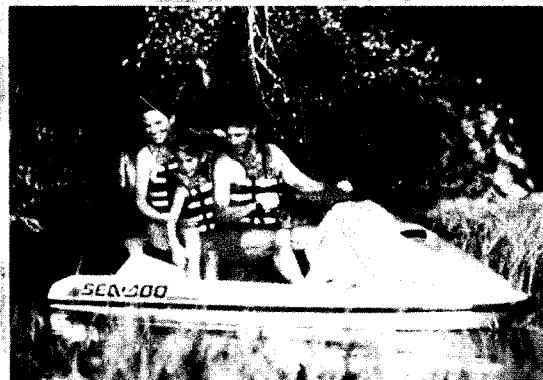


SHOP MANUAL

MODELS
5806
5808
5807
5852
5813
5861
5820



SEADOO
SP, SPI, SPX, XP, GTS,
GTX, & EXPLORER



219-100-008

SHOP MANUAL



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SAFETY NOTICE

This manual has been prepared as a guide to service the SEA-DOO, models SP 5806, SPI 5808, SPX 5807, XP 5852, GTS 5813, GTX 5861 and EXPLORER 5820.

This edition was primarily published to be used by watercraft mechanics who are already familiar with all service procedures relating to Bombardier made watercraft.

Please note that the instructions will apply only if proper hand tools and special service tools are used.

This *Shop Manual* uses technical terms which may be slightly different from the ones used in *Parts Catalogs*.

The content depicts parts and / or procedures applicable to the particular product at its time of manufacture. It does not include dealer modifications, whether authorized or not by Bombardier, after manufacturing the product.

In addition, the sole purpose of the illustrations / photographs throughout the manual, is to assist identification of the general configuration of the parts. They are not to be interpreted as technical drawings or exact replicas of the parts.

The use of Bombardier parts is most strongly recommended when considering replacement of any component. Dealer and / or distributor assistance should be sought in case of doubt.

Torque wrench tightening specifications must be strictly adhered to. Locking devices (ex. : locking disk, elastic stop nut) must be installed or replaced with new ones, where specified. If the efficiency of a locking device is impaired, it must be renewed.

This manual emphasizes particular information denoted by the wording and symbols :

 **WARNING** : Identifies an instruction which, if not followed, could cause serious personal injury including possibility of death.

 **CAUTION** : Denotes an instruction which, if not followed, could severely damage vehicle components.

 **NOTE** : Indicates supplementary information needed to fully complete an instruction.

Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use. Always use common shop safety practice.

This information relates to the preparation and use of Bombardier watercraft and has been utilized safely and effectively by Bombardier Inc.. However, Bombardier Inc. disclaims liability for all damages and / or injuries resulting from the improper use of the contents. We strongly recommend that any services be carried out and / or verified by a highly skilled professional mechanic. It is understood that certain modifications may render use of the watercraft illegal under existing federal, provincial and state regulations.

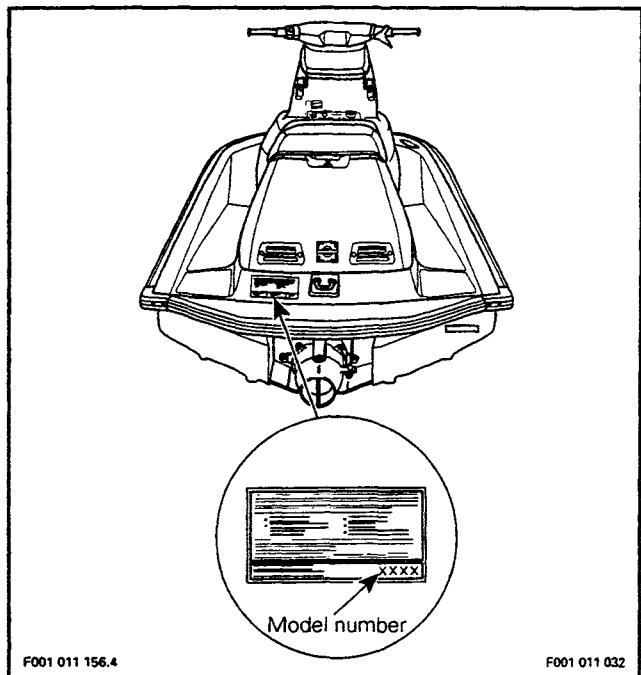
BOMBARDIER WATERCRAFT SHOP MANUAL

INTRODUCTION

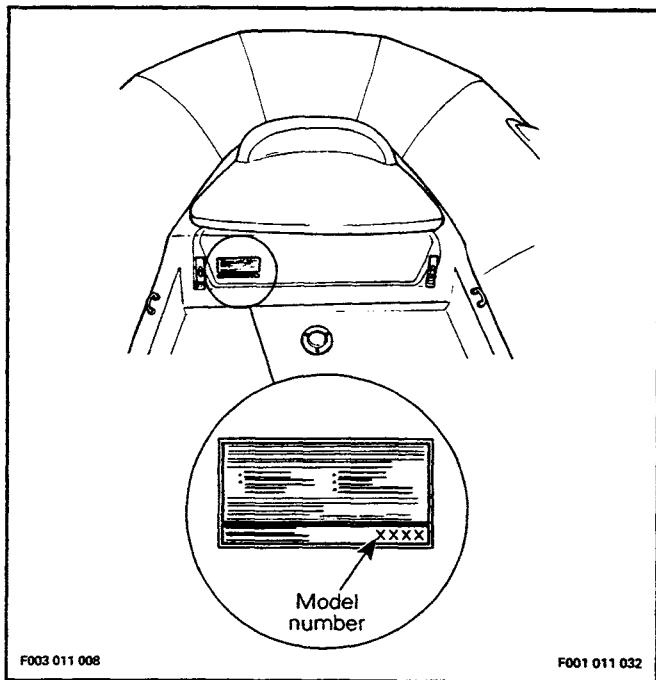
This *Shop Manual* covers BOMBARDIER made SEA-DOO® watercraft models SP 5806, SPI 5808, SPX 5807, XP 5852, GTS 5813, GTX 5861 and EXPLORER 5820.

WATERCRAFT MODEL NUMBER

Can be found on U.S. Coast Guard approved label located on left hand side of stern (rear) eyelet.



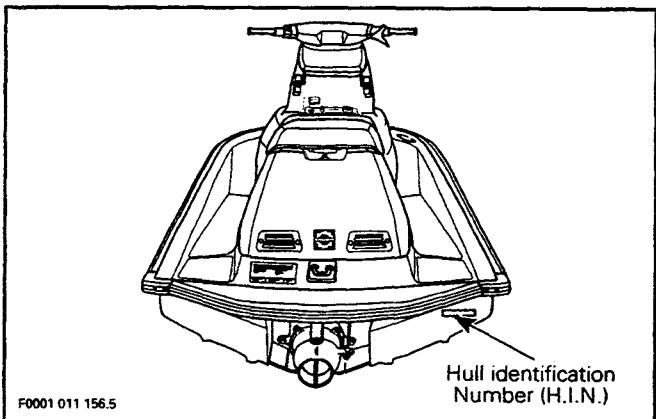
For the EXPLORER model it can be found on left hand side of front storage compartment cover.



F001 011 032

HULL IDENTIFICATION NUMBER (H.I.N.)

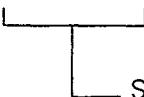
Can be found at right hand rear side of hull, and inside it.



Hull identification
Number (H.I.N.)

The five digits after ZZN are the watercraft serial number.

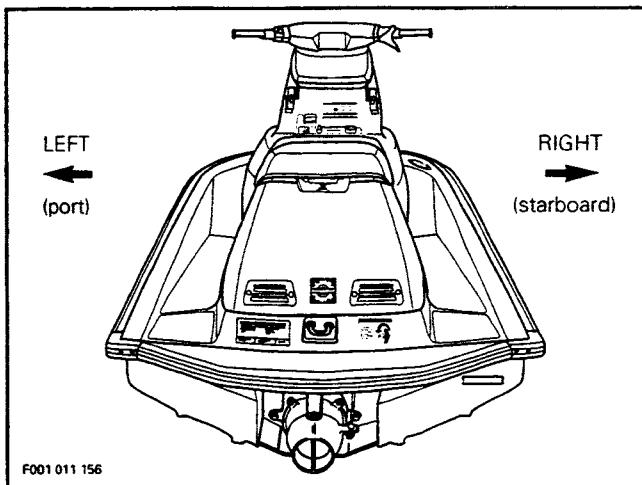
ZZN 1 2 3 4 5 X X X X



Serial number

BOMBARDIER WATERCRAFT SHOP MANUAL

The use of **RIGHT** and **LEFT** indications in the text, always refers to driving position (when sitting on vehicle).



GENERAL

The information and component / system descriptions contained in this manual are correct at time of publication. Bombardier Inc. however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured.

Bombardier Inc. reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring obligation.

ILLUSTRATIONS AND PROCEDURES

An exploded view is conveniently located at the beginning of each section and is meant to assist the user in identifying parts and components.

This *Shop Manual* uses technical terms which may be different from the ones of the *parts catalogs*.

When ordering parts always refer to the specific model, *parts catalogs*.

The illustrations show the typical construction of the different assemblies and, in all cases, may not reproduce the full detail or exact shape of the parts shown, however, they represent parts which have the same or a similar function.

When something special applies (such as adjustment, inspection, etc.), boldface numbers in exploded views are used for specific parts and referred to in the text.

▼ **CAUTION** : Pay attention to torque specifications. Some of these are in **lbf-in** instead of **lbf·ft**. Use appropriate torque wrench.

▼ **CAUTION** : Components of this watercraft are built with parts dimensioned in the metric system. Fasteners are metric and must not be replaced by customary SAE fasteners or vice versa. Mismatched or incorrect fasteners could cause damage to the watercraft or possible personal injury.

As many of the procedures in this manual are interrelated, we suggest, that before undertaking any task, you read and thoroughly understand the entire section or sub-section in which the procedure is contained.

A number of procedures throughout the book require the use of special tools. Where a special tool is indicated, refer to section 01. Before commencing any procedure, be sure that you have on hand all the tools required, or approved equivalents.

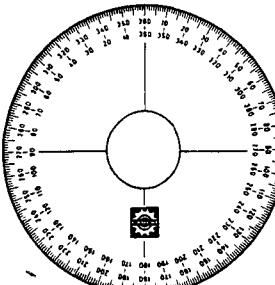
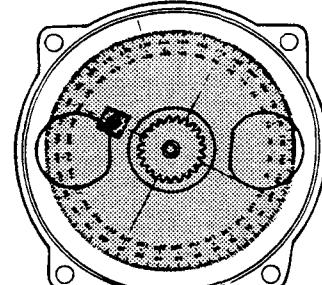
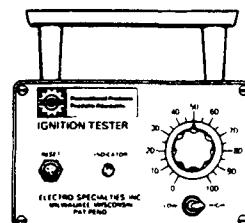
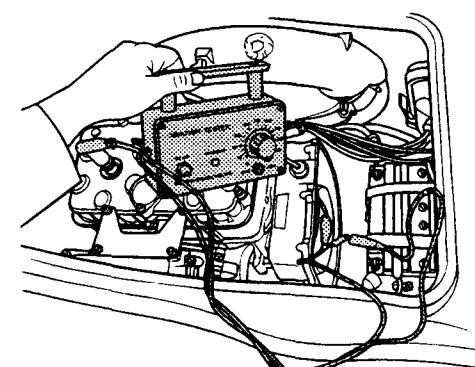
Bombardier Inc.
SEA-DOO Watercraft After Sales Service
Valcourt, (Quebec), Canada

Section 01 SERVICE TOOLS AND PRODUCTS**Sub-Section 01 (SERVICE TOOLS)**

SERVICE TOOLS**ENGINE (Mandatory Tools)**

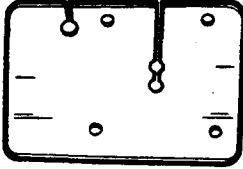
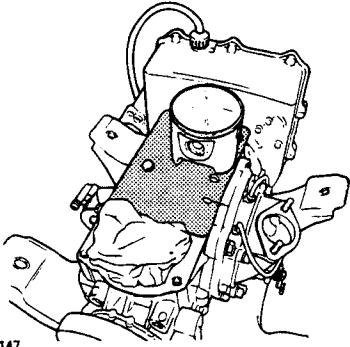
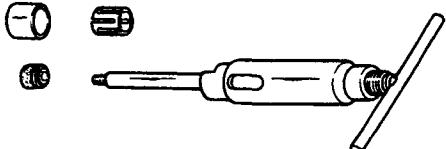
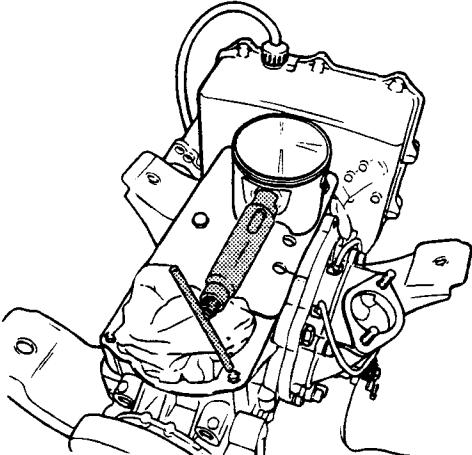
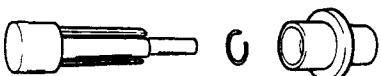
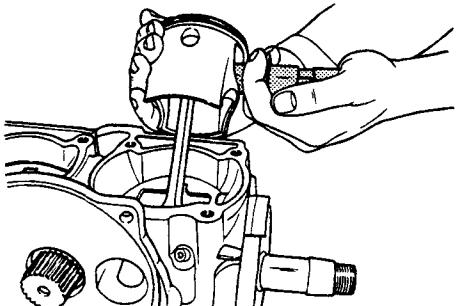
Some of the tools are mandatory, refer to the title of each sections.

Mandatory tool kit is available : P / N 295 000 087.

SERVICE TOOL	PURPOSE	APPLICATION
Degree wheel (mandatory) P / N 295 000 007	 To mark timing position of rotary valve, to check crankshaft alignment.	All models.
A000 001 111	 F001 003 093	
Bombardier ignition tester (mandatory) P / N 295 000 008	 To test engine electrical components.	All models.
A000 002 056	 F001 007 100	

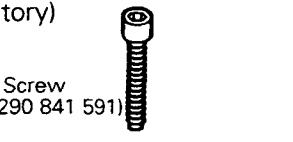
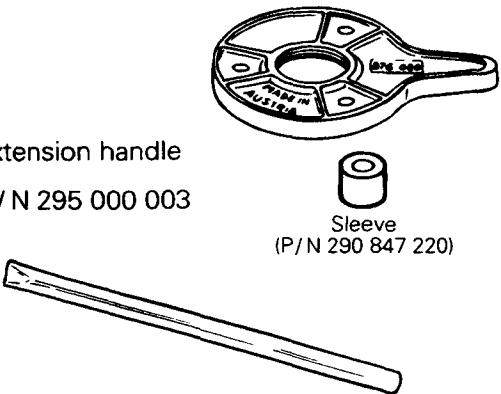
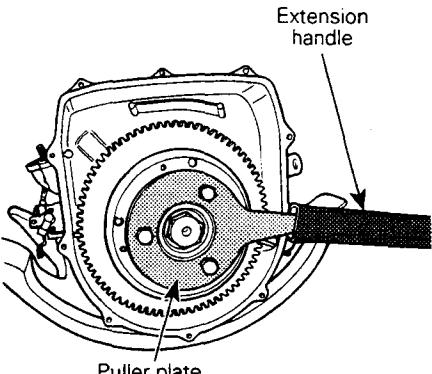
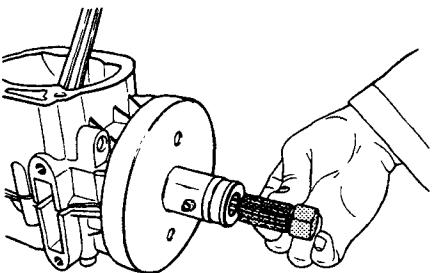
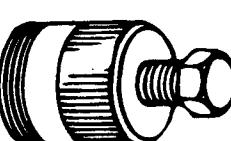
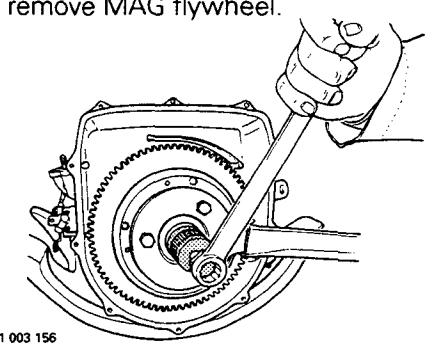
Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
<p>Rubber pad (mandatory) P / N 295 000 079</p>  <p>F001 001 019</p>	<p>To avoid needles of connecting rod bearing from falling in crankcase.</p>  <p>F001 003 147</p>	<p>All models.</p>
<p>Piston pin puller (mandatory) P / N 295 000 105 (587 engine) P / N 290 877 092 (657 engine)</p>  <p>Locating sleeve (P / N 290 877 180)(587) (P / N 290 877 181)(657)</p> <p>Expansion sleeve (P / N 290 877 040)(587) (P / N 290 877 041)(657)</p>  <p>F001 001 031</p> <p>F001 003 095</p>	<p>To remove and install piston pin.</p>	<p>All models.</p>
<p>Piston circlip installer (mandatory) P / N 295 000 077(587 engine) P / N 290 877 016 (657 engine)</p>  <p>A001 001 061</p>	<p>To install circlips on pistons.</p>  <p>F001 003 034</p>	<p>All models.</p>

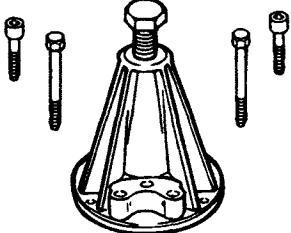
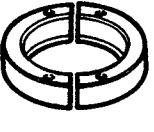
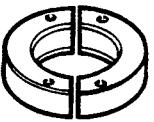
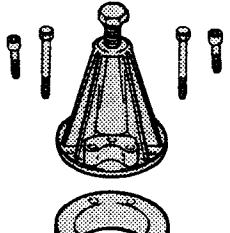
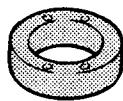
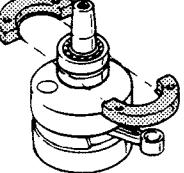
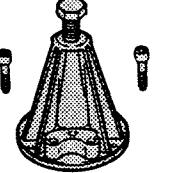
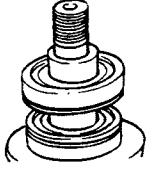
Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
<p>Puller plate (mandatory) P / N 290 876 080</p> <p>Screw (P / N 290 841 591)</p>  <p>Extension handle P / N 295 000 003</p> <p>Sleeve (P / N 290 847 220)</p>  <p>F001 003 151</p>	<p>Used with extension handle to retain crankshaft. When removing / installing PTO flywheel and loosen / tighten MAG flywheel nut.</p>  <p>F001 003 152</p>	<p>All models.</p>
<p>Impeller / PTO flywheel remover / installer (mandatory) P / N 295 000 001</p>  <p>F001 009 029</p>	<p>Used to loosen / tighten PTO flywheel and impeller. Must be used in conjunction with puller plate (P / N 290 876 080) and extension handle (P / N 295 000 003).</p>  <p>F001 003 046</p>	<p>All models.</p>
<p>Puller (mandatory) P / N 290 876 065</p>  <p>A000 002 046</p>	<p>Used with puller plate (P / N 290 876 080) and extension handle (P / N 295 000 003) to remove MAG flywheel.</p>  <p>F001 003 156</p>	<p>All models.</p>

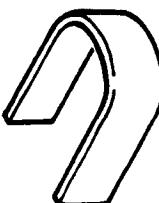
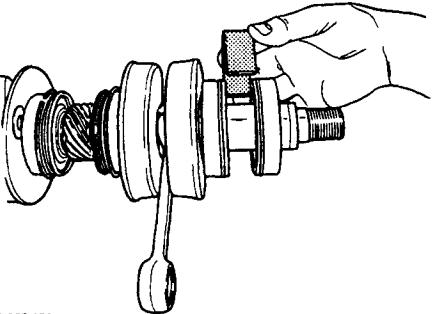
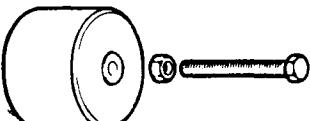
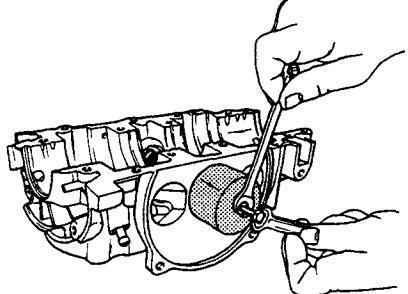
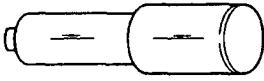
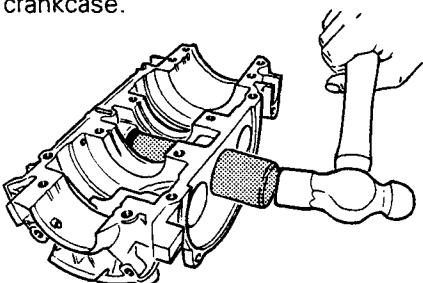
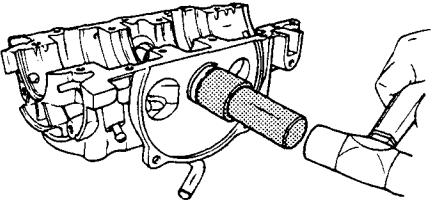
Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
Puller with screws (mandatory) P / N 290 876 298  F001 001 010	To remove crankshaft bearings.	All models.
Protective cap (both ends) (mandatory) P / N 290 876 557  F001 001 011		
Ring (both ends) (mandatory) P / N 290 977 490  F001 001 013		
Ring halves (PTO) (mandatory) P / N 290 977 475  F001 001 015		
Distance ring (MAG) (mandatory) P / N 290 876 569  F001 001 012		
Ring halves (MAG) (mandatory) P / N 290 276 025  F001 001 014		
	    MAG side	
	    PTO side	
	F001 003 094	F001 003 095

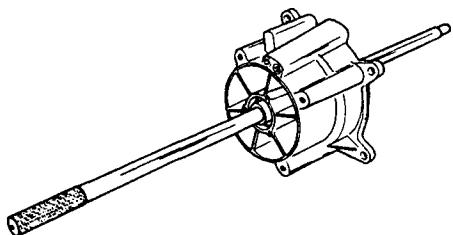
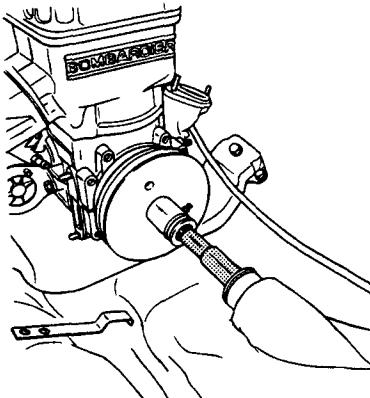
Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
Distance gauge (mandatory) P / N 290 876 826  F001 001 017	To position outer crankshaft bearing on PTO side.  F001 003 070	5806, 5808, 5813 models only.
Puller (mandatory) P / N 290 876 487  F001 001 018	To remove rotary valve shaft from crankcase.  F001 003 076	All models.
Pusher (mandatory) P / N 290 876 500  A000 001 091	To install end bearing of rotary valve shaft in crankcase.  F001 003 086	All models.
Pusher (mandatory) P / N 290 876 605  A000 002 034	To install rotary valve shaft in crankcase.  F001 003 088	All models.

Section 01 SERVICE TOOLS AND PRODUCTS

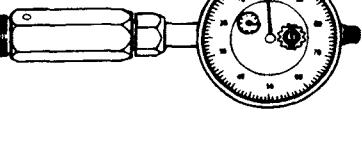
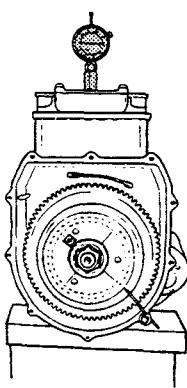
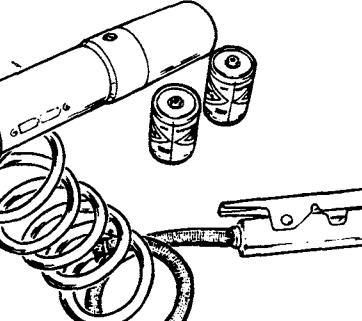
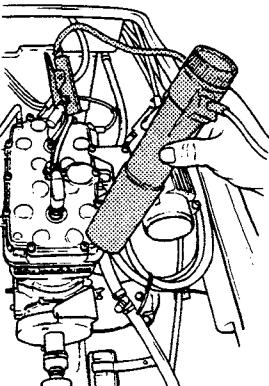
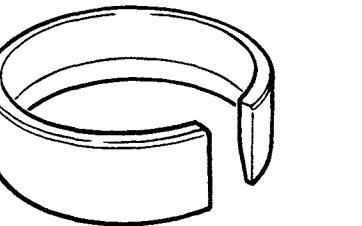
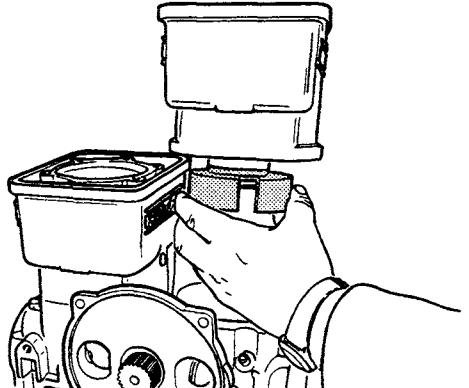
Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
Alignment tool (mandatory) P / N 295 000 089  F001 011 089	To align engine / jet pump whenever either one is removed and reinstalled.  F001 011 101	All models.

Section 01 SERVICE TOOLS AND PRODUCTS

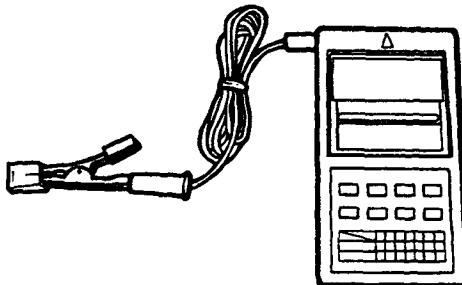
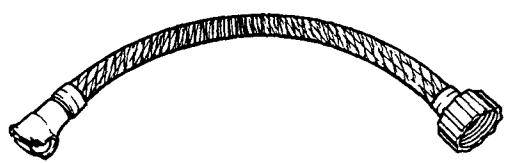
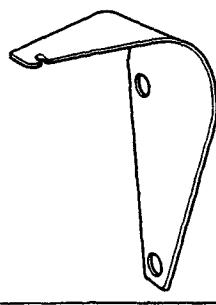
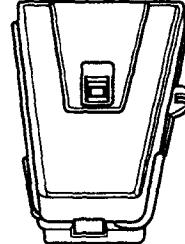
Sub-Section 01 (SERVICE TOOLS)

ENGINE (recommended tools)

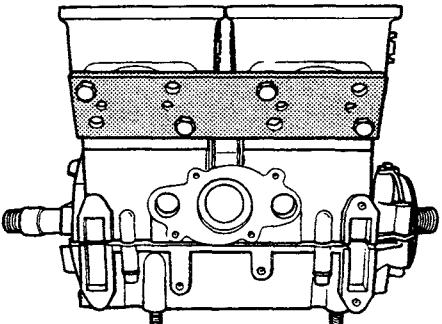
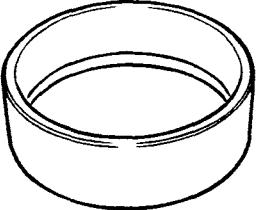
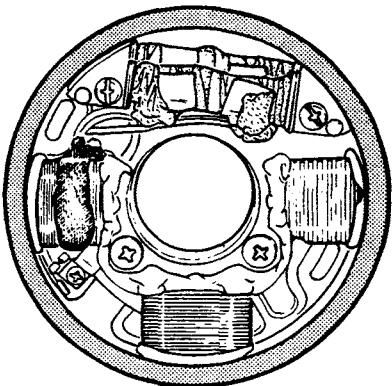
SERVICE TOOL	PURPOSE	APPLICATION
Dial indicator (TDC gauge) (recommended) P / N 295 000 065	To find TDC position. For ignition timing and rotary valve timing. To check crank-shaft alignment.  A000 001 086	All models.  F001 003 162
Stroboscopic timing light (recommended) P / N 295 000 078	To verify ignition timing.  A001 001 092	All models.  F001 007 090
Ring compressor (recommended) P / N 290 876 972 (587 engine)	To compress piston ring when inserting piston in cylinder.  A001 001 065	All models. Except XP 5852.  F001 003 036

Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 01 (SERVICE TOOLS)

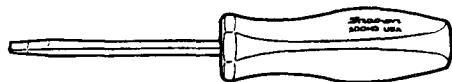
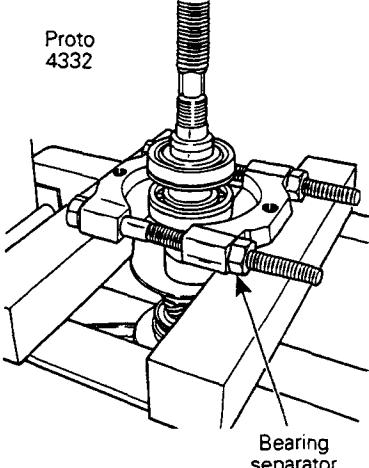
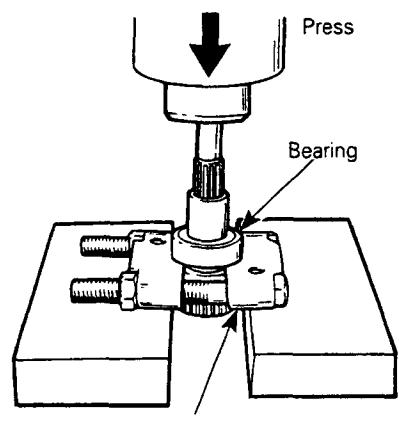
SERVICE TOOL	PURPOSE	APPLICATION
Digital / induction type tachometer (recommended) P / N 295 000 100  F001 001 052	To verify engine RPM.	All models.
Coupler hose (recommended) P / N 295 500 099  F001 004 035	To cool engine when watercraft is out of water. To clean cooling system.	All models.
Timing mark pointer (recommended) P / N 295 000 102  F001 007 127	Align mark on PTO flywheel with pointer to verify engine timing.	All models.
Spark tester (recommended) Purchase locally Superex Canada Ltd No. 15-785  F001 001 053	To verify spark at spark plug cap outlet.	All models.

Section 01 SERVICE TOOLS AND PRODUCTS**Sub-Section 01 (SERVICE TOOLS)**

SERVICE TOOL	PURPOSE	APPLICATION
<p>Aligning tool (recommended) P / N 290 876 902</p>  <p>A000 001 008</p>	<p>To align cylinders by exhaust flanges at assembly.</p>  <p>F001 003 037</p>	<p>All models.</p>
<p>Centering tool (recommended) P / N 290 876 922</p>  <p>A001 001 067</p>	<p>To position coils on armature plate at assembly.</p>  <p>A001 004 003</p>	<p>All models.</p>

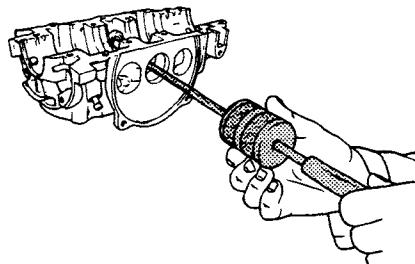
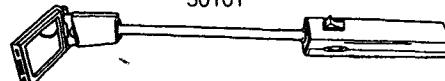
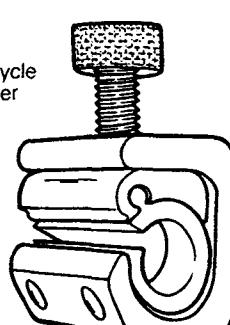
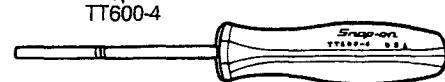
Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
<p>Screw driver (recommended) Not sold by Bombardier Purchase locally</p> <p>Snap-on SDD-143</p>  <p>F001 001 061</p>	<p>To remove / install carburetors pilot jet and main jet.</p>	<p>All models.</p>
<p>Bearing separator (recommended) Not sold by Bombardier Purchase locally</p> <p>Proto 4332</p>  <p>F001 003 061</p>	<p>Pull out bearing.</p>	<p>Crankshaft.</p>
<p>Bearing separator (recommended) Not sold by Bombardier Purchase locally</p>  <p>Bearing separator Snap-on CJ-950</p> <p>F001 003 078</p>	<p>Pull out bearing.</p>	<p>Bearing beside distance sleeve on rotary valve shaft.</p>

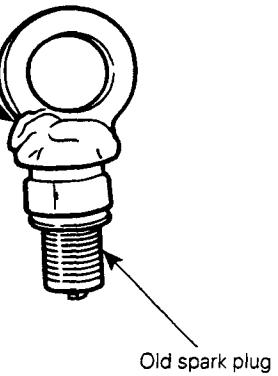
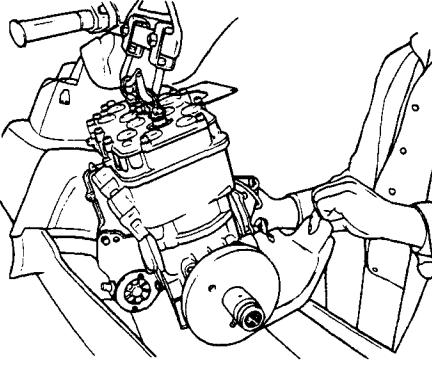
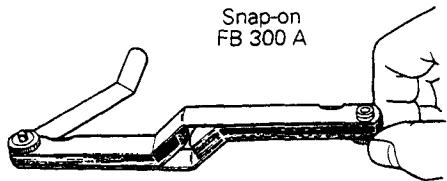
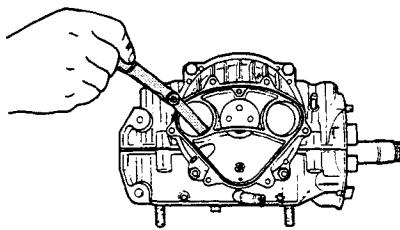
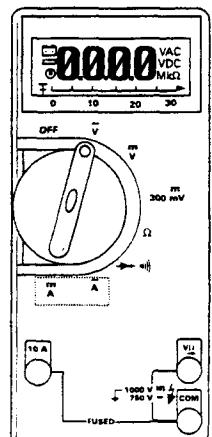
Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
<p>Slide hammer puller (recommended) Not sold by Bombardier Purchase locally</p> <p>Snap on : Handle CJ93-1 Hammer CJ125-6 Claws CJ93-4</p>  <p>F001 009 035</p>	<p>Pull out rotary valve shaft end bearing / crankcase.</p>  <p>F001 003 080</p>	<p>All models.</p>
<p>Lighted adjustable mirror (recommended) Not sold by Bombardier Purchase locally</p> <p>Snap-on 50101</p>  <p>F001 001 054</p>	<p>See in dark area.</p>	<p>Oil injection pump adjustment.</p>
<p>Cable luber (recommended) Not sold by Bombardier Purchase locally</p> <p>See a motorcycle parts supplier</p>  <p>F001 001 002</p>	<p>Power inject Sea-Doo Lube in throttle cable.</p>	<p>All models.</p>
<p>Terminal remover (recommended) Not sold by Bombardier Purchase locally</p> <p>Snap-on TT600-4</p>  <p>F001 001 055</p>	<p>Remove terminals from connector housing in electrical circuit.</p>	<p>All models.</p>

Section 01 SERVICE TOOLS AND PRODUCTS

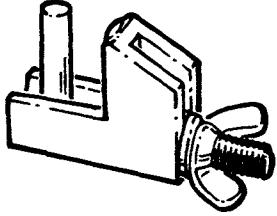
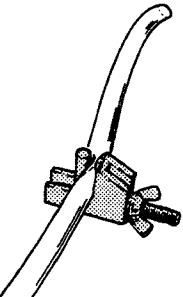
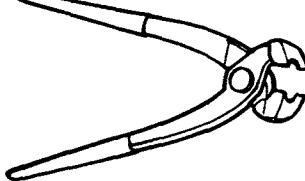
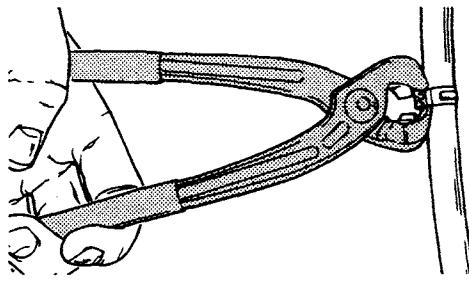
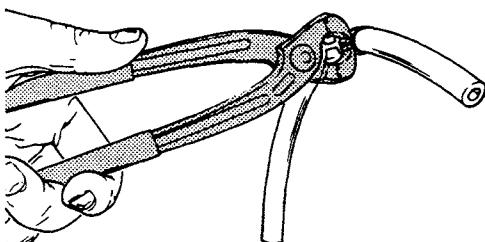
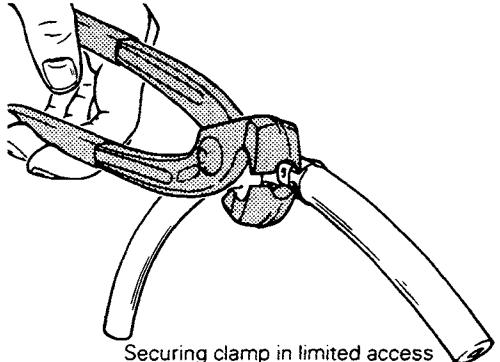
Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
<p>Engine lifting device (recommended) Not sold by Bombardier Do it yourself Refer to <i>shop manual</i> section 03-02</p> <p>Weld a lock washer here</p>  <p>F001 003 010</p>	<p>Lift engine out of watercraft.</p>  <p>F001 003 144</p>	<p>All watercraft engines.</p>
<p>Feeler gauge 45° (recommended) Not sold by Bombardier Purchase locally</p>  <p>F001 001 056</p>	<p>To measure rotary valve and rotary valve cover clearance.</p>  <p>F001 003 183</p>	<p>All models.</p>
<p>Digital / analog multimeter (recommended) P / N 529 022 000</p>  <p>F001 001 060</p>	<p>To verify electrical system specifications.</p>	<p>All models.</p>

Section 01 SERVICE TOOLS AND PRODUCTS

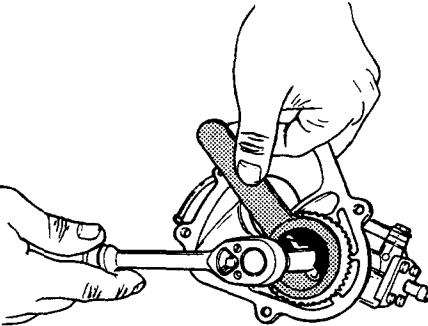
Sub-Section 01 (SERVICE TOOLS)

COOLING / FUEL / OIL SYSTEMS (Mandatory Tools)

SERVICE TOOL	PURPOSE	APPLICATION
Hose pincher (mandatory) P / N 295 000 076  A001 001 090	To avoid leaks while working on oil / fuel lines.  A001 001 091	All models.
Pliers (mandatory) P / N 295 000 070  F001 003 043	To secure / cut ear clamps on oil / fuel lines and coolant hoses.  Cutting clamp  Securing clamp  Securing clamp in limited access F001 001 003 F001 001 004 F001 001 005	All models.

Section 01 SERVICE TOOLS AND PRODUCTS

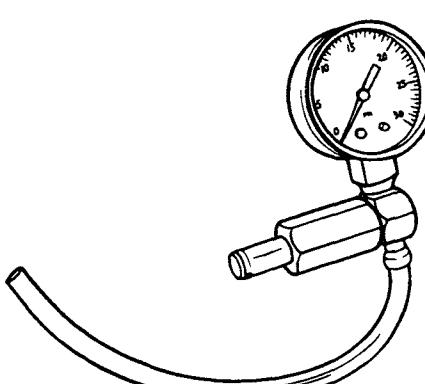
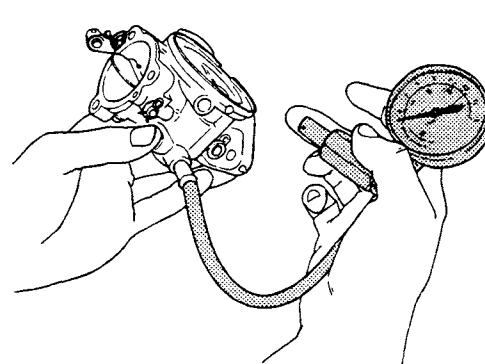
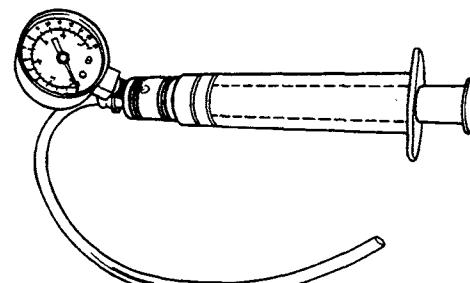
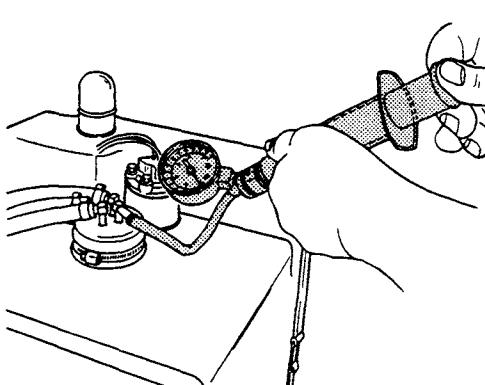
Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
<p>Gear holder (mandatory) P / N 290 277 905</p>  A000 002 042	<p>To remove / install retaining nut of oil injection pump gear.</p>  A000 002 043	<p>All models.</p>

Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 01 (SERVICE TOOLS)

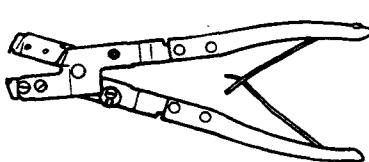
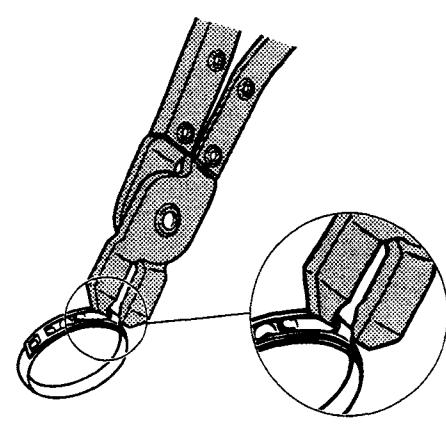
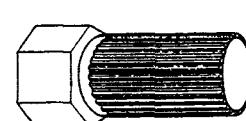
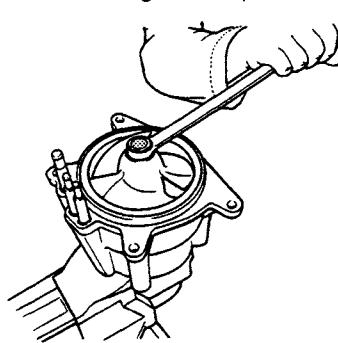
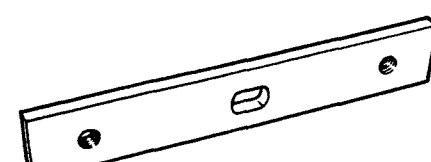
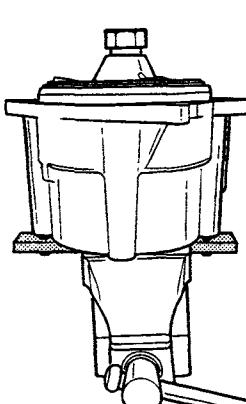
COOLING / FUEL / OIL SYSTEMS (Recommended Tools)

SERVICE TOOL	PURPOSE	APPLICATION
Pump gauge tester (recommended) P / N 295 000 083	To verify release pressure and leak at carburetor.  F001 001 033	All models.  F001 005 014
Pump gauge tester (recommended) P / N 295 000 085  F001 001 034	To make sure there is no leak by pressurizing the fuel system or oil system.  F001 005 018	All models.

Section 01 SERVICE TOOLS AND PRODUCTS

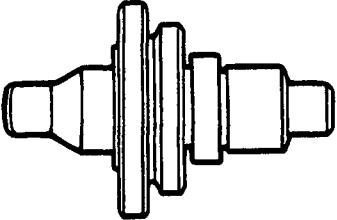
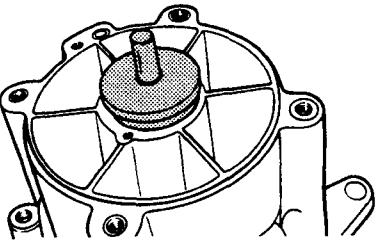
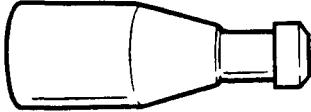
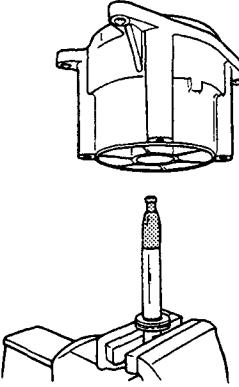
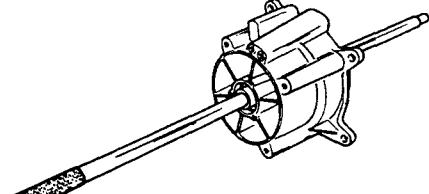
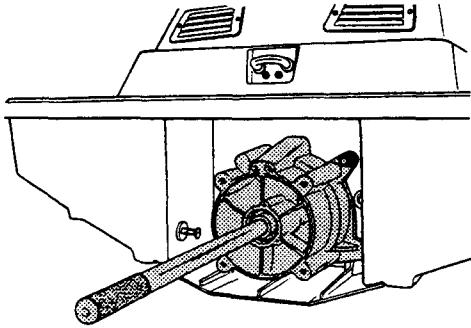
Sub-Section 01 (SERVICE TOOLS)

PROPULSION SYSTEM (Mandatory Tools)

SERVICE TOOL	PURPOSE	APPLICATION
Pliers (mandatory) P / N 295 000 069	To remove / install drive shaft boot reusable stepless clamps.  	All models.
Impeller / PTO flywheel remover / installer (mandatory) P / N 295 000 001	Used to loosen / tighten impeller on shaft.  	All models.
Impeller shaft holder (mandatory) P / N 295 000 082	Used to loosen / tighten impeller on shaft.  	All models.

Section 01 SERVICE TOOLS AND PRODUCTS

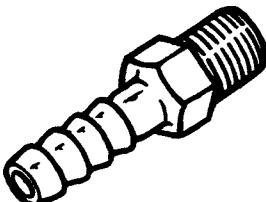
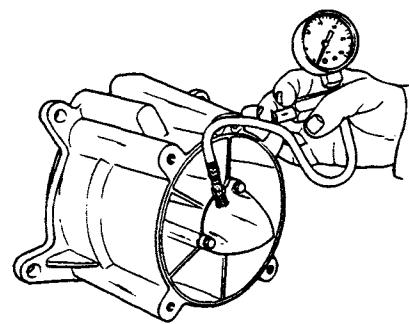
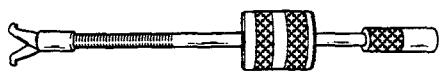
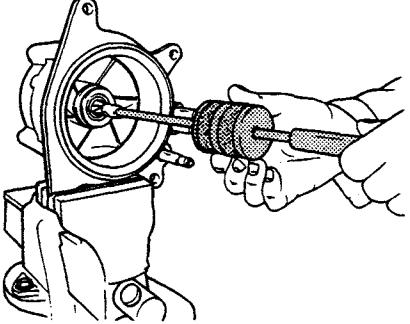
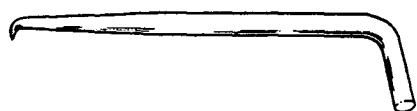
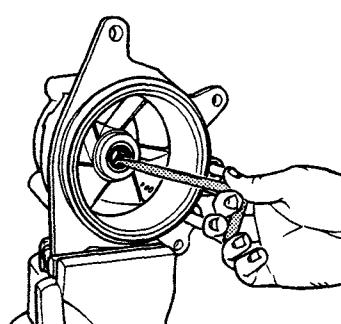
Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
Bearing / seal installer (mandatory) P / N 295 000 107  F001 009 164	To install impeller shaft needle bearings and seal.  F001 009 054	All models.
Impeller shaft guide (mandatory) P / N 295 000 002  F001 009 060	To protect seal lip when installing impeller shaft in its housing.  F001 009 061	All models.
Alignment tool (mandatory) P / N 295 000 089  F001 011 099	To align engine / jet pump whenever either one is removed and reinstalled.  F001 011 100	All models.

Section 01 SERVICE TOOLS AND PRODUCTS

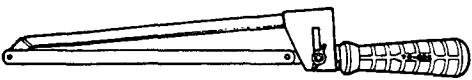
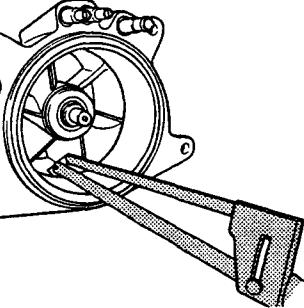
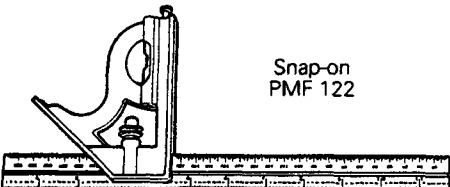
Sub-Section 01 (SERVICE TOOLS)

PROPULSION SYSTEM (Recommended Tools)

SERVICE TOOL	PURPOSE	APPLICATION
<p>Fitting (recommended) P / N 295 000 086</p> <p>NOTE : Must maintain a pressure of 70 kPa (10 PSI) during 10 minutes. Never pressurize over 70 kPa (10 PSI).</p>  <p>F001 001 035</p>	<p>To pressurize pump assembly before installation, to verify if any leak.</p>  <p>F001 009 090</p>	All models.
<p>Slide hammer puller (recommended) Not sold by Bombardier Purchase locally</p> <p>Snap-on : Handle CJ93-1 Hammer CJ125-6 Claws CJ93-4</p>  <p>F001 009 035</p>	<p>Pull out impeller shaft seal.</p>  <p>F001 009 036</p>	All models.
<p>Seal puller (recommended) Not sold by Bombardier Purchase locally</p> <p>Snap-on #S6129</p>  <p>F001 009 033</p>	<p>Pull out impeller shaft seal.</p>  <p>F001 009 034</p>	All models.

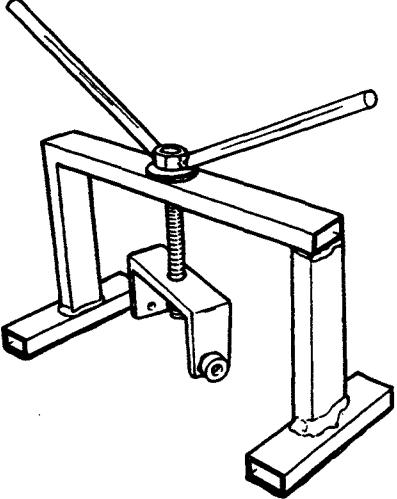
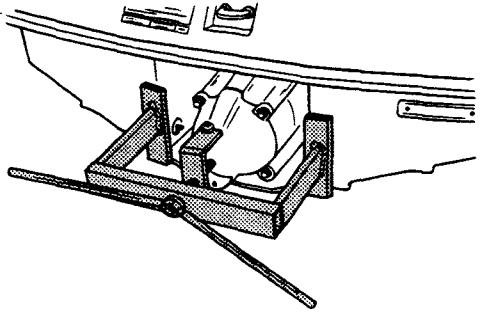
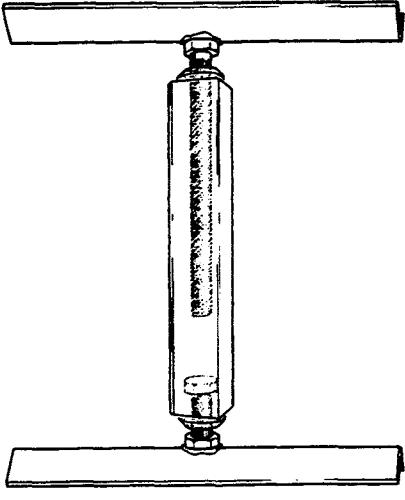
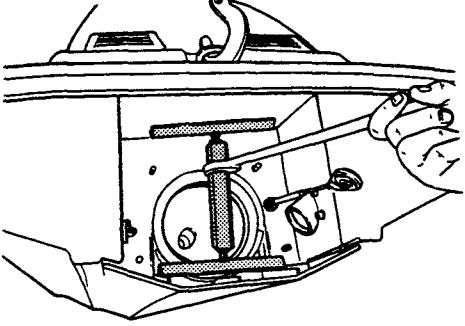
Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
<p>Scraper (recommended) Not sold by Bombardier Purchase locally</p> <p>F001 001 057</p> <p>Snap-on CS-A12A</p> 	Remove silicone.	Impeller housing.
<p>Hacksaw (recommended) Not sold by Bombardier Purchase locally</p> <p>F001 001 058</p> <p>Snap-on HS3</p> 	<p>Cut wear ring.</p> <p>F001 009 032</p> 	All models.
<p>Machinist's square (recommended) Not sold by Bombardier Purchase locally</p> <p>F002 001 006</p> <p>Snap-on PMF 122</p> 	Adjust reverse gate.	Models equipped with reverse.

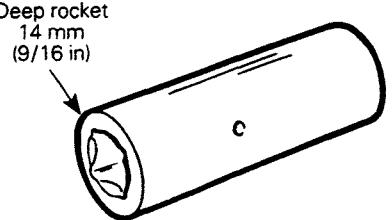
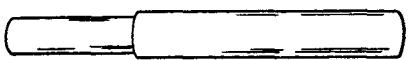
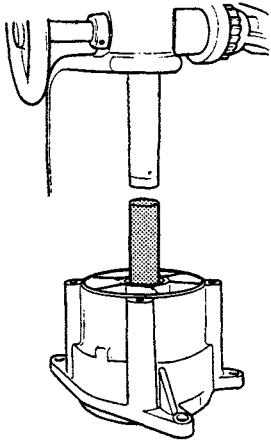
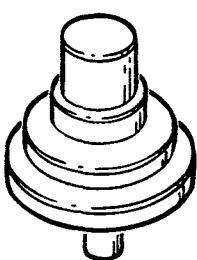
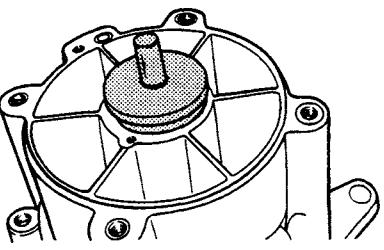
Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
Impeller housing remover (recommended) Not sold by Bombardier Do it yourself Refer to <i>shop manual</i> section 08-01	Remove impeller housing.	All models. Except XP 5852.
 F001 011 096	 F001 011 097	
Ride shoe remover (recommended) Not sold by Bombardier Do it yourself Refer to <i>shop manual</i> section 08-01	Remove ride shoe.	All models.
 F001 009 025	 F001 009 026	

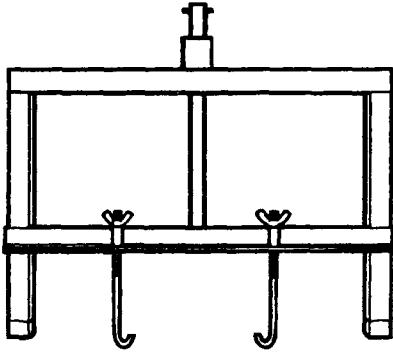
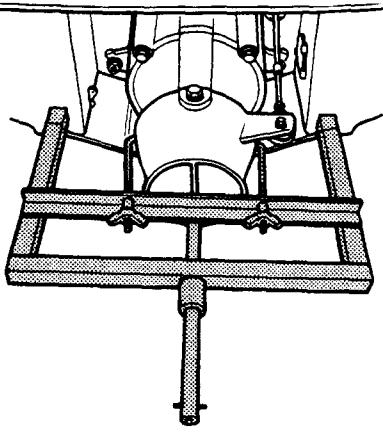
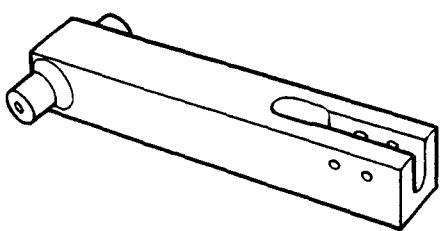
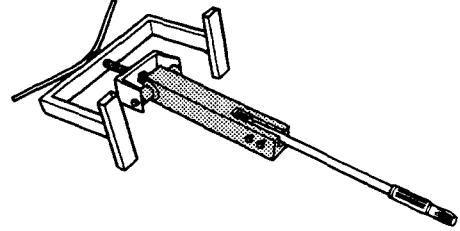
Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
<p>Fitting remover (recommended) Not sold by Bombardier Do it yourself Refer to <i>shop manual</i> section 08-01 Deep rocket 14mm (9/16 in)</p>  <p>F001 009 099</p>	Remove impeller housing fittings.	All models.
<p>Bearing remover (recommended) Not sold by Bombardier Do it yourself Refer to <i>shop manual</i> section 08-01</p>  <p>F001 009 037</p>	<p>Remove impeller housing bearings.</p>  <p>F001 009 038</p>	All models.
<p>Bearing installer (recommended) P / N 295 000 014</p>  <p>F001 009 052</p>	<p>To install impeller shaft needle bearings.</p>  <p>F001 009 054</p>	All models.

Section 01 SERVICE TOOLS AND PRODUCTS

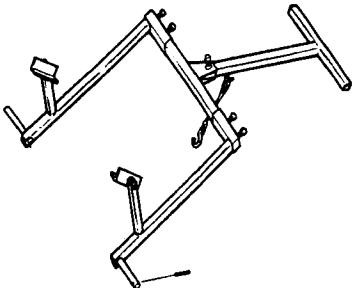
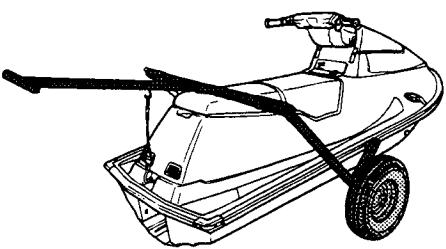
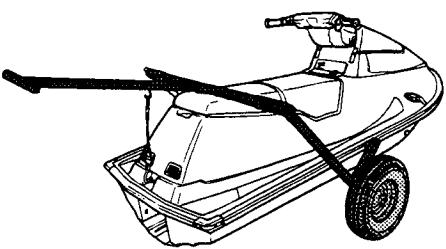
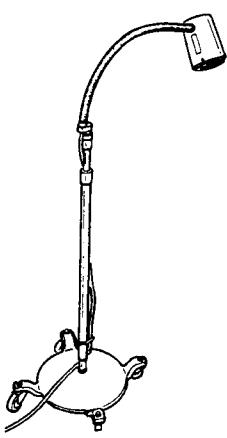
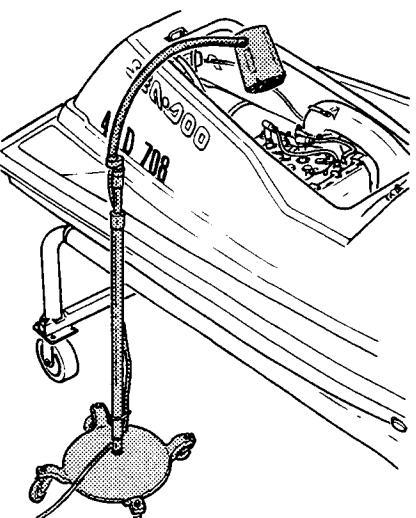
Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
<p>Steering system alignment tool (recommended) Not sold by Bombardier Do it yourself Refer to <i>shop manual</i> section 09-01</p>  <p>F001 010 028</p>	<p>Ease handlebar / nozzle alignment.</p>  <p>F001 010 029</p>	<p>All models. Except EXPLORER 5820.</p>
<p>Drive shaft puller (recommended) Not sold by Bombardier Do it yourself Refer to <i>shop manual</i> section 08-01</p>  <p>F001 008 005</p>	<p>Remove drive shaft.</p>  <p>F001 008 006</p>	<p>All models.</p>

Section 01 SERVICE TOOLS AND PRODUCTS

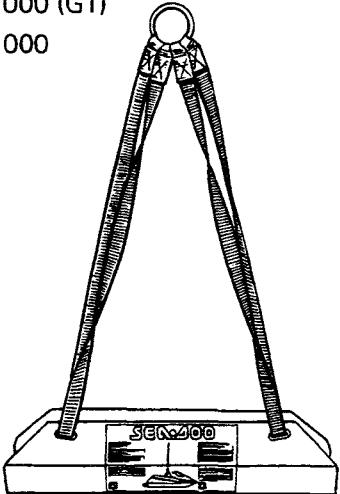
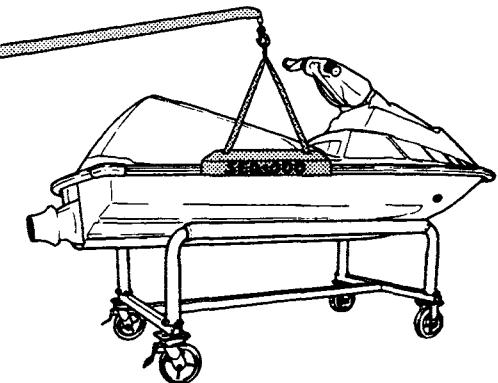
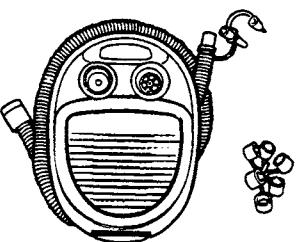
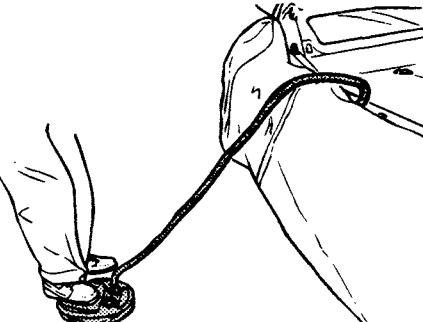
Sub-Section 01 (SERVICE TOOLS)

WATERCRAFT HANDLING (Recommended Tools)

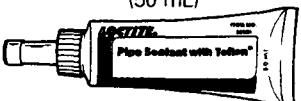
SERVICE TOOL	PURPOSE	APPLICATION
<p>Dolley (recommended) P / N 295 000 004</p>  <p>F001 001 001</p>	<p>To handle watercraft in shop or on beach.</p> 	<p>All models.</p>
<p>Beach wheels (recommended) P / N 295 000 005</p>  <p>F001 001 007</p>	 <p>F001 001 008</p>	
<p>Shop lamp (recommended) P / N 295 000 081</p> <p>◆ WARNING : Never use electric powered tools on watercraft unless first verifying no gasoline leaks / fumes are present.</p>  <p>F001 001 021</p>	<p>To facilitate repair when working inside the hull / body.</p>  <p>F001 001 030</p>	<p>All models.</p>

Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 01 (SERVICE TOOLS)

SERVICE TOOL	PURPOSE	APPLICATION
<p>Lift kit (recommended) P / N 298 760 000 (SP and XP) P / N 298 776 000 (GT) P / N 298 780 000 (EXPLORER)</p>  <p>F001 001 059</p>	<p>To handle watercraft in shop.</p>  <p>F001 009 146</p>	<p>All models.</p>
<p>Foot Pump Kit P / N 204 000 047</p>  <p>F003 015 001</p>	<p>To inflate tube.</p>  <p>F003 011 034</p>	<p>EXPLORER model 5820.</p>

Section 01 SERVICE TOOLS AND PRODUCTS**Sub-Section 02 (SERVICE PRODUCTS)****SERVICE PRODUCTS**

SERVICE PRODUCT	PURPOSE	APPLICATION
Pipe sealant P / N 293 800 018 Loctite 592 (50 mL)  A000 001 104	To seal pipe fittings. Prevents leakage and vibrational loosening.	Plug on impeller housing cover. Plastic fitting (tool P / N 295 000 086) on impeller housing cover.
Removable threadlocker P / N 293 800 015 Loctite 242 (blue) (10 mL)  A000 001 110	A medium-strength adhesive for threadlocking and threadsealing. Vibration-proof nuts, bolts and screws.	Cylinder head cover screws. Exhaust manifold studs and screws. Engine rubber mount screws. Armature plate screws. Magneto flywheel / crankshaft. Carburetor mount nuts. Magneto coil screws. Impeller housing cover screws. Venturi / impeller housing screws. Grill screws. Engine support screws. Impeller housing / hull nuts. Steering nozzle screws. Reverse gate screws.
High strength threadlocker P / N 293 800 005 Loctite 271 (red) (10 mL)  A000 001 102	Hi-strength threadlocking threadsealing adhesive. Apply heat to ease disassembly.	Starter screws / engine. Impeller shaft thread. Steering column screw.

Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 02 (SERVICE PRODUCTS)

SERVICE PRODUCT	PURPOSE	APPLICATION
<p>High temperature threadlocker P / N 290 899 788</p> <p>Loctite 648 (green) (5 g)</p>  <p>A000 001 121</p>	<p>Hi-strength threadlocking threadsealing adhesive that resists high temperature.</p>	<p>Crankcase / plug at end of rotary valve shaft.</p> <p>Ring gear / MAG fly-wheel.</p>
<p>Primer for paste gasket P / N 293 600 012</p> <p>Loctite Locquic Primer N (4 oz)</p>  <p>A000 001 077</p>	<p>General purpose primer. Primer N assures fixturing of parts in 15-30 minutes and full cure in 12 hours or less. On part life is 30 days, but it is recommended that parts be joined within 10 minutes after adhesive is applied over primer.</p>	<p>Crankcase halves mating surface.</p> <p>Impeller shaft thread.</p> <p>Venturi / impeller housing mating surface.</p>
<p>Solvent P / N 293 800 019</p> <p>Loctite Safety Solvent 755</p>  <p>A000 001 130</p>	<p>Clean and prepare surface before assembly.</p>	<p>Impeller shaft threads.</p> <p>Drive shaft splines.</p> <p>Impeller threads and splines.</p>
<p>Silicone "Ultra Black" P / N 293 800 030</p> <p>Silicone "Ultra Black HB" P / N 293 800 028</p>  <p>F001 001 046</p> <p>Loctite 598 (300 mL) Loctite 598 HB ('Heavy Body') (300 mL)</p>	<p>Seal fiberglass and metal parts.</p>	<p>Ride shoe / hull, pump / hull.</p>

Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 02 (SERVICE PRODUCTS)

SERVICE PRODUCT	PURPOSE	APPLICATION
<p>Paste gasket P / N 293 800 007</p> <p></p> <p>Loctite 515 (50 mL)</p> <p>A000 001 101</p>	Makes, dresses and repairs gaskets of sizes and shapes.	Cylinder sleeve / O-ring groove. Crankcase halves mating surface. Impeller housing cover. Impeller shaft seal. Venturi / impeller housing. Seal outer diameter in seal carrier.
<p>Retaining compound P / N 413 703 100</p> <p></p> <p>Loctite 609 (10 ml)</p> <p>A000 001 100</p>	Eliminates the need for setscrews. Locks bushings, sleeves and pins in housing and on arms.	Trim ring arm / venturi housing spring pin.
<p>Gelcoat kit P / N 295 500 100</p> <p></p> <p>Sea-Doo Gelcote Repair kit</p> <p>F001 001 027</p>	Gelcoat repair.	Body. Hull.
<p>Gelcoat paste (white) P / N 293 500 016</p> <p></p> <p>F001 001 051</p>	Gelcoat repair.	Body. Hull.

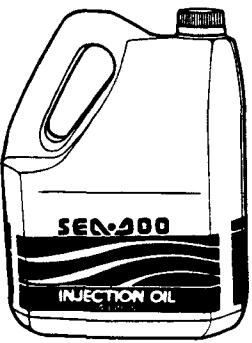
Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 02 (SERVICE PRODUCTS)

SERVICE PRODUCT	PURPOSE	APPLICATION
Gelcoat (liquid) 1 liter white P / N 293 500 033 1 liter mauve P / N 293 500 034 1 liter grey P / N 293 500 035 1 liter light grey P / N 293 500 037 1 liter green P / N 293 500 038 1 liter turquoise P / N 293 500 039	Gelcoat repair.	Body. Hull.
Synthetic grease P / N 293 550 010	Lubricate and provide great wear protection and water resistance.	Under the head of cylinder and cylinder head screws. Carburetor linkage. Impeller shaft seal lips. Both sides of impeller shaft thrust washer. Drive shaft / impeller splines. Seal carrier seals and bearing. PTO flywheel rubber boot.
 Bombardier Sea-Doo F001 001 041		
Penetrating lubricant P / N 293 600 006	Prevents corrosion and sticking. Protects metallic parts.	In carburetor intake when engine is water flooded and before storage. Throttle cable. Wear ring (when new). Corroded parts.
 Sea-Doo lube F001 001 028		
Synthetic oil P / N 293 600 011	Lubricate.	Jet pump.
 Sea-Doo jet pump synthetic oil F001 001 025		

Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 02 (SERVICE PRODUCTS)

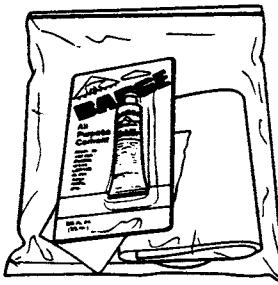
SERVICE PRODUCT	PURPOSE	APPLICATION
Injection oil 1 liter P / N 293 600 005  4 liters P / N 293 600 004 	Lubricate engine.	All models.
F001 001 044		
Anti-seize lubricant P / N 293 550 001 	Protects moving and stationary parts against high temperature seizing. Prevents rust and corrosion on parts exposed to high heat.	Crankshaft thread / PTO flywheel. Crankshaft bearing seat. Spark plug thread. Drive shaft splines. Ignition housing/crank-case screws.
F001 001 043		

Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 02 (SERVICE PRODUCTS)

SERVICE PRODUCT	PURPOSE	APPLICATION
732 Multi-purpose sealant P / N 293 800 006 Dow Corning  F001 001 048	To seal joints.	Ride shoe screws (inside hull).
Electrical insulating compound P / N 293 550 004 Dow Corning  F001 001 042	Prevents moisture and corrosion build-up in electric connections.	Battery posts and cable connectors. Thermosensor connectors.
Primer P / N 293 530 012 Sikaflex Primer 449  F001 001 050	Clean and prepare surface for application of sealant (P / N 293 530 011).	Water tank trap / body surface. Rear baffle / body surface.
Sealant P / N 293 530 011 Sikaflex Sealant 221  F001 001 049	Seal fiberglass and plastic parts. For best result use primer (P / N 293 530 012).	Water tank trap / body surface. Rear baffle / body surface.

