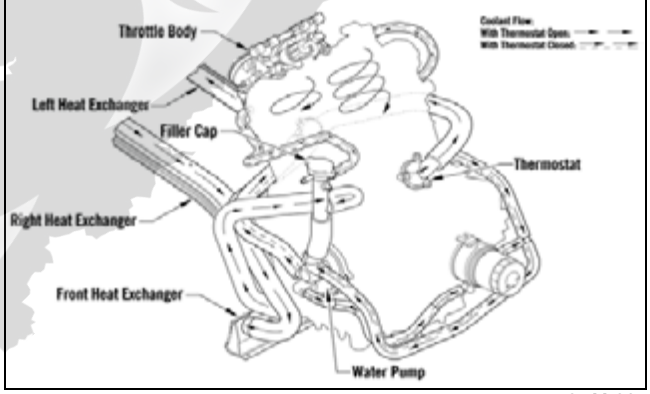
CAUTION

Never heat the thermostat to the fully open position or damage to the thermostat may occur.

Cooling System Schematics

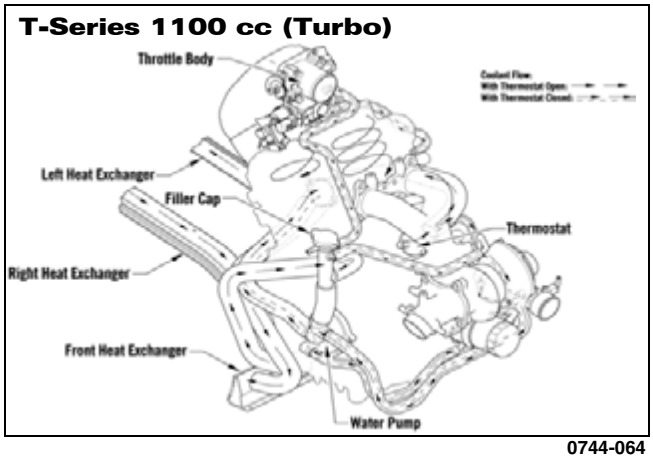
The following schematics are representative of the different styles of cooling systems in the Arctic Cat snowmobiles. Some components may vary from model to model; therefore, the technician should use discretion and sound judgment when servicing a particular cooling system.

Bearcat/T-Series 1100 cc (Non-Turbo)



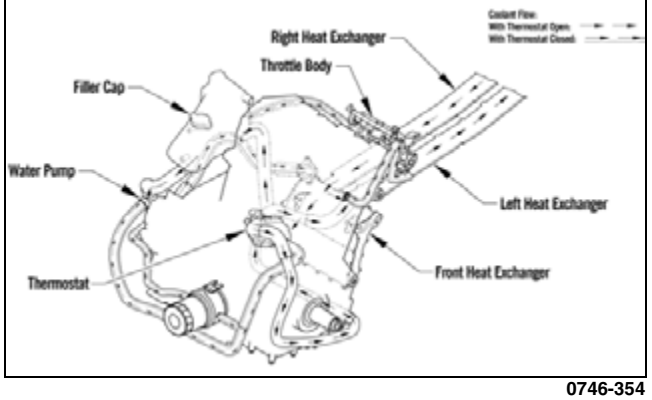
0744-065

T-Series 1100 cc (Turbo)



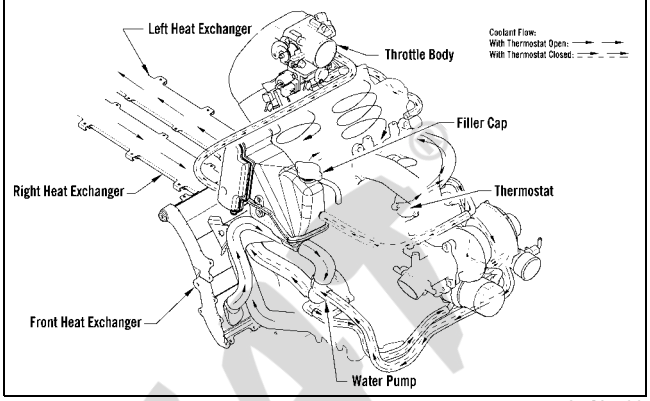
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F/XF/M 1100 cc (Non-Turbo)



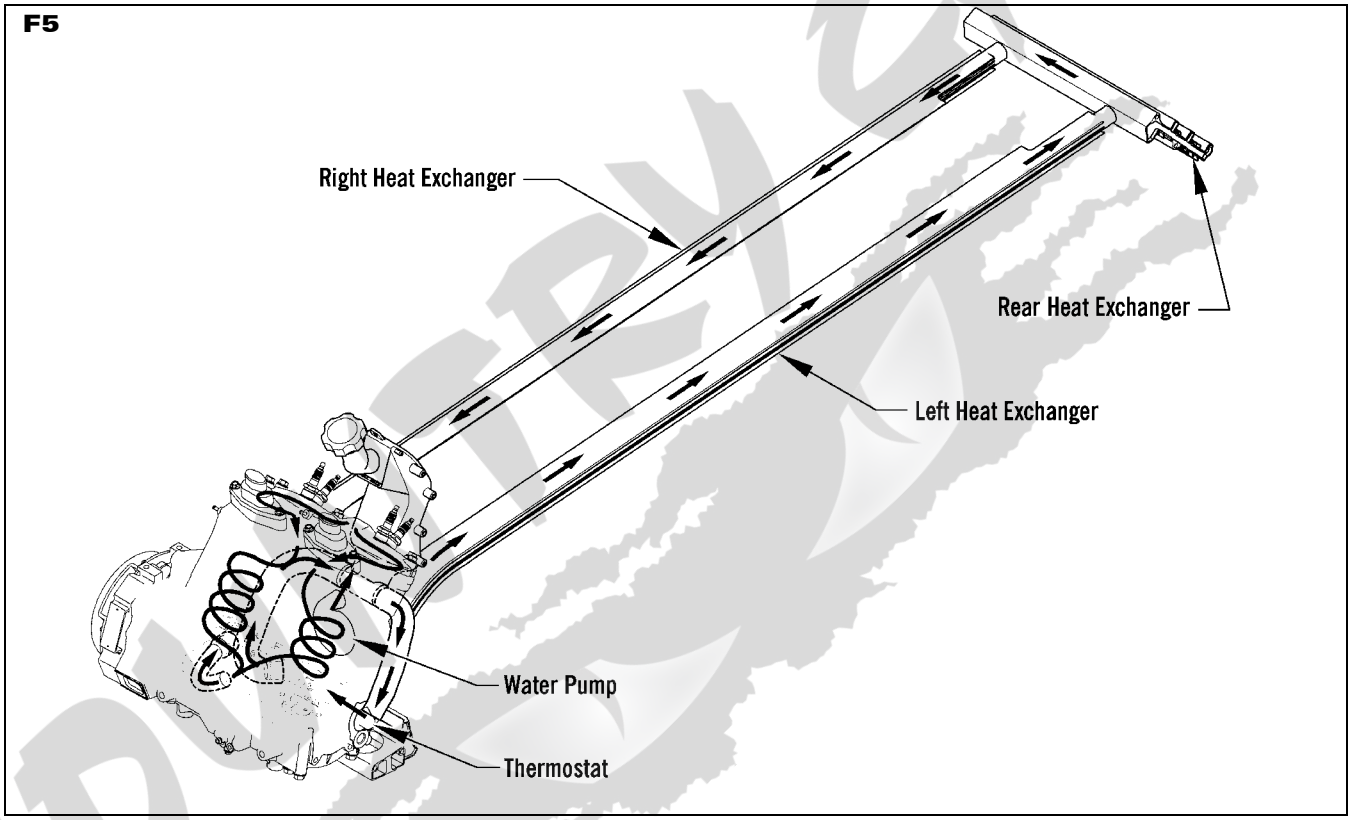
0746-354

F/XF/M 1100 cc (Turbo)



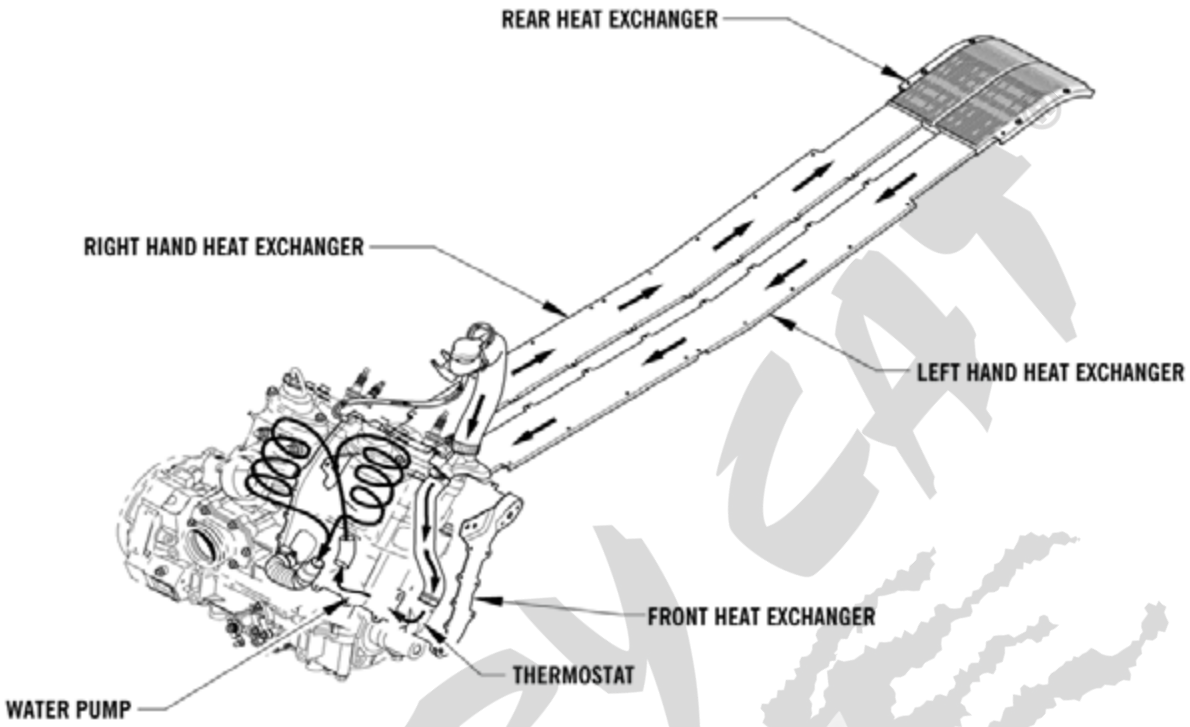
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F5



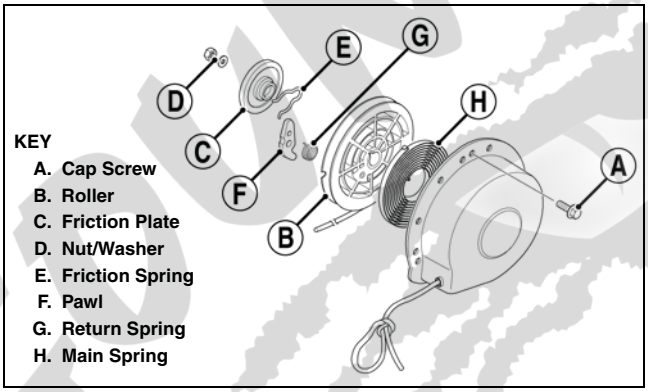
0742-314

800 cc



0746-520

Recoil Starter (500 cc)



741-066A

REMOVING

1. Tie a slip-knot in the starter rope below the console and allow the rope to slowly retract against the starter case.
2. Remove the knot at the handle, remove the handle, and account for the handle cap; then thread the rope through the bushing in the console.
3. Remove the cap screws (A) securing the starter assembly to the magneto case; then remove the starter assembly.

DISASSEMBLING

⚠ WARNING

Always wear safety glasses when servicing the recoil starter.

1. Secure the recoil starter in a vise.

⚠ WARNING

During the disassembly procedure, continuous downward pressure must be exerted on the reel so it does not accidentally disengage and cause injury.

2. Rotate the roller (B) counterclockwise until the notch of the roller is near the rope guide in the case. Guide the rope into the notch and slowly allow the roller to retract until all recoil spring tension is released.

⚠ WARNING

Care must be taken when allowing the recoil roller to unwind. Make sure all spring tension is released before continuing.

3. While exerting downward pressure on the friction plate (C), remove the nut and washer (D).
4. Slowly release the plate and lift the plate with friction spring (E) free of the recoil roller; then remove the friction spring from the plate.
5. Remove the pawl (F); then remove the return spring (G).

6. Carefully lift the roller free of the case making sure the main spring (H) does not disengage from the case.

⚠ WARNING

Care must be taken when lifting the roller free of the case.

7. Remove the main spring (H) from the case by lifting the spring end up and out. Hold the remainder of the spring with thumbs and alternately release each thumb to allow the spring to gradually release from the case.

■NOTE: Do not remove the main spring unless replacement is necessary. It should be visually inspected in place to save time.

8. Unwind the rope from the roller, untie the slip-knot, and remove the rope.

CLEANING AND INSPECTING

1. Clean all recoil starter components.
2. Inspect all springs, washers, and pawl for wear or damage.
3. Inspect the roller and case for cracks or damage.
4. Inspect the center hub for wear, cracks, or damage.
5. Inspect the rope for breaks or fraying.
6. Inspect the main spring for cracks, crystallization, or abnormal bends.
7. Inspect the handle for damage, cracks, or deterioration.

ASSEMBLING

1. Hook the end of the main spring around the mounting lug in the case.
2. Insert the main spring into the case; then wind it in a counterclockwise direction until the complete spring is installed.

■NOTE: The main spring must seat evenly in the recoil case.

3. Insert the rope through the hole in the roller and tie a knot in the end; then wrap the rope counterclockwise around the roller leaving approximately 20 in. of rope free of the roller.
4. Apply low-temperature grease to the main spring and hub.
5. Align the hook in the end of the main spring with the notch in the roller; then carefully slide the roller over the hub and engage the spring with the roller.
6. Install the return spring making sure the end is properly installed in the hole in the roller; then install the pawl making sure the return spring is properly preloaded.
7. Slide the end of the rope through the rope guide of the case; then tie a slip-knot in the rope.
8. Place the friction spring into position on the friction plate making sure the head of the spring is opposite the flat of the inner hole. Apply a low-temperature grease to the plate.
9. Place the plate into position making sure the flat of the inner hole is correctly positioned in the hub. Apply blue Loctite #243 to the threads; then secure the plate with a washer and nut. Tighten the nut to 11 ft-lb.
10. With 20 in. of rope exposed, hook the rope in the notch of the roller.
11. Rotate the roller four or five turns counterclockwise; then release the rope from the notch and allow the rope to retract.
12. Pull the rope out two or three times to check for correct tension.

■NOTE: Increasing the rotations in step 12 will increase spring tension.

INSTALLING

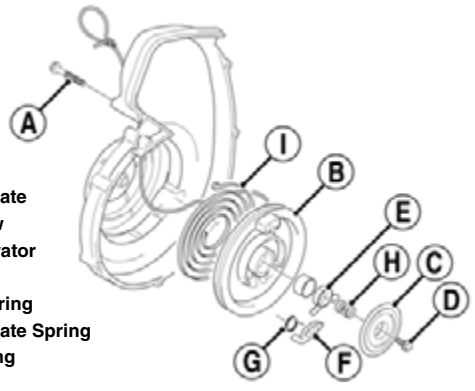
1. Place the starter assembly into position against the magneto case; then secure the starter with cap screws. Tighten to 96 in.-lb.

■NOTE: Before tightening the cap screws, slowly pull the recoil rope until the pawl engages; then tighten the cap screws centering the recoil against the magneto case.

2. Thread the rope through the bushing in the console; then install the handle and secure with a knot. Seat the cap.
3. Release the slip-knot in the rope.

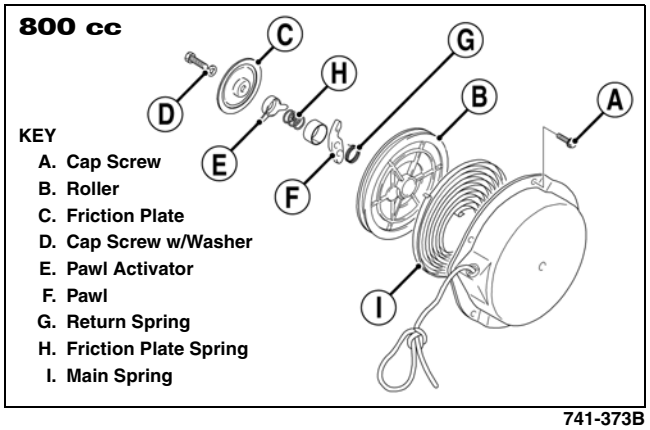
Recoil Starter (570/800 cc)

570 cc



KEY
- A. Cap Screw
- B. Roller
- C. Friction Plate
- D. Cap Screw
- E. Pawl Activator
- F. Pawl
- G. Return Spring
- H. Friction Plate Spring
- I. Main Spring

743-711A



741-373B

REMOVING

1. Tie a slip-knot in the starter rope below the console and allow the rope to slowly retract against the starter case.
2. Remove the knot at the handle, remove the handle, and account for the handle cap; then thread the rope through the bushing in the console.
3. Remove the cap screws (A) securing the starter assembly to the magneto case; then remove the starter assembly.

DISASSEMBLING

⚠ WARNING

Always wear safety glasses and gloves when servicing the recoil starter.

1. Secure the recoil starter in a vise.

⚠ WARNING

During the disassembly procedure, continuous downward pressure must be exerted on the reel so it does not accidentally disengage and cause injury.

2. Rotate the roller (B) counterclockwise until the notch of the roller is near the rope guide in the case. Guide the rope into the notch and slowly allow the roller to retract until all recoil spring tension is released.

⚠ WARNING

Care must be taken when allowing the recoil roller to unwind. Make sure all spring tension is released before continuing.

3. While exerting downward pressure on the friction plate (C), remove the cap screw (570 cc) or cap screw with washer (800 cc) (D).
4. Slowly release the friction plate and lift the plate with pawl activator (E) free of the recoil roller; then remove the pawl activator from the friction plate.
5. Remove the pawl (F) and the return spring (G); then remove the friction plate spring (H).
6. Carefully lift the roller free of the case making sure the main spring (I) does not disengage from the case. Account for the bushing.

⚠ WARNING

Care must be taken when lifting the roller free of the case.

7. Remove the main spring from the case by lifting the spring end up and out. Hold the remainder of the spring with thumbs and alternately release each thumb to allow the spring to gradually release from the case.

■NOTE: Do not remove the main spring unless replacement is necessary. It should be visually inspected in place to save time.

8. Unwind the rope from the roller, untie the slip-knot, and remove the rope.

CLEANING AND INSPECTING

1. Clean all recoil starter components.
2. Inspect springs and pawl for wear or damage.
3. Inspect the roller and case for cracks or damage.
4. Inspect the center hub for wear, cracks, or damage.
5. Inspect the rope for breaks or fraying.
6. Inspect the main spring for cracks, crystallization, or abnormal bends.
7. Inspect the handle for damage, cracks, or deterioration.

ASSEMBLING

1. Hook the end of the main spring around the mounting lug in the case.
2. Insert the main spring into the case; then wind it in a counterclockwise direction until the complete spring is installed.

■NOTE: The main spring must seat evenly in the recoil case.

3. Insert the rope through the hole in the roller and tie a knot in the end; then wrap the rope counterclockwise around the roller leaving approximately 20 in. of rope free of the roller.
4. Apply low-temperature grease to the main spring and hub.
5. Align the hook in the end of the main spring with the notch in the roller.
6. Carefully slide the roller over the hub and engage the spring with the roller; then install the bushing.
7. Install the return spring making sure the short leg of the spring is properly installed in the hole in the roller; then install the pawl making sure the return spring is properly positioned in the notch of the pawl.
8. Slide the end of the rope through the rope guide of the case; then tie a slip-knot in the rope.

9. Apply a low-temperature grease to the friction plate. Place the pawl activator into position on the friction plate making sure the arms of the activator are properly positioned to the pawl.
10. Place the friction plate into position allowing it to rest on the friction plate spring; then install the cap screw/cap screw w/washer (coated with blue Loctite #243) and thread the cap screw in until it contacts the friction plate.
11. Press down on the friction plate and tighten the cap screw to 48 in.-lb (570 cc) or to 15 ft-lb (800 cc).
12. With 20 in. of rope exposed, hook the rope in the notch of the roller.
13. Rotate the roller four or five turns counter-clockwise; then release the rope from the notch and allow the rope to retract.
14. Pull the rope out two or three times to check for correct tension.

■NOTE: Increasing the rotations in step 13 will increase spring tension.

INSTALLING

1. Place the starter assembly into position against the magneto case.
2. On the 570 cc, secure the starter with cap screws (coated with blue Loctite #243). Tighten to 60 in.-lb. On the 800 cc, secure the starter with cap screws. Tighten to 96 in.-lb.

■NOTE: Before tightening the cap screws, slowly pull the recoil rope until the pawl engages; then tighten the cap screws centering the recoil against the magneto case.

3. Thread the rope through the bushing in the console; then install the handle and secure with a knot. Seat the cap.
4. Release the slip-knot in the rope.

Air Silencer (570 cc)

The air silencer is a specially designed component used to silence the incoming fresh air and also to catch the fuel that "spits back" out of the carburetors. The carburetors are calibrated with the air silencer in position; therefore, the engine must never be run with the air silencer removed.

■NOTE: To remove and install the air silencer, see Section 2.

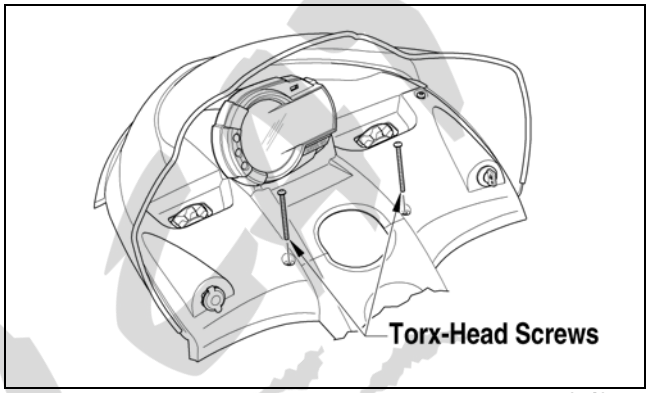
CLEANING AND INSPECTING

1. Check for holes or cracks in the silencer.
2. Periodically clean the silencer by removing the cover/tool tray assembly and vacuuming the interior of the silencer.

Air Silencer (F5)

REMOVING

1. Remove the hood and the left-side and right-side access panels; then remove the torx-head screws securing the console.



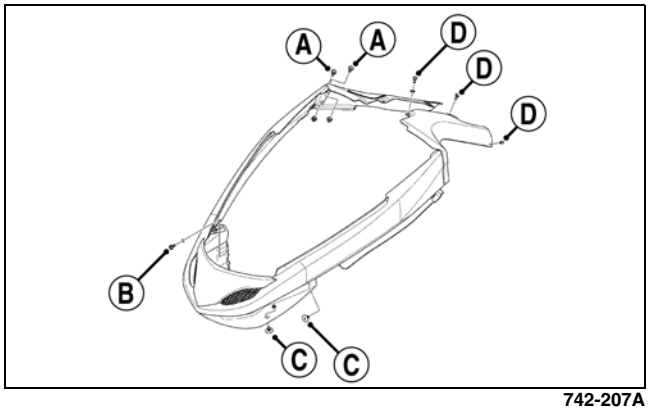
0743-777

2. Lift the rear of the console and disconnect the console/main harness plug-in; then remove the console.
3. Remove the springs securing the expansion chamber; then remove the expansion chamber from the engine compartment. Account for the two exhaust gaskets.
4. With the seat adjusted to its lowest position, remove the machine screw from the right-side seat adjustment track; then remove the seat.



ZJ100A

5. Remove the torx-head screws securing the handlebar close-off panel; then remove the panel.
6. Remove the lock nuts and torx-head cap screws (A) securing the right-side front and rear spar panels; then remove the torx-head screws (D) securing the left-side rear spar panel to the gas tank and support tube.



742-207A

■NOTE: The right-side rear spar panel will remain secured to the chassis.

7. Remove the cap screw located directly above the ECM securing the air-silencer duct to the front upper panel; then disconnect the air temperature sensor and remove the duct.

■NOTE: To aid in accessing the cap screw, the ECM may be removed.

8. Remove the body screws and flange nuts (C) from each side securing the front bumper assembly to the chassis; then remove the two remaining self-tapping screws (B) from each side securing the front bumper assembly. Remove the assembly.

■NOTE: At this point, remove the air silencer and account for the rubber exhaust bumper.

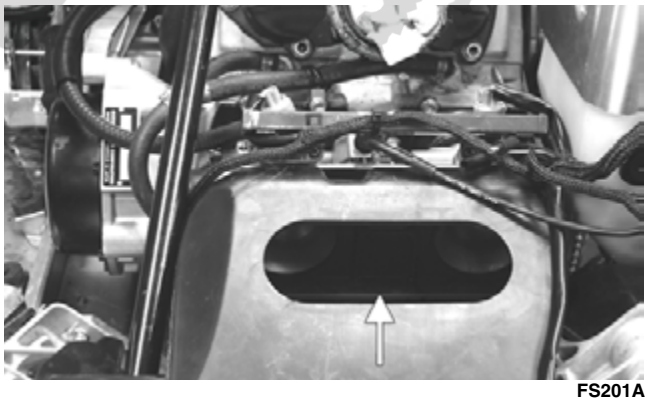
CLEANING AND INSPECTING

1. Check for holes or cracks in the silencer.
2. Periodically clean the silencer by blowing fresh air through it.
3. Inspect the silencer dual intake boot and seals for cracks or wear.

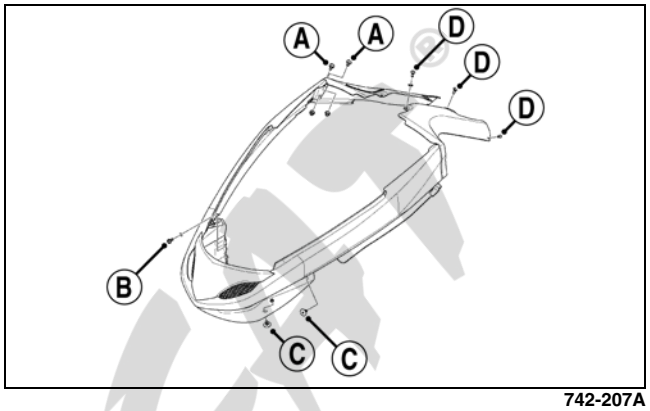
INSTALLING

1. Install the air silencer onto the throttle bodies making sure the dual intake boot is properly positioned and seated.

■NOTE: To aid in installing the air silencer, it can be helpful to remove the air silencer cover and work the intake boot over the throttle body from inside the silencer.


FS201A

2. Place the front bumper assembly (with spar panels) into position on the snowmobile; then secure the front and rear spar panels together with the torx-head cap screws and lock nuts (A). Tighten the lock nuts securely.



742-207A

3. Install the body screws and lock nuts (C) from each side and the self-tapping screws (B) from each side securing the front bumper assembly to the chassis. Tighten all hardware securely.
4. Connect the air temperature sensor and place the sensor harness beneath the intake duct; then install the duct into the silencer.

■NOTE: To aid in installing the duct, it can be helpful to apply a thin film of WD-40 to the air silencer seal and to work the duct back and forth until the sleeve of the duct is properly seated into the silencer.

CAUTION

Make sure to place the sensor harness beneath the intake duct to avoid contact with exhaust components.

5. Secure the intake duct to the upper frame with the cap screw. Tighten securely.

■NOTE: If the ECM was removed to gain access to the duct cap screw, install the ECM using the two cap screws. Tighten the cap screws securely; then connect the harness plug-ins to the ECM.

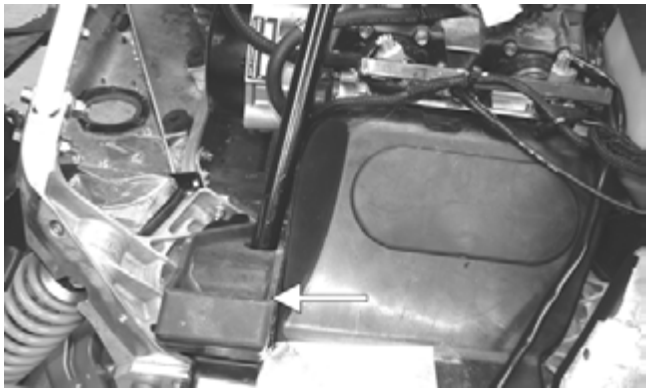


FS202A

6. Using the illustration following step 2, secure the left-side rear spar panel to the gas tank and support tube with the three torx-head screws (D). Tighten the screws securely.

7. Install the seat; then install the machine screw (threads coated with blue Loctite #243) to the right side of the seat support.

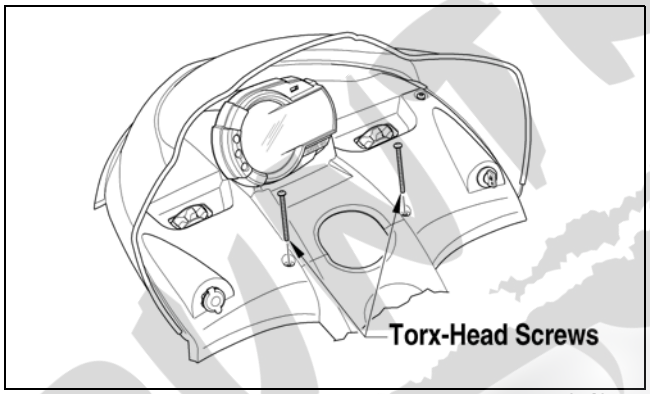
8. Place the rubber exhaust bumper into position on the air silencer.



FS203A

9. Place gaskets on the resonator and exhaust manifold; then install the expansion chamber. Secure the chamber to manifold and upper frame with the springs.

10. Secure the console to the steering support with the torx-head screws and tighten the screws securely; then close the left-side and right-side access panels and close the hood.

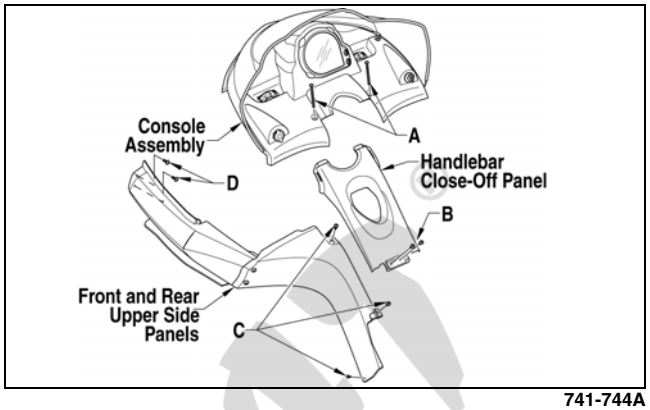


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Air Silencer (Bearcat/T-Series 1100 cc Non-Turbo)

REMOVING/INSPECTING/CLEANING

1. Remove the two torx-head cap screws (A) securing the console to the chassis; then lift up the rearward end of the console and disconnect the console harness plug-in. Remove the console.

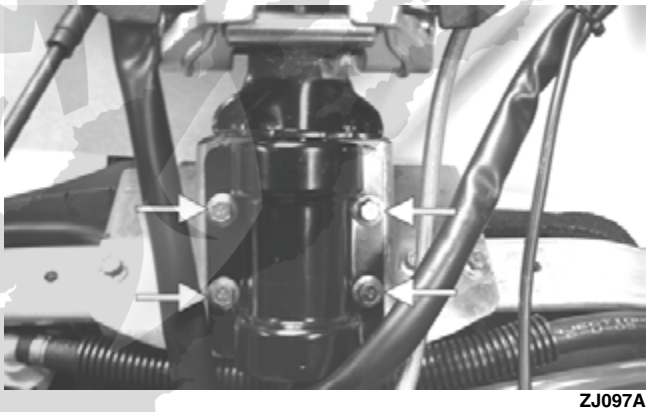


741-744A

2. Remove the torx-head cap screws securing the upper front/rear panels (C) and the handlebar close-off panel (B) along with the body screws securing the knee-pads to the steering support.

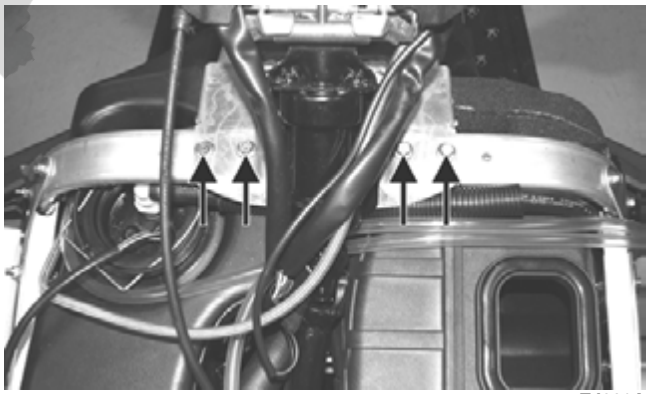
3. Remove the torx-head cap screws (D) securing the upper front panel to the front bumper.

4. Remove the four cap screws securing the upper bearing bracket to the upper support plate.



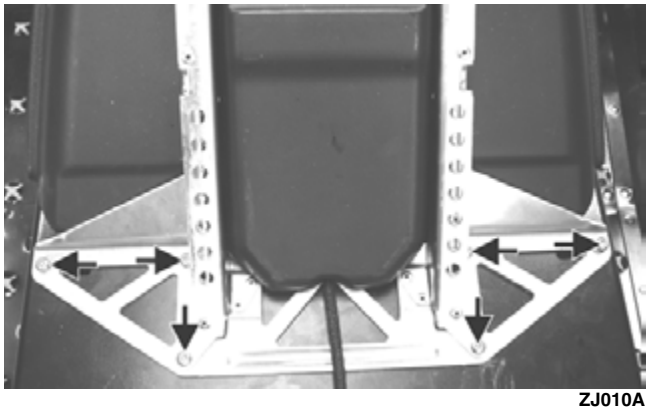
ZJ097A

5. Remove the four cap screws securing the support plate to the steering support.



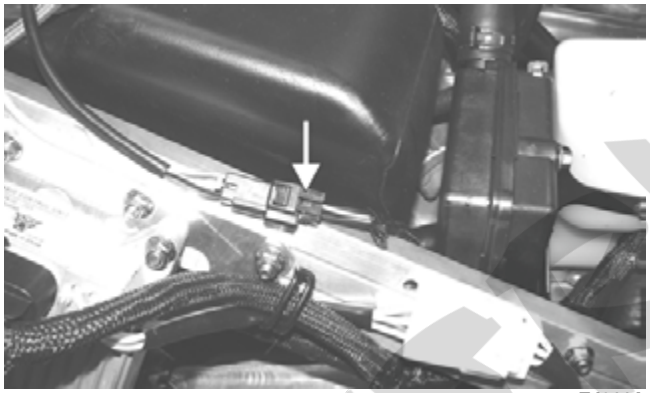
ZJ009A

6. Remove the six torx-head screws securing the seat support assembly to the tunnel; then slide the support back out of the way.



ZJ010A

7. Disconnect the fuel pump four-wire connector; then slide the gas tank rearward enough to gain access to the gasline hose connector.



ZJ011A

8. Compress the clip on the gasline hose connector and remove the hose from the gas tank; then disconnect the vent hose and remove the gas tank.



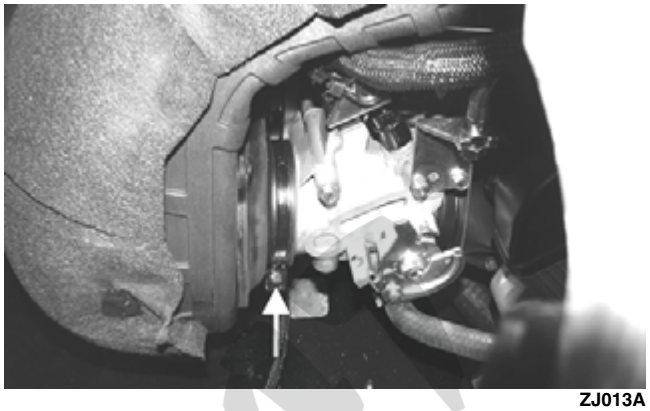
IO053A

⚠ WARNING

The gasoline supply hose may be under pressure. Place an absorbent towel around the connection to absorb gasoline; then remove the hose slowly to release the pressure.

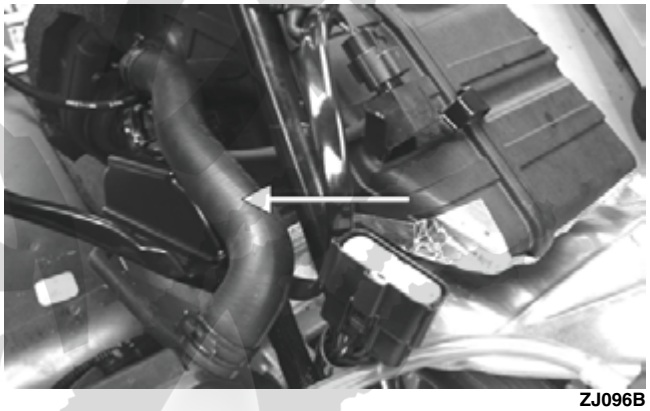
■NOTE: After the gas tank vent hose has been removed, plug the hose outlet of the gas tank to avoid gas leakage.

9. Remove the two torx-head cap screws securing the air silencer to the chassis; then loosen the screws on the clamps securing intake boot to the throttle bodies.



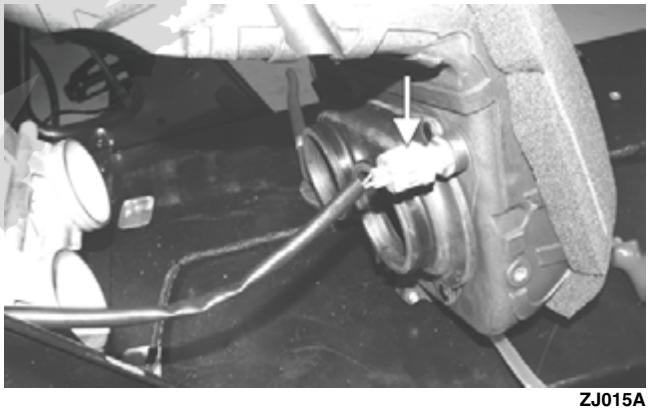
ZJ013A

10. Remove the breather hose from the air silencer.



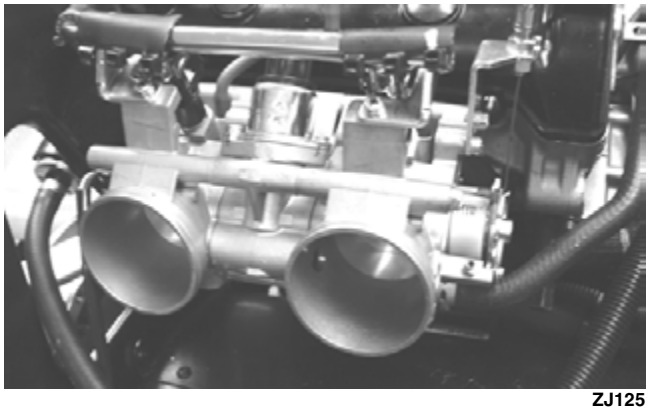
ZJ096B

11. Move the air silencer far enough to the right to bypass the air silencer mounting bracket; then slide the air silencer rearward and disconnect the air temperature sensor. Remove the air silencer from the chassis.



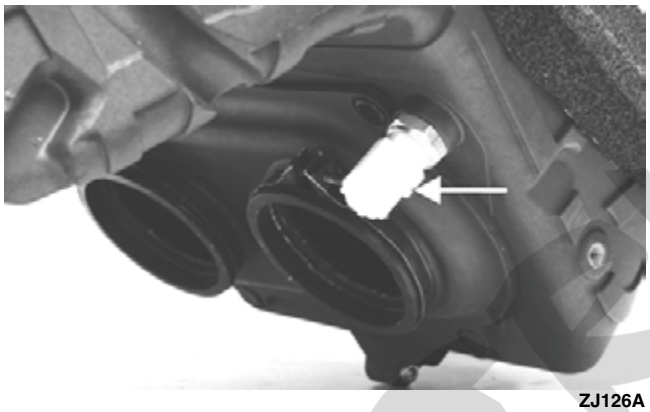
ZJ015A

12. Inspect the throttle valve thoroughly for carbon residue buildup. If signs of carbon buildup exist, the throttle body should be cleaned (see Fuel System (EFI) - Throttle Body Assembly in Section 4).



ZJ125

13. Remove the air temperature sensor from the air silencer.



ZJ126A

14. Split the protective foil at the seam of the air silencer; then remove the retaining clips securing the dual intake boot to the air silencer.
15. Remove the seven machine screws and separate the air silencer halves.
16. Inspect the air silencer thoroughly for any foreign material; then clean the air silencer with soap and water. Dry the air silencer thoroughly prior to installing.

INSTALLING

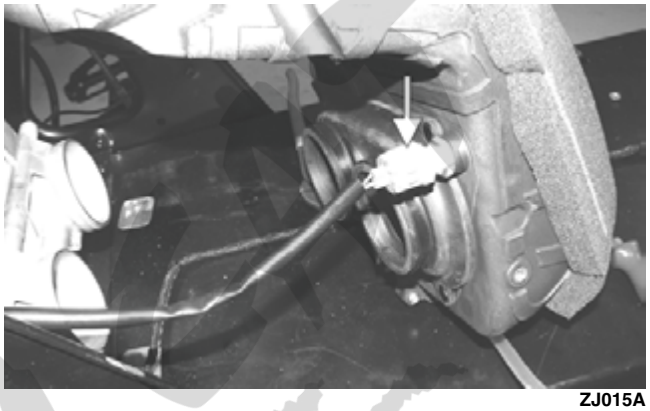
1. Join the air silencer halves and secure with the seven machine screws; then install the dual intake boot and secure with retaining clips.
2. Install the air temperature sensor.

■NOTE: Before installing the air silencer, make sure the gasline hose is routed over the air silencer.

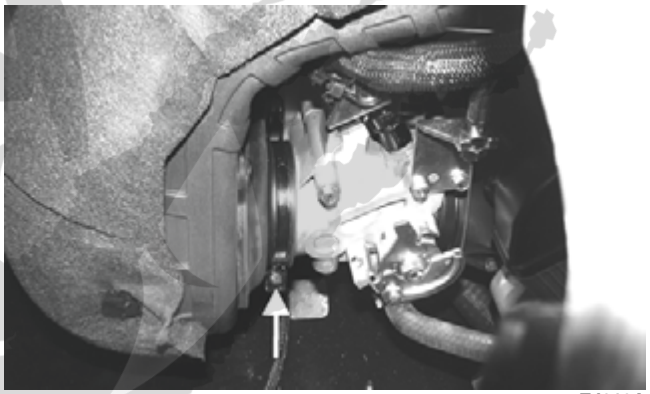
3. Connect the air temperature sensor harness plug into the sensor on the air silencer; then with screws of the flange clamps directed properly as noted during removing, install the air silencer and secure to the chassis with the two torx-head cap screws. Secure the flange clamps to the throttle body.

■NOTE: To aid in installing the air silencer, apply a coat of alcohol on the insides of the intake boot openings.

■NOTE: Install the air silencer at an angle positioning it to the PTO-side throttle body first and tightening its clamp; then working it back and forth and with an angle tool, slide the mag-side air silencer boot onto the throttle body and tighten its clamp. Once in place and secured, carefully inspect that the boots are properly seated to the throttle bodies.

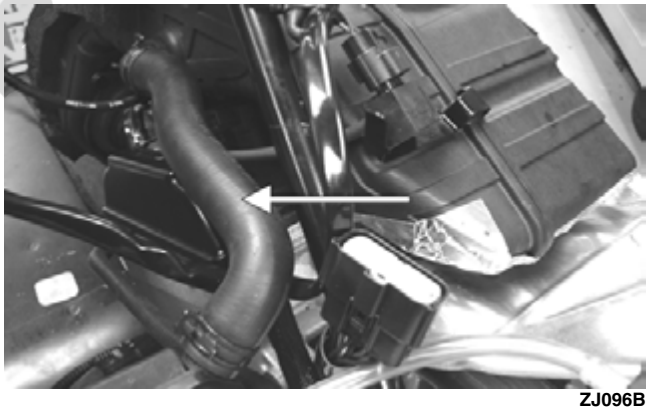


ZJ015A



ZJ013A

4. Install the breather hose connecting the air silencer to the separator tank; then connect the harness plug to the sensor.



ZJ096B

■NOTE: Before placing the gas tank into position on the chassis, install the gasline hose to the tank, push down on the connector until it snaps into place, and route the vent hose to its proper position as noted during removing.

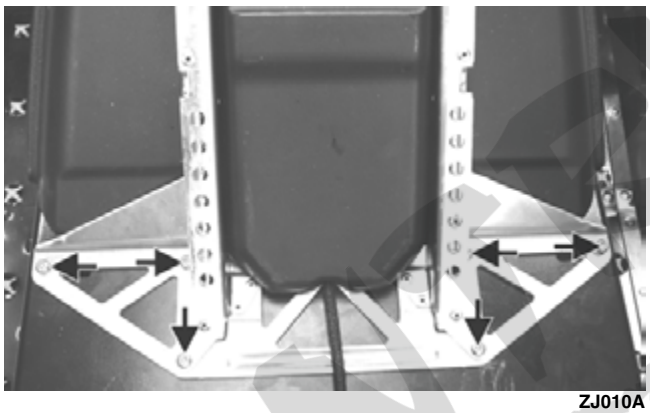


IO054A

CAUTION

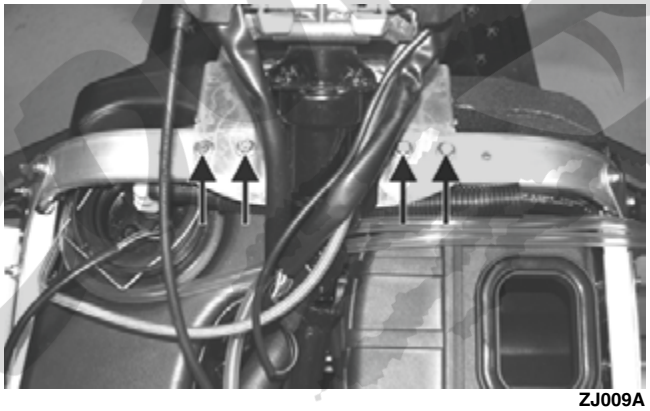
Make sure the gasline hose is properly locked to the gas tank before continuing installing.

5. Install the gas tank to its proper position; then secure the gas tank with the seat support assembly and install the six torx-head cap screws. Tighten securely.



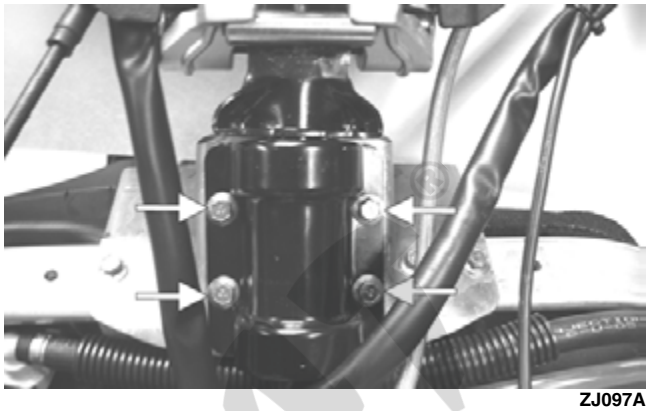
ZJ010A

6. Install the four cap screws securing the steering support plate to the steering support.



ZJ009A

7. Install the four cap screws securing the upper bearing bracket to the upper support plate and tighten to 8 ft-lb.



ZJ097A

8. Connect the fuel pump four-wire connector; then secure the knee-pads to the steering support with the two body screws.
9. Install the upper body panels and secure with the torx-head cap screws; then install the handlebar close-off panel and secure it with two torx-head cap screws.
10. Place the console into position on the headlight support bracket; then connect the console harness connector.



ZJ098A

11. Secure the console to the chassis with the two torx-head cap screws.
12. Install the seat to the lowest position; then install the machine screw (threads coated with blue Loctite #243) into the seat support assembly and tighten securely.

CAUTION

Do not tighten machine screw against the seat support. The screw must be loose enough to be effective as a seat "stop."

Air Silencer (F/M/XF 1100 cc Non-Turbo)

REMOVING/INSTALLING

1. Remove the right- and left-side access panels; then disconnect the hood harness and remove the hood.
2. Remove the seat (see Section 8) and gas tank (see Section 4).

3. Loosen both clamps securing the air silencer to the throttle bodies; then remove the air silencer assembly.
4. Install the air silencer assembly and secure to the throttle bodies using the clamps.
5. Install the gas tank (see Section 4) and seat (see Section 8).
6. Install the hood, connect the hood harness, and install both access panels.

Air Silencer (1100 cc Turbo)

REMOVING/INSPECTING

1. Remove the air cleaner cover; then remove the air filter.
2. Inspect the filter for tears or dirt and replace if necessary. Clean any debris from inside the air intake plenum.

CAUTION

Do not use compressed air to clean the filter. Damage to the filter may occur.

CAUTION

A torn air filter can cause damage to the turbocharger/engine. Contaminants may get inside the turbocharger/engine if the filter is torn. Carefully examine the filter for holes or tears. Replace the filter with a new one if torn.

INSTALLING

Place the air filter into position into the plenum; then secure the air cleaner cover onto the plenum.

CAUTION

Do not run the engine without the air filter installed. Severe damage to the turbocharger/engine will occur.

Turbocharger/Intercooler (F/XF/M 1100 cc Turbo)

⚠ WARNING

The rotating components in a turbocharger turn at speeds of 150,000 RPM. Any imbalance could cause rapid disintegration resulting in bodily injury or death. Always handle a turbocharger in accordance with the manufacturer's recommendations.

CAUTION

Do not drop the turbocharger. If dropped, it must be replaced.

CAUTION

Do not touch rotating parts as damage to turbine or compressor blades may occur.

CAUTION

Do not carry the turbocharger by the hoses or by the waste gate control rod. Damage could occur.

CAUTION

Do not run a turbocharged engine with the intake hose removed from the compressor inlet. Dirt, foreign objects, or loose clothing can be ingested causing turbocharger failure and engine damage.

CAUTION

Do not spin the turbocharger with compressed air as bearings will be damaged.

CAUTION

Do not store the turbocharger vertically as oil will be lost from the bearing cavity and bearing damage on start-up could occur.

REMOVING

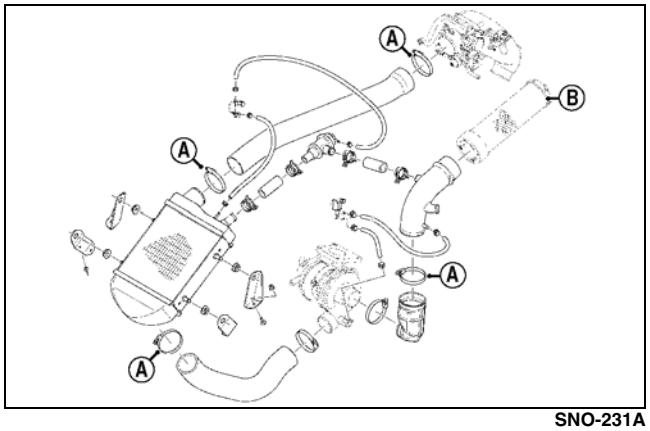
1. Remove the right- and left-side panels; then remove the hood.
2. Disconnect the oxygen sensor; then remove the cap screws, nuts, gasket, and spring securing the resonator. Remove the resonator.



PC227

■NOTE: Be sure to mark all hoses to the corresponding locations for installation purposes.

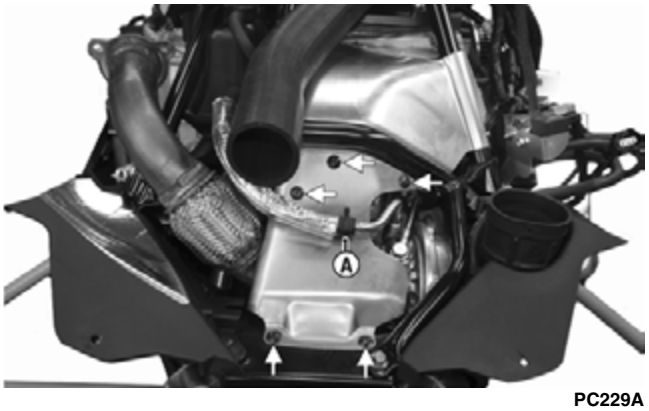
3. Remove all clamps (A) securing the outlet hose, air duct, and intercooler; then remove the air filter (B) and all hoses connected to the intercooler.



SNO-231A

4. Remove the intercooler, air bypass valve, and air duct as an assembly by removing the intercooler from the four mounting brackets.

5. Remove the clamp securing the coolant return hose (A); then remove the five torx-head screws securing the front heat shield.



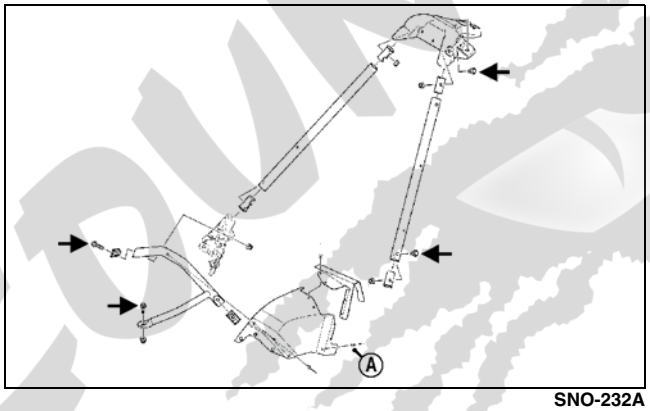
PC229A

CAUTION

If the turbocharger is not being replaced during this procedure, close off the inlet and outlet of the turbocharger to avoid any objects entering the turbocharger.

6. Remove the torx-head screws securing the front left-side facia to the chassis.

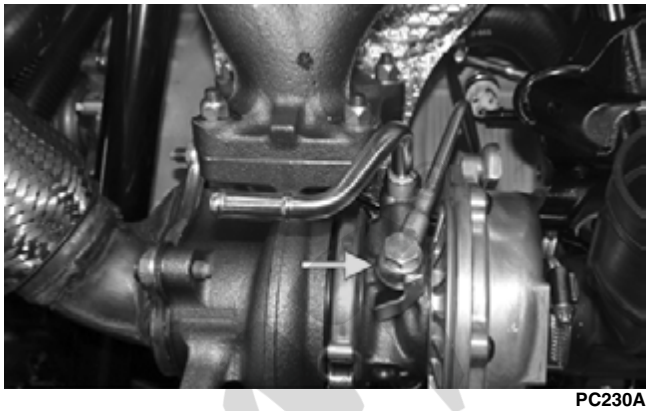
7. Remove the cap screws securing the left-side front spar to the chassis; then remove the two cap screws and nuts securing shock mount support bracket. Remove the rear heat shield, front spar, and shock mount.



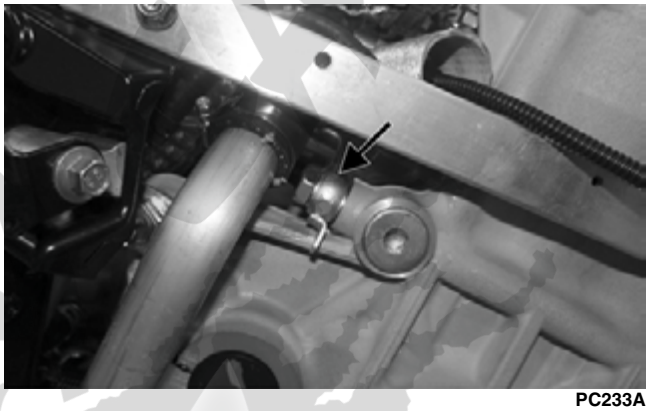
SNO-232A

■NOTE: To aid in the removal of the assembly from step 6, drill out the rivet (A) securing the rear heat shield to the left spar tube.

8. Remove the banjo bolts with four crush washers securing the oil feed pipe to the turbocharger and to the engine. Discard the washers.



PC230A



PC233A

9. Place a shop towel under the coolant feed hose and oil return hose; then using a suitable clamping device, clamp off the coolant hose. Loosen the hose clamps and disconnect the hoses from the turbo.



PC236

10. Remove the three lock nuts and washers securing the bracket of the turbocharger to the engine; then loosen the lock nuts securing the mounting bracket to the turbocharger.



PC234A

■NOTE: If the oil hose has to be removed from the engine, note the banjo bolt securing the hose to the turbocharger has the smaller feed holes.

11. Remove the lock nuts and washers securing the exhaust manifold to the cylinder head; then carefully remove the turbocharger and exhaust manifold assembly.
12. Remove the cap screws securing the lower heat shield to the exhaust manifold and turbocharger; then remove the mounting bracket.
13. Remove the lock nuts securing the turbocharger outlet; then remove the turbocharger outlet from the turbocharger and account for the gasket.
14. Remove the four lock nuts securing the turbocharger to the exhaust manifold. Account for the gasket and flat washers.

INSPECTING

1. With the exhaust pipe removed, inspect the turbine (exhaust) blades for any signs of wear or damage; then inspect the compressor (intake) blades.

■NOTE: If any damage to the compressor or turbine blades is present, the turbocharger must be replaced.



TZ093A

2. Inspect the waste gate linkage for signs of wear or damage.

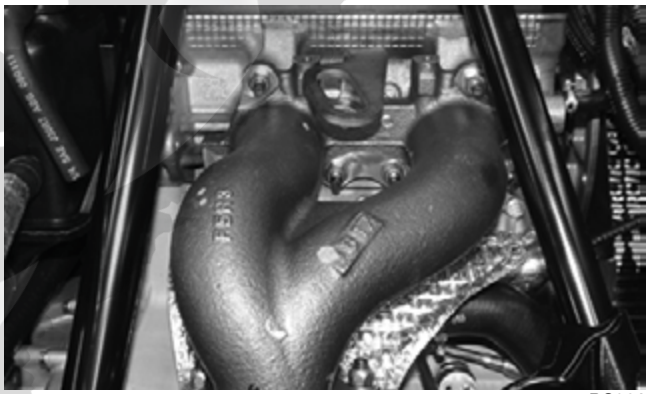
INSTALLING

1. With the turbocharger secured in a suitable vise and the gasket in place, secure the exhaust pipe to the turbocharger with the washers and lock nuts. Tighten the lock nuts to 15 ft-lb.
2. Install the mounting bracket to the turbo; then with the backing plate properly positioned as shown, secure the bracket to the turbocharger with the lock nuts and finger tighten only.



PC235A

3. With the gasket in place, install the turbocharger onto the exhaust manifold and secure with the flat washers and lock nuts. Tighten only until snug.
4. Install the lower heat shield onto the turbocharger and exhaust manifold with the four cap screws. Tighten to 56 in.-lb.
5. With the gaskets in place, install the exhaust manifold and turbocharger assembly to the engine; then tighten the exhaust manifold to 15 ft-lb.



PC231

6. Install the three lock nuts securing the turbocharger mounting bracket to the engine. Tighten the nuts to 30 ft-lb and bend each tab to secure the nut.



PC234A

7. Tighten the two lock nuts (from step 2) to 30 ft-lb.

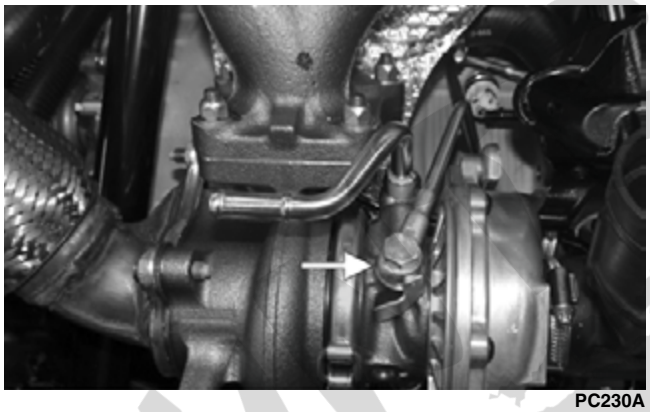
8. Using a crisscross pattern, tighten the lock nuts (from step 3) securing the turbocharger to the exhaust manifold to 30 ft-lb.

9. Connect the coolant feed hose and oil return hose to the turbo, release the clamp, and secure the hoses with the hose clamps.

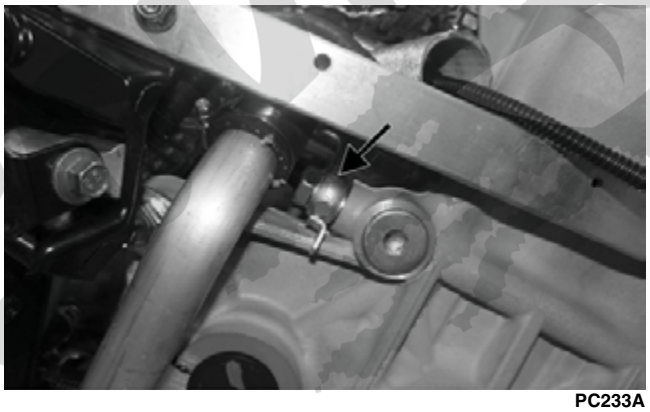


PC236

10. With the turbocharger secured, connect the oil feed hose with both banjo bolts and four new crush washers. Tighten to 11 ft-lb.

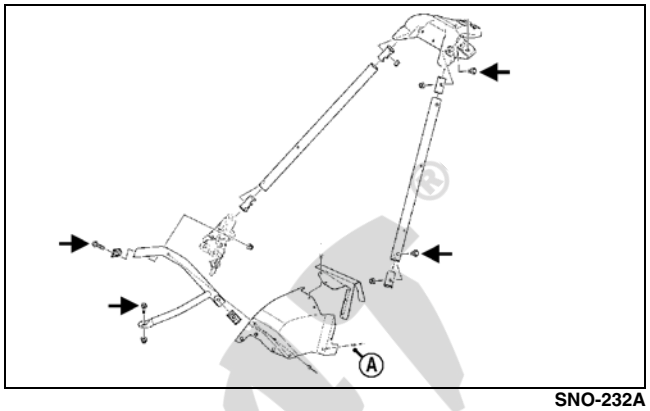


PC230A



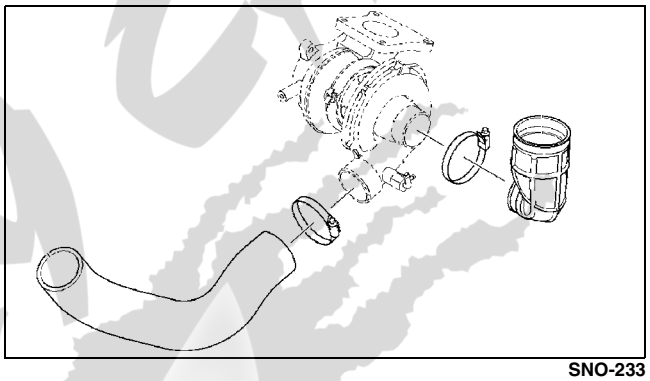
PC233A

11. Secure the left-side front spar to the chassis; then install the two cap screws and nuts securing shock mount support bracket. Install rivet (A) through the heat shield and into the left-side spar. Tighten cap screws to 23 ft-lb.



SNO-232A

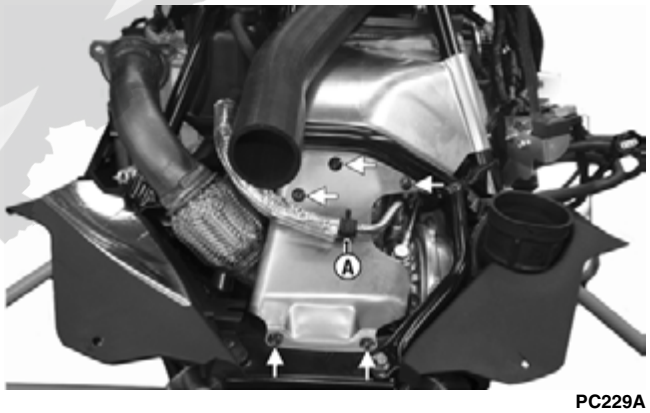
12. Install the inlet boot and the inlet hose and secure using the existing clamps.



SNO-233

13. Secure the front left-side facia to the chassis using the existing torx-head screws.

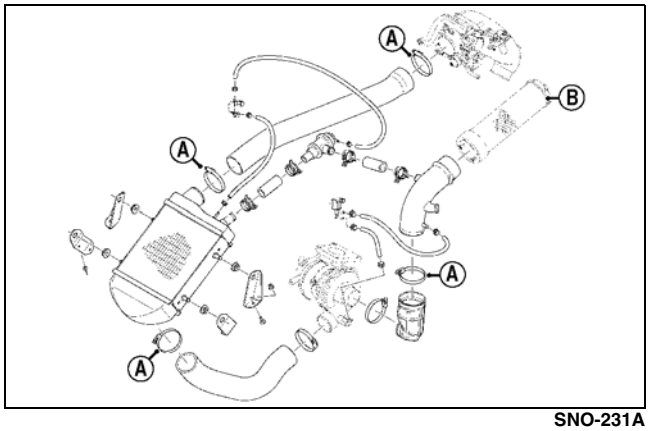
14. Secure the front heat shield using the existing torx-head screws; then secure the coolant return hose (A).



PC229A

15. Install the intercooler, air bypass valve, and the air duct as an assembly into the four mounting brackets.

16. Secure the outlet hose, air duct, and intercooler using the existing clamps (A); then install the air filter (B) and all hoses connected to the intercooler.



SNO-231A

17. Connect the oxygen sensor; then install the cap screws, nuts, new gasket, and spring securing the resonator to the chassis.



PC227

■**NOTE: Check the coolant level and the oil level. Add as necessary (see Section 4).**

18. Install the right- and left-side panels; then install the hood.

Turbocharger/Intercooler (T-Series 1100 cc Turbo)

⚠ WARNING

The rotating components in a turbocharger turn at speeds of 150,000 RPM. Any imbalance could cause rapid disintegration resulting in bodily injury or death. Always handle a turbocharger in accordance with the manufacturer's recommendations.

CAUTION

Do not drop the turbocharger. If dropped, it must be replaced.

CAUTION

Do not touch rotating parts as damage to turbine or compressor blades may occur.

CAUTION

Do not carry the turbocharger by the hoses or by the waste gate control rod. Damage could occur.

CAUTION

Do not run a turbocharged engine with the intake hose removed from the compressor inlet. Dirt, foreign objects, or loose clothing can be ingested causing turbocharger failure and engine damage.

CAUTION

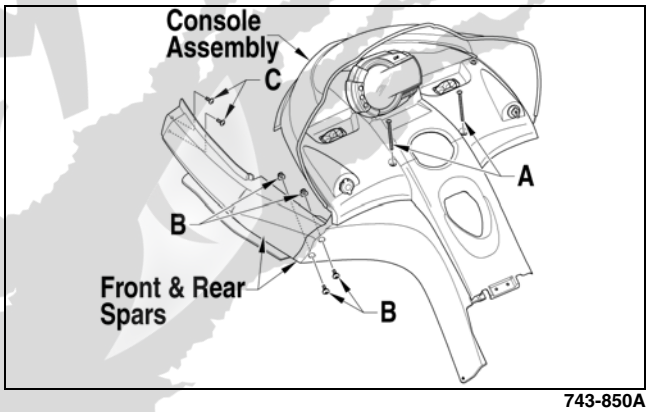
Do not spin the turbocharger with compressed air as bearings will be damaged.

CAUTION

Do not store the turbocharger vertically as oil will be lost from the bearing cavity and bearing damage on start-up could occur.

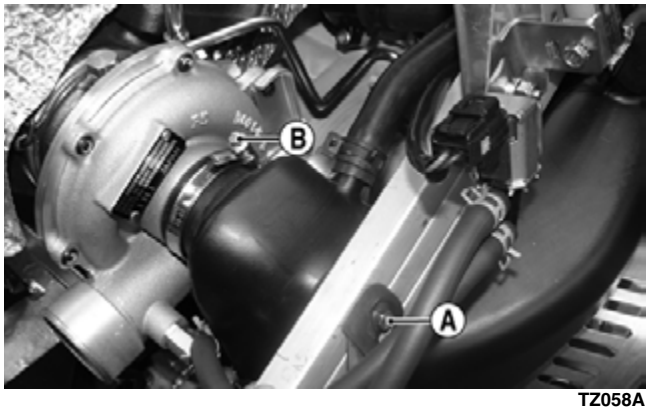
REMOVING

1. Remove the hood and the right- and left-side access panels.
2. Remove the two torx-head cap screws (A) securing the console to the chassis; then lift up the rearward end of the console and disconnect the console harness plug-in. Remove the console.



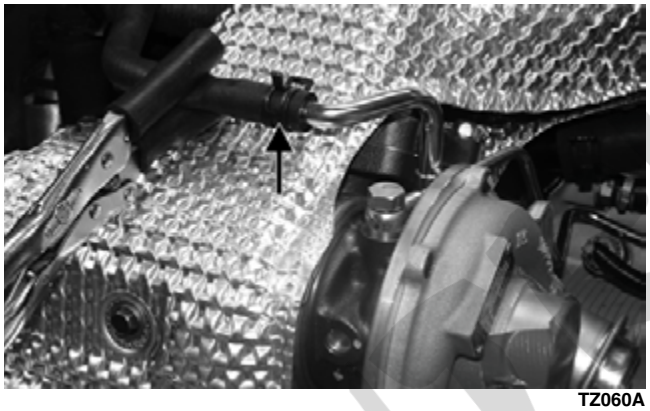
743-850A

3. Remove the torx-head cap screws and lock nuts (B) securing the right-side front and rear spar panels together; then remove the two torx-head screws (C) securing the front spar panel to the front bumper.
4. Loosen the intercooler hose clamps at the intake pipe and the turbocharger; then carefully work the intercooler upward until it releases from the rubber grommets.
5. Disconnect the exhaust springs and remove the center exhaust pipe from between the exhaust manifold and resonator; then secure the pipe up and out of the way.
6. Remove the cap screw (A) securing the air silencer to the right-side upper frame; then loosen the hose clamp (B) and disconnect the air silencer from the turbocharger inlet.



TZ058A

7. Using a suitable clamping device, clamp off the coolant return hose; then remove the clamp securing the coolant return hose to the return line of the turbocharger. Remove the hose.

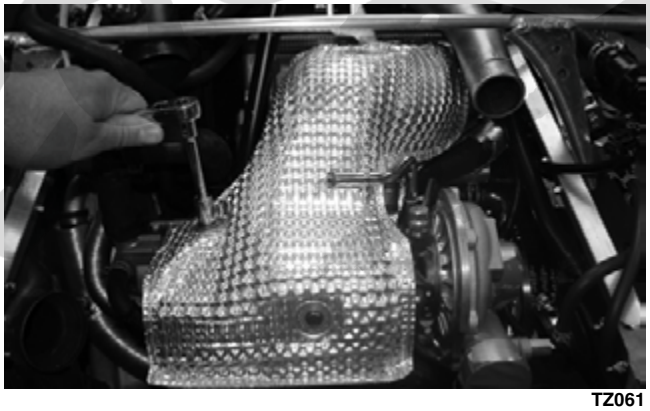


TZ060A

CAUTION

If the turbocharger is not being replaced during this procedure, close off the inlet and outlet of the turbocharger to avoid any foreign objects from entering the turbocharger.

8. Remove the four cap screws securing the upper heat shield to the turbocharger outlet and exhaust manifold.

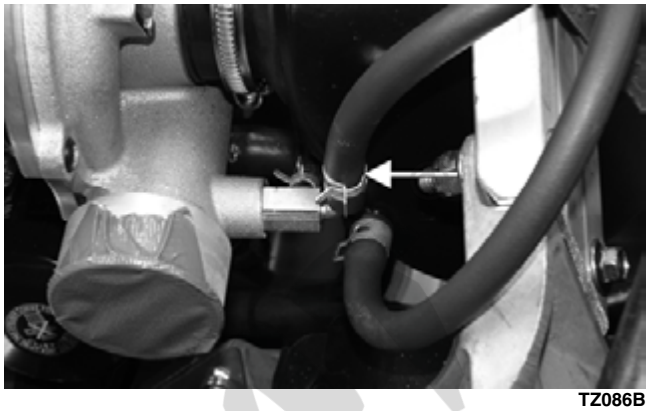


TZ061

CAUTION

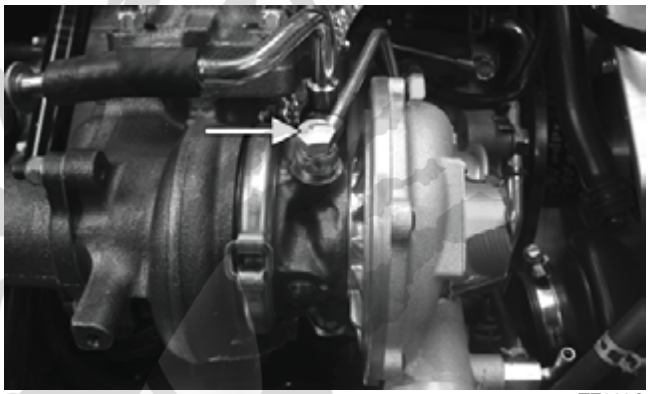
Make sure the washers are free from the heat shield cap screws or damage to the heat shield will occur.

9. Loosen the hose clamp and remove the waste gate control valve hose from the elbow fitting of the turbocharger.



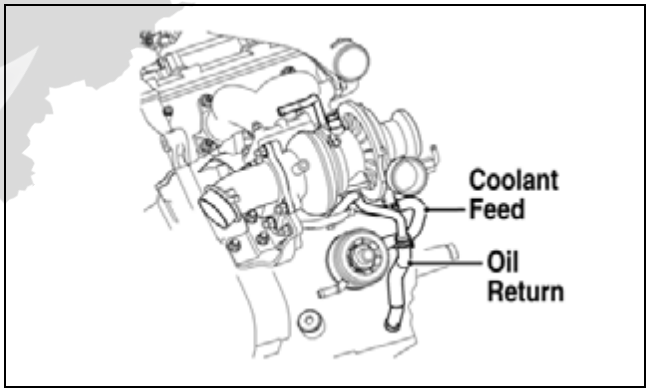
TZ086B

10. Remove the banjo bolt with two crush washers securing the top oil feed pipe to the turbo. Discard the two washers.



TZ062A

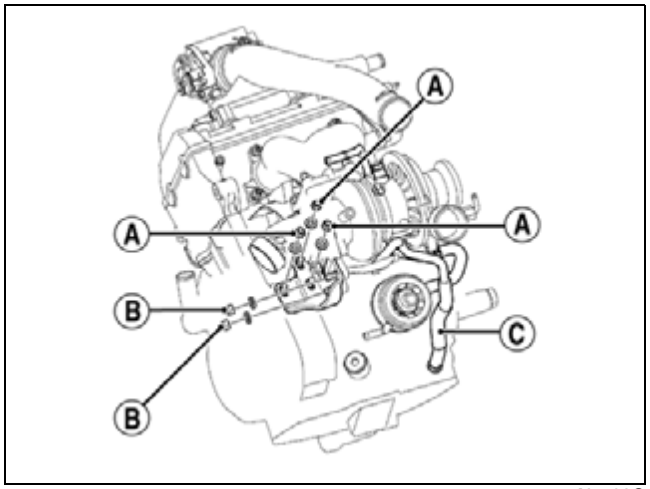
11. Place a shop towel under the coolant feed hose and oil return hose; then using a suitable clamping device, clamp off the two hoses. Loosen the hose clamps and disconnect the hoses from the turbo.



743-991A

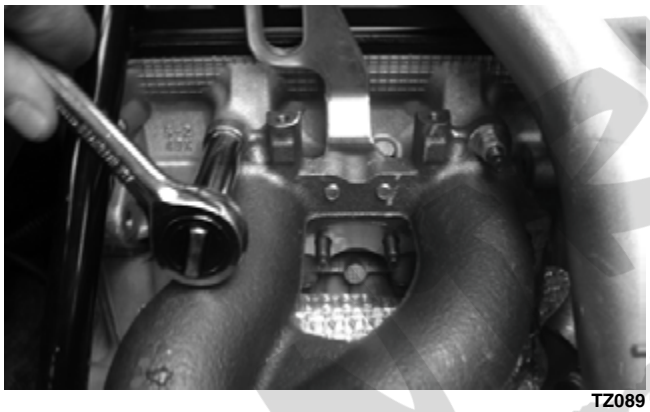
12. Remove the three lock nuts and washers (A) securing the bracket of the turbocharger to the engine; then loosen the lock nuts (B) securing the mounting bracket to the turbocharger.

■NOTE: If the oil hose has to be removed from the engine, note the banjo bolt securing the hose to the turbocharger has the smaller feed holes.



743-780C

13. Remove the lock nuts and washers securing the exhaust manifold to the engine cylinder head; then carefully remove the turbocharger and exhaust manifold assembly.



TZ089

14. Remove the cap screws securing the lower heat shield to the exhaust manifold and turbocharger; then remove the mounting bracket.

■NOTE: Before removing the bracket from the turbocharger outlet, note the location of the backing plate for installing purposes.



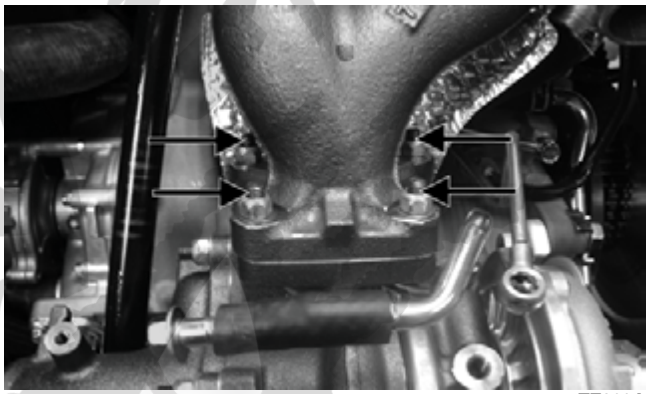
TZ063A

15. Remove the lock nuts securing the turbocharger outlet; then remove the turbocharger outlet from the turbocharger and account for the gasket.



TZ091A

16. Remove the four lock nuts securing the turbocharger to the exhaust manifold. Account for the gasket and flat washers.



TZ092A

INSPECTING

1. With the turbocharger outlet removed, inspect the turbine (exhaust) blades for any signs of wear or damage; then inspect the compressor (intake) blades.



TZ094

■NOTE: If any damage to the compressor or turbine blades is present, the turbo charger must be replaced.

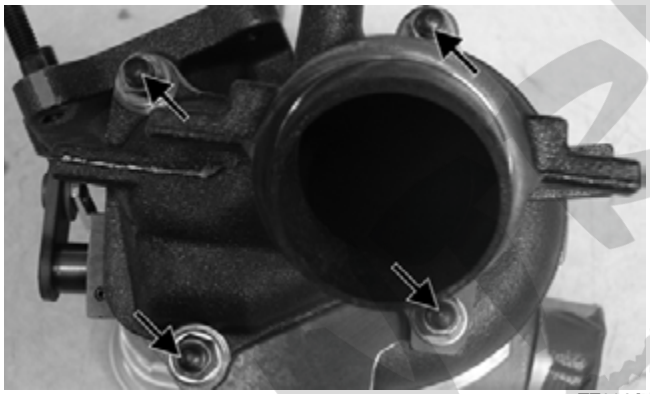


TZ093A

2. Inspect the waste gate linkage for signs of wear or damage.

INSTALLING

1. With the turbocharger secured in a suitable vise and the gasket in place, secure the turbocharger outlet to the turbocharger with the washers and lock nuts. Tighten the lock nuts to 30 ft-lb.



TZ091A

2. Install the mounting bracket to the turbocharger; then with the backing plate properly positioned as noted during disassembling, secure the bracket to the turbocharger with the lock nuts and tighten only until snug.

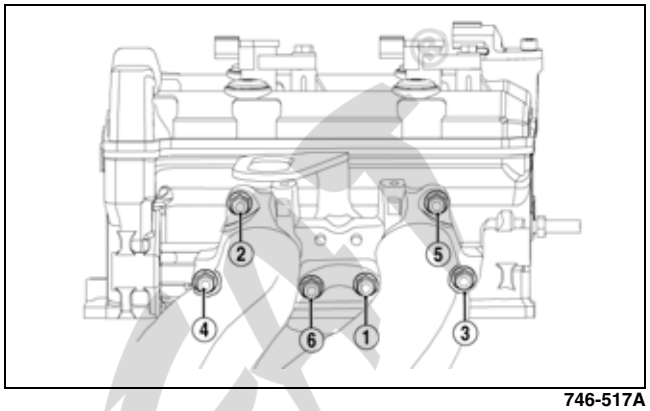


TZ063A

3. With the gasket in place, install the turbocharger onto the exhaust manifold and secure with the flat washers and lock nuts. Tighten only until snug.

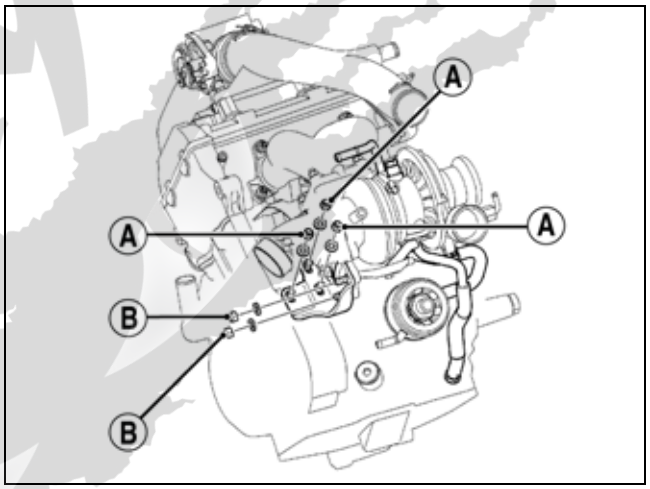
4. Install the lower heat shield onto the turbocharger and exhaust manifold with the four cap screws. Tighten to 56 in.-lb.

5. With the gaskets in place, install the exhaust manifold and turbocharger assembly to the engine; then using the pattern shown, tighten the exhaust manifold to 19 ft-lb.



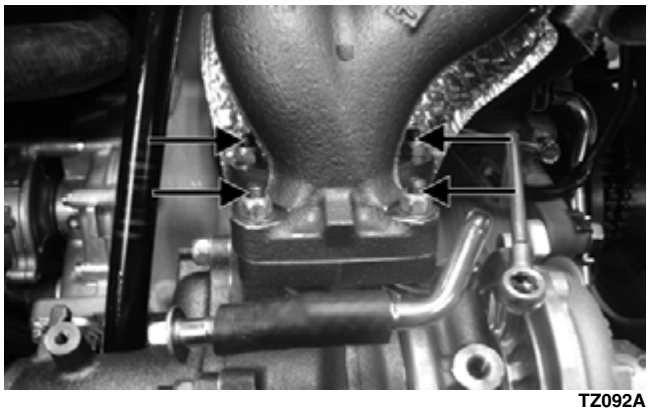
746-517A

6. Install the three lock nuts (A) securing the turbocharger mounting bracket to the engine and tighten to 30 ft-lb; then tighten the two lock nuts (B) (from step 2) to 30 ft-lb.



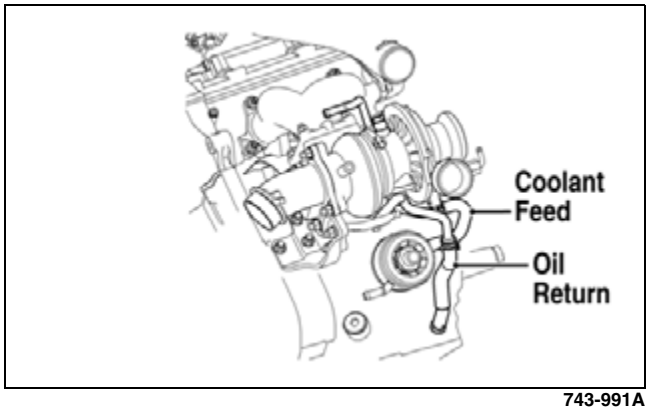
743-780D

7. Using a crisscross pattern, tighten the lock nuts (from step 3) securing the turbocharger to the exhaust manifold to 30 ft-lb.



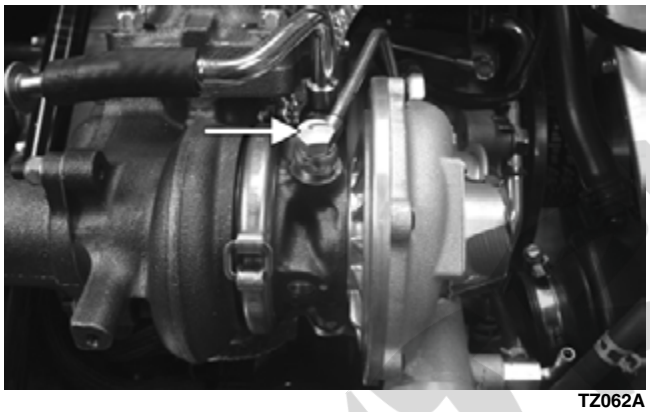
TZ092A

8. Connect the coolant feed hose and oil return hose to the turbo, release the clamps, and secure the hoses with the hose clamps.



743-991A

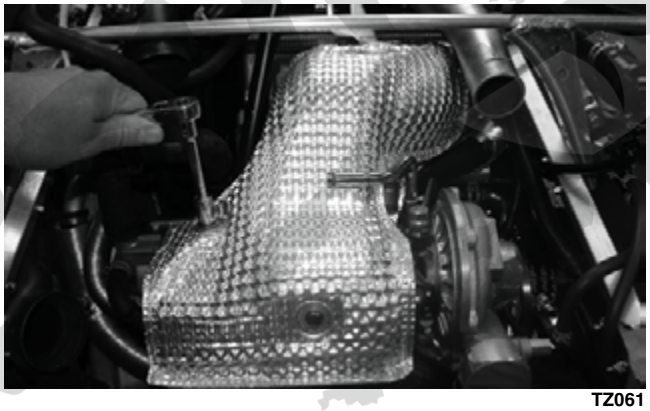
9. With the turbocharger secured, connect the top oil feed pipe with the banjo bolt and two new crush washers. Tighten to 11 ft-lb.



TZ062A

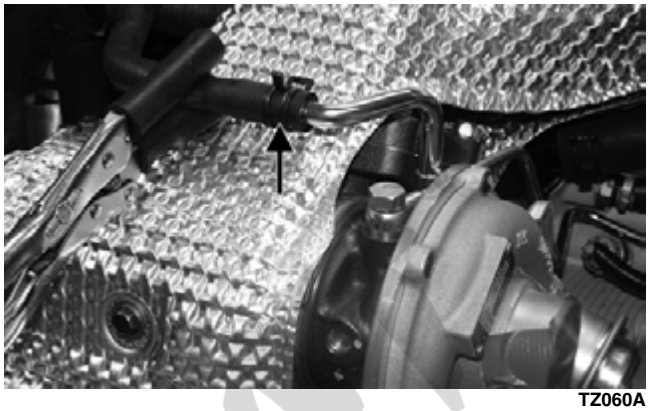
10. Install the exhaust pipe and secure with the five exhaust springs.

11. Install the upper heat shield and secure to the exhaust manifold and turbocharger with the four cap screws. Tighten to 56 in.-lb.



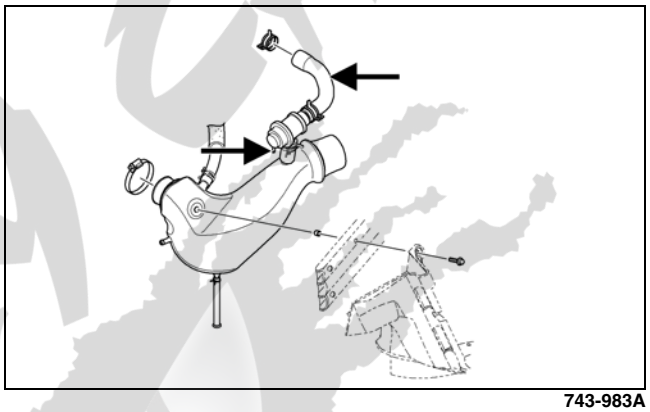
TZ061

12. Connect the coolant return hose to the turbocharger and secure with the hose clamp.



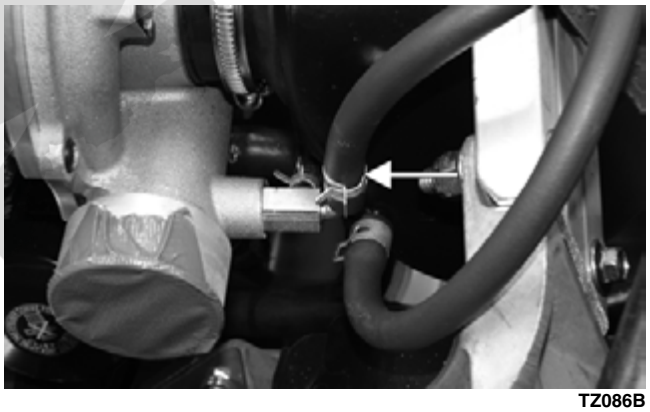
TZ060A

13. Connect the air bypass hose and the air bypass control valve hose to the intake pipe and secure with the clamps.



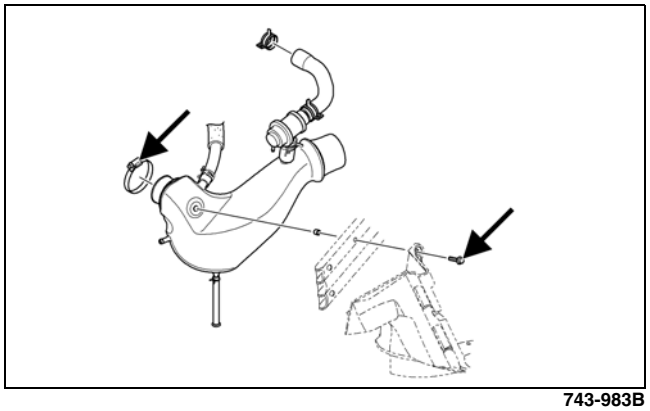
743-983A

14. Install the hose from the waste gate control valve to the elbow fitting of the turbocharger and secure with the clamp.



TZ086B

15. Connect the air silencer hose to the turbocharger and secure with the clamp; then secure the air silencer to the right-side upper frame with the cap screw.



743-983B

16. Position the intercooler into the grommets of the mounting bracket; then connect the intercooler hoses to the turbocharger and to the intake plenum. Tighten all hose clamps securely.
17. Start the engine and allow the engine to idle for at least two minutes before increasing RPM to allow for proper lubrication of the turbocharger shaft and bearings.
18. After running the engine, check the oil and coolant levels.

■NOTE: If adding coolant is required, bleed the cooling system (see appropriate Liquid Cooling System in this section).

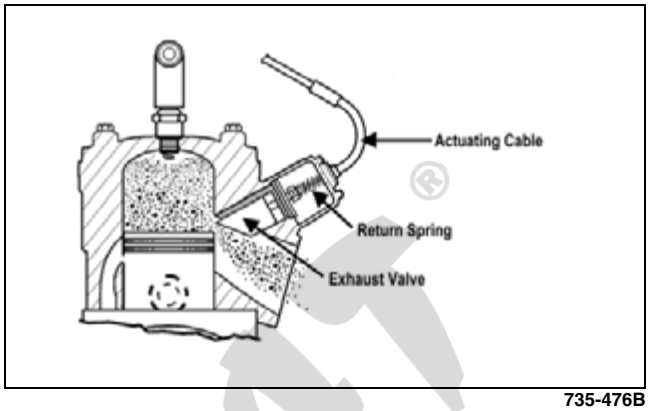
Arctic Power Valve (APV) System (800 cc)

The Arctic Power Valve (APV) System adjusts the size of the exhaust ports to produce maximum horsepower on the top end while providing excellent low end power and increased touring fuel economy.

THEORY

Two-cycle engines and their exhaust systems are designed to produce maximum horsepower in a given RPM range. This RPM range will change according to how high (or low) the exhaust port is in relation to the cylinder. Engines designed for racing have a "high port" exhaust system and will produce more horsepower at higher RPM but only with the loss of low end power and overall fuel economy. "Low port" engines will produce maximum horsepower in the low RPM ranges and provide good mid-range fuel economy, but they sacrifice top end performance.

The APV system does not increase engine horsepower, but it does allow the engine to be designed for maximum top end horsepower without the losses associated with a "high port" exhaust system.



735-476B

COMPONENTS

The main components of the APV system are the following.

A. Lighting Coil

B. Voltage Regulator/Rectifier

C. ECM

D. Servomotor

E. Power Valve Cables

F. Power Valves

Lighting Coil

The AC current generated by the lighting coil flowing to the regulator/rectifier is the power source for the APV system.

Voltage Regulator/Rectifier

The AC current from the power coil first enters the regulator/rectifier changing from AC current to DC current. Since the APV circuit cannot use pulsating DC current, it must be converted (by the condenser) to straight DC current. AC current enters the ECM from the lighting coil and is changed from AC to DC current by a rectifier located within the ECM.

ECM

The computer within the ECM has been programmed to cycle the power valves at 4500 RPM upon initial start-up. When this RPM is reached, DC current is routed to the servomotor by the ECM.

Servomotor

The servomotor consists of two circuits. One circuit is a DC circuit operating the DC motor within the servomotor, and the other is a potentiometer measuring the pulley position based on voltage.

The computer within the ECM has been programmed to operate the servomotor between a low and high voltage range. If voltage is not within the range, the computer will shut down the APV circuit. The computer will then make a total of three more attempts to cycle the power valves. If the correct voltage or pulley position isn't seen, the APV circuit is shut down and no more attempts will be made until the engine is shut down and restarted.

Exhaust Valve Cables

The exhaust valves are connected to the actuating cables and, along with the return springs, are contained inside the APV housing on the exhaust side of each cylinder. The other end of the actuating cable is connected to the servomotor.

OPERATION

At idle and low speed operation, the exhaust valves are held in the "low port" position by the return spring. When engine RPM reaches a predetermined point, the ECM will send a signal to the servomotor which cycles and pulls the exhaust valves into the mid-point. At another RPM, the ECM will send a signal to the servomotor which cycles and pulls the exhaust valves to the up or "high port" position.

If the servomotor cycles the exhaust valves as explained above, the exhaust valve circuit is operating satisfactorily. If the servomotor makes no attempt to open the valves or if the servomotor attempts to cycle the valves three times (then stops working), a problem exists and it must be corrected.

Servomotor Cycles Three Times

In this situation the ECM computer has been programmed with a voltage range (low and high) that the servomotor must operate within. If the servomotor is put under too much load, its resistance goes up and may exceed the range upper limit. It will then stop and attempt two more times. If the resistance still is too high, it shuts down.

If the servomotor is commanded to move but the potentiometer output voltage does not change, an error occurs and the check engine light will flash a trouble code.

Improper servomotor position sensing is normally caused by one or more of the following:

A. Incorrect exhaust valve cable length (too long or too short).

B. Exhaust valve cable(s) sticking, broken, or disconnected at pulley.

C. Exhaust valves sticking.

D. Exhaust valve spring(s) weak or broken.

Check each of the above probable causes in the order given to locate the problem of the servomotor cycling three times in succession; then shutting down.

Check for correct exhaust valve cable length specifications for model being worked on in this section.

Servomotor Makes No Attempt To Cycle

If when running the engine the servomotor makes no attempt to operate, this is caused by one or more of the following:

A. Bad connection from the wiring harness and connector from the lighting coil to the ECM, or from the ECM to servomotor.

B. ECM output to servomotor is too low.

C. Servomotor failure.

D. Blown fuse.

E. Voltage Regulator/Rectifier.

■NOTE: For testing individual APV system components, see Section 5.

MAINTENANCE

The APV system requires only periodic cleaning and cable adjustment. The cables should be checked every 2600 miles and adjusted as necessary.

CABLE ADJUSTMENT

Proper cable adjustment is critical to the operation of the APV system. To check the cable adjustment, use the following procedure.

1. Using a small needle-nose pliers, remove the servomotor cable holder.



PC187A

2. Pull the cable housings down and out of the servomotor; then slide each cable end out of the slot of the pulley.



PC134

■NOTE: Ensure the exhaust valves are free to move.

3. While holding the cable housing firmly, pull the cable as far out as it will go; then release. Repeat three to four times. The cable/exhaust valve should move freely without binding. If the cable/exhaust valve does not move freely, the exhaust valve assembly will need to be removed for further inspection.

■NOTE: When measuring the cables, they are to be routed and as close to their installed position as possible.

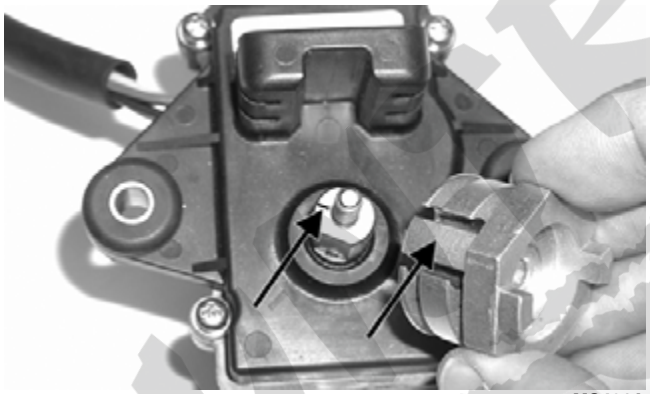
4. While holding the cable housing, lightly pull on one cable end to remove any slack; then measure the amount of exposed cable from the cable housing to the end of the cable.

■NOTE: The two cable measurements must be equal in length or less than 0.5 mm (0.020 in.) difference in length from each other.

■NOTE: Repeat steps 3 and 4 for each cable; then compare the measurements to the APV Cable Length chart in Section 1. The measurements must be within the specifications from the chart. If the measurements are within specifications, no adjustment is necessary (proceed to step 7). If they are not within specifications, proceed to step 5.

5. Loosen the jam nut on the cable to be adjusted; then using the adjusting nuts, lengthen or shorten the housing as needed.
6. Once the proper length has been attained, hold the adjusting nut in place and tighten the jam nut securely.
7. Insert the servomotor cable ends into the slot in the pulley. Secure the cables with the holder.

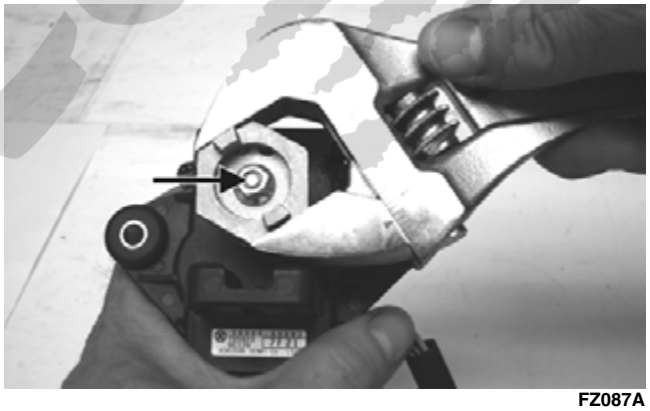
■NOTE: If the pulley was removed from the servomotor, align the space between the two cable slots with the mark on the shaft of the servomotor. Tighten the nut to 35 in.-lb.



MS401A

CAUTION

Never attempt to remove or install the pulley jam nut with the pulley unsecured or damage to the servomotor will occur.

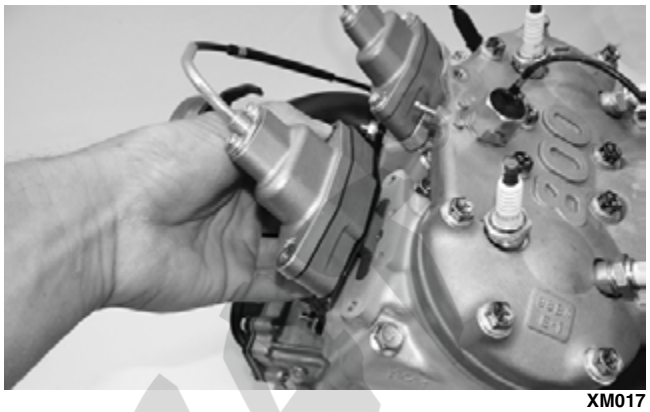


FZ087A

REMOVING/DISASSEMBLING

■NOTE: To avoid a parts mix-up, only remove one valve assembly at a time from the engine.

1. Remove the exhaust valve assembly from the engine.



XM017

2. Remove the retaining screw securing the exhaust valve to the valve stopper.



FC112

3. Hold the valve stopper securely and pull the cable back and up until it clears the top of the stopper; then slowly release the cable and remove it from the valve stopper.



FC113

Cleaning and Inspecting

1. Remove all carbon deposits with solvent and a soft abrasive such as a Scotch-Brite pad.
2. Inspect all parts for nicks, burrs, or other signs of unusual wear.

Replacing Oil Seal

1. Carefully pry the seal up from beneath taking care not to damage the valve plate.



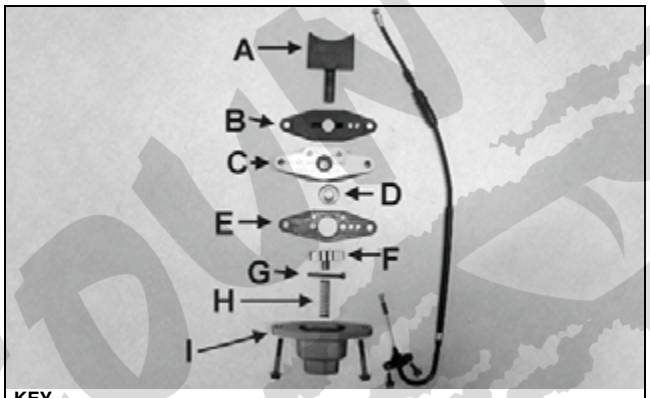
FC116

2. Install the new seal using an appropriate-sized seal driving tool.



FC117

ASSEMBLING/INSTALLING

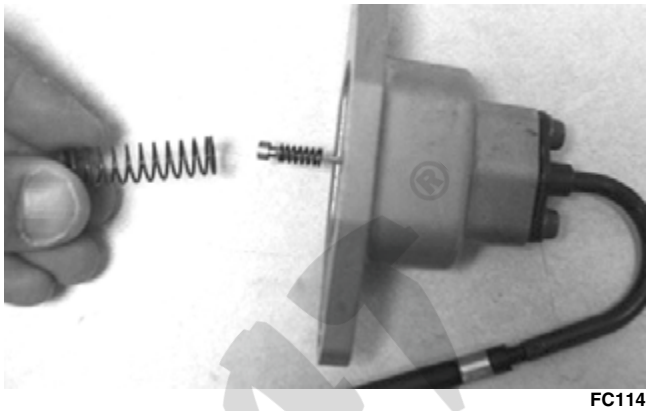


KEY

A. Exhaust Valve	D. Oil Seal	G. Stopper Pin
B. Cover Gasket	E. Gasket	H. Return Spring
C. Valve Plate	F. Stopper	I. Valve Cover

FC111A

1. Slide the return spring over the end of the actuating cable.



FC114

■NOTE: Make sure that the small cable end spring stays in place at the end of the cable.

2. With the cover gasket properly positioned, place the valve stopper on the cable end and slide it down until the cable end is inside the stopper.



FC113

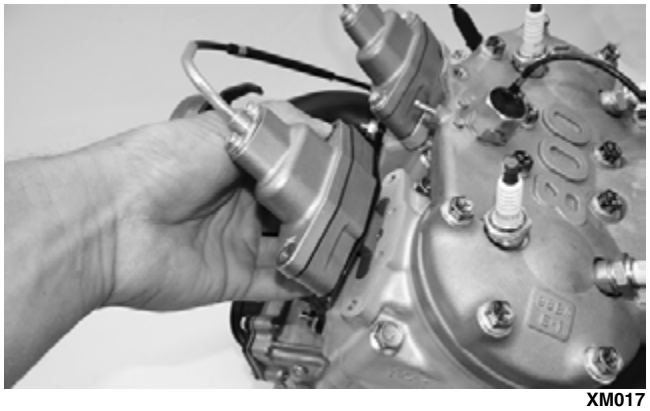
3. With the valve plate gasket properly positioned, slide the exhaust valve through the valve plate and insert it into the valve stopper. Secure with the retaining screw. Tighten to 48 in.-lb.



FC112

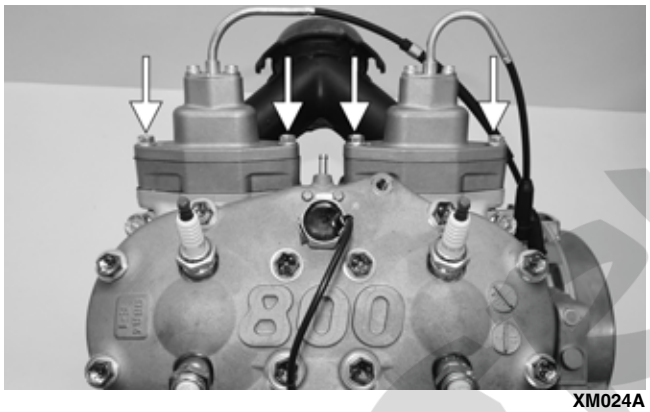
■NOTE: Note that the exhaust valve gaskets are directional and must be installed correctly.

4. Slide the exhaust valve assembly into the cylinder.



XM017

5. Place the valve cover into position on the engine. Secure with two cap screws. Tighten to 96 in.-lb.



XM024A

6. Perform steps 5-8 in Cable Adjustment in this subsection.

TROUBLESHOOTING

The APV system has a self-testing mode built in. Every time that the engine is started, the servomotor will cycle once. The ECM monitors the voltages at the servomotor during this cycle to assure they are within operational tolerances.

If all voltages are within tolerance, the system is ready for operation. If the voltages are not within tolerance, the servomotor will cycle two more times. If the voltages remain out of tolerance, the system will not operate.

For example, if the headlight and taillight are disabled, the ECM will sense a high voltage condition and activate the fail-safe mode. Adding more than 4 amps of accessories will create a low voltage condition and activate the fail-safe mode.

The fail-safe mode is an ECM operated engine RPM limiter. When activated, the fail-safe mode will be seen as an immediate loss of engine horsepower.

Problem: Engine loses power; no top end	
Condition	**Remedy**
1. Exhaust valves sticking in down position	1. Remove carbon deposits, burrs, etc.
2. Cables adjusted too long	2. Inspect—adjust
3. Regulator/Rectifier output voltage out of tolerance	3. Inspect—replace Regulator/Rectifier/stator
Problem: Poor acceleration; hesitation	
Condition	**Remedy**
1. Exhaust valve sticking in up position	1. Remove carbon deposits, burrs, etc.—inspect/replace return spring
2. Cables adjusted too short	2. Inspect—adjust
3. Regulator/Rectifier output voltage out of tolerance	3. Inspect—replace Regulator/Rectifier/stator

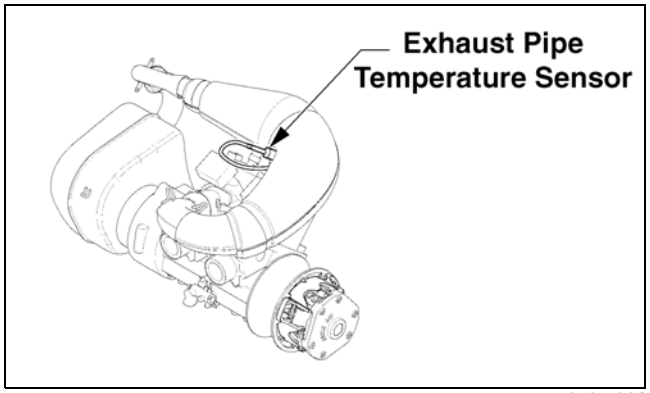
Exhaust Controlled Timing (ECT) System (800 cc)

The 800 cc models are equipped with the Exhaust Controlled Timing (ECT) system utilizing an exhaust pipe temperature sensor.

■NOTE: The 800 cc has a three-stage exhaust valve system. The stages are closed, mid-open, and full-open. These models have a designated RPM of 4500 at which the system is synchronized and checked by the ECM for proper operation occurring once each time the engine is started.

This system automatically adjusts the ignition timing to provide maximum performance through a variety of operating conditions. The ECM receives input on engine RPM (demand) and exhaust temperature (engine condition) and adjusts the ignition timing accordingly. This system is not adjustable and is maintenance free.

If a system fault is suspected, use an ohmmeter to check continuity of the exhaust pipe temperature sensor located in the expansion chamber. A reading of either 0 ohm or infinity indicates a failed sensor.



0737-314

■NOTE: A disabled ECT system WILL NOT cause engine damage; however, a failed ECT system will have slower throttle response and may produce slightly less top-end performance.

COUNTRY CAT

NOTES

SECTION 4 — FUEL SYSTEMS

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Fuel Systems

This section has been organized for servicing the fuel systems; however, some components may vary from model to model. The technician should use discretion and sound judgment when removing/disassembling and assembling/installing components.

Whenever any maintenance or inspection is made on the fuel system where fuel leakage may occur, there should be no welding, smoking, or open flames in the area.

WARNING

Since the fuel supply hose may be under pressure, remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb gasoline; then remove the hose slowly to release the pressure. Always wear safety glasses when removing the fuel hoses.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

A number of special tools must be available to the technician when servicing the fuel systems.

Description	p/n
EFI Analyzer	0744-049
EFI Diagnostic System Manual	2257-850
EFI Diagnostic System Manual (Instructions)	2259-020
Fluke Model 77 Multimeter	0644-559
Fuel Hose Clamp Tool	0644-545
Fuel Pressure Test Kit	0644-493
Vacuum Test Pump	0644-131
Fuel Pump Installation Tool Kit	0744-074
Laptop Diagnostic Test Kit	0744-050
Laptop Diagnostic Tool	0744-060
Main Jet Wrench	0644-065
Oil Injection Usage Tool	0644-007

■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

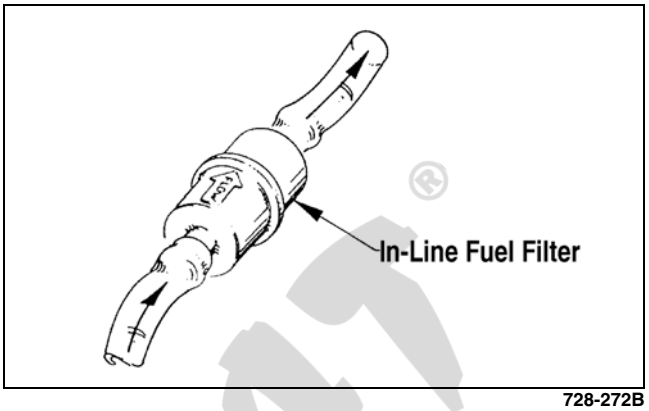
Fuel System (Carbureted)

PRE-MAINTENANCE CHECKS

1. Remove the in-line fuel filter. If the filter is dirty, replace the filter.

■NOTE: Determine which style in-line fuel filter is being replaced and remove and install accordingly.

2. Install a new filter making sure the arrow on the filter is directed toward the fuel pump.



728-272B

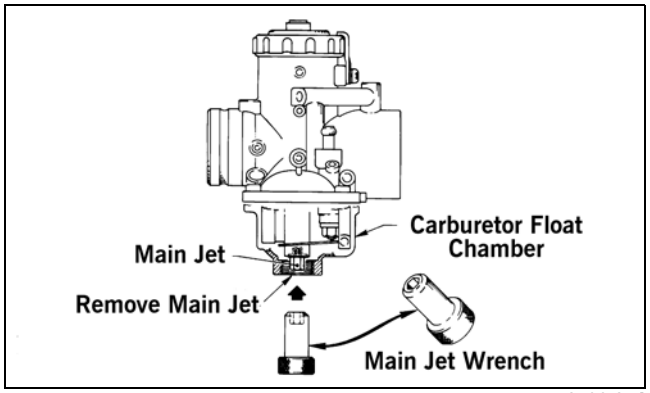
3. Check the hoses to ensure that all are correctly connected; then check for cracks. If any cracks are evident in the hoses, replace them making sure none are against any hot or moving parts. Hoses must fit tightly. If hoses do not fit tightly, cut 6 mm (1/4 in.) from the end and install.
4. Check the impulse hose for cracks or any possible air leaks. The hose must fit tightly at both ends. If loose or cracked, replace the hose.
5. Check each carburetor vent hose for kinks or obstructions; remove any obstructions.
6. Check each carburetor float chamber drain hose for water or debris. If seen, clean by removing the plug and draining the drain hose into a small container.
7. Check the gas tank vent hose and fuel hose for obstructions; remove any obstructions.

Changing Main Jets

1. Loosen each carburetor flange clamp and remove each carburetor from the intake flange and boot.
2. Remove the drain plug and O-ring from each carburetor float chamber and drain the gas into either a small container or an absorbent towel.
3. Using Main Jet Wrench, thread the main jet out of each carburetor. Account for the baffle ring. Install the new main jet with baffle ring and tighten securely.
4. Install the drain plug and O-ring; then tighten securely.

CAUTION

When installing the carburetors, make sure the gasline hoses are properly routed to avoid premature wear and/or contact with exhaust components.



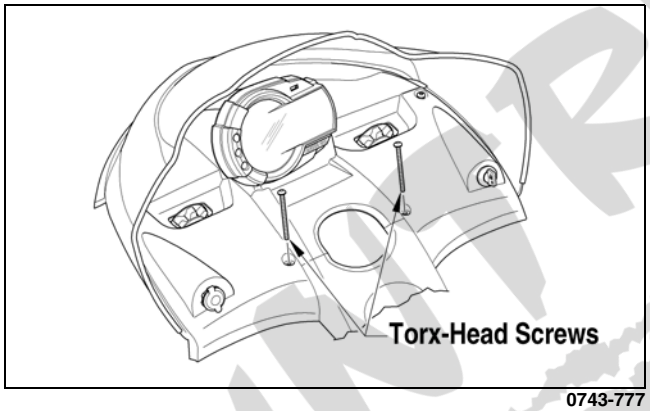
0728-054

5. Install and secure each carburetor.

Carburetor

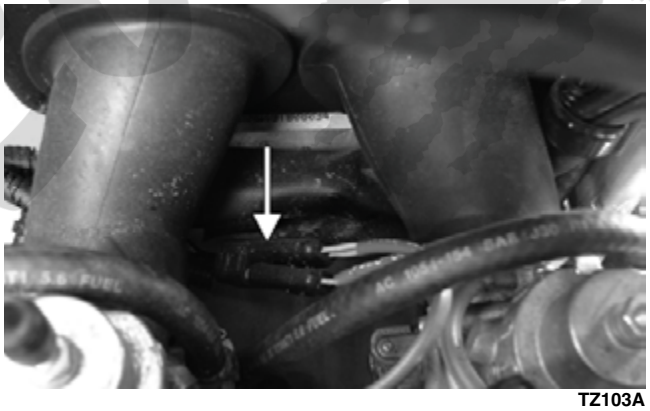
REMOVING

1. Remove the hood and left-side access panel; then remove the torx-head screws securing the console.



0743-777

2. Lift the rear of the console and disconnect the console/main harness plug-in; then remove the console.
3. Disconnect the safety switch wiring harness connector from the main wiring harness; then remove the brass choke-cable housing from the carburetor.

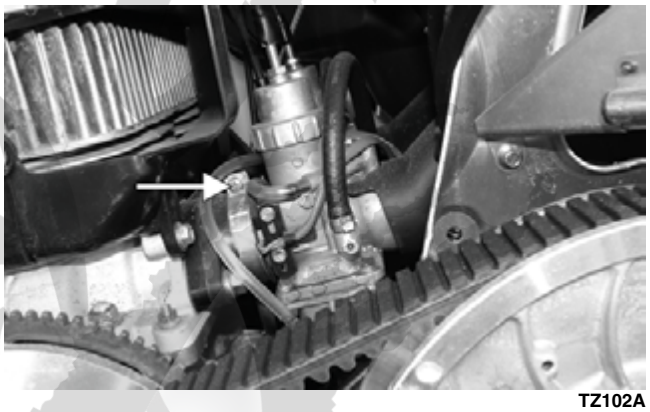


TZ103A



TZ104A

4. Loosen the carburetor-flange clamp; then remove the carburetor.



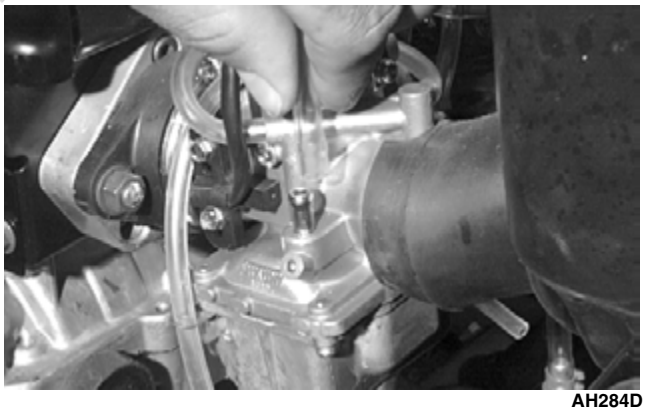
TZ102A

■NOTE: Slide the carburetor into the air silencer boot until free of the flange; then remove carburetor.

CAUTION

Keep MAG-side and PTO-side carburetors identified for installing purposes.

5. Remove the clamp and disconnect the fuel hose from the carburetor inlet fitting; then loosen the lock plate screw and remove the lock plate from the mixing body top.



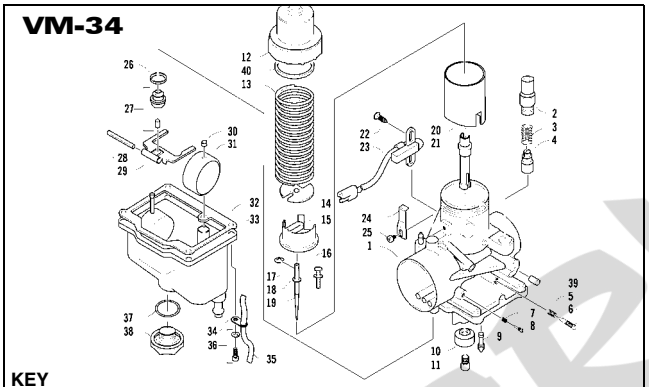
AH284D

6. Remove the mixing body top by rotating it counterclockwise; then remove the top with spring and piston valve assembly from the carburetor.



CM047

DISASSEMBLING



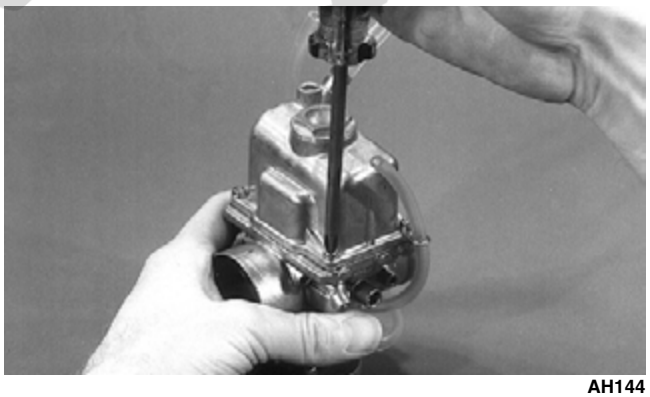
KEY

1. Mixing Body Assy
2. Starter Plunger Cap
3. Starter Plunger Spring
4. Starter Plunger
5. Spring
6. Idle Speed Screw
7. Spring
8. Pilot Air Screw
9. Pilot Jet
10. Baffle Ring
11. Main Jet
12. Mixing Body Top
13. Piston Valve Spring
14. Plate
15. Magnet Block
16. Screw w/Washer
17. E-Clip
18. Washer
19. Jet Needle
20. Piston Valve
21. Needle Jet
22. Self-Tapping Screw
23. Magnetic Switch
24. Plate
25. Screw w/Spring Washer
26. Washer
27. Needle Valve Assy
28. Float Pin
29. Float Arm
30. Cap
31. Float
32. Gasket
33. Float Chamber
34. Plate
35. Hose
36. Screw w/Spring Washer
37. O-Ring
38. Drain Screw
39. Cap
40. Washer

0738-474

■NOTE: Unless a problem with the safety switches exists, do not loosen or remove the screws securing the switch to the carburetor.

1. Remove the four screws and lock washers securing the float chamber; then remove the float chamber and gasket.



AH144

■NOTE: The floats should be removed only if replacement is necessary or the float chamber requires cleaning with carburetor cleaner.

2. Remove the caps from the float towers; then remove the floats. Remove the drain screw and O-ring.

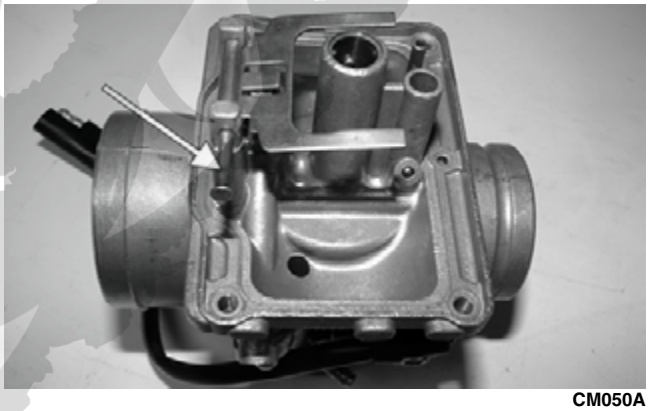


B344

3. Remove the float arm pin; then remove the float arm.

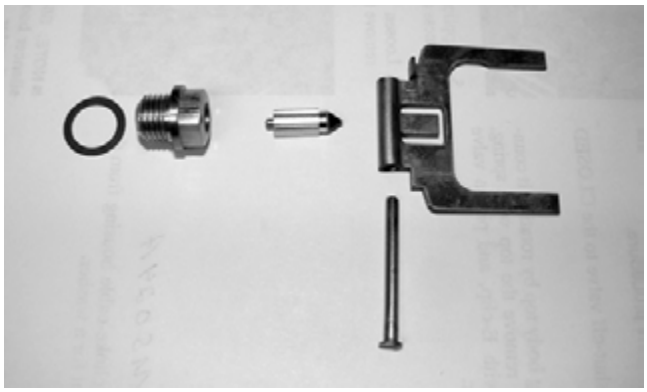
CAUTION

Use care when removing the float arm pin or the towers may break. Also, the pin must be removed from its flattened side.



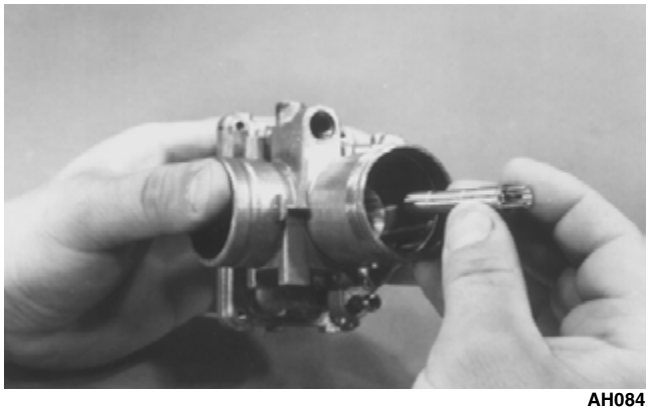
CM050A

4. Remove the needle valve and the seat. Account for a washer from the seat.



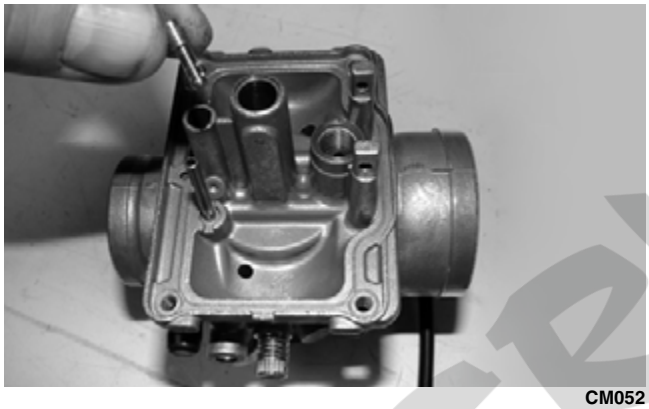
CM051

5. Remove the main jet and baffle ring; then remove the main jet extender guide from the needle jet. Push the needle jet out through the top of the carburetor.



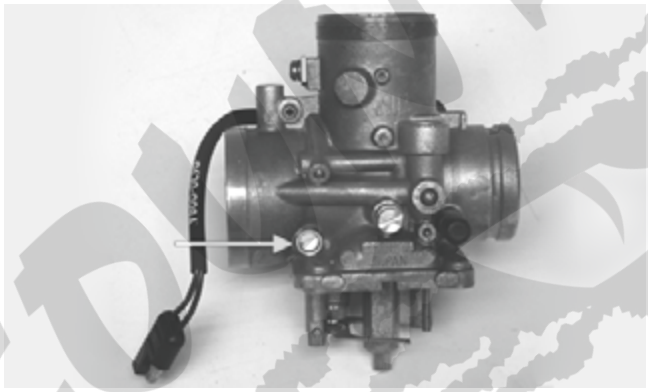
AH084

6. Remove the pilot jet.



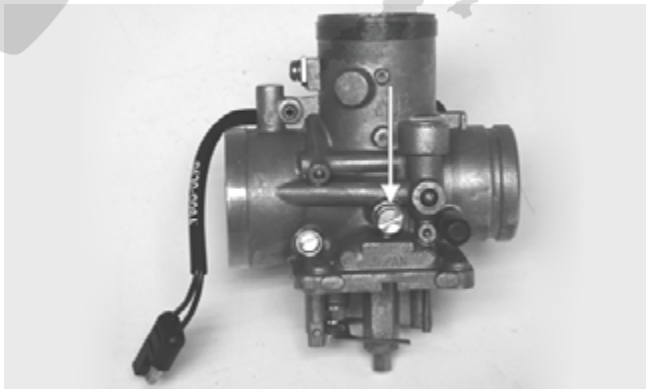
CM052

7. While counting the rotations for installing purposes, rotate the pilot air screw clockwise until lightly seated; then remove the pilot air screw and spring.



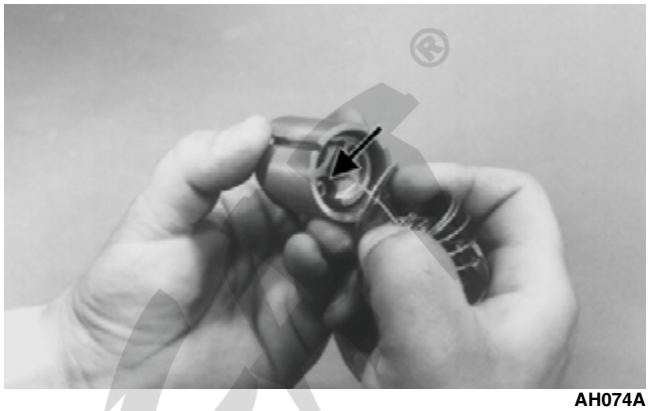
CM053A

8. Remove the idle speed screw and spring.

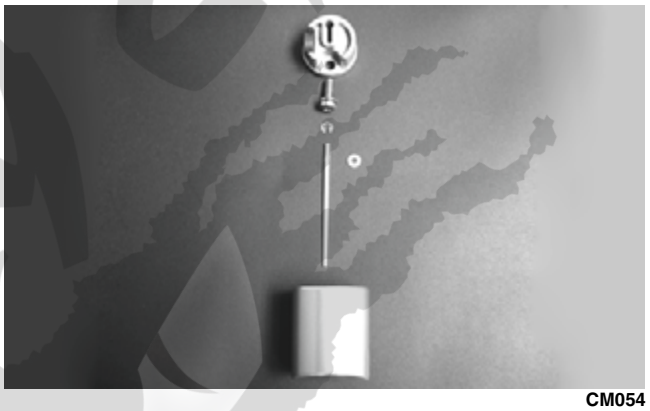


CM053B

9. Remove the Phillips-head screw securing the throttle cable retainer to the piston valve; then remove the retainer. Account for the jet needle with E-clip and washer.



AH074A



CM054

■NOTE: Note the position of the E-clip on the jet needle for assembly purposes.

CAUTION

If an engine problem has been experienced due to improper gas/air mixture, verify the carburetor jetting and E-clip position with the Specification Chart and Carburetor Jet Chart on the snowmobile for altitude, temperature, and type of gasoline.

10. Separate the starter plunger assembly from the choke cable by compressing the spring and removing the plunger from the cable; then remove the spring. Thread the plunger cap off the cable.

CLEANING

CAUTION

DO NOT place any non-metallic components in parts-cleaning solvent or carburetor cleaner because damage or deterioration will result.

1. Place all metallic components in a wire basket and submerge in carburetor cleaner.
2. Soak for approximately 30 minutes; then rinse with fresh parts-cleaning solvent.
3. Wash all non-metallic components with soap and water. Rinse thoroughly.

4. Dry all components with compressed air only making sure all holes, orifices, and channels are unobstructed.

5. Blow compressed air through all hoses to remove any obstructions.

⚠ WARNING

Always wear safety glasses when drying components with compressed air.

CAUTION

DO NOT use wire or small drill bits to clean carburetor orifices, holes, or channels. Distorted or damaged orifices, holes, or channels can result in poor carburetor operation.

INSPECTING

1. Inspect the mixing body for cracks, nicks, stripped threads, and any other imperfections in the casting.

2. Inspect the piston/throttle valve for cracks, score marks, or imperfections in the casting.

3. Inspect the condition of the piston valve spring.

4. Inspect the float for perforations or damage.

5. Inspect the gaskets, O-rings, and washers for distortion, tears, or noticeable damage.

6. When applicable, inspect the tips of the idle speed screw, jet needle, pilot air screw, needle valve, and fuel mixture screw for wear, damage, or distortion.

■NOTE: When inspecting the inlet needle, inspect the side guides and tip for wear. If the guides show any sign of wear, replace the inlet needle.

7. Inspect the pilot jet and main jet for obstructions or damage.

8. Inspect the starter plunger and seat for wear or damage.

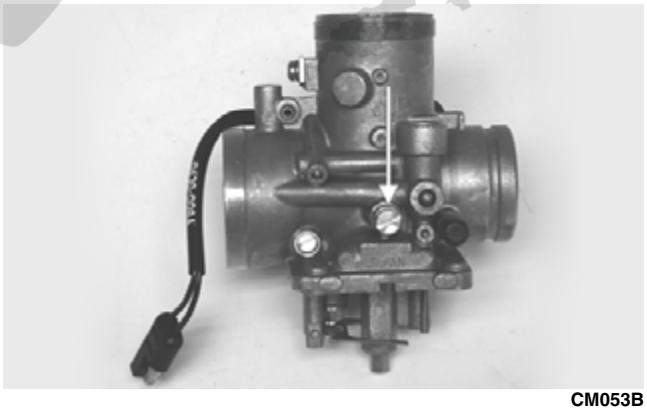
9. Inspect the carburetor mounting flanges for damage and tightness.

CAUTION

An air leak between the carburetor and engine will cause a lean condition and severe engine damage will result.

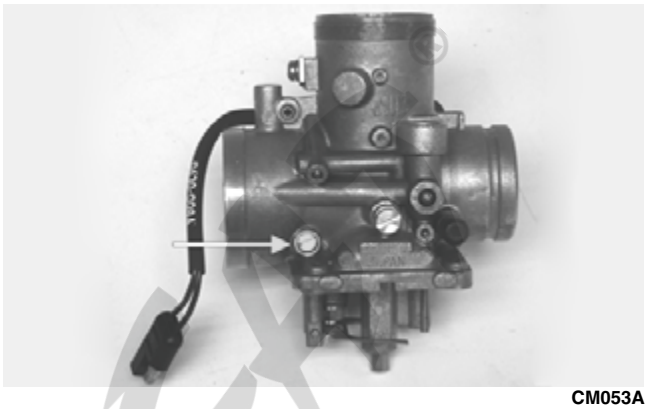
ASSEMBLING

1. Install the idle speed screw and spring.



CM053B

2. Install the pilot air screw and spring. Rotate clockwise until lightly seated; then turn counterclockwise the same number of turns as noted in disassembling for an initial setting.

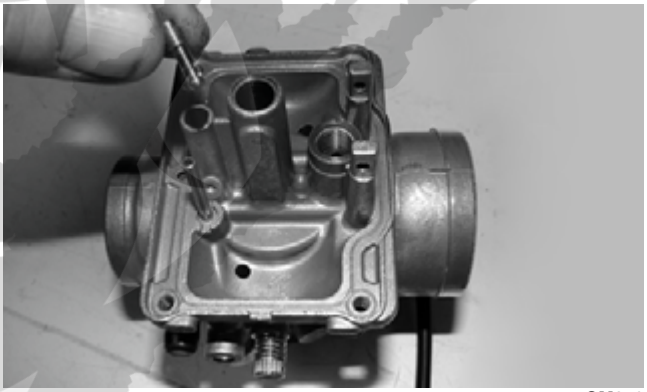


CM053A

CAUTION

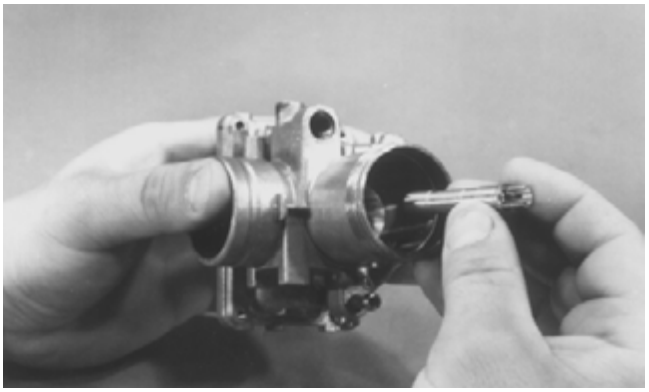
DO NOT force the pilot air screw when seating. Forcing the screw will result in damage to the carburetor body.

3. Install the pilot jet.



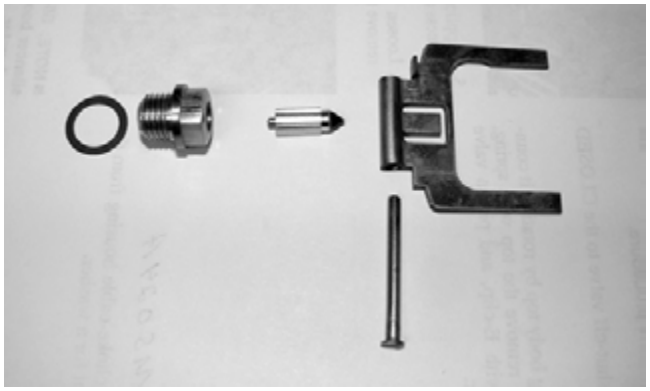
CM052

4. Insert the needle jet into position from the top of the carburetor making sure the groove in the needle jet is aligned with the pin in the mixing body; then place the jet extender, baffle ring, and main jet into position and secure.



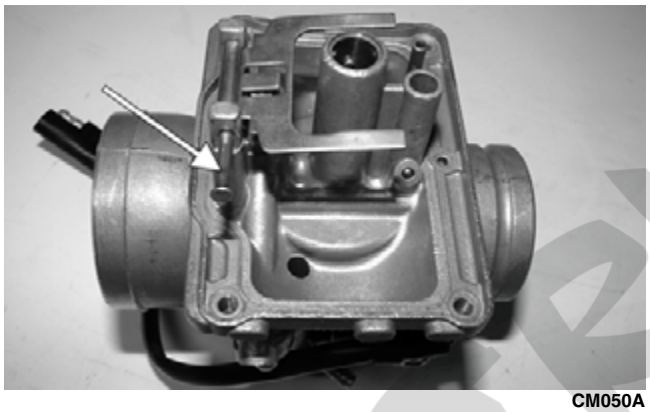
AH084

5. In order, place a washer and inlet seat into position and secure. Install the inlet needle valve.



CM051

6. Place the float arm into position and secure with the pin.



CM050A

7. Check the float arm height. Using a calipers, measure the distance from the gasket surface to the top of the float arm (with the carburetor inverted). If measurement is not within 22-24 mm, adjust by bending the actuating tab.



AH046

8. Place the O-ring and drain plug into position and secure; then place the floats into position making sure the word UP is properly positioned. Press the caps onto the float towers.



B344

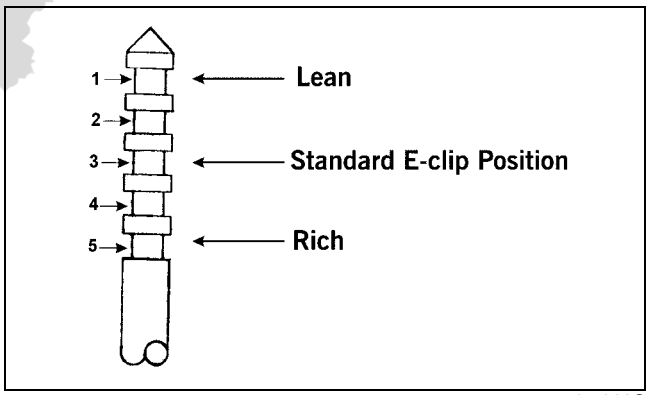
9. Place the gasket and float chamber into position and secure with the four screws and lock washers making sure the hose plates are properly positioned on the two front screws. Install the vent hoses.



AH137

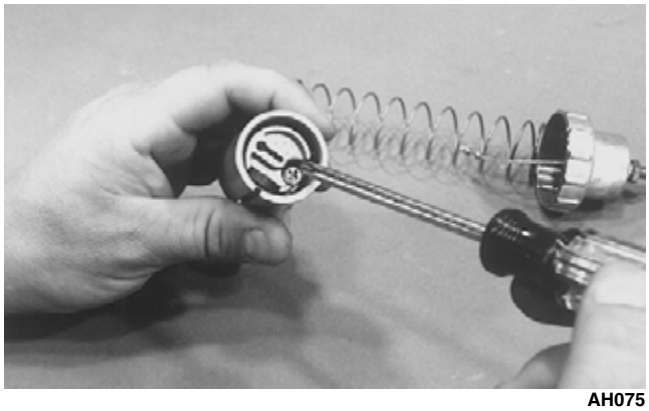
10. Place the E-clip into position on the jet needle. From the bottom of the jet needle, slide the E-clip washer up against the E-clip. Place the jet needle into the piston valve.

■NOTE: Place the E-clip in the proper position as noted in disassembly.



725-266C

11. Place the cable retainer into the piston valve and secure with the Phillips-head screw. Guide the cable end down into the cable retainer slot and slide the cable end to the center of the piston valve. Release the spring and retainer plate to lock the cable in position.



AH075

■**NOTE: The round part of the cable end must come through the hole in the plate/piston valve. If it doesn't, the cable isn't assembled to the piston valve correctly.**

12. Thread the plunger cap onto the choke cable. Place the spring over the cable end and compress. Position the cable end into the starter plunger and release the spring.

INSTALLING

1. Place the piston valve into position making sure the full-length groove in the piston valve is aligned with the pin in the mixing chamber bore; then thread the mixing body top onto the carburetor and tighten securely.



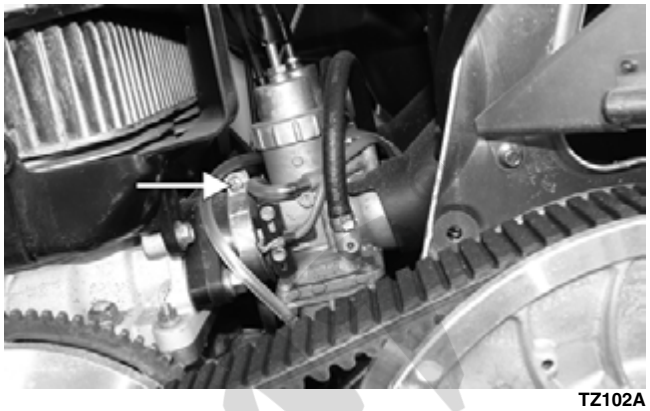
CM056A

■**NOTE: Prior to threading the mixing body top onto the carburetor, assure the rubber washer is positioned correctly on the body top.**

2. Making sure the mixing body top plate is properly positioned, secure the mixing body top by tightening the screw and lock washer.

3. Connect the fuel hose to the carburetor inlet fitting; then using Fuel Hose Clamp Tool, secure the hoses to the carburetor with the clamps.

4. Place the carburetor into position in the flange and air silencer boot; then tighten the flange clamp making sure the carburetor is level. Do not over-tighten the flange clamp as it will damage the carburetor flange.



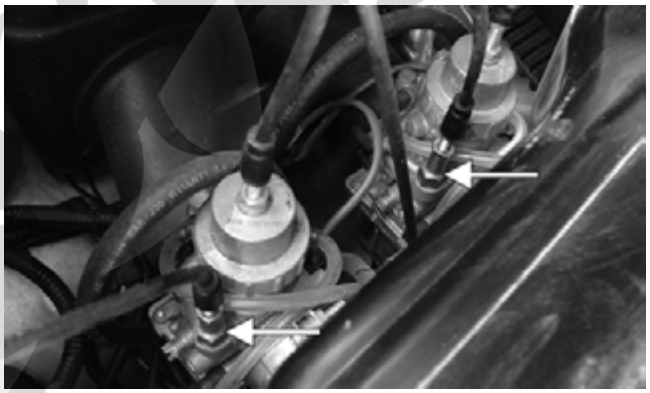
TZ102A

■**NOTE: Slide the carburetor into the air silencer boot; then slide the carburetor into the flange.**

CAUTION

When installing the carburetors, make sure the gasline hoses are properly routed to avoid premature wear and/or contact with exhaust components.

5. Thread the brass choke-cable housing into the carburetor making sure the washer is properly positioned and tighten securely.



TZ104A

6. Connect the safety switch harness connectors to the main wiring harness.

7. Adjust the carburetors to the initial setting (see ADJUSTING in this sub-section).

8. Place the console into position on the headlight support bracket (do not secure the console with the torx-head screws at this time); then connect the console/main harness plug-in.

9. With the belt guard secured, start the engine and warm up to operating temperature; then adjust the carburetors (if necessary) until proper calibration is attained.

CAUTION

Never run the engine with the hood harness disconnected or damage to the electrical system will result.

10. Secure the console to the steering support with the torx-head screws and tighten the screws securely; then close the left-side access panel and close the hood.

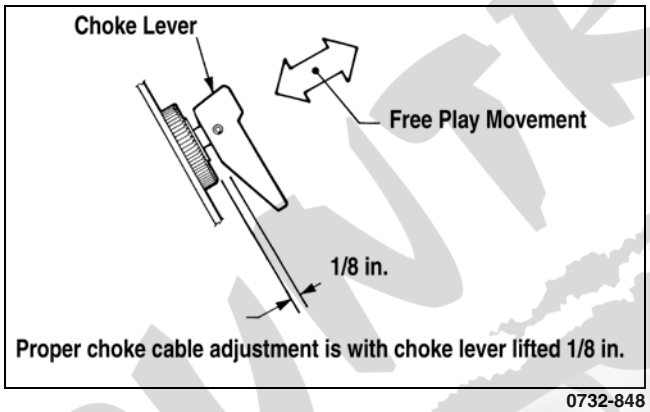
ADJUSTING

CAUTION

The air silencer and boots must be in position whenever the engine is run. If the silencer is removed and the engine is run, a lean condition will result. Therefore, DO NOT run the engine when the air silencer is removed.

Choke Cables

1. Be sure the ignition switch key is in the OFF position and the brake lever lock is set.
2. Loosen the jam nut securing the choke cable adjuster. Rotate the choke cable adjuster clockwise until it bottoms against the brass plunger cap.
3. Slowly rotate the choke cable adjuster counterclockwise while checking the choke lever for free-play. As soon as all free-play has been removed from the end of the lever, stop rotating the adjuster.
4. With free-play removed from the lever, slowly rotate the choke cable adjuster once again clockwise while checking the choke cable lever for free-play. Adjust until 1/8 in. free-play between front bottom edge of lever and housing is attained. Securely tighten the adjuster jam nut.



Proper choke cable adjustment is with choke lever lifted 1/8 in.

0732-848

5. Repeat steps 3 and 4 on each carburetor.

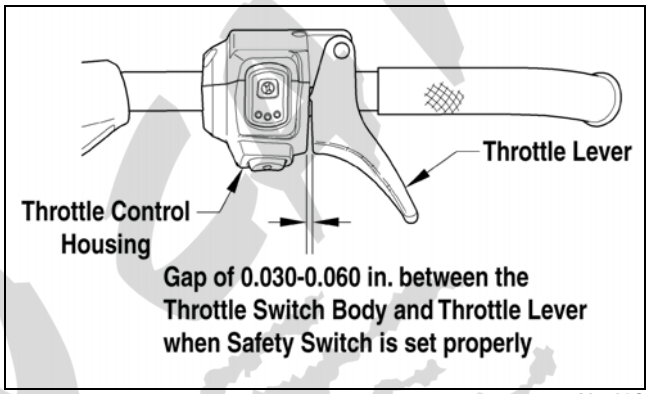
■NOTE: If a carburetor choke cable is adjusted too tight, the engine will only operate on 1 cylinder at idle.

Piston Valves

■NOTE: The air silencer is a one-piece unit, and the silencer boots can be removed to access the intake bores. Remove the boots from the carburetor to access the piston valves.

1. Rotate each idle speed screw counterclockwise until all spring tension is removed.
2. Loosen the jam nut securing each throttle cable swivel adapter; then rotate the swivel adapter clockwise until the piston valve bottoms in the piston valve bore.
3. In turn on each carburetor, place a finger lightly against the side of the piston valve; then rotate the carburetor swivel adapter counterclockwise until slight upward movement of the valve is noted.
4. In turn on each carburetor, place a finger against either piston valve. Rotate the idle speed screw clockwise until it contacts the valve.
5. Compress the throttle lever to the full-open position; then rotate each idle speed screw clockwise 2 complete turns. Release the throttle lever.

■NOTE: The throttle control is equipped with a 3-prong emergency stop switch connector. There must be free-play between the lever and the control housing.



741-518A

■NOTE: If cable free-play gap is incorrect, rotate each swivel adapter an equal amount until recommended free-play is achieved. Each piston valve must be resting against the tip of its idle speed screw.

■NOTE: If throttle cable free-play is incorrect, the carburetor safety switches will be activated prematurely and the engine will not start.

6. Install the air silencer boots making sure they are properly seated to the carburetor.

Synchronizing Piston Valves

■NOTE: Arctic Cat recommends using a suitable carburetor synchronizer. If a carburetor synchronizer is not available, use the following procedure.

1. Move the air silencer boots off the intake bores of the carburetors.
2. Check to make sure the piston valves start to open at the exact same moment by placing a thumb and finger against the valves; then lightly compress the throttle lever.
3. With slight pressure being applied to the throttle lever, the piston valves should start to open at the exact same time. Compress and release the throttle lever several times to assure accurate determination of piston valve opening.
4. If a piston valve starts to open before another, rotate the swivel adapter on the valve which is lifting first clockwise, just enough to synchronize the valves.

■NOTE: Recheck by repeating steps 2-4.

5. Tighten the swivel adapter jam nuts securely. Slide the rubber throttle cable caps down over the swivel adapters.

■**NOTE: There must be free-play in the throttle lever.**

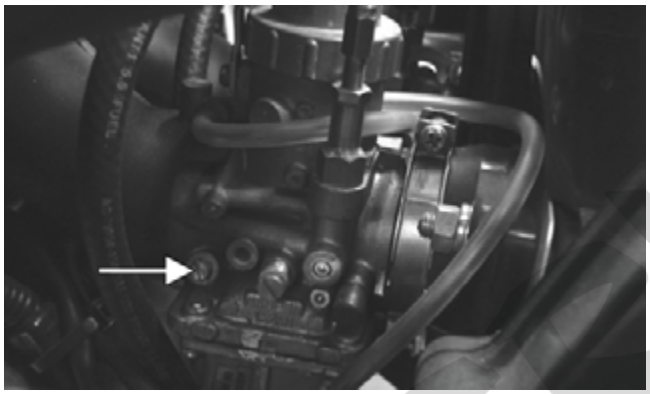
⚠ WARNING

Be sure to tighten the swivel adapter jam nuts securely. If a swivel adapter jam nut is not tightened, the adjuster can rotate out of the carburetor cap causing the piston valve not to return to the full-closed position.

6. After synchronization has been attained, install the air silencer boots over the intake bores of the carburetors.

Pilot Air Screws

1. While counting the rotations, carefully rotate each pilot air screw clockwise until lightly seated.



TZ107A

CAUTION

Do not force a pilot air screw when rotating it clockwise; damage to the pilot air screw needle tip will result.

2. Rotate each pilot air screw counterclockwise the same number of turns as noted in step 1 for an initial setting.
3. Synchronize the oil-injection pump (see Oil-Injection Pump in this section).

Engine Idle Speed

1. With the snowmobile on a shielded safety stand, start the engine, release the brake lever lock, and thoroughly warm up. Fine-tune each idle speed screw and each pilot air screw until the engine idles smoothly at the desired RPM (1500 RPM is recommended).

■**NOTE: Make engine idle adjustment only after the engine has reached running temperature. Since the idle speed screws have not been adjusted, apply slight throttle pressure to keep the engine running. Allow engine to warm up for 2-3 minutes.**

2. After the engine has been allowed to warm up for 2-3 minutes, adjust engine idle by first rotating the PTO-side carburetor idle speed screw clockwise until the tachometer reads 1480 RPM.
3. Rotate the MAG-side carburetor idle speed screw clockwise until tachometer reads 1500 RPM.



TZ107B

4. Rotate the PTO-side carburetor idle speed screw clockwise until the tachometer reads slightly above 1500 RPM; then rotate the idle speed screw counterclockwise to achieve exact 1500 RPM reading. The piston valves should now be synchronized and the engine should idle without holding any throttle pressure.

■**NOTE: If the engine has no ignition spark with the throttle in the idle position but has proper spark with the throttle lever slightly compressed, the carburetor safety switches must be repositioned.**

5. Test the throttle control lever by compressing and releasing it several times. The lever must return to the idle position quickly and completely.

⚠ WARNING

DO NOT operate the snowmobile when any component in the throttle system is damaged, frayed, kinked, worn, or improperly adjusted. If the snowmobile is operated when the throttle system is not functioning properly, personal injury could result.

Throttle Cable

REMOVING

1. Loosen the throttle cable adjuster jam nuts.
2. Remove the mixing body tops.
3. Remove the throttle cables from the piston valves.
4. Remove the throttle cables from the mixing body tops.
5. Remove the handlebar pad and console.
6. Remove the throttle cable end from the throttle lever.
7. Remove the cable from the throttle switch assembly.

■**NOTE: It may be necessary to remove the PTO-side carburetor.**

8. Remove the E-ring securing the oil-injection cable to the control arm. Account for a washer.
9. Loosen the jam nut securing the adjustment cable; then remove the cable from the oil-injection pump.

INSTALLING

1. Route the throttle cable from the throttle switch assembly to the carburetors and oil-injection pump; avoid any sharp bends or moving parts.
2. Install the oil-injection adjustment cable on the oil-injection pump; secure with the jam nuts.
3. Install the oil-injection cable on the control arm; secure with a washer and E-ring.

■NOTE: Install the PTO-side carburetor if removed.

4. Install the throttle cable into the throttle switch assembly making sure it snaps into place.
5. Install the throttle cable end on the throttle lever.
6. Install the handlebar pad and console.
7. Attach the throttle cable to each throttle valve. The valve must seat in the groove of the throttle cable end; then thread the throttle cable into each mixing body top.
8. Install each piston valve and mixing body top on the carburetors. Tighten securely; then secure the tops to the carburetors with the plates.
9. Adjust the carburetors (see Carburetor - ADJUSTING in this section).

CAUTION

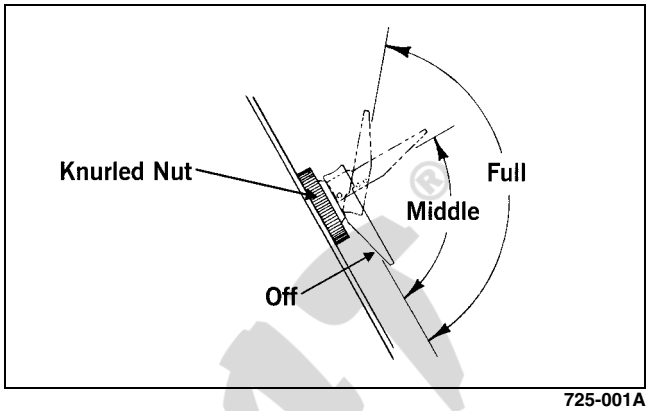
Compress the throttle control lever to ensure free movement. If the throttle cable sticks or binds, correct the problem before starting the engine.

10. Synchronize the oil-injection pump (see Oil-Injection Pump in this section).

Choke Cable

REMOVING

1. Bend down the lock tabs locking each brass choke cable housing on each carburetor.
2. Using a 12-mm wrench, remove each brass choke cable housing from each carburetor. Account for the lock tab washers.
3. Remove each brass plunger and spring from the cable end; then remove each brass choke cable housing.
4. Remove the screws securing the console.
5. Position the choke lever in the middle-choke position; then remove the knurled nut securing the choke lever housing to the console.



725-001A

6. Slide the choke lever housing from the console.
7. Cut any cable ties used to secure the choke cable and remove the choke cable from the engine compartment.

INSTALLING

1. Position the choke lever in the middle-choke position; then from the back side of the console, insert the choke lever housing through the console. Secure with the knurled nut.
2. Route the choke cable from the console to each carburetor; avoid any sharp bends or moving parts.
3. Install each brass choke cable housing onto the cable end; then install each spring and brass plunger.
4. Place the lock tab washer on each brass housing and insert a choke plunger into each carburetor.
5. Thread each brass choke cable housing into each carburetor and tighten. Bend the lock tab up to secure the brass housing. Adjust the choke cable (see Carburetor - ADJUSTING in this section).
6. Place the console into position and secure with the screws.

Fuel Pump

PRELIMINARY CHECKS

■NOTE: Make sure adequate gasoline exists in the gas tank, all hoses are clear and free of kinks and obstructions, the fuel filter is not plugged or damaged, fuel and impulse hoses are in good condition, and evidence of good impulse exists at the crankcase impulse fitting.

TESTING PRESSURE

1. Connect Fuel Pressure Test Kit between fuel pump and carburetor using a piece of fuel hose and a T-fitting.
2. Place snowmobile on a safety stand and start the engine. The specified pressures must be as indicated.

1000-2000 RPM	3.0-3.5 psi
3000-4000 RPM	4.5-5.5 psi
5000-6000 RPM	6.0-7.0 psi

3. Remove gauge and hose and connect fuel hose to carburetor.

TESTING VACUUM

■NOTE: Make sure adequate fuel is in the carburetor for this test.

1. Connect Vacuum Test Pump directly to the fuel pump inlet fitting.
2. With snowmobile on a safety stand, start the engine and accelerate to 2000-3000 RPM for a period of 30 seconds. Note maximum reading of gauge. Reading must be 7-10 in.-hg.
3. Stop engine. Connect fuel hose. Turn the shut-off valve to the OPEN position.