Section 01 SERVICE TOOLS AND PRODUCTS
Sub-Section 02 (SERVICE PRODUCTS)

SERVICE PRODUCT	PURPOSE	APPLICATION
<p>Paint P / N 293 500 040 grey P / N 293 500 041 white P / N 293 500 042 purple</p> <p>F001 0001 026</p> <p>Sea-Doo paint</p> 	Protection of metallic parts.	Metallic parts only.
<p>Tube Repair Kit P / N 204 000 046</p> <p>F003 015 002</p> 	To repair tube minor punctures.	Inflatable tube.
<p>Lubricant Not sold by Bombardier Purchase locally</p> <p>G.E. Versilube G341M</p> <p>A000 001 065</p> <p>or Esso Beacon 325</p> 	Provide excellent lubrication over long interval of no maintenance.	Sliding surface of starter armature shaft splines.
<p>Epoxy glue Not sold by Bombardier Purchase locally 3M-05900</p>	Glue.	Knurled surface of aluminum hull insert (P / N 292 000 075).

Section 01 SERVICE TOOLS AND PRODUCTS

Sub-Section 02 (SERVICE PRODUCTS)

SERVICE PRODUCT	PURPOSE	APPLICATION
Sea-Doo fuel stabilizer P / N 413 408 600	Prevent fuel deterioration during storage.	Fuel tank at storage.
Vinyl protectant Not sold by Bombardier Purchase locally Armor-All	Clean and protect vinyl.	Seat.
Gun Kote Not sold by Bombardier Purchase locally Kal-Gard Coating & Mfg. Corp.	To prevent corrosion.	MAG flywheel and ring gear.

Section 02 PERIODIC INSPECTION CHART

PERIODIC INSPECTION CHART

NOTE : Shade area shows the maintenance frequency.

NOTE : Servicing period is given in hours. On an average, three hours is equivalent to using one tank of gasoline.

DESCRIPTION	FREQUENCY			
	10 hours	25 hours	50 hours	100 hours
Lubrication / corrosion protection of metallic components	①			
Engine ignition timing				
Spark plugs, cleaning / adjustment				
Throttle / choke cables, inspection / lubrication	①			
Flame arrester element, inspection				
Carburetor adjustment including choke / throttle cable adjustments and linkage				
Oil injection pump adjustment				
Fuel filter cleaning, oil filter inspection				
Oil filter, replacement				
Engine head screws, retorque				
Steering column wear / steering cable adjustment / condition				
Reverse system / reverse cable adjustment				
Fastener tightening (flame arrester mount screws, carburetor mount nuts, engine mount screws, exhaust system, etc.).				
Muffler, battery and reservoirs fastening devices				
Fuel / oil lines, check-valves and hoses inspection, fuel system pressurization				
Fuel / oil lines water eliminator valve inspection				
Fuel vent line pressure relief valve inspection				
Inspect / clean engine drain hose	①			
Bilge system / water-trap drains, inspection				
Battery, vent line condition				
Battery vent line water eliminator valve inspection				
Battery and starter cables				
Engine overheating beeper / electrical connections				
Impeller shaft reservoir oil level / oil condition				Replace
Impeller condition and impeller / wear ring clearance		②		
Drive shaft boot / splines condition (both ends)		②		
Drive shaft, lubricate grease fitting at PTO flywheel				
Lubricate grease fitting at seal carrier				
Water intake grill condition		②		
Hull condition				
Cooling system flushing ③				
Inflatable tube condition				④
Zinc anode (Explorer)				
Air blower inspection (Explorer)				

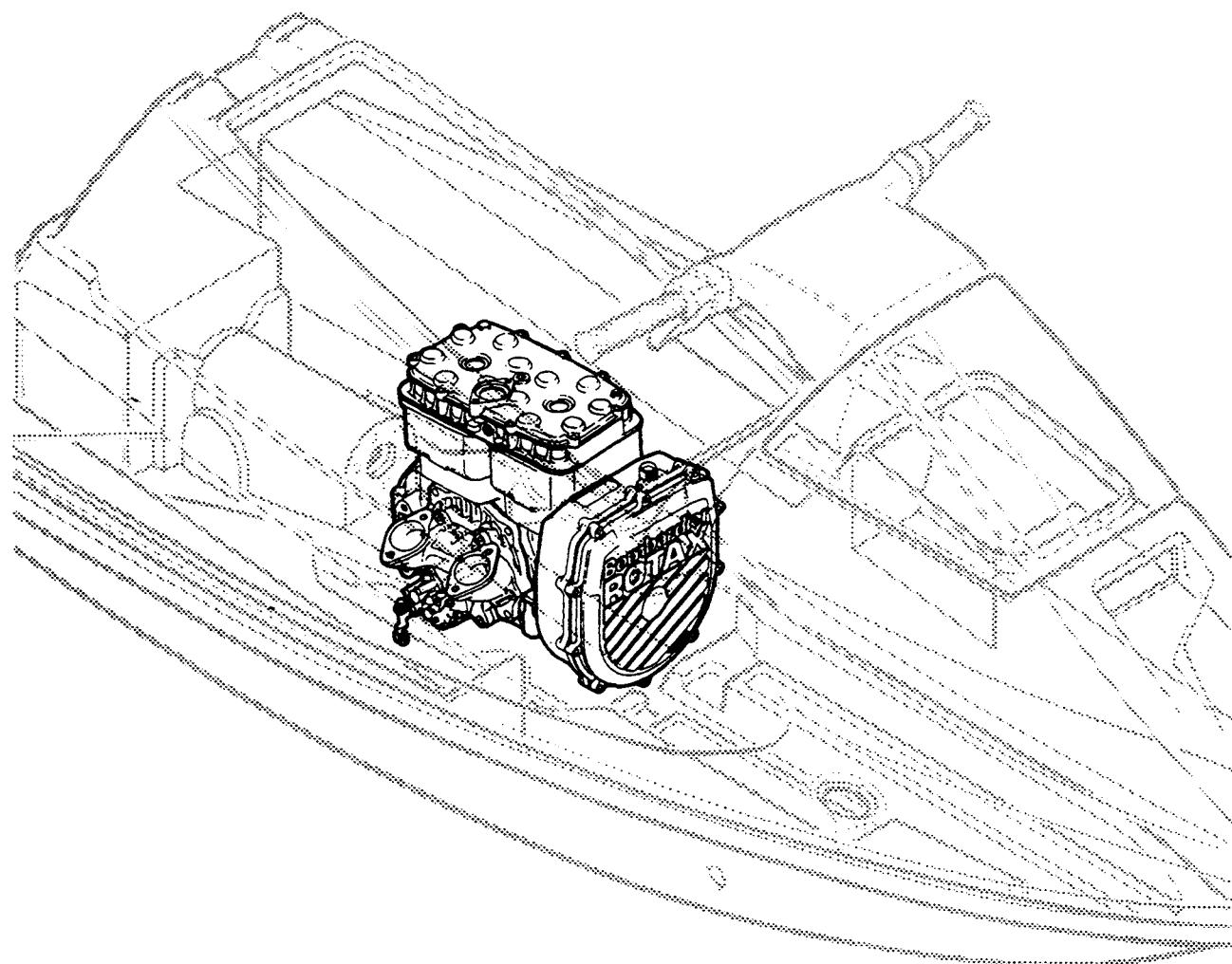
① Every 10 hours in salt water use.

② These items have to be initially checked after 25 hours. Thereafter, servicing to be made as specified in this chart.

③ Daily flushing in salt water or unclean water use.

④ Inflatable tube should be removed and cleaned. Also verify tube attachment condition.

587 AND 657 ENGINE TYPES



WATER-FLOODED ENGINE

ENGINE DESCRIPTION

The two stroke ROTAX engine rotates counterclockwise seen from the rear (PTO flywheel). It has a rotary valve to control fuel mixture intake. Lubrication is provided by a variable oil injection pump. It is cooled by water supplied from the jet pump. It has a NIPPONDENSO Capacitor Discharge Ignition System with single coil and an integrated electronic module (587 engine), double coil (657 engine). The fuel is provided by diaphragm carburetor having an integrated fuel pump.

General

If engine is water-flooded, it must be serviced within a few hours after the event. Otherwise engine will have to be overhauled.

CAUTION : A water-flooded engine must be properly lubricated, operated then lubricated again, otherwise parts will be seriously damaged.

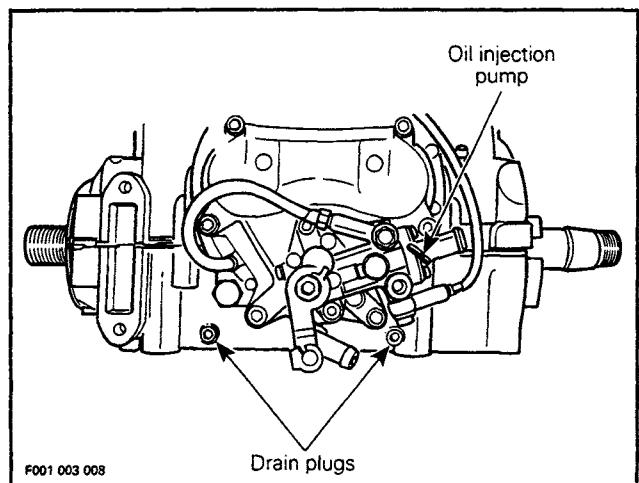
Procedure

Check fuel and oil reservoirs for water contamination. If necessary, siphon and refill with fresh fluids.

Turn fuel valve to OFF position then drain fuel filter bowl.

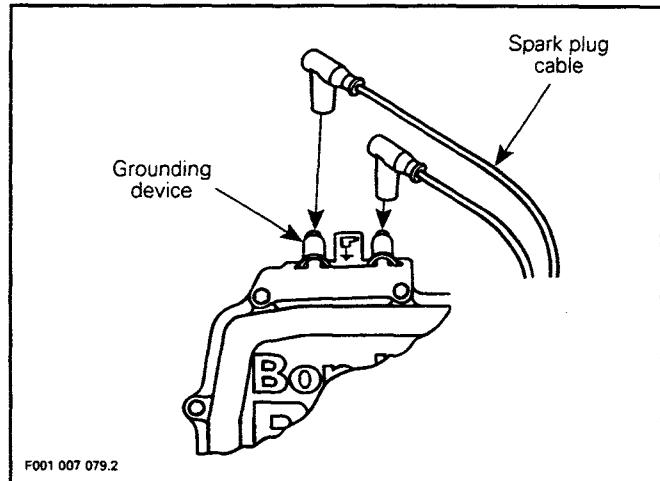
Drain bilge if water is present.

Remove engine crankcase drain plugs located underneath oil injection pump.



Remove spark plug cables and connect them on the grounding device.

WARNING : Never crank engine with spark plugs removed unless spark plug cables are connected to the grounding device.



Remove spark plugs and dry with a clean dry cloth. A contact cleaner spray can be used, it may be preferable to replace spark plugs. Do NOT install spark plugs on engine.

Crank engine to drain crankcase.

NOTE : Whenever the engine is stopped more than 20 seconds, the electrical system has to be reactivated by touching starter button.

CAUTION : Be careful when cranking engine, water will spray out from spark plug holes.

Reinstall crankcase drain plugs.

CAUTION : Crankcase drain plugs should have Loctite PST 592 (P / N 293 800 018) applied to threads before reinstalling.

Crank engine again to allow any remaining water to escape from spark plug holes.

Spray SEA-DOO LUBE (P / N 293 600 006) into spark plug holes.

Crank engine again.

Reinstall spark plugs and spark plug cables then tether cord cap on switch.

Turn fuel valve to ON position.

Press starting button to start engine. It may be necessary to use the choke. If engine does not start, repeat previous steps as necessary.

CAUTION : To avoid starting motor overheating, the cranking period should not exceed 5-10 seconds and a rest period of 30 seconds should be observed between cranking cycles. Never depress the starting button when the engine is running.

Section 03 ENGINE

Sub-Section 01 (WATER-FLOODED ENGINE)

 **NOTE :** If engine does not start after several attempts, check ignition system for spark occurrence.

Refer to CDI AND CHARGING SYSTEMS 07-06 then refer to **ignition system testing procedure**. Also a spark tester tool no. 15-785 from Superex Canada Ltd can be used. Check crankshaft if needed, it can become misaligned or deflected.

Refer to BOTTOM END 03-05 then refer to **crankshaft alignment**.

 **WARNING :** Ventilate bilge at least two minutes prior to checking spark.

After engine has started, spray SEA-DOO lube through carburetor intake while engine is running.

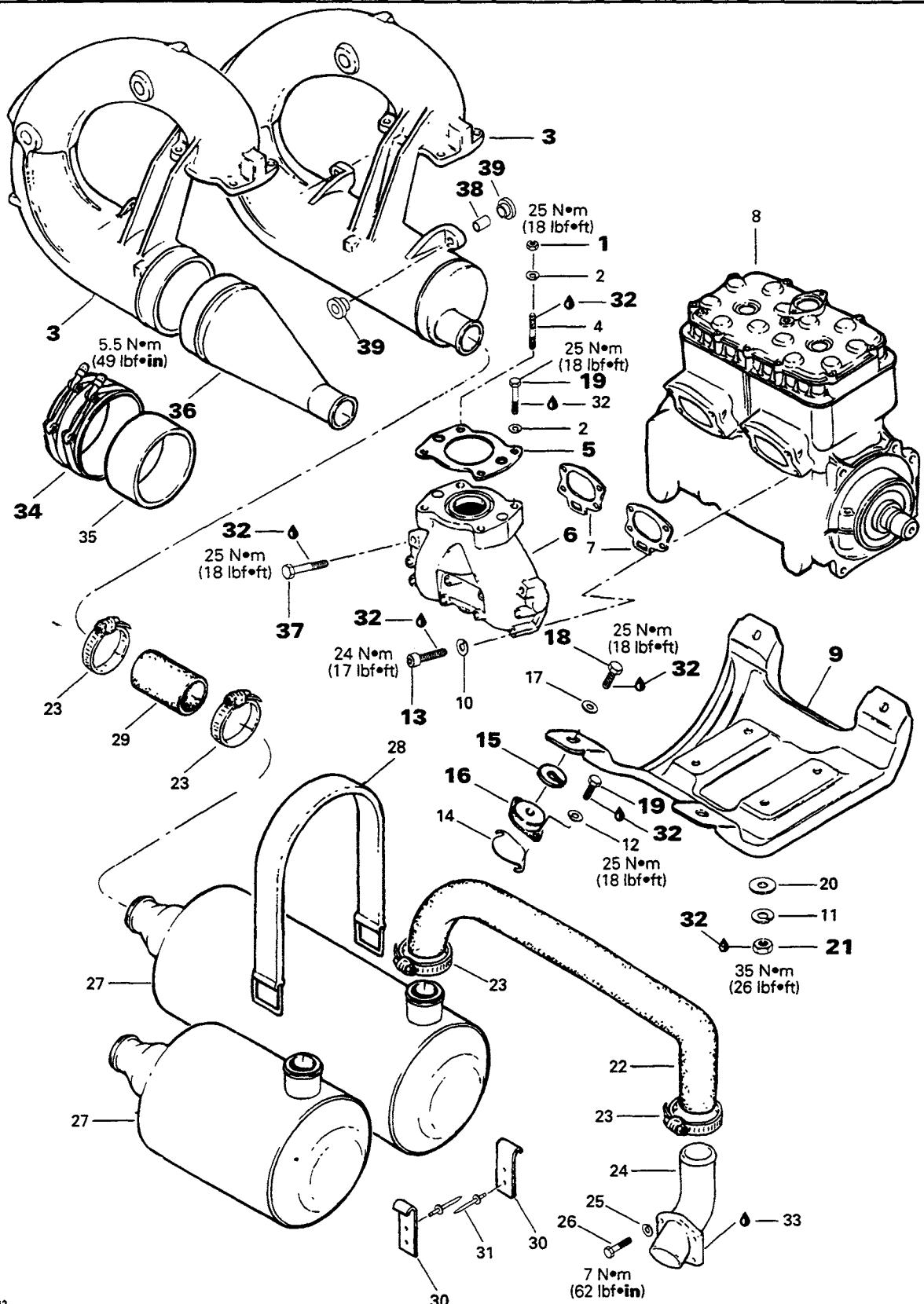
Run engine until it reaches its normal operating temperature.

Make sure to supply water to cool engine.

 **CAUTION :** Water must be supplied to cool engine with coupler hose (P / N 295 500 099).

Section 03 ENGINE

Sub-Section 02 (REMOVAL AND INSTALLATION)



Section 03 ENGINE

Sub-Section 02 (REMOVAL AND INSTALLATION)

COMPONENTS

1. Hexagonal nut M8 (1)
2. Lock washer M8 (4)
3. Tuned pipe
4. Stud M8 x 26 (1)
5. Gasket
6. Exhaust manifold
7. Gasket (2)
8. Rotax engine
9. Engine support
10. Lock washer M8 (8)
11. Lock washer (4)
12. Lock washer M8 (8)
13. Allen screw M8 x 75 (8)
14. Shim 0.40 mm (0.016 in)
Shim 1.40 mm (0.055 in)
15. Shim 0.40 mm (0.016 in)
Shim 1.30 mm (0.051 in)
16. Rubber mount (4)
17. Flat washer 8 mm (4)
18. Hexagonal screw M8 x 20 (4)
19. Hexagonal screw M8 x 30 (11)
20. Flat washer 10 mm (4)
21. Elastic stop nut M10 (4)
22. Formed hose
23. Tridon clamp (4)
24. Exhaust outlet
25. Flat washer 6 mm (4)
26. Allen screw M6 x 20 (4)
27. Muffler
28. Muffler strap
29. Exhaust hose
30. Strap clip (2)
31. Rivet 3/16 (4)
32. Loctite 242
33. Sealant Loctite 598 "Ultra Black"
34. Exhaust collar
35. Rubber strip
36. Exhaust cone
37. Hexagonal screw M8 x 35 (2)
38. Sleeve (2)
39. Rubber bushing (4)

GENERAL

It is not necessary to remove engine from watercraft for TOP END nor PTO FLYWHEEL AND MAGNETO servicing. However engine removal is necessary to repair BOTTOM END AND ROTARY VALVE.

REMOVAL FROM WATERCRAFT

In order to remove engine from watercraft proceed as follows.

Propulsion System

To withdraw jet pump unit ass'y, refer to PROPULSION AND DRIVE SYSTEMS, 08-01 then refer to removal and overhaul.

Electrical Connections

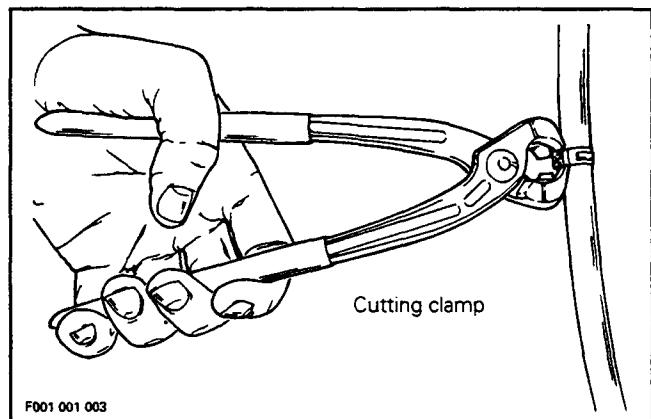
WARNING : Always disconnect starter or battery cables exactly in the specified order, black negative cable first. Electrolyte or fuel vapors can be present in the engine compartment and a spark might ignite them and possibly cause personal injuries. It is recommended to disconnect electrical connections prior to disconnecting fuel lines.

First, remove black negative cable from battery, then red positive cable.

Remove battery holding straps then withdraw battery. Disconnect thermosensor wire and spark plug cables. Connect spark plug cables on grounding device.

Cooling and Exhaust Systems

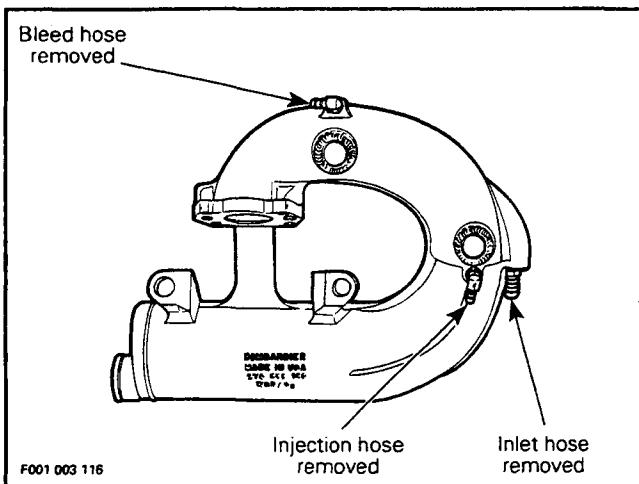
NOTE : To release a clamp from cooling hose / fuel line, use pliers (P / N 295 000 070).



NOTE : For XP model (5852) remove air vent tube support from body opening.

Disconnect hose from water outlet socket on engine. Disconnect inlet hose, injection hose and bleed hose from tuned pipe.

NOTE : On some models the exhaust collar holding exhaust cone and tuned pipe has to be removed first.



NOTE : The tuned pipe is held on exhaust manifold side by one or two retaining screws.

Remove tuned pipe retaining screws from exhaust manifold.

Remove tuned pipe mounting screws and nut ; slightly lift it to release nut as necessary. Withdraw tuned pipe in a forward and rotating movement. Be careful not to drop gasket located on exhaust manifold.

NOTE : For Explorer model, the exhaust manifold does not need to be removed.

Disconnect hose on exhaust manifold fitting. Remove fasteners taking care not to drop any part then withdraw manifold.

Intake System (Except XP Model (5852) and Explorer Model (5820))

Loosen clamp of air intake silencer hose on carburetor side.

Pivot air intake silencer to rear of watercraft.

Remove both retaining screws of flame arrester support from cylinder head cover.

Remove screws holding flame arrester cover, then withdraw cover.

Intake System (Explorer Model (5820))

Loosen clamp of air intake silencer hose on carburetor side.

Remove screw holding air intake silencer to front bracket and withdraw air silencer.

NOTE : For Explorer model, flame arrester system components do not need to be removed.

NOTE : Remove reverse cable retaining clamp from cylinder head cover to enable to move reverse cable as needed.

Intake System (XP Model (5852))

Unlock retaining slides holding air intake silencer cover and remove cover.

Remove screws holding flame arrester retainer and air intake silencer base to flame arrester base. Remove air intake silencer base from watercraft.

Remove screws holding flame arrester base to the cylinder head cover.

Fuel System

Turn fuel valve to OFF position.

Disconnect fuel supply line from carburetor.

Disconnect fuel return line from carburetor.

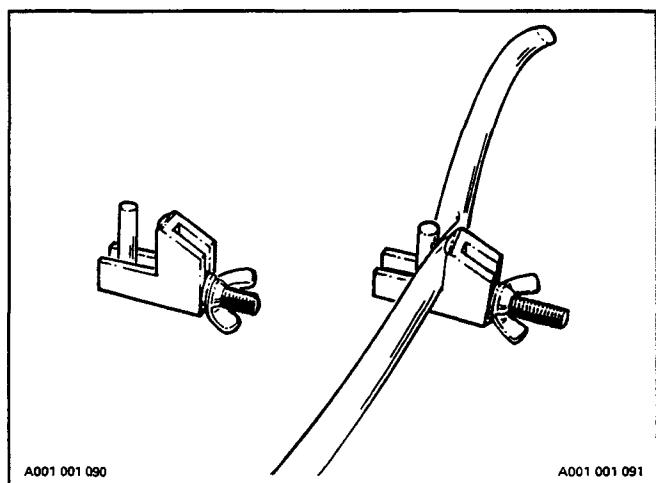
Disconnect throttle and choke cables from carburetor.

Remove screws from flame arrester base then withdraw base.

Pull out electrical box then open electrical box and disconnect wires coming from magneto housing.

Unscrew cable cap. Slide cap and compression grommet away then pull cable out of electrical box.

To prevent excessive oil spillage, use a hose pincher (P / N 295 000 076).



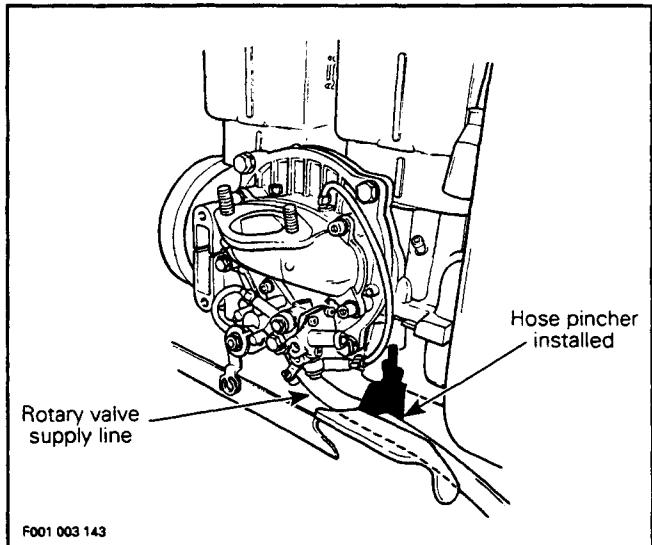
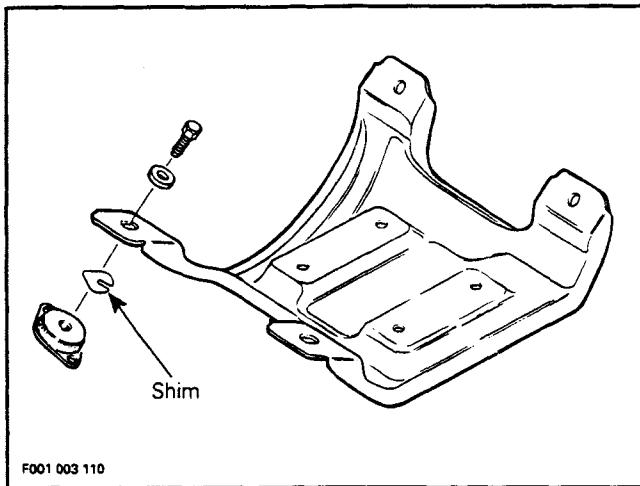
Install hose pincher on oil pump supply line then disconnect hose.

Remove engine support mount screws.

NOTE : Be careful when removing engine support mount screws, shims could have been installed between engine support and rubber mounts.

Section 03 ENGINE

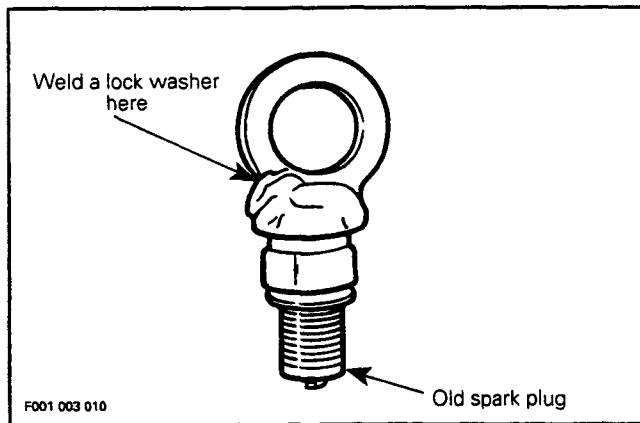
Sub-Section 02 (REMOVAL AND INSTALLATION)



▼ CAUTION : Be sure to indicate shims location for reinstallation. If shims are interchanged engine and jet pump alignment will be altered.

Engine can be easily lifted using the following suggested tools.

- Cut porcelain from two old spark plugs.
- Weld a lock washer approximately 20 mm diameter on each spark plug as shown.



Remove spark plugs and replace by special tools.

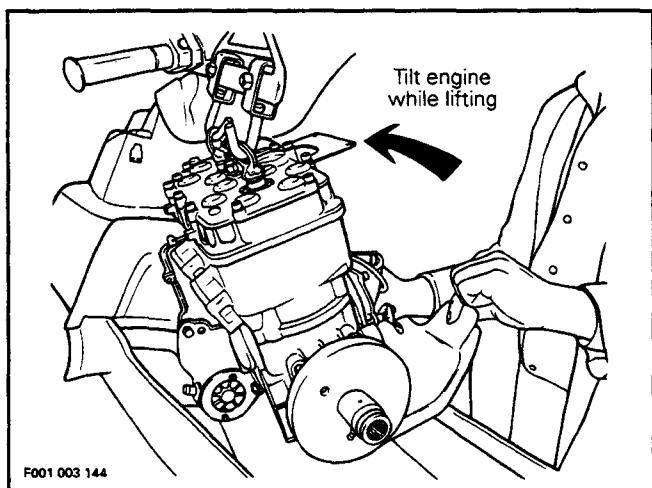
Hook a sling into holes of special tools then using a chain block, a hoist or other suitable equipment, slowly lift engine.

Lift it until rotary valve supply line is reachable. Install a hose pincher on the line, then disconnect.

Install hose pincher on rotary valve oil return line (on top of starter) then disconnect.

Disconnect red positive cable from starter post.

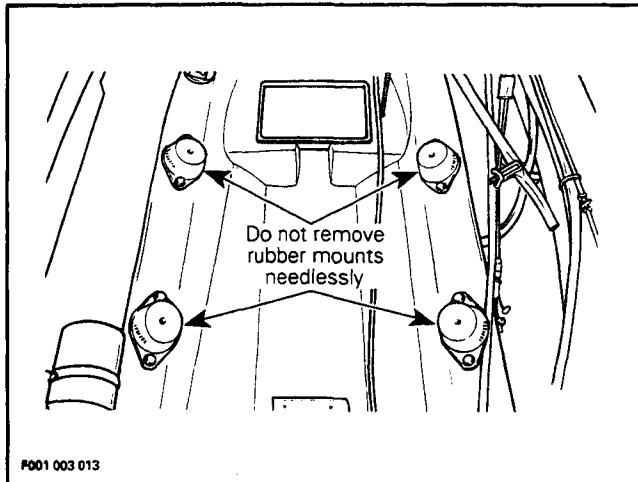
Carry on engine lifting until engine support reaches body opening then tilt engine so that it can completely leave watercraft.



▼ CAUTION : Be careful not to scratch body with engine support or to hit any component.

15,16, Shim and Rubber Mount

Do not remove engine rubber mounts needlessly. They sit on shims which control engine / jet pump alignment. Alignment has been set at the factory. Always remove rubber mounts one at a time and reinstall each shim to its original location.



▼ **CAUTION :** If shims with different thickness are interchanged, engine and jet pump will be disaligned.

○ **NOTE :** If shims location have been mixed up or whenever removing the engine always use engine / jet pump alignment tool (P / N 295 000 089) to check alignment.

CLEANING

Wipe off any spillage in bilge. Clean with a bilge cleaner.

Discard all gaskets and O-rings.

Clean external parts of engine.

INSTALLATION

Installation of engine in watercraft is essentially the reverse of removal procedures. However pay particular attention to the following.

16,19, Rubber Mount and Screw

Check tightness and condition of rubber mounts. If they have been removed, apply Loctite 242 (blue) (P / N 293 800 015) on screw threads. Torque screws to 25 N·m (18 lbf·ft).

▼ **CAUTION :** Strict adherence to this torque is important to avoid damaging threads of aluminum insert in bilge.

9,21, Engine Support and Nut

Properly install support on crankcase so that rounded portion of support matches with MAG side of crankcase. Apply Loctite 242 (blue) (P / N 293 800 015) on threads then torque nuts in a criss-cross sequence to 35 N·m (26 lbf·ft).

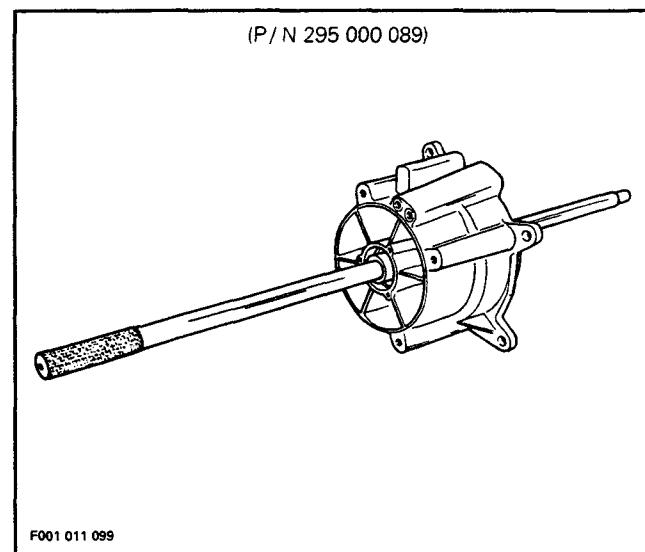
Rotary Valve Supply Line

Make sure to reinstall lines before completely lowering engine in bilge.

○ **NOTE :** If fuel line ends are damaged, cut damaged ends before reinstallation. For fuel line clamping, use special pliers (P / N 295 000 070).

Engine / Jet Pump Alignment

Alignment is necessary to eliminate possible vibration and / or damage to components. The engine / jet pump alignment tool (P / N 295 000 089) must be used.



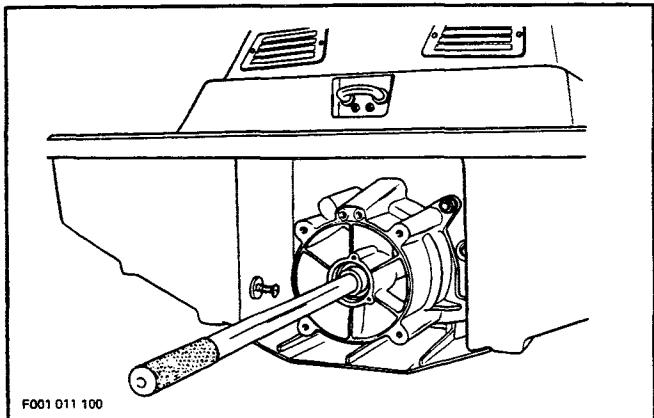
▼ **CAUTION :** Some watercraft have a shim between hull and pump, if shim has been removed ensure to reinstall it. If not install, engine and jet pump alignment will be altered.

To verify alignment proceed as follows :

- Install housing on hull with four nuts.
- Slide shaft slowly through housing. Pay attention not to hit PTO flywheel.

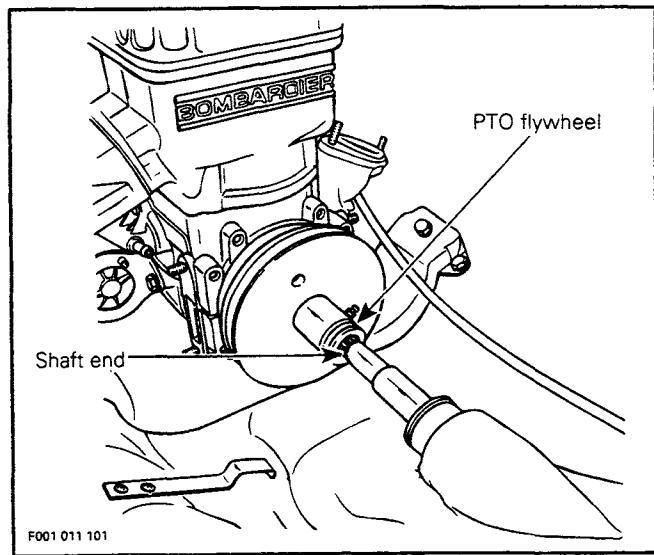
Section 03 ENGINE

Sub-Section 02 (REMOVAL AND INSTALLATION)



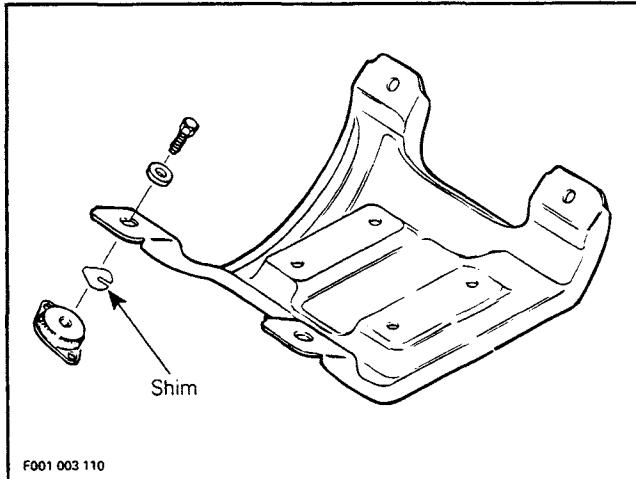
- Insert shaft end into PTO flywheel.

NOTE : The shaft should slide easily in flywheel splines if the alignment is correct.



If the alignment is incorrect loosen engine support screws to enable to align PTO flywheel with shaft end.

NOTE : Use shim(s) (P / N 270 000 024) (P / N 270 000 025) between engine support and rubber mounts to correct alignment.



CAUTION : Whenever shims are used to correct alignment, never install more then 6 mm (0.240 in) shim thickness. If alignment cannot be obtained verify for engine support bending.

18,32, Screw and Loctite 242

Apply Loctite 242 (P / N 293 800 015) on screw threads. Retorque engine support screws to 25 N•m (18 lbf•ft) when procedure is completed.

NOTE : Whenever alignment tool is not utilized, apply SEA-DOO LUBE on its shaft and inside the housing to eliminate possible corrosion.

Electrical Connections

First, install red positive cable on starter post and torque nut to 6 N•m (53 lbf•in). Install black negative cable on starter mounting bolt apply Loctite 271 on threads torque to 22 N•m (16 lbf•ft) if removed. Apply Neopren Grease on connectors then cover with boot.

NOTE : Install red positive cable with a tie rap located on hull right side.

WARNING : Always connect red positive cable first then black ground cable last. Whenever connecting the red positive cable to the starter motor make sure the battery cables are disconnected to prevent electric shock.

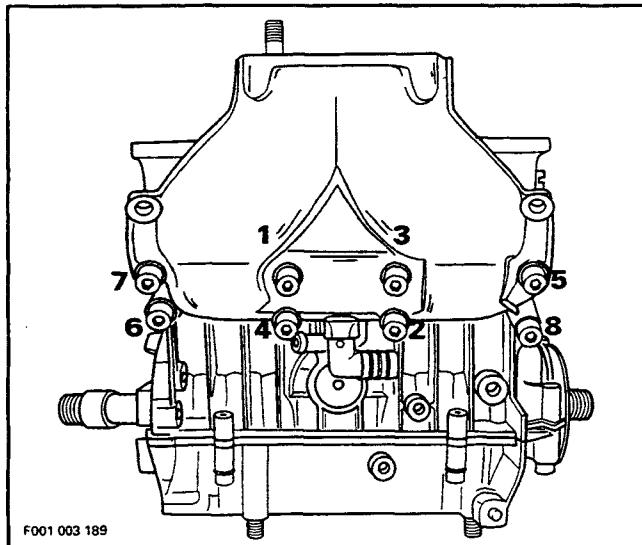
Install cable coming from ignition housing, into electrical box. Connect wires making sure to match wire colors.

Install compression grommet and cap. It is strongly recommended to use a flare nut wrench to properly tighten cap.

Firmly tighten cap. To ensure water-tight mounting, pull cable ; it must not slide through grommet. Retighten as necessary.

6,13, Exhaust Manifold, Screw

Apply Loctite 242 (P / N 293 800 015) on screw threads. Install and torque screws to 24 N•m (17 lbf•ft) as per following illustrated sequence.



All Models

1,3,5,37,38,39, Nut, Tuned Pipe, Gasket, Screw, Sleeve and Rubber Bushing

Make sure that gasket is properly located on exhaust manifold prior to finalizing pipe installation.

Ensure rubber bushings and sleeve are not damaged and are properly installed into tune pipe support(s).

CAUTION : Damage to bushings and / or sleeve will eventually cause stress to tune pipe and may cause cracking.

Apply Loctite 242 on stud and retaining screw threads. Hand-tighten nut and top screws only and assure that tuned pipe bushing(s) rests against manifold.

Pre-torque nut and top screws in a criss-cross sequence to about 20 N•m (15 lbf•ft).

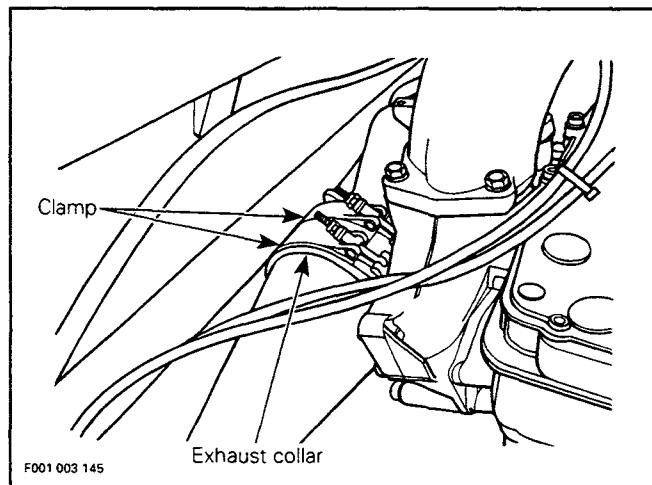
Torque side retaining screw(s) to 25 N•m (18 lbf•ft) and then torque nut and top screws in a criss-cross sequence to 25 N•m (18 lbf•ft).

CAUTION : Make sure that a sufficient gap is present between hull and tuned pipe.

5807, 5820, 5852 and 5861 Models

34,36, Exhaust Cone and Exhaust Collar

Install exhaust cone to tuned pipe with exhaust collar. Position exhaust collar as illustrated. Do not tighten collar yet.



With hose removed, align cone outlet with muffler inlet.

NOTE : Due to exhaust cone angle, it may have to be rotated to obtain alignment.

Push cone until it touches tuned pipe, then tighten exhaust collar clamps and torque to 5.5 N•m (49 lbf•in).

CAUTION : There must be no gap between exhaust cone and tuned pipe.

NOTE : Exhaust collar clamps should be tightened alternatively to assure no leakage and to obtain specified torque.

All Models

Final Inspection

Check throttle cable condition and lubricate cable with SEA-DOO LUBE. After its installation, properly adjust and synchronize oil injection pump as specified in OIL SYSTEM, 06-02.

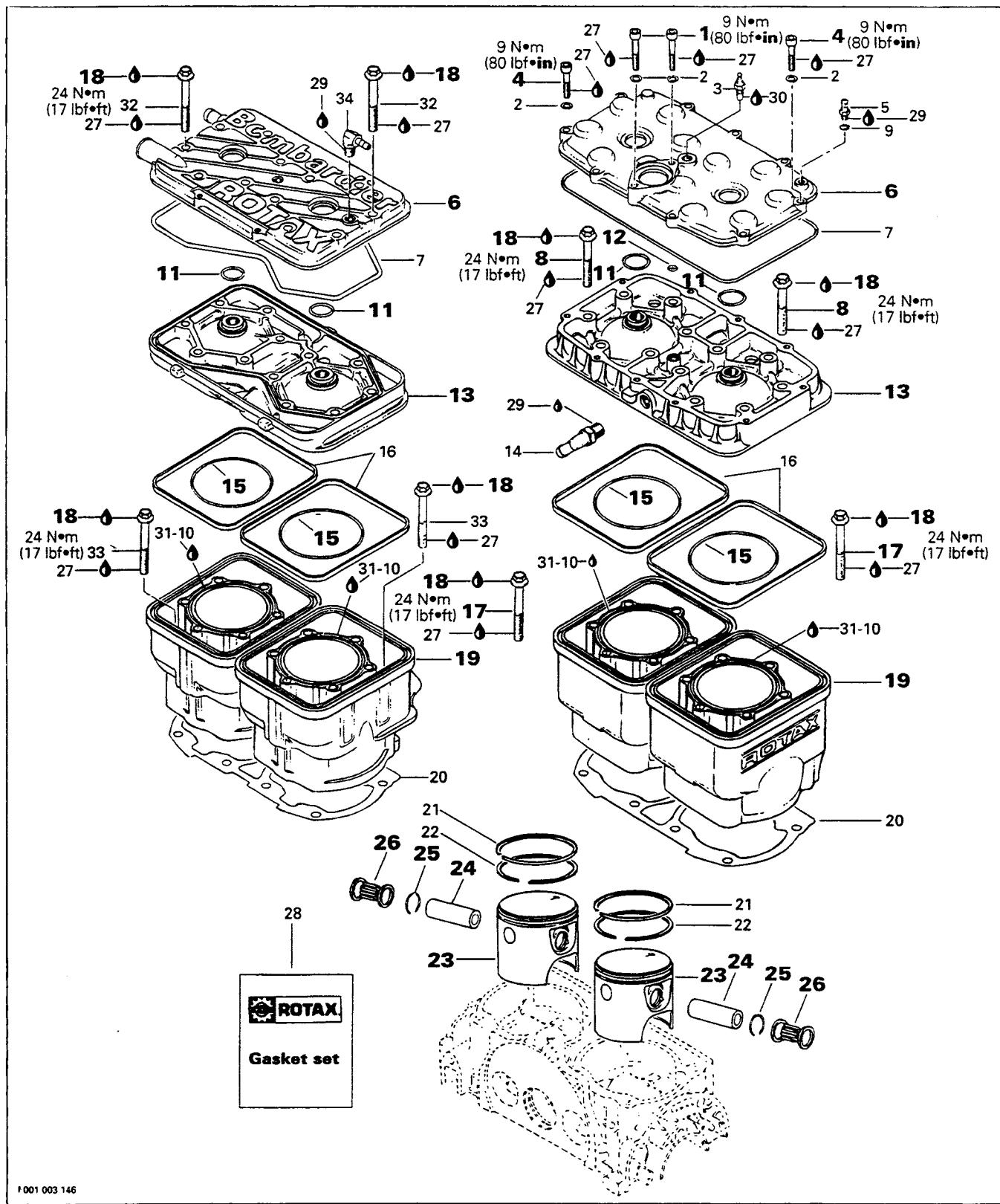
Bleed oil injection pump.

Pressure test fuel system, refer to FUEL SYSTEM 05-03 and look for **fuel system pressurization**. Secure vent line to the battery. Ensure vent line is not kinked or obstructed. Verify all connections and hoses condition.

Run engine and ensure there is no leakage.

CAUTION : Water must be supplied to cool engine with coupler hose (P / N 295 500 099).

TOP END



Section 03 ENGINE

Sub-Section 03 (TOP END)

COMPONENTS

1. Allen screw M6 x 35 (2)	18. Synthetic grease
2. Lock washer (11)	19. Cylinder with sleeve (2)
3. Sensor switch	20. Cylinder gasket
4. Allen screw M6 x 25 (9)	21. Semi-trapez ring (2)
5. Hose nipple	22. Rectangular ring (2)
6. Cylinder head cover	23. Piston (2)
7. O-ring	24. Piston pin (2)
8. Hexagonal screw M8 x 55 (12)	25. Circlip (4)
9. Sealing ring	26. Needle bearing (2)
10. Loctite 515	27. Loctite 242
11. O-ring (2)	28. Gasket set
12. O-ring	29. Loctite PST 592
13. Cylinder head	30. Loctite 515
14. Hose nipple (2)	31. Loctite primer N
15. O-ring (2)	32. Hexagonal screw (12)
16. O-ring (2)	33. Hexagonal screw (8)
17. Hexagonal screw M8 x 70 (8)	34. Elbow fitting

GENERAL

When repairing a seized engine, connecting rods should be checked for straightness and crankshaft for deflection / misalignment. Refer to BOTTOM END for procedures.

DISASSEMBLY

In order to repair engine top end proceed as follows :

Electrical Connections

Refer to ENGINE REMOVAL AND INSTALLATION 03-02 then look for electrical connections.

Exhaust System

To withdraw tuned pipe, refer to ENGINE REMOVAL AND INSTALLATION 03-02 then look for cooling and exhaust systems.

Intake System (Except XP Model (5852) and Explorer Model (5820))

Loosen clamp of intake silencer hose on carburetor side.

Pivot intake silencer to rear of watercraft.

Remove both retaining screws of flame arrester support from cylinder head cover.

Remove screws holding flame arrester cover, then withdraw cover.

Remove throttle and choke cables from flame arrester base.

Remove screws from flame arrester base, then withdraw base.

Intake System (Explorer Model (5820))

Loosen clamp of air intake silencer hose on carburetor side.

Remove screw holding air intake silencer to front bracket and withdraw air silencer.

 **NOTE :** Remove reverse cable retaining clamp from engine cover to enable to move reverse cable as needed.

Remove both retaining screws of flame arrester support from cylinder head cover.

Remove screws holding flame arrester cover, then withdraw cover.

Remove throttle and choke cables from flame arrester base.

Remove screws from flame arrester base, then withdraw base.

Intake System (XP Model (5852))

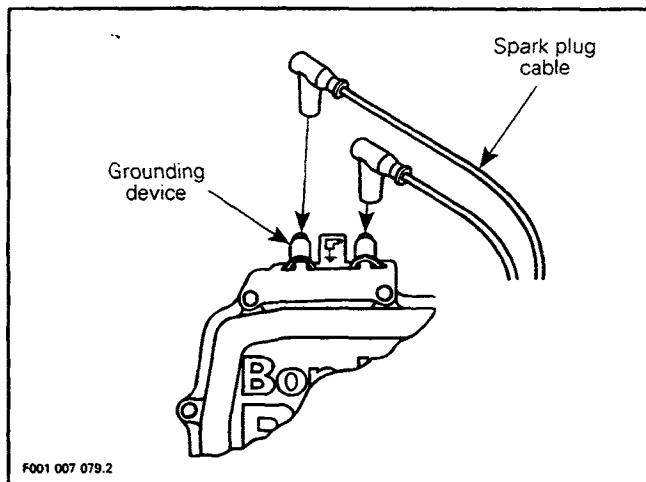
Unlock retaining slides holding air intake silencer cover and remove cover.

Remove screws holding flame arrester retainer and air intake silencer base to flame arrester base. Remove air intake silencer base from watercraft.

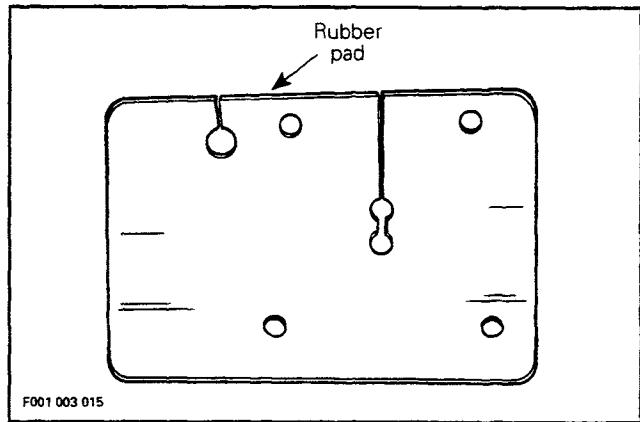
Remove screws holding flame arrester base to the cylinder head cover.

Remove throttle and choke cables from flame arrester base.

Remove screws from flame arrester base, then withdraw base.



Bring piston to Top Dead Center and install rubber pad (P/N 295 000 079) over crankcase opening. Secure with screws. Lower piston until it sits on pad.



Remove cylinder head cover.

NOTE : With engine model 657 cylinder head cover screws secure cylinder head also.

If shells, sand, salt or any other particles are present in cylinder head, clean with a vacuum cleaner.

Remove screws then cylinder head.

If shells, sand, salt water or any other particles are present in cylinder cooling jacket, clean with a vacuum cleaner.

Remove screws then pull cylinder up, being careful that connecting rod does not hit crankcase edge.

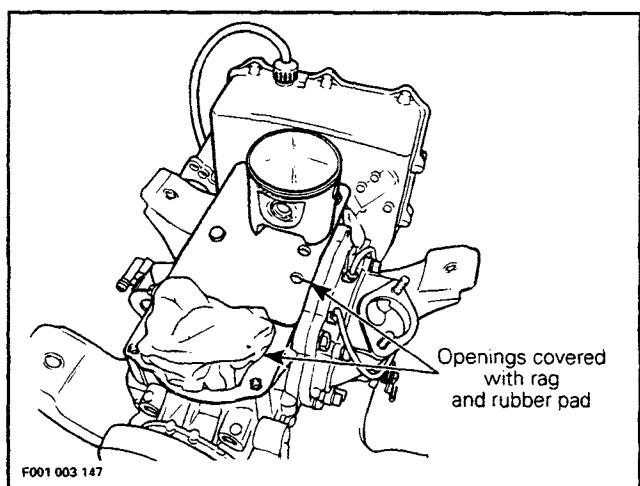
WARNING : If screws need to be heated for removal when engine is in watercraft, fuel system pressurization must be done first. Do not use open flame; use a heat gun. An explosion might occur since vapors can be present in engine compartment.

NOTE : Even if only one cylinder needs repair, both cylinders should be lifted to allow one-piece cylinder base gasket replacement.

23,24,25,26, Piston, Piston Pin, Circlip and Needle Bearing (cageless)

CAUTION : These engines design feature cageless piston pin bearing. At piston disassembly, rollers may fall out, use rubber pad to prevent rollers from dropping in crankcase.

If other cylinder has been removed, completely cover its opening with a clean rag.

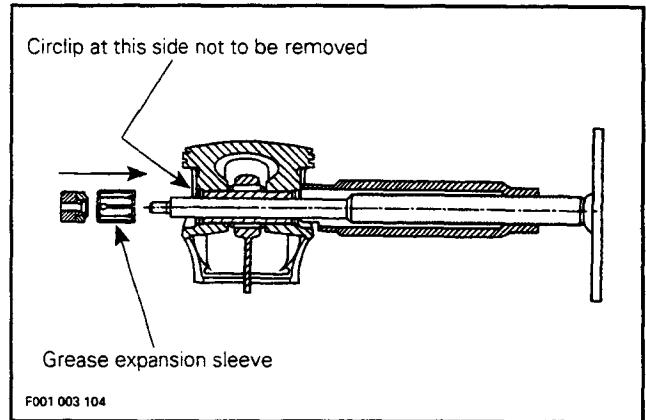
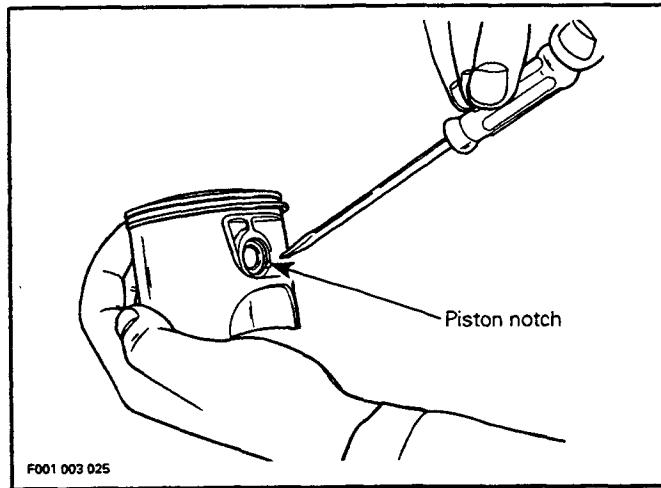


To remove circlip, insert a pointed tool in piston notch then pry it out and discard.

WARNING : Always wear safety glasses when removing piston circlips.

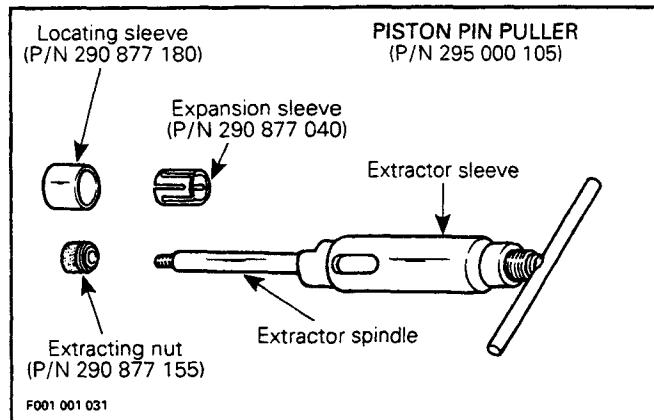
Section 03 ENGINE

Sub-Section 03 (TOP END)



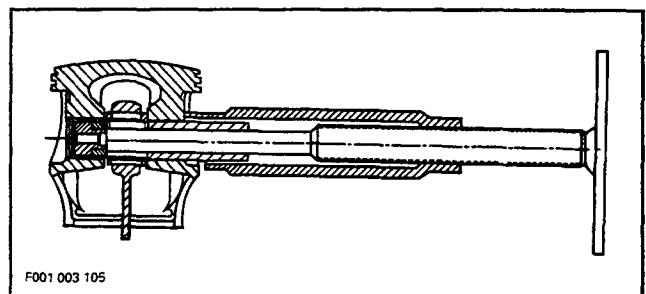
To extract piston pin, use either piston pin puller (P / N 295 000 105) or (P / N 290 877 092) (657 engine) as follows :

- Fully thread on puller handle.
- Insert extractor spindle into the piston pin.
- Slide the expansion sleeve (P / N 290 877 040) onto the spindle.
- Screw in extractor nut (P / N 290 877 155) with the movable extracting ring towards spindle.

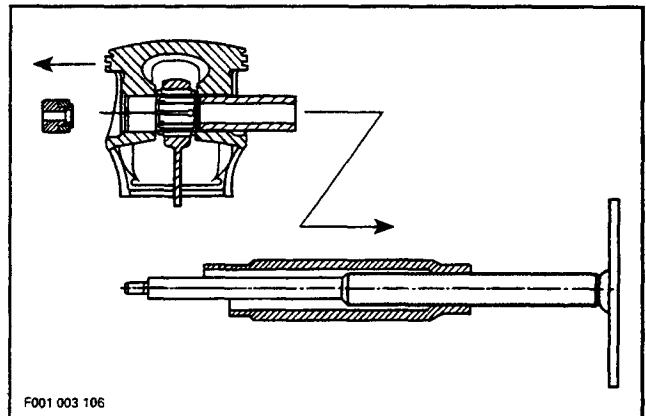


- Firmly hold puller and rotate handle to pull piston pin.

- By turning the spindle, pull out piston pin until it is completely removed from bearing.



- Rotate spindle until extracting nut can be removed.
- Remove spindle and extractor sleeve from piston pin.
- Carefully remove the piston.



- The needles, thrust washers and the expansion sleeve remain in the connecting rod bore and may be used again.

REMOVAL OF NEEDLE BEARING

To remove needles with the thrust washers from the connecting rod bore, push them together with the expansion sleeve into the locating sleeve (P/N 290 877 180) using any suitable pusher 21 mm (.826 in) dia. (587 engine) and suitable pusher 23 mm (.905 in) dia. (657 engine).

CAUTION : Recover rollers, make sure that 31 rollers are found for each piston on 587 engine and 34 rollers for each piston on 657 engine.

CLEANING

Discard all gaskets and O-rings.

Clean all metal components in a solvent.

Clean water passages and make sure they are not clogged.

Remove carbon deposits from cylinder exhaust port, cylinder head and piston dome.

Clean piston ring grooves with a groove cleaner tool, or a piece of broken ring.

INSPECTION

Visually inspect all parts for corrosion damage.

Inspect piston for damage. Light scratches can be sanded with a fine sand paper.

Inspect plane surfaces for warpage. Small deformation can be corrected by grinding surface with a fine sand paper. Install sand paper on a surface plate and rub part against oiled sand paper.

The inspection of engine top end should include the following measurements.

MEASUREMENTS 587 ENGINE	TOLERANCES		
	NEW PARTS (min.)	(max.)	WEAR LIMIT
Cylinder Taper	N.A.	N.A.	0.08 mm (.0031 in)
Cylinder Out of Round	N.A.	N.A.	0.05 mm (.0020 in)
Cylinder / Piston Clearance	0.05 mm (.002 in)	0.07 mm (.0028 in)	0.20 mm (.008 in)
Ring / Piston Groove Clearance	0.05 mm (.002 in)	0.08 mm (.003 in)	0.20 mm (.008 in)
Ring End Gap	0.25 mm (.010 in)	0.40 mm (.016 in)	1.0 mm (.039 in)

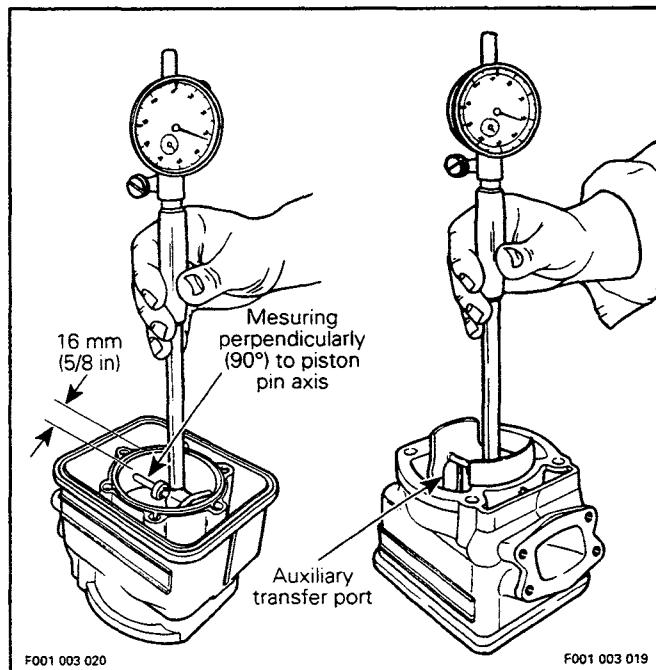
MEASUREMENTS 657 ENGINE	TOLERANCES		WEAR LIMIT
	NEW PARTS (min.)	(max.)	
Cylinder Taper	N.A.	N.A.	0.08 mm (.0031 in)
Cylinder Out of Round	N.A.	N.A.	0.05 mm (.0020 in)
Cylinder / Piston Clearance	0.06 mm (.0024 in)	0.09 mm (.0035 in)	0.15 mm (.006 in)
Ring / Piston Groove Clearance	0.05 mm (.002 in)	0.08 mm (.003 in)	0.20 mm (.008 in)
Ring End Gap	0.25 mm (.010 in)	0.40 mm (.016 in)	1.0 mm (.039 in)

NOTE : Replacement cylinder sleeves are available if necessary. Consult a specialized shop for installation.

NOTE : 0.25 and 0.5 mm oversize piston and rings are available if necessary.

Cylinder Taper

Using a cylinder bore gauge, measure cylinder diameter 16 mm (5/8 in) from top of cylinder to just below auxiliary transfer port, facing exhaust port. If the difference between readings exceed specification, cylinder should be rebored and honed or replaced.

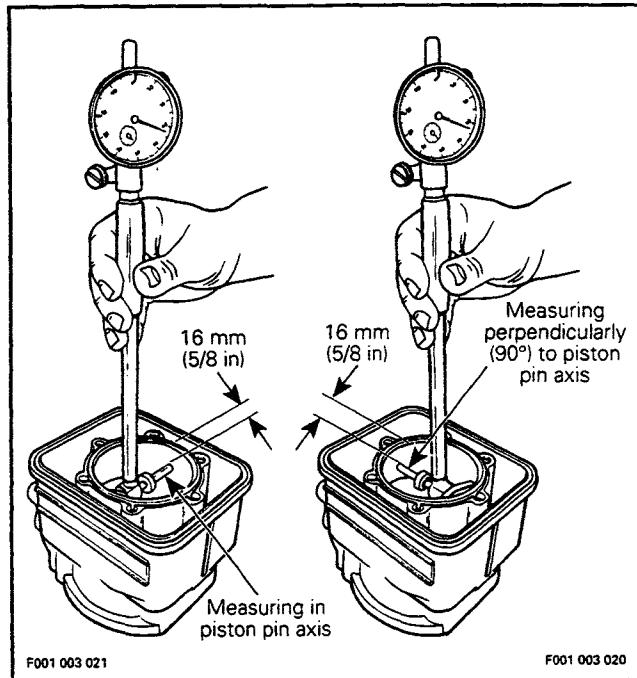


Section 03 ENGINE

Sub-Section 03 (TOP END)

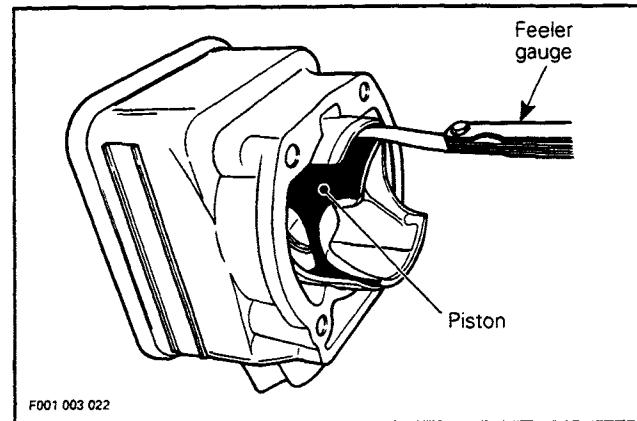
Cylinder Out of Round

Using a cylinder bore gauge, measure cylinder diameter 16 mm (5/8 in) from top of cylinder. Measure diameter in piston pin axis direction then perpendicularly (90°) to it. If the difference between readings exceed specification, cylinder should be rebored and honed or replaced.



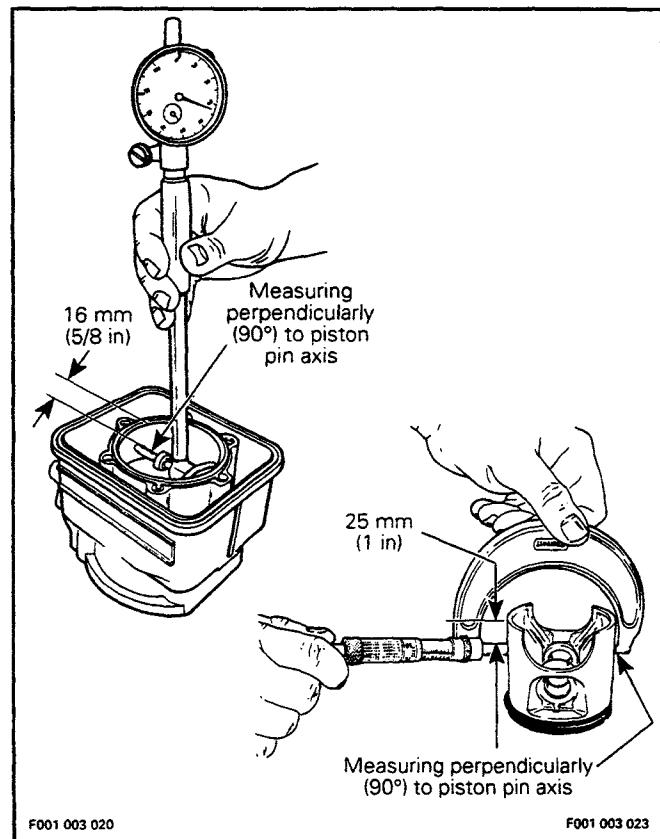
Cylinder / Piston Clearance

Clearance can be quickly checked with a long feeler gauge. Insert feeler gauge in cylinder then slide piston (without piston rings installed) into cylinder as shown in the following illustration.



Or, to accurately determine piston to cylinder wall clearance. Measure piston 25 mm (1 in) below skirt end perpendicularly (90°) to piston pin.

Measure cylinder 16 mm (5/8 in) below its top edge.

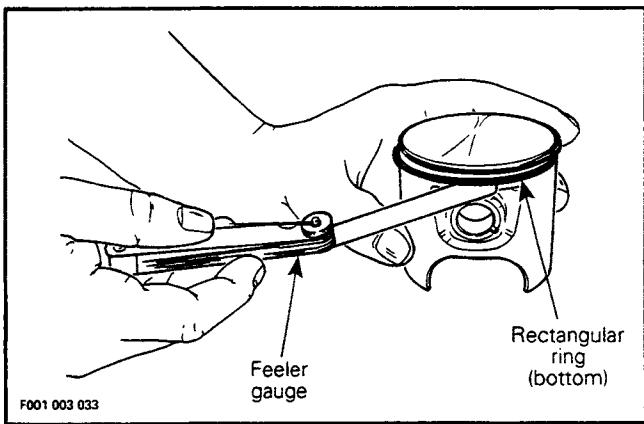


The difference between these two measurements should be within specified tolerance.

Ring / Piston Groove Clearance

Using a feeler gauge, check clearance between rectangular ring and groove. If clearance exceeds specified tolerance, replace piston.

NOTE : Ring / piston groove clearance can be correctly measured only on rectangular ring which is bottom ring.

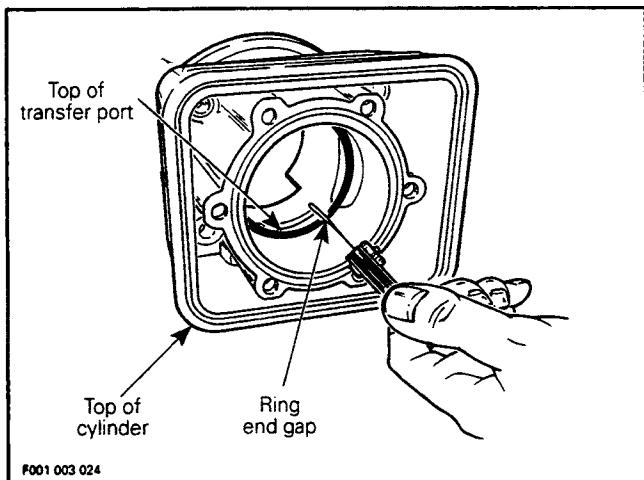


Ring End Gap

Position ring just above transfer ports, in relation with top of cylinder.

NOTE : In order to correctly position ring in cylinder, use piston as a pusher.

Using a feeler gauge, check ring end gap. If gap exceeds specified tolerance, rings should be replaced.



ASSEMBLY

Assembly is essentially the reverse of disassembly procedures. However pay particular attention to the following.

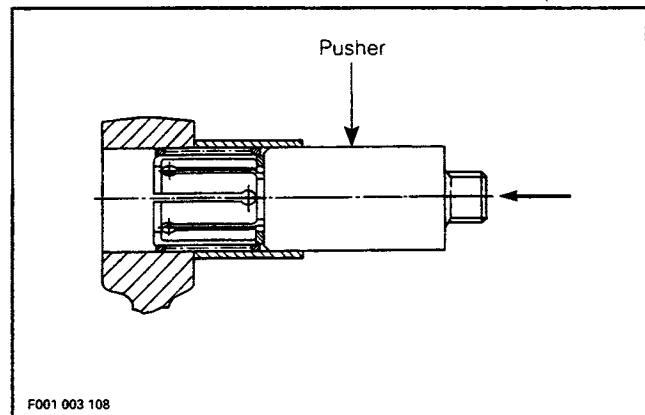
23,24,26, Piston, Piston Pin and Roller Bearing

At assembly, locate piston so that intake hole is on rotary valve side (587 engine).

Carefully cover crankcase opening as for disassembly.

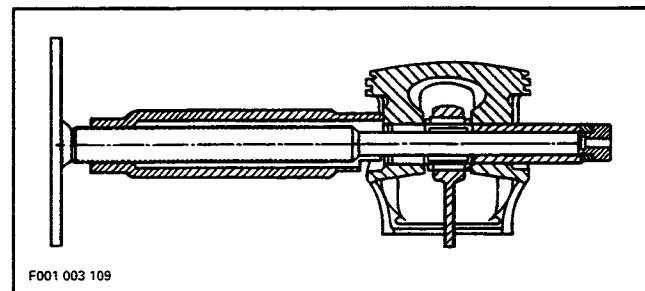
To install roller bearing and piston pin use either piston pin puller (P / N 295 000 105) or (P / N 290 877 092), proceed as follows :

- Replacement bearings are held in place by a locating sleeve outside and two plastic cage halves inside.
- Push roller bearing together with inner halves out of the locating sleeve into the connecting rod bore.
- Use any suitable pusher 21 mm (.826 in) dia. (587 engine) and suitable pusher 23 mm (.905 in) dia. (657 engine) as a tool. Make sure thrust washers are present each side of rollers.



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- Insert piston pin into piston until it comes flush with inward edge of piston hub.
- Warm piston to approximately 50-60°C (122-140°F) and install it over connecting rod.
- Insert extractor spindle into the piston pin, screw on extracting nut.
- Rotate handle to pull piston pin carefully into the piston.



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Plastic Mounting Device Method

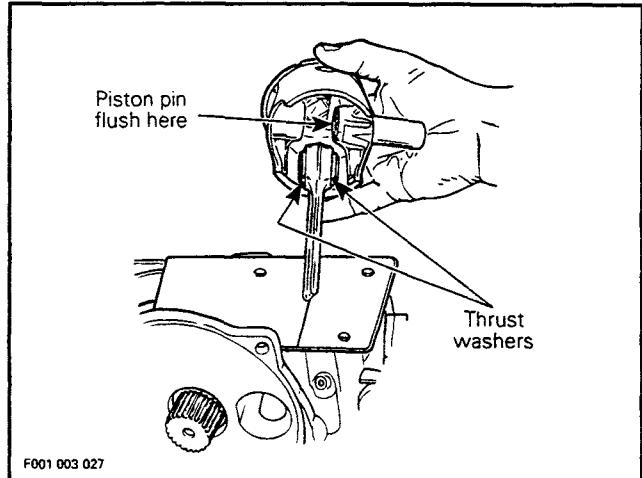
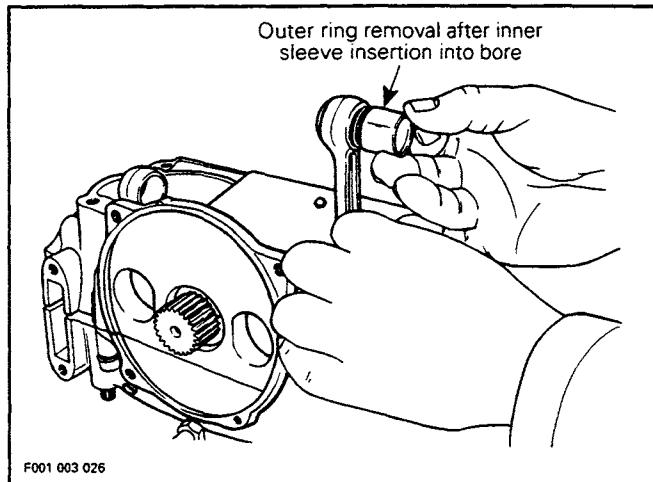
As an alternate method when no service tool is available proceed as follows :

Replacement roller bearings are delivered in a convenient plastic mounting device. For installation, proceed as follows :

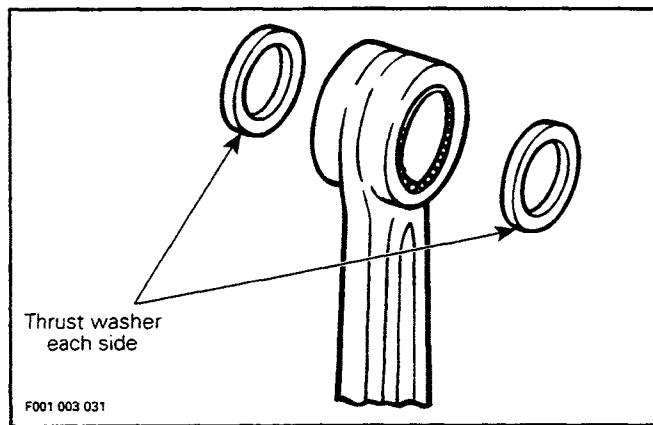
Section 03 ENGINE

Sub-Section 03 (TOP END)

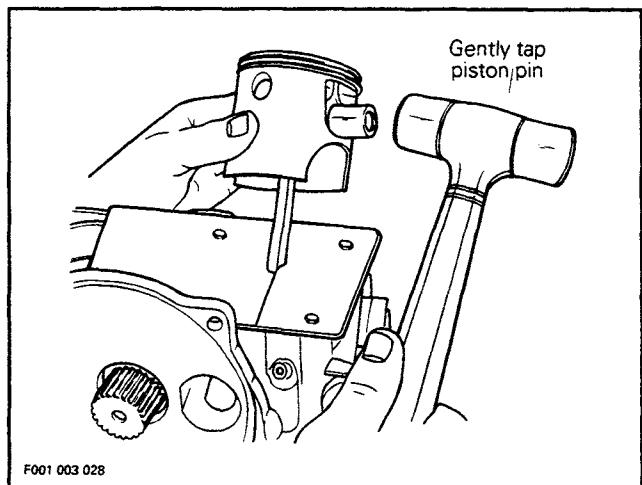
- Align replacement roller bearing with connecting rod bore.
- Carefully push inner plastic sleeve into connecting rod bore ; outer plastic ring will release rollers.



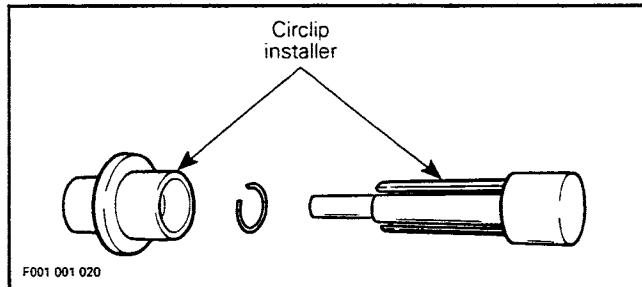
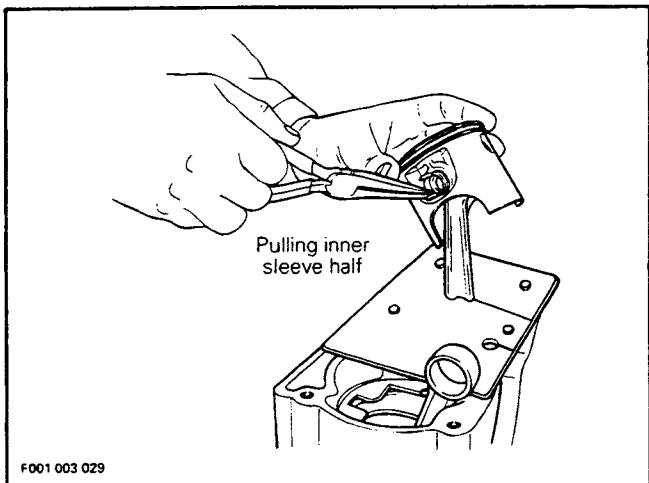
- Make sure thrust washers are present each side of rollers.



- Insert piston pin into piston until it comes flush with inward edge of piston hub.



- As necessary, pull halves of inner sleeve with long nose pliers.

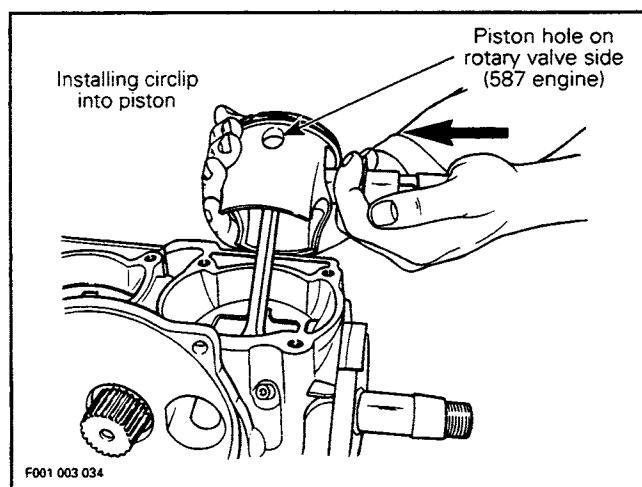
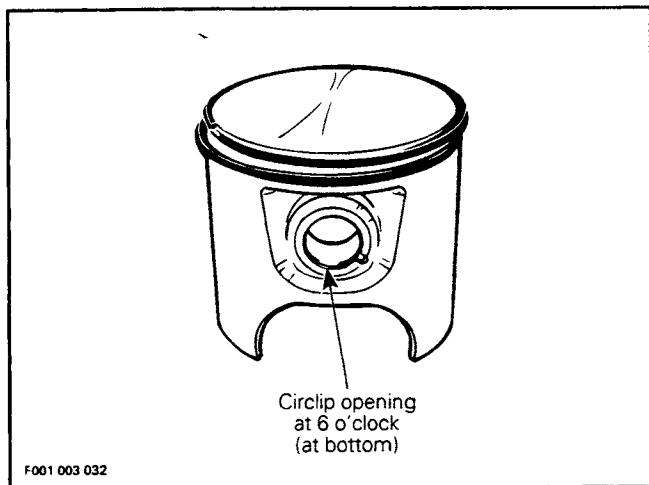


- Remove pusher from tool then insert circlip into its bore.
- Reinstall pusher into tool and push until circlip comes in end of tool.
- Position end of tool against piston pin opening.
- Firmly hold piston against tool and push tool pusher to insert circlip into its groove.

25, Circlip

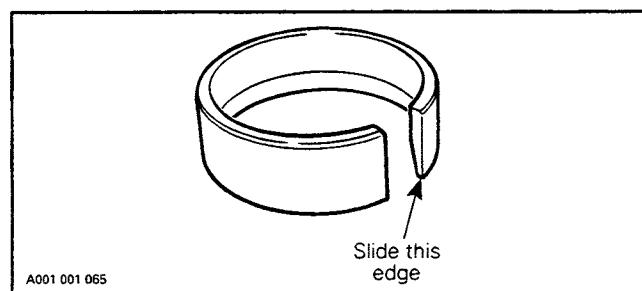
Secure remaining circlip taking into consideration the following.

▼ CAUTION : To minimize the stress on the circlips, install them so that their openings are located at 6 o'clock (at bottom).



19, Cylinder

To easily slide cylinder over piston, install ring compressor (P / N 290 876 972) over rings.



○ NOTE : Ring compressor will not fit on oversize piston / rings.

◆ WARNING : Always wear safety glasses when installing piston circlips.

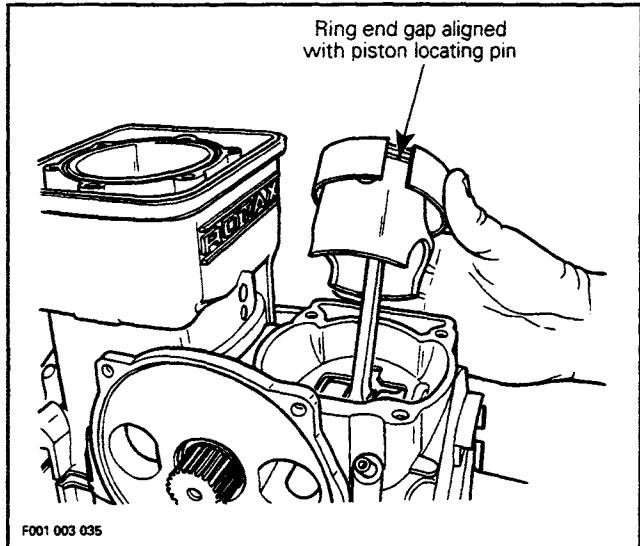
▼ CAUTION : Always use new circlips. At installation, take care not to deform them. Overstressed circlips will come loose and will damage engine. Circlips must not move freely after installation, replace if circlip rotates after installation.

To easily insert circlip into piston, use circlip installer (P / N 295 000 077) (587 engine) or (P / N 290 877 016) for 657 engine.

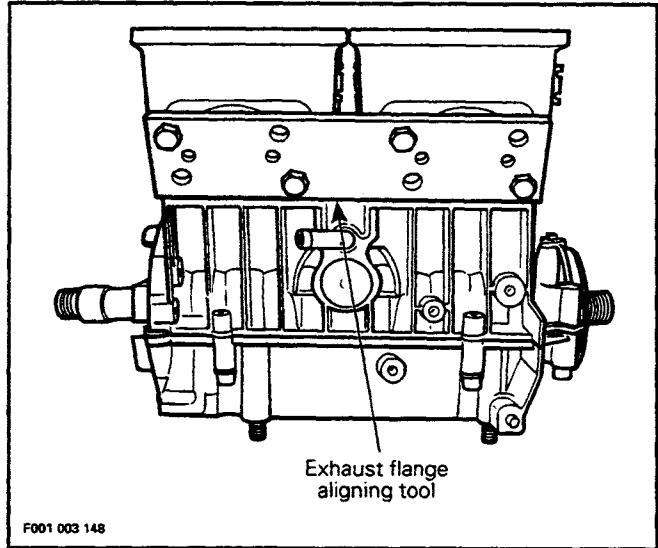
Section 03 ENGINE

Sub-Section 03 (TOP END)

Make sure to align ring end gap with piston locating pin. Slide tool over rings.

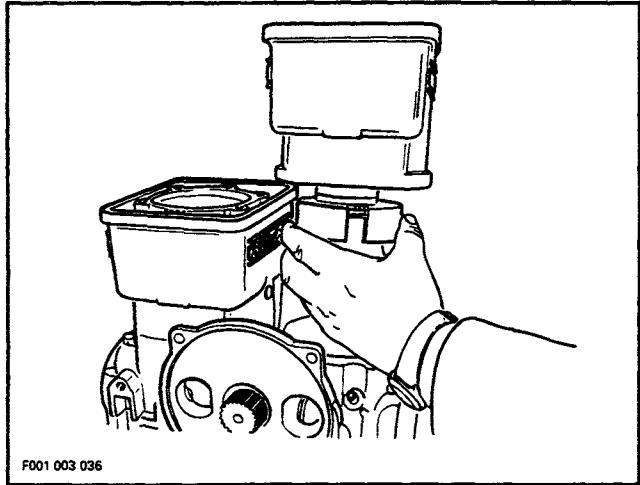


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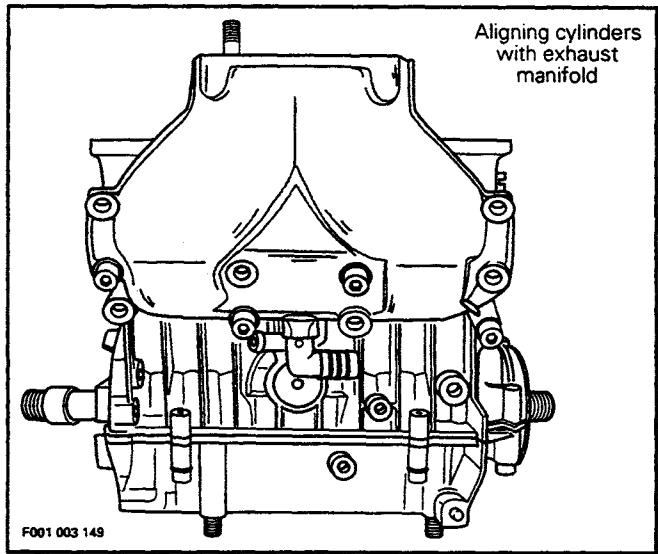
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Install cylinder gasket and slide cylinder over piston.



F001 003 036

When reassembling cylinders to crankcase, it is important to have them properly aligned so that exhaust flanges properly match up with exhaust manifold. Use aligning tool (P / N 290 876 902) or exhaust manifold itself.

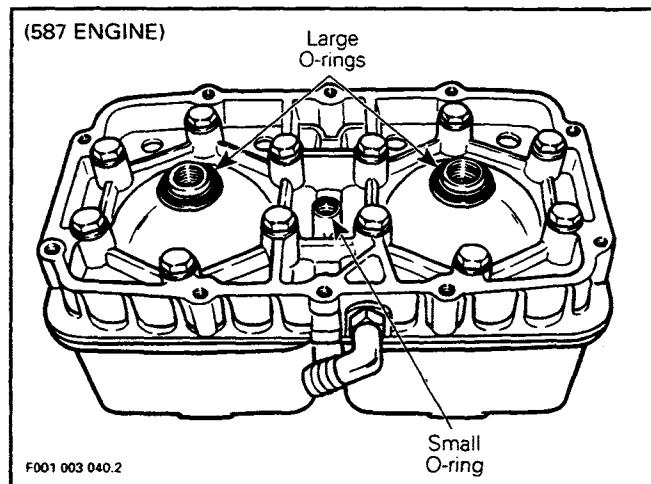
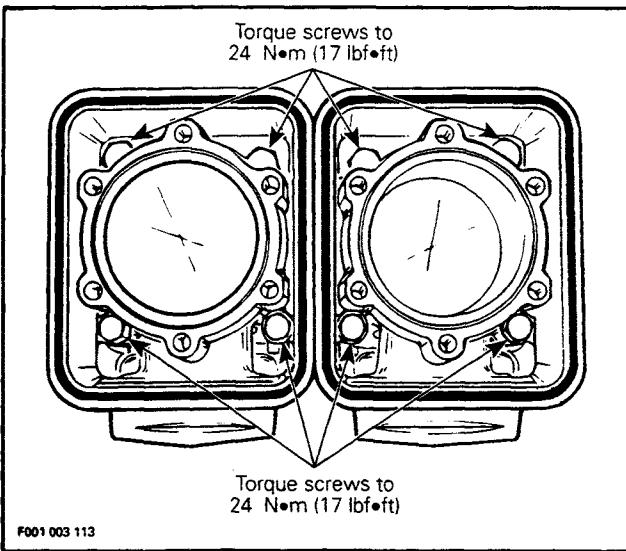


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NOTE : If manifold has been used for exhaust flanges alignment, remove it for engine installation in watercraft. Except Explorer model (5820).

17,18,19, Screw, Grease and Cylinder

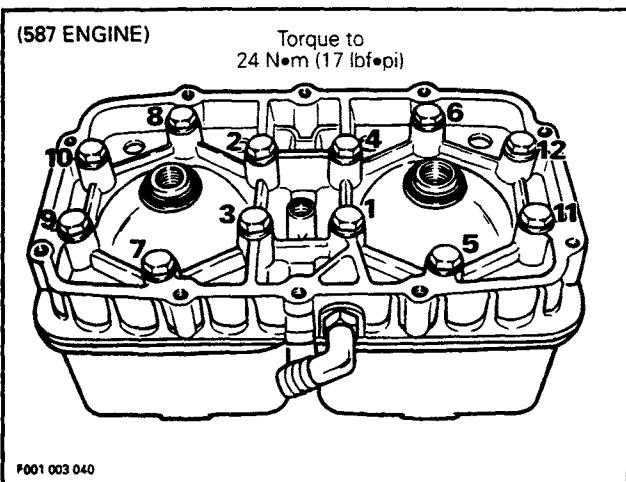
Apply synthetic grease (P / N 293 550 010) below screw head. Apply Loctite 242 (P / N 293 800 015) on screw threads. Install and torque screws in a criss-cross sequence for each cylinder to 24 N•m (17 lbf•ft).



8,11,12,13,15, Screw, O-ring and Cylinder Head Cover (587 Engine)

Apply synthetic grease (P / N 293 550 010) below screw head.

Apply Loctite 515 Gasket Eliminator (P / N 293 800 007) in cylinder sleeve O-ring groove. Apply Loctite 242 (P / N 293 800 015) on screw threads. Install and torque screws to 24 N·m (17 lbf·ft) as per following illustrated sequence.



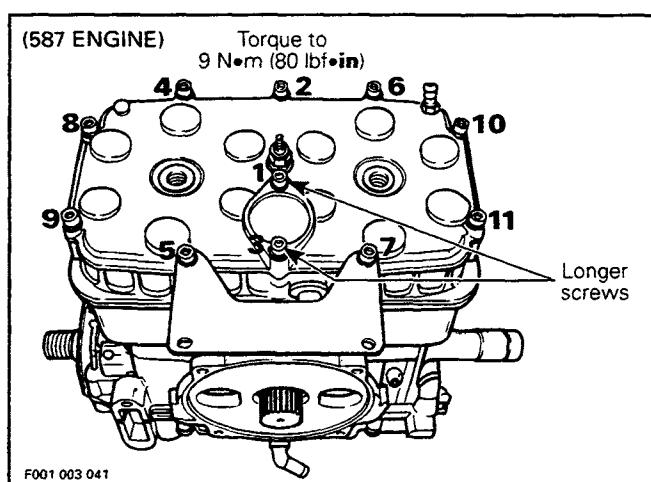
Make sure to install large O-rings around spark plugs holes and small O-ring where shown.

1,4,6, Screw and Cylinder Head Cover (587 Engine)

Install cover over cylinder head. Apply Loctite 242 (P / N 293 800 015) on screw threads. The two longer screws must be installed on oval-shaped housing. Make sure to install flame arrester support.

NOTE : Hand-tighten screws only. Final torque should be carried on after flame arrester / carburetor installation.

Torque cylinder head cover screws to 9 N·m (80 lbf·in) as per following illustrated sequence.



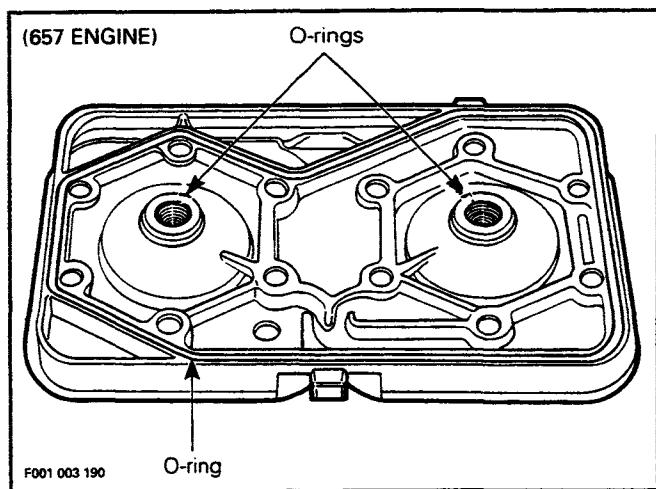
O-ring and Cylinder Head (657 Engine)

Apply Loctite 515 Gasket Eliminator (P / N 293 800 007) in cylinder sleeve O-ring groove.

Make sure to install O-rings around spark plugs holes and cylinder head O-ring where shown.

Section 03 ENGINE

Sub-Section 03 (TOP END)

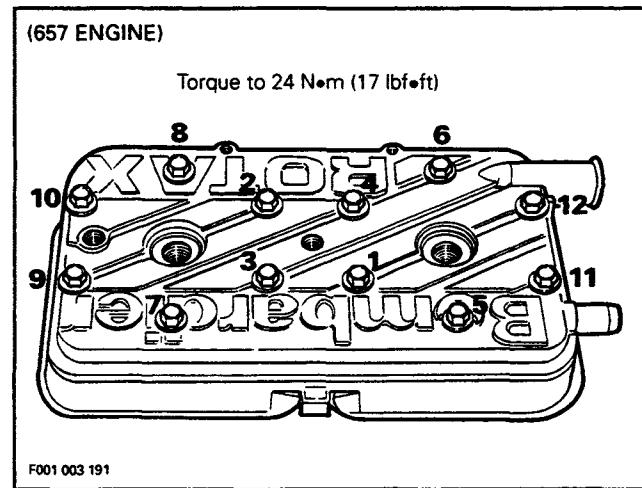


Screw and Cylinder Head Cover (657 Engine)

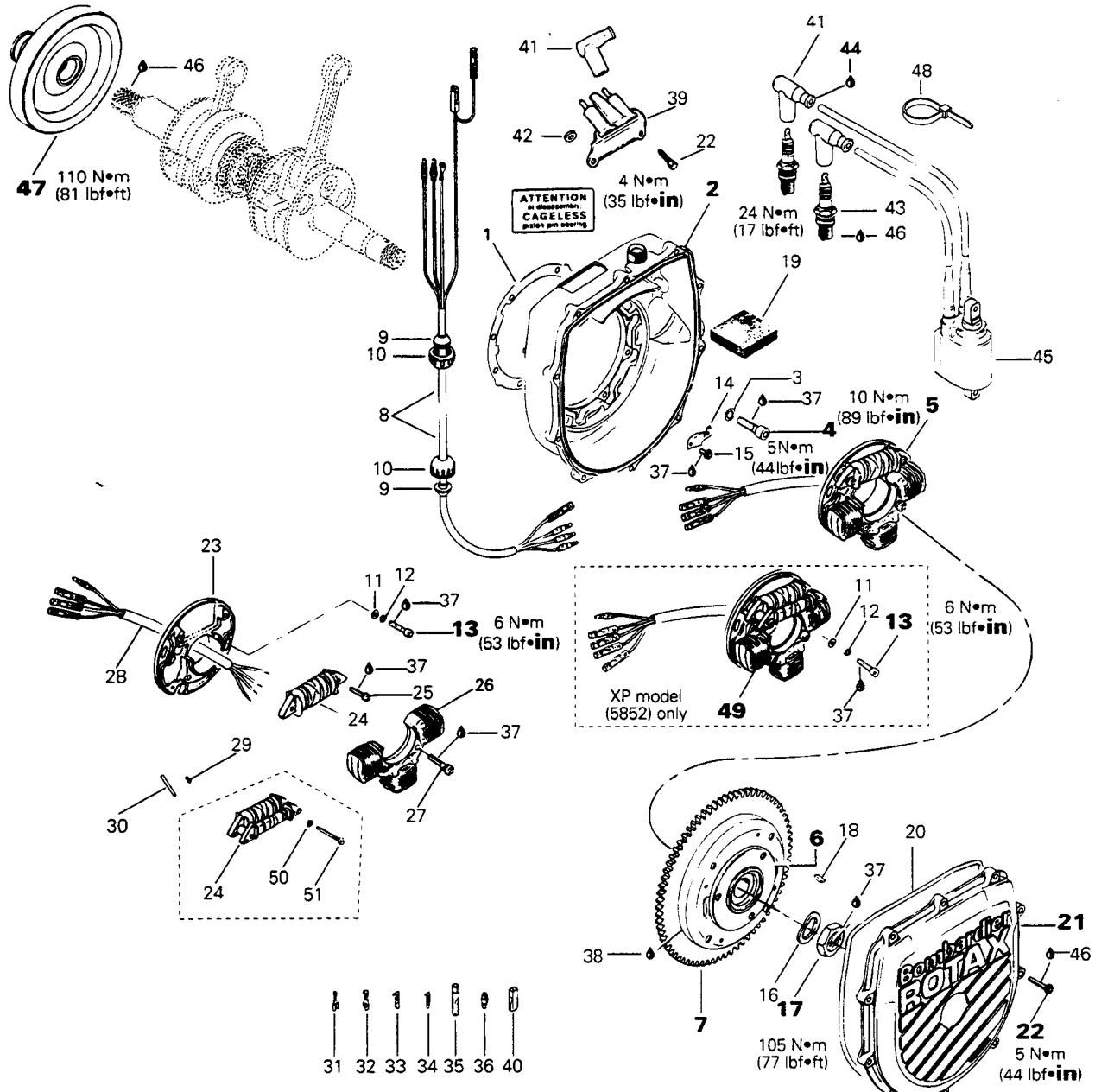
Apply synthetic grease (P / N 293 550 010) below screw head.

Install cover over cylinder head. Apply Loctite 242 (P / N 293 800 015) on screw threads.

Torque cylinder head cover/cylinder head screws to 24 N•m (17 lbf•ft) as per following illustrated sequence.



PTO FLYWHEEL AND MAGNETO



Section 03 ENGINE

Sub-Section 04 (PTO FLYWHEEL AND MAGNETO)

COMPONENTS

1. Gasket
2. Ignition housing
3. Lock washer M8 (8)
4. Allen screw M8 x 25 (8)
5. Armature plate assembly
6. Magneto flywheel
7. Ring gear 77 teeth
8. Harness assembly
9. Grommet (2)
10. Cap nut (2)
11. Washer M5.5 (3)
12. Lock washer M5 (3)
13. Allen screw M5 x 18 (3)
14. Retainer plate
15. Taptite screw M5 x 8 (2)
16. Lock washer M22
17. Hexagonal nut M22
18. Woodruff key
19. Protection mat
20. O-ring
21. Ignition housing cover
22. Self tapping screw M5 x 25 (12)
23. Armature plate
24. Generating coil
25. Phillips screw M5 x 22 (2)
26. Battery charging coil
27. Screw M6 x 25 (2)
28. Harness assembly
29. Terminal clip (4)
30. Shrink tube 30 mm (4)
31. Female connector
32. Ring terminal
33. Female terminal
34. Male terminal
35. Insulation sheath
36. Insulation sheath
37. Loctite 242
38. Loctite 648
39. Ground plate
40. Protection cap
41. Insulator cap (2)
42. Star washer M5 (2)
43. Spark plug (2)
44. Dielectric grease
45. Ignition coil
46. Anti-seize lubricant
47. PTO flywheel
48. Tie rap (2)
49. Armature plate assembly (double generating coil XP (5852) only)
50. Lock washer (2)
51. Slotted head screw M5 x 35 (2)

GENERAL

The following procedures can be performed without removing engine from watercraft. However, battery removal will be required. For only PTO flywheel removal withdraw jet pump unit ass'y, refer to PROPULSION AND DRIVE SYSTEMS 08-01 then refer to removal and overhaul.

To ease the removal of PTO flywheel heat center of flywheel with a heat gun to break bond. Always pressurize fuel system first.

WARNING : Never use a torch in the engine compartment. Electrolyte or fuel vapors can be present it may ignite.

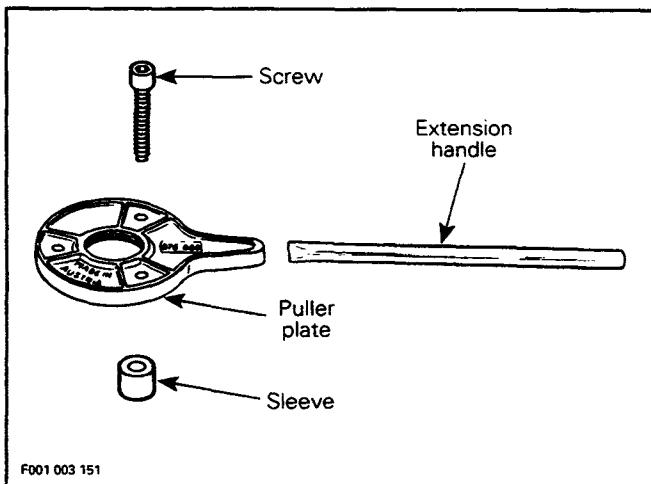
REMOVAL

21.22, Ignition Cover and Screw

Remove screws and spark plug grounding device then withdraw cover.

NOTE : PTO side flywheel must be removed prior to removing MAG side flywheel since puller has to be installed on MAG flywheel.

For removal of both flywheels, MAG flywheel is locked with puller plate (P / N 290 876 080), sleeves (P / N 290 847 220) and extension handle (P / N 295 000 003).



CAUTION : Never lock crankshaft by inserting any tool through connecting rod bores nor through impulse fitting.

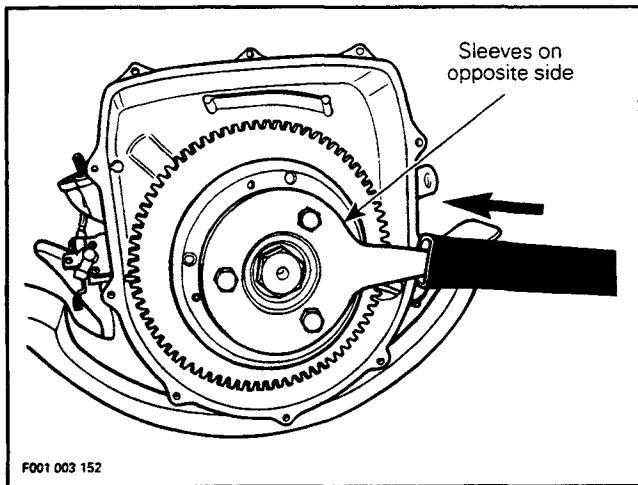
47, PTO Flywheel

Using three M8 x 35 mm screws (P / N 290 841 591), install screws through puller plate and slide sleeves on screws then secure puller plate on MAG flywheel so that sleeves are against flywheel.

Install extension handle on end of puller plate.

Section 03 ENGINE

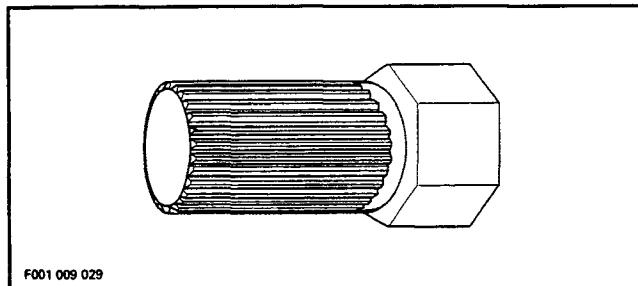
Sub-Section 04 (PTO FLYWHEEL AND MAGNETO)



F001 003 152

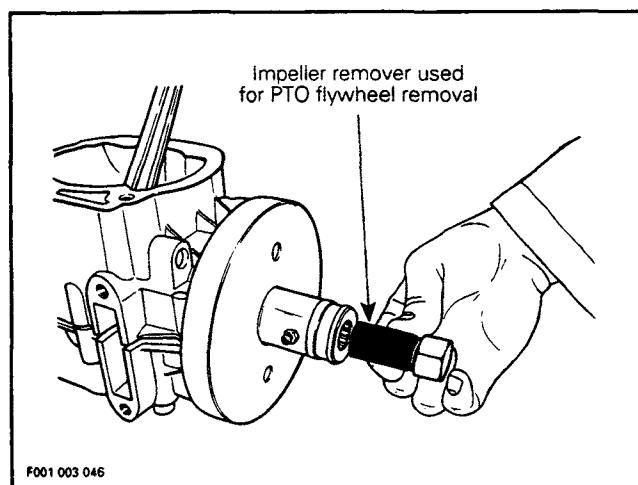
Rotate MAG flywheel so that extension handle end can be held easily before PTO flywheel loosening.

PTO flywheel is loosen using impeller remover (P / N 295 000 001).



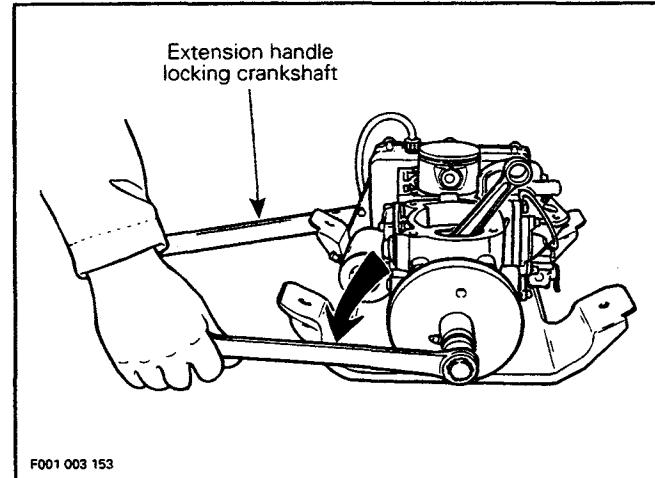
F001 009 029

Insert special tool in PTO flywheel splines.



F001 003 046

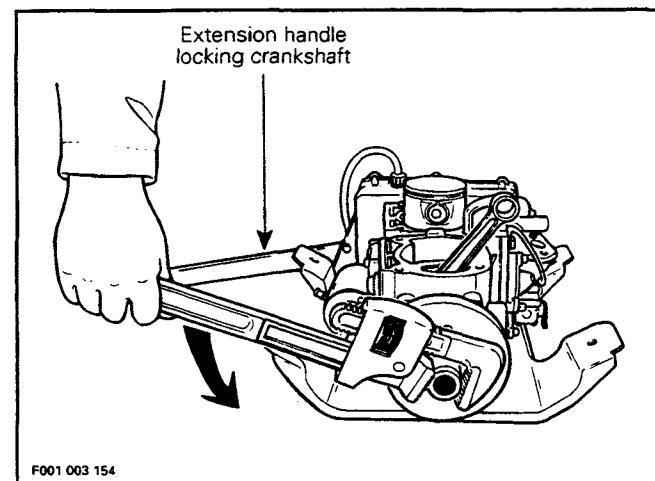
Using a suitable wrench or socket, unscrew PTO flywheel COUNTERCLOCKWISE when facing it.



F001 003 153

As an alternate method to remove PTO flywheel when PTO flywheel splines are worn out and PTO flywheel remover cannot be used.

Use a pipe wrench and install it on PTO flywheel as illustrated.



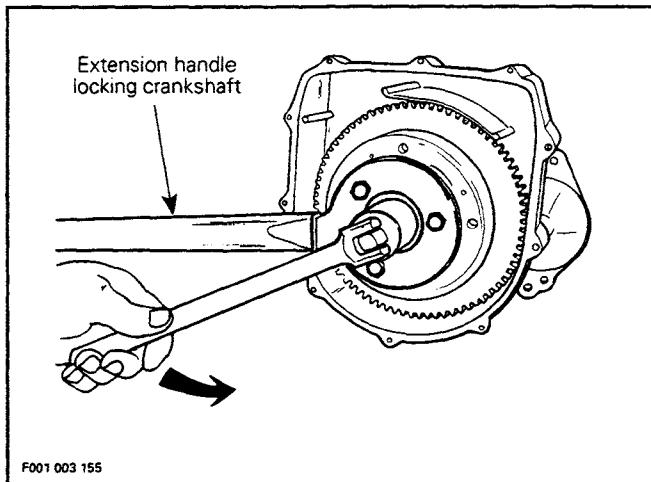
F001 003 154

6, Magneto Flywheel

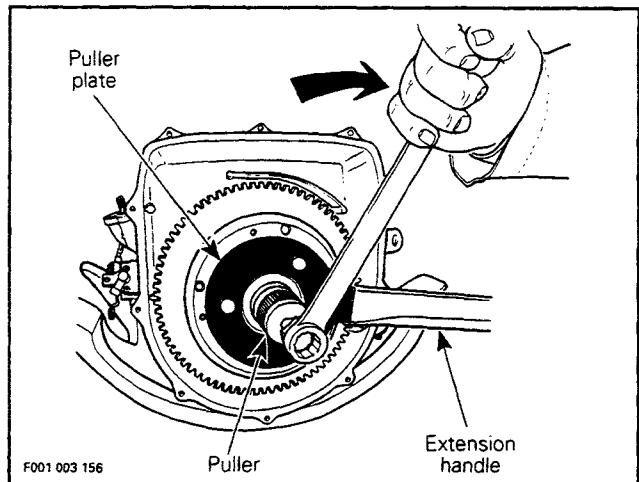
With puller plate properly secured as for PTO flywheel removal, rotate MAG flywheel so that extension handle end can be held easily before loosening.

Section 03 ENGINE

Sub-Section 04 (PTO FLYWHEEL AND MAGNETO)



F001 003 155



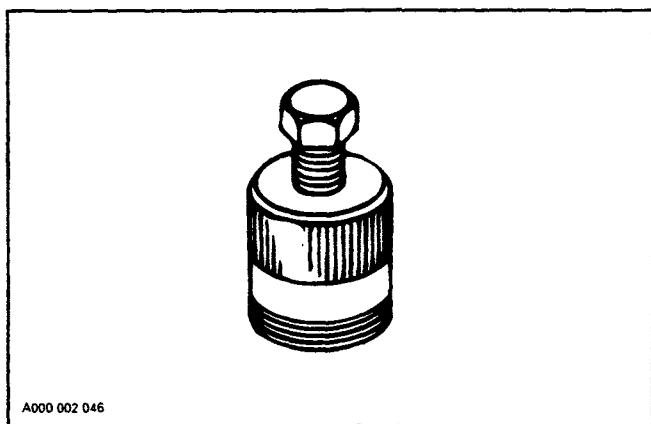
F001 003 156

Using a suitable socket, unscrew retaining nut COUNTERCLOCKWISE when facing it.

NOTE : If socket is found too large to be inserted in puller plate, machine or grind its outside diameter as necessary.

Remove nut and lock washer from MAG flywheel.

MAG flywheel is easily freed from crankshaft with puller (P / N 290 876 065).



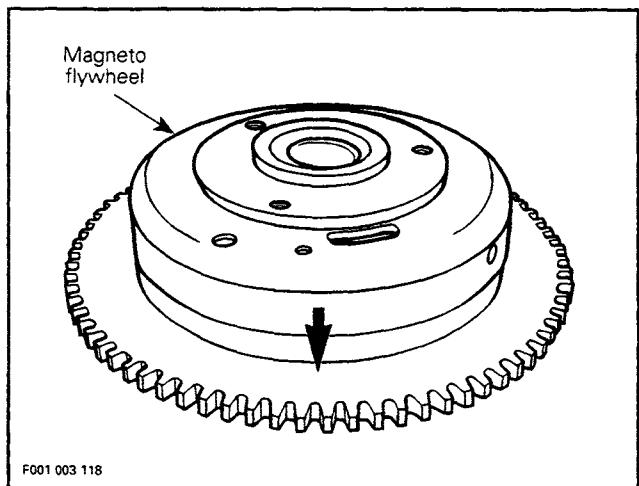
A000 002 046

Fully thread on puller in puller plate.

Tighten puller bolt and at the same time, tap on bolt head using a hammer to release MAG flywheel from its taper.

6,7, MAG Flywheel and Ring Gear

Lay MAG flywheel on a steel plate, then to ease removal heat ring gear with a propane torch to approximately 150 °C (300 °F) to break the Loctite bond. Tap lightly on ring gear using a hammer to release it from MAG flywheel.



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5,13,49, Screw and Armature Plate Ass'y

To ease reassembly and further ignition timing, indexing marks should be made on armature plate and crankcase.

Remove three retaining screws and withdraw armature plate.

Section 03 ENGINE

Sub-Section 04 (PTO FLYWHEEL AND MAGNETO)

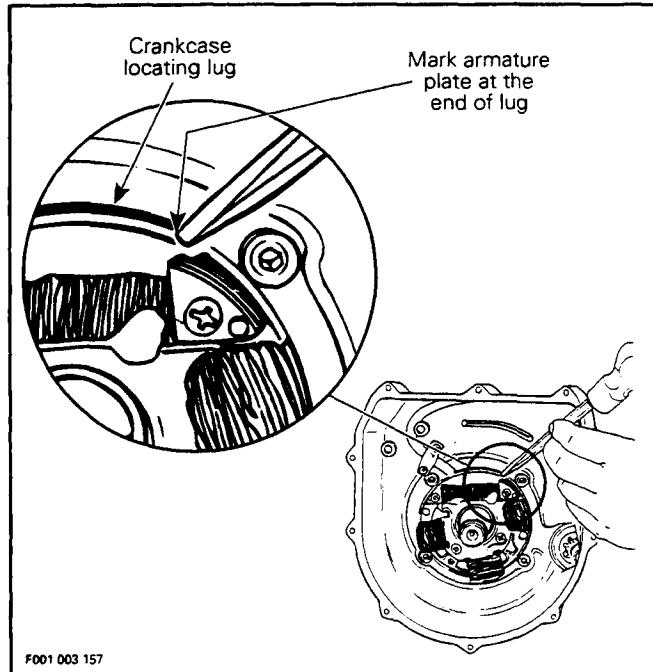
Crankcase Replacement

Since replacement crankcases do not have timing mark for armature plate location, indexing marks should be made on armature plate and crankcase to ease reassembly and further ignition timing.

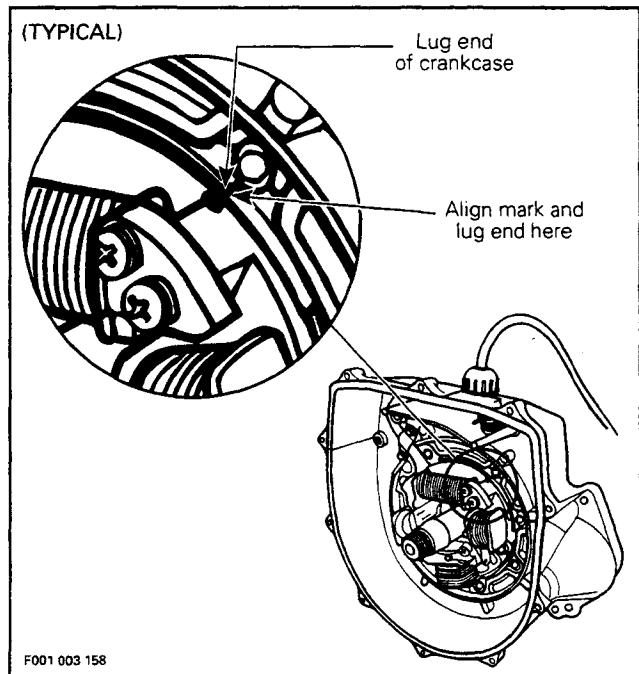
The following procedure is to find a common reference point on both crankcases (old and new) to position armature plate.

Proceed as follows :

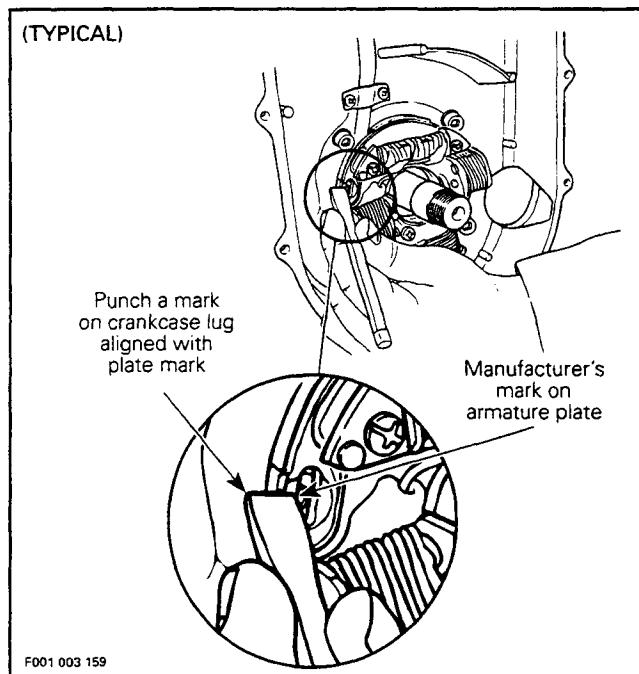
- Find a crankcase locating lug (the top one in this example).
- Place a cold chisel at the end of chosen lug, then punch a mark on armature plate at this point.



- At assembly, align armature plate mark (previously punched) with the end of the same locating lug on the new crankcase.



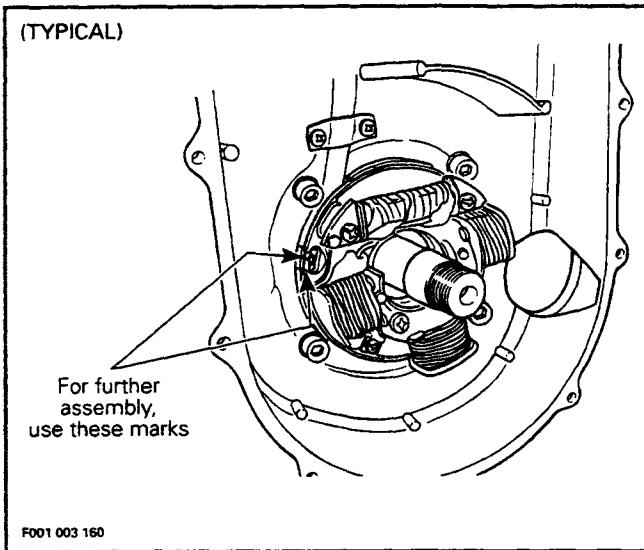
- Find manufacturer's mark on armature plate. In line with this mark, punch another mark on adjacent crankcase lug.



From now on, these marks will be used for further assembly positioning as a pre-timing position.

Section 03 ENGINE

Sub-Section 04 (PTO FLYWHEEL AND MAGNETO)



2.4, Ignition Housing and Screw

To remove ignition housing, starter has to be removed. Refer to ELECTRICAL 07-04 under electric starter for procedures.

Unscrew retaining screws, then withdraw housing.

CLEANING

Clean all metal components in a solvent.

▼ CAUTION : Clean armature coils and magneto magnets using only a clean cloth.

Clean crankshaft taper and threads.

INSTALLATION

Installation is essentially the reverse of removal procedures. However pay particular attention to the following.

2.4, Ignition Housing and Screw

Install gasket on housing / crankcase mating surfaces.

Apply Loctite 242 (blue) (P / N 293 800 015) on screw threads then torque them in a criss-cross sequence to 10 N·m (89 lbf·in).

After housing installation, make sure before reinstalling electric starter, that oil outlet fitting is installed on crankcase.

5,13, Screw and Armature Plate Ass'y

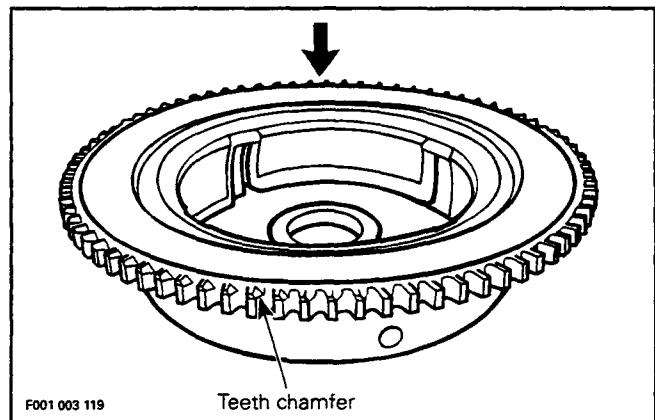
Position armature plate on crankcase, aligning previously traced marks on both parts.

Apply a drop of Loctite 242 (blue) (P / N 293 800 015) on screw threads and torque to 6 N·m (53 lbf·in).

6,7, MAG Flywheel and Ring Gear

Apply Loctite 648 (P / N 290 899 788) to MAG flywheel mating surface. Lay ring gear on a steel plate, then heat with a propane torch in order to install it on MAG flywheel.

Pay particular attention to position ring gear teeth chamfer side as per following illustration.



NOTE : Ensure that ring gear contacts MAG flywheel flange. Scribe a new mark on ring gear for further ignition timing if applicable.

Whenever replacing either ring gear or MAG flywheel, Gun Kote must be applied to prevent possible corrosion.

▼ CAUTION : Always assemble MAG flywheel and ring gear prior to apply Gun Kote. If not done correctly, ring gear won't contact MAG flywheel flange.

To apply Gun Kote proceed as follows:

1. Clean thoroughly and degrease replacement part using a non oil base solvent.

2. Apply coating in light thin coats using a spray gun.

NOTE : Do not spray Gun Kote into MAG flywheel threaded holes.

3. Bake parts in oven at 175 °C (350 °F) for one hour to cure Gun Kote.

▼ CAUTION : Do not eliminate Gun Kote heat curing time because it will lose all its resistance and it won't give any protection.

▼ CAUTION : At installation of magneto, ring gear teeth chamfer and starter clutch should be facing each other.

6,17, Magneto and Nut

Apply Loctite 242 (blue) (P / N 293 800 015) on crankshaft taper.

Position Woodruff key, magneto, apply Loctite 242 on nut threads and install fasteners on crankshaft.

Torque nut to 105 N•m (77 lbf•ft).

CAUTION : Never use any type of impact wrench at magneto installation.

47, PTO Flywheel

Apply Loctite 767 Anti-Seize (P / N 293 550 001) on crankshaft threads then screw on PTO flywheel.

Using same tool as for removal, torque PTO flywheel to 110 N•m (81 lbf•ft).

CAUTION : Never use any type of impact wrench at PTO flywheel installation.

CAUTION : PTO flywheel for 657 engine is thicker and larger than the one for 587 engine. Pay attention to install the appropriate one, because PTO flywheel, crankshaft and magneto were balanced as a unit.

Ignition Timing

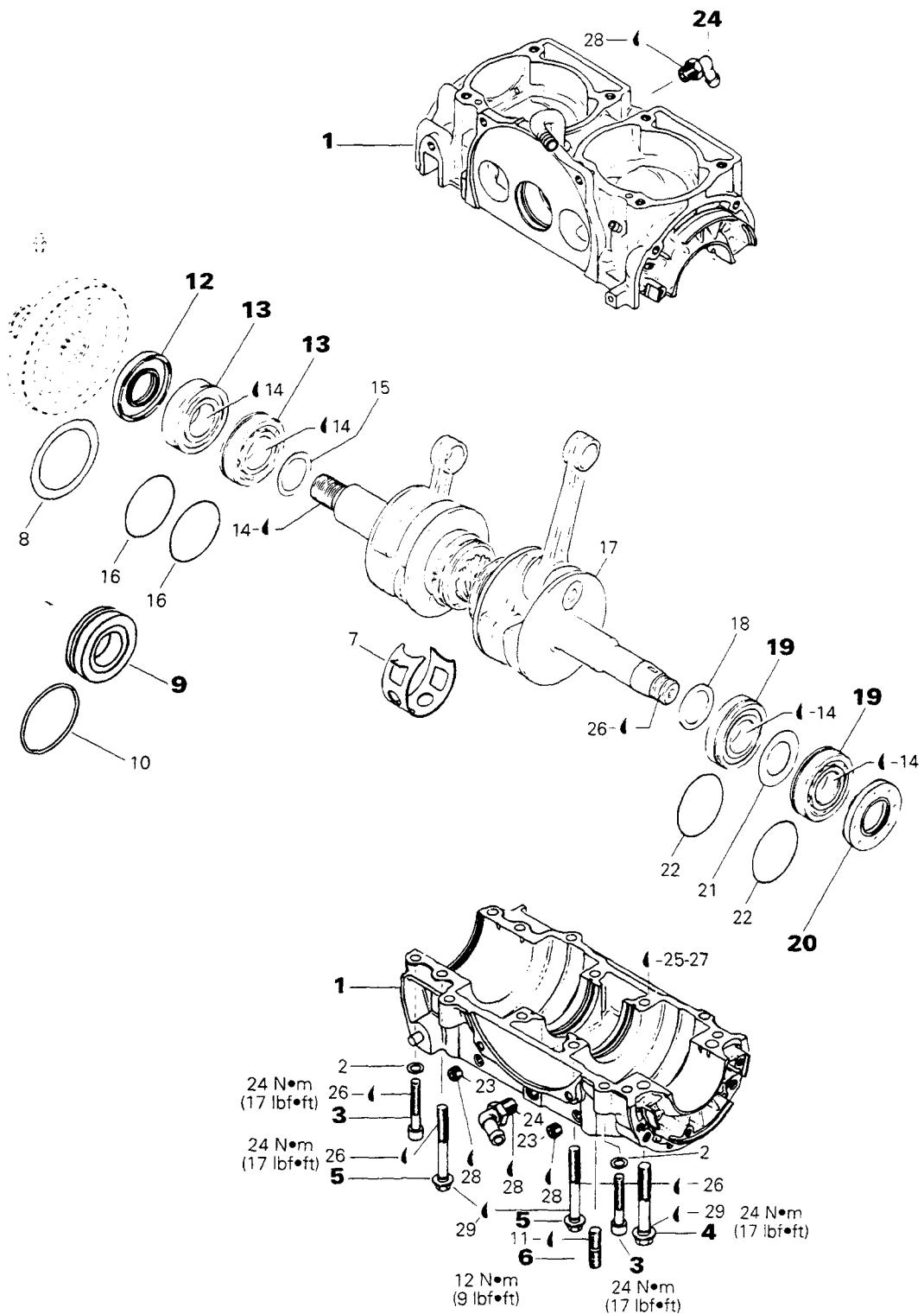
For procedures, refer to ELECTRICAL 07-02 under ignition timing.

21,22, Ignition Housing Cover and Screw

Properly install O-ring in ignition housing. Apply Loctite 767 Anti-Seize (P / N 293 550 001) on screw threads, install cover and spark plug grounding device then torque screws in a criss-cross sequence to 5 N•m (44 lbf•in).

Section 03 ENGINE
Sub-Section 05 (BOTTOM END)

BOTTOM END



Section 03 ENGINE

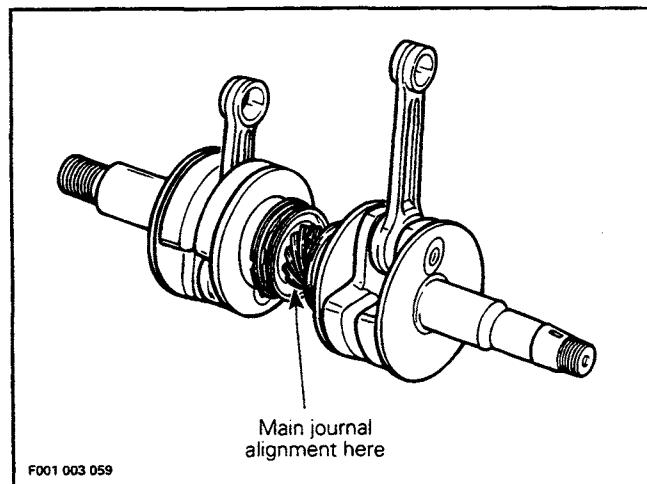
Sub-Section 05 (BOTTOM END)

COMPONENTS

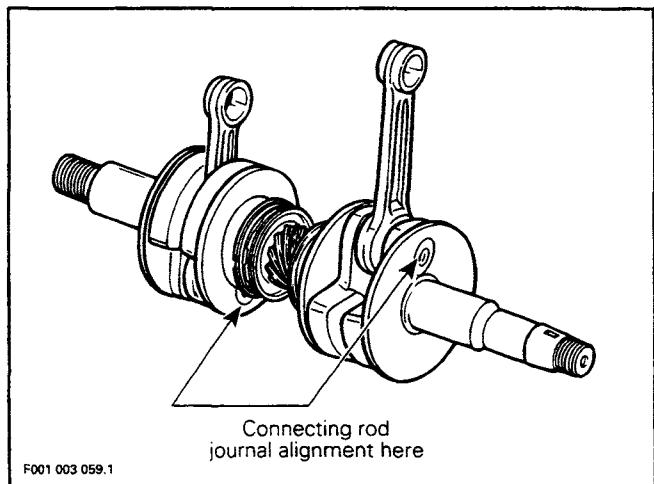
- 1. Crankcase ass'y
- 2. Lock washer 8 mm (6)
- 3. Allen screw M8 x 45 (6)
- 4. Hexagonal head screw M10 x 75 (2)
- 5. Hexagonal head screw M8 x 70 (6)
- 6. Stud M10 x 25 / 18 (4)
- 7. Retaining ring
- 8. Retaining shim
- 9. Labyrinth sleeve
- 10. O-ring
- 11. Loctite 271
- 12. Oil seal
- 13. Ball bearing (2)
- 14. Anti-seize lubricant
- 15. Distance ring
- 16. O-ring (2)
- 17. Crankshaft
- 18. Distance ring
- 19. Ball bearing (2)
- 20. Oil seal
- 21. Shim 30.4 / 51 / 1
- 22. O-ring (2)
- 23. Drain plug (2)
- 24. Oil outlet fitting (2)
- 25. Loctite 515
- 26. Loctite 242
- 27. Primer "N"
- 28. Loctite PST 592
- 29. Synthetic grease

CRANKSHAFT MISALIGNMENT AND DEFLECTION

Since it is an assembled crankshaft it can become misaligned or deflected. Crankshaft can be twisted on center main journal, changing timing of one cylinder in relation with the other.



Counterweights can also be twisted on connecting rod journal on any or both cylinder(s).

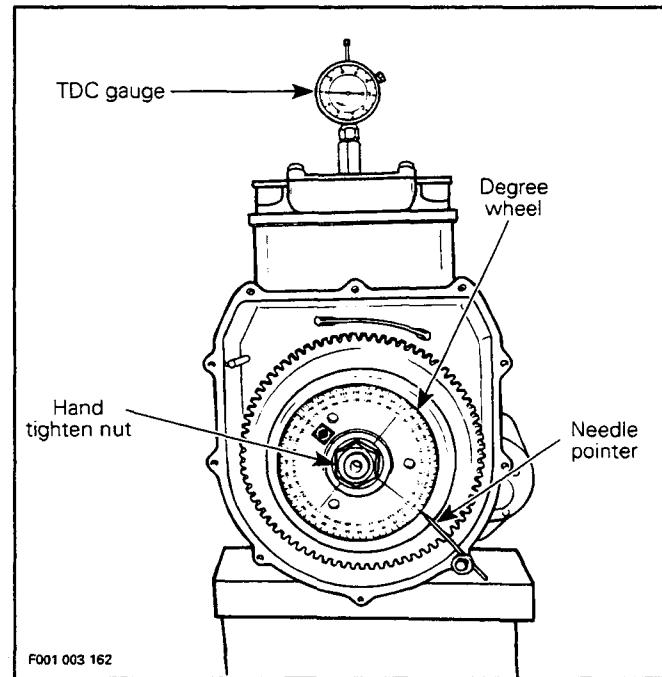
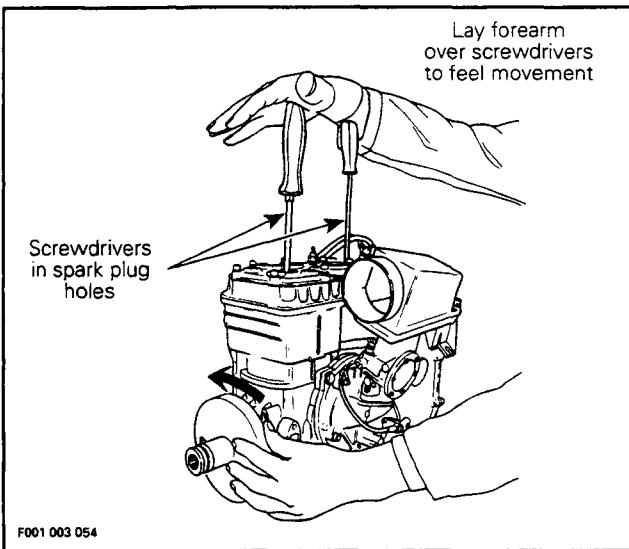


Crankshaft Alignment at Center Main Journal

NOTE : The following checks can be performed with engine in watercraft without overhauling engine.

To quickly check, without accuracy, if crankshaft is twisted on center main journal, proceed as follows :

- Remove PTO flywheel guard.
- Remove spark plugs.
- Insert a screwdriver in one spark plug hole.
- Insert a longer screwdriver in the other hole.
- Lay a forearm over both screwdriver handles to feel piston displacements.
- With the other hand, slowly rotate engine by PTO flywheel.



As soon as one piston starts going up, the other must immediately go down. Any interval between strokes indicates a misaligned crankshaft.

Or, to accurately check crankshaft alignment, proceed as follows :

- Remove ignition housing cover.
- Remove MAG flywheel nut. Refer to PTO FLYWHEEL AND MAGNETO 03-04 for procedures.
- Install Bombardier degree wheel (P / N 295 000 007) on crankshaft end. Hand-tighten nut only.
- Remove both spark plugs.
- Install a TDC gauge (P / N 295 000 065) in spark plug hole on MAG side.
- Bring MAG piston at Top Dead Center.
- As a needle pointer, secure a wire with a cover screw and a washer.
- Rotate degree wheel (NOT crankshaft) so that needle pointer reads 360°.

— Remove TDC gauge and install on PTO side.

— Bring PTO piston at Top Dead Center.

Interval between cylinders must be exactly 180° therefore, needle pointer must indicate 180° on degree wheel (360° - 180° = 180°).

Any other reading indicates a misaligned crankshaft.

Crankshaft Alignment at Connecting Rod Journal

Such misalignment may cause a crankshaft hard to be manually turned. Verification can be done by measuring deflection each end of crankshaft. Refer to INSPECTION paragraph.

If deflection is found greater than specified tolerance, this indicates worn bearing(s), bent and / or disaligned crankshaft.

GENERAL

Engine has to be removed from watercraft to open bottom end.

If crankshaft end seal(s) has / have to be replaced, bottom end must be opened.

DISASSEMBLY

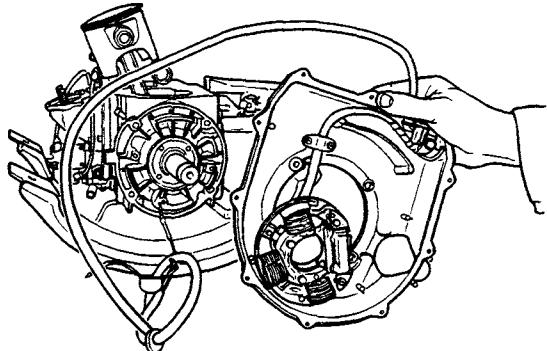
Remove the following parts :

- ignition housing and PTO flywheel on opposite side

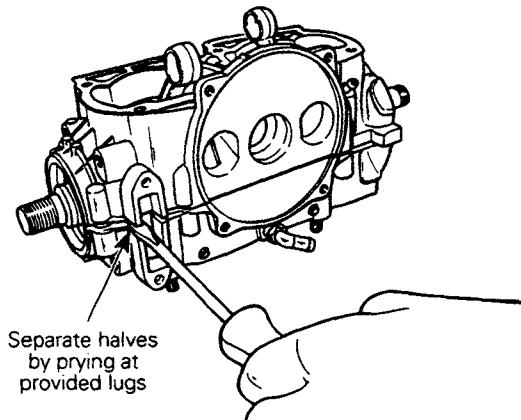
Section 03 ENGINE

Sub-Section 05 (BOTTOM END)

Separating ignition housing/armature plate from crankcase



F001 003 163



F001 003 057

- rotary valve cover and valve
- engine support
- crankcase retaining screws

Insert screwdrivers between crankcase lugs and pry to separate halves being careful not to damage precision machined surfaces.

Separate halves by prying at provided lugs

F001 003 056

12,13,19,20, Seal and Bearing

 **NOTE :** Do not needlessly remove crankshaft bearings.

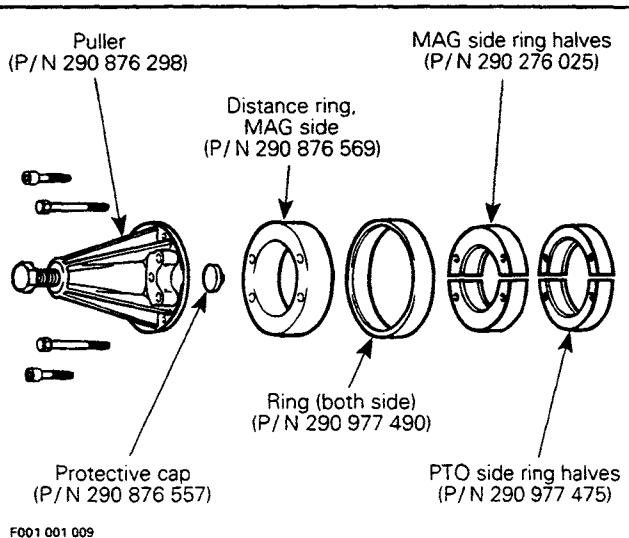
Remove end seals.

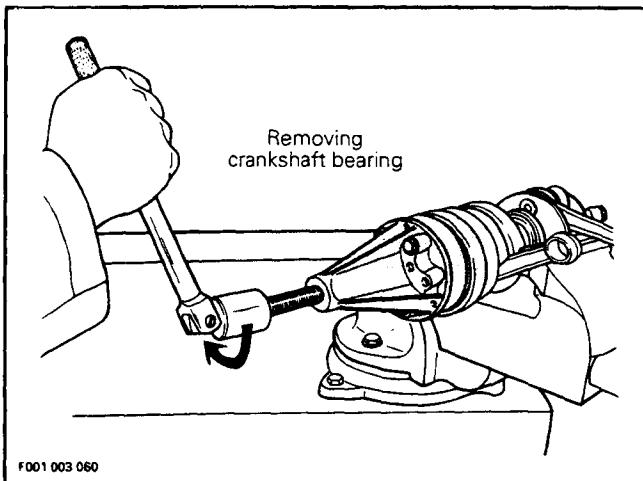
To remove end bearings from crankshaft, use crankshaft end protective cap (P / N 290 876 557) and puller (P / N 290 876 298).