Troubleshooting

Problem: Carburetor Too Rich (0-1/4 Opening)	
Condition	**Remedy**
1. **Choke plunger** will not seat	1. Adjust - service - replace choke cable - plunger assembly
2. **Pilot air screw** too far in	2. Adjust pilot air screw
3. **Pilot air passage** obstructed - damaged	3. Remove obstruction - replace pilot air screw - carburetor
4. **Float/inlet needle** obstructed - damaged - adjusted incorrectly	4. Remove obstruction - replace inlet needle - float - adjust float tab
5. **Pilot jet** loose	5. Tighten pilot jet
Problem: Carburetor Too Rich (1/4-3/4 Opening)	
Condition	**Remedy**
1. **Pilot air screw** too far in	1. Adjust pilot air screw
2. **Needle jet needle** worn - adjusted incorrectly - incorrect	2. Replace needle jet - replace - adjust jet needle E-clip
3. **Pilot air passage** obstructed - damaged	3. Remove obstruction - replace pilot air screw - carburetor
4. **Pilot jet** loose	4. Tighten pilot jet
5. **Float/inlet needle** obstructed - damaged - adjusted incorrectly	5. Remove obstruction - replace inlet needle - float - adjust float tab
6. **Main jet** loose - too large	6. Tighten - replace main jet
7. **Primary air passage** obstructed	7. Remove obstruction
Problem: Carburetor Too Rich (3/4-WOT Opening)	
Condition	**Remedy**
1. **Main jet** loose - too large	1. Tighten - replace with smaller main jet
2. **Float/inlet needle** obstructed - damaged - adjusted incorrectly	2. Remove obstruction - replace inlet needle - float - adjust float tab
3. **Needle jet needle** worn - adjusted incorrectly - incorrect	3. Replace needle jet - replace - adjust jet needle E-clip
Problem: Carburetor Too Lean (0-1/4 Opening)	
Condition	**Remedy**
1. **Choke plunger** remains seated	1. Adjust - service choke cable - plunger assembly
2. **Pilot air screw** too far out - damaged	2. Adjust - replace pilot air screw
3. **Piston valve** sticks open - damaged - worn	3. Service - replace piston valve - throttle cable - spring
4. **Pilot jet - outlet** obstructed	4. Remove obstruction
5. **Float/inlet needle** obstructed - damaged - adjusted incorrectly	5. Remove obstruction - replace inlet needle - float - adjust float tab
Problem: Carburetor Too Lean (1/4-3/4 Opening)	
Condition	**Remedy**
1. **Pilot air screw** too far out - damaged	1. Adjust - replace pilot air screw
2. **Needle jet** obstructed	2. Remove obstruction
3. **Pilot jet - outlet - main jet** obstructed	3. Remove obstruction
4. **Float/inlet needle** obstructed - damaged - adjusted incorrectly	4. Remove obstruction - replace inlet needle - float - adjust float tab
5. **Jet needle E-clip position** incorrect	5. Adjust E-clip
Problem: Carburetor Too Lean (3/4-WOT Opening)	
Condition	**Remedy**
1. **Main jet** obstructed - too small	1. Remove obstruction - replace with larger main jet
2. **Float/inlet needle** obstructed - damaged - adjusted incorrectly	2. Remove obstruction - replace inlet needle - float - adjust float tab
3. **Needle jet needle** obstructed	3. Remove obstruction
Problem: General Fuel System (Engine Cuts Out at High RPM)	
Condition	**Remedy**
1. **Fuel delivery** inadequate	1. Repair - replace fuel pump - impulse hose
2. **In-line fuel filter** obstructed - damaged	2. Remove obstruction - replace in-line fuel filter
3. **Gasoline** contaminated	3. Replace gasoline - de-ice - clean carburetors
4. **Gas-tank vent - hose** obstructed	4. Remove obstruction - replace vent - hose
Problem: General Fuel System (One Cylinder Runs Lean)	
Condition	**Remedy**
1. **Carburetor-to-cylinder** air leak	1. Repair/replace gaskets/flanges - service intake ports - tighten clamps
2. **Carburetors** not aligned vertically	2. Align carburetors vertically
3. **Primary compression (crankcase)** low	3. Troubleshoot engine
4. **Carburetors** not synchronized	4. Synchronize carburetors

Fuel System (EFI)

INTRODUCTION

The Arctic Cat EFI System operates off a series of coils located on the stator and is made up of the following components.

1. An engine control module (ECM) calculates input from sensors (air temperature sensor, coolant temperature sensor, throttle position sensor, ignition timing sensor (2-stroke), barometric pressure sensor (2-stroke), and on the 800/1100 cc turbo models, a knock sensor) to provide the engine with the correct fuel mixture and timing for optimum operation.
2. Charge coils (1 and 2), located on the stator, provide AC voltage to the ECM/CCU/regulator/rectifier where AC voltage is converted to DC voltage.
3. A fuel pump coil located on the stator operates the low voltage, high output fuel pump. At cranking speed, the high output fuel pump provides enough fuel to charge the fuel rail.
4. An injector coil located on the stator provides the injectors with DC voltage for operation through the ECM.
5. A lighting coil located on the stator plate provides output to the CCU (500 cc) or regulator/rectifier (800 cc) to operate accessories and the lighting system.

FLOODED ENGINE

If the engine should become flooded, set the brake lever lock, compress the throttle lever to the full-open position, and crank the engine over until it starts and clears itself. Release the brake lever lock.

FUEL SYSTEM

The fuel is first drawn into the electric fuel pump through multiple pick-up valves and hoses. The fuel is then routed through a high-pressure fuel hose to the fuel rail.

The fuel pressure is maintained in the fuel rail by the fuel regulator. With the fuel pressure maintained at a constant psi, the ECM evaluates the information it receives from the electrical sensors and opens the injectors for precise periods of time (pulse widths) to meet engine demands.

■NOTE: The entire EFI system depends on all coils functioning properly on the stator.

Individual Components

ECM

The ECM is the brain of the EFI system. It uses sensor inputs to determine the correct fuel/air ratio for the engine given the existing conditions of altitude and temperature.

If any of the sensors should fail while the engine is running, the ECM will sense a problem and go into a "fail safe" mode. This is an over-rich condition and will greatly reduce performance. However, the engine will be protected from a possible lean condition and engine damage.

The ECM is equipped with a self-diagnostic system utilizing the service icon in the speedometer/tachometer and remains illuminated when a problem exists with any of the sensors. The technician can determine the problem sensor by reading the code shown on the readout screen and applying it to the ECM Diagnostic Codes chart (see Self-Diagnostic System/Codes in this section).

■NOTE: The ECM cannot be repaired.

On 2-stroke models if the ECM is not receiving current from one of the output coils on the stator, that circuit will not operate. Coils on the stator are the charge coils operating the ECM, the injector coil which operates the injectors, the fuel pump coil which operates the fuel pump, and the lighting coil/chassis control unit operating all accessories and the lighting system.

■NOTE: On the 500 cc, the ECM is coded with a letter (A-B-C). On the 800 cc, the ECM is coded with symbols (■-●-▲). When replacement of the ECM is necessary, the ECM must be replaced with an ECM of the same code.

Removing (800 cc)

1. Remove the expansion chamber.
2. Remove the two torx-head screws securing the rear portion of the ECM heat shield; then remove the shield.
3. Disconnect the wire harness leads from the ECM; then remove the two cap screws securing the ECM. Remove the ECM.

Installing (800 cc)

1. Secure the ECM to the chassis using the existing cap screws; then connect the wiring harness to the ECM.
2. Secure the front of the ECM heat shield into the tabs; then secure the back of the ECM heat shield using the existing torx-head screws. Install the expansion chamber.

■NOTE: Make sure all connectors are clean and tight. Apply dielectric grease to all connectors.

Removing (Bearcat/F-Series/T-Series)

1. Disconnect the wiring harness lead from the ECM.
2. Remove the two screws securing the ECM to the left-front upper frame; then remove the ECM.

Installing (Bearcat/F-Series/T-Series)

Secure the ECM to the left-front upper frame with the screws; then connect the wiring harness to the ECM.

■NOTE: Make sure all connectors are clean and tight. Apply dielectric grease to all connector seals.

Removing (F/M/XF 1100 cc)

1. Remove the left-side access panel; then remove the retaining ring securing the lower console.
2. Remove the two wiring connectors from the ECM; then remove the ECM mounting bracket from the rear belt guard.

3. Remove the two torx-head screws securing the ECM to the mounting bracket.

Installing (F/M/XF 1100 cc)

1. Secure the ECM to mounting bracket using the existing two torx-head screws. Tighten securely.
2. Install the ECM with mounting bracket onto the rear belt guard until it snaps into place.
3. Connect the two wiring connectors to the ECM.
4. Secure the lower console using the retaining ring; then install the left-side access panel.

■NOTE: Make sure all connectors are clean and tight. Apply dielectric grease to all connector seals.

AIR TEMPERATURE SENSOR

This sensor detects air temperature entering the air silencer and engine. The ECM sends current to this sensor, and (depending on the temperature) the sensor will pass a certain amount of current through the sensor to ground. The ECM measures how much current passes through the sensor to ground. From this measurement, the ECM determines the air temperature and calculates the fuel/air mixture ratio. Resistance will drop as the temperature rises.

Removing

1. Disconnect the wiring harness from the air temperature sensor.
2. Using a flat-blade screwdriver, pry the sensor end to end to remove it from the air silencer. Account for two push pins.

Installing

1. Place the sensor into position in the air silencer and secure with push pins.
2. Connect the wiring harness to the air temperature sensor. Secure the sensor wires with cable ties so they do not rub on any other components.

COOLANT TEMPERATURE SENSOR

This sensor detects coolant temperature. The ECM measures the current flow through the sensor to ground. From this measurement, the ECM can determine the engine coolant temperature and calculate the correct fuel/air mixture ratio.

■NOTE: If the coolant temperature rises above 75° C (167° F) (2-Stroke), the temperature sensor starts to richen the fuel mixture. At this time, the check engine light will flash constantly. Once the engine coolant temperature reaches the specified temperature 90° C (194° F), the temperature sensor will signal the ECM to go into the rich mode to protect the engine while overheating. At this time, the check engine light will be constantly on.

■NOTE: If the coolant temp rises above 105°C (221° F) (4-Stroke) the temp light on the gauge will start to flash and the engine will go into a fuel cut (surging) mode to alert the rider of overheating. If the temp continues to rise and exceeds 110°C (230° F) the temp light will be on continuously. The fuel cut will not protect the engine from overheating if the operator continues to ride the snowmobile.

THROTTLE POSITION SENSOR

This sensor is a potentiometer (essentially, a resistor). This sensor transforms the throttle-valve position into output voltage to the ECM. In addition, the sensor detects the opening or closing speed of the throttle valve and feeds that rate of voltage change to the ECM.

■NOTE: The input from the throttle position sensor is one of the main inputs for the ECM calculation of fuel/air mixture ratio.

IGNITION TIMING SENSOR

This sensor is triggered by teeth precisely mounted to the flywheel flange. Each time a tooth rotates past the sensor, a signal is sent to the ECM. From this signal, the ECM determines ignition and injection timing and RPM.

BAROMETRIC PRESSURE SENSOR

This sensor is part of the ECM. Its purpose is to sense atmospheric pressure. From this information, the ECM determines the correct fuel/air mixture ratio.

■NOTE: On 2-stroke models, the sensor is not replaceable. If it should fail, the ECM must be replaced.

FUEL INJECTORS

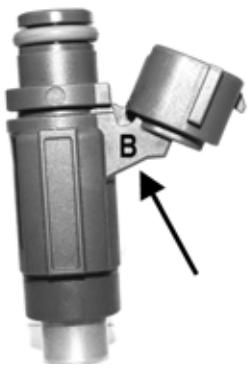
A fuel injector is an electromagnetic injection valve controlled by a signal from the ECM. The coil used in the injector is a high-pressure resistance type. The ECM determines the optimum fuel injection time and duration based on signals from the sensors.

When voltage is sent to the fuel injector, it energizes the coil and opens the needle valve, thereby injecting fuel. Because the fuel pressure (pressure differential between fuel line and manifold) is kept constant, the amount of fuel injected is determined by the duration of time the valve is open and manifold pressure.

On the 500 cc, the injectors are coded with letters (A-B-C). On the 800 cc, the injectors are coded with symbols (■-●-▲) and are color-coded yellow and green. When replacement of a fuel injector is necessary, the injector must be replaced with an injector of the same code symbol/letter and color.

CAUTION
Do not replace an injector with one of a different code symbol or letter. Severe engine damage may occur.

500 cc



IO031A

800 cc



SNO-738

Removing

WARNING

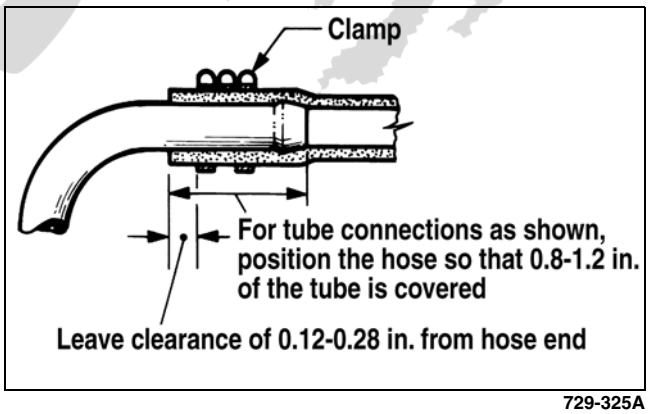
Since the fuel supply hose may be under pressure, remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb gasoline; then remove the hose slowly to release the pressure. Always wear safety glasses when removing the fuel hoses.

1. Loosen the clamp securing the fuel supply hose to the fuel rail; then remove the hose from the fuel rail.
2. Disconnect the wiring harness from each injector.
3. Remove the screws securing the injector hold-down plate to the throttle body assembly; then remove the plate from the injectors.
4. Remove the fuel injectors from the throttle body/ intake manifold assembly.

Installing

1. Apply a light coat of oil to all O-rings; then install the upper and lower O-rings onto each injector.
2. Install the injectors into the throttle body assembly.
3. Place the injector hold-down plate into position on top of the injectors and secure with two screws.
4. Connect the fuel delivery hose to the fuel rail and secure with a clamp.

■NOTE: When securing the fuel delivery hose, position the clamp as shown.



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5. Connect the wiring harness to the injectors.

FUEL PRESSURE REGULATOR

The fuel pressure regulator maintains the fuel pressure at a constant specified level. The turbo models maintain pressure from the manifold pressure.

EXHAUST AIR TEMPERATURE (EAT) SENSOR

This platinum, thin-film sensor detects the exhaust air temperature in the exhaust system. The ECM sends current to this sensor, and (depending on the temperature) the sensor will pass a portion of that current to ground. The ECM measures how much current passes through the sensor to ground. From this measurement, the ECM determines the exhaust air temperature and adjusts the fuel, ignition timing, and APV calibration. Resistance will increase as the temperature rises.

FUEL PUMP CIRCUIT (2-Stroke)

The fuel pump and its circuit are provided with current from the fuel pump coil on the stator. For this circuit to function correctly, five components must be properly functioning. Check the following components before considering the fuel pump assembly to be defective.

A. Fuel pump coil - see coil test procedure.

B. Emergency stop switch and ignition switch must be ON.

C. Fuel pump - see fuel pump test procedure.

D. Wiring harness and connectors - clean the connectors and test the harness.

E. ECM.

CRANKSHAFT POSITION SENSOR (1100 cc)

This sensor measures the location in degrees of rotation of the crankshaft. A 15° resolution exists between signals. The signal is triggered by teeth on the outer surface of the flywheel as they pass by the sensor. The sensor gives the ECM the location of the crankshaft at a given point in time. The ECM processes the information and uses it in many different types of calculations. For example, the sensor can be used for RPM, and it can also be used to determine the rate of acceleration of the crankshaft.

CAMSHAFT POSITION SENSOR (1100 cc)

This sensor tells the ECM which stroke the engine is on. Because the 4-stroke engine operates on a 720° cycle, the piston is at TDC twice per cycle - once on the exhaust stroke and once on the compression stroke.

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR (1100 cc)

This sensor measures pressure in the intake manifold when the engine is running. The ECM uses this sensor to aid in calculating the required fueling. For the base fuel map, the 1100 cc non-turbo relies on the MAP sensor only for low throttle openings. After a given throttle opening is reached, the ECM switches to the TPS sensor for its main fuel map. The 1100 cc turbo relies entirely on the MAP sensor and only uses the TPS for its main fuel map if the MAP sensor should fail.

The ECM uses the MAP sensor for many other calculations, but the base fuel map is the main one.

WASTEGATE CONTROL VALVE (1100 cc Turbo)

The wastegate control valve adjusts the wastegate position based on input from the ECM. The wastegate does not require any input from the ECM to operate at base boost levels. In areas of operation where the ECM will allow the turbo to exceed base boost, the wastegate control valve bleeds some of the pressure that would typically be used to open the wastegate via the wastegate diaphragm port on the turbo. By bleeding this pressure, the wastegate is set at a lower opening thereby allowing more exhaust gas to pass by the turbine increasing the boost level.

KNOCK SENSOR

This sensor controls engine knock or detonation. The knock sensor assesses structure borne noise (vibrations) caused by rapid pressure rises (detonation) in either cylinder and performs calibration adjustments to the necessary cylinder via the ECM limiting damage to internal engine components. Detonation can be caused by many variables including poor fuel quality, lean operating conditions, or modified engine components/systems.

Self-Diagnostic System/ Codes

■NOTE: For testing the 800/1100 cc EFI system, refer to the EFI Diagnostic System Manual with Laptop Diagnostic Tool and Laptop Diagnostic Test Kit.

■NOTE: To aid in testing the 500 cc EFI system, refer to the EFI Analyzer Usage Manual with EFI Analyzer.

INTRODUCTION

The Service Icon is controlled by the ECM. The icon should illuminate each time the engine is started, and it should go out after a few seconds. If the icon stays illuminated while the engine is running and a code is displayed on the readout screen, the ECM is receiving input that is outside of its established parameters. Refer to the appropriate ECM Diagnostic Codes chart.

Deluxe Gauge



FZ001D

Standard Gauge



FZ003B

ECM Diagnostic Codes - 2-Stroke	
Code	**Trouble**
2	Failure in injector(s).
4	Open or short circuit in barometric pressure sensor circuit.
5	Open or short circuit in intake air temperature sensor circuit.
6	Open or short circuit in water temperature sensor circuit.
7	Open or short circuit in throttle position sensor circuit.
12	Failure in ignition coil(s).
16*	Incorrect adjustment/failure in APV cable.
17*	Failure in exhaust temperature sensor circuit.
18*	Failure in servomotor.
21*	Open or short circuit and/or loose knock sensor circuit.
OCTN*	Low octane gasoline.

*800 cc only

■NOTE: For codes ECM 16 and ECM 18, see Servomotor/Potentiometer Test in Section 5. For CCU codes, see Section 5.

ECM Diagnostic Codes - 4-Stroke	
Code	**Trouble**
1	Failure in the fuel system.
2	Failure in injector (PTO).
3	Failure in injector (MAG).
4	Failure in barometric pressure sensor circuit.
5	Open or short circuit in intake manifold air temperature sensor circuit.
6	Open or short circuit in water temperature sensor circuit.
7	Open or short circuit in throttle position sensor circuit.
8	Open or short circuit in manifold air pressure sensor circuit.
9	Failure in crankshaft position sensor circuit.
11	Failure in speed sensor circuit.
12	Failure in coil (MAG).
13	Failure in coil (PTO).
14	Failure in ISC valve.
15	Failure in oxygen sensor circuit.
19	Failure in camshaft position sensor circuit.
21	Open or short circuit and/or loose knock sensor circuit.
22*	Failure in injector (PTO secondary).
23*	Failure in injector (MAG secondary).
25	Failure in shifting system/gear position switch.
26	Malfunction in air pressure sensor circuit.
29	Malfunction in shift control switch.
OCTN*	Low octane gasoline.

*Turbo only

The fuel system and the ignition system remain two separate systems. In a no-start situation, first determine if the problem is caused by lack of spark or by a fuel delivery problem or by an internal engine condition (low cylinder compression for example).

Once the problem area has been determined, check the components involved using the Fluke Model 77 Multimeter or the EFI Analyzer depending on the test being made.

Fuel Pressure Regulator

1. Using the Fuel Pressure Test Kit, connect the tester to the regulator fuel inlet.

■NOTE: A short piece of 3/8 in. I.D. hose will be needed to make the above connections.

2. Pressurize the regulator to 28-31.3 psi. Turn the pressure tester shut off valve to the OFF position. Observe the gauge for several minutes and note any loss of pressure. If pressure begins to drop, the cause may be a ruptured diaphragm, worn spring, or leaking valve. If the regulator fails to build or maintain pressure, replace the regulator.

■NOTE: If the pressure drops, check the hose connections to ensure no leaks exist.

Throttle Body Assembly

REMOVING (500/800 cc)

■NOTE: The expansion chamber, shock mount bracket support (800 cc), and air silencer must be removed for this procedure (see Section 3).

1. Disconnect the wiring harness from each injector and from the throttle position sensor.
2. Remove the coolant hoses from the throttle body assembly and plug them to prevent leakage.
3. Remove the fuel supply hose from the fuel rail.

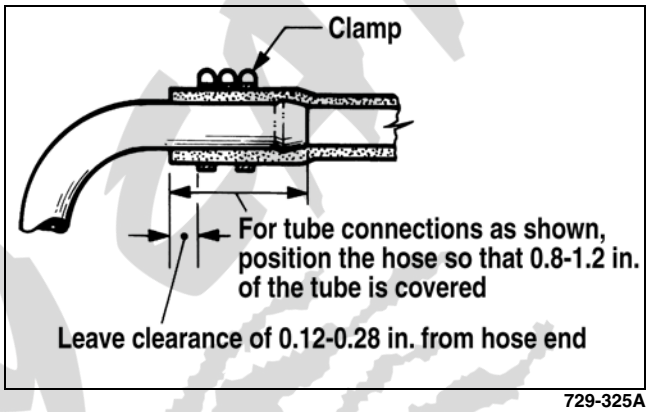
WARNING

Since the fuel supply hose may be under pressure, remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb gasoline; then remove the hose slowly to release the pressure. Always wear safety glasses when removing the fuel hoses.

4. Loosen the flange clamps.
5. Remove the oil pump control rod (800 cc).
6. Slide the throttle body assembly out of the flanges; then loosen the jam nut securing the throttle cable and remove.
7. Remove the throttle body assembly.

INSTALLING (500/800 cc)

1. Attach the throttle cable to the throttle body; then secure with jam nut. Secure the coolant hoses to throttle body assembly.
2. Place the throttle body assembly into position. Make sure the flanges and boots are positioned properly. Secure with flange clamps.
3. Where applicable, connect the oil pump control rod.
4. Connect the fuel supply hose to the fuel rail.



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5. Connect the wiring harness to each injector and throttle position sensor.

CAUTION

Verify the oil pump rod linkage is properly installed or damage to the engine will occur.

■NOTE: Install the air silencer, shock mount bracket support (800 cc), and the expansion chamber (see Section 3).

6. Place the rear of the snowmobile on a shielded safety stand and start the engine without touching the throttle. It may idle slowly and stop. Restart using the same procedure until the engine starts and builds RPM on its own.

CAUTION

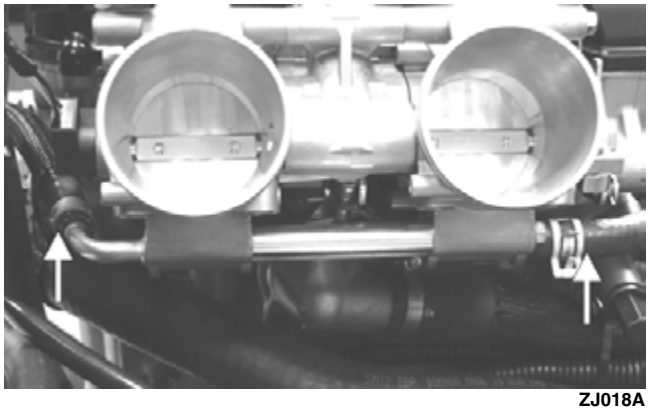
When installing the throttle bodies, make sure the gasline hose is properly routed to avoid premature wear and/or contact with exhaust components.

7. Check the cooling system and adjust the throttle cable as necessary.

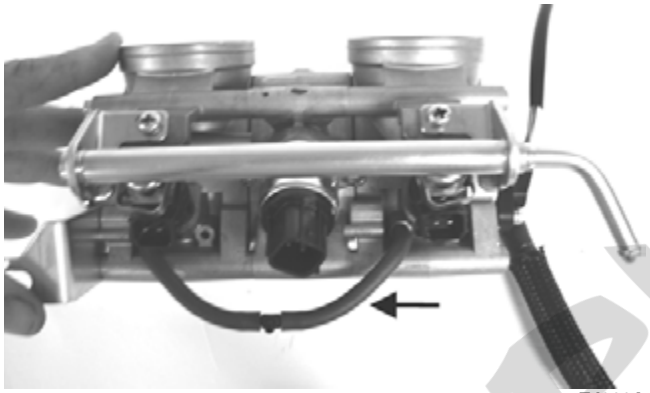
REMOVING/DISASSEMBLING (1100 cc Non-Turbo)

■NOTE: To remove the throttle body assembly, it is necessary to remove the air silencer (see Section 3). On the F/M/XF, the seat and gas tank must also be removed.

1. Remove the coolant hoses and MAP sensor hoses from the throttle body.



ZJ018A



ZJ289A

2. Loosen the throttle cable jam nut; then remove the throttle cable from the bracket and the throttle valve cam.



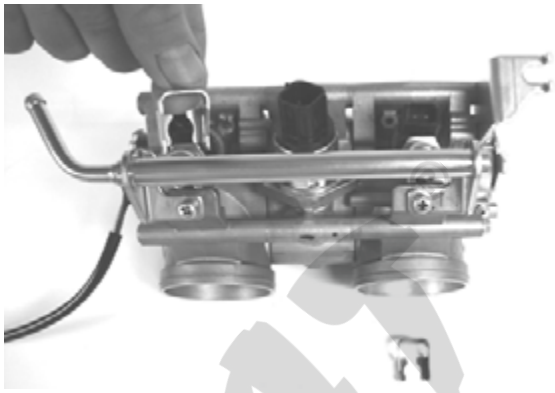
ZJ103A

3. Remove the cable ties securing the fuel injector wiring harness to the fuel rail; then disconnect the harness from the fuel injectors.

■NOTE: For installing purposes, note the location of all cable ties.

4. Loosen the clamps securing the throttle bodies to the intake boots; then remove the throttle body assembly.

5. Remove the retaining clips securing the fuel rail to the injectors; then remove the two screws securing the fuel rail to the throttle body assembly. Remove the fuel rail and injectors from the throttle body assembly.

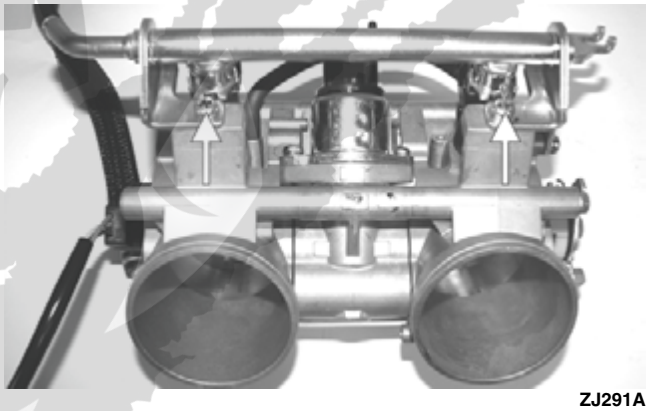


ZJ290

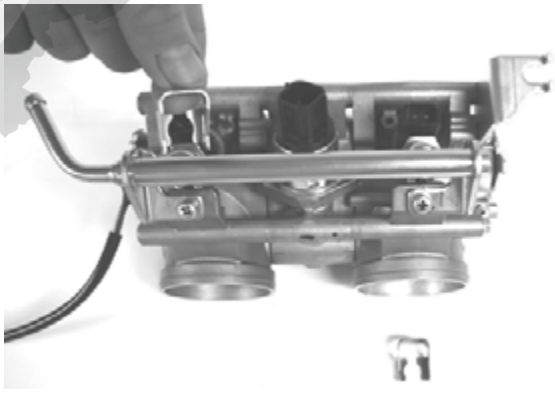
■NOTE: For assembling purposes, note from which side the fuel injectors were removed.

ASSEMBLING/INSTALLING (1100 cc Non-Turbo)

1. Install the fuel injectors onto the throttle body assembly; then secure the fuel rail and injectors to the throttle body assembly with the two screws and the retaining clips.



ZJ291A

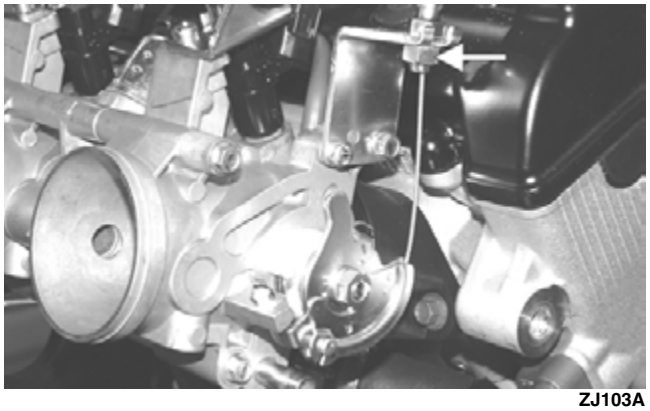


ZJ290

2. Install the throttle body assembly to the intake boots and tighten the clamps; then install the coolant hoses and the MAP sensor hoses. Secure the coolant hoses with the clamps.

3. Connect the injector wiring harness to the injectors; then secure the harness to the fuel rail with cable ties in the proper locations as noted during disassembling.

4. Install the throttle cable to the bracket on the throttle body assembly and to the throttle valve cam; then secure the cable with the jam nut.



ZJ103A

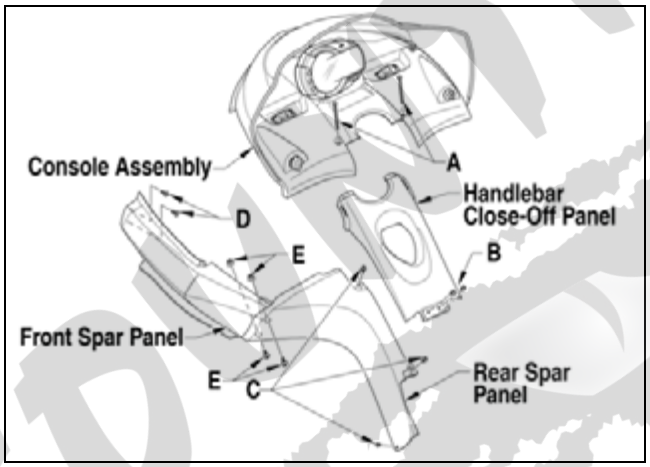
■**NOTE: To finalize this procedure, install the air silencer (see Section 3). On the F/M/XF, install the gas tank and seat.**

REMOVING/DISASSEMBLING (1100 cc Turbo)

1. On the F/M/XF, remove the hood, seat (see Section 8), and gas tank (see Gas Tank in this section).

■**NOTE: Steps 2-4 are for the T-Series only.**

2. Remove the two torx-head cap screws (A) securing the console to the chassis; then lift up the rear end of the console and disconnect the console harness plug-in. Remove the console.

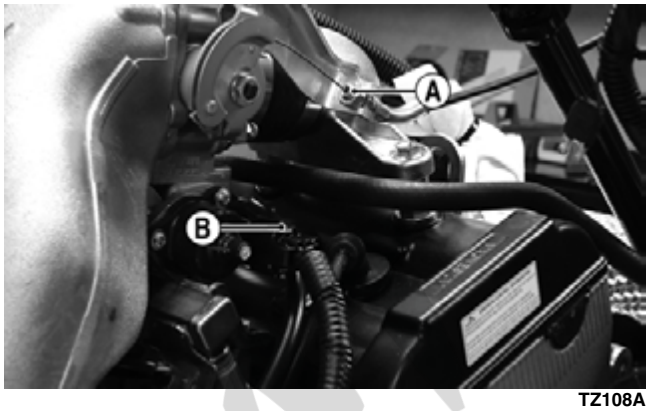


743-945A

3. Remove the two screws securing the handlebar close-off panel (B); then remove the three screws (C) securing the left-side spar panel to the seat support tube.

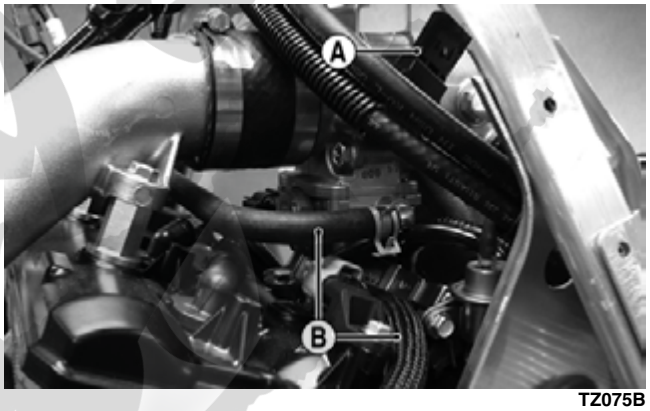
4. Remove the screws (D) and (E) securing the left-front spar panel to the front bumper; then remove the spar panel. Remove the seat (see Section 8).

5. Disconnect the throttle cable (A); then disconnect the idle speed control (B).



TZ108A

6. Remove the harness connector from the throttle position sensor (A); then place a towel under the throttle body coolant hoses (B) and with a suitable clamping device, close-off the coolant hoses and remove them from the throttle body.



TZ075B

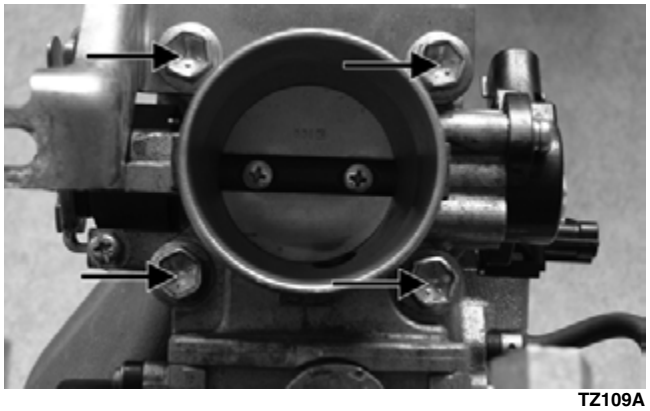
■**NOTE: If the snowmobile is in warranty, breaking the seal on the idle screw jam nut or the Phillips-head screws on the TPS will void warranty.**

7. On the T-Series, loosen the clamps securing the hose to the intake pipe and throttle body.



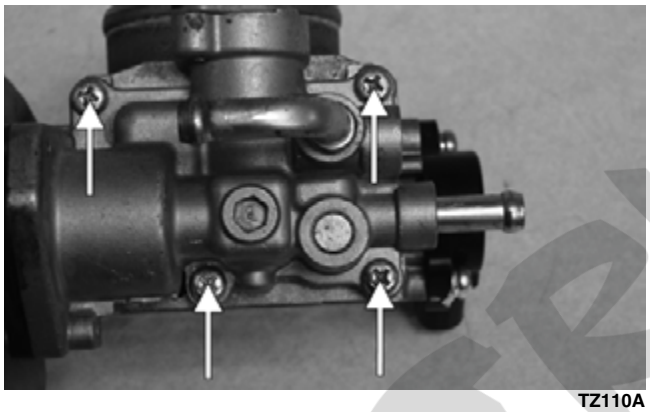
TZ085A

8. Remove the four cap screws securing the throttle body to the intake manifold and account for the throttle cable support bracket.



TZ109A

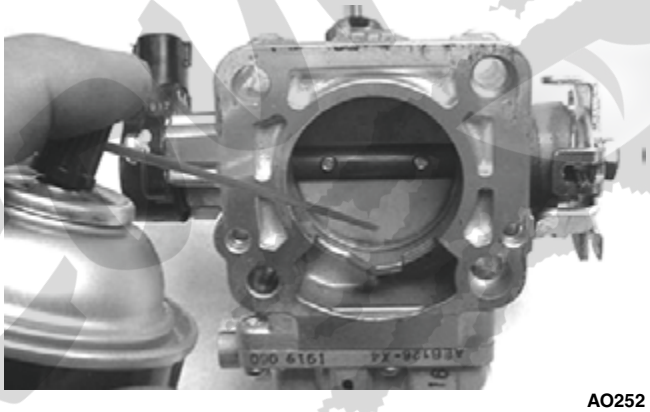
9. Remove the four screws securing the ISC valve to the throttle body.



TZ110A

■NOTE: Remove the throttle body ISC valve before using any type of cleaner to clean the throttle body.

10. Using a throttle body cleaner, spray throttle valve once and clean the venturi of carbon buildup. A fine nylon brush may be needed to clean carbon deposits.



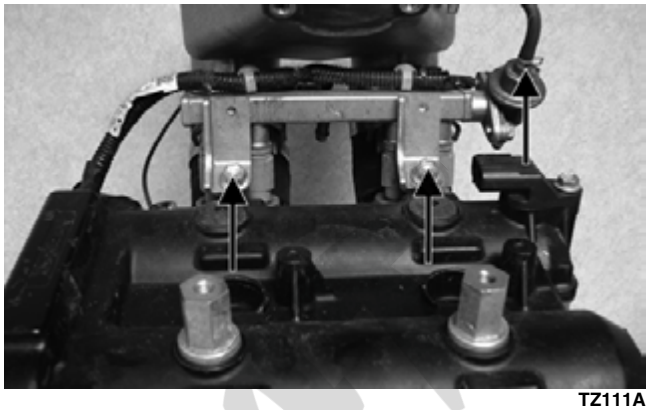
AO252

CAUTION

Never place the throttle body in cleaning solvent with the TPS secured to the throttle body or the sensor must be replaced.

11. Carefully blow-dry the throttle body and be sure that the ISC valve rubber gasket is properly placed for assembly.

12. Disconnect the injector harness and remove the hose from the fuel pressure regulator; then remove the cap screws securing the fuel rail/injectors to the intake flange.



TZ111A

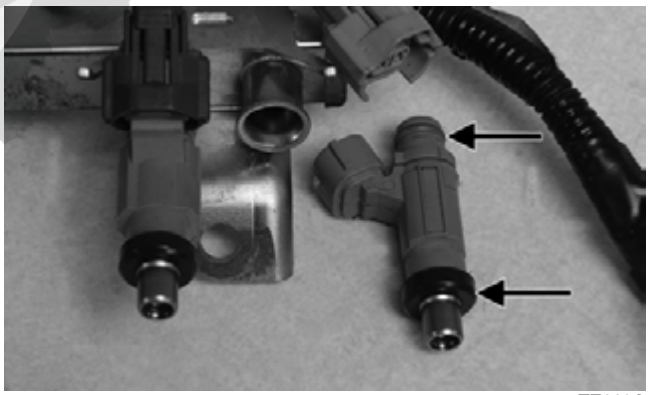
■NOTE: After removing the fuel rail, account for the four injector gaskets.

13. Remove the four harness connectors from the injectors; then carefully remove the injectors from the fuel rail.



TZ113

■NOTE: With the injectors removed, inspect the O-rings and gaskets for damage.



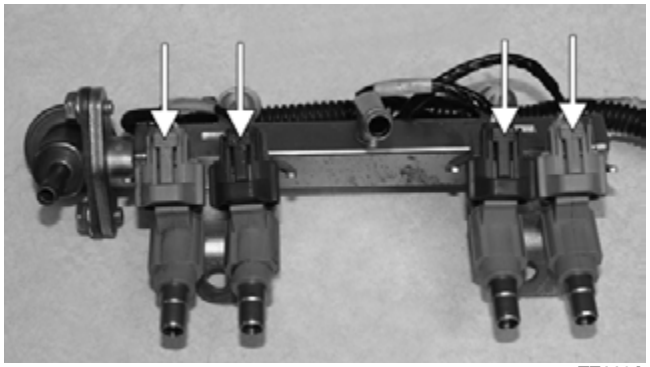
TZ113A

14. If necessary, remove the cap screws securing the fuel pressure regulator to the fuel rail and remove the regulator.

ASSEMBLING/INSTALLING (1100 cc Turbo)

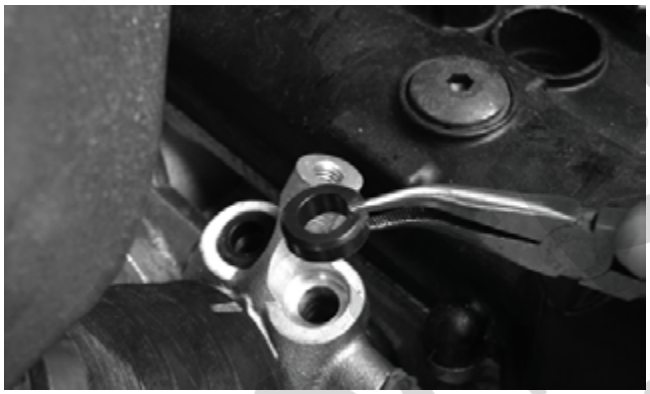
1. If removed during disassembling with a new O-ring in place, install the fuel pressure regulator and secure it to the fuel rail. Tighten to 96 in.-lb.

2. Install the injectors into the fuel rail; then install the four harness connectors to the injectors and connect the injector harness to the main harness connector.

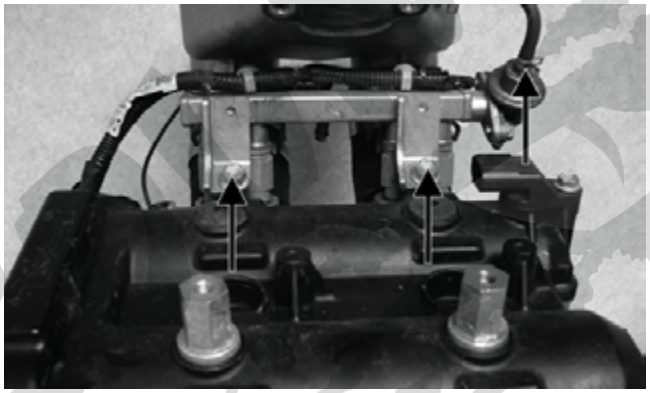


TZ116A

3. Install new injector gaskets into the intake flange and install the fuel rail/injectors. Secure with the two cap screws and tighten to 18 ft-lb; then install and secure the hose to the fuel pressure regulator.

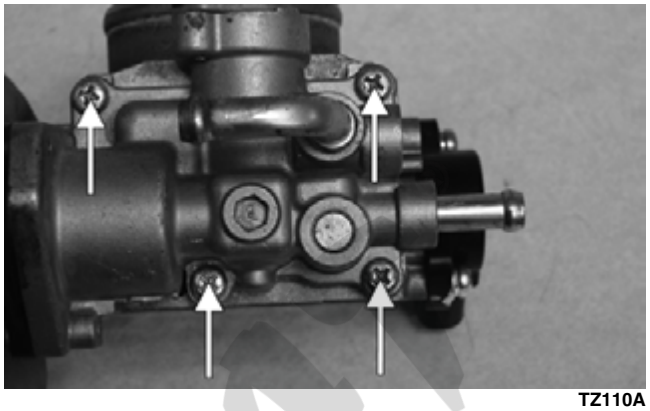


TZ117



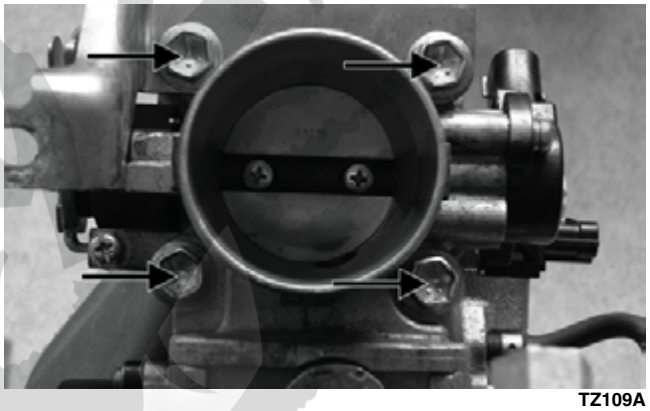
TZ111A

4. With a new gasket for the ISC valve in place, secure the ISC valve to the throttle body and tighten securely.



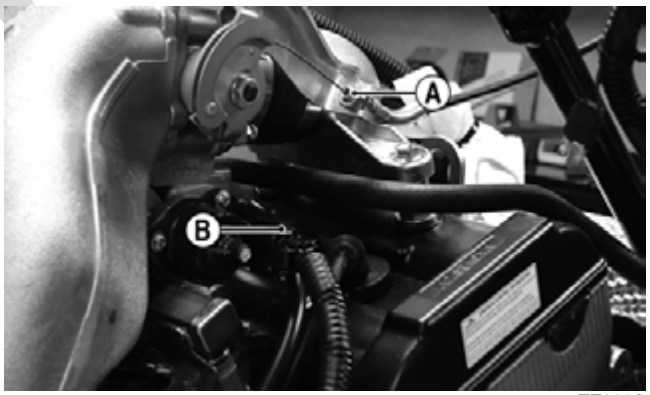
TZ110A

5. With a new throttle body gasket, secure the throttle body with the cable support bracket to the intake plenum with the four caps screws; then tighten to 18 ft-lb.



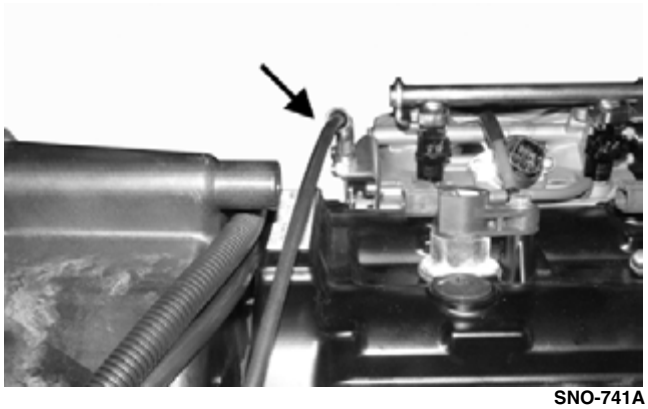
TZ109A

6. Install the hose connecting the intake pipe to the throttle body and secure with the hose clamps.
7. Install the coolant hoses to the throttle body and secure with the clamps; then install the harness connector to the throttle position sensor.
8. Install the harness connector to the idle speed control (B); then install the throttle cable to the throttle body pulley and secure the cable with the jam nut (A).



TZ108A

■**NOTE: On F/M/XF models, make sure the throttle cable is secured correctly so the cable does not rub on the steering post.**



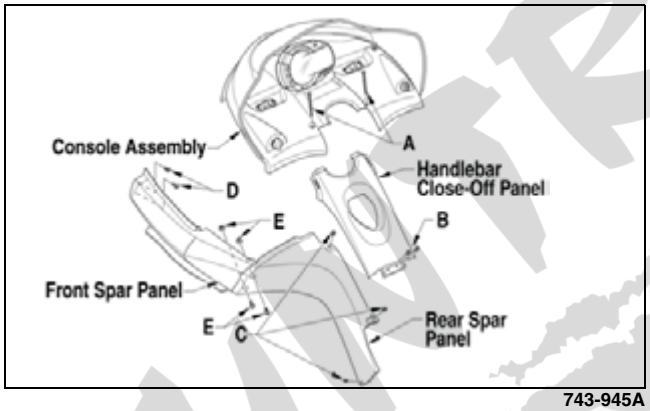
SNO-741A

■**NOTE: Make sure the throttle lever free-play is within a range of 0.030-0.060 in.**

9. On the F/M/XF, install the gas tank (see Gas Tank in this section) and seat (see Section 8); then install the hood and side panels. Connect the hood harness.

■**NOTE: Steps 10-12 are for the T-Series only.**

10. Install the front and rear spar panels; then secure the panels with the cap screws.



743-945A

11. Install the handlebar close-off panel; then secure the panel with the two screws. Position the console assembly on the headlight support bracket; then connect the main hood harness.
12. Secure the console with the two torx-head cap screws; then install the seat (see Section 8).

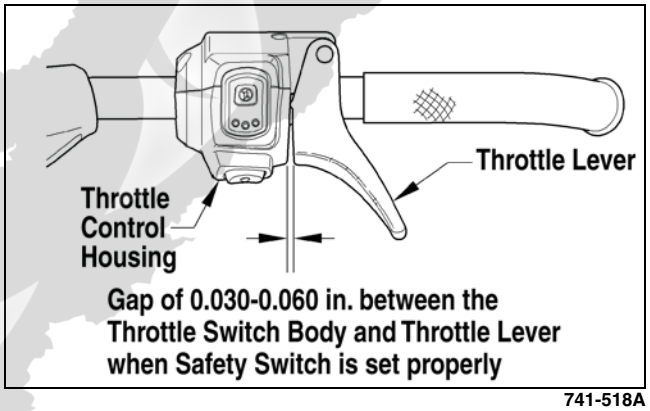
Throttle Cable

REMOVING

1. Loosen the throttle cable from the bracket; then remove the throttle cable from the pulley on the throttle body lever shaft.
2. On the 500 cc, remove the E-clip securing the oil-injection cable to the oil-injection pump control arm. Account for a washer. Loosen the oil-injection cable jam nuts.
3. On Bearcat/T-Series/F-Series, remove the handlebar pad and console.
4. Remove the cable ties securing the throttle cable.
5. Remove the throttle cable ends from the throttle lever and from the throttle control housing.

INSTALLING/ADJUSTING

1. Install the throttle cable into the throttle control assembly making sure the cable snaps into place.
2. Install the throttle cable end on the throttle lever.
3. Route the throttle cable from the throttle control assembly to the throttle body assembly and oil-injection pump; avoid any sharp bends or moving components.
4. Attach the throttle cable to the pulley on the throttle body shaft.
5. On the 500 cc, install the oil-injection cable adjuster on the oil-injection pump and secure with the jam nuts. Install the oil-injection cable on the control arm; secure with a washer and E-clip.
6. On the Bearcat/T-Series/F-Series, install the handlebar pad and console.
7. Secure the throttle cable to the handlebar and steering post with cable ties.
8. Adjust the throttle cable tension by turning the jam nuts in the appropriate direction until 0.030-0.060 in. free-play exists in the throttle lever and the butterfly completely opens and closes. Tighten the jam nuts securely.



741-518A

CAUTION

Compress the throttle control lever to ensure free movement. If the throttle cable sticks or binds, correct the problem before starting the engine.

9. Synchronize the oil-injection pump (see Oil-Injection Pump in this section).

Fuel Filter (1100 cc)

■**NOTE: The fuel filter should be replaced every 5000 miles.**

WARNING

Since the fuel supply hose may be under pressure, remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb gasoline; then remove the hose slowly to release the pressure. Always wear safety glasses when removing the fuel hoses.

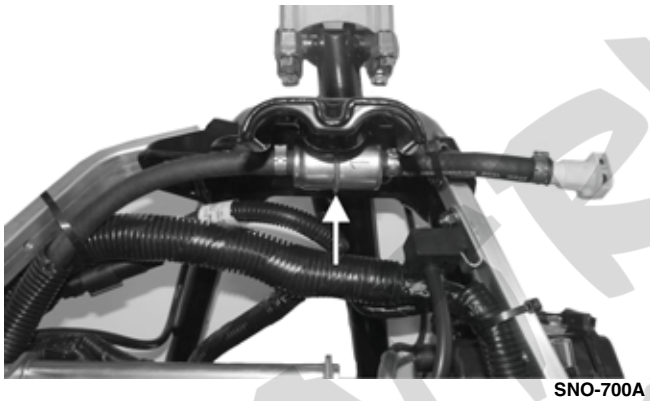
■**NOTE: Before removing the fuel filter, take note of the filter inlet and outlet for installing purposes.**

REMOVING (F/M/XF)

1. Remove both access panels, hood, seat, and gas tank to access the fuel filter.



SNO-699A


SNO-700A

2. Disconnect the gasline hose from the fuel pump.
3. Remove the hose clamps and discard; then slowly remove the fuel hoses from the fuel filter. Dispose of the excess fuel from the filter properly.

■**NOTE: Inspect the hoses for any signs of cracking, cuts, or wear points. Replace if necessary.**

INSTALLING (F/M/XF)

1. Place new hose clamps on the gasline hoses; then with the fuel pump inlet and outlet oriented correctly, connect the gasline hose to the fuel pump.

■**NOTE: On the turbo models, insert the filter making sure the lip sits between the tab and clamp.**

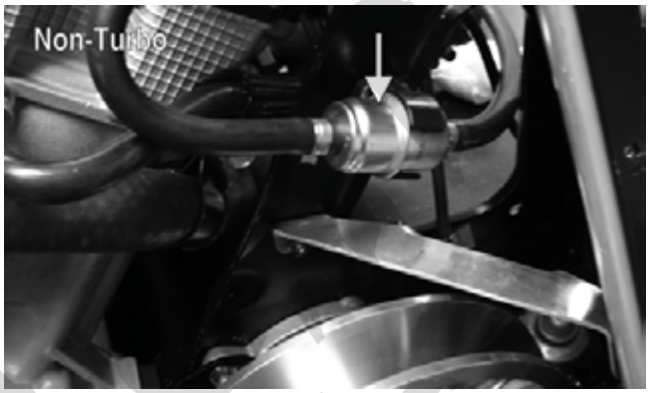


SNO-1021

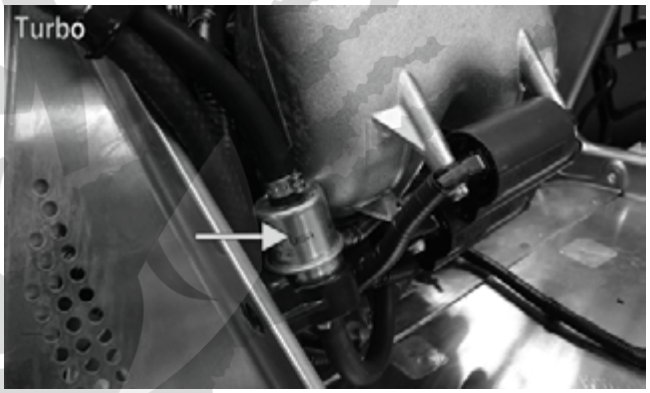
2. Install the gas tank, seat, hood, and access panels; then start the engine and inspect the gasline hoses and filter for any signs of leaks.

REMOVING (Bearcat/T-Series)

1. Open the left-side access panel; then remove the fuel filter from the bracket.



ZJ135B



TZ118A

2. Remove the hose clamps and discard; then slowly remove the gasline hoses from the fuel filter. Dispose of the excess fuel from the filter properly.

■**NOTE: Inspect the fuel lines thoroughly for any signs of cracking, cuts, or wear points.**

INSTALLING (Bearcat/T-Series)

1. Place new hose clamps on the gasline hoses; then with the fuel pump inlet and outlet oriented correctly, connect the gasline hoses to the fuel pump. Secure with the hose clamps.
2. Secure the fuel filter to the fuel filter bracket; then start the engine and inspect the fuel hoses and filter for any signs of leaks.
3. Close the left-side access panel.

Fuel Pump (F/M/XF)

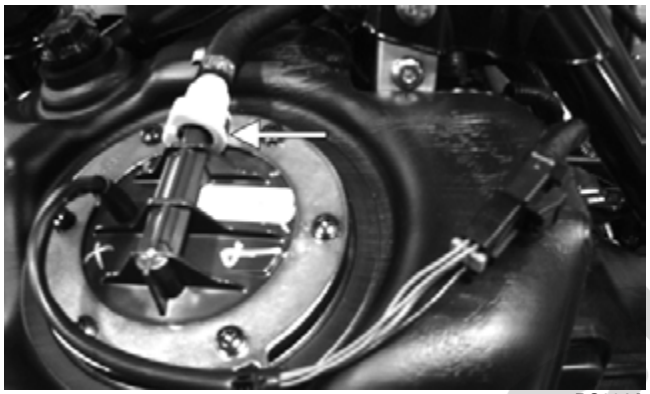
TESTING

1. Remove the seat assembly (see Section 8); then remove the upper and lower console panels.

2. Disconnect the gasline hose connector hose from the outlet of the fuel pump by pressing inward on the white connector, pressing in the black release, and finally pulling back on the hose.

WARNING

Since the fuel supply hose may be under pressure, remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb gasoline; then remove the hose slowly to release the pressure. Always wear safety glasses when removing the fuel hoses.



PC031A

3. Connect Fuel Pressure Test Kit to the fuel pump and fuel hose.
4. On the 800 cc, start the engine. On the 1100 cc, turn the ignition key to the ON position. Fuel pressure should be as specified.

800 cc	42.8-47.3 psi
1100 cc Non-Turbo	43.5 psi
1100 cc Turbo	36.0 psi - Idle 55.0 psi - Full Boost

■NOTE: If fuel pressure is not as specified, the pump is defective and must be replaced.

5. Disconnect the fuel pump from the main wiring harness.
6. Connect the positive lead of a 12-volt power supply to the red wire and the negative lead of the 12-volt power supply to the black wire.
7. The pump should operate (it would be heard running).

■NOTE: If the fuel pump fails to operate, reverse the power supply at the fuel pump connector allowing the motor to run in the opposite direction. This will verify that nothing has entered and/or obstructed the pump.

■NOTE: If the fuel pump still fails to operate, the pump is defective and must be replaced.

REMOVING

1. Remove both access panels, hood, upper and lower consoles, and seat (see Section 8).
2. Disconnect the fuel pump harness connector; then disconnect the gasline hose from the outlet of the fuel pump by pressing inward on the white connector, pressing in the black release, and finally pulling back on the hose.



SNO-684A

WARNING

Since the fuel supply hose may be under pressure, remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb gasoline; then remove the hose slowly to release the pressure. Always wear safety glasses when removing the fuel hoses.

3. Remove and retain the six torx-head screws securing the fuel pump in the fuel tank; then remove the retaining ring.
4. Carefully remove the fuel pump and fuel pickup assembly from the gas tank noting the orientation of the fuel pump outlet for assembling purposes.

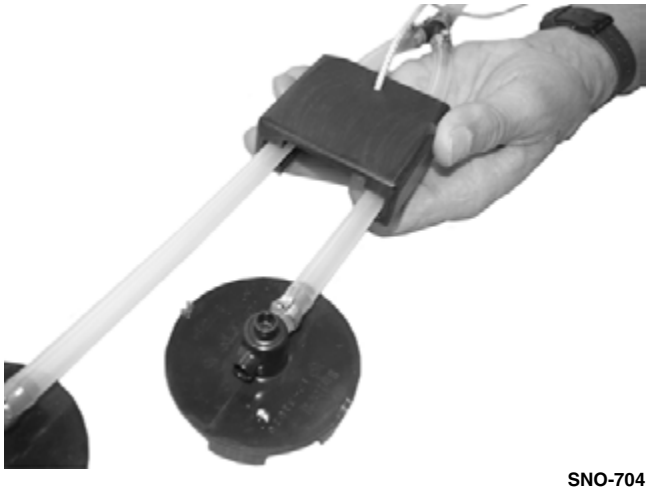


SNO-702

■NOTE: If the fuel pickup assembly is not being replaced, inspect the screens for any tears or obstructions. Also check the hoses and replace if necessary.

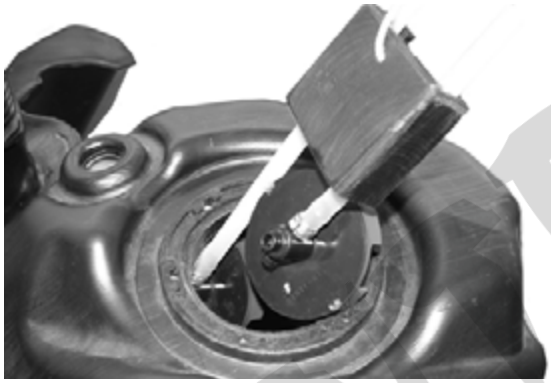
INSTALLING

1. Slide Fuel Pump Installation Tool onto the fuel hose near the "Y" fitting until the tool touches the middle pickup. The two rear pickups should be pulled together.



SNO-704

2. Carefully push the fuel pump assembly down and back into the fuel tank until the white fuel sensor (below the fuel pump) is flush with the fuel pump mounting surface.



SNO-705

3. While holding the fuel pump with the white fuel sensor in this position, pull the tool up to the tank opening with the retrieval cord.



SNO-744

■NOTE: Tip the fuel pump assembly to one side enough to allow the tool to be removed.

■NOTE: When the fuel pump hose assembly is installed correctly, the two rear pickups will lie flat in the rear of the fuel tank.



SNO-791

4. Make sure the front pickup will sit flat on the bottom of the tank with no kinks in the fuel hose.



SNO-706

5. Install the retaining ring over the fuel pump and secure the fuel pump to the gas tank assembly using the existing torx-head screws. Tighten to 40 in.-lb.

CAUTION

Use care not to over tighten the retaining plate screws or damage to the gas tank may result.

6. Connect the fuel pump harness connector to the main harness and secure to the retaining ring with a cable tie; then secure the gasline hose to the fuel pump making sure it locks into place.

7. Install the upper and lower consoles using existing machine screws; then install the seat (see Section 8), hood, and access panels.

Fuel Pump (Bearcat/F-Series/T-Series)

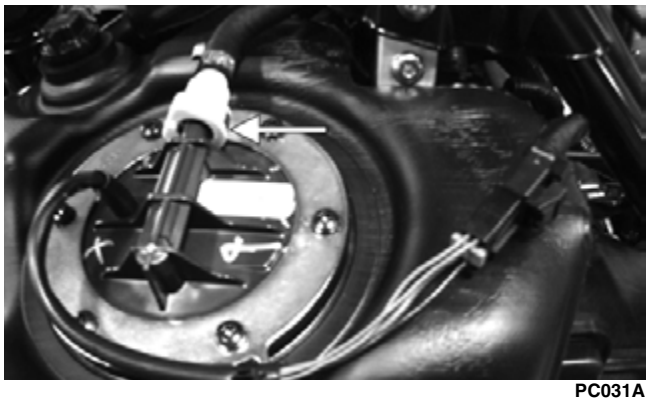
TESTING

1. Remove the hardware securing the console to the gas tank and chassis; then move the console out of the way.

2. Disconnect the gasline hose connector from the fuel pump.

WARNING

Since the fuel supply hose may be under pressure, remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb gasoline; then remove the hose slowly to release the pressure. Always wear safety glasses when removing the fuel hoses.



PC031A

3. Connect Fuel Pressure Test Kit to the fuel pump and fuel hose.
4. On the 500, start the engine. On the 1100 cc, turn the ignition key to the ON position. Fuel pressure should be as specified.

500 cc	42.8-47.3 psi
1100 cc Non-Turbo	43.5 psi
1100 cc Turbo	36.0 psi - Idle 55.0 psi - Full Boost

■NOTE: If fuel pressure is not as specified, the pump is defective and must be replaced.

5. Disconnect the fuel pump from the main wiring harness.
6. Connect the positive lead of a 12-volt power supply to the red wire and the negative lead of the 12-volt power supply to the black wire.
7. The pump should operate (it would be heard running).

■NOTE: If the fuel pump fails to operate, reverse the power supply at the fuel pump connector allowing the motor to run in the opposite direction. This will verify that nothing has entered and/or obstructed the pump.

■NOTE: If the fuel pump still fails to operate, the pump is defective and must be replaced.

REMOVING

1. Using a gasline hose equipped with a one-way check valve, drain the gas from the gas tank; then remove the gas tank (see Gas Tank in this section).
2. Disconnect the fuel pump harness connector.
3. Remove the six self-tapping screws securing the retaining plate; then remove the fuel pump noting the orientation of the fuel pump outlet for installing purposes. Account for the seal.
4. Remove and discard the hose clamp securing the gasline hose to the fuel pump inlet.

WARNING

Since the fuel supply hose may be under pressure, remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb gasoline; then remove the hose slowly to release the pressure. Always wear safety glasses when removing the fuel hoses.

■NOTE: If the fuel pickup assembly is not being replaced, inspect the screens for any tears or obstructions. Also check the gasline hoses and replace if necessary.

INSTALLING

1. Install a new seal on the fuel pump; then with a new hose clamp, secure the gasline hose with the pickup assembly to the inlet of the fuel pump.
2. Install the fuel pump and pickups into the gas tank and position the fuel pump so the outlet is properly oriented (as noted during removing).
3. Install the retaining plate and secure to the gas tank with the six self-tapping screws. Tighten to 40 in.-lb.

CAUTION

Use care not to over tighten the retaining plate screws or damage to the gas tank may result.

4. Install the gas tank (see Gas Tank in this section); then connect the fuel pump harness connector.

Troubleshooting

Problem: Too Rich	
Condition	**Remedy**
1. **Diagnostic trouble code** activated 2. **Fuel pressure** too high 3. **Fuel return hose** obstructed 4. **Injectors** leaking	1. Replace problem sensor 2. Replace regulator 3. Service - replace hose - remove obstruction 4. Replace injectors
Problem: Too Lean	
Condition	**Remedy**
1. **Diagnostic trouble code** activated 2. **Fuel pressure** too low 3. **Vent hose** obstructed 4. **Fuel filter(s)** obstructed	1. Replace problem sensor 2. Replace regulator/fuel pump 3. Remove obstruction 4. Replace fuel filter(s)

Oil-Injection Pump

CAUTION

When servicing the oil-injection system, use a 100:1 gas/oil mixture in the gas tank to ensure adequate engine lubrication. Failure to use the 100:1 mixture to the oil-injection system will result in severe engine damage.

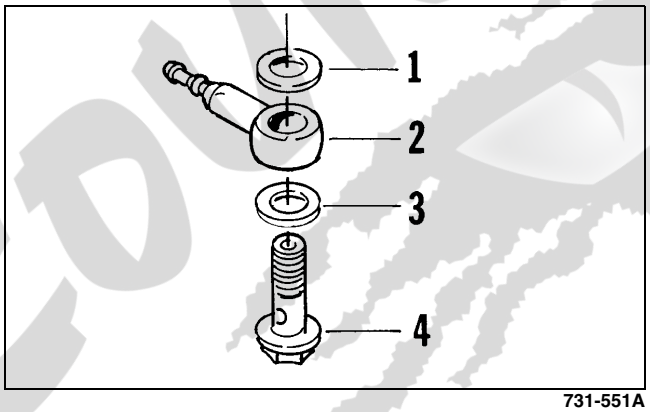
REMOVING

■NOTE: On EFI models to service the oil-injection pump, the exhaust system and the air silencer must be removed (see Section 3).

1. Remove the carburetors/throttle bodies and secure them out of the way in an upright position.
2. Disconnect the oil-supply hose from the pump and plug to prevent oil drainage.
3. Remove the oil-delivery hoses from the adapter plates/intake flanges.
4. Disconnect the oil-injection cable/control rod.
5. Remove the two screws securing the oil-injection pump and retainer to the crankcase; then pull the oil-injection pump away from the retainer/crankcase and account for a gasket/O-ring.

■NOTE: Remove the oil-injection pump from the crankcase only if the O-ring or gasket need to be replaced.

6. Turn the pump sideways; then remove the lower union bolt (4). Account for two washer gaskets (1) (3). Remove the pump.



731-551A

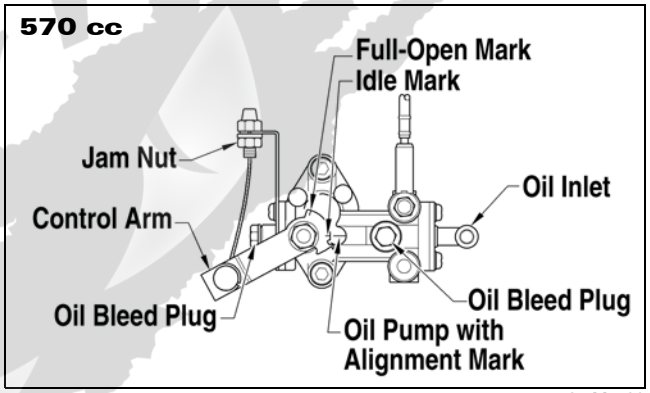
7. Remove the remaining union bolts securing the check valves to the pump. Account for the washer gaskets.
8. Remove the check valves. Account for two gaskets.

INSTALLING

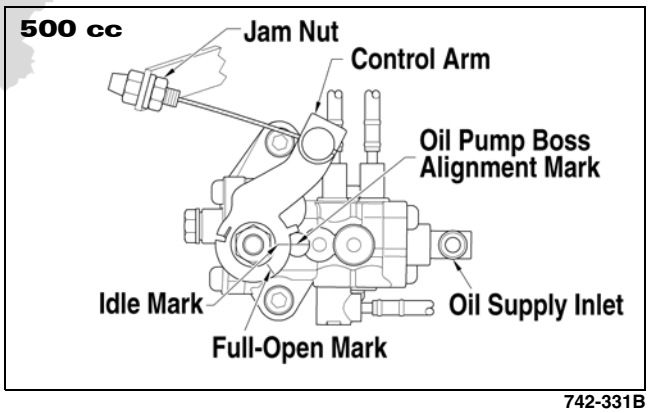
1. In turn on each front union bolt, install a washer gasket, check valve, and washer gasket; then install on the oil-injection pump.
2. Place the gasket and oil-injection pump near the engine; then install the lower union bolt through a gasket, check valve, and gasket.
3. Position the oil-injection pump on the engine making sure the oil-injection pump gear is correctly aligned with the oil-injection pump drive gear.
4. Secure the pump with two screws (coated with blue Loctite #243). Tighten screws to 48 in.-lb (570 cc) or to 96 in.-lb (500/800 cc).
5. Connect the oil-delivery hoses to the adapter plates. Secure with clamps.
6. Connect the oil-injection cable/control rod to the pump and secure.
7. Connect the oil-supply hose to the oil-injection pump inlet fitting. Secure with the clamp.
8. Bleed the oil-injection system.
9. Check the oil-injection system synchronization (see SYNCHRONIZING in this sub-section). Tighten the jam nuts securely.
10. Install the carburetors/throttle bodies.

■NOTE: On EFI models, install the exhaust system and the air silencer (see Section 3).

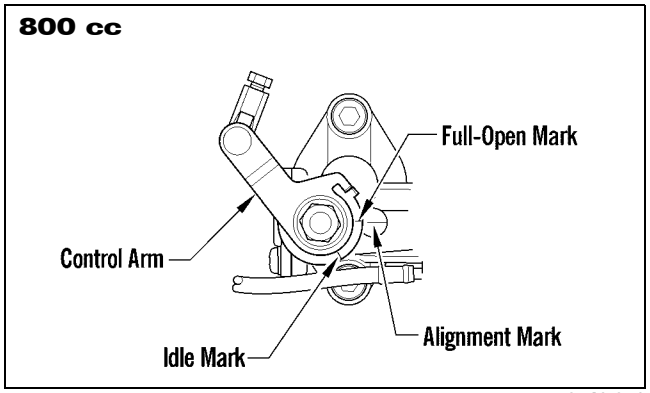
SYNCHRONIZING



0744-532



742-331B



0746-376

1. On the 500/570 cc models with the engine off, disconnect the throttle cable from the throttle lever. Pull the throttle cable to the Full-Open position; then using a suitable clamping device, secure the cable in this position.

CAUTION

Care must be taken when securing the cable not to kink or damage the cable.

2. On the 500/570 cc models, if the marks are not aligned, adjust synchronization by loosening the jam nut(s) on the adjuster. Rotate the jam nuts/adjuster nut until proper alignment is attained. Tighten jam nut(s).
3. On the 500/570 cc models, connect the throttle cable to the throttle lever; then adjust the cable/linkage adjusting nut so the throttle lever moves approximately 1/8 in. before the oil-injection pump control arm begins to move. This ensures the throttle/ignition monitor switch will function properly and prevents ignition "cut-out" and spark plug fouling at low RPM operation
4. On the 800 cc models, rotate the control rod until the setting for oil pump at wide open throttle is 1 to 1.5 lines lean. Return the control rod/throttle cable to the Idle position.

CAUTION

Assure the throttle cable/linkage has returned to the fully closed (idle) position and has not remained partially open and moves freely from the open position to the closed position.

TESTING PUMP

■NOTE: These tests must be made with the snowmobile and oil at a "room" temperature of 20°-30° C (68°-86° F).

⚠ WARNING

Always wear safety glasses when performing this test.

1. Disconnect the oil pump cable/control rod from the control rod on the pump.
2. Clamp off the oil-supply hose between the oil reservoir and oil pump; then remove the supply hose from the pump.
3. Attach a suitable length of clear oil-supply hose to the oil pump; then using Oil Injection Usage Tool, fill the hose with Arctic Cat Synthetic APV 2-Cycle Oil.

■NOTE: Do not fully insert the usage tool into hose. There must be enough room around the tip of the tool and the hose to allow air in the hose to escape.

4. Fill the tool to the 0 line.
5. Wipe the tip of the tool to remove excess oil; then attach the tool to the oil-supply hose and remove the bulb.
6. Secure the tool to the oil reservoir by twisting the rubber strap one half turn and placing the rubber strap around the tool and the oil reservoir filler neck.

■NOTE: On the F570, the tool can be secured to the air silencer.

■NOTE: On the F/M/XF to access the oil pump, the air intake boot must be removed.

■NOTE: On the 800 cc, the control rod must be secured in the Idle position. Secure the rod away from any moving parts to prevent misalignment of the control rod due to engine/chassis movement.

⚠ WARNING

Keep hands and clothing away from all moving or rotating parts.

7. With the control rod secured in the Idle position, start the engine and run the engine at recommended RPM for 3 minutes. Compare the amount of oil used against the specifications listed.

ENGINE	RPM	Full-Closed (Idle) 3 Minutes
500 cc	1833	1.0-2.5 cc
570 cc	2000	1.4-2.2 cc
800 cc	1833	1.32-3.48 cc

■NOTE: Before starting the engine, make sure that no air is present in the testing equipment.

8. With the control rod secured in the Full-Open position (line-to-line), run the engine at recommended RPM for 2 minutes. Compare the amount of oil used against the specifications listed.

ENGINE	RPM	Full-Open 2 Minutes
500 cc	1833	7.4-10.3 cc
570 cc	2000	6.9-9.4 cc
800 cc	1833	8.74-10.8 cc

9. If the oil-injection pump output does not meet the specifications, see TESTING CHECK VALVES in this sub-section.
10. Disconnect the oil usage tool, remove the plug from the reservoir, and attach the oil-supply hose to the oil reservoir.

■NOTE: After testing the oil pump, the oil pump must be correctly synchronized with the carburetors/throttle bodies (see SYNCHRONIZING in this sub-section).

TESTING CHECK VALVES

If an engine problem occurs due to lack of lubrication, the check valves should be tested using a vacuum pump to make sure they are operating properly.

1. Remove the check valves from the oil-injection pump.
2. Attach the Vacuum Test Pump hose to the check valve.
3. Squeeze the vacuum pump handle and watch the pump gauge. The check valve should release at 4.5-5 lb and again reset itself at 3.5-4 lb. If “release” and “reset” are not within specifications, replace the check valve.
4. Record the “release” and “reset” readings for the valve; then perform the test on the other valve. The “release” and “reset” readings must fall within specifications and must be within 1.5 lb of each other. If either or both are not met, replace the check valves.
5. If the check valves are within specifications but oil-injection usage is not, replace the oil-injection pump.

Gas Tank

REMOVING (F/M/XF)

1. Remove the seat (see Section 8).
2. Remove the lower console.
3. Disconnect the reverse alarm; then remove the two machine screws (A) securing the upper console. Remove the console.



SNO-680A

4. Remove and retain all four cap screws (A) securing the rear spar tubes to the chassis and steering support.



SNO-681A



SNO-682A

5. Disconnect the gasline hose, vent hose, and fuel pump harness. Remove the gas tank.

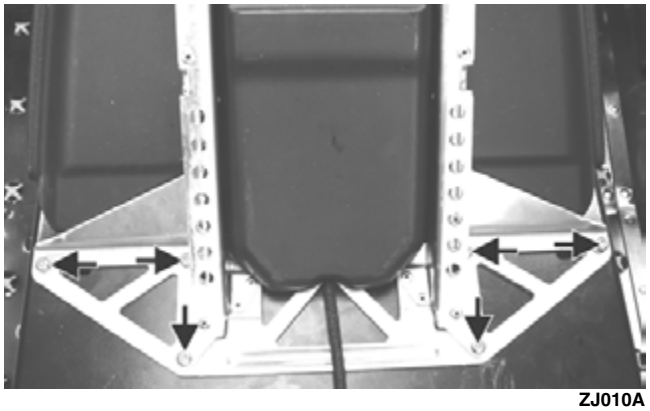

SNO-684

INSTALLING (F/M/XF)

1. Install the gas tank; then connect the gasline hose, vent hose, and fuel pump harness.
2. Install the rear spar tubes and secure to the chassis and steering support using the four cap screws. Tighten to 23 ft-lb.
3. Connect the reverse alarm; then use the two machine screws to secure the upper console.
4. Install the lower console; then install the seat (see Section 8).

REMOVING (Bearcat/F-Series/T-Series)

1. Remove the seat (see Section 8).
2. Remove the four cap screws securing the support tubes to support plate.
3. Remove the six torx-head screws securing the seat support assembly to the tunnel; then slide the support back out of the way.



ZJ010A

4. Disconnect the fuel pump four-wire connector; then slide the gas tank rearward enough to gain access to the gasline hose connector.



FS261A

5. Compress the clip on the gasline hose connector and remove the hose from the gas tank; then disconnect the gas tank vent hose and close off the vent hose outlet of the gas tank and remove the gas tank.



IO053

WARNING

Since the fuel supply hose may be under pressure, remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb gasoline; then remove the hose slowly to release the pressure. Always wear safety glasses when removing the fuel hoses.

INSTALLING (Bearcat/F-Series/T-Series)

1. Install the gasline hose onto the tank and press down on the connector until it snaps into place; then install the vent hose to the outlet and secure with the hose clamp.



IO054

CAUTION

Make sure the gasline hose is properly and securely "snapped" onto the gas tank.

2. Install the gas tank to its proper position; then secure the tank with the seat support assembly and install the four cap screws securing the seat support tubes to the support plate. Tighten securely.

■NOTE: It may be necessary to align the U-nut clips with a punch.

3. Install the six torx-head screws securing the seat support assembly to the tunnel.

4. Connect the fuel pump four-wire connector.



FS261A

5. Install the seat (see Section 8).

SECTION 5 — ELECTRICAL SYSTEMS

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Electrical Systems

All tests of the electrical components should be made using the digital Fluke Model 77 Multimeter. Replace any component that does not have a test value within specifications.

■NOTE: Whenever using a digital-style tester, "open (infinite resistance)" denotes an overload and the meter reading will be OL since the meter is not calibrated to register resistance values of that magnitude.

■NOTE: Always check the appropriate fuse before testing a component for failure.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

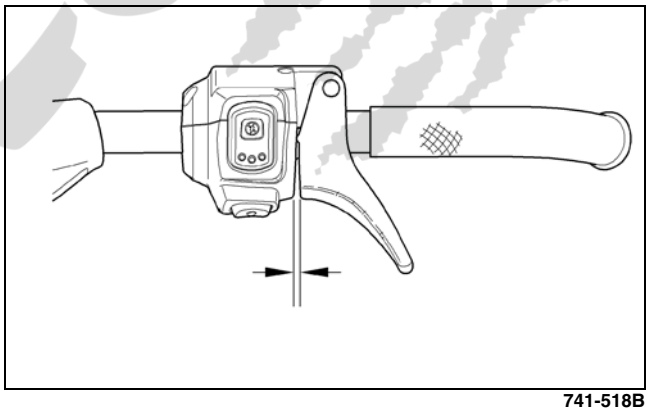
A number of special tools must be available to the technician when servicing the electrical systems.

Description	p/n
Arctic Cat Diagnostic System Manual	2256-974
Laptop Diagnostic Tool	0744-048
Actuator Test Harness	0644-518
Fluke Model 77 Multimeter	0644-559
MaxiClips	0744-041
Throttle Position Sensor (TPS) Adjustment Tool Kit	3639-891
CCU Diagnostic Test Kit	0644-517

■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

Ignition System

■NOTE: There must be 0.030-0.060 in. free-play between the throttle lever and the control housing.



741-518B

TROUBLESHOOTING

1. Remove the spark plugs and visually check their condition. Replace any fouled plug. Attach the spark plugs to the high tension leads and ground them to the engine.

CAUTION

On the 4-stroke, do not ground the spark plug on the cylinder head cover. The cover is made of magnesium and any contact with spark or electrical arc will severely pit the surface.

CAUTION

Before checking for spark, place all the engine switches in the deactivated position. In the event the engine could be flooded, engage the starter several times to clear the engine of excess fuel.

CAUTION

Never crank the engine over without grounding the spark plugs. Damage to coils and/or CDI/ECM may result.

■NOTE: Make sure the ignition switch and the emergency stop switch are in the ON position.

2. Crank the engine over and check for spark. If no spark is present, check to make sure the throttle cable is properly tensioned. Compress the throttle control and while holding the throttle control in this position, crank the engine over and check for spark. If spark is now present, adjust the throttle cable tension.
3. On the 570, if no spark is present, disconnect the main wiring harness 4-pin connector from the engine. Crank the engine over. If spark is present, the problem is either one or more of A-D below.
4. If still no spark is present, the problem is either one or more of A-D below.

   A. Defective emergency stop switch

   B. Defective safety switch in throttle-control housing

   C. Grounded or shorted wire connection at the throttle-control housing or main wiring harness (570 cc). Corroded or loose wire connection at the handlebar, hood, or main wiring harness.

   D. Defective ignition switch

TESTING

Throttle Control Switch

1. Disconnect the handlebar harness connector; then connect the ohmmeter leads as shown below.

Engine	Wire	Wire
500/800 cc	Black/White	Black/Blue
570 cc	Black/White	Violet/Red
1100 cc	Green/Yellow	Red/Green

2. With the throttle lever in the idle position, the meter must read less than 1 ohm. If the meter reads OL (infinite resistance), replace the control assembly.

3. Move the throttle lever to the wide open position. The meter must read OL (infinite resistance). If the meter reads less than 1000 ohms, replace the control assembly.

4. Connect the ohmmeter leads as shown below.

Engine	Wire	Wire
500/800 cc	Black/Blue	Violet/Red
570 cc	Black	Violet/Red
1100 cc	Red/Green	Red/Violet

5. On 1100 cc models, with the emergency stop switch in the off position, the meter must read OL (infinite resistance). If the meter reads less than 1000 ohms, replace the control assembly. With the emergency stop switch in the (RUN) position, the meter must read less than 1 ohms. If the meter reads OL (infinite resistance), replace the control assembly.

6. On 500/570/800 cc models, with the emergency stop switch in the off position, the meter must read less than 1 ohm. If the meter reads OL (infinite resistance), replace the control assembly. With the emergency stop switch in the (RUN) position, the meter must read OL (infinite resistance). If the meter reads less than 1000 ohms, replace the control assembly.

Main Wiring and Safety Switches (570 cc)

1. Check the wire connections at the ignition key switch and at the emergency stop switch. If any of the connections appear dirty or corroded, clean with contact cleaner and compressed air; then apply Dielectric grease to all non-pin connectors and connect all wires and squeeze connections until they are securely locked.

■NOTE: To access the electrical connectors, the console must be removed.

2. Disconnect the main wiring harness connector coming from the engine. Using an ohmmeter, connect one lead to the black wire in the connector of the main harness. Connect the remaining ohmmeter lead to the violet/red wire in the connector of the main harness.

3. With all switches in the RUN position, the meter must read infinite resistance (OL). If the meter reads less than 1 ohm resistance, proceed to Emergency Stop Switch and Ignition Switch sub-sections in this section and the following Carburetor Safety Switches.

Carburetor Safety Switches (570 cc)

1. If the meter read infinite resistance (OL) in the previous test, disconnect the carburetor safety switches one at time and test for a closed circuit.

2. Attach the two ohmmeter leads to the two leads coming from each carburetor switch. The meter must read less than 1 ohm resistance.

3. If the meter reads infinite resistance (OL), the switch must either be adjusted or replaced (proceed to the following Synchronizing Carburetor Safety Switches). If the meter reads less than 1 ohm resistance, see Ignition Switch sub-section in this section.

Synchronizing Carburetor Safety Switches (570 cc)

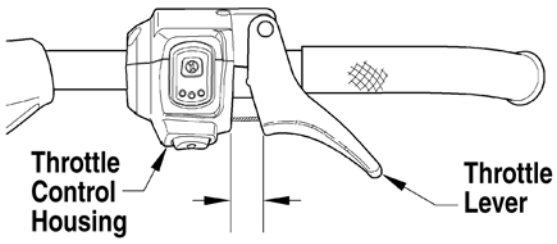
Before synchronizing the carburetor safety switches, verify the idle speed screws are adjusted equally and the piston valves are synchronized. The carburetor safety switches affect ignition spark at idle only. If ignition spark problems are observed at partial or full-throttle positions, the problem is not with the carburetor safety switches.

1. Inspect the cable free-play gap between the throttle lever and the control housing at idle. Adjust the throttle cable swivel adapter at the top of each carburetor for 0.030-0.060 in. cable free-play gap between the throttle lever "nibs" and the control housing. While observing if there is any cable free-play gap, apply slight pressure to the throttle lever to take up any cable slack that may be present. However, do not apply enough pressure to actually raise the carburetor slides during this adjustment. After cable free-play is properly adjusted, tighten the jam nut on each carburetor securely.

2. To determine which switch needs adjusting, disconnect both carburetor safety switches from the main wiring harness connector.

3. Connect a digital ohmmeter to one carburetor safety switch connector; then compress the throttle lever while observing the meter reading and measure the gap between the throttle lever and control housing at the moment the meter reading changes from open to closed. Repeat this step for the other carburetor safety switch.

■NOTE: The correct throttle lever/control housing gap is a range of 0.375-0.500 in. the moment the meter reading changes from open to closed. A switch that changes from open to closed before the other one is the switch that must be raised to attain safety switch synchronization.



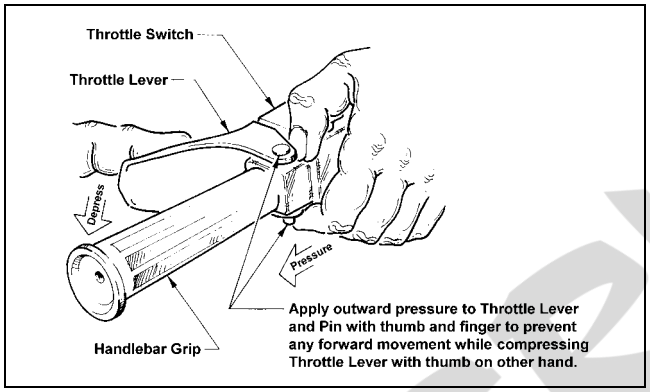
Gap of 0.375-0.500 in. between the Throttle Switch Body and Throttle Lever when Safety Switches open and close

742-349A

4. If an adjustment is necessary, loosen the switch bracket screws, move the switch up, tighten the screws, and then reset using step 3.

■NOTE: After completion of any adjustments, throttle lever "side pressure" should not cause an ignition miss at idle. Carburetor switches set too low or an excessively tight throttle cable makes the shutdown system very sensitive to throttle lever "side pressure" near idle. To test carburetor safety switch synchronization, follow steps 5-9.

5. Reconnect the carburetor safety switch connectors. Place the rear of the snowmobile on a shielded safety stand; then start the engine and allow it to warm up for 3-4 minutes.
6. Hold both the top and bottom of the throttle lever pin so that depression of the throttle lever does not move the lever pin in its control slot.



0728-916

7. Slowly depress the throttle lever to increase engine RPM.

■NOTE: Engine RPM must be allowed to increase slowly.

8. Observe the tachometer and the drive clutch to determine the moment the carburetor safety switches shut down the ignition. Since retaining the throttle lever pin prevents the switch in the throttle control housing from closing, the carburetor safety switches should shut down the ignition at or slightly after clutch engagement.
9. Repeat steps 6-8 several times. If ignition shutdown always occurs at or slightly after clutch engagement, the carburetor safety switches are synchronized.
10. To complete the procedure, repeat step 1.

■NOTE: After completion of any adjustments, throttle lever "side pressure" should not cause an ignition miss at idle. Carburetor safety switches set too low or an excessively tight throttle cable makes the shutdown system very sensitive to throttle lever "side pressure" near idle.

Throttle Position Sensor

■NOTE: Two-stroke engines equipped with a throttle position sensor have a protective feature called "fail-safe" ignition timing preventing engine damage should the TPS fail. If the TPS does fail, the engine may run normally at low RPM but will run poorly at high RPM allowing the operator to get the snowmobile to safety with no engine damage. The engine will continue to operate this way until the TPS is adjusted or replaced.

■NOTE: On the non-turbo Bearcat/T-Series, remove the air silencer. Proceed to Air Silencer (1100 cc Non-Turbo) sub-section in Section 3 and follow steps 1-12 of REMOVING. On the T-Series turbo models, remove the console and left-rear spar panel.

VERIFYING TPS ADJUSTMENT TOOL

Before using the TPS adjustment tool, verify its battery condition. The battery used in the tool is a 9-volt battery. To check battery condition, use a digital volt/ohmmeter set on DC volt scale. Test between the adjustment tool black and red jacks. Insert the red lead of the digital voltmeter into the red jack of the adjustment tool and the black lead of the digital voltmeter into the black jack of the adjustment tool. The green power light of the analyzer should now be illuminated. If voltage is found below 4.9 volts, replace the battery.

■NOTE: The Test Harness must be plugged into the analyzer for testing voltage. Always verify battery voltage is at least 4.9 DC volts before testing TPS.

CHECKING TPS

■NOTE: If the snowmobile is in warranty, breaking the seal on the idle screw jam nut or the Phillips-head screws on the TPS will void warranty. If the TPS is tested out of specification, the throttle body must be replaced. If the snowmobile is out of warranty, proceed to Adjusting TPS.

1. Using Throttle Position Sensor (TPS) Adjustment Tool Kit, connect its wiring harness to the TPS.
2. On the 1100 cc models, connect the red tester lead to the white adjustment tool jack; then connect the black tester lead to the black adjustment tool jack.
3. On the 500/800 cc models, connect the red and black digital voltmeter leads to the white and black jacks of the TPS adjustment tool.
4. Ensure that the throttle cable/control rod (500/800 cc) has the proper amount of free-play.

5. With the throttle in the idle position, compare the reading on the voltmeter to the chart. If the reading is within prescribed specification, proceed to step 6.

Engine	Idle	Full-Open
500 cc	0.710-0.818	3.472-4.048
800 cc	0.646-0.754	3.472-4.485
1100 cc Non-Turbo	1.10-1.14	4.30-4.50
1100 cc Turbo	0.69-1.11	4.00-4.20

6. Compress the throttle lever slowly to the full-open position. The meter reading should show a smooth rise in voltage all the way to the full-open position. If the voltage seems to be erratic or doesn't meet the prescribed specification, repeat this procedure several times to confirm results.

■NOTE: If at any point throughout the throttle range the meter reads no voltage (open), hold the throttle lever in that position. If the voltage does not return, the throttle body must be replaced.

7. If the full-open throttle voltage remains erratic or out of specification, proceed to the appropriate Adjusting TPS.
8. If the TPS is within the prescribed specification, disconnect the adjustment tool harness from the TPS. Connect the snowmobile TPS harness to the TPS.

■NOTE: Before installing the TPS harness connector, apply dielectric grease to the connector pins.

ADJUSTING TPS (500/800 cc)

■NOTE: Adjusting the TPS is for out of warranty snowmobiles only.

■NOTE: It is important that the throttle shaft is in the completely closed position for this procedure.

1. Disconnect the throttle cable/control arm from the throttle shaft.
2. Rotate the idle screw counterclockwise until it no longer contacts the throttle shaft stop. The throttle shaft should now be completely closed. Open the throttle shaft by hand and release it, allowing the shaft to gently snap closed several times.
3. Disconnect the TPS wiring harness from the TPS; then using Throttle Position Sensor (TPS) Adjustment Tool, connect the appropriate wiring harness to the TPS. Connect the red and black digital voltmeter leads to the white and black jacks of the TPS adjustment tool.
4. While observing the digital voltmeter, slowly rotate the sensor until the Full-Closed specification is observed on the LCD of the multimeter. While holding the sensor in this position, tighten the two screws which secure the sensor to the throttle body securely.
5. Gently snap the throttle open and closed several times to check the TPS voltage. If it has changed from the Full-Closed specification, loosen the two screws which secure the sensor and make necessary adjustments.
6. With the full-closed position set to specification, rotate the idle screw clockwise until it contacts the throttle shaft stop. Using the digital multimeter and test harness, rotate the idle screw inward until the Idle specification is observed.

■NOTE: Rotate the idle screw past the recommended voltage specification by two or three volts; then rotate the idle screw counterclockwise to the correct idle position voltage.

7. With the idle position set to specification, slowly compress the throttle lever to the full-open position. The full-open specification should be observed. Gently snap the throttle lever open and closed several times and note if the reading remains within the specification.

■NOTE: If, after adjusting the Throttle Position Sensor to the IDLE specification, the FULL-OPEN is less than the specified voltage, recheck the FULL-CLOSED setting. If the FULL-CLOSED setting is correct, replace the sensor.

Engine	TPS TOOL (DC VOLTS)		ANALYZER TOOL (DC VOLTS)
500 cc	Full-Closed	0.412-0.414	
	Idle	0.710-0.818	0.710-0.818
	Full-Open	3.472-4.048	3.470-4.046
			DIAGNOSTIC TOOL
800 cc	Full-Closed	0.412-0.414	
	Idle	0.646-0.754	3.99° -6.66°
	Full-Open	3.472-4.485	74.97°-89.37°

REPLACING TPS (500/800 cc)

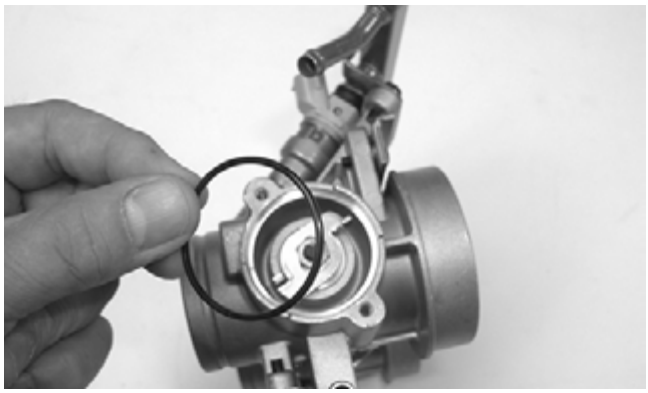
■NOTE: Replacing the TPS is for out of warranty snowmobiles only.

Removing

1. On the 800 cc, remove the expansion chamber and resonator.
2. Rotate the idle screw counterclockwise until it no longer contacts the throttle shaft stop. The throttle shaft should now be completely closed.
3. Disconnect TPS wiring harness from the TPS; then noting the position of the TPS, remove the two screws securing the TPS to the throttle body and remove the sensor.

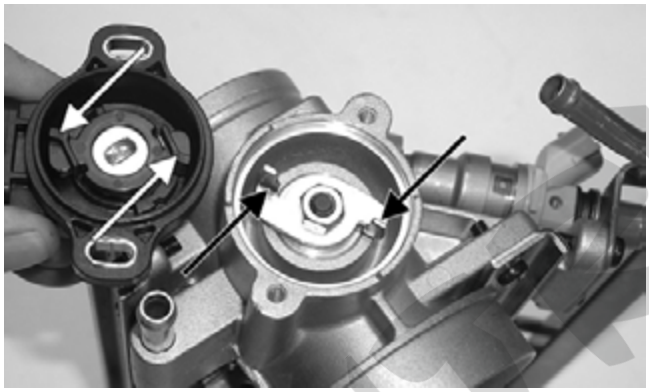
Installing

1. Apply a light film of silicone grease to the O-ring. Install the O-ring into the groove.



MS399

2. Install the new TPS onto the throttle shaft by aligning the “flats” on the throttle shaft cam with the “flats” on the sensor; then rotate the sensor until properly positioned on the throttle body.



MS400A

3. Install the sensor to the throttle body. Do not tighten at this time.
4. Adjust the TPS (see appropriate Adjusting TPS in this sub-section).
5. Disconnect the adjustment tool harness from the TPS. Connect the snowmobile TPS harness to the newly installed or adjusted TPS.

■NOTE: Before installing the TPS harness connector, apply dielectric grease to the connector pins.

6. On the 800 cc, install the resonator and expansion chamber.

ADJUSTING TPS (1100 cc)

■NOTE: Adjusting the TPS is for out of warranty snowmobiles only.

■NOTE: The throttle shaft must be against the throttle stop for this procedure.

CAUTION
Never adjust the throttle plate stop screw and nut. The idle circuit is controlled by the ISC valve.

1. Disconnect the harness connector from the TPS.
2. Loosen the screw(s) of the throttle position sensor to allow adjustment.
3. Using Throttle Position Sensor (TPS) Adjustment Tool Kit, connect its wiring harness to the TPS. Connect the red and black digital voltmeter leads to the white and black jacks of the TPS adjustment tool.
4. While observing the digital voltmeter, slowly rotate the sensor until idle voltage specification is observed on the LCD of the multimeter. While holding the sensor in this position, tighten the screw(s) securing the sensor to the throttle body securely.
5. Gently snap the throttle open and closed several times to check the TPS voltage. If it has changed from the idle voltage specification, loosen the screw(s) securing the sensor and make necessary adjustments.
6. With the idle position set to specification, compress the throttle lever to the full-open position. The full-open specification should be observed. Gently snap the throttle lever open and closed several times and note if the reading remains within the specification.

■NOTE: If, after adjusting the Throttle Position Sensor to the IDLE specification, the FULL-OPEN is less than 4.30 volts, recheck the IDLE setting. If the IDLE setting is correct, replace the sensor.

Engine	Idle	Full-Open
1100 cc Non-Turbo	1.10-1.14	4.30-4.50
1100 cc Turbo	0.69-1.11	4.00-4.20

REPLACING TPS (1100 cc)

■NOTE: Replacing the TPS is for out of warranty snowmobiles only.

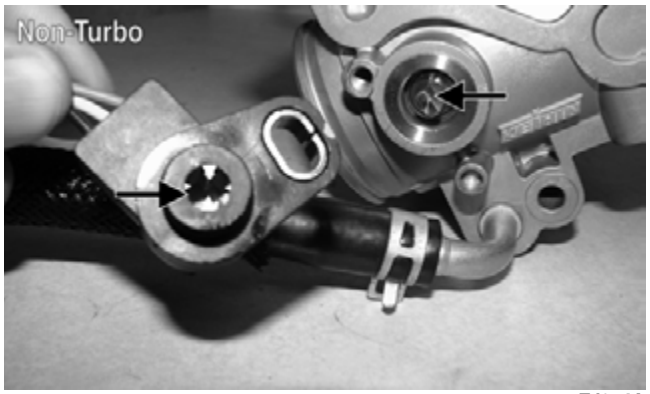
Removing

■NOTE: On the F/M/XF non-turbo, remove the hood, seat (see Section 8), and gas tank (see Section 4). On the F/M/XF turbo, remove the hood, upper console, and lower console.

1. Disconnect the throttle cable from the throttle clutch.
2. Disconnect TPS wiring harness from the TPS; then noting the TPS position, remove the screw(s) securing TPS to the throttle body housing and remove the sensor. Account for the O-ring fitting into the groove of throttle body.

Installing

1. Apply a light coat of silicone grease to the area around the outside of the TPS flange and into the O-ring groove. Install the O-ring into the groove.
2. Install the new TPS onto the throttle shaft by aligning the “flats” on the throttle shaft cam with the alignment points of the sensor; then rotate the sensor until properly positioned on the throttle body.



ZJ254A



TZ119A

3. Install the screw(s), flat washer(s), and lock washer(s) securing the sensor to the throttle body. Do not tighten at this time.
4. Adjust the TPS (see appropriate Adjusting TPS in this sub-section).
5. Disconnect the adjustment tool harness from the TPS. Connect the snowmobile TPS harness to the newly installed or adjusted TPS.

■NOTE: Before installing the TPS harness connector, apply dielectric grease to the connector pins.

■NOTE: On the F/M/XF non-turbo, install the gas tank (see Section 4), seat (see Section 8), and hood. On the F/M/XF turbo, install the lower console, upper console, and hood.

■NOTE: On the non-turbo Bearcat/T-Series, install the air silencer. Proceed to Air Silencer (1100 cc Non-Turbo) sub-section in Section 3 and follow steps 3-12 of INSTALLING. On the T-Series turbo, install the left-rear spar panel and console.

Electrical Resistance Tests

■NOTE: Replace any component that does not have a test value within specifications. If the component tests satisfactorily but is suspected to be faulty, connect the red meter lead to a component lead and the black meter lead to ground. Check for continuity between the component and ground. If continuity is observed, replace the component.

■NOTE: The following test should be made using MaxiClips and the Fluke Model 77 Multimeter set to OHMS scale.

CAUTION

Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.

500 cc

Charge Coil (1)

1. Disconnect the triple-wire plug from the magneto.
2. Connect the red meter lead to the black/red wire in the plug; then connect the black meter lead to the green/red wire in the plug.
3. Resistance must be 8.8-13.2 ohms.

Charge Coil (2)

1. Disconnect the triple-wire plug from the magneto.
2. Connect the red meter lead to the brown/white wire in the plug; then connect the black meter lead to the green/red wire in the plug.
3. Resistance must be 8.8-13.2 ohms.

Fuel Pump Coil

■NOTE: With the engine running, there should 14.5-17.5 DC volts supplied to the fuel pump for operation.

1. Test between the two orange wires in the four-prong connector from the stator.
2. Resistance must be 1.52-2.28 ohms.

Injection Coil

1. Test between the two blue/white leads in the connector harness from the stator plate.
2. Resistance must be 15.2-22.8 ohms.

Lighting Coil

1. Disconnect the three wire connector from the magneto.
2. Connect the two meter leads to each of the yellow leads in the connector from the lighting coil.
3. Resistance must be 0.08-0.12 ohm.

Ignition Timing Sensor

1. Disconnect the sensor connector (green/white and brown/green) from the magneto.
2. Connect the meter leads to the sensor leads.
3. Resistance must be 80.8-121 ohms.

Ignition Coil (Primary)

1. Disconnect the double wire plug from the ignition coil.
2. Connect the red meter lead to the orange/black lead; then connect the black meter lead to the orange/red lead.
3. Resistance must be 0.24-0.36 ohm.

Ignition Coil (Secondary)

1. Remove the spark-plug caps from the high tension wires.
2. Connect the red meter lead to one high tension wire; then connect the black meter lead to the other high tension wire.
3. Resistance must be 6800-10,200 ohms.

Spark-Plug Cap

1. Remove the spark-plug caps from the high tension wires.
2. In turn on each cap, touch a tester lead to each end of the spark-plug cap.
3. Resistance must be 4000-6000 ohms.

Ignition Switch

■NOTE: The console must be removed to access the ignition switch.

1. Remove the harness connectors from the ignition switch.
2. Rotate the key to the OFF position.
3. Resistance must be less than 1 ohm between the ignition switch terminals.
4. Rotate the key to the RUN position. The meter must read OL (infinite resistance).

Fuel Injector

1. Disconnect the fuel injector wiring harness.
2. Test between the two injector terminals. Resistance must be 10-14 ohms.
3. If not within specifications, replace the injector.

Coolant Temperature Sensor

1. Disconnect the coolant temperature sensor wiring harness from the main harness.
2. Test the resistance between the two leads from the sensor.
3. Compare the resistance reading to the Voltage/Resistance Chart - Coolant Temperature in this section.

Air Temperature Sensor

■NOTE: The component temperature must be known before conducting this test. Allow the engine to reach room temperature.

1. Disconnect the wiring harness from the air temperature sensor.
2. Test the sensor connector. Compare with the Voltage/Resistance Chart - Air Temperature in this section.

■NOTE: The air temperature sensor utilizes a thermistor. Resistance will change as temperature varies.

570 cc

Charge Coil (1)

1. Disconnect the four-wire plug from the main harness to the magneto.
2. Connect the red meter lead to the brown/white wire in the plug; then connect the black meter lead to the green/red wire in the plug.
3. Resistance must be 12-18 ohms.

Charge Coil (2)

1. Disconnect the four-wire plug from the main harness to the magneto.
2. Connect the red meter lead to the black/red wire in the plug; then connect the black meter lead to the green/red wire in the plug.
3. Resistance must be 12-18 ohms.

Ignition Timing Sensor

1. Disconnect the green/white and brown/green wires from the sensor to the main harness.
2. Connect the red tester lead to the green/white wire; then connect the black tester lead to the brown/green wire.
3. Resistance must be 148-222 ohms.

Lighting Coil

1. Disconnect the main harness from the lighting coil four-wire connector.
2. Connect the two meter leads to each of the yellow leads in the connector from the engine.
3. Resistance must be 0.12-0.18 ohm.

Ignition Coil (Primary)

1. Disconnect the double wire plug from the CDI unit to the ignition coil.
2. Connect the red meter lead to the orange wire in the plug; then connect the black meter lead to the black/white wire in the plug.
3. Resistance must be 0.26-0.35 ohm.

Ignition Coil (Secondary)

1. Remove the spark-plug caps from the high tension wires.

2. Connect the red meter lead to one high tension wire; then connect the black meter lead to the other high tension wire.
3. Resistance must be 6800-10,200 ohms.

Spark-Plug Cap

1. Remove the spark-plug caps from the high tension wires.
2. In turn on each cap, touch a tester lead to each end of the spark-plug cap.
3. Resistance must be 4000-6000 ohms.

Ignition Switch

■NOTE: The console must be removed for this procedure.

1. Remove the main wiring harness connectors from the ignition switch.
2. Rotate the key to the OFF position.
3. Resistance must be less than 1 ohm between the ignition switch terminals.
4. Rotate the key to the RUN position. The meter must read OL (infinite resistance).

800 cc

Charge Coil (1)

1. Disconnect the triple-wire plug from the main harness to the magneto.
2. Connect the red meter lead to the black/red wire in the plug; then connect the black meter lead to the green/red wire in the plug.
3. Resistance must be 8.8-13.2 ohms.

Charge Coil (2)

1. Disconnect the triple-wire plug from the main harness to the magneto.
2. Connect the red meter lead to the brown/white wire in the plug; then connect the black meter lead to the green/red wire in the plug.
3. Resistance must be 8.8-13.2 ohms.

Fuel Pump Coil

■NOTE: With the engine running, there should 14.5-17.5 DC volts supplied to the fuel pump for operation.

1. Test between the two orange wires in the four-prong connector from the magneto.
2. Resistance must be 1.52-2.28 ohms.

Injection Coil

1. Test between the two blue/white leads in the four-prong connector harness from the magneto.
2. Resistance must be 15.2-22.8 ohms.

Lighting Coil

1. Disconnect the main harness from the magneto.
2. Connect the two meter leads to each of the yellow leads in the connector from the engine.
3. Resistance must be 0.08-0.12 ohm.

Ignition Timing Sensor

1. Disconnect timing sensors 1 and 2 (green/white and brown/green) from the main harness.
2. Connect the meter leads to the sensor leads.
3. Resistance must be 148-222 ohms.

Ignition Coil (Primary)

1. Disconnect the double wire plug from the main harness to the ignition coil.
2. Connect the red meter lead to the black/white lead; then connect the black meter lead to the white/blue lead.
3. Ignition coil primary resistance must be between 0.24-0.36 ohm.

Ignition Coil (Secondary)

1. Remove the spark-plug caps from the high tension wires.
2. Connect the red meter lead to one high tension wire; then connect the black meter lead to ground.
3. Resistance must be 5040-7560 ohms.

Spark-Plug Cap

1. Remove the spark-plug caps from the high tension wires.
2. In turn on each cap, touch a tester lead to each end of the spark-plug cap.
3. Resistance must be 4000-6000 ohms.

Ignition Switch

■NOTE: The console must be removed to access the ignition switch.

1. Remove the main wiring harness connectors from the ignition switch.
2. Rotate the key to the OFF position.
3. Resistance must read less than 1 ohm between the ignition switch terminals.
4. Rotate the key to the RUN position. The meter must read OL (infinite resistance).

Fuel Injector

1. Disconnect the fuel injector wiring harness; then set the meter to the OHMS position.
2. Test between the two injector terminals. Resistance must be 10-14 ohms.
3. If not within specifications, replace the injector.

Exhaust Temperature Sensor

1. Disconnect the sensor harness; then remove the sensor from the exhaust pipe.

2. Suspend the sensor (only up to the threads) in a container filled with automatic transmission oil; then slowly heat the oil on a hot plate.
3. Using a fluid thermometer, closely monitor the oil temperature, and using a digital multimeter with the leads connected to the sensor leads, observe the resistance reading.
4. The sensor must read as shown (see chart).

° F	° C	ohms
77	25	219.6
122	50	238.5
212	100	275.9
302	150	312.7

Coolant Temperature Sensor

1. Disconnect the coolant temperature sensor wiring harness from the main harness.
2. Test the resistance between the two leads from the sensor.
3. Compare the resistance reading to the Voltage/Resistance Chart - Coolant Temperature in this section.

Air Temperature Sensor

■NOTE: The component temperature must be known before conducting this test. Allow the engine to reach room temperature.

1. Disconnect the wiring harness from the air temperature sensor.
2. Test the sensor connector. Compare with the Voltage/Resistance Chart - Air Temperature in this section.

■NOTE: The air temperature sensor utilizes a thermistor. Resistance will change as temperature varies.

1100 cc

Magneto Coil

1. Disconnect the white three-yellow-wire connector.
2. Connect the red meter lead to one yellow wire; then connect the black meter lead to another yellow wire (a total of three tests).
3. Resistance must be 0.2-0.4 ohm.

Crankshaft Position Sensor

1. Disconnect the sensor.
2. Connect the red meter lead to the blue/white wire; then connect the black meter lead to the green/white wire.
3. Resistance must be 173-211 ohms.

Ignition Coil (1)

1. Disconnect the ignition coil (1) connector.
2. Connect the red meter lead to the red/green wire; then connect the black meter lead to the gray/green wire.
3. Resistance must be 1.4 ohms.

Ignition Coil (2)

1. Disconnect the ignition coil (2) connector.
2. Connect the red meter lead to the red/green wire; then connect the black meter lead to the brown/green wire.
3. Resistance must be 1.4 ohms.

Injection Coil

1. Test between the black/yellow and black wires from the injection coil.
2. Resistance must be 3.6 ohms.

Fuel Injector

1. Disconnect the fuel injector wiring harness.
2. Test between the two injector terminals. Resistance must be 9-12 ohms (non-turbo) or 10.5-13 ohms (turbo).

Coolant Temperature Sensor

1. Disconnect the coolant temperature sensor wiring harness from the main harness.
2. Test the resistance between the two leads from the sensor.
3. Compare the resistance reading to the Voltage/Resistance Chart - Coolant Temperature in this section.

Air Temperature Sensor

■NOTE: The component temperature must be known before conducting this test. Allow the engine to reach room temperature.

1. Disconnect the wiring harness from the air temperature sensor.
2. Set the meter selector in the OHMS position and test the sensor connector. Compare with the Voltage/Resistance Chart - Air Temperature in this section.

■NOTE: The air temperature sensor utilizes a thermistor. Resistance will change as temperature varies.

Voltage Regulator/CCU Tests

■NOTE: The following test should be made using MaxiClips and the Fluke Model 77 Multimeter set to DC Volt scale.

This test should be made at the three-pin connector of the regulator/rectifier.

⚠ WARNING

Most voltages generated by the ignition system are sufficient to interrupt pacemakers! All technicians, especially those using pacemakers, must avoid contact with all electrical connections after the engine has been started.

500 cc

1. Connect the red maxiclip and meter lead to the red/blue lead of the connector; then connect the black maxiclip and meter lead to the black lead of the connector.
2. Start the engine and allow it to idle. Meter reading must be within 10-15 DC volts.
3. Connect the red maxiclip and meter lead to the red/black lead; then connect the black maxiclip and meter lead to the black lead.
4. Start the engine and allow it to idle. Meter reading must be within 10-15 DC volts.

570/800 cc

1. For the DC voltage test, connect the red maxiclip and meter lead to the red/blue wire in the three-wire connector; then connect the black maxiclip and meter lead to the brown wire in the connector.
2. Start the engine and allow it to idle. Meter reading must be within 12-15 DC volts.
3. For the AC voltage test, connect the red maxiclip and meter lead to the yellow wire in the connector; then connect the black maxiclip and meter lead to the brown wire in the connector.
4. Start the engine and allow it to idle. Meter reading must be within 11-14 AC.

1100 cc

■NOTE: Test the connector that comes from the engine.

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the positive battery post; then connect the black tester lead to the negative battery post.
3. With the engine running at 2500-3000 RPM, the meter must show 12-14.5 DC volts.
4. Set the meter selector to the AC Voltage position.
5. Test between the three yellow wires for a total of three tests.
6. With the engine running at 2500-3000 RPM, all wire tests must be within 36-44 volts.

■NOTE: If tests failed, check all connections, etc., and test again. If no voltage is present, replace the stator assembly.

Chassis Control Unit (CCU)/Codes (F5)

The CCU distributes regulated DC power to the chassis electrical systems and controls the forward/reverse shifting of the ACT drive to ensure safe operation.

The CCU has two DC outputs used for lighting circuits. Both outputs have a circuit breaker (self resetting devices) protecting components from over-current and short circuit situations. If a system stops working, a short has likely occurred and the system has shut itself off much like a fuse will blow if a circuit is shorted to ground. However, unlike a fuse if the short is resolved, the CCU will reset the output and the system will return to normal operation.

The first output, labeled the High Power DC Output, supplies power for the headlights and handwarmers and is on only while the engine is running. This output is turned off during shifting to allow maximum power transfer to the ACT drive.

The second output, labeled the Low Power DC Output, supplies power to the gauge, speed sensor, taillight, accessory plugs, and APV servomotor via the Engine Control Unit. This output is on only while the engine is running. It is not turned off during shifting.

■NOTE: If the engine will not run, the problem is not related to the CCU.

SERVICE ICON

The Service Icon is controlled by the CCU/ECM and may illuminate for a number of reasons. The icon should illuminate or illuminates each time the engine is started, and it should go out after a few seconds. If the icon stays illuminated while the engine is running, the CCU/ECM is receiving input that is outside of its established parameters.

Deluxe Gauge



FZ001D

Accessing CCU Codes

1. Connect the appropriate harness from CCU Diagnostic Test Kit to the diagnostic port.
2. Start the engine. After approximately 5 seconds, the service icon on the gauge will begin flashing.
3. The readout screen will display an error code as CCU followed by a number (refer to the CCU Diagnostic Codes chart for descriptions). When all error codes have been output, the service icon flashes twice quickly.

CCU Diagnostic Codes		
Code	**Trouble**	**Cause**
CCU 32	High power DC output over current.	Headlight and Hand Warmer (Red/Black) circuit current greater than 20 Amps.
CCU 33	High power DC output shorted.	Headlight and Hand Warmer (Red/Black) circuit shorted to ground.
CCU 34	Low power DC output over current.	Gauge, Taillight, and APV Servo Power (Red/Blue) circuit current greater than 20 Amps.
CCU 35	Low power DC output shorted.	Gauge, Taillight, and APV Servo Power (Red/Blue) circuit shorted to ground.
CCU 37	System over voltage.	Spike in battery voltage - excessive gear case shifting.
CCU 38	Gear shift actuator failure.	Wires to reverse actuator damaged or shorted to ground.
CCU 42	Tachometer input failure (engine running - no tachometer signal present).	Tachometer signal wire shorted to ground.
CCU 43	Gear position switch failure.	Gear position switch damaged or unplugged - reverse actuator not working correctly.
CCU 44	CCU over temperature.	Internal CCU temperature over 105° C (221° F).

Clearing Fault Codes

1. Connect the appropriate harness from CCU Diagnostic Test Kit to the diagnostic port.
2. Start the engine; then press and hold the shift button for 5 seconds.

■NOTE: Two quick flashes of the service icon indicate the codes have been cleared.

Testing Oil Level Sensor (2-Stroke)

The oil level sensor is a magnetic switch. Its operation is based on a magnet located in the float. The switch located in the stem of the sending unit is positioned through the hole in the float. When the float drops to the lower part of the stem, the magnet closes the electrical contacts (located in the stem) allowing the current to pass on to the warning light.



PC256

1. Verify the oil level is below the float; then remove the sensor from the oil reservoir by twisting and pulling out. Wipe excess oil from the sensor.
2. Unplug the sensor from the wiring harness.
3. Set the meter selector to the OHMS position.
4. Touch each of the meter leads to one of the terminals on the sensor. With the sensor in its normal position (float end down), the meter should read less than 1 ohm.
5. If the meter reads greater than 1 ohm, check to make sure good contact has been made with each of the terminals on the sensor. If the meter still reads greater than 1 ohm, replace the sensor.
6. While maintaining contact between the meter leads and the sensor, raise the float. The meter must read OL (infinite resistance). If the meter reads less than 1 ohm, replace the sensor.
7. If the sensor tests satisfactory but the icon doesn't illuminate with only a small amount of oil in the reservoir, verify the icon illuminates on start-up.

Testing Fuel Gauge Sender

■NOTE: Before testing the sender, verify the harness from the sender to the gauge is satisfactory.

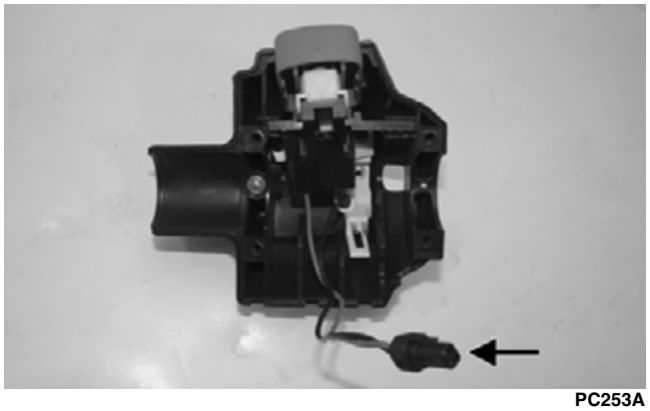
1. On the Bearcat/F-Series/T-Series, remove the torx-head cap screws securing the console to the steering support; then move the console out of the way. On the F/M/XF, remove the hood.
2. Disconnect the fuel gauge sender unit from the main wiring harness; then connect the ohmmeter leads to the two blue sender wires.
3. Compare the reading to the chart following.

Full	<20 ohms
1/2	40-56 ohms
Empty	76-105 ohms

Emergency Stop Switch

RESISTANCE

1. Remove the four torx-head cap screws securing the front/rear throttle control housing assembly to the handlebar.
2. Set the selector to the OHMS position.
3. Connect one tester lead to one pin; then connect the other tester lead to the other pin.



PC253A

4. With the switch in the OFF position, the meter must read OL (infinite resistance) (4-stroke) or less than 1 ohm resistance (2-stroke).
5. With the switch in the RUN position, the meter must read less than 1 ohm resistance (4-stroke) or OL (infinite resistance) (2-stroke).

■NOTE: If the meter does not show as specified, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.

Starter Relay Solenoid

TESTING

■NOTE: The electric start solenoid may be tested using either one of the following methods.

Method #1

1. Disconnect the solenoid connector from the main wiring harness.
2. Place the ohmmeter leads across the solenoid coil terminals. The ohmmeter must read 3-5 ohms.

■NOTE: An in-line ammeter would measure between 2 and 4 amps of solenoid coil current flow with the battery connected.

CAUTION

NEVER connect an in-line ammeter with the large starter cables because the 200 amps of current flow will instantly damage most ammeters.

Method #2

1. Using the multimeter set to the DC Voltage position, check the relay as follows.
2. Connect the red tester lead to the positive battery terminal; then connect the black tester lead to the starter cable connection on the starter relay. The meter must show battery voltage.

■NOTE: Engage the brake lever lock and place the emergency stop switch in the RUN position.

3. Engage the starter while observing the multimeter. The multimeter should drop to 0 volts and a "click" should be heard from the relay.

■NOTE: If a "click" is heard and more than 1 volt is indicated by the multimeter, replace the starter relay. If no "click" is heard and the multimeter continues to indicate battery voltage, proceed to step 4.

4. Disconnect the two-wire plug from the starter relay; then connect the red tester lead to the green wire and the black tester lead to the black wire.
5. Depress the starter button and observe the multimeter.

■NOTE: If battery voltage is indicated, replace the starter relay. If no voltage is indicated, check fuse or relay.

Fuse

TESTING

1. Remove the fuse from the fuse holder.
2. Connect the ohmmeter across the fuse end-caps.
3. The ohmmeter must read less than 1 ohm of resistance.

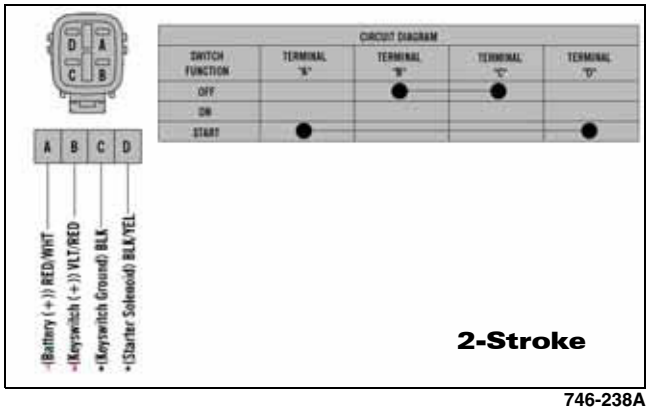
Ignition Switch

TESTING

CAUTION

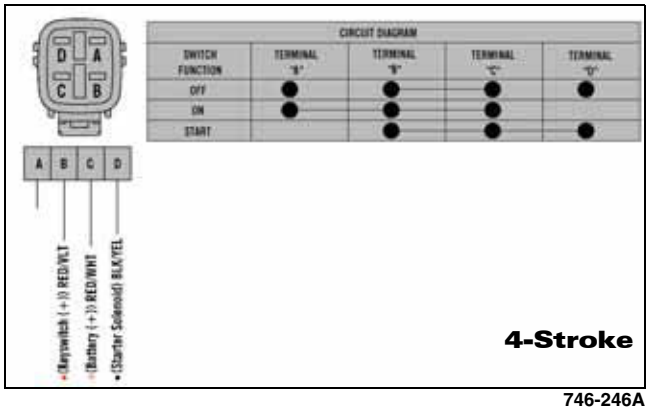
To prevent ohmmeter damage when testing circuits on snowmobiles equipped with an electric start, be sure to disconnect the battery before testing.

1. Disconnect the wiring harness from the ignition switch; then remove the switch from the console.
2. Using the ohmmeter, test the connections indicated in the following charts. If the meter reads more than one ohm of resistance between connected terminals or less than 1 ohm of resistance on non-connected terminals, the switch must be replaced.



2-Stroke

746-238A



746-246A

■NOTE: If the ignition switch tests good, verify battery voltage to the harness side of the switch plug-in. If there is no voltage, troubleshoot the battery, switch fuse, or starter relay solenoid.

If battery voltage is present at the plug-in and the starter fails to activate, use the following procedure:

1. With the ignition switch plugged in, place the emergency stop switch to the OFF position.
2. Connect the red tester lead to the black/yellow wire; then connect the black tester lead to a suitable ground.
3. Rotate the key to the START position and verify battery voltage.

■NOTE: If no battery voltage is present, troubleshoot the harness and/or the starter relay solenoid.

Starter Motor (2-Stroke)

REMOVING (570 cc)

1. Disconnect the battery.
2. Remove the springs securing the expansion chamber to the exhaust manifold and resonator and remove the expansion chamber.
3. Remove the positive lead from the starter motor; then remove the two cap screws securing the MAG-side starter motor bracket to the engine. Remove the bracket and starter motor and account for the rubber dampers and spacer bracket.

REMOVING (500 cc)

1. Disconnect the battery cables (negative cable first); then remove the battery.
2. Remove the lock nut and screw securing the upper battery tray/starter mounting bracket to the chassis.
3. Remove the Allen-head screws securing the flex-drive shaft to the starter motor; then slide the shaft from the starter motor.
4. Remove the two lock nuts securing the lower starter motor bracket to the chassis.
5. Move the starter motor forward enough to allow access to the starter motor cables; then remove the starter motor cables. Account for the washer on the negative cable.
6. Slide the upper starter motor bracket off the starter; then remove the nuts securing the starter motor to the lower starter motor bracket.

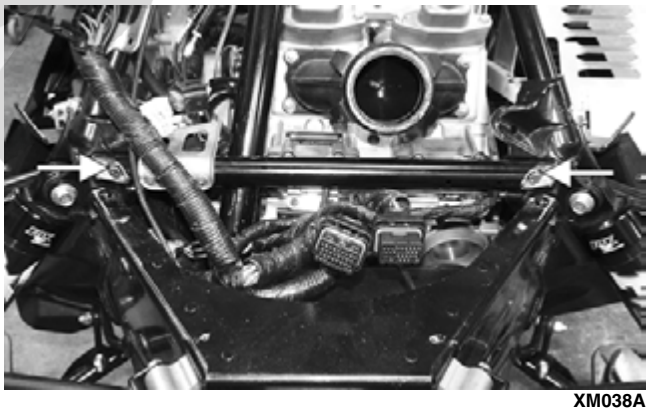
REMOVING (800 cc)

1. Remove the seat and disconnect the battery; then remove the hood and both access panels.
2. Remove all springs securing the expansion chamber and resonator; then remove the expansion chamber and resonator.
3. Remove both torx-head screws securing the front facia pieces; then disconnect the ECM and remove the facia and ECM as an assembly.



XM038A

4. Remove the two cap screws and nuts securing the shock mount support bracket to the chassis; then remove the mount and servomotor up and out of the way.



XM038A

5. Disconnect both injector wires from the injectors; then remove the four clamps securing the throttle bodies.
6. Disconnect the oil pump rod from the throttle bodies; then remove and plug the PTO-side coolant hose from the throttle bodies. Lift up the throttle bodies and set out of the way.
7. Remove the throttle body boot from the chassis.
8. Remove the driven clutch, belt, and drive clutch.

9. Remove the positive battery cable from the starter motor.



XM040A

10. Remove the snap ring securing the pinion shaft in place on the PTO-side of the shaft.



XM042A

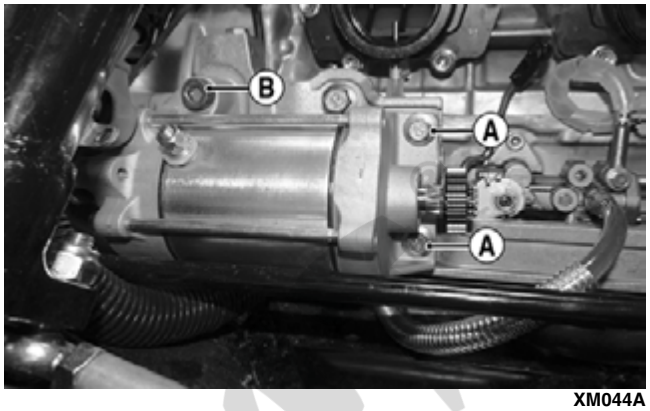
11. Slide the pinion shaft assembly out of the starter motor.

12. Remove the three cap screws securing the MAG side of the starter motor to the starter motor retaining plate. Account for the negative battery cable and external tooth washer.



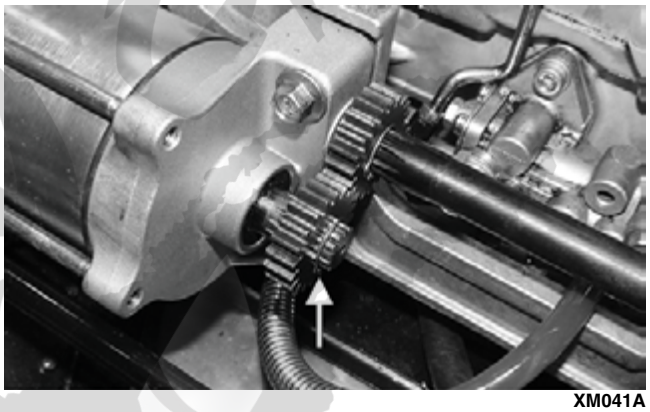
XM043A

13. Remove the two cap screws (A) and one Allen-head screw (B) securing the starter motor to the starter motor mounting bracket. Remove the starter.



XM044A

14. If the starter motor is being replaced, remove the snap ring securing the starter motor gear to the starter motor shaft. Remove the gear.



XM041A

DISASSEMBLING PINION

1. Place a 11 mm or a 7/16 in. socket over the end of the pinion shaft and tap the socket gently with a hammer.

■NOTE: This procedure will dislodge the snap-ring retainer and expose the snap ring.

2. Using a suitable pliers and flat-head screw driver, remove and discard the snap ring.

3. Remove the snap-ring retainer (note end-for-end orientation), pinion spring, spring retainer, and pinion gear. Retain all components.

CLEANING AND INSPECTING PINION

1. Using parts-cleaning solvent, wash grease from the pinion gear. Dry with compressed air.

⚠ WARNING

When using compressed air to dry components, always wear safety glasses.

2. Inspect the pinion gear for wear. If the gear is worn or chipped, replace the pinion assembly.

3. Inspect the inner gear and housing. If the gear shows any signs of wear, replace the pinion assembly.

4. Inspect the inner housing for tightness and cracks. If the housing shows any signs of being loose or cracked, replace the pinion assembly.

5. Inspect the pinion return spring for wear. If the spring shows any worn areas, replace the spring.

ASSEMBLING PINION

1. With low-temperature grease applied to the threads of the pinion shaft, slide the pinion gear, spring retainer, pinion spring, and snap-ring retainer (note end-for-end orientation) onto the shaft in their original positions.
2. Place new snap ring over the end of the pinion shaft; then slide the snap ring over the shaft. Using a 11 mm or 7/16 in. socket and a hammer, gently tap the snap ring into the groove on the shaft.
3. Pull the end cap over the snap ring to lock it in place.

TESTING STARTER MOTOR

■NOTE: Before installing the starter motor, perform test to ensure proper operation using the following procedure.

1. Attach a black jumper cable to a good ground on the starter.
2. Attach the opposite end of the black jumper cable to the negative post of a good 12V battery.
3. Attach the red jumper cable to the positive post of the battery.
4. Holding the starter firmly down on a work bench, touch the red jumper cable to the positive cable stud of the starter.

⚠ WARNING

Be sure to keep clear of the pinion gear area as it will spin at a high RPM when the red cable is touched to the positive stud. Personal injury may result if contact is made with a spinning pinion.

■NOTE: The starter motor must instantly spin at a high RPM. Exept on the 800 cc models the pinion must snap out against the stopper. If the motor does not spin, remove the red cable immediately. Check the battery condition and all connections.

INSTALLING (570 cc)

1. With the rubber dampers and spacer bracket in place on the brackets, install the starter motor and the MAG-side bracket to the engine with the two cap screws and tighten to 20 ft-lb. Route the positive lead up through the engine plate and secure with cap screw. Tighten securely.

■NOTE: Make sure the rubber exhaust bumper is in position on the close-off cover before installing the expansion chamber.

2. Place gaskets on the resonator and exhaust manifold; then install the expansion chamber. Secure the chamber to manifold and upper frame with the springs.

■NOTE: When installing the exhaust manifold springs, the long hook portion of the spring must be attached to the exhaust manifold or premature spring failure will result.

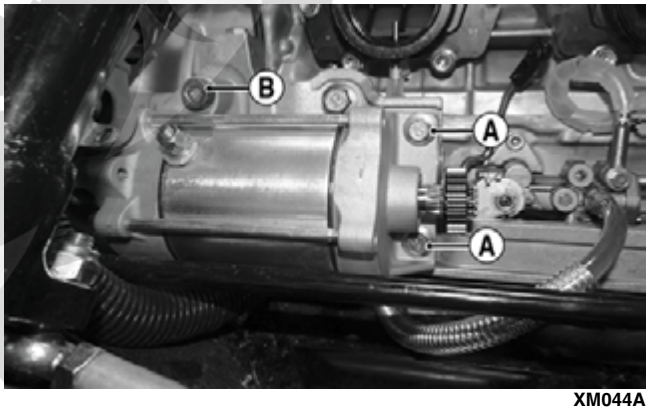
3. Connect the battery.

INSTALLING (500 cc)

1. Install the starter motor to the lower starter mounting bracket and secure with new lock nuts. Tighten securely.
2. Place the upper starter motor bracket and washer on the starter motor; then install the starter motor cables to the starter motor.
3. Install the flex-drive shaft and secure using the two Allen-head screws (coated with red Loctite #271).
4. Secure the lower starter motor bracket to the chassis using new lock nuts; then tighten the lock nuts securely.
5. Secure the upper starter motor bracket/battery tray to the chassis using the screw and new lock nut. Tighten securely.
6. Install the battery; then connect the battery cables (positive cable first).

INSTALLING (800 cc)

1. Secure the starter motor to the starter motor mounting bracket using two cap screws (A) (threads coated with blue Loctite #243 and one Allen-head screw (B) (threads coated with blue Loctite #243). Tighten the Allen-head screw (B) to 25 ft-lb. Tighten the cap screws (A) to 25 ft-lb.



XM044A

2. Secure the MAG-side of the starter motor to the retaining plate using the three cap screws (threads coated with blue Loctite #243). The washer and negative battery cable must be installed in the upper location. Tighten to 96 in.-lb.


XM043A

3. Install the pinion shaft gear onto the pinion shaft; then install into the starter motor.

4. Secure the PTO-side of the pinion shaft to the PTO-side of the starter motor bracket using both thrust washers and existing snap ring. Ensure the snap ring is properly seated into the groove.



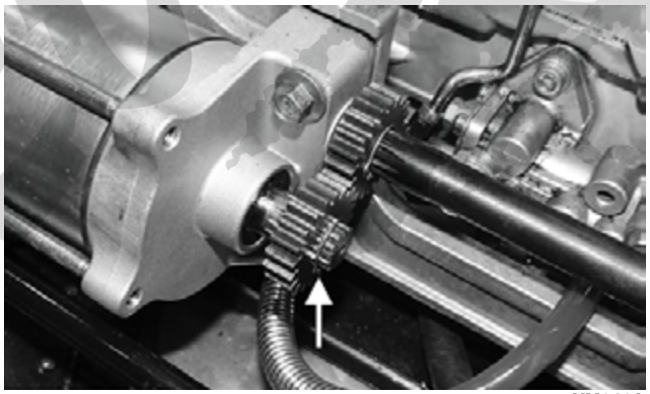
XM042A

■NOTE: The flat side of the inner thrust washer must be installed against the flat side of the bracket.



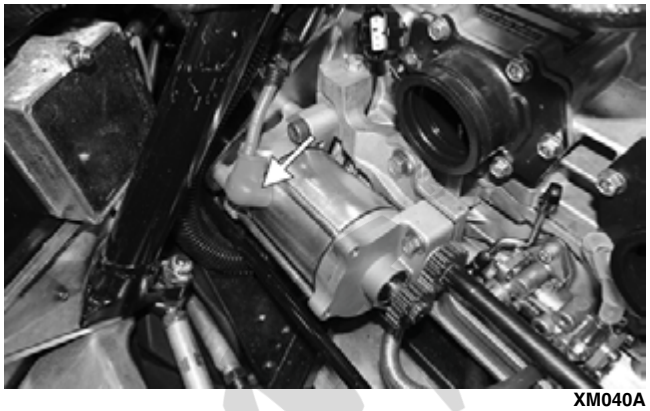
XM048A

5. Install inner snap ring onto the starter motor (if removed during removing); then install the gear and secure using outer snap ring making sure both snap rings are fully seated.



XM041A

6. Secure the positive battery cable to the starter motor and tighten to 72 in.-lb; then install the red cap over the terminal.



XM040A

7. Install the drive clutch and tighten to 51 ft-lb; then install the belt and driven clutch.

8. Install the throttle body boot; then install the throttle bodies making sure to connect the PTO-side coolant hose, oil pump rod, and injection connections.

9. Secure the throttle bodies using four existing clamps.

10. Install the shock mount support bracket to the chassis using existing cap screws. Tighten to 20 ft-lb.



XM038A

11. Secure the ECM and front facia assembly to the chassis using the existing self-tapping screws. Tighten securely.



XM038A

12. Install the resonator and expansion chamber and secure using existing springs.

13. Install the hood, left-, and right-side access panels.

14. Connect both battery cables to the battery making sure both are secure; then install the seat.

Starter Motor (4-Stroke)

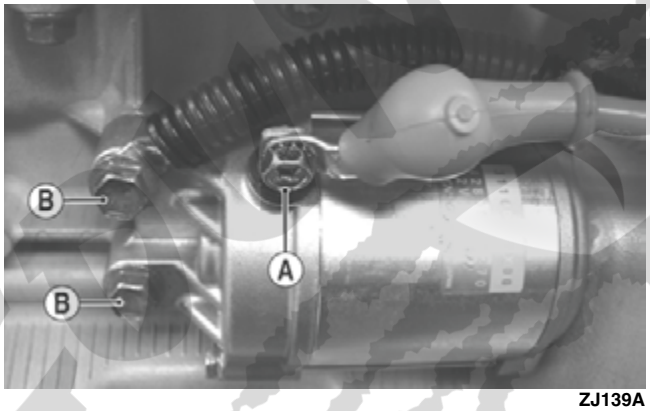
REMOVING

1. On the Bearcat/T-Series, remove the air silencer (see appropriate Air Silencer sub-section in Section 3); then remove the positive cable from the battery.
2. On the F/M/XF, remove the driven clutch, seat, gas tank, throttle bodies, and intake flange; then remove the cap screw securing the upper portion of the left rear engine mount to the engine.



PC254A

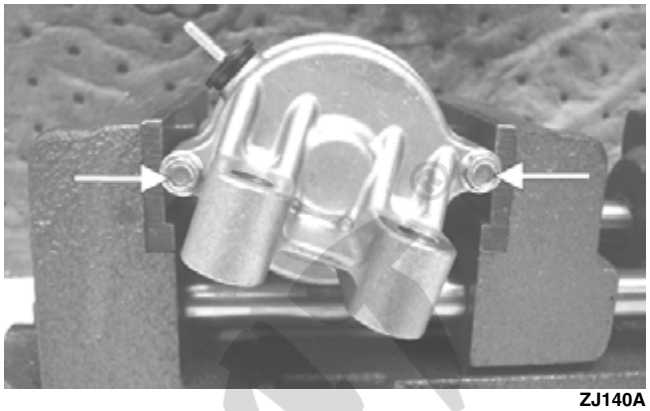
3. On the F/M/XF, carefully pry on the engine enough to remove the starter motor; then remove the positive cable from the battery.
4. Remove cap screw (A) securing the positive cable to the starter motor; then remove the two cap screws (B) and remove the starter motor.



ZJ139A

DISASSEMBLING

1. Secure the starter motor in a suitable clamping device; then remove the two long cap screws from the starter motor.



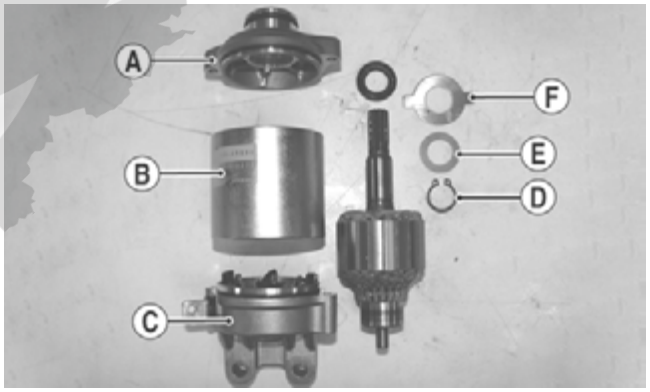
ZJ140A

2. For assembling purposes, make alignment marks on the bearing housing, magnet housing, and brush assembly.



ZJ152A

3. Remove the bearing housing (A) and the magnet housing (B) with armature from the brush assembly (C).



ZJ141A

4. With the armature removed from the magnet housing, remove snap ring (D) from the armature. Account for shim (E) and locking plate (F).
5. Using a flat-blade screwdriver, carefully remove the seal from the bearing housing.



ZJ142A

CLEANING AND INSPECTING

1. Thoroughly clean all components except the armature and brushes in parts-cleaning solvent; then dry with compressed air.

CAUTION

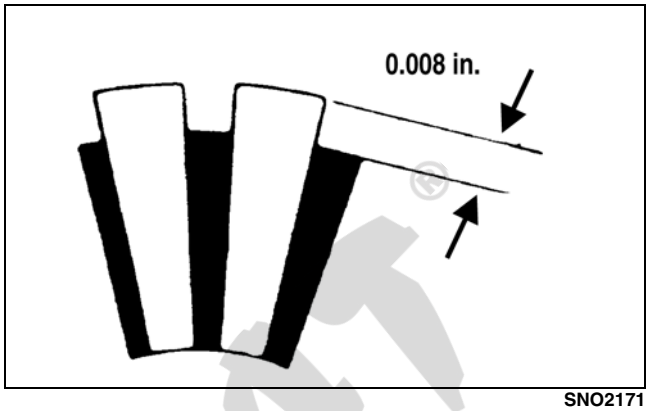
Do not wash the armature and brushes in any kind of solvent. Use only compressed air and clean dry, lint-free cloth in cleaning these components.

2. Inspect all threaded areas for damaged or stripped threads.
3. Inspect the brush holder assembly and brushes for damage or wear. Using a caliper, measure the length of the brushes. If brush measurement is less than 0.40 in., replace with new brushes and brush springs as a set.
4. Inspect brush leads for cracks, wear, or fraying. If any of these conditions exist, replace with new brushes along with new brush springs as a set.
5. Inspect the rear cover bushing for wear.
6. Inspect the front cover bearing for wear.
7. Inspect the brass commutator end of the armature for any discolored spots or damage. If the commutator is slightly discolored or damaged, the armature must be replaced. This is a molded commutator and no attempt to turn it down in a lathe should be attempted.

CAUTION

Do not use emery cloth to clean the commutator as emery particles will become imbedded in the brass commutator resulting in a short circuit. Use only #200 grit sandpaper.

8. Inspect the commutator end of the armature for buildup in the grooves. Carefully remove any buildup by undercutting using a thinly ground hacksaw blade. Do not cut any deeper than the original groove which can be seen by looking at the end of the commutator.
9. Using a caliper, measure the undercut. Maximum undercut groove must be 0.008 in.

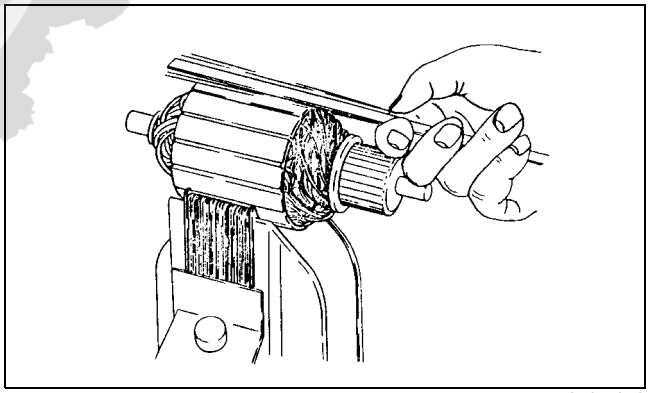


SNO2171

CAUTION

Buildup in the grooves must be removed to prevent any chance of an electrical arc between individual sections of the commutator.

10. Inspect the commutator for shorting using a multimeter and the following procedure.
    A. Set the selector to the OHMS position.
    B. Touch the black lead to the armature shaft.
    C. Using the red tester lead, probe the commutator end of the armature. The meter indicator should not change. If the indicator shows resistance, the armature is shorted and must be replaced.
11. Inspect the armature for shorting using a "growler" and the following procedure.
    A. Place the armature in the "growler."
    B. While holding a metal strip on the armature, rotate the armature an entire revolution. If the metal strip vibrates at any point on the armature, the armature is shorted and must be replaced.



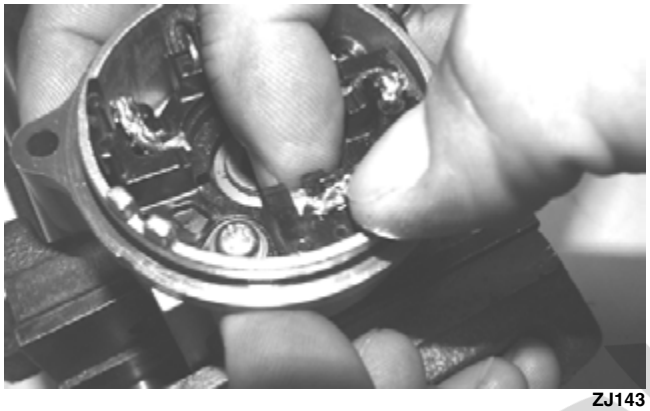
0725-653

12. Inspect the ground brushes to make sure they are properly grounded. Use a multimeter and the following procedure.
    A. Set the selector to the OHMS position.
    B. Touch the black tester lead to a ground brush.
    C. Touch the red tester lead to the brush holder assembly.

■NOTE: If no resistance is indicated, check the ground connection for tightness and for cleanliness. If there is still no meter indication, replace the brush assembly.

ASSEMBLING

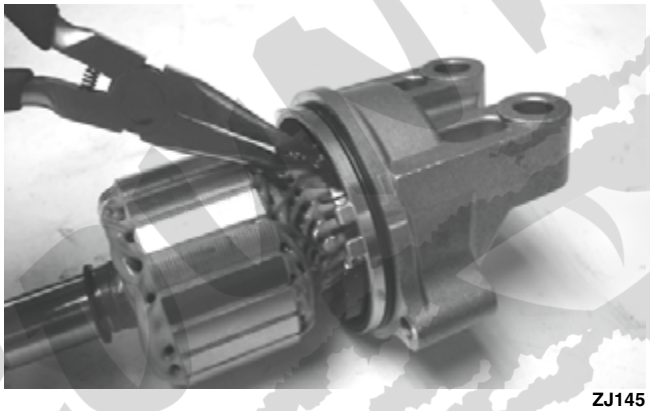
1. With the brush assembly secured in a vise, compress each brush all the way into the housing; then carefully push the brush wire over and down to secure the brush in the fully compressed position.



ZJ143

■NOTE: The brushes must be fully compressed to allow enough room to install the armature.

2. Install the armature into the brush assembly; then using a small needle-nose pliers, carefully move the brush wires upward allowing the brushes to fully contact the commutator.

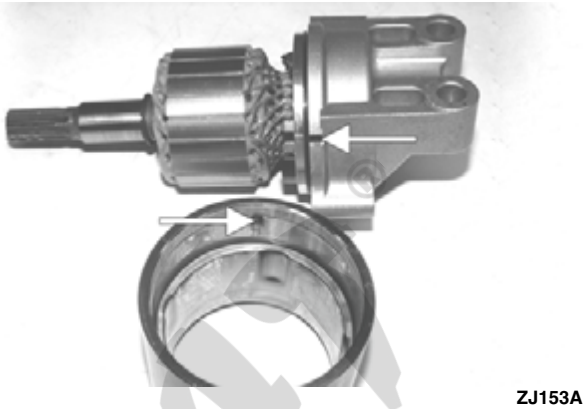


ZJ145

■NOTE: After completing step 2, ensure that the brushes are properly seated to the commutator.

3. Noting the alignment marks made in disassembling, install the magnet housing; then with the magnet housing properly seated to the brush assembly, install the snap ring, shim, and locking plate to the armature shaft.

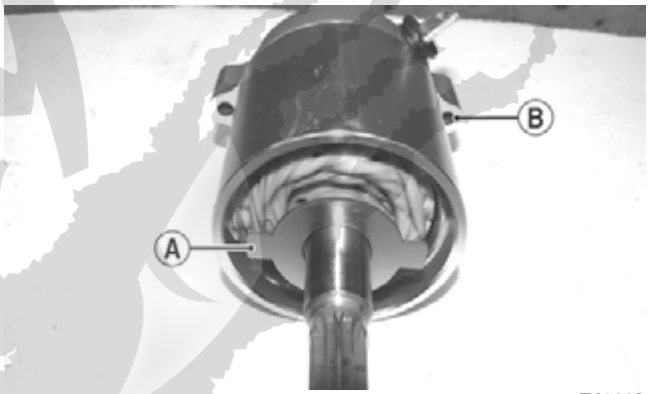
■NOTE: If alignment marks were not made during disassembling, align properly by matching notch on the magnet housing to notch on the brush assembly.



ZJ153A

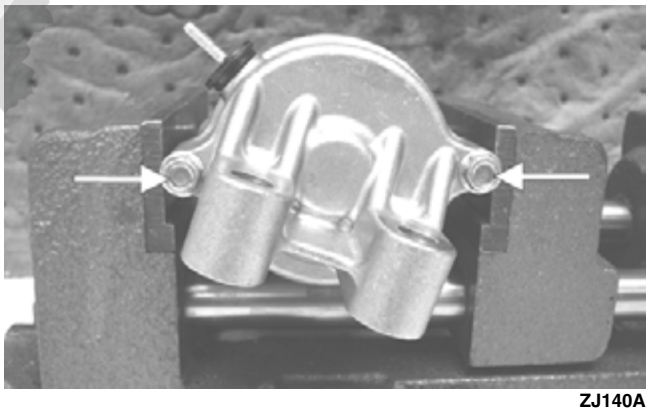
4. With a suitable driving tool, install new seal into the bearing housing; then install the bearing housing.

■NOTE: Prior to installing the bearing housing, position the locking plate with the tabs (A) of the locking plate aligned with the cap screw ears (B) of the starter motor.



ZJ144A

5. Install the two long cap screws securing the starter motor together; then tighten the cap screws to 108 in.-lb.



ZJ140A

INSTALLING

1. Install the starter motor to the engine; then with the ground cable positioned to the top mounting hole, install the two cap screws (B) and tighten to 19 ft-lb.



ZJ139A

2. Install the positive cable (A) to the starter motor and tighten securely. Secure the positive and negative cables with cable ties as noted during disassembling.

■NOTE: To finalize this procedure on the Bearcat/T-Series, install the air silencer. Proceed to appropriate Air Silencer sub-section in Section 3.

3. On the F/M/XF, install the cap screw (threads coated with blue Loctite #243) securing the upper portion of the left rear engine mount to the engine; then install the intake flange, throttle bodies, driven clutch, gas tank, and seat. Tighten to 50 ft-lb.

4. Install the positive cable to the battery.

Troubleshooting Electric Start

Problem: Hot or Smoking Wires	
Condition	**Remedy**
1. **System** wired incorrectly	1. Check wiring against wiring diagram
Problem: Starter Does Not Turn Over	
Condition	**Remedy**
1. **Battery** discharged	1. Check/charge the battery
2. **Connection** loose	2. Check tightness of all connections
3. **Grounding** improper	3. Check ground connections
4. **Fuse** blown - not installed	4. Check - replace fuse

Magneto (4-Stroke)

REMOVING

■NOTE: Prior to removing the magneto, the engine oil and cooling system must be drained (see Section 3).

1. Disconnect the connector for the exhaust temperature sensor; then remove the cap screws, nuts, and springs securing the and resonator.

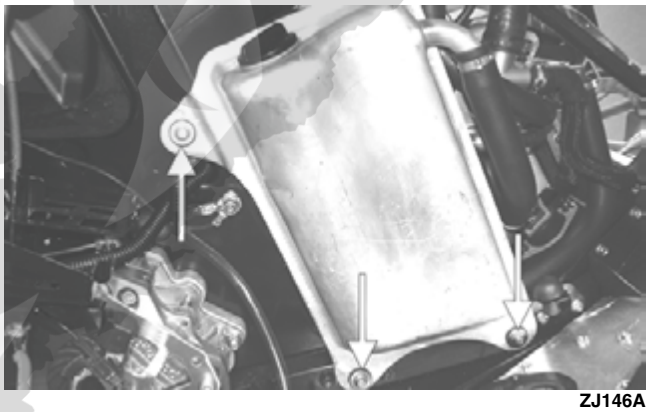
2. On the F/M/XF, remove the cap screws and nuts securing the MAG-side chassis support; then remove all clamps and hoses to gain access to the magneto cover.


SNO-728

■NOTE: Steps 3-4 are for the Bearcat/T-Series only.

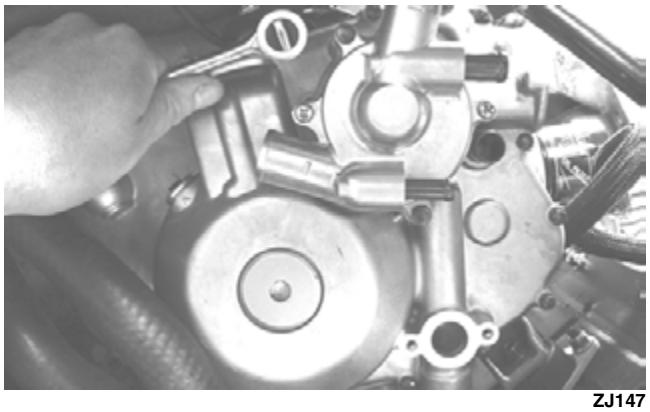
3. Disconnect the connector for the exhaust temperature sensor; then remove the springs securing the exhaust pipe and resonator to the engine and chassis. Remove the exhaust assembly and account for exhaust gaskets and springs.

4. Remove the three cap screws securing the oil tank to the chassis; then remove the clamps securing the oil return and oil supply hoses from the magneto cover. Disconnect the hoses (along with the breather hose located at the top of the tank) and remove the oil tank.

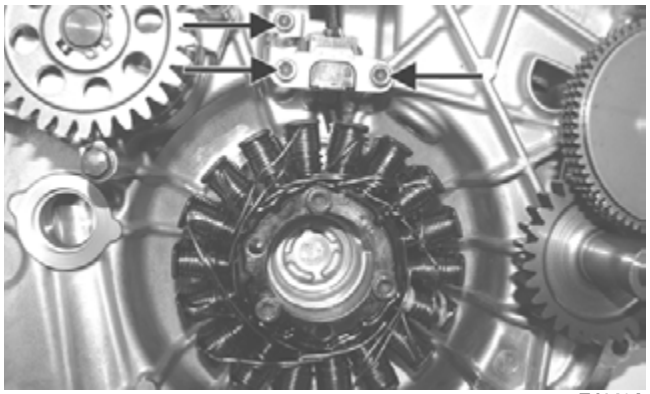

ZJ146A

5. To gain access to the magneto cover, remove the remaining coolant hoses from the water pump, oil cooler, and separator tank.

6. Remove the eighteen cap screws securing the magneto cover to the engine; then remove the cover and account for the dowel pins, the oil pump seal, and the gasket.

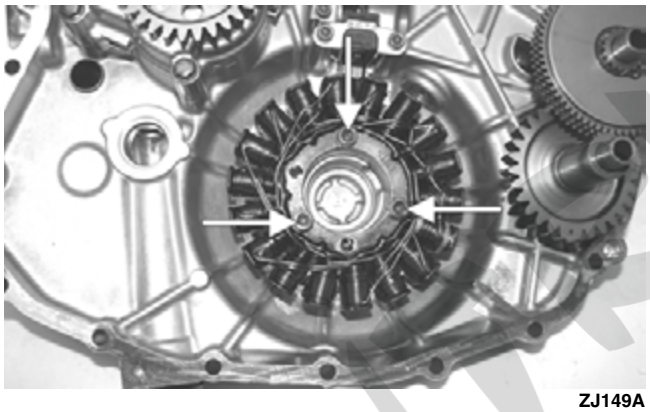

ZJ147

7. Remove the cap screws securing the harness clamp and timing sensor to the magneto cover.



ZJ148A

8. Remove the three cap screws securing the magneto to the cover; then remove the magneto assembly.



ZJ149A

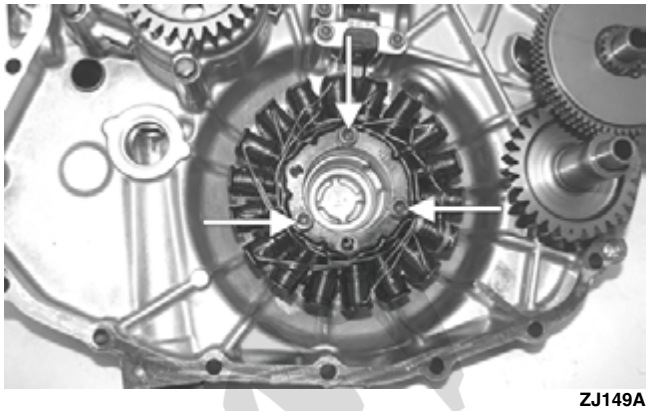
9. Remove the torque limiter/idler gear assembly from the magneto cover. For installing purposes, note the location of the spacers.



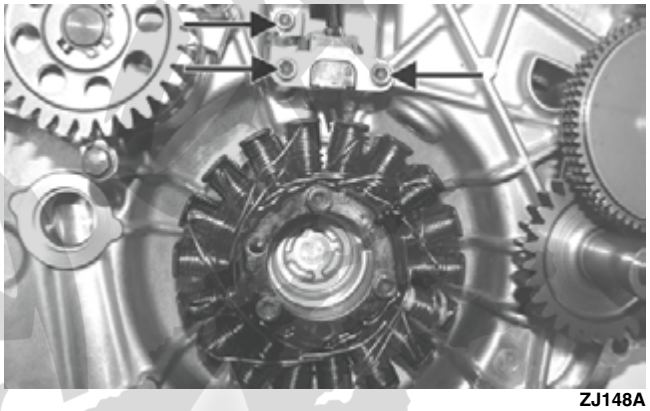
ZJ150A

INSTALLING

1. Place the magneto into position on the cover; then install and tighten the three cap screws to 84 in.-lb. With the harness routed properly, install the timing sensor and harness clamp and tighten to 84 in.-lb.

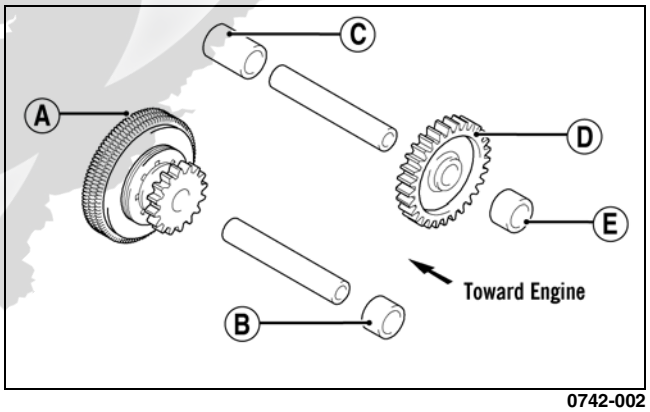


ZJ149A



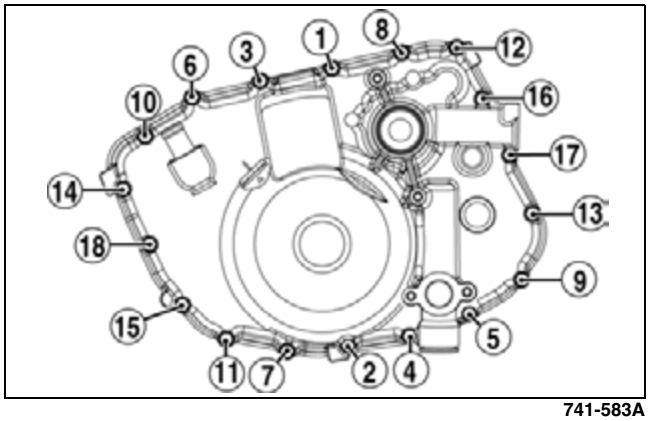
ZJ148A

2. With the two dowel pins installed in the engine case, install the torque limiter (A) and spacer (B); then install the inner spacer (C), idler gear (D), and outer spacer (E).



0742-002

3. Install the two alignment pins in the engine for the magneto cover; then with a new gasket, install the cover and with the pattern shown, tighten the 18 cap screws to 84 in.-lb.



741-583A

■**NOTE: Assure the oil pump seal is in place prior to installing the magneto cover.**



ZJ151A

4. Install the coolant hoses to the water pump, oil cooler, and separator tank; then secure the hoses with the clamps.

■**NOTE: Steps 5-6 are for the Bearcat/T-Series only.**

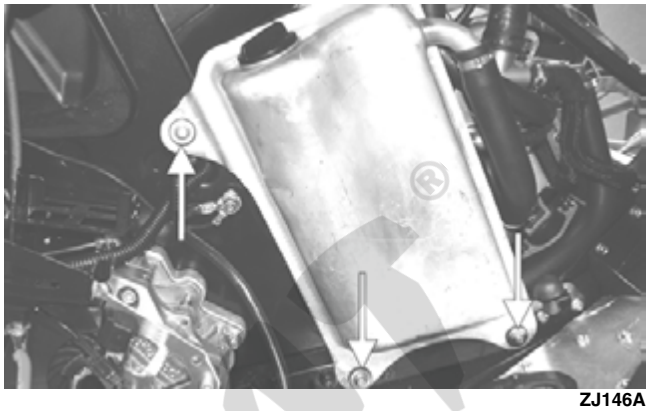
5. Place the oil tank into position in the chassis and install the breather hose; then secure with the clamp. With the hoses routed properly, install the supply/return oil hoses to the tank; then secure the hoses with new clamps.

■**NOTE: Assure the O-rings are properly seated in the supply/return oil hose fittings.**



ZJ248A

6. Secure the oil tank to the chassis with the three cap screws; then tighten securely.



ZJ146A

7. On the F/M/XF, secure all coolant hoses and oil hoses using the existing clamps; then secure the left-side support using the existing cap screws and nuts. Tighten securely.



SNO-728

8. Install the resonator and secure using existing hardware.

■**NOTE: At this point, fill and bleed the oil and cooling systems (see Section 3).**

Ignition Timing (2-Stroke)

■**NOTE: The ignition timing is not adjustable, but it can be checked and/or verified.**

CHECKING

1. Connect a timing light to the MAG-side spark plug lead.
2. Using a shielded safety stand, raise the rear of the snowmobile off the floor and start the engine. Gradually increase the engine speed to the specified RPM; the pointer should align with the proper timing mark on the flywheel (see Section 1).

Brakelight Switch

TESTING/REMOVING

■**NOTE: On the F-Series/T-Series models to access the brakelight switch connector, the two rear console torx-head screws must be removed and the console must be lifted upward and forward.**

1. Disconnect the brakelight switch black and brown two-wire connector (located below the steering support).
2. To test the brakelight switch, connect one tester lead to the brown terminal; then connect the other lead to the black terminal.
3. With the brake lever compressed, the meter must read 1 ohm or less resistance. With the brake lever released, the meter must read OL (open). If the meter does not read as specified, the brakelight switch is defective and must be replaced.
4. To remove the switch, remove the snap ring; then remove the pin securing the brake lever to the control assembly.
5. Using a small flat-blade screwdriver, compress the tabs of the switch; then push the switch toward the end of the handlebar and out of the control assembly.



CM108A

INSTALLING

1. Slide the brakelight switch into the brake control assembly until the self-locking tabs snap into position. Lightly pull the switch body to ensure the switch is properly secured.
2. Install the brake lever and secure with the pin and snap ring.
3. Connect the switch harness to the main wiring harness. Position the wires so they will not be either pinched or come in contact with any moving components. Start the engine and check the switch for proper operation.

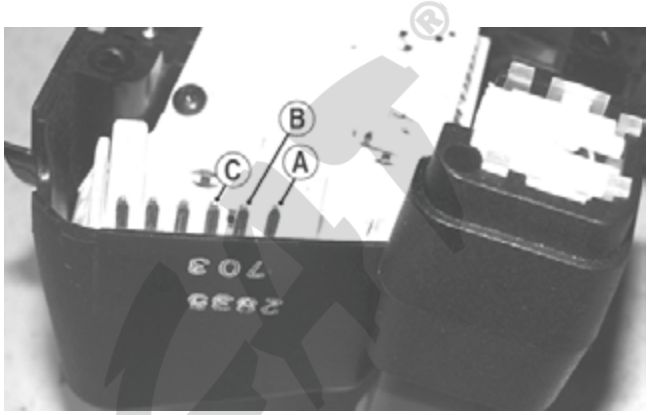
■NOTE: On the F-Series/T-Series models, return the console to position and secure with the two rear screws.

Headlight Dimmer Switch

■NOTE: At this point, remove the handlebar pad (if applicable).

REMOVING/TESTING

1. Remove the four screws securing the left-side handlebar control assembly; then remove the control assembly from the handlebar.
2. Disconnect the HI/LO beam harness from the switch.
3. With the switch in the LO beam position, connect one ohmmeter lead to pin (A) and the other ohmmeter lead to pin (C). The meter must read 1 ohm or less resistance.



CM109A

4. With the switch in the HI beam position, connect one ohmmeter lead to pin (B) and the other ohmmeter lead to pin (C). The meter must read 1 ohm or less resistance.

■NOTE: If either test does not read within specification, replace the complete control assembly.

INSTALLING

1. Connect the HI/LO beam harness to the switch; then place the control assembly on the handlebar.
2. Secure with the four screws, then install the handlebar pad (if applicable).

Testing Handlebar Warmer Elements

■NOTE: Resistance will vary due to temperature; therefore, this test should be made at room temperature of 20° C (68° F).

■NOTE: To access the element connectors, the handlebar control assembly for the side being tested must be removed.

1. Remove the handlebar pad (if applicable); then disconnect the handlebar warmer three-wire connector.
2. In the element connector, connect one ohmmeter lead to the green/white lead; then connect the other ohmmeter lead to the green lead.
3. The meter must read between 6.3-7.7 ohms.
4. In the element connector, connect the ohmmeter between the green/blue and green lead wires on the 2-stroke models or between the green/black and yellow lead wires on the 4-stroke models.
5. The meter must read between 12.6 and 15.4 ohms.
6. Replace any element measuring less than or more than the specified amount.

■**NOTE: Repeat test for the other element.**

7. Connect the leads; then install the handlebar control assembly and secure the handlebar pad (if applicable).

Testing Thumb Warmer Element

■**NOTE: Resistance will vary due to temperature; therefore, this test should be made at room temperature of 20° C (68° F).**

1. Remove the handlebar pad (if applicable); then disconnect the thumb warmer three-wire connector.
2. In the element connector, connect one ohmmeter lead to the green/white lead; then connect the other ohmmeter lead to the green lead.
3. The meter must read between 1.5 and 6.9 ohms.
4. In the element connector, connect the ohmmeter between the green/blue lead and the green lead on the 2-stroke models or between the green/black lead and the yellow lead on the 4-stroke models.
5. The meter must read between 5.5 and 23.0 ohms.

■**NOTE: If either test is not within specification, replace the thumb warmer element.**

6. Connect the leads; then install and secure the handlebar pad (if applicable).

Testing Handlebar Warmer/Thumb Warmer Switch

REMOVING/TESTING

1. Remove the handlebar pad (if applicable).
2. Remove the four screws securing the left-side handlebar control assembly; then remove the control assembly from the handlebar.
3. Disconnect the handlebar/thumb warmer harness from the switch.
4. With the thumb warmer toggle in the low position, connect one ohmmeter lead to pin (C) and the other ohmmeter lead to pin (B). The meter must read 1 ohm or less resistance.



CM110A

5. With the thumb warmer toggle in the high position, connect one ohmmeter lead to pin (C) and the other ohmmeter lead to pin (A). The meter must read 1 ohm or less resistance.

■**NOTE: If either test does not read within specification, replace the complete control assembly.**

6. With the handwarmer toggle in the low position, connect one ohmmeter lead to pin (C) and the other ohmmeter lead to pin (D). The meter must read 1 ohm or less resistance.
7. With the handwarmer toggle in the high position, connect one ohmmeter lead to pin (C) and the other ohmmeter lead to pin (E). The meter must read 1 ohm or less resistance.

■**NOTE: If either test does not read within specification, replace the complete control assembly.**

INSTALLING

1. Connect the handlebar/thumb warmer harness to the switch; then place the control assembly on the handlebar.
2. Secure with the four screws; then install the handlebar pad (if applicable).

Testing Passenger Handwarmer Switch

1. Disconnect the lead wires from the switch.
2. With the switch in the LO position, connect one ohmmeter lead to the green/white wire at the connector; then connect the other ohmmeter lead to the brown wire at the connector. The meter must read less than 1 ohm of resistance.
3. With the switch in the HI position, connect one ohmmeter lead to the green/blue wire at the connector; then connect the other ohmmeter lead to the brown wire at the connector. The meter must read less than 1 ohm of resistance.

Testing Passenger Handwarmer Elements

■NOTE: During this test, resistance will vary due to temperature; therefore, this test should be made at room temperature of 20° C (68° F).

1. Disconnect the lead wires from the main wiring harness.
2. For the LO position, connect one ohmmeter lead to the green/white wire from the element; then connect the other ohmmeter lead to the green wire from the element. The meter must read between 23.8-32.2 ohms.
3. For the HI position, connect one ohmmeter lead to the green/blue wire from the element; then connect the other ohmmeter lead to the green wire from the element. The meter must read between 8.7-11.7 ohms.

Testing Seat Heater Harness/Switches

■NOTE: The seat heater elements cannot be tested.

OPERATOR HEATER SWITCH - Resistance

■NOTE: The element connectors are located at the rear of the front seat beneath the flap.

1. Disconnect the main harness/element connector.
2. Connect one ohmmeter lead to the red/yellow main harness wire; then connect the other ohmmeter lead to the green/red main harness wire. The meter must read the following ± 5%:

LO	4.32K ohms
HI	3.75K ohms

■NOTE: If resistance is not within specification, troubleshoot the switch connector located below the steering support. If the switch connector tests good, replace the switch.

PASSENGER HEATER SWITCH - Resistance

1. Disconnect the main harness/element connector.
2. Connect one ohmmeter lead to the red/blue main harness wire; then connect the other ohmmeter lead to the green/red main harness wire. The meter must read the following ± 5%:

LO	4.32K ohms
HI	3.75K ohms

■NOTE: If resistance is not within specification, troubleshoot the switch connector located beneath the seat. If the switch connector tests good, replace the switch.

OPERATOR/PASSENGER SWITCH - Voltage

1. Disconnect the main harness/element connector.

■NOTE: For this procedure, test the main harness side of the connector, not the element side of the connector.

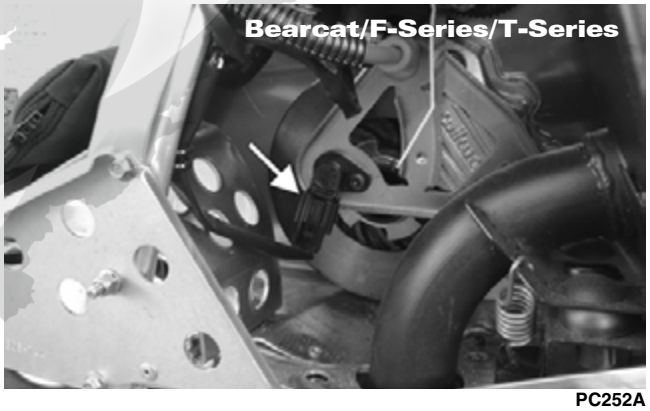
2. Connect one meter lead to the red/blue main harness wire; then connect the other meter lead to the black main harness wire.
3. Start the engine. The meter must read 12-15 volts.

■NOTE: If this voltage test does not read within specification, troubleshoot the main harness, F-2 fuse, K-2 relay, or the F-7 main fuse.

Testing Speedometer Sensor

■NOTE: The following test should be made using MaxiClips and the Fluke Model 77 Multimeter set to the DC Volt scale.

■NOTE: Prior to testing the sensor, inspect the three-wire connector on the sensor harness for contamination, broken pins, and/or corrosion. With the engine running, note that a power supply of 10.8-14.4 DC volts exists at the main harness/speedometer connector.



PC252A



PC067B

1. Elevate the rear of the snowmobile onto a suitable safety stand.

2. Set the meter selector to the DC Voltage position.
3. At the sensor side of the plug-in, connect the red maxiclip and meter lead to the white/orange lead; then connect the black maxiclip and meter lead to the black lead.
4. Connect a positive 12-volt DC power supply to the red/blue wire; then connect a negative cable to the black wire from the main harness side of the plug-in.
5. Rotate the driven clutch. The meter must read 0 volts and 12 volts alternately.

Testing Gear Position Switch

1. On the Bearcat/F-Series/T-Series, remove the six torx-head cap screws securing the left-side footrest to the chassis and remove the footrest; then un-thread the switch from the gear case.
2. Disconnect the switch two-wire connector.
3. Connect one ohmmeter lead to one black wire; then connect the other ohmmeter lead to the other black wire.
4. With the reverse button pressed in, the meter must read less than 1 ohm of resistance. With the reverse button released, the meter must read OL (infinite resistance).

■NOTE: If the meter does not read as specified in either test, the switch is defective and must be replaced.

Testing Shift Switch

■NOTE: The switch is located on the right-side handlebar control. To access the switch, the control assembly must be disassembled.

1. Disconnect the two-wire connector from the handlebar control.
2. Connect one ohmmeter lead to one pin; then connect the other ohmmeter lead to the other pin.



PC253B

3. With the reverse button pressed in, the meter must read less than 1 ohm of resistance. With the reverse button released, the meter must read OL (infinite resistance).

■NOTE: If the meter does not read as specified in either test, the switch is defective and must be replaced.

Testing Shift Actuator (500/1100 cc)

■NOTE: On the Bearcat/F-Series/T-Series, the actuator is located on the gear case above the left-side footrest. On the F/M/XF, the actuator is located on the chain case.

1. Disconnect the actuator two-wire connector; then connect Actuator Test Harness onto the harness side of the connector.
2. Connect one meter lead to the red/blue lead of the test harness; then connect the other meter lead to the black/orange wire lead (500 cc) or yellow/orange wire lead (1100 cc) of the test harness.
3. Press the reverse button; there should be a flash of DC battery voltage indicated on the meter. Release the reverse button; then again press the reverse button; there should be a flash of DC battery voltage indicated on the meter.

■NOTE: If the meter indicates a flash of voltage but the actuator does not function, the actuator is defective and must be replaced.

■NOTE: If the meter does not indicate a flash of voltage, troubleshoot the main harness.

Servomotor/ Potentiometer Test (800 cc)

SERVOMOTOR

■NOTE: A 12-volt battery and test leads will be needed for this test.

1. Remove the servomotor from the snowmobile.

CAUTION
Care must be taken not to contact the servo yellow, orange, or black/white terminals, or damage to the potentiometer circuit will result.

2. Contact the red/black servo terminal with the battery positive lead; then contact the black/red servo terminal with the battery negative lead.
3. The servo should rotate when the negative lead contacts the black/red terminal. Note the direction of rotation.

4. Reverse the connections on the servo terminals: positive lead to black/red and negative lead to red/black. The servomotor should rotate in the opposite direction.
5. Install the servomotor.

■NOTE: If the servo operates correctly in the above test but fails to operate when connected to the ECM/CCU/regulator/rectifier at the designated RPM, proceed to Potentiometer test.

POTENTIOMETER

■NOTE: The following test should be made using MaxiClips and the Fluke Model 77 Multimeter set to the ohms scale.

1. Remove the servomotor from the snowmobile.
2. Connect the red maxiclip and meter lead to the black/white servo terminal; then connect the black maxiclip and meter lead to the yellow servo terminal.
3. Rotate the servo clutch counterclockwise. The ohms should increase as the clutch is rotated until it reaches 4700-5000 ohms.
4. Continue the clutch rotation, and there will be a small area in the rotation where the ohm reading will disappear; then it will return again.
5. Continue the clutch rotation, and the ohms should appear at a very low value but will again increase to 4700-5000 ohms. This is normal operation.



FZ088A

6. Install the servomotor.

■NOTE: If the servo operates correctly and the potentiometer test is correct but fails to operate when connected to the ECM/CCU/regulator/rectifier at the designated RPM, see Troubleshooting Servomotor chart in this section.

Troubleshooting Servomotor

START

Inspect harness connectors for chaffed or broken wires and make sure pin connectors are in place

Trouble code 18 - servo potentiometer trouble

Yes

Verify servo connector properly plugged into the harness connector adjustment

No

Correct

Remove servo from chassis; then check servo pulley for proper installation/rotation (see page 27 in this section)

CAUTION

Never attempt to remove or install the servo pulley jam nut with the pulley unsecured or damage to the servo will occur.

No

Trouble code 16 - servo self-cleaning trouble

Yes

No

Other troubles

D

Verify the exhaust valve cable(s) are properly routed and installed to the servo

Correct

Remove exhaust valve cable(s) from servo

Incorrect

Cable(s) installed properly

Yes

Yes

No problem code 16, but slack exhaust valve cable(s) after self-cleaning

Correct (opposite side of the harness) or incorrect (harness side)

Correct

Incorrect

B

No

No problem in self-cleaning, but slack exhaust valve cable(s) when activated

Yes

Improper cable installation/direction - verify proper cable installation/direction

Verify exhaust valve adjustment/condition

Trouble

No

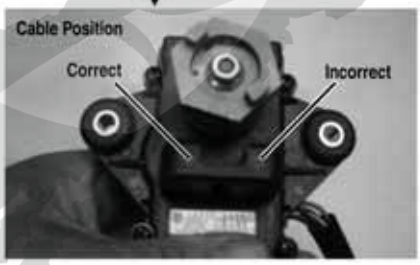
Failed servo

Return to START

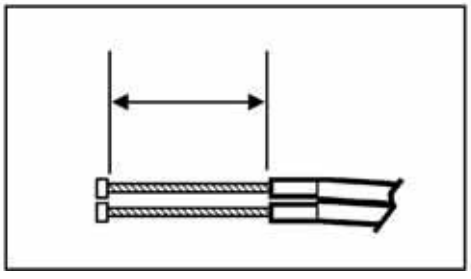
Problem with exhaust valve or exhaust valve cable - fix valve or cable

Yes

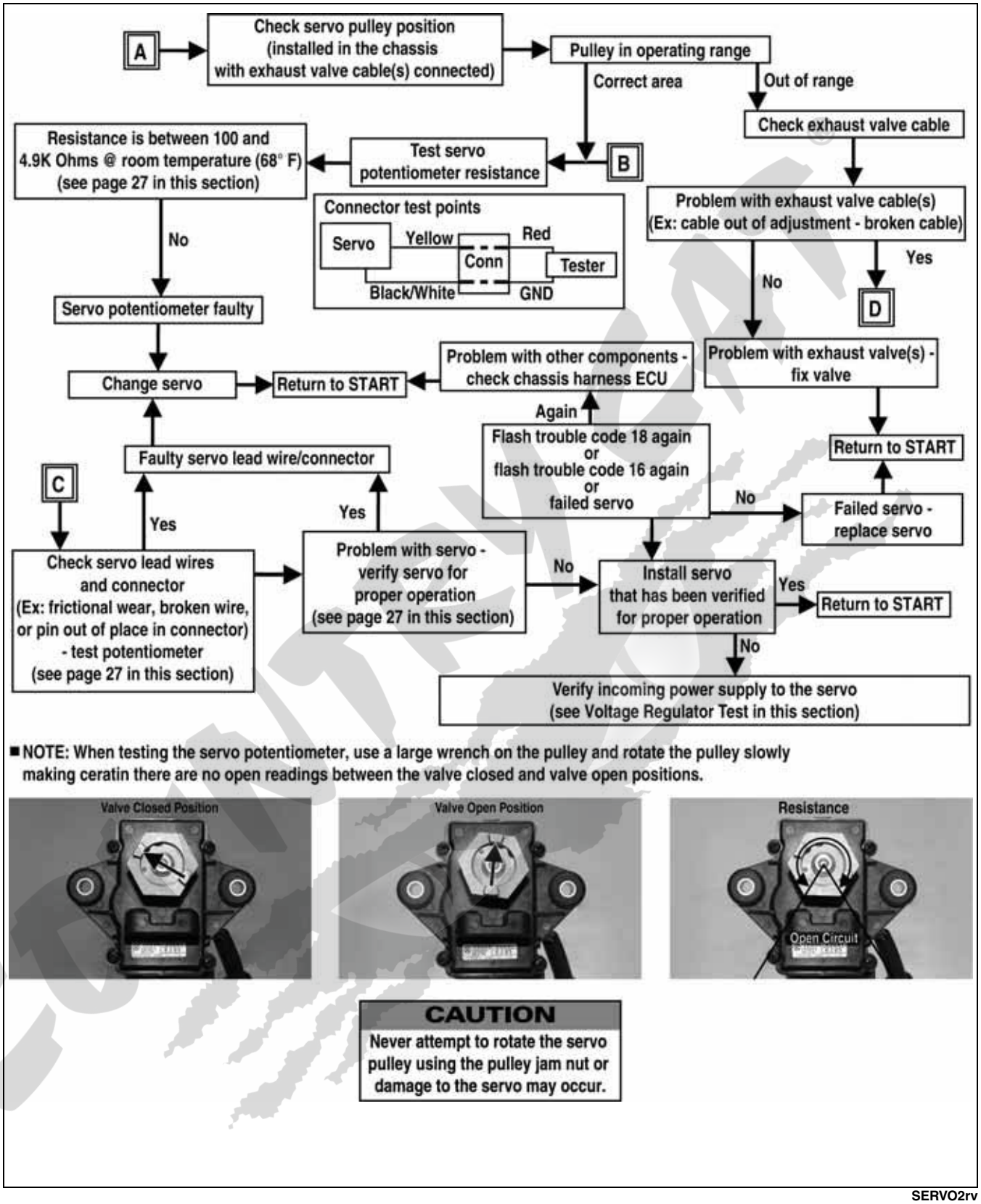
C



APV CABLE LENGTH	
CENTER ± 0.039 in.	1.437 in.



SERVO1A12



■ NOTE: When testing the servo potentiometer, use a large wrench on the pulley and rotate the pulley slowly making ceratin there are no open readings between the valve closed and valve open positions.

CAUTION

Never attempt to rotate the servo pulley using the pulley jam nut or damage to the servo may occur.

SERVO2rv

Voltage/Resistance Chart - Air Temperature

Temperature		Volts	Ohms	Temperature		Volts	Ohms
100° C	212° F	0.113	555	28° C	82° F	1.230	8540
98° C	208° F	0.121	595	26° C	79° F	1.322	9530
96° C	205° F	0.128	635	24° C	75° F	1.413	10520
94° C	201° F	0.136	675	22° C	72° F	1.505	11510
92° C	198° F	0.143	715	20° C	68° F	1.596	12500
90° C	194° F	0.151	755	18° C	64° F	1.716	14020
88° C	190° F	0.162	819	16° C	61° F	1.836	15540
86° C	187° F	0.173	883	14° C	57° F	1.955	17060
84° C	183° F	0.184	947	12° C	54° F	2.075	18580
82° C	180° F	0.195	1011	10° C	50° F	2.195	20100
80° C	176° F	0.206	1075	8° C	46° F	2.323	23060
78° C	172° F	0.222	1160	6° C	43° F	2.452	26020
76° C	169° F	0.238	1245	4° C	39° F	2.580	28980
74° C	165° F	0.253	1330	2° C	36° F	2.709	31940
72° C	162° F	0.269	1415	0° C	32° F	2.837	34900
70° C	158° F	0.285	1500	-2° C	28° F	2.969	39940
68° C	154° F	0.308	1640	-4° C	25° F	3.101	44980
66° C	151° F	0.331	1780	-6° C	21° F	3.233	50020
64° C	147° F	0.353	1920	-8° C	18° F	3.365	55060
62° C	144° F	0.376	2060	-10° C	14° F	3.497	60100
60° C	140° F	0.399	2200	-12° C	10° F	3.610	76080
58° C	136° F	0.432	2410	-14° C	7° F	3.722	92060
56° C	133° F	0.465	2620	-16° C	3° F	3.835	108040
54° C	129° F	0.498	2830	-18° C	-0.4° F	3.947	124020
52° C	126° F	0.531	3040	-20° C	-4° F	4.060	140000
50° C	122° F	0.564	3250	-22° C	-8° F	4.142	156000
48° C	118° F	0.612	3595	-24° C	-11° F	4.224	172000
46° C	115° F	0.659	3940	-26° C	-15° F	4.306	188000
44° C	111° F	0.707	4285	-28° C	-18° F	4.388	204000
42° C	108° F	0.754	4630	-30° C	-22° F	4.470	220000
40° C	104° F	0.802	4975	-32° C	-26° F	4.522	261000
38° C	100° F	0.869	5490	-34° C	-29° F	4.574	302000
36° C	97° F	0.937	6005	-36° C	-32° F	4.625	343000
34° C	93° F	1.004	6520	-38° C	-36° F	4.677	384000
32° C	90° F	1.072	7035	-40° C	-40° F	4.729	425000
30° C	86° F	1.139	7550				

Voltage/Resistance Chart - Coolant Temperature

Temperature		Volts	Ohms	Temperature		Volts	Ohms
110° C	230° F	0.115	129	28° C	82° F	1.377	1800
108° C	226° F	0.129	137	26° C	79° F	1.459	1950
106° C	223° F	0.143	145	24° C	75° F	1.541	2100
104° C	219° F	0.157	153	22° C	72° F	1.623	2250
102° C	216° F	0.171	161	20° C	68° F	1.705	2400
100° C	212° F	0.185	169	18° C	64° F	1.806	2670
98° C	208° F	0.192	180	16° C	61° F	1.907	2940
96° C	205° F	0.199	191	14° C	57° F	2.008	3210
94° C	201° F	0.206	202	12° C	54° F	2.109	3480
92° C	198° F	0.213	213	10° C	50° F	2.210	3750
90° C	194° F	0.220	224	8° C	46° F	2.327	4170
88° C	190° F	0.235	240	6° C	43° F	2.444	4590
86° C	187° F	0.250	256	4° C	39° F	2.561	5010
84° C	183° F	0.265	273	2° C	36° F	2.678	5430
82° C	180° F	0.280	289	0° C	32° F	2.795	5850
80° C	176° F	0.295	305	-2° C	28° F	2.901	6510
78° C	172° F	0.317	327	-4° C	25° F	3.007	7170
76° C	169° F	0.339	349	-6° C	21° F	3.113	7830
74° C	165° F	0.361	371	-8° C	18° F	3.219	8490
72° C	162° F	0.383	393	-10° C	14° F	3.325	9150
70° C	158° F	0.405	415	-12° C	10° F	3.421	9422
68° C	154° F	0.438	445	-14° C	7° F	3.517	9694
66° C	151° F	0.471	475	-16° C	3° F	3.613	9966
64° C	147° F	0.504	505	-18° C	-0.4° F	3.709	10238
62° C	144° F	0.537	535	-20° C	-4° F	3.805	10510
60° C	140° F	0.570	565	-22° C	-8° F	3.885	13688
58° C	136° F	0.598	609	-24° C	-11° F	3.965	16866
56° C	133° F	0.626	653	-26° C	-15° F	4.045	20044
54° C	129° F	0.654	697	-28° C	-18° F	4.125	23222
52° C	126° F	0.682	741	-30° C	-22° F	4.205	26400
50° C	122° F	0.710	785	-32° C	-26° F	4.267	30520
48° C	118° F	0.759	849	-34° C	-29° F	4.329	34640
46° C	115° F	0.808	913	-36° C	-32° F	4.391	38760
44° C	111° F	0.857	977	-38° C	-36° F	4.453	42880
42° C	108° F	0.906	1041	-40° C	-40° F	4.515	47000
40° C	104° F	0.955	1105	-42° C	-44° F	4.553	55100
38° C	100° F	1.023	1214	-44° C	-47° F	4.591	63200
36° C	97° F	1.091	1323	-46° C	-51° F	4.629	71300
34° C	93° F	1.159	1432	-48° C	-54° F	4.667	79400
32° C	90° F	1.227	1541	-50° C	-58° F	4.705	87500
30° C	86° F	1.295	1650				

2013 SNOWMOBILE WIRING DIAGRAMS

This chart is designed to direct the technician to the appropriate Harness Wiring Diagram. Select the snowmobile model from the chart to determine the correct diagram:

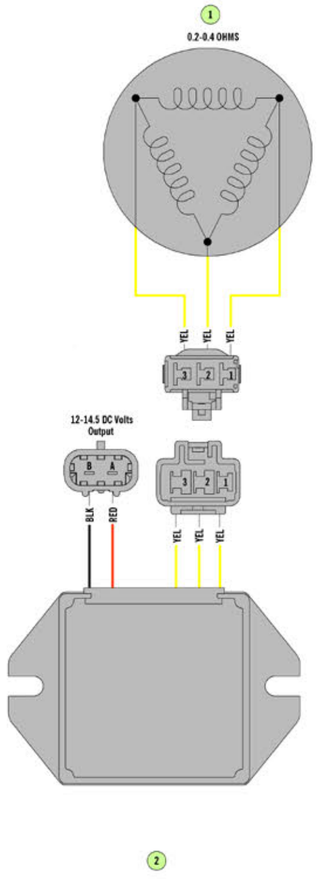
Model	Ignition/Main Harness	Hood/Console Harness	Handlebar Harness
Bearcat 570, F570, T570	p. 2	p. 15	p. 24
Bearcat Z1 XT/GS/LTD	p. 9	p. 19	p. 21
F 800, M 800, XF 800 w/o Electric Start	p. 6	p. 14	p. 23
F 800, M 800, XF 800 w/Electric Start	p. 13	p. 14	p. 23
F5	p. 3	p. 16	p. 25
F 1100/M 1100/XF 1100	p. 4	p. 17	p. 26
F 1100 Turbo/M 1100 Turbo/XF 1100 Turbo	p. 5	p. 17	p. 26
F 1100 Turbo Sno Pro RR/M 1100 Turbo HCR	p. 5	p. 17	p. 28
Sno Pro 120	p. 10	N/A	N/A
Sno Pro 500	p. 11	p. 20	p. 27
Sno Pro 600	p. 12	p. 18	N/A
TZ1/LXR	p. 8	p. 19	p. 21
TZ1 Turbo LXR	p. 7	p. 19	p. 21

■NOTE: All Magneto diagrams on p. 1, Passenger Seat Harness on p. 22, and miscellaneous Groomer Special Harnesses on p. 29.

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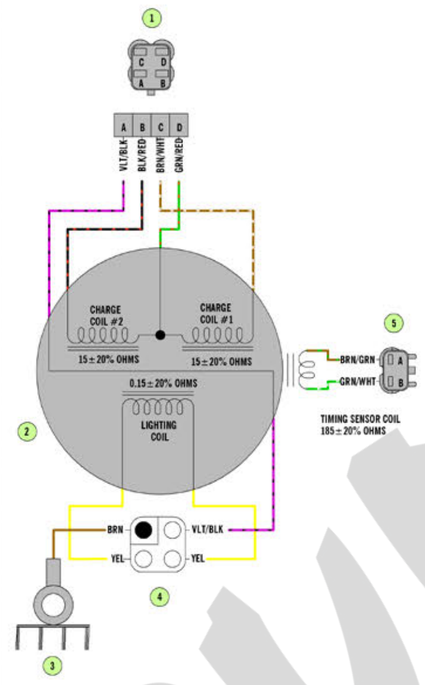
STATOR DIAGRAM 4-STROKES

1. STATOR
2. REGULATOR/RECTIFIER



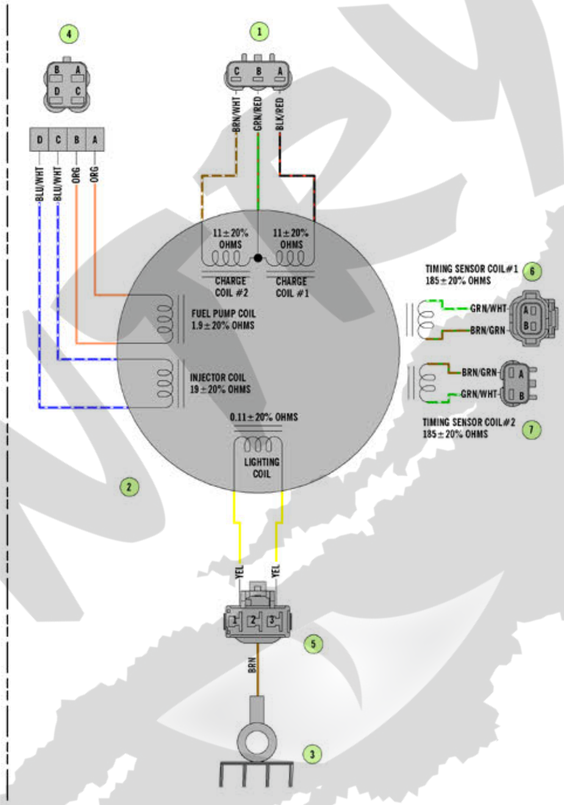
MAGNETO DIAGRAM 570 SERIES

1. COIL, CHARGE
2. MAGNETO
3. GROUND, CHASSIS
4. CONNECTOR, ENGINE
5. SENSOR, TIMING



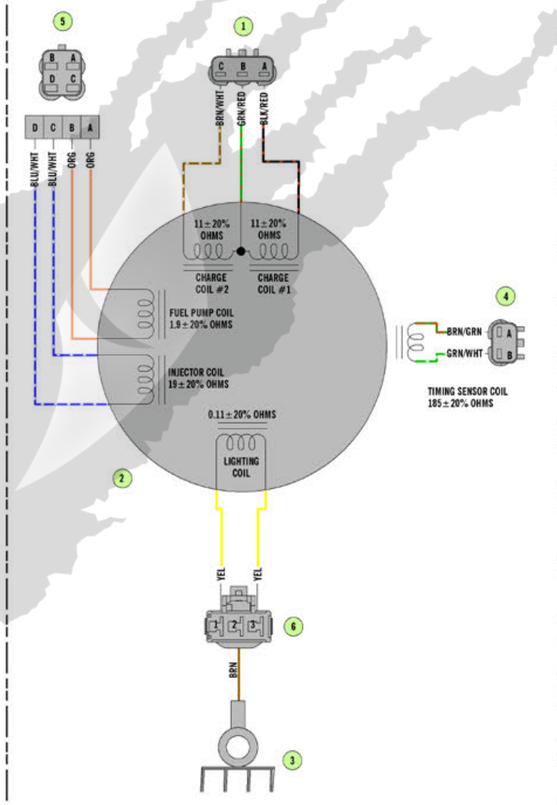
MAGNETO DIAGRAM 800

1. COIL, CHARGE
2. MAGNETO
3. GROUND, CHASSIS
4. COILS, FUEL PUMP/INJECTOR
5. COIL, LIGHTING
6. SENSOR, TIMING #1
7. SENSOR, TIMING #2



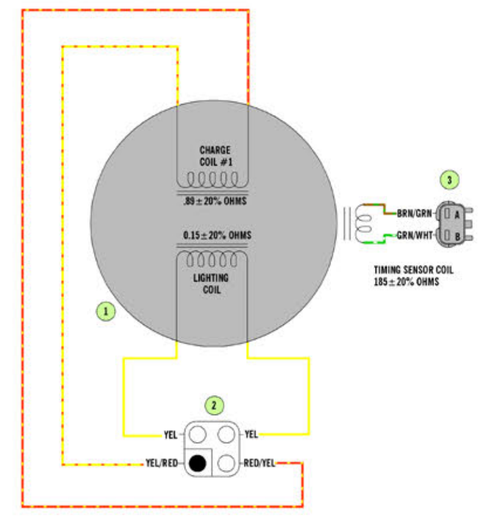
MAGNETO DIAGRAM 500

1. COIL, CHARGE
2. MAGNETO
3. GROUND, CHASSIS
4. SENSOR, TIMING
5. COILS, FUEL PUMP/INJECTOR
6. COIL, LIGHTING



MAGNETO DIAGRAM 600 RACE

1. MAGNETO
2. CONNECTOR, ENGINE
3. SENSOR, TIMING

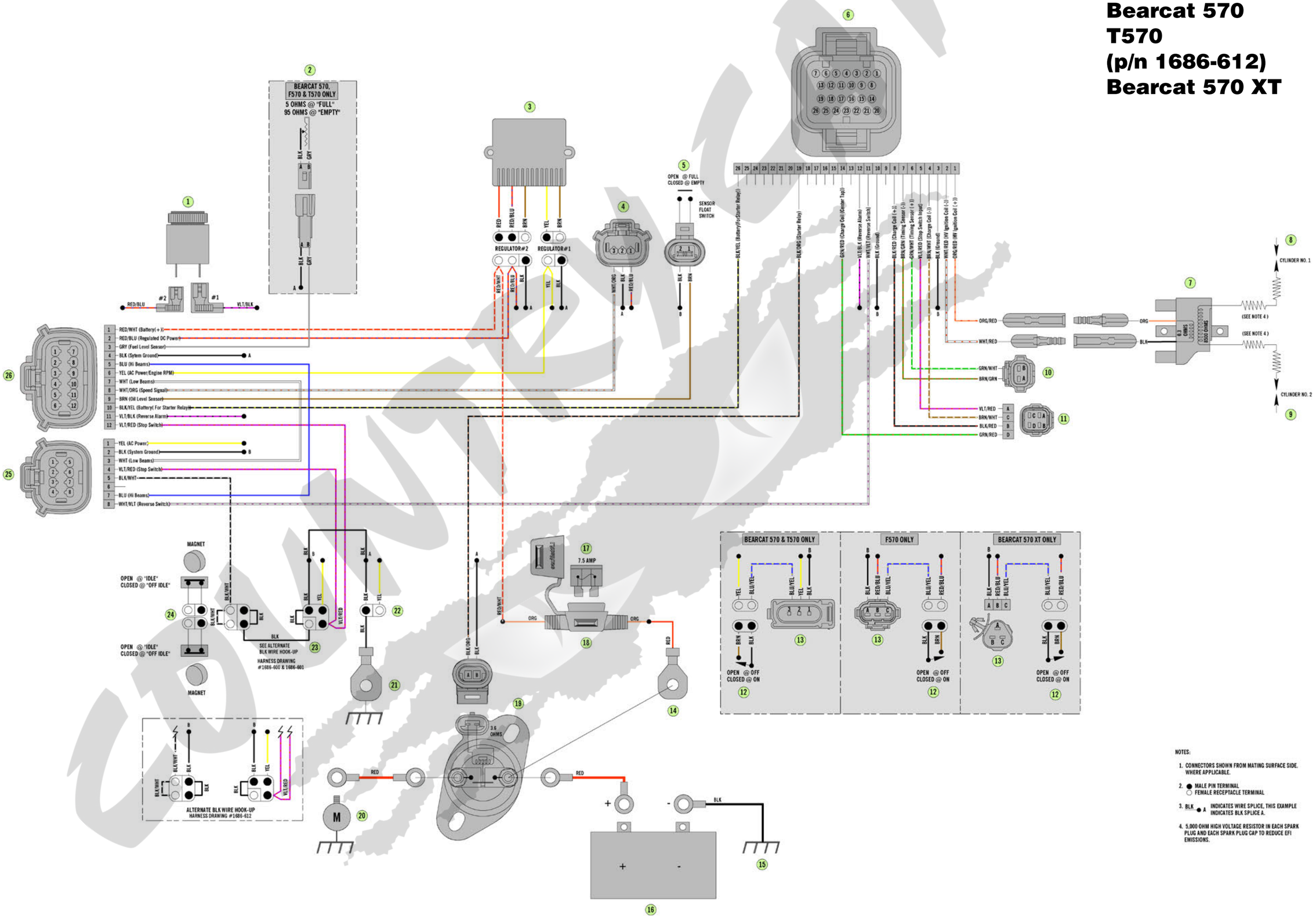


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL

Main Harness
(p/n 1686-600)
F570
(p/n 1686-601)
Bearcat 570
T570
(p/n 1686-612)
Bearcat 570 XT

1. ALARM, REVERSE
2. SENSOR, FUEL LEVEL
3. REGULATOR/RECTIFIER
4. CONNECTOR, SPEED SENSOR
5. SENSOR, OIL LEVEL
6. CONNECTOR, CDI
7. COIL, HV IGNITION
8. PLUG, CYLINDER 1 SPARK
9. PLUG, CYLINDER 2 SPARK
10. CONNECTOR, TIMING SENSOR
11. CONNECTOR, CHARGE COIL
12. SWITCH, BRAKE
13. CONNECTOR, TAILLIGHT
14. CONNECTOR, BATTERY TERMINAL
15. CONNECTOR, CHASSIS GROUND
16. BATTERY, 12V
17. FUSE
18. FUSE HOLDER
19. SOLENOID
20. STARTER
21. CONNECTOR, CHASSIS GROUND
22. CONNECTOR, ACCESSORY
23. CONNECTOR, ENGINE
24. SWITCH, CARBURETOR
25. CONNECTOR, HANDLEBAR HARNESS
26. CONNECTOR, CONSOLE HARNESS

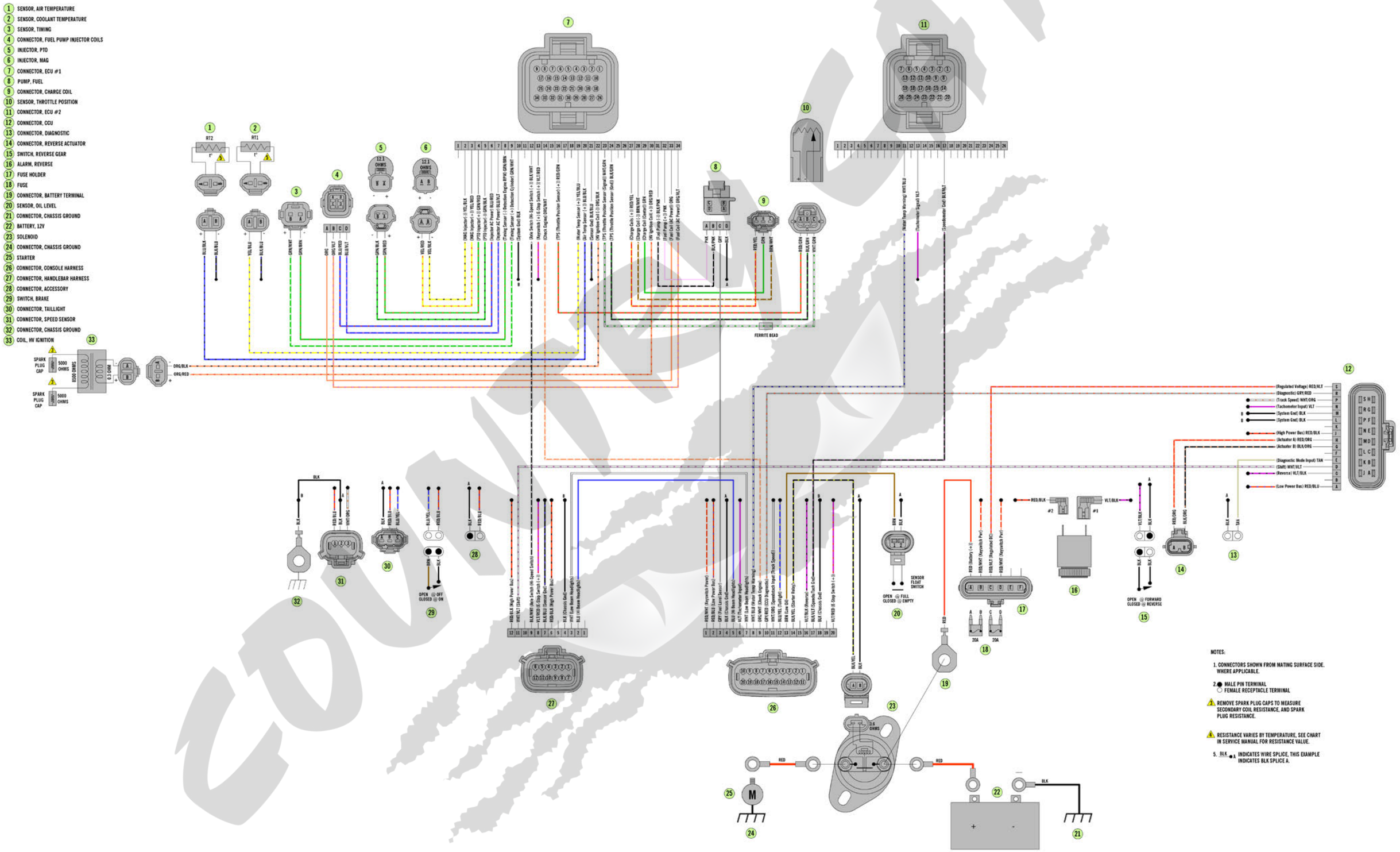


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE, WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. BLK ● A INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE A.
4. 5,000 OHM HIGH VOLTAGE RESISTOR IN EACH SPARK PLUG AND EACH SPARK PLUG CAP TO REDUCE EFI EMISSIONS.

Main Harness (p/n 1686-603) F5

1. SENSOR, AIR TEMPERATURE
2. SENSOR, COOLANT TEMPERATURE
3. SENSOR, TIMING
4. CONNECTOR, FUEL PUMP INJECTOR COILS
5. INJECTOR, PTO
6. INJECTOR, MAG
7. CONNECTOR, ECU #1
8. PUMP, FUEL
9. CONNECTOR, CHARGE COIL
10. SENSOR, THROTTLE POSITION
11. CONNECTOR, ECU #2
12. CONNECTOR, CCU
13. CONNECTOR, DIAGNOSTIC
14. CONNECTOR, REVERSE ACTUATOR
15. SWITCH, REVERSE GEAR
16. ALARM, REVERSE
17. FUSE HOLDER
18. FUSE
19. CONNECTOR, BATTERY TERMINAL
20. SENSOR, OIL LEVEL
21. CONNECTOR, CHASSIS GROUND
22. BATTERY, 12V
23. SOLENOID
24. CONNECTOR, CHASSIS GROUND
25. STARTER
26. CONNECTOR, CONSOLE HARNESS
27. CONNECTOR, HANDLEBAR HARNESS
28. CONNECTOR, ACCESSORY
29. SWITCH, BRAKE
30. CONNECTOR, TAILLIGHT
31. CONNECTOR, SPEED SENSOR
32. CONNECTOR, CHASSIS GROUND
33. COIL, HV IGNITION

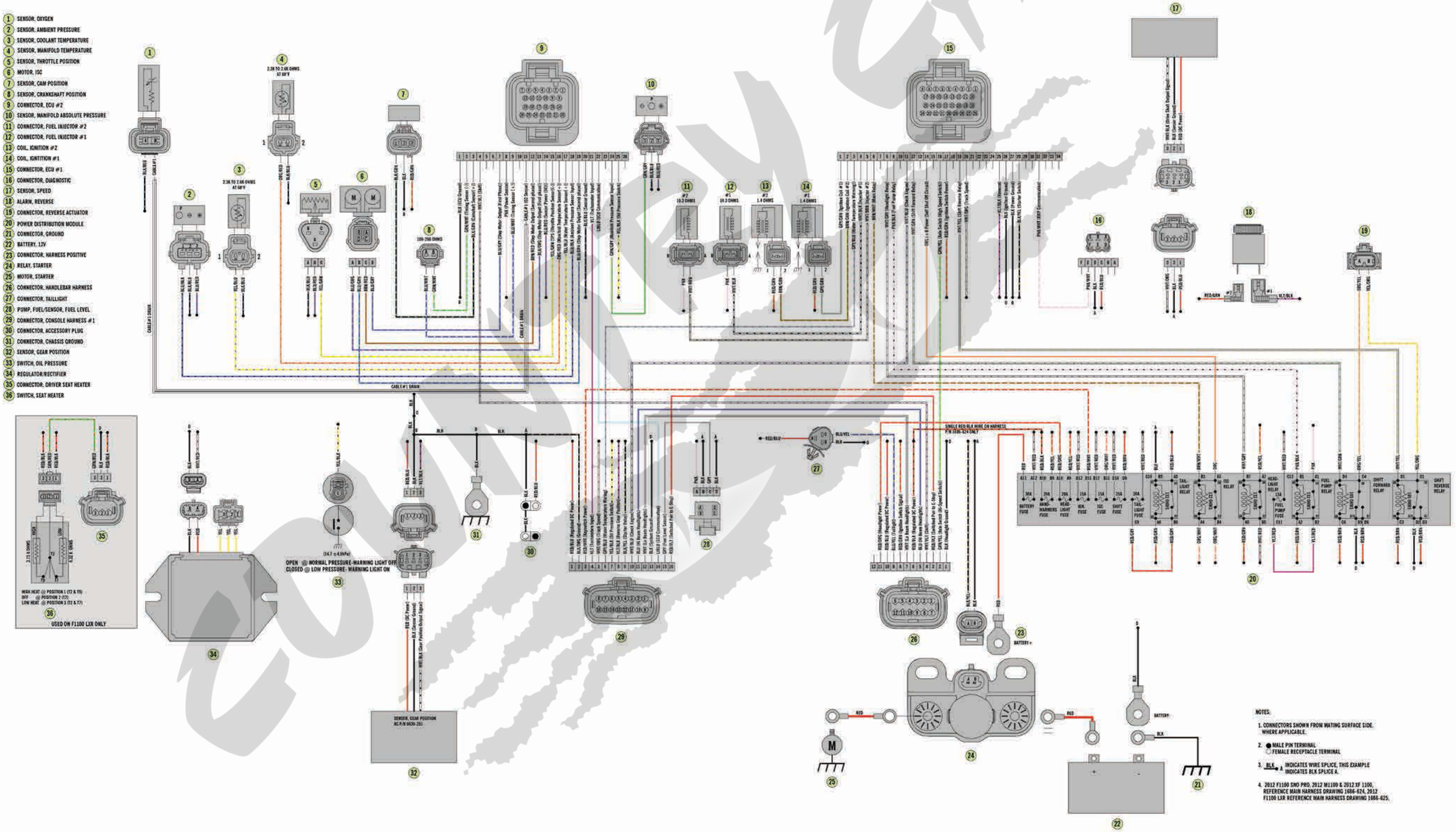


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. REMOVE SPARK PLUG CAPS TO MEASURE SECONDARY COIL RESISTANCE, AND SPARK PLUG RESISTANCE.
4. RESISTANCE VARIES BY TEMPERATURE, SEE CHART IN SERVICE MANUAL FOR RESISTANCE VALUE.
5. BLK ● A INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE A.

Main Harness
(p/n 1686-681)
F 1100 Sno Pro
M 1100
XF 1100 Sno Pro
(p/n 1686-682)
F 1100 LXR/Sno Pro LTD
XF 1100 LXR/Sno Pro LTD/ Cross-Tour

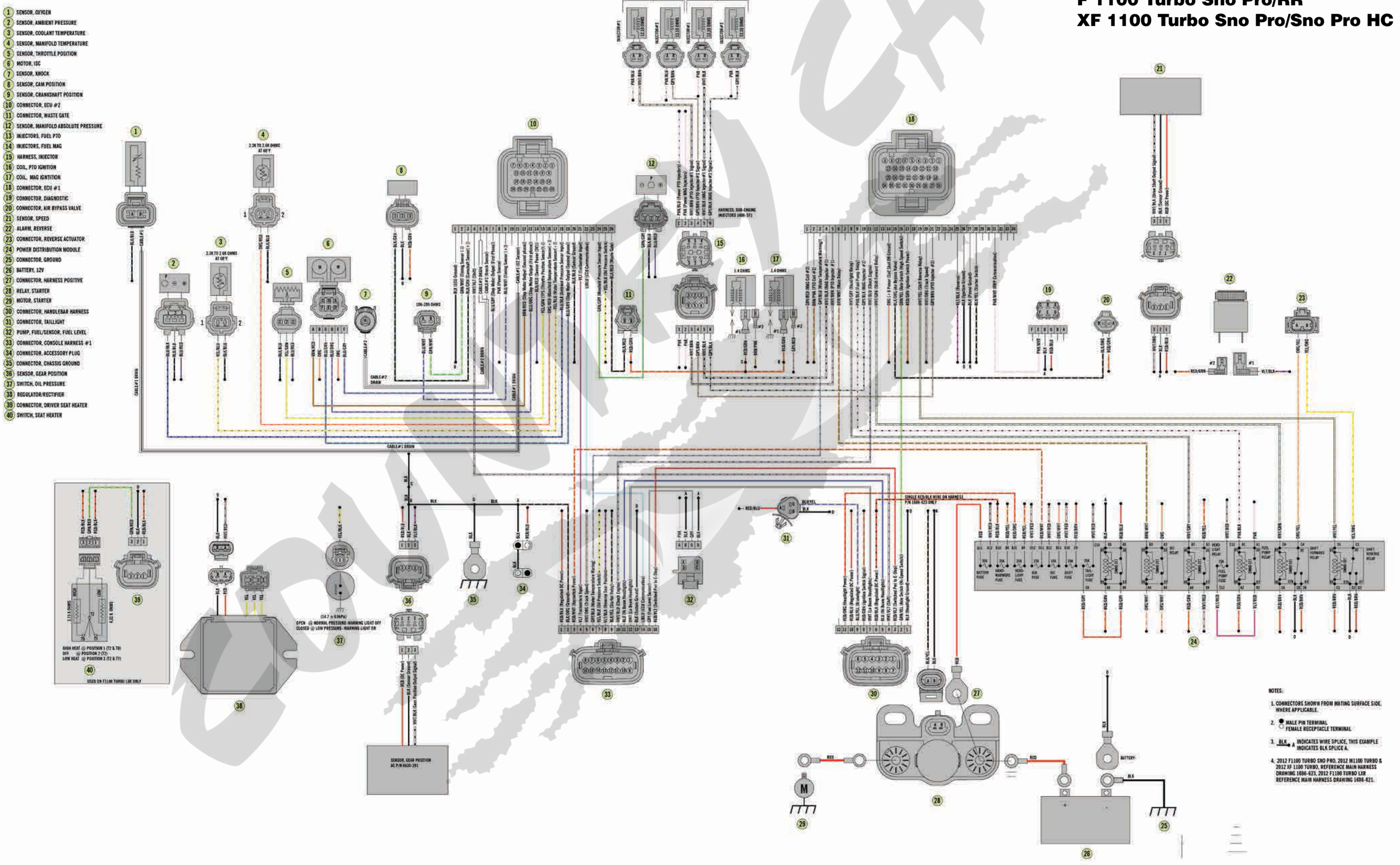
1. SENSOR, OXYGEN
2. SENSOR, AMBIENT PRESSURE
3. SENSOR, COOLANT TEMPERATURE
4. SENSOR, MANIFOLD TEMPERATURE
5. SENSOR, THROTTLE POSITION
6. MOTOR, ISC
7. SENSOR, CAM POSITION
8. SENSOR, CRANKSHAFT POSITION
9. CONNECTOR, ECU #2
10. SENSOR, MANIFOLD ABSOLUTE PRESSURE
11. CONNECTOR, FUEL INJECTOR #2
12. CONNECTOR, FUEL INJECTOR #1
13. COIL, IGNITION #2
14. COIL, IGNITION #1
15. CONNECTOR, ECU #1
16. CONNECTOR, DIAGNOSTIC
17. SENSOR, SPEED
18. ALARM, REVERSE
19. CONNECTOR, REVERSE ACTUATOR
20. POWER DISTRIBUTION MODULE
21. CONNECTOR, GROUND
22. BATTERY, 12V
23. CONNECTOR, HARNESS POSITIVE
24. RELAY, STARTER
25. MOTOR, STARTER
26. CONNECTOR, HANDLEBAR HARNESS
27. CONNECTOR, TAILLIGHT
28. PUMP, FUEL/SENSOR, FUEL LEVEL
29. CONNECTOR, CONSOLE HARNESS #1
30. CONNECTOR, ACCESSORY PLUG
31. CONNECTOR, CHASSIS GROUND
32. SENSOR, GEAR POSITION
33. SWITCH, OIL PRESSURE
34. REGULATOR/RECTIFIER
35. CONNECTOR, DRIVER SEAT HEATER
36. SWITCH, SEAT HEATER



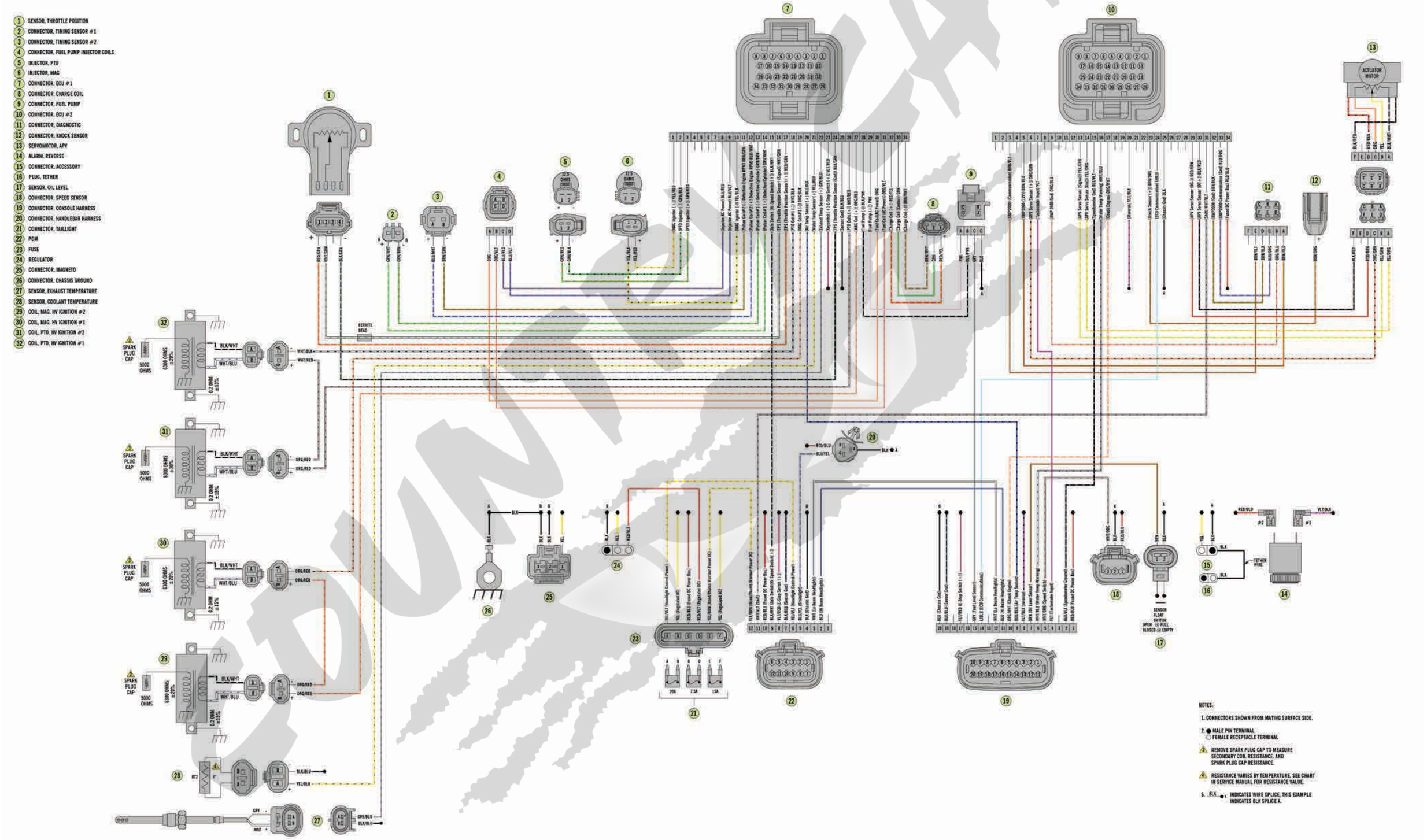
NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE, WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. BLK ▸ A INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE A.
4. 2012 F1100 SNO PRO, 2012 M1100 & 2012 XF 1100, REFERENCE MAIN HARNESS DRAWING 1686-624, 2012 F1100 LXR REFERENCE MAIN HARNESS DRAWING 1686-625.

Main Harness
(p/n 1686-679)
F 1100 Turbo LXR/Sno Pro LTD
M 1100 Turbo Sno Pro LTD
XF 1100 Turbo LXR/Sno Pro HC LTD/
Sno Pro LTD/Cross-Tour
(p/n 1686-680)
M 1100 Turbo/Sno Pro/HCR
F 1100 Turbo Sno Pro/RR
XF 1100 Turbo Sno Pro/Sno Pro HC



Main Harness
(p/n 1686-672)
F 800 Sno Pro/Sno Pro RR
M 800/HCR/Sno Pro
XF 800 Sno Pro/Sno Pro HC



Main Harness
(p/n 1686-611)
TZ1 Turbo LXR

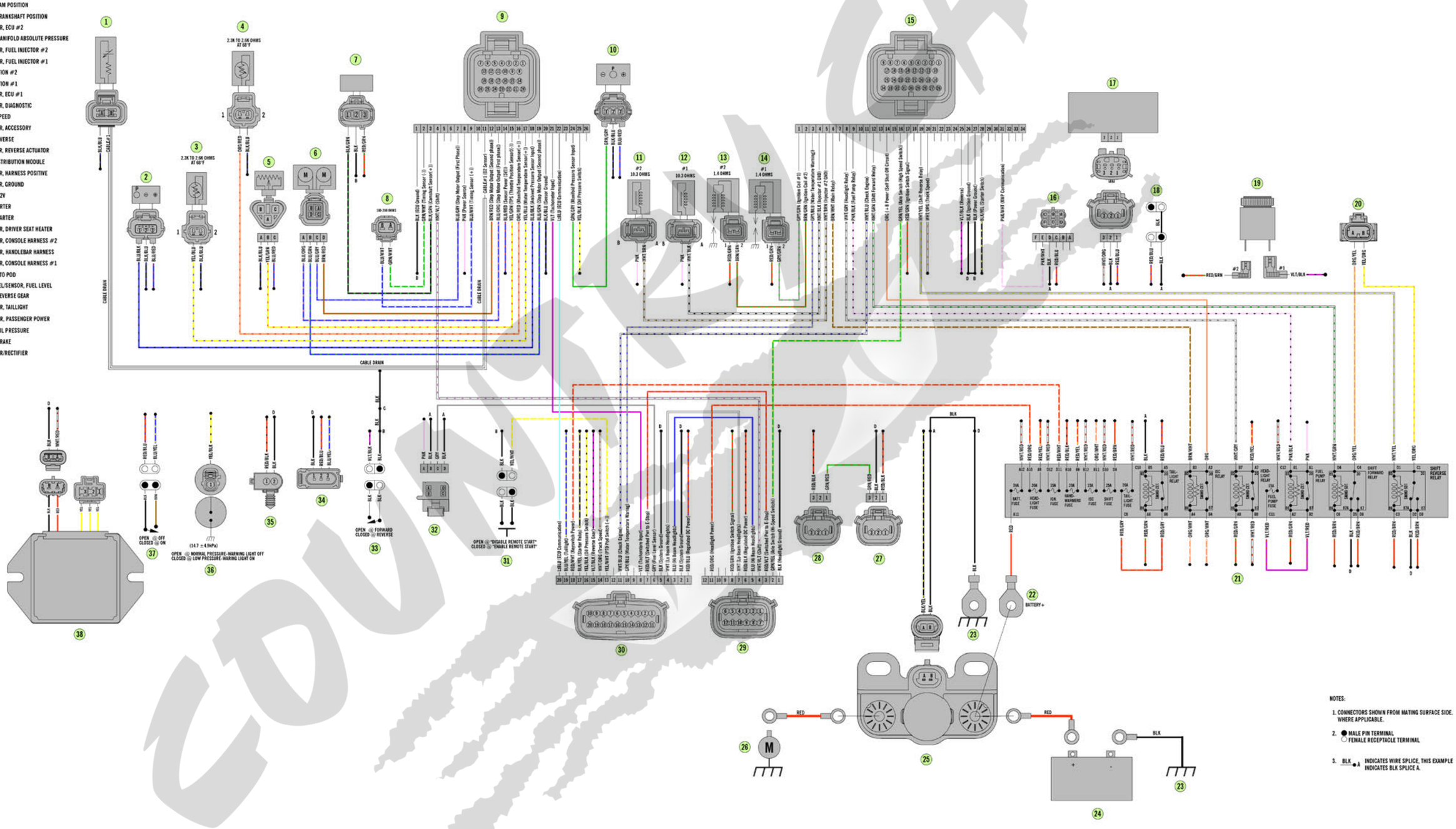
1. SENSOR, OXYGEN
2. SENSOR, AMBIENT PRESSURE
3. SENSOR, COOLANT TEMPERATURE
4. SENSOR, INTAKE AIR TEMPERATURE
5. SENSOR, THROTTLE POSITION
6. MOTOR, ISC
7. SENSOR, KNOCK
8. SENSOR, CAM POSITION
9. SENSOR, CRANKSHAFT POSITION
10. CONNECTOR, ECU #2
11. CONNECTOR, WASTE GATE
12. SENSOR, MANIFOLD ABSOLUTE PRESSURE
13. INJECTORS, FUEL PTO
14. INJECTORS, FUEL MAG
15. HARNESS, INJECTOR
16. COIL, PTO IGNITION
17. COIL, MAG IGNITION
18. CONNECTOR, ECU #1
19. CONNECTOR, DIAGNOSTIC
20. CONNECTOR, AIR BYPASS VALVE
21. SENSOR, SPEED
22. ALARM, REVERSE
23. CONNECTOR, REVERSE ACTUATOR
24. POWER DISTRIBUTION MODULE
25. CONNECTOR, GROUND
26. BATTERY, 12V
27. CONNECTOR, HARNESS POSITIVE
28. RELAY, STARTER
29. MOTOR, STARTER
30. CONNECTOR, DRIVER SEAT HEATER
31. CONNECTOR, CONSOLE HARNESS #2
32. CONNECTOR, HANDLEBAR HARNESS
33. CONNECTOR, CONSOLE HARNESS #1
34. SWITCH, PTO POD
35. PUMP, FUEL/SENSOR, FUEL LEVEL
36. SWITCH, REVERSE GEAR
37. SWITCH, OIL PRESSURE
38. SWITCH, BRAKE
39. CONNECTOR, TAILLIGHT
40. CONNECTOR, PASSENGER POWER
41. CONNECTOR, ACCESSORY
42. REGULATOR/RECTIFIER

NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. BLK ●A INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE A.

Main Harness
(p/n 1686-610)
TZ1
TZ1 LXR

1. SENSOR, OXYGEN
2. SENSOR, AMBIENT PRESSURE
3. SENSOR, COOLANT TEMPERATURE
4. SENSOR, INTAKE AIR TEMPERATURE
5. SENSOR, THROTTLE POSITION
6. MOTOR, ISC
7. SENSOR, CAM POSITION
8. SENSOR, CRANKSHAFT POSITION
9. CONNECTOR, ECU #2
10. SENSOR, MANIFOLD ABSOLUTE PRESSURE
11. CONNECTOR, FUEL INJECTOR #2
12. CONNECTOR, FUEL INJECTOR #1
13. COIL, IGNITION #2
14. COIL, IGNITION #1
15. CONNECTOR, ECU #1
16. CONNECTOR, DIAGNOSTIC
17. SENSOR, SPEED
18. CONNECTOR, ACCESSORY
19. ALARM, REVERSE
20. CONNECTOR, REVERSE ACTUATOR
21. POWER DISTRIBUTION MODULE
22. CONNECTOR, HARNESS POSITIVE
23. CONNECTOR, GROUND
24. BATTERY, 12V
25. RELAY, STARTER
26. MOTOR, STARTER
27. CONNECTOR, DRIVER SEAT HEATER
28. CONNECTOR, CONSOLE HARNESS #2
29. CONNECTOR, HANDLEBAR HARNESS
30. CONNECTOR, CONSOLE HARNESS #1
31. SWITCH, PTO POD
32. PUMP, FUEL/SENSOR, FUEL LEVEL
33. SWITCH, REVERSE GEAR
34. CONNECTOR, TAILLIGHT
35. CONNECTOR, PASSENGER POWER
36. SWITCH, OIL PRESSURE
37. SWITCH, BRAKE
38. REGULATOR/RECTIFIER

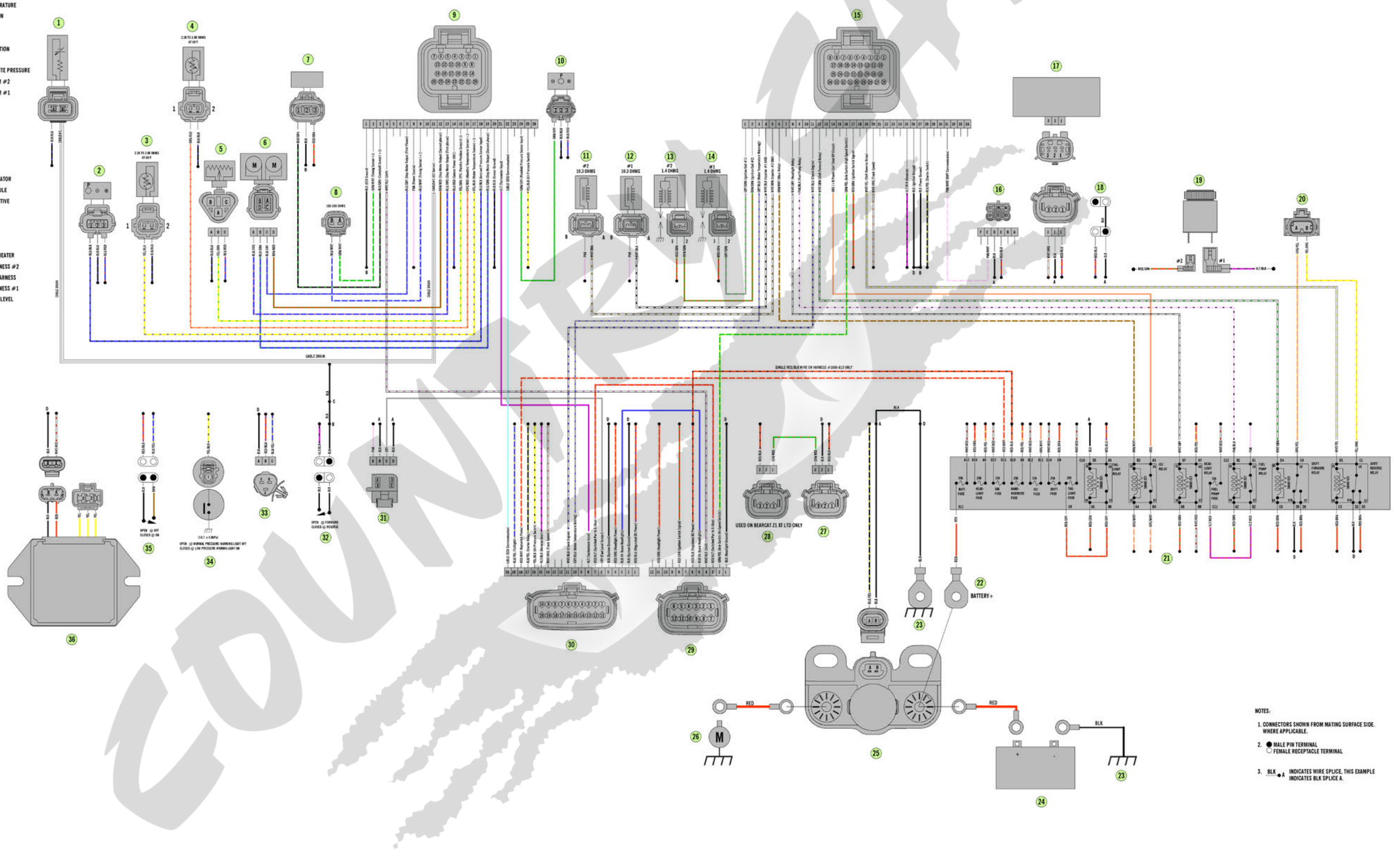


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. BLK ●A INDICATES WIRE SPLICE. THIS EXAMPLE INDICATES BLK SPLICE A.

Main Harness
(p/n 1686-613)
Bearcat Z1 XT/GS
(p/n 1686-615)
Bearcat Z1 XT LTD

1. SENSOR, OXYGEN
2. SENSOR, AMBIENT PRESSURE
3. SENSOR, COOLANT TEMPERATURE
4. SENSOR, INTAKE AIR TEMPERATURE
5. SENSOR, THROTTLE POSITION
6. MOTOR, ISC
7. SENSOR, CAM POSITION
8. SENSOR, CRANKSHAFT POSITION
9. CONNECTOR, ECU #2
10. SENSOR, MANIFOLD ABSOLUTE PRESSURE
11. CONNECTOR, FUEL INJECTOR #2
12. CONNECTOR, FUEL INJECTOR #1
13. COIL, IGNITION #2
14. COIL, IGNITION #1
15. CONNECTOR, ECU #1
16. CONNECTOR, DIAGNOSTIC
17. SENSOR, SPEED
18. CONNECTOR, ACCESSORY
19. ALARM, REVERSE
20. CONNECTOR, REVERSE ACTUATOR
21. POWER DISTRIBUTION MODULE
22. CONNECTOR, HARNESS POSITIVE
23. CONNECTOR, GROUND
24. BATTERY, 12V
25. RELAY, STARTER
26. MOTOR, STARTER
27. CONNECTOR, DRIVER SEAT HEATER
28. CONNECTOR, CONSOLE HARNESS #2
29. CONNECTOR, HANDLEBAR HARNESS
30. CONNECTOR, CONSOLE HARNESS #1
31. PUMP, FUEL/SENSOR, FUEL LEVEL
32. SWITCH, REVERSE GEAR
33. CONNECTOR, TAILLIGHT
34. SWITCH, OIL PRESSURE
35. SWITCH, BRAKE
36. REGULATOR/RECTIFIER

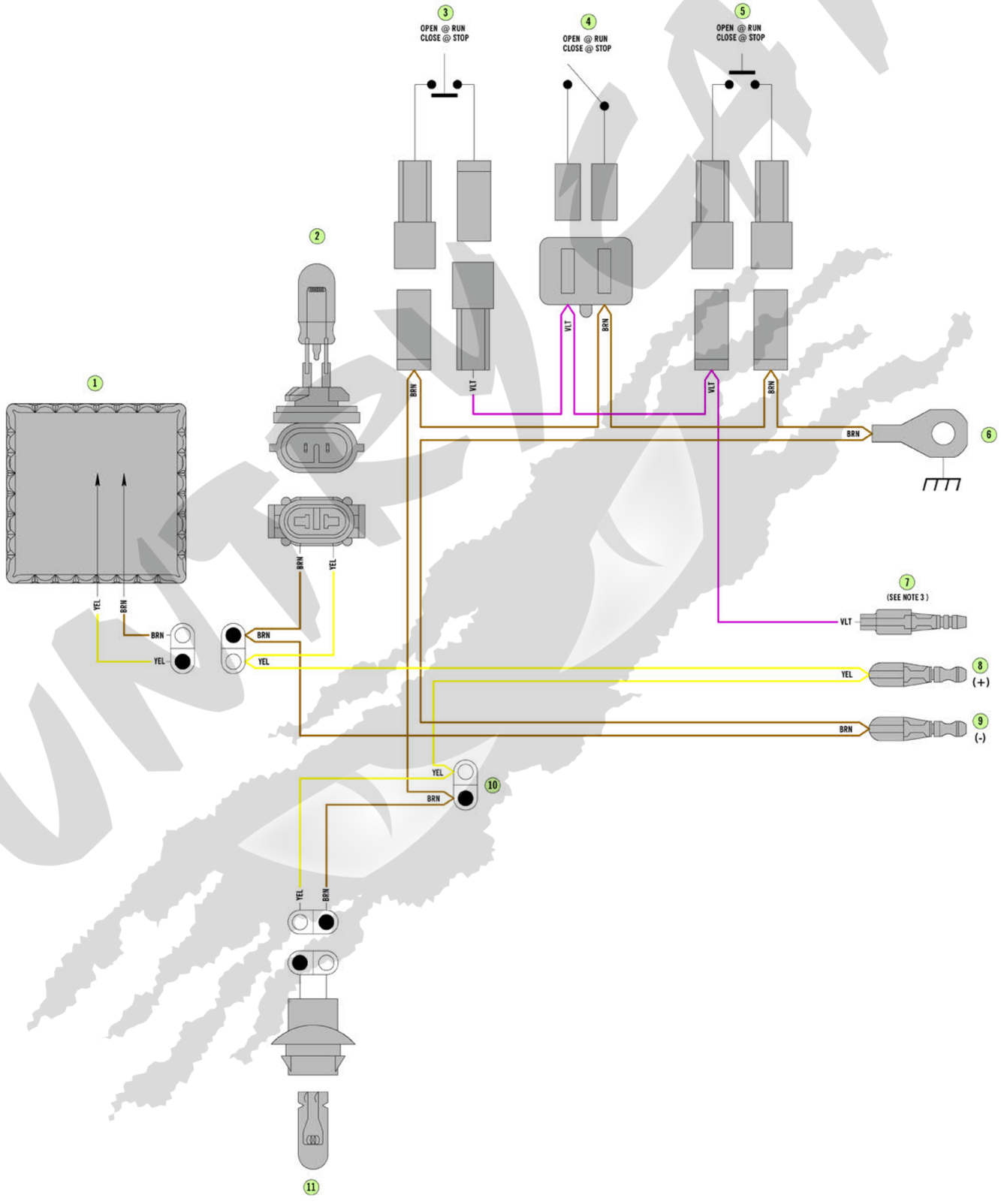


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. BLK ●A INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE A.

Main Harness (p/n 1686-578) Sno Pro 120

1. REGULATOR, AC
2. HEADLIGHT
3. SWITCH, TETHER
4. SWITCH, KEY
5. SWITCH,STOP
6. GROUND, ENGINE
7. CONNECTOR, ENGINE STOP
8. CONNECTOR, MAGNETO (+)
9. CONNECTOR, MAGNETO (-)
10. CONNECTOR, ACCESSORY
11. TAILLIGHT

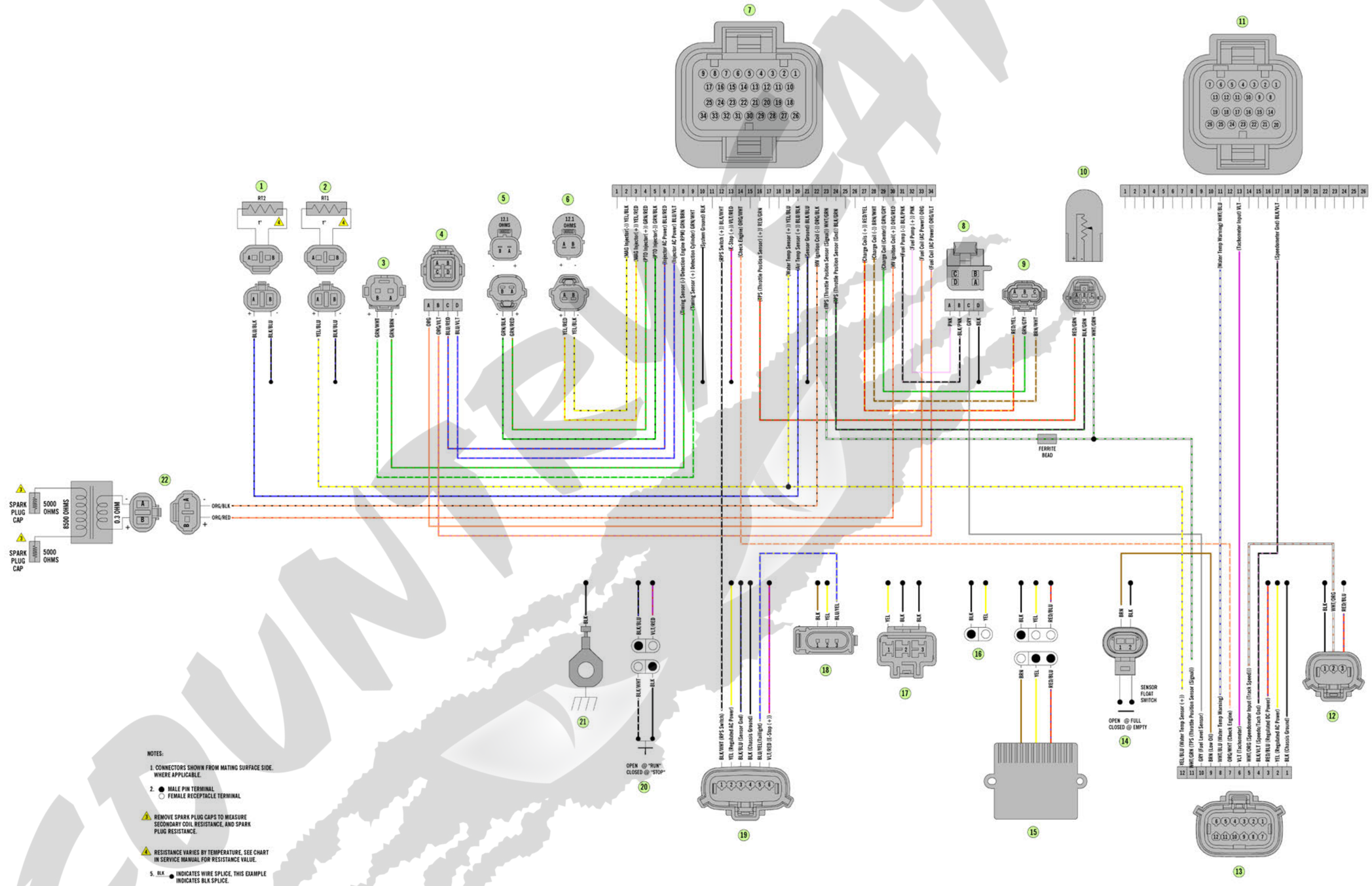


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. NORMALLY OPEN IGNITION; MAIN HARNESS VLT WIRE MUST BE OPEN TO RUN, GROUNDED TO STOP IGNITION.

Ignition/Main Harness
(p/n 1686-628)
Sno Pro 500

1. SENSOR, AIR TEMPERATURE
2. SENSOR, COOLANT TEMPERATURE
3. SENSOR, TIMING
4. CONNECTOR, FUEL PUMP INJECTOR COILS
5. INJECTOR, PTO
6. INJECTOR, MAG
7. CONNECTOR, ECU #1
8. FUEL PUMP
9. CONNECTOR, CHARGE COIL
10. SENSOR, THROTTLE POSITION
11. CONNECTOR, ECU #2
12. CONNECTOR, SPEED SENSOR
13. CONNECTOR, HOOD HARNESS
14. SENSOR, OIL LEVEL
15. REGULATOR, AC
16. CONNECTOR, ACCESSORY
17. CONNECTOR, MAGNETO
18. CONNECTOR, TAILLIGHT
19. CONNECTOR, HANDLEBAR HARNESS
20. SWITCH, TETHER
21. GROUND, CHASSIS
22. COIL, HV IGNITION



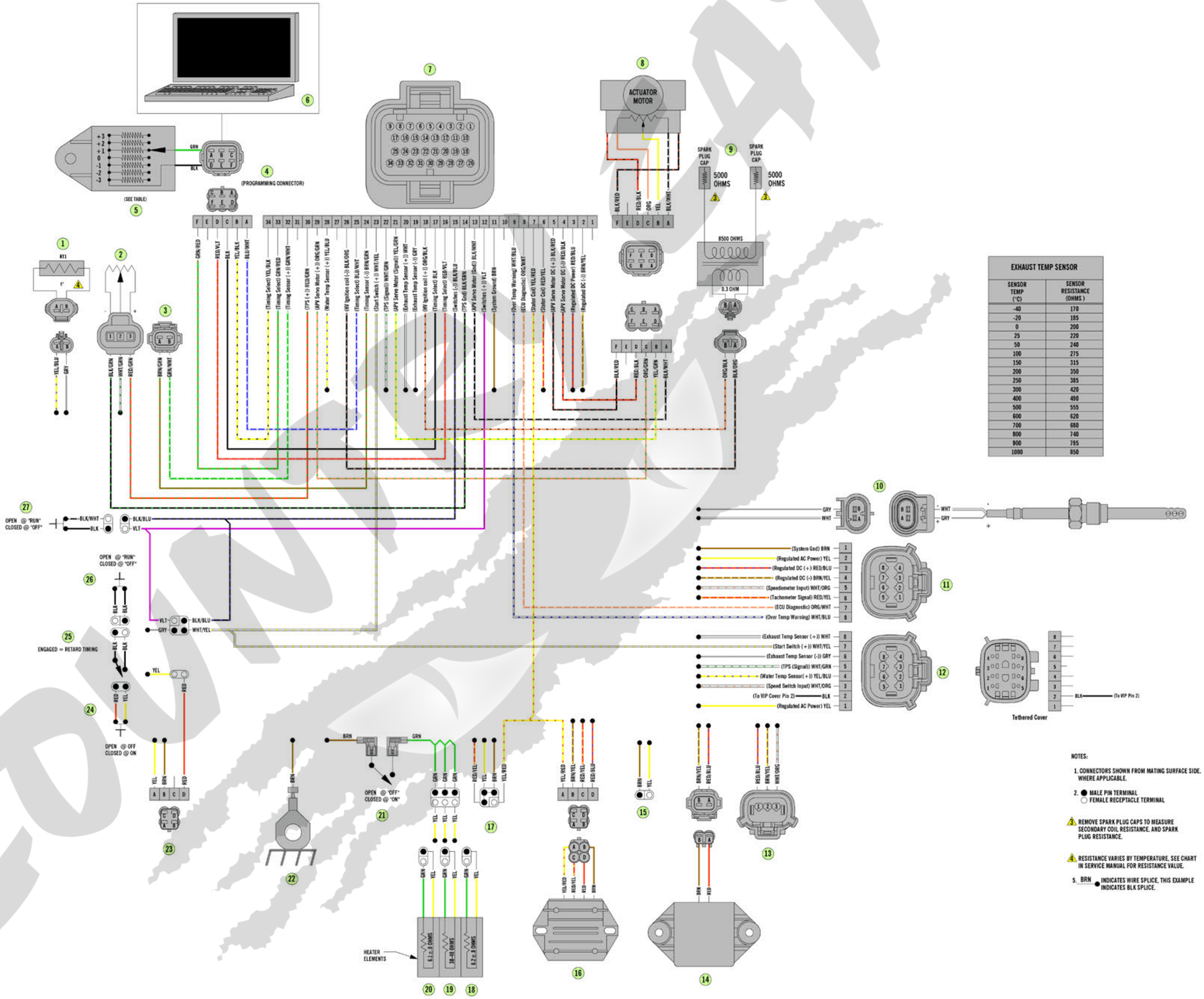
NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE, WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. REMOVE SPARK PLUG CAPS TO MEASURE SECONDARY COIL RESISTANCE, AND SPARK PLUG RESISTANCE.
4. RESISTANCE VARIES BY TEMPERATURE, SEE CHART IN SERVICE MANUAL FOR RESISTANCE VALUE.
5. BLK ● INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE.

Ignition/Main Harness
(p/n 1686-657)
Sno Pro 600

1. SENSOR, THROTTLE POSITION
2. SENSOR, COOLANT TEMPERATURE
3. SENSOR, TIMING
4. CONNECTOR, TIMING SELECT
5. SWITCH, ROTARY SELECT
6. COMPUTER, PROGRAMMING
7. CONNECTOR, CDI
8. SERVOMOTOR, APV
9. COIL, IGNITION HV
10. SENSOR, EXHAUST TEMP.
11. CONNECTOR, HOOD HARNESS
12. CONNECTOR, VIP
13. CONNECTOR, SPEED SENSOR
14. CONDENSOR, DC
15. CONNECTOR, AC REGULATOR
16. REGULATOR, DC
17. CONNECTOR, STATOR
18. ELEMENT, RH WARMER
19. ELEMENT, THUMB WARMER
20. ELEMENT, LH WARMER
21. SWITCH, WARMER
22. GROUND, CHASSIS
23. CONNECTOR, TAILLIGHT
24. SWITCH, BRAKE
25. SWITCH, START
26. SWITCH, EMERGENCY STOP
27. SWITCH, TETHER

IGNITION TIMING ROTARY SELECT SWITCH	
TIMING	RESISTANCE (OHMS ±5)
+3	4640
+2	3000
+1	1000
0	1470
-1	1000
-2	680
-3	400

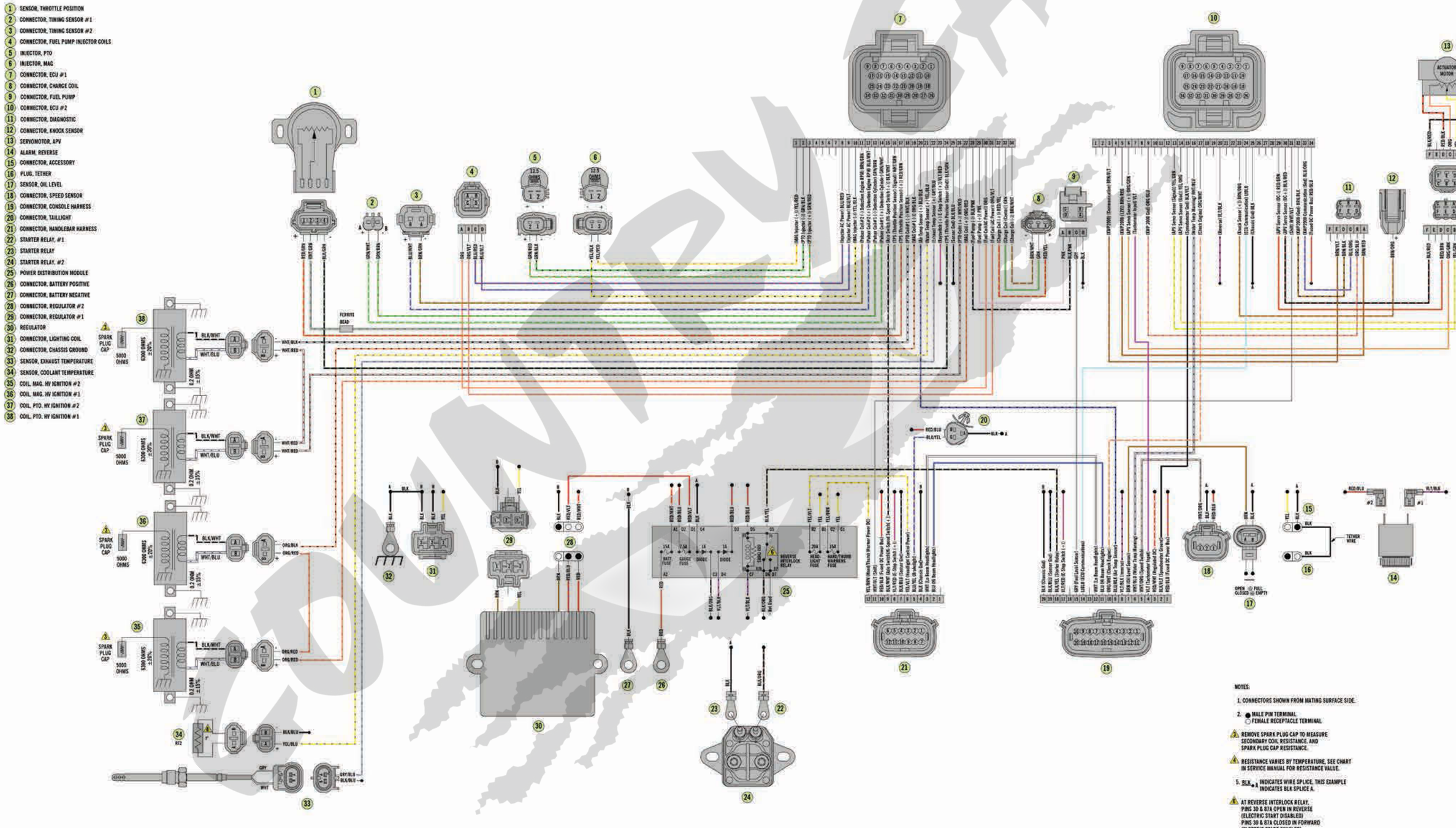


EXHAUST TEMP SENSOR	
SENSOR TEMP (°C)	SENSOR RESISTANCE (OHMS)
-40	170
-20	185
0	200
25	220
50	240
100	275
150	315
200	350
250	385
300	420
400	490
500	555
600	620
700	680
800	740
900	795
1000	850

NOTES:

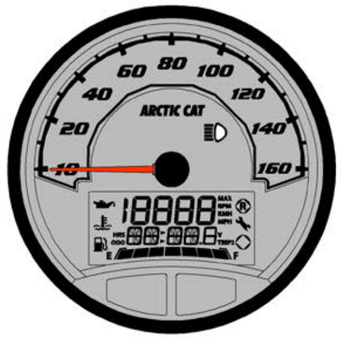
1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. REMOVE SPARK PLUG CAPS TO MEASURE SECONDARY COIL RESISTANCE. AND SPARK PLUG RESISTANCE.
4. RESISTANCE VARIES BY TEMPERATURE. SEE CHART IN SERVICE MANUAL FOR RESISTANCE VALUE.
5. BRN ● INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE.

Main Harness
(p/n 1686-673)
F 800 LXR/Sno Pro LTD
M 800 Sno Pro LTD
XF 800 LXR/Sno Pro LTD/ Sno Pro LTD HC/ Cross-Tour



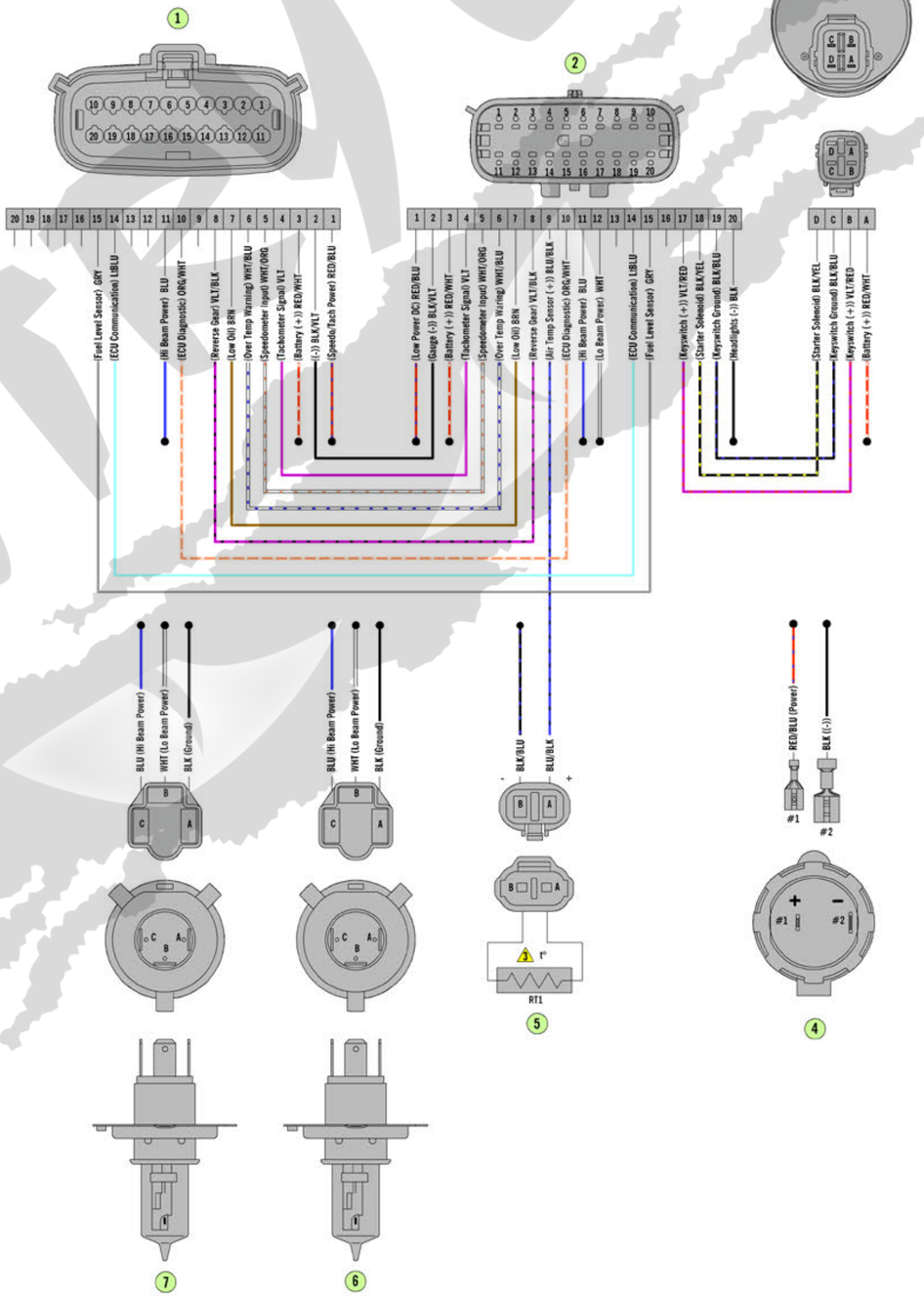
Hood Harness
(p/n 1686-638)
F 800/LXR/Sno Pro/LTD/RR
M 800/Sno Pro/LTD/HCR
XF 800/LXR/Sno Pro/LTD/HC/ Cross-Tour

1. CONNECTOR, SPEEDOMETER
2. CONNECTOR, MAIN HARNESS #1
3. CONNECTOR, KEYSWITCH
4. OUTLET, ACCESSORY
5. SENSOR, AIR TEMPERATURE
6. HEADLIGHT, B
7. HEADLIGHT, A





CIRCUIT DIAGRAM*				
SWITCH FUNCTION	TERMINAL "A"	TERMINAL "B"	TERMINAL "C"	TERMINAL "D"
OFF		●	●	
ON				
START	●			●



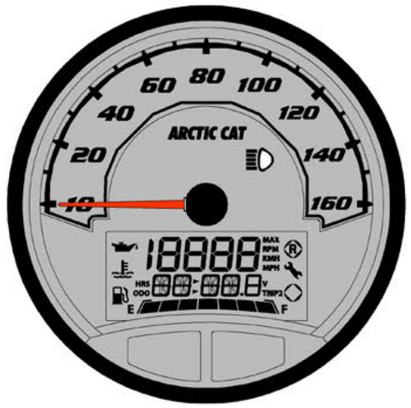
NOTES:

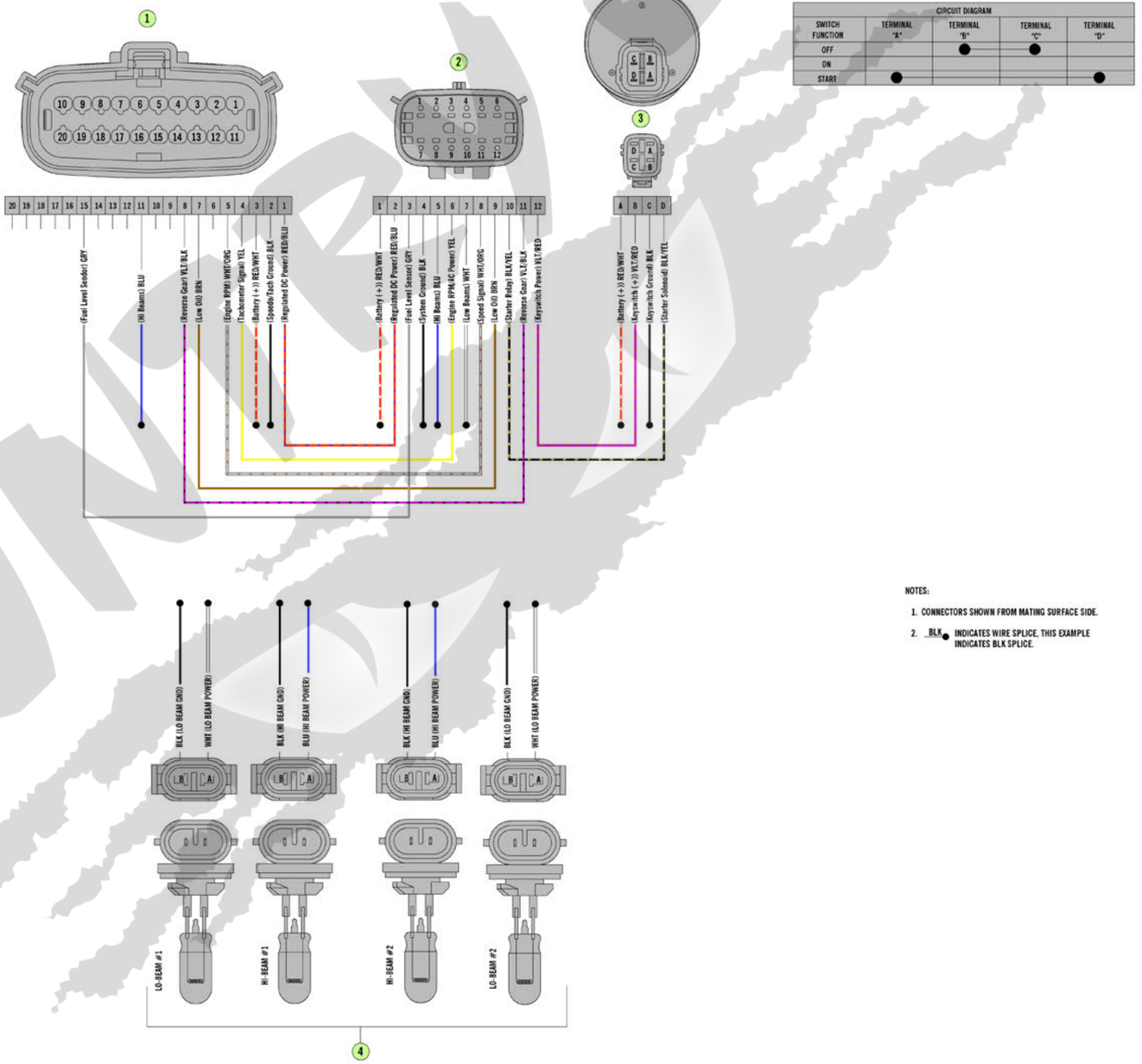
1. CONNECTORS SHOWN FROM MATING SURFACE SIDE.
2. BLK ● INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE.

⚠ RESISTANCE VARIES WITH TEMPERATURE, SEE CHART IN SERVICE MANUAL FOR RESISTANCE VALUES.

Console Harness
(p/n 1686-633)
Bearcat 570/XT
F570
T570

1. CONNECTOR, SPEEDOMETER
2. CONNECTOR, MAIN HARNESS #1
3. CONNECTOR, KEYSWITCH
4. HEADLIGHT





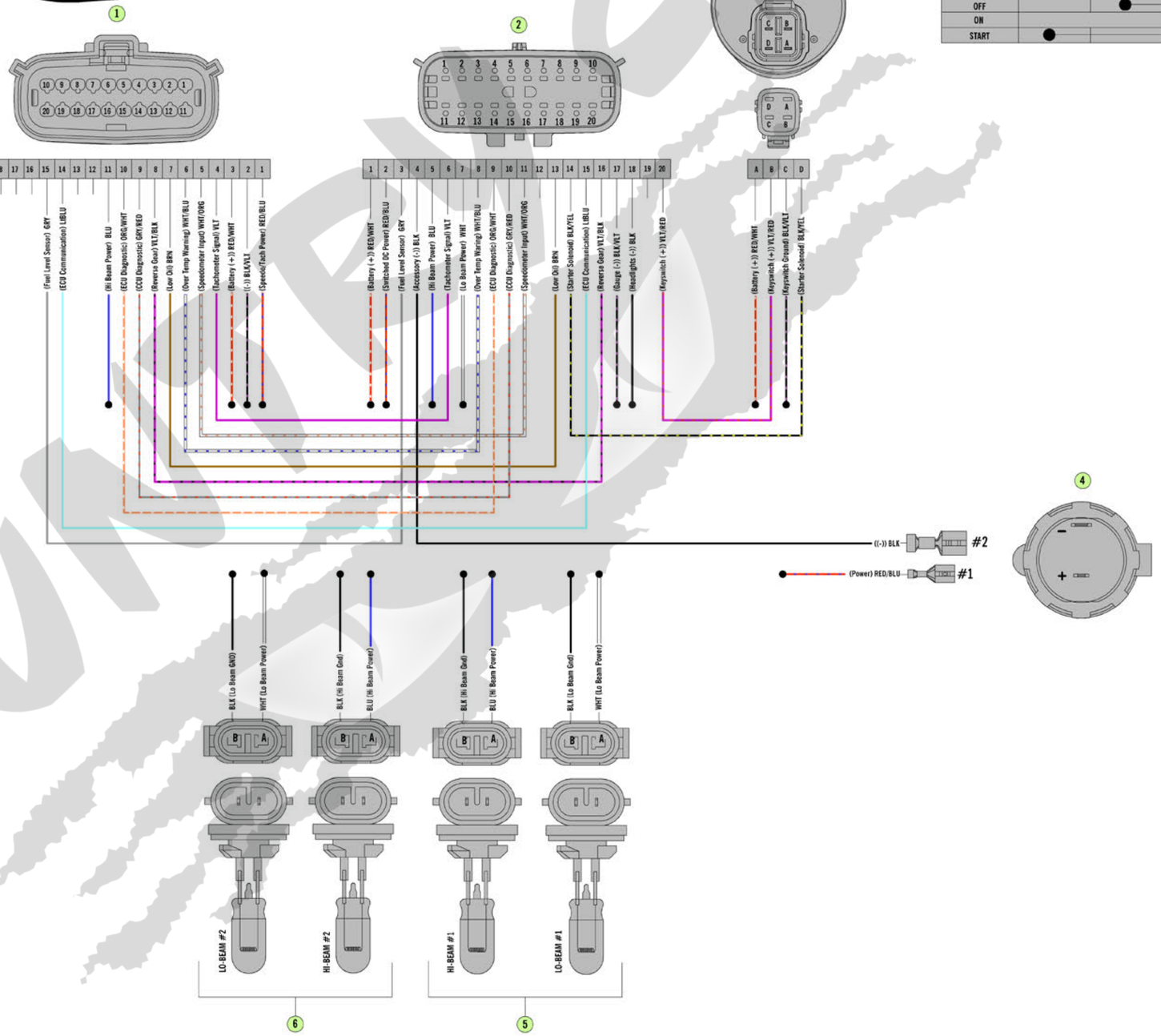
NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE.
2. BLK● INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE.

Console Harness (p/n 1686-634) F5

1. CONNECTOR, SPEEDOMETER
2. CONNECTOR, MAIN HARNESS #1
3. CONNECTOR, KEYSWITCH
4. OUTLET, ACCESSORY
5. HEADLIGHTS, LEFT
6. HEADLIGHTS, RIGHT





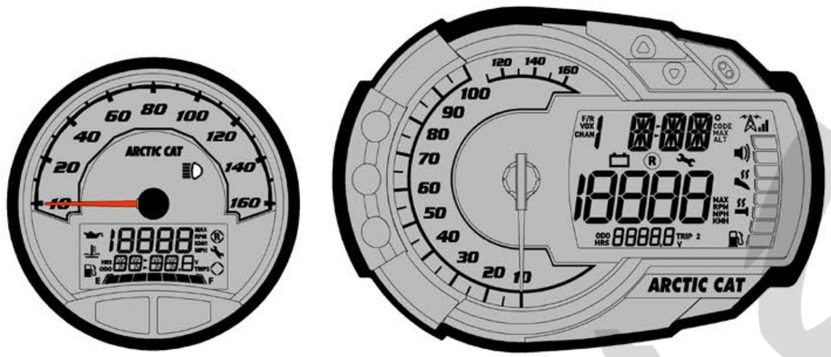
CIRCUIT DIAGRAM*				
SWITCH FUNCTION	TERMINAL "A"	TERMINAL "B"	TERMINAL "C"	TERMINAL "D"
OFF		●	●	
ON				
START	●			●

NOTES:

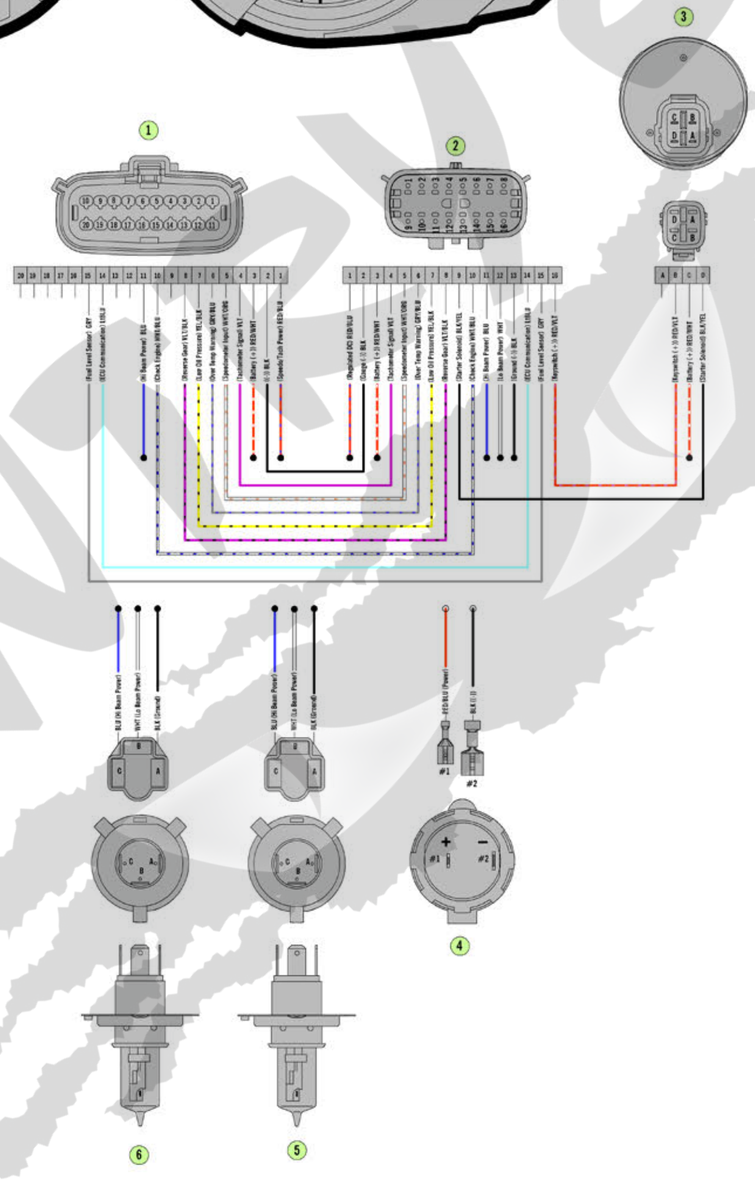
1. CONNECTORS SHOWN FROM MATING SURFACE SIDE.
2. BLK ● INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE.

Hood Harness
(p/n 1686-639)
F 1100/Turbo/LXR/ Sno Pro
M 1100/Turbo/HCR
XF 1100/Turbo/ LXR/Sno Pro

1. CONNECTOR, SPEEDOMETER
2. CONNECTOR, MAIN HARNESS #1
3. CONNECTOR, KEYSWITCH
4. OUTLET, ACCESSORY
5. HEADLIGHT, B
6. HEADLIGHT, A



CIRCUIT DIAGRAM				
SWITCH FUNCTION	TERMINAL "A"	TERMINAL "B"	TERMINAL "C"	TERMINAL "D"
OFF	●	●	●	●
ON	●	●	●	
START		●	●	●

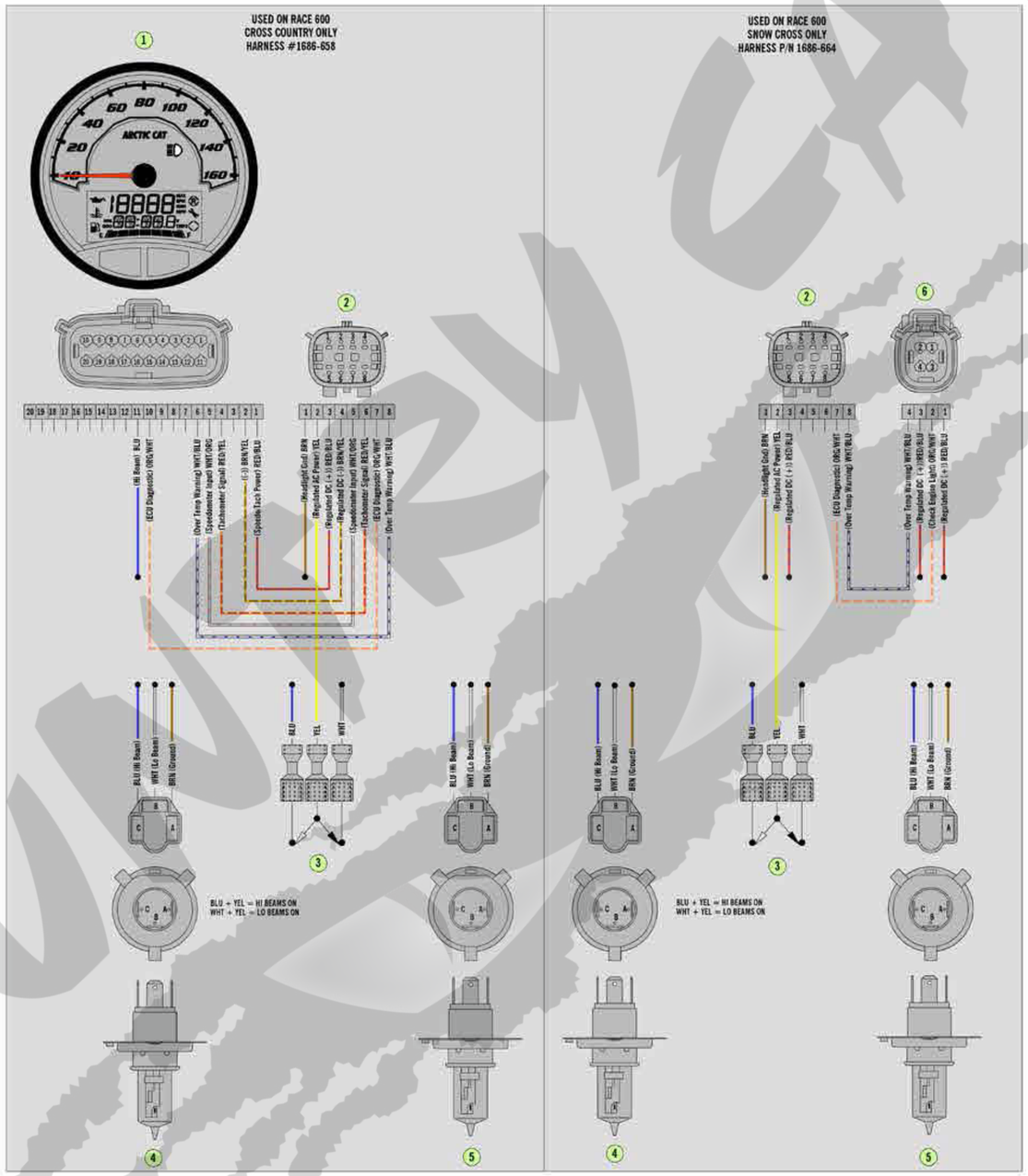


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE, WHERE APPLICABLE.
2. BLK ● A INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE A.

Hood Harness
(p/n 1686-658)
Sno Pro 600 Cross Country
(p/n 1686-664)
Sno Pro 600 Sno Cross

1. CONNECTOR, SPEEDOMETER
2. CONNECTOR, MAIN HARNESS #1
3. SWITCH, HEADLIGHT DIMMER
4. HEADLIGHT, A
5. HEADLIGHT, B
6. CONNECTOR, ENGINE INDICATOR

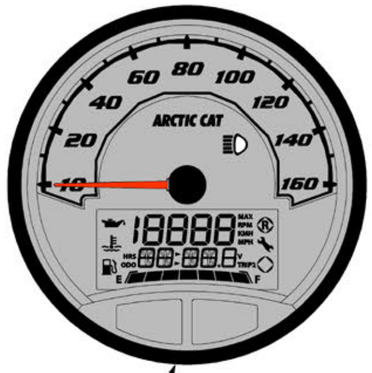


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE, WHERE APPLICABLE.
2. BLK → A INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE A.

Console Harness (p/n 1686-547) Bearcat Z1 XT/GS (p/n 1686-549) Bearcat Z1 XT LTD TZ1/LXR/Turbo LXR

1. CONNECTOR, SPEEDOMETER
2. CONNECTOR, MAIN HARNESS #1
3. CONNECTOR, KEYSWITCH
4. HEADLIGHTS, LEFT
5. HEADLIGHTS, RIGHT
6. OUTLET, ACCESSORY
7. CONNECTOR, MAIN HARNESS #1
8. SWITCH, DRIVER'S SEAT HEATER



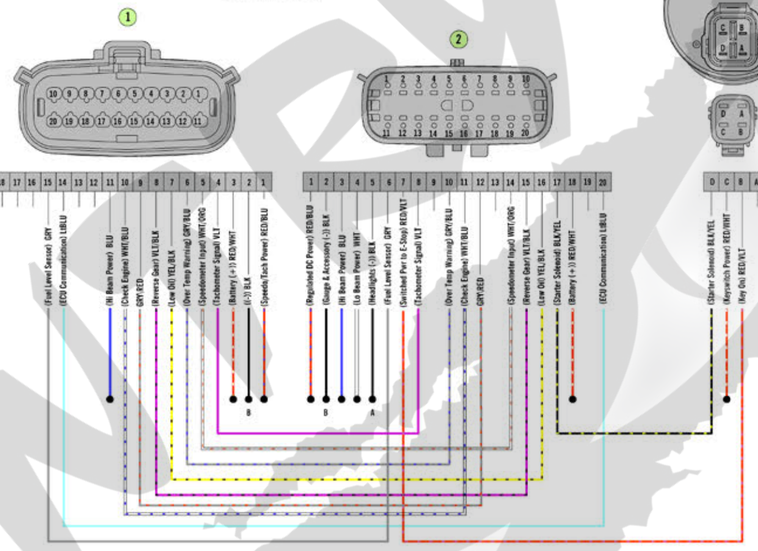
USED ON BEARCAT Z1 WT & TZ1

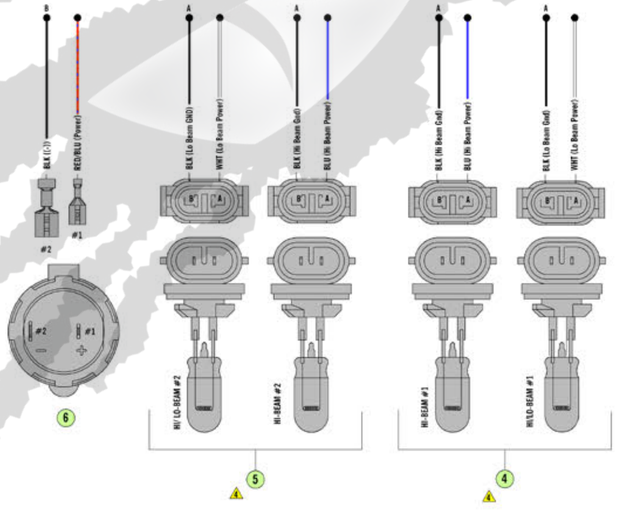


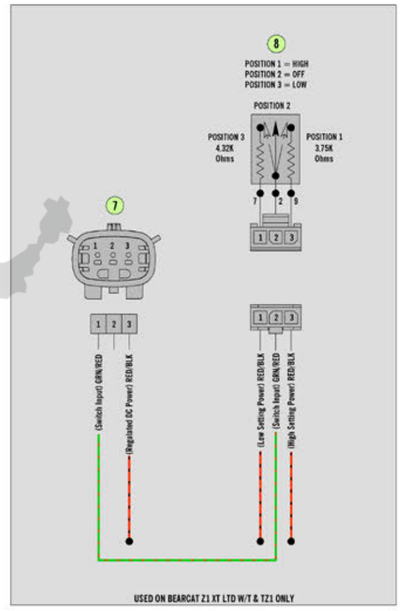
USED ON BEARCAT Z1 XT LTD W/T

CIRCUIT DIAGRAM

SWITCH FUNCTION	TERMINAL "A"	TERMINAL "B"	TERMINAL "C"	TERMINAL "D"
OFF	●	●	●	●
ON	●	●	●	
START		●	●	●







USED ON BEARCAT Z1 XT LTD W/T & TZ1 ONLY

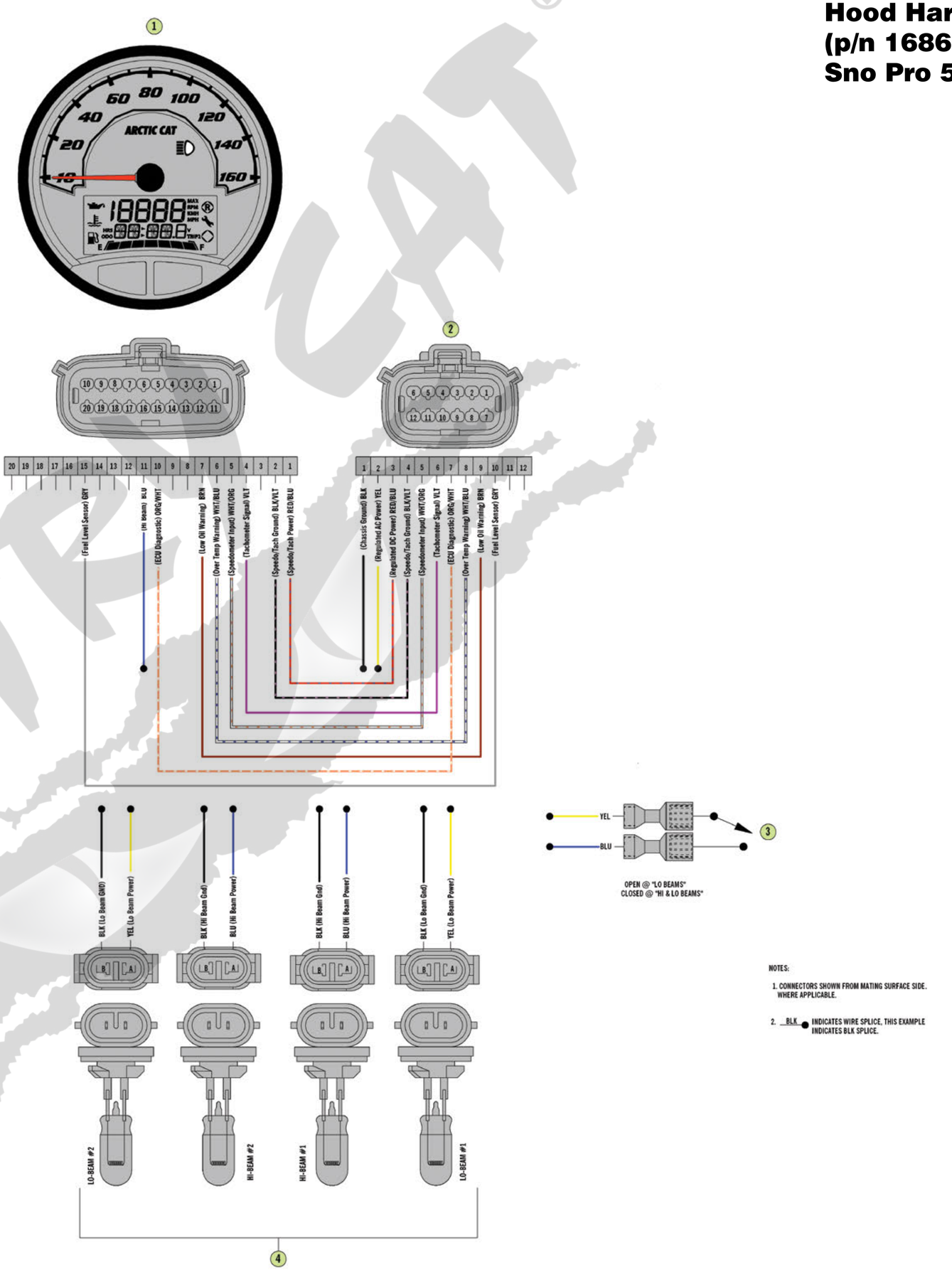
NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE.
2. BLK A INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE A.
3. 2012 BEARCAT Z1 XT LTD W/T, TZ1 (REF. CONSOLE HARNESS DRAWING 1686-548). 2012 BEARCAT Z1 W/T, 2012 BEARCAT Z1 XT GS (REF. CONSOLE HARNESS DRAWING 1686-547).

⚠ WHEN 4-STROKE HIGH BEAM IS ACTIVATED ALL FOUR HEADLIGHTS ARE ILLUMINATED.

Hood Harness
(p/n 1686-587)
Sno Pro 500

1. CONNECTOR, SPEEDOMETER
2. CONNECTOR, MAIN HARNESS
3. SWITCH, HEADLIGHT DIMMER
4. HEADLIGHTS

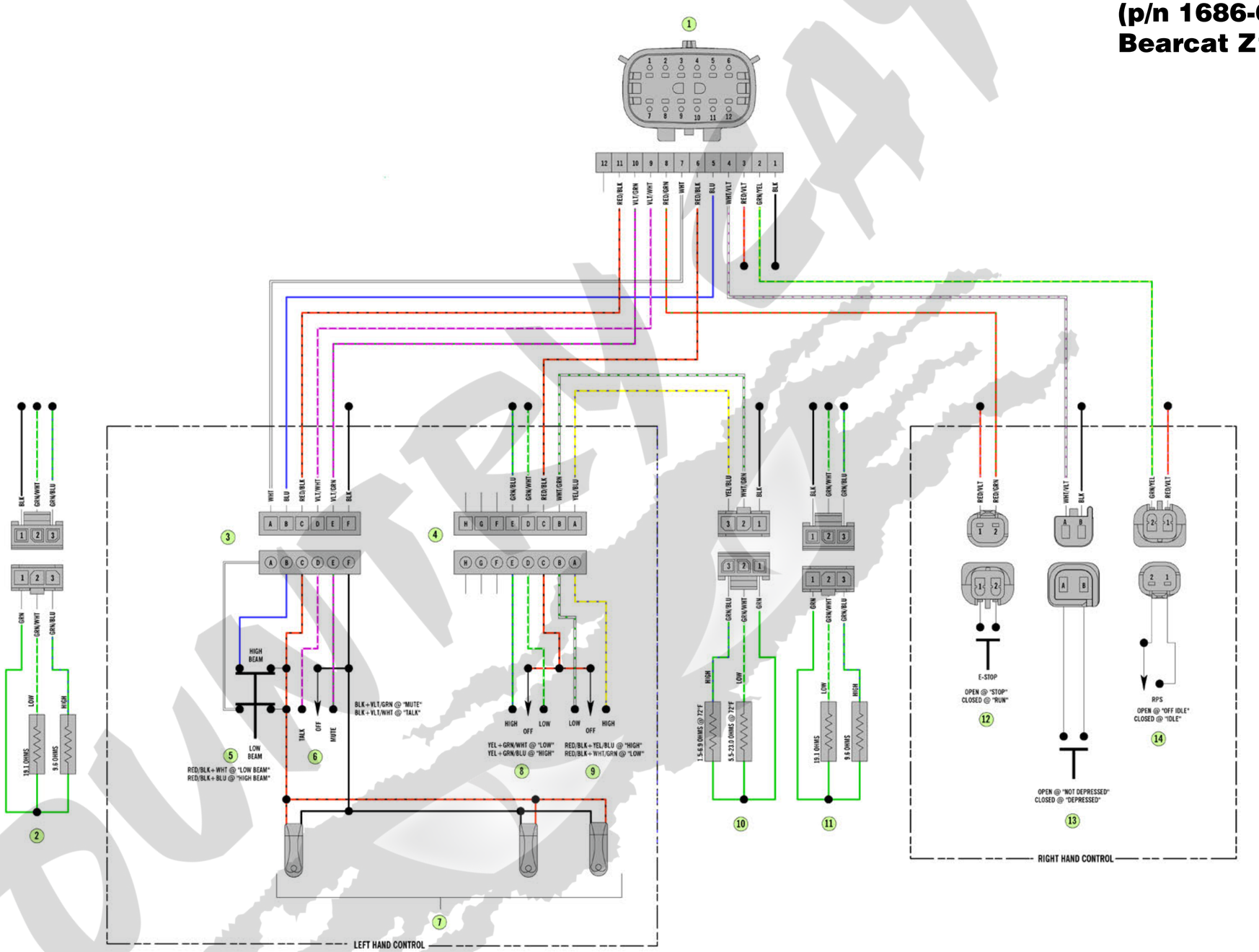


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. BLK ● INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE.

Handlebar Harness
(p/n 1686-652)
TZ1/LXR/Turbo LXR
(p/n 1686-653)
Bearcat Z1 XT/GS/LTD

1. CONNECTOR, HANDLEBAR
2. ELEMENT, LH HANDWARMER
3. CONNECTOR, HEADLIGHT CONTROL
4. CONNECTOR, WARMER CONTROL
5. SWITCH, HEADLIGHT
6. SWITCH, PTT/MUTE
7. BULBS, SWITCH
8. SWITCH, HANDWARMER
9. SWITCH, THUMBWARMER
10. ELEMENT, THUMBWARMER
11. ELEMENT,RH HANDWARMER
12. SWITCH, EMERGENCY STOP
13. SWITCH, SHIFT
14. MICROSWITCH, RPS

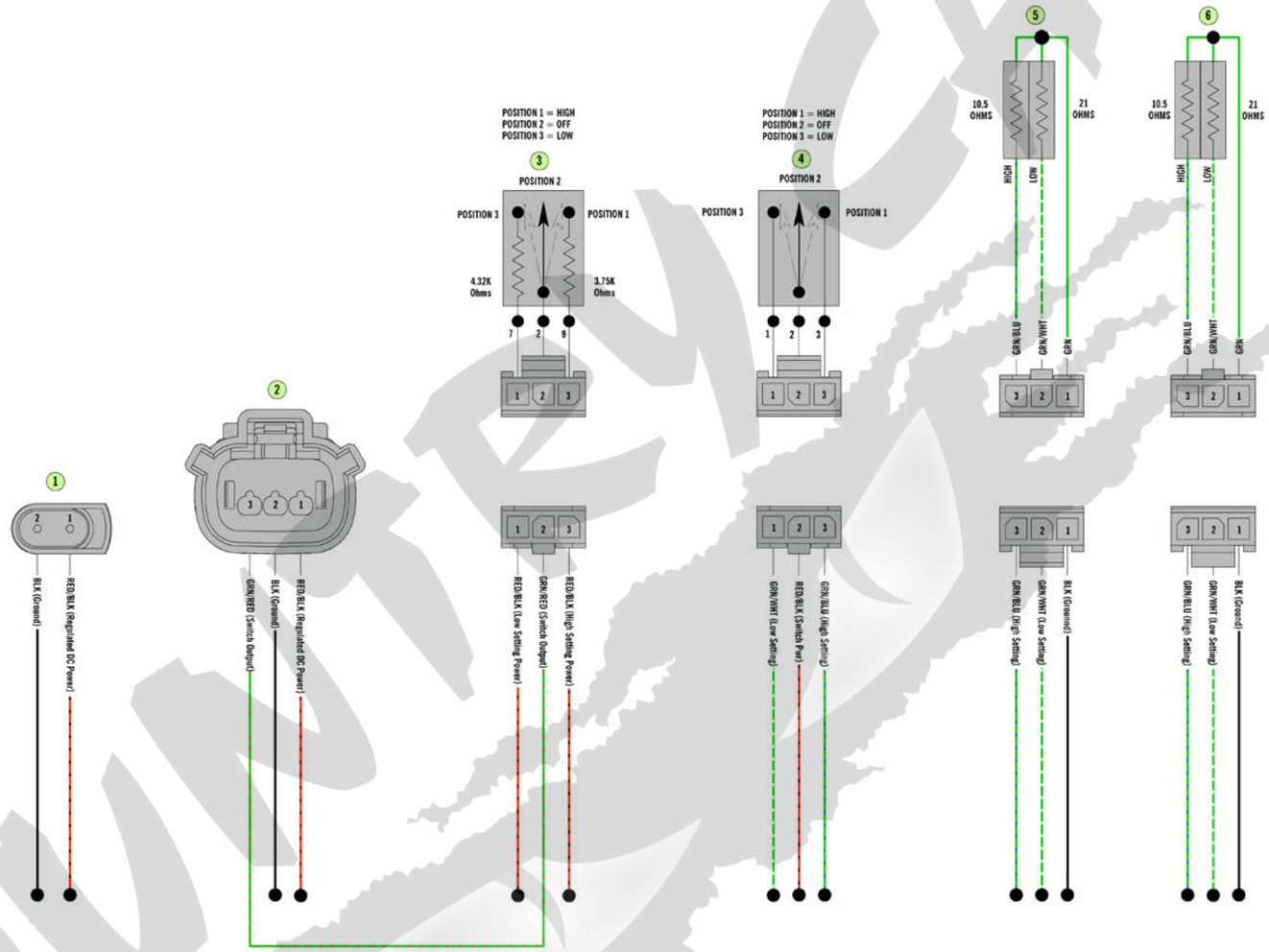


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. BLK ● INDICATES WIRE SPLICE. THIS EXAMPLE INDICATES BLK SPLICE.

Passenger Seat Harness (p/n 1686-570)

1. CONNECTOR, PASSENGER SEAT
2. CONNECTOR, PASSENGER SEAT HEATER
3. SWITCH, SEAT HEATER
4. SWITCH, HAND WARMER
5. ELEMENT, HAND WARMER #1
6. ELEMENT, HAND WARMER #2

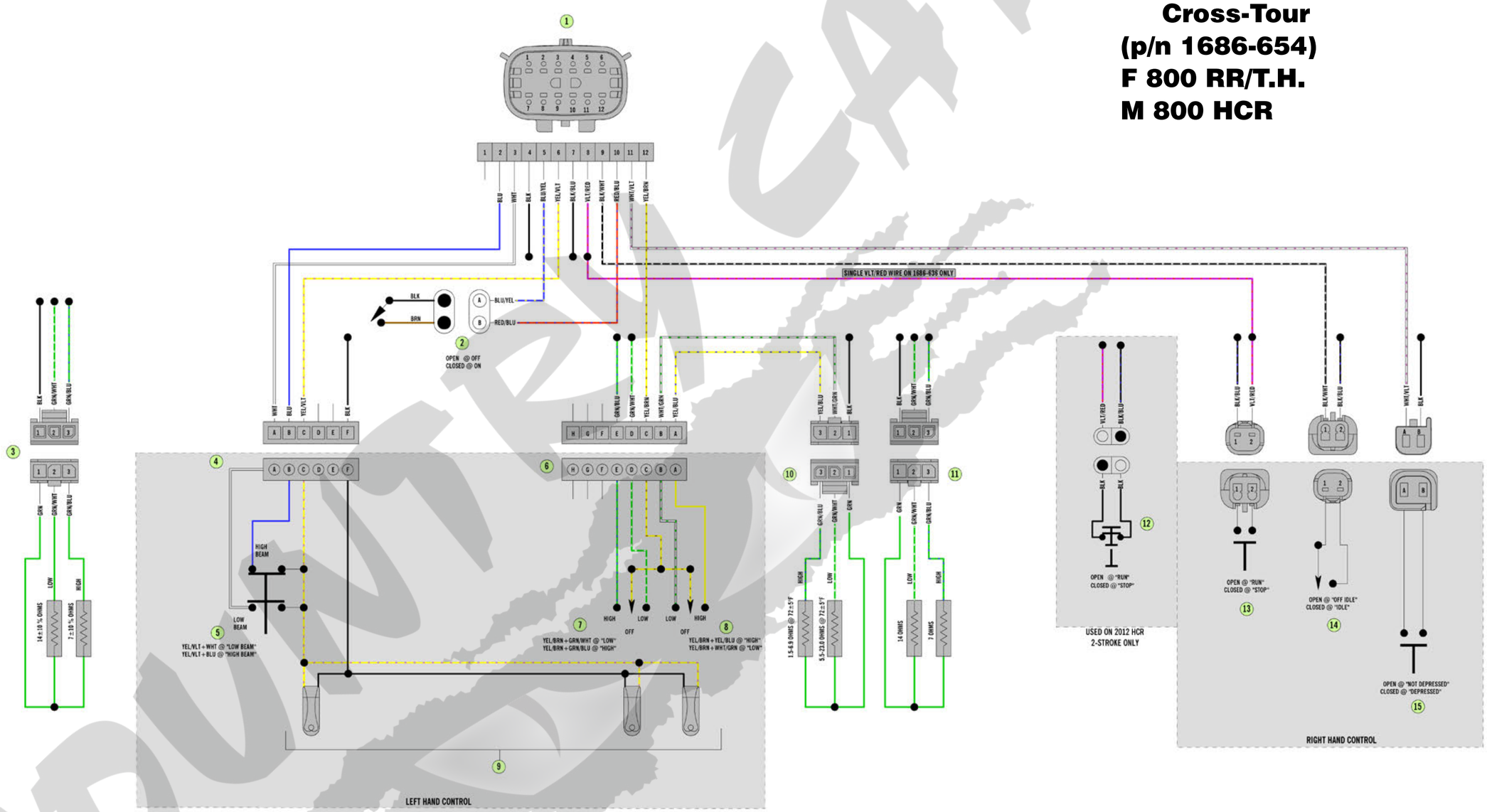


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE.
2. BLK ● INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES PNK SPLICE.

Handlebar Harness
(p/n 1686-636)
F 800/LXR/Sno Pro
M 800/Sno Pro
XF 800/LXR/Sno Pro/ Cross-Tour
(p/n 1686-654)
F 800 RR/T.H.
M 800 HCR

1. CONNECTOR, HANDLEBAR
2. SWITCH, BRAKE
3. ELEMENT, LH HANDWARMER
4. CONNECTOR, HEADLIGHT CONTROL
5. SWITCH, HEADLIGHT
6. CONNECTOR, HANDWARMER/THUMBWARMER
7. SWITCH, HANDWARMER
8. SWITCH, THUMBWARMER
9. BULBS, SWITCH
10. ELEMENT, THUMBWARMER
11. ELEMENT,RH HANDWARMER
12. SWITCH, TETHER
13. SWITCH, EMERGENCY STOP
14. MICROSWITCH, RPS
15. SWITCH, SHIFT

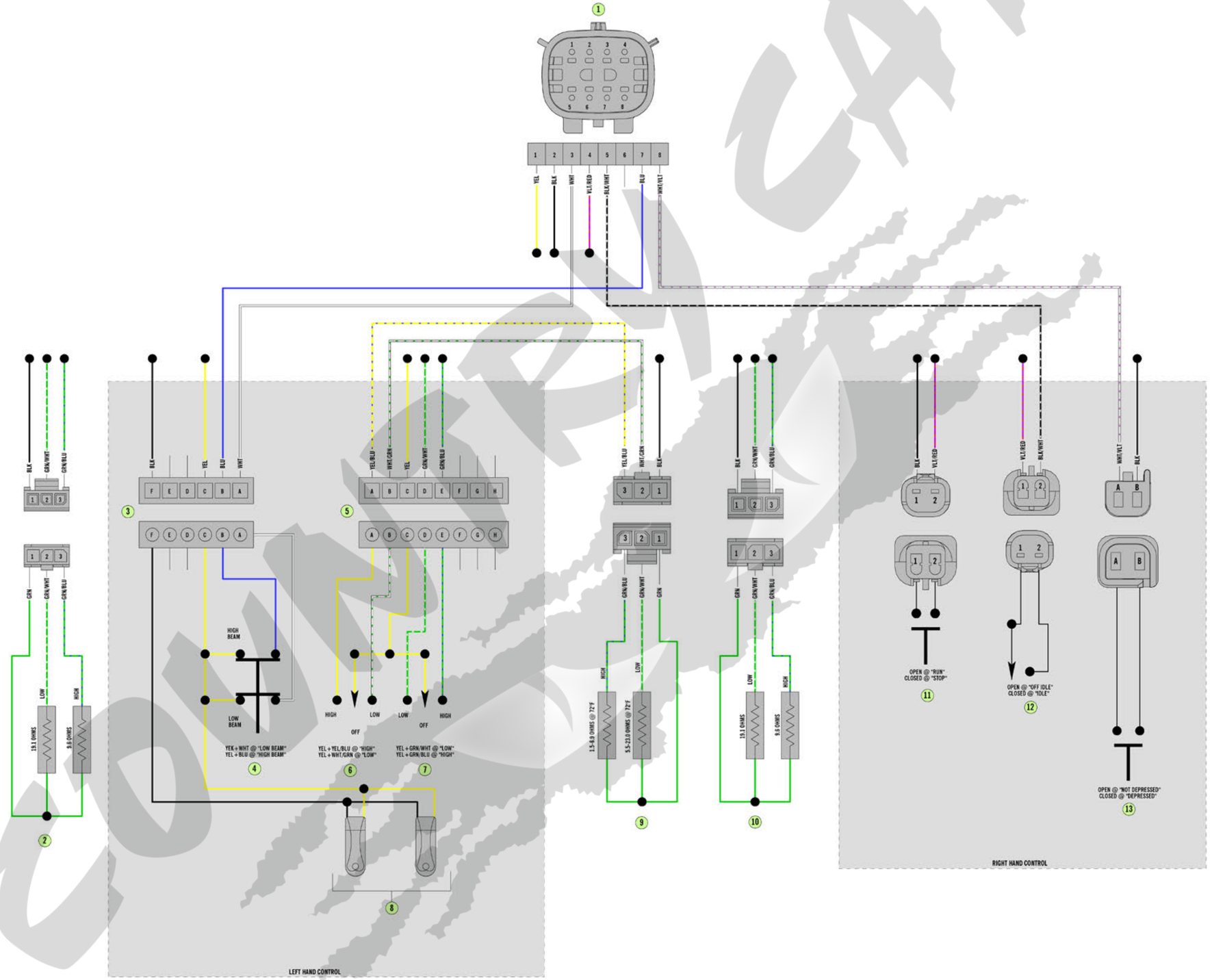


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. BLK ●—A INDICATES WIRE SPLICE. THIS EXAMPLE INDICATES BLK SPLICE A.

Handlebar Harness
(p/n 1686-537)
Bearcat 570/XT
F570
T570

1. CONNECTOR, HANDLEBAR
2. ELEMENT, LH HANDWARMER
3. CONNECTOR, HEADLIGHT CONTROL
4. SWITCH, HEADLIGHT
5. CONNECTOR, HANDWARMER/THUMBWARMER
6. SWITCH, HANDWARMER
7. SWITCH, THUMBWARMER
8. BULBS, SWITCH
9. ELEMENT, THUMBWARMER
10. ELEMENT,RH HANDWARMER
11. SWITCH, EMERGENCY STOP
12. MICROSWITCH, RPS
13. SWITCH, SHIFT

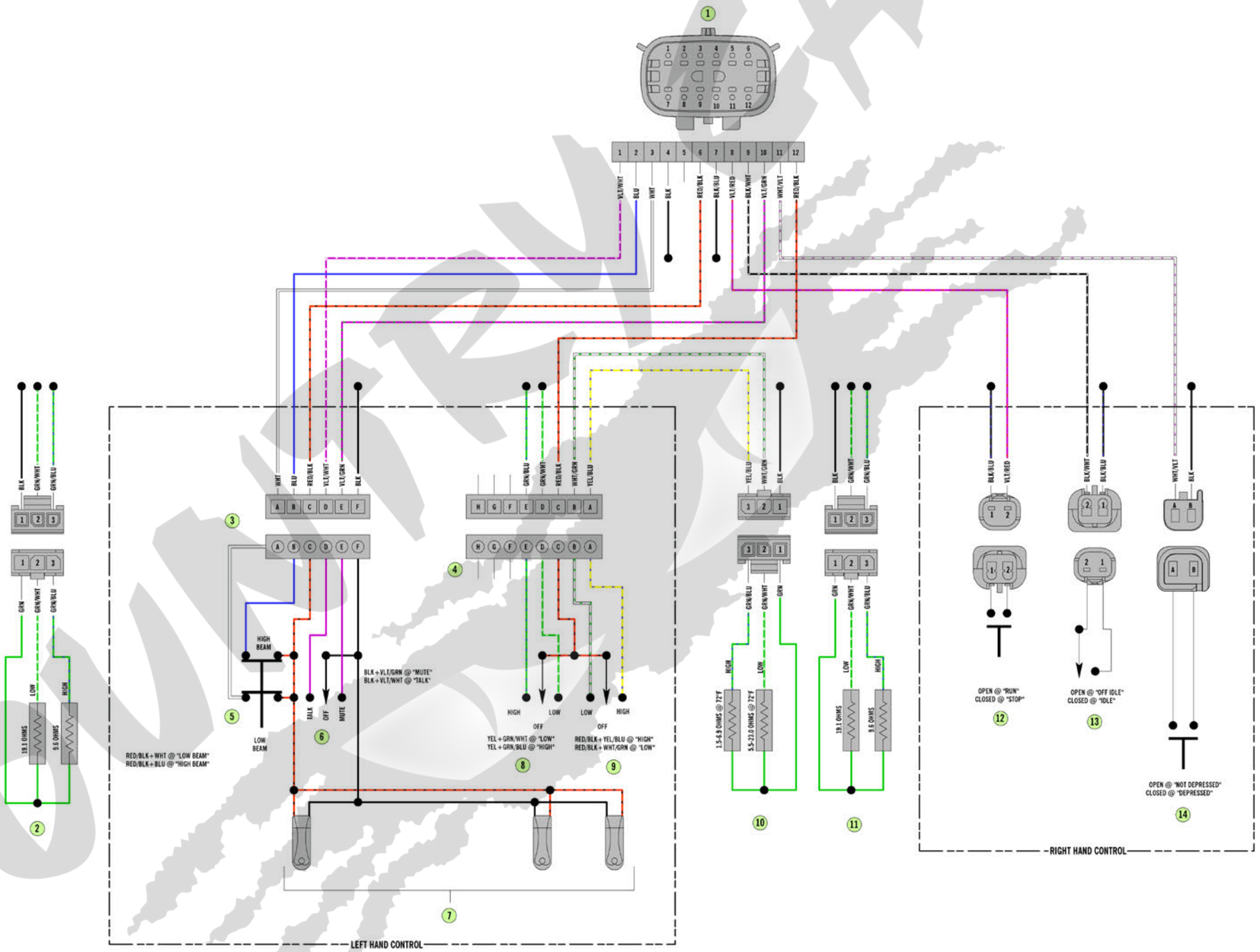


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. BLK ● A INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE A.

Handlebar Harness
(p/n 1686-574)
F5

1. CONNECTOR, HANDLEBAR
2. ELEMENT, LH HANDWARMER
3. CONNECTOR, HEADLIGHT CONTROL
4. CONNECTOR, WARMER CONTROL
5. SWITCH, HEADLIGHT
6. SWITCH, PTT/MUTE
7. BULBS, SWITCH
8. SWITCH, HANDWARMER
9. SWITCH, THUMBWARMER
10. ELEMENT, THUMBWARMER
11. ELEMENT,RH HANDWARMER
12. SWITCH, EMERGENCY STOP
13. MICROSWITCH, RPS
14. SWITCH, SHIFT

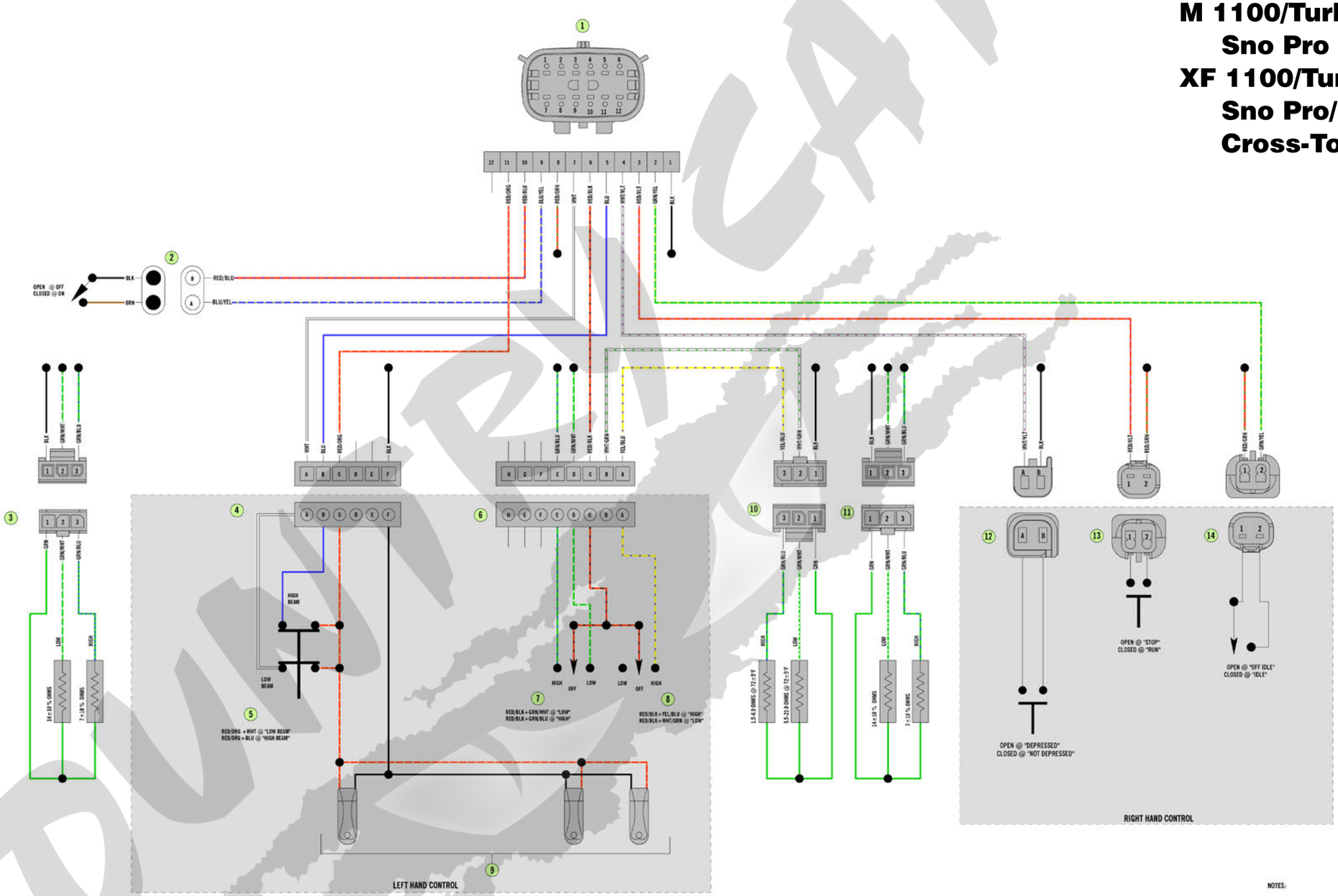


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE, WHERE APPLICABLE.
2. BLK ● INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE.

Handlebar Harness
(p/n 1686-637)
F 1100/Turbo/LXR/ Sno Pro
M 1100/Turbo/ Sno Pro
XF 1100/Turbo/LXR/ Sno Pro/ Cross-Tour

1. CONNECTOR, HANDLEBAR
2. SWITCH, BRAKE
3. ELEMENT, LH HANDWARMER
4. CONNECTOR, HEADLIGHT CONTROL
5. SWITCH, HEADLIGHT
6. CONNECTOR, HANDWARMER/THUMBWARMER
7. SWITCH, HANDWARMER
8. SWITCH, THUMBWARMER
9. BULBS, SWITCH
10. ELEMENT, THUMBWARMER
11. ELEMENT,RH HANDWARMER
12. SWITCH, SHIFT
13. SWITCH, EMERGENCY STOP
14. MICROSWITCH, RPS

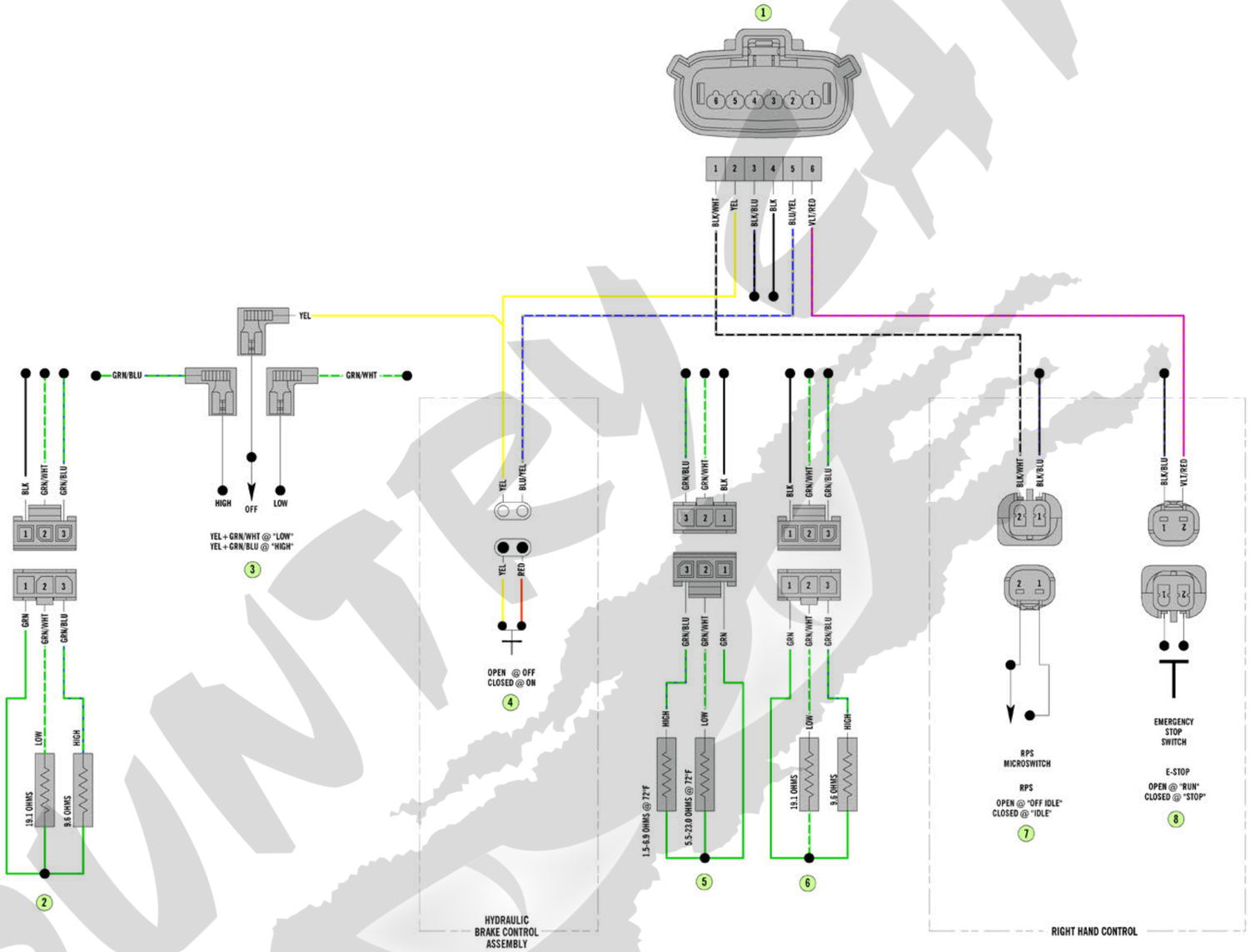


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. BLK ●—A INDICATES WIRE SPLICE. THIS EXAMPLE INDICATES BLK SPLICE A.