On PTO side, use ring (P / N 290 977 490) with ring halves (P / N 290 977 475).

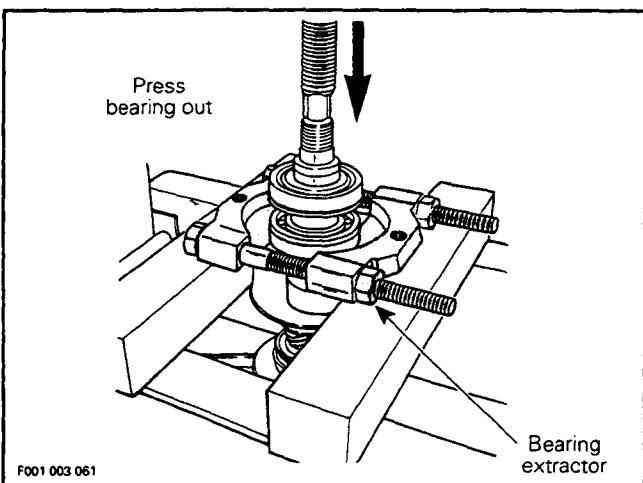
On MAG side, use distance ring (P / N 290 876 569) and ring (P / N 290 977 490) with ring halves (P / N 290 276 025).

 **NOTE :** To facilitate ring or distance ring installation lubricate their inside diameters.





Or, use a bearing extractor such as Proto #4332 and a press to remove two bearings at a time.



NOTE : If bearings are to be replaced, they can be quickly removed using an air hammer.

CLEANING

Discard all oil seals, gaskets, O-rings and sealing rings. Clean water and oil passages and make sure they are not clogged.

Clean all metal components in a solvent.

Remove old Loctite from crankcase mating surfaces with stripper (P / N 295 000 040).

CAUTION : Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

INSPECTION

Visually inspect parts for corrosion damage.

Inspect plane surfaces for warpage. Small deformation can be corrected by grinding surface with a fine sand paper. Install sand paper on a surface plate and rub part against oiled sand paper.

Inspect crankshaft bearings. Check for scoring, pitting, chipping or other evidence of wear. Make sure plastic cage is not melted. Rotate and make sure they turn smoothly.

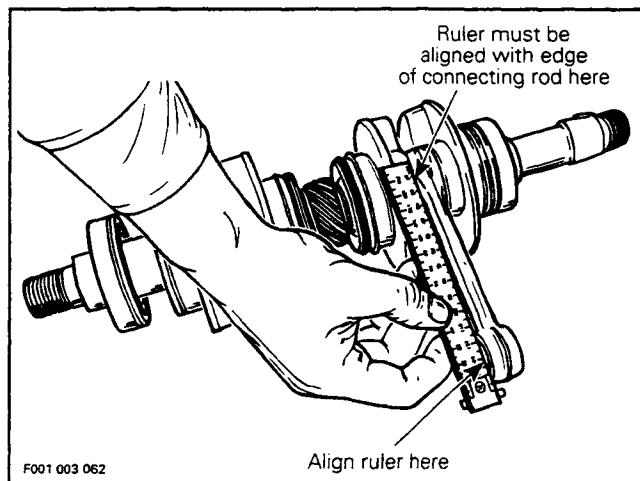
If crankshaft and / or components are found defective, it must be repaired by a specialized shop or replaced.

The inspection of engine bottom end should include the following measurements :

MEASUREMENTS	TOLERANCES		
	NEW PARTS (min.)	(max.)	WEAR LIMIT
Crankshaft deflection	N.A.	N.A.	0.08 mm (.0031 in)
Connecting rod big end axial play	0.39 mm (.015 in)	.737 mm (.029 in)	1.2 mm (.047 in)

Connecting Rod Straightness

Align a steel ruler on edge of small end connecting rod bore. Check if ruler is perfectly aligned with edge of big end.



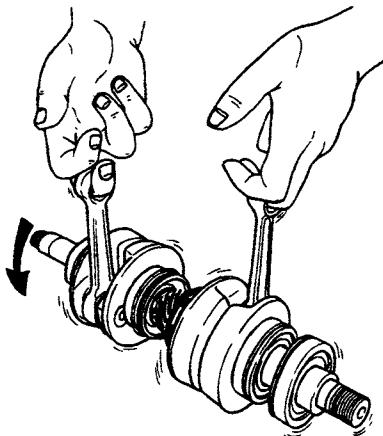
Crankshaft Alignment

A quick check can be made as follows :

- Insert a finger in each connecting rod.
- Lift crankshaft and apply a rotation movement to crankshaft with fingers.

Section 03 ENGINE

Sub-Section 05 (BOTTOM END)



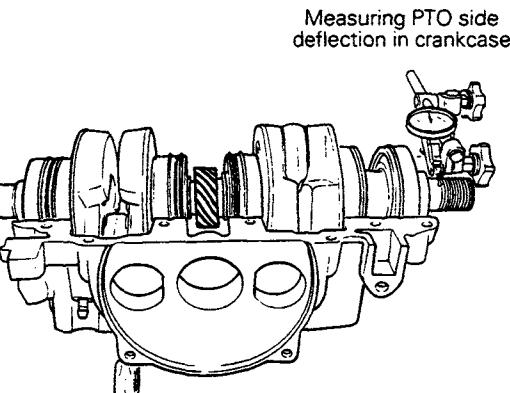
F001 003 063

A twisted crankshaft will turn irregularly in an out of round motion.

Crankshaft Deflection

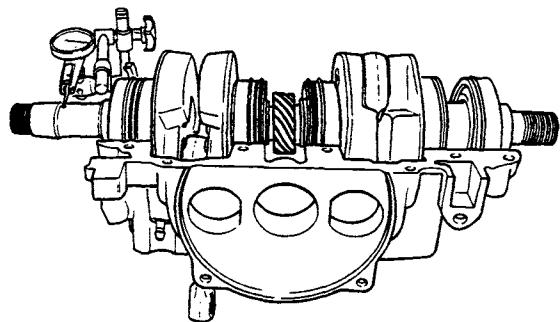
Crankshaft deflection is measured each end with a dial indicator.

First, check deflection with crankshaft in crankcase. If deflection exceeds the specified tolerance, it can be either ball bearings wear, bent or twisted crankshaft at connecting rod journal.



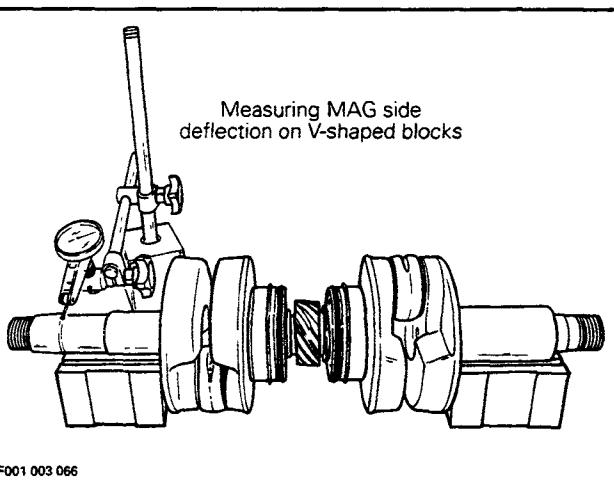
F001 003 064

Measuring MAG side deflection in crankcase



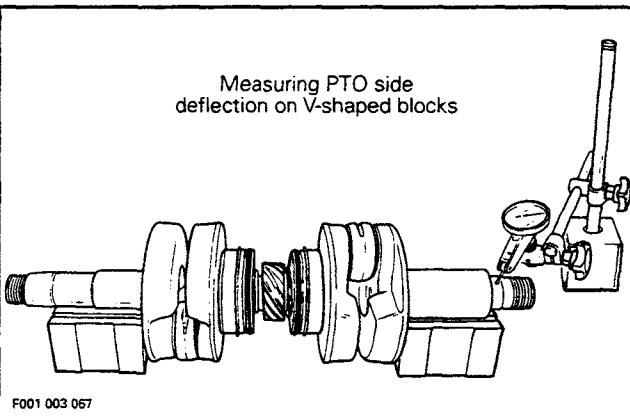
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Remove crankshaft bearings and check deflection again on V-shaped blocks as illustrated.



F001 003 066

Measuring MAG side deflection on V-shaped blocks



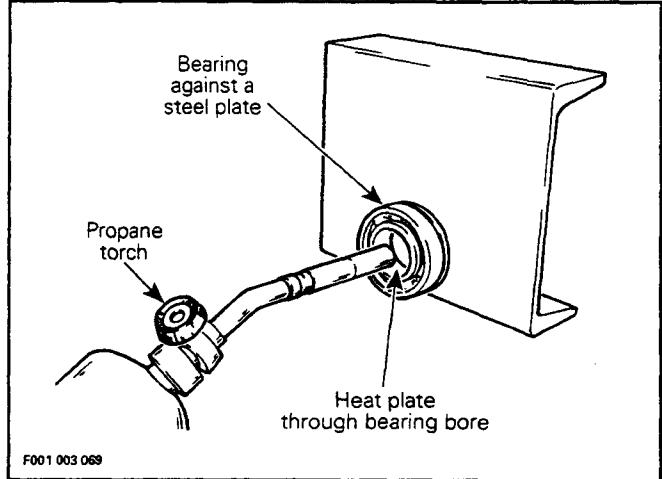
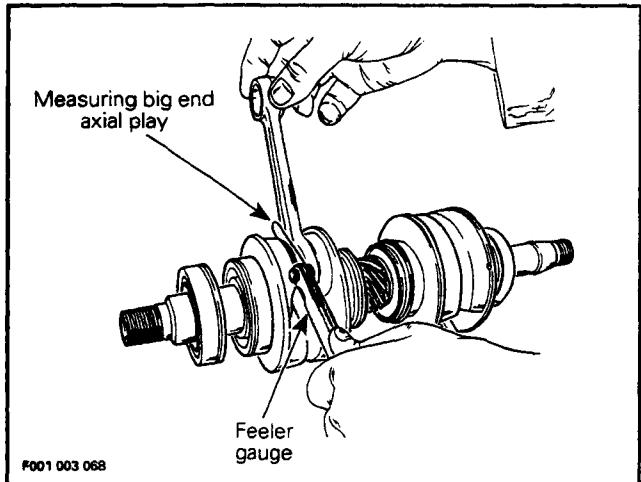
F001 003 067

Measuring PTO side deflection on V-shaped blocks

 NOTE : Crankshaft deflection can not be correctly measured between centers of a lathe.

Connecting Rod Big End Axial Play

Using a feeler gauge, measure distance between thrust washer and crankshaft counterweight.



To properly locate outer PTO bearing, temporarily install distance gauge (P / N 290 876 826) against inner bearing. Slide outer bearing until stopped by gauge then remove gauge.

ASSEMBLY

Assembly is essentially the reverse of disassembly procedures. However pay particular attention to the following.

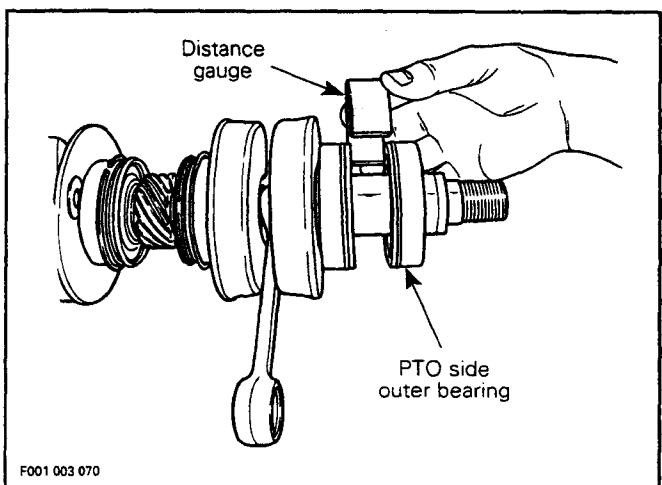
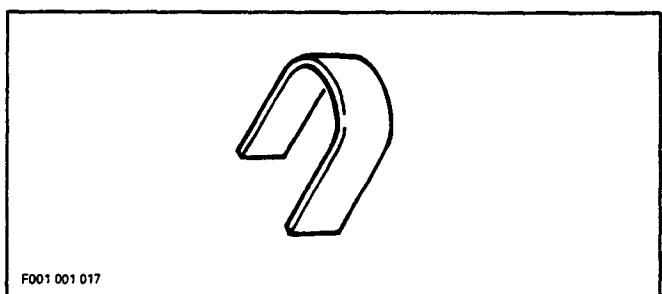
13,19, Bearing

Apply Loctite 767 Anti-Seize (P / N 293 550 001) on bearing seats.

Prior to installation, place bearings into a container filled with oil, previously heated to 75°C (167°F). This will expand bearing and ease installation.

Or, as an alternate method, apply heat with a propane torch. Lay bearing on a steel plate, then heat plate through bearing bore until smoke is noticed from bearing. Install bearing carefully on crankshaft.

CAUTION : Immediately stop heating as soon as smoke is noticed. Overheating bearing will melt plastic cage. Practice with used bearings on first try.

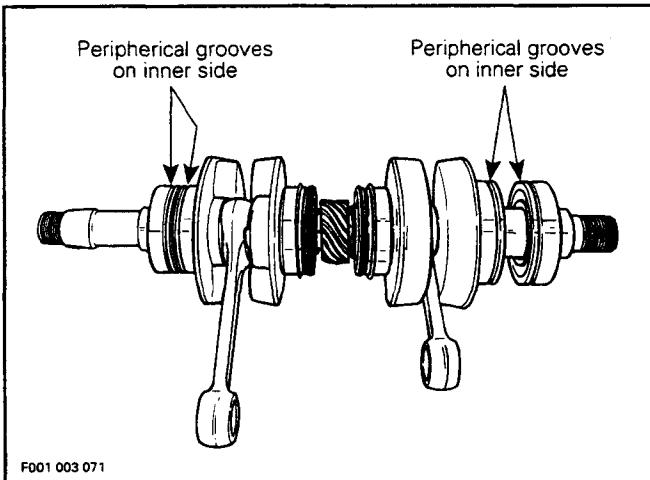
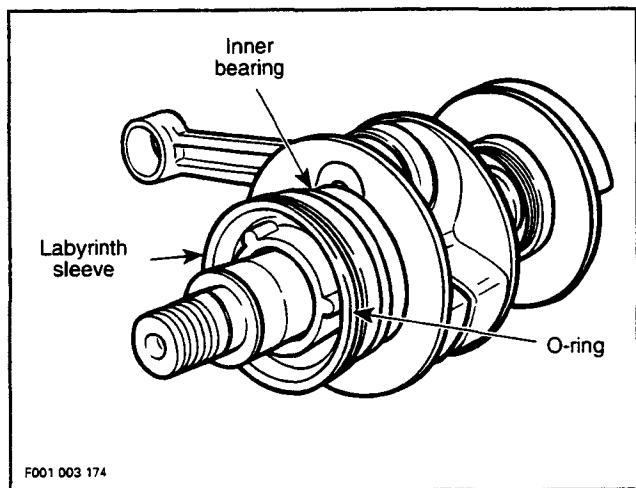


Section 03 ENGINE

Sub-Section 05 (BOTTOM END)

9, Labyrinth Sleeve (5807, 5820, 5852 and 5861 models)

To properly locate outer PTO bearing, install labyrinth sleeve against inner bearing side.



12,20, Seal

At seal assembly, apply a light coat of lithium grease on seal lips.

1, Crankcase

Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves.

Prior to joining crankcase halves, apply a light coat of Loctite 515 Gasket Eliminator (P / N 293 800 007) on mating surfaces. Do not apply in excess as it will spread out inside crankcase.

NOTE : On aluminum material it is recommended to use Loctite Primer N (P / N 293 600 012) to reduce curing time and increase gap filling capability. Refer to manufacturer's instructions.

CAUTION : Rotary valve shaft must be installed in crankcase before closing halves. Before joining crankcase halves, make sure that crankshaft gear is well engaged with rotary valve shaft gear.

Position crankcase halves together and hand-tighten bolts.

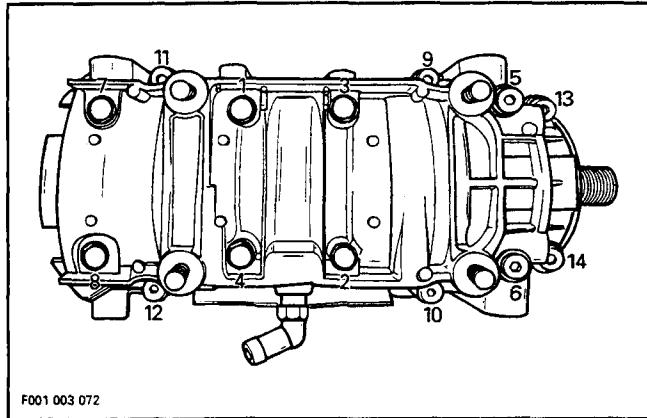
CAUTION : Temporarily install armature plate to align crankcase halves with each other.

Slide outer bearing until it touches sleeve.

Install bearings so that their peripherical grooves be located as shown in following illustration.

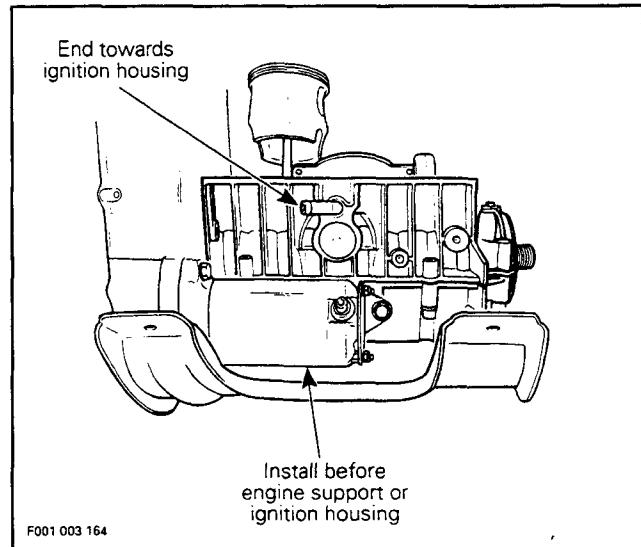
3,4,5, Screw

Apply Loctite 242 (P / N 293 800 015) on screw threads. Torque crankcase screws to 24 N•m (17 lbf•ft) as per following illustrated sequence.



For rotary valve timing and assembly procedures, refer to ROTARY VALVE AND RESERVOIR 03-06.

If engine support is installed on crankcase before ignition housing, electric starter must be installed before engine support.



6, Stud

At assembly in crankcase, apply Loctite 271 (P / N 293 800 005) on stud threads. Torque to 12 N•m (9 lbf•ft)

Finalizing Assembly

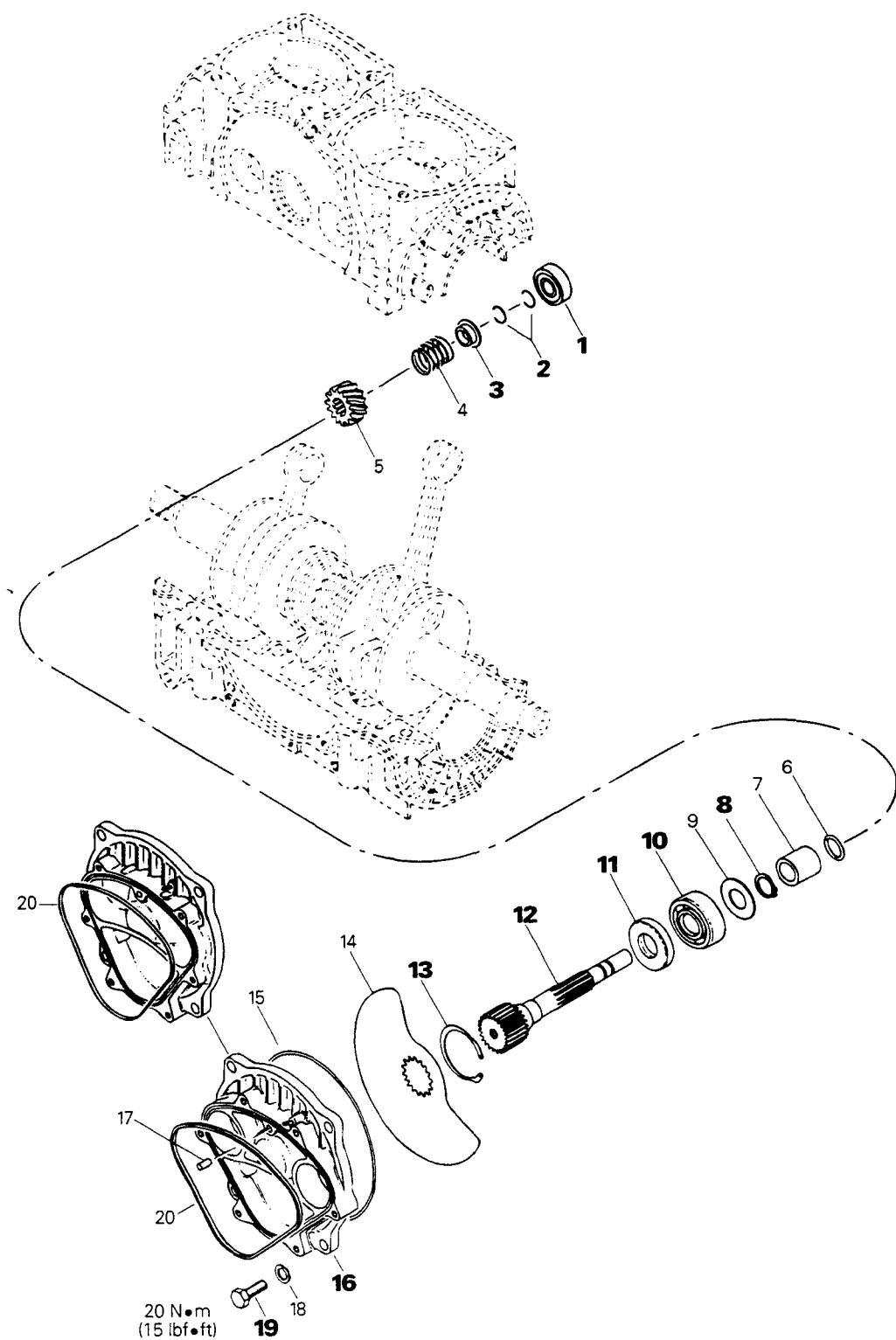
24, Oil Outlet Fitting

If oil outlet fitting has been removed from crankcase, reinstall it with its end pointing towards ignition housing. Apply Loctite PST 592 (P / N 293 800 018) on fitting threads.

Section 03 ENGINE

Sub-Section 06 (ROTARY VALVE AND RESERVOIR)

ROTARY VALVE



Section 03 ENGINE

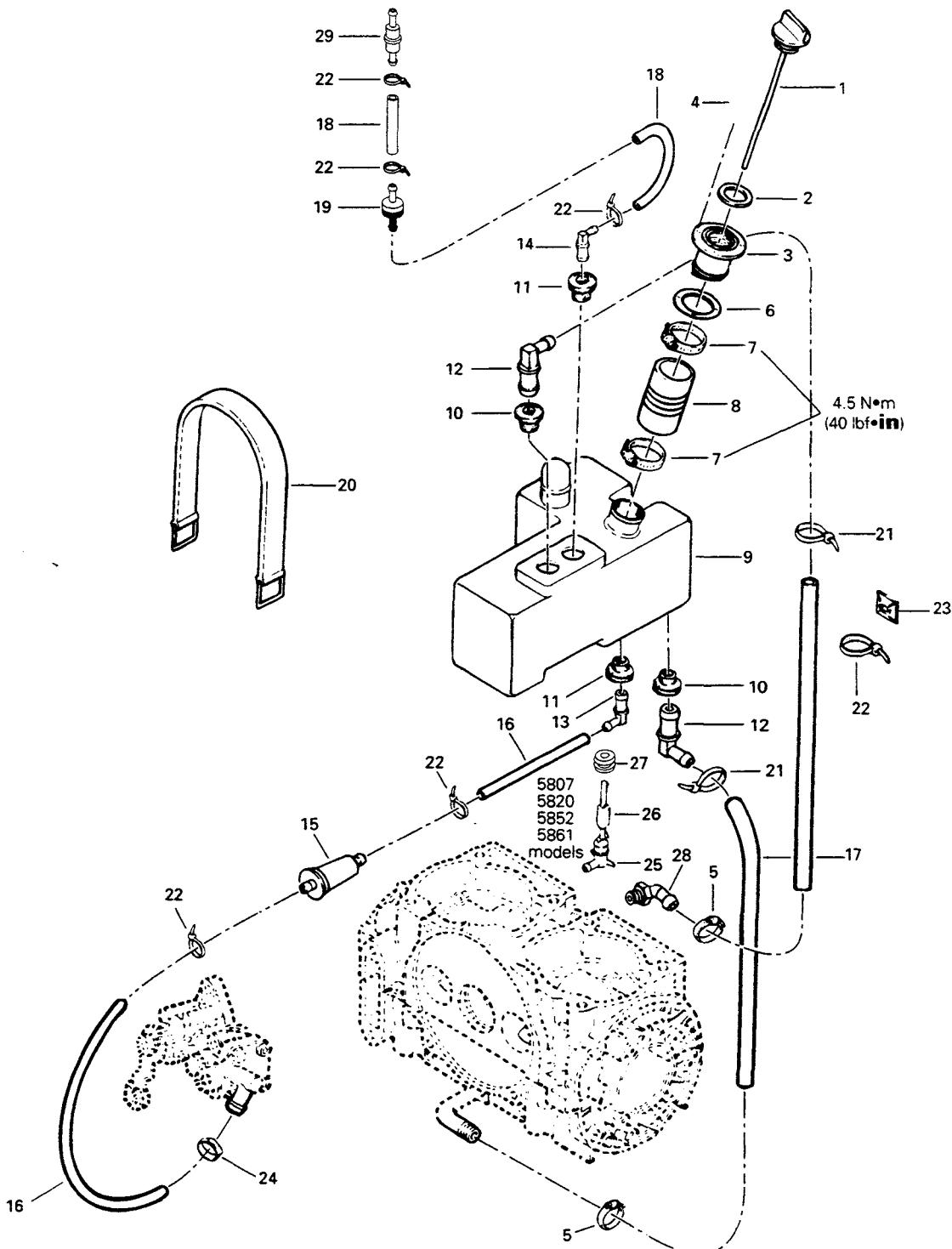
Sub-Section 06 (ROTARY VALVE AND RESERVOIR)

COMPONENTS

1. Ball bearing 6201	11. Oil seal
2. Circlip (2)	12. Rotary valve shaft
3. Spring seat	13. Snap ring
4. Spring	14. Rotary valve
5. Sprocket 14 teeth	15. O-ring
6. O-ring	16. Rotary valve cover
7. Distance sleeve 24.5 mm	17. Dowel pin
8. Snap ring	18. Lock washer 8 mm (4)
9. Shim	19. Hexagonal head screw M8 x 20 (4)
10. Ball bearing 6203	20. Rubber ring

Section 03 ENGINE
Sub-Section 06 (ROTARY VALVE AND RESERVOIR)

RESERVOIR



Section 03 ENGINE

Sub-Section 06 (ROTARY VALVE AND RESERVOIR)

COMPONENTS

1. Oil level indicator cap	16. Hose 8 mm
2. O-ring	17. Hose 12 mm
3. Adaptor	18. Hose 6 mm
4. Rivet (4)	19. One way check valve
5. Tridon clamp (2)	20. Strap
6. Gasket	21. Tie rap
7. Tridon clamp (2)	22. Tie rap
8. Hose	23. Tie-mount
9. Oil tank	24. Oetiker clamp
10. Grommet (2)	25. Oil level sensor (5807, 5820, 5852, 5861 models)
11. Grommet (2)	26. Float (5807, 5820, 5852, 5861 models)
12. 90° Elbow (2)	27. Grommet (5807, 5820, 5852, 5861 models)
13. 90° Elbow	28. Hose fitting
14. 90° Elbow	29. Water eliminator valve
15. Filter	

GENERAL

The following verification procedures such as clearance between rotary valve and rotary valve cover or crankshaft and rotary valve shaft gear backlash can be performed without removing engine from watercraft. Refer to INSPECTION further in this section.

However engine must be removed from watercraft to work on rotary valve shaft / components. Refer to REMOVAL AND INSTALLATION 03-02 for procedures.

Bottom end must be opened to remove rotary valve shaft.

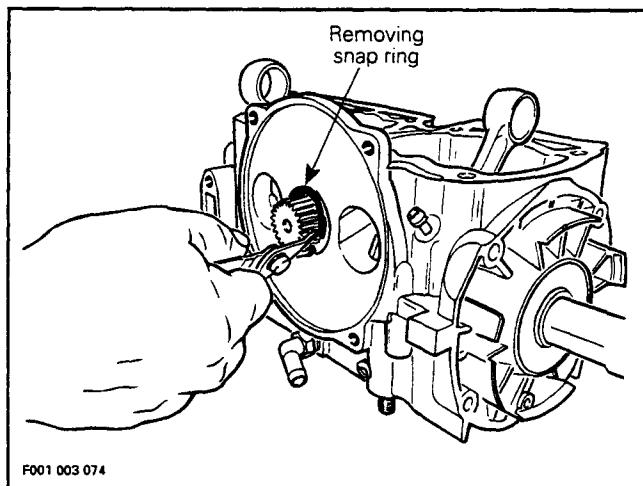
DISASSEMBLY

16,19, Rotary Valve Cover and Screw

Unscrew four retaining screws and withdraw rotary valve cover and valve.

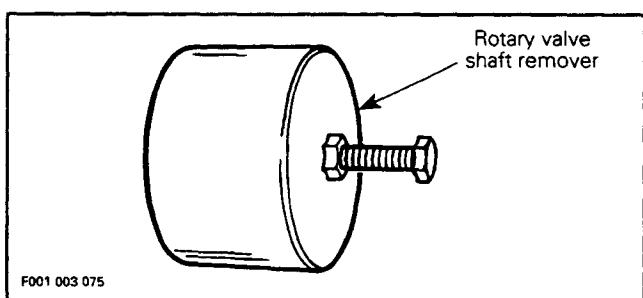
12,13, Rotary Valve Shaft and Snap Ring

To remove rotary valve shaft assembly from crankcase, first remove snap ring from crankcase.

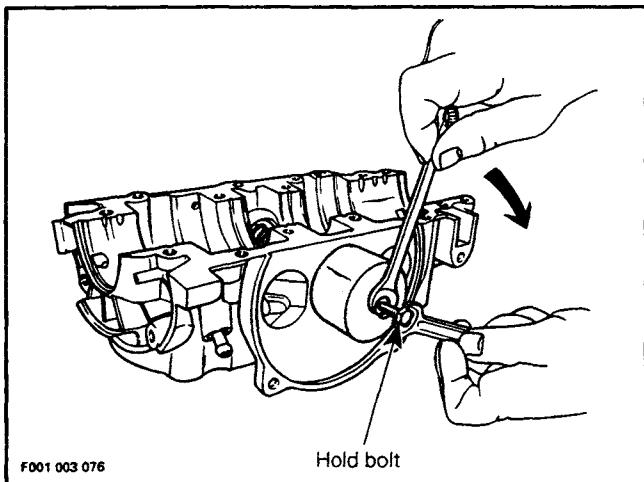


▼ CAUTION : Bottom end must be opened to remove rotary valve shaft.

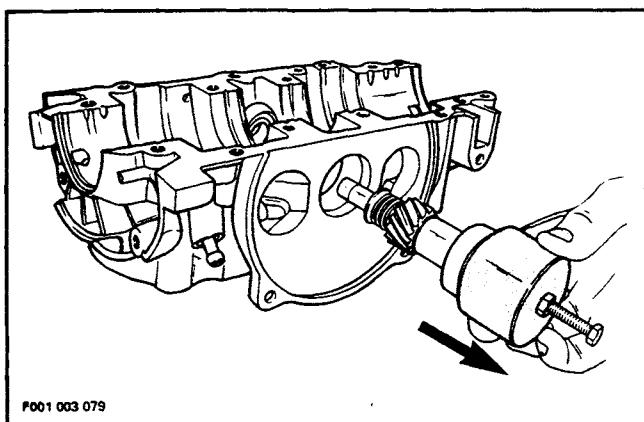
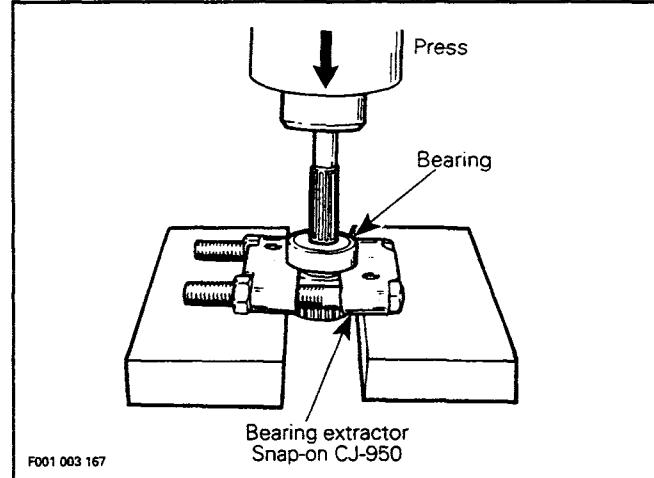
To remove rotary valve shaft, use a remover (P / N 290 876 487).



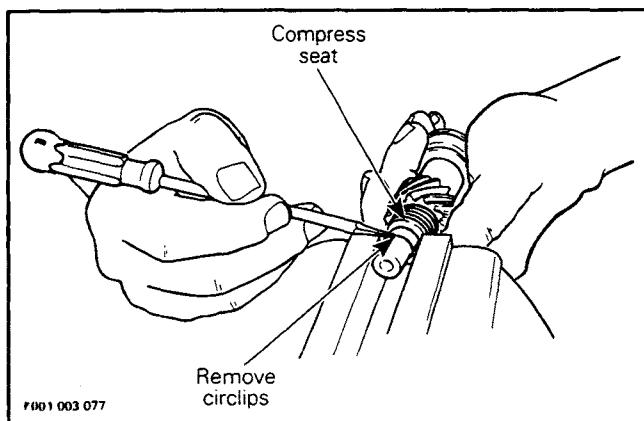
Place puller over rotary valve shaft end and screw on puller bolt into shaft. While retaining bolt with a wrench, turn puller nut CLOCKWISE until shaft comes out.

**8,10, Snap Ring and Bearing**

To remove bearing use a bearing extractor such as Snap-on # CJ-950 as illustrated. Slide off distance sleeve, remove snap ring and press shaft out.

**2,3, Circlip and Spring Seat**

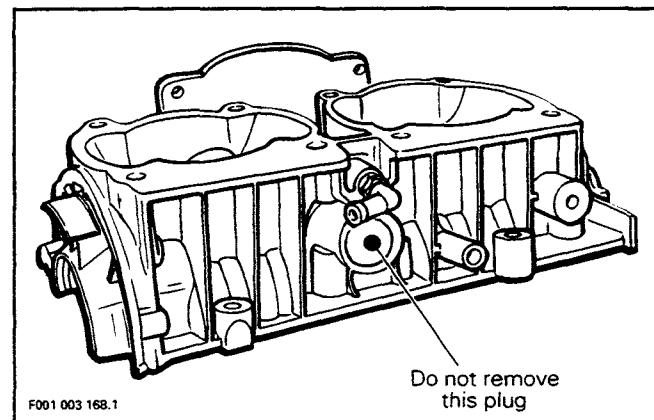
If it is necessary to disassemble components of rotary valve shaft assembly, use seat to compress spring and remove circlips.



▼ CAUTION : Ensure that rotary valve shaft is perfectly perpendicular with press tip or damage will occur.

1, Bearing

NOTE : Do not remove plug against bearing in upper crankcase half.

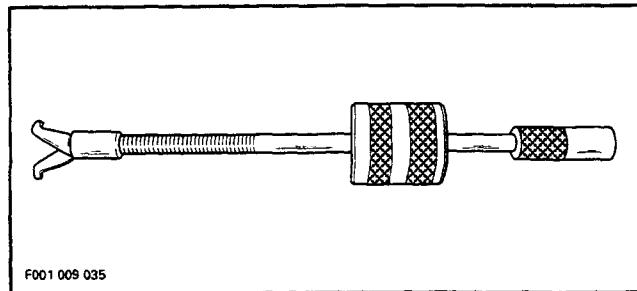


End bearing can be easily removed using the following suggested tool.

Section 03 ENGINE

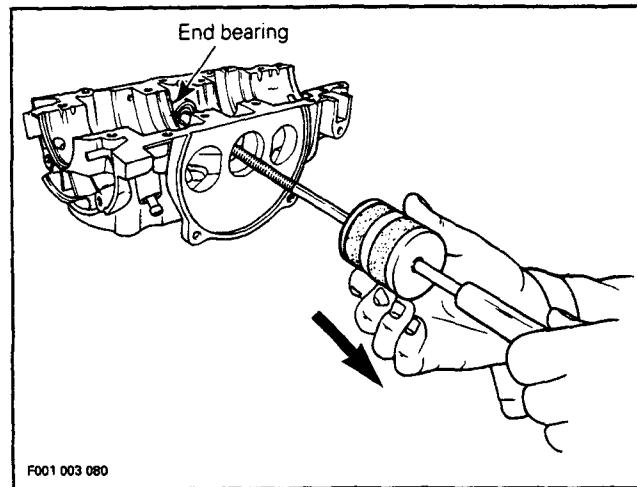
Sub-Section 06 (ROTARY VALVE AND RESERVOIR)

Snap-on hammer puller including : Handle CJ93-1
Hammer CJ125-6
Claws CJ93-4



Close puller claws so that they can be inserted in end bearing. Holding claws, turn puller shaft clockwise so that claws open and become firmly tight against bearing.

Slide puller sleeve outwards and tap puller end. Retighten claws as necessary to always maintain them tight against bearing. Continue this way until bearing completely comes out.



CLEANING

Discard all seals and O-rings.

Clean all metal components in a solvent.

Clean oil passages and make sure they are not clogged.

Clean rotary valve shaft and inside of distance sleeve.

INSPECTION

Inspect rotary valve cover for warpage. Small deformation can be corrected by surfacing with fine sand paper on a surface plate. Surface part against oiled sand paper.

Inspect bearings. Check for scoring, pitting, chipping or other evidence of wear. Make sure plastic cage (on bigger bearing) is not melted. Rotate them and make sure they turn smoothly.

Check for presence of brass filings in gear housing.

Visually check gear wear pattern. It should be even on tooth length all around. Otherwise it could indicate a bent shaft, check deflection. Replace gear if damaged.

The inspection of rotary valve system should include the following measurements.

MEASUREMENTS	TOLERANCES	
	NEW PARTS	WEAR LIMIT
Rotary Valve Cover and Valve Gap	N.A.	0.25 - 0.35 mm (.010 - .014 in)
Rotary Valve Shaft Deflection	N.A.	0.08 mm (.003 in)

NOTE : The following verifications can be performed with engine in watercraft without overhauling engine.

Rotary Valve and Rotary Valve Cover Clearance

There is a choice of two measuring methods.

One with a 45° feeler gauge, the other one with solder.

The clearance between the rotary valve and the rotary valve cover must be 0.30 ± 0.05 mm (0.012 ± 0.002 in).

NOTE : If the clearance is below 0.25 mm (0.010 in) this could create an overheating situation and if the clearance is over 0.35 mm (0.014 in) this could create a hard starting situation.

45° Feelor Gauge Method

Remove rotary valve cover and its O-ring.

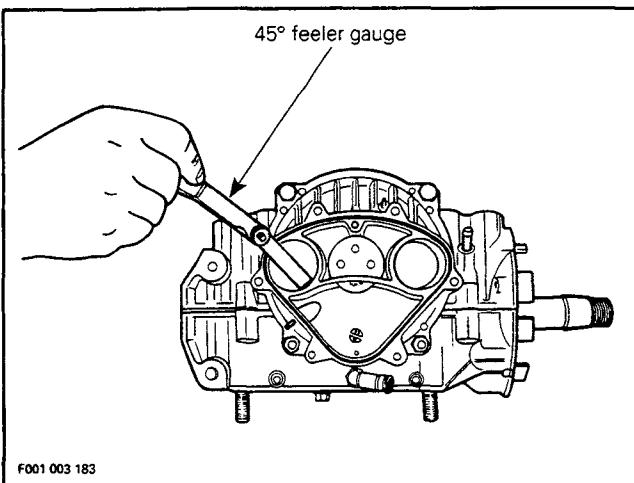
Reinstall cover in place WITHOUT its O-ring and torque screws to 20 N•m (15 lbf•ft).

Feeler gauge blade from 0.25 mm (.010 in) to 0.35 mm (.014 in) thickness should fit between rotary valve and cover.

Insert feeler gauge blade through cover inlet ports to verify clearance. At least verify clearance at two different places in each port.

Section 03 ENGINE

Sub-Section 06 (ROTARY VALVE AND RESERVOIR)



Solder Method

Remove rotary valve cover and its O-ring.

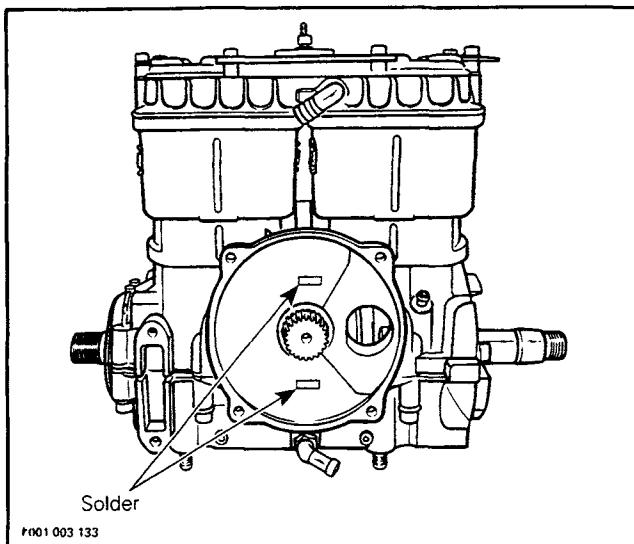
Use the following type of solder :

- rosin core
- diameter : 0.8 mm (0.032 in)
- electronic application (available at electronic stores)

Install two short pieces (13 mm (1/2 in) long) of solder directly on rotary valve, one above and one below rotary valve gear. Apply grease to hold solder in position.

Reinstall cover in place WITHOUT its O-ring and torque screws to 20 N·m (15 lbf·ft).

Remove cover then clean and measure compressed solder thickness, it must be within the specified tolerance 0.30 ± 0.05 mm ($0.012 \pm .002$ in).



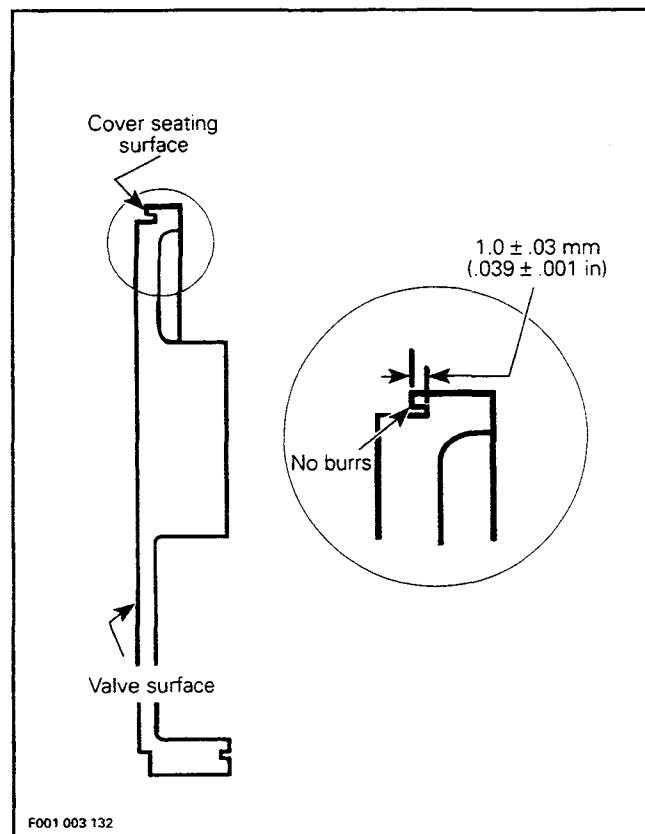
If rotary valve/rotary valve cover clearance is out of specification, machine rotary valve cover seating surface or replace the cover.

Machining Information

The amount of mm (in) over tolerance must be removed from the rotary valve cover seating surface.

Also cut the O-ring groove and equal amount to obtain $1.0 \pm .03$ mm ($.039 \pm .001$ in) between the bottom of the groove and the seating surface.

Remove burrs on the edges of the seating surface and O-ring groove.



Reverify the clearance.

At assembly the rotary valve timing must remain as per original setting.

Crankshaft and rotary valve shaft gear backlash

Remove PTO flywheel guard.

Remove spark plugs, rotary valve cover and valve.

Manually feel backlash at one position, then turn crankshaft about 1/8 turn and recheck. Continue this way to complete one revolution.

Section 03 ENGINE

Sub-Section 06 (ROTARY VALVE AND RESERVOIR)

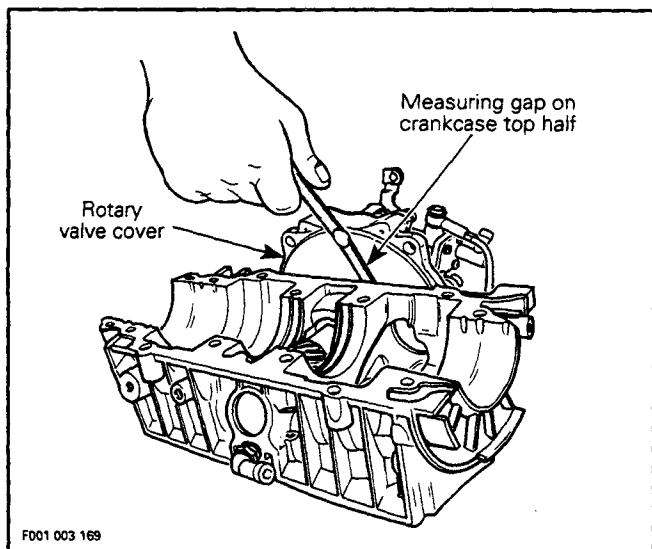
Backlash must be even at all positions. Otherwise overhaul engine to find which part is faulty (gear, rotary valve shaft or crankshaft with excessive deflection).

Rotary Valve Cover and Valve Gap

A gap must be maintained between rotary valve and crankcase.

To measure this gap, use a feeler gauge inserted between rotary valve and upper half crankcase with rotary valve cover in place WITHOUT its O-ring.

Check as much surface as possible. Follow the same procedure for lower half crankcase.

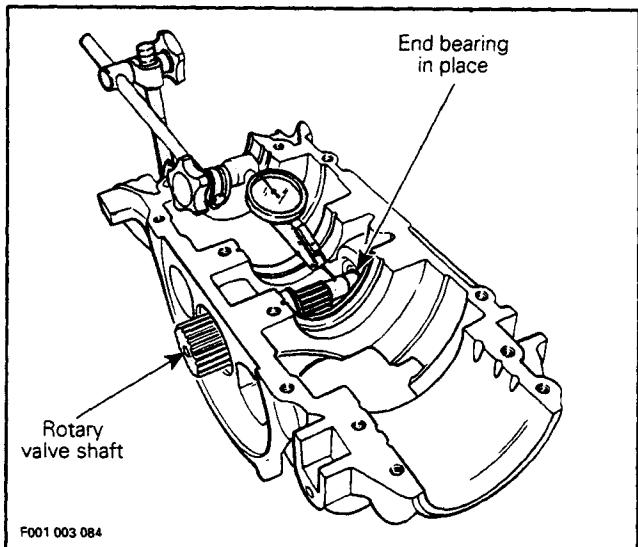


Rotary Valve Shaft Deflection

Deflection is measured with a dial gauge. Install rotary valve shaft in crankcase half, without its gear.

NOTE : End bearing must be in crankcase half.

Measure shaft deflection near gear mounting area.



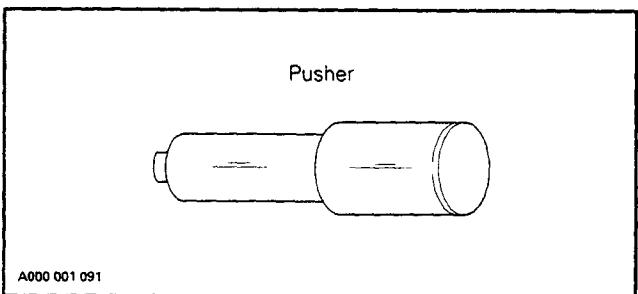
Deflection must not exceed specified value. Replace shaft as necessary.

ASSEMBLY

Assembly is essentially the reverse of disassembly procedures. However pay particular attention to the following.

1, Bearing

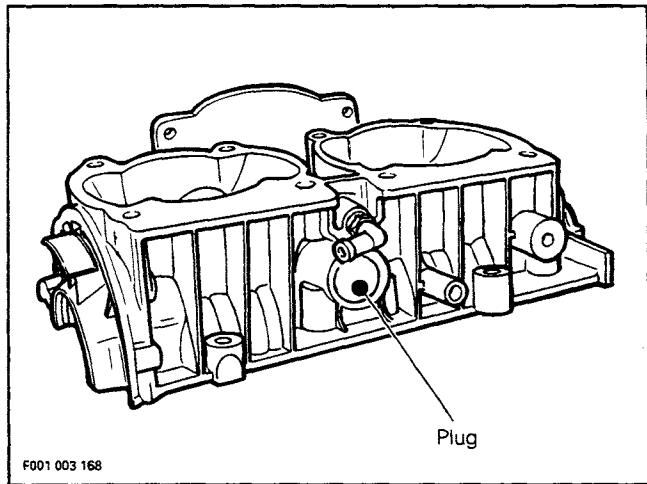
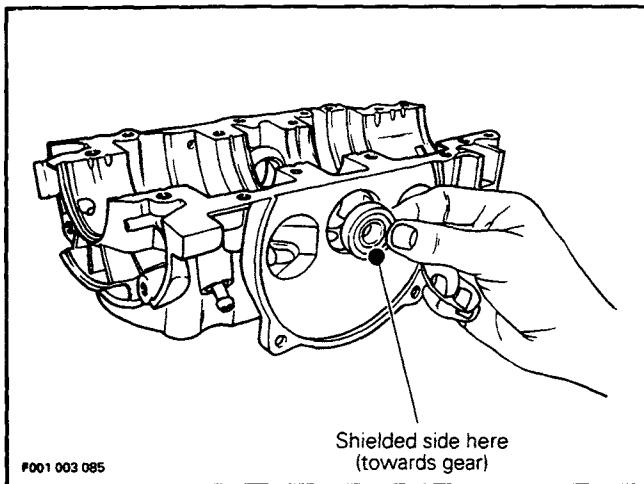
To install end bearing in crankcase, use a pusher (P/N 290 876 500).



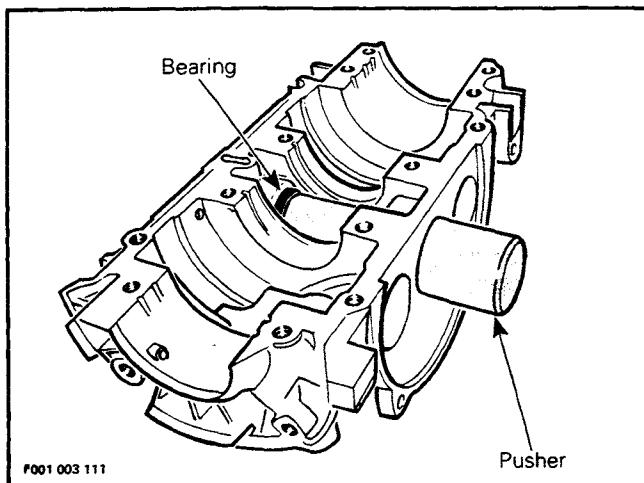
Position ball bearing shielded side towards rotary valve.

Section 03 ENGINE

Sub-Section 06 (ROTARY VALVE AND RESERVOIR)



Push bearing until it stops on its seat.



NOTE : Do not remove plug against bearing in crankcase half.

If plug has been removed, clean plug and crankcase hole with Loctite Safety Primer (P / N 293 800 019).

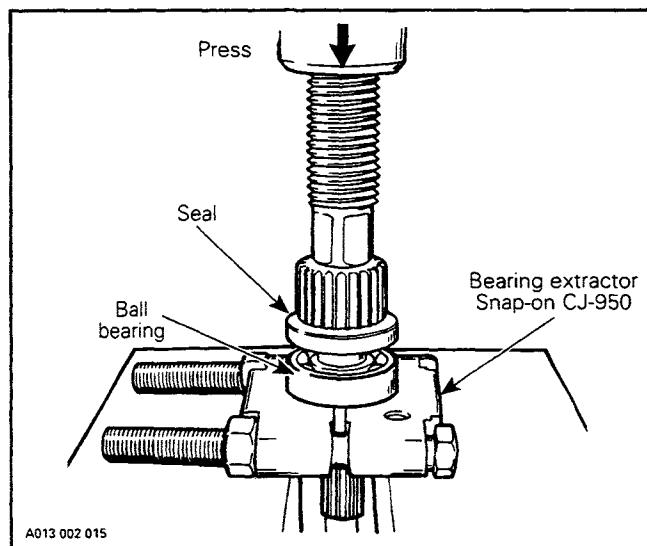
Apply Loctite Primer "T" and Loctite 648 (green) (P / N 290 899 788) inside crankcase hole, then press plug into crankcase.

11,12, Seal, Rotary Valve Shaft

Apply lithium grease on seal lips. Position seal with shielded portion against shaft splines.

8,10,12, Snap Ring, Bearing and Rotary Valve Shaft

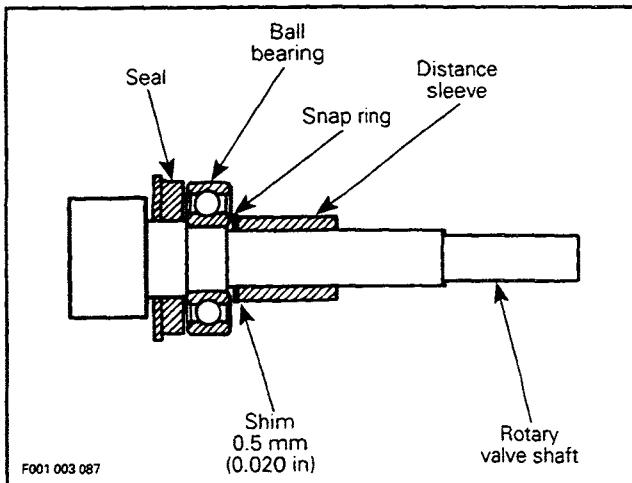
Install ball bearing as illustrated.



Section 03 ENGINE

Sub-Section 06 (ROTARY VALVE AND RESERVOIR)

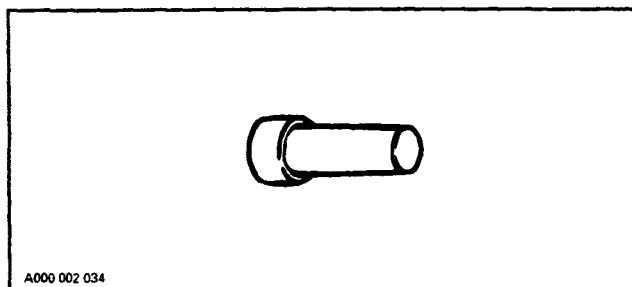
Install shim, snap ring and slide distance sleeve on shaft.



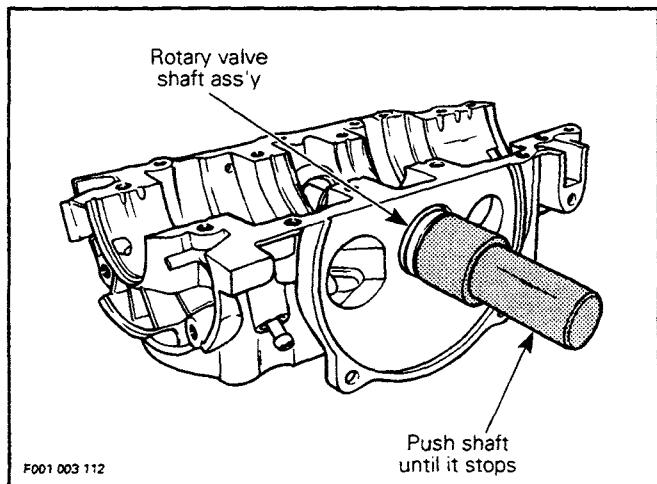
12,13, Rotary Valve Shaft Ass'y and Snap Ring

CAUTION : Crankcase halves must be separated and crankshaft must not be present to install rotary valve shaft ass'y in crankcase.

To install rotary valve shaft in crankcase, use a pusher (P / N 290 876 605).



Push shaft until its stops on bearing seat.



At snap ring installation, position it so that its sharp edge faces outwards.

ROTARY VALVE

The rotary valve controls the opening and closing of the inlet ports. Therefore its efficiency will depend on the precision of its installation.

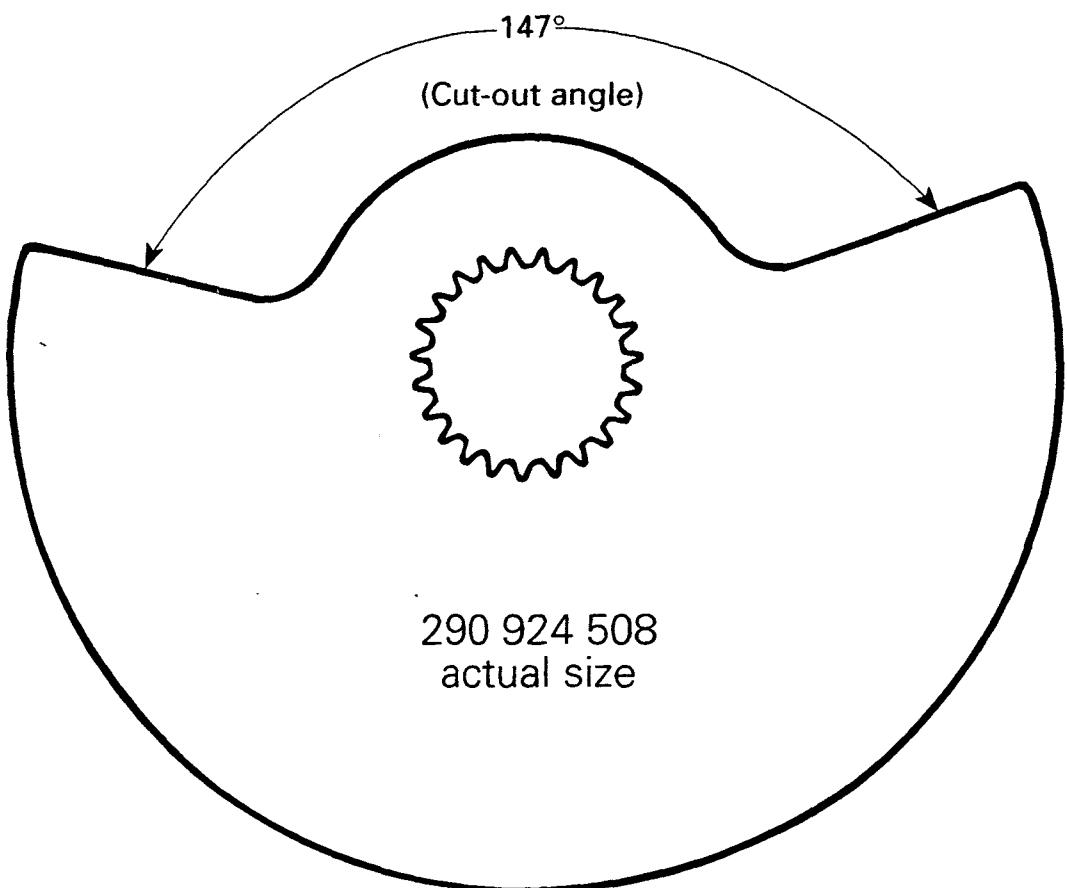
Identification of the rotary valve

Watercraft Model no.	Rotary Valve P / N	Valve Cut-out Angle
SP 5806		
SPX 5807		
SPI 5808		
GTS 5813		
EXPLORER 5820	290 924 508	147°
XP 5852		
GTX 5861		

There is no identification code on the valves. To find out the angle, place an angle finder on the valve and measure the valve cut-out angle or use the following template.

Section 03 ENGINE
Sub-Section 06 (ROTARY VALVE AND RESERVOIR)

Template



Section 03 ENGINE

Sub-Section 06 (ROTARY VALVE AND RESERVOIR)

Rotary Valve Cover and Valve Clearance

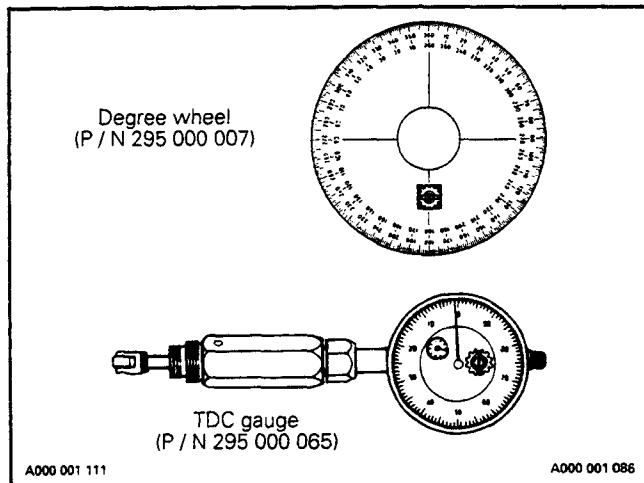
The clearance between rotary valve cover and valve must be 0.30 ± 0.05 mm (0.012 ± 0.002 in).

NOTE : If clearance is below 0.25 mm (0.010 in) it could create an overheating situation and if clearance is over 0.35 mm (0.014 in) it could create a hard starting situation.

Rotary Valve Timing

CAUTION : Never use the ridge molded in crankcase as a timing mark.

The following tools are required to measure rotary valve opening and closing angles in relation with MAG side piston.



Rotary valve must be set so that timing occurs as follows

WATERCRAFT MODEL NO.	TIMING	
	OPENING BTDC	CLOSING ATDC
SP 5806		
SPI 5808	$115^\circ + 5$	$80^\circ + 5$
GTS 5813	$- 5$	$- 5$
SPX 5807		
EXPLORER 5820		
XP 5852	$130^\circ + 5$	$65^\circ + 5$
GTX 5861	$- 5$	$- 5$

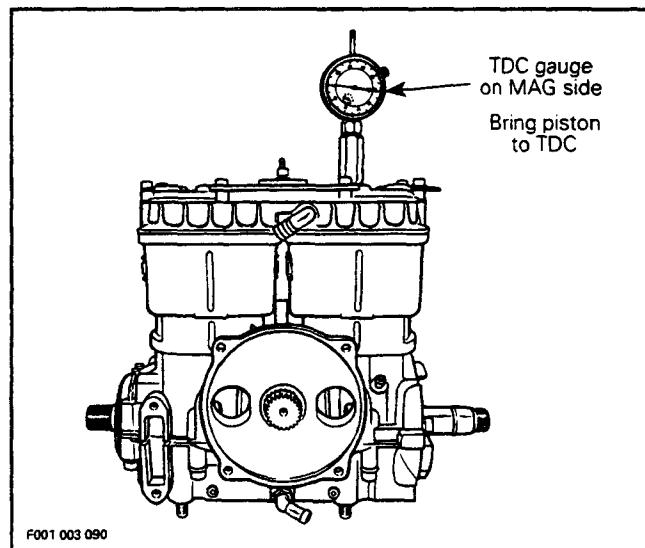
For the following instructions, let's use these specifications as example :

OPENING : 115° BTDC

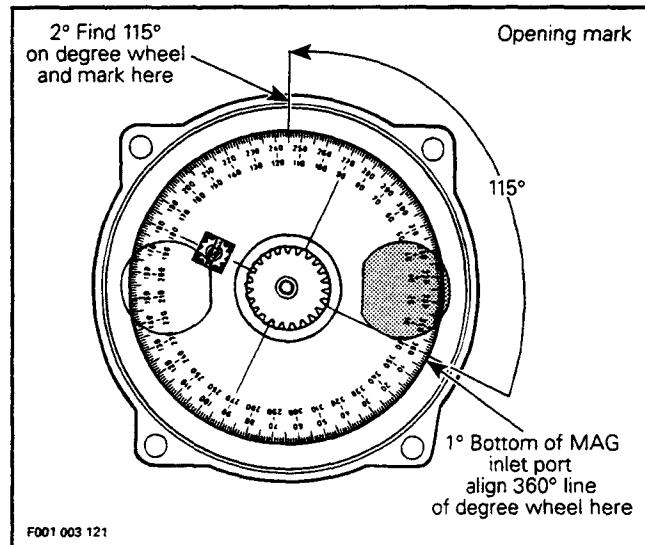
CLOSING : 80° ATDC

Proceed as follows :

- Turning crankshaft, bring MAG side piston to Top Dead Center using a TDC gauge.



- For opening mark, first align 360° line of degree wheel with BOTTOM of MAG side inlet port. Then, find 115° line on degree wheel and mark crankcase at this point.

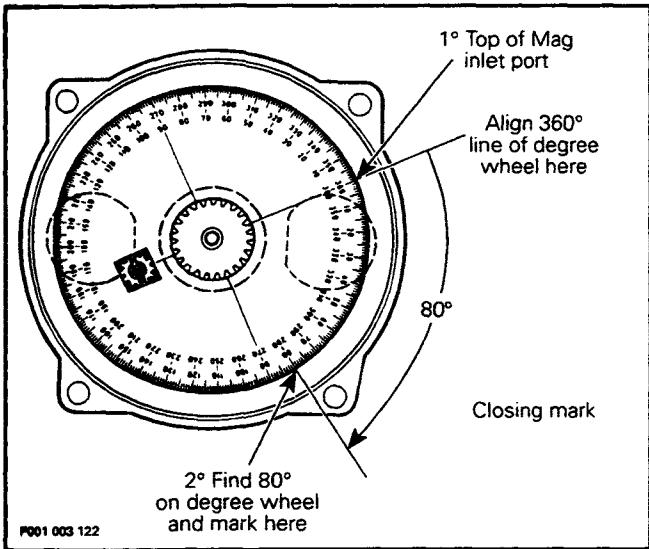


Section 03 ENGINE

Sub-Section 06 (ROTARY VALVE AND RESERVOIR)

NOTE : Do not rotate the crankshaft.

- For **closing** mark, first align 360° line of degree wheel with **TOP** of **MAG** side inlet port. Then, find 80° line on degree wheel and mark crankcase at this point.



— Remove degree wheel.

- Position rotary valve on shaft splines to have edges as close as possible to these marks with the MAG piston at TDC.

NOTE : Rotary valve is asymmetrical. Therefore, try flipping it over then reinstall on splines to obtain best installation position.

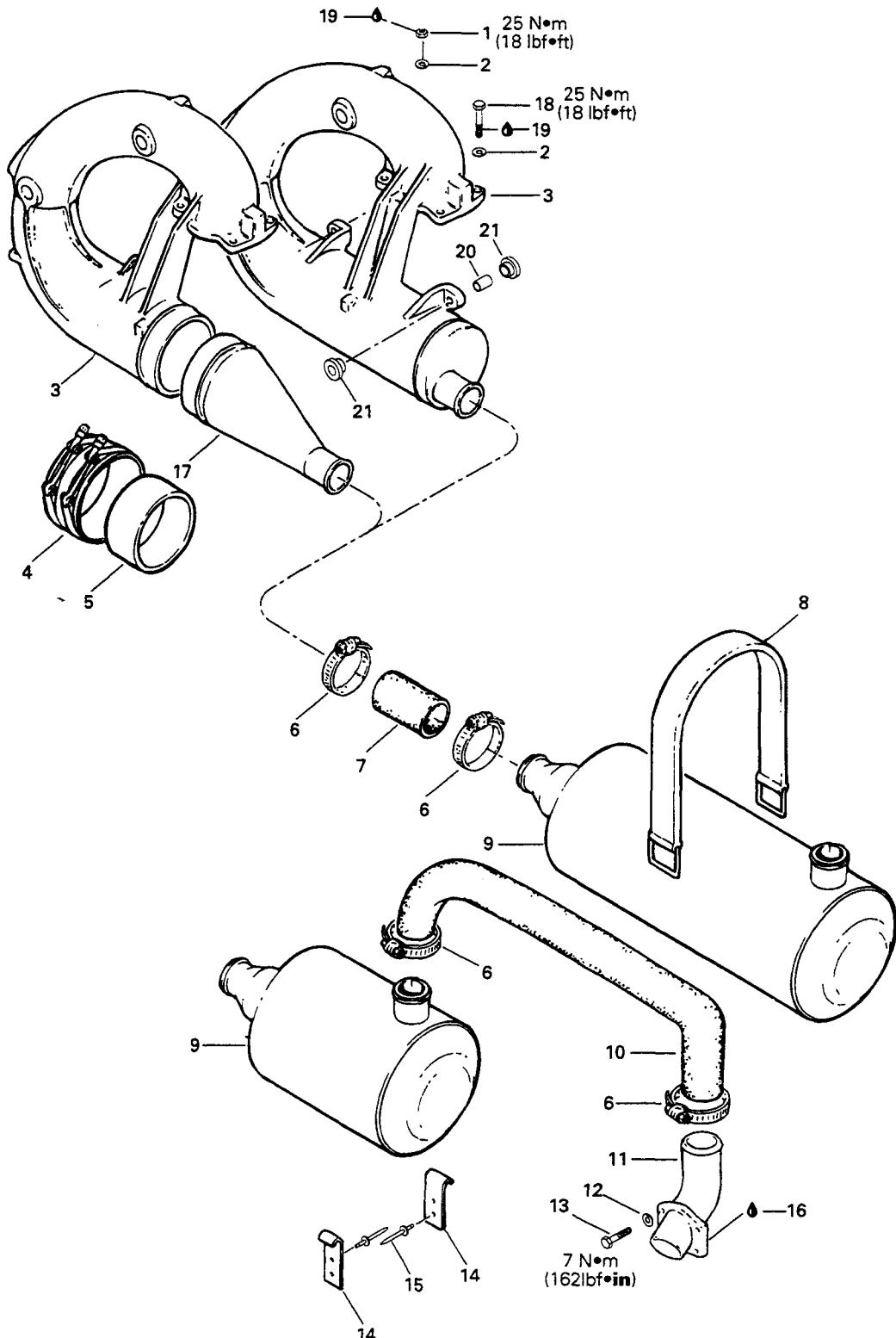
Apply SEA-DOO injection oil on rotary valve before reassembling rotary valve cover.