Handlebar Harness
(p/n 1686-590)
Sno Pro 500

1. CONNECTOR, HANDLEBAR
2. ELEMENT, LH HANDWARMER
3. SWITCH, WARMERS
4. SWITCH, BRAKE
5. ELEMENT, THUMBWARMER
6. ELEMENT,RH HANDWARMER
7. MICROSWITCH, RPS
8. SWITCH, EMERGENCY STOP

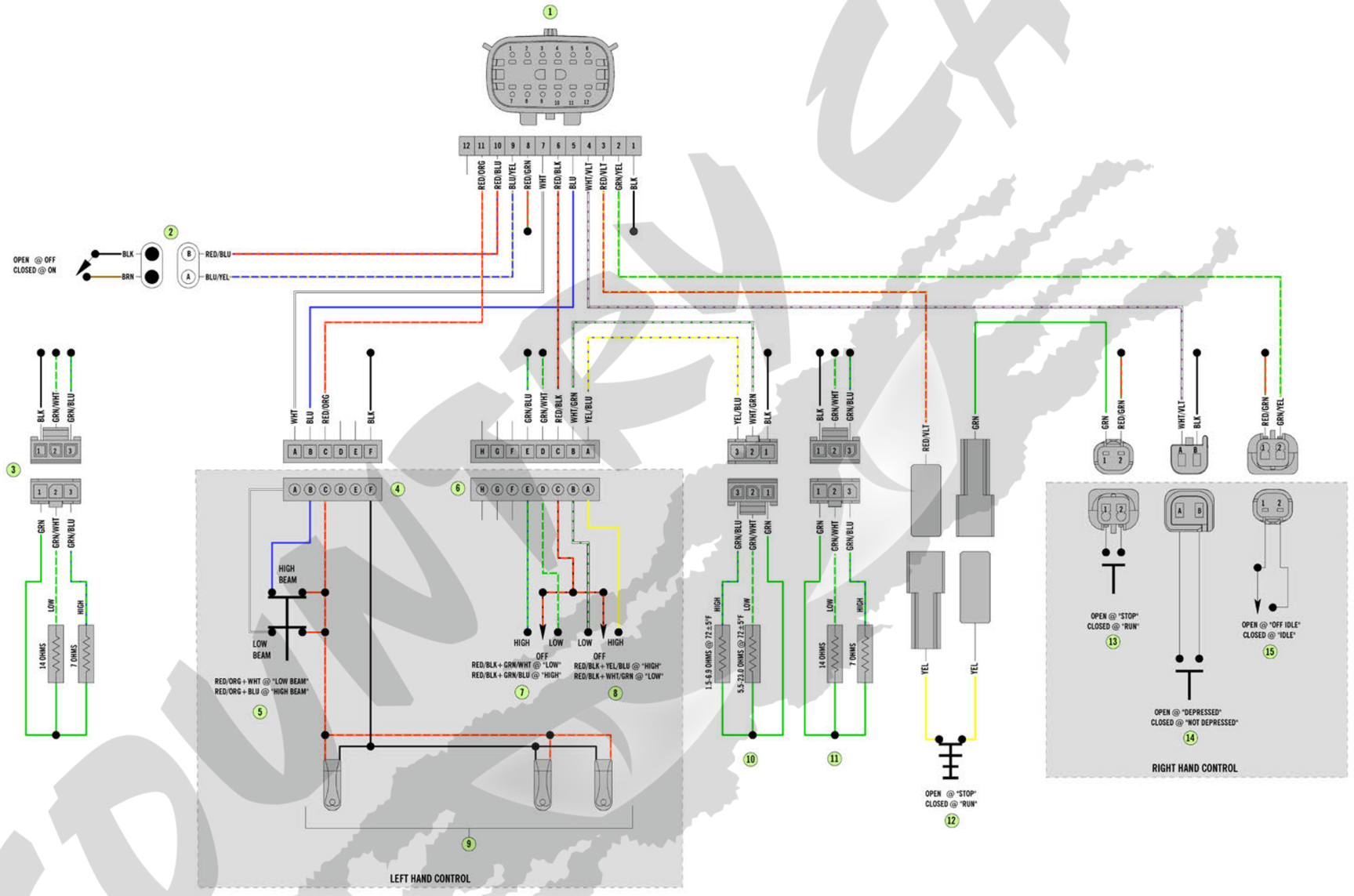


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE, WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. BLK ● INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE.

Handlebar Harness
(p/n 1686-656)
F 1100 Turbo Sno Pro RR
M 1100 Turbo HCR

1. CONNECTOR, HANDLEBAR
2. SWITCH, BRAKE
3. ELEMENT, LH HANDWARMER
4. CONNECTOR, HEADLIGHT CONTROL
5. SWITCH, HEADLIGHT
6. CONNECTOR, HANDWARMER/THUMBWARMER
7. SWITCH, HANDWARMER
8. SWITCH, THUMBWARMER
9. BULBS, SWITCH
10. ELEMENT, THUMBWARMER
11. ELEMENT,RH HANDWARMER
12. SWITCH, TETHER
13. SWITCH, EMERGENCY STOP
14. SWITCH, SHIFT
15. MICROSWITCH, RPS

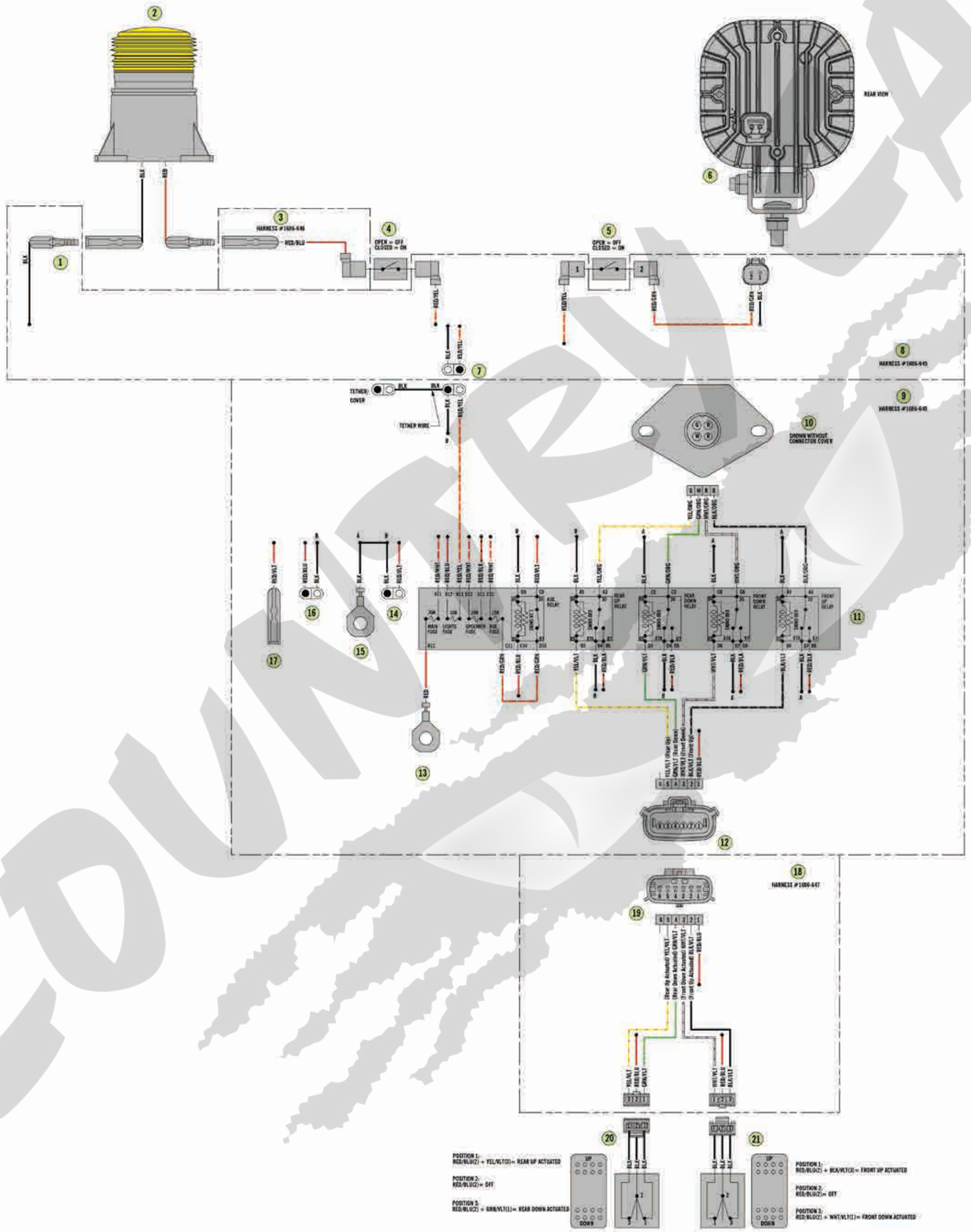


NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. BLK ●A INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE A.

Misc. Groomer Special
(p/n 1686-645)
(p/n 1686-646)
(p/n 1686-647)
(p/n 1686-648)

1. CONNECTOR, BEACON GROUND
2. LIGHT, BEACON
3. HARNESS, BEACON
4. SWITCH BEACON
5. SWITCH, WORK LIGHT
6. LIGHT, WORK
7. CONNECTOR, LIGHT BAR
8. HARNESS, LIGHT BAR
9. HARNESS, MAIN GROOMER
10. CONNECTOR, GROOMER
11. POWER DISTRIBUTION MODULE
12. CONNECTOR, GROOMER SWITCH CONSOLE
13. CONNECTOR, BATTERY POSITIVE
14. CONNECTOR, FAN
15. CONNECTOR, BATTERY GROUND
16. CONNECTOR, ACCESSORY
17. CONNECTOR, WINCH POWER
18. HARNESS, GROOMER SWITCH CONSOLE
19. CONNECTOR, GROOMER SWITCH MAIN
20. SWITCH, REAR ACTUATOR
21. SWITCH, FRONT ACTUATOR



NOTES:

1. CONNECTORS SHOWN FROM MATING SURFACE SIDE. WHERE APPLICABLE.
2. ● MALE PIN TERMINAL
   ○ FEMALE RECEPTACLE TERMINAL
3. BLK ●A INDICATES WIRE SPLICE, THIS EXAMPLE INDICATES BLK SPLICE A.

SECTION 6 — DRIVE TRAIN/TRACK/ BRAKE SYSTEMS

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Drive Train/Track/Brake Systems

This section has been organized into sub-sections for servicing drive train, track, and brake systems; however, some components may vary from model to model. The technician should use discretion and sound judgment when removing and installing components.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

A number of special tools must be available to the technician when servicing the drive train, track, and brake systems.

Description	p/n
Drive Clutch Bolt Tool	0644-281
Driven Shaft Bearing Spanner Wrench Kit - Socket	0644-516
Bearing Removal and Installation Tool	0644-167
Movable Sheave Bearing Tool	0644-594
Brake Disc Socket Wrench	0644-481
Clutch Alignment Bar (Bearcat/F-Series/T-Series)	0644-496
Clutch Alignment Bar (F/M/XF)	0644-428
Drive Clutch Puller	0744-062
Drive Clutch Spanner Wrench	0644-136
Driven Clutch Compressor Tool	0644-444
Driven Clutch Puller	0644-469
Clutch Alignment Bar (Parallelism)	0644-509
Rear Suspension Spring Tool	0144-311
Reverse Gear Adjustment Gauge	0644-244
Roller Pin Removal Tool	0644-276
Gear Case Drain Fitting	0644-552
Deep Socket	0444-237
Brake Caliper Bearing Puller	0744-067
Movable Sheave Bearing Installation/Removal Tool	0644-594

■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

CAUTION

Never attempt to substitute any other drive clutch puller for the recommended puller or severe clutch damage will occur.

Drive Belt

If the drive belt is longer than specified, the drive clutch and driven clutch will not achieve full shift ratio. This will result in poor acceleration and a decrease in top speed.

If the drive belt is shorter than specified, the starting ratio will be higher causing the belt to slip. A too-short drive belt will cause a bog on engagement and will not allow the engine to reach peak RPM.

■NOTE: A thinly-worn drive belt may produce the same effect as one that is too long.

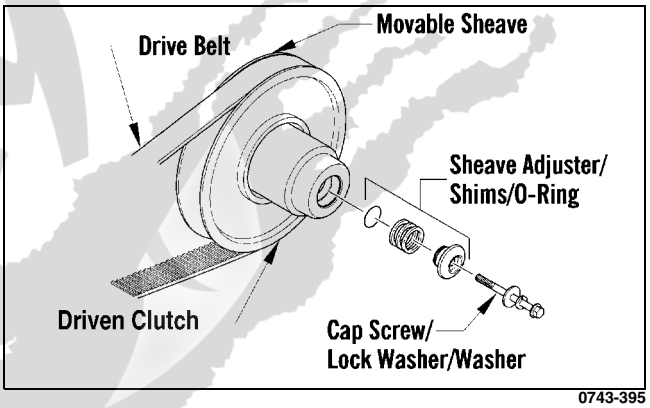
■NOTE: A stiff belt causes a HP loss to the track. As a belt warms up, it gets more flexible and transmits power with less HP loss.

■NOTE: When installing a new drive belt, see After Break-In Checkup - Drive Belt Break-In in Section 1.

REMOVING

1. With the engine off, open the left-side access panel; then remove the belt guard. On the F/M/XF, loosen the 1/4 turn screws on the lower console.
2. Remove the cap screw, lock washer and sheave adjuster from the end of the driven clutch; then remove the cap screw, lock washer, and washer from the adjuster.

■NOTE: Assure that the shims and O-ring are not removed from the adjuster.



0743-395

3. Reverse the adjuster and install the cap screw without washers into the adjuster. Install the sheave adjuster and cap screw onto the driven clutch; then tighten the cap screw until the movable sheave opens far enough to allow the belt to be removed.
4. Remove the drive belt from the driven clutch first; then from the drive clutch.

INSTALLING

1. Place the drive belt (so the arrow is pointing toward the front of the snowmobile) on the drive clutch; then between the sheaves of the driven clutch.
2. Install the sheave adjuster in its original position (beveled side out); then install the cap screw, lock washer, and washer into the driven clutch. Tighten the cap screw to 32 ft-lb (Bearcat/F-Series/T-Series) or 20 ft-lb (F/M/XF).

CAUTION

Do not apply Loctite to the driven clutch cap screw or component damage may occur.

3. Install the belt guard; then close the left-side access panel.

⚠ WARNING

Never operate the snowmobile without the belt guard/access panel secured in place.

Drive Clutch

CHANGING CAM ARMS/SPRINGS

Removing

1. Using Drive Clutch Bolt Tool, remove the cap screw and lock washer securing the drive clutch to the crankshaft.

■NOTE: Before installing the clutch puller, apply oil to the threads of the puller and a small amount of grease to the tip of the puller.

2. Using the Drive Clutch Puller and the Drive Clutch Spanner Wrench, tighten the puller. If the drive clutch will not release, sharply strike the head of the puller. Repeat this step until the clutch releases.

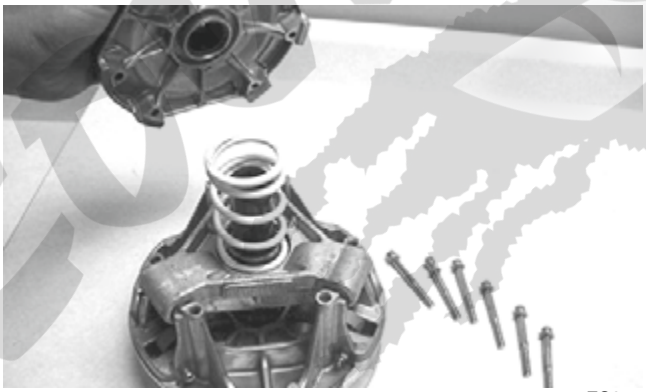
3. Remove the drive clutch and drive belt from the engine compartment.

Disassembling

■NOTE: Note the timing marks on the cover, spider, and movable sheave. These must be aligned when assembling the drive clutch for balance purposes.

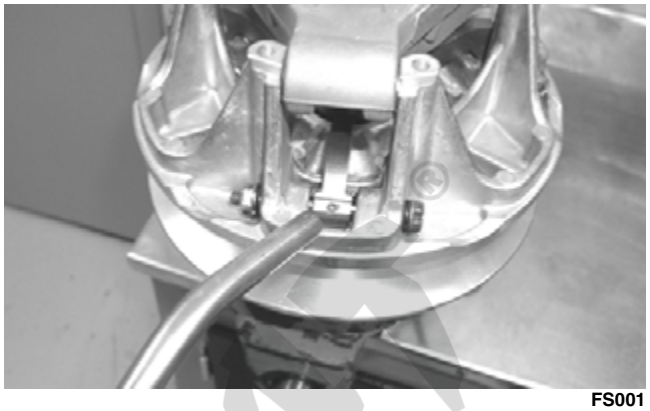
1. Loosen the machine screws securing the cover. Remove every other cap screw and lock washer from the cover; then while firmly holding the cover, remove the three remaining screws and lock washers equally.

2. Remove the cover and spring.



FC055

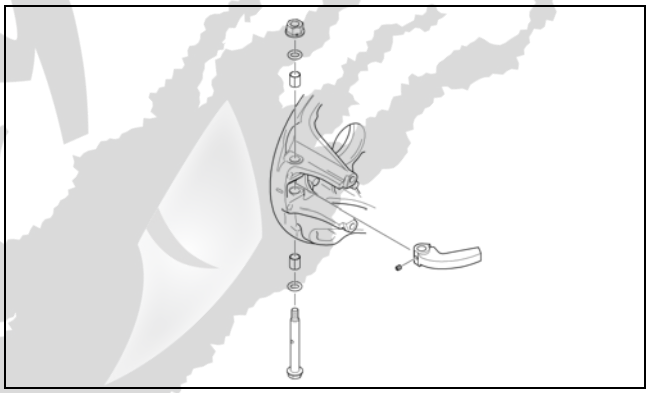
3. Remove the cam arm pin lock nuts; then using a small torch, apply heat to the cam arm set screws to loosen the Loctite used in assembly.



FS001

■NOTE: Heat must be applied to the cam arm in order to remove the set screws.

4. After the lock nuts and set screws have been removed, remove the cam arm pins one at a time noting the position of the alignment notches in the cap screws for assembly purposes. Account for the O-rings.



0739-038

Cleaning And Inspecting

1. Using parts-cleaning solvent, wash grease, dirt, and foreign matter off all components; dry with compressed air.

⚠ WARNING

Always wear safety glasses when using compressed air to dry components.

2. Remove any drive belt dust accumulation from the stationary sheave, movable sheave, and bushings using parts-cleaning solvent only.

3. Inspect stationary sheave, movable sheave, spider, and cover for cracks or imperfections in the casting.

4. Inspect the cam arm pins for wear or bends.

5. Inspect the spring for distortion, cracks, or wear.

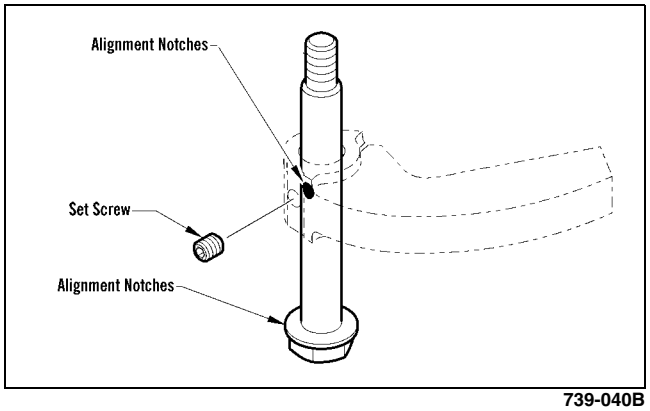
6. Inspect rollers for damage or wear.

Assembling

1. With the head of each cam arm pin positioned towards the direction of the drive clutch rotation, install the cam arms.

■NOTE: The drive clutch rotates counterclockwise.

2. With the cam arm pin properly positioned, apply green Loctite #620 to the set screw holes in the cam arm, install the new set screws (pre-coated with Loctite), and tighten to 19 in.-lb.



739-040B

CAUTION

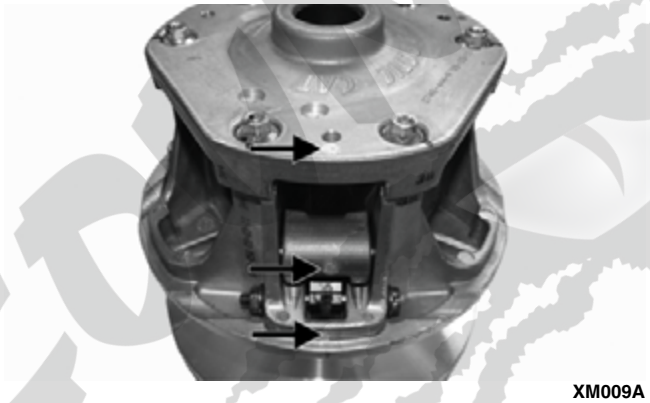
Green Loctite #620 must be applied to the set screw holes in the cam arms or component damage may occur.

3. Secure the cam arm pins with new lock nuts and tighten to 11 ft-lb.

CAUTION

When installing cam arms, always use new lock nuts and cam arm set screws.

4. Place the spring and cover into position making sure the timing mark on the cover is properly aligned; then compress the spring and install the machine screws coated with blue Loctite #243 and lock washers. In a crisscross pattern, tighten evenly to 120 in.-lb.



XM009A

CAUTION

Care must be taken when installing the cover not to damage the bushing.

Installing

■NOTE: Before installing the drive clutch, be sure to wipe both the crankshaft taper and clutch mounting taper clean using a clean towel.

1. Place the drive clutch into position on the crankshaft; then apply a few drops of oil to the threads of the cap screw. Secure with the cap screw and lock washer. Tighten to 51 ft-lb.

CAUTION

When installing the drive clutch, do not tighten the cap screw with any kind of impact tool. Tighten cap screw using a hand torque wrench only. Failure to do so could result in stationary sheave damage.

2. Check alignment between the drive clutch and driven clutch (see Drive Clutch/Driven Clutch in this section).

3. Install the drive belt. Check drive belt deflection (see Drive Clutch/Driven Clutch in this section). Secure the belt guard and close the left-side access panel.

■NOTE: For installing drive belt, see Drive Belt in this section.

⚠ WARNING

Never operate the engine without the belt guard/access panel secured.

4. Either test drive the snowmobile or run the engine for five minutes; then verify the drive clutch cap screw torque specification.

Driven Clutch (Bearcat/F-Series/T-Series)

REMOVING

1. Remove the drive belt (see Drive Belt in this section).

2. Using a 9/16-in. socket and extension, remove the cap screw securing the driven clutch to the input shaft.

3. Slide the driven clutch off the shaft.

■NOTE: Account for and remove any alignment washers. These washers must be used during installing.

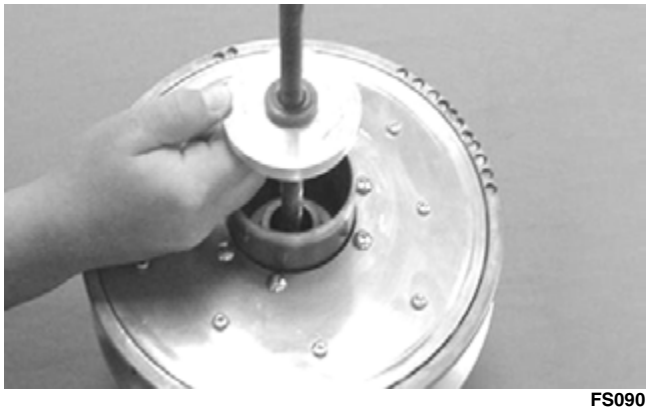
DISASSEMBLING

1. Prior to disassembling, mark the driven clutch sheaves and torque bracket.



CM060

2. Place the driven clutch on the Driven Clutch Compressor Tool; then install the compressor flange spacer and wing nut and compress the driven clutch spring.



FS090

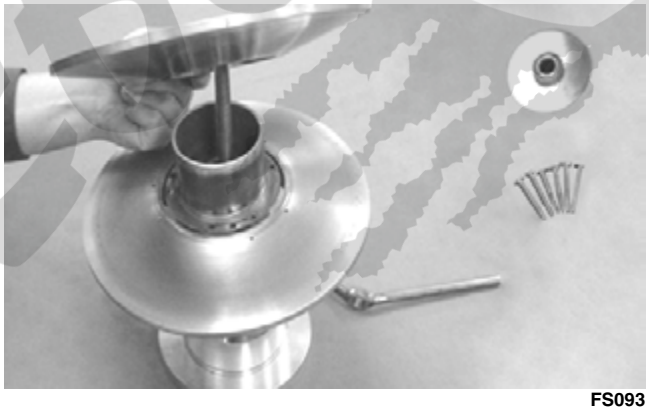
3. Remove the torx-head cap screws securing the movable sheave to the torque bracket.



CM061

■**NOTE: To loosen the torx-head cap screws, it may be necessary to insert a torx-bit and strike each screw with a hammer.**

4. Release the compression of the spring by removing the wing nut; then remove the movable sheave. Account for the torque bracket retainer.

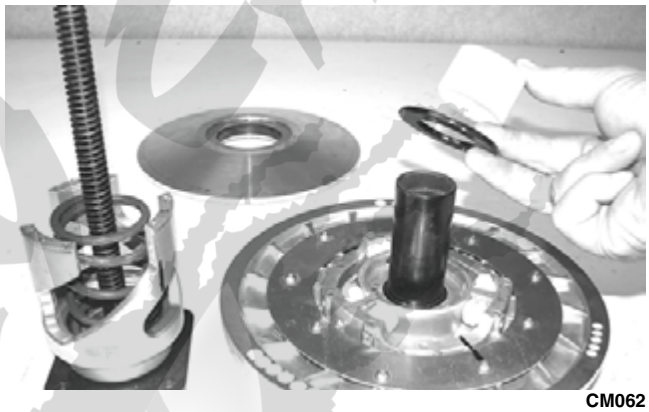


FS093



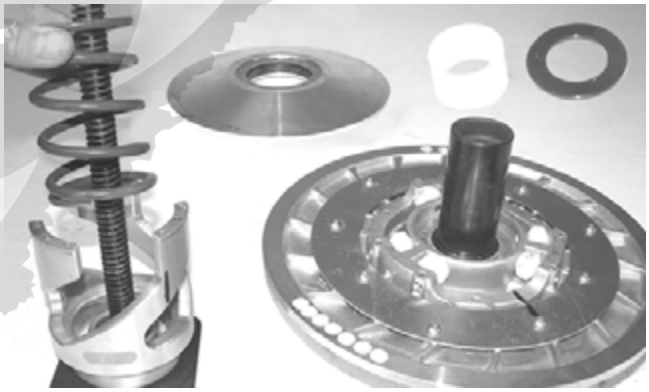
FS094

5. Remove the stationary sheave; then remove the plastic washer (spring seat) and the spacer.

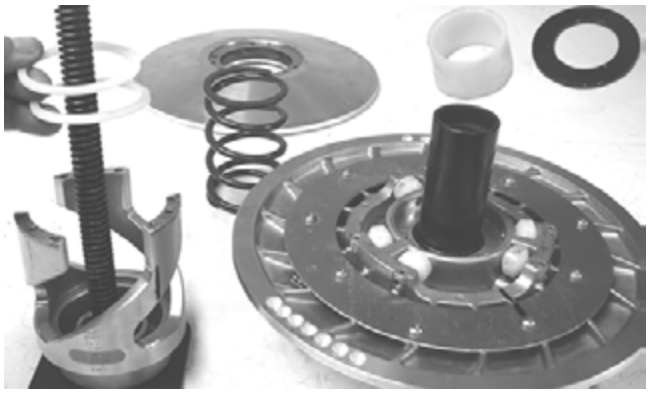


CM062

6. Remove the spring and remaining spring seats.



CM063



CM064

6

CLEANING AND INSPECTING

1. Using parts-cleaning solvent, wash grease, drive belt dust, and foreign matter off all components.

CAUTION

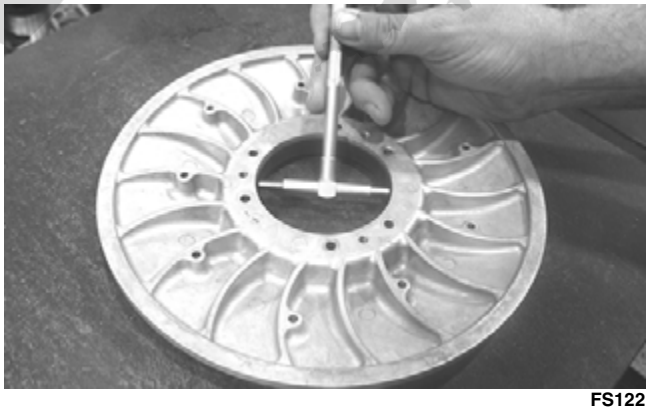
Do not use steel wool or a wire brush to clean driven clutch components. A wire brush or steel wool will cause the sheaves to be gouged (thus, the drive belt may not slide properly between sheaves). Decreased performance and possible accelerated drive belt wear will result.

2. Inspect the rollers for damage, cracks, or wear.
3. Inspect the sheaves for any gouges, cracks, or other damage. Also, inspect threaded areas of sheaves for damaged or stripped threads.
4. Inspect the torque bracket for cracks or damage. The ramp portions of the bracket must be free of gouges and damage. Minor scratches may be repaired using #320 grit wet-or-dry sandpaper.
5. Inspect spring for distortion, crystallization, or breaks.
6. Inspect the rollers, pins, and spring mounting holes for cracks, damage, or wear.
7. Inspect the cover and movable sheave bearings for wear. For each respective bearing, measure the outside diameter of the shaft and the inside diameter of the bearing. Compare the readings. Clearance between the shaft and the respective bearing must not exceed 0.020 in. If the clearance exceeds the specification, the driven clutch must be replaced.

■NOTE: The movable sheave bearing is a non-serviceable component.



CM101



FS122



FS123

REPLACING TORQUE BRACKET BEARING/COVER BEARING

1. Remove the snap ring.
2. Using a suitable driving tool, drive the bearing out.

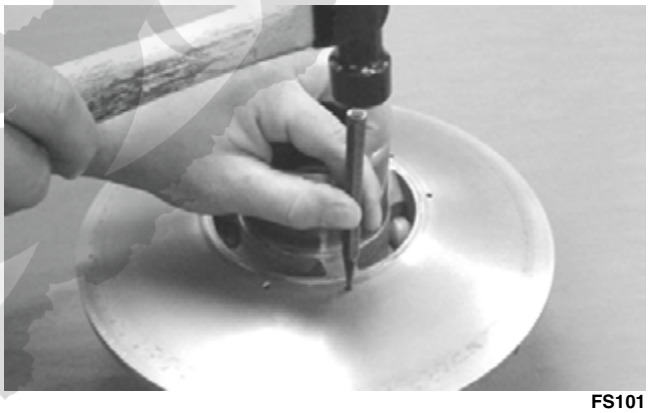
⚠ WARNING

Always wear safety glasses when using the bearing driver.

3. Install the new bearing; then secure with the snap ring.

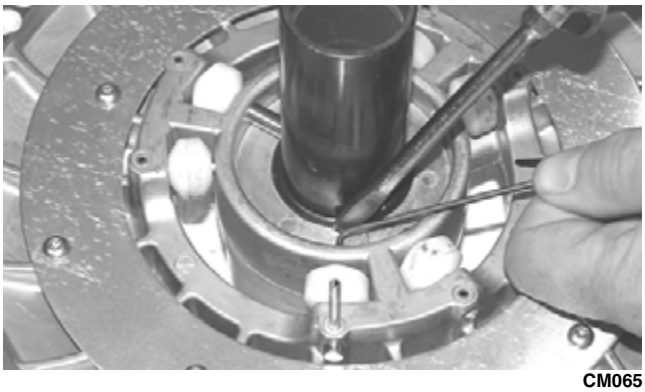
REPLACING ROLLERS

1. Drive the spring pins through the stationary sheave until the cam roller pin can be driven out.



FS101

2. Using Roller Pin Remove Tool or a suitable substitute and a flat-blade screwdriver, press the roller pin out of the stationary sheave.

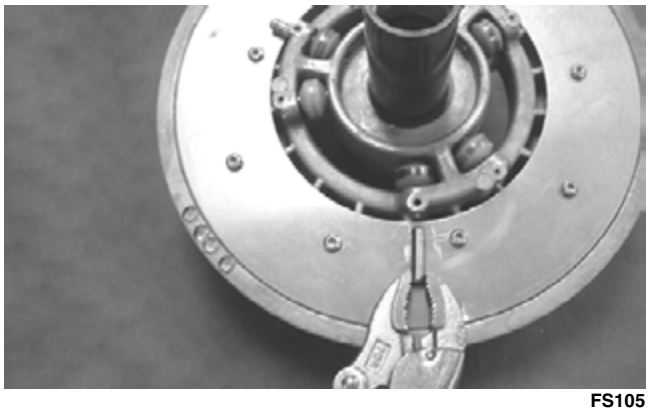


CM065

CAUTION

Care must be taken not to damage the driven clutch shaft.

■**NOTE: Once the roller pin is exposed, it may be necessary to use a pair of vise-grips to remove the pin.**



FS105

3. Place the new roller into position and tap the roller pin in far enough to install the spring pin.

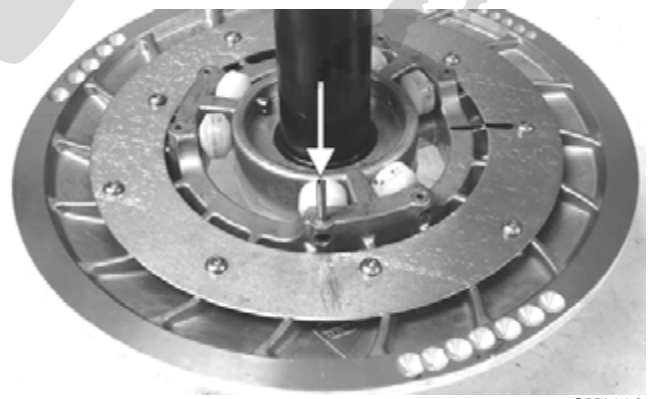


CM066



CM067A

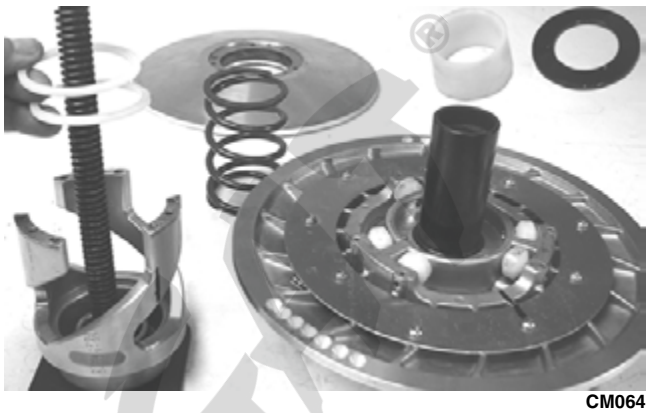
4. Tap the spring pin back into place.



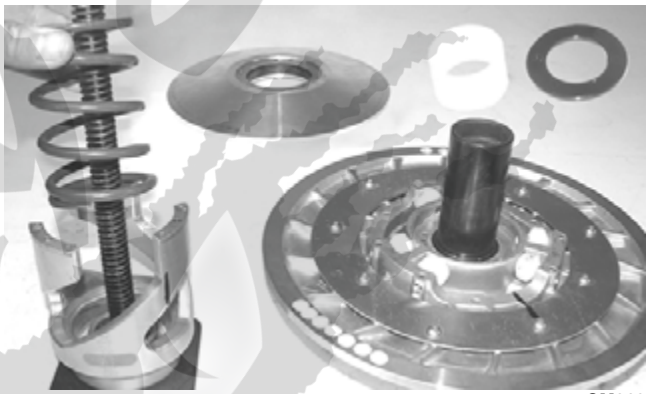
CM068A

ASSEMBLING

1. Place the torque bracket onto the Driven Clutch Compressor Tool; then install the spring seats onto the torque bracket and place the spring into position.



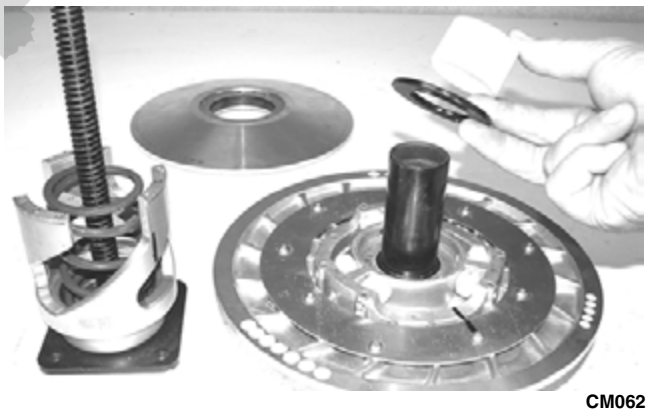
CM064



CM063

■**NOTE: Premature wear will result if the plastic washer is not installed.**

2. Noting the alignment marks made during disassembling and with the spring seat and spacer on the stationary sheave shaft, place the stationary sheave onto the torque bracket.



CM062

3. Place the spacer (retainer) into position on the stationary sheave with the holes properly aligned.



FS094

4. Noting the alignment marks made during disassembling, place the movable sheave onto the stationary sheave.



FS093

5. With the clutch in place on the compressor, install the compressor flange spacer and wing nut; then compress the driven clutch spring.



CM069

6. Install the torx-head cap screws securing the movable sheave. Tighten in a crisscross pattern to 72 in.-lb.



CM061

7. Remove the clutch from the compressor.

INSTALLING

1. Set the brake lever lock.
2. Install the alignment washers; then install the driven clutch onto the input shaft. Tighten to 32 ft-lb.

CAUTION

Do not allow the driven clutch to "float" on the input shaft. Damage to the driven clutch will occur.

3. Check drive clutch/driven clutch alignment; then install the drive belt (see Drive Belt in this section).

Driven Clutch (F/M/XF)

REMOVING

1. Remove the drive belt (see Drive Belt in this section).
2. Slide the driven clutch off the shaft.

■NOTE: Account for any alignment washers. These washers must be in place during installation.

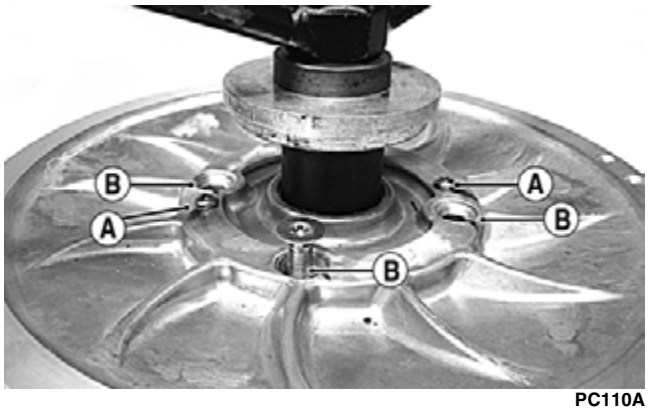
DISASSEMBLING

1. Place the driven clutch on the Driven Clutch Compressor Tool; then install the compressor flange spacer and wing nut and compress the driven clutch spring.



PC109

2. Remove the screws (A) securing the backside cams; then remove the screws (B) securing the movable sheave to the torque bracket.



PC110A

■**NOTE: To loosen the screws, it may be necessary to heat the heads with a torch to soften the Loctite.**

3. Release the compression of the spring by removing the wing nut; then remove the movable sheave.



PC127

4. Remove the stationary sheave; then remove the plastic spring seat.



PC111

■**NOTE: XF and M models will have a spacer installed on the stationary sheave.**



SNO-1050A

5. Remove the spring and remaining spring seat.



PC112



PC113

CLEANING AND INSPECTING

1. Using parts-cleaning solvent, wash grease, drive belt dust, and foreign matter off all components.

CAUTION

Do not use steel wool or a wire brush to clean driven clutch components. A wire brush or steel wool will cause the sheaves to be gouged (thus, the drive belt may not slide properly between sheaves). Decreased performance and possible accelerated drive belt wear will result.

2. Inspect the rollers for damage, cracks, or wear.
3. Inspect the sheaves for any gouges, cracks, or other damage. Also, inspect threaded areas of sheaves for damaged or stripped threads.

4. Inspect the back-side cams and torque bracket for cracks or damage. The ramp portions of the bracket must be free of gouges and damage. Minor scratches may be repaired using #320 grit wet-or-dry sandpaper.
5. Inspect spring for distortion, crystallization, or breaks.
6. Inspect the cover and movable sheave bearing for wear. If wear is present, replace the bearing using Movable Sheave Bearing Tool.

REPLACING TORQUE BRACKET BEARING/COVER BEARING

1. Remove the snap ring.
2. Using a suitable driving tool, drive the bearing out.

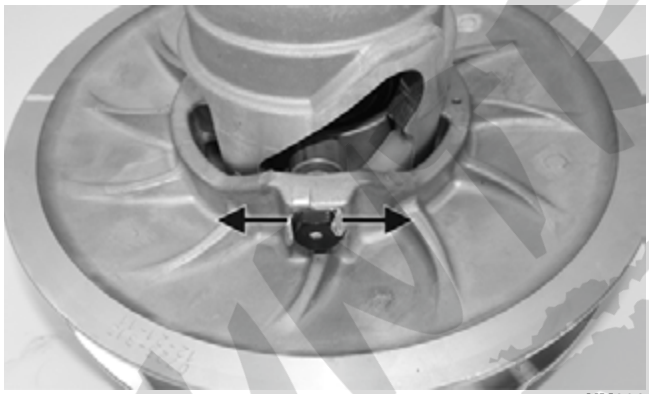
⚠ WARNING

Always wear safety glasses when using the bearing driver.

3. Install the new bearing; then secure with the snap ring.

REPLACING ROLLERS

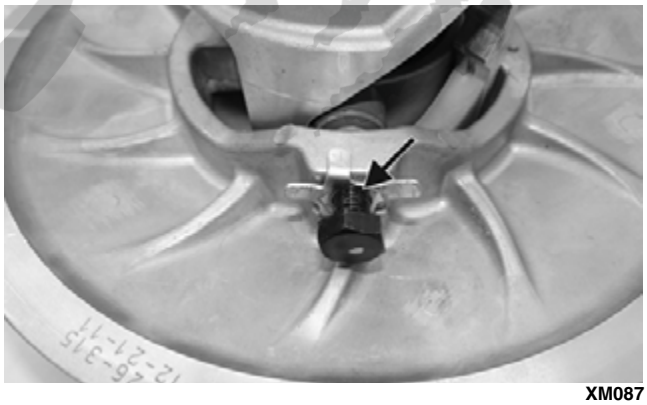
1. Bend the locking tabs down away from the shoulder bolt; then remove the bolt.



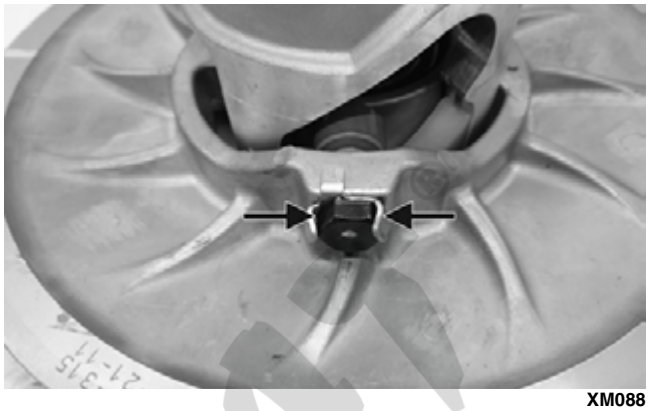
XM086

2. Place a new roller into position and secure with the shoulder bolt (with a drop of red Loctite #271). Tighten securely and bend the lock tabs to contact the bolt head.

■NOTE: If the flat does not align with the tab, tighten the shoulder bolt until it aligns.



XM087



XM088

ASSEMBLING

1. Place the torque bracket onto the Driven Clutch Compressor Tool; then install the spring seat (flat side toward the spring) onto the torque bracket and place the spring into position.



PC122



PC123



PC124

■**NOTE: Premature wear will result if the spring seat is not installed.**

2. Place the stationary sheave spring seat onto the spring (flat side toward the spring); then noting the alignment marks made during disassembling, place the stationary sheave onto the torque bracket.



PC126

3. Place the movable sheave onto the stationary sheave.
4. With the clutch in place on the compressor, install the compressor flange spacer and wing nut; then compress the driven clutch spring.



PC109

5. With a drop of red Loctite #271 on the threads, install the screws securing the movable sheave. Tighten in a crisscross pattern to 20 ft-lb.



PC128



PC129

6. Remove the clutch from the compressor.
7. Install the back-side cams; then secure with the screws and tighten to 24 in.-lb.

INSTALLING

1. Set the brake lever lock.
2. Install the alignment washers; then install the driven clutch. Tighten to 20 ft-lb.
3. Check drive clutch/driven clutch alignment; then install the drive belt (see Drive Belt in this section).

Drive Clutch/Driven Clutch

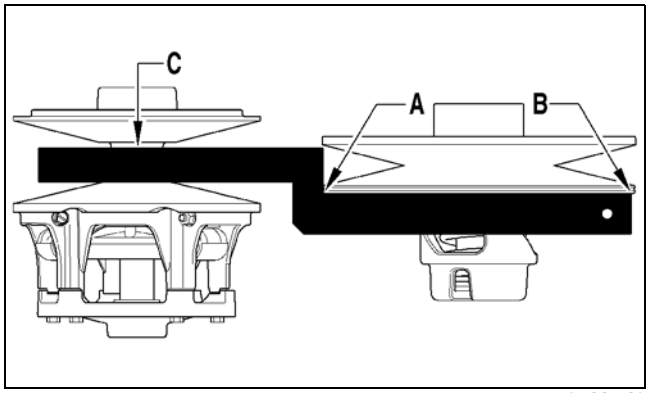
If premature drive belt wear is experienced or if drive belt turns over, check parallelism/offset. Also, parallelism/offset must be checked whenever either drive clutch or driven clutch is serviced. To check offset, use appropriate Clutch Alignment Bar. To check parallelism, use Parallelism Bar.

CHECKING OFFSET

1. With the engine off, open the left-side access panel; then remove the belt guard. Remove the drive belt (see Drive Belt in this section).
2. Install appropriate Clutch Alignment Bar between the drive clutch sheaves.
3. Allow the bar to rest on the drive clutch shaft and against the outside edge of the driven clutch stationary sheave.

■**NOTE: The alignment bar must extend beyond the front edge of the drive clutch.**

4. With the bar against the outside edge of the driven clutch stationary sheave at points A and B, the bar should just clear the inside edge of the stationary sheave of the drive clutch and rest on the stationary shaft at point C. If the bar either will not clear the inside edge or is more than the specified amount, the offset must be corrected.



0744-549

CORRECTING OFFSET

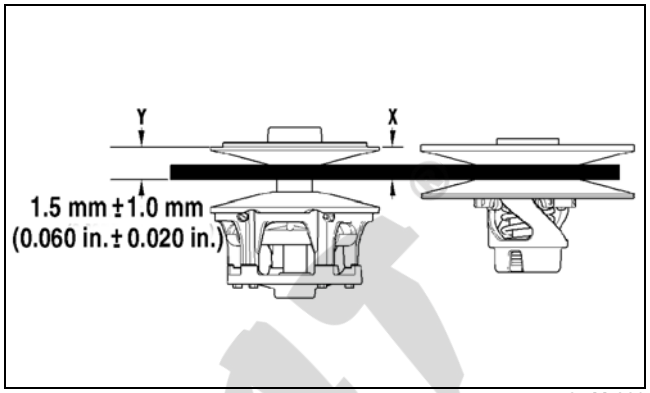
1. To correct offset, the driven clutch must be moved laterally on the input shaft. Remove the cap screw and washers securing the driven clutch.

■NOTE: If the driven clutch is tight on the shaft, pull the driven clutch off using the Driven Clutch Puller.

2. To move the driven clutch inward on the shaft, remove alignment washer(s) from the gear/chain case side of the clutch.
3. To move the driven clutch outward on the shaft, install additional alignment washer(s) on the gear/chain case side of the clutch.
4. Arrange washers to obtain correct offset; then install driven clutch, cap screw, and washers.
5. Install the drive belt (see Drive Belt in this section).

CHECKING PARALLELISM (Bearcat/T-Series 1100 cc)

1. With the engine off, remove the drive belt (see Drive Belt in this section); then open the driven sheaves and place the Parallelism Bar between the sheaves. Release the sheaves.
2. Check the parallelism of the drive clutch/driven clutch using the parallelism bar and reference points X and Y with the parallelism bar between the driven sheaves. Using a caliper or a machinist's scale, measure X and Y from the back side of the parallelism bar to the back side of the drive clutch sheave. Measurement Y must be 0.060 in. ± 0.020 in. more than measurement X, but Y must not exceed measurement X by more than 0.100 in.

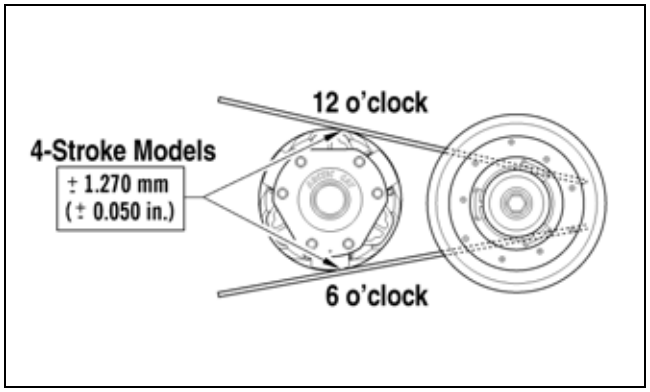


0744-609

3. If parallelism is not within specifications, the parallelism must be corrected by first loosening all the engine mounting bolts (left side, front, and right top rear). Then, pry the front of the engine towards the MAG-side of the engine compartment. Next tighten the left-side mounting bolts followed by the front and right-top rear bolts. Re-check the parallelism. If still out of specification, repeat correction procedure.
4. Install the drive belt (see Drive Belt in this section).

VERTICAL PARALLELISM (Bearcat/T-Series 1100 cc)

1. With engine off, remove the drive belt (see Drive Belt in this section).
2. With the driven clutch sheaves open far enough to install the Parallelism Bar into the driven clutch so the parallelism bar lies vertical between the driven clutch sheaves on the driven cam.
3. Using a digital caliper, measure from the top back (12 o'clock) of the drive clutch to the alignment bar.
4. Zero the digital caliper; then do the same procedure (step 3) for the bottom side (6 o'clock) of the drive clutch.
5. If drive clutch alignment is out of specification, loosen the cap screw securing the engine bracket to the front right engine mount enough to install an appropriate number of engine shims to equal ±1.270 mm (± 0.050 in.).



0745-193

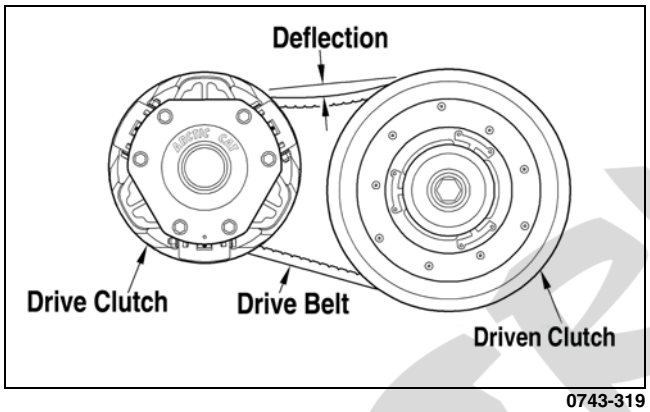
6. Once the drive clutch offset is corrected, tighten cap screw to 25 ft-lb from step 5.
7. Install drive belt (see Drive Belt in this section).

DRIVE BELT DEFLECTION

Drive belt length, condition, and deflection are all important for peak performance. To check and adjust drive belt deflection, use the following procedure.

■NOTE: Make sure the drive belt is sitting at the top of the driven clutch sheaves.

1. Place a straightedge on top of the drive belt. The straightedge should reach from the drive clutch to the top of the driven clutch.
2. Using a stiff ruler centered between the drive clutch and driven clutch, push down on the drive belt just enough to remove all slack. Note the amount of deflection on the ruler at the bottom of the straightedge. The deflection should be at 1 1/4 in.



0743-319

■NOTE: Push down on the belt with the ruler only until the bottom of the belt flexes upward; then read the amount of deflection.

3. To correct drive belt deflection, remove the sheave adjuster from the clutch, remove or add shim washers to the adjuster, and install the adjuster.

■NOTE: Adding shim washers will decrease belt deflection; removing shim washers will increase belt deflection.

Drive Train (Bearcat/F-Series/T-Series)

Removing Gear Case/Track Driveshaft 6-13
Installing Track Driveshaft/Gear Case 6-15
Disassembling Gear Case 6-17
Cleaning and Inspecting Gear Case 6-20
Assembling Gear Case 6-20
Flushing Gear Case 6-23

REMOVING GEAR CASE/TRACK DRIVESHAFT

■NOTE: The gear case drive fluid does not have to be drained for this procedure.

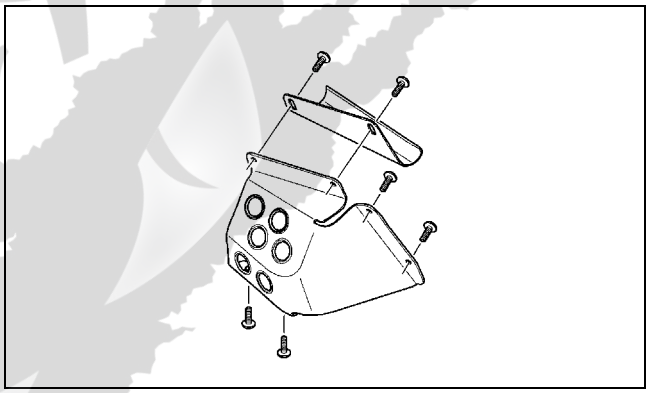
1. Remove the access panels from both sides of the snowmobile.
2. Engage the brake lever lock; then remove the cap screw securing the driven clutch to the input shaft. Remove the clutch from the shaft.



ZJ182A

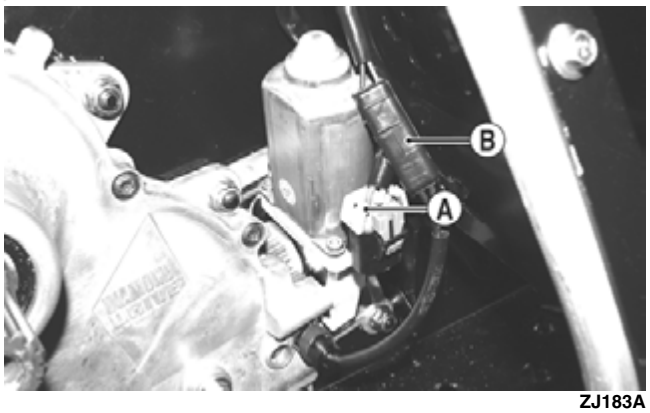
■NOTE: After removing the driven clutch, account for any alignment washers (if applicable). These washers must be used during installing.

3. On the F-Series/T-Series, remove the torx-head cap screws securing the toe shield and hook bracket to the chassis and remove the shield and bracket.



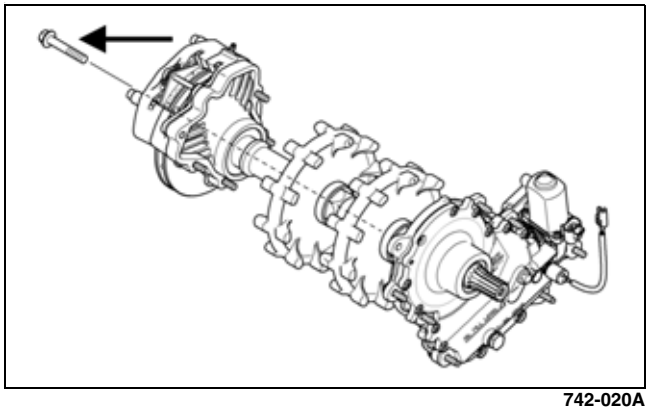
0742-089

4. On electronic reverse models, disconnect the plug-ins for the shift actuator (A) and the gear indicator switch (B).



ZJ183A

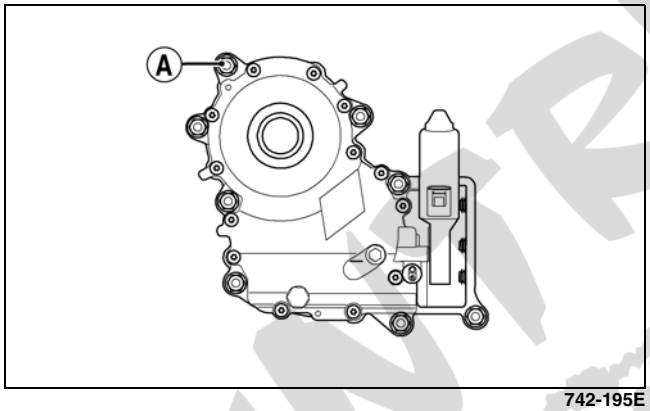
5. Loosen the cap screw (from the brake disc side of the inner driveshaft) securing the driveshaft to the gear case.



742-020A

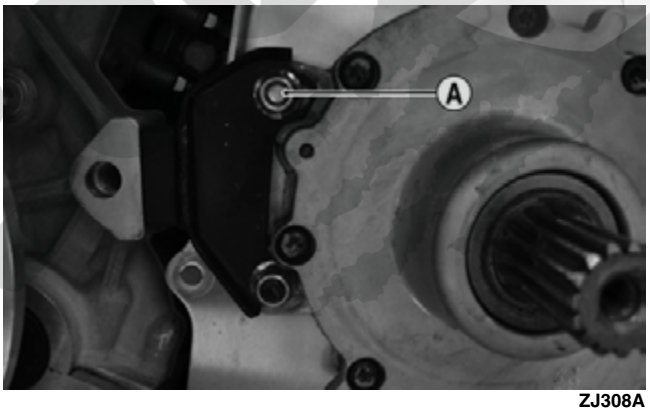
■**NOTE: If the gear case is being removed, do not remove the 5/8-in. cap screw. If only the track driveshaft is being removed, remove the cap screw and proceed to step 10.**

6. Remove the lock nuts securing the gear case to the chassis; then remove the remaining lock nut (A) from the torx-head cap screw.



742-195E

■**NOTE: On the Bearcat Z1/TZ1 after cap screw (A) is removed, account for the snubber bracket and the torx-head cap screw from the back-side of the chassis.**



ZJ308A

7. Place the snowmobile in the upright position; then using a 5/8-in. socket, long extension, and a hammer, tap against the driveshaft cap screw until the gear case is free from the studs of the mounting plate.

8. Remove the cap screw from the inner driveshaft (from step 5); then remove the gear case.

■**NOTE: If the gear case is difficult to remove, it may be necessary to loosen the track tension.**

■**NOTE: On the 2-stroke models, account for the torque bumper.**

9. Remove the hairpin clip and springs securing the resonator; then remove the resonator from the engine compartment.

■**NOTE: Remove the negative cable from the battery; then remove the positive cable. Remove the hardware securing the battery to the tray; then remove the battery.**

10. Remove the two cap screws securing the speedometer sensor bracket. Account for two spacers.



ZJ210A

11. Lock the brake lever; then using Brake Disc Socket Wrench, remove the retaining nut from the driveshaft.



ZJ211

12. Using the Rear Suspension Spring Tool, remove the spring from the adjusting cam.

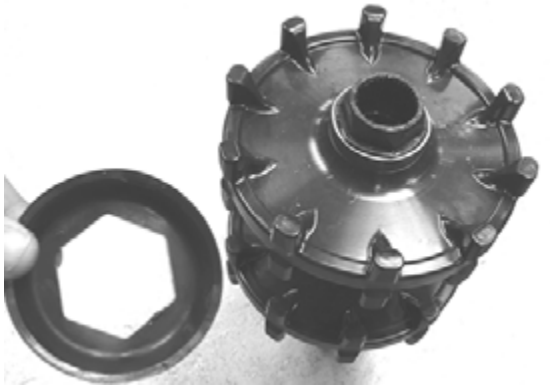
⚠ WARNING

Care must be taken when removing the spring or damage or injury could result.

13. On the F-Series/T-Series, remove the rear cap screws securing the skid frame to the tunnel; then slide the skid frame rearward far enough to drop the front arm out of the slider axle and remove the skid frame. Account for lock washers and flat washers.

14. On the Bearcat, remove all four cap screws and lock nuts (if applicable); then remove the skid frame.

15. With the gear case and skid frame removed, pull the driveshaft toward the gear case side of the tunnel until it clears the brake caliper housing; then remove the driveshaft. Account for the rubber seal.



ZJ212

■NOTE: The brake disc can remain locked in the brake caliper unless being serviced.

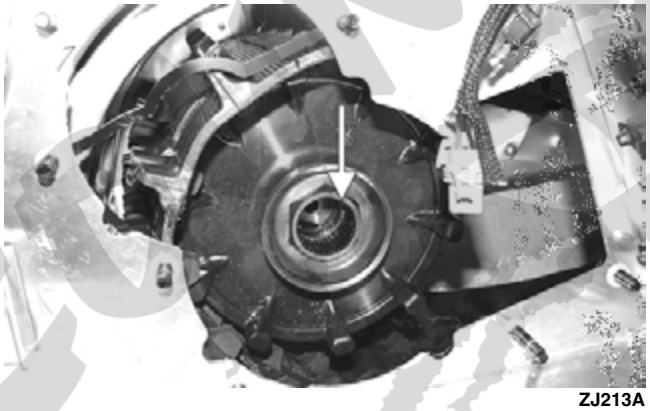
■NOTE: At this point if necessary, remove the track.

INSTALLING TRACK DRIVESHAFT/ GEAR CASE

■NOTE: At this point if the track was removed, install the track.

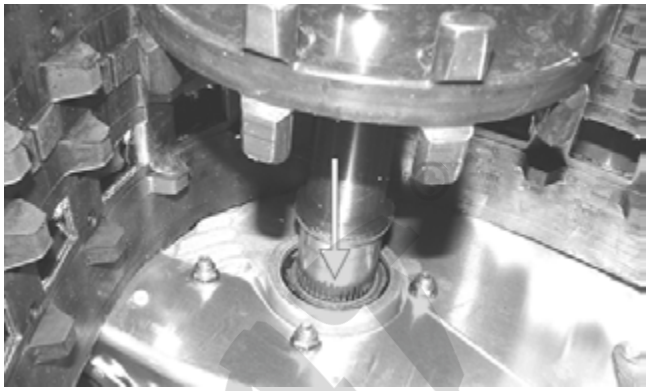
■NOTE: Steps 1-8 are for installing the track driveshaft. If only installing the gear case, proceed to step 9.

■NOTE: Prior to installing the driveshaft, apply a coat of Anti-Seize Thread Compound to the internal splines of the driveshaft.



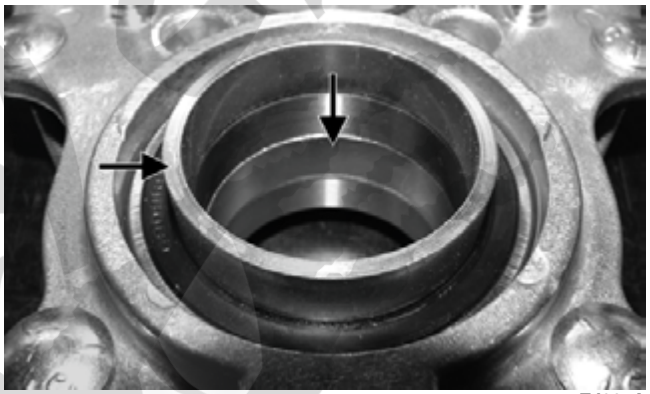
ZJ213A

1. If the brake disc was removed, place the track/driveshaft assembly into the bearing of the brake housing just far enough to allow the brake disc to be installed in the brake housing assembly.



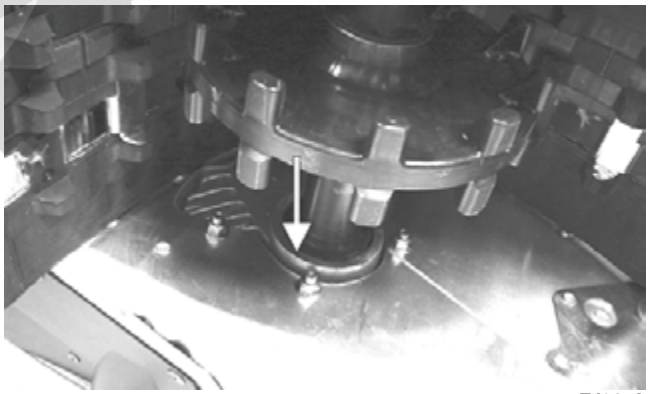
ZJ214A

■NOTE: Prior to installing the driveshaft, ensure the driveshaft sleeves are centered to the inner bore of the brake caliper housing.



ZJ307A

2. With the brake lever lock engaged and the brake disc correctly positioned in the brake housing assembly, properly align the splines of the driveshaft with the brake disc; then push the driveshaft the rest of the way into the brake housing until properly seated.



ZJ215A

3. Apply Anti-Seize Thread Compound to the threads of the brake disc retaining nut; then install the nut.

4. With the brake lever in the locked position, use Brake Disc Socket Wrench to tighten the brake disc retaining nut to 120 ft-lb.



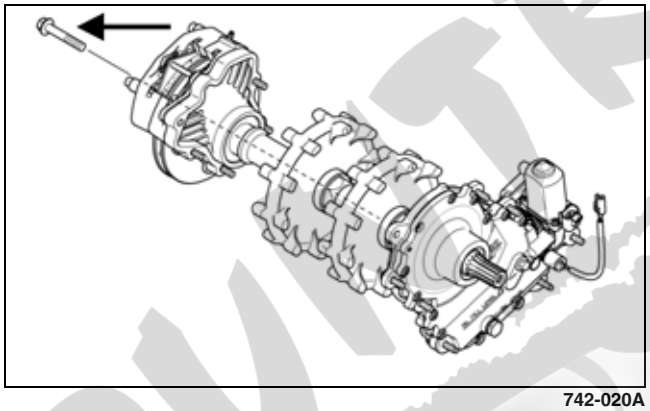
ZJ237

■**NOTE: After the retaining nut is tightened to specifications, peen the nut at the flat spot of the driveshaft.**

5. Install the speedometer sensor mounting bracket (with two spacers); then secure with the two cap screws. Tighten to 17 ft-lb.

■**NOTE: At this point, install and secure the battery; then connect the battery cables (positive cable first).**

6. If the gear case is installed, secure the driveshaft to the output shaft with the cap screw (coated with blue Loctite #243) and washer. Tighten to 70 ft-lb.



742-020A

■**NOTE: If the gear case is not installed, do not secure the driveshaft to the output shaft at this time. Proceed to step 7.**

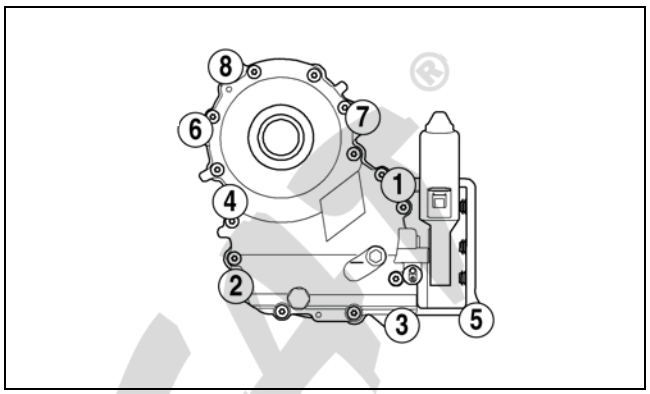
7. Place the resonator into position and secure with the springs and hairpin clip.
8. Install the skid frame (see Section 7).

■**NOTE: At this point if the gear case is installed, proceed to step 22 to finish installing the track driveshaft.**

9. Place the gear case onto the driveshaft; then press the gear case toward the sprocket until it properly seats into place on the chassis. It may be necessary to rotate the driveshaft slightly for proper seating.

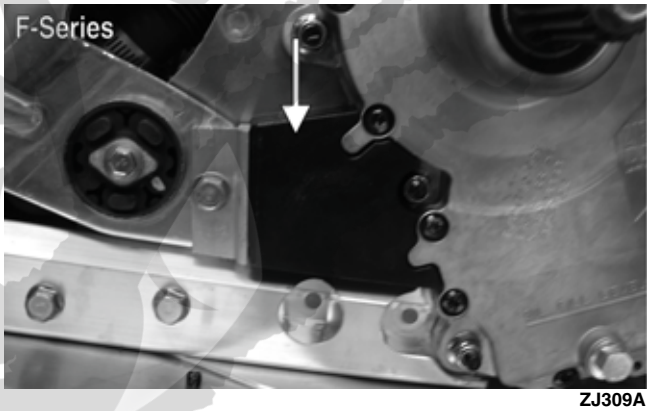
■**NOTE: Prior to placing the gear case onto the driveshaft, apply a light coat of Anti-Seize Thread Compound to the splines of the driveshaft.**

10. Secure the gear case by installing the lock nuts; then using the pattern shown, evenly tighten all the nuts to 20 ft-lb.



742-195B

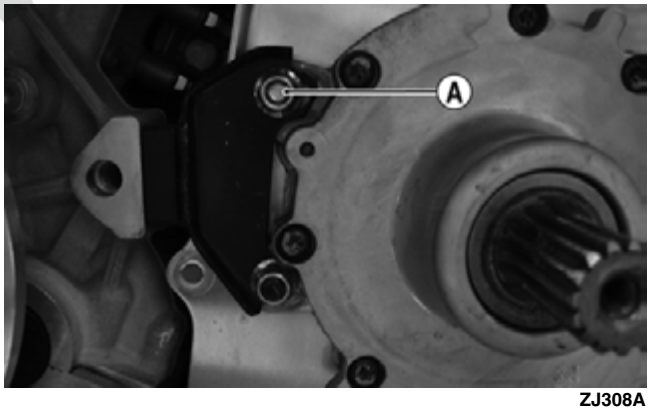
11. On the 2-stroke, install the torque bumper behind the engine mounting bracket; then carefully work it into place with the aid of a flat-blade screwdriver.



ZJ309A

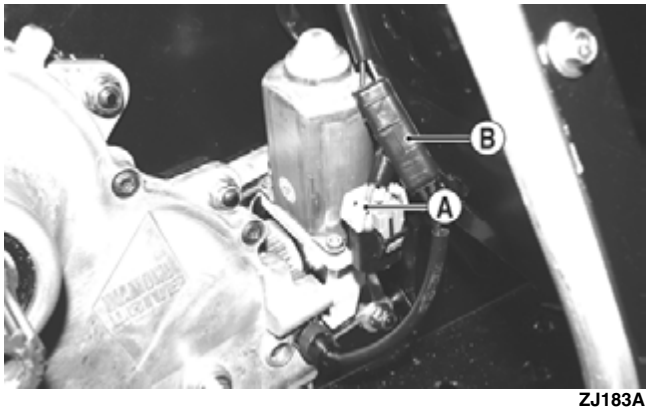
■**NOTE: Use of a quality silicone spray will aid in installing the torque bumper.**

12. On the Bearcat Z1/TZ1, install the torx-head cap screw (A) from the back-side of the chassis; then install the snubber bracket.



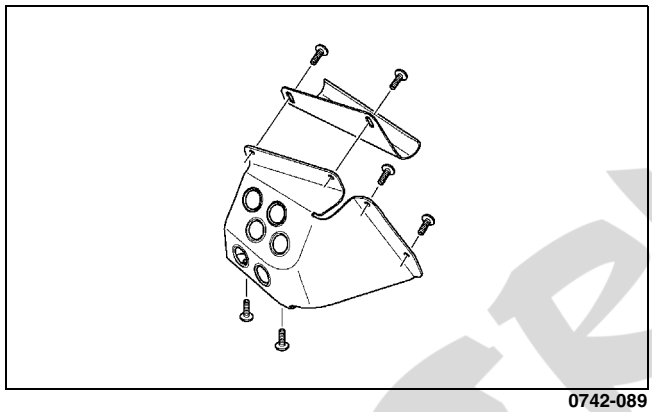
ZJ308A

13. On the electronic reverse models, connect shift actuator harness (A) and gear indicator switch harness (B).



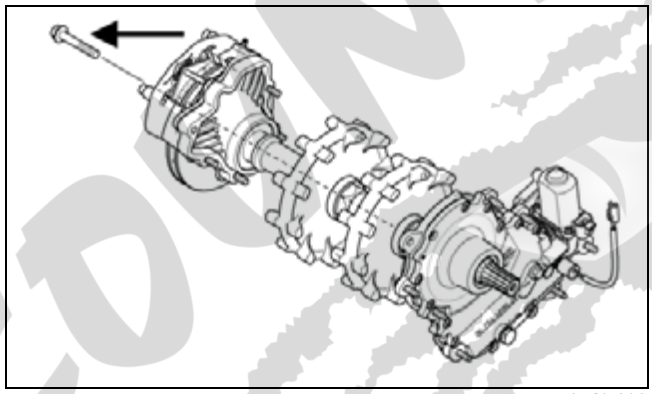
ZJ183A

14. Install the toe shield and toe hook bracket; then install the torx-head cap screws. Tighten securely.



0742-089

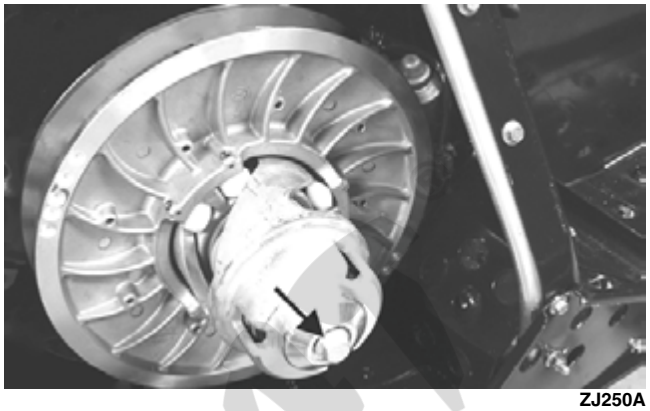
15. Install the cap screw (coated with blue Loctite #243) securing the driveshaft to the gear case; then tighten to 70 ft-lb.



0742-020

16. Slide the driven clutch onto the input shaft making sure alignment washers are in place (if applicable).

17. Secure the driven clutch with components and hardware as noted in removing. Tighten to 32 ft-lb.



ZJ250A

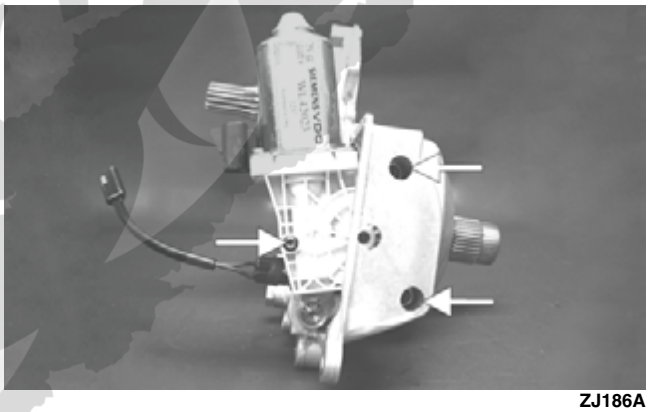
18. Install the drive belt (see Drive Belt in this section).

19. Check the track for alignment and recommended tension; then tighten the cap screws securely (see Track Tension and Track Alignment in this section).

20. Install and secure the access side panels.

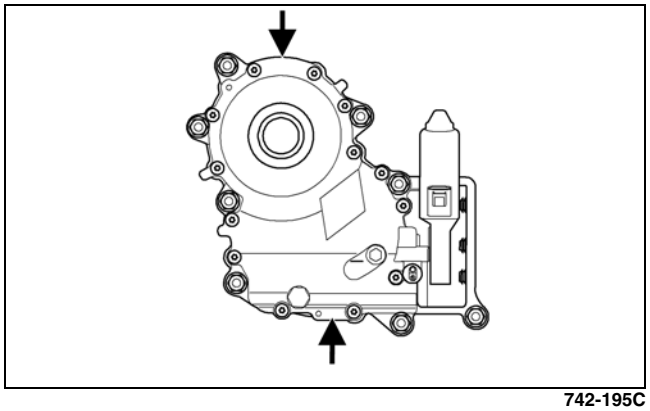
DISASSEMBLING GEAR CASE

1. On electronic reverse models, remove the three torx-head cap screws securing the shift actuator to the gear case and remove the actuator; then remove the gear indicator switch.



ZJ186A

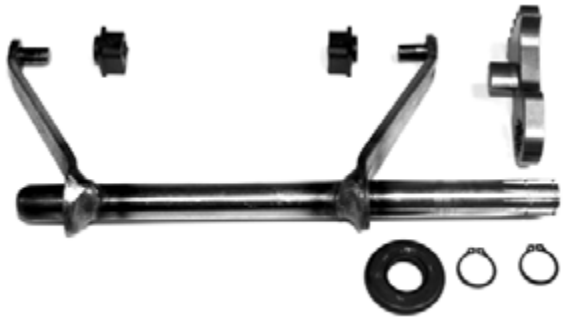
2. Remove the torx-head cap screws securing the gear case cover to the gear case assembly; then insert two flat-blade screwdrivers into the slots on the gear case. Working back and forth, pry the cover up and off the gear case. Discard the gasket.



742-195C

3. Drain the gear case fluid into a suitable container.

4. Remove the shift fork assembly; then remove the retaining ring securing the shift fork arm to the shaft and remove the arm. Account for the retaining rings, O-ring, and slider blocks.



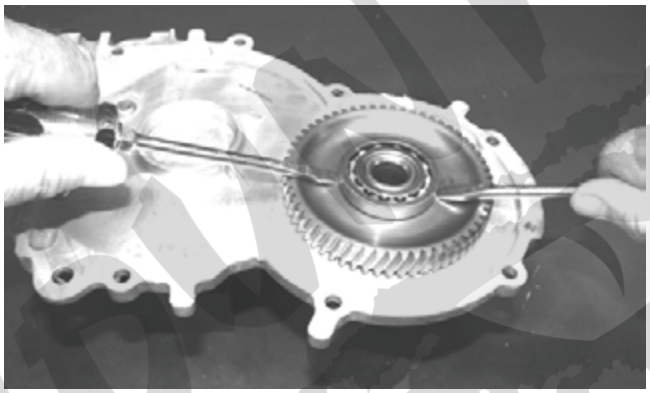
ZJ300

■**NOTE: For assembling purposes, note the position of the slider blocks on the shift fork arm.**

CAUTION

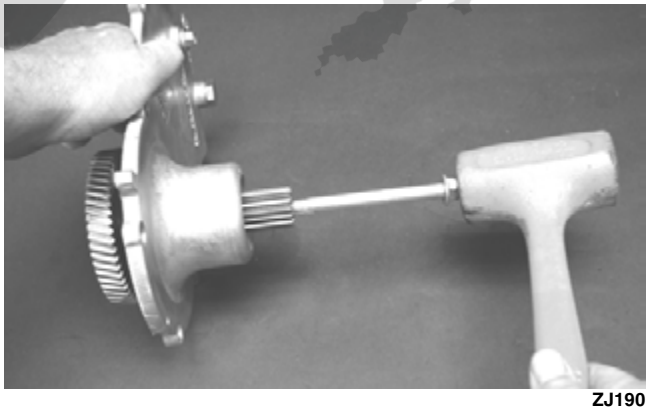
If the input shaft bearing is removed, always replace it with a new one or severe component damage may occur.

5. Secure the gear case cover in a suitable clamping device; then using two flat-blade screwdrivers from opposite sides of the cover bearing, evenly pry the input shaft bearing up and off the shaft.



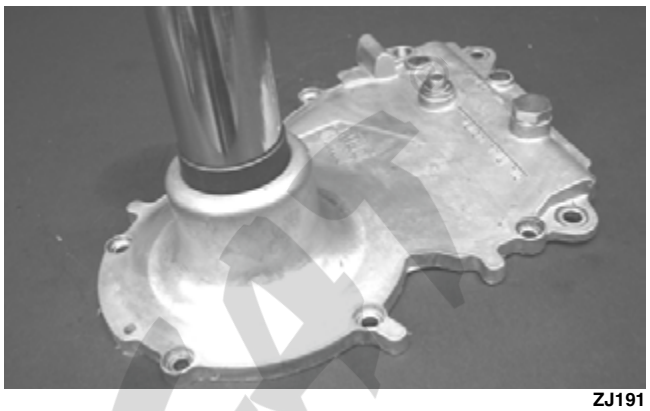
ZJ189

6. With a cap screw threaded into the input shaft and using a soft hammer, drive the input shaft out of the gear case cover.



ZJ190

7. Using a suitable bearing press and fixture, press the input shaft bearing out of the gear case cover. Account for a bearing and a seal.

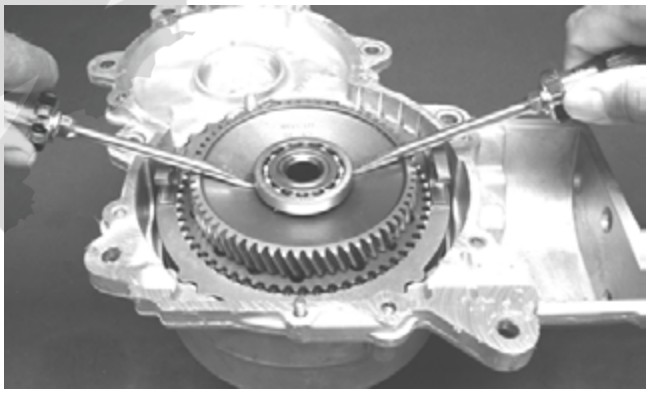


ZJ191



MS331

8. Secure the gear case in a suitable clamping device; then using the procedure from step 5, remove the outer bearing from the transfer gear.

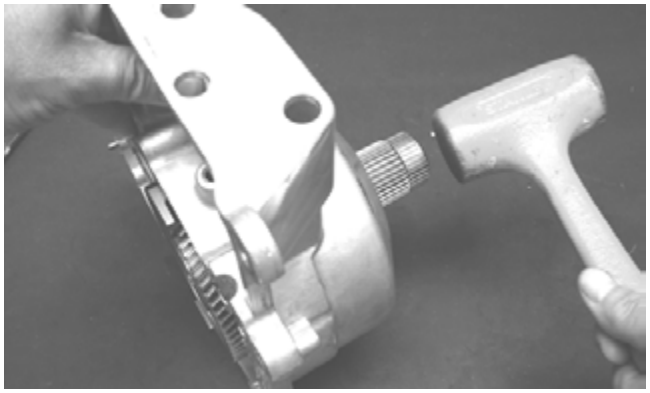


ZJ192

CAUTION

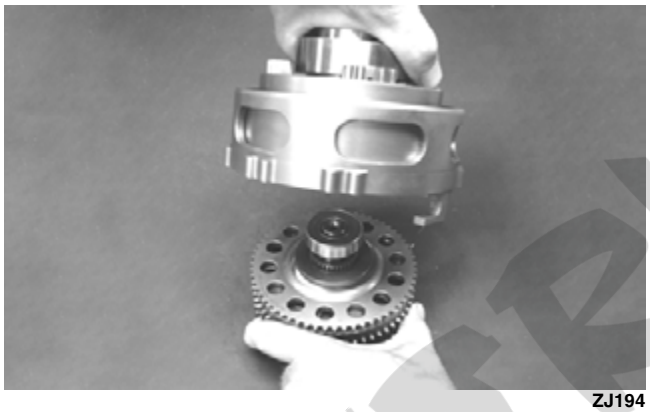
If any transfer gear bearings are removed, always replace them with new ones or severe component damage may occur.

9. Place the gear case on its side; then using a soft hammer, tap the output shaft until the slider and output gear assembly come free of the gear case.



ZJ193

10. Remove the output gear assembly from the slider housing.



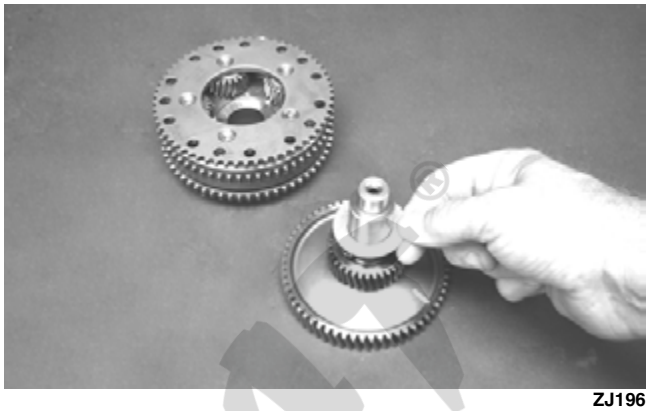
ZJ194

11. Using a suitable bearing puller, remove the inner bearing from the transfer gear assembly. Account for a spacer washer.



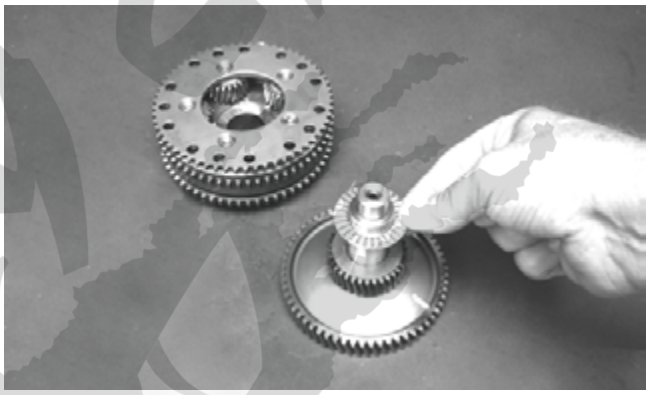
ZJ195

12. Remove the transfer gear from the planetary gear assembly and account for the thrust washer and thrust bearing.



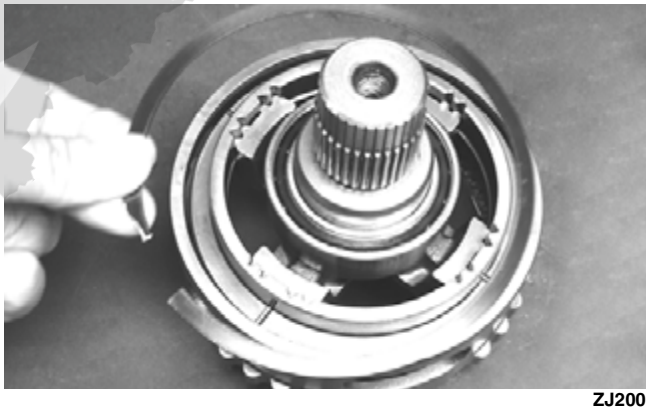
ZJ196

■**NOTE: For assembling purposes, note that the thrust bearing is positioned between the thrust washer and the gear assembly.**



ZJ197

13. Remove the retaining ring and thrust washer securing the slider housing assembly to the output shaft assembly.



ZJ200

14. Using a suitable puller, remove the bearing from the output shaft.

15. Using a suitable seal removing tool, remove the output/input shaft seals from the gear case.



ZJ204

CLEANING AND INSPECTING GEAR CASE

■NOTE: The planetary gear assembly is a non-serviceable component. If any damage or wear is detected, it must be replaced.

1. Wash the gear case halves and unsealed bearing in parts-cleaning solvent.
2. Inspect the gear case halves for trueness, scoring, pitting, scuffing, or any imperfections in the casting.
3. Inspect all threaded areas for damaged or stripped threads.
4. Inspect the bearing areas for cracks or excessive bearing movement. If evidence of excessive bearing movement is noted, replace the component.
5. Inspect the gears for wear, cracks, or chipped teeth.
6. Inspect the input shaft/transfer gear bearings for wear, scoring, scuffing, damage, or discoloration. Rotate the bearings. Bearings must rotate freely and must not bind or feel rough. If any abnormal condition is noted, replace the bearing.

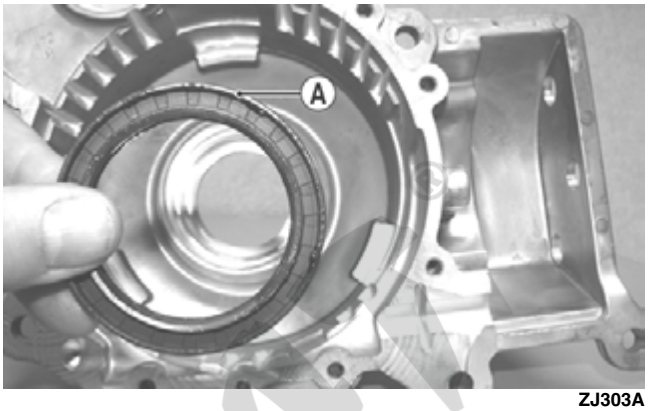
■NOTE: The output shaft bearing is a non-serviceable component. If any damage or binding is noted, the output shaft assembly must be replaced.

7. Apply a light film of Arctic Cat Synthetic ACT Drive Fluid to the unsealed bearings prior to assembling.

ASSEMBLING GEAR CASE

1. With the narrow, raised edges of the seal (A) facing outward and using an appropriate seal installation tool, install the oil seal into the output shaft opening of the gear case.

■NOTE: Grease must be applied to the seal prior to installing.

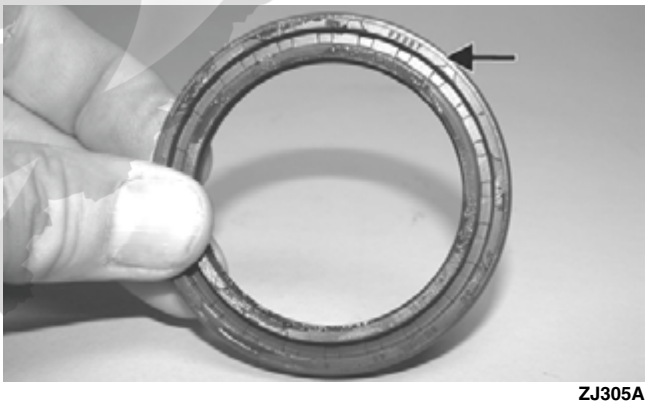


ZJ303A



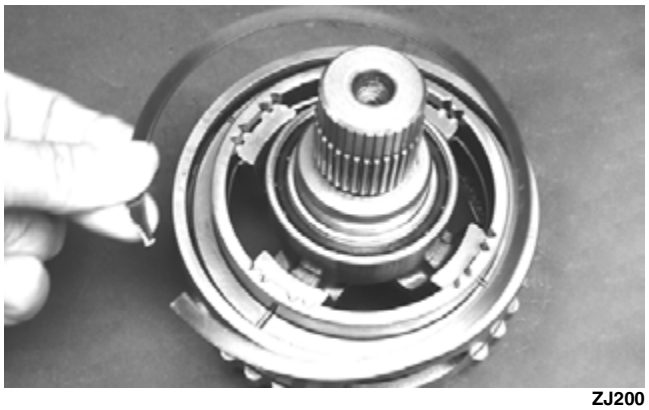
ZJ304

■NOTE: Always install the seal with the wide, raised edge of the seal facing against the seal surface of the gear case.



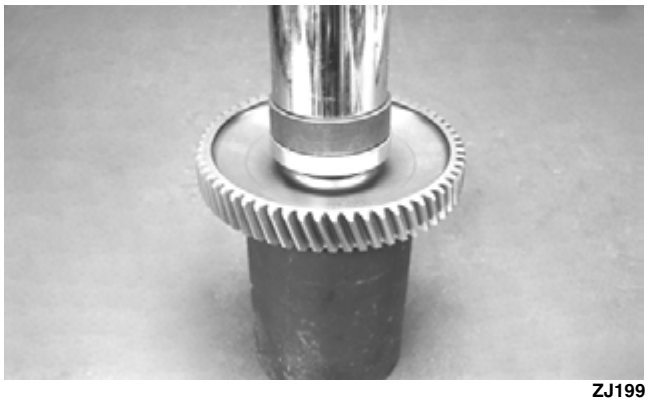
ZJ305A

2. Place the output shaft assembly into position in the slider housing; then secure the assembly to the housing with the thrust washer and retaining ring.



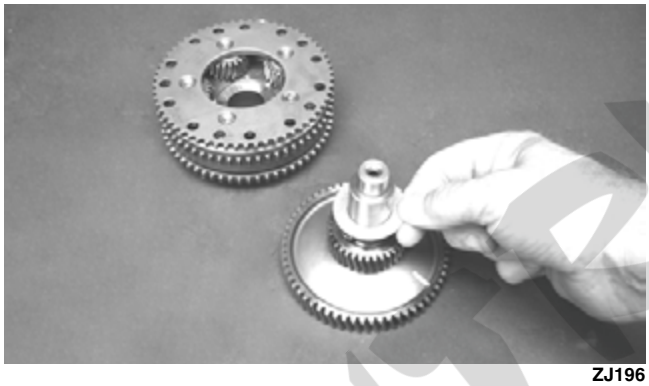
ZJ200

3. Using a suitable bearing press, install the bearing onto the ring gear.

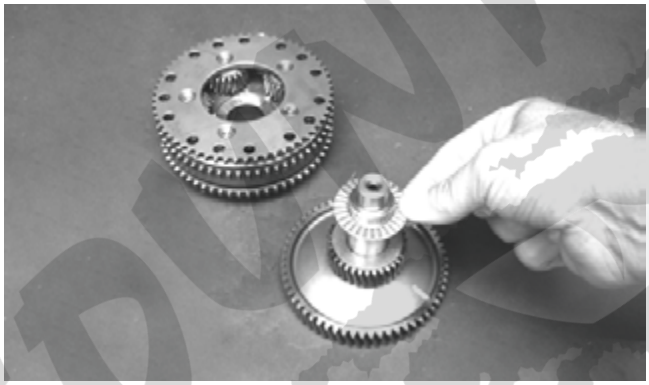


ZJ199

4. In order, install the thrust washer and then the thrust bearing onto the transfer gear shaft.



ZJ196



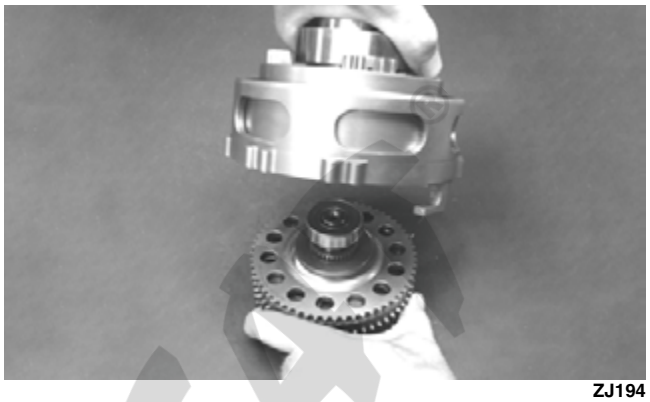
ZJ197

5. Position the planetary gear assembly onto the transfer gear shaft; then install the spacer washer. Using a suitable press, install the inner bearing onto the transfer gear shaft.



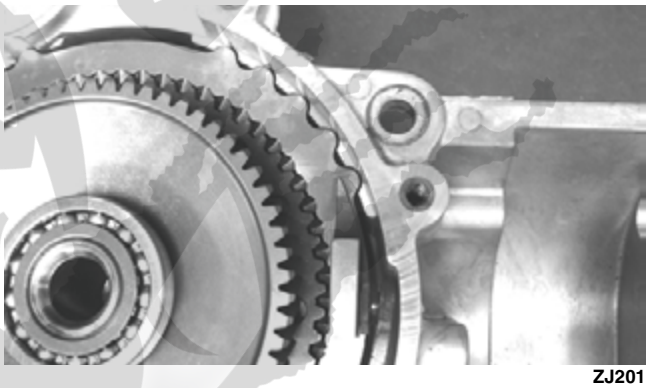
ZJ208

6. Install the output gear assembly into the slider assembly until the inner bearing is properly seated.



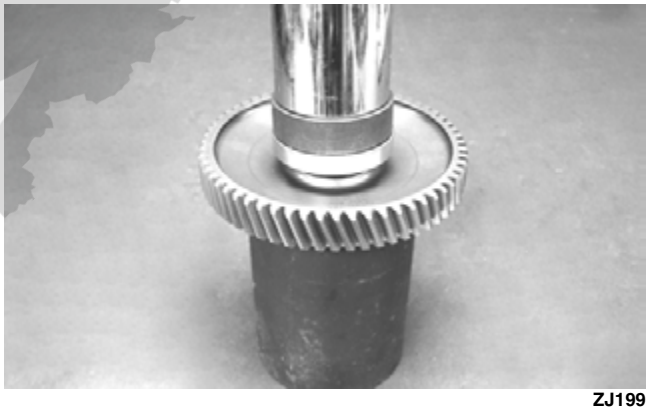
ZJ194

7. With the alignment notches of the slider and gear case properly positioned, install the slider/output gear assembly into the gear case.



ZJ201

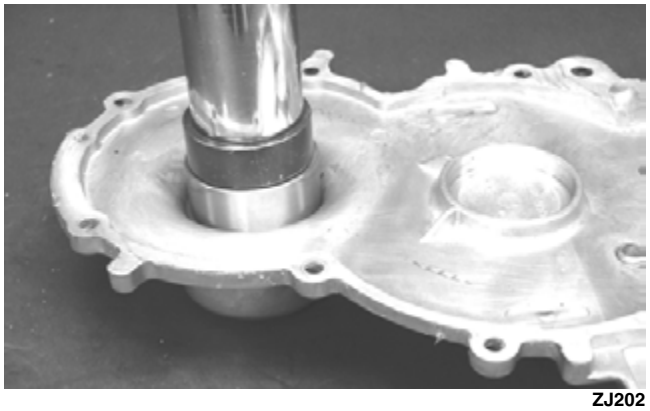
8. Using a suitable bearing press, install the outer bearing onto the transfer gear shaft.



ZJ199

9. Using a suitable bearing press and fixture, install the input shaft bearing to the gear case; then install the oil seal.

■NOTE: A light coat of grease must be applied to the seal prior to installing.

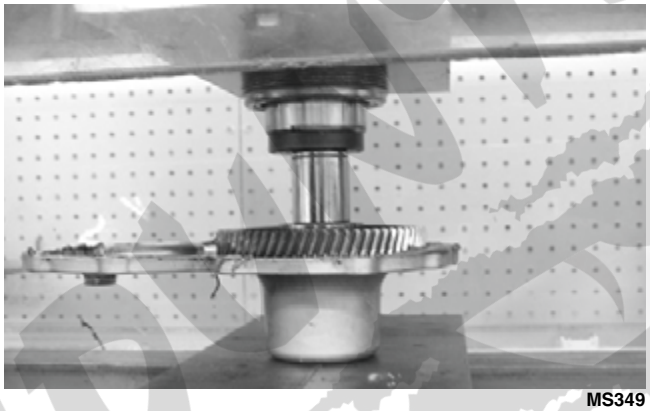


ZJ202



ZJ204

10. Using a suitable press, install the input shaft to the gear case cover.

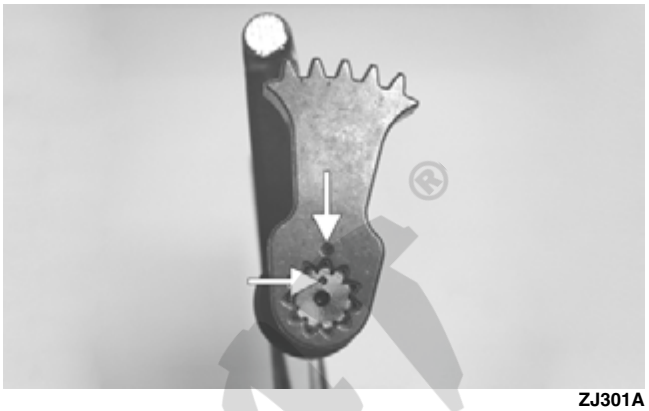


MS349

11. Install the first retaining ring onto the shift fork shaft; then install a new oil seal.

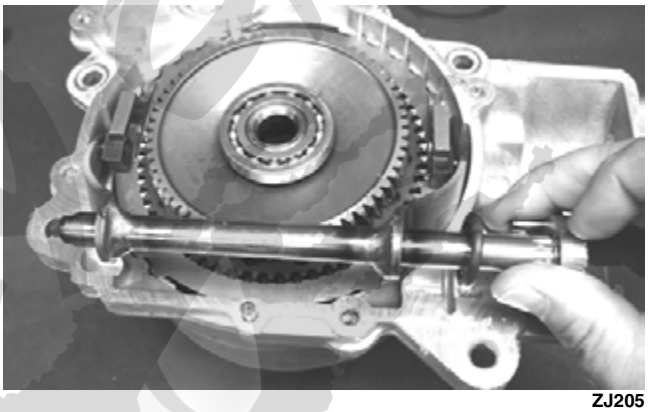
■NOTE: Apply a film of grease to the oil seal prior to installing.

12. With the alignment marks properly positioned, install the shift fork arm to the shaft. Secure the arm with the remaining retaining ring.



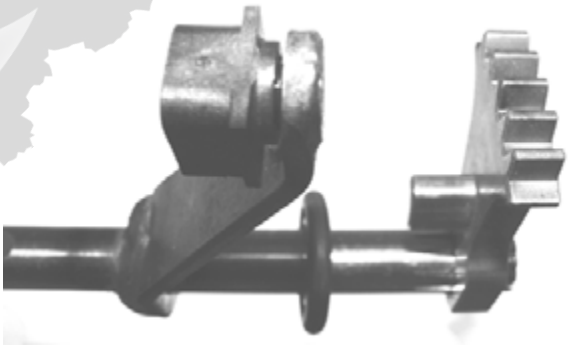
ZJ301A

13. Install the slider blocks to the shift fork assembly; then install the fork assembly into the slider and gear case.



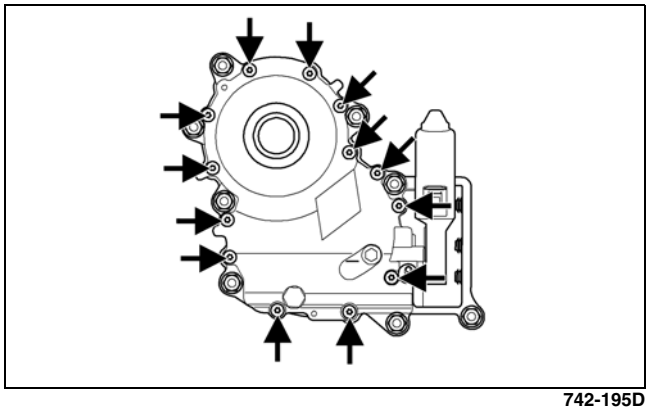
ZJ205

■NOTE: Make sure to install the slider blocks with the rounded end up and the raised edges facing to the outside of each other.



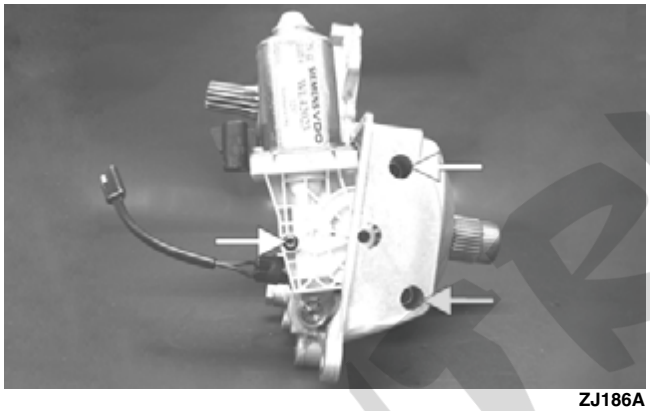
ZJ302

14. With the dowel pins and new gasket in place, install the cover to the gear case and secure with the torx-head cap screws; then in a crisscross pattern, tighten to 100 in.-lb.



742-195D

15. Install the shift actuator and secure with the three torx-head cap screws. Tighten to 41 in.-lb. On electronic reverse models, install the gear indicator switch; then tighten securely.



ZJ186A

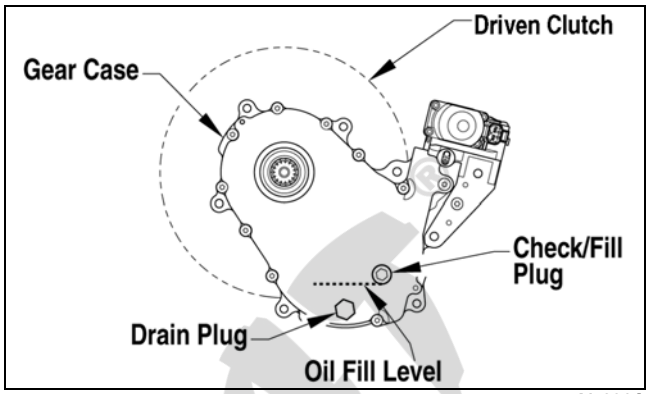
16. Pour 12 fl oz of Arctic Cat Synthetic ACT Drive Fluid into the drain/fill hole; then install the plug. Tighten to 12 ft-lb.

CAUTION

Do not add more or less than the recommended amount of drive fluid to the gear case or damage to the gear case will occur.

FLUSHING GEAR CASE

1. Remove the access panels; then remove the belt guard.
2. Remove the drive belt (see Drive Belt in this section); then remove the driven clutch.
3. Tip the snowmobile onto its right side and use a suitable support to protect the snowmobile from the floor.
4. Remove the drain plug from the gear case; then install a drain adapter fitting with hose into the drain plug hole.



741-636A

■NOTE: To aid in draining the lubricant, it is advisable to fashion a drain adapter by using the Gear Case Drain Fitting and a length of 3/8-in. hose.

5. Tip the snowmobile back to the upright position; then place a drain pan on the floor next to the drain hose and tip the snowmobile toward its left side far enough to allow the lubricant to drain from the gear case into the drain pan.

■NOTE: It is critical that the snowmobile is on a level surface to ensure the lubricant drains properly and completely.

6. Secure the snowmobile in this position until the lubricant is completely drained.

CAUTION

All old lubricant must be drained from the gear case prior to flushing the gear case.

7. When the lubricant has completely drained from the gear case, tip the snowmobile back to the upright position, remove the drain adapter, and install and securely tighten the drain plug; then remove the check/fill plug.
8. Pour the recommended amount of Arctic Cat ACT Drive Flush Fluid into the check/fill hole; then install the plug. Tighten securely.

CAUTION

Do not add more or less than the recommended amount of flush fluid to the gear case.

9. Install the driven clutch and tighten to 32 ft-lb; then install the drive belt (see Drive Belt sub-section) and the belt guard.
10. Install the access panels.
11. Using a shielded safety stand, raise the rear of the snowmobile off the floor making sure the track is free to rotate.

⚠ WARNING

DO NOT stand behind the snowmobile or near the rotating track. NEVER run the track at high speed when the track is suspended.

12. Start the engine and accelerate slightly. Use only enough throttle to turn the track several revolutions. SHUT ENGINE OFF.
13. Remove the access panels; then remove the belt guard.
14. Remove the drive belt (see Drive Belt sub-section); then remove the driven clutch.
15. With the stand in place, tip the snowmobile onto its right side.
16. Remove the drain plug from the gear case; then install the drain adapter fitting with hose into the drain plug hole.
17. Tip the snowmobile back to the upright position; then place a drain pan on the floor next to the drain hose and with the stand in place, tip the snowmobile toward its left side far enough to allow the flush fluid to drain from the gear case into the drain pan.
18. Secure the snowmobile in this position until the flush fluid is completely drained.

CAUTION

All flush fluid must be drained from the gear case prior to filling with new lubricant.

19. When the fluid has completely drained from the gear case, tip the snowmobile back to the upright position, remove the drain adapter, and install and tighten the drain plug to 12 ft-lb; then remove the check/fill plug.

CAUTION

The correct lubricant to use in the gear case is Arctic Cat Synthetic ACT Gear Case Fluid. Any substitute may cause serious damage to the drive system.

20. Pour the exact amount (see appropriate specification sheet) of Arctic Cat Synthetic ACT Gear Case Fluid into the check/fill hole; then install the plug. Tighten to 12 ft-lb.

CAUTION

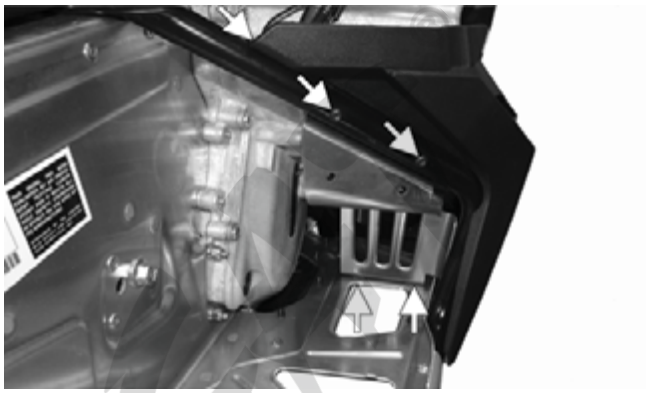
Do not add more or less than the recommended amount of lubricant to the gear case or damage to the gear case will occur. Oil level should be at the Oil Fill Level on the gear case cover.

21. Install the driven clutch and tighten to 32 ft-lb; then install the drive belt (see Drive Belt sub-section) and the belt guard.
22. Install and close the access panels.

Drive Train (F/M/XF 800)

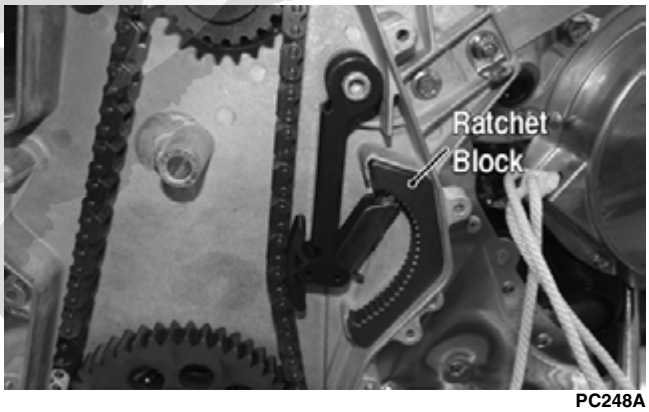
REMOVING CHAIN CASE/DRIVEN SHAFT/DRIVESHAFT/TRACK

1. Remove the left- and right-side panels, hood; then loosen the retaining pin securing the lower console to the skid panels and secure out of the way.
2. Remove the resonator; then remove the right-side footrest.
3. Remove the torx-head screw securing the belly pan to the right-side footrest support.



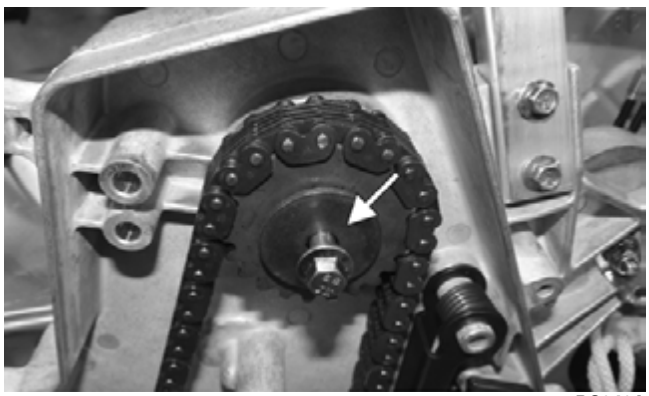
SNO-753A

4. Disconnect the speed sensor connector.
5. Place a drain pan under the right-side skid plate under the chain case; then loosen the eleven screws securing the chain case cover/oil tank assembly to the chain case housing starting with the bottom screws first.
6. Remove the chain case cover/oil tank and set out of the way leaving the oil hose connected.
7. Release tension on the chain tensioner; then remove the ratchet block. The tensioner does not need to be removed.



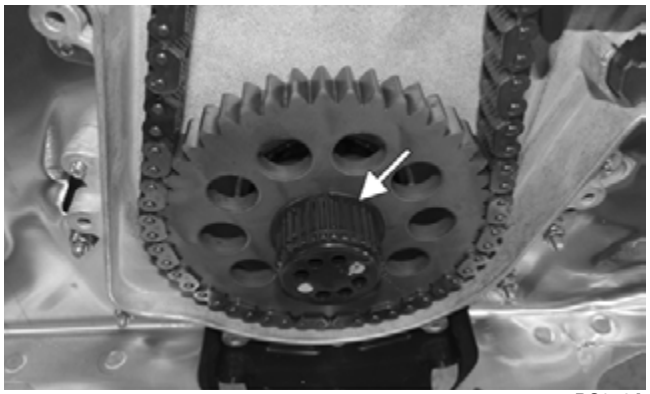
PC248A

8. Remove the cap screw and washer securing the upper sprocket to the driven shaft.



PC249A

9. Remove the retaining ring securing the lower sprocket. Remove the sprocket and chain.

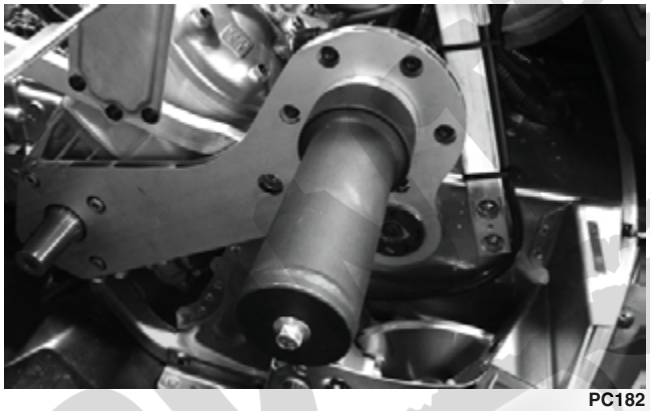


PC250A

■**NOTE: If the driven shaft and driveshaft will be serviced, proceed to Cleaning and Inspecting Chain Case. If bearings and chain or case assembly are to be replaced, remove the driven clutch; then proceed to step 10.**

10. Remove the drive and driven clutches.

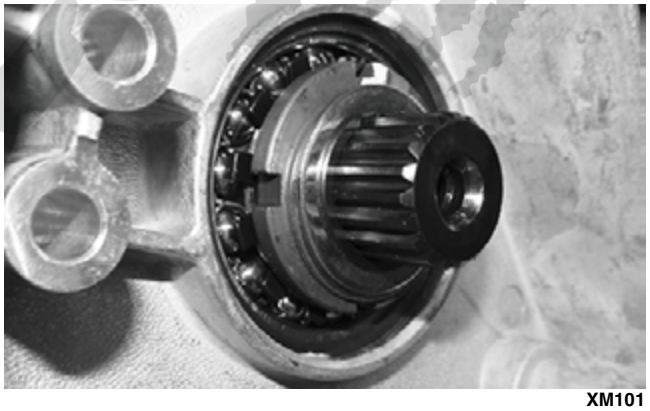
11. Install Deep Socket to support the bearing housing and secure with the driven clutch cap screw.



PC182

12. Remove the four screws securing the PTO engine mount plate to the engine.

13. Remove the retaining ring; then remove the flat washers from the driveshaft.



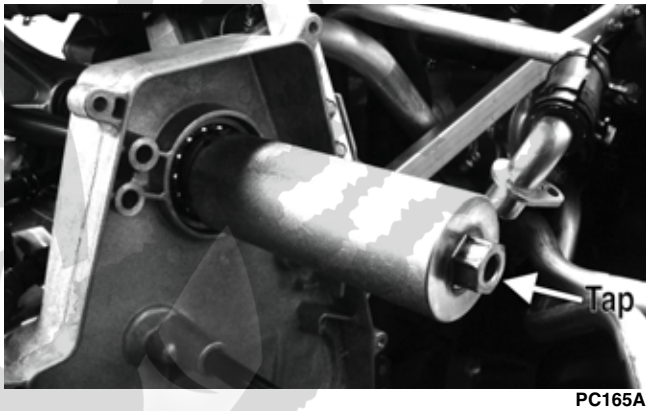
XM101

13. Bend the locking tab out of the ring nut.



XM093

14. With the Socket, loosen (but do not remove) the ring nut; then lightly tap the socket to disengage the adapter sleeve from the driveshaft. Do not remove completely.



PC165A

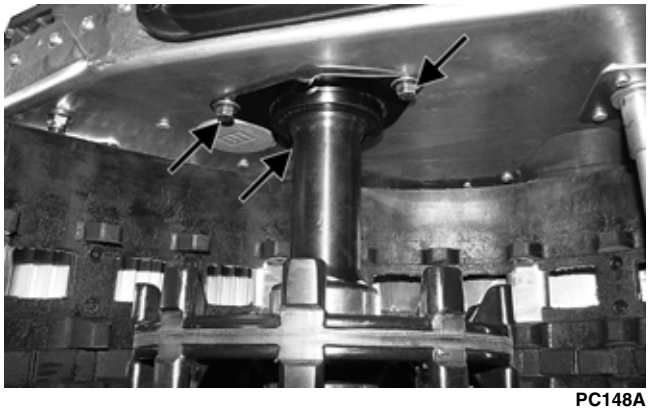
15. Remove the inner retaining ring; then from the left side carefully remove the driven shaft assembly keeping the bearing 90° to the shaft.

16. Remove the skid frame assembly (see Section 7).

17. Remove the brake shield and the left-side footrest.

■**NOTE: DO NOT split the brake caliper unless necessary service work is required.**

18. Remove the cap screws securing the inner caliper to the tunnel; then remove the inner caliper.



PC148A

19. Pull the driveshaft out to the left; then drop out of tunnel right side first.

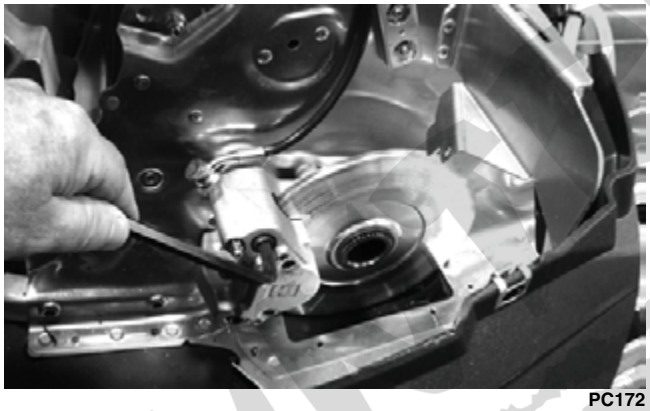


PC14

■**NOTE: If the caliper does not remove from the driveshaft easily, proceed to step 20.**

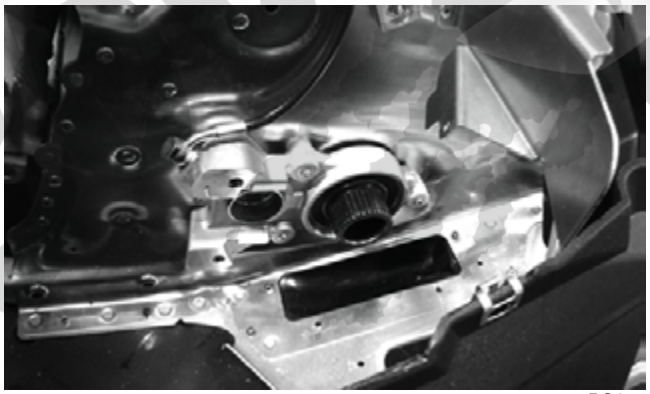
20. Remove the brake pads; then remove the outer brake caliper. Account for a rubber seal.

■**NOTE: Place an absorbent towel under the caliper to absorb slight amount of brake fluid. Do not compress the brake lever.**



PC172

21. Remove the retaining ring securing the brake disc to the driveshaft and remove the brake disc.



PC175

■**NOTE: It may be necessary to use Brake Caliper Bearing Puller to remove the caliper/bearing assembly.**



PC151

■**NOTE: If the chain case needs to be removed, remove all self-tapping screws and machine screws with lock nuts.**

CLEANING AND INSPECTING CHAIN CASE

1. Inspect sprockets and chain(s) for excessive wear or stretching.



PC159

2. Inspect bearings and gears for roughness or chipping.

■**NOTE: If bearing replacement is necessary, the chain case must be removed from the tunnel and an appropriate press utilized to remove and install bearings.**

3. Clean all interior chain case surfaces and components in cleaning solvent and dry using compressed air.

⚠ WARNING

Always wear safety glasses when using compressed air.

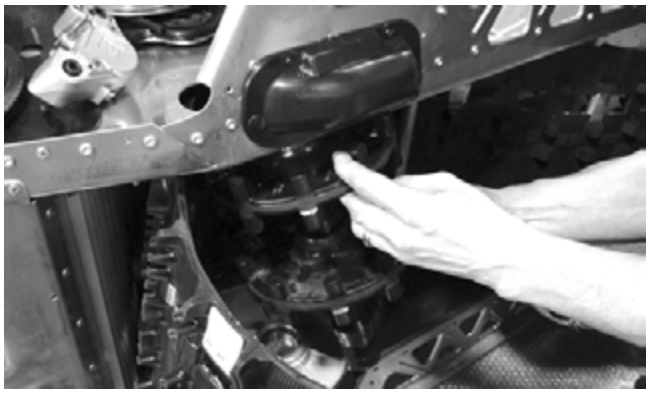
ASSEMBLING/INSTALLING CHAIN CASE/DRIVEN SHAFT/DRIVESHAFT/ TRACK

If the driveshaft and driven shaft were not removed, proceed to step 12.

1. Install chain case assembly onto the chassis and secure with six self-tapping screws and four machine screws with lock nuts. Tighten the self-tapping screws to 144 in.-lb.

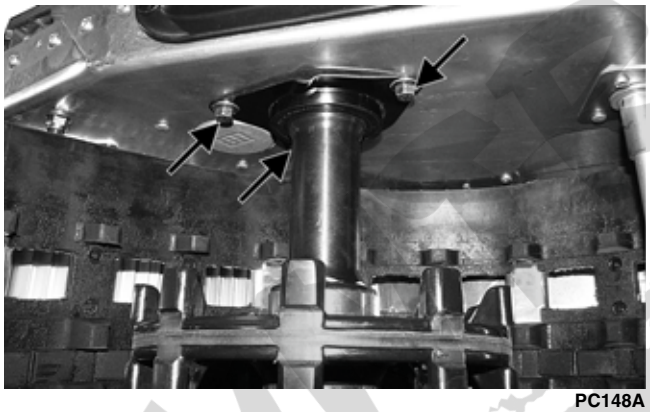
■**NOTE: If an existing chain case is being reinstalled, tighten the self-tapping screws to 105 in.-lb.**

2. Place the driveshaft/drive sprocket assembly into the tunnel brake-end first; then into the chain case driveshaft bearing.



PC147

3. Install the inner brake caliper assembly and secure with three cap screws and the retaining ring. Tightened cap screws securely.



PC148A

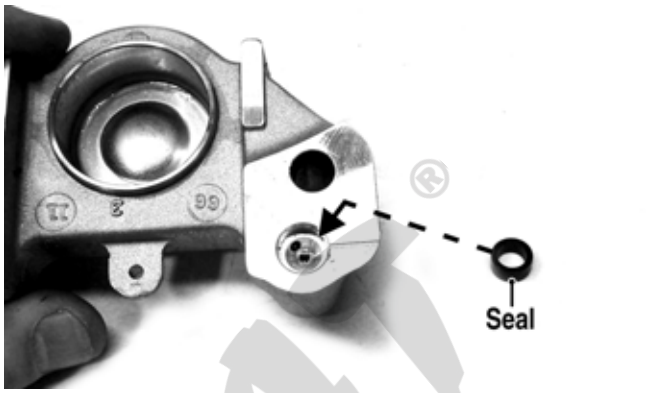
■**NOTE: If the brake caliper was split, proceed to step 4. If not, proceed to step 6.**

4. Install the brake disc and secure with the retaining ring.



PC 150

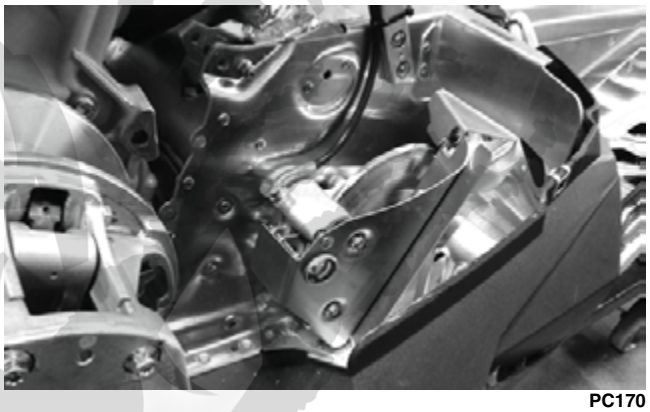
5. Making sure the seal is correctly installed in the outer brake caliper, install on the inner caliper and secure with two cap screws. Tighten to 25 ft-lb.



PC173A

6. Install the skid frame (see Section 7).

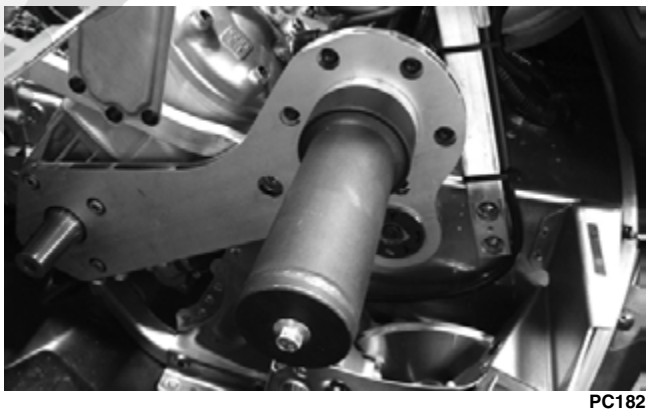
7. Install the brake shield and left-side footrest. Tighten the cover cap screws to 8 ft-lb.



PC170

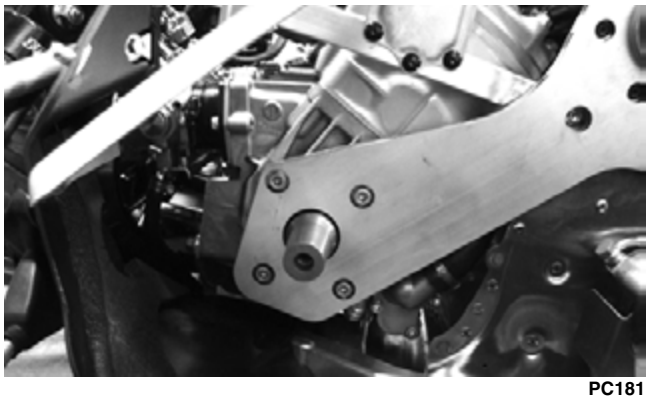
■**NOTE: Bleed the brake system if the brake caliper was split in this section.**

8. Install the driven shaft from the left-side making sure the bearing remains at 90° to the shaft.



PC182

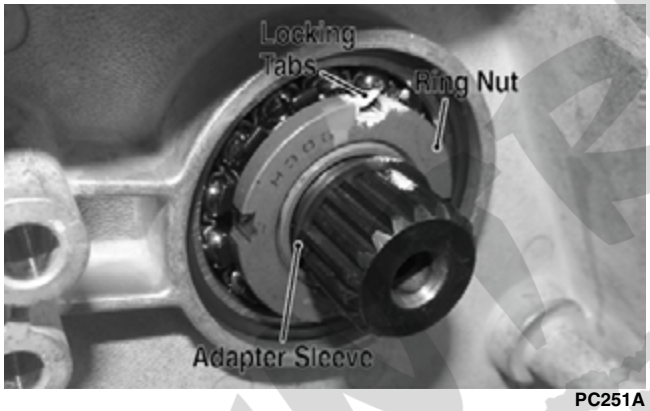
9. Secure the PTO-side engine mounting plate to the crankcase with four cap screws (coated with blue Loctite #243). Tighten to 30 ft-lb.



PC181

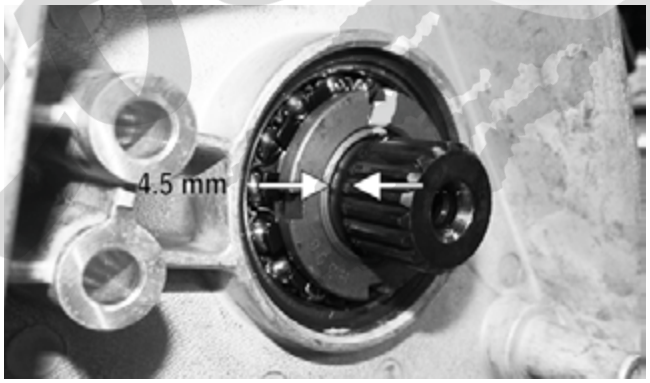
10. Install the drive clutch and tighten the clutch cap screw to 51 ft-lb; then install the driven clutch and drive belt. Tighten to 20 ft-lb and install the belt guard.

11. Tighten the adapter sleeve onto the driven shaft bearing with the ring nut. Tighten to 50 ft-lb; then bend a tab on the locking washer into one of the slots in the nut.



PC251A

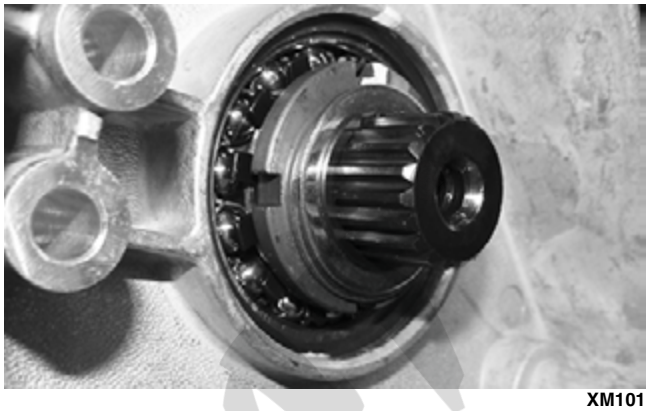
■NOTE: Make sure there is approximately 4.5 mm gap between the retaining ring groove and the adapter sleeve. This ensures the driven shaft is installed correctly.



XM100A

■NOTE: If no tabs align with the slots, tighten until one aligns; then bend tab to lock nut.

12. Install the existing flat washers between the ring nut and the adaptor sleeve groove; then install the existing retaining ring.

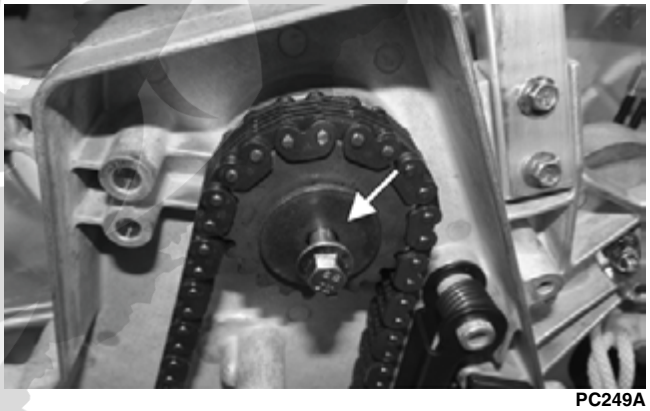


XM101

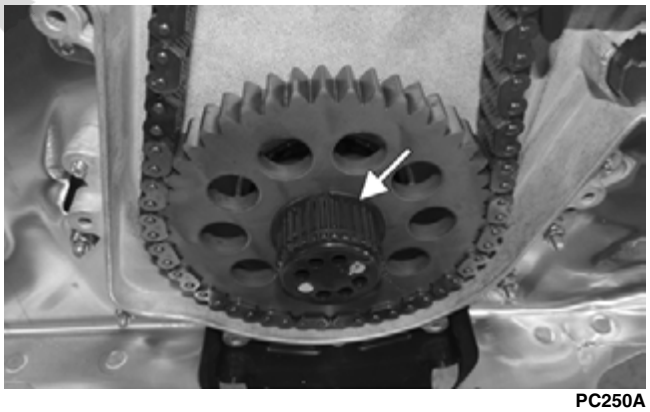
■ NOTE: The correct combination of washers need to stack up to take up the space in between the adapter sleeve and the retaining ring, yet small enough for the retaining ring to secure properly and the washers to rotate freely.

13. Secure the lower/upper sprocket with the chain to the driveshaft with the retaining ring and the upper sprocket to the driven shaft with a spring washer and cap screw (coated with blue Loctite #243). Tighten to 25 ft-lb.

■NOTE: Make sure washer is cupped toward the sprocket.

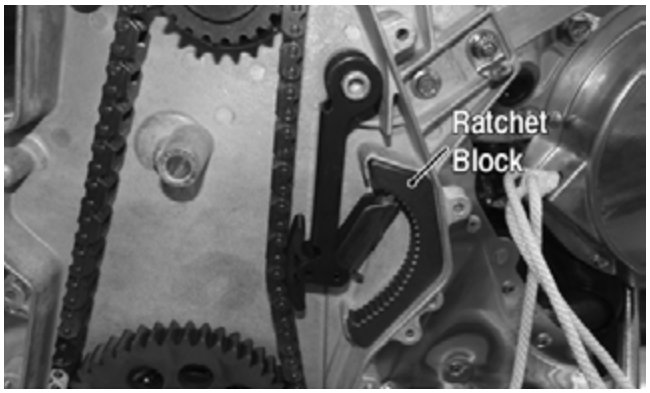


PC249A



PC250A

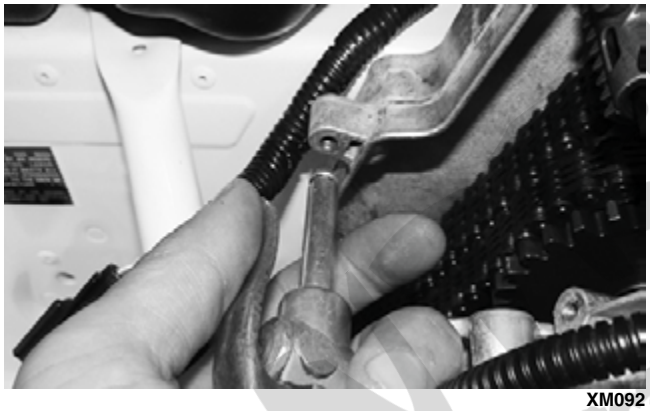
14. Install the ratchet block; then set the tensioner in the first notch in the block as it is self tightening.



PC248A

CAUTION

Before installing the chain case screws, be sure to clean the holes using compressed air completely of debris or damage to the chain case may occur.


XM092

15. Install the chain case cover/oil tank assembly and secure with the self-tapping screws. Tighten in a crisscross pattern to 105 in.-lb.

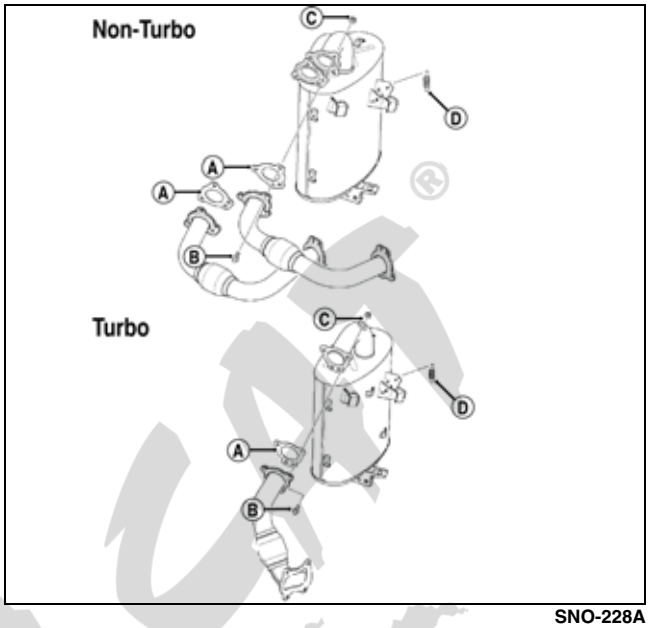
■NOTE: If a new case is being installed, tighten to 144 in.-lb.

15. Fill the chain case with 15 oz. of Arctic Cat Chain Lube.
16. Connect the speed sensor connector.
17. Install the right-side footrest support and secure to the belly pan using the torx-head screw.
18. Install the right-side footrest; then install the resonator.
19. Secure the lower console to the skid panels; then install the hood and side panels.

Drive Train (F/M/XF 1100)

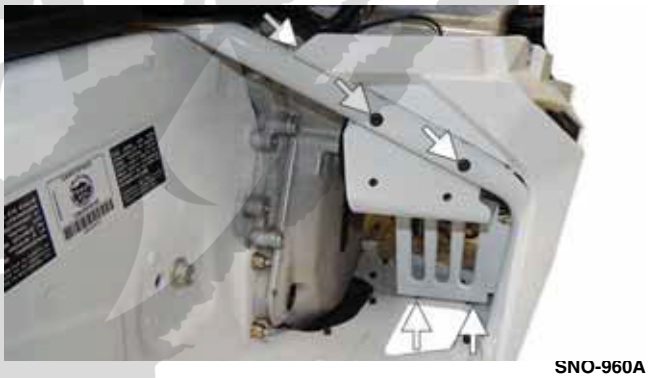
REMOVING CHAIN CASE/DRIVEN SHAFT/DRIVESHAFT/TRACK

1. Remove the left- and right-side panels, hood; then disconnect the oxygen sensor and remove the resonator. Discard exhaust gaskets (A), cap screws (B), and nuts (C) but retain the exhaust spring (D).

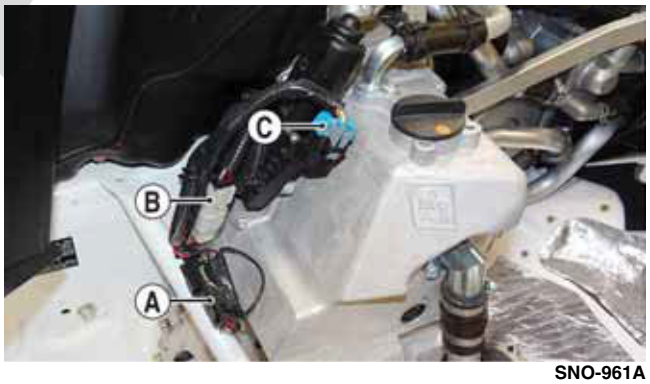


SNO-228A

2. Remove the torx-head screw securing the belly pan to the right-side foot rest support; then remove the torx-head screws securing the right-side foot rest.


SNO-960A

3. Disconnect the speed sensor connector (A), gear position sensor connector (B), and reverse actuator connector (C).



SNO-961A

4. Remove the clamp securing the oil separator line; then remove the line from the oil tank elbow fitting.



SNO-963A

5. Remove the reverse shift actuator; then remove the actuator extension from the chain case.



SNO-962

6. To drain the chain lube, place a drain pan under the under the chain case; then loosen the eleven screws securing the chain case cover/oil tank assembly to the chain case housing starting at the bottom.

■NOTE: Do not remove all eleven screws completely until the chain lube has been completely removed. This will help keep debris/oil out of the screw holes.

7. Swing the chain case out of the way. Account for a thrust washer on the countershaft.



SNO-964A

8. Remove the reverse gear, reverse fork, reverse shift rack, and the reverse shift shaft as an assembly.

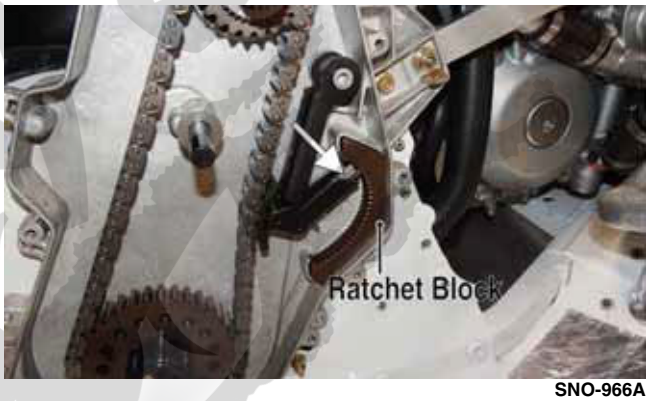
■NOTE: Items that will be discarded are: shift fork, shift arm, lower pin, and one of the springs.

9. Remove the retaining ring from the driveshaft; then remove the reverse chain and sprockets. Account for a thrust washer.



SNO-965A

10. Release tension on the chain tensioner; then remove the ratchet block. The tensioner does not need to be removed.



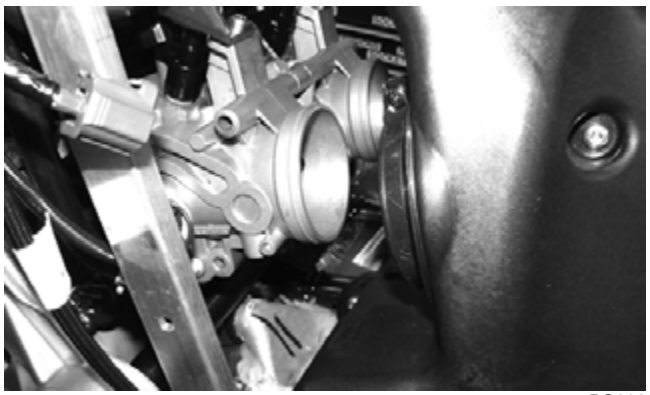
SNO-966A

11. Remove the sprockets and chain.

■NOTE: If the driven shaft and driveshaft are going to serviced, proceed to Cleaning and Inspecting Chain Case. If bearings and chain or case assembly are to be replaced, remove the driven clutch; then proceed to step 12.

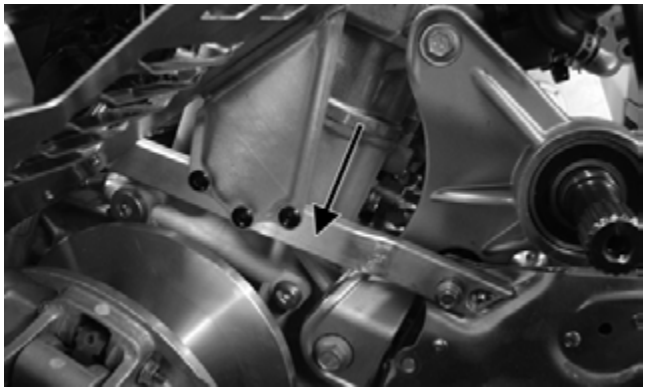
12. Remove the gas tank (see Section 4).

13. Disconnect the breather hose from oil separator, throttle body boots, and inlet air temperature sensor connector; then remove the air silencer.



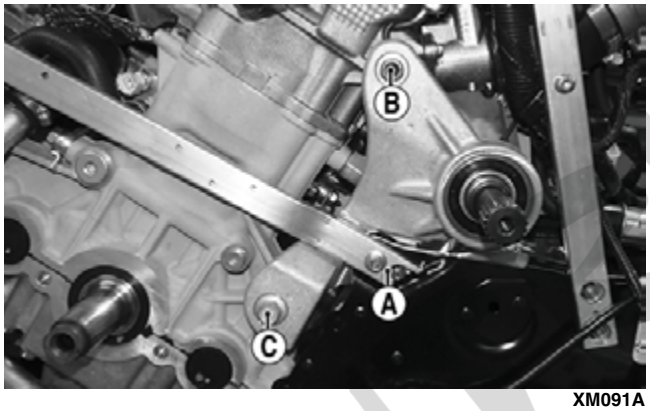
PC161

14. Remove the PTO-side chassis support.



PC162A

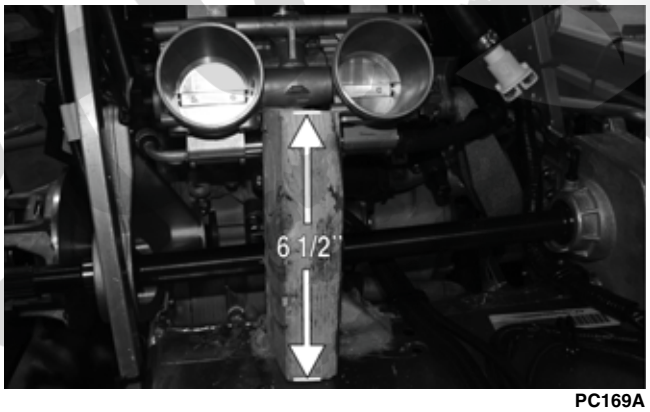
15. Remove the left and right rear engine mount bolts (A); then remove the Allen-head screw (B) and cap screw (C) securing the left rear engine mount to the engine.



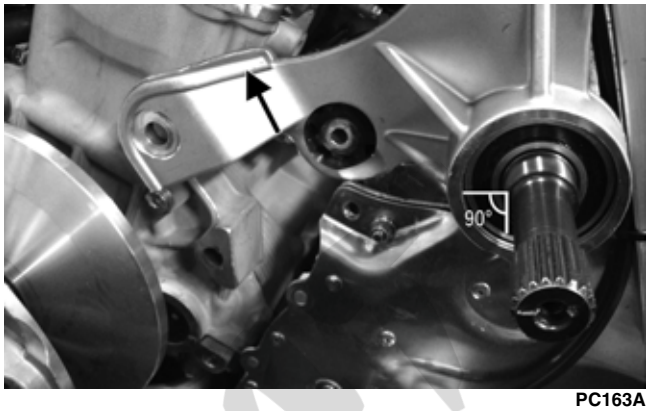
XM091A

16. Lift and support the engine at the rear to allow the engine mount to clear chassis.

■NOTE: A support can be cut from a wood block 6 1/2" long and placed under the throttle bodies for support.



PC169A

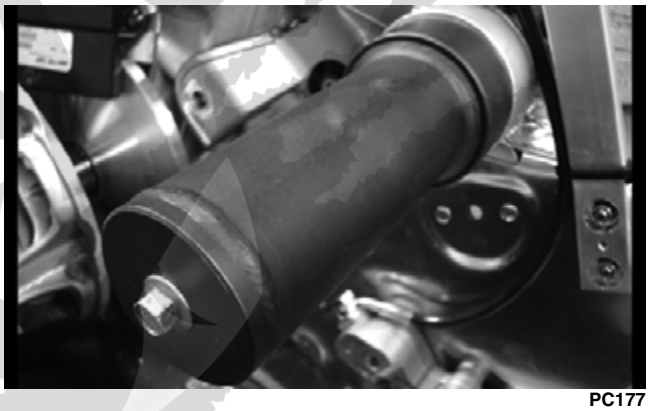


PC163A

CAUTION

Keep the bearing at 90° to the driven shaft to prevent seal damage.

17. Install Deep Socket to support the bearing housing and secure with the driven clutch cap screw.



PC177

18. Bend the locking tab out of the ring nut; then with the Socket loosen (but do not remove) the ring nut. Lightly tap the socket to disengage the adapter sleeve or the shaft will not slide.



SNO-970A

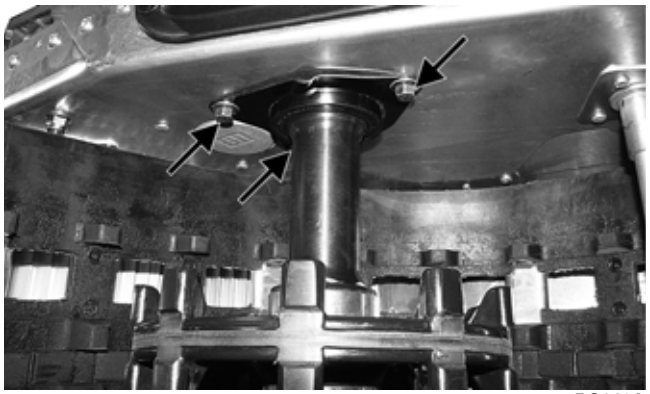
19. Remove the inner retaining ring; then from the left side, carefully remove the driven shaft assembly keeping the bearing 90° to the shaft.

20. Remove the skid frame assembly (see Section 7).

21. Remove the brake cover and the left-side footrest.

■NOTE: DO NOT split the brake caliper unless necessary service work is required.

22. Remove the cap screws securing the inner caliper to the tunnel; then remove the inner caliper.



PC148A

23. Pull the driveshaft out to the left; then drop out of tunnel right side first.

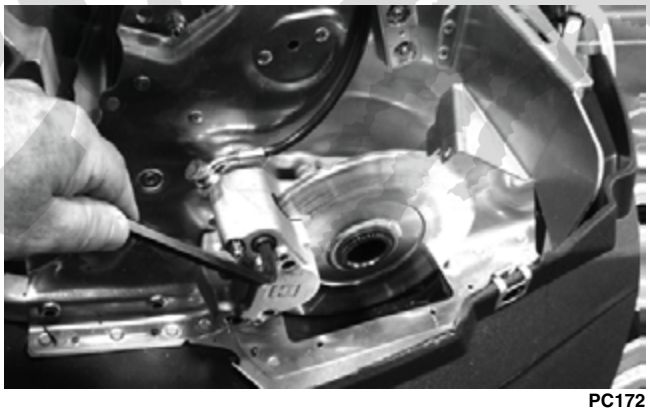


PC147

■NOTE: If the calliper does not remove from the driveshaft easily, proceed to step 24.

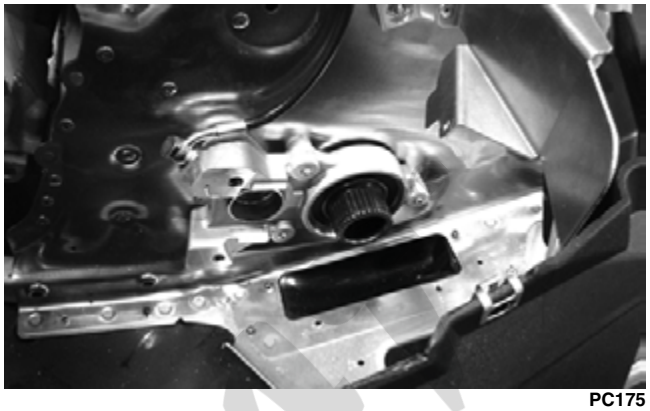
24. Remove the brake pads; then remove the outer brake caliper. Account for a rubber seal.

■NOTE: Place an absorbent towel under the caliper to absorb slight amount of brake fluid. Do not compress the brake lever.



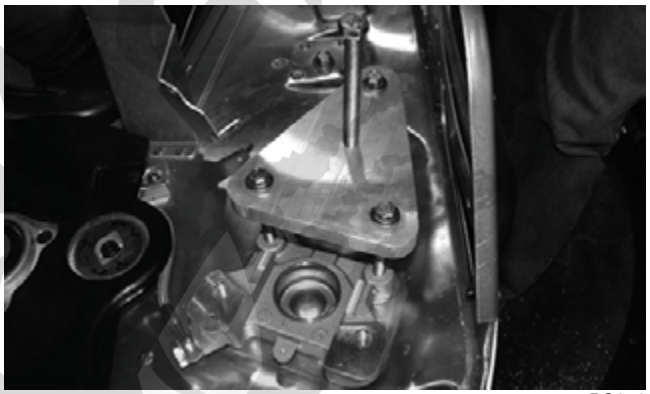
PC172

25. Remove the retaining ring securing the brake disc to the driveshaft and remove the brake disc.



PC175

■NOTE: It may be necessary to use Brake Caliper Bearing Puller (p/n 0744-067) to remove the caliper/bearing assembly.



PC151

■NOTE: If the chain case needs to be removed, remove all self-tapping screws and machine screws with lock nuts.

CLEANING AND INSPECTING CHAIN CASE

1. Inspect sprockets and chain(s) for excessive wear or stretching.



PC159

2. Inspect bearings and gears for roughness or chipping.

■NOTE: If bearing replacement is necessary, the chain case must be removed from the tunnel and an appropriate press utilized to remove and install bearings.

3. Inspect reverse shift rack and fork for excessive wear, discoloration, or other damage.
4. Clean all interior chain case surfaces and components in cleaning solvent and dry using compressed air.

⚠ WARNING

Always wear safety glasses when using compressed air.

5. Inspect chain snubbers for excessive wear.



PC155

ASSEMBLING/INSTALLING CHAIN CASE/DRIVEN SHAFT/DRIVESHAFT/ TRACK

If the driveshaft and driven shaft were not removed, proceed to step 16.

1. Install chain case assembly onto chassis and secure with six self-tapping screws and four machine screws with lock nuts. Tighten the self-tapping screws to 12 ft-lb.

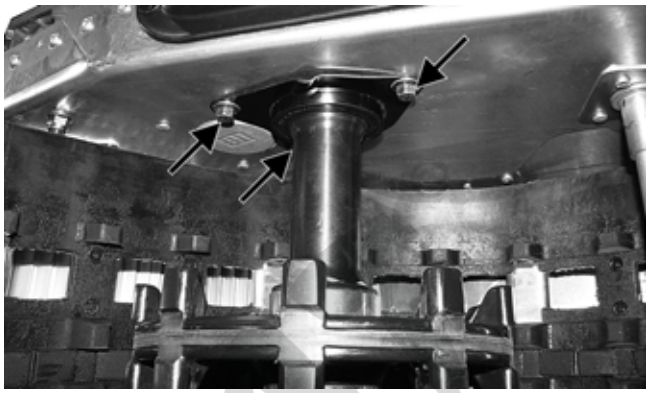
■NOTE: If an existing chain case is being reinstalled, tighten the self-tapping screws to 105 in.-lb.

2. Place the driveshaft/drive sprocket assembly into the tunnel brake-end first; then into the chain case driveshaft bearing.



PC147

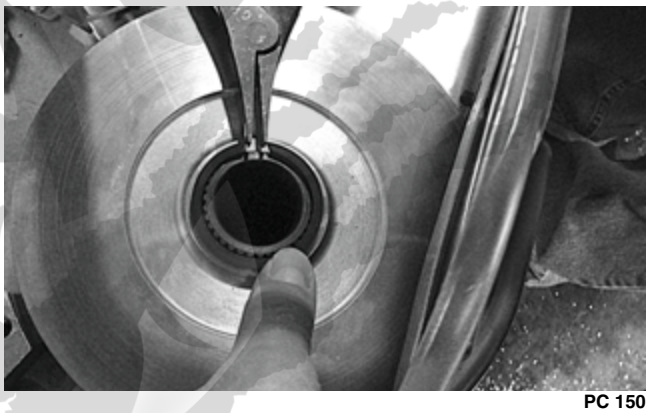
3. Install the inner brake caliper assembly and secure with three cap screws and the retaining ring. Tightened cap screws securely.



PC148A

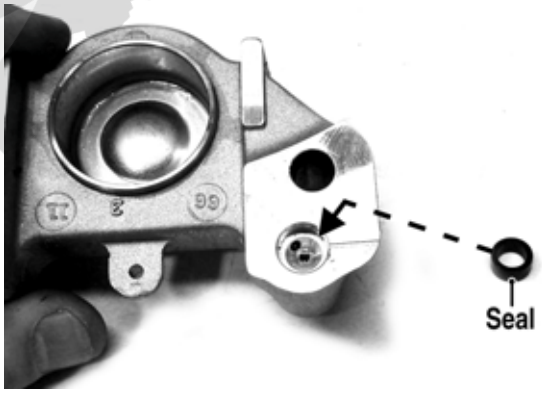
■NOTE: If the brake caliper was split, proceed to step 4. If not, proceed to step 6.

4. Install the brake disc and secure with the retaining ring.



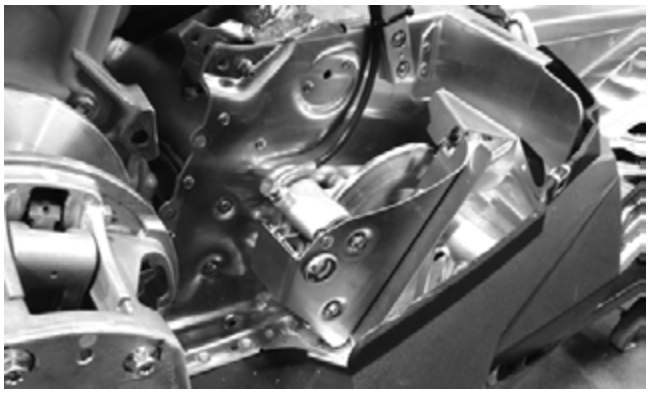
PC 150

5. Making sure the seal is correctly installed in the outer brake caliper, install on the inner caliper and secure with two cap screws. Tighten to 25 ft-lb.



PC173A

6. Install the skid frame (see Section 7).
7. Install the brake cover and left-side footrest. Tighten the cover cap screws to 8 ft-lb.



PC170

■NOTE: Bleed the brake system if the brake caliper was split in this section.

8. Install the driven shaft from the left-side making sure the bearing remains at 90° to the shaft.



PC177

9. Install the screws (threads coated with blue Loctite #243) securing the PTO-side engine mount to the engine. Tighten the upper and lower screws to 100 ft-lb.



XM037

10. Install the right rear engine mount bolt and secure with a new lock nut. Tighten securely.
11. Install the side chassis support and the left rear engine mount bolt with a new lock nut. Tighten securely.
12. Install the drive clutch and tighten the clutch cap screw to 51 ft-lb; then install the driven clutch and drive belt. Tighten to 20 ft-lb and install the belt guard.
13. Add a few drops of Chain Lube to the threads of the adapter sleeve; then install the ring nut and tighten to 36 ft-lb using the socket.

■ NOTE: The tabs on Socket (p/n 0644-516) must be 0.175-in. long so the tool only catches the ring nut. Grinding of the tabs on the tool may be required.

14. Bend locking tab into one of the slots in the ring nut.



SNO-969B

■NOTE: If no tabs align with the slots, tighten ring nut until one aligns; then bend tab to lock ring nut.

15. Using a caliper, measure from the retaining ring groove to the adapter sleeve. Install the existing flat washers (1.00 x 1.43 x .030 and/or 1.00 x 1.43 x .075) between the groove and the adapter sleeve. Install the existing black retaining ring (A).



SNO-971A

■ NOTE: The correct combination of washers need to stack up to take up the space in between the adapter sleeve and the retaining ring, yet small enough for the retaining ring to secure properly and the washers to rotate freely.

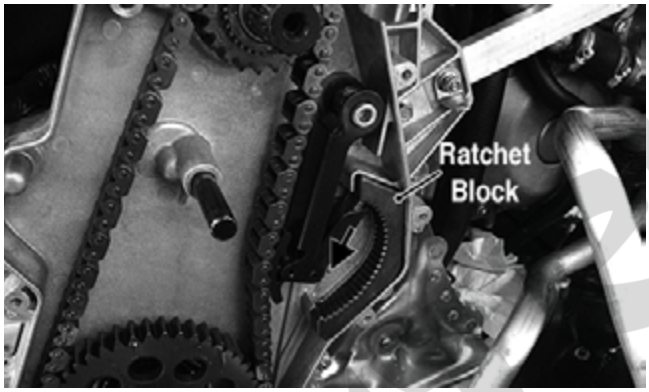
16. Install the existing thrust washer (A) next to the retaining ring.

Fig. 14



SNO-972A

17. Install the chain and sprockets; then install the ratchet block making sure to only have the tensioner on the first notch as this is a self adjusting tensioner.



PC085A

18. Install the reverse sprockets and chain.

19. Secure the driveshaft reverse sprocket to the driveshaft with a retaining ring; then install a existing thrust washer on the outside of the upper reverse sprocket and reverse idler shaft.



SNO-965A



SNO-973A

20. Install the reverse gear, fork, shift shaft, and shift rack assembly into the chain case.

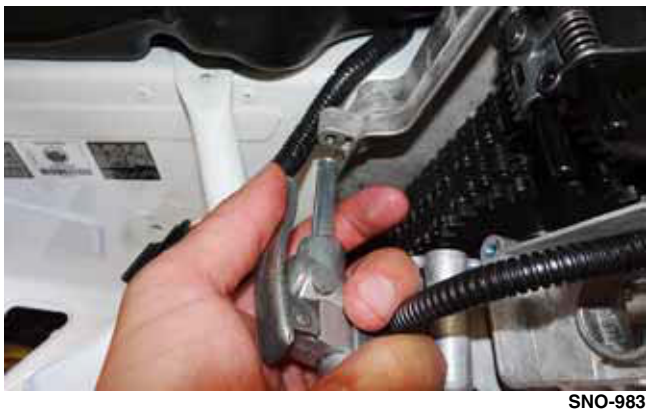


SNO-979

■NOTE: Models within the VIN range of 112314-115781 were manufactured with a washer between the spring and shift fork. If the washer was present when disassembled, it must be installed during assembly.

CAUTION

Before installing the chain case screws, be sure to clean the holes using compressed air completely of debris or damage to the chain case may occur.



SNO-983

21. Install the chain case cover/oil tank assembly and secure with the self-tapping screws. Tighten in a crisscross pattern to 105 in.-lb.

■NOTE: If a new case is being installed, tighten to 144 in.-lb.

22. Fill the chain case with 12 oz of Arctic Cat Chain Lube.

■ **NOTE: Make sure the gear position sensor wires are routed up and over the top side of the actuator so they are not pinched when installing the reverse shift actuator.**



SNO-982

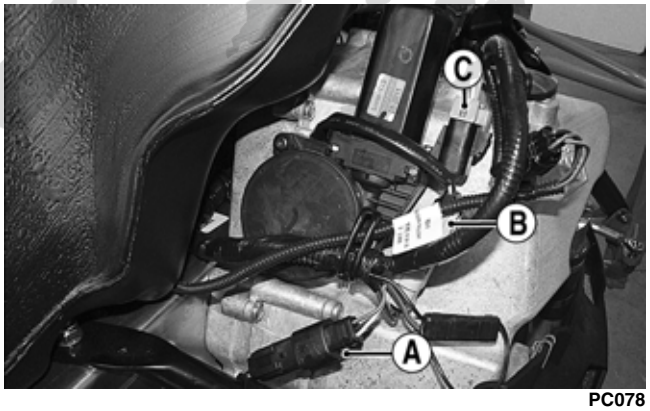
23. Install the actuator extender; then install the reverse actuator and with a drop of blue Loctite #243 on each screw, secure the actuator to the chain case cover.



PC078

24. Using new O-rings, install the oil supply, oil return, and oil separator return fittings onto the oil tank and tighten securely. Fill the oil tank with the recommended amount of engine oil.

25. Connect the speed sensor connector (A), the gear indicator switch connector (B), and reverse actuator connector (C).



PC078

■**NOTE: If the driven shaft was removed, proceed with step 26.**

26. Install the air silencer and gas tank (see Section 4). Connect gasline to fuel pump and fuel level, fuel pump wire connectors; then connect the inlet air temperature sensor connector.

27. Install the right-side footrest support and secure to the belly pan using the torx-head screw; then install the right-side footrest.

28. Install the seat (see Section 8).

CAUTION

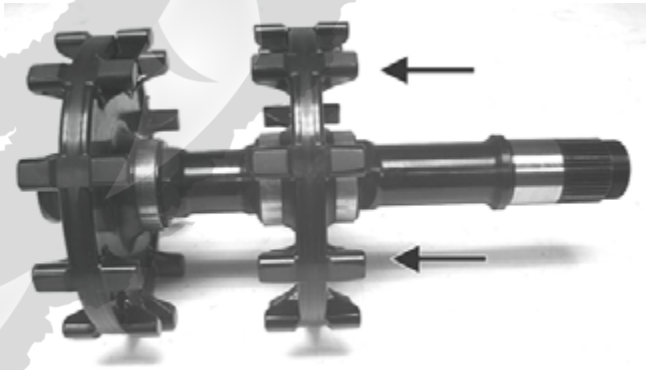
At this point before starting the engine, cycle the key ON then OFF to ensure the forward gear position is selected. Failure start the engine with the gears in forward could result in damage to the gears.

29. Start the engine and with the snowmobile on a jackstand; then shift the snowmobile into and out of reverse three times.

Drive Sprockets

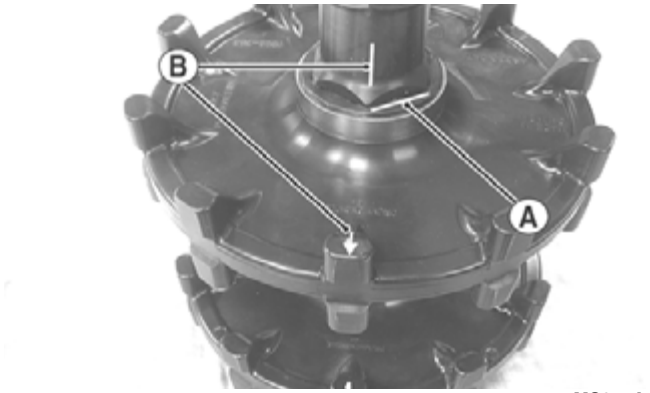
REMOVING

■**NOTE: The drive sprockets must be removed from the gear case end of the driveshaft (Bearcat/F-Series/T-Series) or the brake side (F/M/XF).**



ZJ216A

1. For installing purposes, scribe a line on the driveshaft (A) next to the drive sprocket for proper alignment; then scribe a line on the driveshaft directly in line with the timing arrows (B) on the drive sprockets for proper sprocket timing.



MS357A

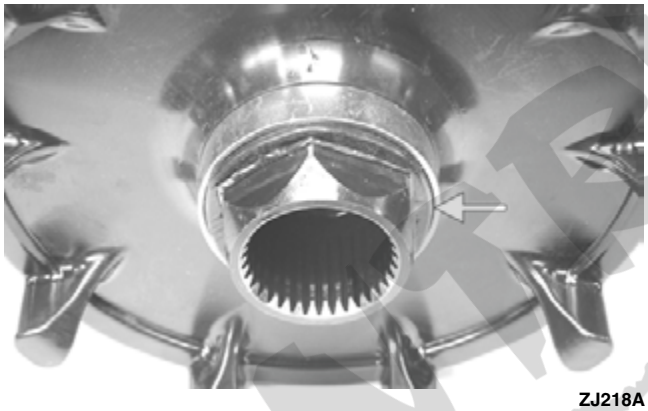
2. Using a suitable press positioned against the tension-collar of the drive sprocket (located on the gear case) and of the driveshaft, press the drive sprockets off the driveshaft.



ZJ217

CAUTION

Always press against the tension-collar of the drive sprockets or damage to the components will occur.



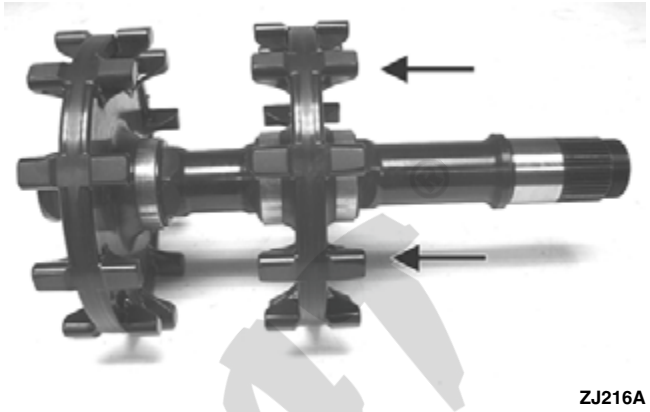
ZJ218A

CLEANING AND INSPECTING

1. Thoroughly wash all metallic components in parts-cleaning solvent. Dry using compressed air.
2. Wash all non-metallic components with soap and water.
3. Inspect the driveshaft for damaged splines or stripped threads.
4. Inspect the seals for any breaks or damage.
5. Inspect the track for cuts, gouges, or wear.
6. Inspect the brake disc for wear or cracks.
7. Inspect the track drive sprockets for wear or damage.

INSTALLING

■NOTE: The drive sprockets must be installed on the gear case end of the driveshaft (Bearcat/F-Series/T-Series) or the brake side (F/M/XF).



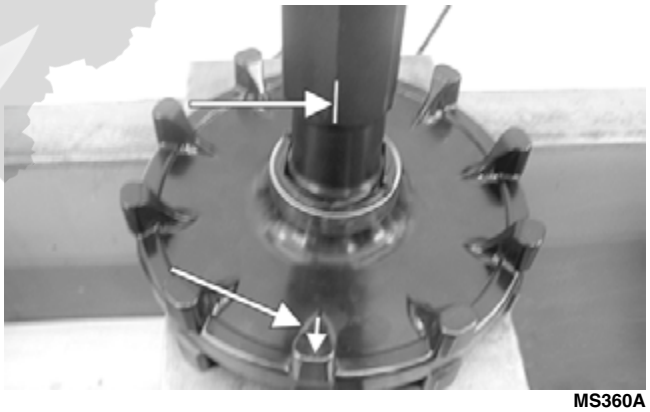
ZJ216A

■NOTE: Prior to installing the sprockets onto the driveshaft, lightly chamfer the inside edge of the sprocket to avoid binding.



MS362

1. Properly align the scribed line on the driveshaft (from removing) with the timing arrow on the drive sprocket; then slide the sprocket onto the driveshaft as far as it will go.



MS360A

2. Using a suitable press and fixture, press the driveshaft into the sprocket until it aligns with the line scribed in removing.



MS361A

3. Slide the remaining sprocket onto the driveshaft making sure the timing arrow/lines (from removing) are aligned; then using the press/fixture, press the sprocket to the remaining alignment line.

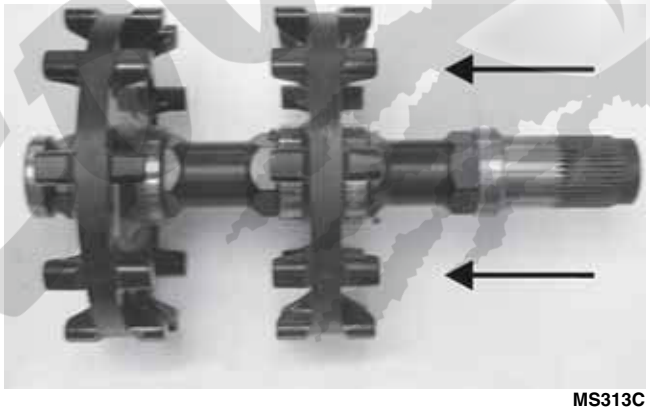
CAUTION

Always press against the tension-collar of the drive sprockets or damage to the components will occur.



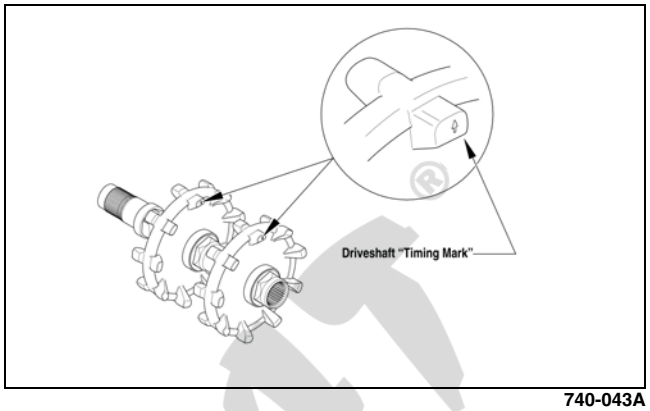
MS359A

■NOTE: The drive sprockets must be installed on the brake disc end of the driveshaft.



MS313C

■NOTE: When pressing new sprockets on the driveshaft, align the sprocket alignment marks or the sprockets won't be timed correctly.

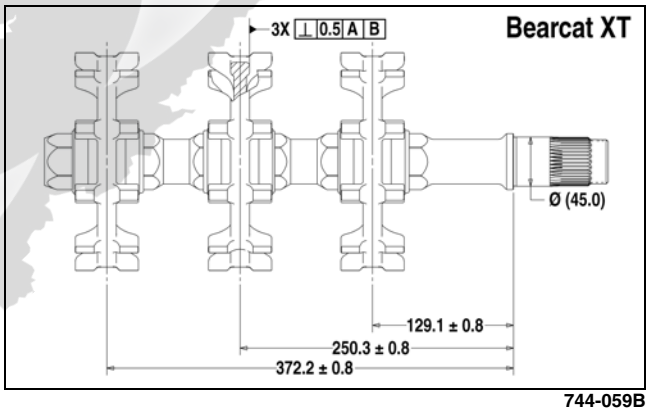


740-043A

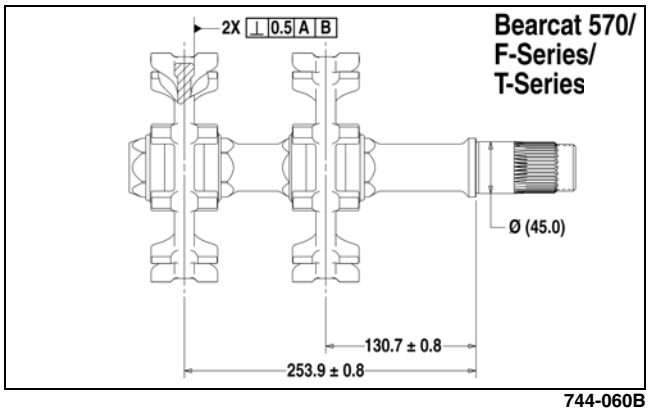
4. Using a calipers, measure distances between the sprockets and from the sprockets to each end of the driveshaft for proper location (see appropriate illustration).



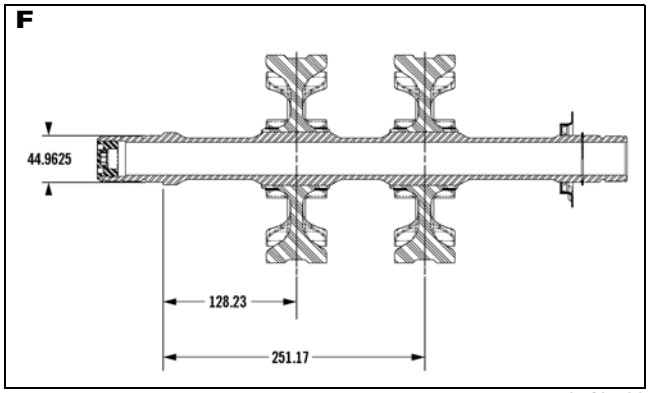
MS364



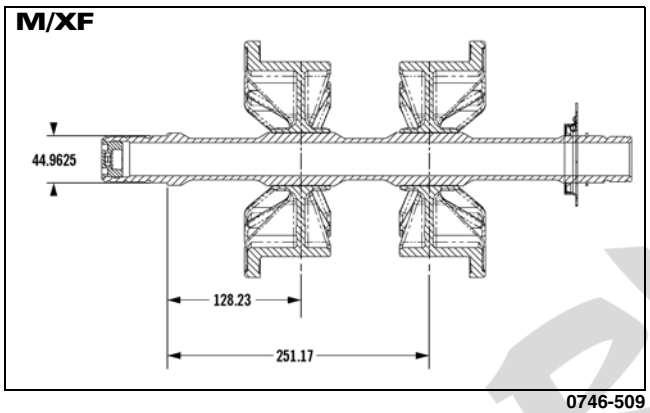
744-059B



744-060B



0746-508



0746-509

Track Tension

CHECKING

⚠ WARNING

DO NOT attempt to check or adjust track tension with engine running. Turn ignition key to the OFF position. Personal injury could result from contact with a rotating track.

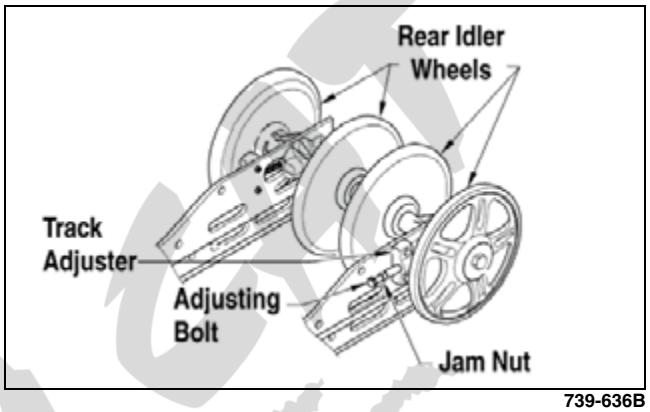
1. Remove excess ice and snow buildup from the track, track drive sprockets, and the inside of the skid frame.
2. Elevate the snowmobile on a shielded safety stand high enough to use a spring scale.
3. At mid-point of the track (on the bottom side), hook a spring scale around a track clip; then pull down on the scale to the recommended pressure. Measure the deflection (distance) between the bottom of the wear strip and the inside surface of the track clip. Compare the measurement with chart below.

Model	Pressure	Setup Tension	After Break-In Tension
Bearcat 570/F-Series/T-Series @ 20 lb	20 lb	44-51 mm (1.75-2 in.)	51-57 mm (2-2.25 in.)
Bearcat XT Models @ 10 lb	10 lb	44-51 mm (1.75-2 in.)	44-51 mm (1.75-2 in.)
Bearcat Z1 XT GS @ 20 lb	20 lb	38-44 mm (1.5-1.75 in.)	38-44 mm (1.5-1.75 in.)
F/M/XF Models	12-15 lb	51 mm (2 in.)	51 mm (2 in.)

■NOTE: Measurement is from the bottom of the wear strip at the point of the shock pad on the slide rail.

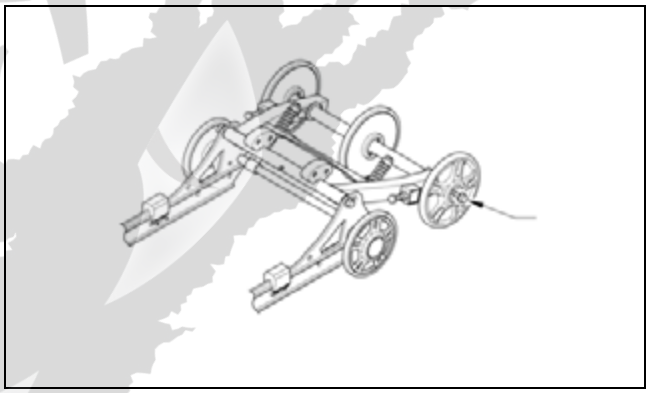
ADJUSTING (Bearcat/F-Series/T-Series)

1. If the measurement is not as specified, loosen the jam nuts of the adjusting bolts.



739-636B

■NOTE: On the Bearcat XT, the rear axle cap screws must also be loosened.



743-323A

2. If the measurement is more than specified, tighten the adjusting bolts. If the measurement obtained is less than specified, loosen the adjusting bolts. When the measurement is within specification range, lock the adjustment by bottoming the jam nuts against the axle housings.

■NOTE: On the Bearcat XT, tighten the rear axle cap screws to 20 ft-lb.

■NOTE: Vigorously push the underside of the track up and down. Track must not hit the top of the tunnel or slap the skid frame.

3. After correct track tension is obtained, check track alignment (see Track Alignment in this section).

■**NOTE: Track tension and track alignment are interrelated; always check both even if only one adjustment seems necessary. Always establish correct track tension before checking and/or adjusting alignment.**

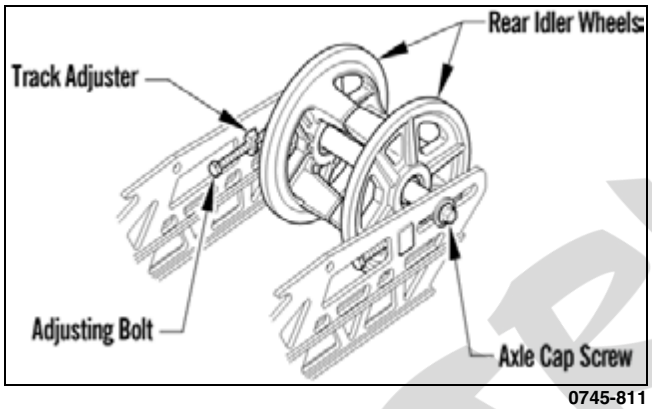
CAUTION

After proper track tension has been attained, make certain that the rear axle cap screws are tightened to specifications or component damage will occur.

ADJUSTING (F/M/XF)

■**NOTE: To ensure proper track tension adjustment, perform all adjustments on both sides of the snowmobile.**

1. Loosen the idler wheel axle cap screws.



0745-811

2. If the deflection (distance between the bottom of the wear strip and the inside surface of the track clip) exceeds specifications, tighten the adjusting bolts to take up excessive slack in the track.
3. If the distance between the bottom of the wear strip and the inside surface of the track clip is less than specified, loosen the adjusting bolts to increase the slack in the track.

CAUTION

Always maintain track tension within recommended specification.

4. Check track alignment (see Track Alignment subsection in this section).
5. After proper track tension is obtained, tighten the idler wheel axle cap screws to 34 ft-lb.

■**NOTE: Since track tension and track alignment are interrelated, always check both even if only one adjustment seems necessary.**

⚠ WARNING

Always make sure the adjusting bolts are snug against the axle and the idler wheel cap screws and the axle nut on the RR models are tightened to specifications. Failure to do so could cause the track to become extremely loose and, under some operating conditions, allow the idler wheels to climb over the track lugs forcing the track against the tunnel causing the track to "lock." If a track "locks" during operation, severe personal injury could result.

Track Alignment

■**NOTE: Proper track alignment is when the rear idler wheels are equidistant from the inner drive lugs on the inside surface of the track.**

CHECKING/ADJUSTING

⚠ WARNING

Make sure the ignition key is in the OFF position and the track is not rotating before checking or adjusting track alignment. Personal injury could result if contact is made with a rotating track.

1. Remove excess ice and snow buildup from the track, track drive sprockets, and the inside of the skid frame.
2. Position the tips of the skis against a wall; then using a shielded safety stand, raise the rear of the snowmobile off the floor making sure the track is free to rotate.

⚠ WARNING

The tips of the skis must be positioned against a wall or similar object for safety. Keep hands, feet, and clothing away from moving components.

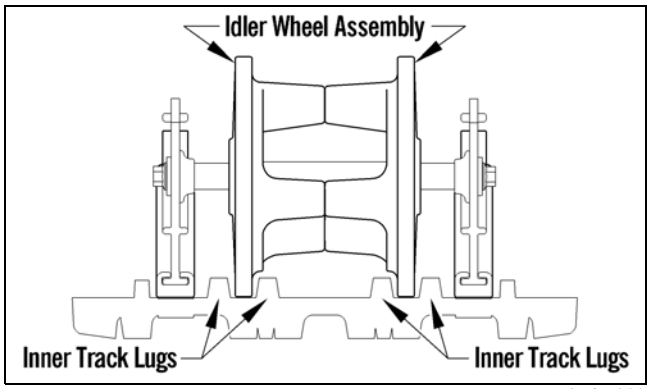
⚠ WARNING

DO NOT stand behind the snowmobile or near the rotating track. NEVER run the track at high speed when the track is suspended.

3. Start the engine and accelerate slightly. Use only enough throttle to turn the track several revolutions. SHUT ENGINE OFF.

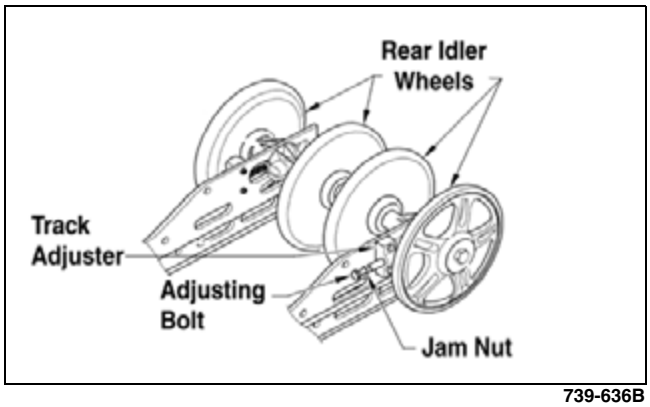
■**NOTE: Allow the track to coast to a stop. DO NOT apply the brake because it could produce an inaccurate alignment condition.**

4. When the track stops rotating, check the relationship of the rear idler wheels and the inner track drive lugs. If the rear idler wheels are centered between the inner track drive lugs, no adjustment is necessary. If not, proceed to step 5.



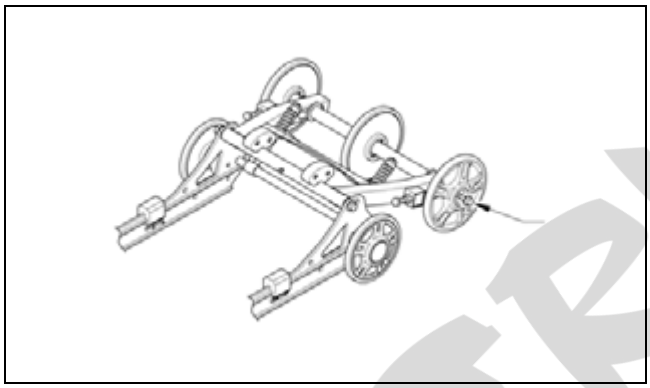
0745-809

5. On the Bearcat/F-Series/T-Series on the side of the track which has the inner track drive lugs closer to the rear idler wheel, loosen the adjusting bolt jam nut; then rotate the adjusting bolt clockwise 1-1/2 turns.



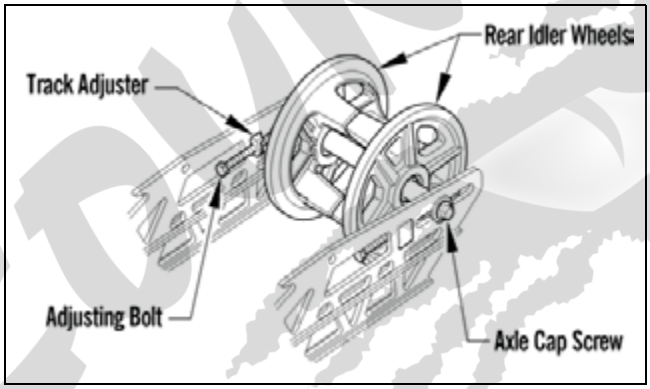
739-636B

■**NOTE: On the Bearcat XT models, the rear axle cap screws must also be loosened.**



743-323A

6. On the F/M/XF on the side of the track which has the inner track drive lugs closer to the rear idler wheel, loosen the idler wheel axle cap screw; then rotate the adjusting bolt clockwise 1 to 1 1/2 turns.



0745-811

7. Check the track alignment and make the necessary adjustments until proper alignment is obtained.

■**NOTE: Make sure correct track tension is maintained after adjusting track alignment (see Track Tension sub-section in this section).**

8. On the Bearcat/F-Series/T-Series after proper track tension and alignment are obtained, lock the jam nut against the axle housing.

■**NOTE: On the Bearcat XT models, tighten the rear axle cap screws to 20 ft-lb.**

⚠ WARNING

If jam nuts are not locked, the adjusting bolts could loosen causing the track to ratchet, derail, or lock.

9. On the F/M/XF after proper track tension and alignment are obtained, tighten the idler wheel axle cap screw to 34 ft-lb; then tighten the adjusting bolt to 84 in.-lb.

⚠ WARNING

Always make sure the adjusting bolts are snug against the axle and the idler wheel cap screws and the axle nut on the RR models are tightened to specifications. Failure to do so could cause the track to become extremely loose and, under some operating conditions, allow the idler wheels to climb over the track lugs forcing the track against the tunnel causing the track to "lock." If a track "locks" during operation, severe personal injury could result.

■**NOTE: Field test the track under actual conditions and after the field test, check track alignment and track tension; adjust as necessary.**

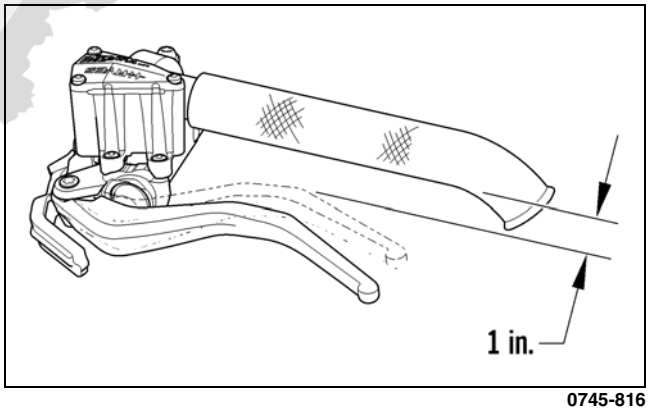
Brake System (Hydraulic)

CHECKING BRAKE LEVER TRAVEL

1. Compress the brake lever fully.

■**NOTE: Do not pump the brake lever as it will produce an inaccurate reading.**

2. Measure the distance between the brake lever and the handlebar. The distance must be greater than 1 in.



0745-816

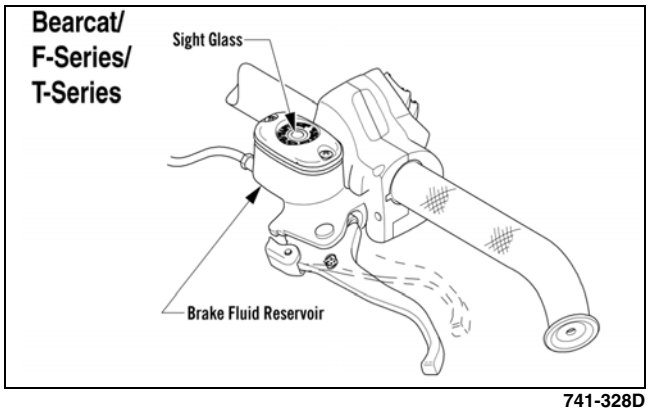
3. If the distance is less than specified, check the brake fluid level (see Checking and Adding Brake Fluid in this sub-section), inspect for leakage, and check the brake pads (see appropriate Checking and Replacing Brake Pads in this sub-section).

⚠ WARNING

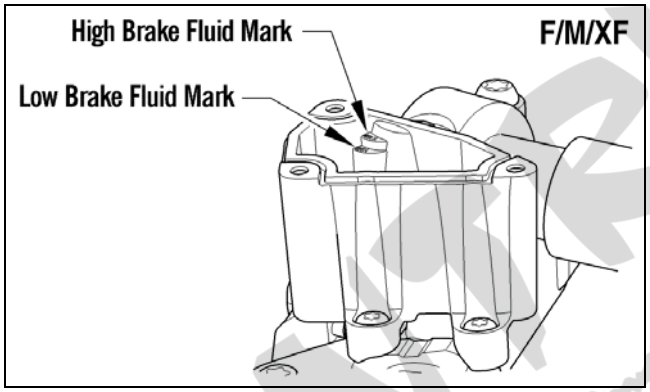
Do not operate the snowmobile if the distance between the compressed brake lever and handlebar is less than 1 in. Brake loss may occur. Brake loss can result in severe personal injury.

CHECKING AND ADDING BRAKE FLUID

1. With brake fluid reservoir in a level position and the cover removed (F/M/XF only), check the fluid level. The brake fluid level must be visible in the sight glass (Bearcat/F-Series/T-Series) or at the high mark in the reservoir (F/M/XF).



741-328D



0745-817

2. If the brake fluid level is low, add Arctic Cat approved brake fluid until the fluid is at the recommended level. Install and secure the reservoir cover. DO NOT allow moisture to contaminate the brake system.

CAUTION

Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the snowmobile.

⚠ WARNING

Do not overfill the brake fluid reservoir. Overfilling the reservoir may cause the brake system to hydraulically lock. Use only approved brake fluid. Never substitute or mix different types or grades of brake fluid. Brake loss may occur. Brake loss can result in severe injury or even death.

CHANGING BRAKE FLUID

The brake fluid must be changed on a regular basis and/or whenever the brake fluid has been overheated or contaminated. The brake fluid should be changed every 1000 miles or at the end of the snowmobiling season, whichever occurs first.

Arctic Cat recommends the removal and disassembly of the brake caliper assembly when changing the brake fluid (see appropriate Brake Caliper/Brake Disc/Driveshaft Bearing in this sub-section).

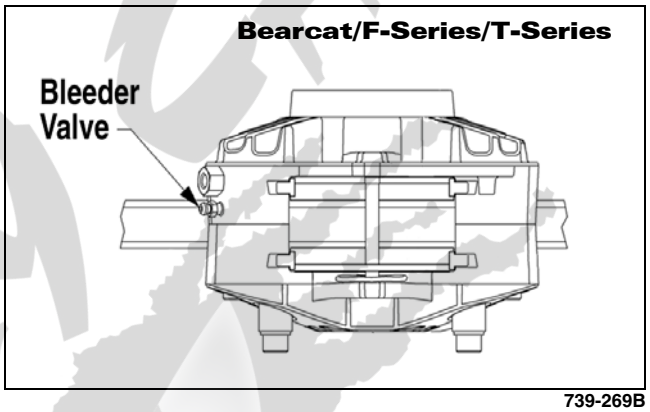
CAUTION

Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the snowmobile.

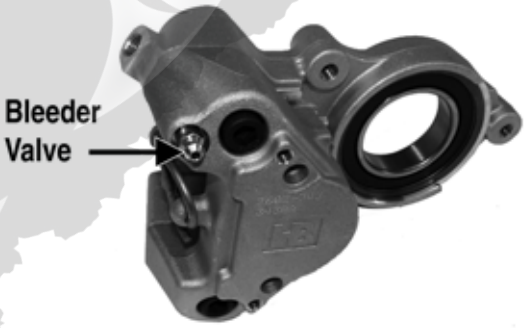
⚠ WARNING

Use only Arctic Cat approved brake fluid. Any substitute may result in a loss of brakes.

1. Slide a piece of flexible tubing over the ball of the bleeder valve and direct the other end into a container.



739-269B



PC223A

2. Slowly compress the brake lever and hold. Open the bleeder valve to release the fluid; then compress the brake lever repeatedly until all brake fluid is expelled. Close the bleeder valve.

3. Add new approved brake fluid to the reservoir; then compress the brake lever and hold. Open the bleeder valve. Repeat the compression until brake fluid flows free of air bubbles and appears clean.

■NOTE: It may be necessary to refill the reservoir a number of times to eliminate all air bubbles in the system.

4. When the brake fluid is free of all air and the brake lever feels firm when compressed, fill the reservoir; then install and secure the cover. Remove the tube from the bleeder valve.

5. Bleed the brake system (see Bleeding Brake System in this sub-section).

BLEEDING BRAKE SYSTEM

If the brake lever feels spongy when applied, the brake system may need to be bled.

1. With the handlebar in the highest position, remove the reservoir cover and fill the reservoir with approved brake fluid.

CAUTION

Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the snowmobile.

⚠ WARNING

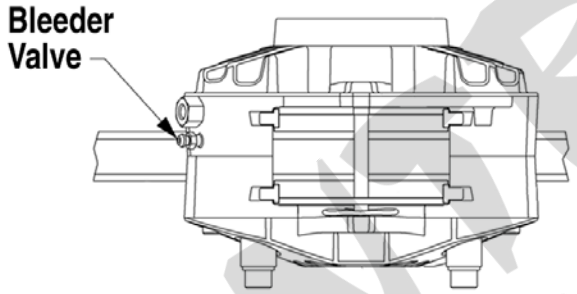
Use only approved brake fluid. Any substitute may result in a loss of brakes.

⚠ WARNING

Do not use brake fluid from a container opened for a long period of time. Unsealed brake fluid containers will absorb moisture and can contaminate the fluid inside.

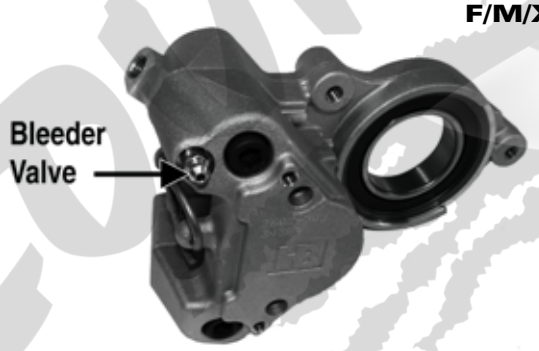
2. Slide a piece of flexible tubing over the ball of the bleeder valve and direct the other end into a container.

Bearcat/F-Series/T-Series



739-269B

F/M/XF



PC223A

3. Slowly compress the brake lever and hold. Open the bleeder valve to release the fluid and air. When the fluid stops flowing, close the bleeder valve; then release the brake lever.

4. Repeat step 3 until the brake fluid flows free of air bubbles.

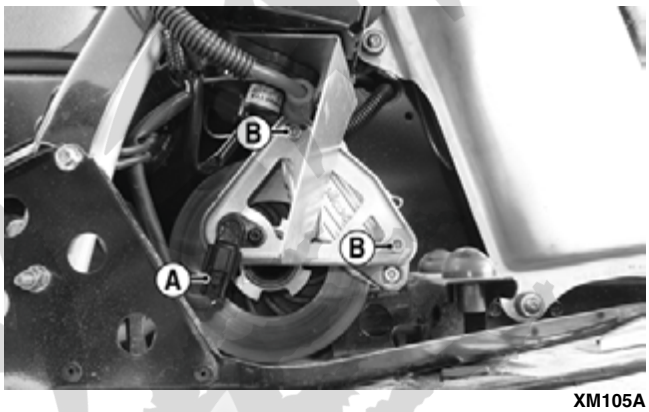
■NOTE: It may be necessary to refill the reservoir during the bleeding process.

5. When the brake fluid is free of all air and the brake lever feels firm when compressed, fill the reservoir; then install and secure the cover. Remove the tube from the bleeder valve.

CHECKING AND REPLACING BRAKE PADS (Bearcat/F-Series/T-Series)

1. Open the right-side access panel and remove the springs and hairpin clip securing the resonator; then remove it from the engine compartment.

3. Disconnect the speed sensor (A); then remove both allen-head screws (B) securing the speed sensor bracket.



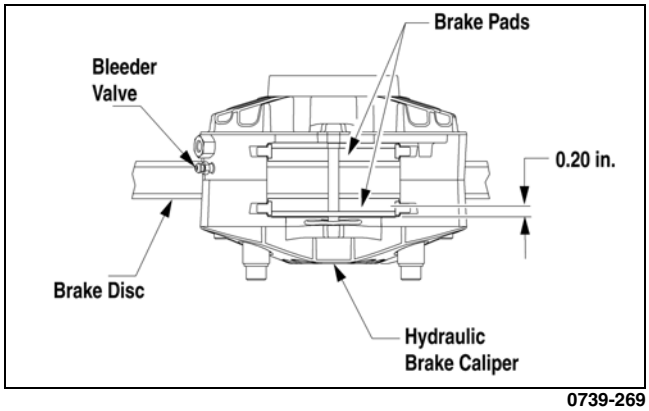
XM105A

4. Remove the hairpin clip from the brake pad retaining pin; then remove the pin. Using a pair of pliers, pull one brake pad out of the caliper assembly.



XM106A

■NOTE: Measure the thickness of both brake pads. The brake pad thickness must be greater than 0.20 in. If the brake pad thickness is less than specified, replacement of both pads is necessary.



0739-269

■NOTE: When installing new brake pads, always install them as a set. Never install just one pad or use brake pads used in another snowmobile.

■NOTE: Changing one pad at a time will prevent one piston from pushing out the other piston from the caliper.

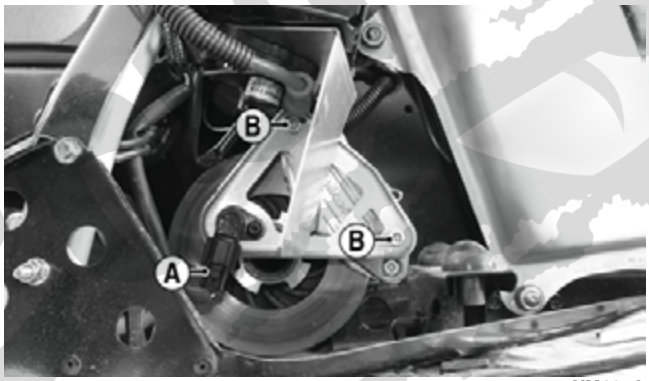
5. Using a flat-blade tool, slowly and carefully push the piston into the caliper.
6. Position the new brake pads into the caliper.
7. Repeat steps 4-6 for the other pad; then secure the pads with the pin and hairpin clip.

■NOTE: When new brake pads are installed, a "burnishing" process is required. Drive the snowmobile slowly and compress the brake lever several times until the pads just start to warm up; then allow them to cool down. This procedure stabilizes the pad material and extends the life of the pads.

BRAKE CALIPER/BRAKE DISC/ DRIVESHAFT BEARING (Bearcat/F-Series/T-Series)

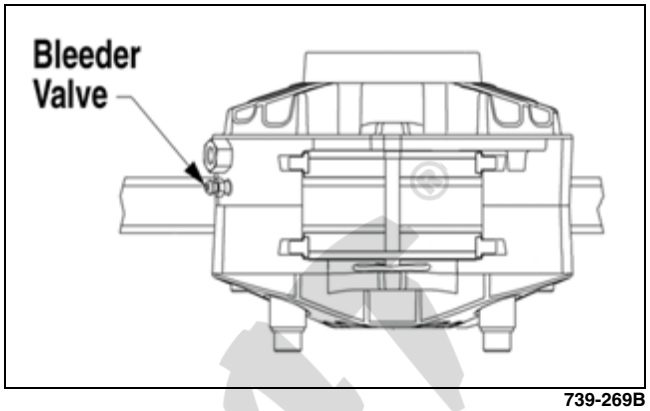
Removing/Disassembling

1. Open the right-side access panel; then remove the springs and hairpin clip securing the resonator to the exhaust pipe and chassis. Remove the resonator.
2. Remove the torx-head cap screws securing the toe shield and hook bracket to the chassis; then remove the shield and bracket.
3. Remove the two allen-head cap screws (B) securing the speedometer sensor mounting bracket to the caliper assembly; then disconnect the speed sensor (A). Remove the sensor and bracket assembly.



XM105A

4. Engage the brake lever lock; then using Brake Disc Socket Wrench, remove the retaining nut from the driveshaft.
5. Slide a piece of flexible tubing over the ball of the bleeder valve and direct the other end into a container.



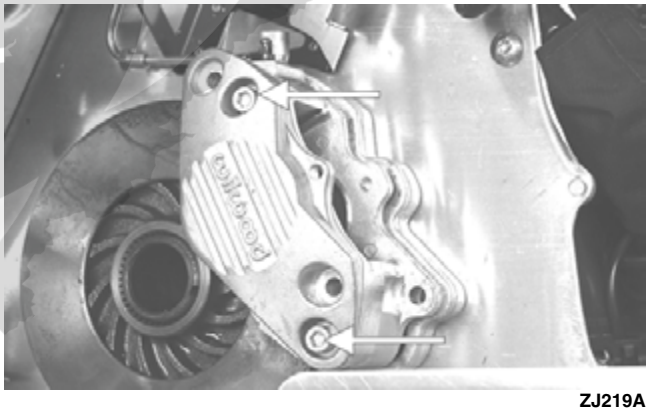
739-269B

CAUTION

Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the snowmobile.

6. Open the bleeder valve and compress the brake lever several times to drain the reservoir of fluid.
7. Remove the brake hose from the caliper. Use an absorbent towel to collect any remaining brake fluid.
8. Disengage the brake lever lock and remove the hairpin clip and pin securing the brake pads; then remove both pads.

■NOTE: If servicing the brake disc only, remove the two remaining torx-head cap screws securing the caliper housings together; then remove the outside housing. Account for the O-ring.

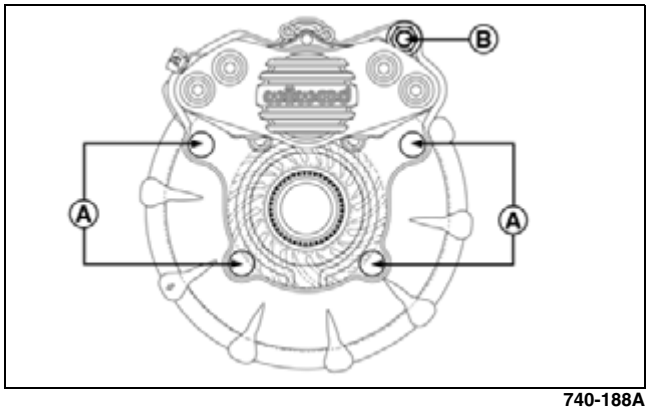

ZJ219A

CAUTION

If the caliper housings are to be separated at this time, take care not to allow any contaminants into the fluid passages of the calipers.

■NOTE: To aid in removing the inner caliper housing, completely loosen track tension.

9. Remove the four lock nuts (A) and the Phillips-head cap screw with lock nut (B) securing the caliper housing assembly to the chassis; then remove the inside caliper housing along with the brake disc from the driveshaft. Account for the caliper spacer and the disc spacer.



740-188A

10. If the bearings are to be replaced with the caliper housing secured in a suitable vise, drive the outer bearing out of the housing by using a hammer and sharp flat punch. Tap evenly in a crisscross pattern on the inner race of the bearing until the bearing is out of the housing. Account for the spacer.

■NOTE: Never reuse bearings that have been removed. Always use new bearings.



ZJ226

CAUTION

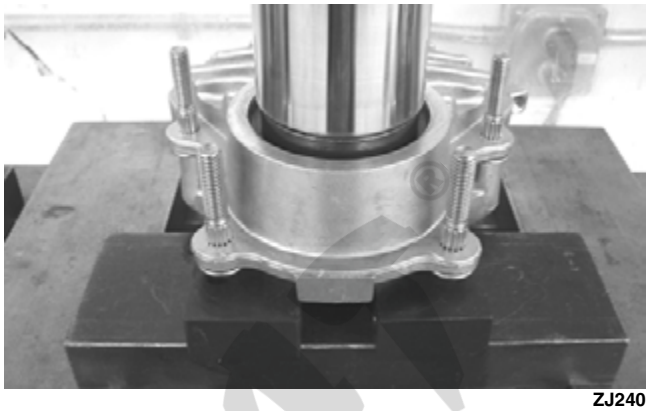
Use care not to bind the bearing in the caliper housing when removing or damage to the housing may occur.

11. Remove the retaining ring securing the inner bearing in the caliper housing.



ZJ245

12. If bearings are to be replaced, place the caliper housing in a suitable clamping device; then using a press, remove the inner bearing from the housing.



ZJ240

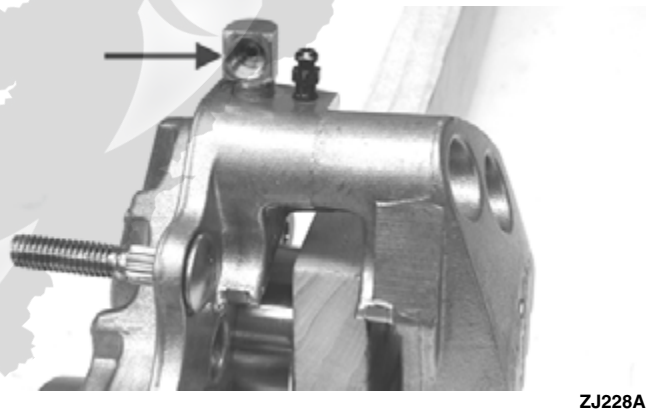
■NOTE: Never reuse bearings that have been removed. Always use new bearings.

■NOTE: If the caliper housings were separated for disassembling purposes, they must be secured together with the small O-ring installed between the inner and outer housings.

13. Position a piece of wood between the pistons. Using low-pressure compressed air, blow into the caliper brake hose fitting to remove the brake pistons.

⚠ WARNING

Always wear safety glasses when using compressed air.



ZJ228A

■NOTE: Remove the two remaining torx-head cap screws securing the caliper halves. Discard the small O-ring.



MS320A

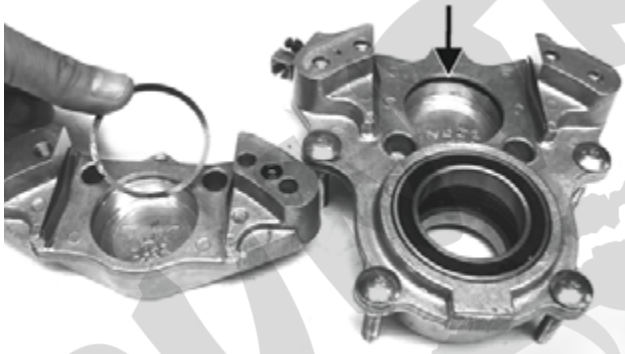
14. Remove the pistons and O-rings; then discard the O-rings.



ZJ229



ZJ230



ZJ251A

Cleaning and Inspecting

1. Inspect the brake pistons for gouges, cracks, pitting, scuffing, or corrosion. If any of these conditions exist, replace the piston.

■NOTE: The inner and outer caliper housings are not serviceable components. If either or both are defective or damaged, the complete caliper assembly must be replaced.

2. Clean the piston outer surface by using a soft Scotch-Brite pad and clean brake fluid as a cleaner.

CAUTION

Do not use any sharp cleaning tool on the piston surface or in the O-ring groove as it may cause damage. Parts-cleaning solvent must not be used as it can damage the piston O-ring.



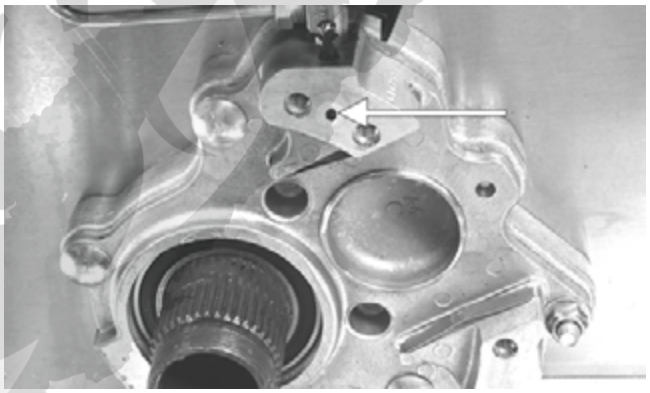
AF230

3. Inspect the piston bore of the inner and outer brake calipers for gouges, cracks, pitting, scuffing, or corrosion. If any of these conditions exist, replace the caliper.

4. Clean the caliper inner wall surface using a soft lint-free cloth and clean brake fluid.

CAUTION

Care must be taken not to allow any contaminants into the fluid passages of the calipers or brake system malfunction may occur.

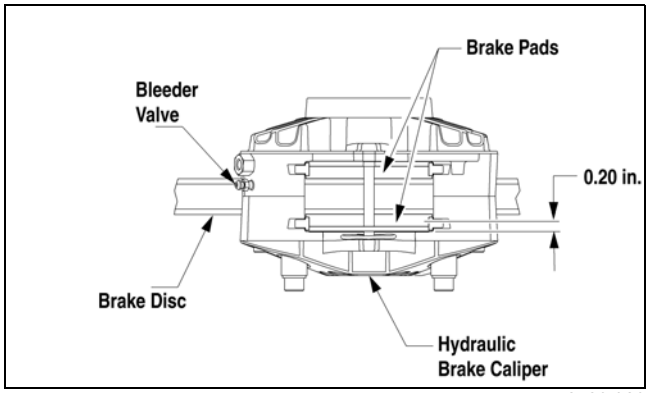


ZJ225A



MS320A

5. Inspect the condition of the brake pads. Replace if damaged or worn. The brake pad thickness must be greater than 0.20 in. If the brake pad thickness is less than specified, replacement of both pads is necessary.



0739-269

6. Inspect the brake hose for cracks and deterioration and check the condition of the threaded connectors.

Assembling/Installing

1. Apply approved brake fluid to the new O-ring; then install the O-ring into the groove of each caliper half.



ZJ231

CAUTION

Never reuse piston O-rings. Always install new O-rings when installing pistons in the brake caliper.

2. In each caliper half, apply approved brake fluid to the brake piston; then while twisting, install the piston with the dished side facing out.



ZJ229



ZJ230

■NOTE: To aid in installing the piston, make sure the piston O-ring is properly seated in the groove of the caliper housing.

3. Place the small O-ring into position; then assemble the two caliper halves. Secure with the two torx-head cap screws. Tighten only until snug.



ZJ231A

■NOTE: Always use a new O-ring and make sure the O-ring is properly seated in the outer brake housing.



MS320A

4. Using a suitable press, install a new inner bearing into the caliper housing until it is properly seated.



ZJ241

CAUTION

When installing a bearing, always press on the outer race of the bearing.



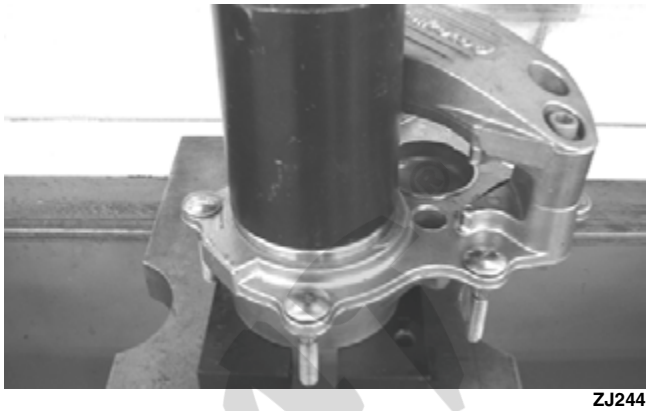
ZJ239A

5. Install the snap ring securing the inner bearing in the caliper housing.



ZJ245

6. Install the bearing spacer; then press a new outer bearing into the caliper housing until properly seated.

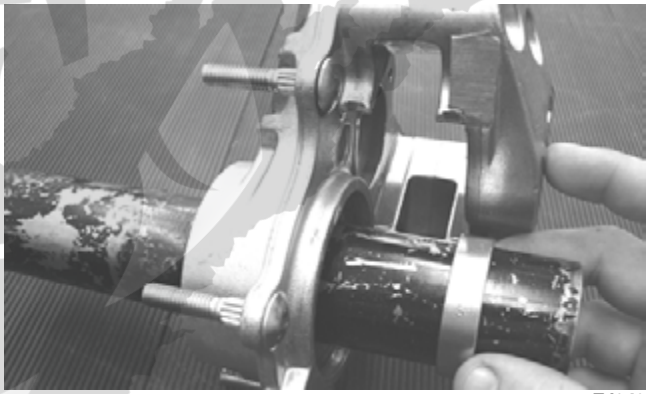


ZJ244

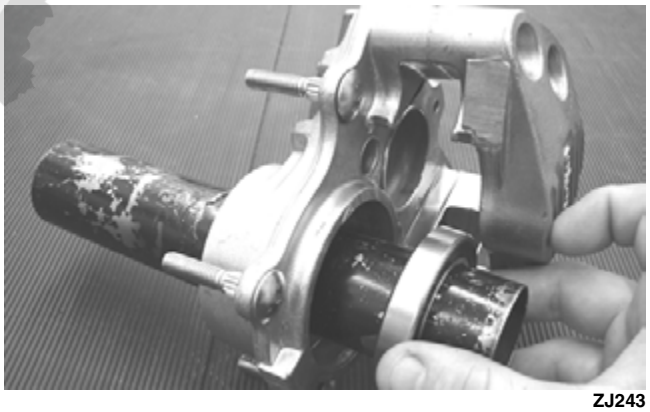
CAUTION

When installing a bearing, always press on the outer race of the bearing.

■NOTE: For aid in installing the outer bearing, insert a length of shaft (the same diameter as the bearing inner bore) through the inner bearing, driveshaft sleeves, and outer bearing to maintain proper alignment of the driveshaft sleeves for driveshaft installation.

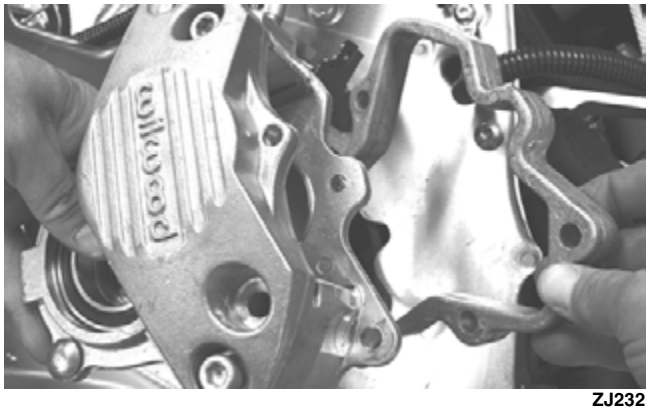


ZJ242

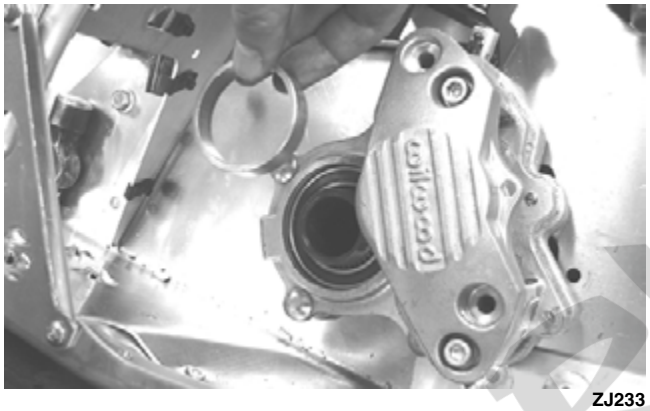


ZJ243

7. Apply Anti-Seize Thread Compound to the splines of the brake disc; then with the brake caliper spacer properly installed, slide the caliper onto the driveshaft far enough to install the spacer and brake disc.

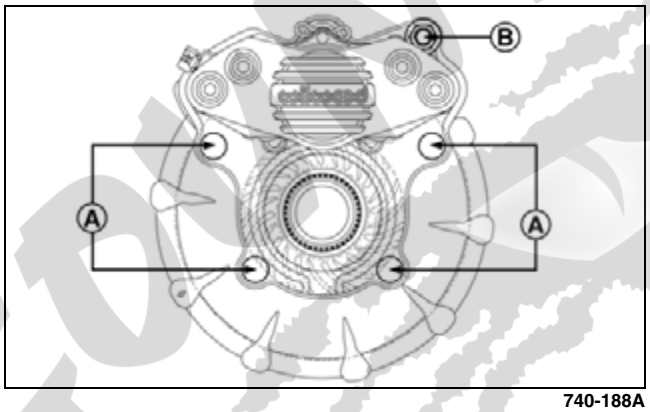


ZJ232



ZJ233

8. With the brake disc splines and driveshaft splines aligned, use a soft hammer and tap the caliper from side to side until the caliper is properly seated to the tunnel.
9. Install the Phillips-head cap screw and lock nut (B); then install the four lock nuts (A). Tighten to 20 ft-lb.



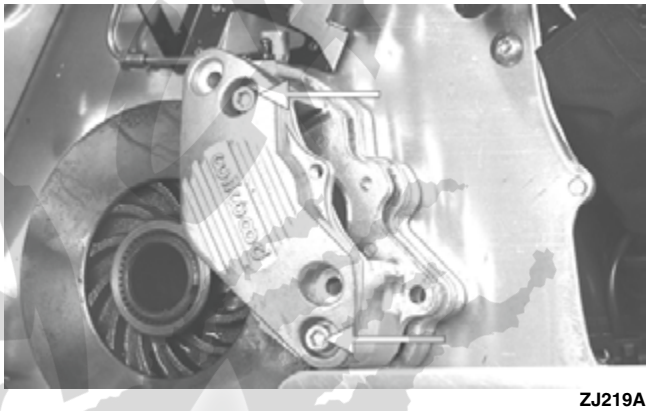
740-188A

10. Apply Anti-Seize Thread Compound to the threads of the brake disc retaining nut; then install the nut. Tighten only until snug.

■NOTE: If the outer caliper housing was removed during disassembling, install a new O-ring and place the housing into position; then secure with the two Allen-head cap screws. Tighten to 17 ft-lb.



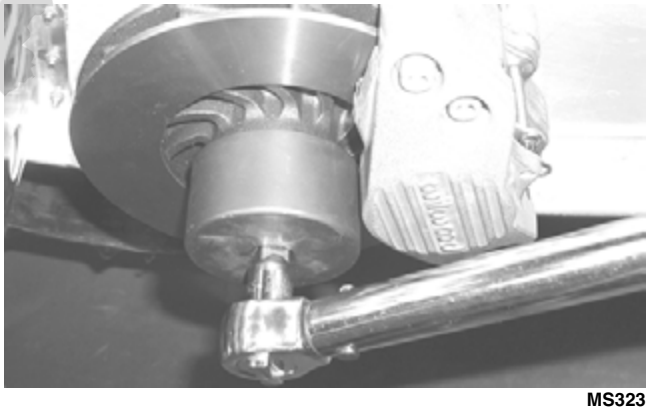
MS320A



ZJ219A

11. Install the brake pads; then secure the brake pads with the retaining pin and hairpin clip.
12. Bleed the brake system (see Bleeding Brake System in this sub-section).
13. Engage the brake lever lock; then using Brake Disc Socket Wrench, tighten the brake disc retaining nut (from step 10) to 120 ft-lb.

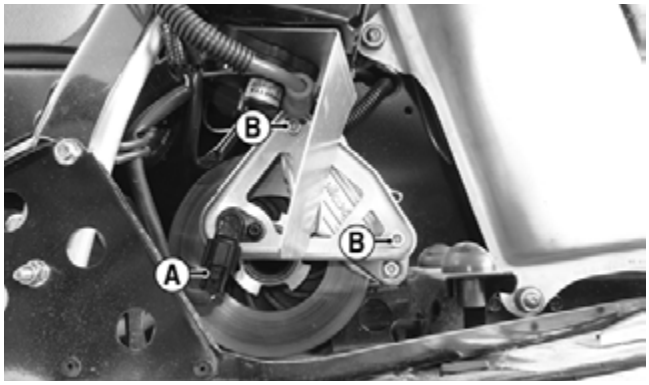
■NOTE: The brake lever lock must be engaged for this procedure.



MS323

■NOTE: After the retaining nut is tightened to specifications, peen the nut at the flat spot of the driveshaft.

14. Install the speedometer sensor mounting bracket to the caliper housing with the two remaining allen-head cap screws (B); then tighten all four to 17 ft-lb.

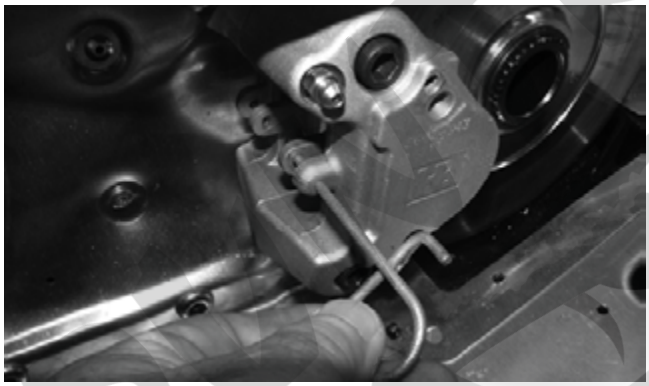


XM105A

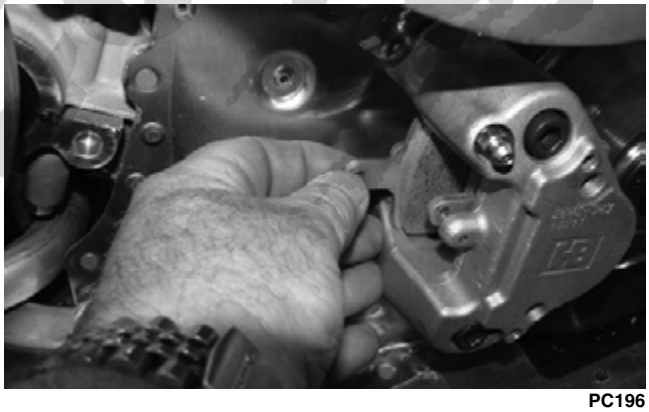
15. Connect the harness connector (A) to the speedometer sensor plug-in.
16. Install the toe shield and toe hook bracket; then install the torx-head cap screws. Tighten securely.
17. Place the expansion chamber and resonator into position and secure with the springs and the hairpin clip.
18. Adjust track alignment and tension (see Track Tension and Track Alignment in this section).

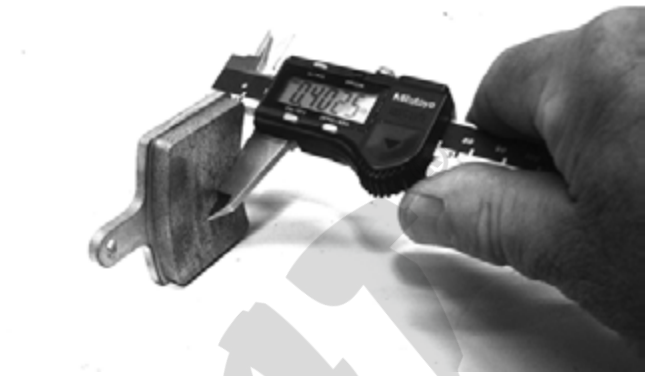
CHECKING AND REPLACING BRAKE PADS (F/M/XF)

1. Remove the brake shield; then remove the retaining pin securing the brake pads.


PC195

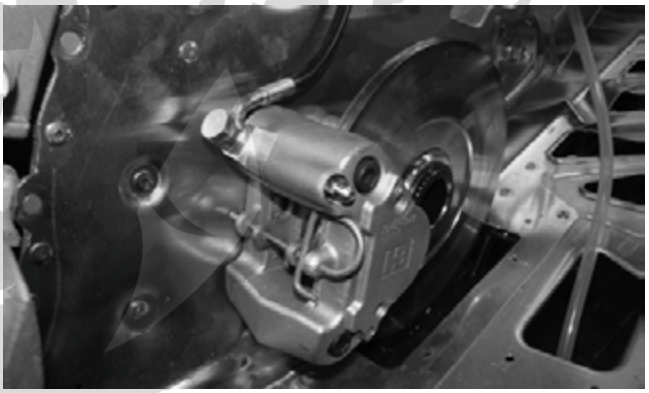
2. Remove one brake pad and measure the thickness.


PC196


PC199

■NOTE: Brake pad thickness must be greater than 0.20 in. If brake pad thickness is less than specified, replacement of both pads is necessary. Always replace with new pads and always replace as a set.

3. Position the new brake pad into the caliper.
4. Repeat for the other pad; then secure the pads with the retaining pin.

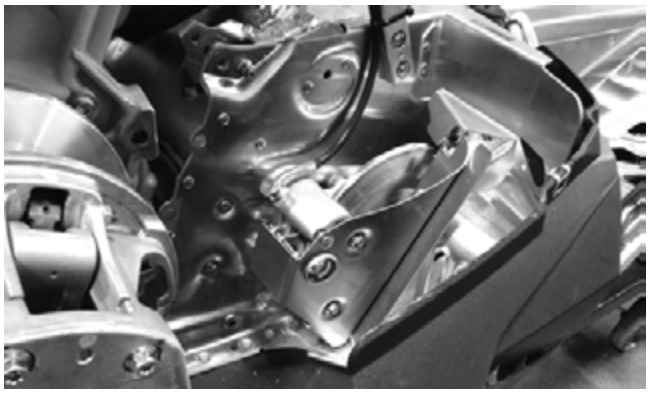

PC194

■NOTE: When new brake pads are installed, a "burnishing" process is required. Drive the snowmobile slowly and compress the brake lever several times until the pads just start to warm up; then allow them to cool down. This procedure stabilizes the pad material and extends the life of the pads.

BRAKE CALIPER/BRAKE DISC/ DRIVESHAFT BEARING (F/M/XF)

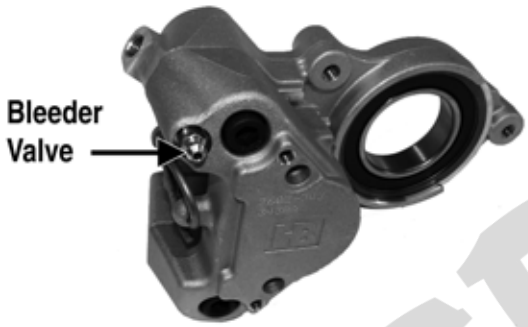
Removing/Disassembling

1. Remove both access panels; then remove the drive belt (see Drive Belt in this section) and driven clutch.
2. Remove the screws securing the brake shield and footrest to the chassis; then remove the shield and rest.



PC170

3. Slide a piece of flexible tubing over the ball of the bleeder valve and direct the other end into a container.

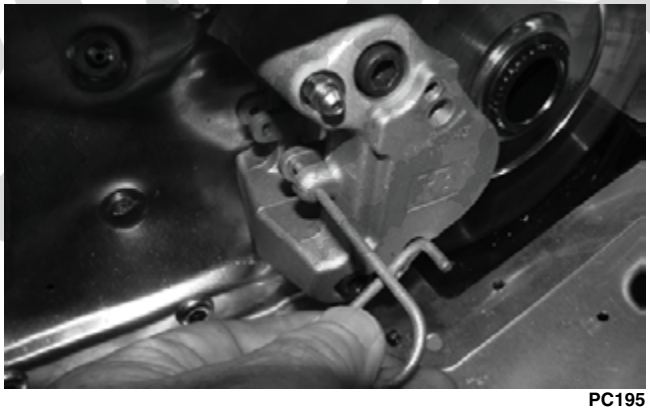


PC223A

CAUTION

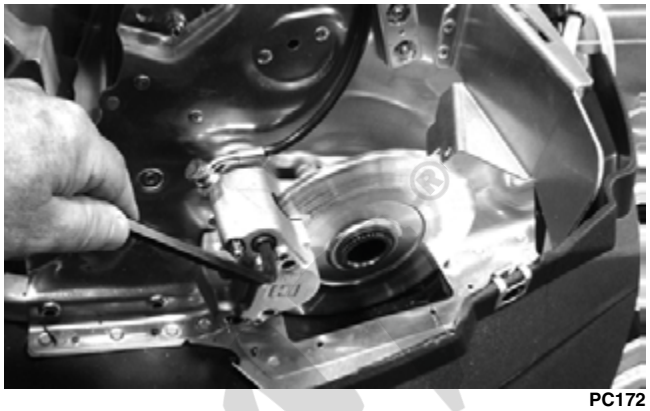
Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the snowmobile.

4. Open the bleeder valve and compress the brake lever several times to drain the reservoir of fluid.
5. Remove the brake hose from the caliper. Use an absorbent towel to collect any remaining brake fluid.
6. Remove the retaining pin securing the brake pads; then remove both pads.



PC195

■NOTE: If servicing the brake disc only, remove the cap screws securing the caliper housings together; then remove the outside housing. Account for the seal.



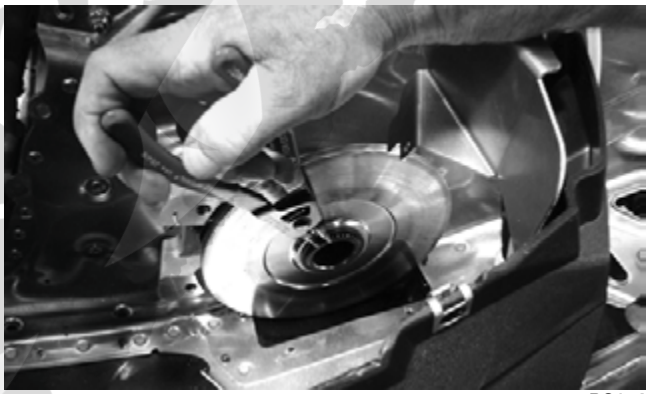
PC172

CAUTION

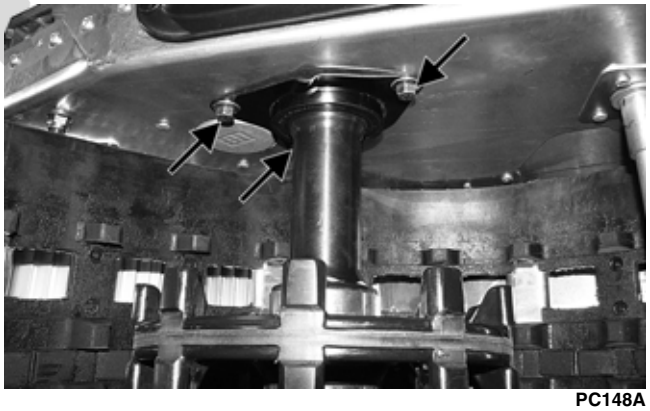
If the caliper housings are to be separated, take care not to allow any contaminants into the fluid passages of the calipers.

■NOTE: To aid in removing the inner caliper housing, completely loosen track tension.

7. Remove the retaining ring from the driveshaft and remove the brake disc; then remove the cap screws securing the inner caliper/driveshaft bearing housing to the chassis.



PC174



PC148A

8. If the bearing will be replaced, remove the retaining ring; then using a suitable press, remove the bearing from the housing.



PC200

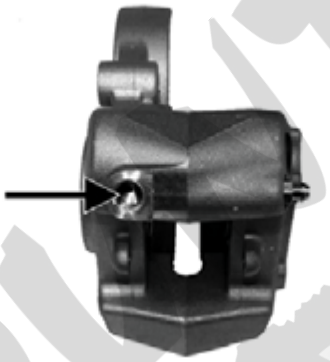
■**NOTE: Never reuse bearings that have been removed. Always use new bearings.**

■**NOTE: If the caliper housings were separated, they must be secured together with the seal installed between the inner and outer housings.**

9. Position a piece of wood between the pistons. Using low-pressure compressed air, blow into the caliper brake hose fitting to loosen the brake pistons.

⚠ WARNING

Always wear safety glasses when using compressed air.

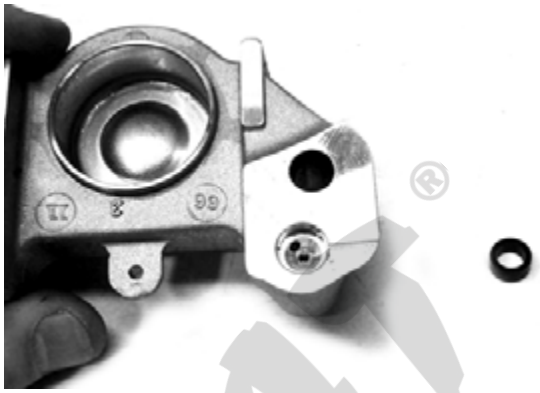


PC221A

10. Remove the two screws securing the caliper halves. Discard the seal.



PC219A



PC173

11. Remove the pistons (A) and O-rings (B); then discard the O-rings.



PC220A

Cleaning and Inspecting

1. Inspect the brake pistons for gouges, cracks, pitting, scuffing, or corrosion. If any of these conditions exist, replace the piston.

■**NOTE: The inner and outer caliper housings are not serviceable components. If either or both are defective or damaged, the complete caliper assembly must be replaced.**

2. Clean the piston outer surface by using a soft Scotch-Brite pad and clean brake fluid as a cleaner.

CAUTION

Do not use any sharp cleaning tool on the piston surface or in the O-ring groove as it may cause damage.



AF230

3. Inspect the piston bore of the inner and outer brake calipers for gouges, cracks, pitting, scuffing, or corrosion. If any of these conditions exist, replace the caliper.

4. Clean the caliper inner wall surface using a soft lint-free cloth and clean brake fluid.

CAUTION

Care must be taken not to allow any contaminants into the fluid passages of the calipers or brake system malfunction may occur.

5. Inspect the condition of the brake pads. Replace if damaged or worn. The brake pad thickness must be greater than 0.20 in. If the brake pad thickness is less than specified, replacement of both pads is necessary.

6. Inspect the brake hose for cracks and deterioration and check the condition of the threaded connectors.

Assembling/Installing

1. Apply approved brake fluid to new O-rings; then install the O-rings into the groove of each caliper half.

CAUTION

Never reuse piston O-rings. Always install new O-rings when installing pistons in the brake caliper.

2. In each caliper half, apply approved brake fluid to the brake piston; then while twisting, install the piston with the dished side facing out.



PC201

■**NOTE: To aid in installing the piston, make sure the piston O-ring is properly seated in the groove of the caliper housing.**

3. Using a suitable press, install a new inner bearing into the caliper housing until it is properly seated.

CAUTION

When installing a bearing, always press on the outer race of the bearing.



ZJ239A

4. Install the snap ring securing the bearing in the caliper housing.

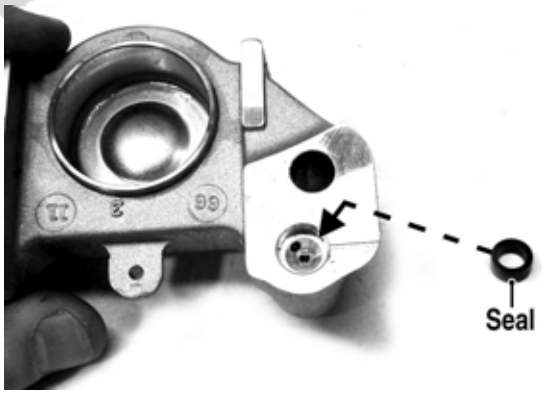


PC204

5. Place the inner caliper housing/driveshaft bearing housing onto the driveshaft and secure with the cap screws coated with blue Loctite #243. Tighten to 25 ft-lb.

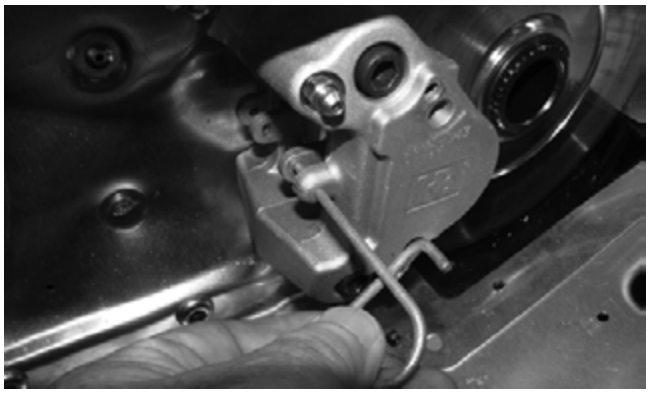
6. Apply Anti-Seize Thread Compound to the splines of the brake disc; then install on the driveshaft and secure with the retaining ring.

7. Install a new seal in the outer caliper fluid passage; them install the outer caliper and secure with the cap screws. Tighten to 25 ft-lb.



PC173A

8. Install new brake pads in the caliper and secure with the retainer pin.



PC195

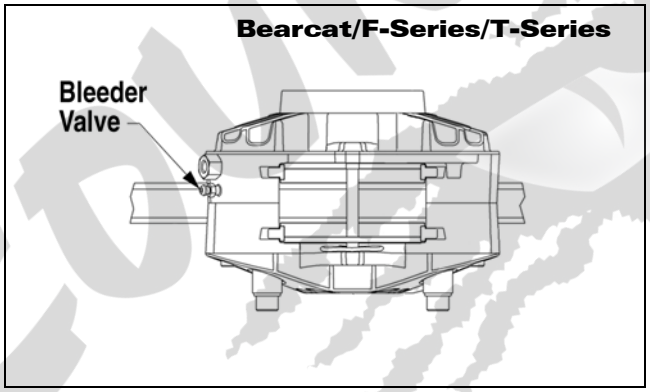
9. Bleed the brake system (see Bleeding Brake System in this sub-section).
10. Install the brake shield and footrest; then install the drive belt (see Drive Belt in this section) and driven clutch. Tighten the driven clutch cap screw to 20 ft-lb.
11. Adjust the track tension (see Track Tension in this section) and track alignment (see Track Alignment in this section).
12. Close and secure both side panels.

Brake Lever/Master Cylinder Assembly

REMOVING

1. Slide a piece of flexible tubing over the ball of the bleeder valve and direct the other end into a container.

Bearcat/F-Series/T-Series



739-269B

F/M/XF



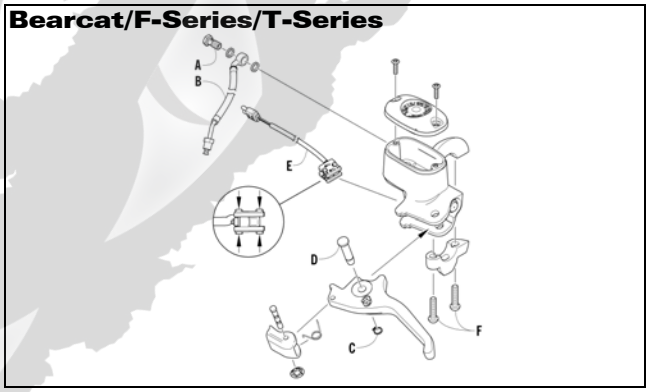
PC223A

2. Remove the two screws securing the reservoir cover and remove the reservoir cover; then open the bleeder valve. Allow the brake fluid to drain completely.
3. Place an absorbent towel around the connection to absorb brake fluid. Remove the banjo-fitting bolt (A) securing the brake fluid hose (B) to the master cylinder. Discard the two crush washers.

CAUTION

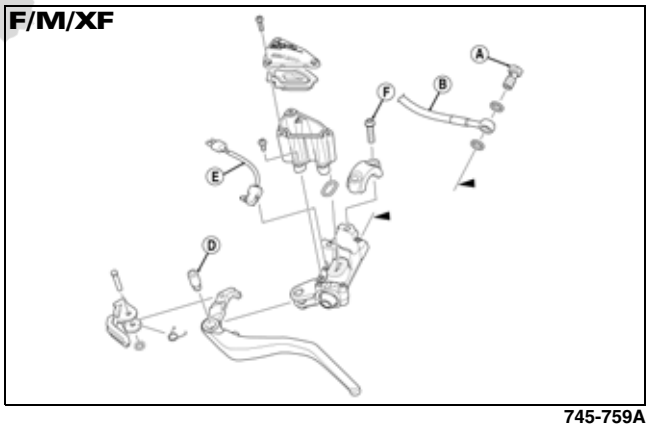
Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the snowmobile.

Bearcat/F-Series/T-Series



742-152A

F/M/XF



745-759A

4. Remove the snap ring (C) (Bearcat/F-Series/T-Series) and pin (D) securing the brake lever to the master cylinder.
5. Using a small screwdriver, compress the tabs of the brake-light switch (E) to release it from the master cylinder.

6. Remove the two torx-head screws (F) and clamp securing the brake reservoir to the handlebar; then place a towel over the reservoir and remove the assembly from the handlebar.

INSPECTING

1. Inspect the snap ring and pin securing the brake lever for wear or damage; then inspect the brake lever for cracks or damage.
2. Inspect the master cylinder reservoir and cover for cracks and leakage.

■NOTE: The master cylinder is a non-serviceable component. If any wear or damage is detected, the master cylinder must be replaced.

3. Inspect the brake fluid hose for cracks, deterioration, and the condition of the fittings (threaded and compression).

INSTALLING

1. Position the brake assembly on the handlebar. Secure with two torx-head screws (F) and clamp; tighten securely.
2. Install the brake fluid hose (B) to the master cylinder with the banjo-fitting bolt (A) and two new crush washers. Tighten securely.

CAUTION
Always use new crush washers when installing the brake fluid hose.

3. Install the brakelight switch (E) to the master cylinder.
4. Install the brake lever; then secure with pin (D) and snap ring (C) (Bearcat/F-Series/T-Series).
5. Place the reservoir cover onto the reservoir; then secure with the two screws.
6. Bleed the brake system (see Bleeding Brake System in this sub-section).

Troubleshooting Track

Problem: Track Edge Frayed — Drive Lugs Worn	
Condition	**Remedy**
1. **Track alignment** adjusted incorrectly	1. Align — replace track
Problem: Track Worn Adjacent to Outer Drive Lugs	
Condition	**Remedy**
1. **Track tension** adjusted incorrectly 2. **Rear idler wheels** dirty — damaged	1. Adjust track tension 2. Clean — replace idler wheels
Problem: Track Ratchets — Slaps Tunnel	
Condition	**Remedy**
1. **Track tension** adjusted incorrectly (too loose) 2. **Drive sprockets** misaligned — damaged	1. Adjust track tension (tighten) 2. Align — replace sprockets
Problem: Wear-Strip Wear Excessive	
Condition	**Remedy**
1. **Slide rail** bent — broken — damaged 2. **Track alignment** adjusted incorrectly	1. Repair — replace slide rail 2. Adjust track alignment

Troubleshooting Hydraulic Brake System

Problem: Caliper Leaks	
Condition	**Remedy**
1. **Caliper O-ring** deteriorated — severed 2. **Piston — O-ring** damaged	1. Replace O-ring 2. Repair piston — replace piston — O-ring
Problem: Lever Spongy — Bottoms Out	
Condition	**Remedy**
1. **Brake system air bubbles** present 2. **Master cylinder** damaged — faulty	1. Bleed brake system 2. Replace master cylinder
Problem: Oscillation Feedback in Lever	
Condition	**Remedy**
1. **Brake pad residue** present on brake disc 2. **Caliper** loose	1. Replace pads — clean disc 2. Tighten mounting bolts
Problem: Loss of Brake	
Condition	**Remedy**
1. **Brake fluid** overheated — contaminated 2. **Master cylinder** damaged — faulty 3. **Caliper — brake hose** leaking 4. **Brake lever linkage** damaged	1. Replace fluid 2. Replace master cylinder 3. Replace caliper O-ring — repair piston —replace piston — O-ring — brake hose 4. Repair — replace lever — mounting bolt
Problem: Brakes Drag	
Condition	**Remedy**
1. **Master cylinder** damaged — faulty 2. **Brake pads** worn — tapered	1. Replace master cylinder 2. Replace pads
Problem: Snowmobile Won't Stop — Have to Pull Too Hard on Lever	
Condition	**Remedy**
1. **Pads/brake disc** glazed 2. **Brake lever** binding 3. **Caliper pistons** binding	1. Replace pads — clean disc 2. Loosen pivot bolt — replace master cylinder 3. Service caliper assembly

Troubleshooting Drive Clutch/Driven Clutch

Problem: Midrange Shift-Up (Too Quickly - Lowers RPM)	
Condition	**Remedy**
1. **Drive clutch spring** weak	1. Replace drive clutch spring
2. **Driven clutch spring** weak	2. Replace driven clutch spring
3. **Driven clutch spring preload tension** inadequate	3. Replace driven clutch spring
4. **Center-to-center distance** too close	4. Adjust center-to-center distance
5. **Driven clutch bearing** worn — damaged	5. Replace bearing — movable sheave
Problem: Midrange Shift-Up (Too Slowly - Raises RPM)	
Condition	**Remedy**
1. **Drive clutch components** dirty	1. Clean drive clutch components
2. **Driven clutch components** dirty	2. Clean driven clutch components
3. **Driven clutch spring preload tension** excessive	3. Replace driven clutch spring
4. **Driven clutch bearing** worn — dirty	4. Clean — replace bearing — movable sheave
Problem: Excessive Belt Deposits	
Condition	**Remedy**
1. **Offset/parallelism** incorrect	1. Adjust offset/parallelism
2. **Drive clutch/driven clutch sheaves** rough — damaged — dirty	2. Repair — replace — clean drive clutch/driven clutch
3. **Driven clutch movable sheave travel** impaired	3. Service driven clutch
4. **Driven clutch bearing** worn — dirty	4. Clean — replace bearing — movable sheave
Problem: Excessive Belt Drag—Impaired Drive Clutch Disengagement	
Condition	**Remedy**
1. **Drive clutch components** dirty — damaged	1. Clean — replace drive clutch components
2. **Drive belt** does not meet measurement specifications	2. Replace drive belt
Problem: Engine RPM Suddenly Increases—Drive Clutch Vibrates	
Condition	**Remedy**
1. **Cam arm pin** bent — damaged	1. Replace pin
2. **Cam arm** damaged — broken	2. Replace cam arm
3. **Drive clutch** out of balance	3. Align — replace components — drive clutch — drive belt
Problem: Driven Clutch Vibrates	
Condition	**Remedy**
1. **Driven clutch** out of balance	1. Service — replace driven clutch
Problem: Drive Clutch Engagement (Before Specified RPM)	
Condition	**Remedy**
1. **Drive clutch spring** weak — bent	1. Replace spring
2. **Cam arms** incorrect — worn	2. Replace cam arms
Problem: Drive Clutch Engagement (After Specified RPM)	
Condition	**Remedy**
1. **Drive clutch spring** incorrect	1. Replace spring
2. **Spider buttons** worn	2. Replace clutch
Problem: Drive Clutch Sticks	
Condition	**Remedy**
1. **Drive clutch components** dirty	1. Clean drive clutch components
2. **Movable sheave** bent — binding	2. Clean — replace movable sheave
3. **Spider buttons** worn	3. Replace clutch
Problem: Drive Clutch Jerks—Shifts Erratically	
Condition	**Remedy**
1. **Drive clutch** dirty	1. Clean — drive clutch components
2. **Rollers** worn	2. Replace clutch
3. **Cam arms** rough	3. Polish — replace cam arms
4. **Spider buttons** worn	4. Replace clutch
5. **Sheaves** dirty	5. Clean sheaves

NOTES

SECTION 7 — SUSPENSION

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Suspension

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

A number of special tools must be available to the technician when servicing the rear suspension.

Description	p/n
Shock Absorber Air Pump	2603-614
Piston Location Tool	0644-169
Idler Wheel Puller Kit	0644-570
Inflation Needle	0744-020
Rear Suspension Spring Tool	0144-311
Gas Shock Retaining Blocks (Zero Pro)	0644-486
Spanner Wrench - Fox Float Shock	0744-072
Handlebar Stand	5639-152
Steering Post Stand	5639-946
Bearing Cap Seal Protector	0644-268
Floating Piston Location Gauge	0644-350
Axle Nut Spanner Wrench	0644-454

■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

UNDERSTANDING THE SUSPENSION

Quick acceleration and the ability to go through the turns with power are the most important handling qualities. This section explains how the skid frame functions to provide these two important handling qualities. Before proceeding, however, note these terms.

Weight Transfer — A shift in the center of gravity in any direction depends on the force applied.

Track Tension — The amount of tightness or looseness of the track when correctly mounted in the chassis.

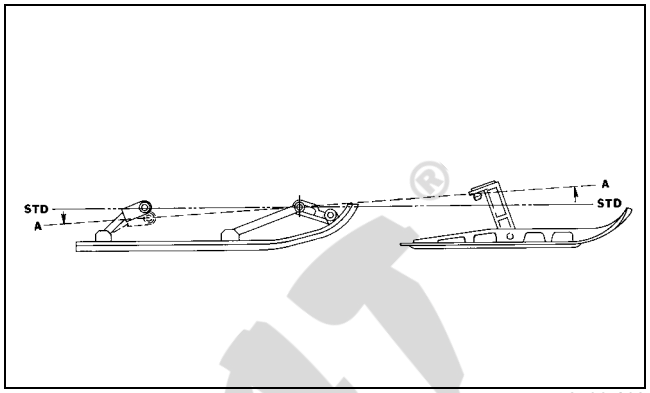
Spring Tension — The amount of force exerted on the spring by either fork tension adjustment or eyebolt adjustment.

Ski Pressure — The amount of force exerted downward on the skis.

Good weight transfer characteristics are needed for fast acceleration (shift of weight from skis to track) and for cornering (shift of weight back to skis to hold the front end in turns). Effective weight transfer depends on suspension tension, position of rider, and the position of the front arm limiter.

To understand how the suspension system works, think of the entire system in terms of three points; the skid frame rear axle center, the skid frame front arm, and the ski saddle center.

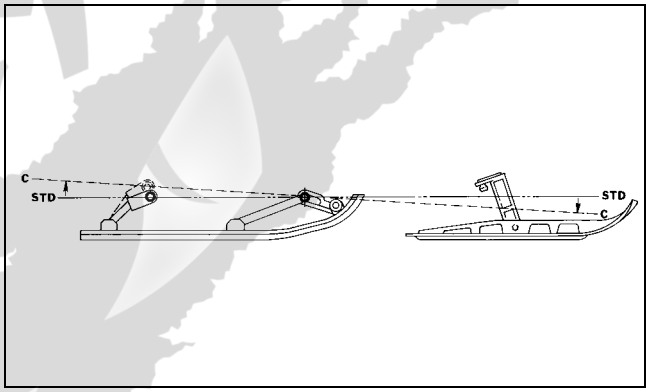
Assume that the front arm functions as a stationary pivot point between the rear axle center and the ski saddle center. Also assume that the ski saddle center is the same height off the ground as the rear axle center. This produces the standard position arrangement.



0728-180

Under acceleration when the center of gravity is transferred to the rear of the machine, the rear suspension collapses slightly. This brings the rear arm point downward and with the front arm stationary, the teeter-totter effect reduces the pressure on the skis, position A.

However, for controlled cornering, more pressure is needed on the skis. So when the driver decelerates coming into a corner, the center of gravity is transferred forward, putting the required pressure onto the skis and reducing the pressure on the rear suspension, position C.



0728-181

This is essentially what weight transfer is all about — the shift of weight to the rear of the machine for positive traction and good acceleration or to the front of the machine for positive handling and cornering control.

Suspension Setup Basics

SKI SHOCK ABSORBER SPRINGS

The shock absorber springs have been matched to the shock valving and rear suspension. These springs are the result of hours of testing and comparison riding trying many different combinations of springs and shocks. If changes are necessary, several spring and shock sizes are available. While making these changes, keep the following points in mind.

Heavier Or Stiffer Springs

1. These will require shocks with more rebound control, or the front end will become like a pogo stick.

2. With stiffer springs, the front end will become more aggressive in the corners as more weight will be transferred to the skis when decelerating. Also, more weight is transferred to the rear on acceleration and can cause the rear shocks and spring to bottom out.
3. If the springs are too stiff for general riding conditions and style, the ride comfort is gone.

Spring Tension Too Soft

1. Front end bottoms out; hard on front end parts.
2. Less aggressive steering in corners on deceleration, and less weight is transferred to the skis because of softer springs.
3. Less weight gets transferred to rear of the machine upon acceleration.

■NOTE: When softening the ski springs, also soften the rear to match entire suspension.

CAUTION

If the ski shock spring is adjusted too loose, the spring retainer may fall out. If the spring is adjusted beyond specification, the spring will coil bind and spring adjuster damage will occur.

ADJUSTING SKI SHOCKS (Fox Air Shocks)

The air shocks are individually adjustable for the terrain conditions and driving style of the operator. The ski shocks are initially preset at the factory (see Section 1). However, the shocks can be "fine tuned" to match the operator's weight, riding style, and terrain conditions.

■NOTE: Care should be taken to have equal pressure in the shocks before operating the snowmobile.

To increase or decrease air pressure, use the following procedure.

■NOTE: The shocks should not be under load when adjusting.

■NOTE: Adding air pressure will increase the air spring force; reducing air pressure will decrease air spring force.

⚠ WARNING

Do not exceed 105 kg/cm^2 (150 psi) in the shock.

1. Remove the air valve cap from the shock; then thread the valve of Shock Absorber Air Pump onto the shock air valve approximately six rotations.

■NOTE: As the pump is being attached to the shock, the hose will fill with air resulting in a lower gauge pressure 0.14-3.52 kg/cm^2 (2-5 psi).

2. To decrease air pressure in the shock, press the black bleed valve button half way down and hold until desired pressure is attained.

■NOTE: Pressing the button fully down and releasing it will allow only a small amount of air to escape (micro-adjust).

3. To increase air pressure in the shock, pump until desired pressure is attained.
4. Remove the pump valve from the shock air valve.

■NOTE: As the pump valve is being removed from the shock, the sound of air loss is from the pump hose, not from the shock.

5. Install the air valve cap onto the shock.

FRONT ARM SPRING TENSION

Having very light front arm spring tension is desirable. When riding in 4 in. or more of snow, the machine will be quicker if the front spring tension is adjusted lightly.

If the spring tension is adjusted too stiff, the track angle at the front of the skid frame is steep. This steep angle prevents the snowmobile from getting up on plane and slows down by 5 to 8 mph. Also, the following could occur.

1. Slows machine down in loose snow.
2. Causes the snowmobile to dart and dive as a result of less track on the ground on deceleration.

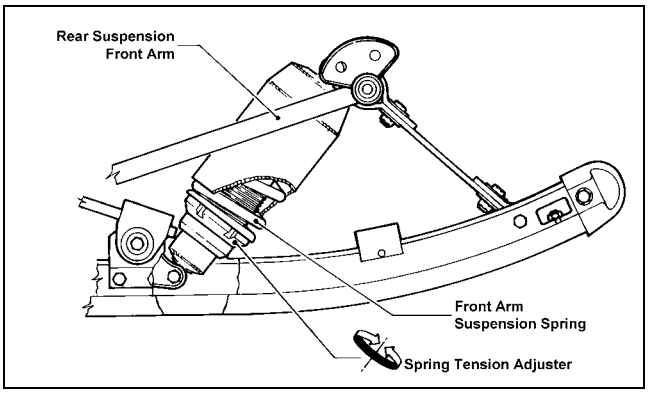
■NOTE: A tight front arm works well under only two conditions: sticky snow conditions in the spring of the year and in hill climbing on hard packed snow.

With the front arm adjusted too soft, the spring may come off the roller.

When riding in sticky snow (springtime or warm days) or hill climbing on hard snow, it may be desirable to stiffen the front arm spring tension. When this is done, weight is transferred back quicker. The problem with too much front arm spring tension is that the feel of the snowmobile becomes very short. The reason for this is the front arm becomes the pivot point between the spindles and rear of the snowmobile. With dominant spring tension on the front arm, the suspension is basically contacting the snow from a point below the front arm to the skis or the spindle pressure point. This makes for a very short and darting snowmobile on the trail. This is especially true when decelerating and the center of gravity is transferred forward.

A method for adjusting the front spring tension follows.

■NOTE: The spring tension should be set as soft as possible when operating on trails and in deep snow.



0729-662

FRONT ARM LIMITER STRAPS

Under no circumstances should the front arm limiter strap be lengthened. If lengthened, it may cause shock absorber travel problems.

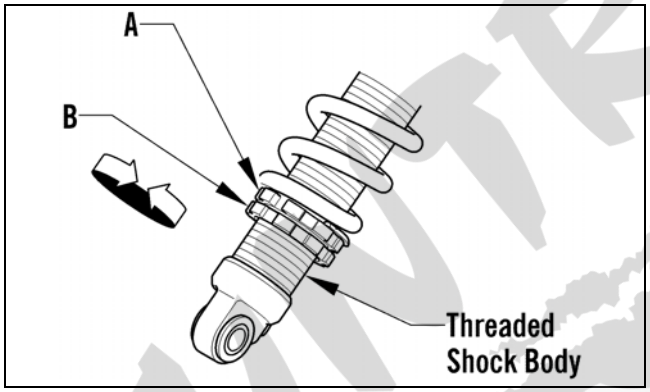
The two limiter straps can be shortened to suit driving style and some test driving time. With the rear arm in its present mounting location, no advantage has been noted from changing the strap length. If the front arm straps are shortened, the result will be more ski pressure and aggressive steering.

REAR ARM SHOCK SPRING (M/XF)

Proper adjustment of rear arm shock absorber spring pre-load is necessary to get the most desirable ride.

The rear arm shock spring is adjustable for the terrain conditions and driving style and weight of the operator. The spring adjuster nut has been set at the factory so the correct amount of threads are exposed between the adjuster nut and the threaded shock body as an initial setting.

Rear spring pre-load adjustment is accomplished by loosening the adjuster nut locking collar (B) from the adjuster nut (A) and using the Spring Adjuster Tool from the tool kit, rotating the adjuster nut in whichever direction is desired. Tighten the locking collar against the adjuster nut.



0745-159

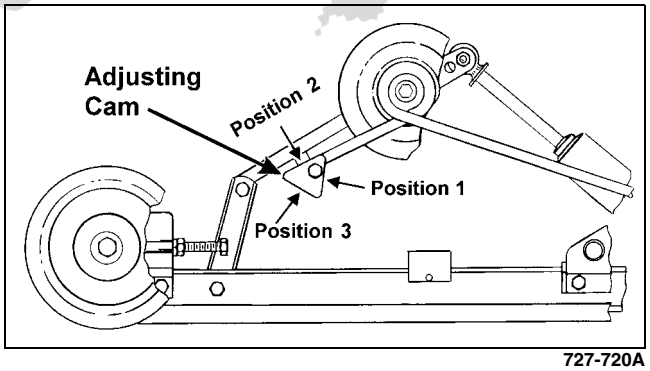
REAR ARM SPRING TENSION (Bearcat/F/F-Series/T-Series)

The rear spring tension is adjusted for the weight of the driver. Three possible adjustments exist.

1st block position - set for up to 150 lb

2nd block position - set for 150 to 200 lb

3rd block position - set for over 200 lb



727-720A

■NOTE: When making any changes to the front or rear suspension, the change should be made at both ends to keep the suspension balanced. For example, installing stiffer springs in front may require installing the next step stiffer spring in back to keep everything in balance.

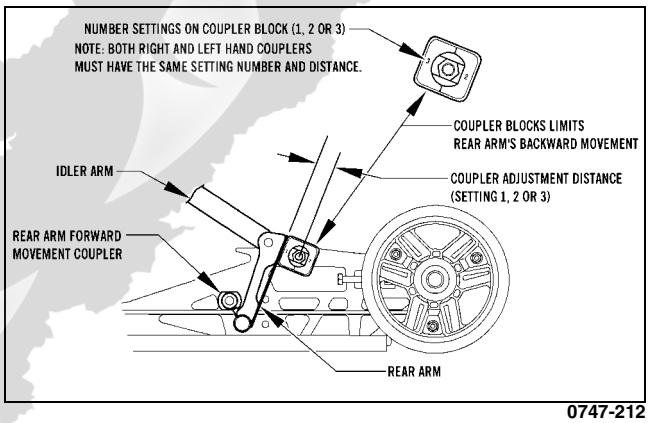
ADJUSTING REAR ARM COUPLER

The rear arm coupler provides advantages over the standard suspension.

First, with the coupler system, ski lift under acceleration is greatly reduced which provides improved handling. Second, when riding through rough terrain, the rear suspension arm receives some needed assistance from the front arm shock and spring as the rear arm is fully collapsed and locked up by the coupler blocks. The front arm then starts to collapse the shocks and spring which assist the rear springs. The result is a smoother ride for the operator.

If additional coupler action is desired, the coupler blocks can be set to the number 2 or 3 position. Each of the coupler blocks has three positions numbered on the inside surface of the block. When changing the block position, change both to the same number. To make the coupler adjustment, follow the procedure below.

1. Loosen the two cap screws that secure the coupler blocks to the inside of the suspension rails.
2. Rotate the coupler blocks to the desired position making sure both are set the same.



0747-212

3. Place a 4-in. block of wood under the rear of the suspension just in front of the rear idler wheels to assist in collapsing the suspension.
4. Collapse the rear suspension until the rear arm is firmly against the coupler blocks aligning the two blocks squarely with the arm. While in this position, tighten the two cap screws securely.

Servicing Suspension (Bearcat XT)

This sub-section has been organized so each procedure can be completed individually and efficiently.

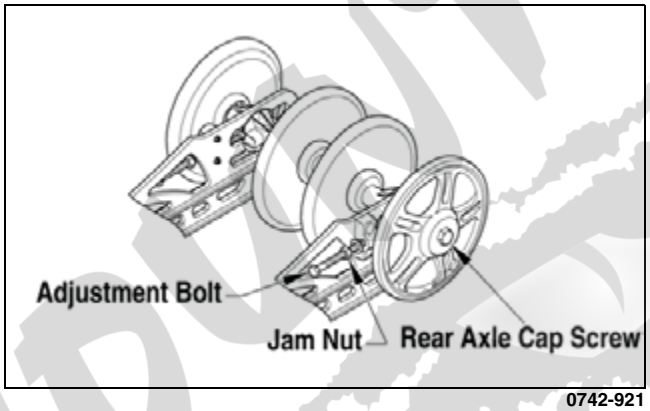
■NOTE: Some components may vary from model to model. Some illustrations and photographs used in this sub-section are used for clarity purposes only and are not designed to depict actual conditions. The technician should use discretion and sound judgment when removing and installing components.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

Removing Skid Frame

■NOTE: Many service procedures can be performed without removing the skid frame. The technician should use discretion and sound judgment when removing and installing components.

1. To avoid having the adjuster bushings binding during removal, remove the rear idler wheel caps and loosen the cap screws on the rear axle.



0742-921

2. Loosen the jam nuts and two track-tension adjusting bolts of the articulating skid frame.
3. Place a support stand under the rear bumper; then while holding the flared bushing, remove the rear cap screws securing the skid frame to the tunnel.

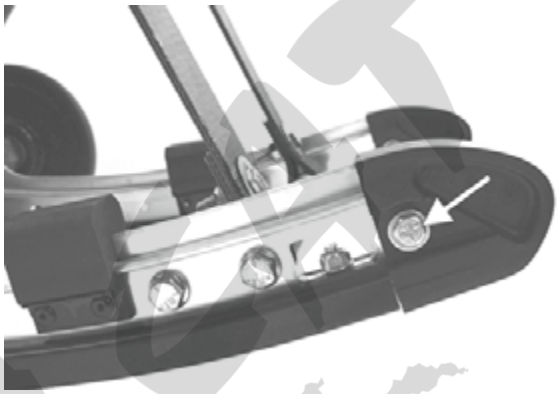
■NOTE: The support stand should hold the snowmobile level but not raised off the floor.

4. Remove the front cap screws securing the skid frame to the tunnel. Account for a flat washer and a lock washer.
5. Remove the support stand; then using an appropriate handlebar/steering post support stand, tip the snowmobile onto one side. Remove the skid frame.

End Caps

REMOVING

1. Remove the lock nut, washers, and cap screw securing the end cap.



MS016A

2. Using a hammer, tap the end cap off the rail.

CLEANING AND INSPECTING

1. Inspect the end cap area of the slide rail for cracks and wear.
2. Inspect the end cap for any signs of cracking or wear.
3. Clean both the slide rail area and the end cap. Using compressed air, clean the areas of dirt and gravel.

⚠ WARNING

Always wear an approved pair of safety glasses when using compressed air.

4. Inspect the cap screw for cracked, stretched, or damaged threads. Use a new lock nut when assembling.

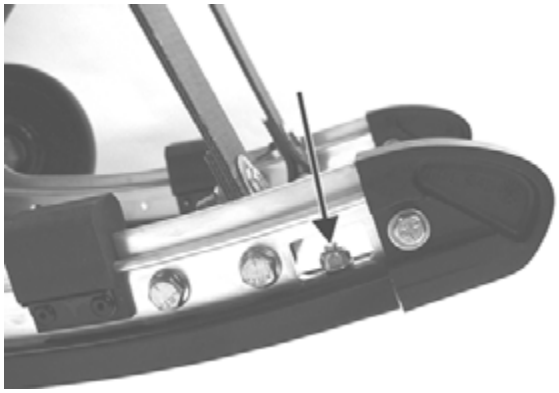
INSTALLING

1. Position the end cap on the slide rail; then align the hole in the end cap with the hole in the slide rail.
2. Secure with a cap screw, washers, and lock nut. Tighten to 80 in.-lb.

Wear Strips

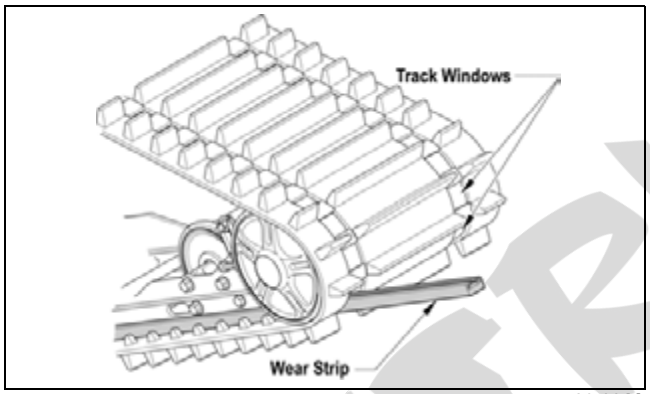
REMOVING

1. Remove the machine screw and lock nut securing the wear strip to the front of the slide rail.



MS016B

2. Align the wear strip with the openings (windows) in the track; then using a suitable driving tool, drive the wear strip rearward off the slide rail.



739-884A

CLEANING AND INSPECTING

1. Clean the slide rail using parts-cleaning solvent and compressed air.

⚠ WARNING

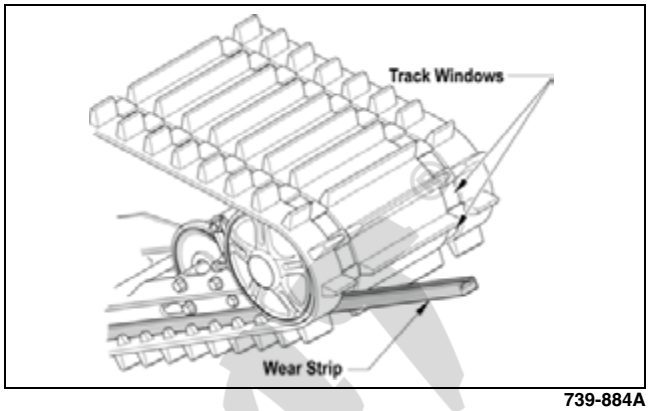
Always wear an approved pair of safety glasses when using compressed air.

2. Inspect the slide rail for cracks. If any cracks are found, replace the slide rail.
3. Using a straightedge, inspect the slide rail for any unusual bends. With the slide rail removed, place the straightedge along the bottom surface of the slide rail. If the rail is found to be bent, it must be replaced.

INSTALLING

■NOTE: Use a file to remove any sharp edges on the lower portion of the rail.

1. Align the wear strip with the openings (windows) in the track and from the back, start the wear strip onto the rail; then using a block of wood and a hammer, drive the wear strip forward into position.



739-884A

2. Secure with a machine screw and lock nut. Tighten to 50 in.-lb.

Shock Pads

REMOVING

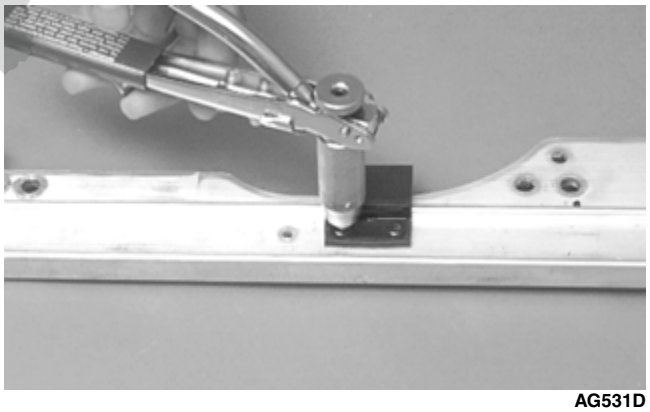
1. Using a 3/16-in. drill bit, drill out the rivets securing each front shock pad to the slide rail. Account for the retaining brackets.
2. Remove the torx-head screws and lock nuts securing the rear shock pads to the slide rail; then remove the shock pads.

INSPECTING

1. Inspect the pad and retaining brackets for damage or wear.
2. Inspect the rivet holes in the slide rail for damage or elongation.

INSTALLING

1. Place the front and rear pads and retaining brackets into position on the slide rail.
2. Secure the pads with rivets.



AG531D

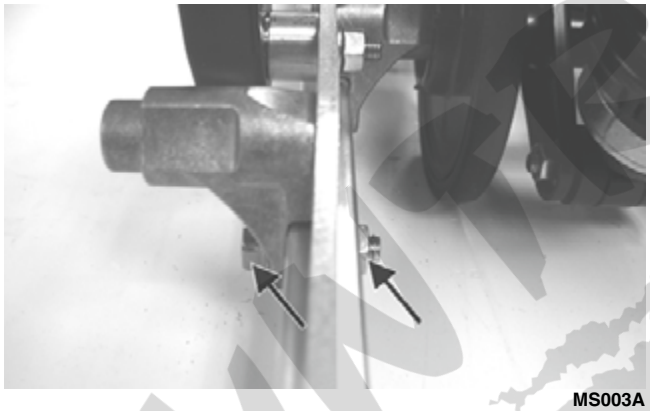
Idler Wheels/Mounting Blocks

REMOVING

Remove the cap screws and lock nuts securing the front outer idler wheel and mounting block. Account for the washer.



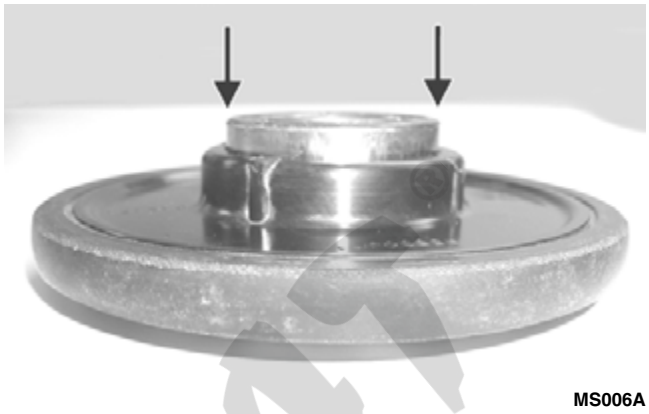
MS208



MS003A

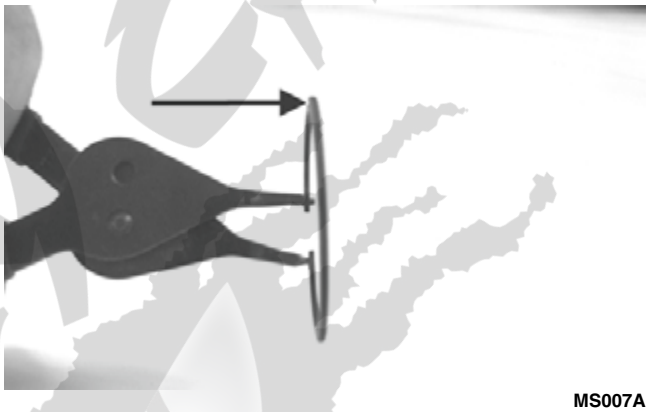
CLEANING AND INSPECTING

1. Clean the bearing with a clean cloth.
2. Inspect each idler wheel and each plastic hub for cracks or damage.
3. Rotate the idler wheel bearing (by hand) and inspect for binding or roughness.
4. If a bearing must be replaced, use this procedure.
   A. Remove the snap ring.
   B. Using a hydraulic press, press the bearing out the inside of the wheel.
   C. Press the new bearing (on its outer race) into the idler wheel.



MS006A

D. Install the snap ring making sure the “sharp side” is directed away from the bearing.

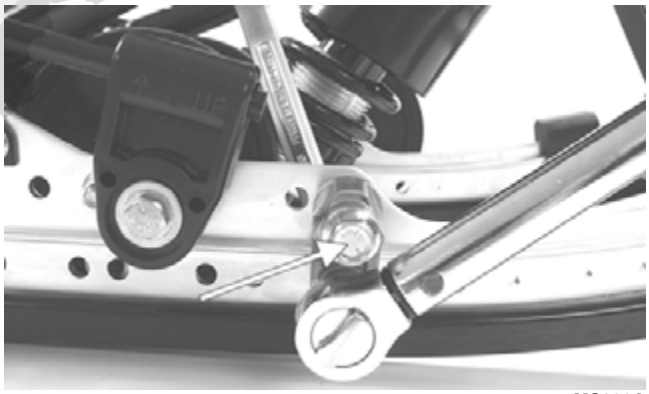


MS007A

INSTALLING

1. Secure each idler wheel mounting block on the slide rail with a cap screw and lock nut. Tighten to 20 ft-lb.

■NOTE: For proper alignment, install an idler wheel cap screw into the top mounting block hole prior to tightening.



MS009A

2. Place the idler wheel against the mounting block making sure the washer is on the outside of the idler wheel.
3. Secure the idler wheel assembly with a cap screw and a lock nut. Tighten to 20 ft-lb.

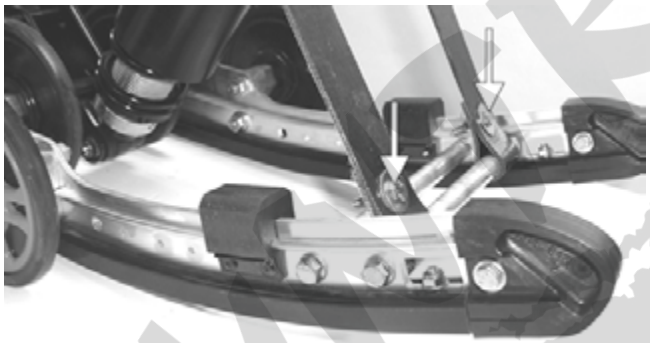


MS208

Front Arm/Front Shock Absorber/Front Inner Idler Wheels

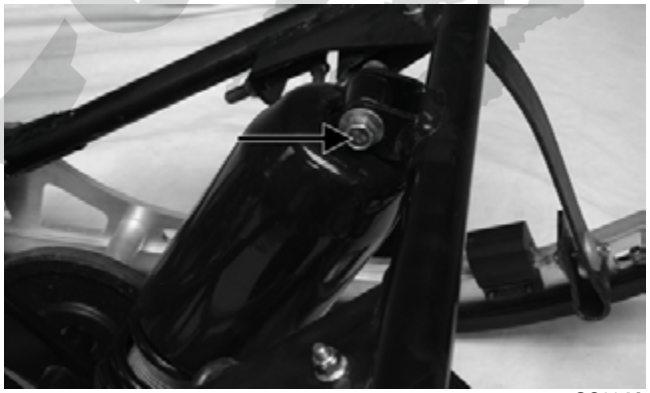
REMOVING

1. With skid frame removed and the rear springs removed from the adjusting cams, remove the lower cap screws and lock nuts securing the limiter straps to the rail support. Account for flat washers.



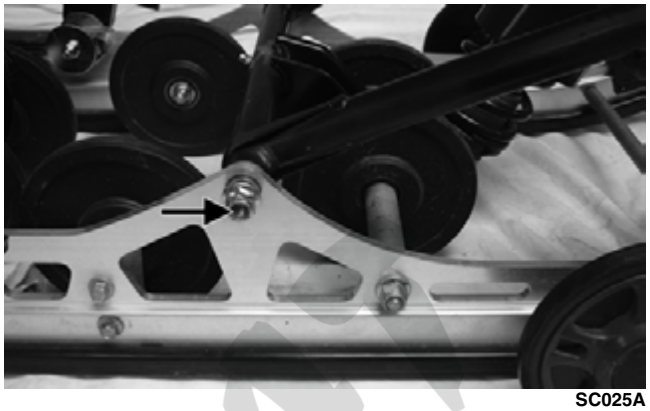
MS082A

2. Remove the cap screw and lock nut securing the upper front shock absorber eyelet to the front arm. Pull the shock eyelet free of the bracket. Account for a serrated axle.

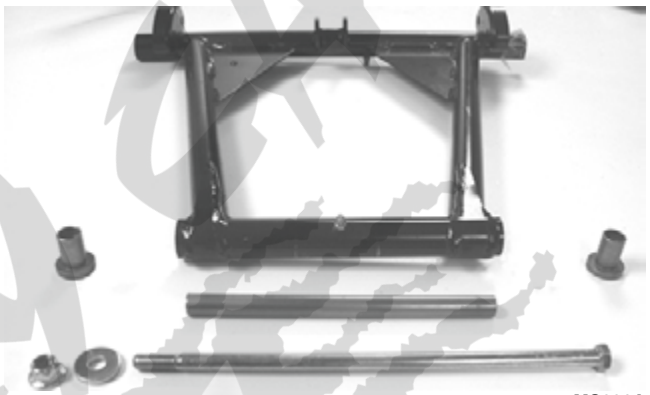


SC024A

3. Remove the cap screw and lock nut securing the front arm to the slide rail; then remove the front arm and account for the serrated axles, bushings, and an axle tube.

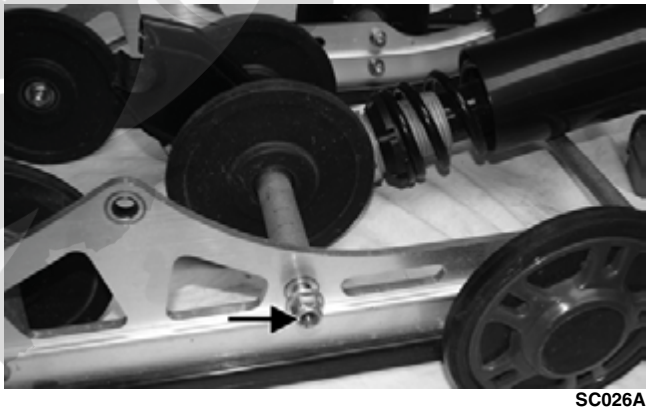


SC025A



MS036A

4. Remove the cap screw and lock nut securing the shock bracket/inner idler wheels to the slide rail.



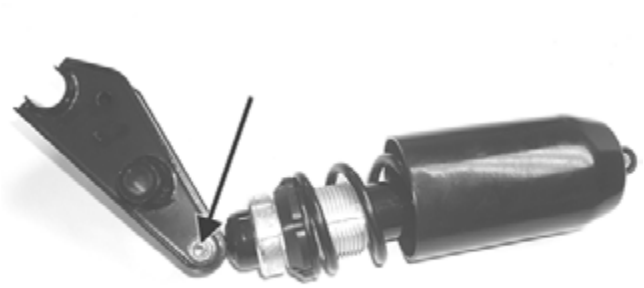
SC026A

5. From one side, tap on the shaft of the assembly rearward until the shaft is clear of the slide rail; then remove the assembly.



SC027

6. Remove the outer spacers and idler wheels; then slide the axle out of the shock bracket.
7. Remove the cap screw and lock nut securing the shock absorber to the bracket.



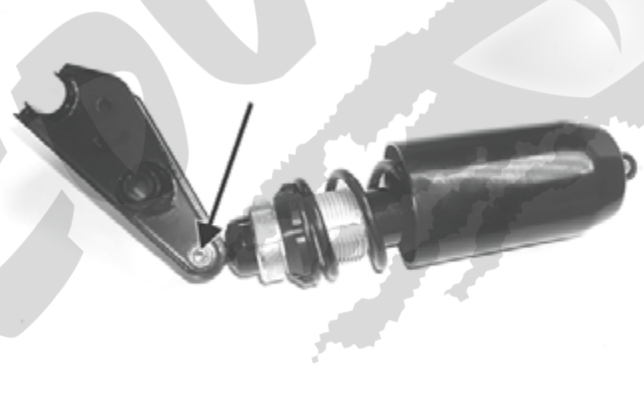
MS086A

INSPECTING

1. Inspect all front arm weldments for cracks or unusual bends.
2. Closely inspect all tubing for cracks or unusual bends.
3. Inspect the bearings, bushings, and front arm spacers for wear or damage.
4. Inspect the shock absorber for damage and for any signs of oil leakage especially at the point where the shock shaft enters the shock body.
5. Inspect the shock absorber eyelet welds (at each end) for any cracks, signs of separation, or for unthreading.

INSTALLING

1. Secure the shock absorber to the shock bracket with the cap screw and lock nut. Tighten securely.



MS086A

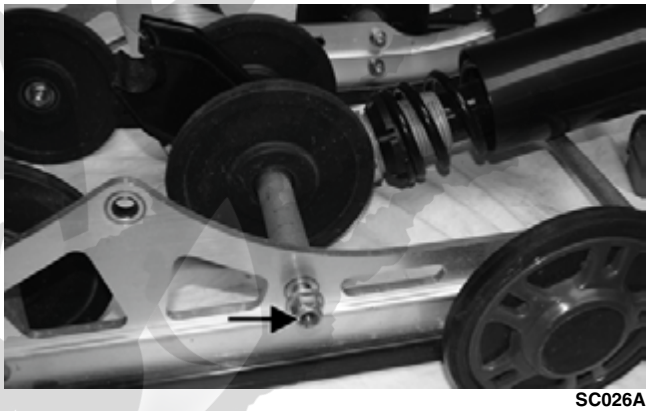
■NOTE: Do not over-tighten the shock absorber cap screw as the shock eyelet must be free to pivot.

2. Apply grease to the axle and install it into the shock bracket; then install the idler wheels and outer spacers.



SC027

3. Place the idler wheel/shock bracket assembly into position on the skid frame making sure the axle is aligned with the hole in the slide rail. Secure with the cap screw and a new lock nut. Tighten only until snug.



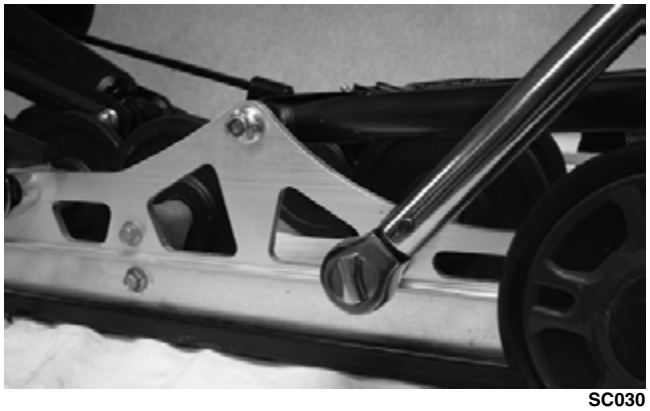
SC026A

4. Position the front arm into the slide rail. Secure with cap screws and lock nuts. Tighten to 40 ft-lb.



SC029

■NOTE: At this point, tighten the lock nut (from step 3) to 40 ft-lb.



SC030

5. Secure the upper shock eyelet and serrated axle in the mounting hole of the front arm. Secure with a cap screw and lock nut. Tighten to 40 ft-lb.



SC024A

6. Secure the limiter straps to the rail supports with cap screws, washers, and lock nuts. Tighten to 72 in.-lb.
7. Install the skid frame (see Installing Skid Frame in this sub-section); then install the rear arm springs onto the adjuster blocks.

Rear Upper Idler Wheels/ Rear Springs

REMOVING

1. With the skid frame removed using the Rear Suspension Spring Tool, remove the spring from the adjusting cam.

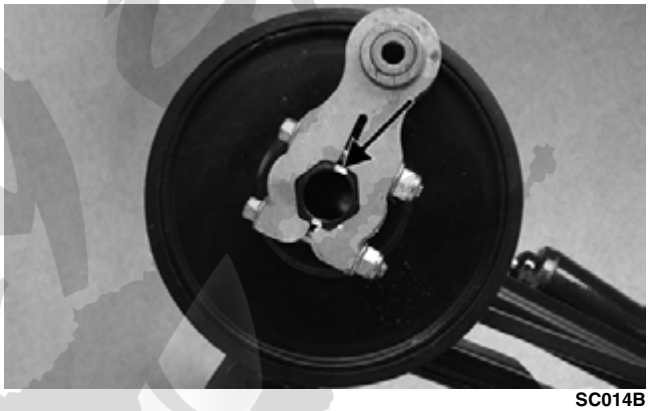
⚠ WARNING

Care must be taken when removing the spring or damage or injury could result.



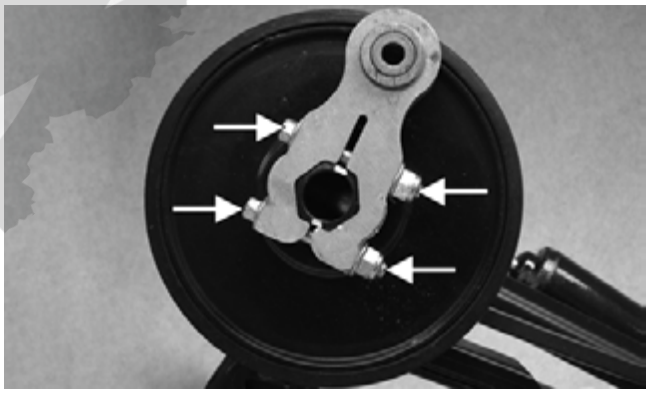
MS063

2. Mark the offset arm and the idler arm for assembly purposes. Note the flared side of the upper bushing is oriented outwards.



SC014B

3. Loosen the cap screws securing the offset arm to the idler arm; then remove the offset arm assembly. Account for two offset arm spacers.



SC014A

■NOTE: Unless the offset arm is being replaced, the cap screws and lock nuts do not need to be removed to remove the offset arm.



MS064

4. Using the appropriate Idler Wheel Puller Kit, remove the wheel.



SC015

5. Remove the cap screw, lock nut, and three flat washers securing the spring slide to the rail. Account for a slide block and washer.



SC016A



MS068

6. Remove the spring and sleeve from the idler arm.



MS069

■**NOTE: Use the same procedure for the other side.**

CLEANING AND INSPECTING

1. Clean the bearing with a clean cloth.
2. Inspect each idler wheel and plastic hub for cracks or damage.
3. Rotate the idler wheel bearings (by hand) and inspect for binding or roughness.
4. If a bearing must be replaced, see Idler Wheels/ Mounting Blocks - Cleaning and Inspecting in this sub-section.

■**NOTE: If the idler wheel has no snap ring securing the bearing, the idler wheel is not serviceable.**

5. Inspect the spring, spring slide, sleeve, washers, slide block insert, and shaft area for wear.
6. Inspect the adjusting cams and arms for cracks.

INSTALLING

1. Slide the sleeve and spring onto the idler arm.



MS069

2. Place the slide spacer and slide block (with spring in slide block) into position on the slide rail. Secure with a cap screw, three flat washers, and lock nut. Tighten to 20 ft-lb.



MS068

■**NOTE: Make sure the spring is located above the spring slide mounting cap screw.**



SC017

3. Using the appropriate wheel insertion tool (from Idler Wheel Puller Kit), install the rear upper idler wheel on the idler arm.



SC018

CAUTION

When driving the idler wheel onto the idler arm, use a tool to contact the inside race of the bearing or damage to the wheel or bearing may occur.

4. Install the two offset arm spacers onto the idler arm.

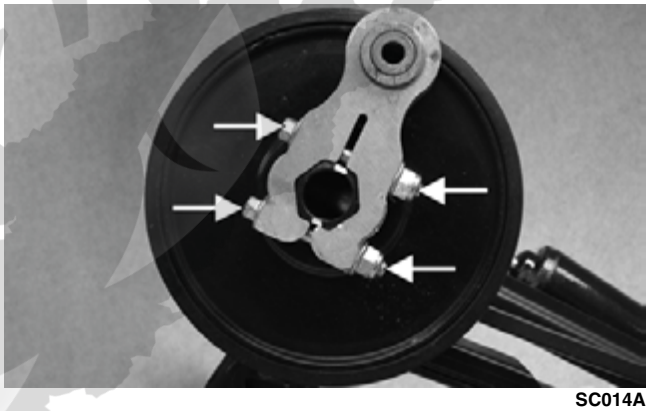


MS064

5. Place the flared bushings with a thin flat washer through the back side of the offset arm assembly.

■**NOTE: If the flared bushing in the offset arm is loose, it must be cleaned and green Loctite #609 must be applied to it prior to installation.**

6. Align the marks on the idler arm to the centerline of the offset arm assembly; then install the offset arm with the flared side of the bushing out. Secure the offset arm to the idler arm with cap screws and lock nuts. Tighten to 20 ft-lb.



SC014A

■**NOTE: When tightening the offset arm lock nuts, tighten the upper lock nut first to ensure an even clamp load.**

7. Install the skid frame (see Installing Skid Frame in this sub-section); then install the rear arm springs onto the adjuster blocks.

Idler Arm/Rear Arm

DISASSEMBLING

1. With the skid frame removed, remove the rear upper idler wheels and springs (see Rear Upper Idler Wheels/Rear Springs in this sub-section).

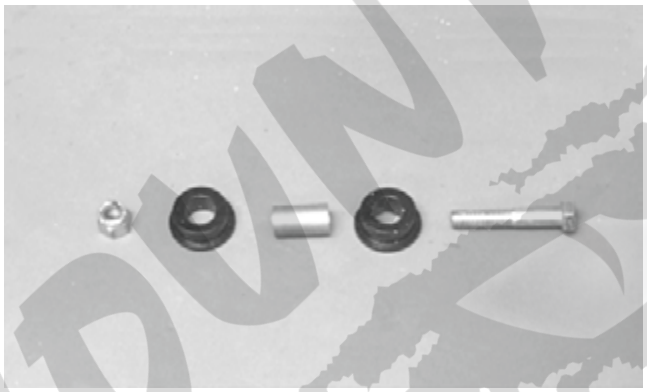


MS074

2. Remove the cap screw and lock nut securing the upper shock eyelet to the idler arm. Account for a spacer, lock nut, and bushings.



SC019A



AG553D

■**NOTE: Mark the hole that the upper shock links are mounted in for assembling purposes.**

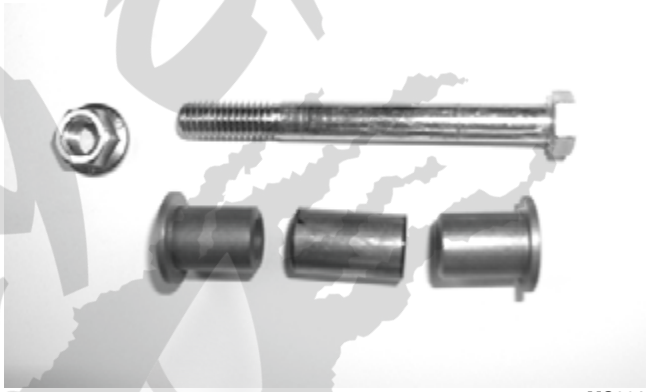


MS076

3. Remove the cap screw and lock nut securing the upper shock links to the idler arm. Account for a lock nut, spacer, and axle links.

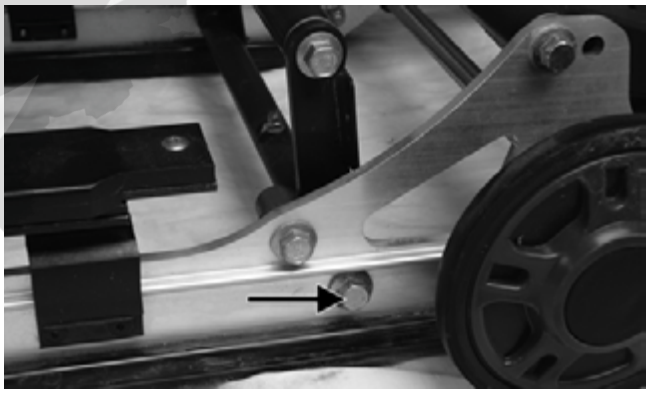


SC020A

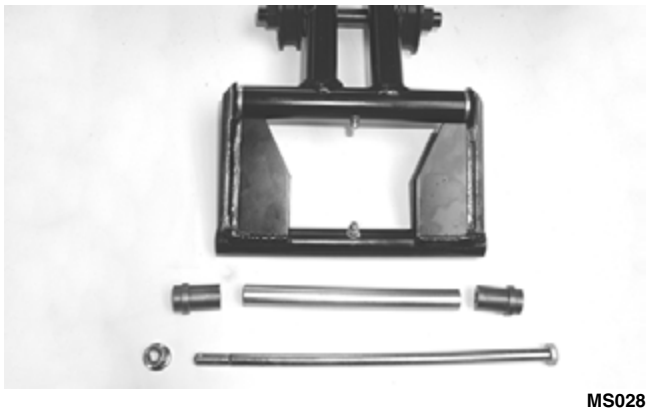


MS031

4. Remove the cap screw, washer, and lock nut securing the rear arm to the slide rail. Account for the serrated axles and axle tube.



SC021A



MS028

7

5. Remove the cap screw and lock nut securing the rear arm to the idler arm. Account for the aluminum axle and bushing assemblies.



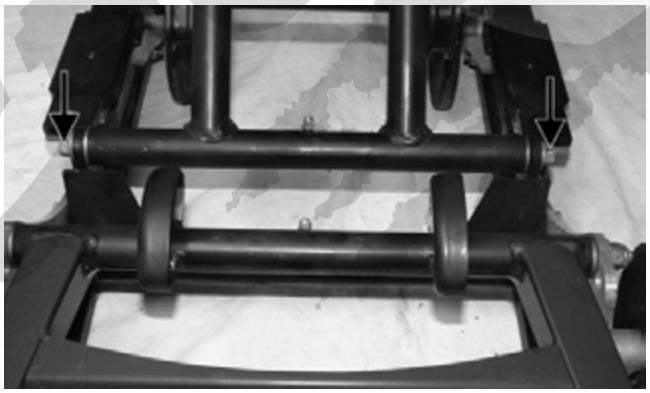
SC022A

CLEANING AND INSPECTING

1. Closely inspect the rear arm/idler arm tubing and brackets for cracks or unusual bends.
2. Clean the bearings with a clean cloth.
3. Inspect each idler wheel for cracks or damage.
4. Inspect the bushings (located in the arm pivot area) for wear or damage.
5. Inspect all welds and the tubing of the upper arm for cracks or unusual bends.
6. Inspect the two adjusting cams for damage.
7. If an idler wheel bearing must be replaced, see Idler Wheels/Mounting Blocks - Cleaning and Inspecting in this sub-section.

ASSEMBLING

1. Install the rear arm onto the idler arm with an aluminum axle, bushing assemblies, and two cap screws (coated with blue Loctite #243). Tighten only until snug.



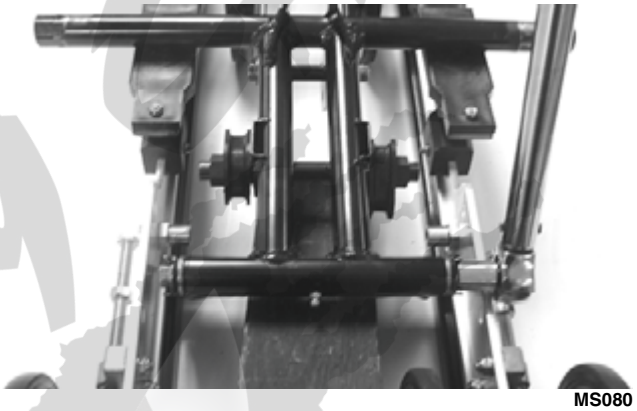
SC022A

2. Place the rear arm assembly into position. Secure with a cap screw, washer, and lock nut. Tighten to 40 ft-lb.



SC021A

3. Place a support beneath the rear arm; then tighten the cap screws (from step 1) to 40 ft-lb.



MS080

4. Position the shock links in the appropriate holes of the idler arm brackets (as noted during disassembling). Place a spacer between the center of the brackets. Insert the axle links into the upper shock link eyelets; then insert the cap screw through the eyelets. Secure with a cap screw, washer, and lock nut. Tighten securely.



MS031



SC023A

5. Place the upper shock eyelet with bushings between the idler arm brackets making sure the spacer is properly positioned between the brackets. Secure with a cap screw and lock nut. Tighten securely.



SC019A

■NOTE: Do not over-tighten the shock absorber cap screw as the shock eyelet must be free to pivot.

6. Grease the idler arm and rear arm grease fittings with an all-temperature grease.
7. Install the rear upper idler wheels and rear springs (see Rear Upper Idler Wheels/Rear Springs in this sub-section).
8. Install the skid frame (see Installing Skid Frame in this sub-section).

■NOTE: Install the rear arm springs onto the adjuster blocks after the skid frame has been installed.

Rear Shock Absorber/ Links and Pivot Assembly

■NOTE: Before removing the skid frame by using the Rear Suspension Spring Tool, remove the spring from the adjusting cam.

⚠ WARNING

Care must be taken when removing the spring from the adjusting cam or damage or injury could result.

DISASSEMBLING

■NOTE: When removing center components from the skid frame, loosening all axle cap screws/lock nuts will make removing easier.

1. With the skid frame removed, remove the cap screw and lock nut securing the shock absorber to the eyelet of the idler arm and remove the shock absorber. Account for a sleeve, cap screw, lock nut, and bushings.



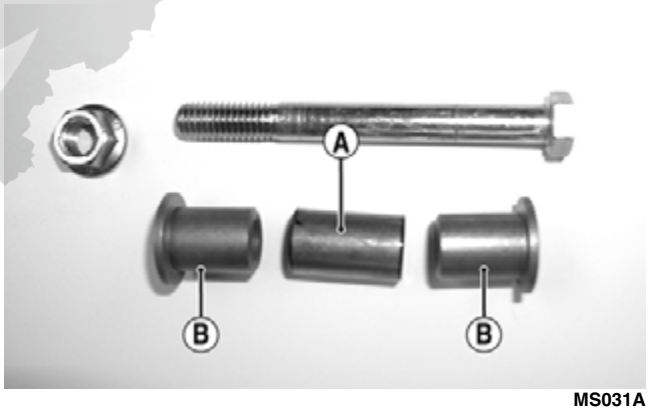
MS089A



MS091

■NOTE: For ease of servicing the rear arm components, engage the overload springs.

2. Mark the hole that the shock links are mounted on the idler arm for assembly purposes; then remove the cap screw and lock nut securing the shock links to the idler arm bracket. Account for the two axles (B) and spacer (A).



MS031A

3. Note the hole location that the idler wheel/pivot assembly is in; then remove the cap screw and lock nut securing the assembly to the rails.



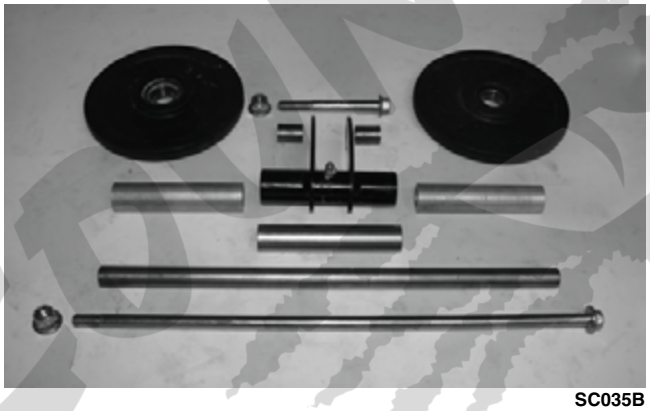
SC032

4. Tap the idler wheel/pivot assembly forward and up until it clears the slide rails; then lift the assembly upward and out from between the rails.



MS095

5. With the idler wheel/pivot assembly removed, remove the two outer spacers, an axle, and center spacer from the pivot bracket.



SC035B

6. Remove the cap screw, lock nut, and washer securing the shock rod links to the offset arm. Account for all components and mounting hardware.



SC036

CLEANING AND INSPECTING

1. Clean shock pivot and idler wheel axle in part-cleaning solvent. Dry with compressed air.

⚠ WARNING

Always wear an approved pair of safety glasses when using compressed air.

2. Clean the idler wheel bearings with a clean cloth.
3. Closely inspect the pivot bracket arm and axle for cracks, wear, bends, or elongated holes.
4. Inspect the idler wheels for signs of cracking, wear, or outer rubber separation from plastic wheel.
5. Rotate the idler wheel bearings (by hand) and inspect for any signs of binding or roughness.
6. If the idler wheel bearing must be replaced, see Idler Wheels/Mounting Blocks - Cleaning and Inspecting in this sub-section.
7. Inspect the shock absorber for any signs of oil leakage especially at the point where the shock shaft enters the shock body.
8. Inspect the rubber shock bushings located in the shock absorber eyelets for cracks or deterioration.
9. Inspect the shock absorber eyelet welds (at each end) for any cracks or signs of separation.
10. Inspect the welds securing the eyelets of the shock links for cracks or signs of separation. If either condition exists, replace the shock link.
11. Inspect the axle surfaces for any signs of corrosion. If corrosion is found, lightly buff the surface of the axle with #400 wet-or-dry sandpaper; then apply a light coat of grease.

ASSEMBLING

1. Secure the shock rod links (with axles) and the lower end of the shock absorber to the idler wheel/pivot assembly with the cap screw and lock nut. Tighten to 40 ft-lb.



MS096A

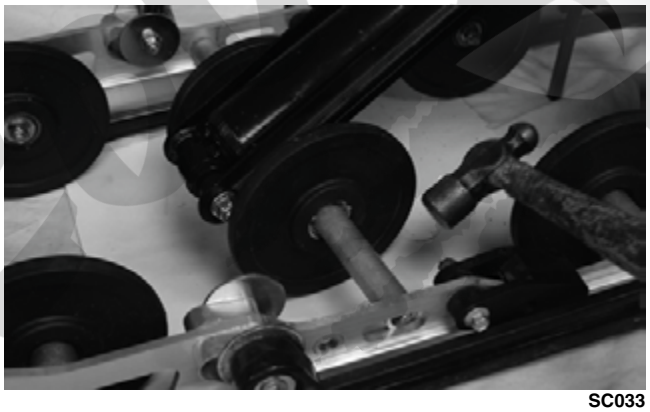
2. Apply a thin coat of low-temperature grease to the axle and slide the axle and center spacer into the shock pivot bracket. Have equal amounts of the axle exposed on either side of the pivot bracket tube.



FC189

3. From each side of the pivot, install an idler wheel and spacer.

4. Lower the idler wheel/pivot assembly down between the rails. Align the axle with the mounting hole (as noted during disassembling). Secure with the cap screw and a new lock nut. Tighten to 40 ft-lb.

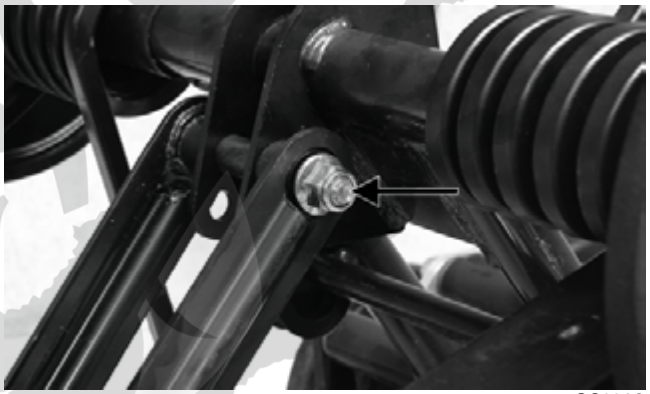


SC033



SC032

5. Position the shock links in the appropriate holes of the idler arm brackets (as marked during disassembling). Place a spacer between the center of the brackets; then insert the link axles into the upper shock link eyelets. Secure with a cap screw, washer, and lock nut. Tighten securely.



SC031A

6. Secure the shock absorber to the idler arm with bushings, sleeve, lock nut, and a cap screw. Tighten to 40 ft-lb.



MS100

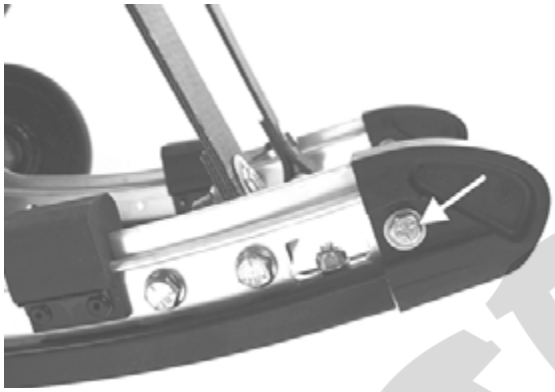
7. Install the skid frame (see Installing Skid Frame in this sub-section); then install the rear arm springs onto the adjuster blocks.

Slide Rails

REMOVING

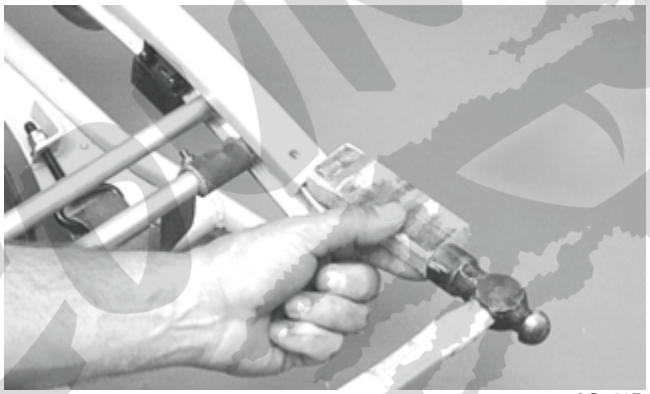
■NOTE: When replacing one or both slide rails is necessary, remove one slide rail at a time. The remaining slide rail will then hold the rail supports, axles, and brackets in their correct assembly order. Always mark the mounting hole locations during disassembly to speed up the assembly process and to prevent any damage.

1. With the skid frame removed and the rear arm springs disengaged, remove the end cap from the slide rail. Account for a cap screw, lock nut, and two flat washers.



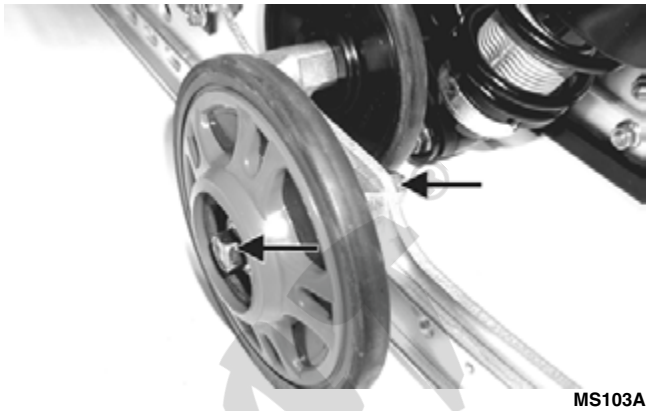
MS016A

2. Remove the machine screw and lock nut securing the wear strip to the front of the slide rail.
3. Using a suitable driving tool, drive the wear strip off the rail.

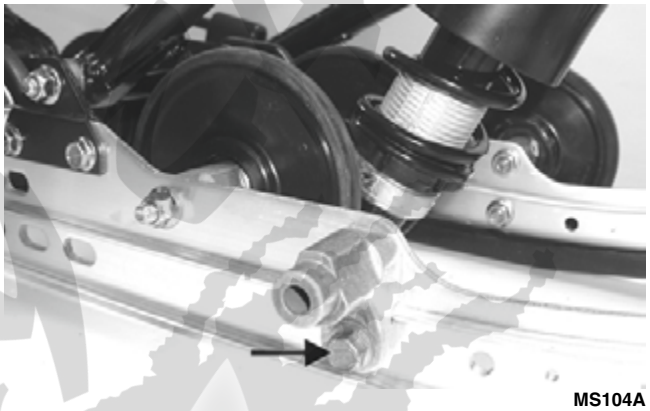


AG510D

4. Remove the cap screws and lock nuts securing the front arm limiter straps to the rail support.
5. Remove the cap screws securing the rail supports to the slide rail.
6. On the slide rail being replaced, remove the cap screws and lock nuts securing the inner and outer idler wheels and the idler wheel mounting blocks. Account for flat washers.