- Remove TDC gauge.

16,19, Rotary Valve Cover and Screw

Install O-ring and cover then torque screws to 20 N·m (15 lbf·ft) in a criss-cross sequence.

EXHAUST SYSTEM



Section 03 ENGINE

Sub-Section 07 (EXHAUST SYSTEM)

COMPONENTS

- 1. Hexagonal nut M8 (1)
- 2. Lock washer M8 (4)
- 3. Tuned pipe
- 4. Exhaust clamp
- 5. Rubber collar
- 6. Tridon clamp (4)
- 7. Exhaust hose
- 8. Muffler strap
- 9. Muffler
- 10. Formed hose
- 11. Exhaust outlet
- 12. Flat washer 6 mm (4)
- 13. Allen screw M6 x 20 (4)
- 14. Strap clip (2)
- 15. Rivet 3/16 (4)
- 16. Locite 598 "Ultra Black"
- 17. Exhaust cone
- 18. Hexagonal screw M8 x 30 (3)
- 19. Loctite 242
- 20. Sleeve (2)
- 21. Rubber bushing (4)

TUNED PIPE REPAIR

This procedure is given to repair tuned pipe cracks using T.I.G. welding process.

Procedure

- Sand the cracked area to obtain bare metal.
- Perform a 1.50 mm (1/16 in) depth chamfer over crack.
- Use pure argon gas with 5.55 mm (3/32 in) tungsten electrode (puretung "green", zirtung "brown") and AC current.

— Use aluminum welding rod 5.55 mm (3/32 in) (# 4043), to fill crack.

— Sand welding slightly to remove material surplus.

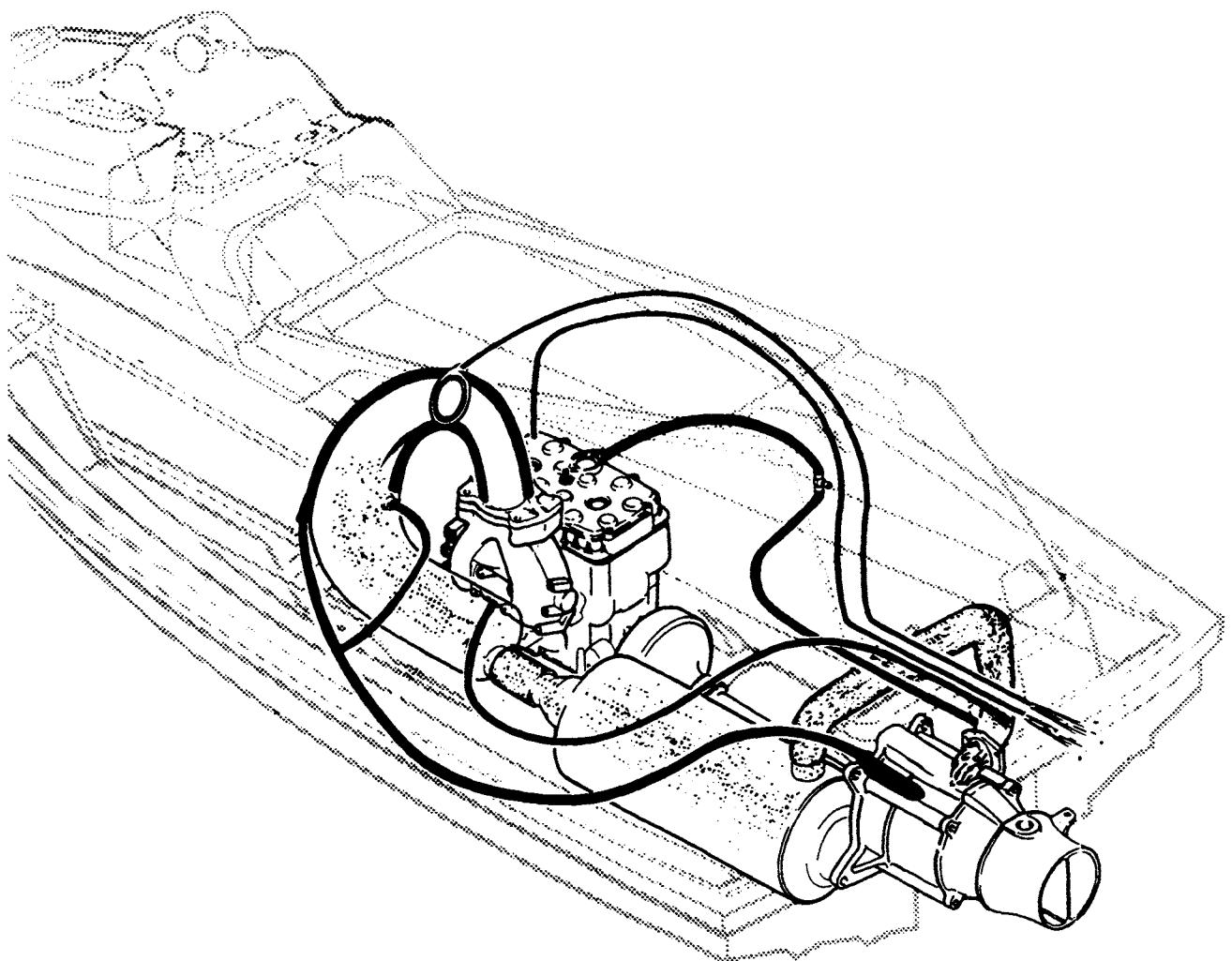
Test :

— Use compressed air at 124 kPa (18 PSI) to pressurize tuned pipe.

 **NOTE :** Prior to verify leaks plug all holes and pressurize tuned pipe while immersing it in water.

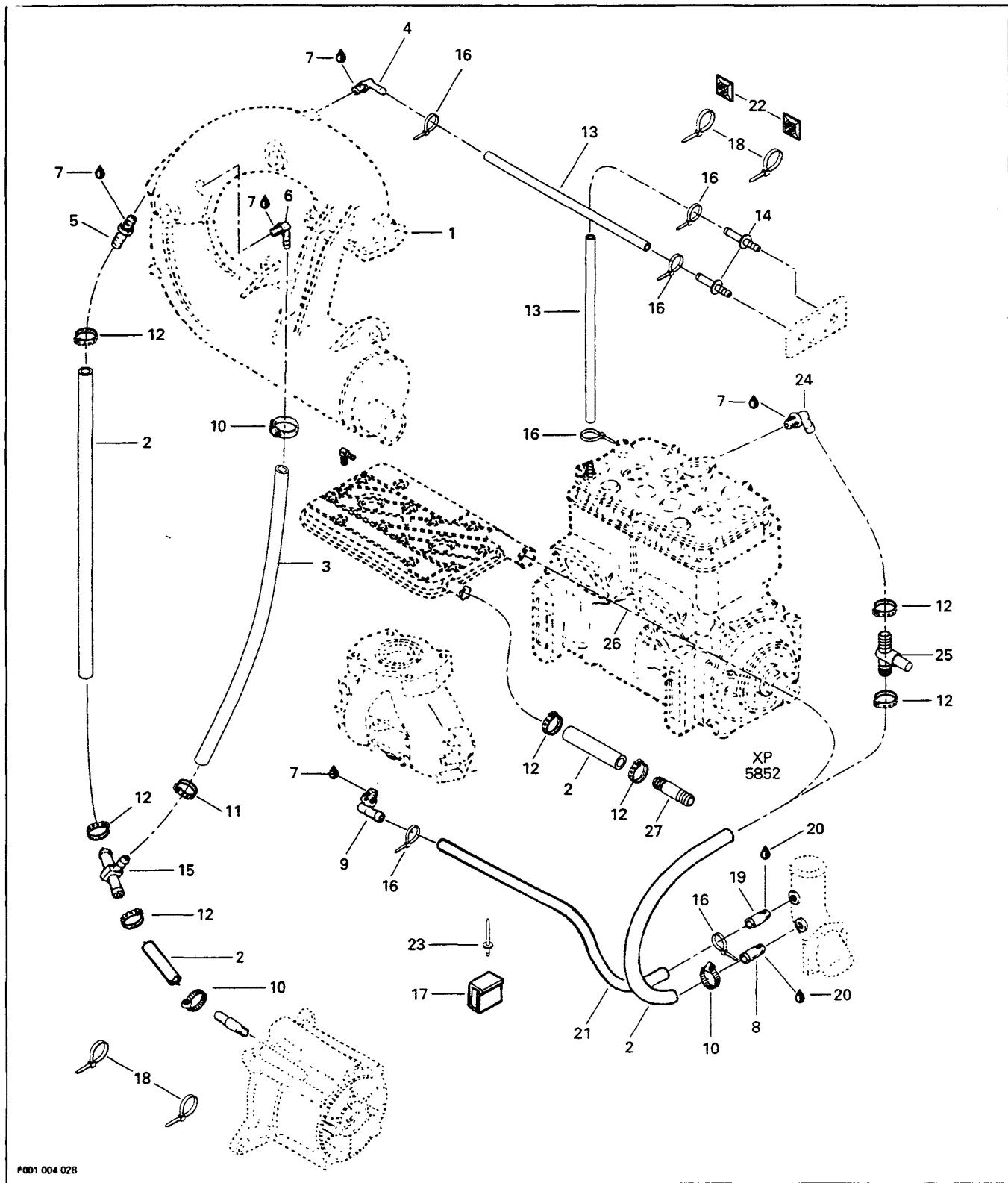
 **CAUTION :** Always ensure water passages are not blocked partially or completely while welding tuned pipe.

COOLING SYSTEM



Section 04 COOLING SYSTEM
Sub-Section 01 (COMPONENTS)

COMPONENTS



Section 04 COOLING SYSTEM

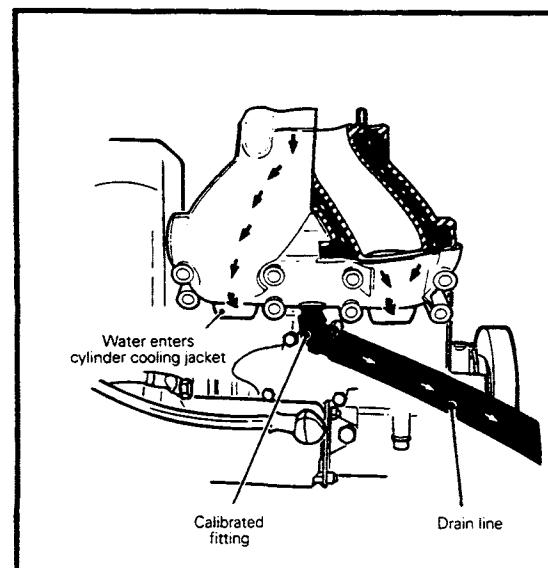
Sub-Section 01 (COMPONENTS)

COMPONENTS

1. Tuned pipe	15. Tee fitting
2. Hose 12.5 mm	16. Tie rap
3. Hose 8 mm	17. Tie rap mount
4. Elbow fitting 90°	18. Tie rap
5. Male connector	19. Male connector
6. Elbow fitting 90°	20. Loctite 592
7. Loctite *PST 567	21. Hose 8 mm
8. Male connector	22. Tie rap mount (2)
9. Elbow fitting 90°	23. Rivet
10. Tridon clamp (5)	24. Elbow fitting 90°
11. Oetiker clamp	25. Tee fitting (flushing)
12. Oetiker clamp (4)	26. Hose 20 mm (5852 model)
13. Hose 6 mm	27. Fitting (flushing) (5852 model)
14. Bleed fitting (2)	

SEA-DOO® WATERCRAFT COOLING SYSTEM

TECHNICAL DATA	
Type :	TLCS (Total Loss Cooling System)
Coolant pressure:	Pressure build-up at impeller housing (no water pump)
Flow control :	Calibrated outlet fitting at exhaust outlet and drain line (no thermostat)
System bleeding :	Self-bleed type (hose at uppermost point of circuit and at cylinder head cover)
System draining :	Self-drain type hose at lowest point of circuit
System flushing :	A coupler hose is available
Overheat beeper :	TURNS ON AT 96-99°C (205-210°F)



For XP model only (5852 model)

Uppermost point of circuit allows trapped air to escape

Fresh water flows through tuned pipe water jackets and manifold

Uppermost point of engine allows trapped air to escape

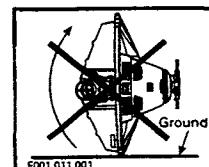
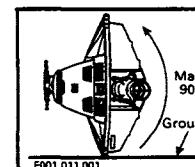
Temperature sensor monitors engine temperature and turn on an overheating beeper when temperature is over 96-99°C (205-210°F)

All models except XP

XP 5852 model

POINTS TO REMEMBER

1 When servicing hull / jet pump, always rotate watercraft counter-clockwise (seen from the rear). Rotating watercraft clockwise could allow residual water in tuned pipe to enter the engine and cause engine damage.



2 Check joints for leaks to avoid water accumulation in the bilge.

3 Flush cooling system after each operation in salt water or unclean water.

4 Do not modify hose or socket size as coolant flow could be altered

5 A small stream of water must flow from the rear bleed outlet(s). This indicates that coolant is circulating.

Options coupler hose to be used with a garden hose to flush the whole system by backwash or to allow the vehicle to run briefly out of the water

Small stream of water from bleed outlet(s). (CSI Cooling System Indicator)

Calibrated outlet sockets limits water flow

Lowest point of circuit allows draining whenever engine is stopped (calibrated outlet to minimize loss of cooling water)



▼ **CAUTION :** All hoses and fittings of the cooling system have calibrated inside diameters to assure proper cooling of the engine. Always replace using appropriate Bombardier part number.

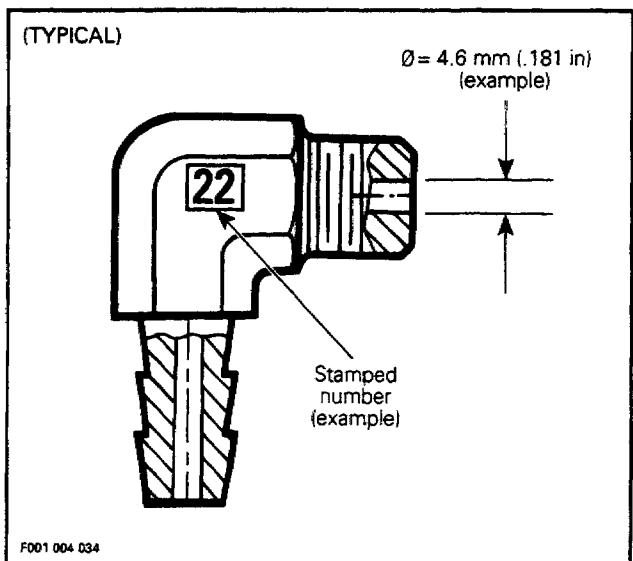
6, Elbow Fitting

Water injection used on exhaust system cools the exhaust gases to obtain maximum performance from the tuned pipe. The water intake elbow fitting has a calibrated inside diameter to optimize water flow in each model.

The water injection also helps in reducing noise level and cools components of the exhaust system.

▼ **CAUTION :** The water intake elbow fittings are calibrated for each model and can not be interchanged with one of a different size as severe engine damage could result.

The elbow fitting can be identified by using the two digits number stamped onto the fitting or by measuring its inside diameter. Refer to the following illustration and chart.



Watercraft model	Stamped number on fitting	Fitting P / N	Fitting inside diameter	Fitting location
All models except XP (5852)	22	293 700 022	4.6 mm (.181 in)	On tuned pipe
XP (5852)	37	293 710 037	3.5 mm (.139 in)	On tuned pipe
XP (5852)	37	293 710 037	3.5 mm (.139 in)	On exhaust cone

FLUSHING

When the watercraft is operated in unclean water and / or particularly in salt water, flushing of cooling system is necessary.

▼ **CAUTION :** Failure to perform cooling system flushing, when watercraft is used in salt water, will result in damage to watercraft components.

Since the watercraft uses the same water where it sails, for propulsion and cooling systems, this water flows everywhere in water jackets. If the watercraft is being used in salt water and cooling system is not regularly flushed, salt will corrode components.

Infiltration in cooling system of any particle present in the water is unavoidable. Deposit accumulation can clog cooling system and lead to severe engine damage.

Flushing is necessary when the watercraft is operated in :

- salt water
- debris filled water
- shallow water where the bottom is sandy and / or shell covered.

Flushing the cooling system with **fresh water** is essential to neutralize corroding effects of salt or other chemical products present in water. It will help to clear sand, salt, shells or other particles in water jackets (engine, exhaust manifold, tuned pipe) and / or hoses.

Flushing should be performed when the watercraft is not expected to be used further the same day or when the watercraft is stored for any extended time.

▼ **CAUTION :** Failure to flush cooling system, when necessary, will severely damage engine and / or exhaust system. Never flush a hot engine. Make sure engine operates during entire procedure.

◆ **WARNING :** Do not touch any electrical parts or jet pump area when engine is running.

Clean jet pump by spraying water in its inlet and outlet.

◆ **WARNING :** Always remove tether cord cap from switch to prevent accidental engine starting before cleaning the jet pump area. Engine must not be running for this operation.

A convenient coupler hose (P / N 295 500 099) can be installed on the watercraft for flushing.

Proceed as follows :

1. Remove seat to allow access to cooling system.
2. Remove dust cap from tee fitting spigot and attach coupler hose. Make sure coupler hose is properly locked to tee fitting spigot.

Attach other end of coupler hose to a garden hose. Do not open water tap yet.

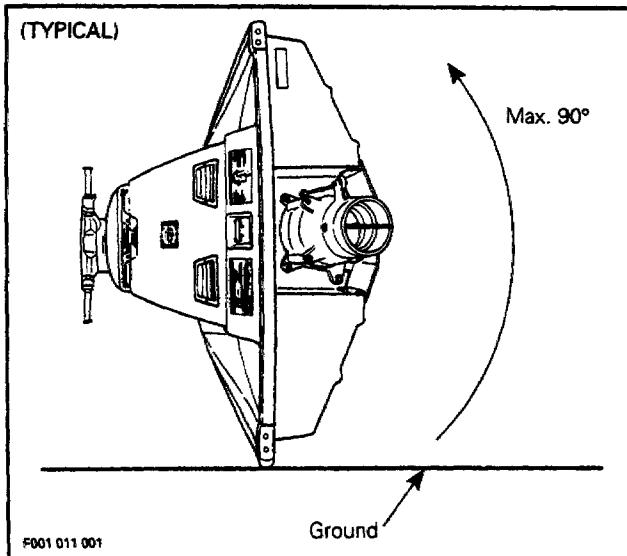
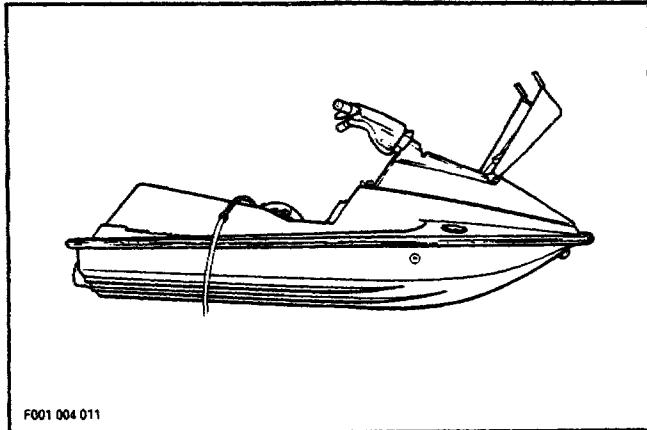
Section 04 COOLING SYSTEM

Sub-Section 03 (FLUSHING AND CARE)

NOTE : To allow a more efficient flushing on watercraft, install a hose pincher (P / N 295 000 076) between tee fitting and exhaust socket. This prevents water from exiting through exhaust socket.

NOTE : For XP model 5852 install the hose pincher on outlet hose.

Remove hose pincher after flushing operation.



3. Start the engine then immediately open the water tap.

CAUTION : Always start the engine before opening the water tap. Otherwise, water will back flow through the tuned pipe into the engine and may cause damage to internal parts. Open water tap immediately after engine is started to prevent overheating. Follow this procedure exactly.

4. Run the engine about five minutes at a fast idle around 3500 RPM.

CAUTION : Never run engine longer than five minutes. Drive line seal has no cooling when watercraft is out of water.

5. Close the water tap then stop the engine.

CAUTION : Always close the water tap before stopping the engine. Follow this procedure exactly otherwise severe engine damage could occur.

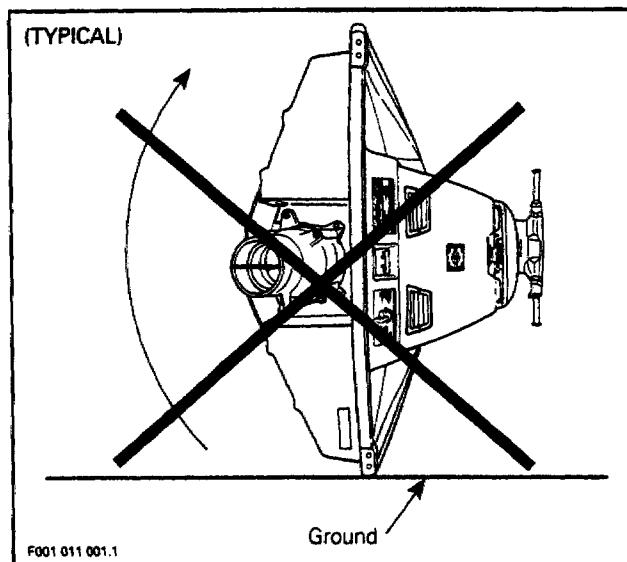
6. Press unlocking button to remove coupler hose. Reinstall dust cap over tee fitting.

7. Wipe off any residual water on the engine.

8. Reinstall seat and properly latch.

CARE

1. When servicing hull / jet pump, always rotate watercraft counterclockwise (seen from the rear). Rotating watercraft clockwise could allow residual water in tuned pipe to enter the engine and cause damage.



2. Check joints for leaks to avoid water accumulation in the bilge.

3. Do not modify hose or socket size as coolant flow could be altered.

4. When engine is running, water must flow from bleed outlet(s) indicating that water circulates.

5. For hose clamp installation, use special pliers (P / N 295 000 070).

6. When installing hoses onto fittings or when troubleshooting for water intake in the bilge area, confirm that all hoses are properly / tightly secured to the fittings.

7. Check overheating beeper operation by jumping terminal of thermosensor wire to ground. Beeper must operate.

Section 04 COOLING SYSTEM

Sub-Section 03 (FLUSHING AND CARE)

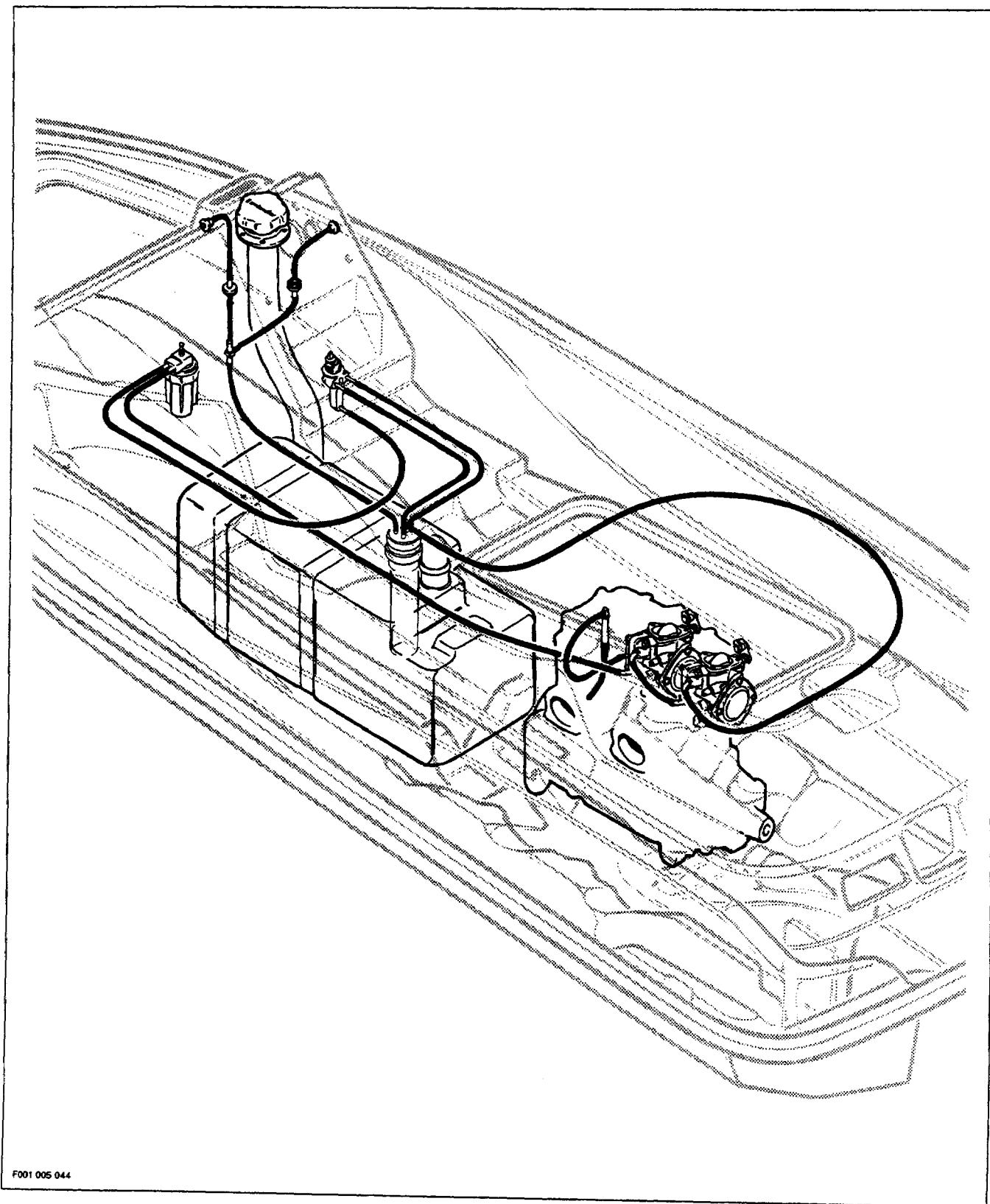
 **NOTE :** Engine has to be started to test beeper operation.

At every verification of overheating beeper always apply dielectric grease (P / N 293 550 004) on thermosensor connector.

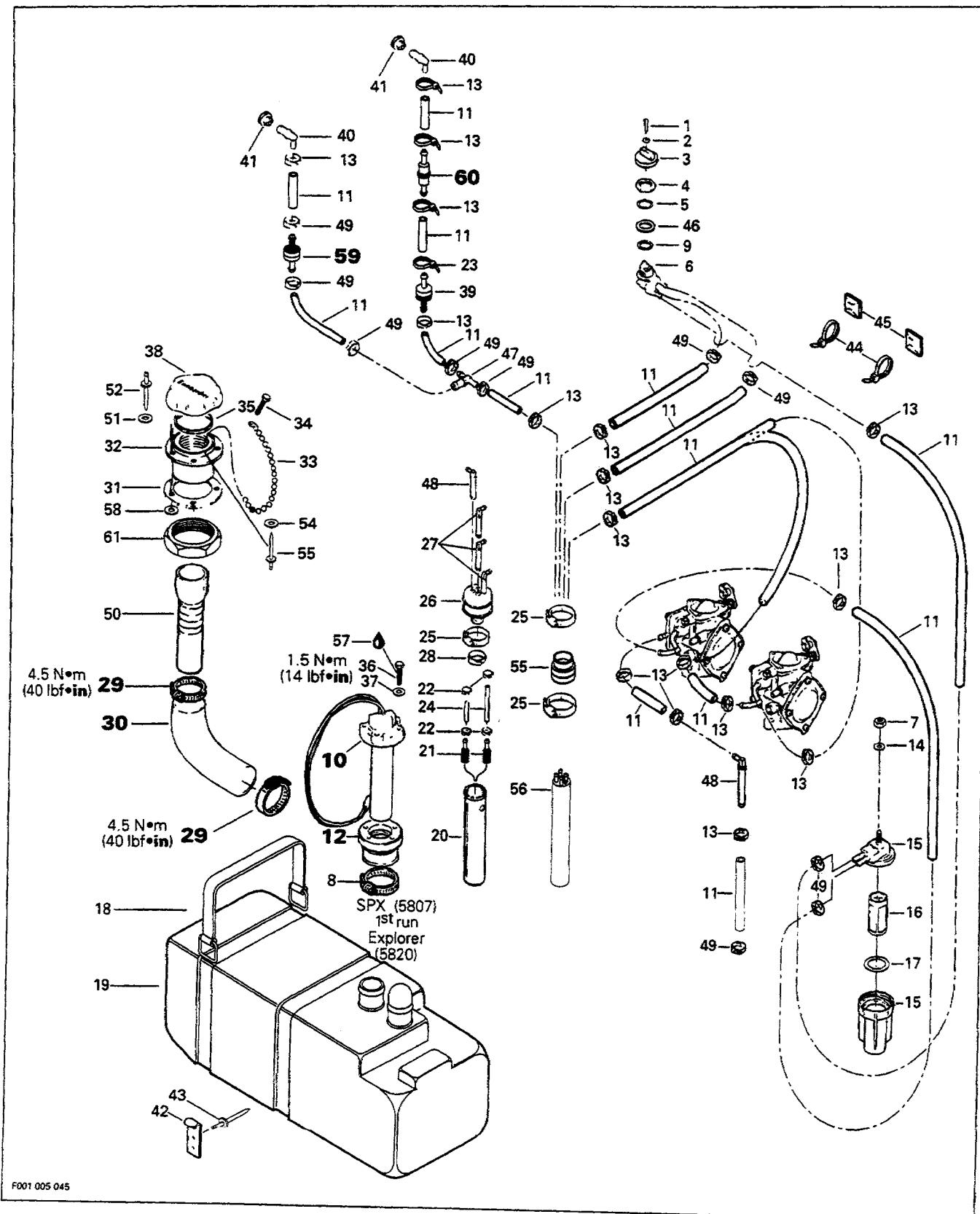
Verify wire terminal on connector for tightness. If too loose, squeeze terminal slightly at installation.

 **CAUTION :** When investigating for no water flow in the cooling system, check all elbows and straight fittings as well as all hoses for blockage.

FUEL SYSTEM



FUEL CIRCUIT



Section 05 FUEL SYSTEM

Sub-Section 01 (FUEL CIRCUIT)

1. Countersunk Phillips screw M4 x 8
2. Flat washer M4
3. Fuel valve knob
4. Nut M22
5. Gasket
6. Fuel valve
7. Elastic stop nut M6
8. Clamp, Explorer (5820), SPX (5807) 1st Run
9. Valve gasket
10. Fuel sensor, Explorer (5820), SPX (5807) 1st Run
11. Hose 6 mm
12. Fuel sensor adaptor, Explorer (5820), SPX (5807) 1st Run
13. Oetiker clamp
14. Flat washer M6
15. Fuel filter housing
16. Fuel filter
17. O-ring
18. Fuel tank strap (2)
19. Fuel tank
20. Baffle
21. Fuel filter screen (2)
22. Oetiker clamp (4)
23. Tie rap
24. Hose 6 mm
25. Tridon clamp
26. Tube adapter
27. Pick up tube (3)
28. Tridon clamp
29. Tridon clamp (2)
30. Filler neck hose
31. Gasket
32. Filler neck
33. Chain
34. Cylindrical Phillips screw M3.9 x 9.5
35. Gasket
36. Hexagonal screw M5 x 25, Explorer (5820), SPX (5807) 1st Run
37. Flat washer M5, Explorer (5820), SPX (5807) 1st Run
38. Fuel tank cap
39. Check valve
40. Elbow fitting 90° (2)
41. Grommet (2)
42. Strap clip (6)
43. Rivet 3/16 x .565 (12)
44. Tie rap
45. Tie mount (6)
46. Washer
47. «Tee» fitting
48. Pick up tube (2)
49. Oetiker clamp
50. Inner filler neck hose
51. O-ring (8)
52. Rivet 1/8 x .690 (8)
53. Flat washer M3 (2)
54. Rivet 1/8 x .502 (2)
55. Adapter
56. Baffle pick up
57. Loctite 242
58. Washer (8)
59. Pressure relief valve
60. Water eliminator valve
61. Nut XP (5852)

GENERAL

Whenever repairing the fuel system, always verify for water infiltration in reservoir.

29, 30, Clamp and Filler Hose

Verify fuel filler neck hose for damage. Always ensure that clamps are well positioned and tightened. Torque clamps to 4.5 N·m (40 lbf·in).

59, Pressure Relief Valve

This valve will eliminate fuel spillage when the watercraft is upside down. If pressure is built up in fuel system the valve should open at 10 kPa (1.5 PSI) to release the pressure.

 **WARNING :** If pressure relief valve is stuck, the pressure in fuel system will build up and it may cause fuel leakage in engine compartment.

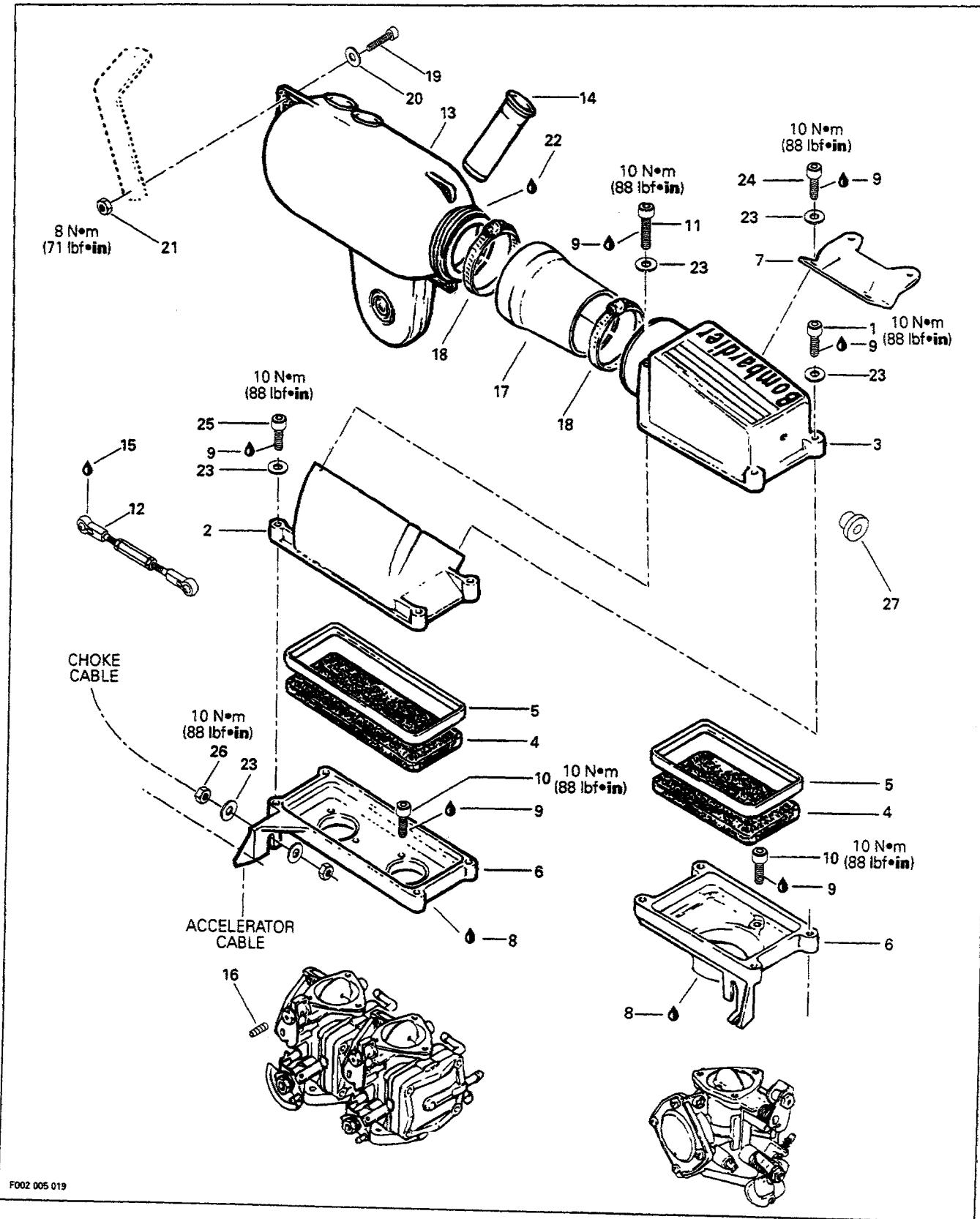
 **NOTE :** It is a one way valve with an arrow to indicate the air flow.

60, Water Eliminator Valve

This valve will reduce water intrusion in fuel system. It is a one way valve with an arrow to indicate the air flow.

Section 05 FUEL SYSTEM
Sub-Section 02 (AIR INTAKE)

AIR INTAKE



Section 05 FUEL SYSTEM

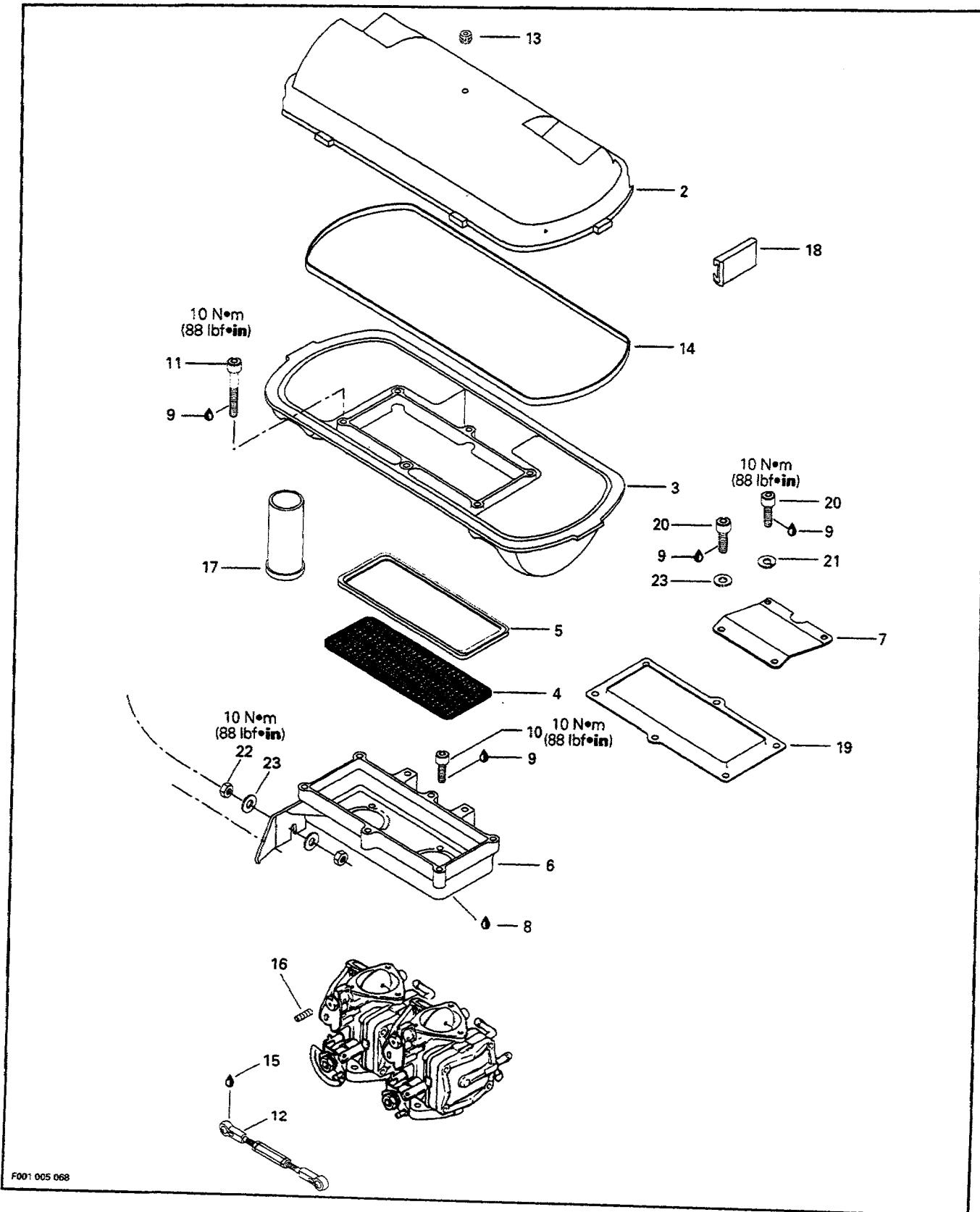
Sub-Section 02 (AIR INTAKE)

AIR INTAKE

1. Allen screw M6 x 25 (2)
2. Cover adaptor except SP (5806), SPI (5808), GTS (5813)
3. Flame arrester cover
4. Flame arrester foam
5. Isolator
6. Base
7. Support
8. Loctite 515
9. Loctite 242
10. Allen screw M6 x 16 (6)
Allen screw M6 x 30 (3)
11. Allen screw M6 x 80 (2)
12. Carburetor linkage
13. Air intake silencer
14. Inlet tube (2)
15. Synthetic grease
16. Screw M4 x 6 (2)
17. Performed hose
18. Clamp (2)
19. Hexagonal Screw M6 x 20
20. Flat washer M6
21. Hexagonal nut M6
22. Silicone 732 RTV
23. Flat washer M6 (10)
24. Allen screw M6 x 12 (2)
25. Allen screw M6 x 30 (4) except SP (5806), SPI (5808),
GTS (5813)
26. Nut M6 (2)
27. Rubber plug

Section 05 FUEL SYSTEM
Sub-Section 02 (AIR INTAKE)

AIR INTAKE XP MODEL (5852)



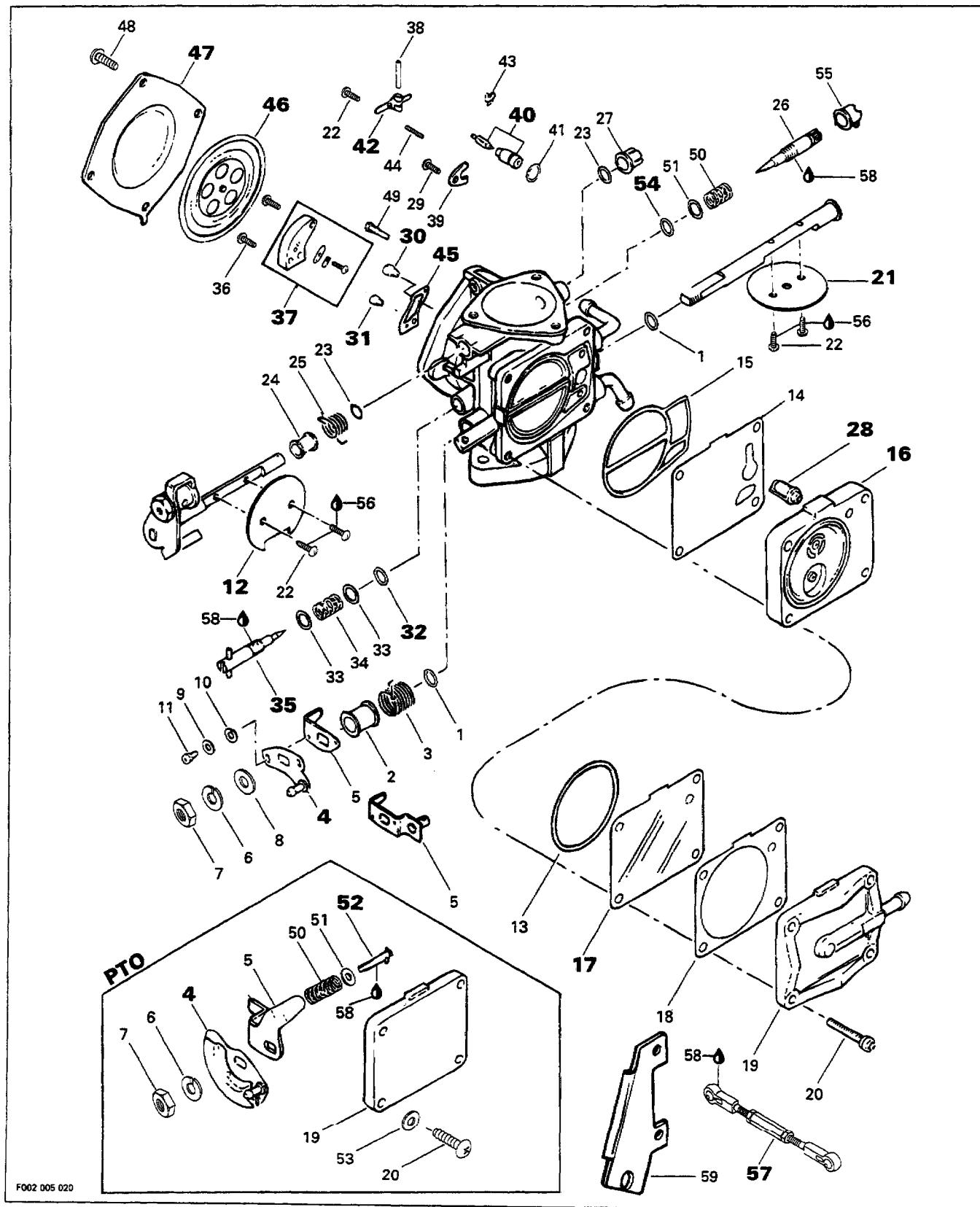
Section 05 FUEL SYSTEM

Sub-Section 02 (AIR INTAKE)

AIR INTAKE XP MODEL (5852)

1. Allen screw M6 x 25 (2)	13. Rubber plug
2. Air silencer cover	14. Gasket
3. Air silencer base	15. Synthetic grease
4. Flame arrester foam	16. Screw M4 x 6 (2)
5. Isolator	17. Inlet tube (4)
6. Base	18. Retaining slide (6)
7. Support	19. Holder
8. Loctite "515"	20. Allen screw M6 x 12 (4)
9. Loctite "242"	21. Hexagonal washer M6 (2)
10. Allen screw M6 x 16 (6)	22. Nut M6 (2)
11. Allen screw M6 x 30	23. Washer M6 (2)
12. Carburetor linkage	

CARBURETORS



Section 05 FUEL SYSTEM

Sub-Section 03 (CARBURETORS)

CARBURETORS

1. Sealing ring (2)	31. Pilot jet
2. Sleeve	32. O-ring
3. Spring	33. Washer (2)
4. Throttle lever	34. Spring
5. Throttle lever stopper	35. Low speed mixture screw
6. Lock washer	36. Screw (2)
7. Nut	37. Check valve housing
8. Ring	38. Pin
9. Washer	39. Plate
10. Lock washer	40. Needle valve
11. Screw	41. O-ring
12. Choke valve	42. Needle valve lever
13. O-ring	43. Clip
14. Gasket	44. Spring
15. O-ring	45. Gasket
16. Pump body	46. Diaphragm
17. Diaphragm	47. Cover
18. Gasket	48. Screw (4)
19. Pump cover	49. Plug
20. Screw (4)	50. Spring (2)
21. Throttle valve	51. Washer (2)
22. Screw and spring washer (5)	52. Screw
23. Sealing ring (2)	53. Washer (4)
24. Sleeve	54. O-ring
25. Spring	55. Cap
26. Main jet screw (locked)	56. Loctite 242
27. Ring	57. Carburetor linkage
28. Filter	58. Synthetic grease
29. Screw and spring washer	59. Bracket (twin carburetor only)
30. Main jet	

REMOVAL FROM ENGINE

To remove carburetors from engine, proceed as follows :

Intake and Fuel Systems (Single Carburetor)

Loosen clamp of air intake silencer hose on flame arrester cover.

Move air intake silencer hose to rear of watercraft. Remove screws holding flame arrester cover to engine, then remove screws from cover and withdraw cover. Remove throttle cable from flame arrester base and unhook cable from throttle rope lever. Unscrew Allen screw holding choke cable rod to choke shaft levers then remove cable rod.

NOTE : Choke cable does not need to be removed from flame arrester base.

Unscrew base retaining screws then remove base from carburetor and move it to front of watercraft.

Turn fuel valve to OFF position.

Disconnect impulse line, fuel supply line and fuel return line from fuel pump.

Remove two nuts, lock washers from carburetor base and withdraw carburetor.

NOTE : For easier access to right carburetor base nut, throttle rope lever should be removed from throttle shaft.

Intake and Fuel Systems (Twin Carburetors Except XP Model (5852))

Loosen clamp of air intake silencer hose on flame arrester cover.

Move air intake silencer hose to rear of watercraft. Remove screws holding flame arrester cover to engine, then remove screws from cover and flame arrester adaptor. Remove cover and adaptor from watercraft. Remove throttle cable from flame arrester base and unhook cable from throttle rope lever. Unscrew Allen screws holding choke cable rod to choke shaft levers then remove cable rod.

NOTE : Choke cable does not need to be removed from flame arrester base.

Unscrew base retaining screws then remove base from carburetors and move it to front of watercraft.

Turn fuel valve to OFF position.

Disconnect impulse line from fuel pump.

Disconnect fuel supply line from fuel pump.

Disconnect fuel return line from PTO side carburetor.

Remove oil injection cable bracket from fuel pump cover.

Remove four bolts, lock washers from rotary valve cover then move carburetors and rotary valve cover together on top of engine.

NOTE : Oil lines from oil pump don't need to be removed and don't disconnect oil injection cable from oil pump lever.

Intake and Fuel Systems (XP Model (5852))

Remove air vent tube support from body opening.

Unlock retaining slides holding air intake silencer cover and remove cover.

Remove screws holding flame arrester retainer and air intake silencer base to flame arrester base. Remove air intake silencer base from watercraft.

Remove throttle cable from flame arrester base and unhook cable from throttle rope lever. Unscrew Allen screws holding choke cable rod to choke shaft levers then remove cable rod.

NOTE : Choke cable does not need to be removed from flame arrester base.

Remove screws holding flame arrester base to cylinder head cover

Unscrew base retaining screws then remove base from carburetors and move it to front of watercraft.

Turn fuel valve to OFF position.

Disconnect impulse line from fuel pump.

Disconnect fuel supply line from fuel pump.

Disconnect fuel return line from PTO side carburetor.

Remove oil injection cable bracket from fuel pump cover.

Remove four bolts, lock washers from rotary valve cover then move carburetors and rotary valve cover together on top of engine.

NOTE : Oil lines from oil pump don't need to be removed and don't disconnect oil injection cable from oil pump lever.

CLEANING

The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

CAUTION : Be careful at carburetor cleaning not to remove paint. Paint removal will cause carburetor to rust very rapidly. Repaint if necessary.

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instruction.

WARNING : Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

CAUTION : Heavy duty carburetor cleaner may be harmful to the rubber parts, O-ring, etc. Therefore, it is recommended to remove those parts prior to cleaning.

Discard O-rings, diaphragms and gaskets.

INSPECTION

Inspect parts for corrosion damage (shaft, butterfly, spring, screw, check valve housing, etc).

40, Needle Valve

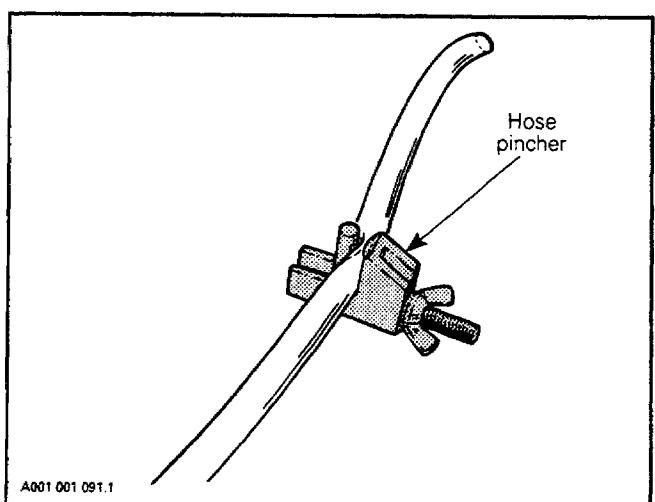
Inspect needle valve tip for a grooved condition. If worn, needle and seat must be replaced as a matched set.

35, Low-Speed Mixture Screw

Check tip for a grooved condition. Replace if necessary.

PUMP VERIFICATION

Install a hose pincher (P / N 295 000 076) on fuel supply line close to pump inlet. Disconnect fuel inlet line.

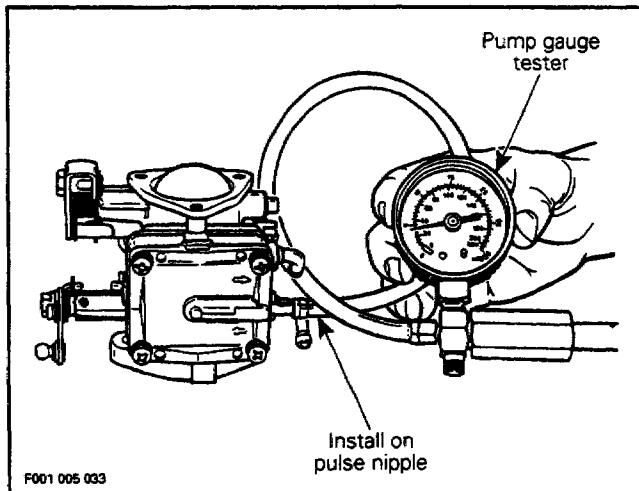
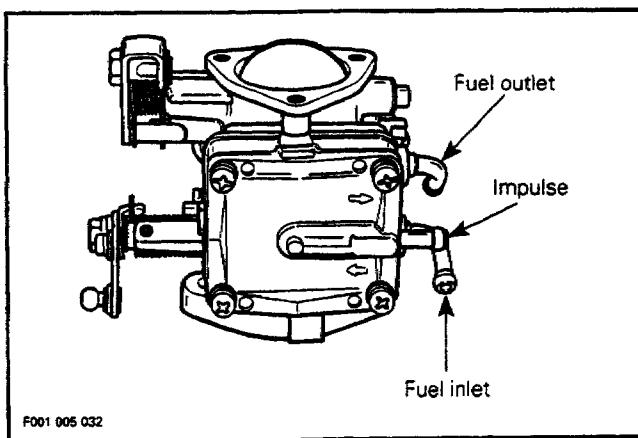


Section 05 FUEL SYSTEM

Sub-Section 03 (CARBURETORS)

Disconnect fuel outlet line.

Disconnect impulse line.



Check fuel pump valves operation as follows :

Connect a clean plastic tubing to the inlet nipple and alternately apply pressure and vacuum with the mouth. The inlet valve should release with pressure and hold under vacuum.

Repeat the same procedure at the outlet nipple. This time the outlet valve should hold with pressure and release under vacuum.

◆ **WARNING : Some fuel may be present in fuel pump. Be Careful not to swallow fuel when under vacuum.**

17. Diaphragm

Pump Diaphragm Leak Test

Using a suitable pump gauge tester, perform the following test proceeding as follows :

- Install pump gauge tester (P / N 295 000 083) on pulse nipple.
- Pump tester until it reaches 28 kPa (4 PSI).

Diaphragm must stand pressure for 10 seconds. If pressure drops, replace diaphragm.

16. Pump Body

Inspect valves. The pumping area should be free of holes, tears or imperfections. Replace as needed.

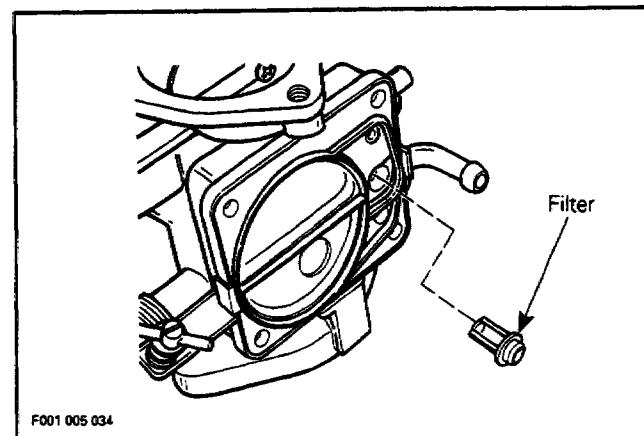
28. Filter

To verify filter condition proceed as follows :

Remove pump cover, gasket, diaphragm and then pump body and gasket.

Remove filter from carburetor body then clean filter and blow carefully with compressed air (low pressure).

Replace filter if damaged.



ASSEMBLY

When assembling pump, ensure to properly position components together. Refer to previous illustrations if necessary.

12.21, Choke Valve and Throttle Valve

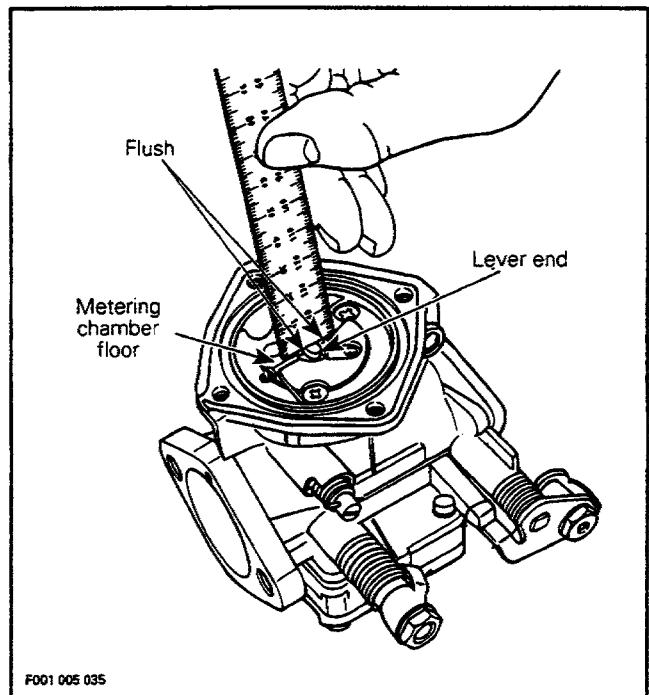
When installing butterfly onto shaft, close butterfly so that it centers into carburetor bore. Firmly tighten screws.

CAUTION : Always apply Loctite 242 (blue) on screw threads prior to installing screws.

42, Needle Valve Lever

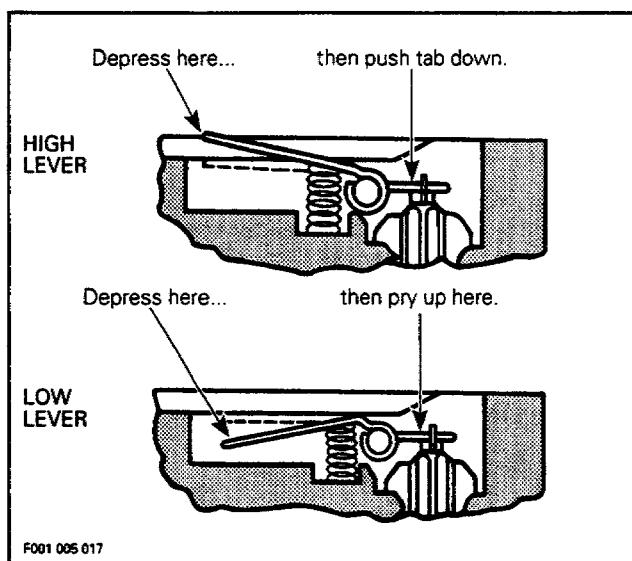
Inlet Control Lever

Rounded end of needle valve lever must be flush with surrounding metering chamber floor and not with body assembly. Place the end of a ruler over lever to check adjustment.



To adjust, bend lever very slightly to change its height.

CAUTION : When adjusting lever, do not pry it so that it applies pressure on needle. This could damage valve seat / needle.



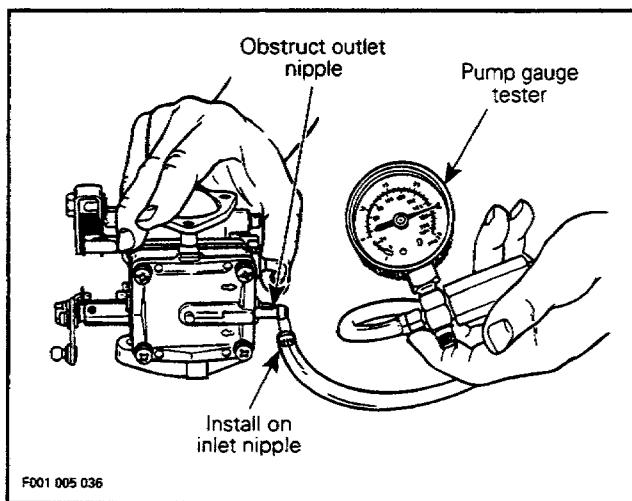
Pressure Test

Proceed as follows :

- Install pump gauge tester on carburetor inlet nipple.
- Obstruct outlet nipple with a finger.
- Pump tester until inlet release pressure is reached (seen by a sudden pressure drop). This must occur within 150-225 kPa (21-32 PSI) then pressure will drop.

The pressure drop will vary, but it should not go less than 100 kPa (15 PSI).

NOTE : Pressure test should be performed three times to obtain a valid reading.



Section 05 FUEL SYSTEM

Sub-Section 03 (CARBURETORS)

If release pressure is not within specification, check control lever adjustment. Replace spring as necessary.

CAUTION : Do not stretch or cut spring.

Leak Test

Needle valve must stand a pressure of 69 kPa (10 PSI) for 30 seconds. Otherwise, hold carburetor upside down, pour oil over needle valve and apply pressure.

Check for bubbles. If they come from seat O-ring, bubbles will exit around seat. Retighten as necessary.

If it still leaks remove needle and seat and replace O-ring.

If bubbles come from needle, replace needle and seat.

30,31, Main Jet and Pilot Jet

Pilot jet and main jet are replaceable. Different jet sizes are available to suit temperature and altitude conditions. Always inspect spark plug tip condition when dealing with pilot jet and main jet. Spark plug tip condition gives a good indication of carburetor mixture setting.

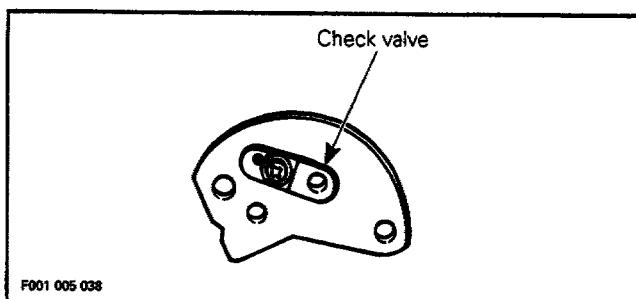
CAUTION : Adjustments vary with temperature and altitude. Always observe spark plug condition for proper jetting.

NOTE : To have access to pilot jet or main jet, check valve housing must be removed.

37,45, Check Valve, Gasket and Check Valve Housing

The check valve is needed if a back pressure occurs into carburetor. It will prevent fuel from flowing back into carburetor lower portion.

Inspect check valve, it should be free of holes, tears or imperfections. Replace as needed.



NOTE : Prior to check valve housing installation, remember to set gasket.

46,47, Diaphragm and Cover

Install diaphragm with its integrated O-ring into carburetor groove. Make sure that the tab of cover is inserted into carburetor notch.

32,54, O-ring

When installing O-rings of low-speed mixture screw and main jet screw, apply some SEA-DOO LUBE (P / N 293 600 006) to prevent sticking.

Carburetor Mount Nuts

Install lock washers and apply Loctite 242 (P / N 293 800 015) on threads then torque nuts to 25 N·m (18 lbf·ft).

Fuel Lines and Hose Clamps

If fuel line ends are damaged, cut damaged end before reinstallation.

Properly tighten clamps with special pliers (P / N 295 000 070).

WARNING : Make sure there is no leak in fuel system.

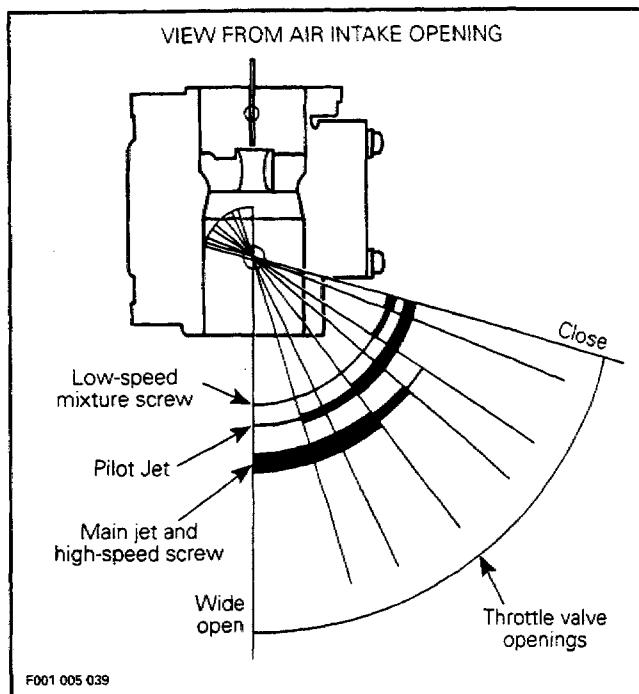
Refer to fuel system pressurization.

Flame Arrester

Always verify if flame arrester is dirty or restricted.

WARNING : Never operate watercraft without flame arrester.

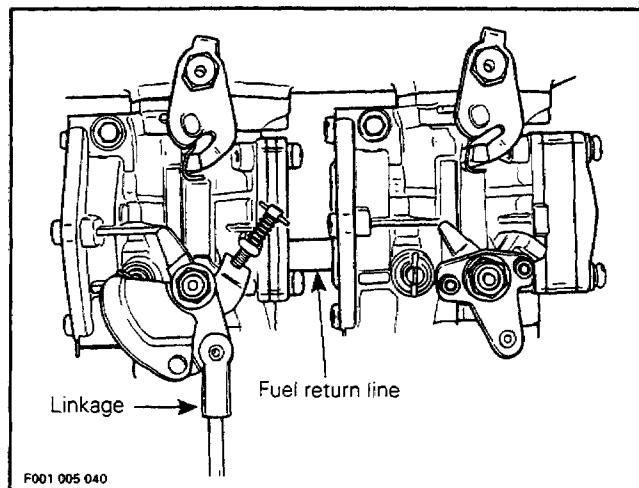
The following illustration shows which part of the carburetor begins to function at different throttle valve openings.



DISASSEMBLY (Twin carburetor)

57, Carburetor Linkage

Disconnect fuel return line between carburetors and disconnect linkage from carburetor. Unscrew carburetor mount nuts and remove carburetor.



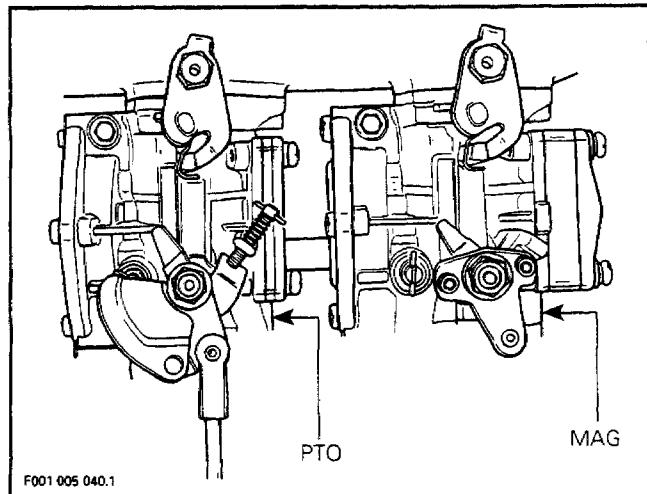
ASSEMBLY

Carburetor Synchronization (SPX Model (5807) 1st Run and Explorer (5820))

At assembly, pay attention to the following.

MAG Carburetor and PTO Carburetor

When installing carburetors pay attention on which side of oil pump mounting flange carburetors are to be located. To ensure proper installation, carburetors are identified on the side with MAG or PTO. Refer to following illustration.



4,52, Throttle Levers and Idle Speed Screw

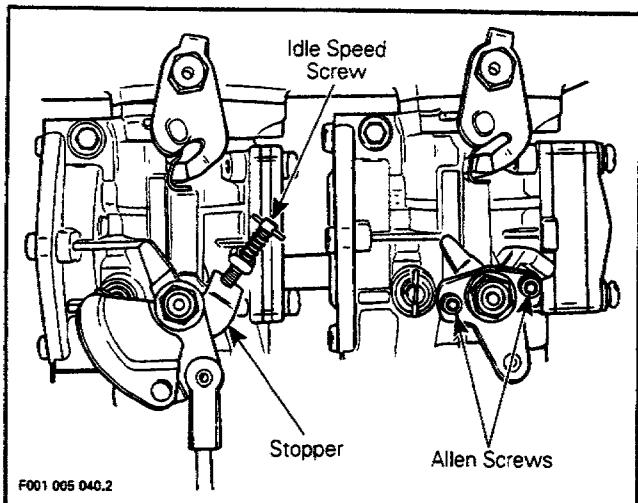
With idle speed screw not touching stopper on PTO carburetor, both throttle levers are in closed position.

Loosen Allen screws on MAG carburetor throttle lever.

NOTE : Ensure throttle lever is released. Paint could possibly hold lever.