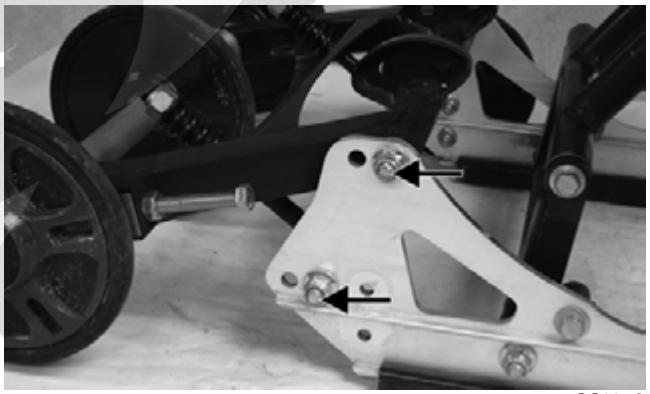


MS103A



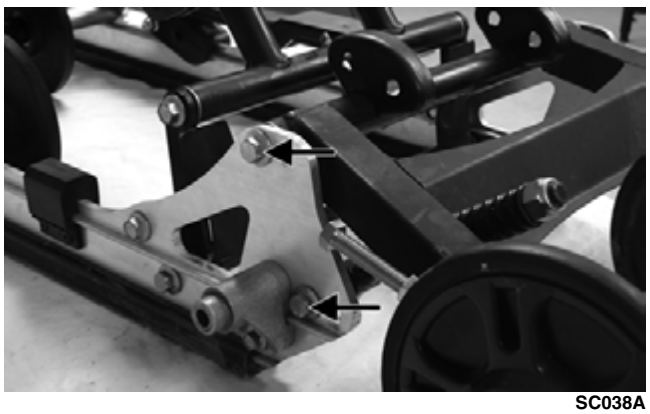
MS104A

7. Remove the lock nuts and cap screws securing the articulating skid frame to the mounting location of the slide rails.



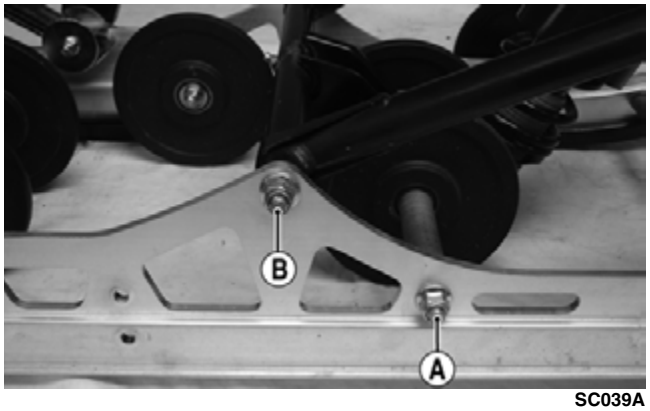
SC037A

■NOTE: The rear idler wheel from the opposite side may need to be removed to remove the cap screws securing the articulating skid frame being removed.



SC038A

8. Remove the cap screw and lock nut (A) securing the shock bracket/wheel assembly to the slide rail; then remove the lock nut and cap screw (B) securing the front arm to the slide rails.



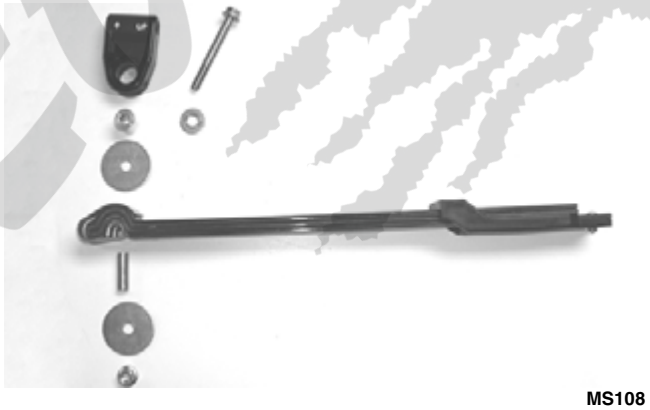
SC039A

■NOTE: If removing the cap screw is necessary to replace the slide rail, install the cap screw from the opposite side into the assembly to secure the components and aid in replacing the slide rail.

9. Remove the cap screw and flat washer securing the spring slide and overload spring to the rail. Account for a spacer, the slide block, overload spring, retainer clips, bushing, one small washer, and two large washers.



SC040A



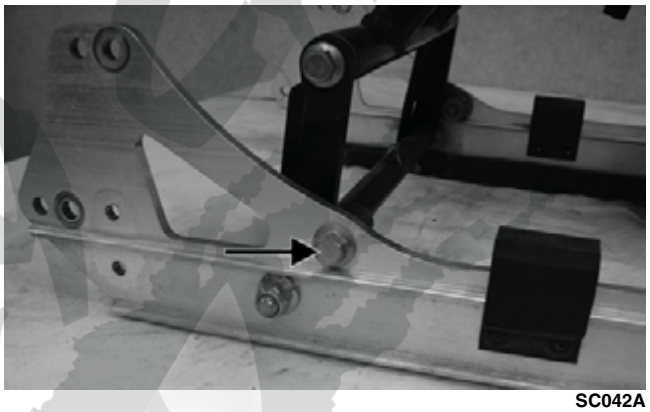
MS108

10. Remove the cap screw and lock nut securing the overload spring tension block to the slide rail.



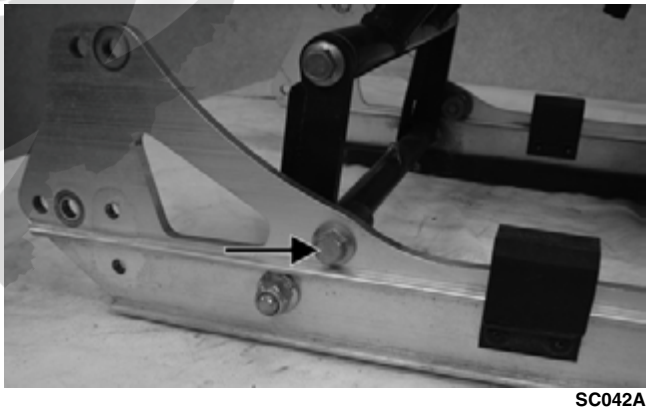
SC041A

11. Remove the cap screw and lock nut securing the rear arm shock pivot assembly to the slide rail.



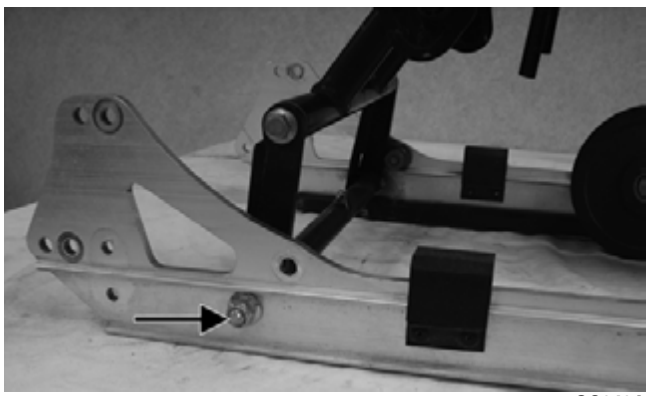
SC042A

12. Remove the cap screws from the rear arm stop brackets.



SC042A

13. Remove the cap screw and lock nut securing the rear arm to the rail.



SC043A

■NOTE: At this point, the slide rail should be free of the skid frame components and can be removed.

■NOTE: If the shock pad must be replaced, refer to Shock Pads at the beginning of this procedure.

INSPECTING

1. Inspect the slide rail for cracks, elongated holes, or unusual bends.
2. Inspect the wear strip for wear. The wear strip must be 0.42 in. thick or thicker. If the wear strip measurement is less than specified, replacement of both wear strips is necessary.

INSTALLING

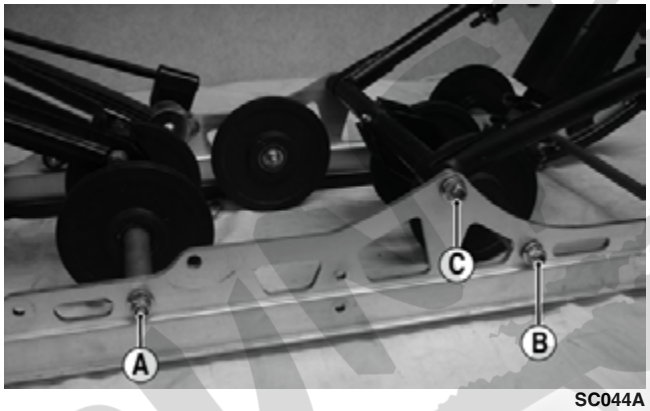
1. Place the slide rail into position; then install the cap screws and new lock nuts securing the components to the slide rails in the following order and tighten them to 40 ft-lb.

   A. Rear Arm Shock Pivot Axle

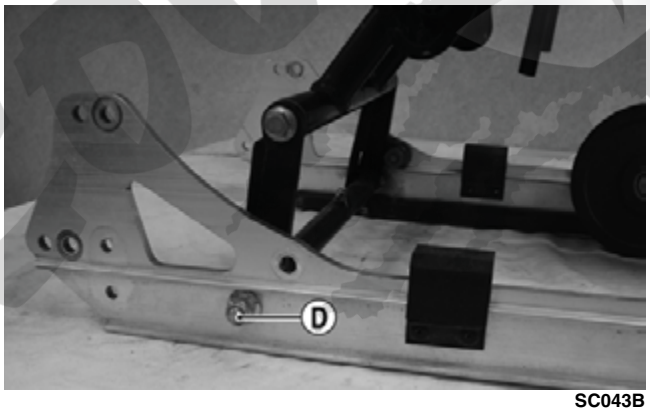
   B. Front Arm Shock Bracket Axle

   C. Front Arm

   D. Rear Arm



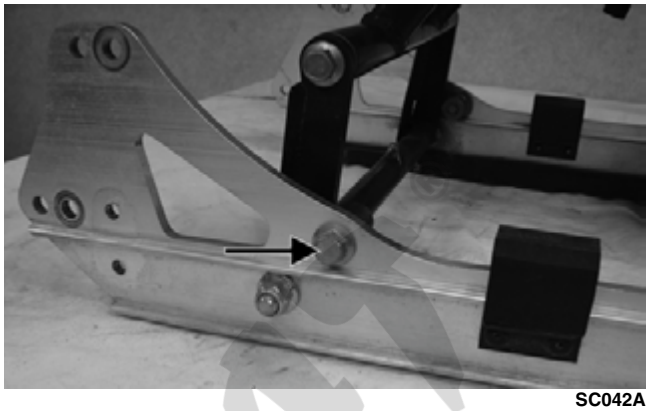
SC044A



SC043B

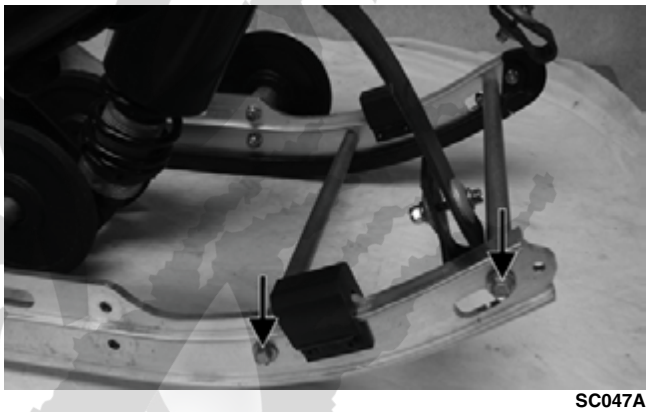
■NOTE: Take care that all the shim washers and spacers are in place on the center components of the slide rail.

2. Install the rear arm limiter and secure with cap screw (coated with blue Loctite #243) and tighten to 40 ft-lb.



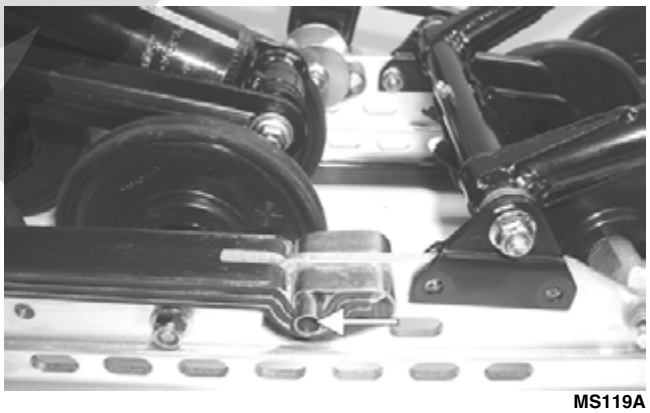
SC042A

3. Secure the two front rail supports with cap screws (coated with blue Loctite #243). Tighten to 20 ft-lb.



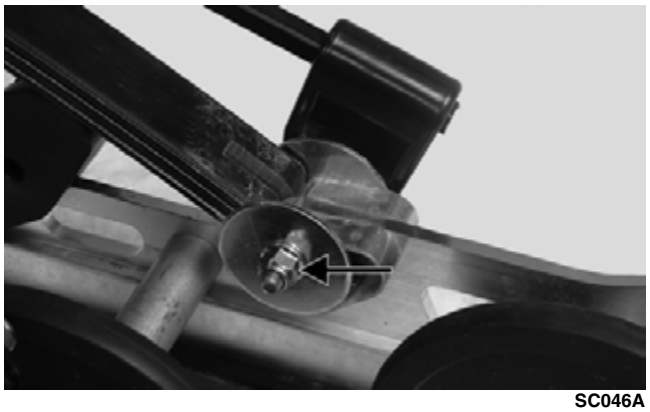
SC047A

4. Secure the limiter straps to the front rail support with cap screws, washers, and lock nuts and tighten to 120 in.-lb.
5. Place the overload spring with retaining clips and bushing to the proper hole in the slide rail.



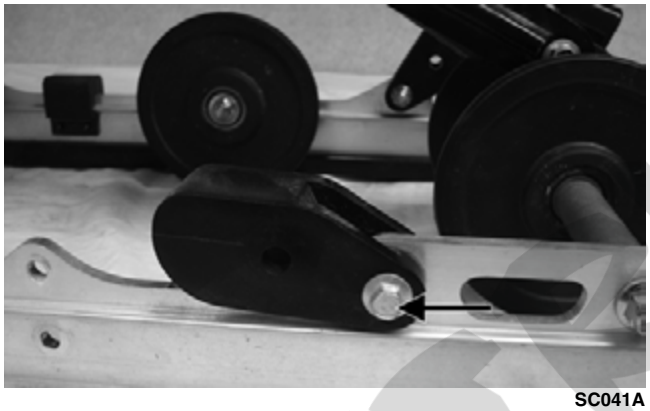
MS119A

6. Place the spring into the spring slide; then with the overload spring in position, place the spring slide and slide block assembly into position on the slide rail. Secure with a cap screw, washer, spacer, two large flat washers, and a lock nut. Tighten to 20 ft-lb.



SC046A

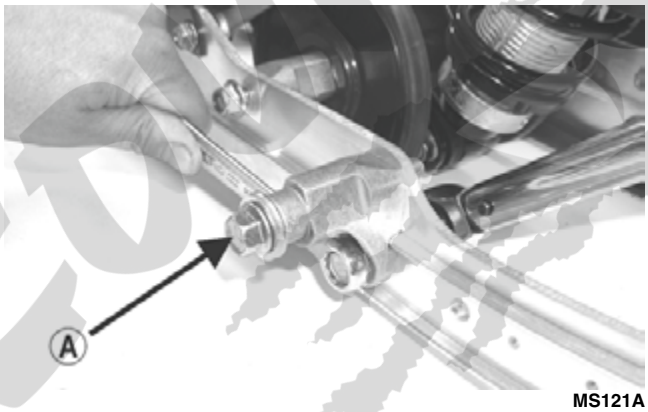
7. Install the overload spring tension block with a cap screw and lock nut. Tighten securely.



SC041A

8. Secure the outer idler wheel mounting block with the cap screw and lock nut. Tighten to 20 ft-lb.

■NOTE: When tightening the mounting block lock nut, install the idler wheel cap screw (A) to maintain proper alignment.



MS121A

9. Secure the outer idler wheel to the mounting block with a cap screw, flat washers, idler wheel, and a lock nut. Tighten to 20 ft-lb.



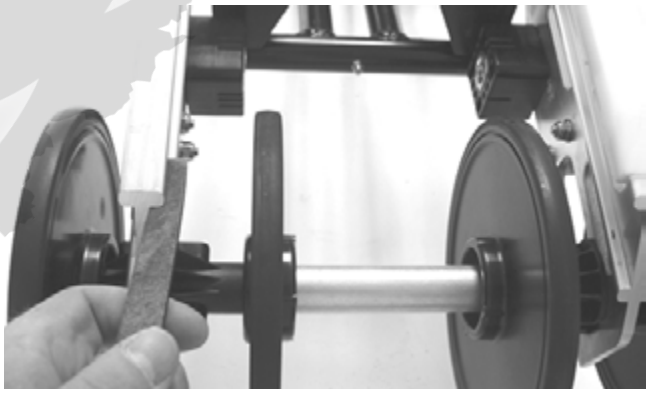
MS122

10. Secure the end cap onto the slide rail using a cap screw, flat washers, and a lock nut. Tighten to 80 in.-lb.



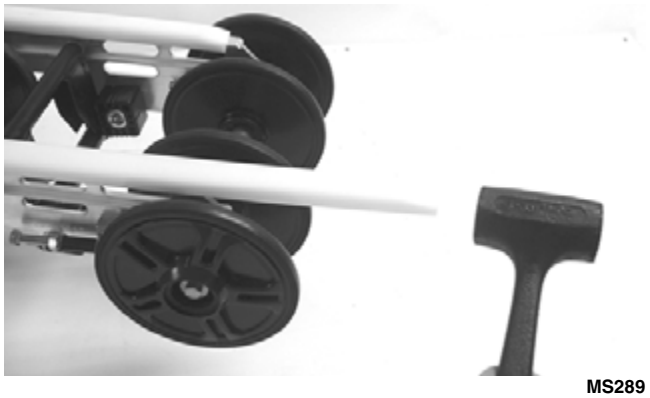
MS206A

■NOTE: Use a file to remove any sharp edges on the lower portion of the rail.

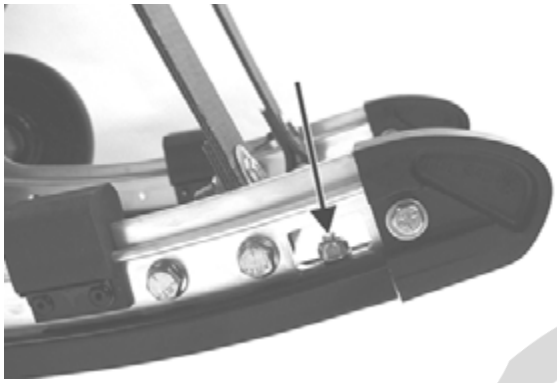


MS288

11. From the back, start the wear strip onto the rail; then using a soft hammer, drive the wear strip forward into position. Secure with a machine screw and lock nut. Tighten to 50 in.-lb.



MS289



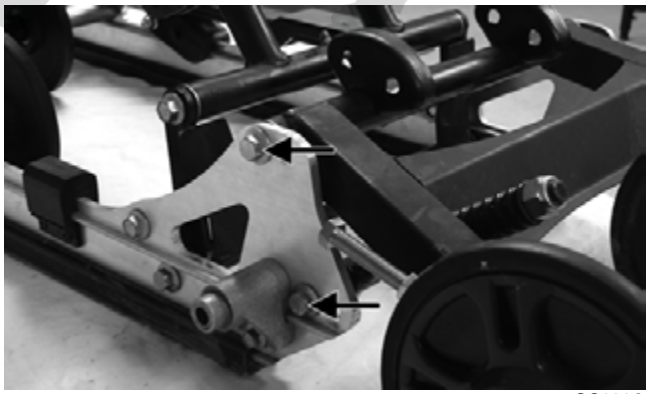
MS016B

12. Install the articulating skid frame to the slide rails; then secure with two cap screws and lock nuts. Tighten to 20 ft-lb.



SC037A

■NOTE: If the rear idler wheel was removed from the opposite side slide rail, install the idler wheel and secure it to the mounting block with cap screw, washer, and lock nut. Tighten to 20 ft-lb.



SC038A

13. Install the skid frame (see Installing Skid Frame in this sub-section); then install the rear arm springs onto the adjuster blocks.

Articulating Skid Frame

■NOTE: For the following procedure, refer to illustration 744-166A on the following page.

DISASSEMBLING

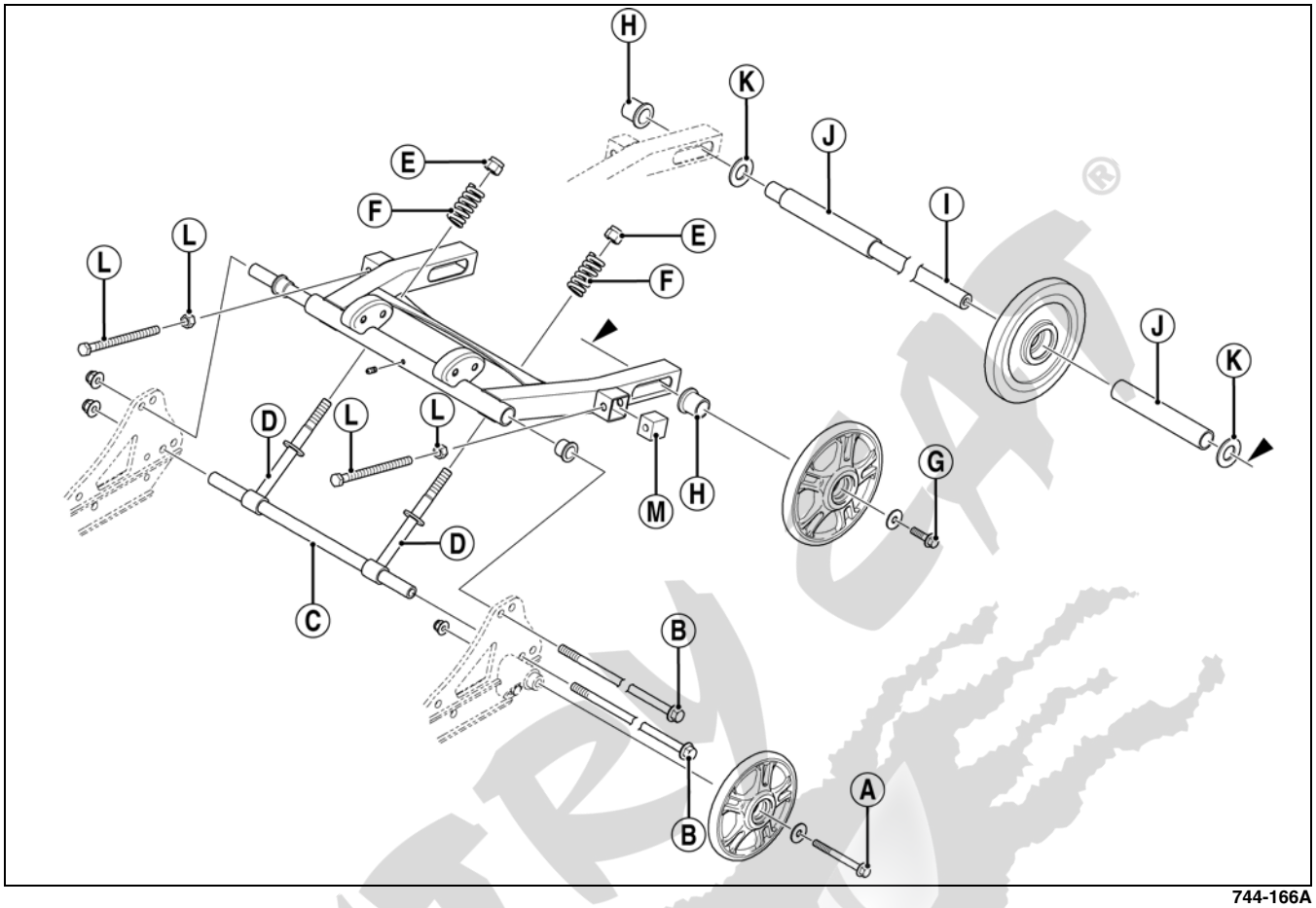
1. Remove the rear idler wheel cap screw (A), washer, and lock nut from the cap screw side of the skid frame.
2. Remove the two cap screws (B) and lock nuts securing the articulating skid frame to the slide rail.
3. With the adjuster rod axle (C) in place in the adjuster rods (D), remove the lock nuts (E) from the adjuster springs (F); then remove the adjuster rods and axle from the swing arm.
4. Remove the two cap screws (G) securing the rear axle/idler wheel assembly to the swing arm; then remove the idler wheels and account for the two adjuster bushings (H).
5. From one side, slide the rear axle (I) out from between the swing arm and account for the two idler wheel spacers (J) and two washers (K).
6. Remove the two cap screws and lock nuts (L) securing the adjuster blocks (M) to the swing arm.

INSPECTING

1. Inspect each idler wheel and plastic hub for cracks or damage.
2. Rotate the idler wheel bearings (by hand) and inspect for binding or roughness.
3. Inspect all bushings for wear or damage.
4. Inspect all weldments and the tubing of the arms and spacers for cracks or unusual bends.
5. Inspect the track bumper guides for wear.
6. Inspect the axle surfaces for any signs of corrosion. If corrosion is found, lightly buff the surface of the axle with #400 wet-or-dry sandpaper; then apply a light coat of grease.

ASSEMBLING

1. Install the adjuster blocks (M) into the swing arm; then thread the two cap screws with lock nuts (L) into the blocks.
2. Slide the rear axle through one side of the swing arm and through a washer (K) and an idler wheel spacer (J); then in order on the rear axle (I), install the center idler wheel, the remaining spacer (J), and washer (K). Continue to slide the rear axle through the other side of the swing arm.
3. Slide an adjuster bushing (H) on each end of the rear axle making sure the bushings are properly positioned to the adjuster bolts; then secure each rear axle idler wheel with a cap screw (G). Tighten only until snug.



744-166A

4. Install the adjuster rods (D) into the swing arm; then install the adjuster springs (F) and lock nuts (E). Tighten only until snug.
5. Slide the adjuster rod axle (C) into the adjuster rods; then install the swing arm axle into the swing arm.
6. Position the articulating skid frame between the slide rails; then with the adjuster rod axle (C) and the swing arm axle centered to the mounting holes of the slide rails, install the cap screws (B) securing the articulating skid frame to the slide rails.
7. Install new lock nuts to the cap screws (B) and tighten to 20 ft-lb.
8. Install the rear idler wheel to the mounting block of the slide rail. Secure with cap screw (A), flat washer, and lock nut. Tighten to 20 ft-lb.

ADJUSTING

1. Place the skid frame assembly on a flat work surface.
2. Preload the articulating suspension by equally adjusting the lock nuts on the spring brackets until both rear idler wheels are 1 in. off the work surface.

⚠ WARNING

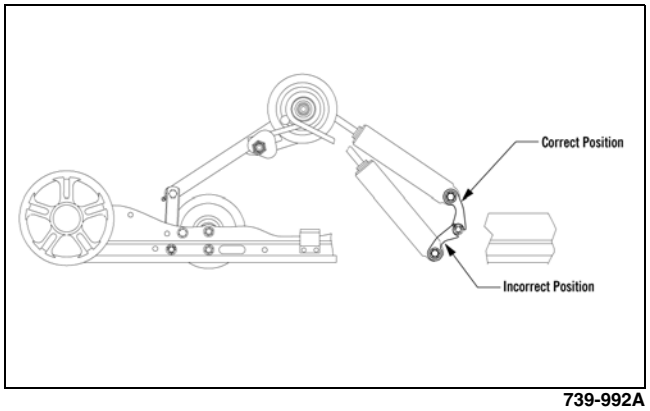
The spring brackets must be adjusted equally. Improper adjustment of the spring brackets may result in binding in the articulating suspension. Upon completing the adjustment, there must be at least two full threads behind the lock nuts.

Installing Skid Frame

1. Using an appropriate handlebar/steering post support stand, tip the snowmobile onto one side.
2. Pull the track away from the tunnel and spread open; then place the skid frame into the track.
3. Position the front of the skid frame into the tunnel and align the front arm with the appropriate mounting hole in the tunnel. Insert the cap screw with washers through the tunnel mounting hole and through the front arm. DO NOT TIGHTEN AT THIS TIME. Repeat this procedure on the other side.

CAUTION

When installing the skid frame, make sure the rear arm shock mounting location on the pivot/axle is positioned correctly above the axle or component damage will occur.



739-992A

■NOTE: To aid in centering the front arm with the hole in the tunnel, position the skid frame and track at a 45° angle to the bottom of the tunnel.

4. Install the rear of the skid frame and the track into position in the tunnel.
5. Align the rear arm assembly with the appropriate hole in the tunnel. Secure the rear arm assembly with a cap screw. TIGHTEN ONLY UNTIL SNUG.
6. Tip the snowmobile onto the other side; then align the rear arm assembly with the appropriate hole in the tunnel. Secure the offset arm assembly with a cap screw, lock washer, and flat washer. TIGHTEN ONLY UNTIL SNUG.

■NOTE: Do not install the short legs of the rear springs onto the adjusting cams at this time.

7. At this time, place the snowmobile to the upright position; then tighten both rear arm mounting cap screws to 40 ft-lb.

■NOTE: At this point, tighten all remaining skid frame mounting hardware to 40 ft-lb.

8. Using the Rear Suspension Spring Tool, install the short legs of the rear springs onto the adjusting cams making sure the cams are in the same adjustment positions.
9. Adjust track tension and alignment (see Track Tension and Track Alignment in Section 6).

Servicing Suspension (F/M/XF)

This sub-section has been organized so each procedure can be completed individually and efficiently.

■NOTE: Some components may vary from model to model. Some illustrations and photographs used in this sub-section are used for clarity purposes only and are not designed to depict actual conditions. The technician should use discretion and sound judgment when removing and installing components.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

Removing Skid Frame

■NOTE: Many service procedures can be performed without removing the skid frame. The technician should use discretion and sound judgment when removing and installing components.

1. Loosen the jam nuts and two track-tension adjusting bolts.
2. Place a support stand under the rear bumper; then while holding the flared bushing, remove the rear arm assembly cap screws securing the skid frame to the tunnel.

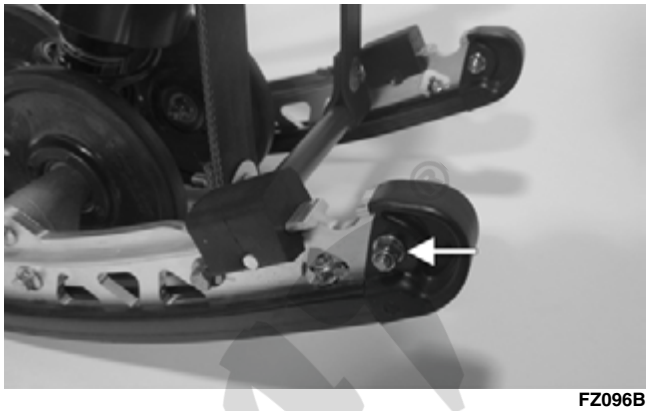
■NOTE: The support stand should hold the snowmobile level but not raised off the floor.

3. Remove the support stand; then using an appropriate handlebar/steering post stand, tip the snowmobile onto one side.
4. On the F, slide the skid frame rearward far enough to drop the front arm out of the slider axle; then remove the skid frame.
5. On the M and XF, remove the two cap screws and nuts securing the front of the skid frame to the chassis. Account for two washers.

End Caps

REMOVING

1. Remove the lock nut and cap screw securing the end cap.



FZ096B

2. Using a hammer, tap the end cap off the rail.

CLEANING AND INSPECTING

1. Inspect the end cap area of the slide rail for cracks and wear.
2. Inspect the end cap for any signs of cracking or wear.
3. Clean both the slide rail area and the end cap. Using compressed air, clean the areas of dirt and gravel.

⚠ WARNING

Always wear an approved pair of safety glasses when using compressed air.

4. Inspect the cap screw for cracked, stretched, or damaged threads. Use a new lock nut when assembling.

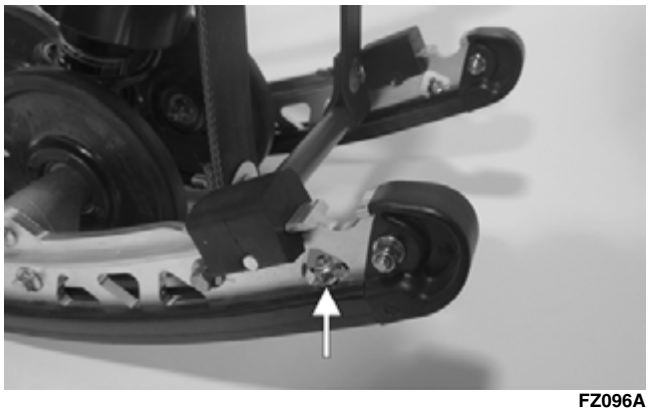
INSTALLING

1. Position the end cap on the slide rail; then align the hole in the end cap with the hole in the slide rail.
2. Secure with a cap screw, washers, and lock nut. Tighten to 80 in.-lb.

Wear Strips

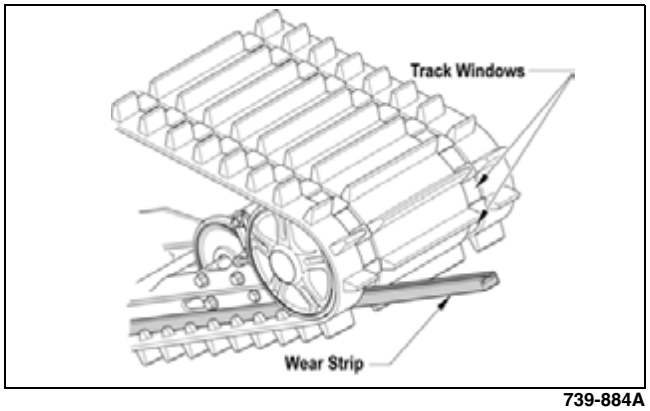
REMOVING

1. Remove the machine screw and lock nut securing the wear strip to the front of the slide rail.



FZ096A

2. Align the wear strip with the openings (windows) in the track; then using a suitable driving tool, drive the wear strip rearward off the slide rail.



739-884A

CLEANING AND INSPECTING

1. Clean the slide rail using parts-cleaning solvent and compressed air.

⚠ WARNING

Always wear an approved pair of safety glasses when using compressed air.

2. Inspect the slide rail for cracks. If any cracks are found, replace the slide rail.
3. Using a straightedge, inspect the slide rail for any unusual bends. With the slide rail removed, place the straightedge along the bottom surface of the slide rail. If the rail is found to be bent, it must be replaced.

INSTALLING

■NOTE: Use a file to remove any sharp edges on the lower portion of the rail.

1. Align the wear strip with the openings (windows) in the track and from the back, start the wear strip onto the rail; then using a block of wood and a hammer, drive the wear strip forward into position.
2. Secure with a machine screw and lock nut. Tighten to 50 in.-lb.

Shock Pads

REMOVING

1. Remove torx-head screws and nuts securing the shock pads.
2. Remove the rear shock pads.

INSPECTING

1. Inspect the pads for damage or wear.
2. Inspect the rivet holes in the slide rail for damage or elongation.

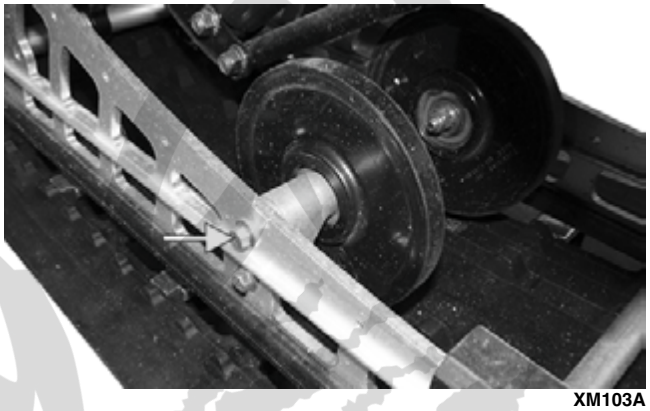
INSTALLING

1. Place the pads brackets into position on the slide rail.
2. Secure the pads with existing torx-head screws and nuts.

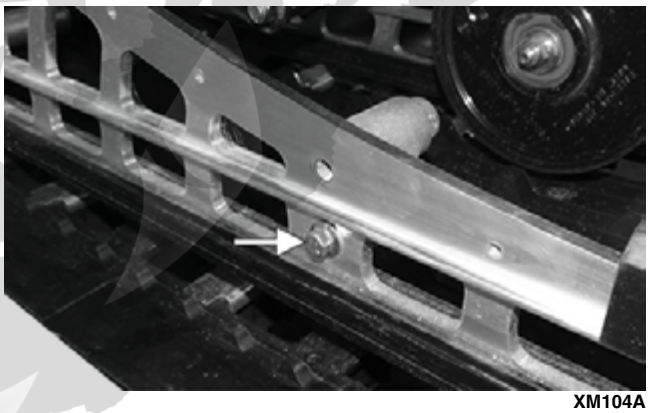
Idler Wheels/Mounting Blocks

REMOVING

1. Remove the cap screw and lock nut securing the idler wheel to the idler wheel mounting block; then remove the cap screw and lock nut securing the mounting block to the slide rail.



XM103A



XM104A

2. Account for a flat washer from the idler wheel cap screw.

CLEANING AND INSPECTING

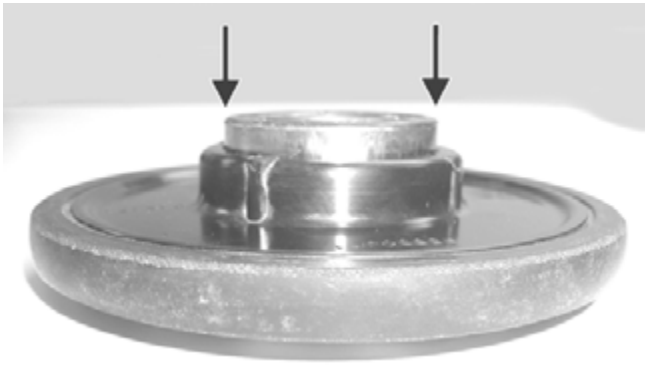
1. Clean the bearing with a clean cloth.
2. Inspect each idler wheel for cracks or damage.
3. Rotate the idler wheel bearing (by hand) and inspect for binding or roughness.
4. If a bearing must be replaced, use this procedure.

■NOTE: If the idler wheel has no snap ring securing the bearing, the idler wheel is not serviceable.

A. Remove the bearing snap ring.

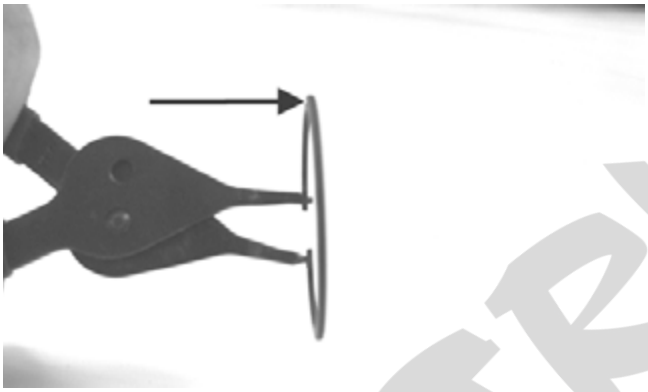
B. Using a hydraulic press or suitable driving tool, remove the bearing from the inside of the wheel.

C. Press the new bearing (on its outer race) into the idler wheel.



MS006A

D. Install the snap ring making sure the "sharp side" is directed away from the bearing.



MS007A

INSTALLING

1. Secure the mounting block on the slide rail with a cap screw and lock nut. Tighten to 20 ft-lb.

■NOTE: For proper alignment, install an idler wheel cap screw into the top mounting block hole prior to tightening.

2. Place the idler wheel to the mounting block; then secure the idler wheel assembly with a cap screw, flat washer, and a lock nut. Tighten to 20 ft-lb.

Front Arm Assembly

■NOTE: To service the front arm assembly on the RR models, proceed to Front Arm Assembly (RR) in this sub-section.

REMOVING

1. With the skid frame removed, remove the cap screws and lock nuts securing the limiter straps to the front arm. Account for flat washers.
2. Remove the cap screw and lock nut securing the upper front shock absorber eyelet to the front arm. Pull the shock eyelet free of the bracket. Account for a sleeve.



ZJ271A

3. Remove the lock nut and cap screw securing the rear shock pivot to the front arm.



XM004A

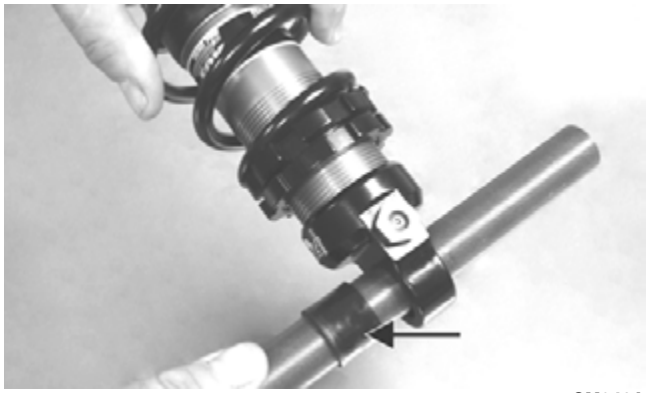
4. Remove the cap screws securing the front arm to the rails.
5. Remove the front arm and account for the front arm axle.
6. Remove the cap screw securing the front outer idler wheel to the idler wheel mounting block. Account for lock nut, cap screw, and flat washer.
7. Remove the cap screw and lock nut securing the idler wheel mounting block to the slide rail.
8. Remove the cap screws, washer, and lock nut from the front shock axle; then from one side, tap the assembly forward far enough for the axle assembly to clear the slide rails. Account for an axle, two spacers, and two shim washers.

INSPECTING

1. Inspect all front arm weldments for cracks or unusual bends; then inspect the front arm mounting brackets for cracks and for elongated holes.
2. Closely inspect all tubing for cracks or unusual bends.
3. Inspect the bearings, bushings, and front arm spacers for wear or damage.
4. Inspect the shock absorber for damage and for any signs of oil leakage especially at the point where the shock shaft enters the shock body.
5. Inspect the shock absorber eyelet welds (at each end) for any cracks, signs of separation, or for unthreading.

INSTALLING

1. With the rubber bushing in place, install the axle into the lower shock eyelet bushing assembly; then install the two shim washers and two spacers.



CM246A

2. Place the front arm shock axle assembly into position on the skid frame making sure the spacers and washers are properly positioned. Secure with the cap screw, washer, and a new lock nut. Tighten to 40 ft-lb.

3. On the side that the idler wheel and mounting block were removed from, secure the mounting block on the slide rail with a cap screw and lock nut. Tighten to 20 ft-lb.

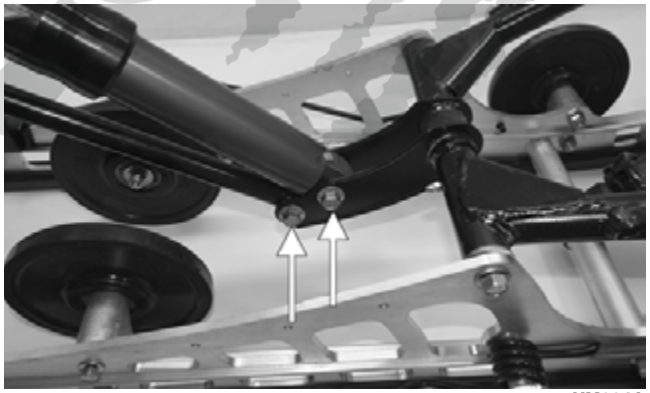
■NOTE: For proper alignment, install an idler wheel cap screw and lock nut into the top mounting block hole prior to tightening.

4. Secure the idler wheel to the mounting block with both existing cap screw. Tighten cap screws to 20 ft-lb.

5. Install the axle into the front arm; then position the front arm to the mounting location of the slide rail. Secure with cap screws and lock nuts. Tighten to 40 ft-lb.

■NOTE: Move the rear arm assembly forward enough to allow the rear arm springs to be installed into the slide blocks.

6. Secure the rear shock pivot to the front arm with cap screw and lock nut. Tighten to 20 ft-lb.



XM004A

7. Secure the upper shock eyelet and axle in the mounting hole of the front arm. Secure with a cap screw and lock nut. Tighten securely.



ZJ271A

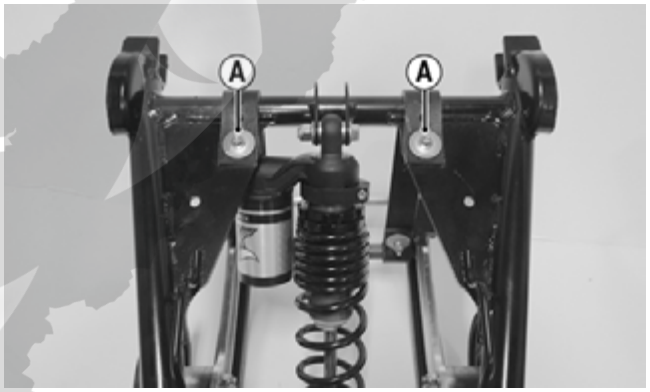
■NOTE: Do not over-tighten the shock absorber cap screw as the shock eyelet must be free to pivot.

8. Secure the limiter straps to the front arm with cap screws, washers, and lock nuts. Tighten to 72 in.-lb.

Front Arm Assembly (RR)

REMOVING

1. With the skid frame removed, remove the cap screws (A) and lock nuts securing the limiter straps to the front arm. Account for flat washers.



RR001A

2. Remove the cap screw and lock nut securing the upper front shock absorber eyelet to the front arm. Pull the shock eyelet free of the bracket. Account for two spacers and two O-rings.

3. Remove the cap screw (A) and axle (B) securing the front arm to the rails Account for two washers.



RR002A

INSPECTING

1. Inspect all front arm weldments for cracks or unusual bends; then inspect the front arm mounting brackets for cracks and for elongated holes.
2. Closely inspect all tubing for cracks or unusual bends.
3. Inspect the bearings, bushings, and front arm spacers for wear or damage.

INSTALLING

1. Install the existing washers onto both axles; then install the axles into the front arm and secure using existing cap screws (threads coated with blue Loctite #243). Tighten to 50 ft-lb.



RR002

2. Secure the front shock absorber to the front arm using existing cap screw and nut. Tighten to 20 ft-lb.
3. Secure the limiter straps to the front arm using exiting cap screws, washers and nuts. Tighten to 72 in.-lb.

Rear Arm Assembly (F)

■NOTE: To service the rear arm assembly on the RR models, proceed to Rear Arm Assembly (RR) in this sub-section.

REMOVING

1. With the skid frame removed using the Rear Suspension Spring Tool, remove the spring from the adjusting cam.

⚠ WARNING

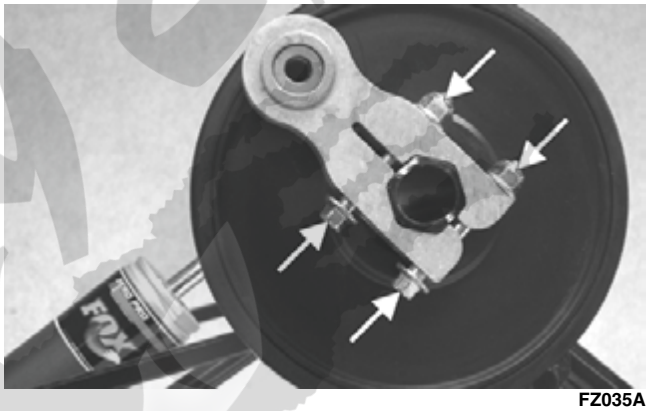
Care must be taken when removing the spring or damage or injury could result.

2. Mark the offset arm and the idler arm for assembly purposes.



FZ034

3. Loosen the cap screws and lock nuts securing the offset arm assembly to the idler arm; then remove the offset arm assembly. Account for a flanged axle, idler spacer, and washer.



FZ035A

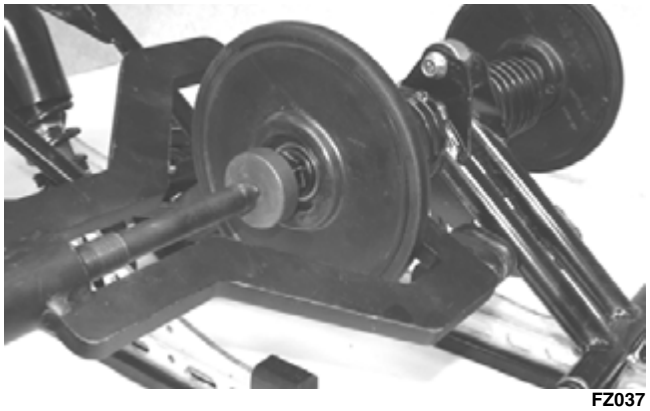


FZ036

4. Remove the idler wheel.

■NOTE: Use the Idler Wheel Puller Kit to remove the wheel.

7



FZ037

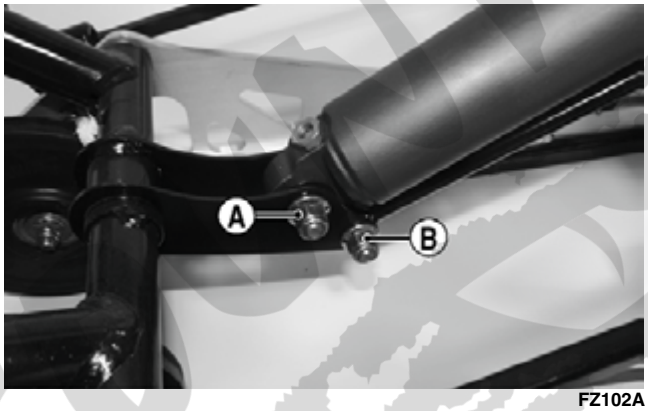
5. Remove the cap screw, flat washer, and lock nut securing the spring slide to the slide rail. Account for the spring slide and all mounting hardware.

6. Remove the spring and sleeve from the idler arm.

■**NOTE: Use the same procedure for the other side.**

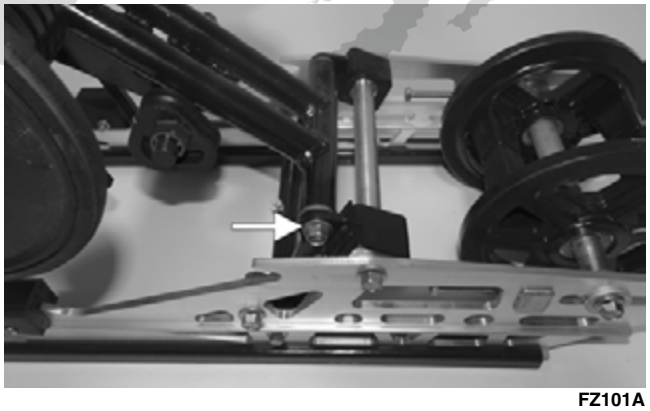
7. Remove the cap screw and lock nut securing the upper shock eyelet to the idler arm; then remove the cap screw and lock nut securing the upper shock link to the idler arm. Account for the cap screws, lock nuts, and sleeves.

8. Remove the cap screw (A) and lock nut securing the rear arm shock absorber to the rear shock pivot; then remove the cap screw (B) and lock nut securing the shock absorber link to the pivot and account for the cap screws, lock nuts, and sleeves.



FZ102A

9. Remove the cap screw securing the rear arm to the idler arm. Account for the aluminum axle.



FZ101A

10. Remove the cap screw and lock nut securing the rear arm to the slide rail. Account for the serrated axles and axle tube.



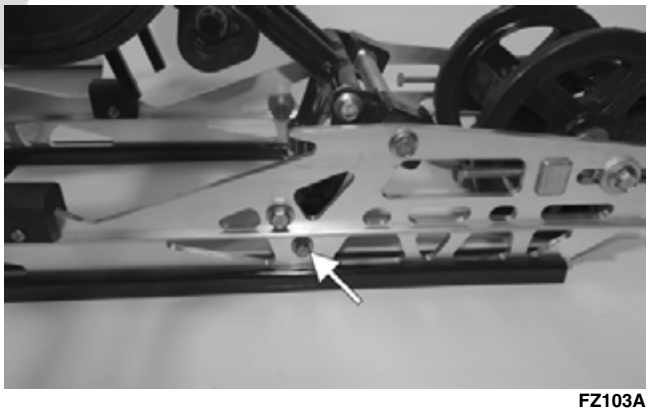
FZ103A

CLEANING AND INSPECTING

1. Clean the bearings with a clean cloth.
2. Inspect each idler wheel for cracks or damage.
3. Inspect the bushings (located in the arm pivot area) for wear or damage.
4. Inspect all welds and the tubing of the rear arm/idler arm for cracks or unusual bends.
5. Inspect the two adjusting cams for damage.
6. Rotate the idler wheel bearings (by hand) and check for binding or roughness.
7. If a bearing must be replaced, see Idler Wheels/ Mounting Blocks - Cleaning and Inspecting in this sub-section.

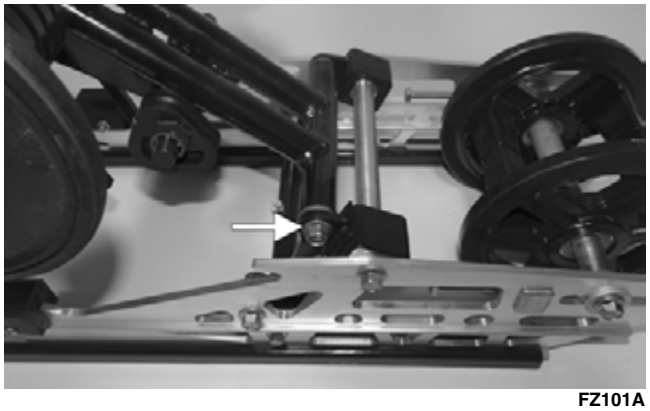
INSTALLING

1. Place the rear arm assembly into position between the slide rails. Secure with a cap screw and lock nut. Tighten to 40 ft-lb.



FZ103A

2. Install the rear arm onto the idler arm with an aluminum axle and two cap screws. Tighten to 40 ft-lb.



FZ101A

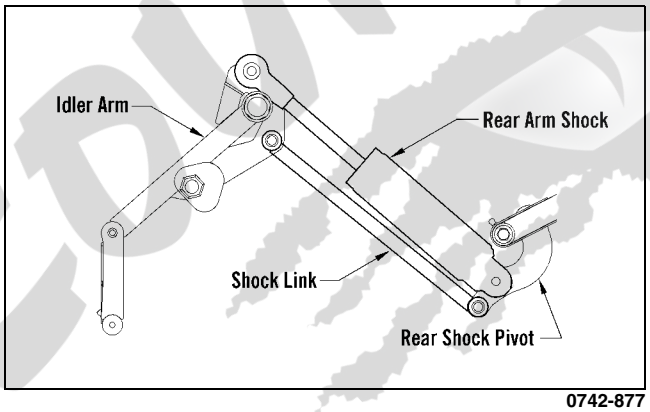
3. With the sleeves installed, install the shock absorber link to the lower mounting hole of the rear shock pivot; then install the shock absorber with cap screws (A) and (B) and lock nuts. Tighten securely.



FZ102A

CAUTION

When installing the shock absorber link, note that the offset of the link eyelets are directed away from the rear arm shock absorber for proper clearance.



0742-877

4. With the sleeves installed, install the shock absorber link to the lower mounting hole of the idler arm along with the cap screw and lock nut; then secure the shock absorber to the idler arm with cap screws and lock nuts. Tighten securely.

■NOTE: Do not over-tighten the shock absorber cap screw as the shock eyelet must be free to pivot.

■NOTE: Install the rear arm springs onto the adjuster blocks after the skid frame has been installed.

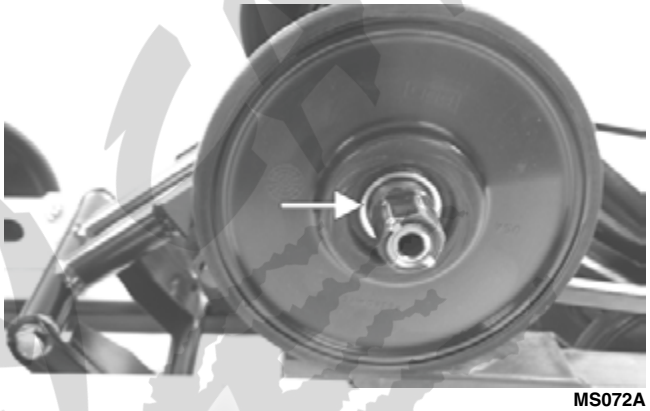
5. Slide the sleeve and spring onto the idler arm.

6. Place the spring slide and slide block (with spring in slide block) into position on the slide rail. Secure with a cap screw and washer. Tighten to 20 ft-lb.

7. With wheel insertion tool, install the rear upper idler wheel on the idler arm.

CAUTION

When driving the idler wheel onto the idler arm, use a tool to contact the inside race of the bearing or damage to the wheel or bearing may occur.



MS072A

8. Install the idler spacer collar onto the idler arm.

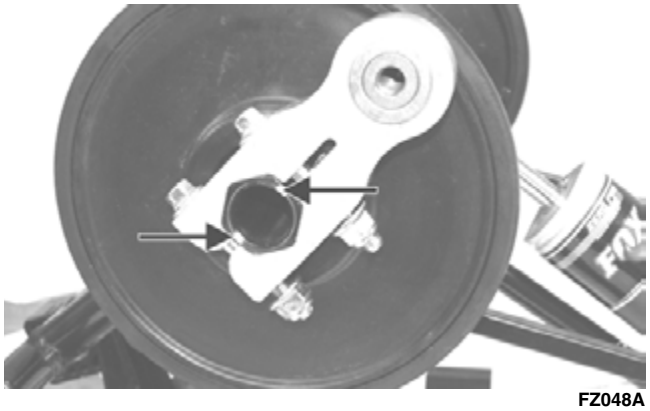


FZ047

9. Place the flared bushing with a thin flat washer through the notched side of the offset arm assembly.

■NOTE: If the flared bushing in the offset arm is loose, it must be cleaned and green Loctite #609 must be applied to it prior to installation.

10. Align the marks on the idler arm to the centerline of the offset arm assembly. Secure the offset arm to the idler arm with cap screws and lock nuts. Tighten to 20 ft-lb.

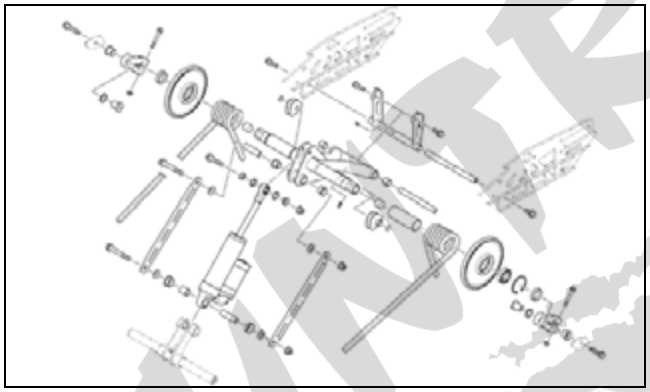


FZ048A

■**NOTE: When tightening the offset arm lock nuts, tighten the upper lock nut first to ensure an even clamp load. Make sure the flared side of the bushing is directed outward.**

11. Grease the idler arm and rear arm grease fittings with an all-temperature grease.

Rear Arm Assembly (RR)



SNO-265

REMOVING

1. With the skid frame removed using the Rear Suspension Spring Tool, remove the springs from the adjusting cams.

⚠ WARNING

Care must be taken when removing the spring or damage or injury could result.

2. Mark the offset arm and the idler arm for assembly purposes.



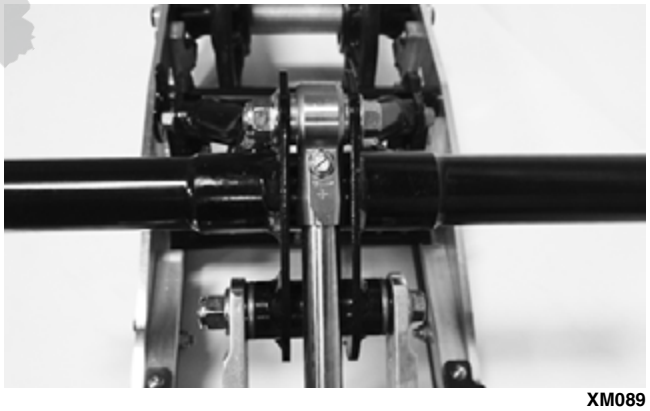
FZ034

3. Loosen the cap screws and lock nuts securing the offset arm assembly to the idler arm; then remove the offset arm assembly. Account for a flanged axle, idler spacer, and washer.



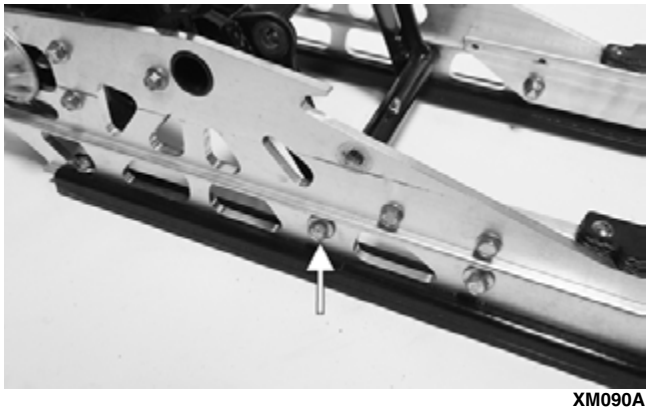
FZ036

4. Remove the upper idler wheel.
5. Remove the spring and sleeve from the idler arm. Repeat for opposite side.
6. Remove the cap screw and lock nut securing the upper rear shock absorber eyelet to the rear arm. Account for two spacers and two O-rings.



XM089

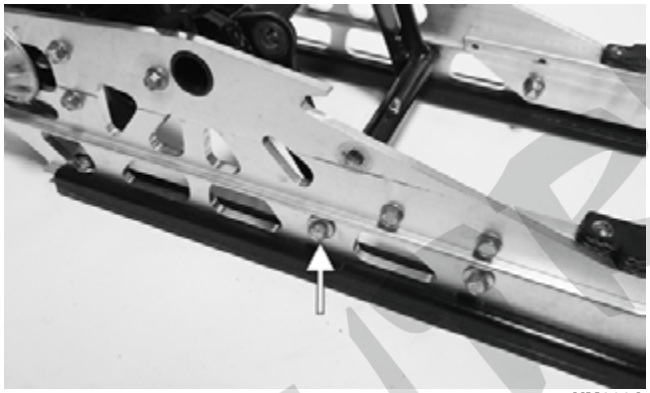
7. Remove the cap screw and nut securing the rear shock links to the rear arm. Account for one axle.
8. Remove the cap screw securing the rear arm to the idler arm. Account for the aluminum axle.
9. Remove the cap screw and lock nut securing the rear arm to the slide rail. Account for the axle tube.



XM090A

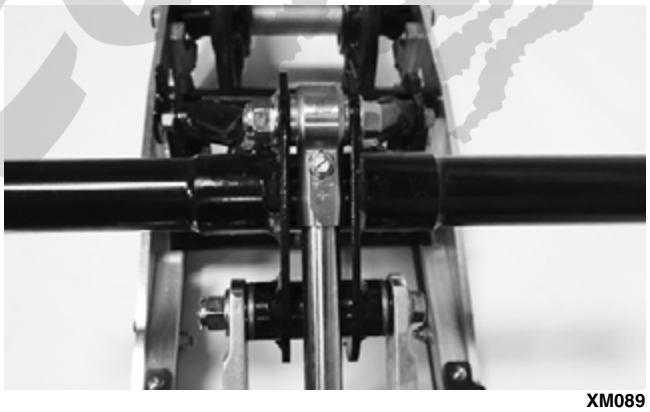
INSTALLING

1. Slide the axle tube into the rear arm; then position the rear arm with the holes in the slide rails. Secure using existing cap screws (threads coated with blue Loctite #243. Tighten to 20 ft-lb.



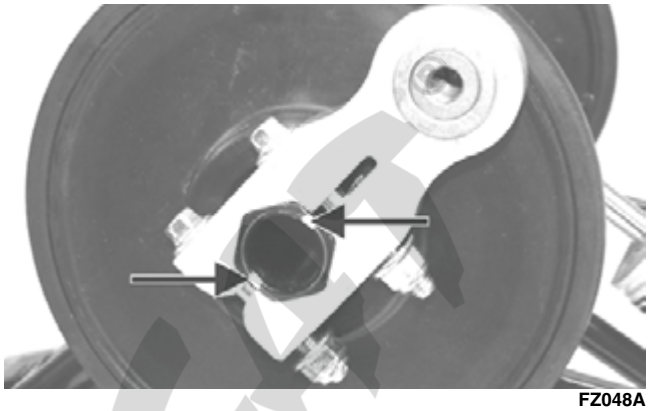
XM090A

2. Install the aluminum axle into the idler arm; then postion the idler arm between the rear arm and secure using existing cap screws (thread coated with blue Loctite #243. Tighten to 40 ft-lb.
3. Loosely secure the rear shock links to the idler arm using existing cap screw and nut.
4. With both O-rings and spacers, secure the rear shock absorber to the idler arm using existing cap screws and lock nut. Tighten to 40 ft-lb.



XM089

5. Install both spring sleeves onto the rear arm; then install the suspension springs into the spring slides then onto the idler arm.
6. Install spacers onto the idler arm.
7. Align the marks on the idler arm to the centerline of the offset arm assembly. Secure the offset arm to the idler arm with cap screws and lock nuts. Tighten to 20 ft-lb.



FZ048A

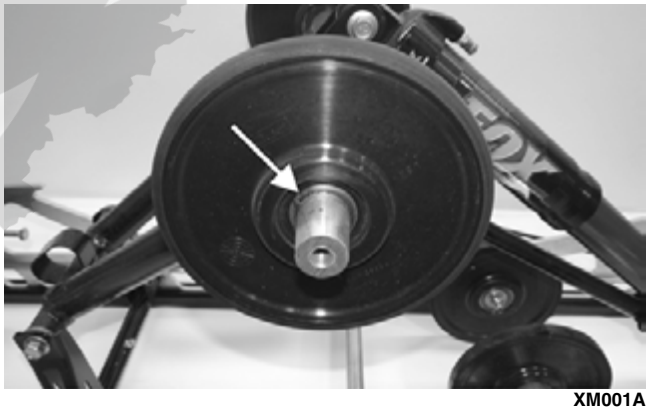
■NOTE: When tightening the offset arm lock nuts, tighten the upper lock nut first to ensure an even clamp load. Make sure the flared side of the bushing is directed outward.

8. Grease the idler arm and rear arm grease fittings with an all-temperature grease.

Rear Arm Assembly (M/XF)

DISASSEMBLING

1. With the skid frame removed, remove the snap ring securing the rear arm idler wheels to the inner carriage axle and account for the wave washers; then remove the axle from the idler arm.



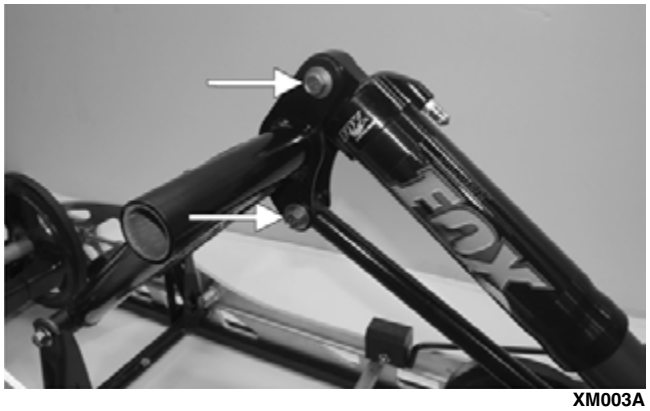
XM001A



CM232

7

2. Remove the cap screw and lock nut securing the upper shock eyelet to the idler arm; then remove the cap screw and lock nut securing the rear shock link to the idler arms.



XM003A

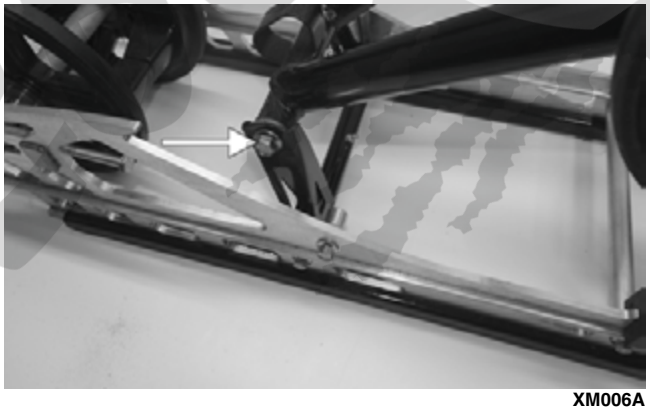
3. Remove the cap screws and lock nuts securing the rear arm shock absorber and shock link to the offset arm.



XM004A

■NOTE: With the rear arm shock and shock link removed, account for the four sleeves.

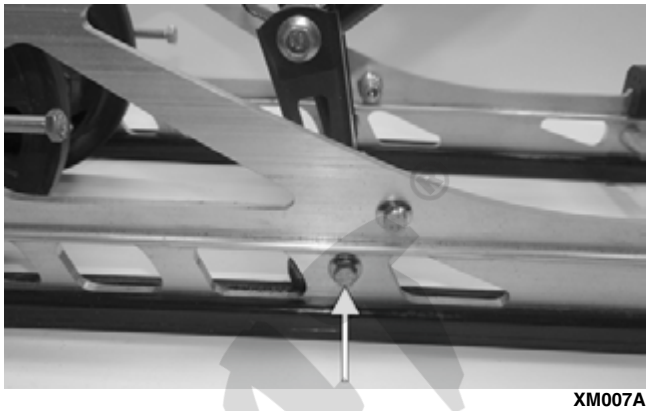
4. Remove the cap screw and lock nut securing the rear arm to the idler arm. Account for the aluminum axle and flared bushings.



XM006A

■NOTE: To loosen and remove the remaining cap screw from the rear arm/idler arm, it may be necessary to reinstall the cap screw.

5. Remove the cap screw and lock nut securing the rear arm to the slide rail. Account for the bushings and axle tube.



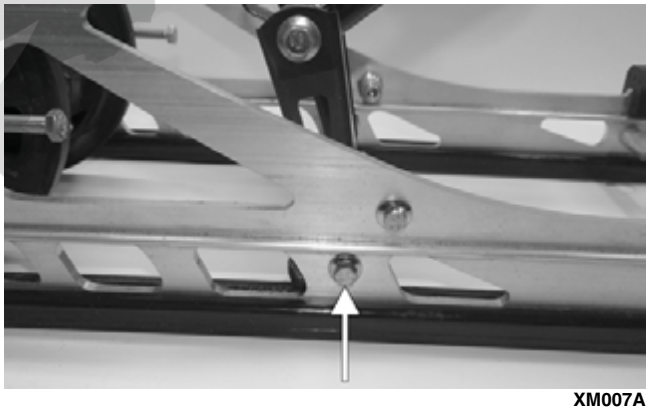
XM007A

CLEANING AND INSPECTING

1. Clean the bearings with a clean cloth.
2. Inspect each idler wheel for cracks or damage.
3. Inspect the bushings (located in the arm pivot area) for wear or damage.
4. Inspect all welds and the tubing of the upper arm for cracks or unusual bends.
5. Inspect the two adjusting cams for damage.
6. Rotate the idler wheel bearings (by hand) and check for binding or roughness.
7. If a bearing must be replaced, see Idler Wheels/ Mounting Blocks - Cleaning and Inspecting in this sub-section.

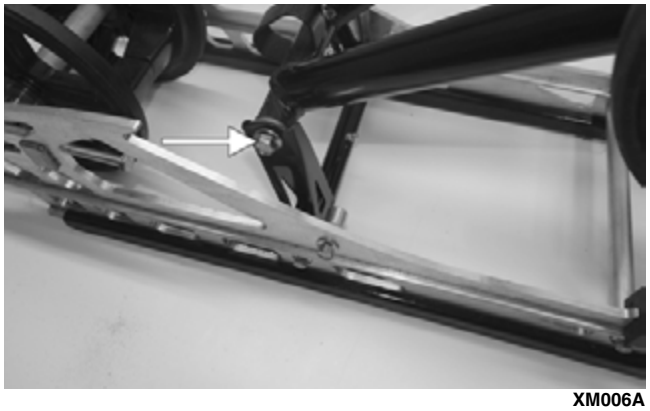
ASSEMBLING

1. Place the rear arm assembly into position between the slide rails. Secure with existing cap screws. Tighten to 20 ft-lb.



XM007A

2. Install the idler arm onto the rear arm with an aluminum axle, bushing assemblies, and two cap screws. Tighten to 40 ft-lb.



XM006A

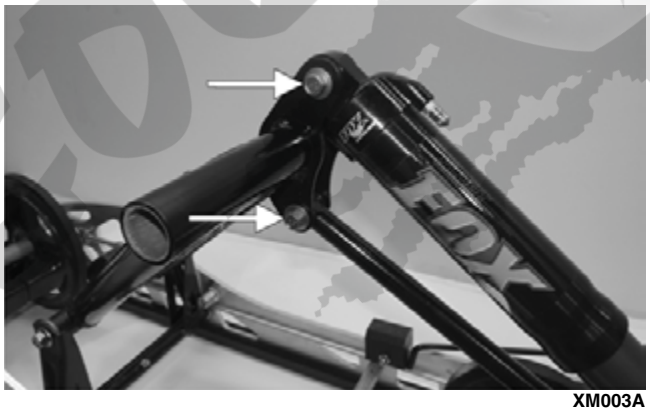
3. With the sleeves installed, place the shock absorber and shock link between the offset arm bracket. Secure with the cap screws and lock nuts. Tighten securely.



XM004A

■NOTE: Do not over-tighten the shock absorber cap screw as the shock eyelet must be free to pivot.

4. With the sleeves installed, position the shock link in the appropriate holes of the idler arm brackets and shock absorber; then insert the cap screw through the eyelets. Secure with the cap screws and lock nuts. Tighten securely.



XM003A

5. Install the inner carriage axle to the idler arm; then install a wave washer and idler wheel. Secure with the snap ring.



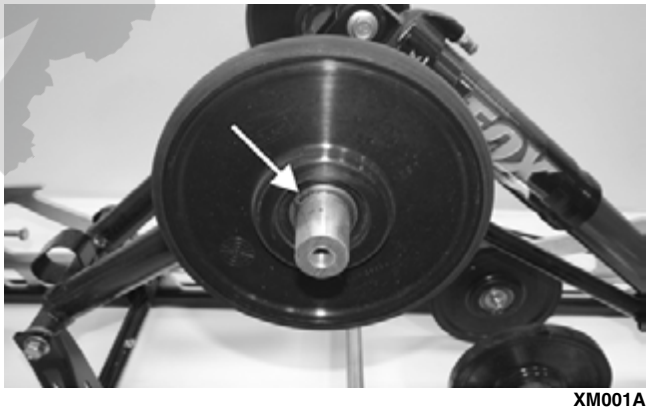
XM002

6. Turn the slide rail onto the side the idler wheel was installed in (from step 5); then with a block of wood placed under the inner carriage axle/idler arm, install a wave washer.



XM005

7. Install the remaining idler wheel along with the snap ring onto the axle; then using a suitable driving tool, carefully drive the snap ring into the idler wheel until properly seated in the groove of the axle.



XM001A

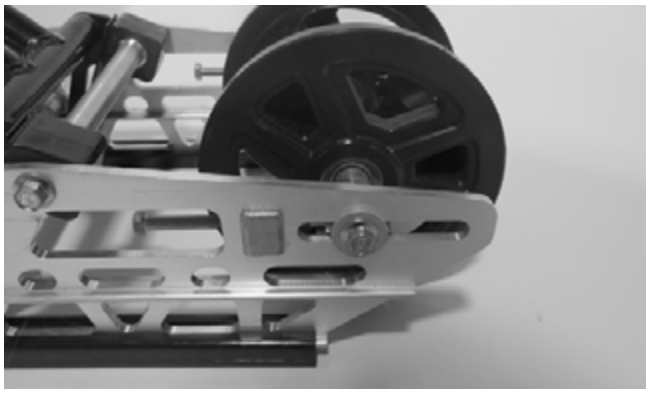
8. Grease the idler arm and rear arm grease fittings with an all-temperature grease.

Rear Axle/Idler Wheels

■NOTE: To service the rear axle on the RR models, proceed to Disassembling Rear Axle (RR) in this subsection.

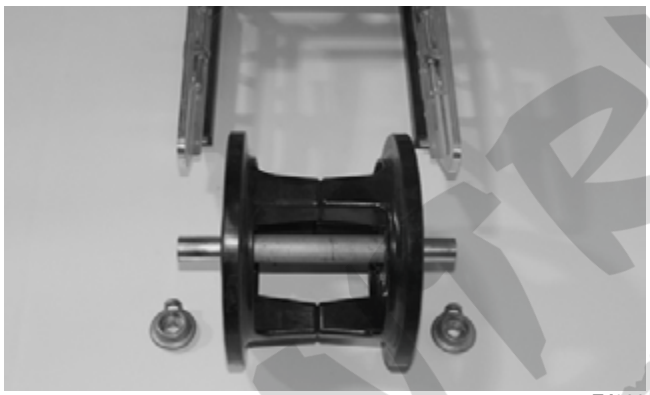
DISASSEMBLING REAR AXLE (F/XF/M)

1. Remove both cap screws and washers and securing rear wheel assembly to the rails.



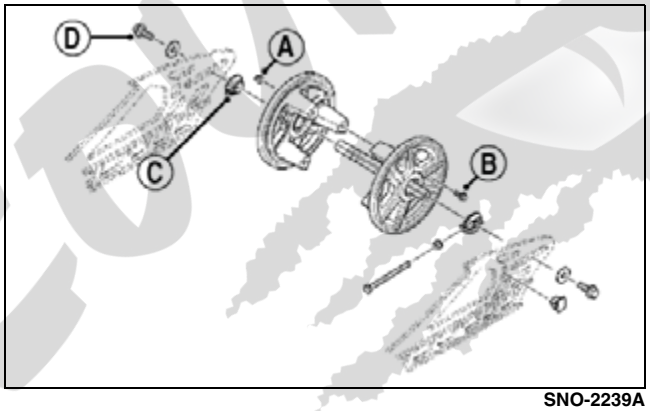
FZ104

2. Loosen the track adjusting bolts then carefully remove the rear axle assembly from the skid frame.



ZJ266

ASSEMBLING REAR AXLE (F/XF/M)



SNO-2239A

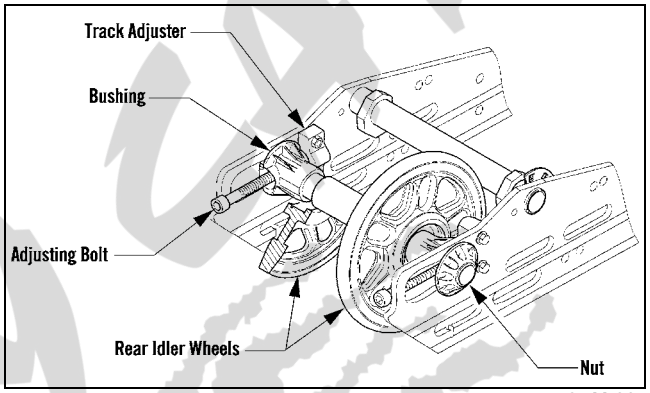
1. If the rear idler wheels were separated, install both wheels onto the axle and secure using the existing cap screws (B) and nuts (A). Tighten to 80 in.-lb.
2. Place the adjuster bushings (C) on the axle; then install the idler wheels and secure with two cap screws (D) (coated with blue Loctite #243) and flat washers. Tighten cap screws only until snug.

■NOTE: Tighten the rear idler wheel axle only until snug until the skid frame has been installed and track tension has been adjusted; then the axle assembly must be tightened to 34 ft-lb.

3. Install the skid frame (see Installing Skid Frame in this sub-section).

DISASSEMBLING REAR AXLE (RR)

1. Using Axle Nut Spanner Wrench (p/n 0644-558 or 0644-454) from the tool kit, loosen the right-side rear axle nut.



0744-067

■NOTE: Always loosen the right-side rear axle nut when adjusting track tension/alignment. The left-side rear axle nut is secured with green Loctite #609 and should not be loosened or removed.

ASSEMBLING REAR AXLE (RR)

1. Apply blue Loctite #243 to the right-side axle threads; then tighten the nut with an impact wrench.

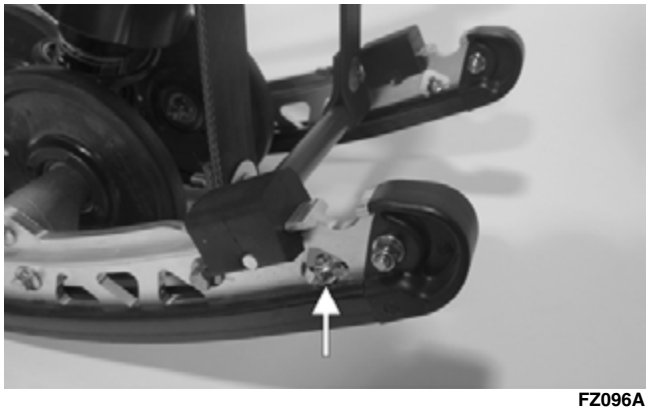
CAUTION
Make certain the right-side rear axle nut is tightened or component damage will occur.

Slide Rails

REMOVING

■NOTE: When replacing one or both slide rails is necessary, remove one slide rail at a time. The remaining slide rail will then hold the crossbraces, axles, and brackets in their correct assembly order. Always mark the mounting hole locations during disassembly to speed up the assembly process and to prevent any damage.

1. With the skid frame removed, remove the machine screw and lock nut securing the wear strip to the front of the slide rail; then using a suitable driving tool, drive the wear strip rearward off the slide rail.



FZ096A

2. Remove the end cap from the slide rail. Account for a cap screw, lock nut, and two flat washers.



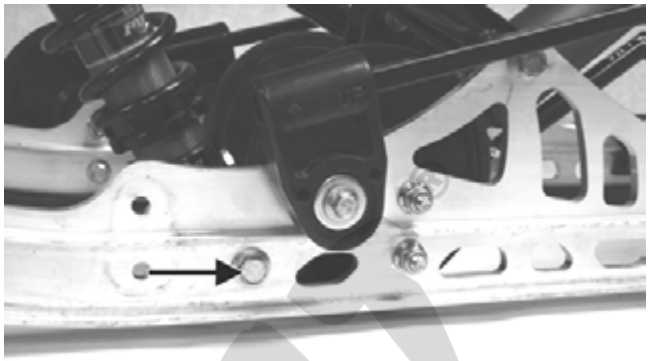
FZ096B

3. Remove the front arm limiter straps from the front arm of the skid frame.



ZJ270

4. Remove the cap screws securing the two front rail supports to the slide rail.
5. Remove the cap screws and lock nuts securing the idler wheels and the idler wheel mounting blocks.
6. Remove the lock nut and flat washer securing the front shock axle assembly to the slide rail. Discard the lock nut.



FZ058A

■NOTE: If removing the cap screws from the front shock axle is necessary to replace the slide rail, install the cap screw from the opposite side into the assembly to secure components and aid in replacing the slide rail.

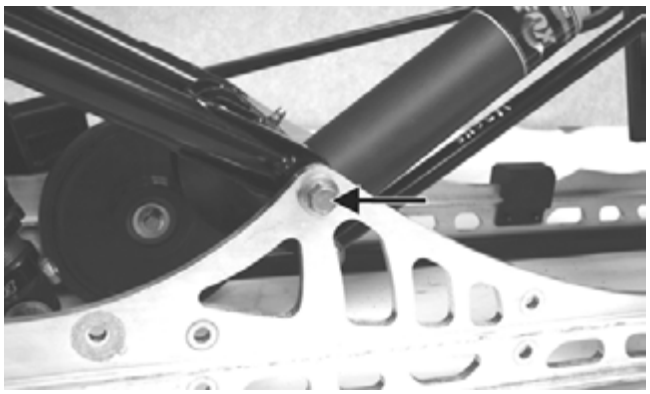
7. On the F, remove the lock nut, cap screw, and flat washer securing the spring slide to the rail. Account for a spacer and the slide block.



FZ059A

■NOTE: On the F, remove the short spring leg from the adjusting cam.

8. Remove the cap screw securing the front arm to the slide rail.



FZ061A

9. Remove the cap screw from the rear arm limiter.



FZ062A

10. On the F, remove the cap screw securing the rear arm coupler block to the slide rail.



FZ103B

11. Remove the idler wheel cap screw; then remove the adjuster bushing.

■NOTE: The adjusting bolt may have to be loosened to remove the adjuster bushing.

12. Remove the adjusting cap screw and adjuster bracket.
13. Remove the cap screw and lock nut securing the rear arm assembly to the slide rail.



FZ103A

■NOTE: At this point, the slide rail should be free of the skid frame components and can be removed.

■NOTE: If the shock pads must be replaced, refer to Shock Pads at the beginning of this procedure.

INSPECTING

1. Inspect the slide rail for cracks, elongated holes, or unusual bends.
2. Inspect the wear strip for wear. The wear strip must be 0.42 in. thick or thicker. If the wear strip measurement is less than specified, replacement of both wear strips is necessary.
3. On the F, inspect the front arm slider bumpers for cracks or wear.

INSTALLING

1. Insert the track adjuster bracket through the slot in the slide rail; then thread the adjuster cap screw into the bracket.
2. With the slide rail assembly on its side, place the rail that was removed or replaced into position; then finger tighten the cap screw securing the rear arm to the rail.
3. Secure the front arm to the slide rail with the cap screw.



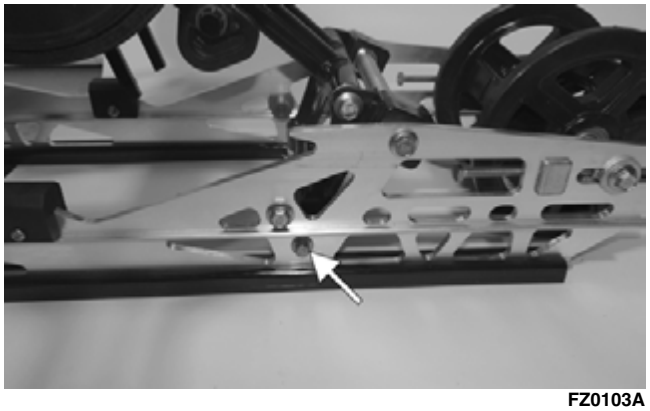
FZ107

■NOTE: At this point, return to steps 2 and 3 and tighten the rear arm and front arm cap screws and lock nuts to 40 ft-lb.

4. Install the adjuster bushing and rear idler wheel. Install a cap screw and flat washer. Tighten only until snug.

■NOTE: Tighten the rear idler wheel axle only until snug until the skid frame has been installed and track tension has been adjusted; then the axle assembly must be tightened to 20 ft-lb.

5. Secure the coupler block with the cap screw. Tighten securely.



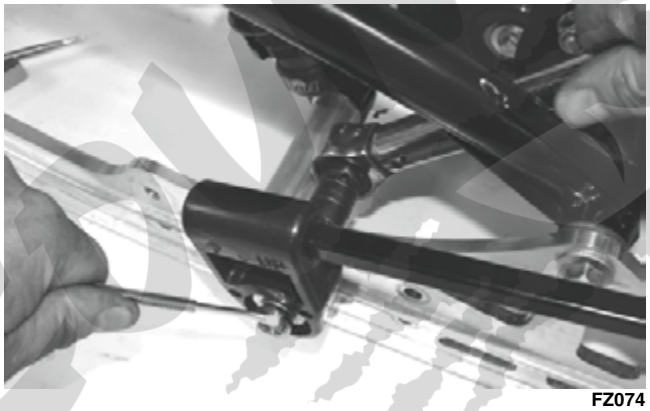
FZ0103A

6. Install the rear arm limiter and secure with the cap screw. Tighten the cap screw to 50 ft-lb.



FZ103B

7. On the F, place the spring into the spring slide; then place the spring slide and slide block assembly into position on the slide rail. Secure with a cap screw and washer. Tighten to 20 ft-lb.



FZ074

8. Install the inner idler wheel mounting block and secure with cap screw and lock nut. Tighten to 20 ft-lb.

■NOTE: To obtain proper alignment for the idler wheel cap screw, place the cap screw in the top hole through the rail and mounting block prior to tightening.

9. Secure the outer idler wheel mounting block with the cap screw and lock nut. Tighten to 20 ft-lb; then secure the outer and inner idler wheels to the mounting blocks with existing hardware. Tighten to 20 ft-lb.

■NOTE: To obtain proper alignment for the idler wheel cap screw, place the cap screw in the top hole through the rail and mounting block prior to tightening.

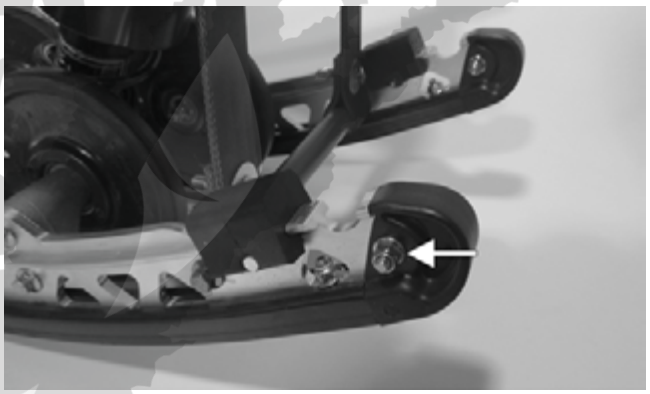
10. Secure the rail supports with cap screws. Tighten to 20 ft-lb.



FZ077

11. With the spacer on the front rail support centered between the limiter straps, secure the straps to the rail support with the cap screw, washers, and lock nut. Tighten to 120 in.-lb.

12. Secure the end cap onto the slide rail using a cap screw, flat washers, and a lock nut. Tighten to 80 in.-lb.



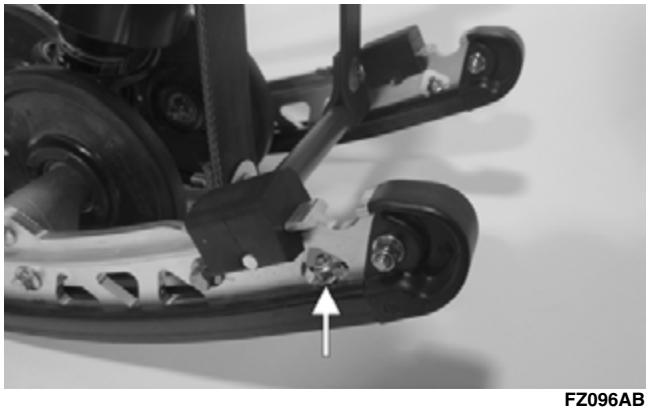
FZ096B

■NOTE: Use a file to remove any sharp edges on the lower portion of the rail.

13. From the back, start the wear strip onto the rail; then using a soft hammer, drive the wear strip forward into position. Secure with a torx-head screw and lock nut. Tighten to 50 in.-lb.



MS207



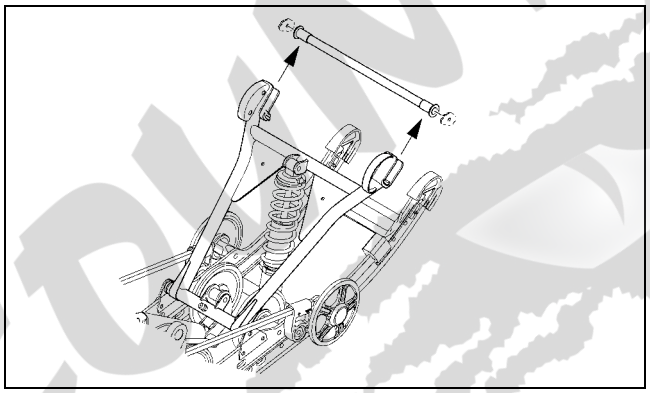
FZ096AB

14. Install the skid frame (see Installing Skid Frame in this sub-section).

■NOTE: Install the rear arm springs onto the adjuster blocks after the skid frame has been installed.

Installing Skid Frame

1. Using a piece of cardboard on the floor to protect against scratching and an appropriate handlebar/steering post stand, tip the snowmobile onto one side.
2. Pull the track away from the tunnel and spread open; then place the skid frame into the track.
3. On the F, position the front of the skid frame into the tunnel and engage the front arm with the slider axle in the tunnel.



0742-187

4. On the M and XF, secure the front of the skid frame to the tunnel using the existing cap screws, flat washers, and lock nuts.

■NOTE: To aid in centering the front arm with the hole in the tunnel, position the skid frame and track at a 45° angle to the bottom of the tunnel.

5. Push the rear of the skid frame and the track into the tunnel.
6. Align the rear arm assembly with the appropriate hole in the tunnel. Secure the rear arm assembly with a cap screw, lock washer, and flat washer. AT THIS TIME, TIGHTEN ONLY UNTIL SNUG.
7. Tip the snowmobile onto the other side; then align the offset arm assembly with the appropriate hole in the tunnel. Secure the rear arm assembly with a cap screw, lock washer, and flat washer. AT THIS TIME, TIGHTEN ONLY UNTIL SNUG.

■NOTE: Do not install the short legs of the rear springs onto the adjusting cams at this time.

8. At this time, place the snowmobile to the upright position; then tighten all cap screws to 40 ft-lb.
9. On the F, using the Rear Suspension Spring Tool, install the short legs of the rear springs onto the adjusting cams making sure the cams are in the same adjustment positions.
10. Adjust track tension (see Section 6) and track alignment (see Section 6).

CAUTION

After proper track tension and alignment have been attained, make certain that the rear axle cap screws tightened to specifications or component damage will occur.

Servicing Suspension (Bearcat 570/T-Series)

This sub-section has been organized so each procedure can be completed individually and efficiently.

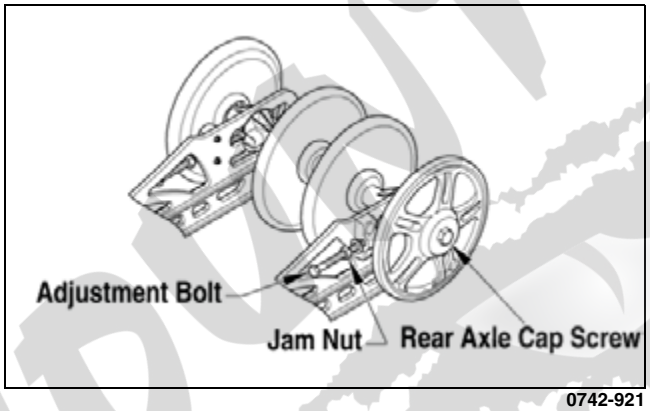
■NOTE: Some components may vary from model to model. Some illustrations and photographs used in this sub-section are used for clarity purposes only and are not designed to depict actual conditions. The technician should use discretion and sound judgment when removing and installing components.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

Removing Skid Frame

■NOTE: Many service procedures can be performed without removing the skid frame. The technician should use discretion and sound judgment when removing and installing components.

1. To avoid having the adjuster bushings binding during loosening of the track, remove the rear idler wheel caps and loosen the cap screws on the rear axle.



0742-921

2. Loosen the jam nuts and two track-tension adjusting bolts.
3. Place a support stand under the rear bumper; then while holding the flared bushing, remove the rear cap screws securing the skid frame to the tunnel. Account for lock washers and flat washers.

■NOTE: The support stand should hold the snowmobile level but not raised off the floor.

4. Remove the support stand; then using an appropriate handlebar/steering post support stand, tip the snowmobile onto one side.
5. Slide the skid frame rearward far enough to drop the front arm out of the slider axle; then remove the skid frame.

End Caps

REMOVING

1. Remove the lock nut and cap screw securing the end cap.



FZ026A

2. Using a hammer, tap the end cap off the rail.

CLEANING AND INSPECTING

1. Inspect the end cap area of the slide rail for cracks and wear.
2. Inspect the end cap for any signs of cracking or wear.
3. Clean both the slide rail area and the end cap. Using compressed air, clean the areas of dirt and gravel.

⚠ WARNING

Always wear an approved pair of safety glasses when using compressed air.

4. Inspect the cap screw for cracked, stretched, or damaged threads. Use a new lock nut when assembling.

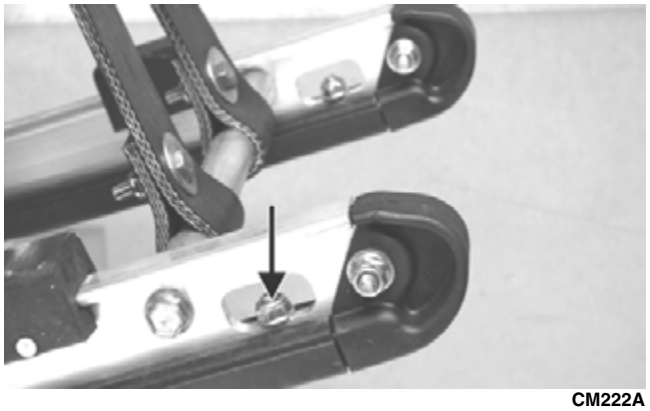
INSTALLING

1. Position the end cap on the slide rail; then align the hole in the end cap with the hole in the slide rail.
2. Secure with a cap screw, washers, and lock nut. Tighten to 80 in.-lb.

Wear Strips

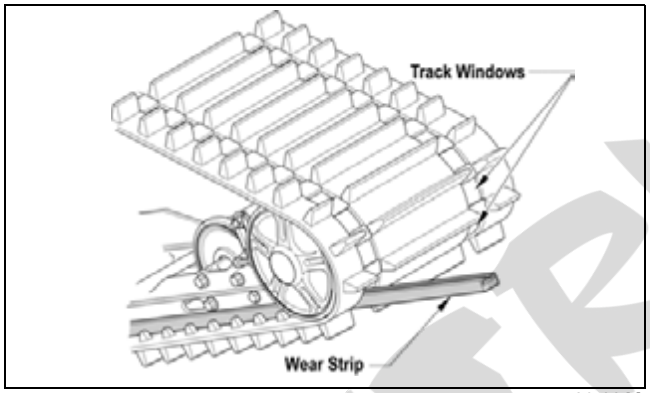
REMOVING

1. Remove the machine screw and lock nut securing the wear strip to the front of the slide rail.



CM222A

2. Align the wear strip with the openings (windows) in the track; then using a suitable driving tool, drive the wear strip rearward off the slide rail.



739-884A

CLEANING AND INSPECTING

1. Clean the slide rail using parts-cleaning solvent and compressed air.

⚠ WARNING

Always wear an approved pair of safety glasses when using compressed air.

2. Inspect the slide rail for cracks. If any cracks are found, replace the slide rail.
3. Using a straightedge, inspect the slide rail for any unusual bends. With the slide rail removed, place the straightedge along the bottom surface of the slide rail. If the rail is found to be bent, it must be replaced.

INSTALLING

■NOTE: Use a file to remove any sharp edges on the lower portion of the rail.

1. Align the wear strip with the openings (windows) in the track and from the back, start the wear strip onto the rail; then using a block of wood and a hammer, drive the wear strip forward into position.
2. Secure with a machine screw and lock nut. Tighten to 50 in.-lb.

Shock Pads

REMOVING

1. Using a 3/16-in. drill bit, drill out the rivets securing each front shock pad to the slide rail. Account for the retaining brackets.
2. Remove the torx-head screws and lock nuts securing the rear shock pads to the slide rail; then remove the shock pads.

INSPECTING

1. Inspect the pad and retaining brackets for damage or wear.
2. Inspect the rivet holes in the slide rail for damage or elongation.

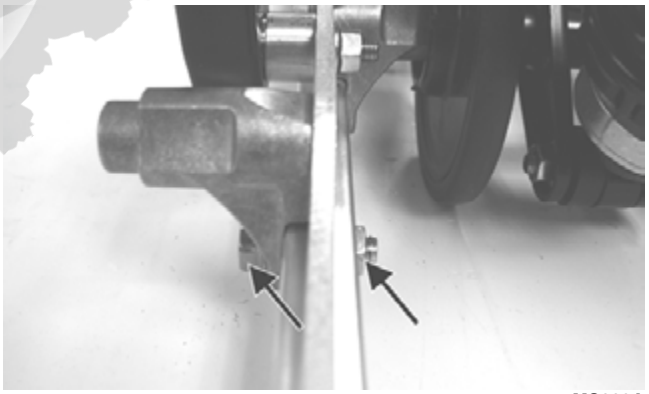
INSTALLING

1. Place the front pads and retaining brackets into position on the slide rail; then secure with rivets.
2. Place the rear pads into position on the slide rails; then secure with the torx-head screws and lock nuts. Tighten securely.

Idler Wheels/Mounting Blocks

REMOVING

1. Remove the cap screw and lock nut securing the idler wheel to the idler wheel mounting block; then remove the cap screw and lock nut securing the mounting block to the slide rail.



MS003A

2. Account for a flat washer from the idler wheel cap screw.

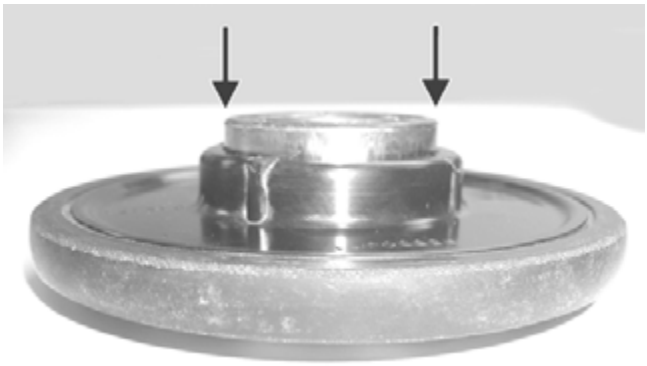
CLEANING AND INSPECTING

1. Clean the bearing with a clean cloth.
2. Inspect each idler wheel for cracks or damage.
3. Rotate the idler wheel bearing (by hand) and inspect for binding or roughness.
4. If a bearing must be replaced, use this procedure.

A. Remove the bearing snap ring.

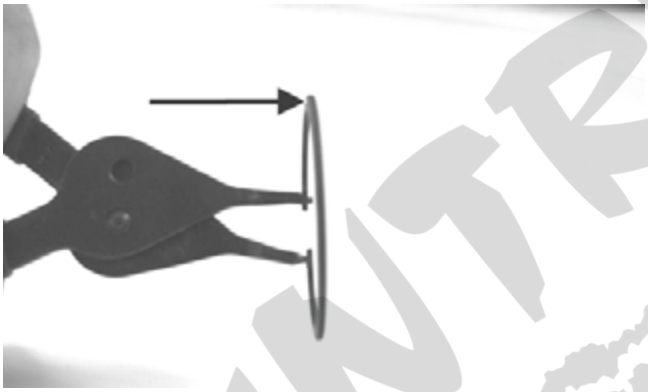
B. Using a hydraulic press or suitable driving tool, remove the bearing from the inside of the wheel.

C. Press the new bearing (on its outer race) into the idler wheel.



MS006A

D. Install the snap ring making sure the "sharp side" is directed away from the bearing.

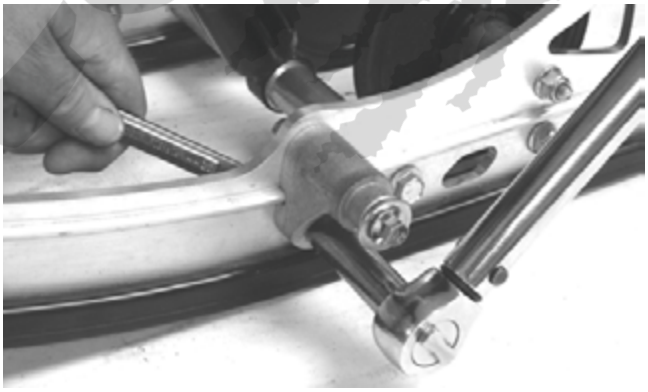


MS007A

INSTALLING

1. Secure the mounting block on the slide rail with a cap screw and lock nut. Tighten to 20 ft-lb.

■NOTE: For proper alignment, install an idler wheel cap screw into the top mounting block hole prior to tightening.



TZ025

2. Place the idler wheel to the mounting block; then secure the idler wheel assembly with a cap screw, flat washer, and a lock nut. Tighten to 20 ft-lb.

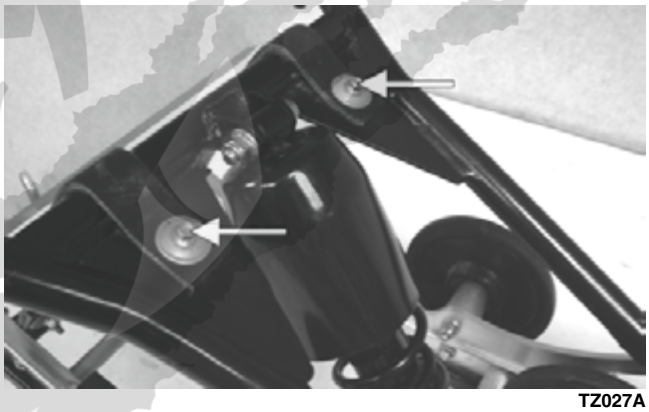


TZ026

Front Arm Assembly

REMOVING

1. With the skid frame removed and the rear springs removed from the adjusting cams, remove the cap screws and lock nuts securing the limiter straps to the front arm. Account for flat washers.



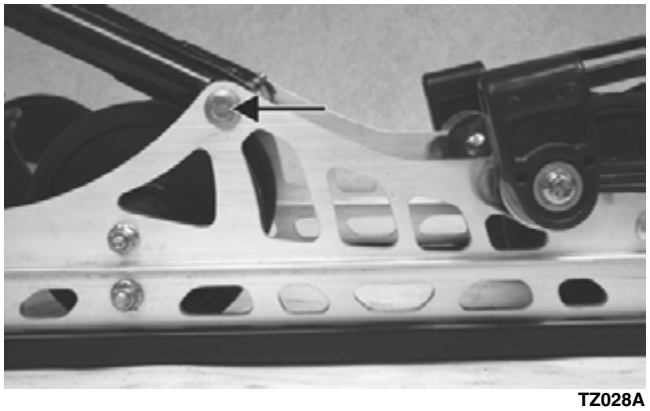
TZ027A

2. Remove the cap screw and lock nut securing the upper front shock absorber eyelet to the front arm. Pull the shock eyelet free of the bracket. Account for a sleeve.



ZJ271A

3. Remove the cap screw and lock nut securing the front arm to the slide rail. Account for the external tooth washer.

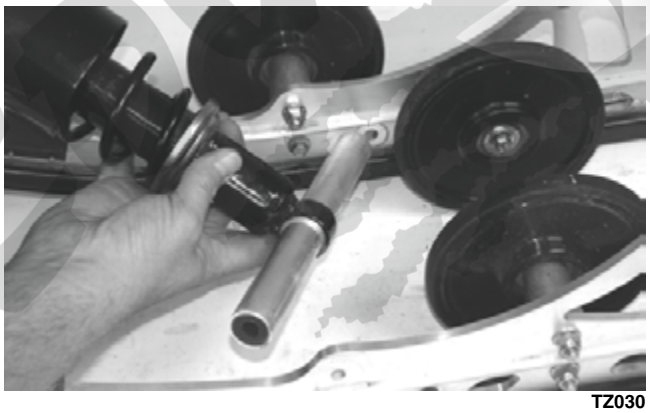


TZ028A

4. Remove the front arm and account for the front arm axle.
5. Remove the front outer idler wheel and mounting block from the side of the slide rail in which the front arm shock axle cap screw was installed.
6. Remove the cap screws, washer, and lock nut from the front shock axle; then from the side that the idler wheel and mounting block was removed, tap the assembly forward far enough for the axle assembly to clear the slide rails. Account for an axle, two spacers, and two shim washers.



TZ029



TZ030

INSPECTING

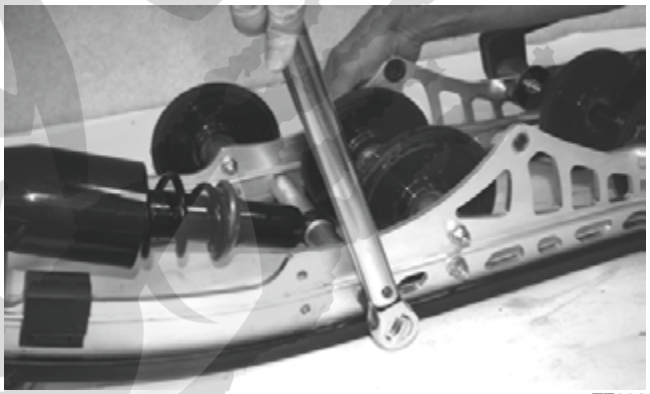
1. Inspect all front arm weldments for cracks or unusual bends; then inspect the front arm mounting brackets for cracks and for elongated holes.
2. Closely inspect all tubing for cracks or unusual bends.
3. Inspect the bearings, bushings, and front arm spacers for wear or damage.
4. Inspect the shock absorber for damage and for any signs of oil leakage especially at the point where the shock shaft enters the shock body.
5. Inspect the shock absorber eyelet welds (at each end) for any cracks, signs of separation, or for unthreading.

INSTALLING

1. With the rubber bushing in place, install the axle into the lower shock eyelet bushing assembly; then install the two shim washers and two spacers.

■NOTE: Applying a light film of lubricant to the rubber bushing will aid in installing.

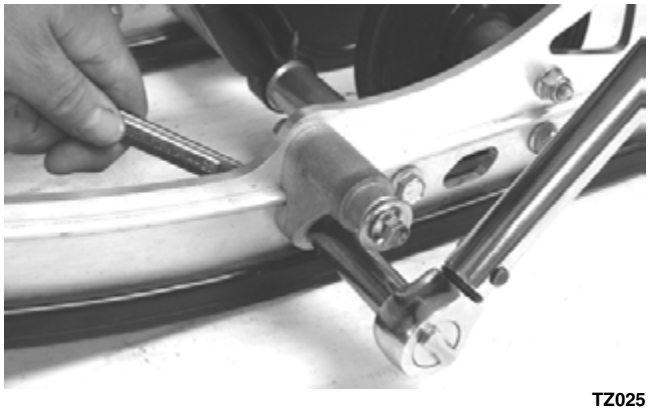
2. Position the front arm shock axle assembly on the skid frame making sure the spacers and washers are properly positioned. Secure with the cap screw, washer, and a new lock nut. Tighten to 40 ft-lb.



TZ031

3. On the side that the idler wheel and mounting block were removed from, secure the mounting block on the slide rail with a cap screw and lock nut. Tighten to 20 ft-lb.

■NOTE: For proper alignment, install an idler wheel cap screw and lock nut into the top mounting block hole prior to tightening.



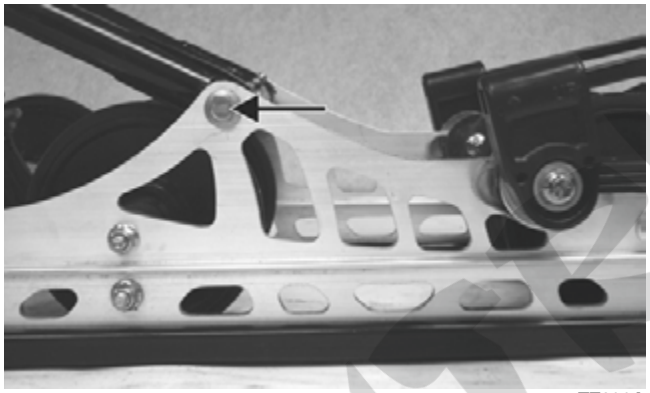
TZ025

4. Secure the idler wheel to the mounting block with a cap screw and a lock nut. Tighten cap screw to 20 ft-lb.



TZ026

5. Install the axle into the front arm; then position the front arm to the mounting location of the slide rail. Secure with cap screws, external tooth washer, and lock nuts. Tighten to 50 ft-lb.



TZ028A

6. Secure the upper shock eyelet and axle in the mounting hole of the front arm. Secure with a cap screw and lock nut. Tighten securely.



ZJ271A

■NOTE: Do not over-tighten the shock absorber cap screw as the shock eyelet must be free to pivot.

7. Secure the limiter straps to the front arm with cap screws, washers, and lock nuts. Tighten to 120 in.-lb.



TZ027A

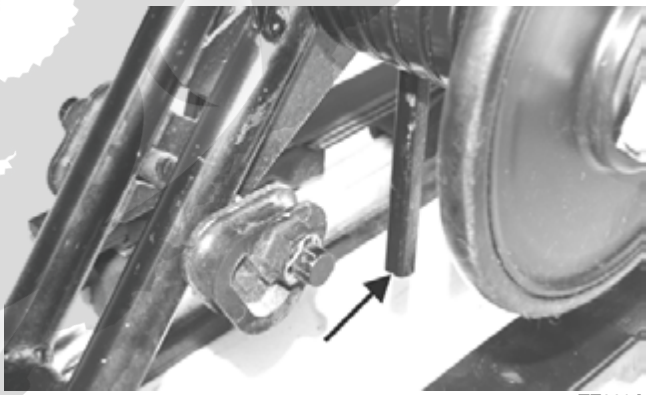
Rear Arm/Rear Shock Pivot Assembly

REMOVING

1. With the skid frame removed using the Rear Suspension Spring Tool, remove the spring from the adjusting cam.

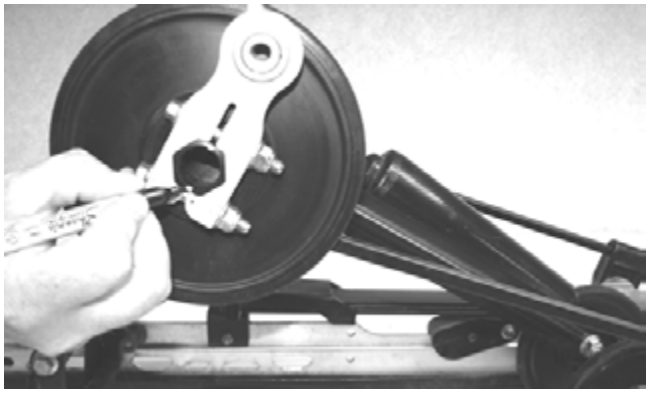
⚠ WARNING

Care must be taken when removing the spring or damage or injury could result.



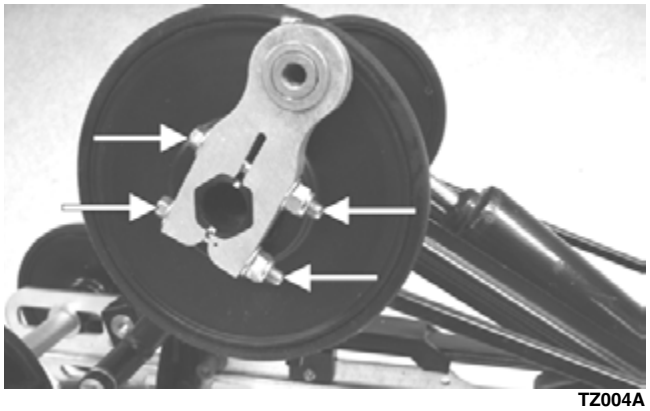
TZ002A

2. Mark the offset arm and the idler arm for assembly purposes.

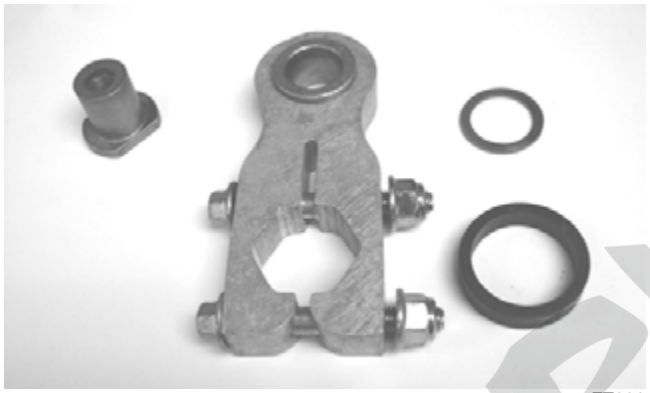


TZ003

3. Loosen the cap screws and lock nuts securing the offset arm assembly to the idler arm; then remove the offset arm assembly. Account for a flanged axle, idler spacer, and washer.



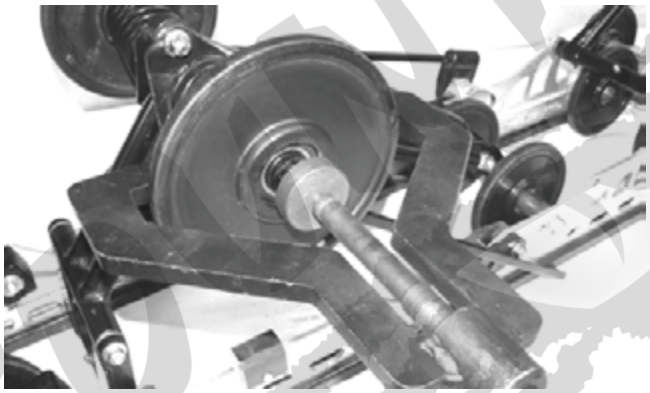
TZ004A



FZ036

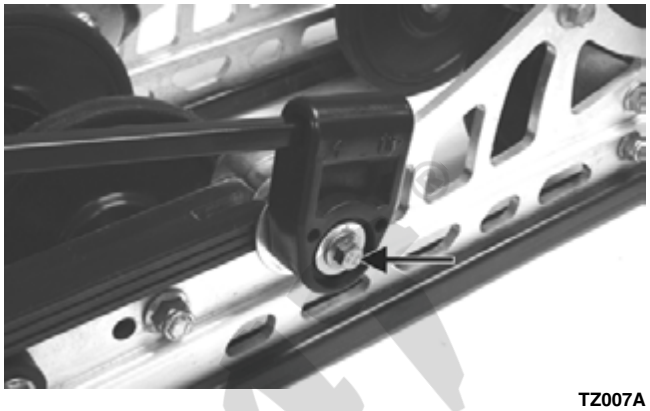
4. Remove the idler wheel.

■NOTE: Use the Idler Wheel Puller Kit to remove the wheel.



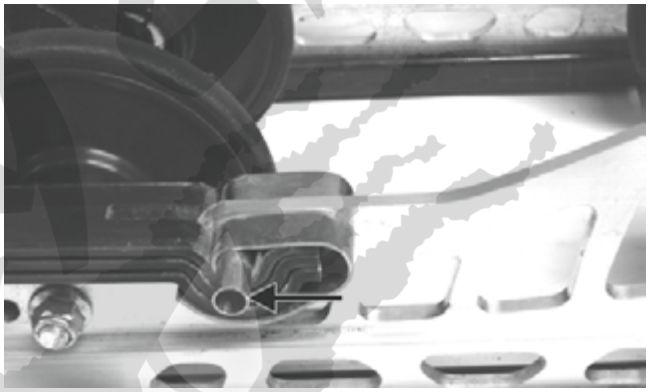
TZ005

5. Remove the cap screw, flat washers, and lock nut securing the spring slide and overload spring to the slide rail. Account for the spring slide and all mounting hardware.



TZ007A

■NOTE: If the overload spring is being removed, use a punch to drive the bushing out from the back side of the slide rail and remove the spring.

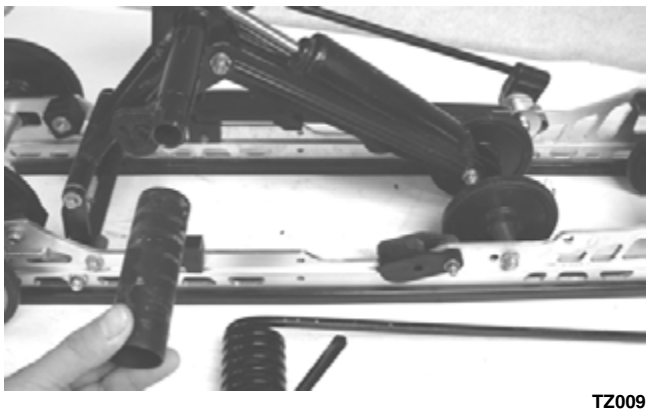


TZ006A



TZ008

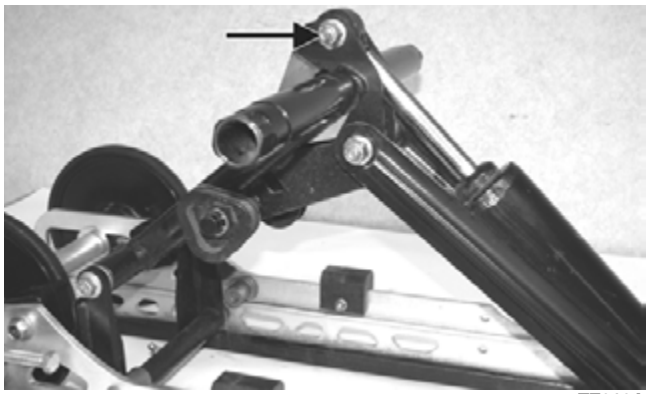
6. Remove the spring and sleeve from the idler arm.



TZ009

■NOTE: Use the same procedure for the other side.

7. Remove the cap screw and lock nut securing the upper shock eyelet to the idler arm; then remove the cap screw and lock nut securing the upper shock links to the idler arm. Account for the cap screws, lock nuts, and sleeves.



TZ010A



TZ011A

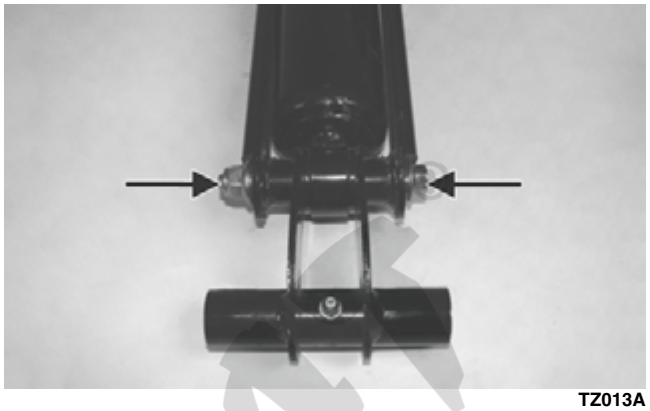
■NOTE: For assembling purposes, note the mounting location of the shock links to the idler arm.

8. Remove the cap screw and lock nut securing the rear shock pivot/idler wheel assembly to the slide rails; then remove the assembly and account for the axle, axle spacers, and shim washers (if applicable).

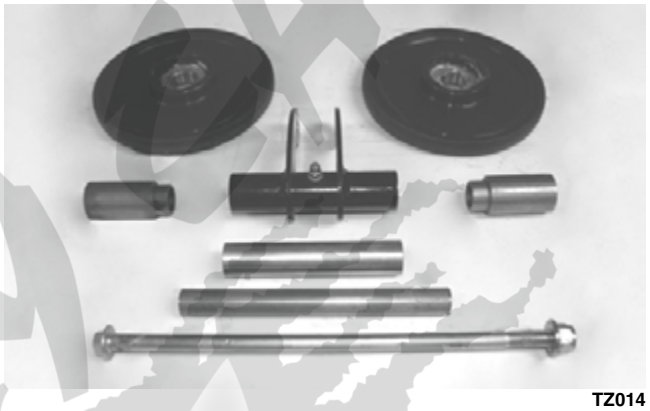


TZ012A

9. Remove the cap screw and lock nut securing the rear arm shock absorber and shock links to the rear shock pivot. Account for the cap screws, lock nuts, and sleeves.

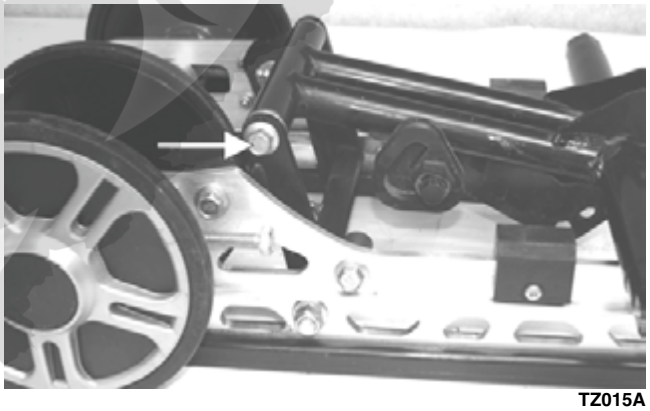


TZ013A



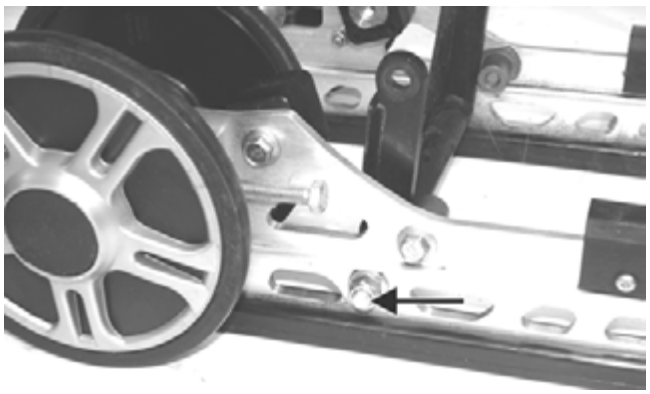
TZ014

10. Remove the cap screws securing the idler arm to the rear arm. Account for the aluminum axle.



TZ015A

11. Remove the cap screw and lock nut securing the rear arm to the slide rail. Account for the bushings and axle tube.



TZ016A

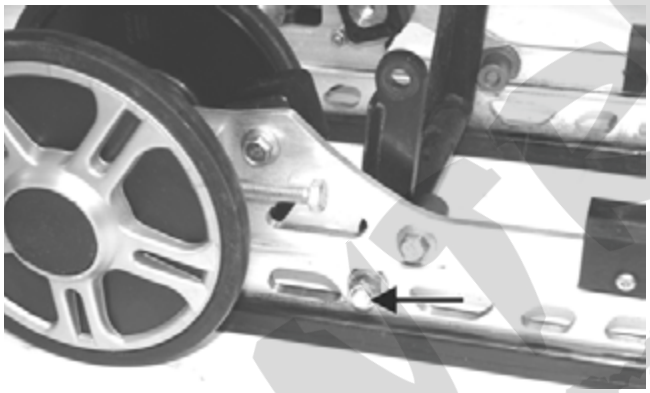
7

CLEANING AND INSPECTING

1. Clean the bearings with a clean cloth.
2. Inspect each idler wheel for cracks or damage.
3. Inspect the bushings (located in the arm pivot area) for wear or damage.
4. Inspect all welds and the tubing of the rear arm/idler arm for cracks or unusual bends.
5. Inspect the two adjusting cams for damage.
6. Rotate the idler wheel bearings (by hand) and check for binding or roughness.
7. If a bearing must be replaced, see Idler Wheels/ Mounting Blocks - Cleaning and Inspecting in this sub-section.

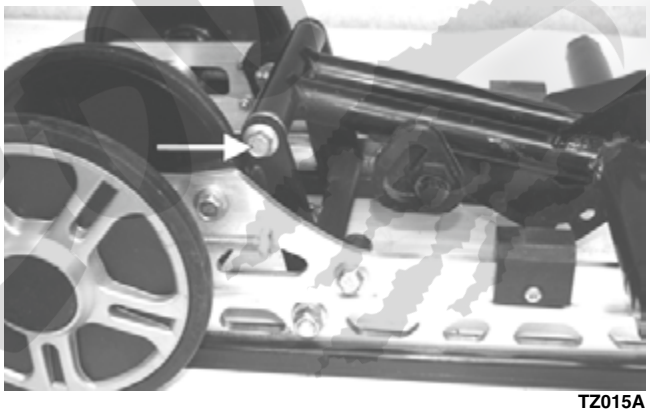
INSTALLING

1. Place the rear arm assembly into position between the slide rails. Secure with a cap screw and lock nut. Tighten to 40 ft-lb.



TZ016A

2. Install the rear arm onto the idler arm with an aluminum axle and two cap screws. Tighten to 40 ft-lb.



TZ015A

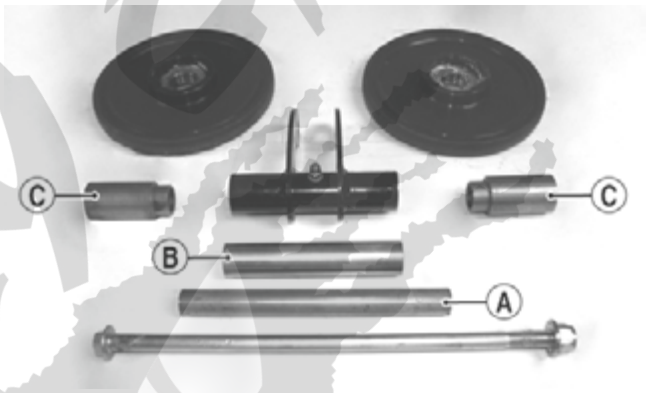
3. With the sleeves installed, install the shock absorber and links to the mounting hole of the rear shock pivot with cap screws and lock nuts. Tighten securely.

■NOTE: The shock absorber and links must be secured to the rear shock pivot before installing to the slide rails.



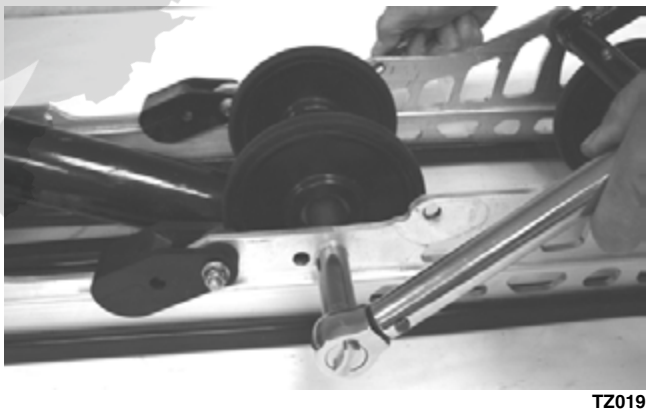
TZ017A

4. Assemble the rear shock pivot idler wheel assembly with the axle (A), axle tube (B), axle spacers (C), and shim washers (if applicable).



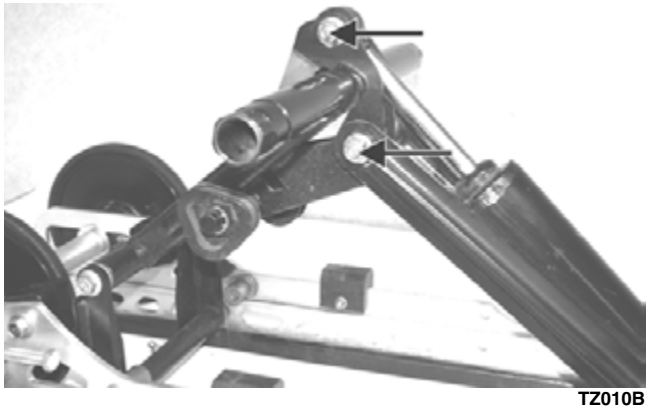
TZ014A

5. Install the rear shock pivot/idler wheel assembly to the mounting location in the slide rails and secure with cap screws and lock nuts. Tighten to 20 ft-lb.



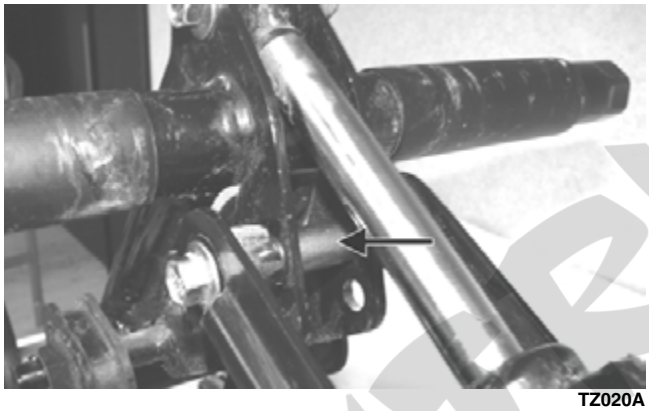
TZ019

6. With the sleeves installed, install the shock absorber to the mounting hole of the idler arm along with the cap screw and lock nut; then secure the shock absorber links and spacer to the upper mounting hole of the idler arm with cap screws and lock nuts. Tighten securely.



TZ010B

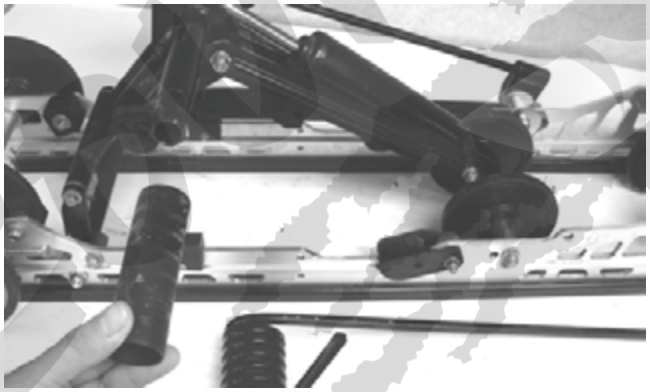
■**NOTE: Do not over-tighten the shock absorber cap screw as the shock eyelet must be free to pivot.**



TZ020A

■**NOTE: Make sure the spacer is installed between the brackets of the idler arm before securing the shock links.**

7. Slide the sleeve and spring onto the idler arm.



TZ009

8. Place the spring slide and slide block (with spring in slide block) into position on the slide rail. Secure with a cap screw and washer. Tighten to 20 ft-lb.



TZ008

■**NOTE: Install the rear arm springs onto the adjuster blocks after the skid frame has been installed.**



TZ021

9. Using a suitable driving tool, install the rear upper idler wheel on the idler arm.

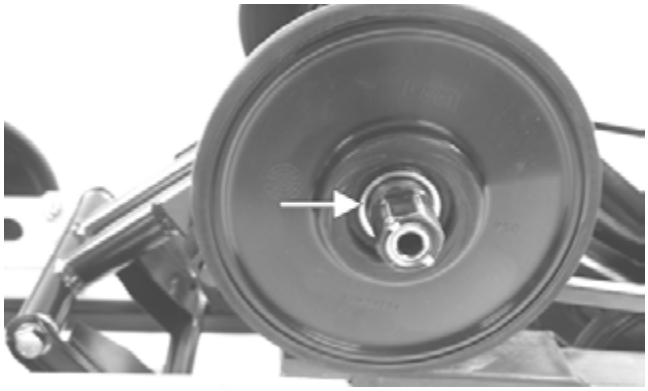


TZ022

CAUTION

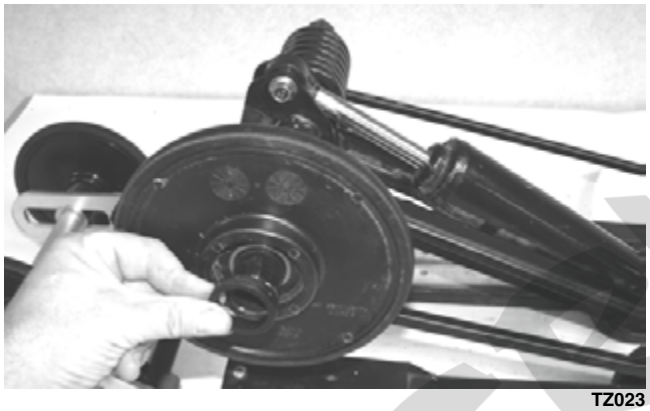
When driving the idler wheel onto the idler arm, use a tool to contact the inside race of the bearing or damage to the wheel or bearing may occur.

7



MS072A

10. Install the idler spacer collar onto the idler arm.



TZ023

11. Install the axle with a thin flat washer through the back side of the flared bushing of the offset arm.

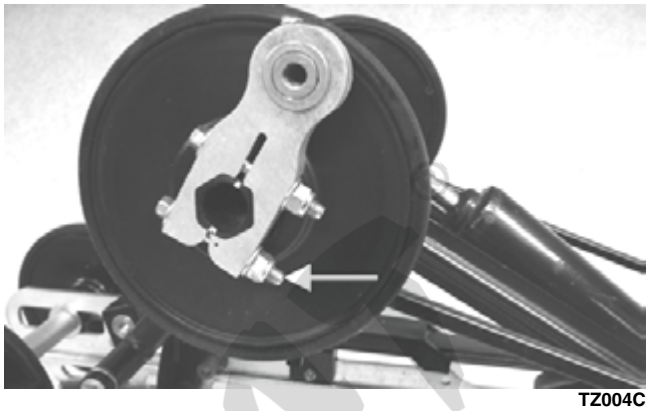
■NOTE: If the flared bushing in the offset arm is loose, it must be cleaned and green Loctite #609 must be applied to it prior to installation.

12. Align the marks on the idler arm to the centerline of the offset arm assembly. Secure the offset arm to the idler arm with cap screws and lock nuts. Tighten to 20 ft-lb.



TZ004B

■NOTE: When tightening the offset arm lock nuts, tighten the lower lock nut first to ensure an even clamp load. Make sure the flared side of the bushing is directed outward.



TZ004C

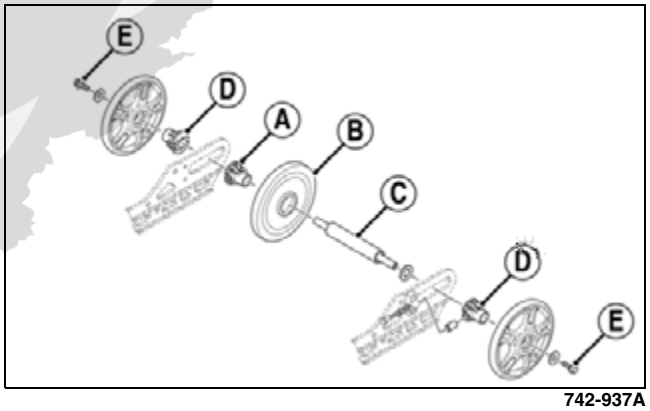
13. Grease the idler arm and rear arm grease fittings with an all-temperature grease.

Rear Axle and Slide Rail Idler Wheels

DISASSEMBLING REAR AXLE

1. With the skid frame removed, remove the cap screw and large flat washer securing the outer rear idler wheel. Remove the outer idler wheel from the shaft.
2. Loosen the track adjusting bolts. Slide the outer adjuster bushings off the axle.
3. Carefully slide the shaft out from the slide rails and inner idler wheels. Account for the rear idler wheel spacer and adjuster bushings.

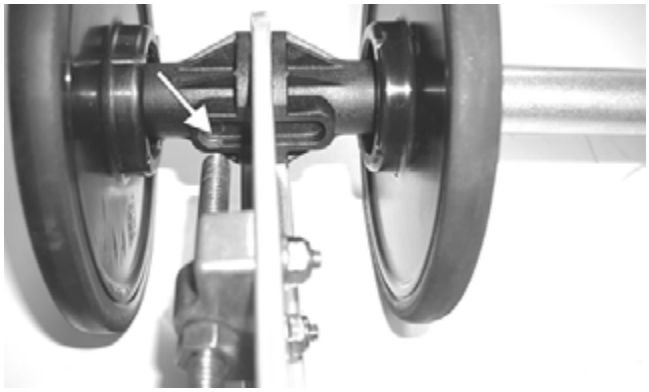
ASSEMBLING REAR AXLE



742-937A

1. In order from the right-hand side, slide the axle through the slide rail axle slot; then place a bushing (A), inner idler wheel (B), and long spacer (C) with a flat washer on the axle. Slide the axle through the opposite slide rail axle slot.
2. Place the plastic adjuster bushings (D) on the axle (on the outside of each axle slot); then install the outer idler wheels on the axle and secure with two cap screws (E) (coated with blue Loctite #243) and large flat washers. Tighten cap screws only until snug.

■NOTE: Care must be taken that the adjuster bushing slot with the cap screw hole is aligned properly with the adjuster bolt.



MS058A



ZJ266

■**NOTE: Tighten the rear idler wheel axle only until snug until the skid frame has been installed and track tension has been adjusted; then the axle assembly must be tightened to 20 ft-lb.**

3. Install the skid frame (see Installing Skid Frame in this sub-section).
4. Adjust track tension and alignment (see Track Alignment in Section 6).

Slide Rails

REMOVING

■**NOTE: When replacing one or both slide rails is necessary, remove one slide rail at a time. The remaining slide rail will then hold the rail supports, axles, and brackets in their correct assembly order. Always mark the mounting hole locations during disassembly to speed up the assembly process and to prevent any damage.**

1. With the skid frame removed, remove the machine screw and lock nut securing the wear strip to the front of the slide rail; then using a suitable driving tool, drive the wear strip rearward off the slide rail.



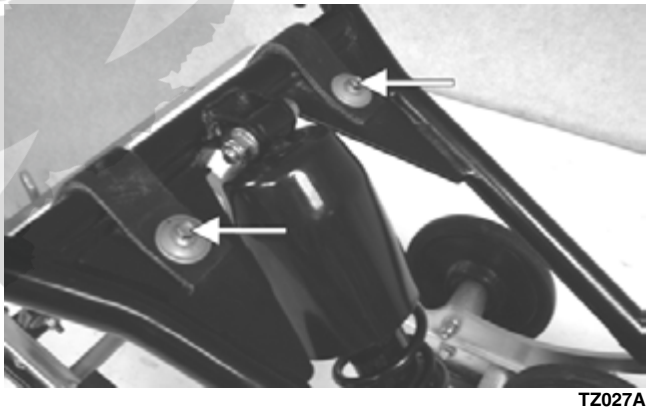
FZ026B

2. Remove the end cap from the slide rail. Account for a cap screw, lock nut, and two flat washers.



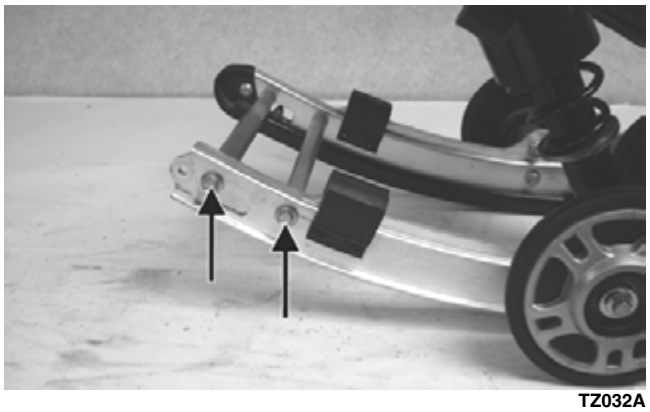
FZ079A

3. Remove the front arm limiter straps from the front arm of the skid frame.



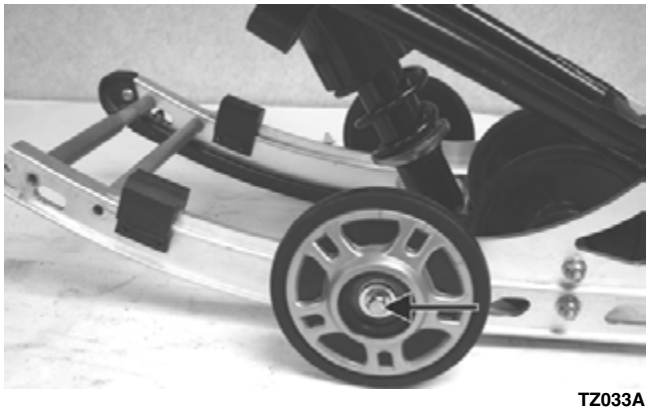
TZ027A

4. Remove the cap screws securing the two front rail supports to the slide rail.

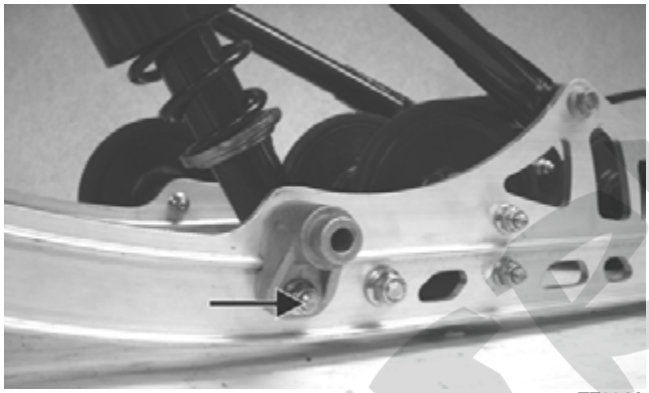


TZ032A

5. Remove the cap screws and lock nuts securing the front outer idler wheel and the idler wheel mounting block.

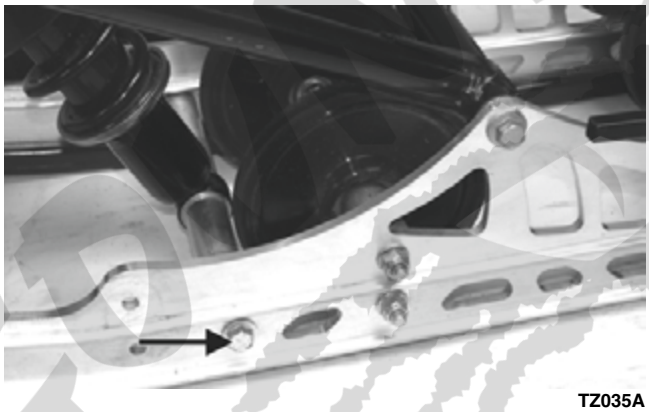


TZ033A



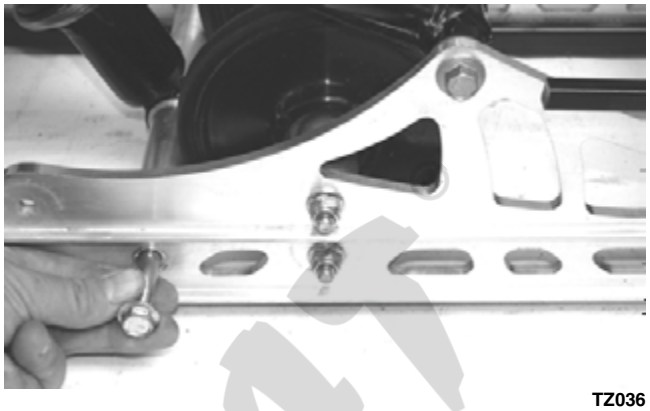
TZ034A

6. Remove the lock nut from the cap screw securing the front shock axle assembly to the slide rail.



TZ035A

■NOTE: If removing the cap screws from the front shock axle is necessary to replace the slide rail, remove the front outer idler wheel and install the cap screw from the opposite side into the assembly to secure components and aid in replacing the slide rail.



TZ036

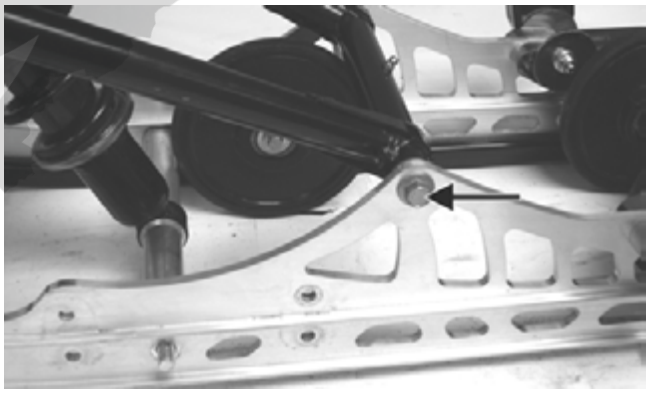
■NOTE: If not already done, remove the short spring leg from the adjusting cam.

7. Remove the cap screws and lock nuts securing the inner idler wheel and mounting block.



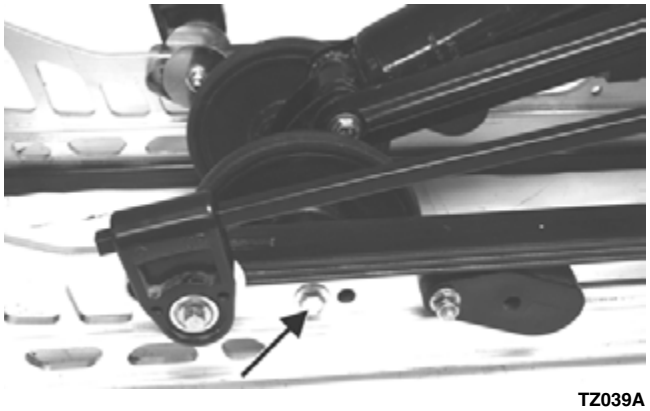
TZ037A

8. Remove the cap screw securing the front arm to the slide rail.



TZ038A

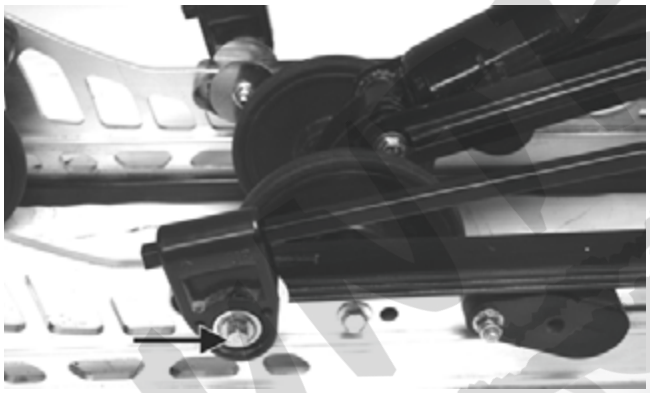
9. Remove the lock nut from the cap screw securing the rear arm pivot/idler wheel assembly to the slide rail.



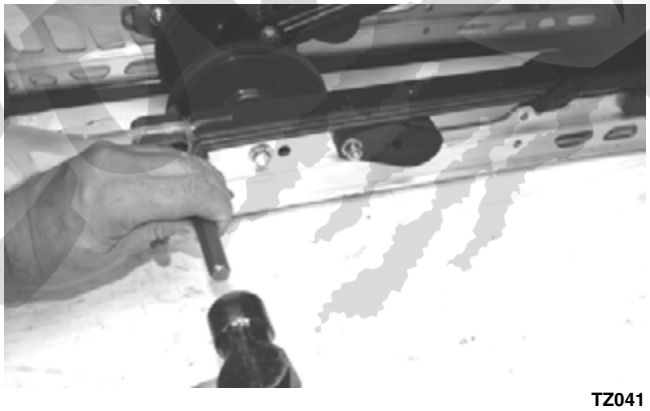
TZ039A

■NOTE: If removing the cap screw is necessary to replace the slide rail, install the cap screw from the opposite side into the assembly to secure the components and aid in replacing the slide rail.

10. Remove the cap screw, lock nut, and flat washer securing the spring slide and overload spring to the rail; then using a suitable driving tool, remove the bushing securing the overload spring to the rail. Account for a spacer, the slide block, overload spring, retainer clips, bushing, one small washer, and two large washers.

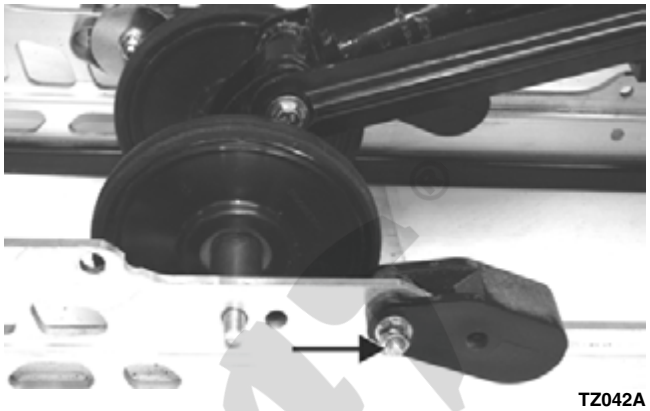


TZ040A



TZ041

11. Remove the cap screw and lock nut securing the overload spring tension block to the slide rail.

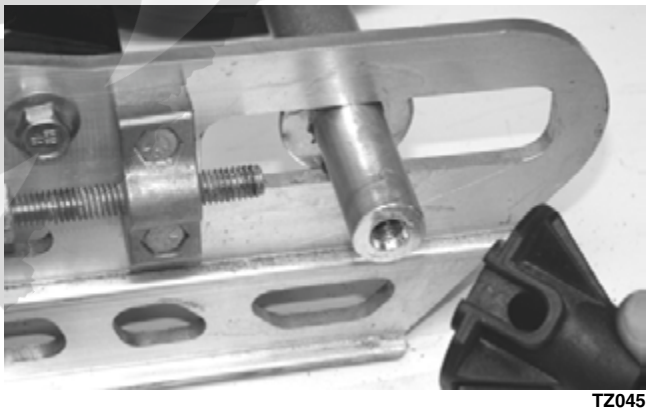


TZ042A

12. Remove the cap screws from the rear arm limiter (A); then remove the cap screw and flat washer securing the rear idler wheel. Remove the idler wheel; then remove the adjuster bushing.



TZ044B

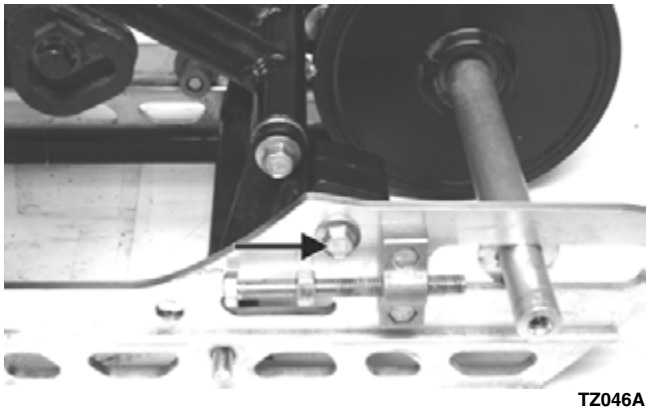


TZ045

■NOTE: The adjusting bolt may have to be loosened to remove the adjuster bushing.

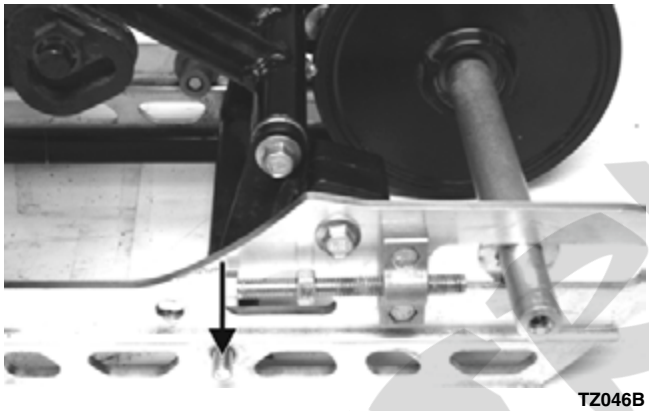
13. Remove the cap screw securing the rear arm coupler block to the slide rail. Account for the block, bushing, cap screw, and lock nut.

7



TZ046A

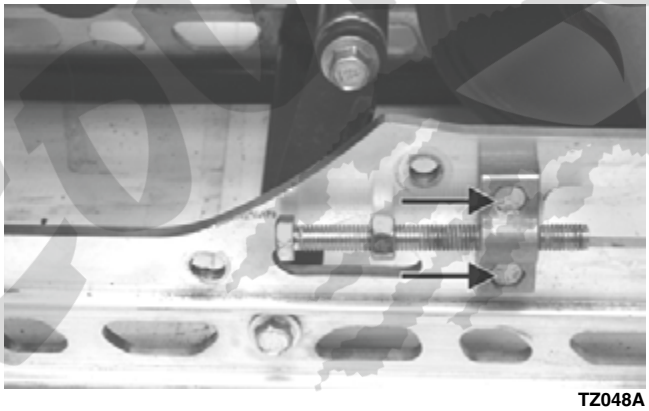
14. Remove the lock nut from the cap screw securing the rear arm assembly to the slide rail.



TZ046B

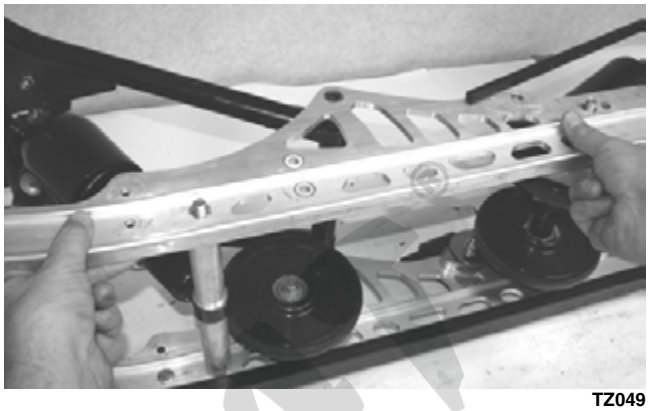
■NOTE: If removing the cap screw is necessary to replace the slide rail, install the cap screw from the opposite side into the assembly to secure the components and aid in replacing the slide rail.