Section 05 FUEL SYSTEM

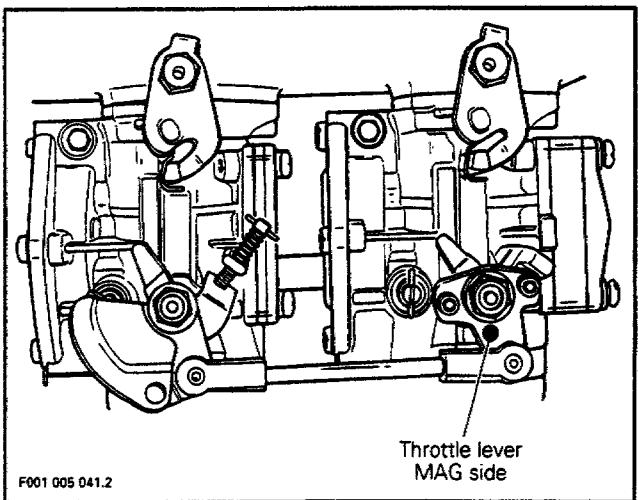
Sub-Section 03 (CARBURETORS)



NOTE : Grease carburetor linkage at both ends with synthetic grease (P / N 293 550 010).

Connect linkage between both carburetor levers and fully tighten Allen screws on carburetor throttle lever MAG side. Be careful not to rotate lever while tightening it.

CAUTION : This set-up is done to ensure good synchronization between carburetor throttle levers when throttle lever is pushed at handlebar grip.



CAUTION : Throttle valves must open simultaneously. Otherwise this will cause engine to vibrate and / or back fire.

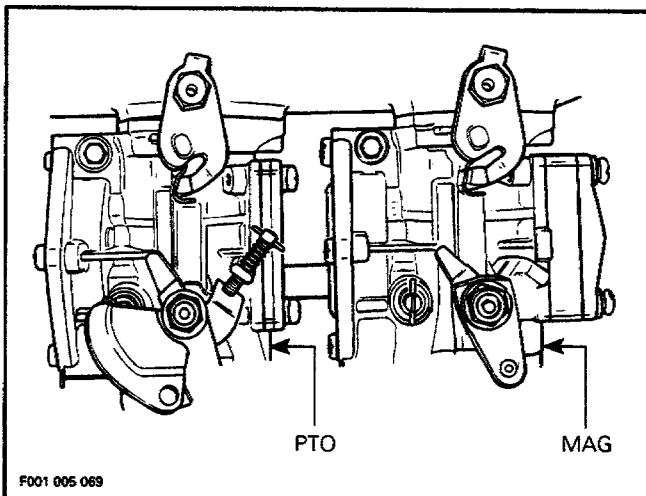
Carburetor Synchronization
(All Models Except SPX Model (5807)
1st Run and Explorer (5820))

At assembly, pay attention to the following.

MAG Carburetor and PTO Carburetor

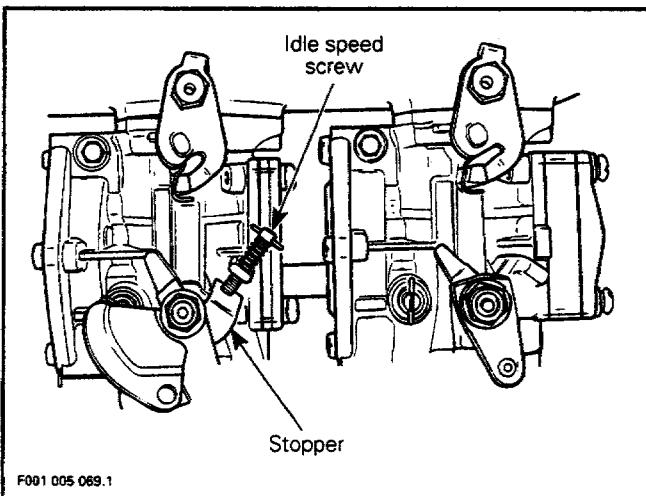
When installing carburetors pay attention on which side of oil pump mounting flange carburetors are to be located. To ensure proper installation, carburetors are identified on the side with MAG or PTO. Refer to following illustration.

CAUTION : The XP (5852) model carburetors are different from the others only in the jetting. Carburetors are identified on body by a yellow dot. Ensure to install the appropriate carburetors on the proper engine, because damage to engine components could occur.



4.52 Throttle Levers and Idle Speed Screw

With idle speed screw not touching stopper on PTO carburetor, both throttle levers are in closed position.

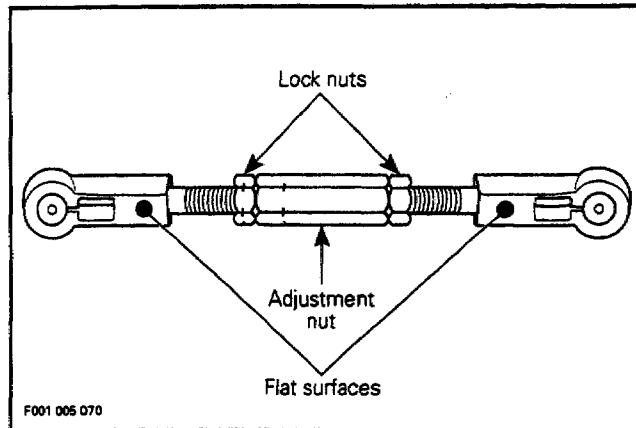


Loosen lock nuts on carburetor linkage and adjust linkage with adjustment nut.

Section 05 FUEL SYSTEM

Sub-Section 03 (CARBURETORS)

Make sure threads length is the same on each side of linkage and flat surfaces of both ends are parallel with each other.



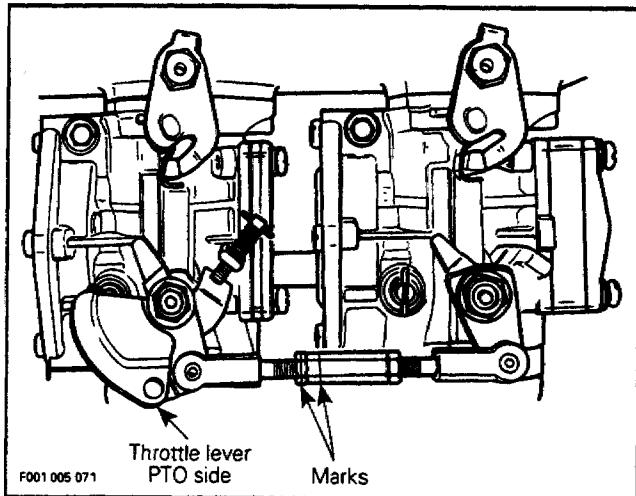
Tighten lock nuts and torque to 1.5 N·m (14 lbf·in).

NOTE : Grease carburetor linkage at both ends with synthetic grease (P / N 293 550 010).

Connect linkage between both carburetor levers and ensure that marks on lock nut and adjustment nut are located near PTO carburetor throttle lever side.

Ensure both throttle valves are still in closed position.

CAUTION : This set-up is done to ensure good synchronization between carburetor throttle levers when throttle lever is pushed at handlebar grip.



NOTE : The linkage installation is done with the marks located near PTO carburetor throttle lever to ease adjustment if to be performed in the watercraft.

CAUTION: Throttle valves must open simultaneously. Otherwise this will cause engine to vibrate and / or back fire.

Return Line Orifice

The fuel return line orifice of carburetor MAG side is 3.0 mm (.118 in) and the one on carburetor PTO side is 0.5 mm (.020 in).

CAUTION : If carburetors are installed on wrong side, the carburetor PTO side will run very lean because of low fuel flow.

WARNING : Always verify tightness of clamps and hoses.

Carburetor Mount Nuts

Install lock washers and apply Loctite 242 (P / N 293 800 015) on threads then torque nuts to 25 N·m (18 lbf·ft).

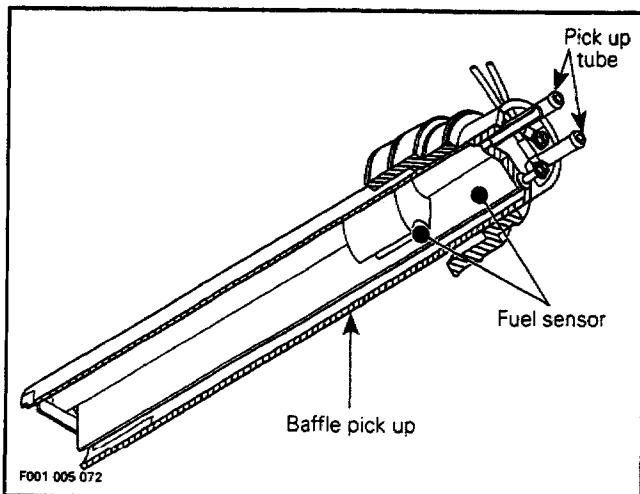
Rotary Valve Cover and Screws

Install O-ring and cover then torque screws to 20 N·m (15 lbf·ft) in a criss-cross sequence.

Baffle Pick Up

(All Models Except SPX Model (5807)
1st Run and Explorer (5820)

NOTE : The baffle pick up has an integrated fuel sensor on models which have a fuel level gauge.



Section 05 FUEL SYSTEM

Sub-Section 03 (CARBURETORS)

◆ **WARNING :** Always disconnect battery cables exactly in the specified order, black negative cable first. Electrolyte or fuel vapors can be present in the engine compartment and a spark might ignite them and possibly cause personal injuries.

Disconnect the red positive cable last.

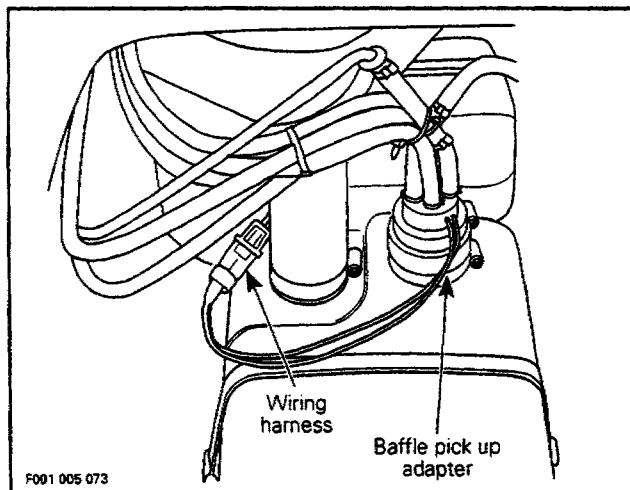
Empty fuel tank.

◆ **WARNING :** Fuel is inflammable and explosive under certain conditions. Always work in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity. Always wipe off fuel spillage from the watercraft.

Remove storage basket from watercraft.

GTS (5813) GTX (5861) Models Only

Press on vent tube upper part to enable to withdraw tube from body.



Remove upper clamp from adapter and slide adapter from baffle.

○ **NOTE :** Assembly is essentially the the reverse of disassembly procedures.

Slide adapter onto baffle pick up until it stops on rib. Install clamp.

Install baffle pick up into fuel tank and push it until it sits on fuel tank neck. Install clamp and torque both clamps to 4.5 N·m (40 lbf·in)

Fuel Sensor and Fuel Sensor Adapter, (SPX Model (5807) 1st Run and Explorer (5820).

◆ **WARNING :** Always disconnect battery cables exactly in the specified order, black negative cable first. Electrolyte or fuel vapors can be present in the engine compartment and a spark might ignite them and possibly cause personal injuries.

Disconnect the red positive cable last.

Empty fuel tank.

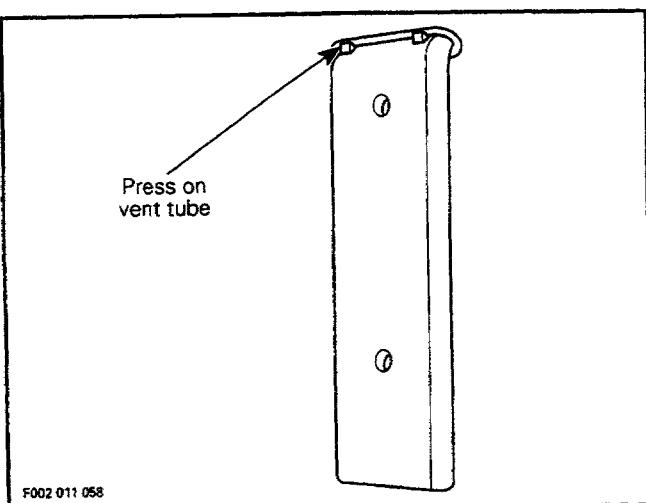
◆ **WARNING :** Fuel is inflammable and explosive under certain conditions. Always work in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity. Always wipe off fuel spillage from the watercraft.

Explorer Model (5820) only

Remove windscreen from console and then remove air blower.

Remove steering stem arm from steering stem and then remove steering cable from steering bracket.

Disconnect engine overheating beeper and engine stop switch wiring harnesses.



◆ **WARNING :** Vent tube must be in place to provide proper bilge ventilation.

Disconnect filler neck hose from fuel tank.

Remove retaining straps from fuel tank and move tank forward.

All Models Except SPX (5807) 1st Run and Explorer (5820)

Remove hoses from baffle pick up and disconnect fuel sensor wiring harness if applicable.

Remove lower clamp from baffle pick up adapter and pull out baffle from fuel tank.

Section 05 FUEL SYSTEM

Sub-Section 03 (CARBURETORS)

Remove wave pin from reverse shaft and unscrew reverse handle.

Remove four screws and washers which hold console to body then move console aside.

Pull off ventilation plate from body which is installed just underneath console.

Disconnect filler neck hose from fuel tank.

Remove battery and its support.

Remove retaining strap from oil reservoir.

Remove two screws which hold oil filler neck to body. Pull oil reservoir, disconnect oil sensor wires and move reservoir rearward.

Remove retaining straps from fuel tank and pull tank rearward.

SPX Model (5807) 1st Run and Explorer (5820)

Disconnect and remove fuel sensor from fuel tank.

Remove fuel sensor adapter from fuel sensor.

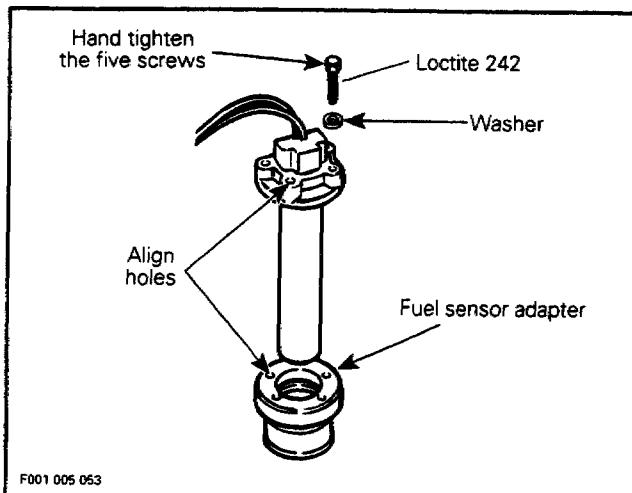
Make sure there is no obstructions in threaded holes of fuel sensor adapter.

Slide fuel sensor adapter on fuel sensor.

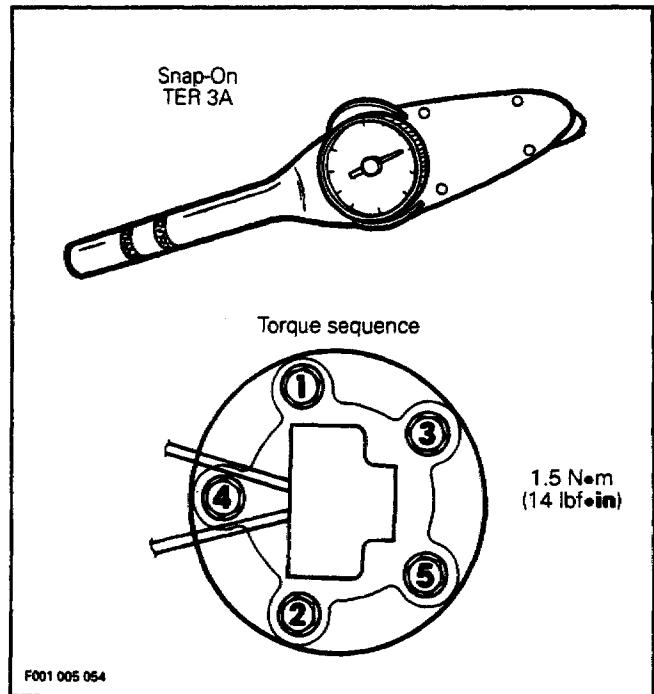
Align sensor holes with adapter holes.

WARNING : A good hole alignment is necessary.

Apply some Loctite 242 (blue) on the five screws, install washers and hand tighten to eliminate play between sensor and adapter.

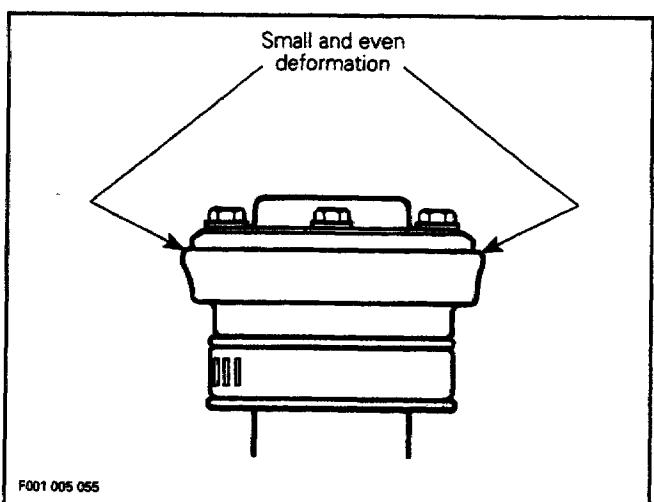


Torque screws in a criss-cross sequence to 1.5 N·m (14 lb·in) using an appropriate torque wrench such as Snap-On TER 3A.



WARNING : Do not over torque. Torque wrench tightening specifications must be strictly adhere to.

NOTE : It is normal to have a small and even deformation all around fuel sensor adapter.



Torque applied to materials such as rubber, plastic and fiberglass will decrease automatically. The torque reduction is caused by material creeping. This situation is normal and should not cause any installation problem.

Section 05 FUEL SYSTEM

Sub-Section 03 (CARBURETORS)

▼ **CAUTION** : Do not retorque after a while, this could lead to an excessive deformation and / or components damages.

○ **NOTE** : Assembly is essentially the reverse of disassembly procedures. However pay particular attention to the following. At clamps installation on fuel tank filler hose, ensure that clamp tightening screws are placed face to face. Torque clamps to 4.5 N·m (40 lbf·in).

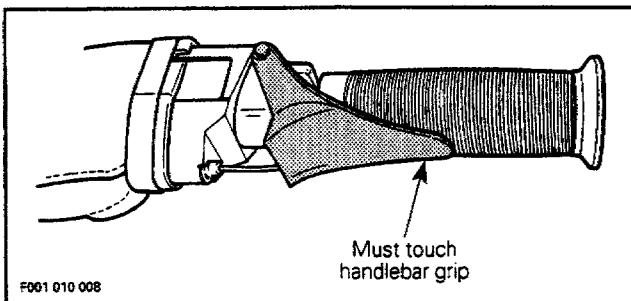
ADJUSTMENTS (Single carburetor)

Throttle Cable

▼ **CAUTION** : Make sure engine is turned off before adjusting throttle cable.

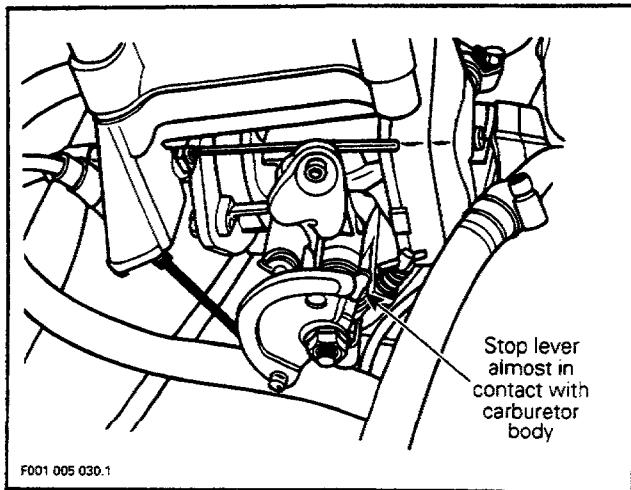
Lubricate cable with SEA-DOO LUBE.

Throttle lever must reach handlebar grip without causing strain to cable or carburetor cable bracket.



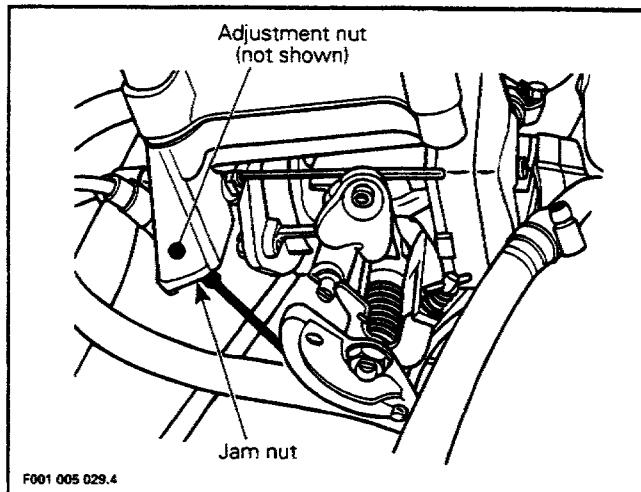
Insure carburetor butterfly is fully open at full throttle position. At this position throttle stop lever is almost in contact (0.5 mm (1/64 in)) with carburetor body.

◆ **WARNING** : Insure lock tab on throttle handle is installed over cable barrel opening.



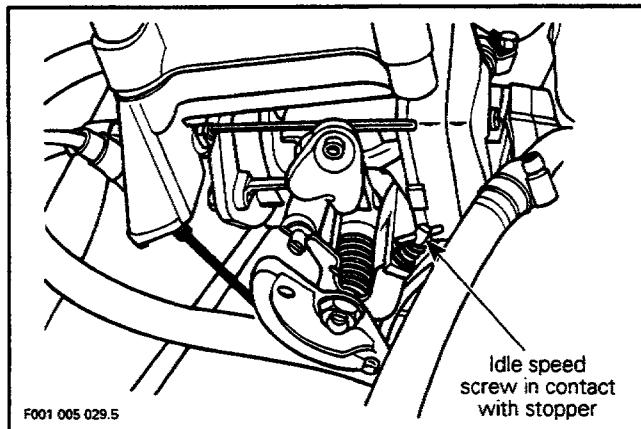
▼ **CAUTION** : Improper cable full throttle adjustment will cause strain on cable and / or damage cable bracket or throttle lever at handlebar.

To adjust, loosen jam nut then turn adjustment nut as necessary.



Tighten jam nut and recheck adjustment.

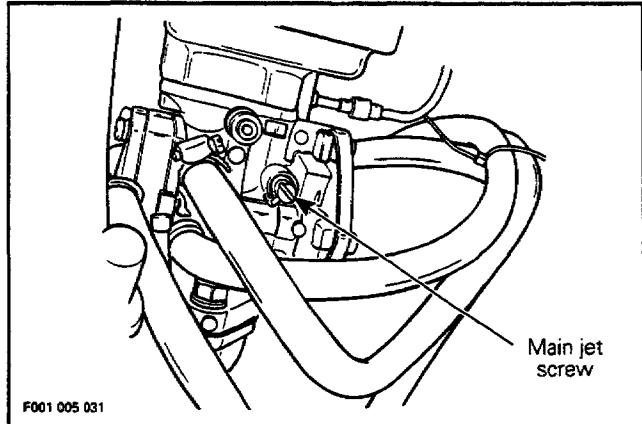
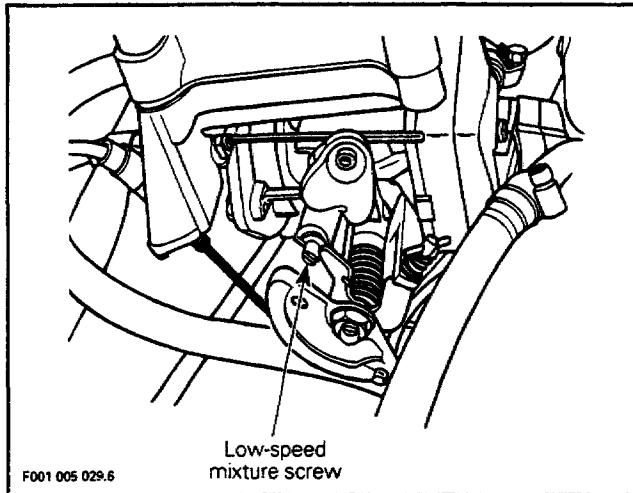
◆ **WARNING** : Make sure idle speed screw contacts stopper when throttle lever is fully released at handlebar.



After throttle cable adjustment, always proceed with oil injection pump adjustment.

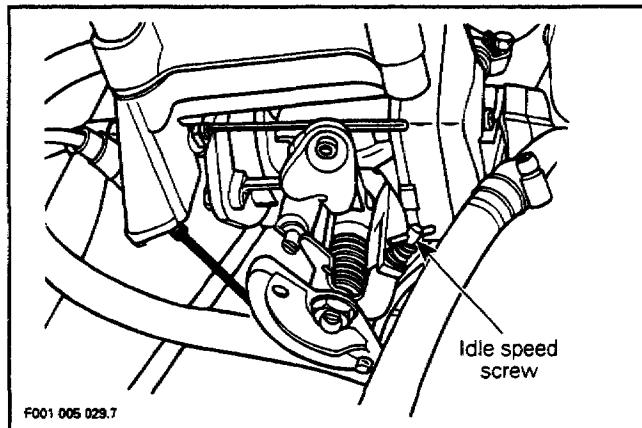
▼ **CAUTION** : Improper oil injection pump synchronization with carburetor can cause serious engine damage.

35, Low-Speed Mixture Screw



▼ CAUTION : Do not attempt to adjust main jet screw. Severe engine damage can occur.

52, Idle Speed Screw



▼ CAUTION : Do not attempt to set engine idle speed with low-speed mixture screw. Severe engine damage can occur.

As a preliminary set-up, tighten screw in until a slight resistance is felt then back off 3/4 to 1-1/4 turn.

Start and warm engine.

▼ CAUTION : Water must be supplied to cool engine with coupler hose (P / N 295 500 099).

Turning screw clockwise leans mixture and turning screw counterclockwise enriches mixture.

Turn low-speed mixture screw so that engine reaches the most suitable idle and runs smoothly. Make sure engine reacts quickly to throttle lever depression.

26, Main Jet Screw

The main jet screw is sealed with a plastic cap that allows an adjustment of 1/4 turn.

NOTE : Turning screw 1/4 turn counterclockwise enriches mixture and turning screw clockwise leans mixture.

Turning screw clockwise increases engine idle speed and turning screw counterclockwise decreases engine idle speed.

Connect an induction-type tachometer (P / N 295 000 100) on spark plug cable of magneto side to measure engine speed.

Start engine and bring to normal operating temperature.

▼ CAUTION : Water must be supplied to cool engine with coupler hose (P / N 295 500 099).

Turn screw so that engine idles between 1300 to 1500 RPM (in water) or 2400 to 2600 RPM (out of water).

Stop engine and recheck oil injection pump aligning marks and readjust as necessary.

▼ CAUTION : Oil injection pump adjustment must be checked each time carburetor is adjusted. Improper oil pump adjustment can cause severe engine damage.

Section 05 FUEL SYSTEM

Sub-Section 03 (CARBURETORS)

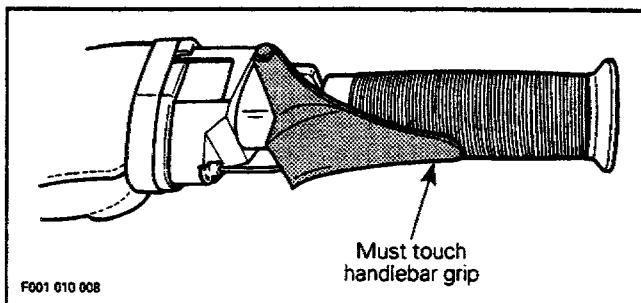
ADJUSTMENTS (Twin Carburetors)

Throttle Cable

▼ CAUTION : Make sure engine is turned off before adjusting throttle cable.

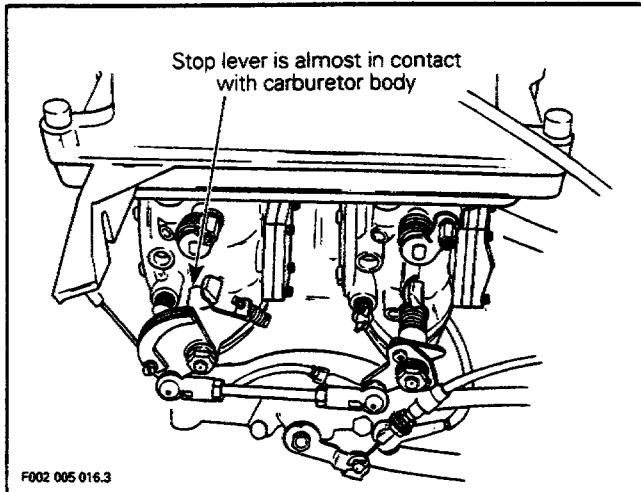
Lubricate cable with SEA-DOO LUBE.

Throttle lever must reach handlebar grip without causing strain to cable or carburetor cable bracket.



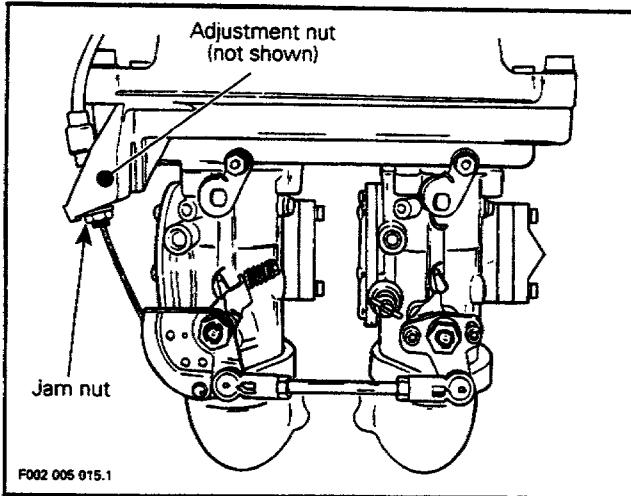
Insure carburetor butterflies are fully open at full throttle position. At this position throttle stop lever is almost in contact (0.5 mm (1/64 in)) with carburetor body.

◆ WARNING : Insure lock tab on throttle handle is installed over cable barrel opening.



▼ CAUTION : Improper cable full throttle adjustment will cause strain on cable and / or damage cable bracket or throttle lever at handlebar.

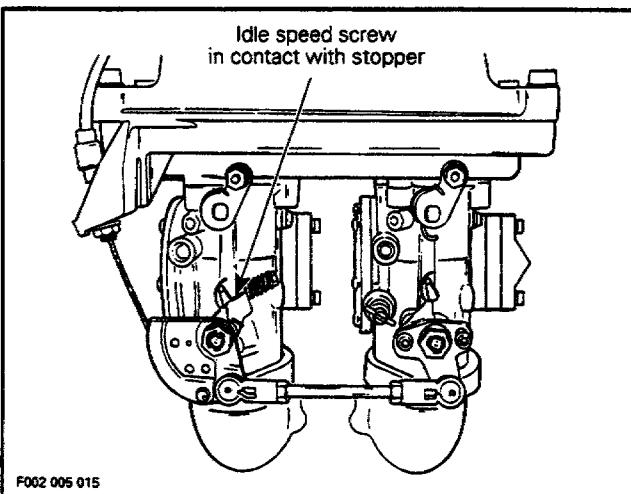
To adjust, loosen jam nut then turn adjustment nut as necessary.



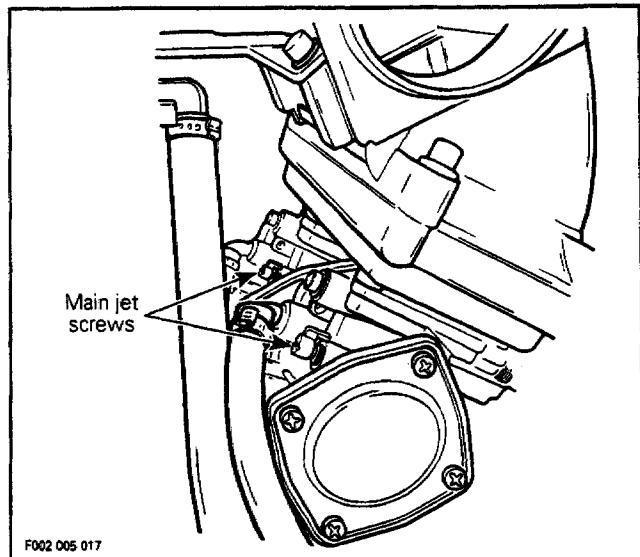
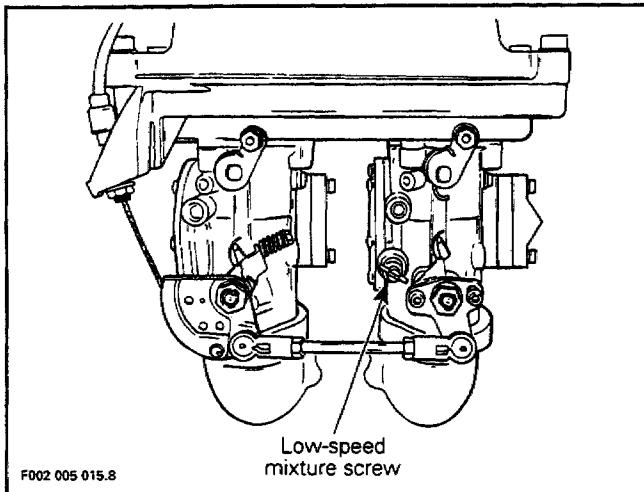
Tighten jam nut and recheck adjustment.

◆ WARNING : Make sure idle speed screw contacts stopper when throttle lever is fully released at handlebar.

○ NOTE : There is only one idle speed screw for both carburetors. It is located on the PTO side carburetor.



35, Low-speed Mixture Screw



▼ CAUTION : Do not attempt to set engine idle speed with low-speed mixture screw. Severe engine damage can occur.

As a preliminary set-up tighten screw in until a slight resistance is felt then back off 1 to 1-1/2 turn.

Start and warm engine.

▼ CAUTION : Water must be supplied to cool engine with coupler hose (P / N 295 500 099).

Turning screw clockwise leans mixture and turning screw counterclockwise enriches mixture.

Turn low-speed mixture screw so that engine reaches the most suitable idle and runs smoothly. Make sure engine reacts quickly to throttle lever depression.

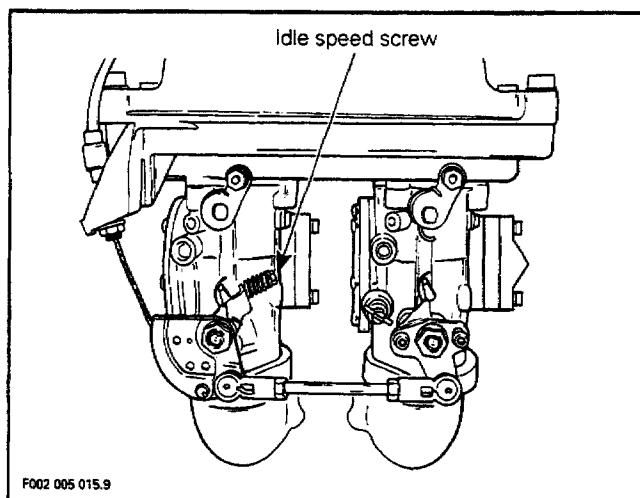
26, Main Jet Screw

The main jet screw is sealed with a plastic cap that allows an adjustment of 1/4 turn.

NOTE : Turning screw 1/4 turn counterclockwise enriches mixture and turning clockwise leans mixture.

▼ CAUTION : Do not attempt to adjust main jet screw. Severe engine damage can occur.

52, Idle Speed Screw
(on PTO Side Carburetor Only)



Turning screw clockwise increases engine idle speed and turning screw counterclockwise decreases engine idle speed.

Connect an induction tachometer (P / N 295 000 100) on spark plug cable of magneto side to measure engine speed.

Start engine and bring to normal operating temperature.

▼ CAUTION : Water must be supplied to cool engine with coupler hose (P / N 295 500 099).

Section 05 FUEL SYSTEM

Sub-Section 03 (CARBURETORS)

Turn screw so that engine idles between 1300 to 1500 RPM (in water) or 2800 to 3000 RPM (out of water).

Stop engine and recheck oil injection pump aligning marks and readjust as necessary.

CAUTION : Oil injection pump adjustment must be checked each time carburetors are adjusted. Improper oil pump adjustment can cause severe engine damage.

FUEL SYSTEM PRESSURIZATION

WARNING : Whenever doing any type of repair on watercraft or if any components of the fuel system are disconnected, a pressure test must be done before starting engine and/or releasing watercraft to customer.

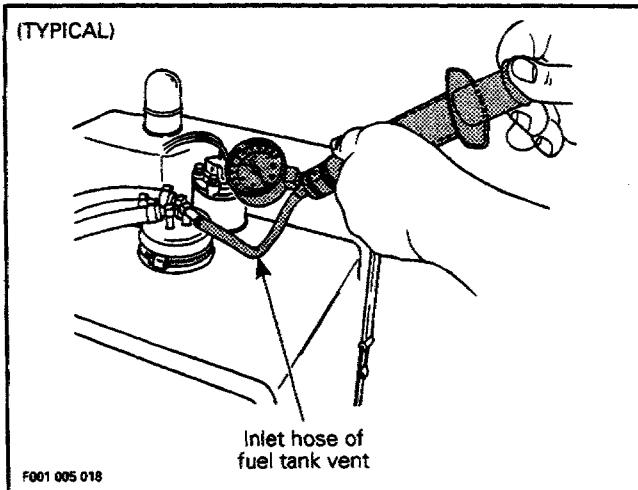
CAUTION : Ensure to verify fuel line ends for damage. Always cut damaged end before reinstallation.

Pressure Test

Proceed as Follows :

- Fill up fuel tank.
- Remove inlet hose of fuel tank vent from body.
- Install a hose pincher (P / N 295 000 076) on outlet hose of fuel tank vent.
- Connect pump gauge tester (P / N 295 000 085) to inlet hose.
- Turn fuel valve to OFF and pressurize fuel system to 34 kPa (5 PSI). If no leaks are found, turn fuel valve to ON and pressurize once more.
- If pressure is not maintained locate leak and repair / replace component leaking. To ease leak search spray a solution of soapy water on components, bubbles will indicate leak location.

NOTE : To minimize time of fuel system pressurization the fuel tank should be quite full. The system must maintain a pressure of 34 kPa (5 PSI) during 10 minutes. Never pressurize over 34 kPa (5 PSI).



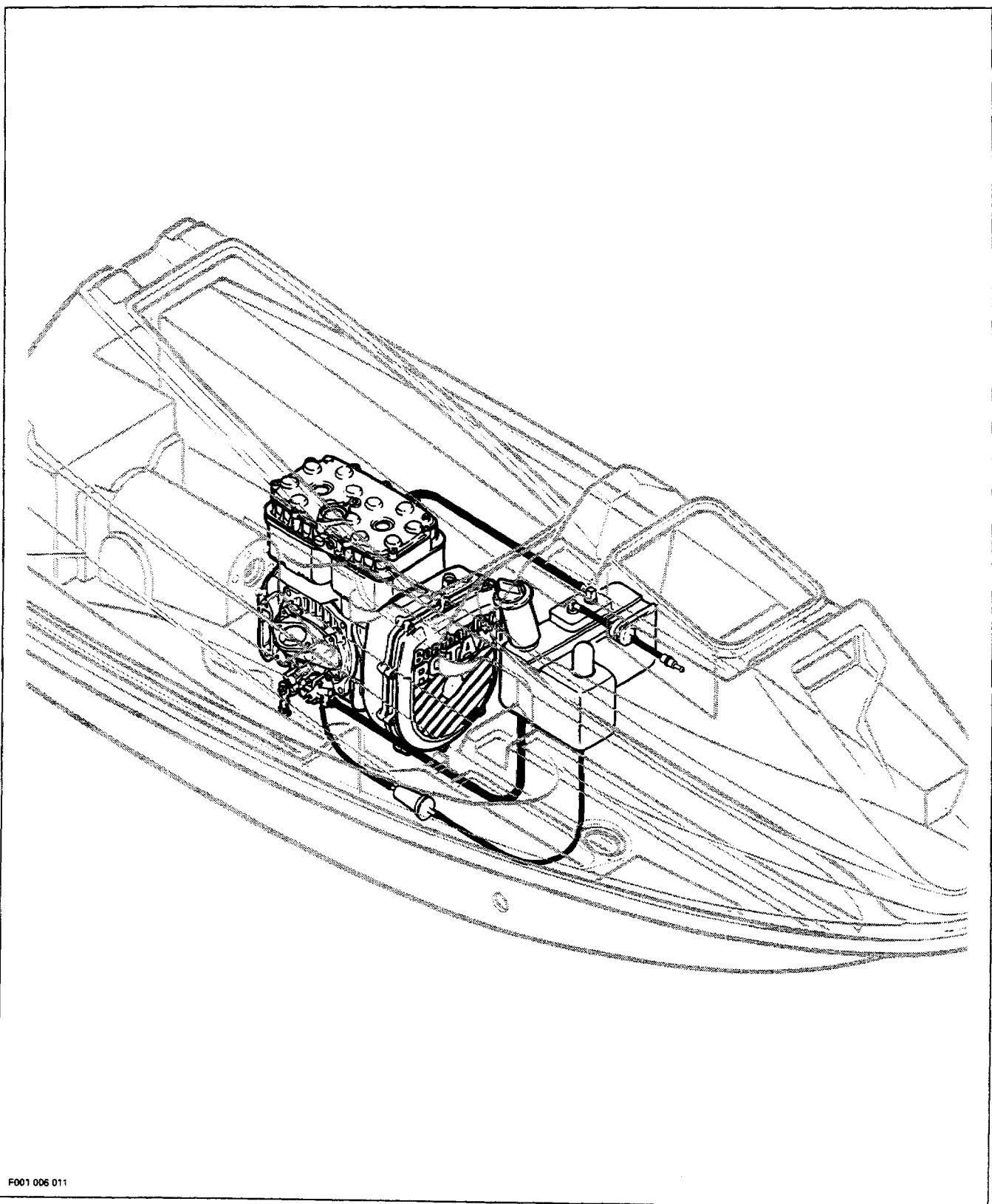
WARNING : If any leak is found, do not start the engine and wipe off any fuel leakage. Failure to correct a leak could lead to an explosion. Do not use electric powered tools on watercraft unless system has been verified for no leaks.

Reconnect inlet hose of fuel tank vent on body.

NOTE : Before removing the hose pincher, block with your finger, the outlet hole to feel if air is coming out when removing hose pincher. This will indicate that pressure relief valve and the outlet fitting are not blocked.

Remove hose pincher from outlet hose of fuel tank vent.

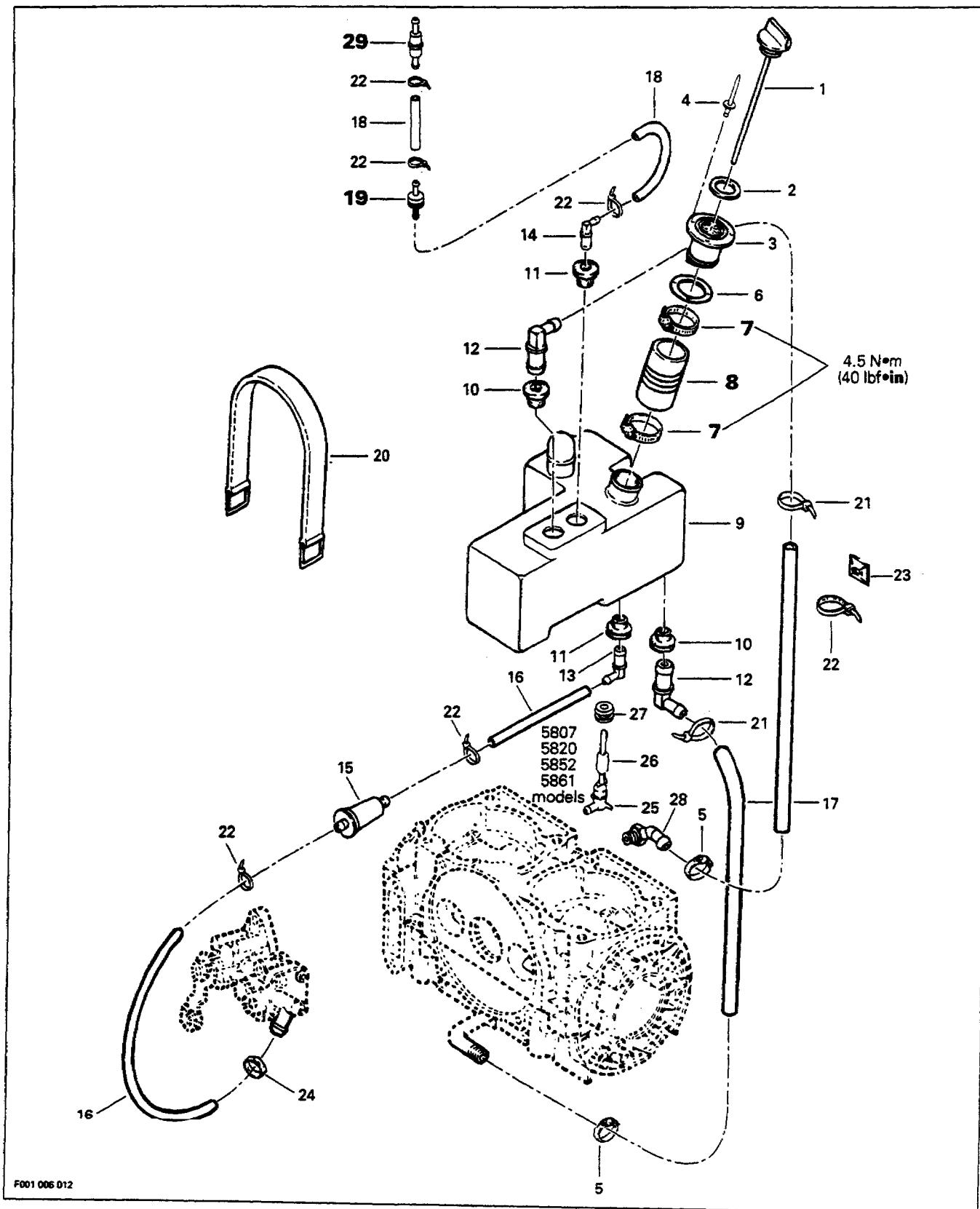
OIL SYSTEM



Section 06 OIL SYSTEM

Sub-Section 01 (OIL INJECTION RESERVOIR)

OIL INJECTION RESERVOIR



Section 06 OIL SYSTEM

Sub-Section 01 (OIL INJECTION RESERVOIR)

COMPONENTS

1. <i>Oil gauge</i>	16. <i>Hose 8 mm</i>
2. <i>O-ring</i>	17. <i>Hose 12 mm</i>
3. <i>Filler neck</i>	18. <i>Hose 6 mm</i>
4. <i>Rivet 1/8 x .640 (4)</i>	19. <i>Check valve</i>
5. <i>Clamp (2)</i>	20. <i>Strap</i>
6. <i>Gasket</i>	21. <i>Tie rap</i>
7. <i>Clamp (2)</i>	22. <i>Tie rap</i>
8. <i>Filler neck hose</i>	23. <i>Tie mount (2)</i>
9. <i>Oil tank</i>	24. <i>Oetiker clamp</i>
10. <i>Grommet (2)</i>	25. <i>Oil level sender (5807, 5820, 5852, 5861 models)</i>
11. <i>Grommet (2)</i>	26. <i>Float (5807, 5820, 5852, 5861 models)</i>
12. <i>Elbow fitting (2)</i>	27. <i>Grommet (5807, 5820, 5852, 5861 models)</i>
13. <i>Elbow fitting</i>	28. <i>Hose fitting</i>
14. <i>Elbow fitting</i>	29. <i>Water eliminator valve</i>
15. <i>Oil filter</i>	

GENERAL

Whenever repairing the oil injection system, always verify for water infiltration in reservoir.

7,8, Clamp and Hose

Verify oil filler neck hose for damage. Always ensure that clamps are well positioned and tightened. Torque clamps to 4.5 N·m (40 lbf·in).

19, Check Valve

Black side of the one-way check valve is the valve outlet.

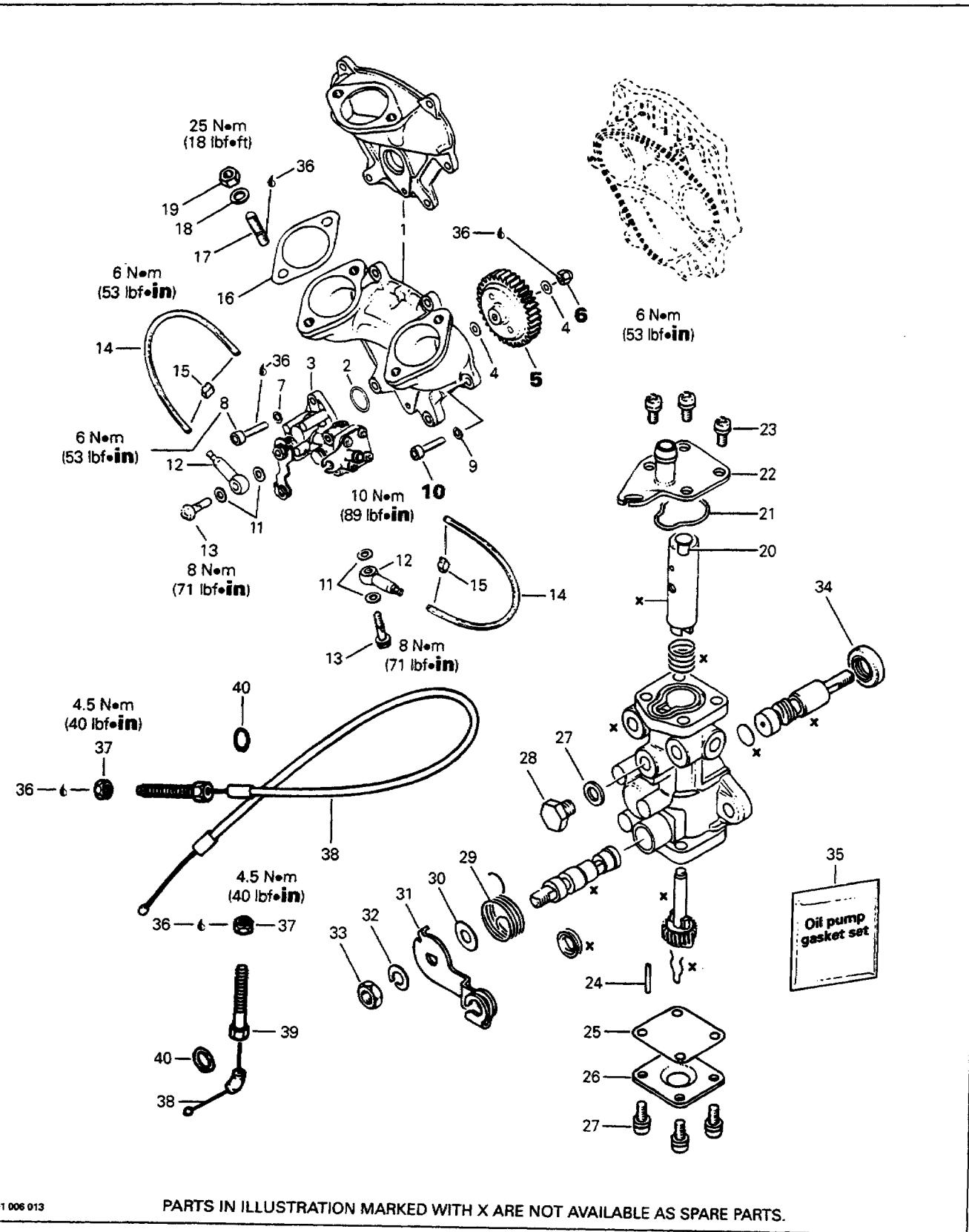
29, Water Eliminator Valve

This valve will reduce water intrusion in oil system. It is a one-way valve with an arrow to indicate the air flow.

Section 06 OIL SYSTEM

Sub-Section 02 (OIL INJECTION PUMP, REPAIR AND ADJUSTMENT)

OIL INJECTION PUMP, REPAIR AND ADJUSTMENT



Section 06 OIL SYSTEM

Sub-Section 02 (OIL INJECTION PUMP, REPAIR AND ADJUSTMENT)

COMPONENTS

1. Oil pump flange	21. O-ring
2. O-ring	22. Upper plate
3. Oil pump	23. Screw with lock washer M4 x 8 (8)
4. Washer (2)	24. Stop pin
5. Oil pump gear 41 teeth	25. Gasket
6. Lock nut M6	26. Pump lower plate
7. Lock washer (2)	27. Gasket
8. Allen screw M5 x 16 (2)	28. Hexagonal screw M6 x 8
9. Lock washer M6 (6)	29. Spring
10. Allen screw M6 x 20 (6)	30. Flat washer M6
11. Oil banjo gasket (4)	31. Lever
12. Check valve (2)	32. Lock washer M6
13. Valve bolt M6 x 16 (2)	33. Nut M6
14. Oil line	34. Seal
15. Clamp (4)	35. Gasket set
16. Gasket	36. Loctite "242"
17. Stud M8 x 19 (2)	37. Nut M6
18. Lock washer M8 (2)	38. Injection cable
19. Nut M8 (2)	39. Cable guide
20. Retainer	40. Circlip

Parts in illustration marked with X are not available as spare parts.

CLEANING

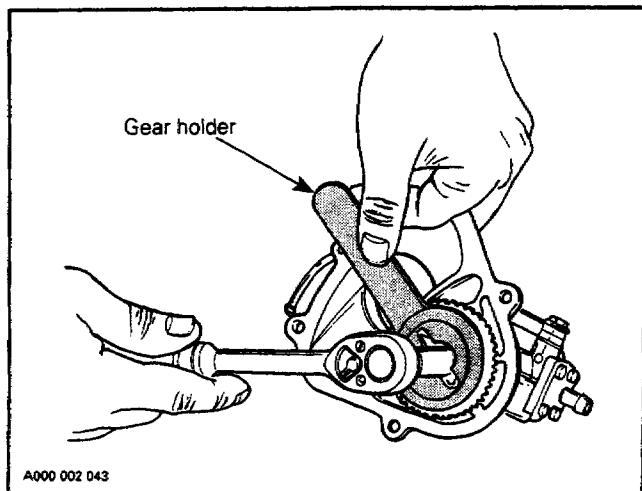
Discard all seals and O-rings. Clean metal components in a solvent.

DISASSEMBLY

 NOTE : Some oil pump parts are not available in single parts.

5,6, Oil Pump Gear and Lock Nut

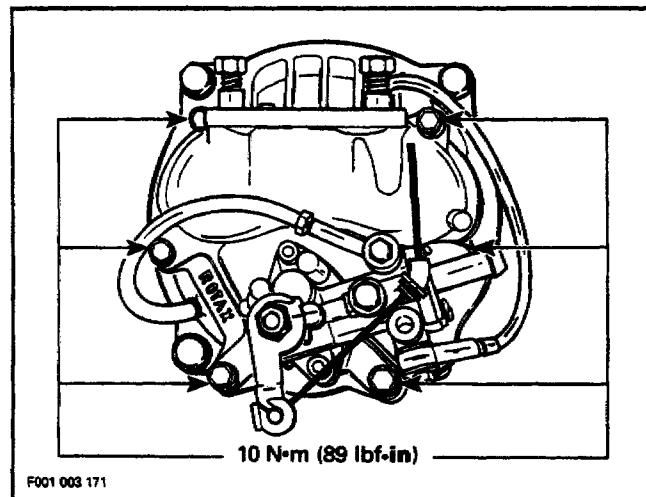
To remove retaining nut, lock gear using gear holder (P / N 290 277 905).



ASSEMBLY

10, Screw

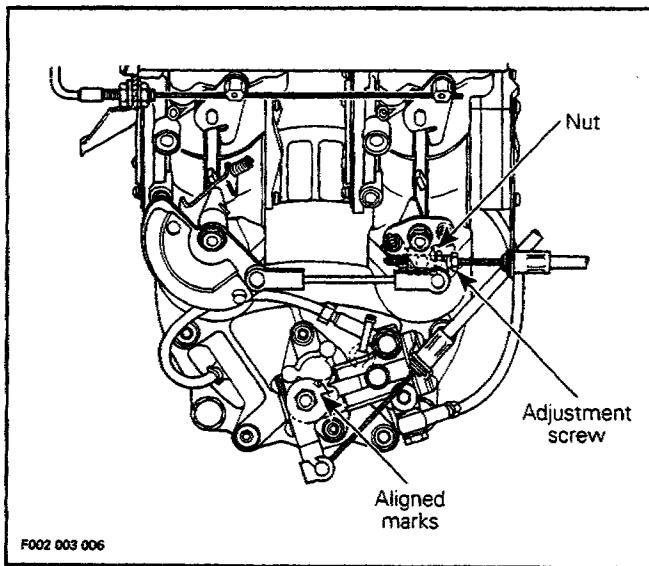
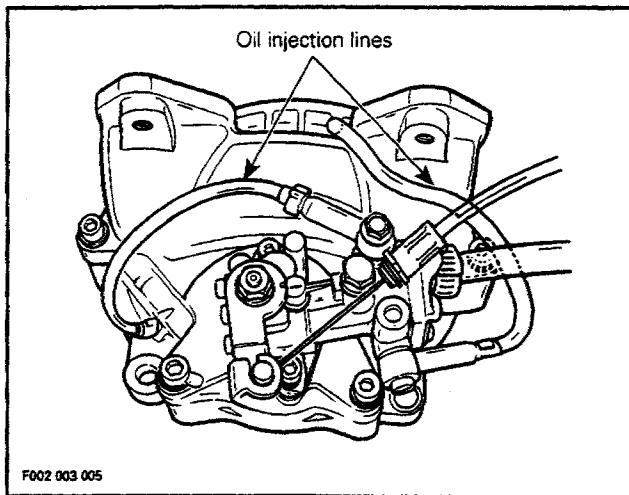
Torque to 10 N·m (89 lbf·in).



6, Lock Nut

Apply Loctite 242 (P / N 293 800 015) on nut threads and torque to 6 N·m (53 lbf·in).

 CAUTION : Whenever oil injection lines are removed, always make the routing as shown.



ADJUSTMENTS

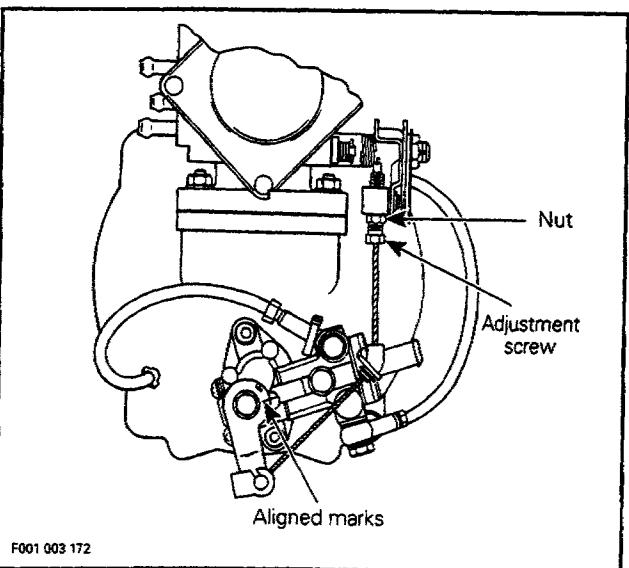
Synchronization

▼ CAUTION : As oil injection pump adjustment is dependant on throttle cable position, make sure to perform throttle cable adjustment first.

Eliminate throttle cable free-play by depressing throttle lever until a slight resistance is felt. In this position, marks on pump body and lever must align.

NOTE : A mirror may be used to facilitate this verification.

If necessary, turn cable adjustment screw to obtain pump mark alignment.



Tighten nut and recheck alignment marks.

▼ CAUTION : Proper oil injection pump adjustment is very important. Any delay in the opening of pump can result in serious engine damage.

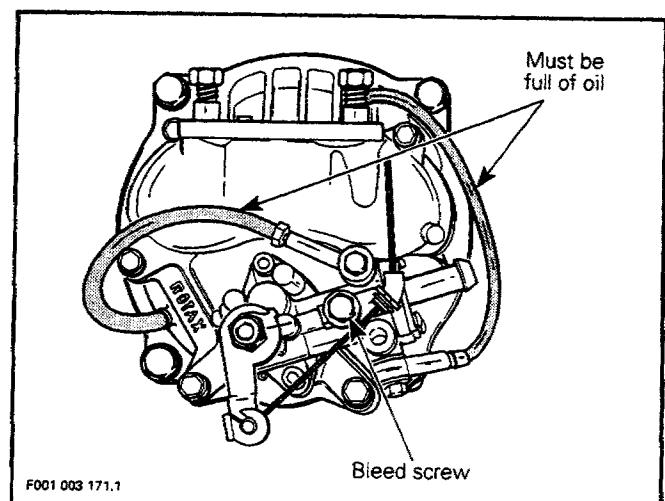
Bleeding

▼ CAUTION : Oil injection system must be bled and adjustment checked before operating engine.

Ensure oil injection reservoir is sufficiently filled.

Install a dry rag below oil injection pump.

Remove bleed screw to allow oil to flow.



Section 06 OIL SYSTEM

Sub-Section 02 (OIL INJECTION PUMP, REPAIR AND ADJUSTMENT)

Keep bleeding until all air has escaped from line. Make sure no air bubbles remain in oil feed line.

Reinstall and tighten bleed screw.

Wipe any oil spillage.

Check small oil lines between pump and intake manifold. They must be full of oil.

If not, run engine at idle speed while manually holding pump lever in fully open position. Do not activate throttle lever.

CAUTION : Water must be supplied to cool engine with coupler hose (P / N 295 500 099).

CHECKING OPERATION

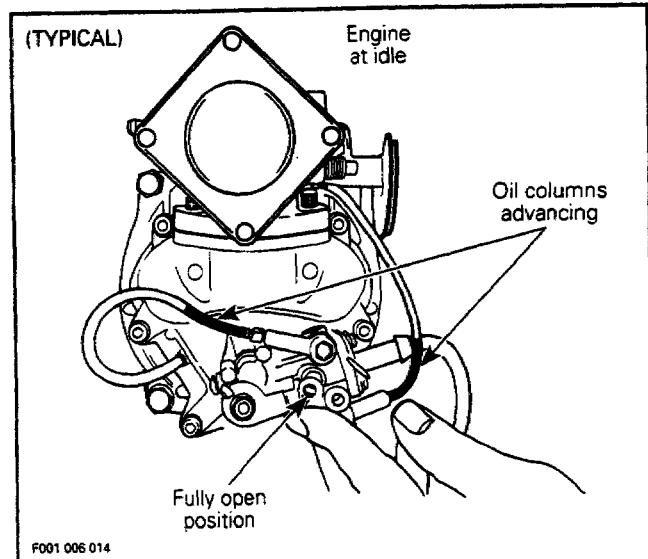
On Watercraft

NOTE : Main oil line must be full of oil. See bleeding procedure above.

Unscrew banjo fittings from pump. Start engine and stop it as soon as it fires.

Ensure that oil level in small oil lines is passed banjo fitting by about 25 mm (1 in) (oil lines are clear tube, therefore the verification can be done easily). Repeat the procedure until this condition is attained.

Reconnect banjo fittings with a washer on each side, start engine and run at idle while holding the pump lever in fully open position. Oil columns must advance into small oil lines.



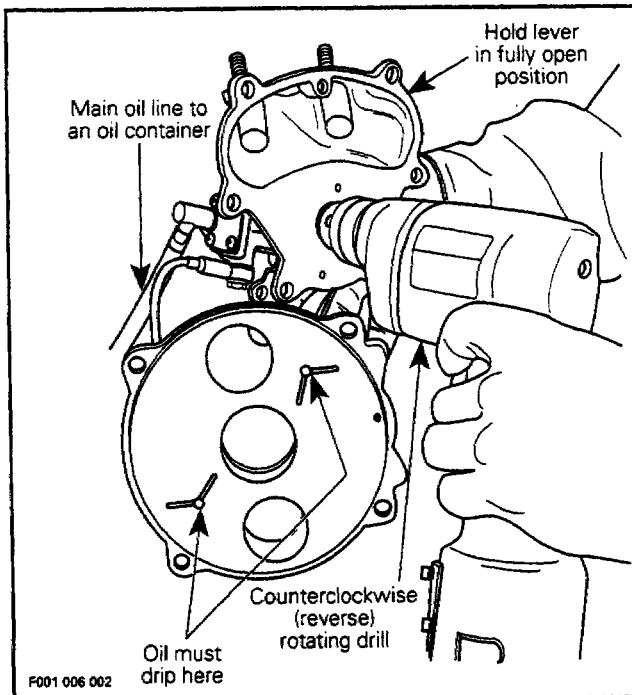
If not, remove pump assembly and check the pump gear and drive shaft (if applicable) for defects, replace as necessary. Test pump as described below :

NOTE : Through normal use, oil level must not drop in small tubes. If oil drops, verify check valve operation in banjo fittings. Replace as necessary.

Bench Test

The oil pump must be removed out of watercraft.

Connect a hose filled with injection oil to main line fitting. Insert other hose end in an injection oil container. Using a counterclockwise (reverse position) rotating drill rotate pump shaft. Oil must drip from outer holes while holding lever in a fully open position. If not replace pump.



OIL SYSTEM PRESSURIZATION

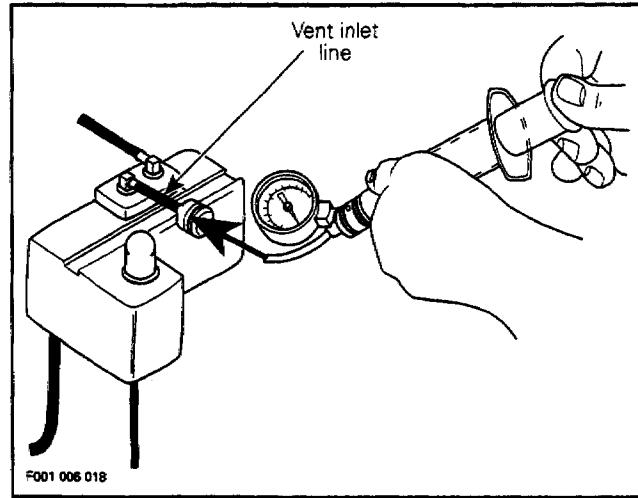
CAUTION : Whenever oil system components are disconnected or replaced, a pressure test must be done before starting engine and / or releasing watercraft to customer. Ensure to verify oil line ends for damage. Always cut damaged end before reinstallation.

Pressure Test

Proceed as follows :

- Fill up oil reservoir
- Install hose pinchers (P / N 295 000 076) on oil inlet lines close to oil pump and to rotary valve.
- Install a hose pincher (P / N 295 000 076) on oil return line.
- Connect pump gauge tester to oil reservoir vent inlet line.
- Pressurize oil system to 21 kPa (3 PSI). If pressure is not maintained locate leak and repair / replace component leaking. To ease leak search spray a solution of soapy water on components, bubbles will indicate leak location.

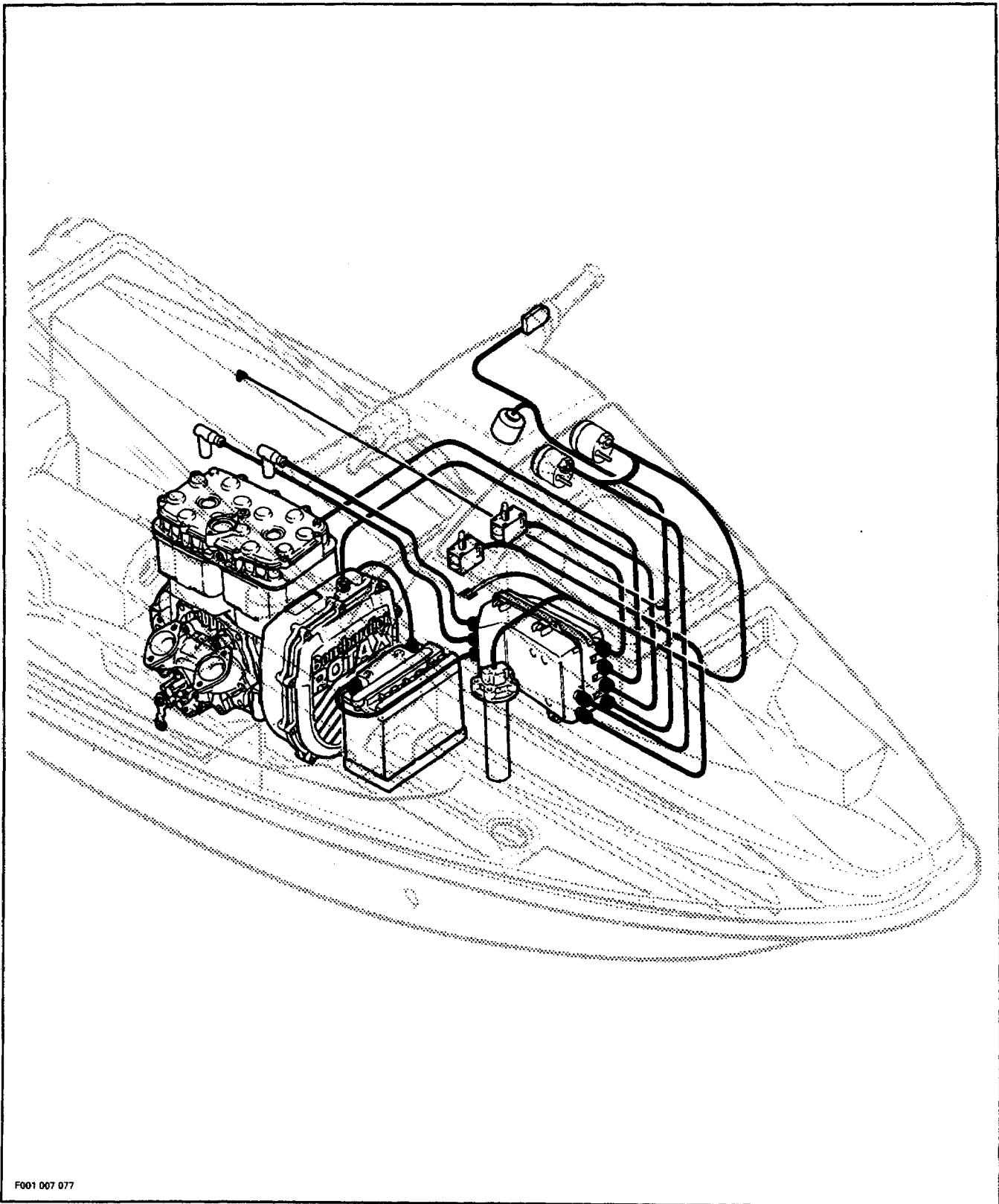
NOTE : To minimize time of oil system pressurization the oil reservoir should be quite full. The system must maintain a pressure of 21 kPa (3 PSI) for at least 10 minutes. Never pressurize over 21 kPa (3 PSI).



CAUTION : If any leak is found, do not start the engine and wipe off any oil leakage. Failure to correct a leak could cause serious damage to engine components.

Remove hose pinchers from inlet lines and return line.

ELECTRICAL



WIRING DIAGRAM

WIRING COLOR CODES

First color of a wire is the main color. Second color is the tracer color.

Ex. : YELLOW / BLACK is a YELLOW wire with a BLACK tracer.

Some wires have a colored-identification tube near wire terminal. On wires having such a tube, tube color (NOT wire color) will be used.

Ex. : A BLUE wire with a yellow identification tube is referred as a YELLOW wire.

Color Codes

YL	=	YELLOW
BK	=	BLACK
BR	=	BROWN
BL	=	BLUE
GN	=	GREEN
GY	=	GREY
PU	=	PURPLE
RD	=	RED
TA	=	TAN
WH	=	WHITE
OR	=	ORANGE

◆ **WARNING :** Ensure all terminals are properly crimped on wires and connector housings are properly fastened. Ensure electrical box is watertight.

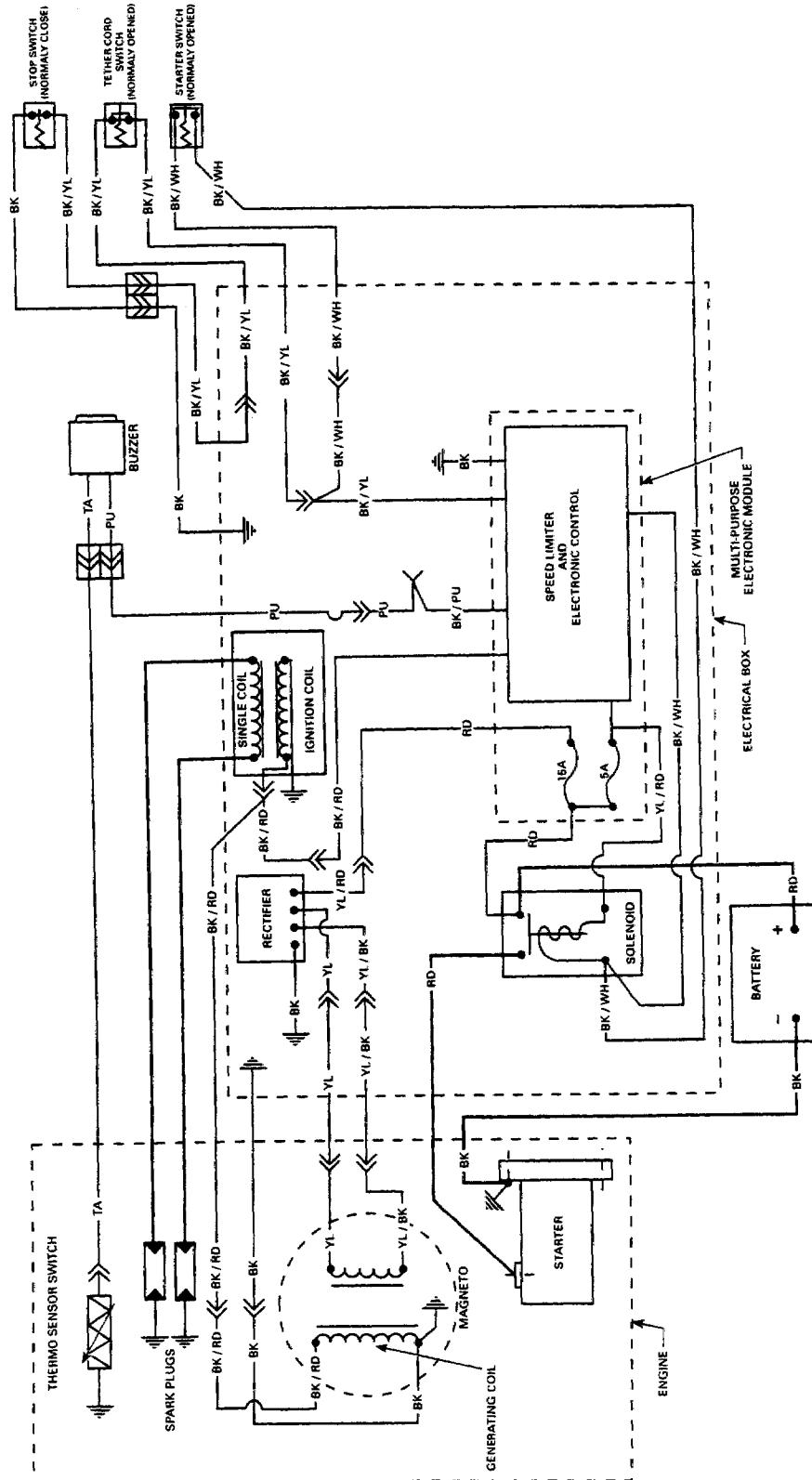
WIRE TERMINAL REMOVAL

To remove terminal from connector housing use Snap-on TT600-4 tool.

Section 07 ELECTRICAL

Sub-section 01 (WIRING DIAGRAM)

WIRING DIAGRAM FOR 5806, 5808 AND 5813 MODELS

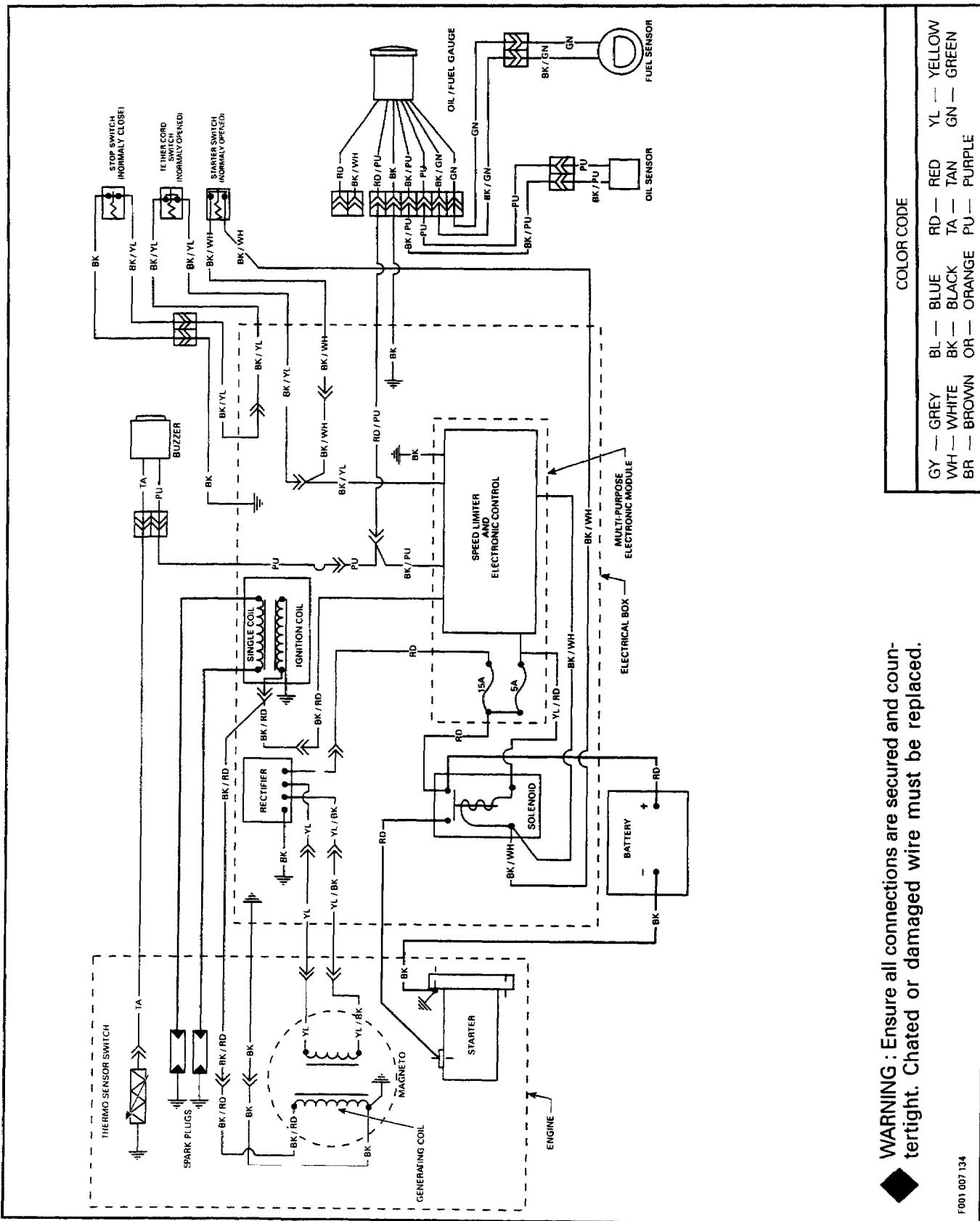


WARNING: Ensure all connections are secured and countertight. Chafed or damaged wire must be replaced.

COLOR CODE	
GY — GREY	BL — BLUE
WH — WHITE	BK — BLACK
BR — BROWN	OR — ORANGE
	RD — RED
	TA — TAN
	GN — GREEN
	PU — PURPLE

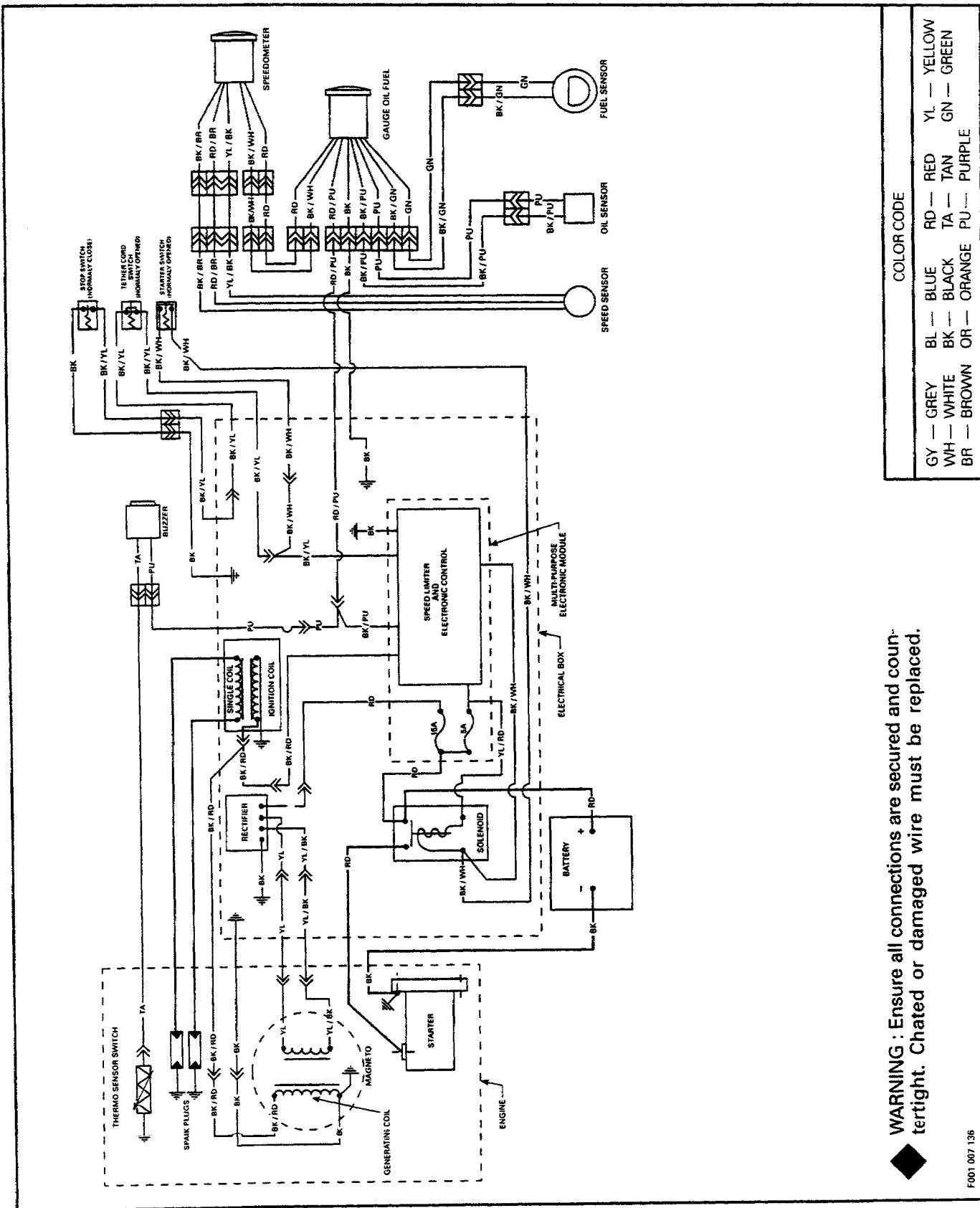
Section 07 ELECTRICAL
Sub-section 01 (WIRING DIAGRAM)

WIRING DIAGRAM FOR 5807 MODEL



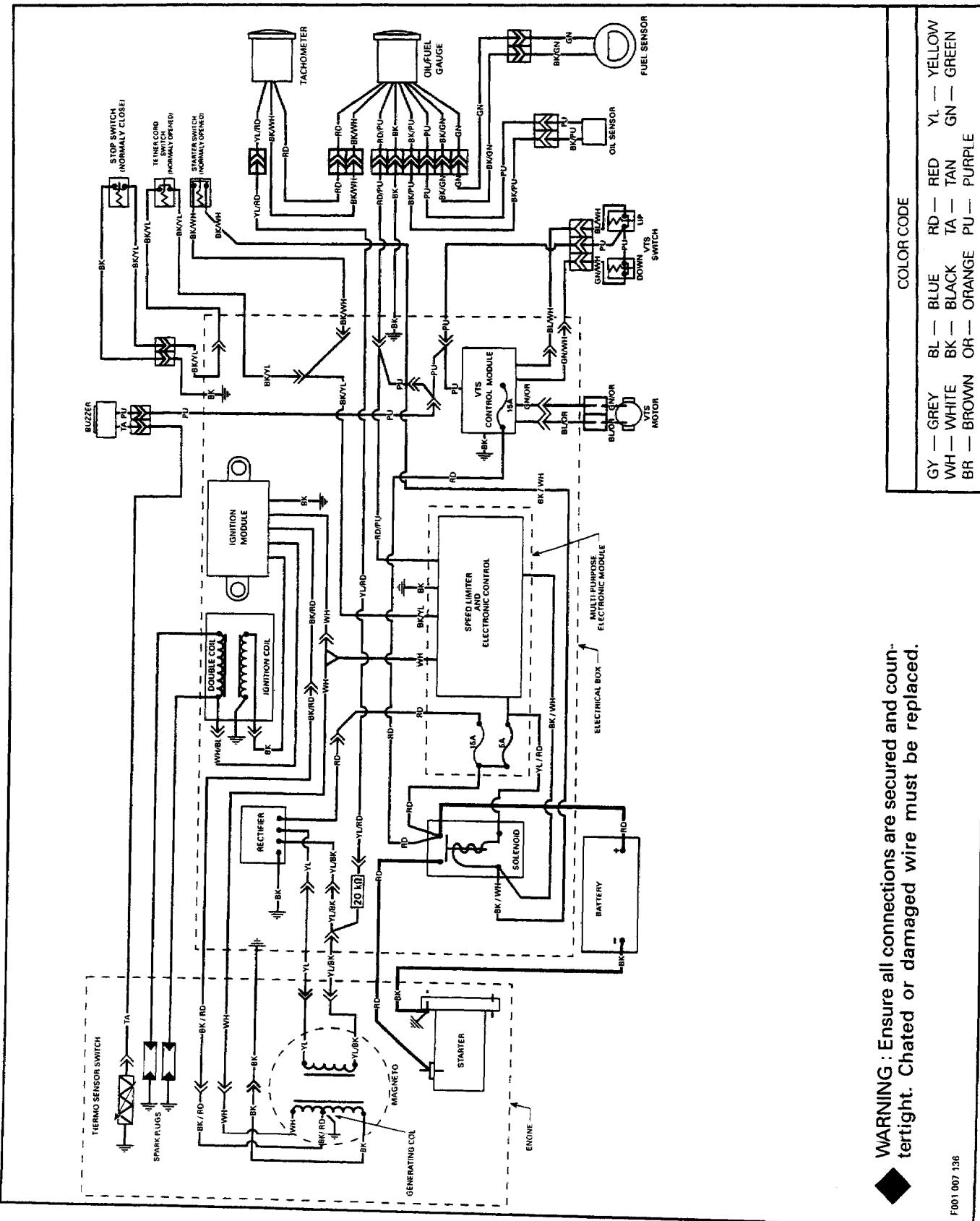
Section 07 ELECTRICAL
Sub-section 01 (WIRING DIAGRAM)

WIRING DIAGRAM FOR 5861 MODEL



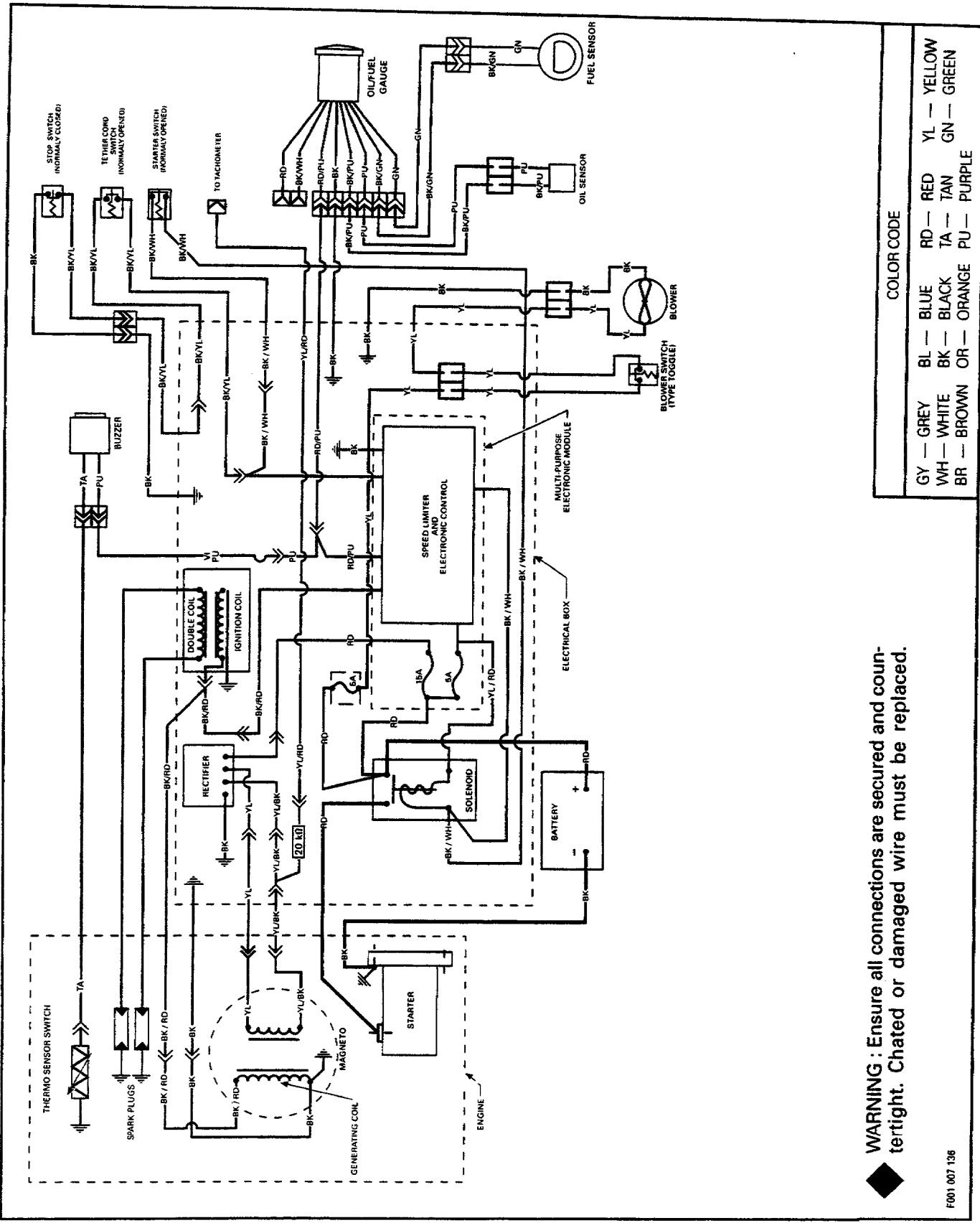
Section 07 ELECTRICAL
Sub-section 01 (WIRING DIAGRAM)

WIRING DIAGRAM FOR 5852 MODEL



Section 07 ELECTRICAL
Sub-section 01 (WIRING DIAGRAM)

WIRING DIAGRAM FOR 5820 MODEL



IGNITION TIMING

ELECTRONIC IGNITION SYSTEM

This section is mainly divided in two parts, the first one using a top dead center (TDC) gauge to verify PTO flywheel timing mark position. The second one using a stroboscopic timing light to check ignition timing.

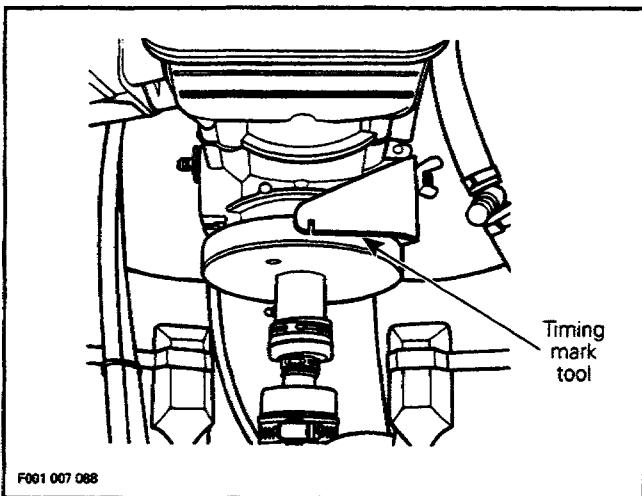
Flywheel timing mark position verification is required to :

1. Troubleshoot a missing or broken magneto flywheel woodruff key.
2. Troubleshoot a magneto flywheel corresponding to a different engine type.
3. Scribe the timing mark on a new service PTO flywheel.

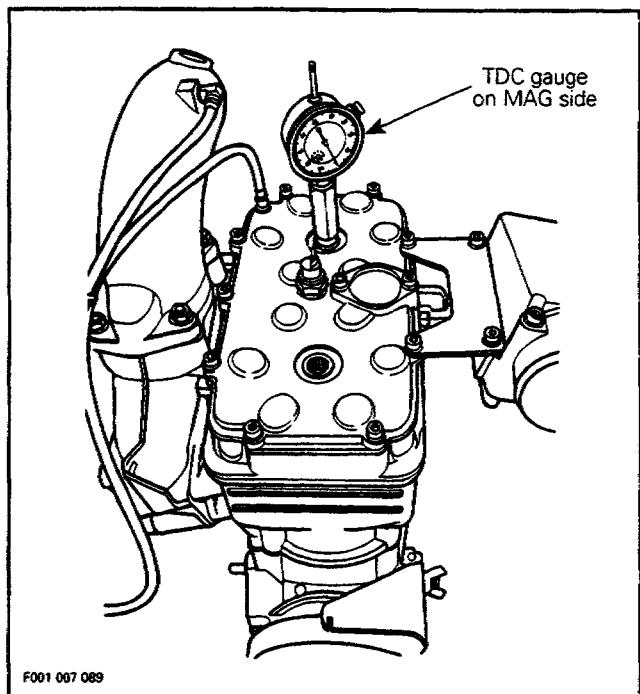
Always verify PTO flywheel timing mark position before checking ignition timing.

Verifying PTO Flywheel Timing Mark Position

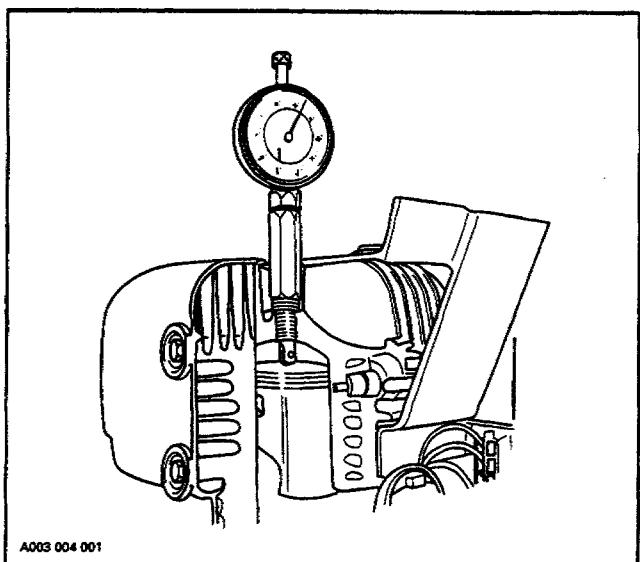
1. Disconnect MAG side spark plug wire and connect wire to grounding device then remove spark plug.
2. Remove PTO flywheel guard.
3. Install timing mark tool (P / N 295 000 102) on engine right side using wing nut previously removed.



4. Install and adjust a TDC gauge (P / N 295 000 065) in spark plug hole as follows :



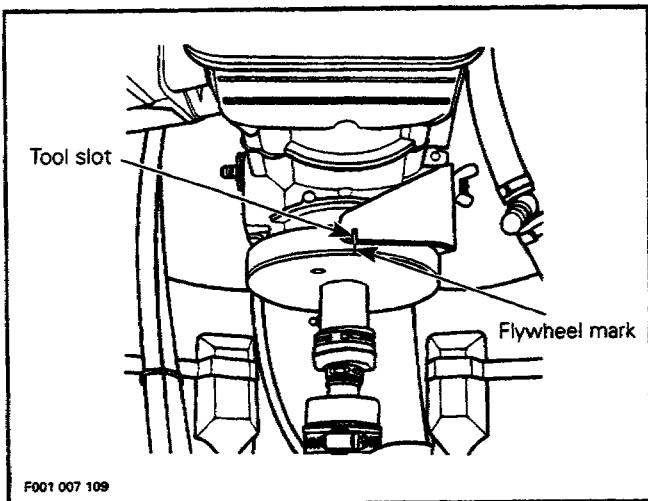
Rotate PTO flywheel counterclockwise (when facing it) until piston is just before top dead center.



Section 07 ELECTRICAL

Sub-Section 02 (IGNITION TIMING)

- Loosen adaptor lock nut then holding gauge with dial facing toward PTO, screw adaptor in spark plug hole.
- Slide gauge far enough into adaptor to obtain a reading then finger tighten adaptor lock nut.
- Rotate PTO flywheel counterclockwise until piston is at Top Dead Center.
- Unlock outer ring of dial and turn it until zero (0) on dial aligns with pointer.
- Lock outer ring in position.
- 5. From this point, rotate flywheel back 1/4 turn then rotate it counterclockwise to reach 2.65 mm (.104 in) BTDC (Before Top Dead Center) for 587 engine or 2.59 mm (0.102 in) BTDC for 657 engine.
- 6. Using timing tool slot as reference mark, scribe in middle of tool slot a mark onto PTO flywheel.



This mark becomes the reference when using stroboscopic timing light.

▼ CAUTION : Timing mark position verification cannot be used as a timing procedure, therefore, always check the timing with a stroboscopic timing light at 6000 RPM after the marks have been checked.

Checking Ignition Timing

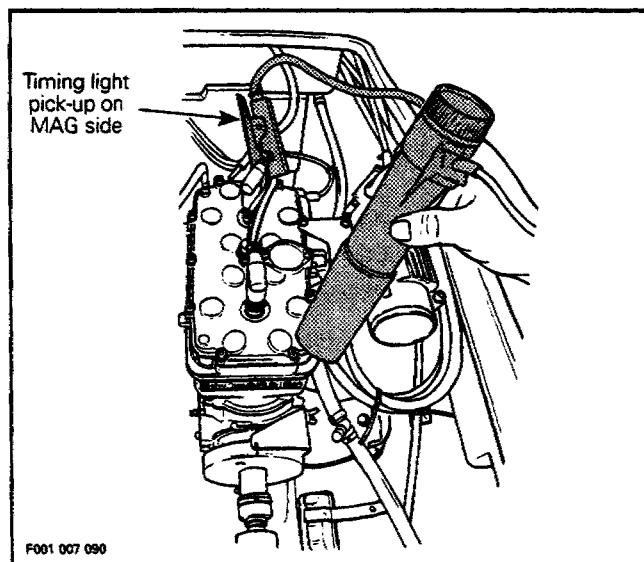
NOTE : To perform this procedure it is recommended to use a stroboscopic timing light rated to work up to 6000 RPM.

To check ignition timing, use a timing light (P/N 295 000 078).

NOTE : This timing light is battery powered (two batteries, type C) and therefore needs no auxiliary power source.

The ignition components are affected by temperature variation, therefore, timing must be checked when engine is cold, after MAXIMUM 20 seconds idling.

1. Connect timing light pick-up to MAG side spark plug lead.



2. Connect an induction-type tachometer to spark plug wire.
3. Start engine and point timing light straight in line with timing tool slot. Bring engine to 6000 RPM for a brief instant.

NOTE : On this NIPPONDENSO system, timing advance decreases as engine speed increases. When marks are aligned at 6000 RPM, spark occurrence is still before top dead center.

4. Check if PTO flywheel mark (or reference one previously scribed) aligns with timing tool slot.

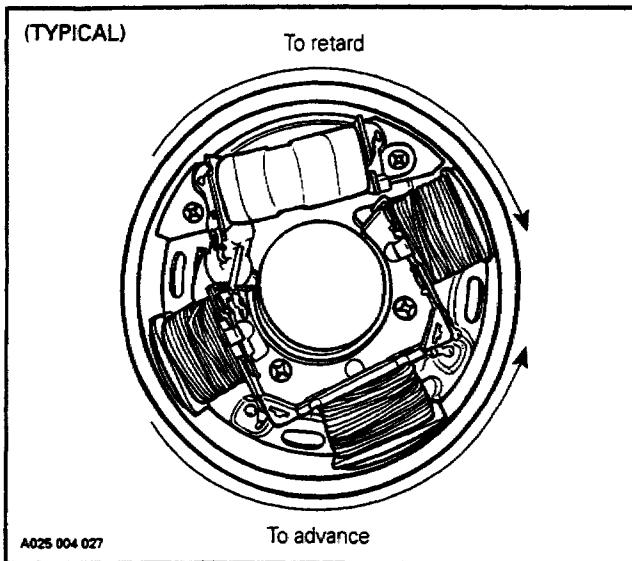
▼ CAUTION : If engine is to be run more than a few minutes, connect coupler hose (P/N 295 500 099) to properly cool engine.

If timing marks align, timing is correct.

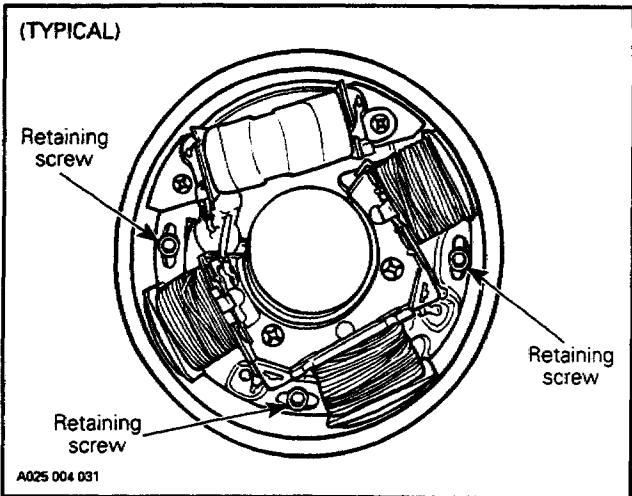
▼ CAUTION : Always verify timing marks with TDC gauge before checking the timing. Particularly if PTO flywheel has been replaced, it could possibly move slightly.

IGNITION TIMING ADJUSTMENT

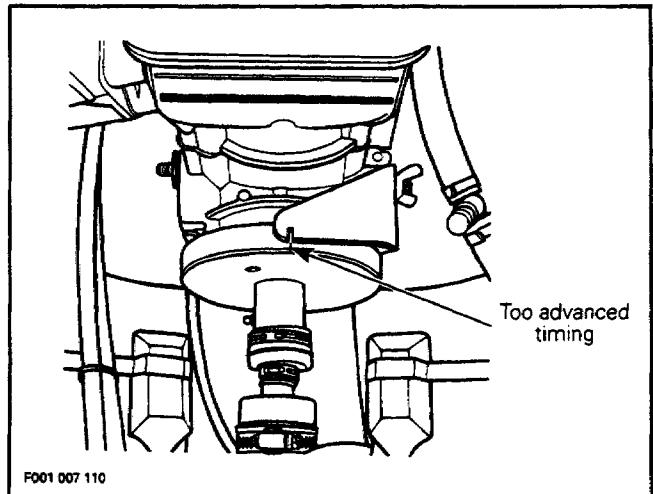
Timing is performed by moving armature plate, clockwise to retard spark occurrence or counterclockwise to advance.



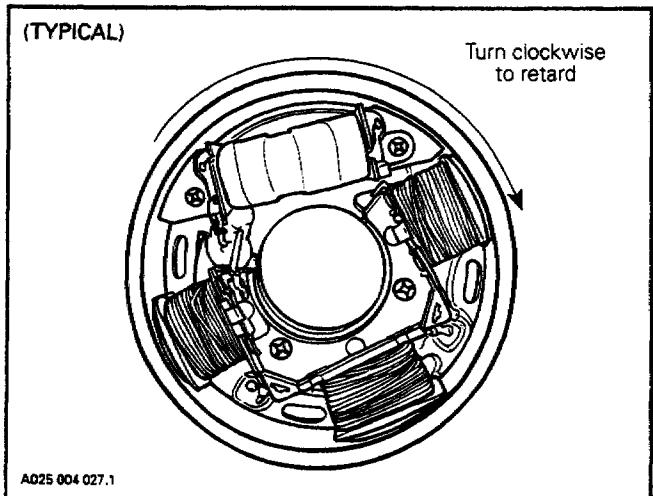
To adjust, loosen three armature plate retaining screws and slightly rotate armature plate in proper direction.



When PTO flywheel mark is on right side of timing tool slot, it indicates advanced timing.



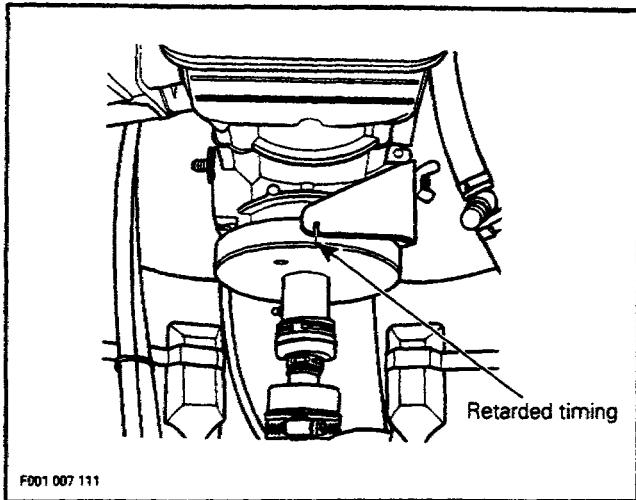
In this case, turn armature plate clockwise.



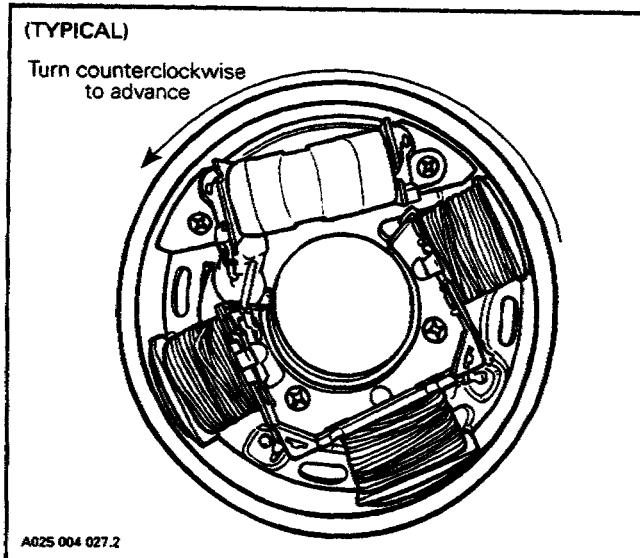
When PTO flywheel mark is on left side of timing tool slot, it indicates retarded timing.

Section 07 ELECTRICAL

Sub-Section 02 (IGNITION TIMING)



In this case, turn armature plate counterclockwise.



After adjustment, tighten armature plate retaining screws.

▼ **CAUTION : Armature plate screws must have Loctite 242 (blue) (P / N 293 800 015) applied before tightening. Make sure armature plate screws are well secured.**

Reinstall removed parts.

Recheck ignition timing (make sure engine is cold).

BATTERY

TROUBLESHOOTING

Symptom	Cause	Remedy
Discharged or weak battery	1. Battery posts and / or cable terminal oxidized 2. Loose or bad connections 3. Faulty battery (sulfated, doesn't keep a full charge, damaged casing, loose post) *4. 15 amp fuse burnt or faulty rectifier **5. Faulty charging coil	Clean and coat with dielectric grease Check wiring and connectors cleanliness, damaged or short circuit Replace First check charging coil. If it is in good condition replace fuse or rectifier Replace

* To test charging system, refer to CDI AND CHARGING SYSTEMS 07-06 then look for **current test**.

** To test charging coil, refer to CDI AND CHARGING SYSTEMS 07-06 then look for **battery charging coil**.

REMOVAL

◆ **WARNING :** Battery black negative cable must always be disconnected first and connected last. Never charge or boost battery while installed on vehicle. Electrolyte or fuel vapors can be present in engine compartment and a spark might ignite them and possibly cause personal injuries.

Proceed as follows :

1. Disconnect the black negative cable first.
2. Then disconnect the red cable last.
3. Remove the vent line from the battery.
4. Remove the holding straps.
5. Withdraw battery from vehicle being careful not lean it so that electrolyte flows out of vent elbow.

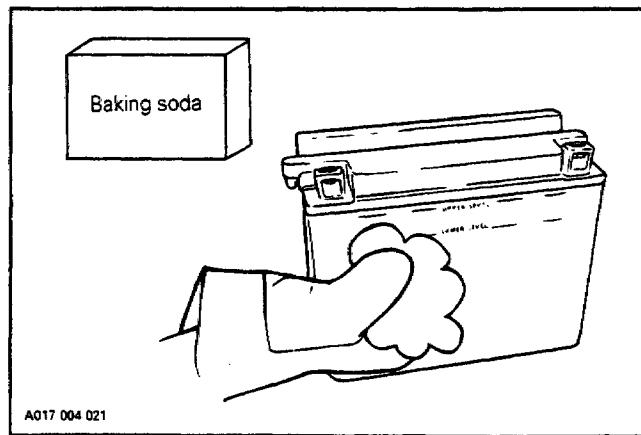
◆ **CAUTION :** Should any electrolyte spillage occur, immediately wash off with a solution of baking soda and water to prevent damage to vehicle components.

◆ **WARNING :** Electrolyte is poisonous, dangerous and explosive. It contains sulfuric acid and can cause severe burns. Avoid contact with eyes, skin and clothing.

CLEANING

Clean the battery casing, caps, cables and battery posts using a solution of baking soda and water.

◆ **CAUTION :** Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte chemical properties.



Remove corrosion from battery cable terminals and battery posts using a firm wire brush. Rinse with clear water and dry well.

INSPECTION

Visually inspect battery casing for cracks or other possible damage. If casing is damaged, replace battery and thoroughly clean battery tray and close area with water and baking soda.

◆ **WARNING :** Should the battery casing be damaged, wear a suitable pair of non-absorbent gloves when removing the battery by hand.

Inspect battery posts for security of mounting.

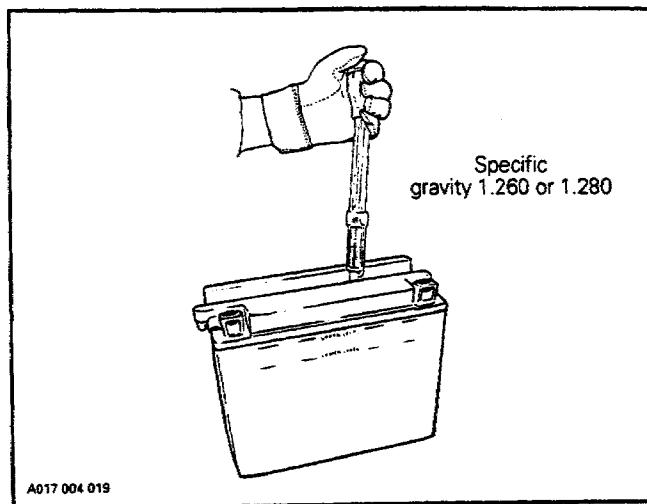
Inspect for cracked or damaged battery caps, replace defective caps.

◆ **WARNING :** Battery caps do not have vent holes. Make sure that vent line is not obstructed.

Section 07 ELECTRICAL

Sub-Section 03 (BATTERY)

HYDROMETER TEST



A hydrometer measures the charge of a battery in terms of specific gravity of the electrolyte. Most hydrometers give a true reading at 21°C (70°F).

In order to obtain correct readings, adjust the initial reading by **adding .004** points to the hydrometer readings for each 5.5°C (10°F) **above** 21°C (70°F) and by **subtracting .004** point for every 5.5°C (10°F) **below** 21°C (70°F).

This chart will be useful to find the correct reading.

ELECTROLYTE TEMPERATURE		OPERATION TO PERFORM	
°C	°F		
38	100	.012	
32	90	add .008	to the reading
27	80	.004	
21	70	correct reading	
16	60	.004	
10	50	subtract .008	from the reading
4	40	.012	
-1	30	.016	

EXAMPLE NO. 1

Temperature below 21°C (70°F) :
Hydrometer reading : 1.250
Electrolyte temperature : -1°C (30°F)
Subtract .016 Sp. Gr.
Corrected Sp. Gr. is 1.234

EXAMPLE NO. 2

Temperature above 21°C (70°F) :
Hydrometer reading : 1.235
Electrolyte temperature : 38°C (100°F)
Add .012 Sp. Gr.
Corrected Sp. Gr. is 1.247

BATTERY STORAGE

Disconnect and remove battery from the vehicle. Check electrolyte level in each cell, add distilled water up to upper level line.

▼ CAUTION : Do not overfill.

The battery must always be stored in fully charged condition. If required, charge until specific gravity of 1.260 is obtained.

▼ CAUTION : Battery electrolyte temperature must not exceed 50°C (122°F). The casing should not feel hot.

Clean battery terminals and cable connections using a wire brush. Apply a light coat of dielectric grease (P / N 293 550 004) or petroleum jelly on terminals.

Clean battery casing and caps using a solution of baking soda and water. (Do not allow cleaning solution to enter battery, otherwise it will destroy the electrolyte). Rinse battery with clear water and dry well using a clean cloth.

Store battery on a wooden shelf in a cool dry place. Such conditions reduce self-discharging and keep fluid evaporation to a minimum. Keep battery away from dew, high moisture and direct sunlight.

During the storage period, recheck electrolyte level and specific gravity readings at least every month. As necessary, keep the battery at its upper level line and near full charge as possible (trickle charge).

ACTIVATION OF NEW BATTERY

◆ WARNING : Never charge or boost battery while installed on vehicle.

A new battery is factory fresh dry charged. For storage purposes, it is fitted with a temporary sealing tube.

Do not remove the sealing tube or loosen battery caps unless activation is desired.

▼ CAUTION : Do not leave a new battery standing on a shelf without its sealing tube.

In case of accidental premature removal of caps or sealing tube, battery should be given a full charge.

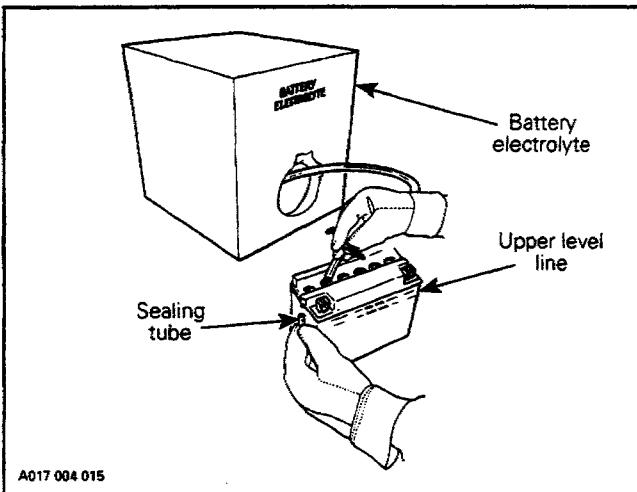
Perform the following operations anytime a new battery is to be installed.

1. Remove the sealing tube from the vent elbow.

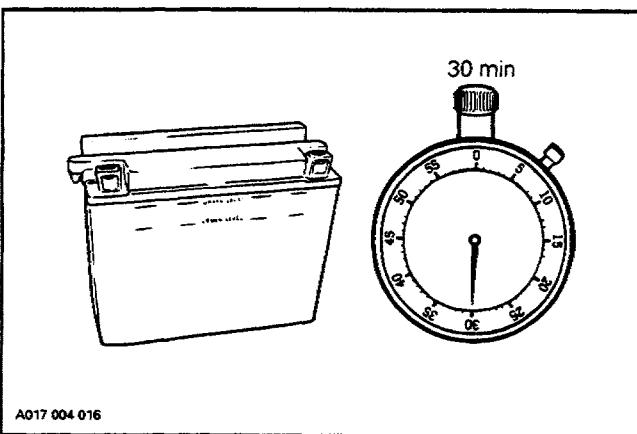
◆ WARNING : Failure to remove the sealing tube could result in an explosion.

Section 07 ELECTRICAL

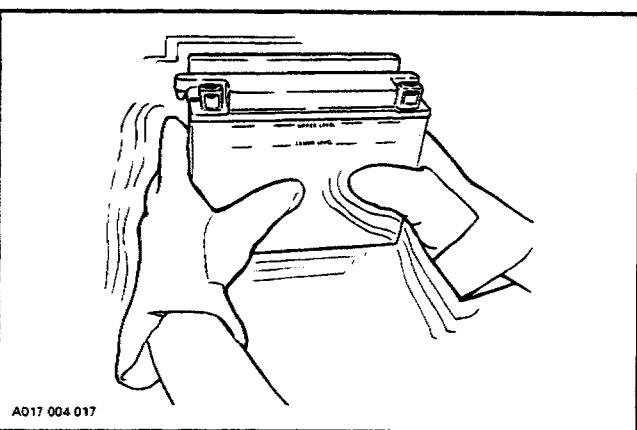
Sub-Section 03 (BATTERY)



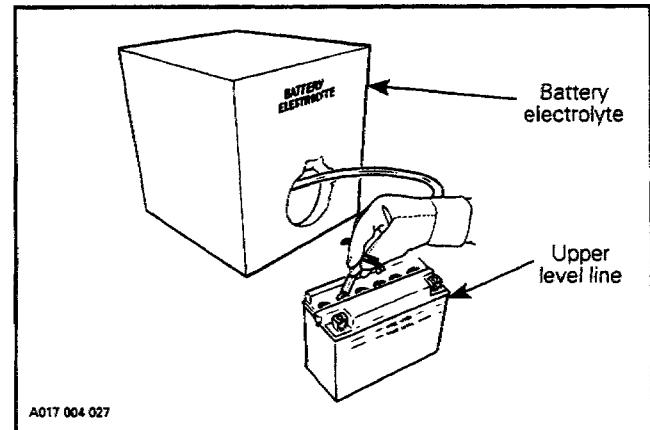
2. Remove caps and fill battery to UPPER LEVEL line with electrolyte (specific gravity : 1.260 or 1.280 at 21°C (70°F)).
3. Allow the battery to stand for 30 minutes MINIMUM so that electrolyte soak through battery cells.



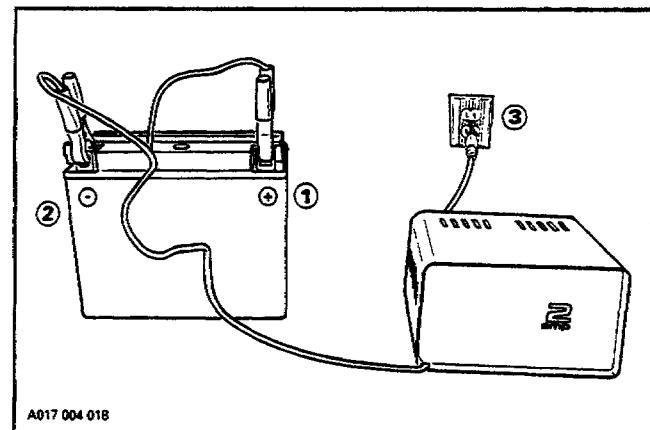
4. Allow gas bubbles to escape by lightly shaking battery by hand.



5. Readjust the electrolyte level to the UPPER LEVEL line.



6. Connect a 2 A battery charger for three to five hours.



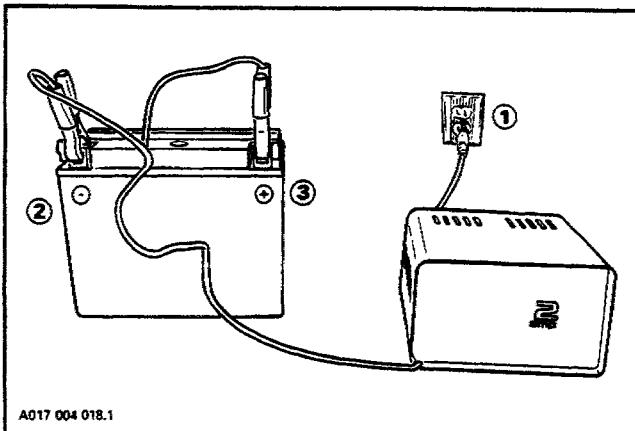
▼ CAUTION : If charging rate raises higher than 2.4 A reduce it immediately. If cell temperature rises higher than 50°C (122°F) or if the casing feels hot, discontinue charging temporarily or reduce the charging rate.

◆ WARNING : Gases given off by a battery being charged are highly explosive. Always charge in a well ventilated area. Keep battery away from cigarettes or open flames. Always turn battery charger off prior to disconnecting cables. Otherwise a spark will occur and battery might explode.

Section 07 ELECTRICAL

Sub-Section 03 (BATTERY)

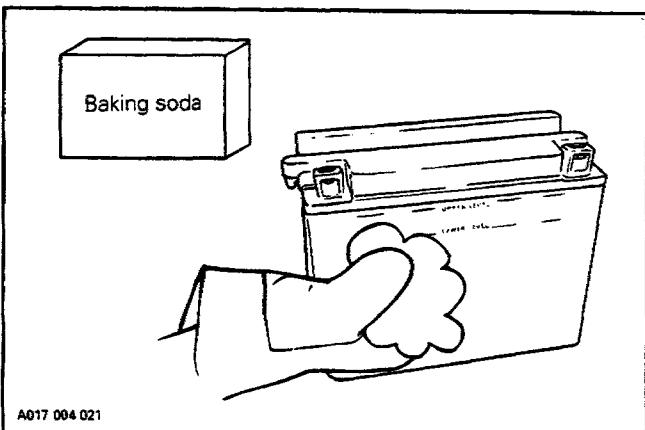
7. Disconnect battery charger.



A017 004 018.1

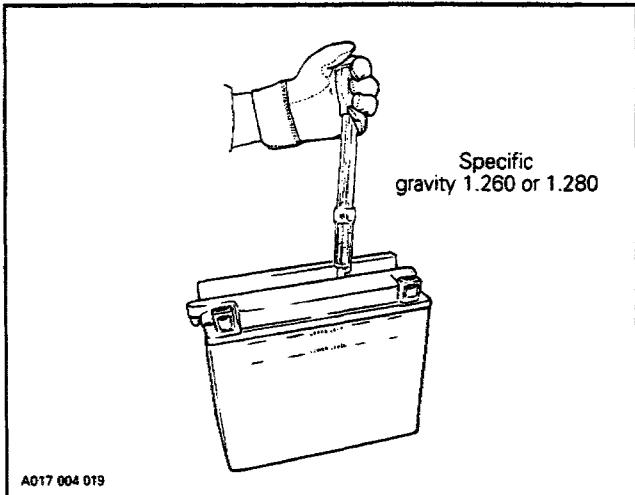
10. If electrolyte level has dropped after charging, fill with distilled water to UPPER LEVEL line. After water is added, continue charging for one to two hours to mix water with electrolyte.

11. Reinstall caps and clean any electrolyte spillage using a solution of baking soda and water.



A017 004 021

8. Test battery state of charge. Use a hydrometer.



A017 004 019

▼ CAUTION : Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte chemical properties.

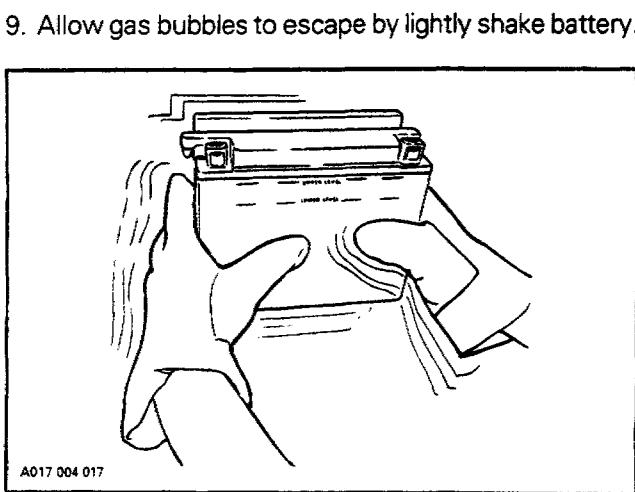
12. Reinstall battery. Hook up battery cables observing correct polarity and coat terminals with silicone dielectric grease (P / N 293 550 004) or petroleum jelly. Install vent line.

○ NOTE : On XP model (5852) a check valve is installed on vent line to prevent water to flow back into battery.

▼ CAUTION : Negative battery terminal should always be disconnected FIRST and reconnected LAST.

◆ WARNING : Vent line must be free and open. A kinked or bent line will restrict ventilation and create gas accumulation that might result in an explosion.

○ NOTE : It is recommended to verify the battery charge once a month. If necessary, fully charge battery.



A017 004 017

SERVICING

Electrolyte Level

Since a battery has been activated (see above), add distilled water to top up electrolyte.

TIPS FOR CHARGING A USED BATTERY

CAUTION : Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

For best results, battery should be charged when the electrolyte and the plates are at room temperature. A battery that is cold may not accept current for several hours after charging begun.

Do not charge frozen battery. If the battery charge is very low, the battery may freeze. If it is suspected to be frozen, keep it in a heated area for about two hours before charging.

WARNING : Do not place battery near open flame.

The time required to charge a battery will vary depending on some factors such as :

- Battery temperature : The charging time is increased as the temperature goes down. The current accepted by a cold battery will remain low. As the battery warms up, it will accept a higher rate of charge.
- State of charge : Because the electrolyte is nearly pure water in a completely discharged battery, it cannot accept current as well as electrolyte. This is the reason the battery will not accept current when the charging cycle first begins. As the battery remains on the charger, the current from the charger causes the electrolytic acid content to rise which makes the electrolyte a better conductor and then, the battery will accept a higher charging rate.
- Type of charger : Battery chargers vary in the amount of voltage and current that they can supply. Therefore, the time required for the battery to begin accepting measurable current will also vary.

Charging a Very Flat or Completely Discharged Battery :

Unless this procedure is properly followed, a good battery may be needlessly replaced.

- Measure the voltage at the battery posts with an accurate voltmeter. If it is below 10 volts, the battery will accept current at very low rate, in terms of milliamperes, because electrolyte is nearly pure water as explained above. It could be some time before the charging rate increases. Such low current flow may not be detectable on some charger ammeters and the battery will seem not to accept any charge.
- Exceptionally for this particular case, set the charger to a high rate.

NOTE : Some chargers have a polarity protection feature which prevents charging unless the charger leads are connected to the correct battery terminals. A completely discharged battery may not have enough voltage to activate this circuitry, even though the leads are connected properly. This will make it appear that the battery will not accept a charge. Follow the charger manufacturer's instruction telling how to bypass or override this circuitry so that the charger will turn on and charge a low-voltage battery.

- Since the battery chargers vary in the amount of voltage and current they provide, the time required for the battery to accept measurable charger current might be up to approximately 10 hours or more.
- If the charging current is not up to a measurable amount at the end of about 10 hours, the battery should be replaced.
- If the charging current is measurable before the end or at the end of about 10 hours, the battery is good and charging should be completed in the normal manner as specified in **Activation of a new battery**.
- It is recommended that any battery recharged by this procedure be load tested prior to returning it to service.

Section 07 ELECTRICAL

Sub-Section 03 (BATTERY)

BATTERY CHARGING EQUIPMENT

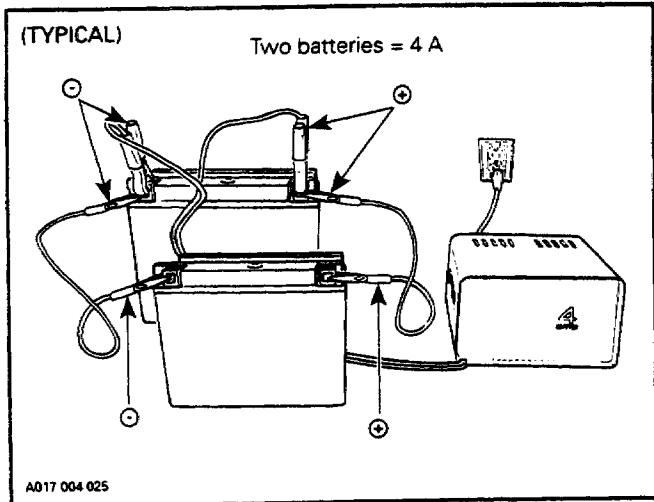
The battery charger should have an adjustable charging rate. Variable adjustment is preferred, but a unit which can be adjusted in small increments is acceptable.

The battery charger must be equipped with an ammeter capable of accurately measuring current of less than one ampere.

Charging Two or More Batteries at a Time

Connect all positives together and use a charger with a capacities (rated) equal to : number of battery to be charged multiply by 2 A.

For example : Charging five batteries at a time requires a 10 A rated charger ($5 \times 2 \text{ A} = 10 \text{ A}$).



INSTALLATION OF BATTERY

◆ **WARNING :** Always connect battery cables exactly in the specified order, red positive cable first black negative cable last.

Proceed as follows :

1. Install battery in its emplacement.
2. Secure vent line to the battery. Ensure vent line is not kinked or obstructed.

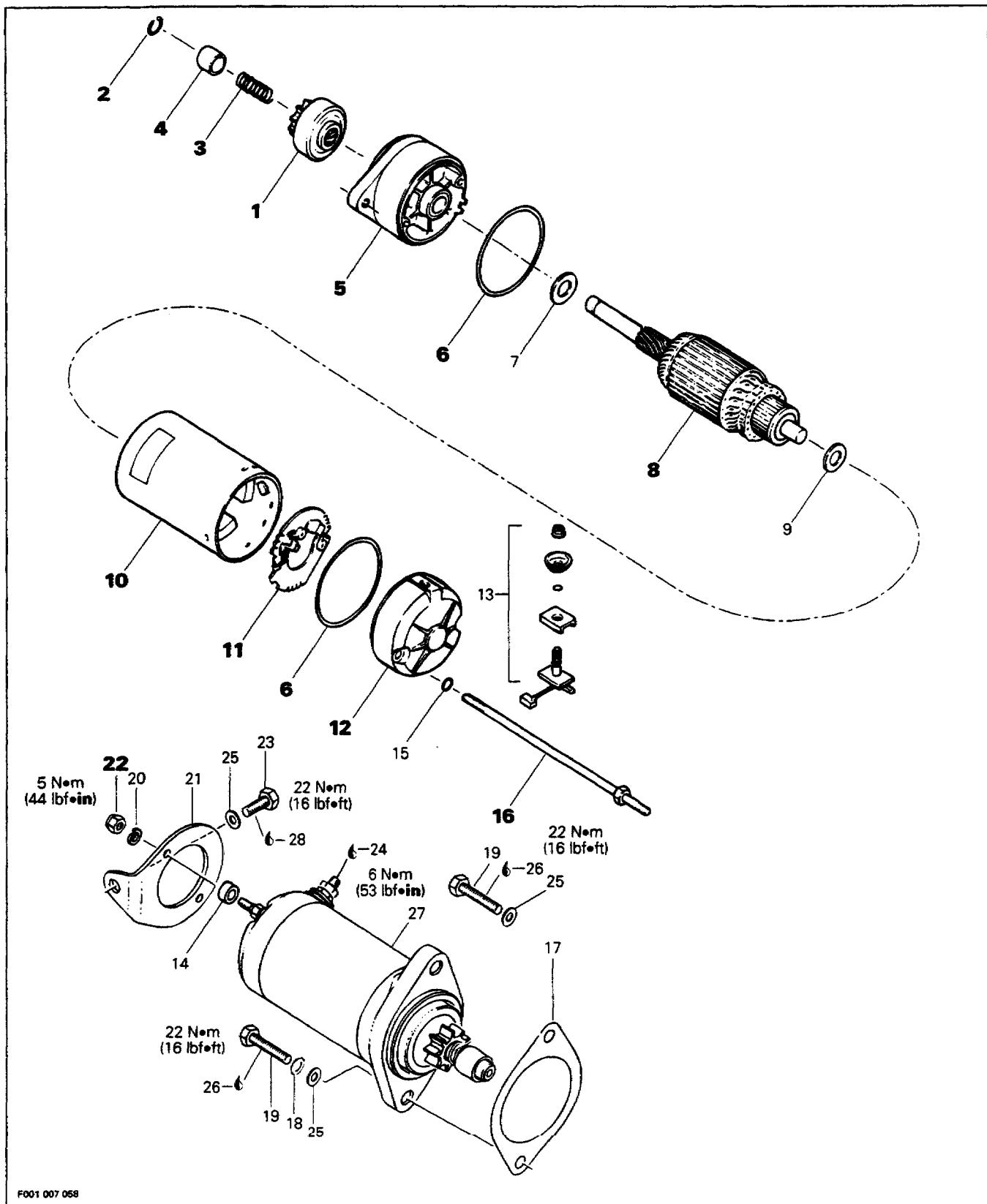
◆ **NOTE :** Ensure check valve is not blocked if applicable.

◆ **WARNING :** Vent line must be free and open. If not, it will restrict ventilation and create a gas accumulation that could result in an explosion. Gases given off by a battery being charged are highly explosive. Always charge in a well ventilated area. Keep battery away from cigarettes or open flames. Avoid skin contact with electrolyte.

3. First connect red positive cable.
4. Then connect black negative cable last.
5. Apply anticorrosion product (salt water resistant) such as dielectric grease (P / N 293 550 004) or the equivalent on battery posts.
6. Verify cable routing and attachment.

Section 07 ELECTRICAL
Sub-Section 04 (ELECTRIC STARTER)

ELECTRIC STARTER



Section 07 ELECTRICAL

Sub-Section 04 (ELECTRIC STARTER)

COMPONENTS

1. Starter clutch assembly
2. Circlip
3. Spring
4. Pinion stop collar
5. Starter clutch housing
6. O-ring (2)
7. Washer
8. Armature
9. Thrust washer
10. Yoke assembly
11. Brush holder
12. Commutator end frame
13. Brush kit
14. Spacer (2)
15. O-ring (2)
16. Through bolt (2)
17. Gasket
18. External teeth lock washer 8 mm
19. Hexagonal head screw M8 x 30 (2)
20. Lock washer 5 mm (2)
21. Starter support
22. Elastic stop nut M5 (2)
23. Hexagonal head screw M8 x 16
24. Grease dielectric
25. Washer 8 mm (3)
26. Loctite 271 (red)
27. Starter
28. Loctite 242 (blue)

STARTER SPECIFICATION

Nominal output	0.6 kW				
Voltage	12 V				
Rated time	30 seconds				
Rotation	Counterclockwise (viewed from pinion side)				
Weight	Approx. 2 kg (4.4 lb)				
Performance	Test condition				
Spec. at 20°C (68°F)	No load	11.5 V	20 A max.	5500 RPM	
	Load	8.5 V	170 A max.	2200 RPM	2 N•m (18 lbf•in)
	Stall	5 V	350 A max.	0 RPM	3 N•m (27 lbf•in)
Battery	19 Ah				

TROUBLESHOOTING

Causes of troubles are not necessarily related to starter but may be due to a faulty battery, switches, electrical cables and / or connections. Consult the following troubleshooting table.

◆ WARNING : Short circuiting electric starter is always a danger, therefore disconnect the battery ground cable before carrying out any kind of maintenance on starting system. Do not place tools on battery.

Section 07 ELECTRICAL
Sub-Section 04 (ELECTRIC STARTER)

STARTING SYSTEM TROUBLESHOOTING TABLE

SYMPTOM	CAUSE	REMEDY
Starter does not turn.	Burnt fuse 5A. Weak battery. Poor contact of starter switch contact points. Open circuit between starter switch / tether cord switch / stop switch and solenoid switch.	Check wiring condition and replace fuse. Recharge battery. Repair or replace switch. Repair.
Starter turns ; but does not crank the engine.	Poor contact of battery terminal(s). Poor battery ground cable connection. Burnt or poor contact of solenoid switch contact disc. Poor contact of brush. Burnt commutator. Worn commutator segments. Shorted armature. Weak brush spring tension. Weak magnet. Worn bushings. Weak battery. Shorted battery cell(s).	Clean and tighten terminal(s). Clean and tighten. Replace solenoid switch. Straighten commutator and brush. Turn commutator in lathe. Undercut mica. Repair or replace armature. Replace brush holder or spring. Replace yoke assembly. Replace bushings. Recharge battery. Replace battery.
Starter turns, but overrunning clutch pinion does not mesh with ring gear.	Worn clutch pinion gear. Defective clutch. Poor movement of clutch on splines. Worn clutch bushing. Worn starter bushing(s). Worn ring gear.	Replace clutch. Replace clutch. Clean and correct. Replace clutch. Replace bushing(s). Replace ring gear.
Starter motor keeps running.	Shorted solenoid switch winding. Melted solenoid switch contacts. Starter switch returns poorly. Sticking or defective starter clutch. Presence of salt water in the electrical box which gives continuity.	Replace solenoid switch. Replace solenoid switch. Verify if rubber cap holds switch button down or replace starter switch. Lubricate or replace. Verify electrical box watertightness.

Section 07 ELECTRICAL

Sub-Section 04 (ELECTRIC STARTER)

REMOVAL

Disconnect black cable ground connection from battery.

WARNING : Always disconnect ground cable first and reconnect last.

Disconnect red cable connection from battery.

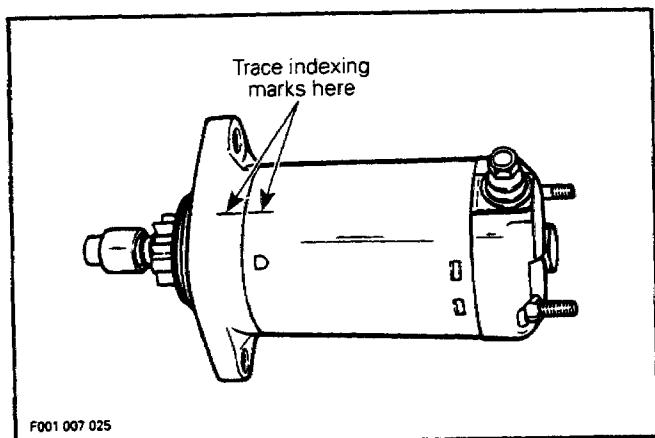
Remove the following parts.

- cables from starter
- screw of starter rear support (item #23)
- starter mount screws (item #19)

DISASSEMBLY

10,11,12,16,22, Yoke, Brush Holder, End Frame, Through Bolt and Nut

Before disassembling, trace index marks on yoke and clutch housing to ease further assembly.



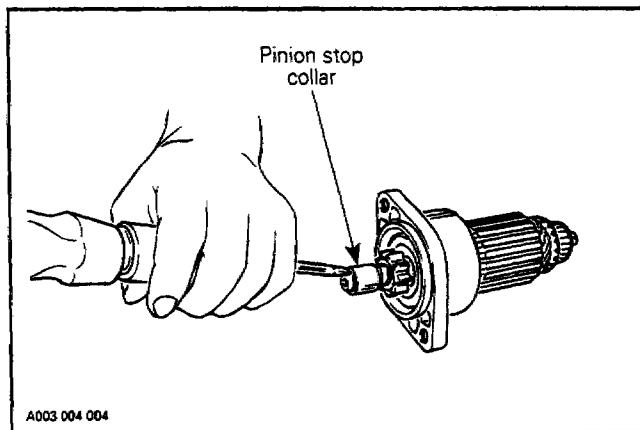
Remove starter support nuts then through bolts. Separate end frame from yoke assembly. Withdraw yoke assembly from armature.