15. Remove the torx-head cap screws and lock nuts securing the track adjuster bracket.



TZ048A

■NOTE: At this point, the slide rail should be free of the skid frame components and can be removed.



TZ049

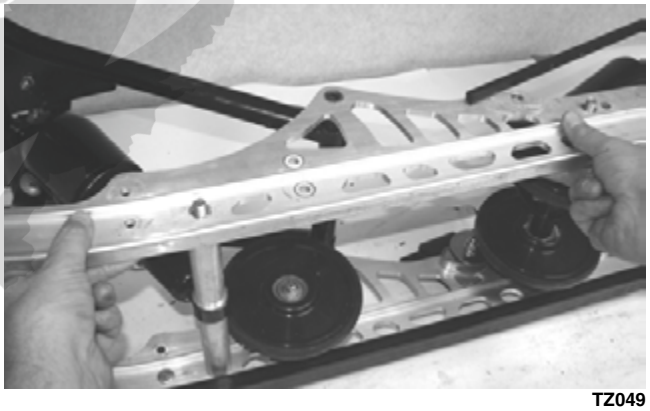
■NOTE: If the shock pad must be replaced, refer to Shock Pads at the beginning of this procedure.

INSPECTING

1. Inspect the slide rail for cracks, elongated holes, or unusual bends.
2. Inspect the wear strip for wear. The wear strip must be 0.42 in. thick or thicker. If the wear strip measurement is less than specified, replacement of both wear strips is necessary.
3. Inspect the front arm slider bumpers for cracks or wear.

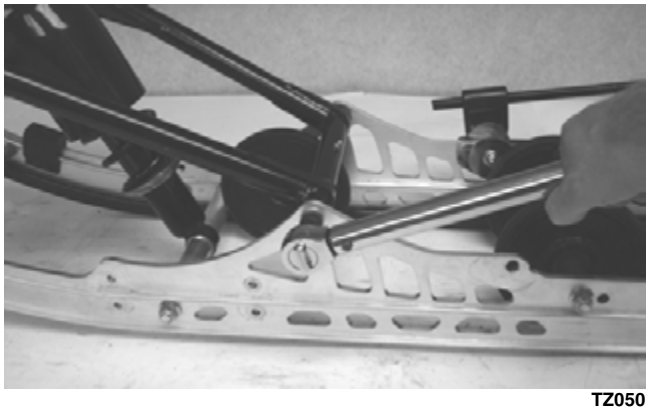
INSTALLING

1. With the slide rail assembly on its side, place the slide rail to the front shock axle, rear arm pivot/idler wheel assembly, and rear arm cap screws; then secure the cap screws with lock nuts. Finger tighten only.



TZ049

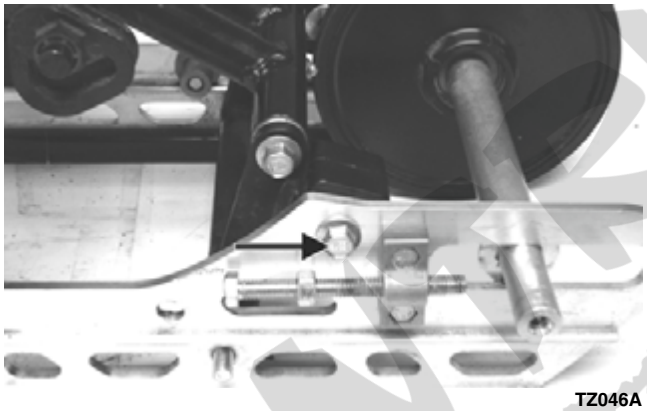
2. Secure the track adjuster bracket with the cap screws and lock nuts. Tighten to 120 in.-lb.
3. Secure the front arm to the slide rail with the cap screws and lock nuts. Tighten to 40 ft-lb.



TZ050

■**NOTE: At this point, return to step 1 and tighten the rear arm and front arm cap screws and lock nuts to 40 ft-lb; then tighten the rear arm pivot/idler wheel assembly to 20 ft-lb.**

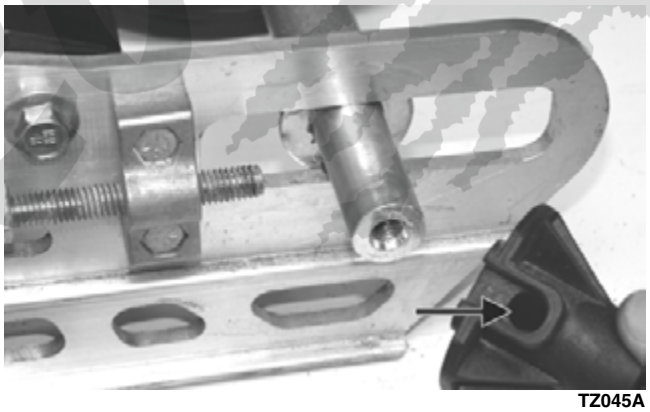
4. Install coupler block w/bushing. Secure with cap screw and lock nut. Tighten securely.



TZ046A

5. Install the adjuster bushing and rear idler wheel. Install a cap screw and flat washer. Tighten only until snug.

■**NOTE: Care must be taken that the adjuster bushing slot with the hole is aligned properly with the adjuster bolt.**



TZ045A

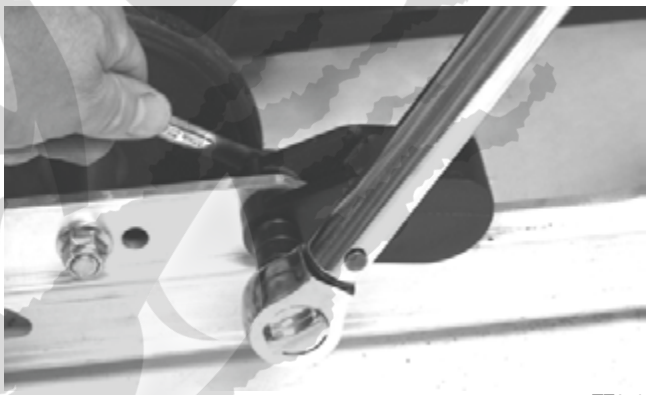
■**NOTE: Tighten the rear idler wheel axle only until snug until the skid frame is installed and track tension is adjusted; then the axle assembly must be tightened to 20 ft-lb.**

6. Install the rear arm limiter and secure with the cap screw. Tighten the cap screw (coated with blue Loctite #243) to 50 ft-lb.



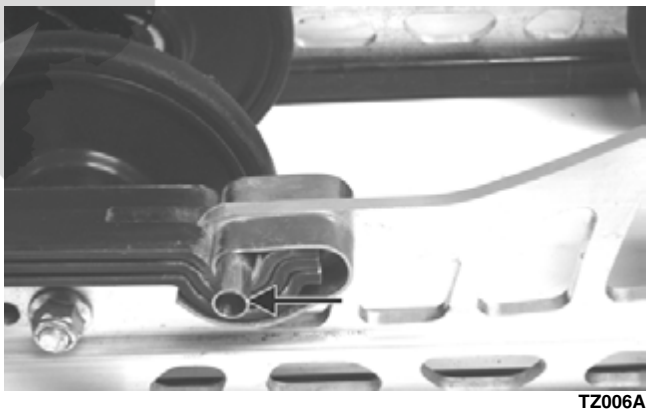
TZ051

7. Install the overload spring tension block with a cap screw and lock nut. Tighten securely.



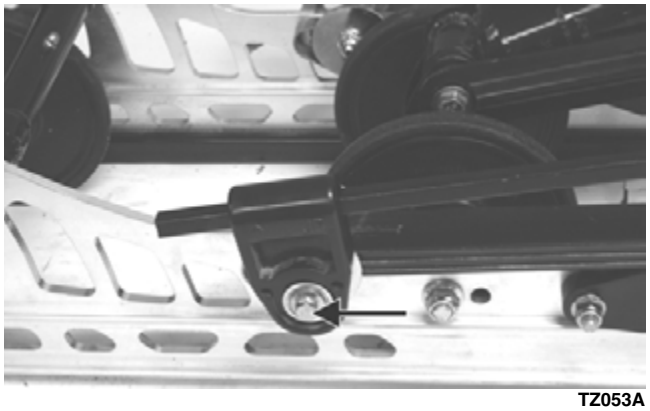
TZ052

8. Place the overload spring with retaining clips and bushing to the proper hole in the slide rail.



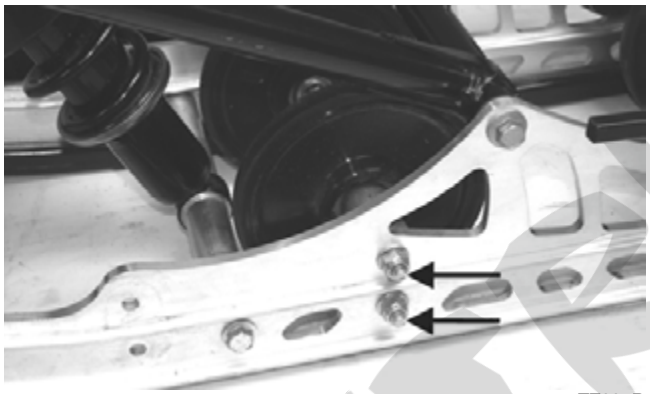
TZ006A

9. Place the spring into the spring slide; then place the spring slide and slide block assembly into position on the slide rail. Secure with a cap screw, washer, spacer, two large flat washers, and a lock nut. Tighten to 20 ft-lb.



TZ053A

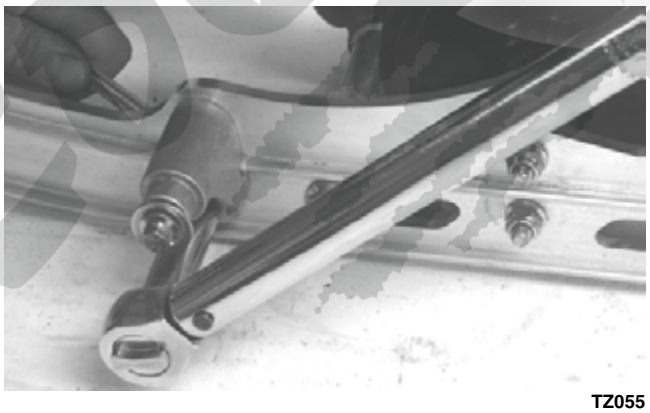
10. Install the inner idler wheel mounting block and secure with cap screws and lock nuts. Tighten to 20 ft-lb.



TZ035B

■NOTE: To obtain proper alignment for the idler wheel cap screw, place the cap screw in the top hole through the rail and mounting block prior to tightening.

11. Secure the outer idler wheel mounting block with the cap screw and lock nut. Tighten to 20 ft-lb; then secure the idler wheel to the mounting blocks with existing hardware. Tighten to 20 ft-lb.



TZ055

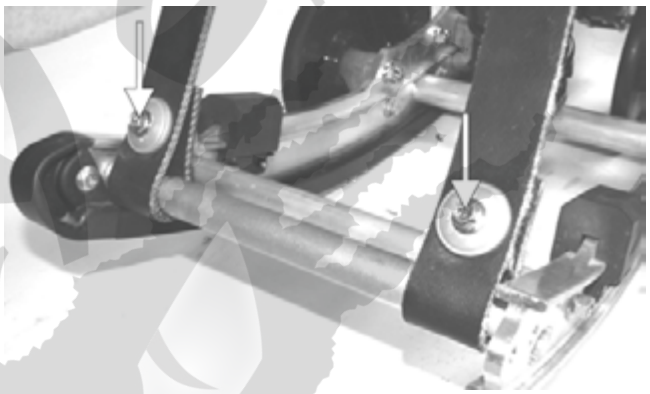
■NOTE: To obtain proper alignment for the idler wheel cap screw, place the cap screw in the top hole through the rail and mounting block prior to tightening.

12. Secure the rail supports with cap screws. Tighten to 20 ft-lb.



FZ077

13. With the spacer on the front rail support centered between the limiter straps, secure the straps to the rail support with the cap screw, washers, and lock nut. Tighten to 120 in.-lb.



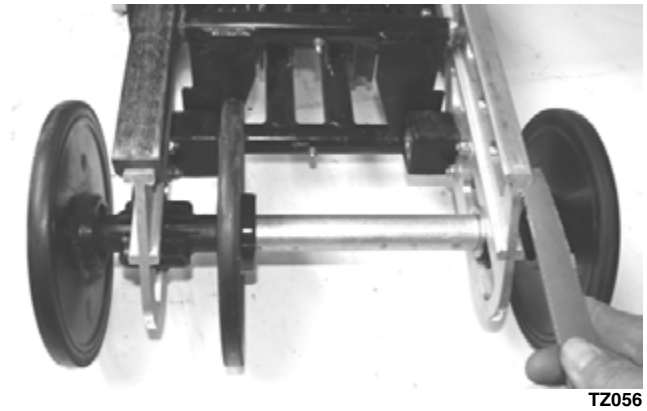
FZ078A

14. Secure the end cap onto the slide rail using a cap screw and a lock nut. Tighten to 80 in.-lb.



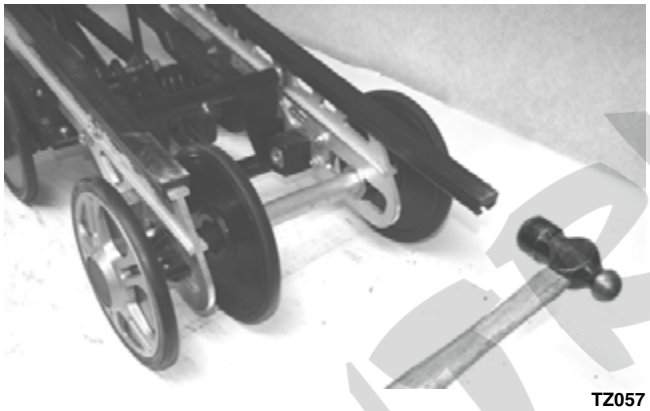
FZ079A

■NOTE: Use a file to remove any sharp edges on the lower portion of the rail.



TZ056

15. From the back, start the wear strip onto the rail; then using a soft hammer, drive the wear strip forward into position. Secure with a torx-head screw and lock nut. Tighten to 50 in.-lb.



TZ057

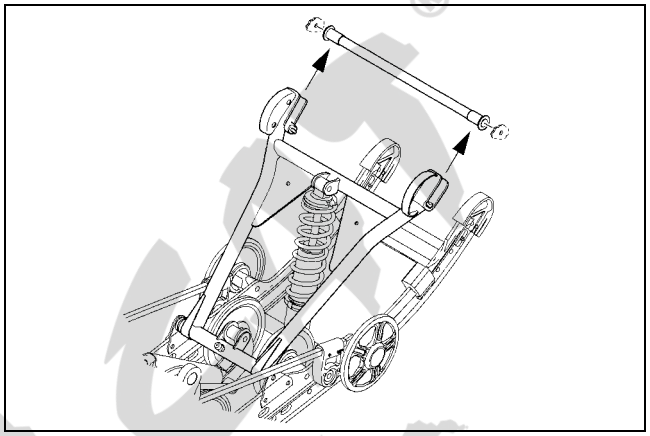


FZ026B

16. Install the skid frame (see Installing Skid Frame in this sub-section); then install the rear arm springs onto the adjuster blocks.

Installing Skid Frame

1. Using an appropriate handlebar/steering post support stand, tip the snowmobile onto one side.
2. Pull the track away from the tunnel and spread open; then place the skid frame into the track.
3. Position the front of the skid frame into the tunnel and engage the front arm with the slider axle in the tunnel.



0742-187

■NOTE: To aid in centering the front arm with the hole in the tunnel, position the skid frame and track at a 45° angle to the bottom of the tunnel.

4. Install the rear of the skid frame and the track into position in the tunnel.
5. Align the rear arm assembly with the appropriate hole in the tunnel. Secure the rear arm assembly with a cap screw. TIGHTEN ONLY UNTIL SNUG.
6. Tip the snowmobile onto the other side; then align the rear arm assembly with the appropriate hole in the tunnel. Secure the offset arm assembly with a cap screw, lock washer, and flat washer. TIGHTEN ONLY UNTIL SNUG.

■NOTE: Do not install the short legs of the rear springs onto the adjusting cams at this time.

7. At this time, place the snowmobile to the upright position; then tighten both rear arm mounting cap screws to 40 ft-lb.

■NOTE: At this point, tighten all remaining skid frame mounting hardware to 40 ft-lb.

8. Using the Rear Suspension Spring Tool, install the short legs of the rear springs onto the adjusting cams making sure the cams are in the same adjustment positions.
9. Adjust track tension deflection and alignment (see Track Tension and Track Alignment in Section 6).

CAUTION

After proper track tension and alignment have been attained, make certain that the rear axle cap screws are tightened to 20 ft-lb or component damage will occur.

Servicing Suspension (F-Series)

This sub-section has been organized so each procedure can be completed individually and efficiently.

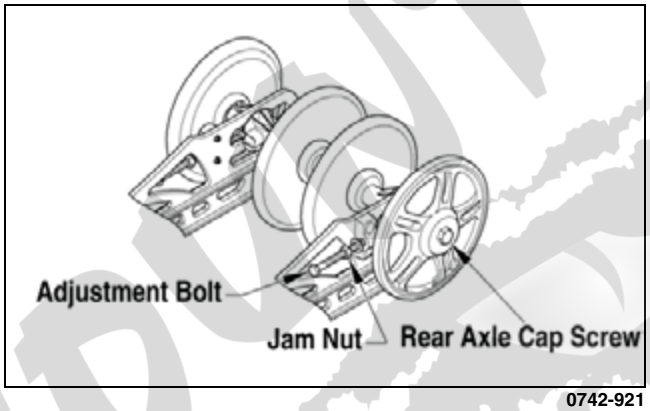
■NOTE: Some components may vary from model to model. Some illustrations and photographs used in this sub-section are used for clarity purposes only and are not designed to depict actual conditions. The technician should use discretion and sound judgment when removing and installing components.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

Removing Skid Frame

■NOTE: Many service procedures can be performed without removing the skid frame. The technician should use discretion and sound judgment when removing and installing components.

1. To avoid having the adjuster bushings binding during loosening of the track, remove the rear idler wheel caps and loosen the cap screws on the rear axle.



0742-921

2. Loosen the jam nuts and two track-tension adjusting bolts.
3. Place a support stand under the rear bumper; then while holding the flared bushing, remove the rear arm assembly cap screws securing the skid frame to the tunnel.

■NOTE: The support stand should hold the snowmobile level but not raised off the floor.

4. Remove the support stand; then using a suitable handlebar support stand, tip the snowmobile onto one side.
5. Slide the skid frame rearward far enough to drop the front arm out of the slider axle; then remove the skid frame.

End Caps

REMOVING

1. Remove the lock nut and cap screw securing the end cap.



FZ026A

2. Using a hammer, tap the end cap off the rail.

CLEANING AND INSPECTING

1. Inspect the end cap area of the slide rail for cracks and wear.
2. Inspect the end cap for any signs of cracking or wear.
3. Clean both the slide rail area and the end cap. Using compressed air, clean the areas of dirt and gravel.

⚠ WARNING

Always wear an approved pair of safety glasses when using compressed air.

4. Inspect the cap screw for cracked, stretched, or damaged threads. Use a new lock nut when assembling.

INSTALLING

1. Position the end cap on the slide rail; then align the hole in the end cap with the hole in the slide rail.
2. Secure with a cap screw, washers, and lock nut. Tighten to 80 in.-lb.

Wear Strips

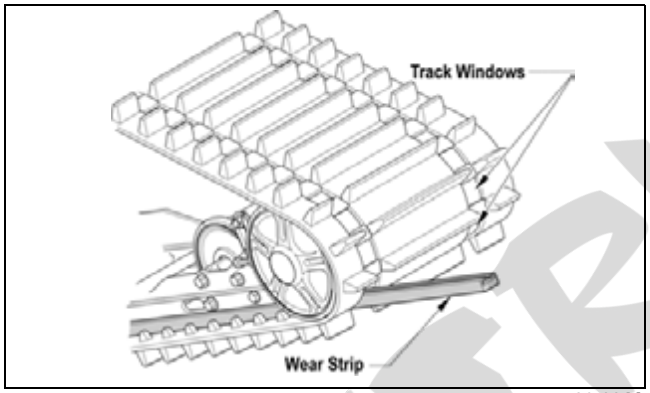
REMOVING

1. Remove the machine screw and lock nut securing the wear strip to the front of the slide rail.



FZ026B

2. Align the wear strip with the openings (windows) in the track; then using a suitable driving tool, drive the wear strip rearward off the slide rail.



739-884A

CLEANING AND INSPECTING

1. Clean the slide rail using parts-cleaning solvent and compressed air

⚠ WARNING

Always wear an approved pair of safety glasses when using compressed air.

2. Inspect the slide rail for cracks. If any cracks are found, replace the slide rail.
3. Using a straightedge, inspect the slide rail for any unusual bends. With the slide rail removed, place the straightedge along the bottom surface of the slide rail. If the rail is found to be bent, it must be replaced.

INSTALLING

■NOTE: Use a file to remove any sharp edges on the lower portion of the rail.

1. Align the wear strip with the openings (windows) in the track and from the back, start the wear strip onto the rail; then using a block of wood and a hammer, drive the wear strip forward into position.
2. Secure with a machine screw and lock nut. Tighten to 50 in.-lb.

Shock Pads

REMOVING

1. Using a 3/16-in. drill bit, drill out the rivets securing the front shock pads to the slide rail. Account for the retaining brackets.
2. Remove the rear shock pads.

INSPECTING

1. Inspect the pads for damage or wear.
2. Inspect the rivet holes in the slide rail for damage or elongation.

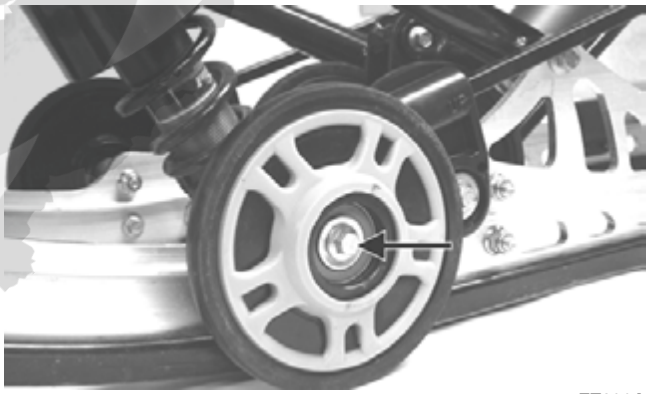
INSTALLING

1. Place the pads and retaining brackets into position on the slide rail.
2. Secure the pads with rivets.

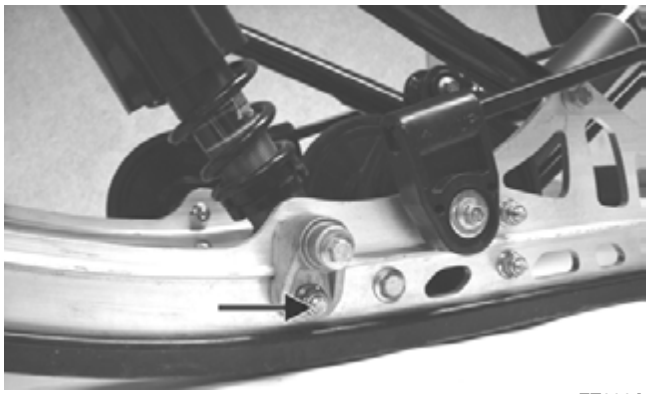
Idler Wheels/Mounting Blocks

REMOVING

1. Remove the cap screw and lock nut securing the idler wheel to the idler wheel mounting block; then remove the cap screw and lock nut securing the mounting block to the slide rail.



FZ029A



FZ030A

2. Account for a flat washer from the idler wheel cap screw.

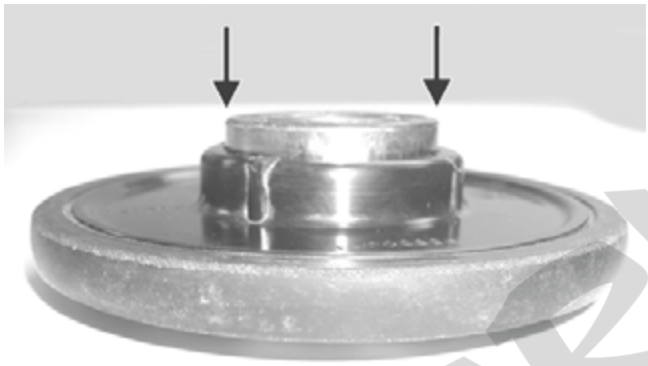
CLEANING AND INSPECTING

1. Clean the bearing with a clean cloth.
2. Inspect each idler wheel for cracks or damage.
3. Rotate the idler wheel bearing (by hand) and inspect for binding or roughness.
4. If a bearing must be replaced, use this procedure.

   A. Remove the bearing snap ring.

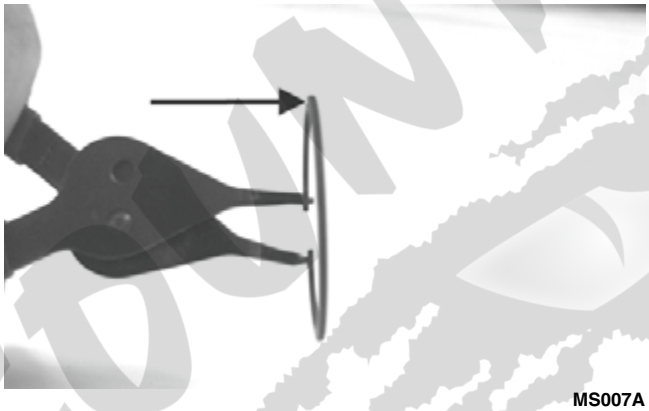
   B. Using a hydraulic press or suitable driving tool, remove the bearing from the inside of the wheel.

   C. Press the new bearing (on its outer race) into the idler wheel.



MS006A

   D. Install the snap ring making sure the "sharp side" is directed away from the bearing.



MS007A

INSTALLING

1. Secure the mounting block on the slide rail with a cap screw and lock nut. Tighten to 20 ft-lb.

■NOTE: For proper alignment, install an idler wheel cap screw into the top mounting block hole prior to tightening.



FZ031A

2. Place the idler wheel to the mounting block; then secure the idler wheel assembly with a cap screw, flat washer, and a lock nut. Tighten to 20 ft-lb.



FZ032

Front Arm Assembly

REMOVING

1. With the skid frame removed and the rear springs removed from the adjusting cams, remove the cap screws and lock nuts securing the limiter straps to the front arm. Account for flat washers.



ZJ270A

2. Remove the cap screw and lock nut securing the upper front shock absorber eyelet to the front arm. Pull the shock eyelet free of the bracket. Account for a sleeve.



ZJ271A

3. Remove the lock nut and cap screw securing the rear shock pivot to the front arm.



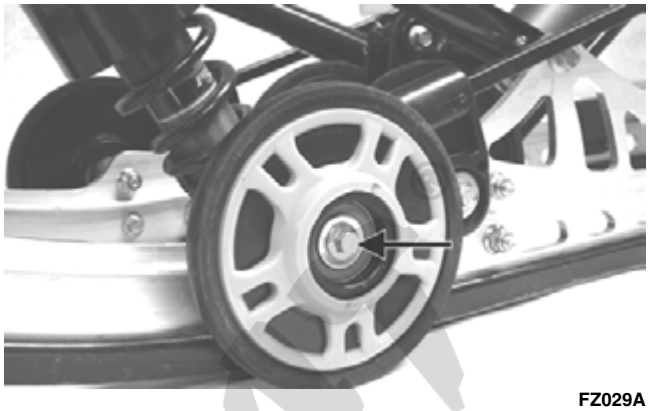
FZ049A

4. Remove the cap screw and lock nut securing the front arm to the front arm mounting bracket.



FZ050A

5. Remove the front arm and account for the front arm axle.
6. Remove the cap screw securing the front outer idler wheel to the idler wheel mounting block. Account for lock nut, cap screw, and flat washer.



FZ029A

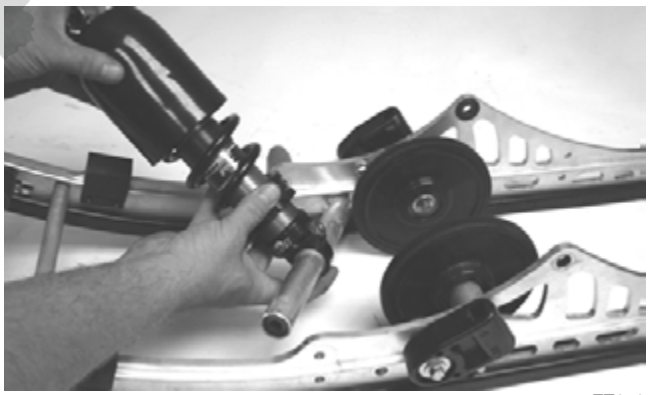
7. Remove the cap screw and lock nut securing the idler wheel mounting block to the slide rail.

■NOTE: For ease of removal, remove the front outer idler wheel and mounting block from the side of the slide rail in which the front arm shock axle cap screw was installed.

8. Remove the cap screws, washer, and lock nut from the front shock axle; then from one side, tap the assembly forward far enough for the axle assembly to clear the slide rails. Account for an axle, two spacers, and two shim washers.



FZ051A



FZ052

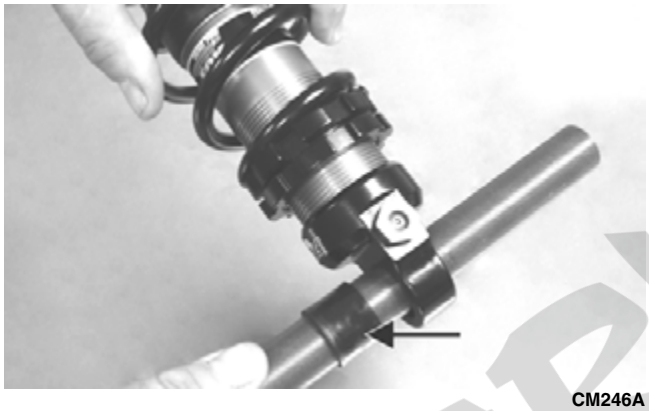
INSPECTING

1. Inspect all front arm weldments for cracks or unusual bends; then inspect the front arm mounting brackets for cracks and for elongated holes.
2. Closely inspect all tubing for cracks or unusual bends.

3. Inspect the bearings, bushings, and front arm spacers for wear or damage.
4. Inspect the shock absorber for damage and for any signs of oil leakage especially at the point where the shock shaft enters the shock body.
5. Inspect the shock absorber eyelet welds (at each end) for any cracks, signs of separation, or for unthreading.

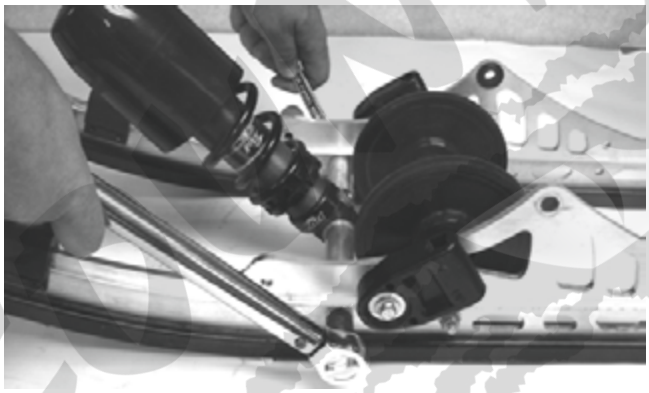
INSTALLING

1. With the rubber bushing in place, install the axle into the lower shock eyelet bushing assembly; then install the two shim washers and two spacers.



CM246A

2. Place the front arm shock axle assembly into position on the skid frame making sure the spacers and washers are properly positioned. Secure with the cap screw, washer, and a new lock nut. Tighten to 40 ft-lb.



FZ053

3. On the side that the idler wheel and mounting block were removed from, secure the mounting block on the slide rail with a cap screw and lock nut. Tighten to 20 ft-lb.

■NOTE: For proper alignment, install an idler wheel cap screw and lock nut into the top mounting block hole prior to tightening.



FZ055A

4. Secure the idler wheel to the mounting block with a cap screw and a lock nut. Tighten cap screw to 20 ft-lb.



FZ056

5. Install the axle into the front arm; then position the front arm to the mounting location of the slide rail. Secure with cap screws and lock nuts. Tighten to 40 ft-lb.

■NOTE: Move the rear arm assembly forward enough to allow the rear arm springs to be installed into the slide blocks.



FZ054

6. Secure the rear shock pivot to the front arm with cap screw and lock nut. Tighten to 20 ft-lb.



FZ049

7. Secure the upper shock eyelet and axle in the mounting hole of the front arm. Secure with a cap screw and lock nut. Tighten securely.



ZJ271A

■NOTE: Do not over-tighten the shock absorber cap screw as the shock eyelet must be free to pivot.

8. Secure the limiter straps to the front arm with cap screws, washers, and lock nuts. Tighten to 120 in.-lb.



ZJ270

Rear Arm Assembly

REMOVING

1. With the skid frame removed using the Rear Suspension Spring Tool, remove the spring from the adjusting cam.

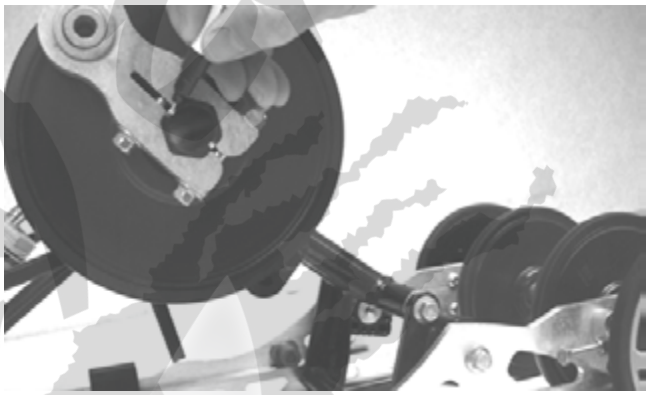
⚠ WARNING

Care must be taken when removing the spring or damage or injury could result.



FZ033A

2. Mark the offset arm and the idler arm for assembly purposes.



FZ034

3. Loosen the cap screws and lock nuts securing the offset arm assembly to the idler arm; then remove the offset arm assembly. Account for a flanged axle, idler spacer, and washer.

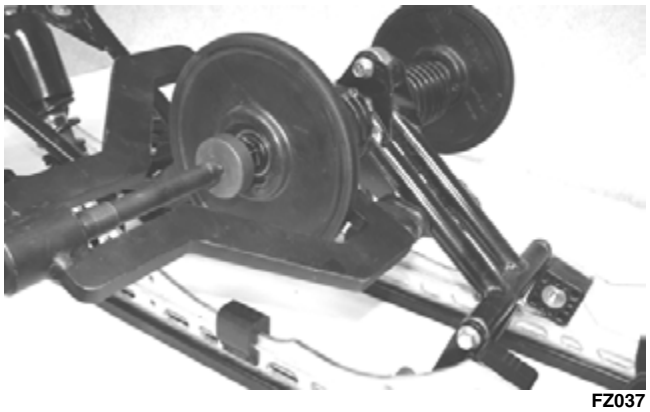


FZ035A



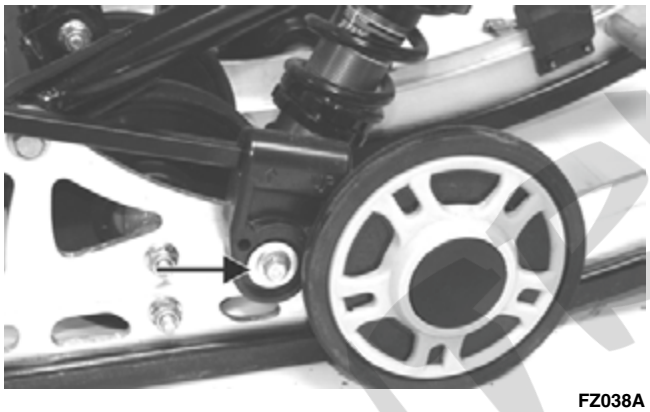
FZ036

4. Remove the idler wheel using Idler Wheel Puller Kit.



FZ037

5. Remove the cap screw, flat washer, and lock nut securing the spring slide to the slide rail. Account for the spring slide and all mounting hardware.

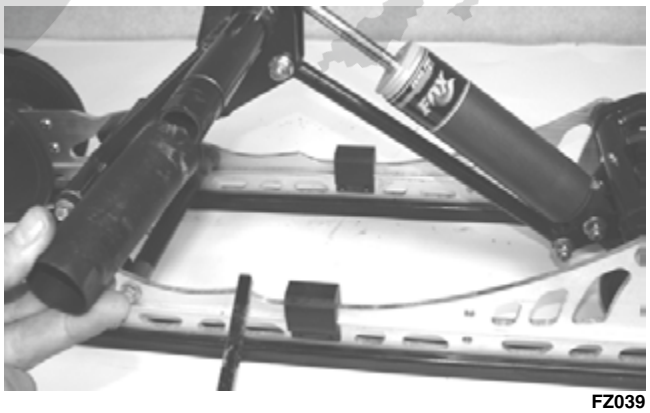


FZ038A



MS014

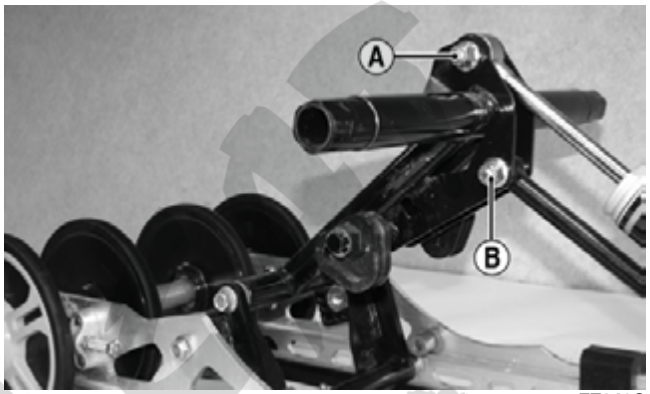
6. Remove the spring and sleeve from the idler arm.



FZ039

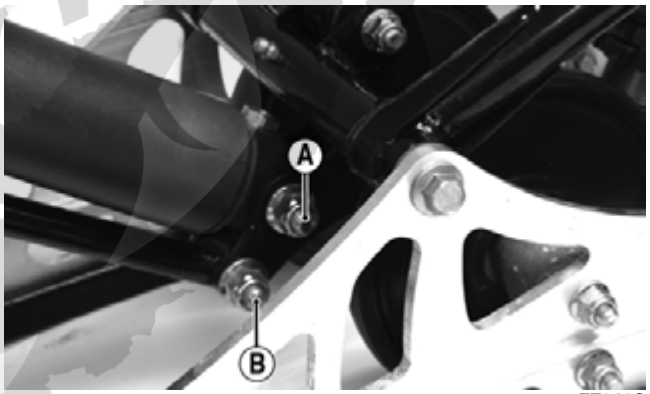
■**NOTE: Use the same procedure for the other side.**

7. Remove the cap screw (A) and lock nut securing the upper shock eyelet to the idler arm; then remove the cap screw (B) and lock nut securing the upper shock link to the idler arm. Account for the cap screws, lock nuts, and sleeves.



FZ040C

8. Remove the cap screw (A) and lock nut securing the rear arm shock absorber to the rear shock pivot; then remove the cap screw (B) and lock nut securing the shock absorber link to the pivot and account for the cap screws, lock nuts, and sleeves.



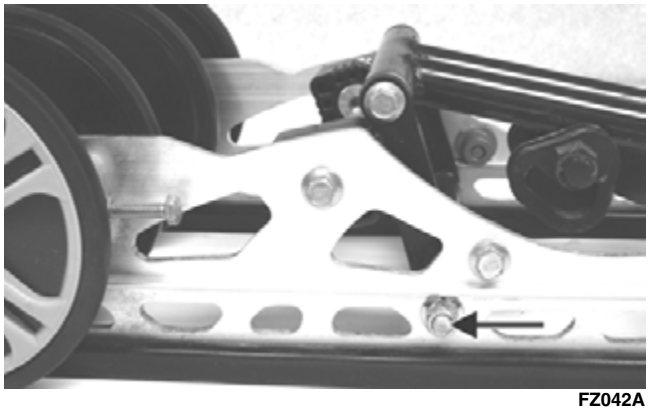
FZ041C

9. Remove the cap screw securing the rear arm to the idler arm. Account for the aluminum axle.



FZ085B

10. Remove the cap screw and lock nut securing the rear arm to the slide rail. Account for the serrated axles and axle tube.



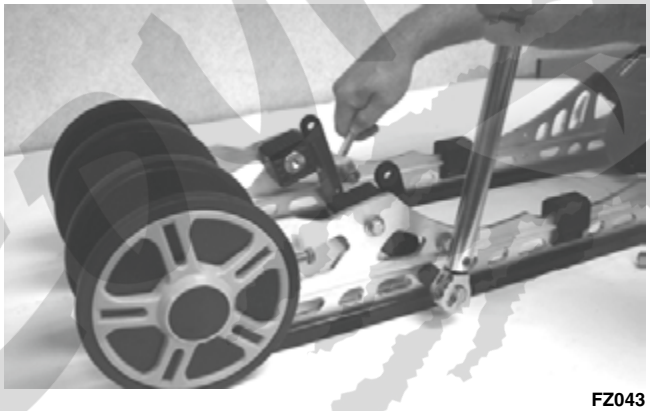
FZ042A

CLEANING AND INSPECTING

1. Clean the bearings with a clean cloth.
2. Inspect each idler wheel for cracks or damage.
3. Inspect the bushings (located in the arm pivot area) for wear or damage.
4. Inspect all welds and the tubing of the rear arm/idler arm for cracks or unusual bends.
5. Inspect the two adjusting cams for damage.
6. Rotate the idler wheel bearings (by hand) and check for binding or roughness.
7. If a bearing must be replaced, see Idler Wheels/ Mounting Blocks - Cleaning and Inspecting in this sub-section.

INSTALLING

1. Place the rear arm assembly into position between the slide rails. Secure with a cap screw and lock nut. Tighten to 40 ft-lb.



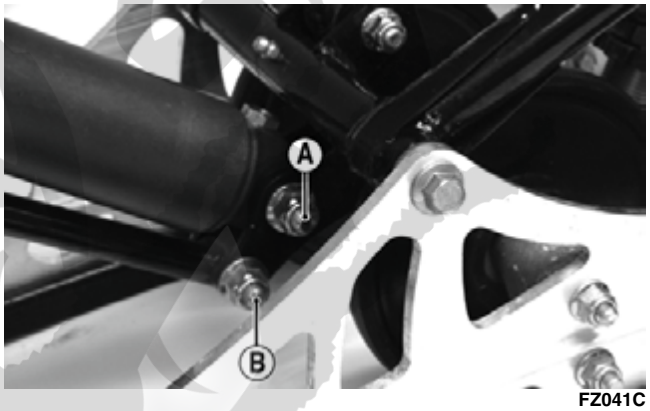
FZ043

2. Install the rear arm onto the idler arm with an aluminum axle and two cap screws. Tighten to 40 ft-lb.



FZ044

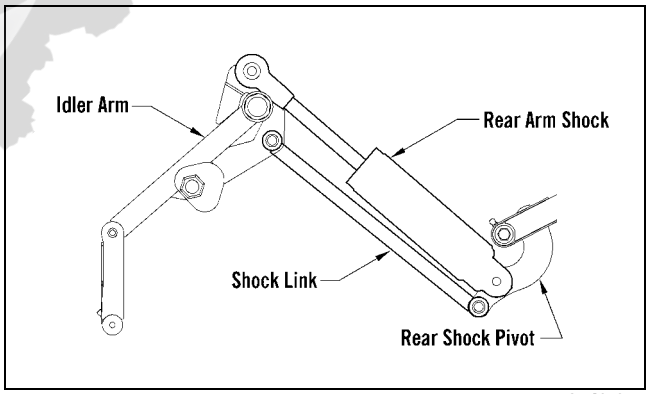
3. With the sleeves installed, install the shock absorber link to the lower mounting hole of the rear shock pivot; then install the shock absorber with cap screws (A) and (B) and lock nuts. Tighten securely.



FZ041C

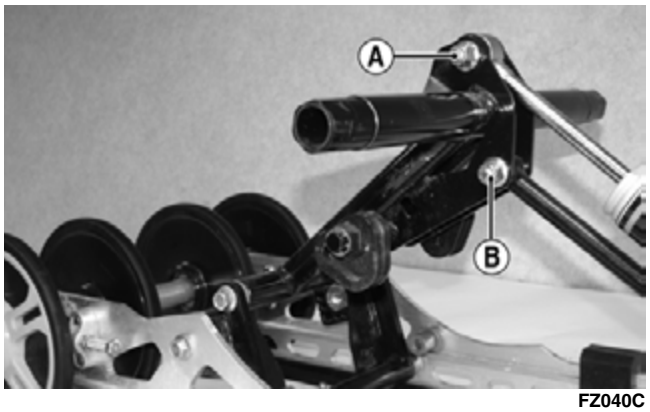
CAUTION

When installing the shock absorber link, note that the offset of the link eyelets are directed away from the rear arm shock absorber for proper clearance.



0742-877

4. With the sleeves installed, install the shock absorber link to the lower mounting hole of the idler arm along with the cap screw (B) and lock nut; then secure the shock absorber to the idler arm with cap screws (A) and lock nuts. Tighten securely.



FZ040C

■**NOTE: Do not over-tighten the shock absorber cap screw as the shock eyelet must be free to pivot.**

■**NOTE: Install the rear arm springs onto the adjuster blocks after the skid frame has been installed.**

5. Slide the sleeve and spring onto the idler arm.

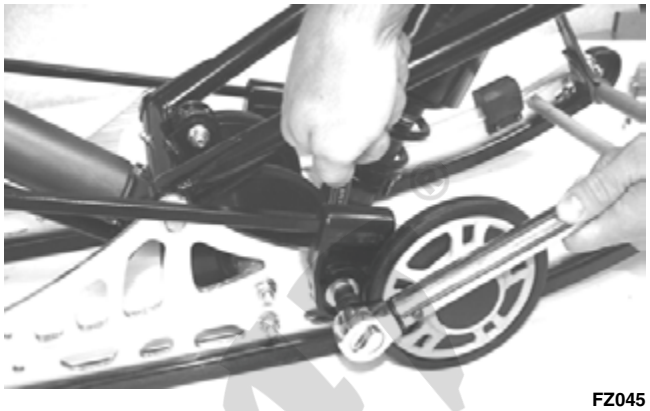


MS145

6. Place the spring slide and slide block (with spring in slide block) into position on the slide rail. Secure with a cap screw and washer. Tighten to 20 ft-lb.



MS014



FZ045

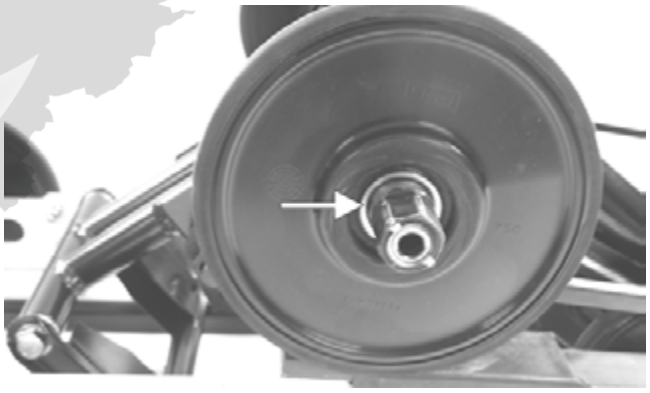
7. With a suitable driving tool, install the rear upper idler wheel on the idler arm.



FZ046

CAUTION

When driving the idler wheel onto the idler arm, use a tool to contact the inside race of the bearing or damage to the wheel or bearing may occur.



MS072A

8. Install the idler spacer collar onto the idler arm.

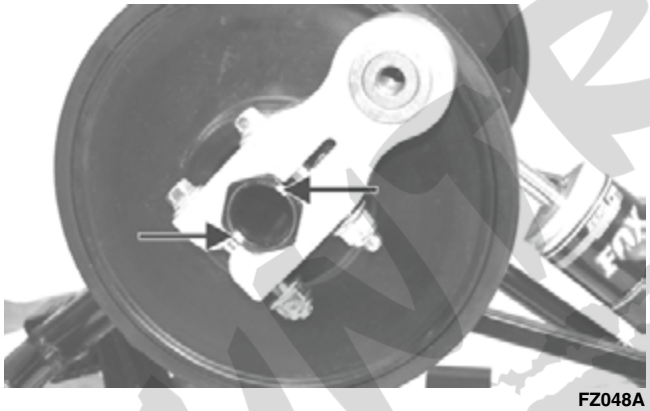


FZ047

9. Place the flared bushing with a thin flat washer through the notched side of the offset arm assembly.

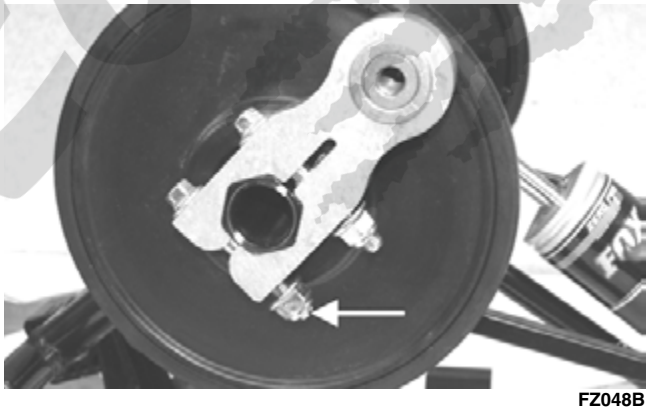
■NOTE: If the flared bushing in the offset arm is loose, it must be cleaned and green Loctite #609 must be applied to it prior to installation.

10. Align the marks on the idler arm to the centerline of the offset arm assembly. Secure the offset arm to the idler arm with cap screws and lock nuts. Tighten to 20 ft-lb.



FZ048A

■NOTE: When tightening the offset arm lock nuts, tighten the lower lock nut first or binding may occur. Make sure the flared side of the bushing is directed outward.



FZ048B

11. Grease the idler arm and rear arm grease fittings with an all-temperature grease.

Rear Axle/Idler Wheels

DISASSEMBLING REAR AXLE

1. With the skid frame removed, remove the cap screw and large flat washer securing the outer rear idler wheel. Remove the outer idler wheel from the shaft.



FC194

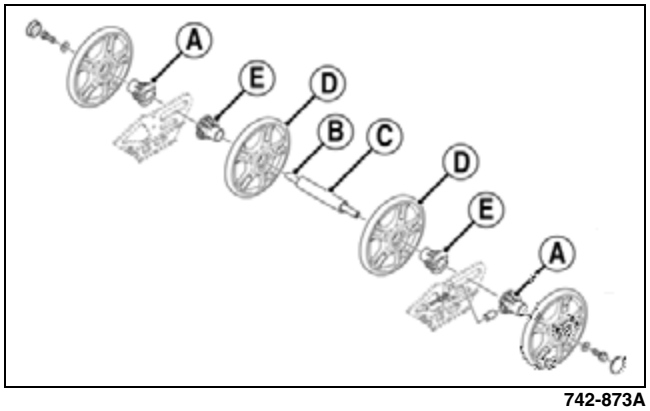
2. Loosen the track adjusting bolts. Slide the outer adjuster bushings off the axle.



ZJ266

3. Carefully slide the shaft out from the slide rails and inner idler wheels. Account for the rear idler wheel spacer and adjuster bushings.

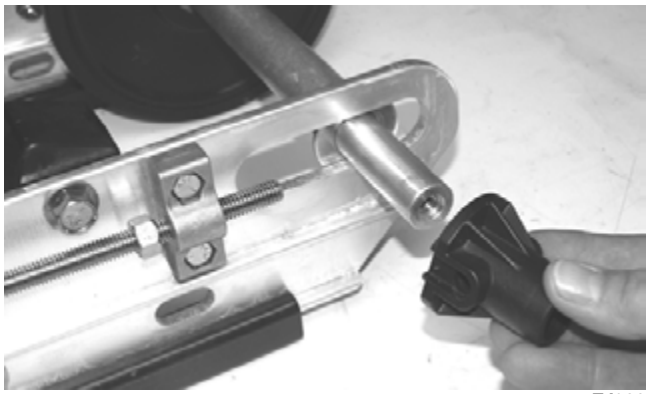
ASSEMBLING REAR AXLE



742-873A

1. In order from the right-hand side, slide the axle through the slide rail axle slot; then place a bushing (A), inner idler wheel (B), rear idler wheel spacer (C), inner idler wheel (D), and bushing (E) on the axle. Slide the axle through the opposite slide rail axle slot.

2. Place the plastic adjuster bushings on the axle (on the outside of each axle slot); then install the outer idler wheels on the axle and secure with two cap screws (coated with blue Loctite #243) and large flat washers. Tighten cap screws only until snug.



ZJ266



FC194

■NOTE: Tighten the rear idler wheel axle only until snug until the skid frame has been installed and track tension has been adjusted; then the axle assembly must be tightened to 20 ft-lb.

3. Install the skid frame (see Installing Skid Frame in this sub-section).

Slide Rails

REMOVING

■NOTE: When replacing one or both slide rails is necessary, remove one slide rail at a time. The remaining slide rail will then hold the crossbraces, axles, and brackets in their correct assembly order. Always mark the mounting hole locations during disassembly to speed up the assembly process and to prevent any damage.

1. With the skid frame removed, remove the machine screw and lock nut securing the wear strip to the front of the slide rail; then using a suitable driving tool, drive the wear strip rearward off the slide rail.



FZ026B

2. Remove the end cap from the slide rail. Account for a cap screw, lock nut, and two flat washers.



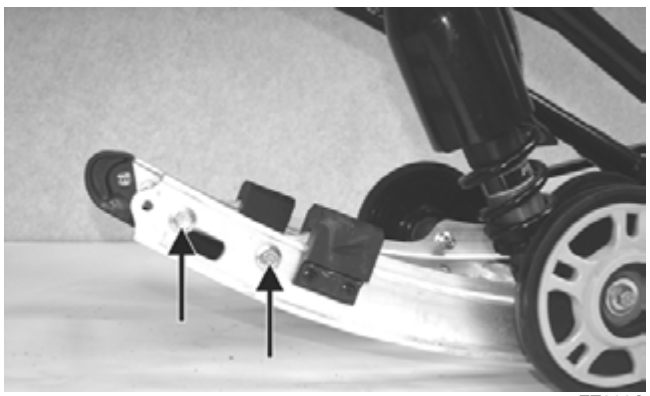
FZ079A

3. Remove the front arm limiter straps from the front arm of the skid frame.



ZJ270

4. Remove the cap screws securing the two front rail supports to the slide rail.

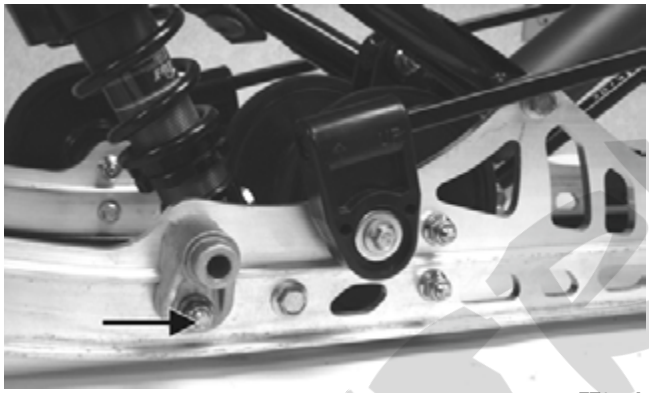


FZ080A

5. Remove the cap screws and lock nuts securing the front outer idler wheel and the idler wheel mounting block.

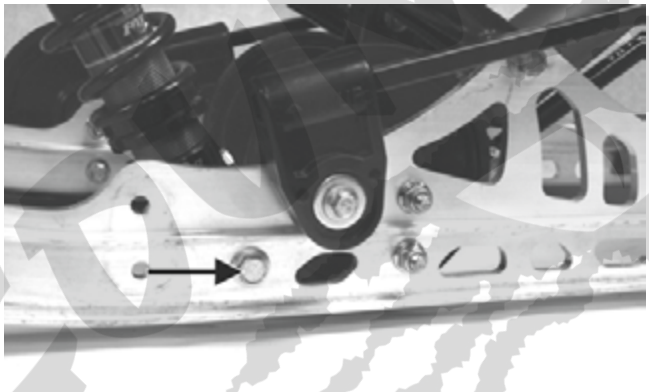


FZ081A



FZ057A

6. Remove the lock nut and flat washer securing the front shock axle assembly to the slide rail. Discard the lock nut.



FZ058A

■NOTE: If removing the cap screws from the front shock axle is necessary to replace the slide rail, install the cap screw from the opposite side into the assembly to secure components and aid in replacing the slide rail.

7. Remove the lock nut, cap screw, and flat washer securing the spring slide to the rail. Account for a spacer and the slide block.

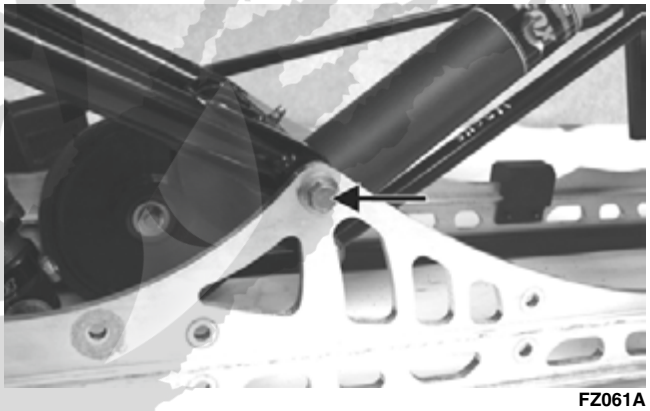


FZ059A

■NOTE: If not already done, remove the short spring leg from the adjusting cam.

8. Note the mounting location for installing purposes; then remove the cap screws and lock nuts securing the inner idler wheel and mounting block.

9. Remove the cap screw securing the front arm to the slide rail.



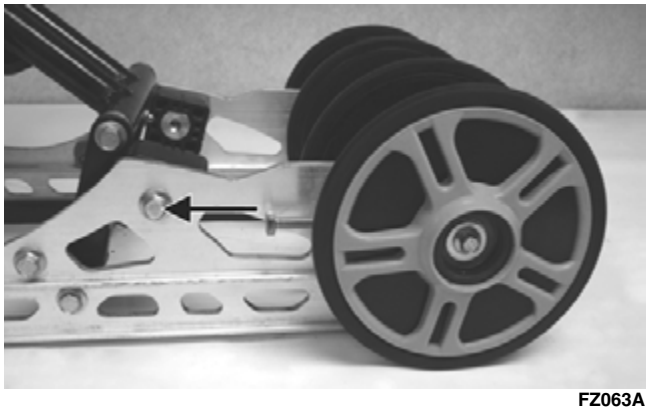
FZ061A

10. Remove the cap screw from the rear arm limiter.



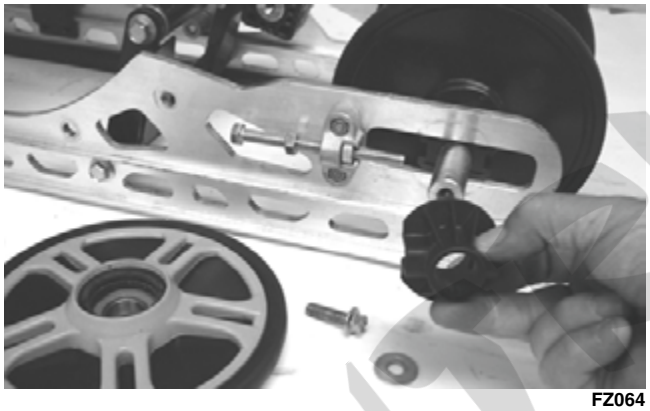
FZ062A

11. Remove the cap screw securing the rear arm coupler block to the slide rail. Account for the block, bushing, cap screw, and lock nut.



FZ063A

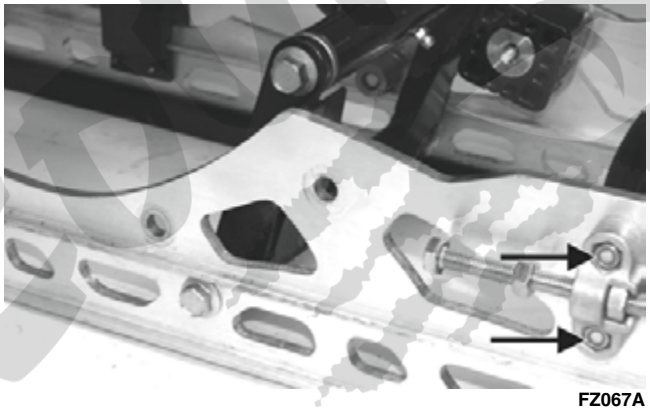
12. Remove the idler wheel cap; then remove the cap screw and flat washer securing the rear idler wheel. Remove the idler wheel; then remove the adjuster bushing.



FZ064

■NOTE: The adjusting bolt may have to be loosened to remove the adjuster bushing.

13. Remove the torx-head cap screws and lock nuts securing the track adjuster bracket.



FZ067A

14. Remove the cap screw and lock nut securing the rear arm assembly to the slide rail.



FZ065A

■NOTE: At this point, the slide rail should be free of the skid frame components and can be removed.

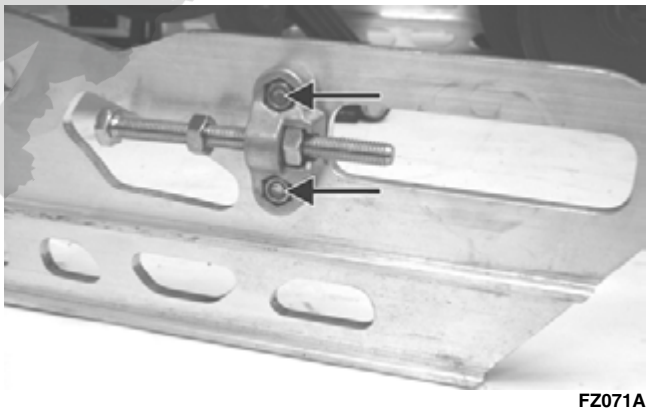
■NOTE: If the shock pads must be replaced, refer to Shock Pads at the beginning of this procedure.

INSPECTING

1. Inspect the slide rail for cracks, elongated holes, or unusual bends.
2. Inspect the wear strip for wear. The wear strip must be 0.42 in. thick or thicker. If the wear strip measurement is less than specified, replacement of both wear strips is necessary.
3. Inspect the front arm slider bumpers for cracks or wear.

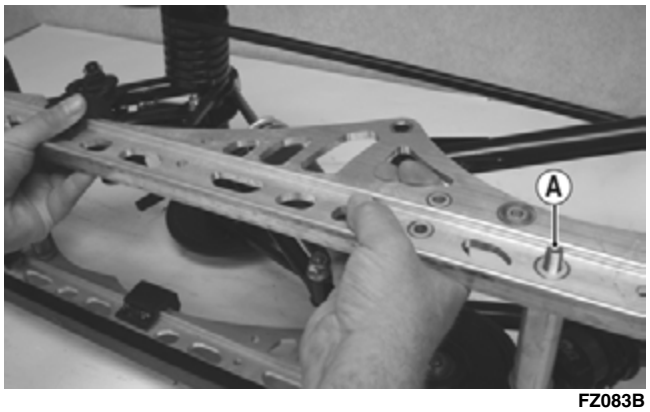
INSTALLING

1. Secure the track adjuster bracket with the cap screws and lock nuts. Tighten only until snug.



FZ071A

2. With the slide rail assembly on its side, place the rail that was removed or replaced into position; then push the rear arm cap screw and the pivot shock axle cap screw through the mounting holes in the rail.
3. Install the lock nuts securing the front shock axle (A) and rear arm assembly (B) to the slide rails. Tighten only until snug.



FZ083B



FZ084B

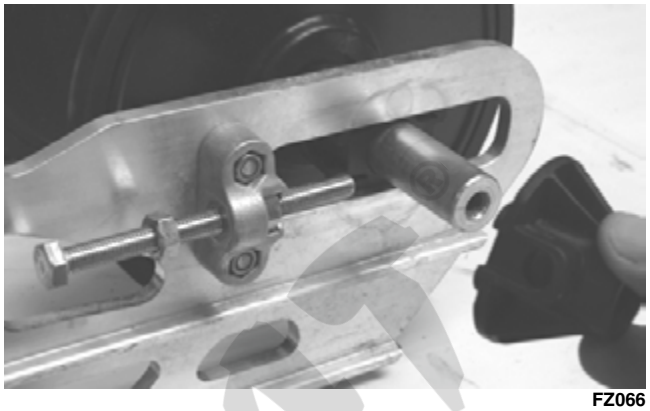
4. Secure the front arm to the slide rail with the cap screws and lock nuts. Tighten to 40 ft-lb.



FZ070

■NOTE: At this point, return to steps 2 and 3 and tighten the rear arm and front arm cap screws and lock nuts to 40 ft-lb.

5. Install the adjuster bushing and rear idler wheel. Install a cap screw and flat washer. Tighten only until snug.



FZ066

■NOTE: Care must be taken that the adjuster bushing slot with the hole is aligned properly with the adjuster bolt.



CM261A

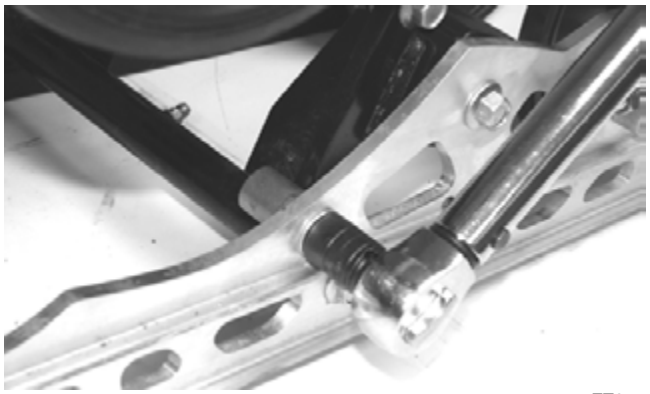
■NOTE: Tighten the rear idler wheel axle only until snug until the skid frame has been installed and track tension has been adjusted; then the axle assembly must be tightened to 20 ft-lb.

6. Install coupler block w/bushing. Secure with cap screw. Tighten securely.



FZ076

7. Install the rear arm limiter and secure with the cap screw. Tighten the cap screw to 50 ft-lb.



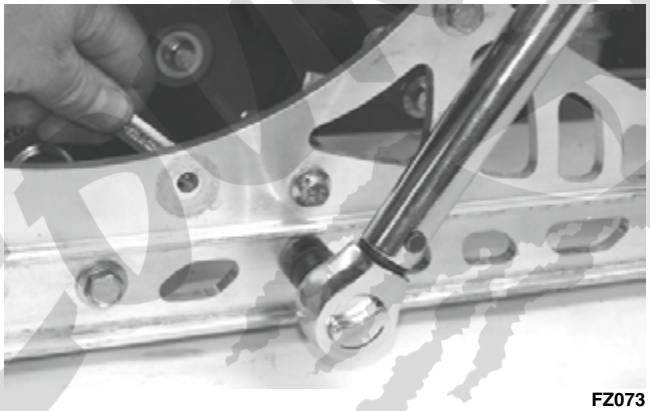
FZ075

8. Place the spring into the spring slide; then place the spring slide and slide block assembly into position on the slide rail. Secure with a cap screw and washer. Tighten to 20 ft-lb.



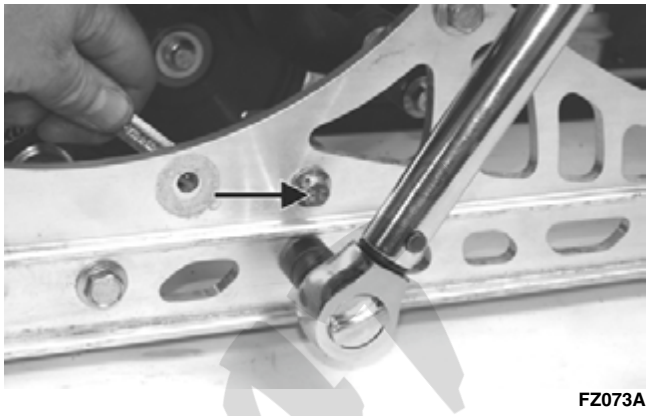
FZ074

9. Install the inner idler wheel mounting block and secure with cap screw and lock nut. Tighten to 20 ft-lb.



FZ073

■**NOTE: To obtain proper alignment for the idler wheel cap screw, place the cap screw in the top hole through the rail and mounting block prior to tightening.**



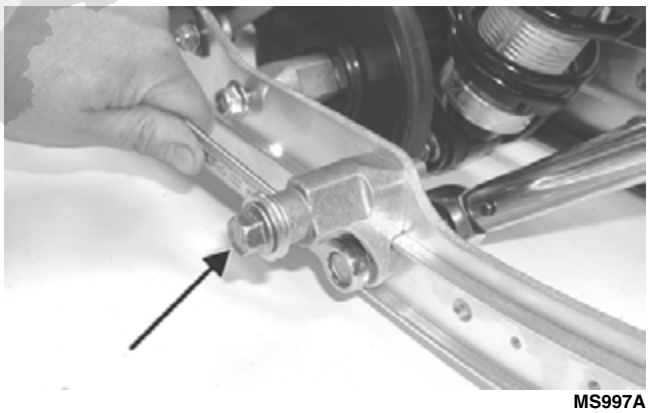
FZ073A

10. Secure the outer idler wheel mounting block with the cap screw and lock nut. Tighten to 20 ft-lb; then secure the outer and inner idler wheels to the mounting blocks with existing hardware. Tighten to 20 ft-lb.



ZJ288

■**NOTE: To obtain proper alignment for the idler wheel cap screw, place the cap screw in the top hole through the rail and mounting block prior to tightening.**



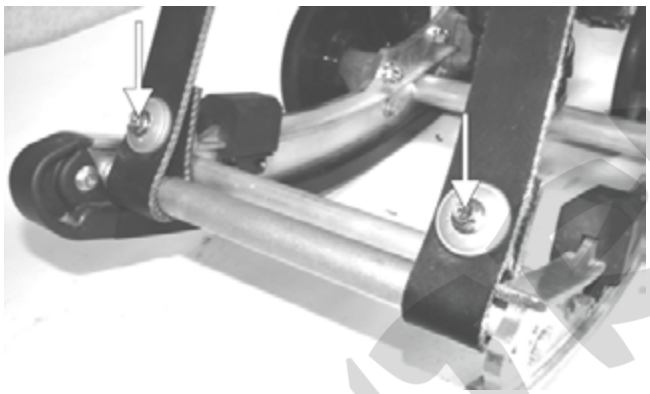
MS997A

11. Secure the rail supports with cap screws. Tighten to 20 ft-lb.



FZ077

12. With the spacer on the front rail support centered between the limiter straps, secure the straps to the rail support with the cap screw, washers, and lock nut. Tighten to 120 in.-lb.



FZ078A

13. Secure the end cap onto the slide rail using a cap screw, flat washers, and a lock nut. Tighten to 80 in.-lb.



FZ079A

■**NOTE: Use a file to remove any sharp edges on the lower portion of the rail.**

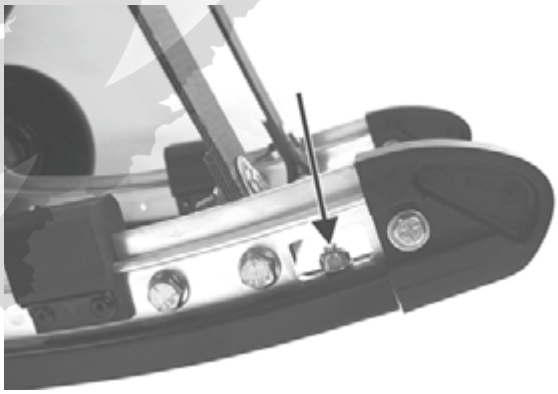


MS288

14. From the back, start the wear strip onto the rail; then using a soft hammer, drive the wear strip forward into position. Secure with a torx-head screw and lock nut. Tighten to 50 in.-lb.



MS207

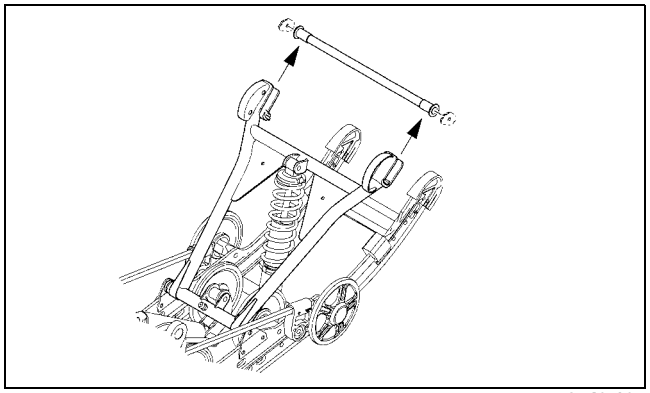


MS016B

15. Install the skid frame (see Installing Skid Frame in this sub-section); then install the rear arm springs onto the adjuster blocks.

Installing Skid Frame

1. Using a piece of cardboard on the floor to protect against scratching, tip the snowmobile onto one side.
2. Pull the track away from the tunnel and spread open; then place the skid frame into the track.
3. Position the front of the skid frame into the tunnel and engage the front arm with the slider axle in the tunnel.



0742-187

■NOTE: To aid in centering the front arm with the hole in the tunnel, position the skid frame and track at a 45° angle to the bottom of the tunnel.

4. Push the rear of the skid frame and the track into the tunnel.
5. Align the rear arm assembly with the appropriate hole in the tunnel. Secure the rear arm assembly with a cap screw, lock washer, and flat washer. AT THIS TIME, TIGHTEN ONLY UNTIL SNUG.
6. Tip the snowmobile onto the other side; then align the offset arm assembly with the appropriate hole in the tunnel. Secure the rear arm assembly with a cap screw, lock washer, and flat washer. AT THIS TIME, TIGHTEN ONLY UNTIL SNUG.

■NOTE: Do not install the short legs of the rear springs onto the adjusting cams at this time.

7. At this time, place the snowmobile to the upright position; then tighten both rear arm assembly mounting cap screws to 40 ft-lb.
8. Using the Rear Suspension Spring Tool, install the short legs of the rear springs onto the adjusting cams making sure the cams are in the same adjustment positions.
9. Adjust track tension deflection (see Track Tension in Section 6) and track alignment (see Track Alignment in Section 6).

CAUTION

After proper track tension and alignment have been attained, make certain that the rear axle assembly is tightened to specifications or component damage will occur.

Rebuilding/Recharging Fox Air Shocks

⚠ WARNING

Before starting, read through all of these instructions first to become familiar with the procedure. Make sure the work area is clean and all of the necessary tools are available. These shocks contain high pressure nitrogen gas. Always use proper safety equipment such as latex gloves and safety glasses when working on shock absorbers.

⚠ WARNING

Always wear latex or rubber gloves when servicing a shock absorber with shock oil.

■NOTE: Fox Shock Rebuild Kits should be ordered before servicing a Fox Float Shock. Kit (p/n 2604-796) is for float shocks without reservoirs and Kit (p/n 2603-498) is for float shocks with reservoirs.

REMOVING/INSTALLING SHAFT EYELET

1. Using Gas Shock Retaining Blocks to prevent damage to the shaft surface, place the shock shaft into a vise.
2. Heat the shaft eyelet with a torch to soften the Loctite.



AG260

■NOTE: The eyelet must be heated up to 300° for the Loctite to soften.

3. Using a wrench, unscrew the eyelet from the shaft.



AG261

■NOTE: With the eyelet removed, inspect the bottom-out bumper for cracks or wear.

4. Clean shaft threads and eyelet threads.
5. Apply red Loctite #271 to both threads, install the eyelet, and tighten securely.

DISASSEMBLING

1. Remove the valve cap; then bleed the air from the air chamber.



FS141

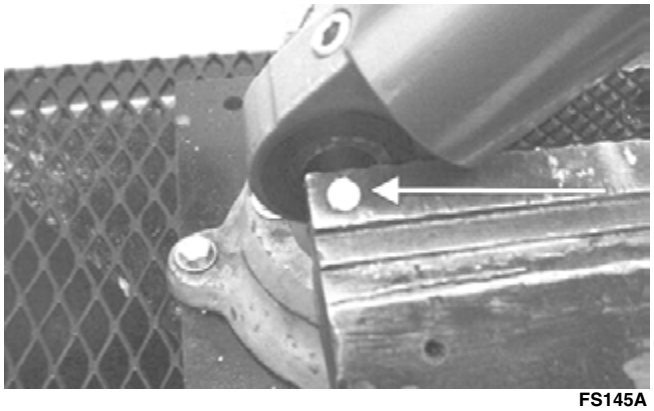
2. While holding end cap; unscrew the air chamber.



FS142

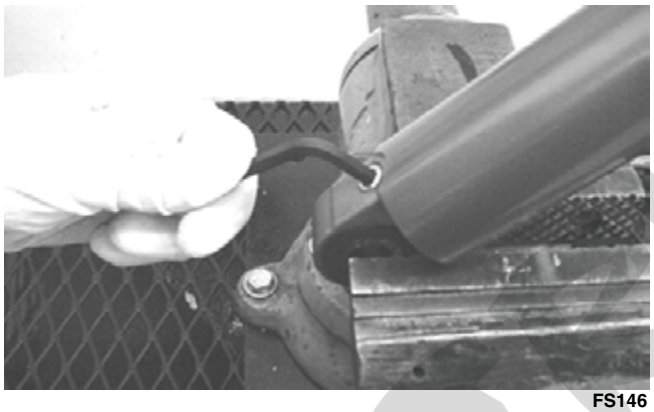
■NOTE: The air chamber should only be hand-tight.

3. Drain the oil from the air chamber.
4. Remove the air chamber from the bottom of the shock body.
5. Using a pick, remove the air valve ball from the nitrogen bladder.



FS145A

6. Using an Allen-wrench, loosen the nitrogen bladder half turn.



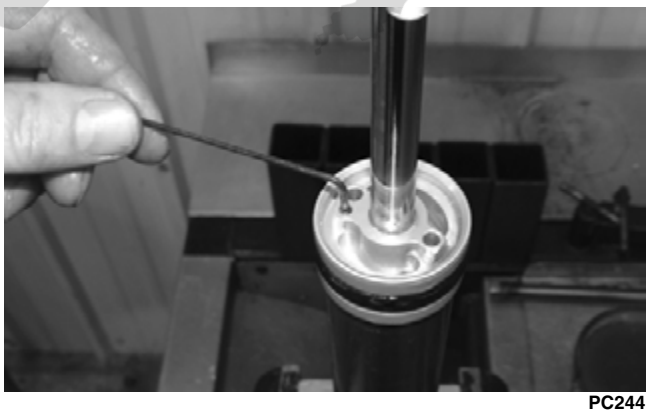
FS146

7. Using Inflation Needle, remove all the nitrogen from the shock.



FS147

8. Using a 5/64-in. Allen-wrench, remove the set screw from the bearing cap.



PC244

9. Using a magnet, remove the bleed ball.



PC245

10. Using Spanner Wrench, loosen the bearing cap.



PC246

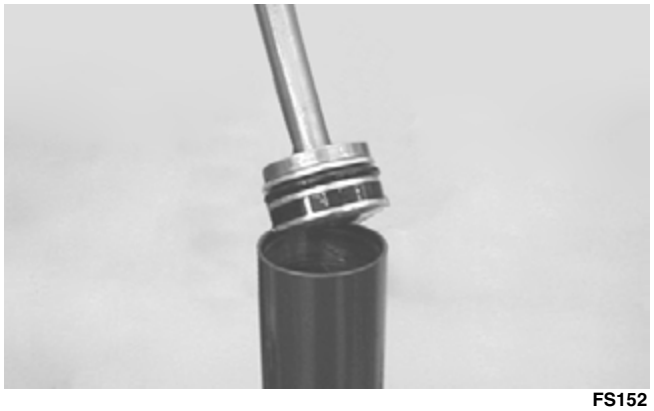
11. Remove the shock rod/piston assembly from the shock body.



FS151

12. Drain the oil from the shock body into a suitable container.

13. Using an appropriate piston removal tool, remove the floating piston.



FS152

■**NOTE: For ease in removing the piston, use the inflation needle to help vent the shock body.**



FS153

14. Clean and inspect all components.

ASSEMBLING/CHARGING

1. Lubricate the O-ring and wiper on the floating piston with shock oil.



FS154

2. Carefully install the floating piston into the shock body until it is below the threads.



FS155

3. Using Floating Piston Location Gauge, install the floating piston while using the inflation needle to vent the shock body.

■**NOTE: Refer to the Suspension Specifications - Shock Absorbers sub-section in Section 1.**



FS156

4. Using Fox Racing Shock Oil, fill the shock body to the bottom of the threads; then, allow to sit 1-2 minutes to ensure no air is in the oil.



FS157

5. Lubricate the O-ring on the underside of the end cap with shock oil.



FS158

6. Lower the shock rod into the shock body until the piston is submerged in oil.



FS159

7. While keeping the shock rod fully extended, thread the bearing cap into position.



FS160

8. Using Spanner Wrench, tighten the bearing cap.



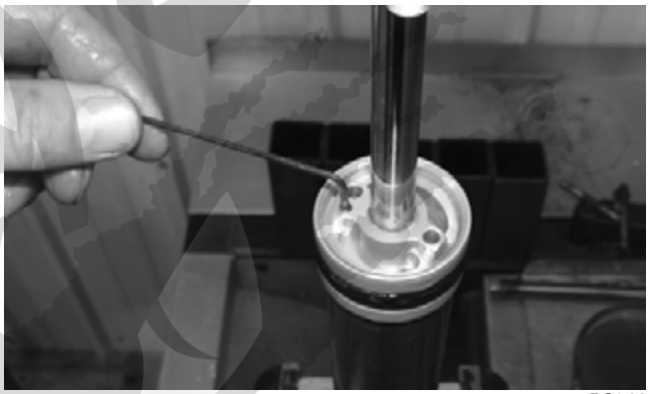
PC246

■NOTE: When tightening the bearing cap, note air and excess oil being bled from the hole in the cap.

9. Install the bleed ball and set screw into the bearing cap.

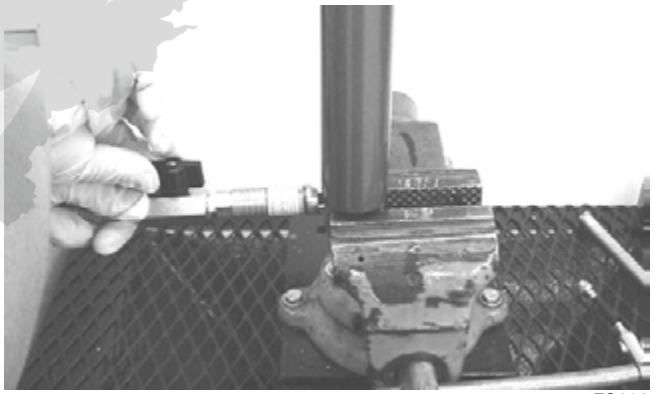


PC245



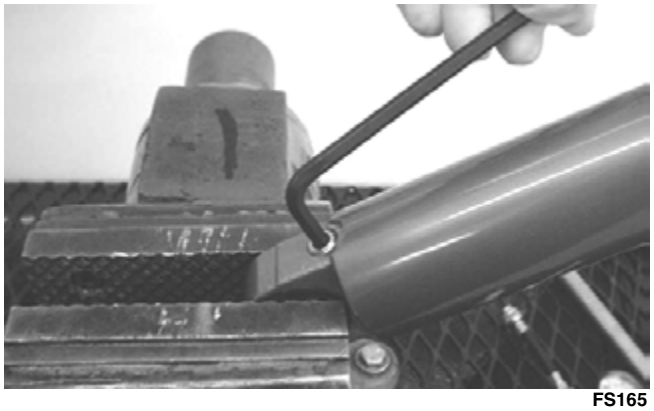
PC244

10. Charge the shock with nitrogen to 200 psi.



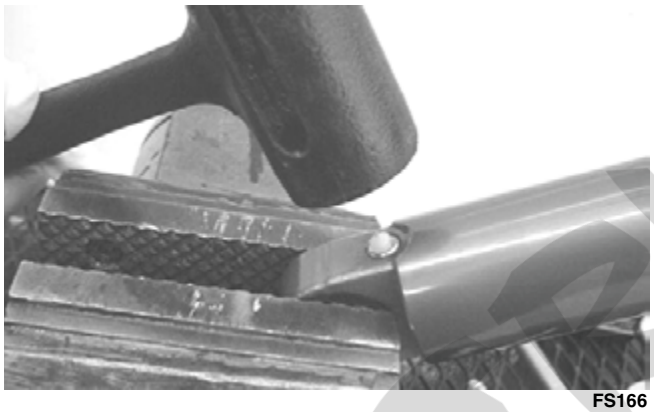
FS164

11. Using a 3/16-in. Allen-wrench, tighten the nitrogen bladder.



FS165

12. Install the air valve ball by gently tapping it with a rubber hammer.



FS166

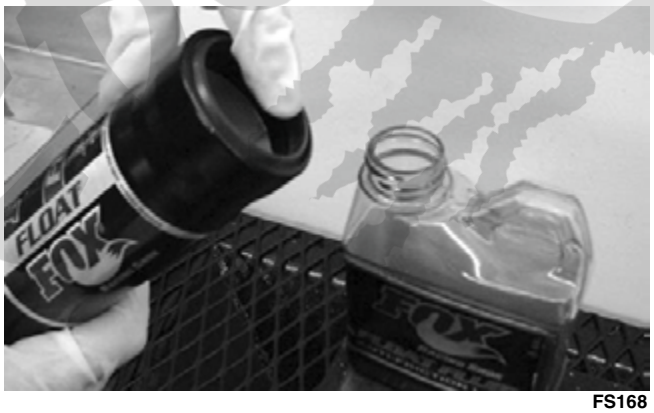
13. Test the shock for proper operation.

14. Using compressed air, blow all oil from the holes in the bearing cap.

⚠ WARNING

Always wear an approved pair of safety glasses when using compressed air.

15. Lubricate the seal on the air chamber with Fox Float Fluid.



FS168

16. Slide the air chamber onto the shock body.

17. Add 1 cc of Fox Float Fluid into the chamber.



FS170

18. Thread the air chamber into the end cap until hand-tight.

■NOTE: Prior to installing the air chamber, make sure the end cap O-ring is properly positioned in the chamber.

19. Invert the shock and secure by the end cap to assure the air chamber is tight.



FS172

20. Using a Shock Absorber Air Pump as an initial setting, inflate the air chamber to 75 psi for the F Sno Pro and XF Sno Pro models or 90 psi for the M Sno Pro models and HCR models.

■NOTE: The rear arm shock should be inflated to 145-150 psi on the M Sno Pro or 140 psi on the XF Sno Pro.



FS173

⚠ WARNING

Do not exceed 150 psi in the shock.

21. Install the valve cap.

Servicing Fox Float X EVOL Front Shock Absorbers

Disassembling Shock Absorber

⚠ WARNING

Before starting, read through all of these instructions first to become familiar with the procedure. Make sure the work area is clean and all of the necessary tools are available. These shocks contain high pressure nitrogen gas. Always use proper safety equipment such as latex gloves and safety glasses when working on shock absorbers.

■NOTE: Some illustrations and photographs used in the following sub-sections are used for clarity purposes and are not designed to depict actual conditions.

1. Rotate both adjuster screws counterclockwise to the full-open position.
2. Securely clamp the EVOL chamber eyelet (bottom) of the shock in a soft-jawed vise; then remove the green valve caps and set them aside.



A

3. Depressurize the main chamber first; then depressurize the EVOL chamber next.

■NOTE: When depressurizing the chambers, a "hissing" should be noticed as air is released. Also, the shock normally contracts slightly due to the internal negative spring.

4. Using a strap wrench at the very end of the sleeve, loosen, but do not remove, the air sleeve.



B

5. Remove the shock from the vise, invert it, and clamp it in the vise by the reservoir eyelet.
6. Unthread the air sleeve from the EVOL chamber by hand and slide it down the body.



C

■NOTE: Look for oil in the air chamber which may be at the top of the bearing head assembly. There should be a small amount of assembly lube (blue) present, but any indication of shock oil (red) indicates worn shaft seals.



D

7. Using a 5/64-in. hex key, remove the button screw from the nitrogen pellet valve.



E

8. Using a Fox nitrogen safety needle, press it through the rubber pellet to depressurize the nitrogen charge. When the shock is fully discharged, pull the needle away in a straight, smooth motion.

■**NOTE: At this point, inspect the nitrogen valve for signs of wear such as holes on the face of the pellet. Replace if necessary.**



F

9. Press down on the reservoir end cap; then using a scribe or a pick tool, remove the reservoir snap ring. Pull the end cap out of the reservoir.



G



H

7

10. Using a 5/64-in. hex key, carefully loosen the bleed set screw; then remove the ball bearing and set it aside.



I

■**NOTE: It is advisable to use a small magnet to remove the ball bearing from the hole.**



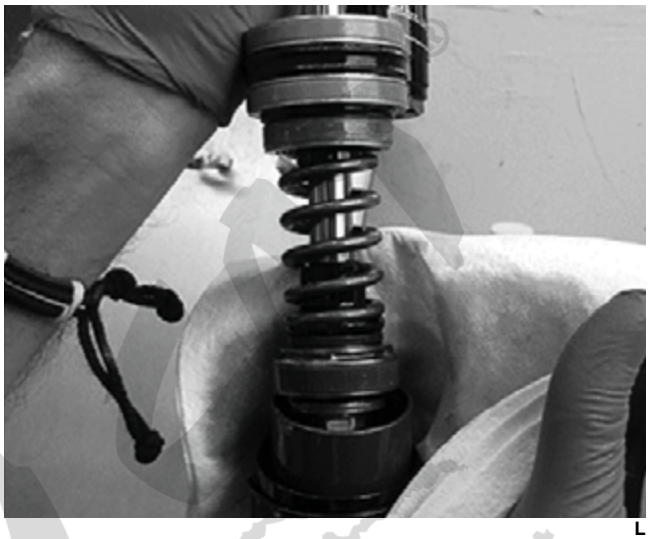
J

11. Using an appropriate bearing head removing tool, unscrew the bearing head assembly from the shock.



K

12. Grasp the EVOL chamber end (bottom) of the shock; then gently pull the piston/shaft/bearing/EVOL free from the shock body. Set this entire assembly aside.



L



M

13. Remove the air sleeve from the reservoir end of the shock.



N

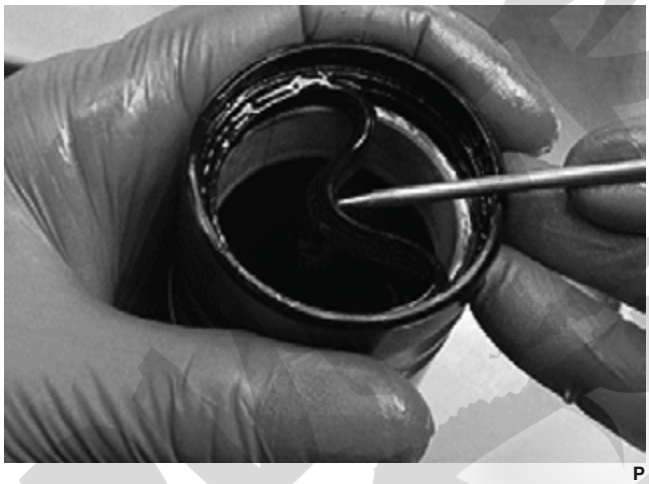
14. Using a scribe or pick tool, remove the “samurai” and back-up seals from the air sleeve.

CAUTION

Care must be taken not to score or damage any of the aluminum sealing surfaces.



O



P

15. Pour the shock oil out of the shock body; then clamp the “piggy-back” body assembly in the vise.



Q



R

16. Using an appropriate IFP removing tool, remove the IFP from the “piggy-back” body.



S

17. Remove the IFP bleed screw and set aside.

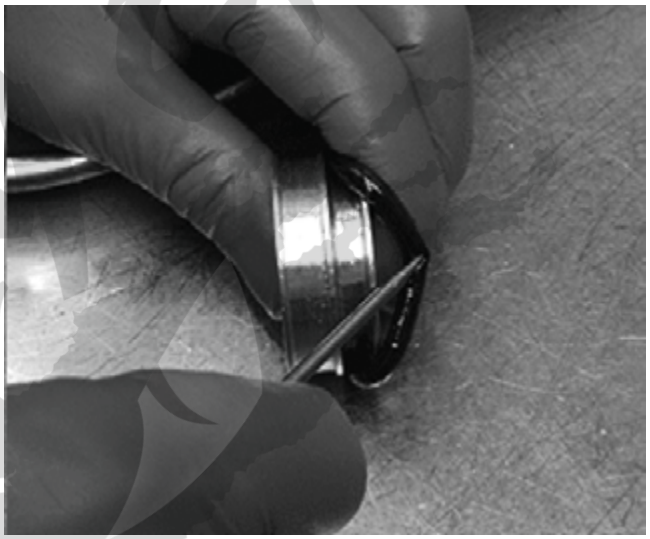


T

18. Using the new seals from the appropriate seal rebuild kit, replace all IFP seals.



U



V

19. Pour the shock oil out of the “piggy-back” body assembly.



W

20. Using a 5/8-in. wrench, remove the LSC assembly from the eyelet, thoroughly clean the assembly, replace the O-rings, and install the assembly into the eyelet. Tighten to 14 ft-lb.



X



Y

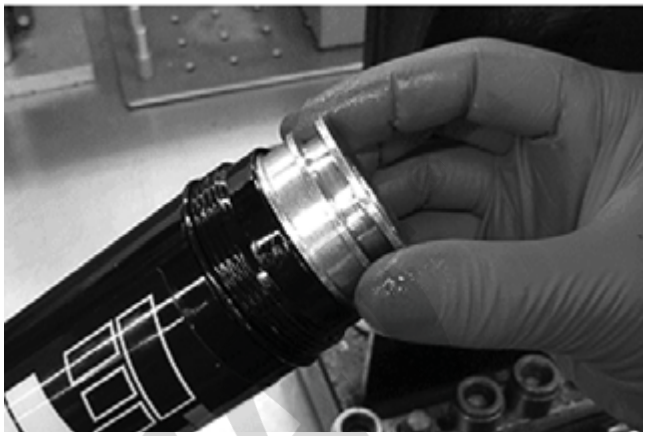
Replacing Air Sleeve DU Bushing

■**NOTE: The DU bushing must be replaced if it is significantly worn or damaged.**

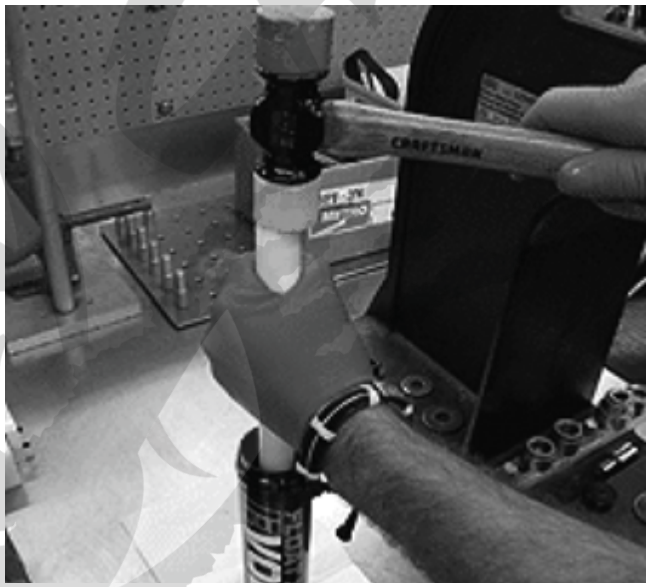


Z

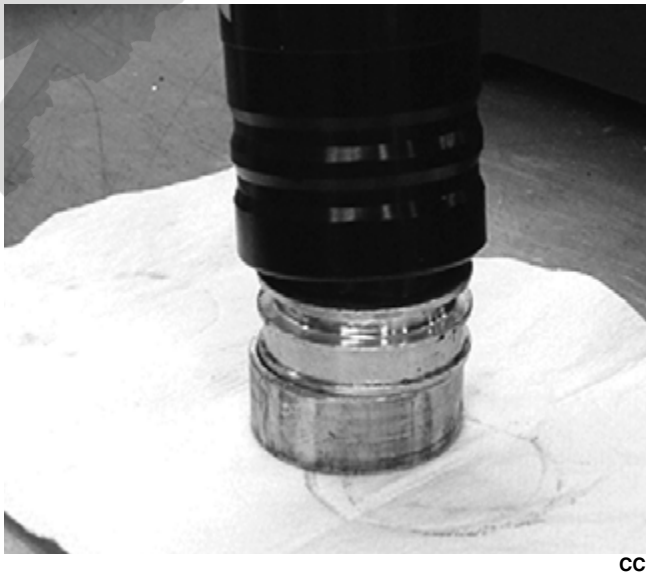
1. Using an appropriately-sized IFP removing tool, insert the tool with a “delrin rod” (or a suitable substitute) into the air sleeve and strike the rod with a hammer freeing the bushing.



AA

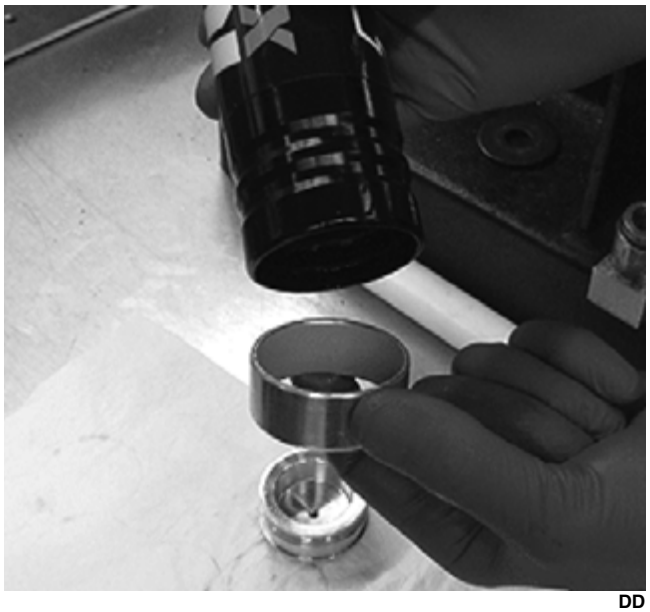


BB



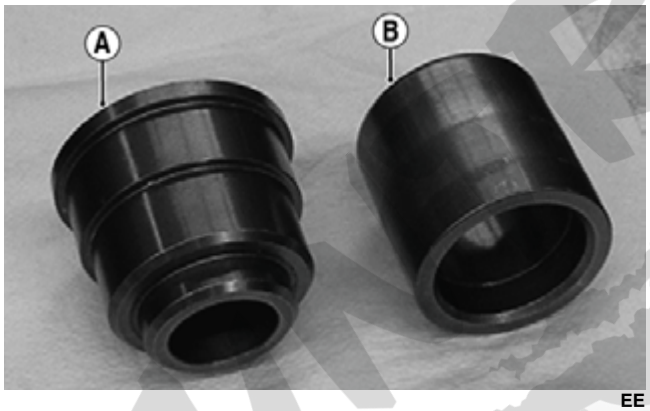
CC

7



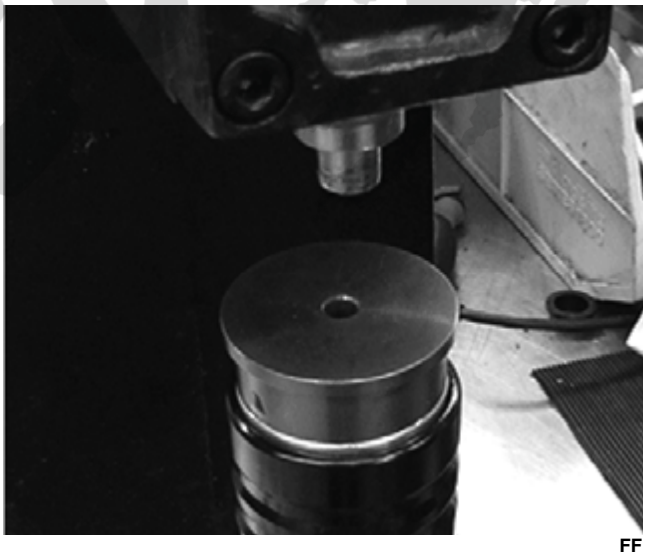
DD

■**NOTE: To install a new DU bushing, an appropriate bushing installer (A), sizer (B), and machine press must be available.**

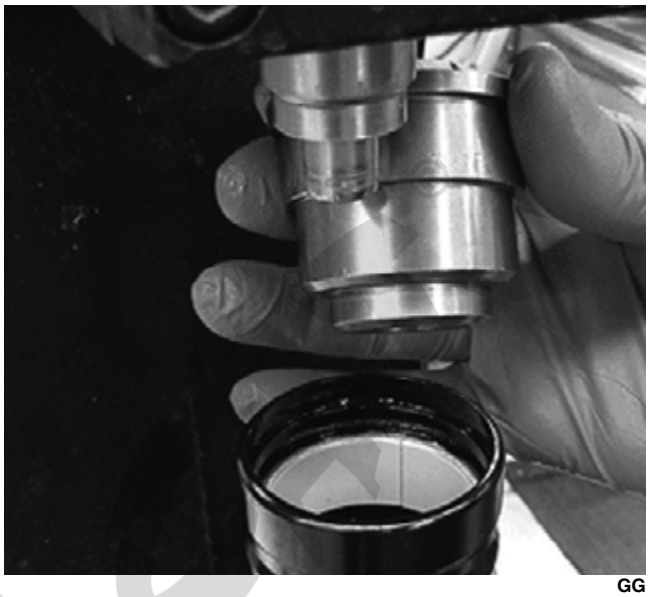


EE

2. Place the new DU bushing partially into the air sleeve and place the installer on top of it; then using the machine press, press the bushing into the air sleeve.



FF



GG

3. At this point, the inside diameter of the new bushing must be re-sized.

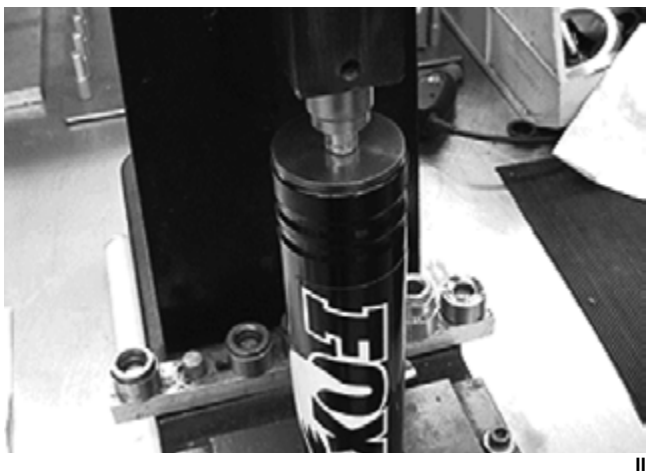
   A. Insert the sizer into the air sleeve.

   B. Place the installer tool on top of the sizer.



HH

   C. Using the machine press, press the stack until the sizer falls free within the air sleeve. Remove the installer and the sizer.



II

4. Apply an ample amount of petroleum grease to the "samurai" and backup seals; then place them into the air sleeve.



JJ



KK

■**NOTE: At this point, apply an ample amount of petroleum grease around the inside lip of the air sleeve; then set the sleeve aside.**



LL

Disassembling Shaft Assembly

1. Using a 9/16-in. wrench, remove the shaft lock nut.



MM

2. Using a scribe or pick tool, lift the piston and valve assembly collectively off the shaft.



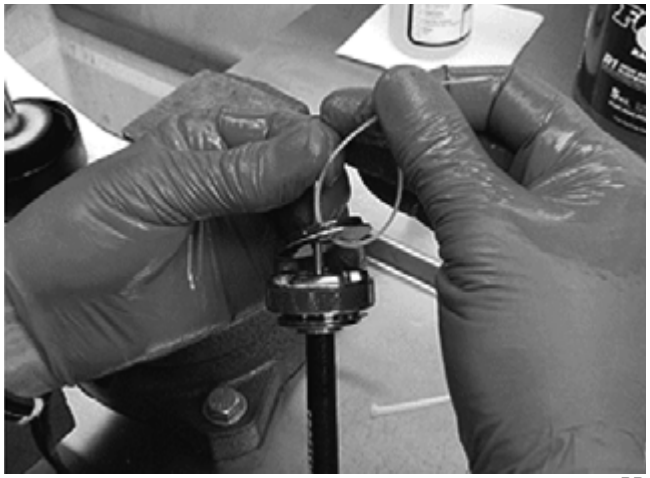
NN



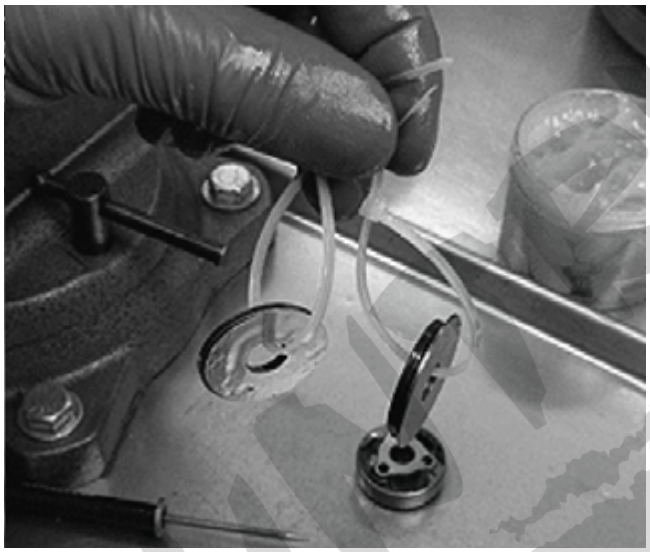
OO

7

■**NOTE: It is advisable to use cable ties to preserve the upper and lower shim stack/piston order.**



PP



QQ

3. Using a sharp blade, cut the piston band; then remove the band and discard.



RR

■**NOTE: Care should be taken not to scratch the piston when cutting the band.**

4. Remove the O-ring from the piston.



SS

5. Install a new piston O-ring; then using an appropriate piston band installation tool, install a new band.

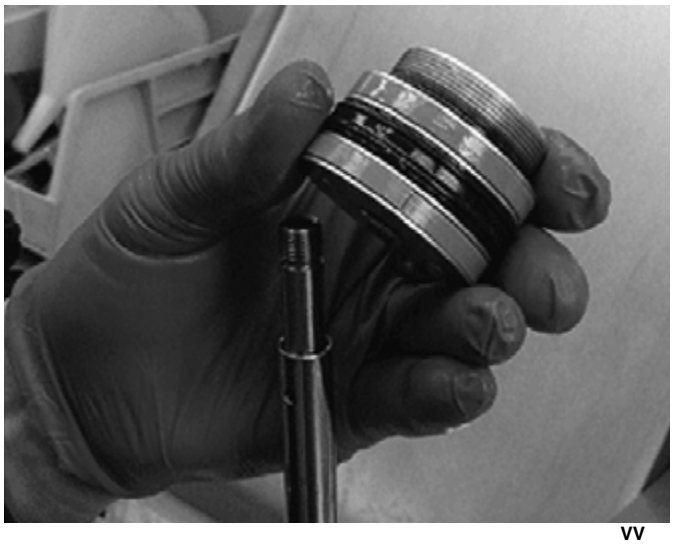


TT

6. Remove the spring from the assembly; then remove the bearing assembly.



UU



VV

7. Remove and replace all O-rings and seals.



WW

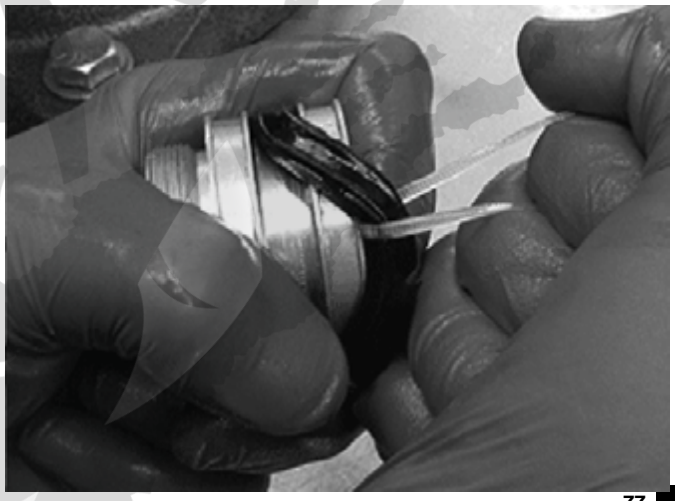


XX



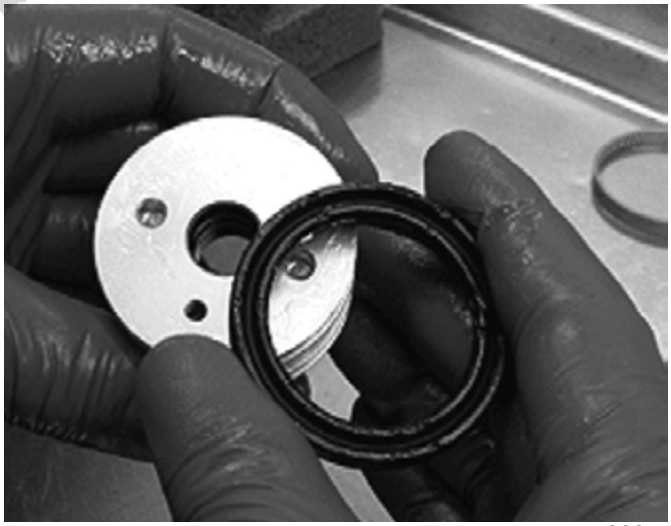
YY

■ **NOTE: It may be advisable to use a cable tie to aid in removing the main seal.**



ZZ

■ **NOTE: When installing the main seal, assure that it is oriented correctly.**



AAA

Rebuilding EVOL Reservoir

1. Install a new O-ring in the rebound eyelet assembly.



BBB

2. Remove the EVOL reservoir from the rebound eyelet assembly; then install a new reservoir O-ring.



CCC



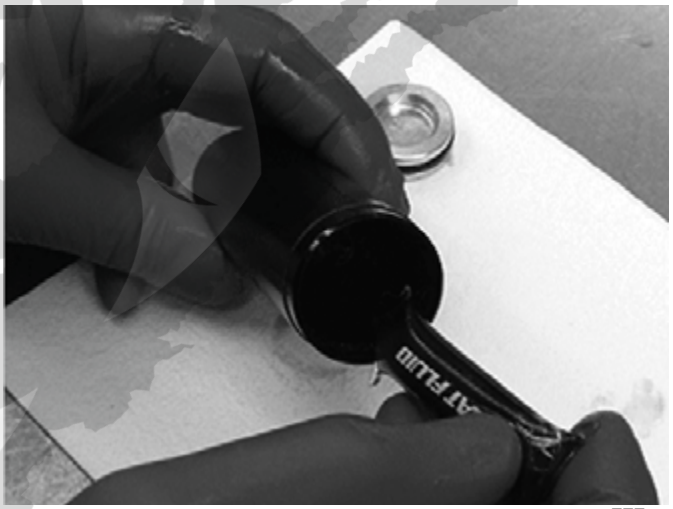
DDD

3. Using a shock absorber hand air pump, apply light pressure to the reservoir to extract the IFP.



EEE

4. Pour approximately 2 cc of float fluid into the reservoir (down its side) to provide lubrication for installing the IFP.



FFF

5. Replace the IFP seal; then amply lubricate the IFP and place it into the reservoir.



GGG

6. Thread the EVOL reservoir onto the rebound eyelet; then tighten to 12 ft-lb.

Assembling Shaft Assembly

1. With the shaft assembly clamped in the vise, install the bottom-out bumper.



HHH

2. Place the Bearing Cap Seal Protector (p/n 0644-268) onto the shaft, amply lubricate the protector, and install the bearing assembly onto the shaft.



III

3. Install the lower and upper shim stack/piston assembly.



JJJ

■ **NOTE: Care must be taken that the preserved shim stack/piston assembly be installed correctly.**

4. Thread the lock nut onto the shaft; then tighten to 18 ft-lb. Set the shaft assembly aside.



KKK

Assembling Shock Absorber

1. Securely clamp the "piggy-back" body assembly in the vise; then using an appropriate air sleeve protector tool, slide the air sleeve over the body.



LLL



MMM

■ **NOTE: At this point, pour 3-5 cc of float fluid between the air sleeve and shock body.**



NNN

2. Assuring that the LCS adjuster screw is rotated fully open (counterclockwise), fill the "piggy-back" reservoir with Fox High V1 Race Oil almost to the rim.



OOO



PPP

■ **NOTE: It is normal for oil to seep through the CD into the shock body; continue "topping-off" the reservoir until the oil settles evenly between the reservoir and shock body.**

3. Rotate the LCS adjuster screw fully closed (clockwise); then remove the IFP bleed screw and insert the well-lubricated IFP into the reservoir.



QQQ



RRR

4. Using an appropriate IFP installing tool, slowly press the IFP down into the oil purging the trapped air out through the bleed hole. Do not press the IFP to the bottom of the reservoir at this time.

⚠ WARNING

Cover the top of the tool to prevent oil from squirting upwards.



SSS



TTT

5. Install the IFP bleed screw.



UUU

■ **NOTE: It is allowable to leave some oil trapped in the reservoir above the piston.**

6. Using the IFP installing tool, press the IFP to the bottom of the reservoir; then pull the IFP back 2 in. from the top of the reservoir.

■ **NOTE: Repeat this procedure several times to assure a full bleed; then position the IFP approximately 1 in. from the bottom of the reservoir.**



VVV



WWW

7. Assuring that the LCS adjuster screw is rotated fully open (counterclockwise), fill the shock body with Fox High V1 Race Oil; then rotate the LCS adjuster screw fully closed (clockwise).



XXX

8. Back out the rebound adjuster on the shaft assembly; then by inserting the long end of an Allen wrench into the shaft post, depress the metering rod lightly until the metering rod moves away from the jet.

9. While holding the negative spring and spacer at the top of the shaft with one hand, insert the shaft and bearing assembly into the shock lower taking care not to spill oil into the air sleeve. Very slowly push the shaft down into the oil while rotating and "wiggling" the shaft until there are no bubbles rising in the oil.



YYY

10. Using a rubber mallet, gently tap the shaft to allow trapped air to escape from between the piston and valve shims.



ZZZ

11. Gently lower the negative spring and spacer into the oil taking care not to let the oil overflow into the air sleeve.

CAUTION

Make sure the piston assembly and the rebound hole in the shaft DO NOT come out of the oil bath. If the rebound adjust hole in the shaft comes out of the oil bath, air can transfer to the underside of the piston aerating the shock. Add oil to the shock as required to keep the hole covered. Pull the shaft assembly out of the oil until the top of the negative spring is even with the end of the body.

12. Carefully lower the bearing assembly into the damping body and thread into the shock; then using an appropriate bearing head tool, tighten the bearing assembly to 50 ft-lb.



AAAA



BBBB

13. Slide the air sleeve up to be flush with the bearing head assembly to prevent oil from spilling into the air sleeve. Gently compress the IFP to purge the last air bubbles from the body out the bleed screw. Make sure the shaft is fully extended to the point of it contacting the negative spring.



CCCC



DDDD

14. Install the bleed set screw; then using a 5/64 in. hex key, tighten the set screw.

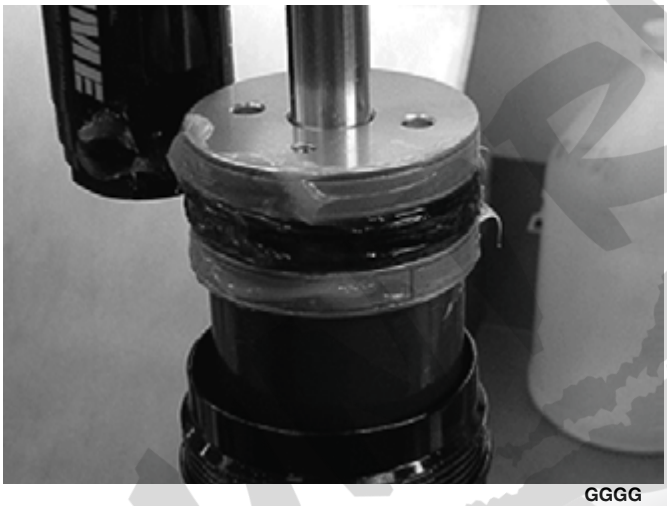


EEEE



FFFF

15. Slide the air sleeve down far enough to liberally lubricate the bearing head assembly.



GGGG

16. To set the IFP depth, remove the bleed screw; then using Floating Piston Location Gauge (p/n 0644-350), adjust the depth to 2.5 in. Install the bleed screw.



HHHH

17. Pour the excess oil from the IFP reservoir, install the reservoir end cap pressing it down firmly, and install the snap ring.



IIII



JJJJ



KKKK

18. Using an appropriate inflation needle, charge the reservoir to 250 psi.

19. Using an appropriate strap wrench, tighten the air sleeve into the rebound eyelet assembly.



LLLL

20. Using a high-pressure hand air pump, pressurize the shocks to 225 psi EVOL/125 psi Main.



MMMM



NNNN

Servicing Mono-Tube Shock Absorbers

⚠ WARNING

Before starting, read through all of these instructions first to become familiar with the procedure. Make sure the work area is clean and all of the necessary tools are available. These shocks contain high pressure nitrogen gas. Always use proper safety equipment such as latex gloves and safety glasses when working on shock absorbers.

⚠ WARNING

Always wear latex or rubber gloves when servicing a shock absorber with shock oil.

■NOTE: Fox Zero Pro Shock rebuild kits should be ordered before servicing the shock. Kit (p/n 2603-849) is for 0.498-in. shaft shocks, Kit (p/n 2603-013) is for 0.620-in. shaft shocks, and Kit (p/n 2604-880) is for 2-in. body rear arm shocks.

REMOVING/INSTALLING SHAFT EYELET

1. Using Gas Shock Retaining Blocks to prevent damage to the shaft surface, place the shock shaft into a vise.
2. Heat the shaft eyelet with a torch to soften the Loctite.



AG260

■NOTE: The eyelet must be heated up to 300° for the Loctite to soften.

3. Using a wrench, unscrew the eyelet from the shaft.



AG261

■NOTE: With the eyelet removed, inspect the bottom-out bumper for cracks or wear.

4. Clean shaft threads and eyelet threads.
5. Apply red Loctite #271 to both threads, install the eyelet, and tighten securely.

DISASSEMBLING

1. Remove the steel sleeve and polyurethane bushings from the eyelets on both ends of the shock.
2. Clean the entire shock assembly with soapy water. Dry the shock assembly with compressed air.

CAUTION

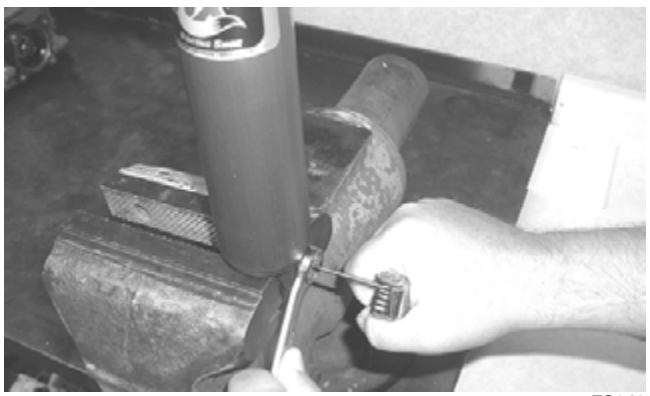
Use a soft-bristle brush to remove as much dirt and debris as possible. Do not pressure wash the shock as this can force water and debris inside causing damage to the seals.

⚠ WARNING

When using compressed air to dry components, always wear safety glasses.

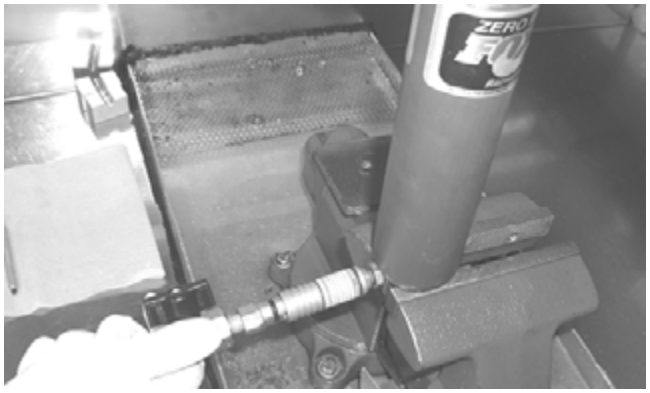
■NOTE: If compressed air is not available, use clean towel to dry the shock assembly.

3. Clamp the body eyelet of the shock securely in vise with shaft side up.
4. Remove the button-head screw from the nitrogen valve in the shock body.



FS040

5. Insert the Inflation Needle squarely into center of the nitrogen valve to release the pressure.

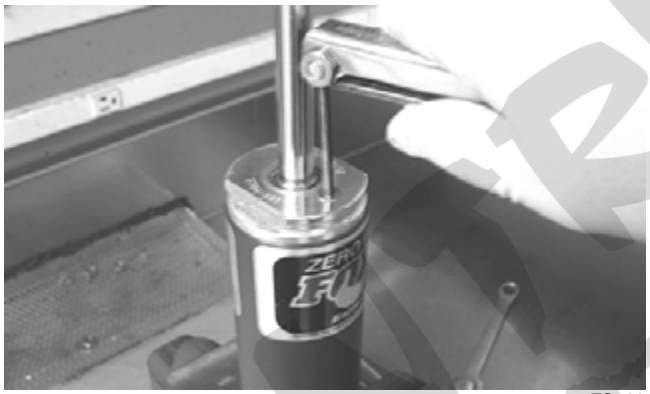


FS016

⚠ WARNING

Point the nitrogen valve away from face and body to avoid injury when discharging or charging the shock.

6. When the shock is fully discharged, pull the needle away from the reservoir in a straight, smooth motion.
7. Loosen (but do not remove) the bearing bleed screw.



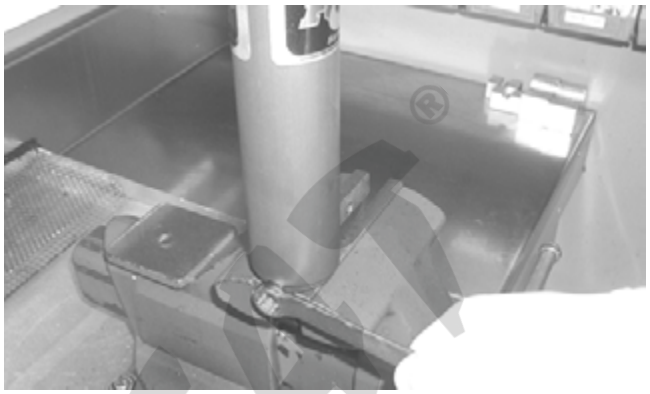
FS013

8. Loosen and unscrew the bearing assembly from the shock body.



FS006

9. Remove the shaft assembly from the body tube and place it on a clean, lint-free paper towel.
10. Remove the shock from the vise and pour shock oil from body tube into a proper disposal container. DO NOT REUSE OLD SHOCK OIL.
11. Clamp the body cap of the shock securely in vise with the open end of the body tube pointing up.
12. Loosen and remove the nitrogen valve from the body.



FS014

13. Remove the shock body from the vise; then invert the shock body and place it on a folded shop towel open end down.
14. Using compressed air (NEVER USE HIGH PRESSURE NITROGEN), insert the air gun nozzle into the nitrogen valve port and blow the IFP out of the shock body and onto the folded shop towel.



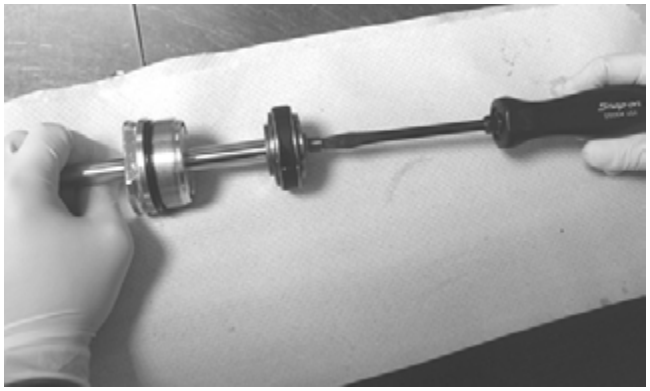
FS012

15. Clean the body tube, reservoir tube, and the IFP with solvent. Dry with compressed air in a well ventilated area.
16. Set body assembly aside on a clean, lint-free towel.
17. Clamp the shaft eyelet securely in vise with the piston end up.
18. Remove the piston lock nut from the end of the shaft.



FS008

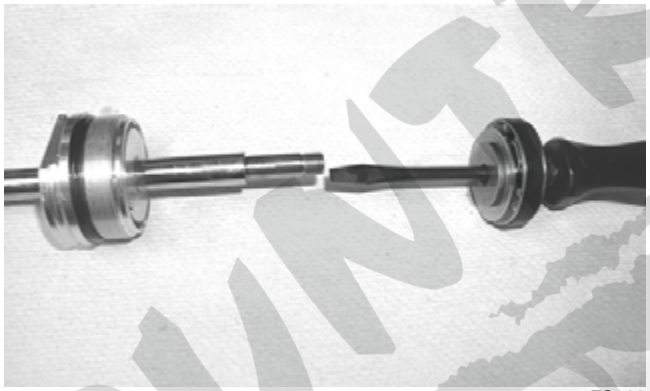
19. Hold the tip of a screwdriver against the end of shaft; then hold the piston assembly under the top-out plate and lift upwards.



FS009

■NOTE: Keeping the components in order is critical for proper performance of the shock absorber. Doing steps 20-21 properly ensures that proper order is kept.

20. Slide the piston assembly onto the shaft of the screwdriver. Pull the screwdriver away from shock shaft while supporting the piston assembly and set this on a clean, lint-free towel.



FS010

21. Slide bearing assembly off of shaft.

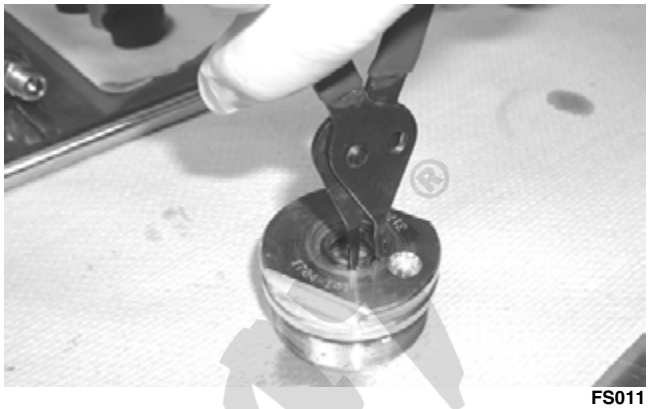
CAUTION

Use care when passing the bearing over the shaft threads not to scratch the inside of the bearing assembly.

22. Remove the bleed screw from the bearing and set them both on a clean, lint-free towel.

REBUILDING

1. Using a pair of snap ring pliers, remove the snap ring from the bearing housing. Using fingers, remove the FIST scraper from the housing. Using a scribe, remove the O-ring from the inside of the FIST scraper by "spearing" the seal with the point of the scribe and pulling it out.



FS011

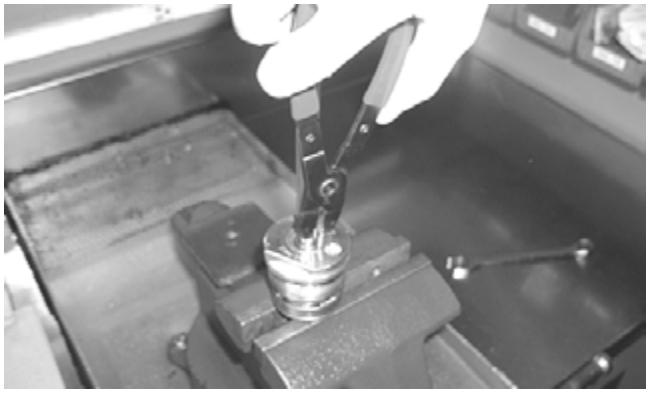
CAUTION

Care must be taken when using a scribe to remove a seal. Always spear the seal with the point of the scribe. Do not attempt to wedge the scribe behind the seal as this could cause damage to the seal groove and compromise the performance of the shock.

2. Using a scribe, remove the U-cup wiper and O-ring seals from the bearing housing.
3. Thoroughly clean the FIST bearing, bearing housing, and piston assembly with solvent. Dry with compressed air in a well ventilated area.
4. Using a scribe, remove the O-ring seal from the IFP.
5. Install the new, well lubricated O-ring into the FIST bearing. Check to make sure the O-ring is properly seated and is not twisted.

■NOTE: To aid in proper seating of the O-ring, it may be advisable to use a soft, blunt object (non-writing end of a pen, etc.) to push it in.

6. Install the new, well lubricated O-rings into the bearing housing making sure the shaft O-ring is in the groove next to the DU bushing and that the O-rings are properly seated and not twisted. It may be advisable to use a soft, blunt object to push it in.
7. Install the new U-cup seal into bearing. U-cup should be installed so the cupped end is facing the DU bushing inside of bearing. Check to make sure seal is properly seated. It may be advisable to use a soft, blunt object to push it in.
8. Install FIST bearing into housing. Check for proper orientation of the FIST bearing. The stepped side of the FIST bearing should be visible.
9. Using a pair of snap ring pliers, install the snap ring into the bearing housing. Check for proper orientation of the snap ring. The flat side of the snap ring should be visible. Check to make sure the snap ring is properly seated.

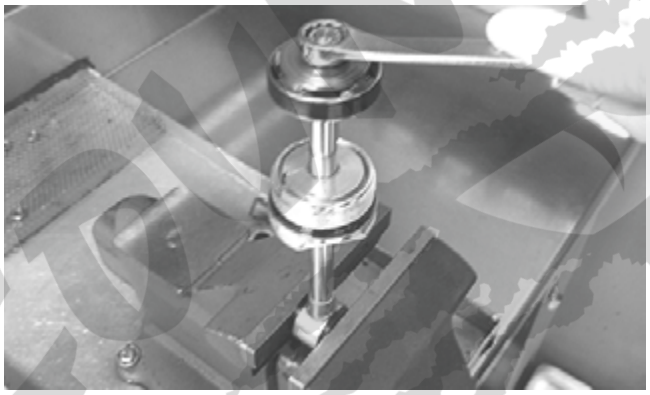


FS007

10. Install the new, well greased O-ring onto the IFP.
11. Replace the bearing bleed screw O-ring.

ASSEMBLING

1. Clamp shaft eyelet securely in vise and place a seal tool on end of shaft.
2. Lubricate the bearing assembly seals with an assembly lube. Slide the bearing assembly onto shaft with the FIST bearing facing the eyelet. This should be done in a single smooth motion to avoid damaging the seals.
3. Hold the piston assembly from underneath the top-out plate and place the end of the screwdriver onto the end of the shock shaft. Slide the piston assembly onto the shaft end. Check to make sure the piston assembly is seated properly and install the piston lock nut. Tighten nut to 18 ft-lb. Remove shaft assembly from vise and set it aside on a clean, lint-free paper towel.



FS008

4. Clamp the body of the shock securely in the vise with the open end of the body facing up.
5. Lubricate the IFP O-ring with assembly lube and wrap a new piston ring around it.
6. Insert the IFP into the shock body (with the dished side facing up toward the open end of the shock body) to just below the bearing threads.



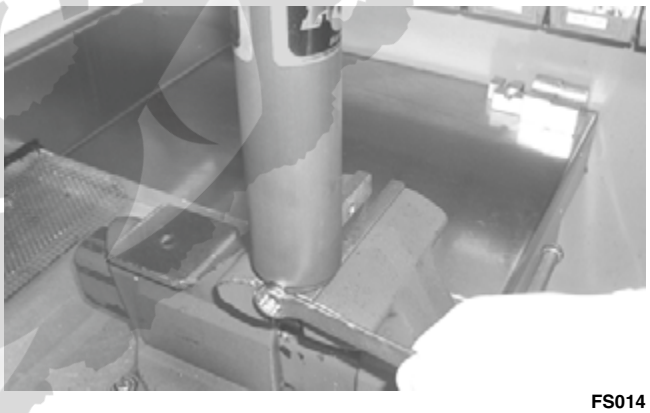
FS015

7. Using Floating Piston Location Gauge, install the floating piston while using the inflation needle to vent the shock body.

■NOTE: Refer to the Suspension Specifications - Shock Absorbers sub-section in Section 1.

■NOTE: Depth is measured from the edge of the body opening to the outside edge of the IFP (not the center depression of the IFP).

8. Lubricate the O-ring on the nitrogen valve with assembly lube and thread it into the body. Tighten securely.



FS014

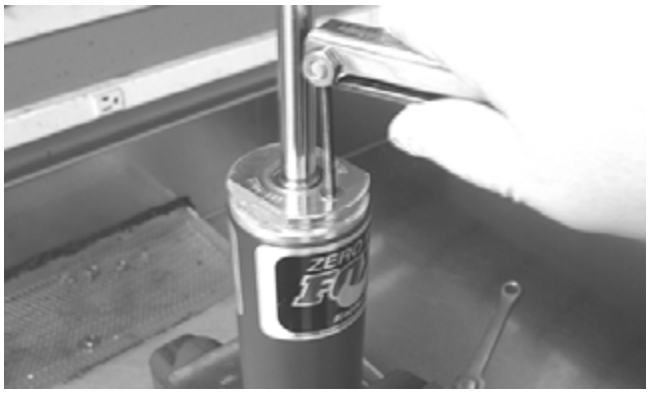
9. Fill the body tube with oil to the bottom of the bearing threads. Wrap the new piston band around the piston making sure the rounded edges face out. Insert the shaft assembly into the body tube. Slowly push shaft into body until piston assembly is approximately 0.5 in. below the oil surface.
10. Slowly stroke the shaft assembly up and down over about a 1-inch range two to three times being very careful not to pull the piston assembly out of the oil.

■NOTE: At this point, there should be no air bubbles rising from the piston assembly.

11. Top off the shock body with oil and slowly pull the shaft up until the piston assembly is about in the middle of the bearing threads.
12. Holding the shaft in that position, slide the bearing assembly down the shaft and start threading it into the body by hand. Oil should flow out of the bearing bleed hole.

13. As the bearing assembly is being threaded down, it will contact the damping piston assembly and pull it down into the shock body with it. As the bearing is being threaded in from this point, be sure the damping piston assembly stays in contact with the bearing.

14. When the bearing is threaded all the way down, thread the bleed screw into the bearing assembly and tighten it securely.



FS013

15. Tighten the bearing assembly into the body.



FS006

16. Push the shaft all the way down until the eyelet lightly contacts the FIST scraper on the bearing assembly. It should go all the way down without any feeling of contact or interference.

■NOTE: At this point, DO NOT attempt to pull the shaft up out of the body.

17. If there is any interference while pushing the shaft into the body, the IFP is in the wrong location.

⚠ WARNING

If there is interference, unthread the bearing assembly from the body and repeat steps 4-16 of Assembling. Failure to repeat the steps and rid the shock of the interference may cause damage to the shock resulting in improper shock performance and could cause operator injury.

18. If there is no interference, proceed to step 19.

19. Maintain the shock in the vise.

20. Make sure the nitrogen valve is directed outward.

21. Insert the needle squarely into the center of the nitrogen valve (taking care that the valve is directed away from face and body) and pressurize the reservoir to 200 psi. The shock shaft should be fully extended from the pressure before the final pressure reading is taken. Continue charging while pulling the reservoir away from the needle using a smooth, straight motion. Keep the reservoir as straight as possible to prevent the needle from bending. As the reservoir and needle separate, a "popping" sound should be heard.

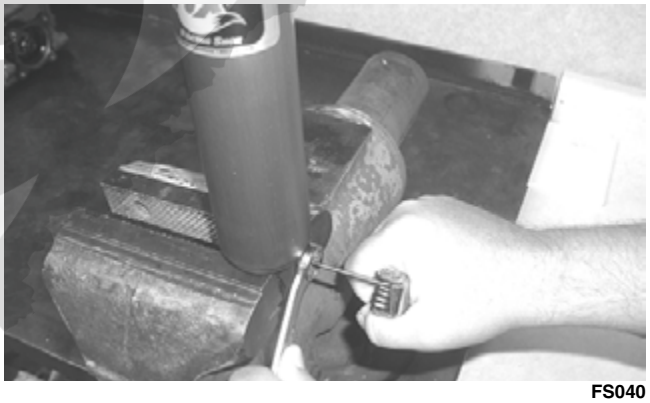


FS016

⚠ WARNING

Charge the shock using nitrogen gas only. DO NOT CHARGE WITH ANY OTHER TYPE OF GAS. Doing so will compromise the performance of the shock and may be EXTREMELY DANGEROUS.

22. Install the button-head screw into the nitrogen valve.



FS040

23. Clean all oil residue from the shock and reservoir with solvent and dry with compressed air in a well ventilated area.

24. Install the polyurethane bushings and steel sleeves into the eyelets.

Pressurizing Rebuildable Shocks

To pressurize the gas shock absorber, a regulator system and a nitrogen tank will be needed.

⚠ WARNING

Never have a nitrogen bottle in the area without having it chained or secured. If the bottle should tip over and the regulator break off, the gas inside it is under 1800 lb of pressure and personal injury may result.

⚠ WARNING

Always rotate the regulator T-handle to its loose position each time when finished using the system. Each time before the nitrogen tank valve is opened, check to make sure the regulator T-handle is turned out. When opening the nitrogen tank valve, never stand in front of the regulator in case there should be a problem.

■NOTE: Before inserting the needle into the bladder, lubricate the needle with light oil to make installation easier.

1. Insert the Inflation Needle into the shock bladder; then open the valve on the filler handle.
2. Turn the nitrogen tank valve open and slowly rotate the regulator T-handle inward until the gauge reads 200 lb of pressure; then close filler valve and remove inflation needle.
3. Install the screw or the air valve ball (Fox Float Shock) into the bladder housing and tighten securely.
4. With the reservoir pressurized, push down on the shock shaft until it nearly bottoms and release it. The shaft should return to its extended position smoothly.

■NOTE: If a soft spot or a mushy area is felt as the shaft is pushed down, this would indicate air in the shock body. If there is air in the shock body, discharge the reservoir gas pressure. Disassemble the shock to the point that the "filling with oil" and the "bleeding air" procedures can be redone. Assemble and repeat the pressurizing procedure. To test the shock absorber for nitrogen gas leaks, submerge in water.

NOTES

SECTION 8 — STEERING AND BODY

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Steering and Body

This section has been organized into sub-sections for servicing steering and body components; however, some components may vary from model to model. The technician should use discretion and sound judgment when removing and installing components.

■NOTE: The designation "F-Series" refers to the F5/ F570 models. The designation "F" refers to the F 800/ F 1100 models.

■NOTE: Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

■NOTE: Critical torque specifications are located in Section 1 of this manual.

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

SPECIAL TOOLS

A special tool must be available to the technician when servicing the steering and body systems.

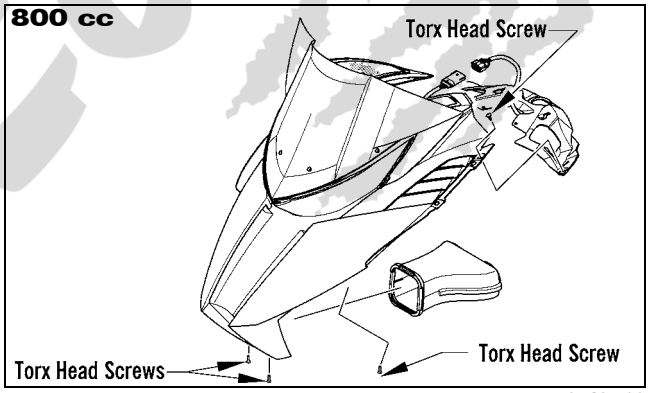
Description	p/n
Shock Spring Removal Tool	0644-057
Handlebar Stand	5639-152
Steering Post Stand	5639-946

■NOTE: Special tools are available from the Arctic Cat Service Parts Department.

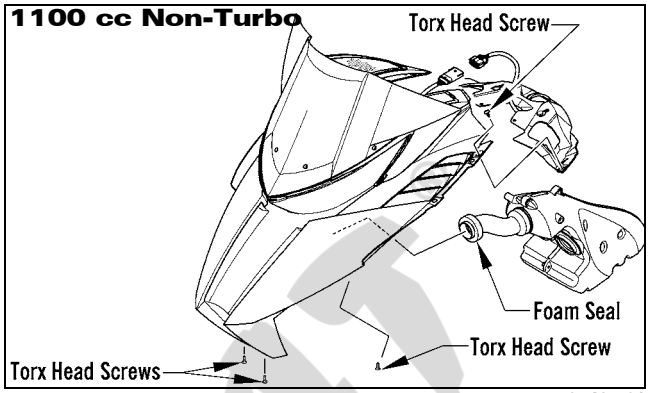
Steering Post (F/M/XF)

REMOVING (Standard/Telescoping)

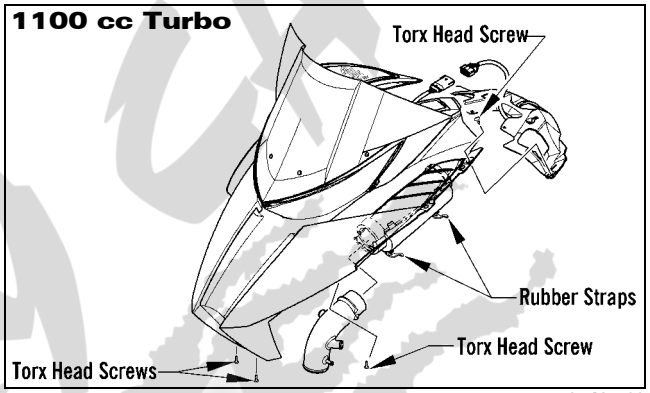
To remove the access panel and hood, use the following procedure:



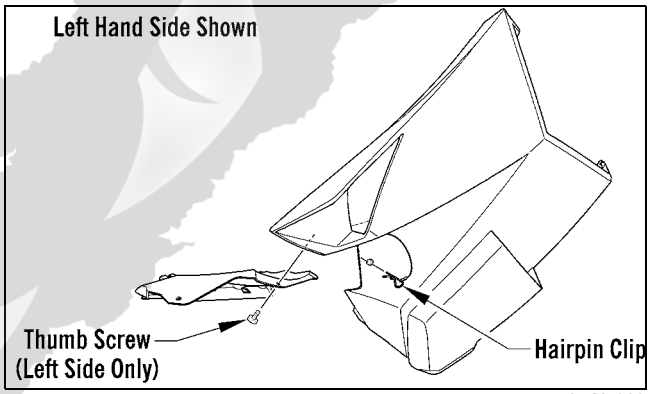
0746-793



0746-791



0746-792



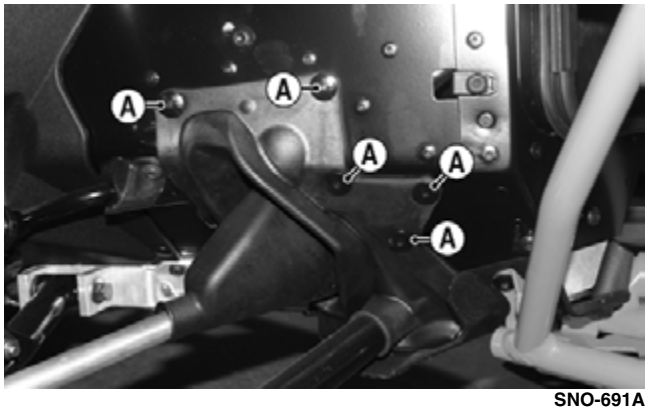
0746-800

1. Remove the hairpin clip from the pin located at the front of the access panel; then unscrew the thumb screw. Move the panel up and off the pin; then swing the panel all the way out and unhinge the panel from the lower console.
2. Remove all six torx-head screws securing the hood.
3. Locate the hood harness connector (located under the center vent between the intake vents) and unplug the connector; then move the hood slightly forward and remove the hood.

■NOTE: On the turbo models, first unhook the rubber straps securing the air filter housing to the intake plenum of the hood; then move the hood slightly forward and remove the hood.

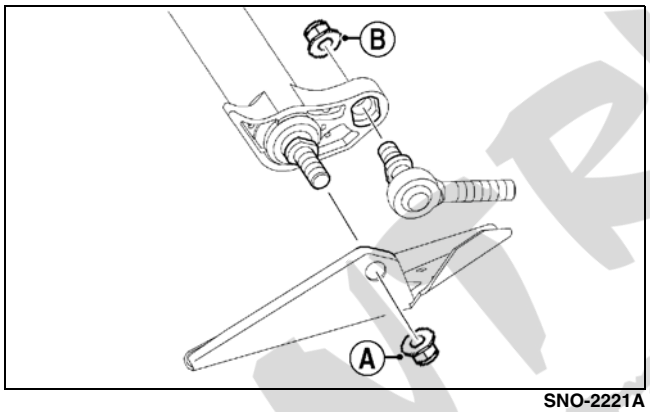
4. On 800 cc models, disconnect the exhaust temperature sensor from the main harness; then remove all springs securing the expansion chamber. Remove the expansion chamber.

5. Remove the five top rivets (A) securing the right-side steering boot to the chassis. This allows access to the two nuts securing the bottom of the steering post.



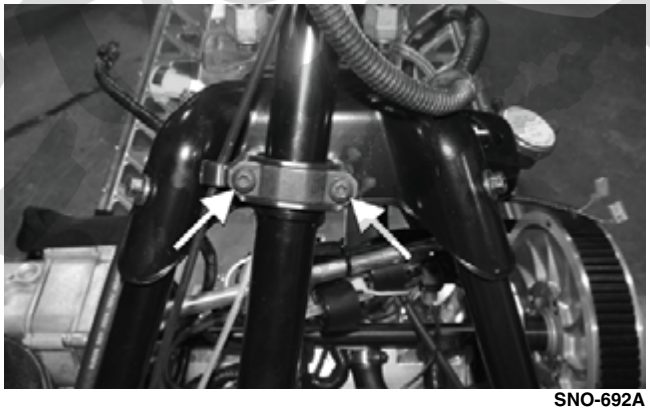
SNO-691A

6. Remove the nut (A) securing the bottom of the existing steering post to the steering stop bracket; then remove the nut (B) securing the steering tie rod assembly to the steering post. Discard both nuts.



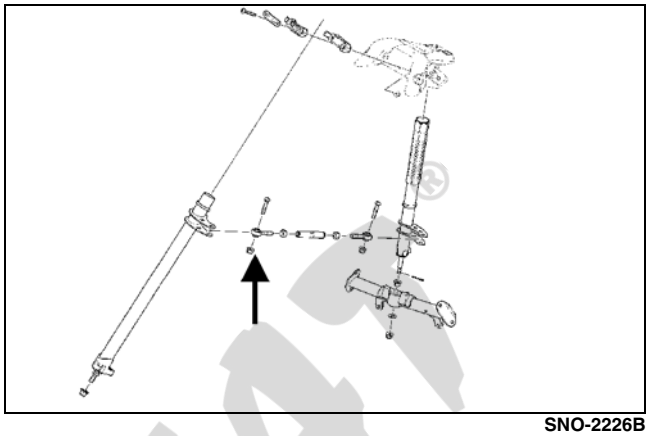
SNO-2221A

7. On standard steering models, remove the cap screws and handlebar caps securing the handlebar to the top of the handlebar riser; then remove the two torx-head screws and nuts securing the top of steering post to the chassis. Account for both steering post blocks and retaining plate.



SNO-692A

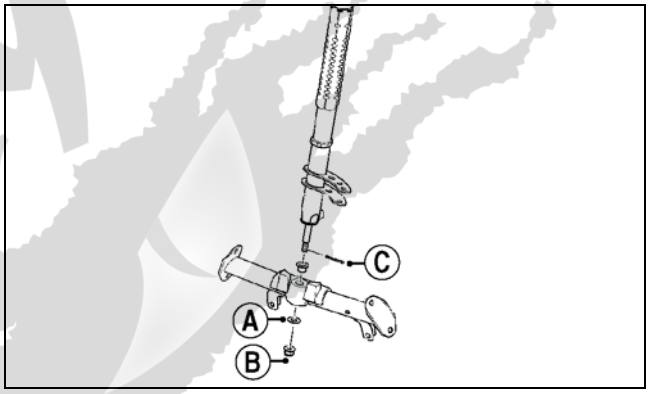
8. On telescoping steering models, remove the torx-head screw and nut securing the tie rod link to the secondary steering post; then remove the two machine screws and nuts securing the top of the secondary steering post to the chassis. Account for both steering post blocks and retaining plate.



SNO-2226B

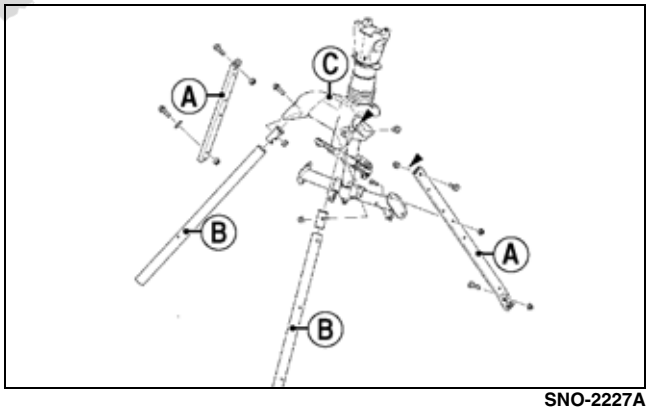
9. Carefully remove the steering post from the snowmobile.

10. On telescoping steering models, remove and discard the cotter pin (C) and nyloc nut (B) securing the steering post to the lower steering support bracket. Account for a thrust washer (A).



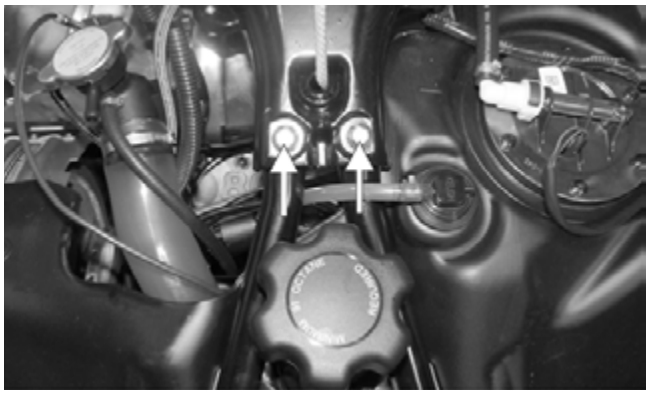
SNO-2225A

11. Remove the two cap screws securing the existing steering support (C) to the front spar tubes (B); then remove the two cap screws securing the steering support to the side support tubes (A). Retain all cap screws and nuts.



SNO-2227A

12. Remove the two cap screws securing the rear portion of the steering support to the rear spar tubes.



SNO-682B

13. With the telescoping steering post/steering support removed from the snowmobile; press down on the adjusting block until the inner snap ring is exposed. Remove the snap ring.



SNO-739A

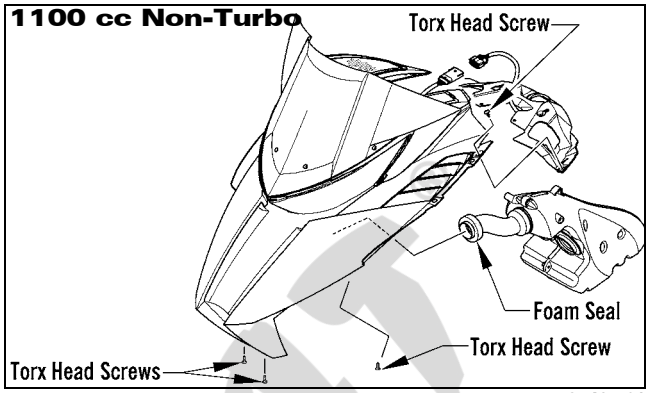
14. Remove the retaining ring securing the bottom side of the steering post; then remove the post from the steering support. Account for two bearings.



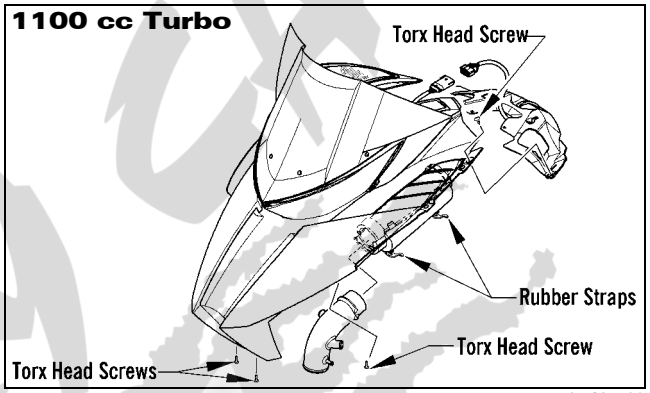
SNO-740A

REMOVING (Vertical)

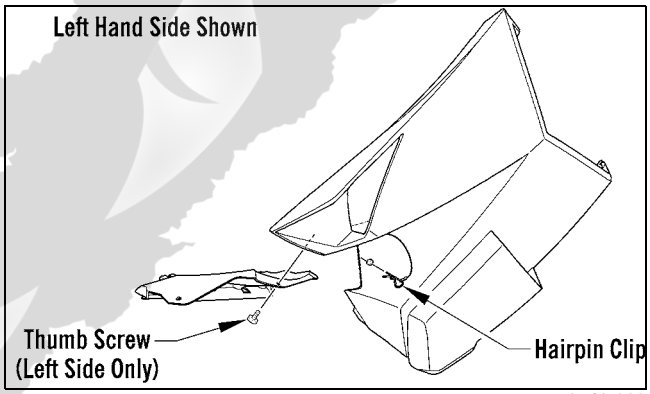
To remove the access panel and hood, use the following procedure:



0746-791



0746-792

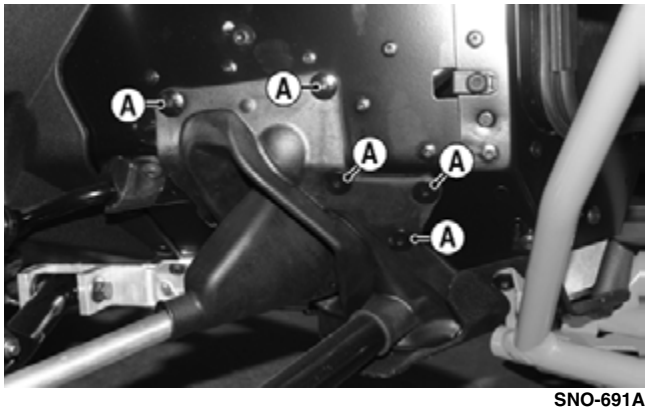


0746-800

1. Remove the hairpin clip from the pin located at the front of the access panel; then unscrew the thumb screw. Move the panel up and off the pin; then swing the panel all the way out and unhinge the panel from the lower console.
2. Remove all six torx-head screws securing the hood.
3. Locate the hood harness connector (located under the center vent between the intake vents) and unplug the connector; then move the hood slightly forward and remove the hood.

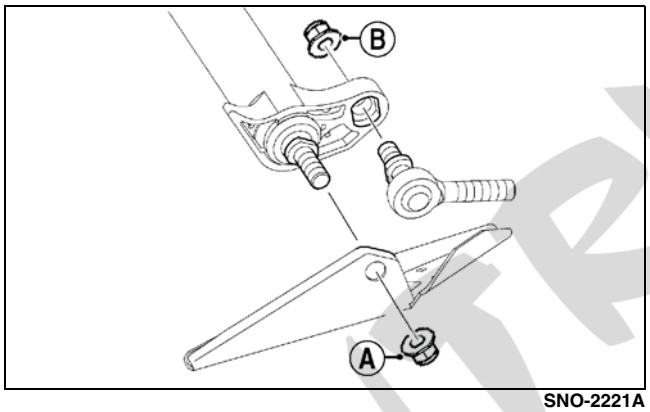
■NOTE: On the turbo models, first unhook the rubber straps securing the air filter housing to the intake plenum of the hood; then move the hood slightly forward and remove the hood.

4. Remove the five top rivets (A) securing the right-side steering boot to the chassis. This allows access to the two nuts securing the bottom of the steering post.



SNO-691A

5. Remove the nut (A) securing the bottom of the existing steering post to the steering stop bracket; then remove the nut (B) securing the steering tie rod assembly to the steering post. Discard both nuts.



SNO-2221A

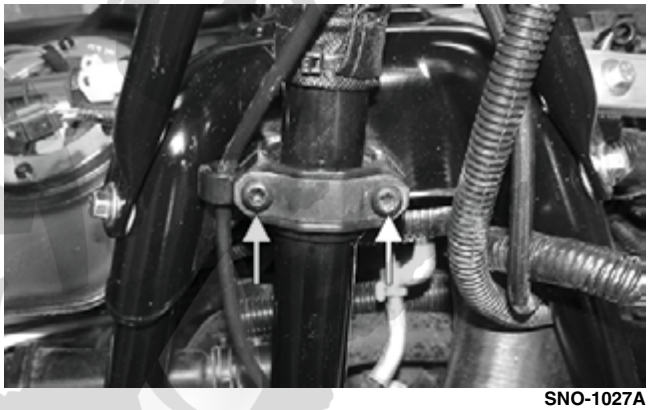
6. Remove the torx-head screws and handlebar caps securing the handlebar to the top of the handlebar riser.


SNO-1025

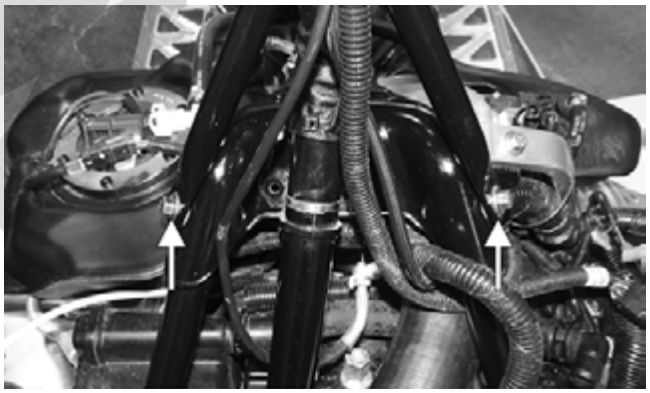
7. Remove the two machine screws and nuts securing the front and rear steering supports around the steering post.


SNO-817

8. Remove the two torx-head screws and nuts securing the top of steering post to the chassis. Account for both steering post blocks and retaining plate.


SNO-1027A

9. Remove both cap screws and flat washers securing the front steering support to the chassis. Remove the support.


SNO-1026A

10. Remove the steering post.

INSPECTING

1. Inspect all welded areas for cracks or deterioration.
2. Inspect the steering post and steering-post retaining plate for cracks, bends, or wear.
3. Inspect the adjuster caps and mounting block for cracks or wear.

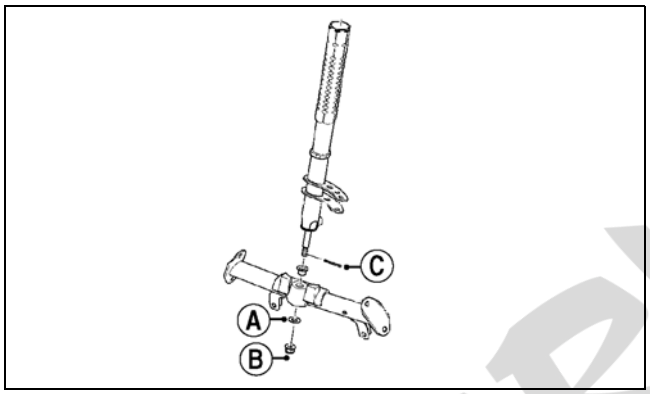
INSTALLING (Standard/Telescoping)

■NOTE: Steps 1-5 are for telescoping steering models only. Proceed to step 6 for standard steering models.

1. Insert the telescoping steering post into the steering support along with two bushings; then secure the steering post using the existing retaining ring.

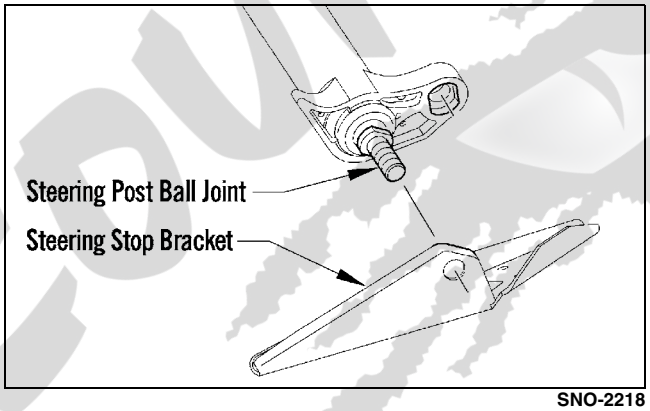
■NOTE: Verify the bushings are properly oriented (the seam should be centered front to back).

2. Install the adjusting block onto the steering post and secure using the existing snap ring.
3. Install the steering post assembly onto the front and rear spar tubes and into the thrust washer (A) and the lower steering post support. Secure with the existing nyloc nut (B) and a new cotter pin (C). Tighten to 20 ft-lb.



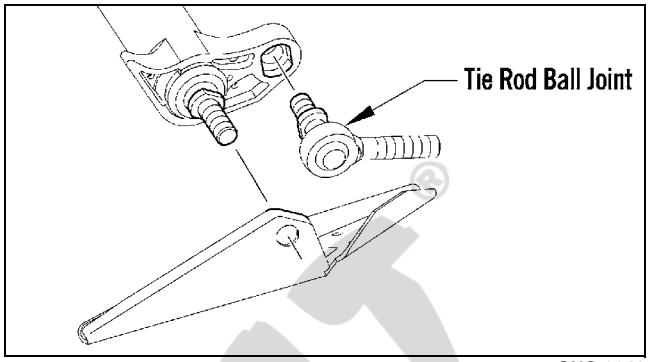
SNO-2225A

4. Secure the steering support to the front and rear spar tubes using the existing cap screws. Tighten to 25 ft-lb.
5. Install steering post into position and secure to the steering stop bracket with a new M10 nut. **Be sure to align the steering post ball joint alignment tab with the steering stop bracket.** Tighten to 43 ft-lb.



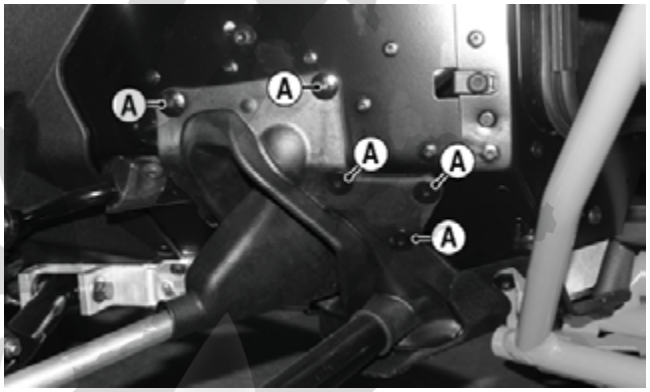
SNO-2218

6. Secure the tie rod assembly to the steering post using a new M10 nut. **Be sure to align the tie rod ball joint alignment tab with the steering post.** Tighten to 35 ft-lb.



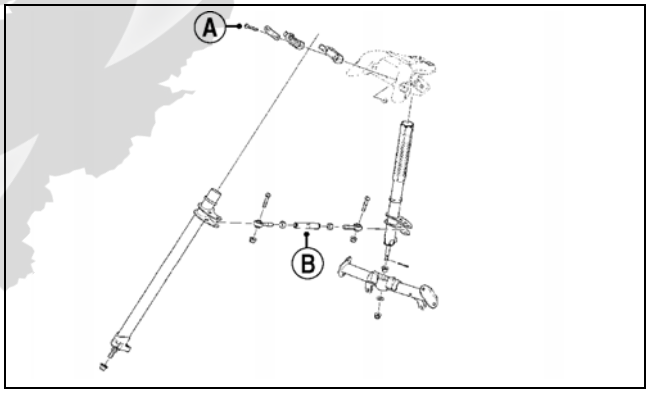
SNO-2219

7. Secure the right-side steering boot to the chassis using five rivets (A).



SNO-691A

8. Secure the top of the steering post to the steering support using the existing machine screws (A) and new nuts. Tighten to 96 in.-lb.



SNO-2226A

9. On telescoping steering models, connect the tie rod (B) from the adjustable steering post to the secondary steering post using the machine screw and nut. Tighten to 20 ft-lb.
10. Install the expansion chamber using the existing springs; then connect the exhaust temperature sensor to the main harness.
11. Position the hood onto the snowmobile and connect the hood harness connector.

■NOTE: On the turbo models prior to securing the hood, make sure the rubber straps of the air filter housing are accessible.

12. Secure the hood with the six torx-head screws and tighten securely.

■**NOTE: Before installing the hood, make sure the mounting screw clips are in position.**

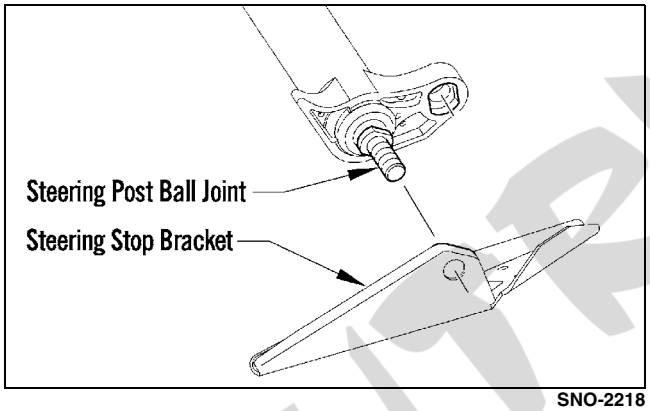
■**NOTE: On the 1100 cc non-turbo models, make sure the foam seal is in place on the air intake.**

■**NOTE: On the turbo models, make sure the air filter housing is properly connected and secured with the rubber straps to the intake plenum of the hood and turbocharger.**

13. Install the access panel onto the lower console; then close the access panel and secure with the hairpin clip.

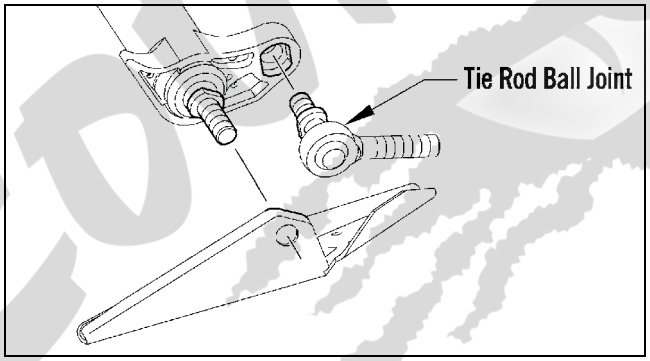
INSTALLING (Vertical)

1. Install steering post into position and secure to the steering stop bracket with a new M10 nut. **Be sure to align the steering post ball joint alignment tab with the steering stop bracket.** Tighten to 43 ft-lb.



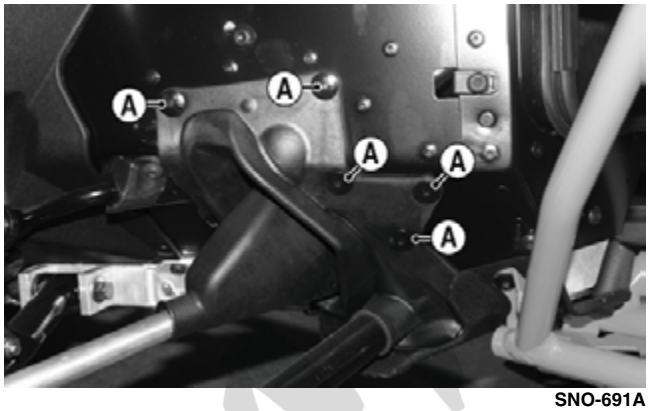
SNO-2218

2. Secure the tie rod assembly to the steering post using a new M10 nut. **Be sure to align the tie rod ball joint alignment tab with the steering post.** Tighten to 35 ft-lb.



SNO-2219

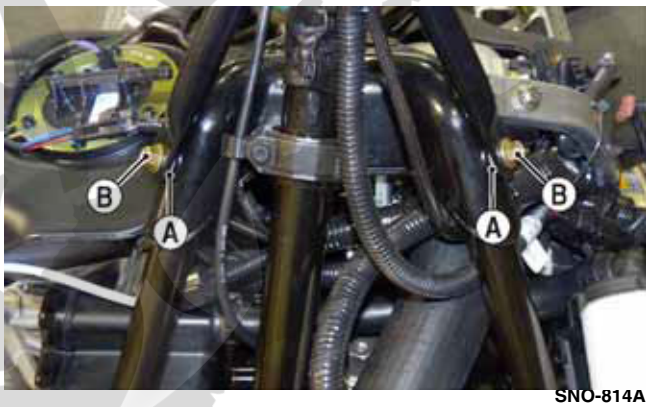
3. Secure the right-side steering boot to the chassis using five rivets (A).



SNO-691A

4. Secure the top of the steering post to the steering support using the existing retaining plate, blocks, machine screws, and nuts. Tighten to 96 in.-lb.

5. Using two aluminum washers (A) and cap screws (B), loosely secure front steering support to the steering support. Finger tighten only at this time.

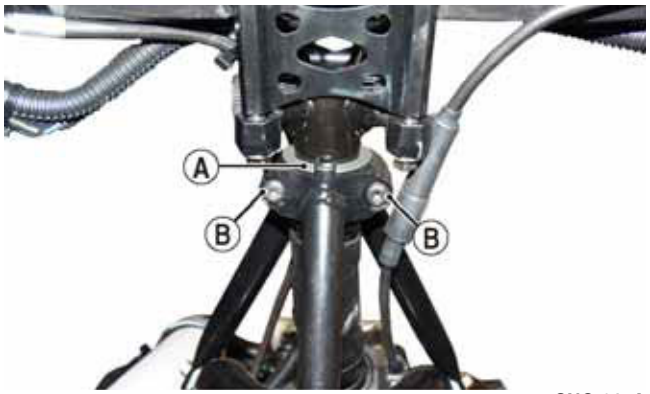


SNO-814A

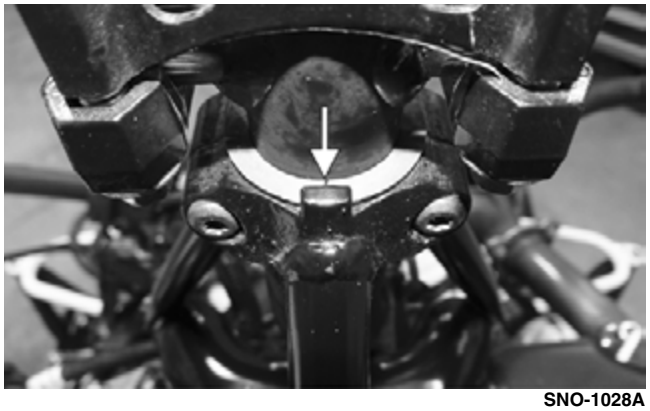
■ **NOTE: The aluminum washers must be installed between the steering support and the front steering support tubes.**

6. Secure handlebar riser to the steering post and the handlebar using the existing handlebar caps and cap screws. Finger tighten only at this time.

7. Position front steering support around the steering post making sure the bearing lip (A) is on top of the front and rear steering supports **and is aligned with the notch in the rear steering support**. Secure using existing machine screws (B) and nuts. Finger tighten only at this time.



SNO-817A



SNO-1028A

8. Tighten the four cap screws securing the front and rear support tubes to 25 ft-lb; then tighten the two machine screws securing the front and rear support tubes around the steering post to 12 ft-lb.

9. Secure the handlebar harness to the handlebar riser using two cable ties.

10. Position the handlebar to the desired position; then tighten all eight screws evenly to 15 ft-lb.

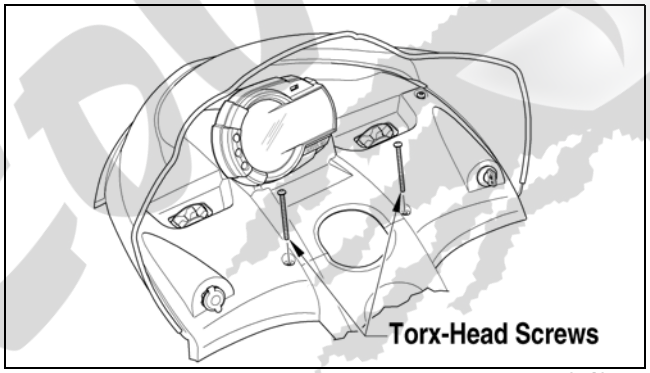
11. Install the upper and lower console; then install the seat using the existing hardware.

12. Install the hood and both access panels.

Steering Post (Bearcat/F-Series/T-Series)

REMOVING

1. Open the hood; then remove the two torx-head screws securing the console to the headlight support bracket.

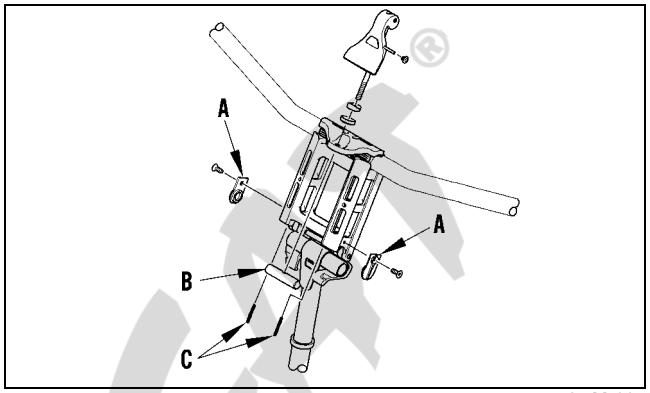


0743-777

2. Lift the rearward end of the console and disconnect the main/hood harness connector; then remove the console.

3. On the standard models, remove the four cap screws, lock nuts, and adjuster block caps securing the handlebar/riser assembly to the steering post; then lay the handlebar/riser assembly aside. Account for the lower adjuster block.

4. On the LXR models, remove the two screws from the handlebar pad; then remove the self-tapping screw securing the retainers (A) to the riser block assembly. Remove the retainer.



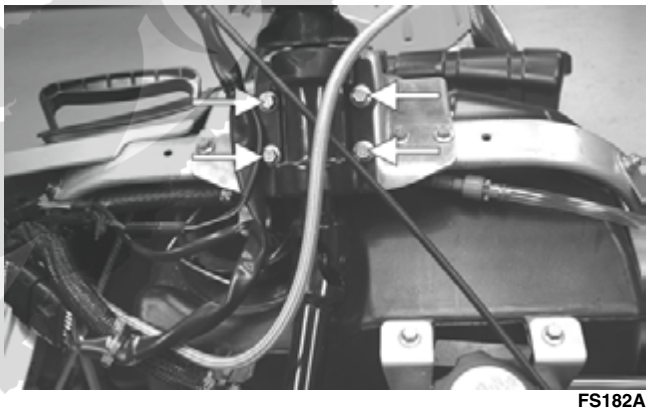
0744-927

5. On the LXR models, unlock the cam lever and unthread the lever from the lock rod (B); then remove the lock rod and account for the two bottom cap springs (C).

CAUTION

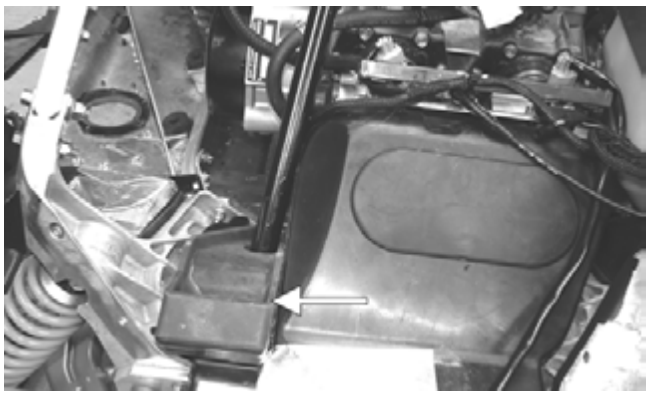
Do not rotate the handlebar to a position allowing air to enter the brake system.

6. Remove the four cap screws securing the upper bearing bracket to the upper support plate.



FS182A

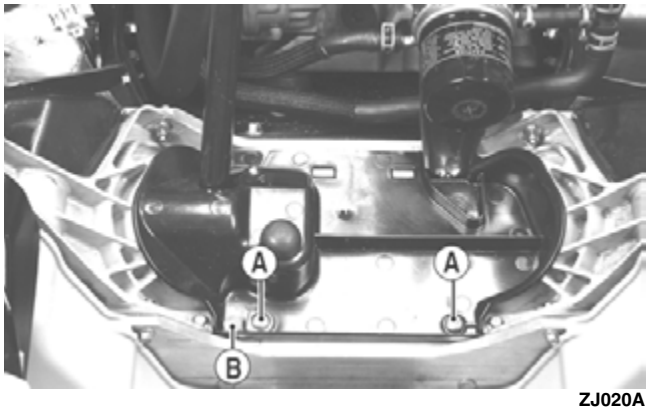
7. On the Bearcat 570/F-Series/T-Series, remove the springs securing the expansion chamber; then remove the expansion chamber from the engine compartment. Account for the rubber exhaust bumper.



FS203A

■**NOTE: On the turbo model, loosen the intercooler hose clamps at the intake pipe and the turbocharger; then carefully work the intercooler upward until it releases from the rubber grommets.**

8. On the non-turbo TZ1, remove the two cap screws (A) securing the front end close-off cover to the chassis.



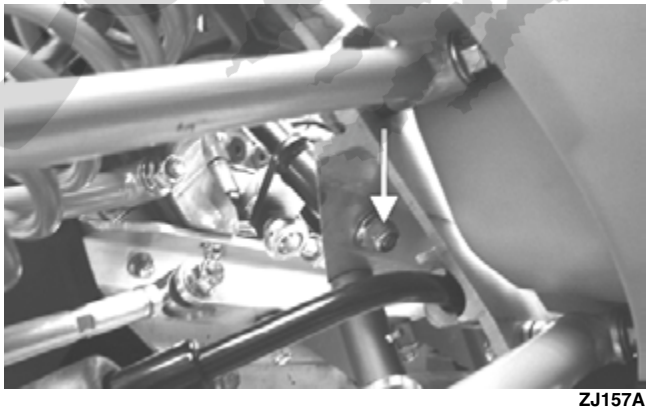
ZJ020A

■**NOTE: For installing purposes, note the location of the exhaust pipe mounting tab (B).**

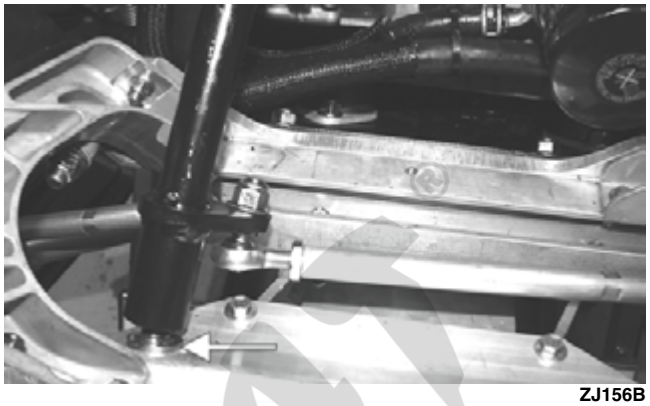
9. Remove and discard the lock nut securing the steering tie rod to the steering post.


ZJ156A

10. Remove and discard the lock nut and washer securing the steering post to the chassis; then carefully guide the steering post out of the chassis.


ZJ157A

■**NOTE: For installing purposes, note the number of washers between the steering post and the chassis.**

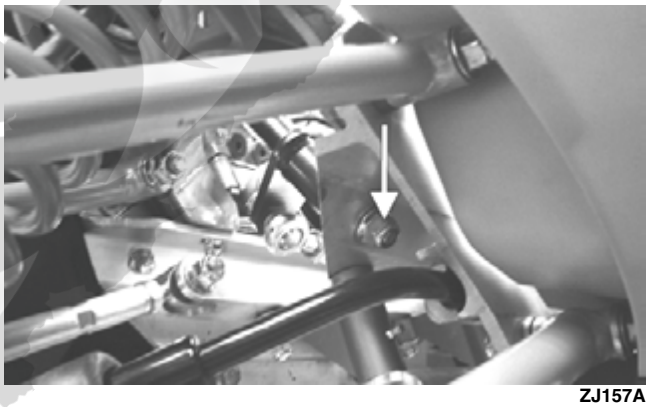

ZJ156B

INSPECTING

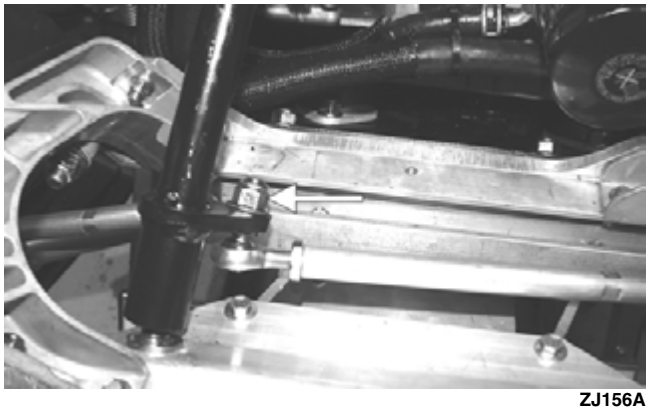
1. Inspect all welded areas for cracks or deterioration.
2. Inspect the steering post and steering-post brackets for cracks, bends, or wear.
3. Inspect the bearing halves, bearing caps, and bearing housings for cracks or wear.

INSTALLING

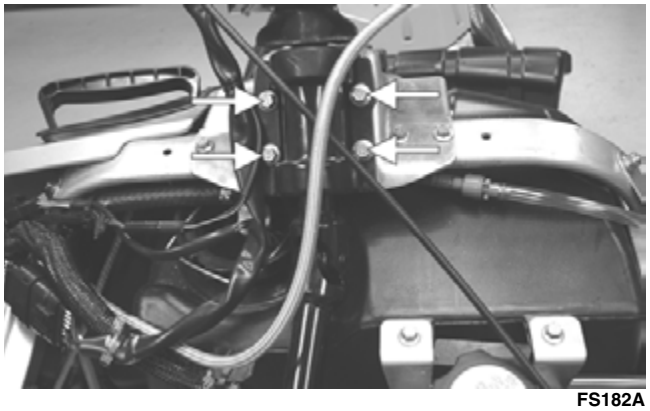
1. Carefully install the steering post into the chassis; then with the number of washers installed on the stud of the post as noted during removing, secure the steering post to the chassis with a new lock nut (threads coated with green Loctite #609). Tighten to 35 ft-lb.


ZJ157A

2. Install the steering tie rod to the steering post and secure with new lock nut. Tighten to 35 ft-lb.

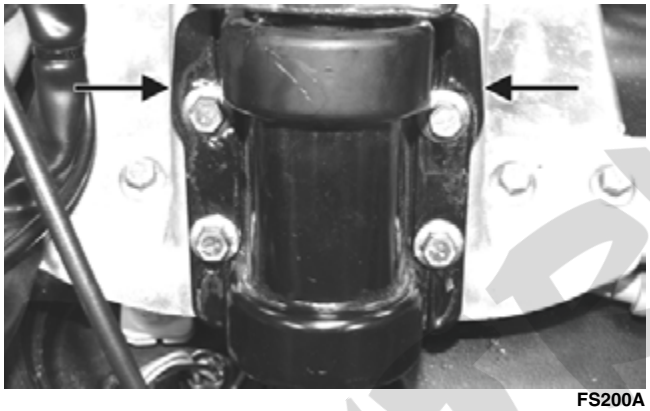

ZJ156A

3. Secure the bearing bracket/steering post assembly to the upper support plate with the bracket plates and cap screws (coated with blue Loctite #243). Tighten the cap screws to 96 in.-lb.



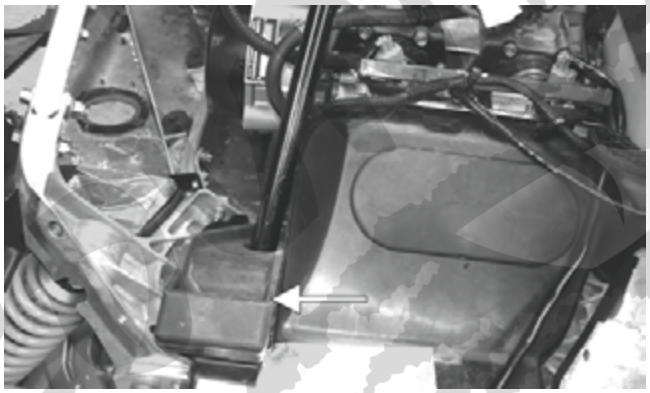
FS182A

■**NOTE: When installing the bracket plates, the wider end of the plate must be directed up.**



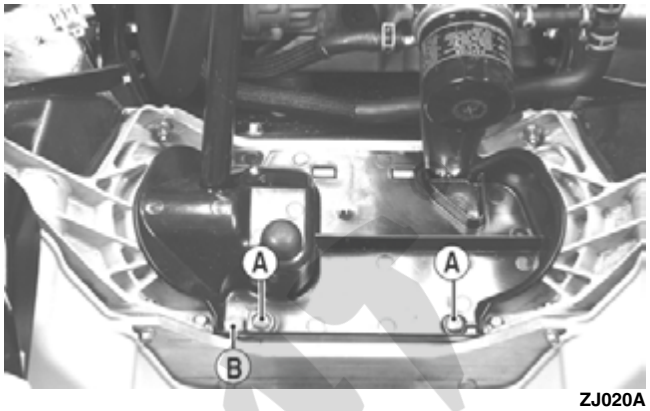
FS200A

4. On the Bearcat 570/F-Series/T-Series, place the rubber exhaust bumper into position on the air silencer.



FS203A

5. Place gaskets on the resonator and exhaust manifold; then install the expansion chamber. Secure the chamber to manifold and upper frame with the springs.
6. On the standard models, place the handlebar/adjuster block onto the steering post; then secure the handlebar to the steering post with the adjuster caps, four cap screws, and lock nuts. Tighten cap screws securely.
7. On the non-turbo TZ1, install the front end close-off cover; then with the exhaust pipe mounting tab (B) installed to the right-side cap screw, tighten the cap screws (A) securely.

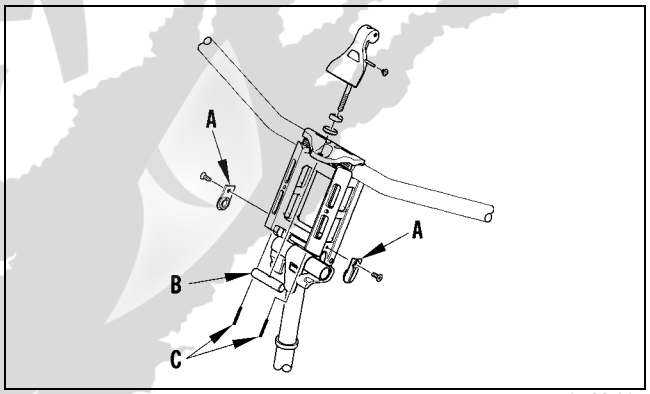


ZJ020A

■**NOTE: On the turbo model, position the intercooler into the grommets of the mounting bracket; then connect the intercooler hoses to the turbo and to the intake plenum. Tighten all hose clamps securely.**

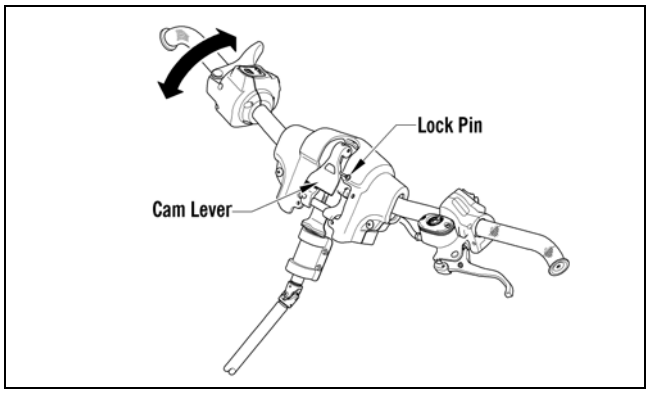
■**NOTE: Steps 8-12 are for the LXR models.**

8. Install the handlebar riser block assembly to the steering post; then secure the assembly with the retainers (A) and set screws.



0744-927

9. With the lock rod (B) and springs (C) in place, thread the cam lever into the lock rod far enough to hold the handlebar in position.
10. Depress the lock pin, lift up on the cam lever, and swing the handlebar up and rotate to the desired position; then press down on the cam lever until the lock pin is properly positioned. Check steering for maximum right/left turning capabilities.



0741-427

CAUTION

Do not rotate the handlebar to position allowing air to enter the brake system.

11. Test the handlebar to ensure it does not rotate within the riser block. If it does rotate, release the cam lever and rotate the cam lever clockwise; then press down on the cam lever until the lock pin is properly positioned and locked. Repeat this procedure until the handlebar is properly secured.
12. After the handlebar is "locked" in position, release the cam lever and rotate it one turn clockwise; then press down on the cam lever until it "locks" in place.

■NOTE: At this point, gently lift the cam lever without pressing in on the lock pin. If the cam lever cannot be lifted, the lock pin is secure.

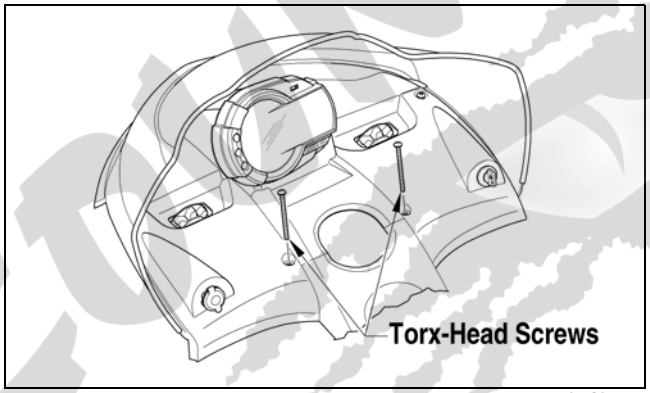
CAUTION

If at any time the lock pin will not engage into the locked position, do NOT operate the snowmobile.

⚠ WARNING

Care must be taken to securely lock the handlebar cam lever to prevent unexpected "movement" of the handlebar during operation over rough terrain. DO NOT offset the handlebar so steering (maximum right/left turning capabilities) are altered or throttle and brake controls will be affected.

13. Secure the console to the steering support with the torx-head screws and tighten the screws securely; then close the left-side and right-side access panels and close the hood.



0743-777

Ski

REMOVING

1. Elevate the front of the snowmobile and secure on a support stand.
2. Remove and discard the cotter pin; then remove the nut and cap screw securing the ski to the spindle.

■NOTE: On F/M/XF models, note the orientation of the damper for installation purposes.

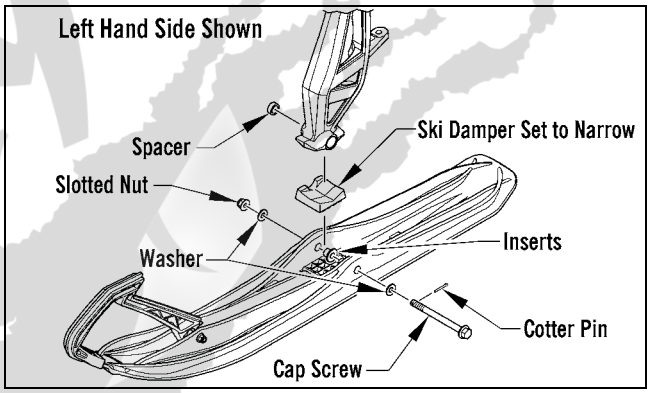
3. Remove the ski. Account for the rubber damper and washers.

INSPECTING

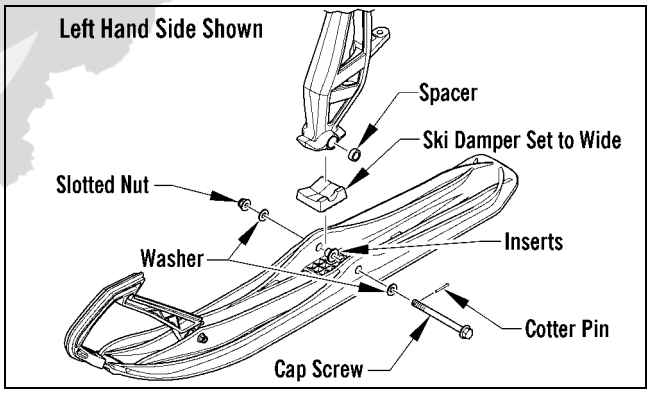
1. Inspect the ski for cracks or deterioration.
2. Inspect the ski for abnormal bends or cracks.
3. Inspect the wear bar for wear.
4. Inspect all hardware and the spindle bushings for wear and damage.
5. Inspect the rubber damper for damage or wear.

INSTALLING

1. Slide a washer onto the cap screw used to secure the ski; then apply all-temperature grease to the shaft portion of the cap screw and spindle axle.
2. Install the spindle axle into the spindle; then position the ski damper into the bottom of the ski making sure the damper is properly positioned for the desired ski stance.



0746-796



0746-797

■NOTE: The ski damper must be positioned in the ski so it is directly under the spindle.

3. With the cap screw hole of the ski centered with the spindle axle, slide the cap screw with washer through the outside of the ski and spindle assemblies.

■NOTE: Local laws and/or regulations as to maximum width of the ski stance may be applicable. Always comply with the maximum width laws and/or regulations when adjusting ski stance.

■**NOTE: Install the cap screw so the lock nut will be located to the inside of the ski and the cotter pin slot in the cap screw will be horizontal with the ski.**

4. Install the remaining washer and lock nut; then tighten the lock nut to 35 ft-lb.

■**NOTE: Assure that the cotter pin slot in the cap screw is still horizontal with the ski (see illustration); then proceed to step 5.**

5. Install a new cotter pin from the back side of the ski cap screw and spread the pin.

Ski Wear Bar

The ski wear bar is a replaceable bar attached to the underside of the ski. If the snowmobile is operated primarily in deep snow, ski wear bar wear will be minimal; however, if the snowmobile is operated on terrain where the snow cover is minimal, the ski wear bar will wear faster. Arctic Cat recommends that the ski wear bars be replaced if worn to 1/2 of original diameter.

REMOVING

1. Raise the front of the snowmobile and secure with a suitable stand.
2. Remove the lock nuts securing the wear bar to the ski; then remove the wear bar.

INSTALLING

1. Install the wear bar into the ski making sure it is fully seated using a rubber mallet.
2. Secure the wear bar with lock nuts. Tighten to 96 in.-lb.

Drag Link (Bearcat/F-Series/ T-Series)

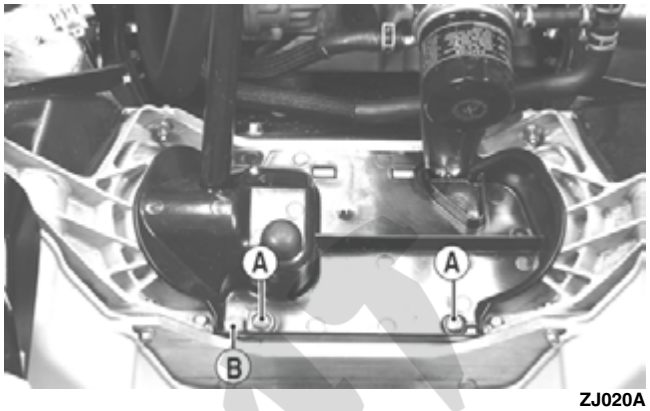
REMOVING

■**NOTE: On the F5 to remove the drag link, it will be necessary to remove the air silencer. Proceed to Air Silencer (F5) sub-section in Section 3 and follow the REMOVING procedure.**

1. On the 1100 cc models, remove the hood and disconnect the oxygen temperature sensor; then remove the exhaust springs securing the exhaust pipe to the manifold, mounting tab, and resonator. Move and secure the pipe out of the way.

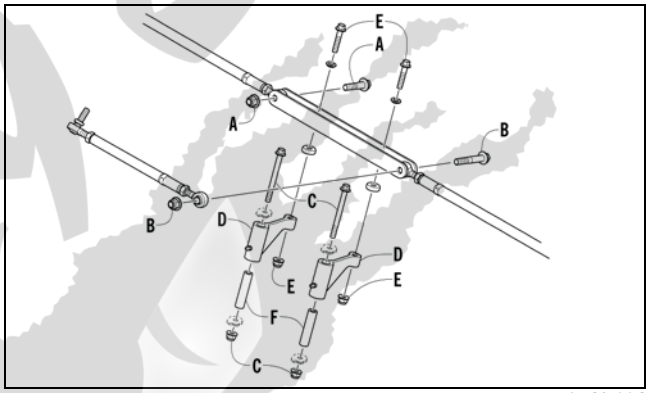
■**NOTE: On the turbo model, loosen the intercooler hose clamps at the intake pipe and the turbocharger; then carefully work the intercooler upward until it releases from the rubber grommets.**

2. On the non-turbo 1100 cc models, remove the two cap screws (A) securing the front end close-off cover to the front end; then remove the cover and account for the exhaust pipe mounting tab (B) from the right-side cap screw.



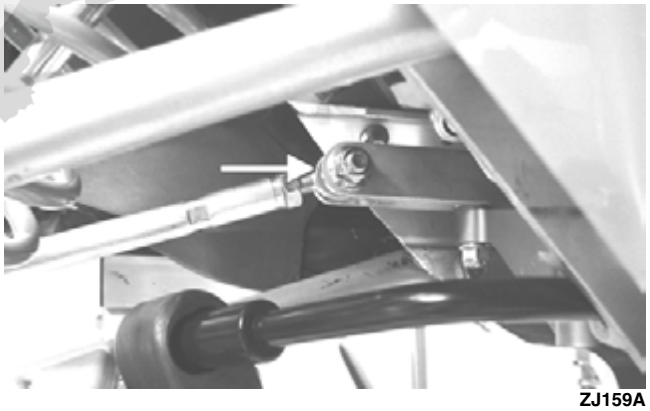
ZJ020A

3. Remove the cap screw and lock nut (A) from the drag link end of the inner tie rod; then remove the cap screw and lock nut (B) securing the left-side inner tie rod and steering tie rod to the drag link. Discard the lock nuts.



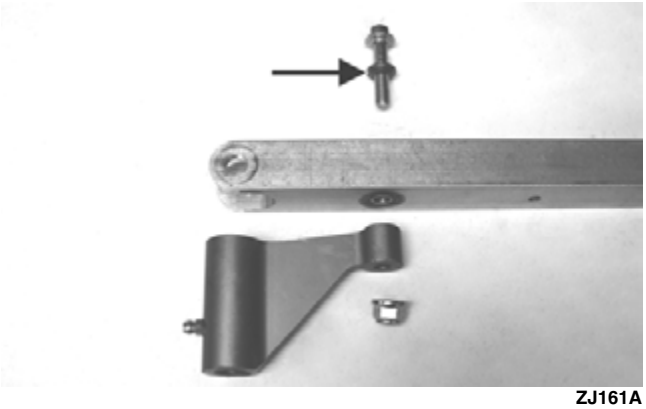
0741-924

■**NOTE: To aid in removing the tie rod cap screws from the drag link, position the drag link so the cap screw is aligned with the opening between the skid plate and the suspension mounting bracket.**


ZJ159A

4. Remove the cap screws and lock nuts (C) from the steering arms (D); then remove the drag link and steering arms from the suspension mounting bracket.
5. Secure the drag link in a suitable vise; then remove the cap screws and lock nuts (E) securing the steering arms to the drag link. Remove the arms and account for the axles (F) inside the steering arms.

■**NOTE: With the steering arms removed, note the direction of the steering arms for installing purposes.**



ZJ161A

6. If replacing using a suitable punch, drive the two bearings out of the drag link.



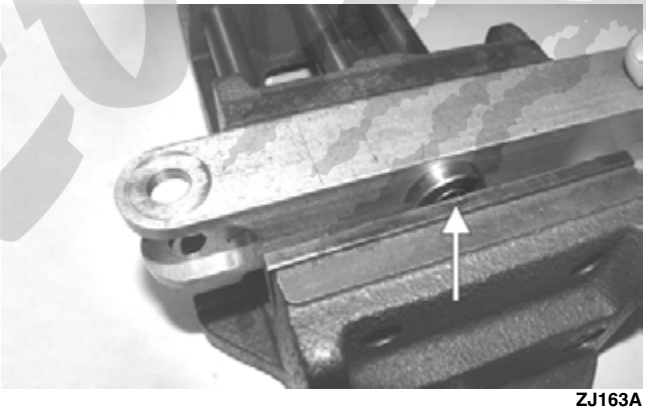
ZJ162

INSPECTING

1. Inspect the entire drag link (especially in the areas where the ball joints attach) for any signs of cracks, wear, or damage.
2. Inspect the bearings and axles for wear or damage.

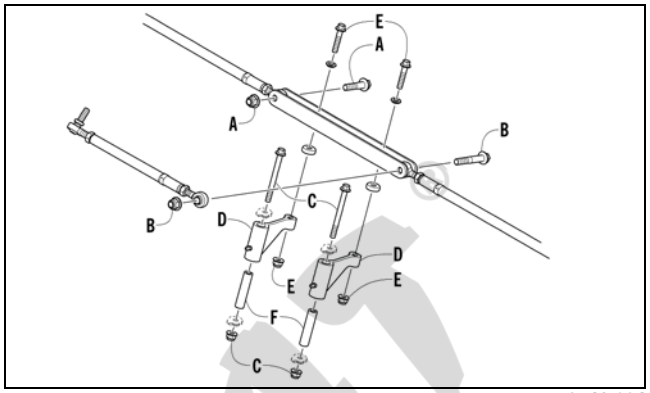
INSTALLING

1. If the bearings were removed, place the drag link in a suitable vise and press the bearings into the drag link.



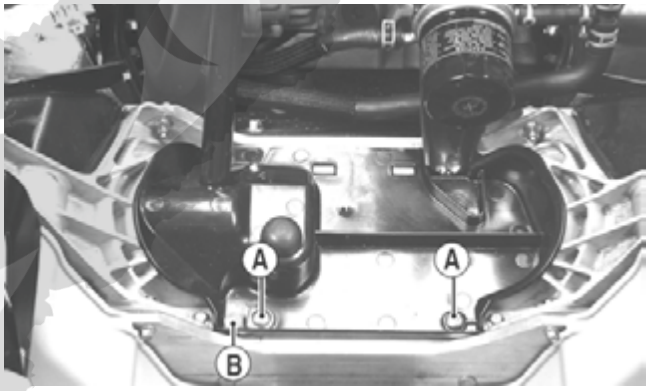
ZJ163A

2. Secure the steering arms to the drag link with the drag link axles, cap screws (E) (threads coated with blue Loctite #243), and new lock nuts (E). Tighten to 12 ft-lb.



0741-924

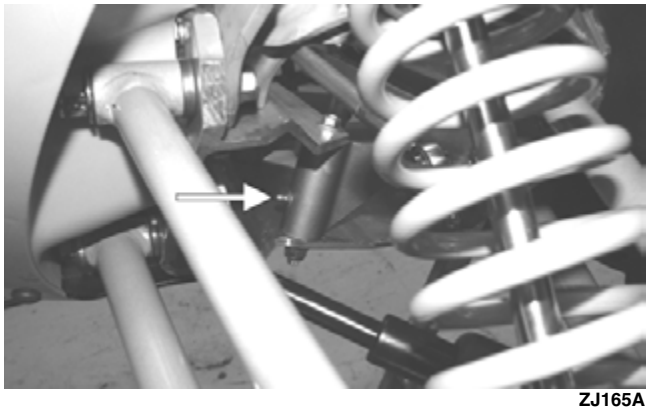
3. Place the steering arms/drag link assembly into position in the chassis; then secure the arms (D) with axles (F) to the chassis with cap screws and new lock nuts (C). Tighten the lock nuts to 20 ft-lb.
4. Install the left-side spindle tie rod and steering tie rod to the drag link with cap screw (threads coated with green Loctite #609) and new lock nut (B); then install the remaining tie rod to the drag link with cap screw (threads coated with green Loctite #609) and new lock nut (A). Tighten to 35 ft-lb.
5. On the non-turbo 1100 cc models, install the front end close-off cover and with the exhaust pipe mounting tab (B) in position on the right-side cap screw, tighten the two cap screws (A) securely.



ZJ020A

■NOTE: On the turbo model, position the intercooler into the grommets of the mounting bracket; then connect the intercooler hoses to the turbocharger and to the intake plenum. Tighten all hose clamps securely.

6. On the 1100 cc models, install the exhaust pipe and secure the pipe to resonator, manifold, and the mounting tab with springs; then connect the oxygen sensor and install the hood.
7. Using an all-temperature grease, grease the steering arms; then verify free movement of the steering components.



ZJ165A

■**NOTE: On the F5 to finalize the installing of the drag link, proceed to Air Silencer (F5) sub-section in Section 3 and follow the INSTALLING procedure.**

Tie Rods (Bearcat/F-Series/T-Series)

REMOVING AND DISASSEMBLING

1. Remove and discard the lock nut securing the inner tie rod to the spindle.

■**NOTE: Note whether the inner tie rod is installed on the top side or on the bottom side of the spindle arm for installing purposes.**

2. Turn the handlebar in the appropriate direction and remove the cap screw and lock nut securing the inner tie rod to the drag link. Discard the lock nut.

■**NOTE: To aid in removing the inner tie rod cap screw from the drag link, position the drag link so the cap screw is aligned with the opening between the skid plate and the suspension mounting bracket.**



ZJ159A

3. Loosen the jam nuts securing the ball joints to the tie rod; then remove the ball joints from the tie rod.

CLEANING AND INSPECTING

1. Inspect the ball joints and tie rods for damaged threads or wear.
2. Inspect the ball joints and tie rods for cracks or unusual bends.
3. Wash the ball joint in parts-cleaning solvent. Dry with compressed air. Inspect the ball joint pivot area for wear. Apply an all-temperature grease to the ball joint.

⚠ WARNING

Always wear safety glasses when using compressed air.

ASSEMBLING AND INSTALLING

1. Install the jam nuts onto the ball joints; then thread the ball joints into the tie rod.
2. Secure the steering tie rod and the left-side inner tie rod to the drag link with the cap screw (threads coated with green Loctite #609) and new lock nut and tighten to 35 ft-lb; then secure the right-side inner tie rod to the spindle. Tighten the cap screws (threads coated with green Loctite #609) and new lock nuts to 30 ft-lb.
3. Secure the right-side spindle tie rod to the drag link and spindle with the cap screws (threads coated with green Loctite #609) and new lock nuts; then tighten to 35 ft-lb.
4. Adjust ski alignment (see Ski Alignment in this section).
5. Tighten the jam nuts (coated with blue Loctite #243) against the tie rod to 13 ft-lb.

⚠ WARNING

Neglecting to lock the jam nuts against the tie rod may cause loss of snowmobile control and possible personal injury.

Spindle (Bearcat/F-Series/T-Series)

REMOVING

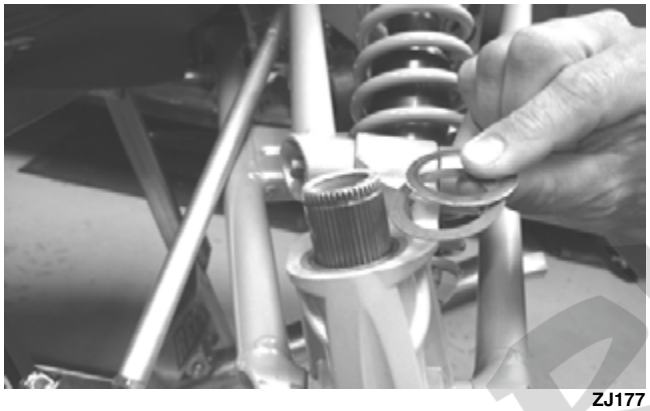
1. Position the front of the snowmobile up on a safety stand.
2. Remove the ski.
3. Remove the tie rod cap and lock nut securing the tie-rod ball joint to the spindle; then remove the ball joint from the spindle.

■**NOTE: Note whether the tie rod is installed on the top side or on the bottom side of the spindle arm for installing purposes.**

4. Remove the spindle cap and snap ring from the top of the spindle; then remove the cap screw securing the spindle arm to the spindle. Remove the spindle arm and account for and note the number of thrust washers for installing purposes.



ZJ172



ZJ177

■**NOTE: The cap screw must be removed to remove the spindle from the spindle housing.**

5. Using a soft hammer and a suitable driving tool, drive the spindle out of the spindle housing.
6. Remove the lock nut and cap screw securing the shock absorber to the spindle. Account for all mounting hardware.



ZJ173A

7. Remove the four torx-head cap screws securing the lower A-arm retainer to the spindle; then remove the cap and lower arm from the spindle.



ZJ174A

8. Remove the cap screw and lock nut securing the spindle to the upper A-arm. Account for all mounting hardware.

INSPECTING

1. Inspect the spindle for excessive wear, cracks, bends, or imperfections.
2. Inspect all welds for cracking.
3. Inspect the A-arm bushings and axle area for wear.
4. Secure the spindle in a vise. Rotate the spindle clockwise and counterclockwise. The movement should be smooth and free. If the spindle movement is rough or binding, grease the spindle with an all-temperature grease. Rotate the spindle. If the movement remains rough, replace the spindle.

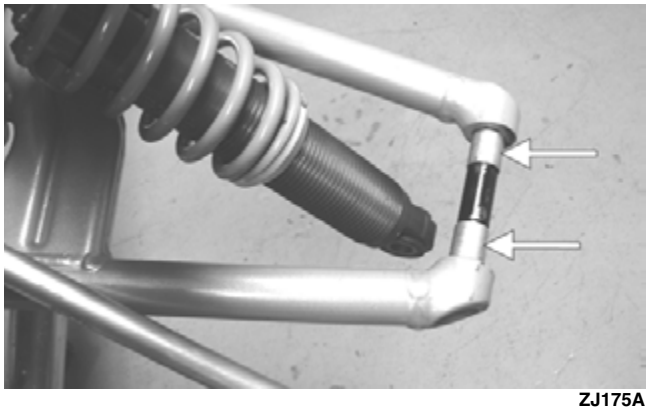
■**NOTE: When greasing the spindle, use enough grease so it can be seen coming out at both the top and bottom of the spindle.**

5. Inspect the spindle axle and bearings for wear, damage, or loose fit. Replace the bearings as a set.
6. Inspect the tie-rod ball joint in place. If damage, wear, or unusual bends are noted, loosen the jam nut; then remove the ball joint from the tie rod.

■**NOTE: Replacing the ski bolt bushings is difficult. The existing bushings will be damaged during removal. Be careful, however, not to damage the spindle when removing the bushings. Press the new bushings into the spindle.**

INSTALLING

1. Place the upper arm end (with axle) into position in the spindle. Secure with cap screw and lock nut. Tighten only until snug.
2. Install new split bearings onto the shaft of the lower A-arm; then using a suitable pliers, evenly compress the bearing until properly fitted to the shaft.



ZJ175A

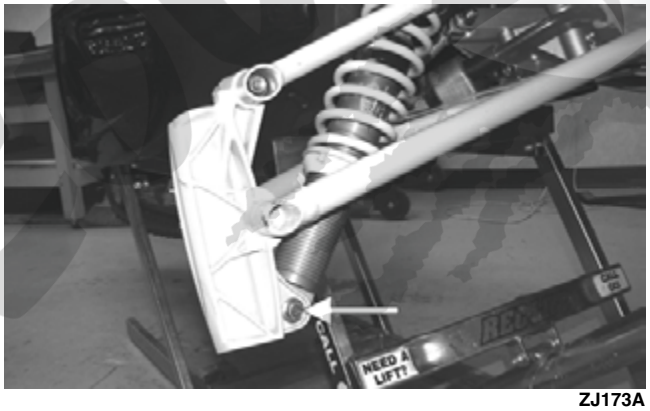
■**NOTE: The split bearings cannot be reused; they must be replaced with new ones.**

3. Position the spindle into the lower A-arm; then install the retainer and secure the cap to the spindle with the four torx-head cap screws (coated with blue Loctite #243). Tighten to 13 ft-lb.



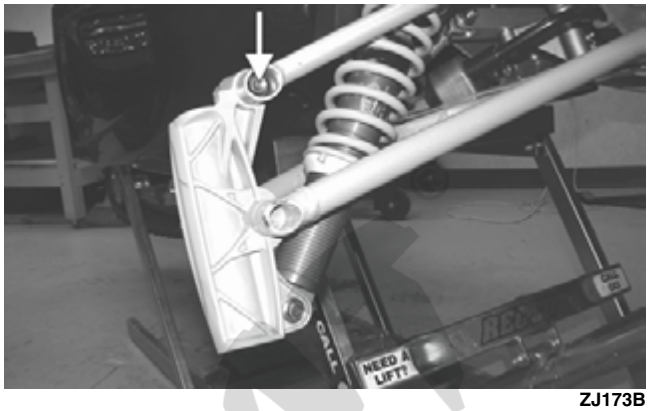
ZJ174A

4. With the shock sleeve in place, align the lower shock eyelet with the mounting hole in the spindle; then secure with the cap screw, optional washers, and lock nut. Tighten to 32 ft-lb.



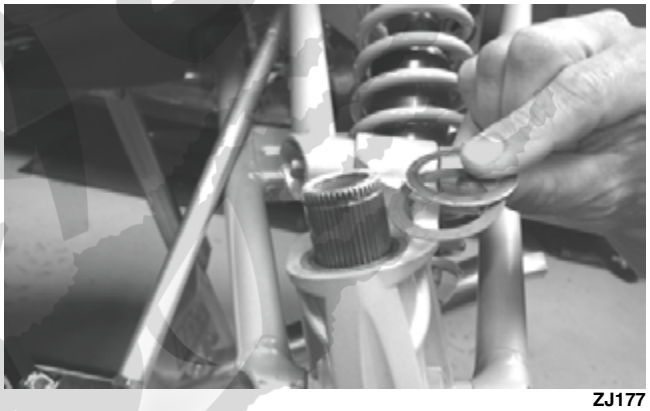
ZJ173A

5. At this point, tighten the lock nut (from step 1) to 32 ft-lb.

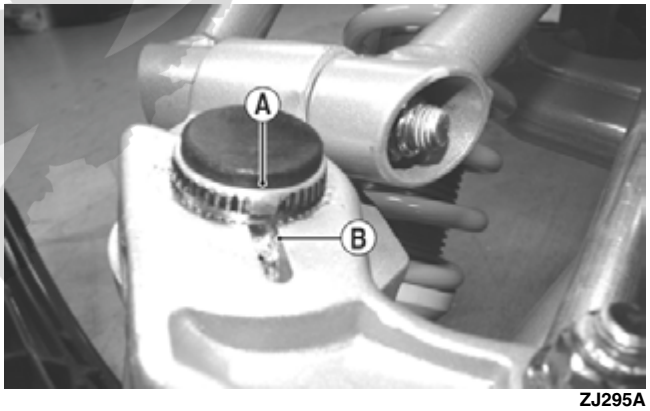


ZJ173B

6. Install the spindle into the spindle housing; then with the correct number of thrust washers (as noted in removing) and with the space (A) in the splines of the spindle aligned with the slot (B) in the steering arm, install the steering arm.



ZJ177



ZJ295A

7. Install the cap screw (threads coated with green Loctite #609) securing the steering arm to the spindle; then tighten to 40 ft-lb.



ZJ176A

8. Install the snap ring and spindle cap.



ZJ172

9. Place the steering tie-rod ball joint into position on the steering arm as noted during removing and secure with a lock nut. Tighten to 30 ft-lb; then install the tie rod cap.
10. Install the ski and tighten to 26 ft-lb.
11. Remove the safety stand from beneath the front end.

Spindle (F/M/XF)

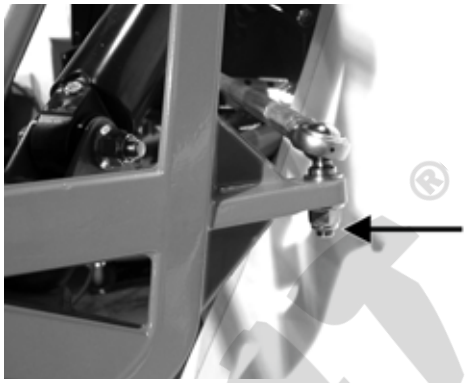
REMOVING

1. Position the front of the snowmobile on a safety stand; then remove the ski (see Ski in this section).
2. Remove the nyloc nut and cap screw securing the shock absorber to the spindle.



PC087A

3. Remove the nyloc nut securing the tie rod to the spindle arm. Account for the washer on the top side.

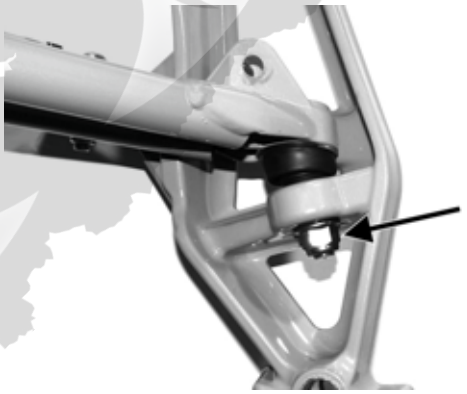


PC088A

4. Remove the two nyloc nuts securing the spindle to the upper and lower A-arms; then using a rubber mallet, remove the arms from the spindle.



PC089A



PC090A

5. Remove the spindle.

INSPECTING

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Inspect the spindle for excessive wear, cracks, bends, or imperfections.
2. Inspect the A-arm bushings and axle area for wear.
3. Inspect the ski spindle axle and bearings for wear, damage, or loose fit. Replace the bearings as a set.

■NOTE: Replacing the ski bolt bushings is difficult. The existing bushings will be damaged during removal. Be careful, however, not to damage the spindle when removing the bushings. Press the new bushings into the spindle.

INSTALLING

1. Place the shock absorber into position on the spindle. Secure with the cap screw and nyloc nut. Tighten to 32 ft-lb.



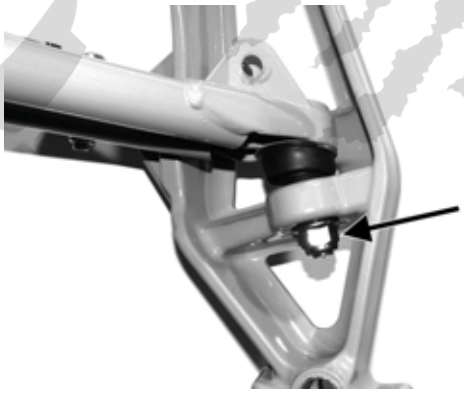
PC087A

2. Install the upper and lower A-arms into the spindle; then remove the snowmobile from the support stand. Secure with new nyloc nuts. Tighten to 45 ft-lb.

■NOTE: The weight of the snowmobile will allow the ball joints to seat into the spindle before tightening the nuts.

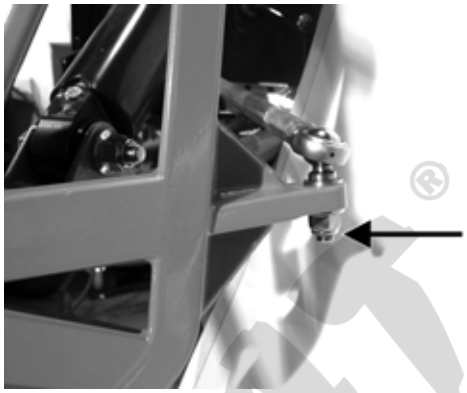


PC089A



PC090A

3. Place the tie rod with washer into position on the spindle arm. Secure with a new nyloc nut. Tighten to 32 ft-lb.



PC088A

4. Install the ski (see Ski in this section).
5. Turn the handlebar fully to the right and then to the left to verify the steering moves freely.

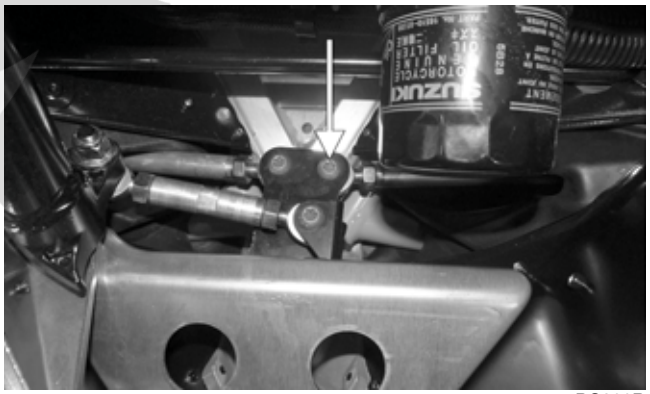
Steering Tie Rod (F/M/XF)

■NOTE: To access the steering arm, the steering tie rods must be removed.

REMOVING

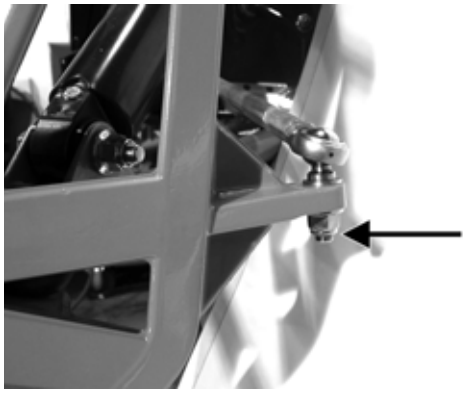
■NOTE: On 800 cc and 1100 cc turbo models, certain components will have to be removed in order to access the steering arm. Refer to the appropriate sections to remove those components. On 1100 cc non-turbo models, only the hood needs to be removed.

1. Remove both torx-head screws and nyloc nuts securing the steering tie rod ends to the steering arm. Discard both nuts.



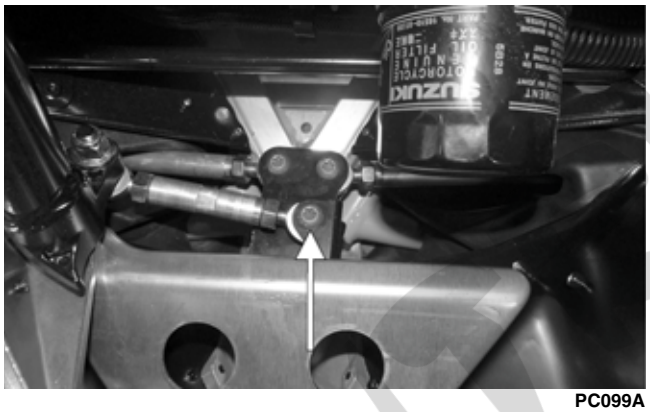
PC099B

2. Remove the nyloc nuts securing the steering tie rod ends to the spindle arms. Account for the washers and discard both nuts.



PC088A

3. Slide the steering tie rod out of the steering boot and out of the snowmobile.
4. Remove the nyloc nut securing the tie rod end to the steering arm. Discard the nut.



PC099A

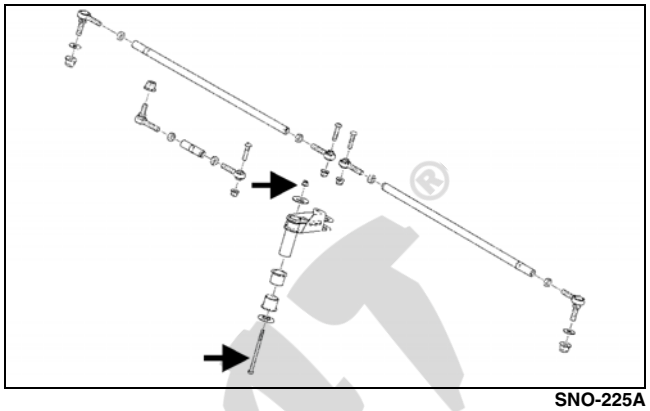
5. Remove the nyloc nut securing the tie rod to the steering post. Discard the nut.



PC099C

■NOTE: At this point if the technician's objective is to remove the steering arm, the reinforcement bracket will need to be removed by drilling out the appropriate rivets.

6. Remove all torx-head screws securing the front skid plate to the chassis; then remove the cap screw and nut securing the steering arm to the chassis. Account for two washers and two bushings.



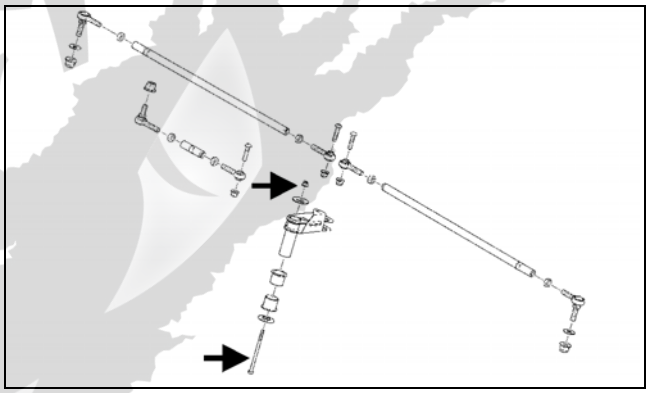
SNO-225A

INSPECTING

1. Inspect the ball joints for damaged threads or wear.
2. Inspect the tie rod for damage, unusual bends, or wear.

INSTALLING

1. Secure steering arm into position and secure using the existing cap screw, flat washers, and nut. Tighten to 96 in.-lb.



SNO-225A

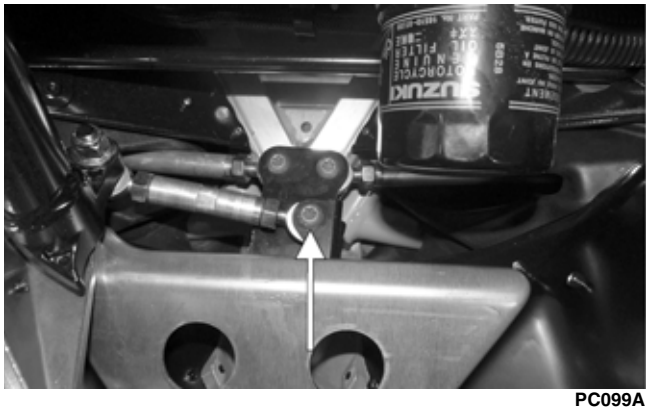
2. Place the tie rod into position on the steering post. Secure with a new nyloc nut. Tighten to 35 ft-lb.



PC099C

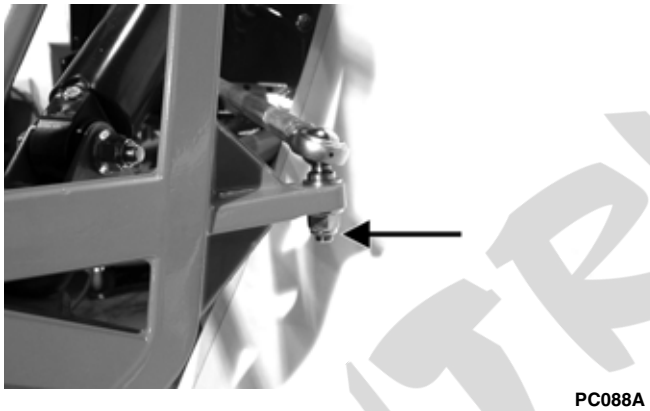
■NOTE: Make sure the tie rod tab is fully seated into the steering post and threads of the ball joint are above the nut when tightened correctly.

3. Place the tie rod end into position on the steering tie rod bracket. Secure with a new nyloc nut. Tighten to 20 ft-lb.



PC099A

4. Slide the steering tie rod through the steering boot and into the snowmobile; then place the steering tie rod into the spindle arm with the washer. Secure with a new nyloc nut. Tighten to 32 ft-lb.



PC088A

5. Secure the steering tie rod to the steering tie rod bracket with the screw and new nyloc nut. Tighten to 20 ft-lb.



PC099B

Steering Tie Rod (Bearcat/ F-Series/T-Series)

REMOVING

1. Remove the springs securing the expansion chamber; then remove the expansion chamber from the engine compartment. Account for the two gaskets and the rubber exhaust bumper.



FS203A

2. Remove and discard the lock nut securing the steering tie rod to the steering post; then remove the cap screw and lock nut securing the left-side inner tie rod and steering tie rod to the drag link. Discard the lock nut.



FS260A

INSPECTING

1. Inspect the ball joints for damaged threads or wear.
2. Inspect the tie rod for damage, unusual bends, or wear.

INSTALLING

1. Thread the jam nuts onto the ball joints; then equally thread the ball joints onto the steering tie rod.

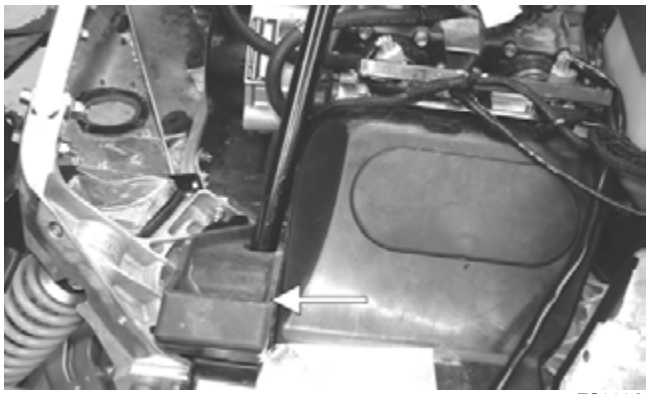
■NOTE: There must be an approximate equal number of threads exposed on each ball joint.

2. Place the tie-rod assembly into position; then rotate the steering tie rod until the holes in the ball joints align with the holes in the steering post and the drag link.
3. Secure the steering tie rod to the steering post with the new lock nut and tighten to 35 ft-lb; then secure the steering tie rod and left-side inner tie rod to the drag link with the cap screw (threads coated with green Loctite #609) and new lock nut. Tighten to 35 ft-lb.
4. Ensure correct handlebar/ski alignment (adjust steering tie rod as necessary); then tighten the jam nut (coated with blue Loctite #243) to 13 ft-lb.

⚠ WARNING

Neglecting to lock the tie rod by tightening the jam nuts may cause loss of snowmobile control and possible personal injury.

5. Place the rubber exhaust bumper into position on the air silencer.



FS203A

6. Place gaskets on the resonator and exhaust manifold; then install the expansion chamber. Secure the chamber to manifold and upper frame with the springs.

Ski Alignment

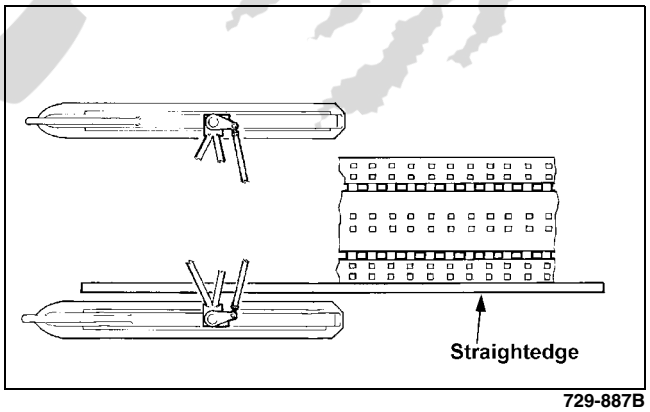
CHECKING

■NOTE: Track tension and alignment must be properly adjusted prior to checking or adjusting ski alignment. Ski alignment must be performed on a flat, level surface. Ski toe-out must fall within the range of 1/16-1/4 in.

1. Raise the front end of snowmobile just high enough to keep the skis from contacting the floor.
2. Turn the handlebar to the straight-ahead position. Visually inspect the handlebar for being centered and in the straight-ahead position.
3. With the handlebar in the straight-ahead position, secure the handlebar to prevent the alignment from becoming disturbed during the remainder of the alignment procedure.

■NOTE: Track tension and alignment must be properly adjusted prior to placing the straightedge against the outside edge of the track.

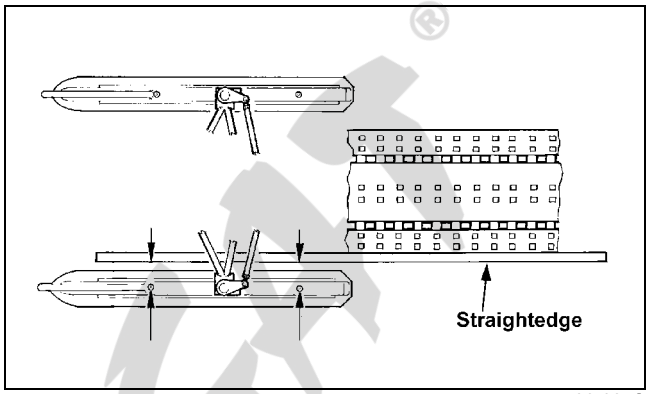
4. Place a long straightedge against the outside edge of the track so it lies near the inside edge of the left-side ski.



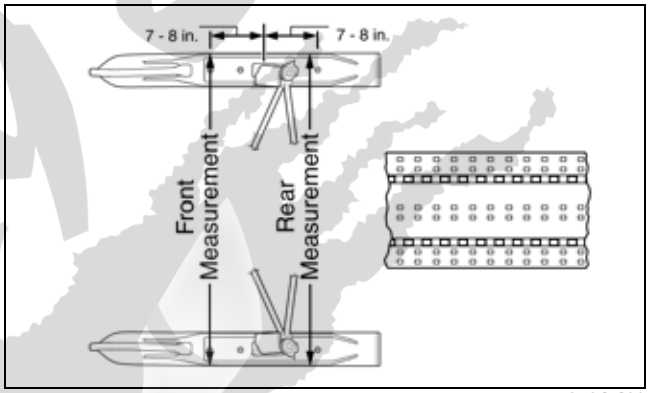
729-887B

■NOTE: The straightedge should be long enough to extend from the back of the track to the front of the ski.

5. Measure the distance from the straightedge to the left-side ski wear bar bolts in two places: approximately 7-8 in. in front of the spindle and 7-8 in. behind the spindle. Record the measurements taken for the left side.



729-887A



0734-408

6. Place the straightedge against the outside edge of the track so it lies near the inside edge of the right-side ski.
7. Measure the distance from the straightedge to the right-side ski wear bar bolts in two places: 7-8 in. in front of the spindle and 7-8 in. behind the spindle. Record the measurements taken for the right side.

⚠ WARNING

The measurement from the front and rear wear bar bolts to the straightedge can be equal (ski parallel to the track), but the front measurement must never be less (ski toed-in) or poor handling will be experienced. The front wear bar bolt measurement to the straightedge must not exceed the measurement from the rear wear bar bolt to the straightedge (ski toed-out) by more than 5/32 in.

8. If ski alignment is not as specified, adjust the alignment of the ski(s) not parallel to the straightedge.

ADJUSTING (F/M/XF)

■NOTE: The following procedure can be used to adjust the alignment of either ski.

■NOTE: The rivets securing the steering boots will have to be removed in order to adjust the inner tie rod ends.

1. Secure the steering tie rod in the centered position.

2. Loosen both spindle tie rod jam nuts on the same side as the ski to be aligned.
3. Using a wrench on the spindle tie rod "flats," rotate the spindle tie rod until recommended specification is attained.
4. Apply blue Loctite #243 to each jam nut thread area; then tighten the jam nuts against the spindle tie rod.

■NOTE: Repeat this procedure on each side (if necessary) until ski toe-out is within specification.

⚠ WARNING

Neglecting to lock the tie rod by tightening the jam nuts may cause loss of snowmobile control and possible personal injury.

ADJUSTING (Bearcat/F-Series/T-Series)

■NOTE: The following procedure can be used to adjust the alignment of either ski.

To adjust ski alignment, use the following procedure.

1. Secure the steering tie rod in the centered position.
2. Loosen both inner tie rod jam nuts on the same side as the ski to be aligned.
3. Using a wrench on the spindle tie rod "flats," rotate the spindle tie rod until recommended specification is attained.
4. Apply blue Loctite #243 to each jam nut thread area; then tighten the jam nuts against the inner tie rod. Tighten to 13 ft-lb.

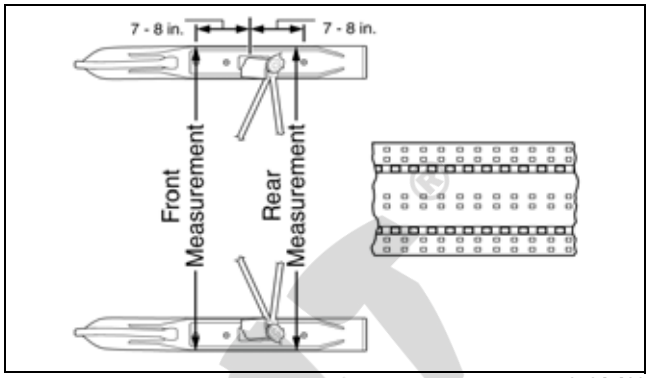
■NOTE: Repeat this procedure on each side (if necessary) until ski toe-out is within specification.

⚠ WARNING

Neglecting to lock the tie rod by tightening the jam nuts may cause loss of snowmobile control and possible personal injury.

VERIFYING

1. With the handlebar in the straight-ahead position, verify ski alignment by measuring across from the outside edge of the left-side wear bar bolts to the outside edge of the right-side wear bar bolts (without using the straightedge) in two places: approximately 7-8 in. in front of the spindle and 7-8 in. behind the spindle.
2. The measurement from in front of the spindle to the outer edge of the wear bar bolts (without using the straightedge) must not exceed the rear measurement by more than 1/16-1/4 in. toe-out.



0734-408

⚠ WARNING

The measurement taken in front of the spindle must never be less than the measurement taken behind the spindle or poor handling will be experienced. Neglecting to lock the tie rod by tightening the jam nuts may cause loss of snowmobile control and possible personal injury.

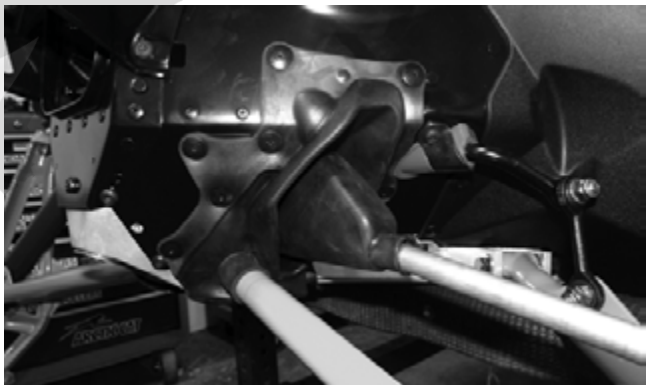
A-Arms (F/M/XF)

REMOVING

1. Elevate the front of the snowmobile and secure using a suitable support stand.

■NOTE: On turbo models, the front bumper will have to be removed.

2. Remove the torx-head screws securing the front skid plate to the chassis; then remove the front skid plate.
3. Remove the eight rivets securing the steering boot to the chassis; then slide the boot away from the snowmobile.



PC092

4. Remove the ski shock absorber (see Ski Shock Absorber in this section).
5. Remove the two lock nuts securing the spindle to the A-arms; then using a rubber mallet, remove the arms from the spindle. Discard the nuts.

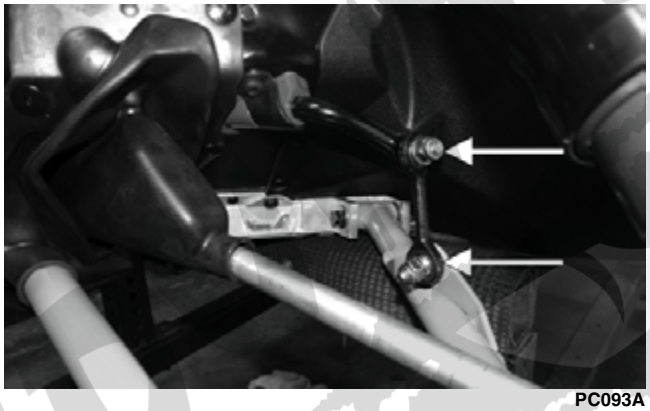


PC089A



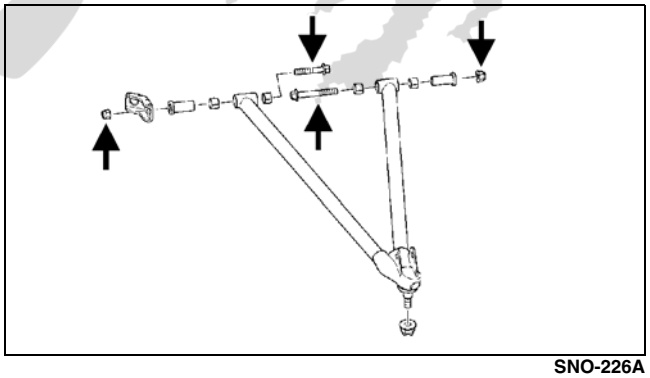
PC090A

6. On the F/XF, remove the cap screw and lock nut securing the sway bar link to the lower arm. Discard the nut.



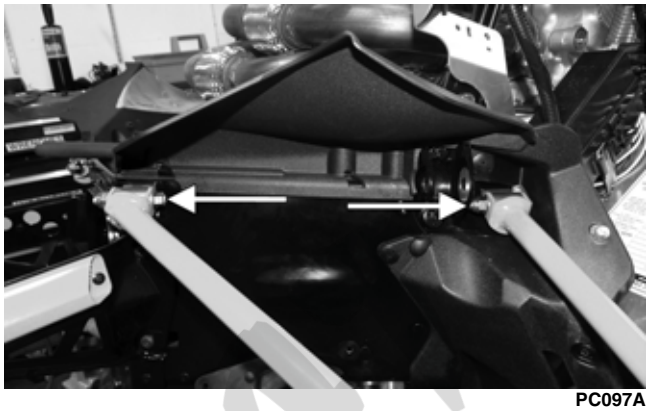
PC093A

7. Remove the two cap screws and nyloc nuts securing the lower arm to the chassis; then slide the boot from the arm and remove the arm.



SNO-226A

8. Remove the two cap screws and lock nuts securing the upper arm to the chassis. Discard the nuts.



PC097A

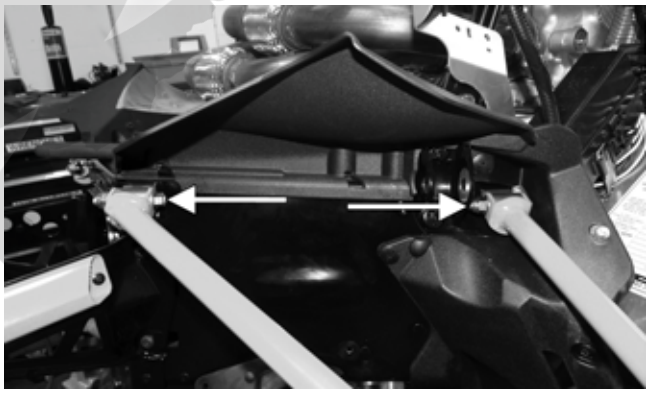
■**NOTE: On the turbo models, the front left fascia must be removed in order to access the upper A- arm cap screws.**

INSPECTING

1. Inspect the arm welded areas for cracks or any signs of deterioration.
2. Inspect the bearings and axles for wear or damage.
3. Inspect the arm tubing for signs of twisting or bending.
4. Inspect mounting location of the chassis for cracks or wear.

INSTALLING

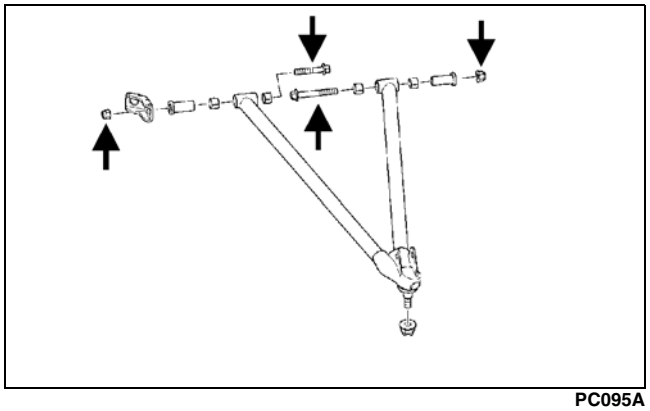
1. Place the upper arm into position on the chassis and secure with the cap screws and new nyloc nuts. Tighten to 23 ft-lb.



NEW

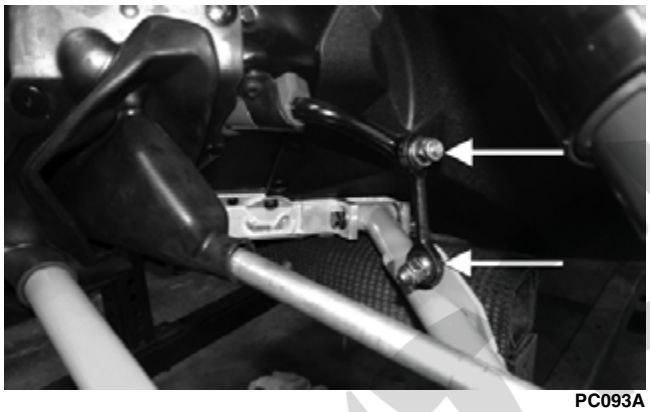
■**NOTE: On the turbo models, install the front left fascia using the existing torx-head screws.**

2. Slide the lower arm into the boot; then place the arm into position on the chassis. Secure with the cap screws and new nyloc nuts and tighten to 55 ft-lb (front) and 45 ft-lb (rear).



PC095A

3. On the F/XF, secure the sway bar link to the lower arm with the cap screw and new nyloc nut. Tighten to 23 ft-lb.



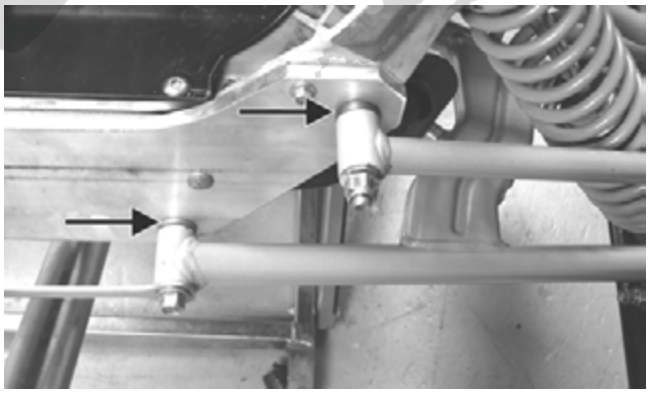
PC093A

4. Secure the A-arms to the spindle (see Spindle in this section).
5. Install the ski shock absorber (see Ski Shock Absorber in this section).
6. Place the front skid plate into position; then secure with the torx-head screws. Install bumper on turbo models.

A-Arms (Bearcat/F-Series/ T-Series)

REMOVING UPPER ARMS

■NOTE: For installing purposes, note the position of the axle shoulders.



ZJ168A

1. Elevate the front of the snowmobile with a suitable safety stand or lift.

CAUTION

Never use the front bumper to support the front of the snowmobile off the floor.

2. Remove the cap screw and lock nut securing the upper arms to the spindle. Account for the spindle axle.
3. Remove the cap screw and lock nut securing the front upper arm to the chassis; then remove the cap screw and lock nut securing the rear upper arm to the chassis. Account for the axles.

INSPECTING

1. Inspect the arm welded areas for cracks or any signs of deterioration.
2. Inspect the bearings and axles for wear or damage.
3. Inspect the arm tubing for signs of twisting or bending.

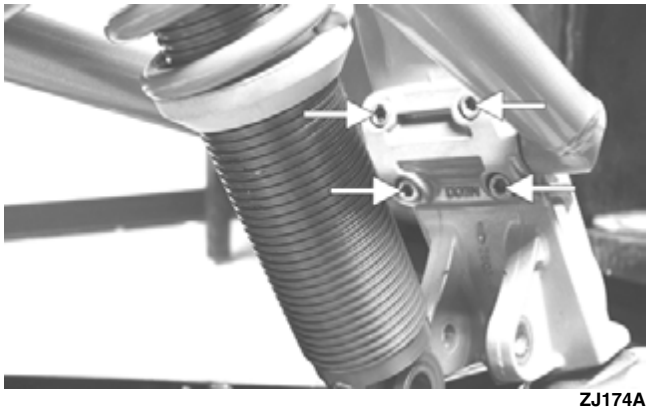
INSTALLING UPPER ARMS

1. With the axles properly installed as noted during removing, install the front and rear upper arms to the chassis; then secure the arms with the cap screws and lock nuts. Tighten to 32 ft-lb.
2. With the axle installed in the spindle, secure the upper arms to the spindle with the cap screw and lock nut. Tighten to 32 ft-lb.

REMOVING LOWER A-ARM

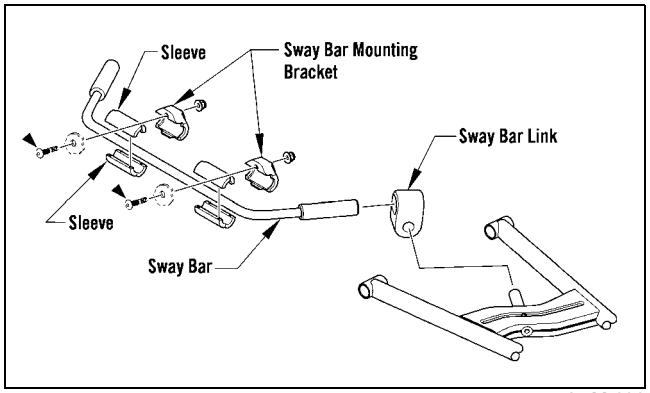
■NOTE: On the F5 to remove the lower A-arms, it will be necessary to remove the air silencer. Proceed to Air Silencer (F5) sub-section in Section 3 and follow REMOVING procedure.

1. Elevate the front of the snowmobile with a suitable safety stand or lift.
2. Remove the cap screw and lock nut securing the shock absorber to the spindle; then remove the shock from the spindle and account for the shock sleeve.
3. Remove the four torx-head cap screws securing the lower A-arm retainer to the spindle; then remove the cap and lower arm from the spindle.



ZJ174A

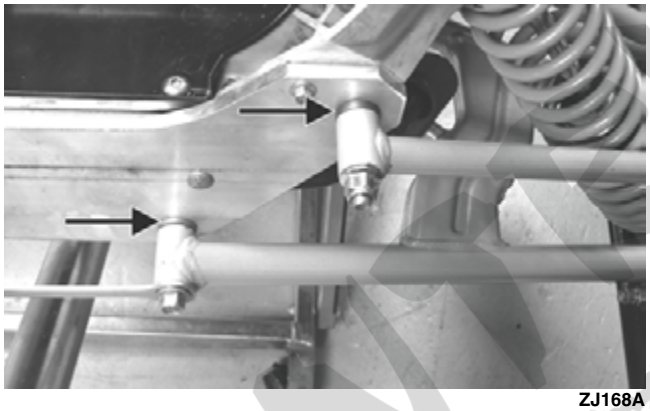
4. Secure the upper arms and spindle out of the way.



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5. Remove the cap screws and lock nuts securing the lower A-arm to the chassis; then remove the arm from the sway bar and chassis and account for the axles and sway bar link.

■NOTE: For installing purposes, note the position of the axle shoulders.


ZJ168A

6. If applicable using a flat-blade screwdriver, pry the split bearings from the spindle axle of the A-arm.

■NOTE: The split bearings cannot be reused; they must be replaced with new ones.

INSPECTING

■NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Inspect the arm welded areas for cracks or any signs of deterioration.
2. Inspect the bearings and axles for wear or damage.
3. Inspect the arm tubing for signs of twisting or bending.

INSTALLING LOWER A-ARM

1. If removed, install new split bearings onto the shaft of the lower A-arm; then using a suitable pliers, evenly compress the bearing until properly fitted to the shaft.
2. Install the lower A-arm into the sway bar link and with the axles properly installed as noted in removing, place the arm into position in the chassis.

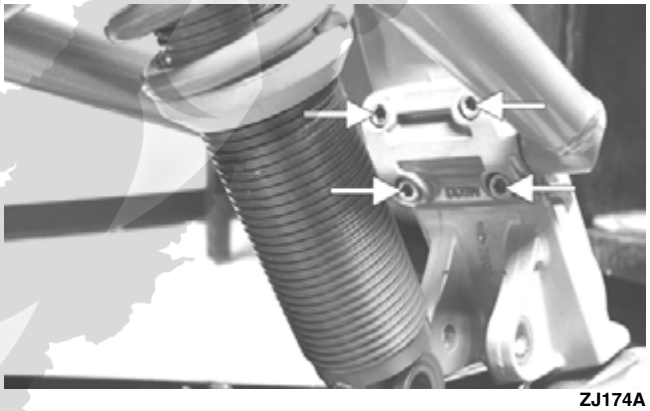
■NOTE: When installing the lower A-arm, position the shock absorber to the inside of the spindle axle before securing the arm to the chassis.


ZJ175

3. Install the cap screws and lock nuts securing the A-arm to the chassis; then tighten to 32 ft-lb.

■NOTE: When installing the rear cap screw of the A-arm, keep the cap screw approximately 1/2 in. out from being fully installed allowing for easier installation of the lock nut.

4. Install the sway bar link to the lower A-arm.
5. Position the spindle into the lower A-arm; then install the lower A-arm retainer and secure the cap to the spindle with the four torx-head cap screws (coated with blue Loctite #243). Tighten to 13 ft-lb.


ZJ174A

6. Install the shock absorber to the spindle; then install the cap screw and lock nut. Tighten to 32 ft-lb.

■NOTE: On the F5 to finalize the installing of the lower A-arms, proceed to Air Silencer (F5) sub-section in Section 3 and follow the INSTALLING procedure.

Ski Shock Absorber

REMOVING

1. Position the front of the snowmobile on a safety stand taking all pressure off the skis.
2. Remove the cap screws securing the shock absorber to the chassis and spindle; then remove the shock absorber. Account for all mounting hardware.

■NOTE: Note the number of threads exposed between the spring adjuster and shock housing for installing purposes.

3. Using the Shock Spring Removal Tool, remove the spring from the shock body by compressing the spring; then remove the spring retainer from the top of the spring. Inspect the shock absorber by quickly compressing and extending the shock plunger while firmly holding the shock body. Resistance must be felt in both directions.

CLEANING AND INSPECTING

1. Inspect the shock absorber seal area for signs of excessive oil leakage.
2. Inspect the shock absorber mounting eyelet, bushings, and sleeve for wear or damage.
3. Inspect the threaded shock sleeve for damage or wear. Clean the sleeve and apply a light coat of grease to the threads before installing.

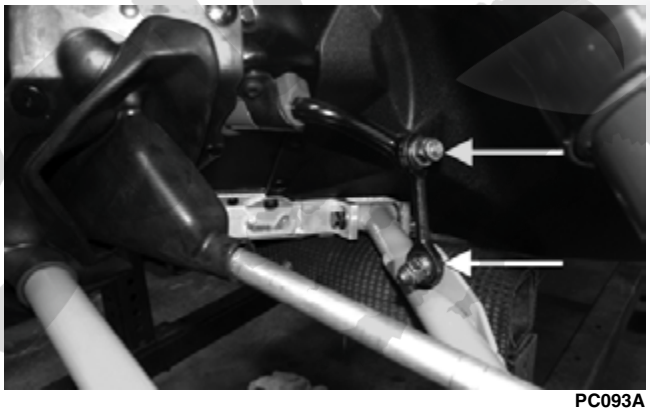
INSTALLING

1. Using the shock spring tool, place the spring on the shock absorber and secure with the retainer.
2. Adjust the retainer nut (spring adjuster) (if applicable) until the specified amount of threads are exposed between the spring adjuster and the shock housing (noted in removing) as an initial setting.
3. Install the bushings, sleeves, and spacers into each shock end; then place the shock absorber into position and secure with the cap screws and lock nuts. Tighten the lock nuts to 20 ft-lb (Bearcat/F-Series/T-Series) or 32 ft-lb (F/M/XF).

Sway Bar (F/XF)

REMOVING

1. Remove the nyloc nuts and cap screws securing the sway bar link to the lower A-arm and the sway bar.



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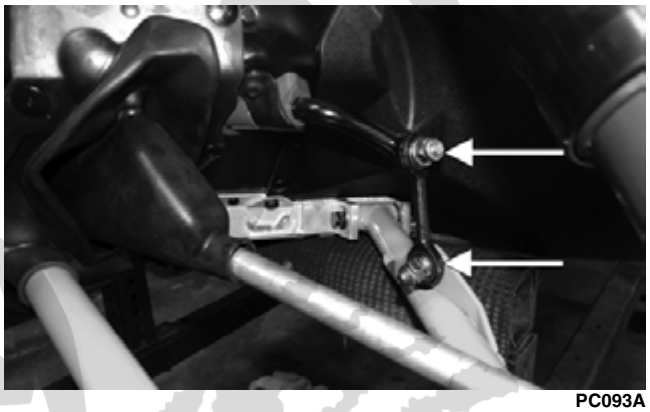
2. Remove the torx-head screws securing the sway bar mounting brackets; then pull the sway bar out of the snowmobile.

INSPECTING

1. Inspect the sway bar for any signs of twisting, fatigue, or wear.
2. Inspect the sway bar arms for cracks or damage.
3. Inspect the links, bushings, bushing retainers, and hardware for damage or wear.

INSTALLING

1. Place the sway bar into the sway bar mounting brackets; then install the sway bar into the snowmobile. Secure with the torx-head screws and tighten to 96 in.-lb.
2. Secure the sway bar links to the sway bar and lower A-arm with the cap screws and new nyloc nuts. Tighten to 23 ft-lb.

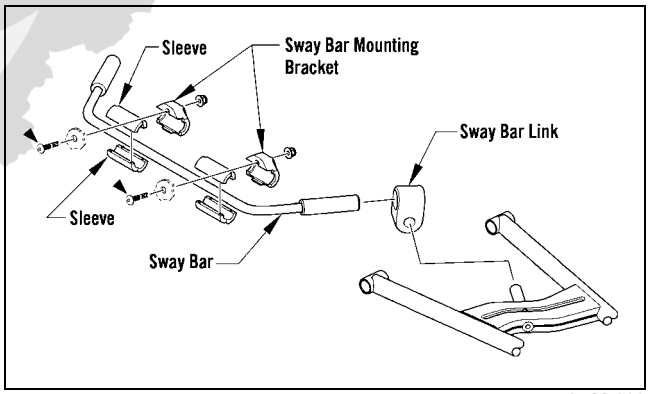


PC093A

Sway Bar (Bearcat Z1 XT LTD/F-Series/T-Series)

REMOVING

1. Remove the two lock nuts securing the sway bar mounting brackets to the chassis; then using a soft hammer, tap the sway bar in either direction until the sway bar link is off the pin on the A-arm.



0744-929

2. Slide the sway bar out of the chassis and account for the sway bar links and four sleeves.

INSPECTING

1. Inspect the sway bar for any signs of twisting, fatigue, or wear.
2. Inspect the sway bar links for cracks or damage.

INSTALLING

1. Place the sway bar into position in the chassis; then install the sway bar links to each end of the sway bar and position the links onto the pins of the A-arms.
2. With the sway bar properly positioned in the chassis, install the sleeves onto the sway bar. Install the sway bar mounting brackets and secure the brackets with the lock nuts. Tighten to 120 in.-lb.

Front Suspension Mounting Bracket (Bearcat/F-Series/T-Series)

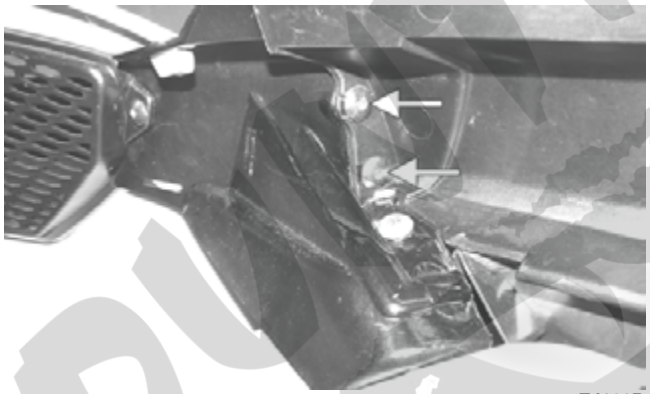
■NOTE: On the F5 to remove the front suspension mounting bracket, it will be necessary to remove the air silencer. Proceed to Air Silencer (F5) sub-section in Section 3 and follow REMOVING procedure.

REMOVING

1. Elevate the front of the snowmobile with a suitable safety stand or lift.

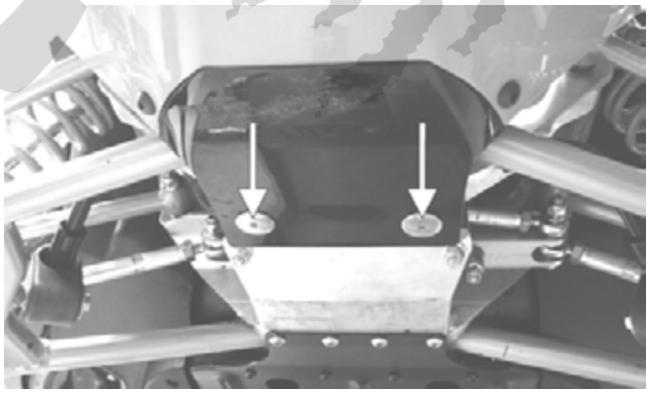
■NOTE: Steps 2-5 are for the 1100 cc models only.

2. Remove the hood; then remove the self-tapping screws securing the front bumper assembly to the left-side and right-side panels.



ZJ166B

3. Remove the two body screws and lock nuts securing the bottom of the bumper assembly to the suspension mounting bracket.

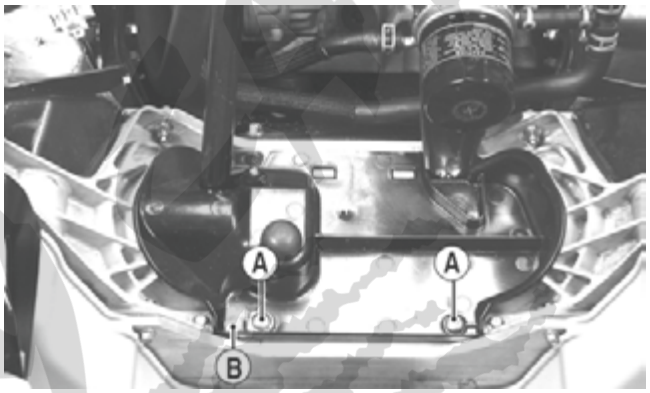


ZJ167A

4. Remove the exhaust springs securing the exhaust pipe to the manifold, resonator, and exhaust pipe mounting tab; then remove the pipe.

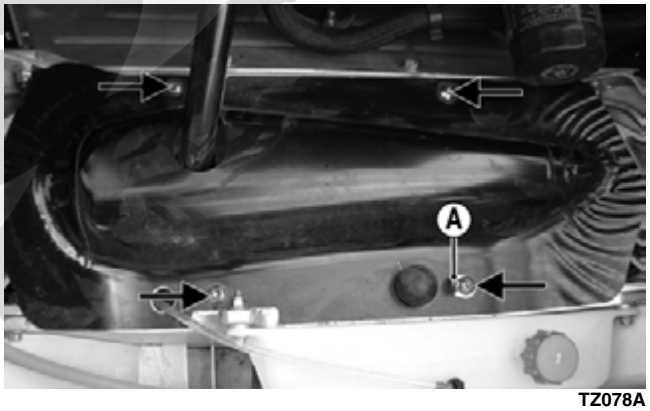
■NOTE: On the turbo model, loosen the intercooler hose clamps at the intake pipe and the turbocharger; then carefully work the intercooler upward until it releases from the rubber grommets.

5. Remove the two torx-head screws (A) securing the close-off cover to the front end; then remove the cover and account for the exhaust pipe mounting tab (B) from the right-side cap screw.



ZJ020A

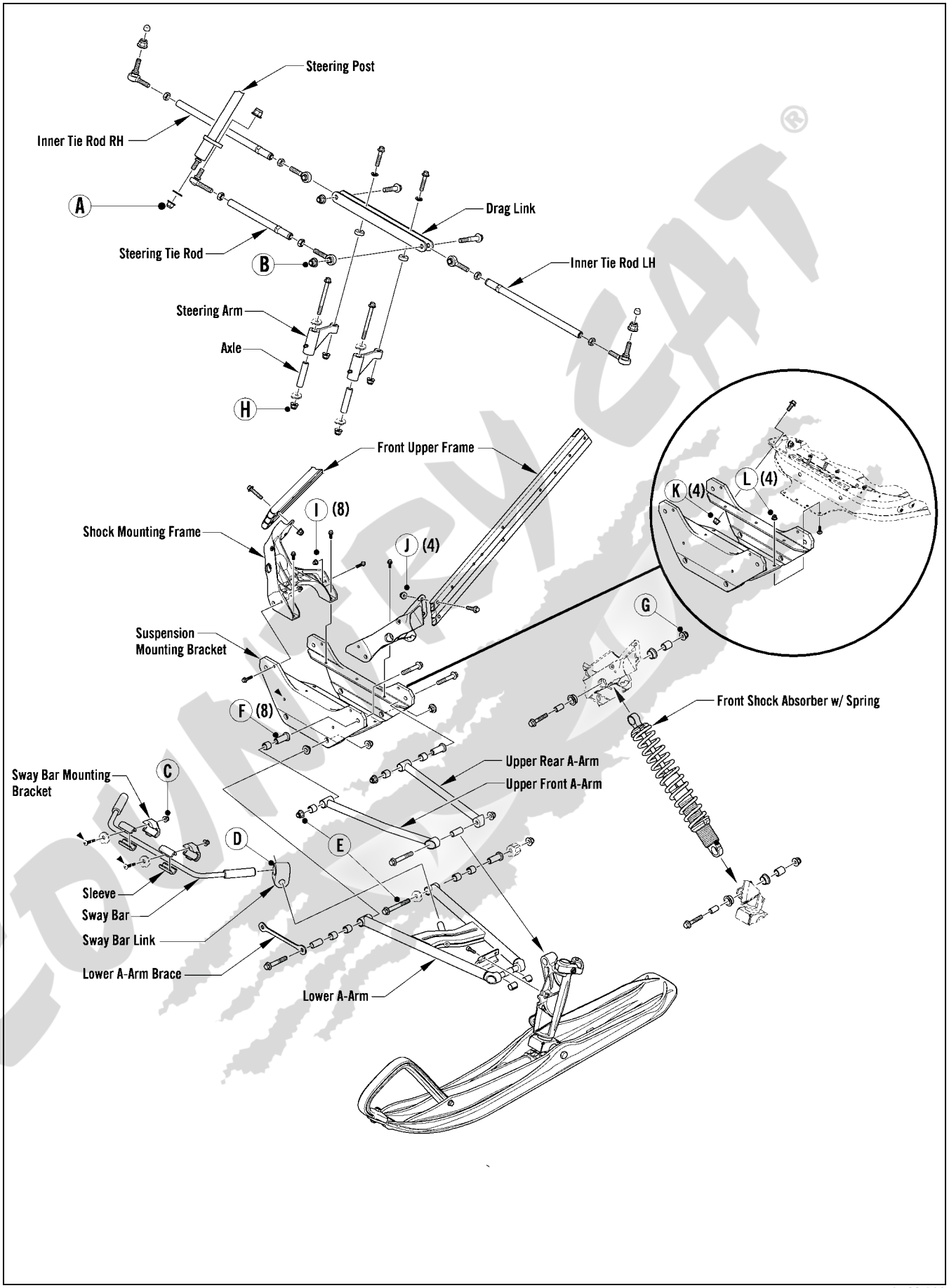
■NOTE: On the Bearcat Z1 XT, remove the four cap screws securing the close-off panel and account for the exhaust pipe mounting tab (A) from the left front cap screw.



TZ078A

■NOTE: For the following steps, refer to the illustration on the following page.

6. Remove the lock nut (A) securing the steering post to the suspension mounting bracket.
7. Remove the cap screw and lock nut (B) securing the steering tie rod and inner tie rod to the drag link.
8. Remove the lock nuts (C) securing the two sway bar mounting brackets to the suspension mounting bracket; then remove the brackets accounting for the sleeves.
9. Remove the sway bar/links (D) from the pins of the left-side/right-side lower A-arms.


Steering Post
Inner Tie Rod RH
A
Drag Link
Steering Tie Rod
B
Inner Tie Rod LH
Steering Arm
Axle
H
Front Upper Frame
I (8)
Shock Mounting Frame
J (4)
K (4)
L (4)
G
Suspension Mounting Bracket
F (8)
Front Shock Absorber w/ Spring
Upper Rear A-Arm
Upper Front A-Arm
Sway Bar Mounting Bracket
C
D
E
Sleeve
Sway Bar
Sway Bar Link
Lower A-Arm Brace
Lower A-Arm

0744-930

10. Remove all cap screws and lock nuts corresponding to (E) securing the left-side lower A-arm and the left-side upper A-arms to the suspension mounting bracket.

■NOTE: At this point, remove all cap screws and lock nuts corresponding to (E) securing the right-side upper A-arms and lower A-arm to the suspension mounting bracket.

11. Move the arms away from the bracket and account for the axles (F).

12. Remove the lock nut from the cap screw (G) securing the left-side shock absorber to the shock mounting frame; then remove the cap screw and remove the left-side steering/suspension components.

13. Remove the cap screws and lock nuts (H) securing the two steering arms to the suspension mounting bracket.

14. Remove the lock nuts and cap screws (I) securing the two shock absorber mounting frames to the suspension mounting bracket; then remove the four lock nuts and cap screws (J) securing the shock mounting frames to the front upper frame.

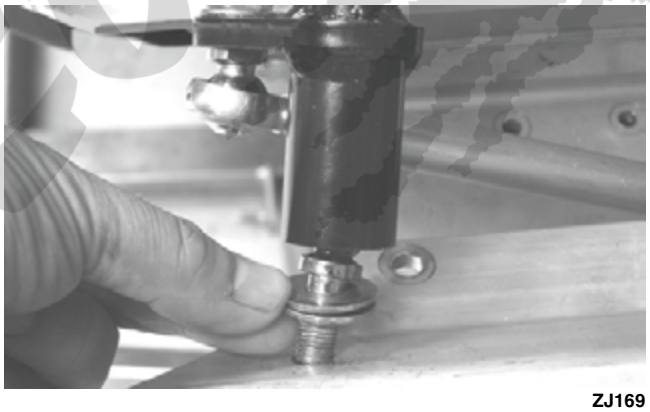
■NOTE: Remove the cap screws and lock nuts (K) and (L) from the suspension mounting bracket.

■NOTE: Remove the lock nut from the cap screw corresponding to (G) - left-side securing the right-side shock absorber to the shock mounting frame; then remove the cap screw and slide the right-side steering/suspension assembly out of the suspension mounting bracket. Account for the axles and the shock absorber sleeve.

INSTALLING

■NOTE: For the following procedure, refer to illustration on the previous page.

1. Install the steering post with the proper number of washers as noted during removing to the suspension mounting bracket with the lock nut (threads coated with green Loctite #609) (A). Tighten only until snug.



ZJ169

2. Place the suspension mounting bracket into position in the chassis; then secure the bracket to the chassis with the four upper (K) and four lower (L) cap screws and lock nuts. Tighten until snug.

■NOTE: For ease of installing, do not tighten the four upper and lower cap screws and lock nuts (K) and (L) until step 14.

3. Tighten the lock nut (A) securing the steering post to the chassis (from step 1) to 35 ft-lb.

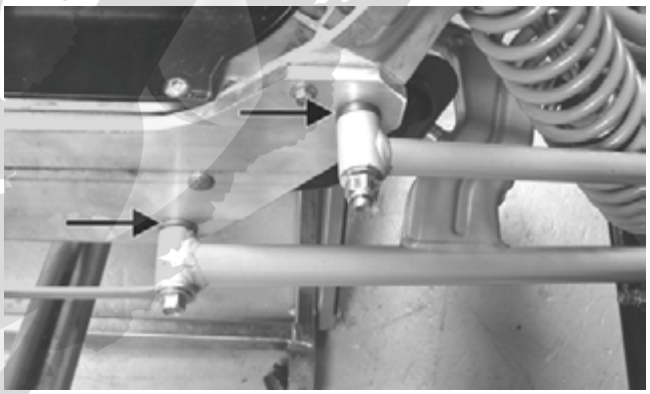
4. Secure the two shock absorber mounting frames to the suspension mounting bracket with cap screws and lock nuts (I); then tighten to 96 in.-lb. Tighten the four front frame cap screws and lock nuts (J) to 20 ft-lb.

■NOTE: When installing the following steering/suspension components, tighten the cap screws and lock nuts only until snug until step 13.

5. At this time to install the right-side steering/suspension components, first install the shock with sleeve to the shock mounting frame with cap screw and lock nut corresponding to (G) - left-side.

6. At this time, position the drag link and steering arms into the suspension mounting bracket; then with axles in place, install the right-side upper A-arms and lower A-arm with all cap screws and lock nuts corresponding to (E).

■NOTE: When installing the A-arms, make sure the axle shoulders are properly positioned.



ZJ168A

7. Install the right-side steering arm with cap screw and lock nut (H).

8. To install the left-side steering components, first place the sway bar into the sway bar link on the right-side A-arm; then move the sway bar to the mounting position.

9. Install the left-side shock absorber with sleeve to the shock mounting frame with cap screw and lock nut (G).

10. With the axles (F) properly installed, install the left-side upper A-arms; then install the lower A-arm with all cap screws and lock nuts corresponding to (E).

11. Install the left-side steering arm with axle to the suspension mounting bracket with cap screw and lock nut corresponding to (H) - right-side.

12. Install the left-side inner tie rod and the steering tie rod to the drag link with cap screw and lock nut (B).

13. Tighten all steering/suspension components (from steps 5-7 and 9-12) in the following sequence and to the indicated torque values:

Step 5	Lock Nut (G) - RH	32 ft-lb
Step 6	Lock Nut (E) - RH	32 ft-lb
Step 7	Lock Nut (H) - RH	20 ft-lb
Step 9	Lock Nut (G) - LH	32 ft-lb
Step 10	Lock Nuts (E) - LH	32 ft-lb
Step 11	Lock Nut (H) - LH	20 ft-lb
Step 12	Lock Nut (B)	35 ft-lb

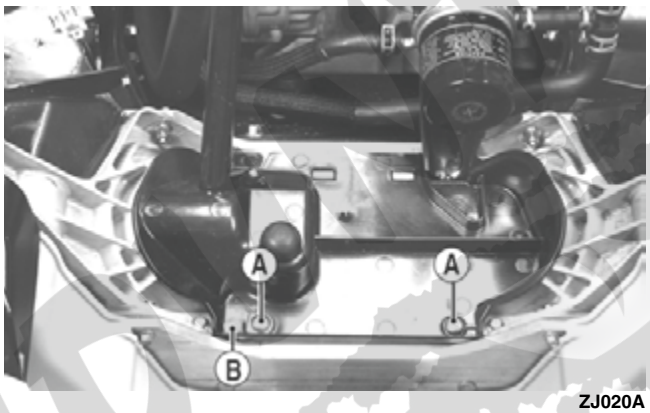
14. Tighten the cap screws and lock nuts (K) and (L) securing the suspension mounting bracket to the chassis (from step 2) to 30 ft-lb (upper) and 12 ft-lb (lower).

15. With the sleeves in place on the sway bar, position the sway bar links (D) onto the sway bar; then install the sway bar/links onto the left-side/right-side lower A-arm pins.

16. Secure the sway bar to the suspension mounting bracket with the sway bar mounting brackets and lock nuts (C). Tighten securely.

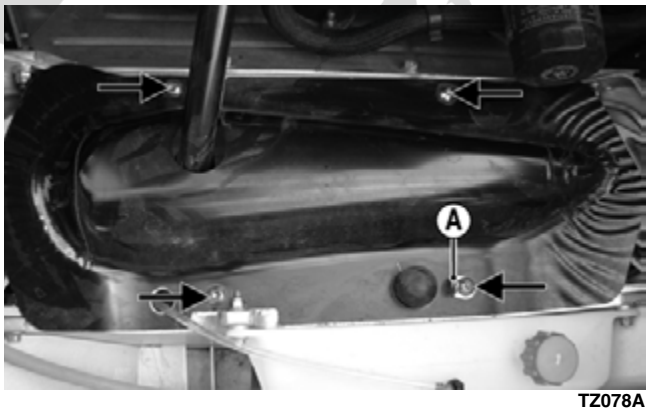
■NOTE: Steps 17-20 are for the 1100 cc models only.

17. Install the close-off cover; then with the exhaust pipe mounting tab (B) installed to the right-side cap screw, secure the cover with the two torx-head cap screws (A). Tighten securely.



ZJ020A

■NOTE: On the Bearcat Z1 XT, remove the four cap screws securing the close-off panel and account for the exhaust pipe mounting tab (A) from left front cap screw.

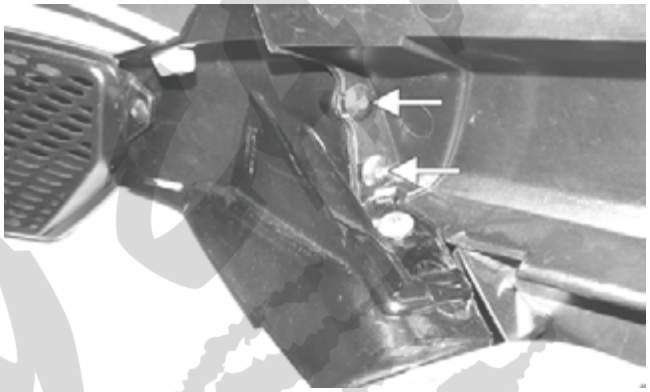


TZ078A

18. Install the exhaust pipe; then secure the pipe to the resonator, manifold, and mounting tab with exhaust springs.

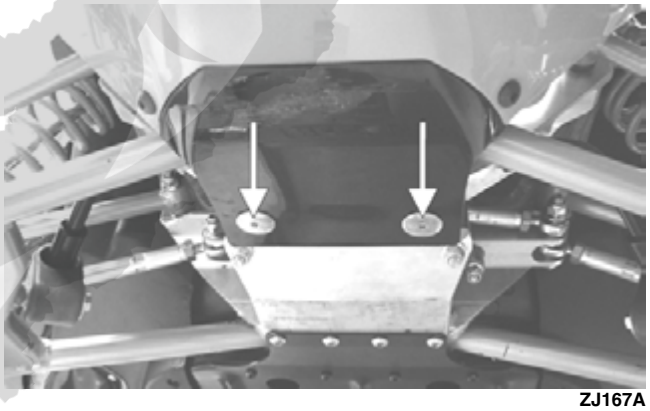
■NOTE: On the turbo models, position the intercooler into the grommets of the mounting bracket; then connect the intercooler hoses to the turbo and to the intake plenum. Tighten all hose clamps securely.

19. To install the front bumper assembly, first secure the bumper to the left-side and right-side panels with the self-tapping screws.



ZJ166B

20. Secure the bottom of the assembly to the suspension mounting bracket with the two body screws and lock nuts. Tighten securely; then install the hood.



ZJ167A

■NOTE: On the F5 to finalize the installing of the front suspension mounting bracket, proceed to Air Silencer (F5) sub-section in Section 3 and follow INSTALLING procedure.

Front Bumper (F/M/XF)

REMOVING/INSTALLING

1. Remove all torx-head screws securing the front bumper; then remove the bumper.

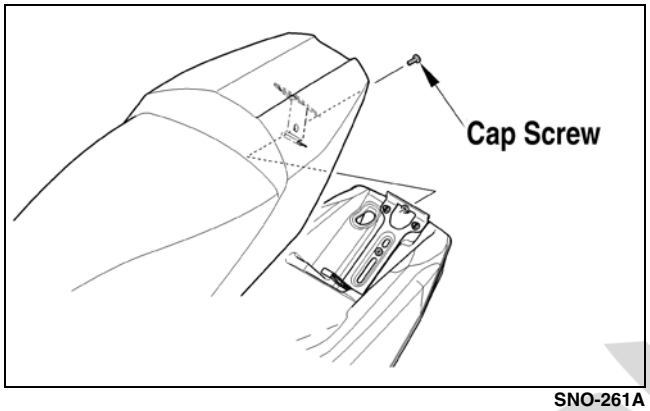
2. With the bumper in position, install all torx-head screws. Tighten securely.

Seat Assembly (F/M/XF)

REMOVING/INSTALLING

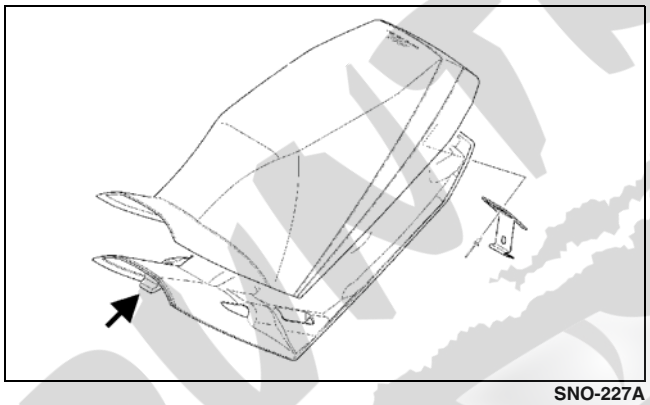
■NOTE: On LXR models, be sure to disconnect the seat heater harness before removing the seat.

1. Remove the cap screw securing the rear of the seat; then remove the seat.



SNO-261A

2. Route the front tab on the seat through the seat-base hold-down bracket; then install the seat and secure using the cap screw.



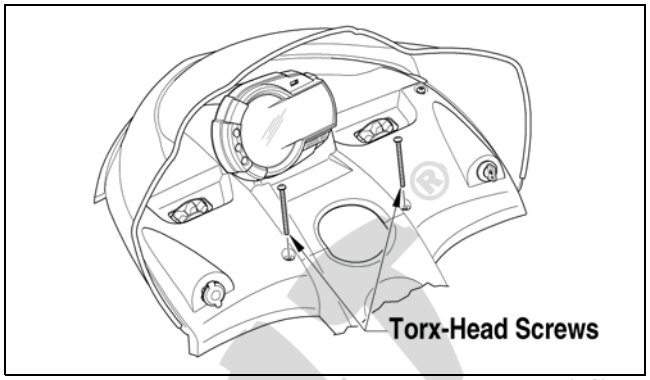
SNO-227A

■NOTE: On LXR models prior to lowering and securing the seat, connect the seat heater harness connector.

Seat Assembly (Bearcat/F-Series/T-Series)

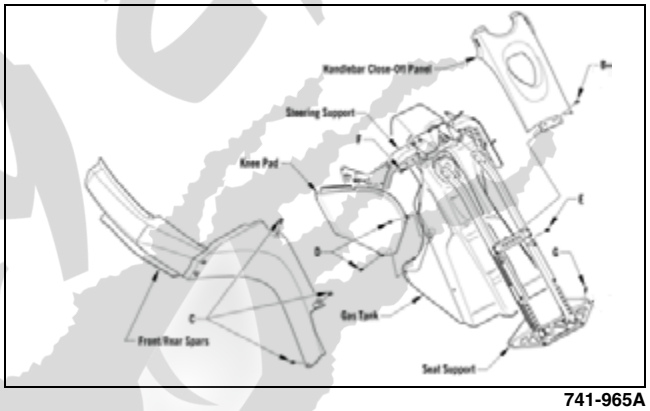
REMOVING

1. Remove the hood and open the right-side and left-side access panels.
2. Remove the two torx-head screws securing the console to the chassis; then lift up the rearward end of the console and disconnect the console harness plug-in. Remove the console.



0743-777

3. Remove the two torx-head cap screws (B) securing the handlebar close-off panel; then remove the three torx-head cap screws (C) securing the rear side panels (spars) to the seat support tubes.



741-965A

4. Remove the two screws (D) securing the knee pads to the gas tank; then remove the remaining body screws securing the knee pads to the steering support.
5. On the standard models, push down on both seat retainer brackets (located in the rear storage compartment) and remove the seat.

■NOTE: On the TZ1 standard, remove the two torx-head cap screws securing the seat frame to the tunnel.

6. On the LXR models, adjust the seat to the lowest position; then while lifting on the top forward part of the seat, remove the machine screw (E) from the right side of the seat support assembly. Remove the seat.

INSTALLING

1. Install the screws (D) and the body screws securing the knee pads to the gas tank and the steering support; then secure the rear side panels (spars) with the three torx-head cap screws (C) for each side.
2. Install the handlebar close-off panel; then secure the panel with the two torx-head cap screws (B). Position the console assembly on the headlight support bracket; then connect the main hood harness.
3. Install the console to the steering support with the two torx-head cap screws. Tighten securely.
4. Install the hood; then close the side access panels.

5. On the standard models, place the seat into position on the chassis; then push down on the rear of the seat until it locks securely in place.

■NOTE: On the TZ1 standard, install the seat and secure the seat frame to the tunnel with the two torx-head cap screws.

6. On the LXR models, install the seat; then install the machine screw (E) (threads coated with blue Loctite #243) to the right side of the seat support.

CAUTION

Do not tighten the machine screw (E) against the seat support. The screw must be loose enough to be effective as a seat "stop."

Seat Cushion

REMOVING

1. Remove the seat assembly (see the appropriate Seat Assembly in this section).
2. On the Bearcat/F-Series/T-Series, remove the two screws securing the taillight cover and remove the cover; then remove the two screws securing the front of the seat cushion to the seat base.
3. Using a sharp tool, pry out all staples securing the seat cover to the plastic seat base.
4. From beneath the seat foam, remove the seat wire from the two elastic loops; then remove the cover from the seat base and seat foam.

INSTALLING

1. Position the cover over the seat foam and seat base; then pull the two elastic loops through the slots in the seat foam and secure with the seat wire. Check to make sure it is positioned straight.

CAUTION

On Bearcat models, beneath the seat base is a dotted guideline to follow when stapling the seat cover. Do not staple inside this guideline or perforation of the gas tank may occur.

2. Fold the rear edge of the cushion down and around the plastic base. Using a staple gun and 1/4 in. staples, staple the rear flap of the cushion to the plastic base in the same areas as the original staples were located. Position staples 1 in. apart.
3. Fold the sides of the cushion down around the bottom edge of the plastic seat base. Position the staples in the same area as the original staples were located.

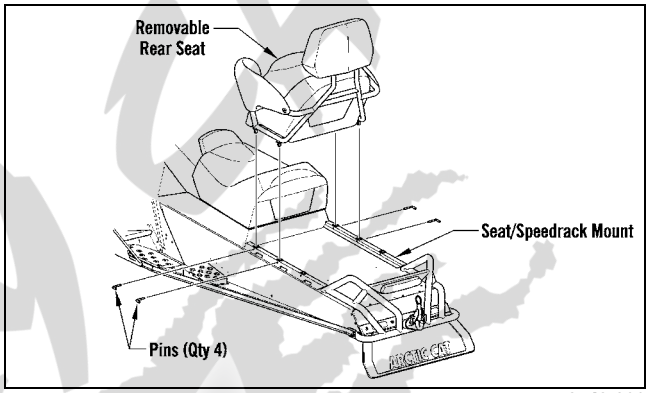
■NOTE: Note the cushion fit. If any wrinkles are noted, remove by pulling the cushion material in the appropriate direction before securing with staples.

4. Fold the front cushion material back and onto the plastic seat base. Check for wrinkles and secure with staples and two screws.
5. On the Bearcat/F-Series/T-Series, install the taillight housing and secure with the screws.
6. Install the seat assembly (see appropriate Seat Assembly in this section).

Taillight/Brakelight Assembly

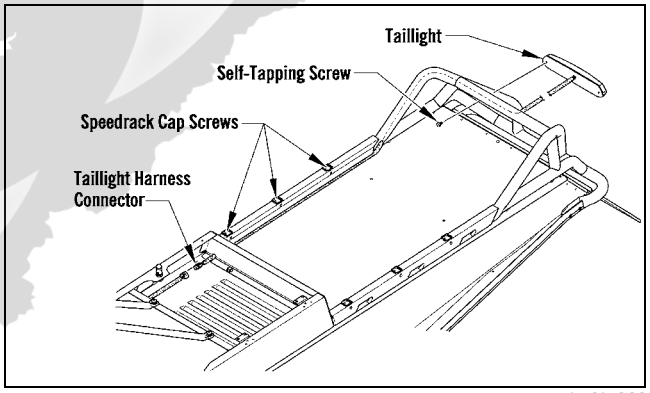
BEARCAT XT

1. Remove the four pins securing the rear seat to the seat/Speedrack mount; then remove the seat.



0743-329

2. Compress the latch on the right side of the front seat and lift the front seat away; then disconnect the taillight harness connector.



0743-444

3. Loosen (but do not remove) the three right-side seat/Speedrack mount cap screws.
4. Carefully route the harness connector through the hole in the storage compartment panel; then remove the harness from beneath the seat/Speedrack mount.
5. Remove the two self-tapping screws securing the taillight to the bumper; then route the harness out of the bumper and remove the taillight.
6. Route the taillight harness through the bumper; then secure the taillight to the bumper with the two self-tapping screws.
7. Carefully route the harness beneath the Speedrack mount and through the hole in the storage compartment panel; then connect the harness connector.

8. Tighten the three right-side mount cap screws; then lower the front seat.
9. Place the rear seat into position on the mount making sure the four pin holes are properly aligned with the mounting location on the mount.
10. Install the four pins making sure they are properly seated.

⚠ WARNING

Make sure the rear seat is securely locked in place with the four pins before carrying a passenger or personal injury may result.

F/M/XF

1. Remove the two torx-head screws securing the taillight to the taillight support; then disconnect the taillight harness connector.



XM098

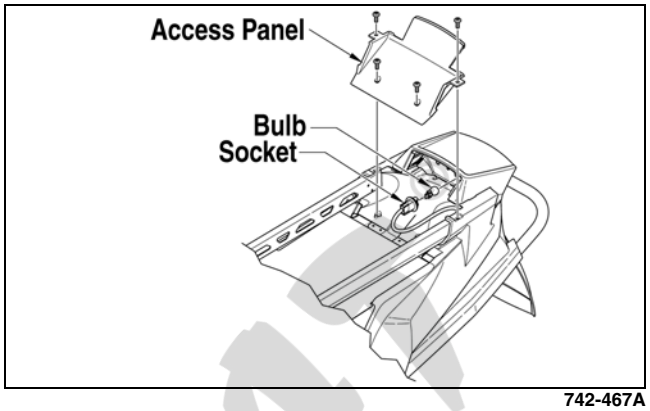


XM099A

2. Connect the taillight harness connector; then secure the taillight to the taillight support with the two torx-head screws. Tighten to 48 in.-lb.

BEARCAT 570/T-SERIES

1. Remove the torx-head cap screws securing the taillight access panel.



742-467A

2. Disconnect the harness connector and remove housing.
3. Push in on the socket and rotate it counterclockwise to remove it from the housing.
4. Remove the old bulb by pulling it straight out of the socket.
5. Install the new bulb in the socket by pushing it straight in.
6. Push the socket into the housing and rotate it clockwise to lock into place.
7. Connect the harness connector.
8. Secure the access panel with the torx-head cap screws.

Backrest/Rack Assembly (Bearcat)

REMOVING

1. Remove the cap screws, washers, and cap nuts securing the rack to the backrest.
2. In turn on each side, remove the two cap screws (inside the tunnel) securing the backrest assembly to the tunnel. Account for the washers.
3. If applicable, disconnect the passenger handwarmer wiring harness.
4. Remove the backrest assembly from the tunnel. Account for the two spacers.

INSTALLING

1. Place the backrest assembly and spacers (located on the rear hole on each side) into position and align holes with tunnel mounting holes.
2. Install the cap screws with washers from the inside of the tunnel and secure with the washers and lock nuts. Tighten securely.
3. In turn on each side, install the 1/4-in. cap screw in the front hole and the 5/16-in. cap screw in the rear hole. Secure with a flat washer and lock nut. Tighten securely.
4. If applicable, connect the passenger handwarmer wiring harness.
5. Place the rack into position and secure with the cap screws, washers, and cap nuts.

Rear Bumper/Snowflap (Bearcat/F-Series/T-Series)

REMOVING BUMPER/SNOWFLAP (Bearcat XT)

■NOTE: The snowflap can be removed without removing the bumper by removing the four torx-head cap screws and lock nuts.

1. Remove the four torx-head cap screws and lock nuts securing the bumper assembly to the running board; then remove the four lock nuts from under the tunnel. Account for the U-nuts and cap screws.
2. Slide the bumper off the tunnel.
3. Remove the four torx-head cap screws securing the snowflap to the tunnel. Account for cap screws, washers, and lock nuts.

INSTALLING BUMPER/SNOWFLAP (Bearcat XT)

1. Secure the snowflap to the tunnel with the cap screws, washers, and lock nuts taking care to place the washers next to the underside of the snowflap. Finger-tighten the cap screws to the lock nuts; then tighten the cap screws to 20 ft-lb.
2. Place the bumper assembly into position on the tunnel and secure to the running boards with the torx-head cap screws; then from under the tunnel, install the four lock nuts and tighten to 20 ft-lb.

REMOVING BUMPER/SNOWFLAP (Bearcat 570/T-Series)

1. Remove the four torx-head cap screws, lock nuts, and washers securing the snowflap to the tunnel.
2. Remove the right- and left-side rear fenders; then carefully drill out the rivets from the back side of the tunnel.

CAUTION

Use caution when drilling the rivets from the rear bumper and snowflap not to damage the heat exchangers.

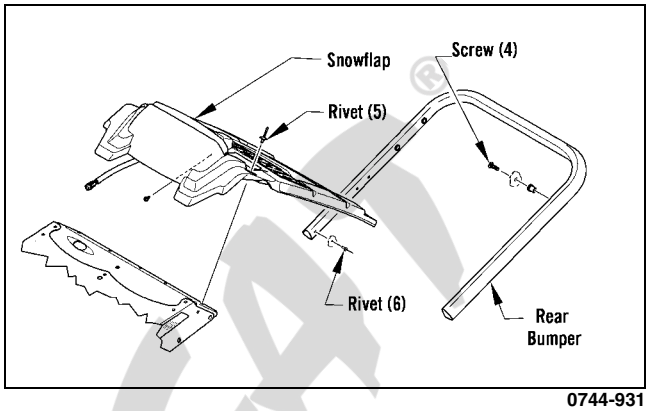
INSTALLING BUMPER/SNOWFLAP (Bearcat 570/T-Series)

1. Install the rear bumper and with the holes properly aligned, secure the bumper to the tunnel with rivets; then install and secure the rear fenders.
2. With the snowflap support in place, install the snowflap and secure with the torx-head cap screws, washers, and lock nuts.

BUMPER/SNOWFLAP (F-Series)

■NOTE: The snowflap can be removed without removing the bumper by removing the five rivets securing the snowflap to the heat exchanger and compressing the two flanged tabs located on the underside of the tunnel.

1. Remove the four machine screws securing the bumper to the tunnel; then carefully drill out the rivets securing the bumper to the tunnel.



0744-931

CAUTION

Use caution when drilling the rivets from the rear bumper and snowflap not to damage the heat exchangers.

2. Remove the bumper.
3. Place the bumper into position on the tunnel; then install the four machine screws and rivets securing the bumper to the tunnel. Tighten the screws to 96 in.-lb.

Rear Bumper/Snowflap (F/M/XF)

REMOVING BUMPER

1. Remove and retain only the two machine screws securing the rear of the skid frame assembly.



SNO-624A

2. Place cardboard or a suitable substitute on the floor to protect the snowmobile from being scratched; then install Steering Post Stand for the standard steering models or Handlebar Stand for the adjustable steering models into the lower holes in the handlebar riser (from the left-side) and tip the snowmobile onto its left side.

CAUTION

The stand must be used when tipping the snowmobile onto the right side. Failure to use the stand may damage the oil fill neck on 2-stroke models.

3. Swing the skid frame assembly away from the chassis; then using a 3/16-in. drill bit, remove all rivets securing the left-side of the bumper; then repeat for opposite side.

4. Remove and retain the two machine screws and nuts securing the front of the existing bumper to the chassis.

5. Remove the two rivets securing the snowflap to the bumper. Remove the bumper.

INSTALLING BUMPER

1. Align the holes in the bumper with the existing holes in the tunnel; then using new rivets, secure rear bumper to the tunnel; then secure the snowflap to the rear bumper using new rivets.

2. Secure the front of the bumper to the chassis using the existing machine screws and nuts. Tighten securely.

3. Install skid frame assembly using two existing machine screws. Tighten securely.

REMOVING SNOWFLAP

1. Drill out the four rivets securing the snowflap to the tunnel; then remove the torx-head screw and nut.

2. Remove the snowflap.

INSTALLING SNOWFLAP

1. Secure the snowflap to the tunnel with the torx-head screw and nut.

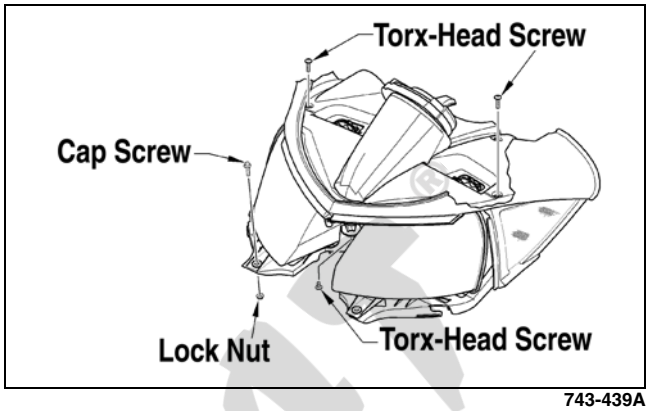
2. Add the appropriate rivets to secure the snowflap to the tunnel.

Headlight Assembly (Bearcat/F-Series/T-Series)

REMOVING HEADLIGHT BULB

■NOTE: The bulb portion of the headlight is fragile. HANDLE WITH CARE. When replacing the headlight bulb, the bulb assembly must first be removed from the housing. Do not touch the glass portion of the bulb. If the glass is touched, it must be cleaned with a dry cloth before installing.

1. Remove the two torx-head screws located to the outside of the headlight adjustment knobs; then remove the single torx-head cap screw from beneath the console (located between the headlights).

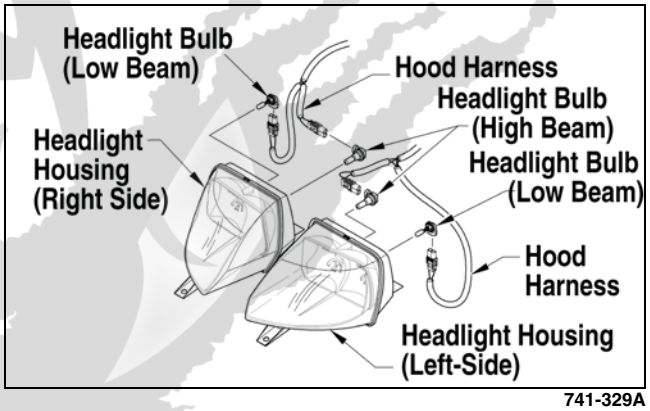


743-439A

2. Remove the cap screw and lock nut securing the front of the headlight assembly to the air silencer.

3. Lift the front of the console enough to allow the headlight housing to be removed; then remove the housing.

4. Remove the bulb from the headlight housing and disconnect the wiring harness from the bulb.



741-329A

INSTALLING HEADLIGHT BULB

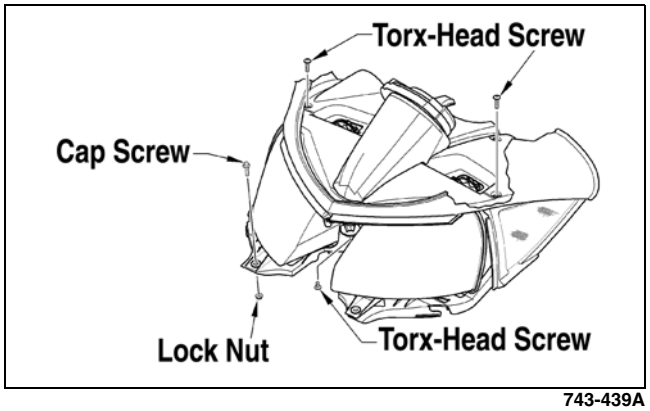
CAUTION

Do not touch the glass portion of the bulb. If the glass portion is touched, it must be cleaned with a dry cloth before installing.

1. Plug the wiring harness into the headlight bulb.

2. Insert the bulb into the headlight housing.

3. Lift the front of the console enough to allow the headlight housing to be installed; then install the housing making sure the forks of the housing go into the grommets on top of the air silencer. Secure with the cap screw and lock nut.



743-439A

4. Position the console onto the air silencer; then secure with the single torx-head cap screw beneath the console (located between the headlights).
5. Install the two torx-head screws located to the outside of the headlight adjustment knobs; then tighten securely.
6. Check headlight aim (see Adjusting Headlight Aim in this section).

⚠ WARNING

Do not operate the snowmobile unless headlight beam is adjusted properly. An incorrectly adjusted beam will not provide the operator the optimum amount of light.

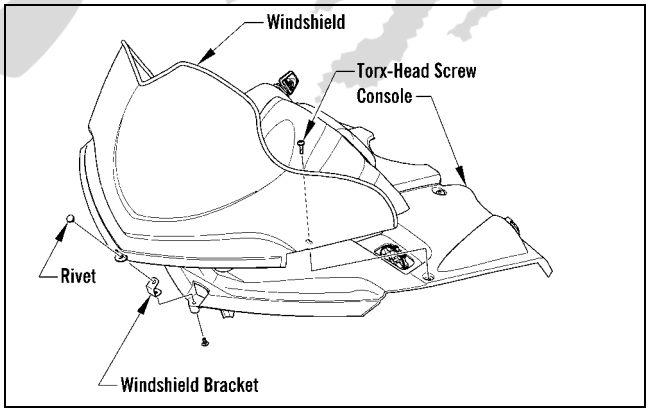
Windshield/Console (Bearcat/F-Series/T-Series)

■NOTE: If removing the console only, the windshield does not have to be removed.

REMOVING WINDSHIELD (Bearcat/F-Series/T570/TZ1 Non-Turbo)

1. Remove the plastic rivet securing the front of the windshield to the windshield bracket.
2. Remove the two torx-head screws securing the windshield to the console; then separate the windshield from the console.

INSTALLING WINDSHIELD (Bearcat/F-Series/T570/TZ1 Non-Turbo)

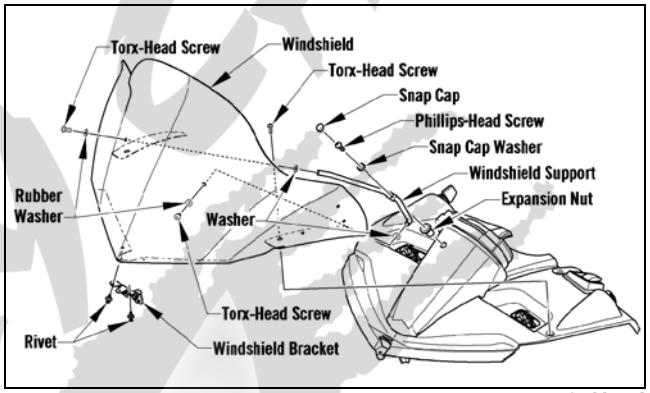


741-637A

1. Place the windshield into position on the console.
2. Secure the windshield to the console with the two torx-head screws.
3. Using a new plastic rivet, secure the windshield to the windshield bracket.

REMOVING WINDSHIELD (TZ1 Turbo)

1. Remove the mounting hardware securing the mirrors to the windshield.
2. Remove the torx-head screws securing the windshield to the console and windshield support; then remove the plastic rivets securing the windshield to the front bracket. Remove the windshield.



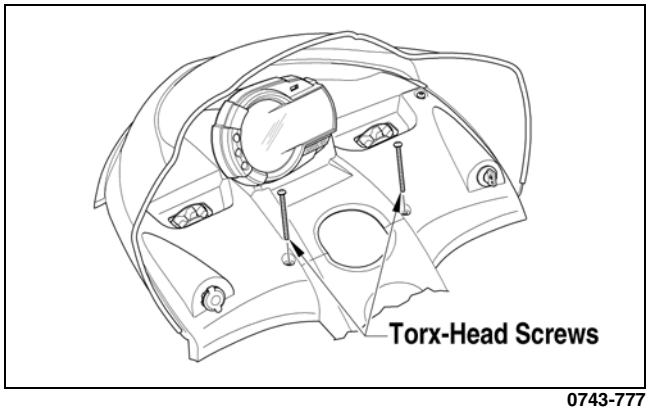
0744-554

INSTALLING WINDSHIELD (TZ1 Turbo)

1. Place the windshield into position on the console and bracket.
2. Secure the windshield using the torx-head screws, washers, and rivets according to the illustration.

REMOVING CONSOLE

1. Remove the two torx-head screws securing the console to the chassis; then lift up the rearward end of the console and disconnect the console harness plug-in.



0743-777

2. Remove the console.

INSTALLING CONSOLE

1. Place the console into position on the headlight support bracket; then connect the console harness plug-in.

2. Secure the console to the chassis with the two torx-head screws.

Windshield/Console/ Headlight (F/M/XF)

REMOVING

1. Remove and retain all machine screws securing the hood; then disconnect the console harness and carefully remove the hood assembly.
2. Remove the four screws securing the windshield to the console; then remove the windshield.
3. Remove the four screws securing the windshield brace to the console. Disconnect the gauge; then remove the windshield brace assembly.

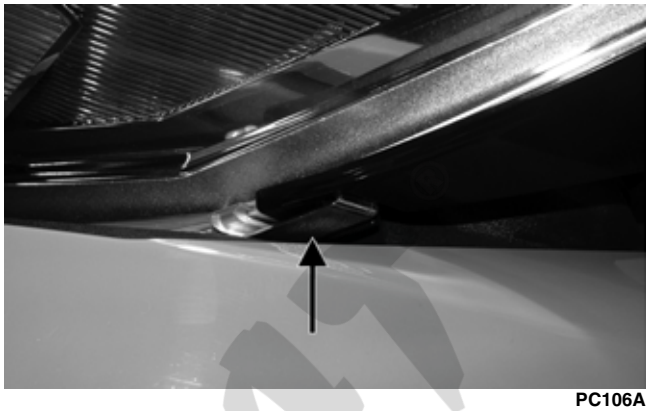


PC104A

4. Disconnect the electrical accessory wires and ignition switch.
5. Remove the two screws securing the rear of the console to the hood.
6. Lift the front of the console from the headlight assembly; then disengage the side console tabs and remove the console.

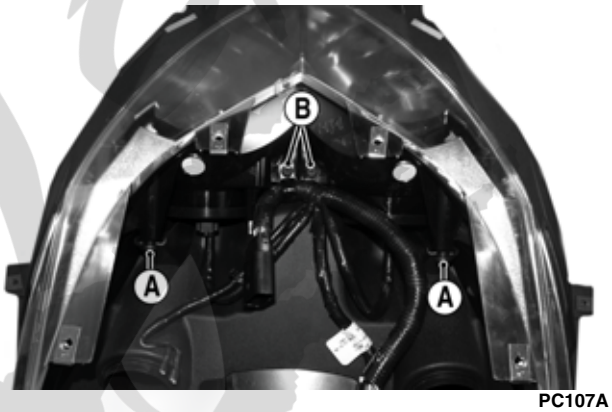


PC108



PC106A

7. Loosen the two side headlight assembly screws (A); then remove the two front headlight assembly screws (B).



PC107A

8. Remove the headlight assembly.

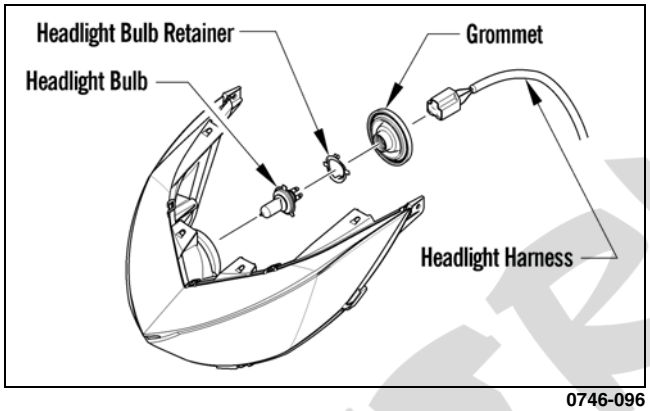
INSTALLING

1. With the headlight assembly in position, install the front headlight assembly screws. Engage the side headlight screws in the slots and tighten until snug.
2. Engage the side console tabs on the headlight assembly; then place the front of the console over the headlight assembly and press down until it snaps in place.
3. Install the two screws securing the rear of the console to the hood. Tighten only until snug.
4. Place the windshield brace assembly into position and secure to the console with the four screws. Tighten until snug.
5. Connect the gauge; then connect the electrical accessory wires and the ignition switch.
6. With the windshield in position, secure the windshield to the frame using the four screws. Tighten securely.
7. Connect the console harness; then install the hood assembly and secure with the screws.

Headlight Bulb (F/M/XF)

■NOTE: The bulb portion of the headlight is fragile. HANDLE WITH CARE. When replacing the headlight bulb, the bulb assembly must first be removed from the housing. Do not touch the glass portion of the bulb. If the glass is touched, it must be cleaned with a dry cloth before installing.

1. Disconnect the headlight harness connector from the bulb; then remove the rubber grommet from the headlight housing.
2. Rotate the bulb retainer counterclockwise until it unlocks from the housing; then remove the bulb.



0746-096

3. Install the bulb and retainer; then rotate the retainer clockwise until it properly locks in place.
4. Install the rubber grommet; then connect the headlight harness connector to the bulb.
5. Check headlight aim (see Adjusting Headlight Aim in this sub-section).

⚠ WARNING

Do not operate the snowmobile unless headlight beam is adjusted properly. An incorrectly adjusted beam will not provide the operator the optimum amount of light.

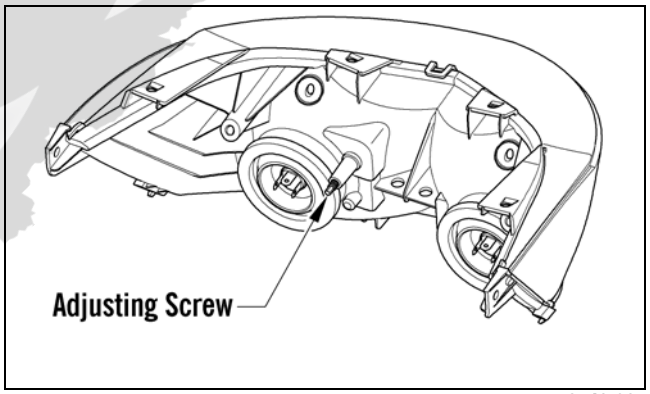
Adjusting Headlight Aim

The headlight can be adjusted for vertical aim of the HIGH/LOW beam. The geometric center of HIGH beam zone is to be used for vertical aiming.

1. Position the snowmobile on a level floor so the headlight is approximately 25 ft from an aiming surface (wall or similar surface).

■NOTE: There should be an "average" operating load on the snowmobile when adjusting headlight aim.

2. Measure the distance from the floor to midpoint of the headlight.
3. Using the measurement obtained in step 2, make a horizontal mark on the aiming surface.
4. Make a vertical mark intersecting the horizontal mark on the aiming surface directly in front of the headlight.
5. Engage the brake lever lock and start the engine. Select the headlight dimmer switch HIGH beam position. DO NOT USE LOW BEAM.
6. Observe the headlight beam aim. Proper aim is when the most intense beam is centered on the vertical mark 5 cm (2 in.) below the horizontal mark on the aiming surface.
7. Adjust the headlight using the adjusting screw on the backside of the headlight housing until correct aim is obtained. Shut the engine off; then disengage the brake lever lock.



0746-807



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