Brush holder can be removed from end frame by unscrewing nut retaining terminal.

Check that the radial play between the armature shaft and end frame is not greater than 0.20 mm (.008 in.). Replace end frame if so.

2,3,4, Circlip, Spring and Pinion Stop Collar

Tap the pinion stop collar using a screwdriver. Remove circlip. Disassemble pinion stop collar and spring.



1,5,6,8, Clutch Ass'y, Housing, O-ring and Armature

Turn assembly counterclockwise to remove it from armature assembly.

Pull housing from armature.

CLEANING

CAUTION : Yoke ass'y and drive unit assembly must not be immersed in cleaning solvent.

Discard all O-rings and gasket.

Clean brushes and holders with a clean cloth soaked in solvent. Brushes must be dried thoroughly with a clean cloth.

Blow brush holders clean using compressed air.

WARNING : Always wear safety glasses when using compressed air.

Remove dirt, oil or grease from commutator using a clean cloth soaked in suitable solvent. Dry well using a clean, dry cloth.

Clean engine ring gear teeth and drive unit (clutch).

NOTE : Bushings must not be cleaned with grease dissolving agents.

Immerse all metal components in cleaning solution. Dry using a clean, dry cloth.

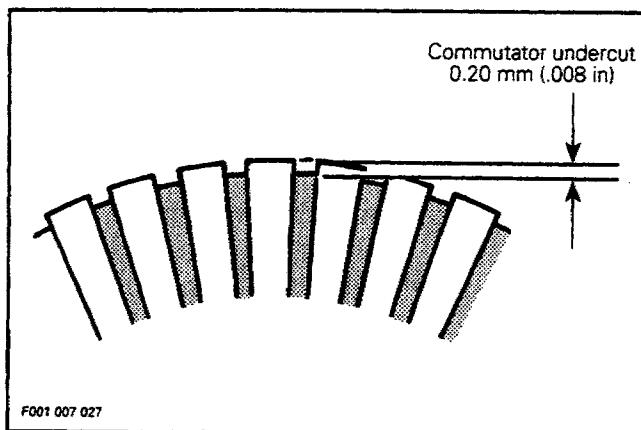
INSPECTION

Armature

NOTE : An ohmmeter may be used for the following testing procedures, except for the one concerning shorted windings in armature.

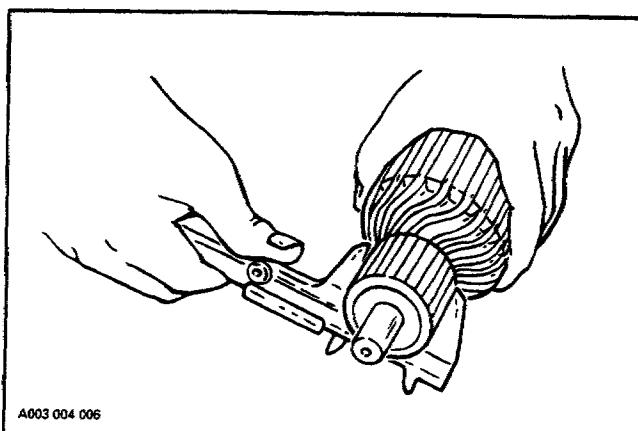
Check commutator for roughness, burnt or scored surface. If necessary, turn commutator on a lathe, enough to resurface only.

Check commutator for mica depth. If depth is less than 0.20 mm (.008 in), undercut mica. Be sure that no burrs are left and no copper dust remains between segments after undercutting operation is completed.



Check commutator out of round condition with V-shaped blocks and an indicator. If commutator out of round is more than 0.40 mm (.016 in), commutator should be turned on a lathe.

Check commutator outer diameter. If less than 27 mm (1.063 in), replace.



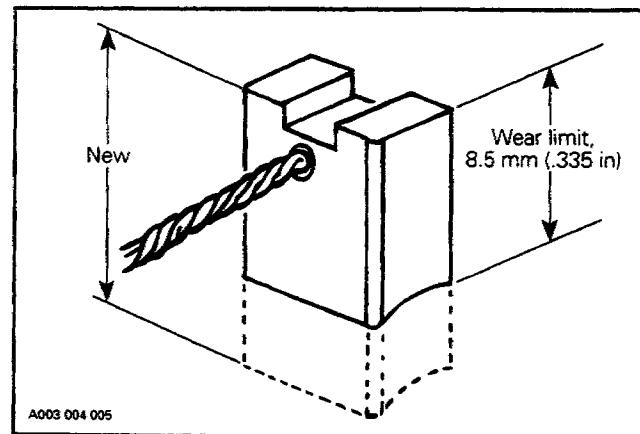
Brush Holder

Check brush holder for insulation using an ohmmeter. Place one test probe on insulated brush holder and the other test probe on brush holder plate. If continuity is found, brush holder has to be repaired or replaced.

Brush Length

Measure brush length. If less than 8.5 mm (.335 in), replace them.

NOTE : New brush length is 12 mm (.472 in).



Overrunning Clutch

Pinion of overrunning clutch should turn smoothly in clockwise direction, and should not slip in a counter-clockwise direction. If defective, replace.

Check pinion teeth for wear and damage. If defective, replace.

NOTE : Always check engine ring gear teeth for wear and damage. If defective replace ring gear. Refer to ENGINE 03-04 then refer to ring gear.

Starter Switch

Switch condition can be checked with an ohmmeter. Install test probes on both BLACK / WHITE wires of switch. Measure resistance, it should be high when button is released and must be close to zero (0) ohm when activated.

Section 07 ELECTRICAL

Sub-Section 04 (ELECTRIC STARTER)

Solenoid Switch

Inspect connections and clean as necessary. Solenoid switch condition can be checked with an ohmmeter. Install test probes on large connectors of solenoid. Measure resistance when current is applied to small connectors ; +12 V on YELLOW / RED wire and negative (–) on BLACK / WHITE wire. If it is more than a few ohms, replace solenoid switch.

IMPORTANT : No current must be present on large cables when using ohmmeter, otherwise meter could be damaged.

ASSEMBLY

Reverse the order of disassembly to reassemble starter. However, attention should be paid to the following operations.

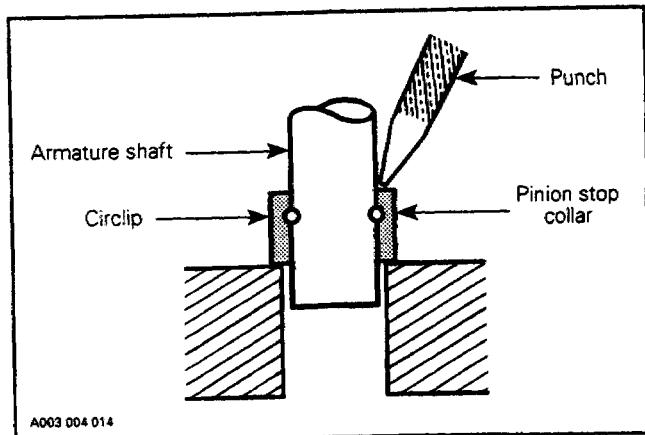
Prior to assembling, coat sliding surfaces on armature shaft splines, overrunning clutch and bushing with G.E. Versilube G 341 M or ESSO Beacon 325 lubricant or equivalent.

Apply motor oil on metal bushings.

2,4, Circlip and Pinion Stop Collar

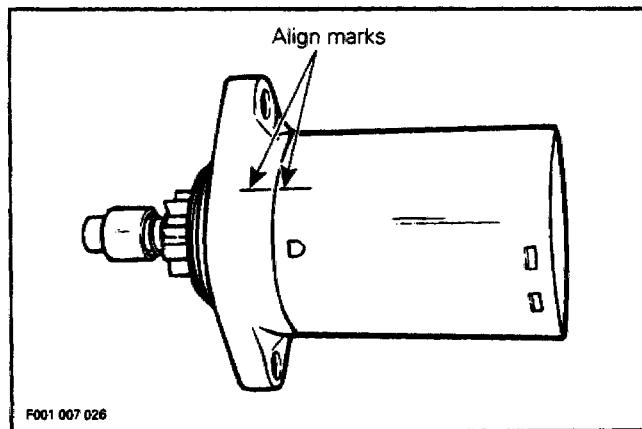
After placing stop collar on armature shaft, fit circlip into armature shaft, then make sure that it is properly secured.

Slide stop collar over circlip and secure in place by punching it at two or three places.



5,10, Housing and Yoke Ass'y

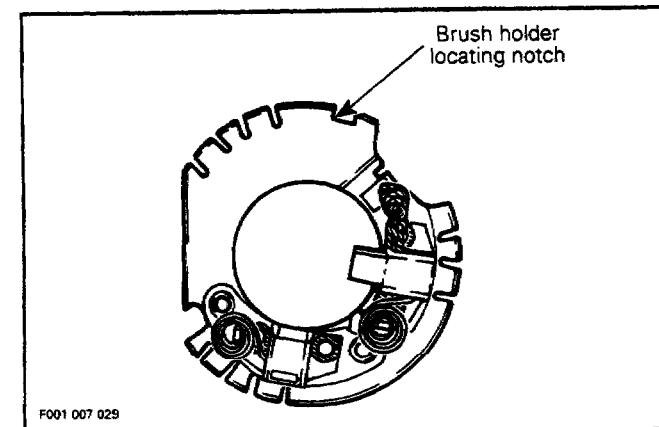
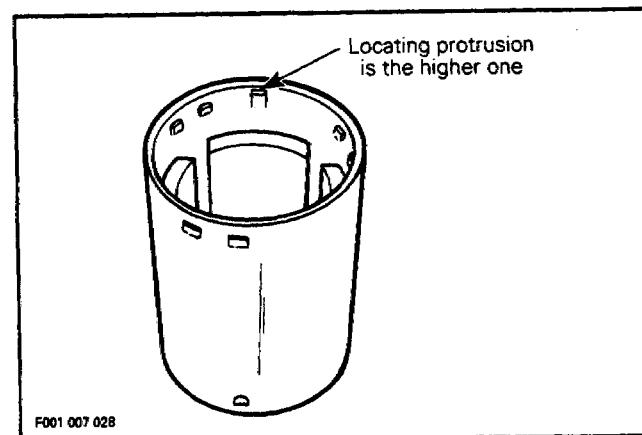
Align previously traced indexing marks.



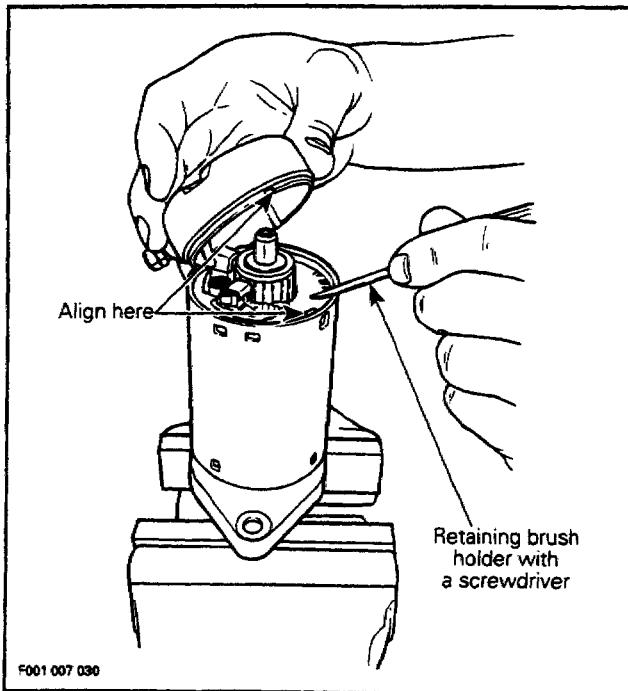
10,12,16, Yoke Ass'y, End Frame and Through Bolt

Open brushes and slide over commutator.

Align end frame locating notch with yoke locating protrusion and properly sit brush holder into yoke.



To ease end frame installation, retain brush holder with a small screwdriver while installing end frame.



Align end frame notch with brush holder notch / yoke protrusion.

▼ **CAUTION : Make sure end frame fits perfectly on yoke.**

INSTALLATION

Make sure that starter and engine mating surfaces are free of debris. Serious trouble may arise if starter is not properly aligned.

○ **NOTE :** Make sure to install starter screws in their proper holes of ignition housing. Install upper screw in lower hole and lower screw in upper hole.

Install starter apply Loctite 242 on starter support screw threads and torque screw to 22 N·m (16 lbf·ft).

Connect the red battery cable to the starter and torque nut to 6 N·m (53 lbf·in). Apply neopren grease on terminal and nut.

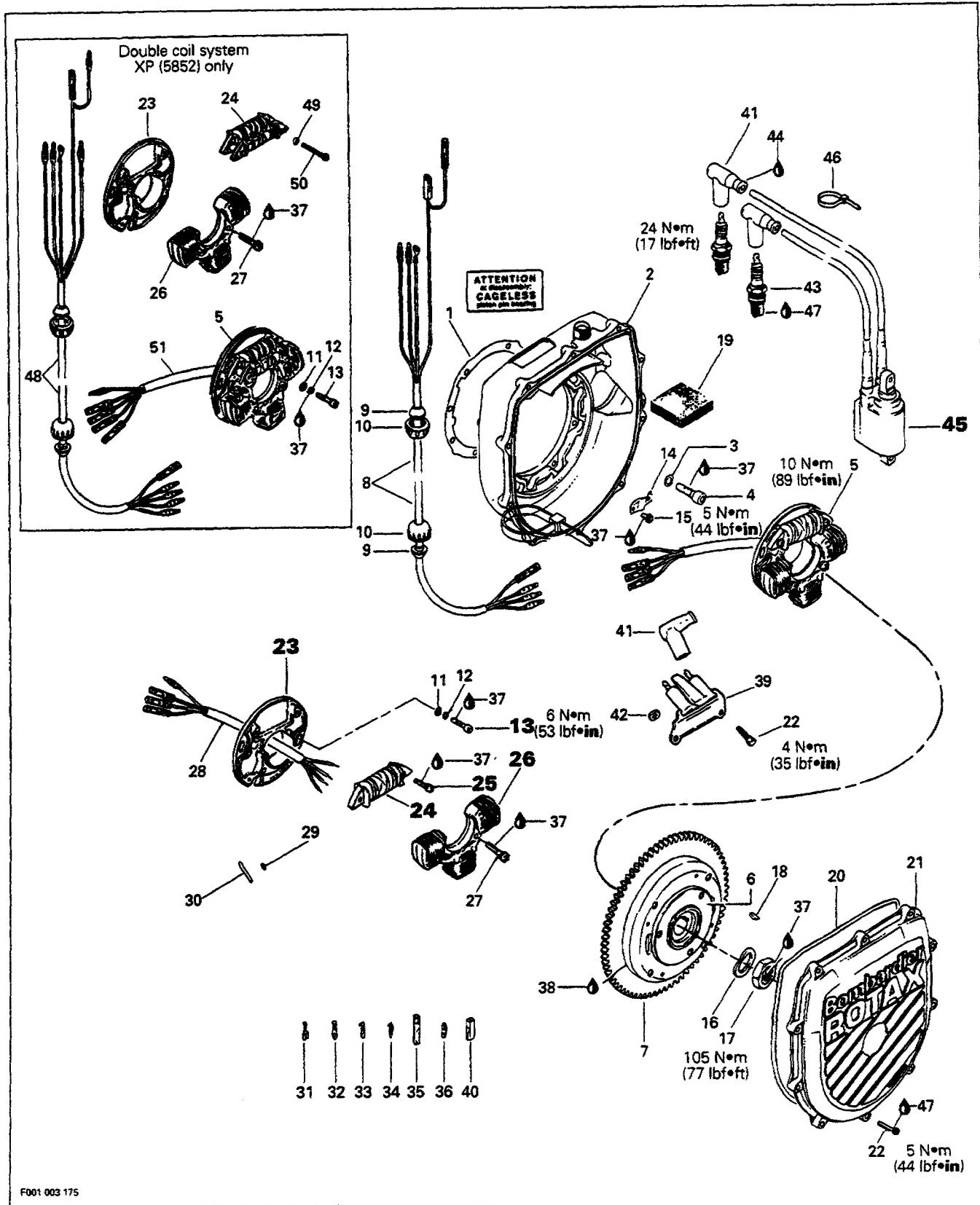
Then connect black cable to starter using a flat washer, a teeth washer and a screw with Loctite 271 on threads. Torque screws to 22 N·m (16 lbf·ft). Apply neopren grease on terminal and screw.

◆ **WARNING :** Always connect red positive cable first then black negative cable last. Whenever connecting the red positive cable to the starter motor make sure the battery cables are disconnected to prevent electric shock.

Section 07 ELECTRICAL

Sub-Section 05 (MAGNETO SYSTEM)

MAGNETO SYSTEM, REPAIR



Section 07 ELECTRICAL

Sub-Section 05 (MAGNETO SYSTEM)

COMPONENTS

1. Gasket
2. Ignition housing
3. Lock washer M8 (8)
4. Allen screw M8 x 25 (8)
5. Armature plate assembly
6. Magneto flywheel
7. Ring Gear 77 teeth
8. Harness assembly
9. Grommet (2)
10. Nut cap (2)
11. Washer M5.5 (3)
12. Lock washer M5 (3)
13. Allen screw M5 x 18 (3)
14. Retainer plate
15. Taptite screw M5 x 8 (2)
16. Lock washer M22
17. Hexagonal nut M22
18. Woodruff key
19. Protection mat
20. O-ring
21. Ignition housing cover
22. Self tapping screw M5 x 25 (10)
23. Armature plate
24. Generating coil
25. Phillips screw M5 x 22 (2)
26. Battery charging coil
27. Screw M6 x 25 (2)
28. Harness assembly
29. Terminal clip (4)
30. Shrink tube 30 mm (4)
31. Female connector
32. Ring terminal
33. Female terminal
34. Male terminal
35. Insulation sheath
36. Insulation sheath
37. Loctite 242
38. Loctite 648
39. Ground plate
40. Protection cap
41. Insulator (2)
42. Star washer M5 (2)
43. Spark plug (2)
44. Dielectric grease
45. Ignition coil
46. Tie rap (2)
47. Anti-seize lubricant
48. Harness assembly
49. Lock washers (2)
50. Slotted head screw M5 x 35 (2)
51. Harness assembly

REMOVAL

Refer to ENGINE section 03-04 then look for PTO flywheel and magneto for parts removal.

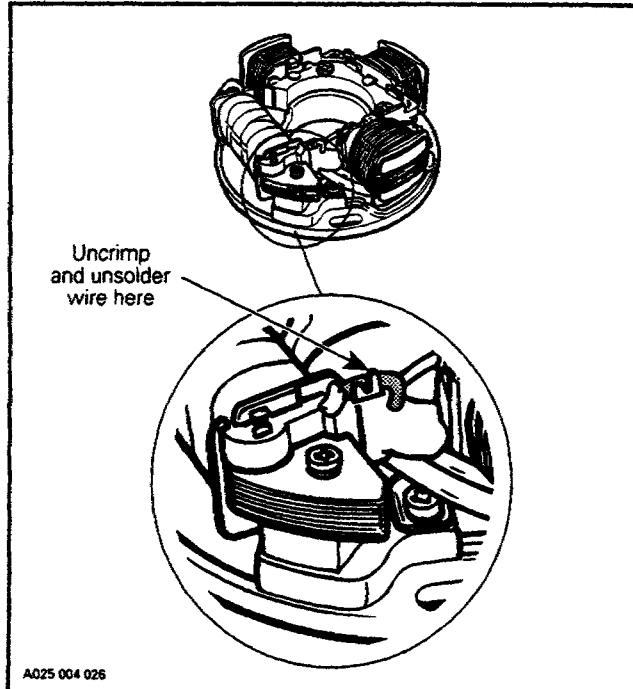
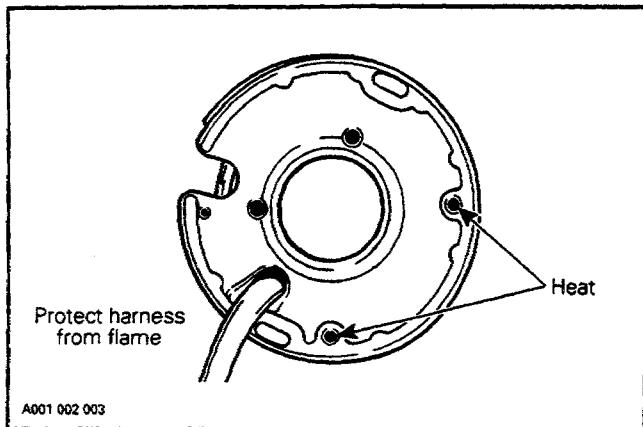
- Remove screws.
- Uncrimp and unsolder BLACK / RED wire from coil terminal.

DISASSEMBLY

24. Generating Coil (Single)

To replace generating coil :

- Heat the armature plate to 93 °C (200 °F) around the screw holes to break the threadlocker bond.



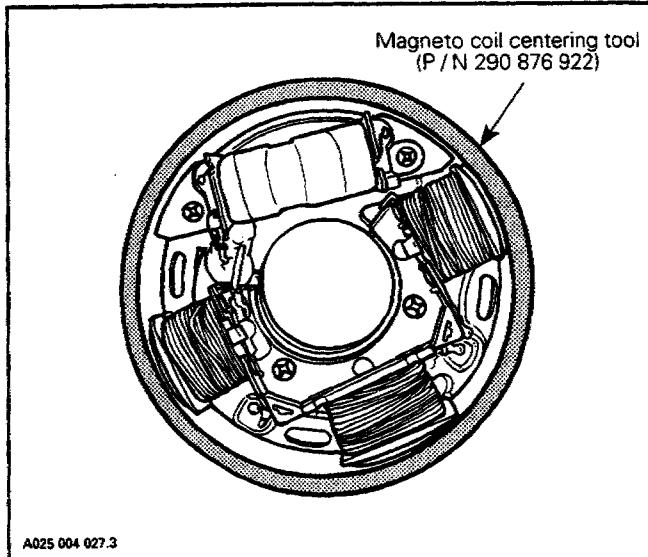
▼ CAUTION : Protect harness from flame.

- Strip end of old wire then crimp and solder on new coil.

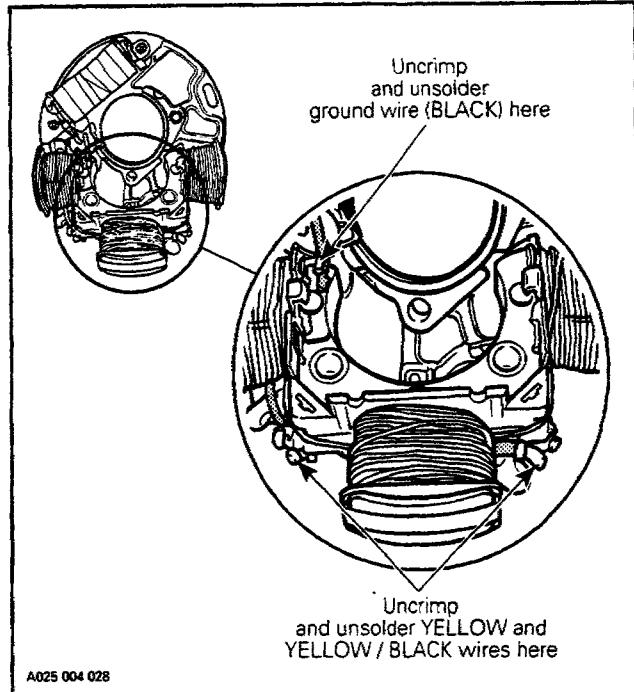
24,25, Generating Coil and Screw

Apply Loctite 242 (blue, medium strength) to screws and install the new coil on armature plate.

Use magneto coil centering tool (P / N 290 876 922) and install so that it fits around armature plate before tightening screws.



- Uncrimp and unsolder ground wire (BLACK) from coil core.

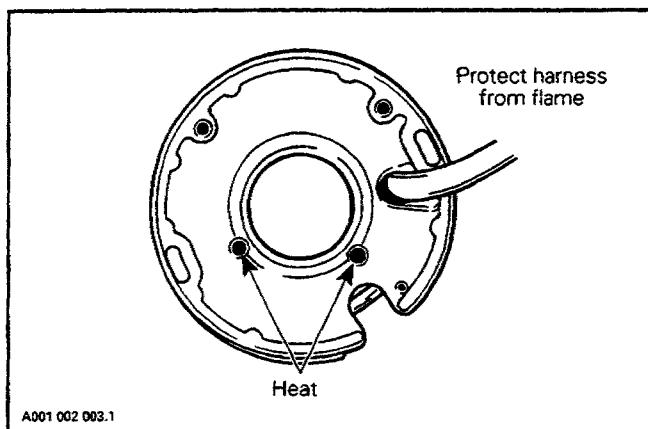


▼ CAUTION : Before reinstalling the magneto, remove the loose epoxy from harness.

26, Battery Charging Coil

To replace battery charging coil :

- Heat the armature plate to 93 °C (200 °F) around the screw holes to break the threadlocker bond.



▼ CAUTION : Protect harness from flame.

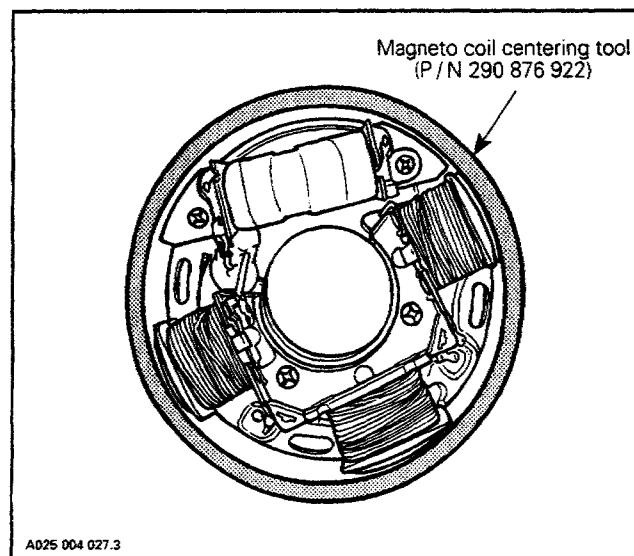
- Remove screws.
- Uncrimp and unsolder YELLOW and YELLOW / BLACK wires from coil terminals.

- Position new coil, crimp and solder all wires.

26,27, Battery Charging Coil and Screw

Prior to assembly, apply Loctite 242 (blue, medium strength).

Use magneto coil centering tool (P / N 290 876 922) and install it so that it fits around armature plate before tightening screws.



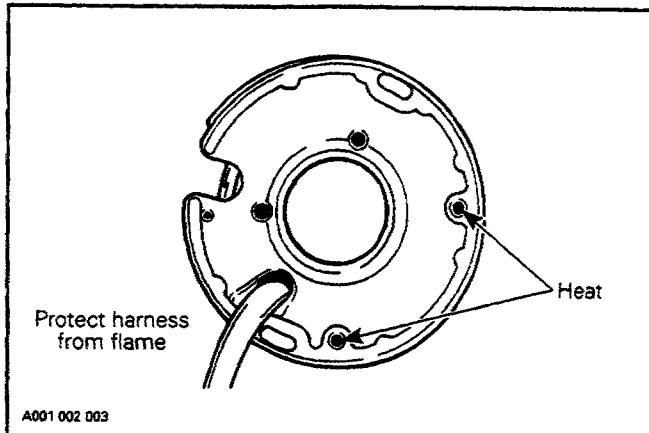
Section 07 ELECTRICAL

Sub-Section 05 (MAGNETO SYSTEM)

Generating Coil (Double)

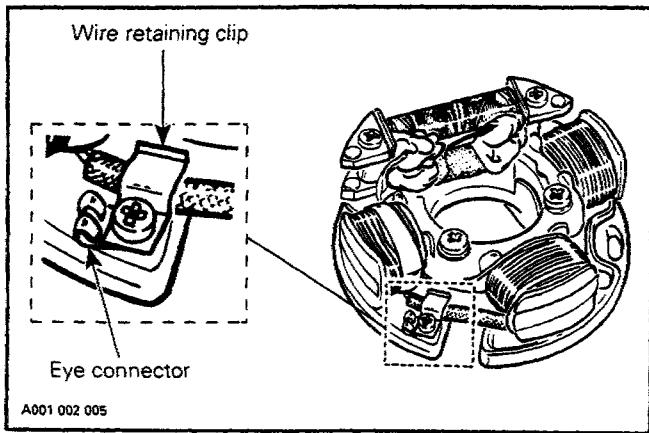
To replace generating coil :

- Heat the armature plate to 93 °C (200 °F) around the screw holes to break the threadlocker bond.



▼ CAUTION : Protect harness from flame.

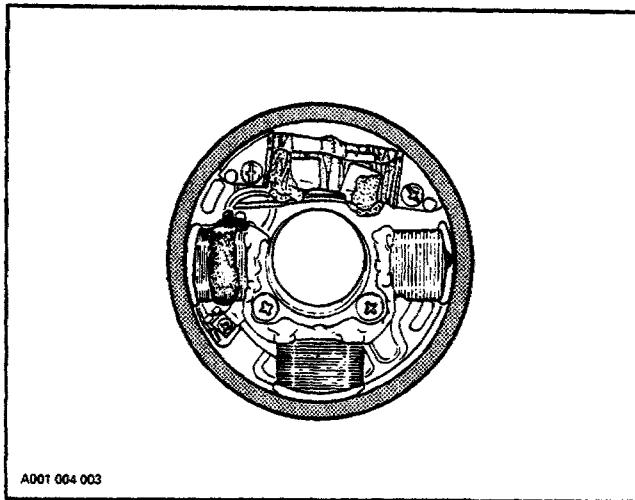
- Remove screws.
- Cut the three wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Strip end of old wires and solder on new coil wires.
- To install the ground connector to the armature plate, tape the new black lead to the old one and pull it under the charging coil with the old wire.
- Solder an eye connector to the lead and fasten it under the wire retaining clip.



Generating Coil and Screw

Apply Loctite 242 (blue, medium strength) to screws and install the new coil on armature plate.

Use magneto coil centering tool (P / N 290 876 922) and install so that it fits around armature plate before tightening screws.

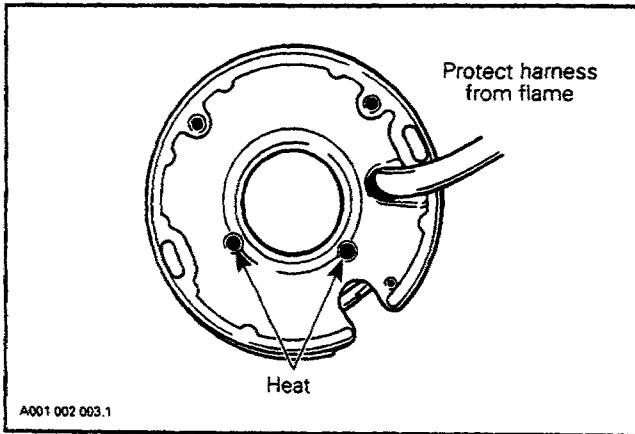


▼ CAUTION : Before reinstalling the magneto, remove the loose epoxy from harness.

Battery Charging Coil

To replace battery charging coil :

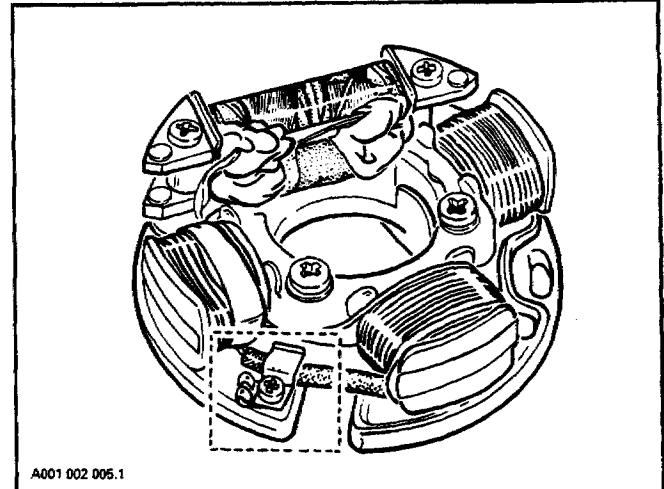
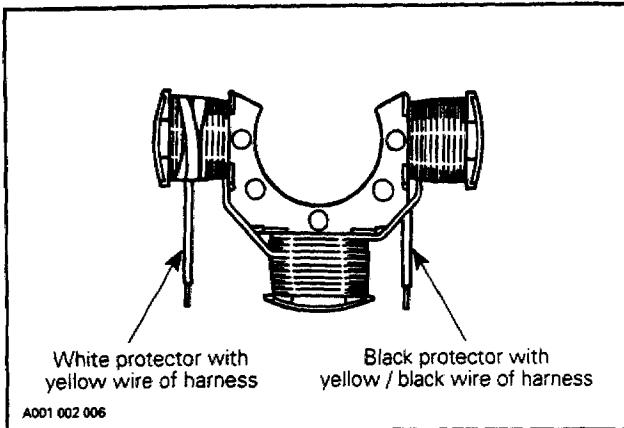
- Heat the armature plate to 93 °C (200 °F) around the screw holes to break the threadlocker bond.



▼ CAUTION : Protect harness from flame.

- Remove screws.
- Remove the wire retaining clip from armature plate.
- Pull out protector tubes and unsolder the splice connectors.

- Solder the yellow wire in the harness to the white tube protected wire of the coil.
- Solder the yellow / black striped wire in the harness to the black tube protected wire of the coil.



▼ **CAUTION :** Before reinstalling the magneto, remove the loose epoxy from harness.

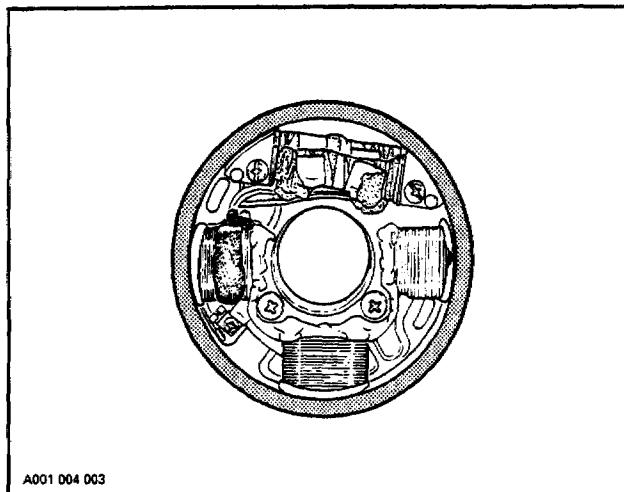
Protector Tube

Position protector tubes over connections.

Battery Charging Coil and Screw

Prior to assembly, apply Loctite 242 (blue, medium strength).

Use magneto coil centering tool (P / N 290 876 922) and install it so that it fits around armature plate before tightening screws.



- Fasten retaining clip onto protector tubes.

The ground terminal from generating coil must be fastened under this clip.

ASSEMBLY

○ **NOTE :** Always apply dielectric grease on all electrical connections.

13,23, Screw and Armature Plate

Position the armature plate on the crankcase, aligning the marks on both parts.

Apply a drop of Loctite 242 on screw threads and tighten.

45, Ignition Coil

Connect BLACK / RED wire to ignition coil terminal (with single generating coil).

Connect wires to ignition coil, connect BLACK wire with "—" symbol underneath coil and WHITE / BLUE wire with "+" symbol (with double generating coil).

Identification of Magneto Flywheels

There are two ways to differentiate the two magneto flywheels :

1. Nippondenso part number stamped on flywheel is different for each system :

Four-wire system flywheel : (P / N 290 995 119) - Nippondenso P / N is 032000-7091 ;

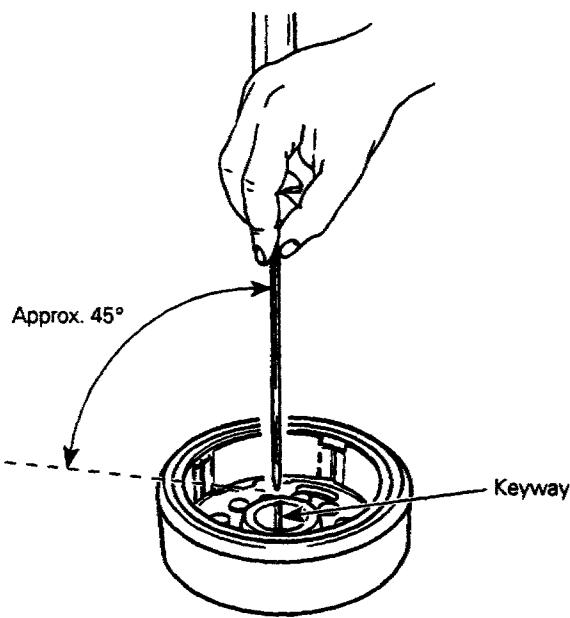
Five-wire system flywheel : (P / N 290 995 113) - Nippondenso P / N is 032000-8000 ;

2. The glued-in magnets have a different angle towards the keyway.

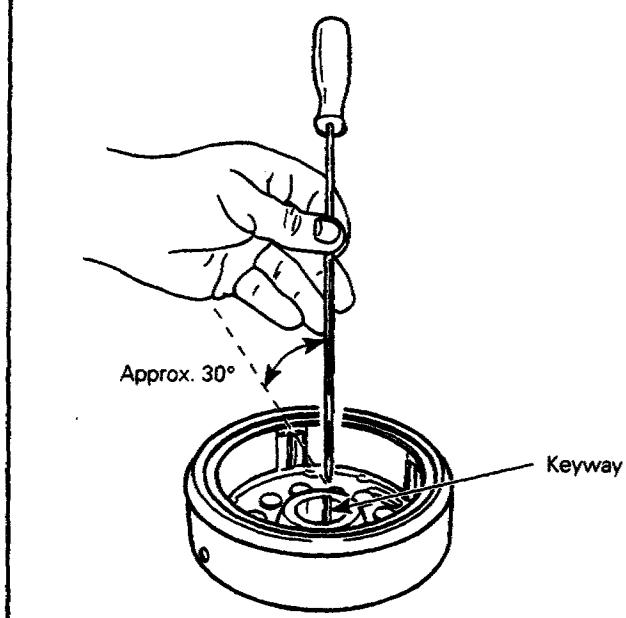
Section 07 ELECTRICAL

Sub-Section 05 (MAGNETO SYSTEM)

FOUR-WIRE SYSTEM 032000-7091



FIVE-WIRE SYSTEM 032000-8000



INSTALLATION

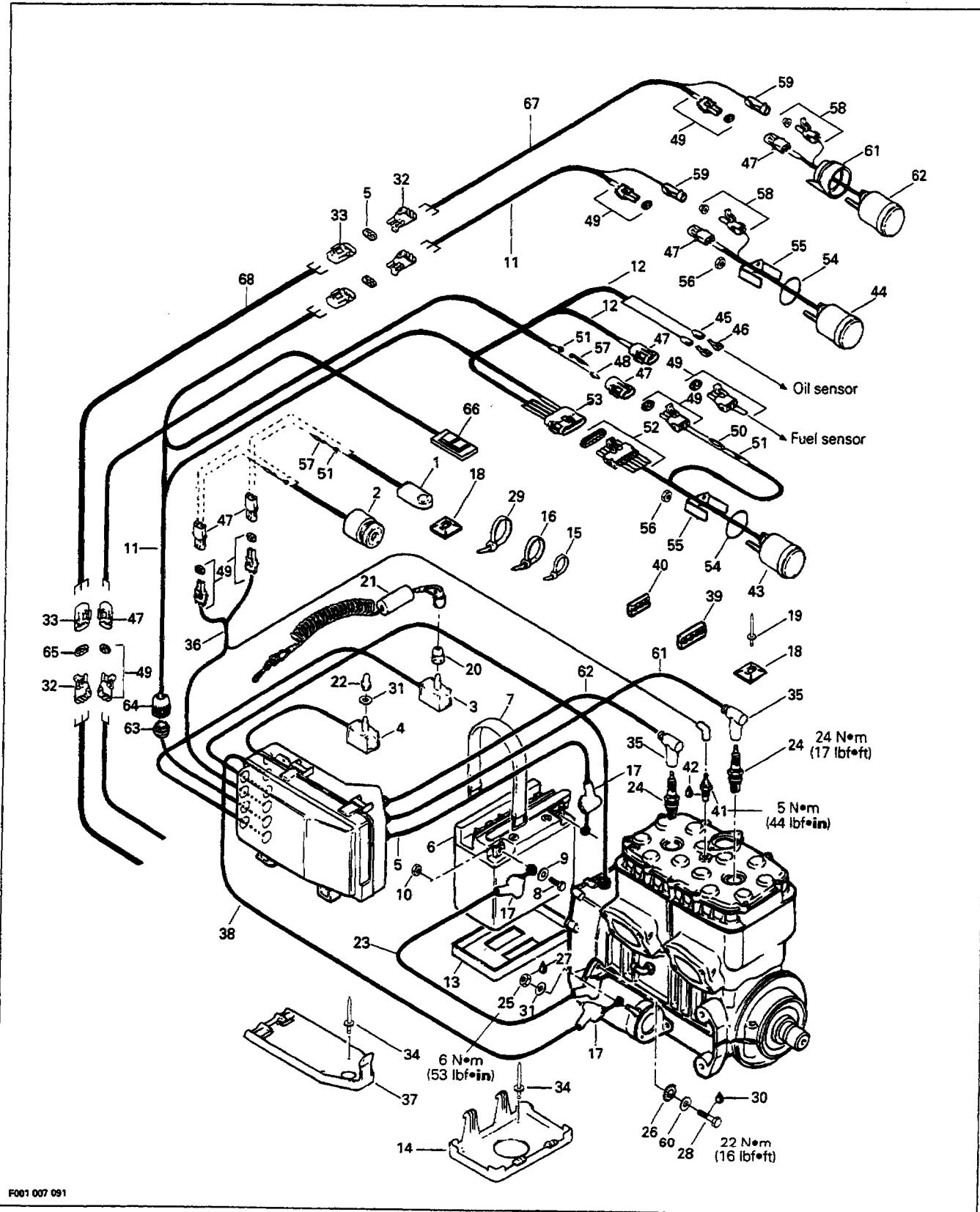
Refer to ENGINE section 03-04 then look for PTO flywheel and magneto for installation.

Perform ignition timing.

Section 07 ELECTRICAL

Sub-Section 06 (CDI AND CHARGING SYSTEMS)

CDI AND CHARGING SYSTEMS ; TESTING PROCEDURES



Section 07 ELECTRICAL

Sub-Section 06 (CDI AND CHARGING SYSTEMS)

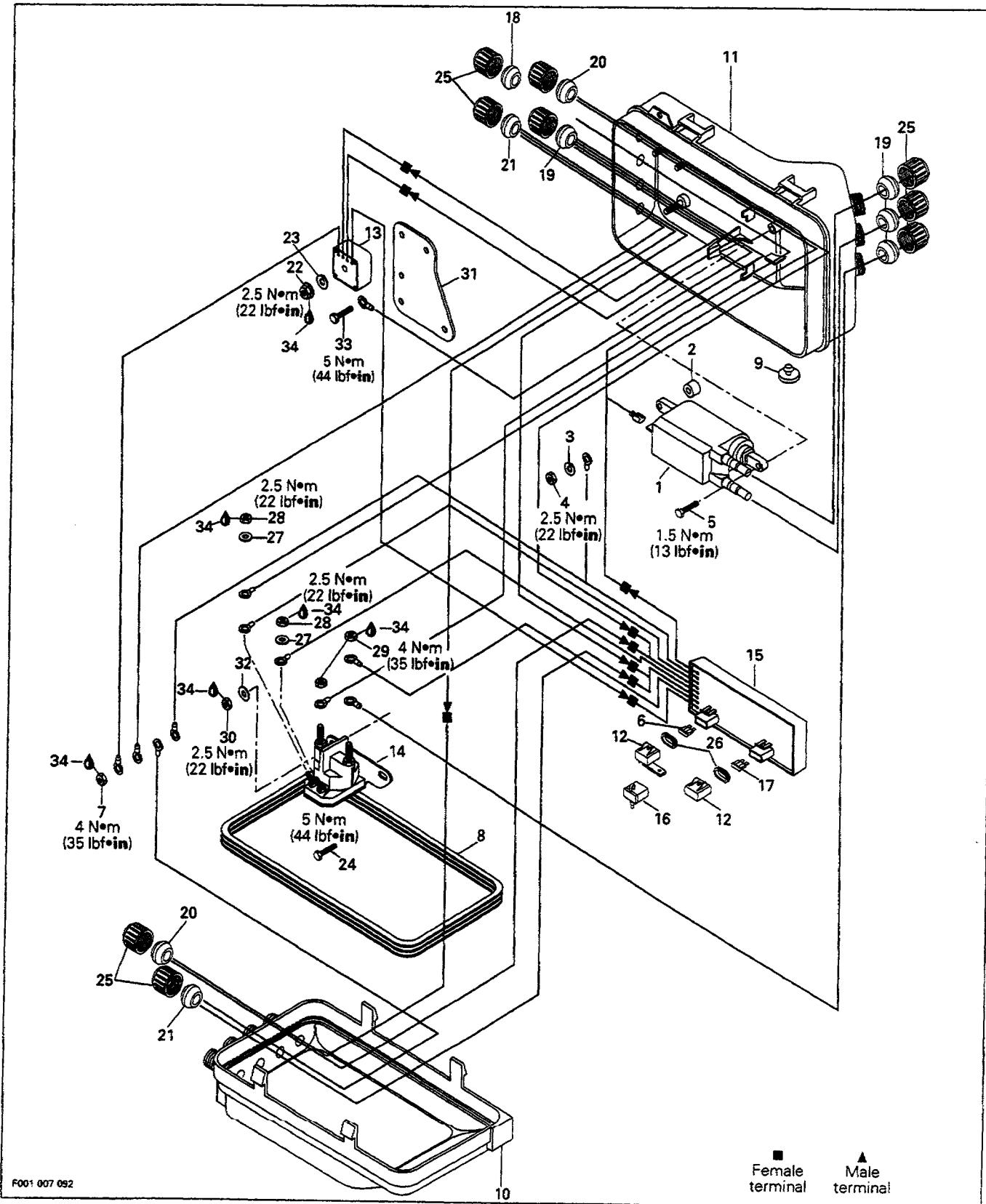
COMPONENTS

1. Stop switch assembly
2. Buzzer assembly
3. Tether cord switch
4. Ignition starter switch
5. Red battery cable (positive)
6. Battery
7. Strap
8. Screw M6 x 16 (2)
9. Washer M6
10. Nut M6
11. Harness (3 ways) assembly
12. Harness (4 ways) assembly
13. Battery lower pad
14. Battery support
15. Tie rap
16. Tie rap
17. Protector cap (3)
18. Tie mount
19. Rivet 1/8" x .640"
20. Switch nut
21. Tether cord
22. Cap
23. Battery ground cable
24. Spark plug (2)
25. Lock nut M6
26. External teeth lock washer M8
27. Dielectric grease
28. Hexagonal screw M8 x 16 (2)
29. Tie rap
30. Loctite 271
31. Washer
32. Male tab housing (3 ways)
33. Female tab housing (3 ways)
34. Rivet
35. Spark plug cap (2)
36. Buzzer / stop switch harness assembly
37. Electrical box support
38. Starter cable
39. Four wires support (2)
40. Three wires support
41. Thermo sensor
42. Loctite 515
43. Oil / fuel gauge
44. Tachometer
45. Sheath (2)
46. Female terminal (2)
47. Female tab housing (2 ways) (5)
48. Wire seal (2)
49. Male tab housing (2 ways) (5)
50. Female terminal
51. Wire seal
52. Male tab housing (6 ways)
53. Tab housing (6 ways)
54. O-ring
55. Gauge support
56. Plastic nut (2)
57. Male terminal
58. Male tab housing (1 way)
59. Tab housing (1 way)
60. Flat washer M8
61. Gauge support
62. Speedometer
63. Grommet
64. Nut cap
65. Wire seal
66. VTS switch
67. Harness (3 ways) assembly
68. Harness (3 ways) assembly

Section 07 ELECTRICAL

Sub-Section 06 (CDI AND CHARGING SYSTEMS)

ELECTRICAL BOX



Section 07 ELECTRICAL

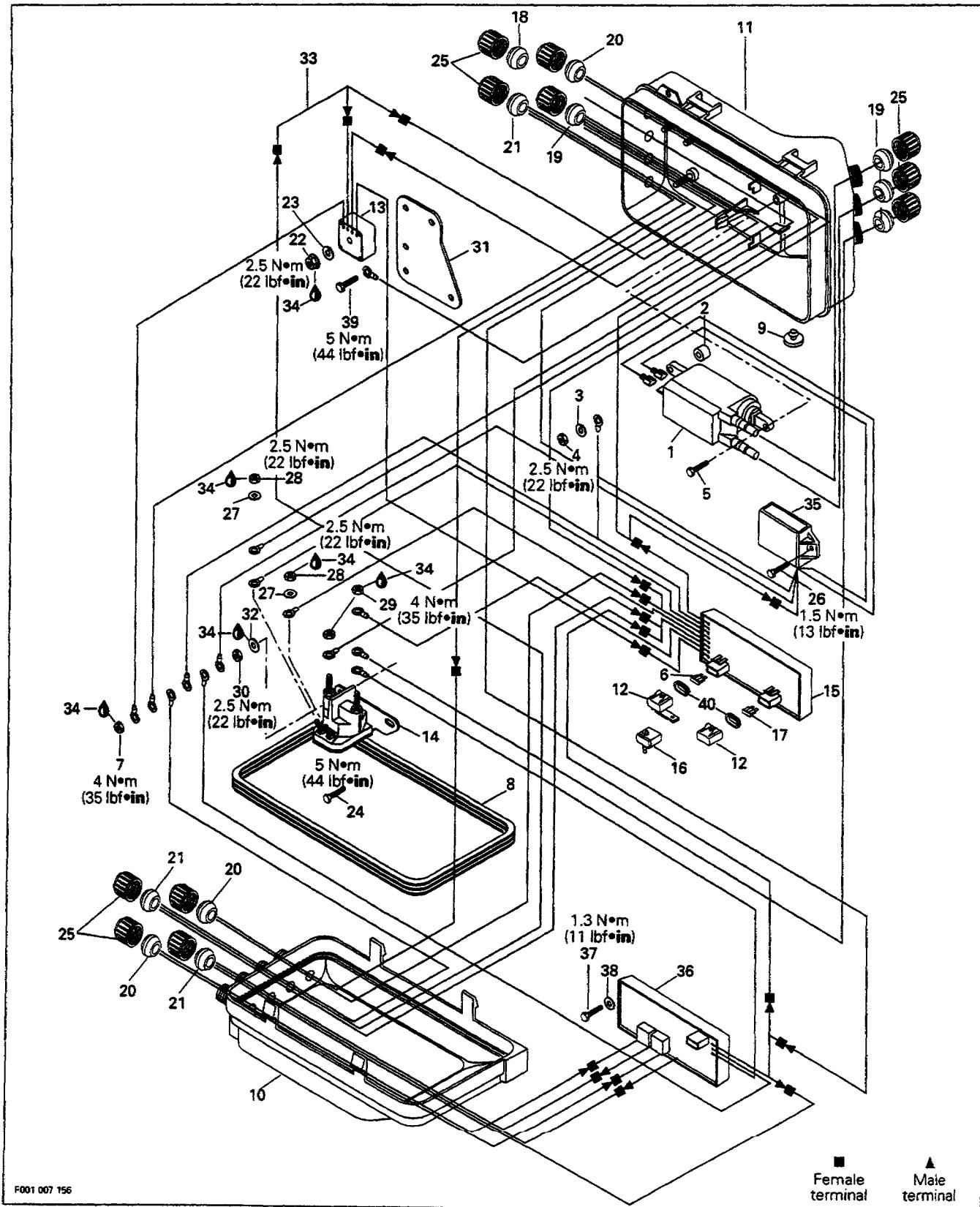
Sub-Section 06 (CDI AND CHARGING SYSTEMS)

COMPONENTS

1. Ignition coil	18. Grommet
2. Spacer	19. Grommet (2)
3. Lock washer M6	20. Grommet (6)
4. Nut M6	21. Grommet (2)
5. Tapping screw M6.3 x 25	22. Nut M6
6. Fuse 15 Amp.	23. Lock washer M6
7. Elastic stop nut M6	24. Self tapping screw M6.3 x 13
8. Gasket	25. Nut cap (9)
9. Rubber bumper (4)	26. Seal (2)
10. Cover	27. Flat washer M5 (2)
11. Electric box base	28. Elastic stop nut 10-32 (2)
12. Fuse cap (2)	29. Elastic nut 1/4-20 (2)
13. Rectifier	30. Nut M6
14. Solenoid	31. Mounting plate
15. Multi-purpose electronic module	32. Washer M6
16. Fuse holder	33. Self tapping screw M6 x 10 (2)
17. Fuse 5 Amp.	34. Dielectric grease

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Sub-Section 06 (CDI AND CHARGING SYSTEMS)

ELECTRICAL BOX XP MODEL (5852)



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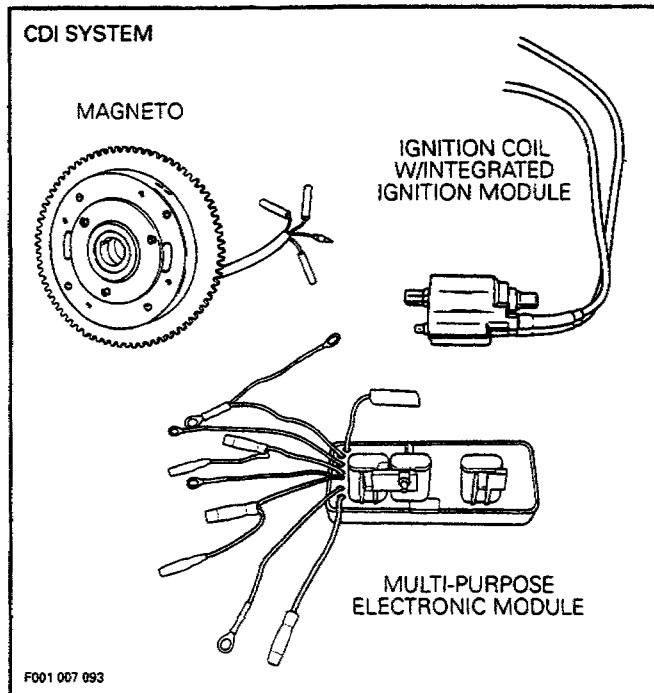
Sub-Section 06 (CDI AND CHARGING SYSTEMS)

COMPONENTS

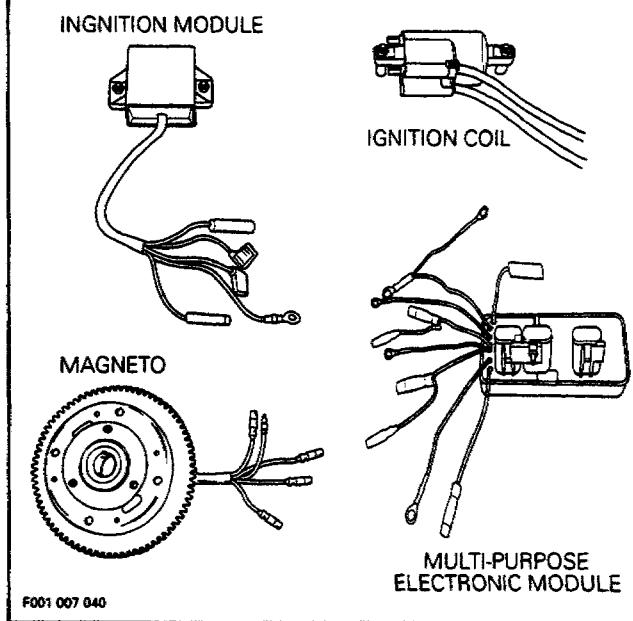
1. Ignition coil
2. Spacer
3. Lock washer M6
4. Nut M6
5. Tapping screw M6.3 x 38
6. Fuse 15 Amp.
7. Elastic stop nut M6
8. Gasket
9. Rubber bumper (4)
10. Cover
11. Electric box base
12. Fuse cap (2)
13. Rectifier
14. Solenoid
15. Multi-purpose electronic module
16. Fuse holder
17. Fuse 5 Amp.
18. Grommet
19. Grommet (2)
20. Grommet (6)
21. Grommet (2)
22. Nut M6
23. Lock washer M6
24. Self tapping screw M6.3 x 13
25. Nut cap (9)
26. Self tapping screw M6.3 x 25
27. Flat washer M5 (2)
28. Elastic stop nut 10-32 (2)
29. Elastic nut 1/4-20 (2)
30. Nut M6
31. Mounting plate
32. Washer M6
33. "Y" wire
34. Dielectric grease
35. Ignition module
36. Variable trim system control module
37. Self tapping screw M6.3 x 13 (2)
38. Flat washer M6 (2)
39. Self tapping screw M6 x 10 (2)
40. Seal (2)

GENERAL

The Capacitor Discharge Ignition system includes the following components :



CDI SYSTEM (DOUBLE GENERATING COIL)

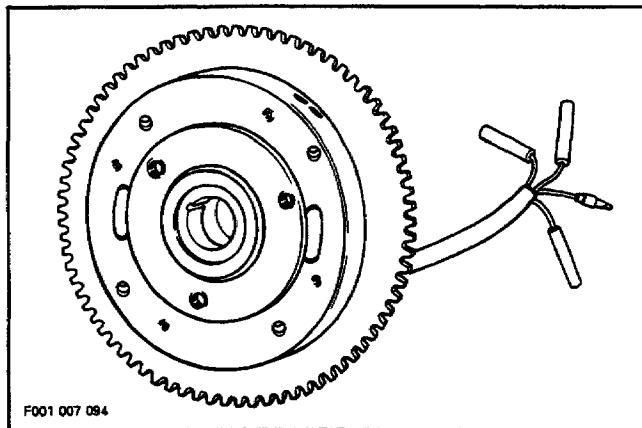


Magneto

It is the primary source of electrical energy. It transforms magnetic field into electric current through a generating coil.

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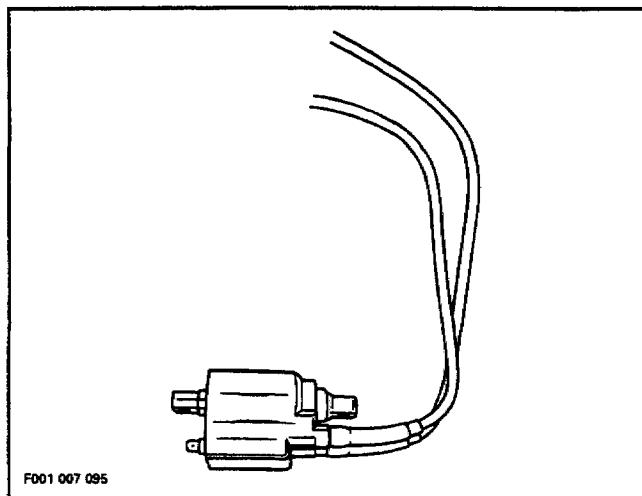
Sub-Section 06 (CDI AND CHARGING SYSTEMS)



Ignition Coil (Single Generating Coil)

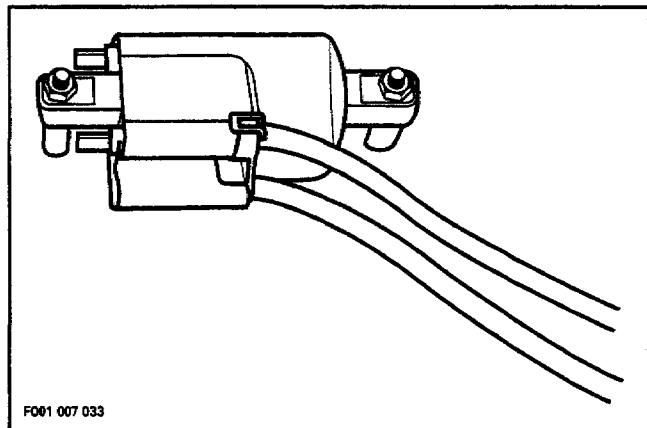
It receives its energy from generating coil via a BLACK / RED wire. The generating coil allows a current flow through ignition coil with its integrated CDI module and through primary windings.

Ignition coil induces voltage to a high level in secondary windings to produce a spark at spark plug.



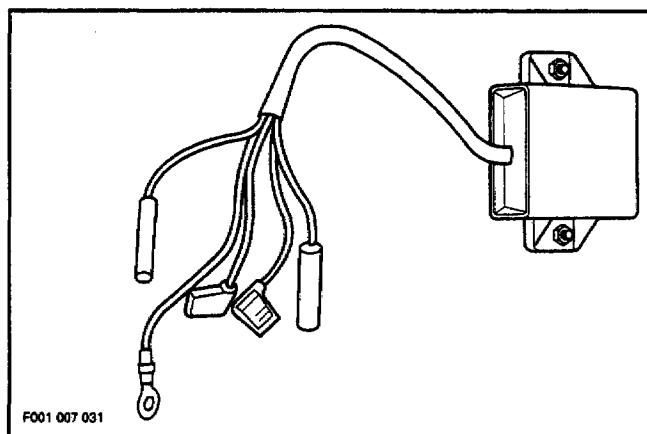
Ignition Coil (Double Generating Coil)

It receives its energy from ignition module via two wires. It induces voltage to a high level in secondary windings to produce a spark at spark plug.



Ignition Module

It receives its primary electric current from magneto via two wires which charges a capacitor. It controls spark occurrence by discharging capacitor to primary windings of ignition coil.

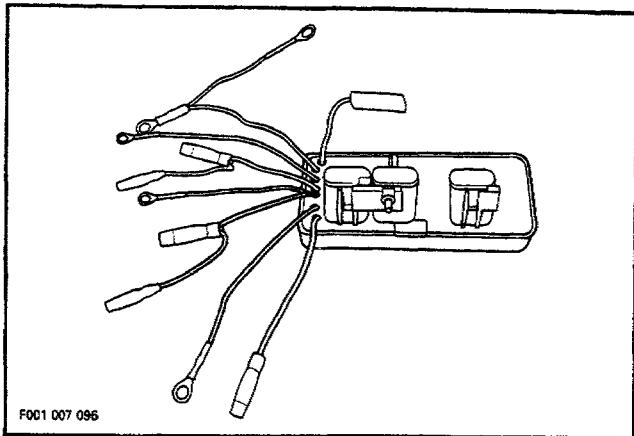


Multi-Purpose Electronic Module

It receives its current from the battery. It includes the engine speed limiter and also integrated in the module a 20 to 30 seconds timer delay which cut off the electrical circuit.

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Sub-Section 06 (CDI AND CHARGING SYSTEMS)



NOTE : The fuses connectors are directly mounted onto the MPEM.

Engine Speed Limiter

It has three functions :

- Keeps high voltage away from tether cord switch.
- Provides engine stop by grounding the primary coil.
- Limits engine RPM to prevent over-revving.

NOTE : It is integrated in the multi-purpose electronic module.

A defective speed limiter may cause the following problems :

- No spark.
- Uninterruption of spark when engine stop / tether cord switch is used.
- Incorrectly controlled engine max. RPM.
- Misfiring / black fouled spark plugs.

To check engine speed limitation function, run engine and check its maximum speed, it should be around 6550 ± 100 RPM for 587 engine and 7050 ± 50 RPM for 657 engine.

IGNITION SYSTEM TESTING PROCEDURE

When dealing with ignition problems, the following items should be verified in this order.

1. Spark occurrence / spark plug condition.
2. Battery condition.
3. Electrical connections.
4. Engine stop / tether cord switches.
5. Ignition relay.

6. Multi-purpose electronic module (MPEM).
7. Variable trim system (VTS) switches (XP (5852) model only).
8. VTS control module (XP (5852) model only).
9. Magneto output.
10. Ignition coil output.

CAUTION : Whenever replacing a component in ignition system, check ignition timing.

NOTE : Spark occurrence can be checked with tester from Superex Canada Ltd part number 15-785.

The first three items can be checked with known automotive equipment and other items as follows :

NOTE : To perform verification a good quality multimeter such as Fluke 73 (P / N 529 022 000) can be used.

Engine Stop / Tether Cord Switches Verification

Both switches can be verified together because they are connected in series. Disconnect stop switch BLACK wire in electrical box. Disconnect tether cord switch BLACK / YELLOW wire from MPEM BLACK / YELLOW wire in electrical box. Using an ohmmeter connect test probes to BLACK and BLACK / YELLOW wires. Install tether cord cap over the switch and if the reading is infinity (∞), verify both switches separately. Proceed as follows :

Engine Stop Switch

Disconnect the BLACK and BLACK / YELLOW wires in the electrical box. Using an ohmmeter, connect test probes to switch BLACK and BLACK / YELLOW wires.

Measure resistance, it must be close to zero ohm in its operating position and an open circuit when depressed.

Tether Cord Switch

Disconnect the BLACK / YELLOW wires in the electrical box. Using an ohmmeter, connect test probes to switch BLACK / YELLOW wires.

Measure resistance, it must be close to zero ohm when cap is over switch and an open circuit when removed.

Ignition Relay Verification

The relay is integrated into the MPEM.

The ignition relay is working off a 20 to 30 seconds timer delay and could be the problem of some faulty ignition situations.

Always confirm first that the fuses are in good condition.

Section 07 ELECTRICAL

Sub-Section 06 (CDI AND CHARGING SYSTEMS)

NOTE : To confirm the relay function, it should stay on for about 20 to 30 seconds and then turn off.

Multi-Purpose Electronic Module (MPEM) Verification

The multi-purpose electronic module testing must be done with all wires disconnected from circuit. Otherwise testing equipment (ohmmeter) could be damaged.

CAUTION : When disconnecting wires, BLACK / RED or WHITE wire must never touch solenoid positive terminal.

NOTE : The MPEM BLACK / RED wire has been changed for a WHITE wire on XP (5852) model for identification purpose.

CAUTION : Do not install MPEM module having a WHITE wire on other models than the XP (5852) damage could occur to components.

MPEM testing equipment :

Use an ohmmeter with an input impedance up to 20 mega ohm (2 000 000 ohm).

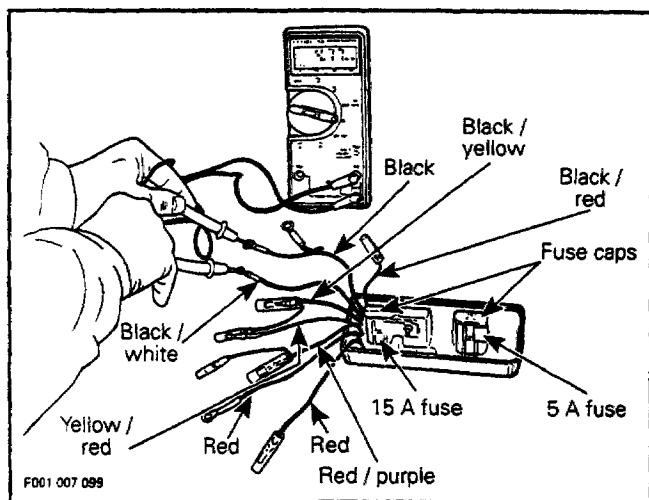
Refer to the following chart for MPEM testing. Always respect polarity in chart.

Meter (-) lead	Meter (+) lead	Minimum value	Wires will be connected to :
Black	Black / red or white	300 kΩ	MPEM / Engine speed limiter
Black / red or white	Black	150 kΩ	
Black	Black / white (ring terminal)	500 kΩ	Solenoid
Black / white (ring terminal)	Black	1 MΩ	
Black	Black / yellow	30 kΩ	Stop switch / Tether cord switch
Black / yellow	Black	34 kΩ	
Black	Yellow / red	100 kΩ	Solenoid
Yellow / red	Black	1 MΩ	
Black	Red / purple	1 MΩ	Buzzer
Red / purple	Black	100 kΩ	
Black	Red (ring terminal)	1 MΩ	Battery (+)
Red (ring terminal)	Black	1 MΩ	
Black	Red (female terminal)	1 MΩ	Rectifier
Red (female terminal)	Black	1 MΩ	
Red / purple	Black / red or white	600 kΩ	CDI module
Black / red or white	Red / purple	1 MΩ	

NOTE : These values are minimum. If obtained values are even or higher then these, the module should function properly.

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Sub-Section 06 (CDI AND CHARGING SYSTEMS)



Most of circuit can be tested with an ohmmeter but a 100 % test doesn't mean the MPEM is in perfect condition.

NOTE : Sometimes only parts replacement can solve the problem.

CAUTION : Whenever connecting MPEM, always have battery disconnected from circuit. If MPEM must be connected when circuit is activated, always connect BLACK / RED or WHITE wire first to ignition coil / CDI module to prevent wire from touching solenoid positive terminal.

CAUTION : Whenever connecting wires, never connect RED / PURPLE and RED wires together. Damage could occur to multi-purpose electronic module.

Variable Trim System (VTS) Switches Verification (XP (5852) Model Only)

Disconnect the PURPLE wire, BLUE / WHITE wire and GREEN / WHITE wire in the electrical box. Using an ohmmeter, connect test probes to switch PURPLE and BLUE / WHITE wires. Connect test probes to PURPLE and GREEN / WHITE wires.

Measure resistance, it should be high when button is released and must be close to zero when activated.

Always confirm first that the fuse is in good condition. Make sure that color code match with color code of the VTS module.

Whenever pushing on UP and DOWN button simultaneously, the nozzle should not move. However a vibration should be noticed, but it should stop immediately.

NOTE : Pushing simultaneously on both switches, GREEN / ORANGE and BLUE / ORANGE wires will be at +12 volts in relation to battery negative terminal.

VTS Control Module Verification (XP (5852) Model Only)

It receives its current from the battery. It is protected by its own 15 amp. fuse. Also integrated in the module two relays which trigger when motor is overloaded.

Voltage test

Disconnect motor wires from the VTS module. Using a voltmeter, connect positive test probe to BLUE / ORANGE wire. Connect negative test probe to GREEN / ORANGE wire.

Push on VTS switch UP button, the reading should be +12 V. Push on DOWN button, the reading should be (-)12 V.

If readings are different the VTS module could be defective.

NOTE : Ensure VTS switches connections were not reversed.

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Sub-Section 06 (CDI AND CHARGING SYSTEMS)

The VTS control module testing must be done with all wires disconnected from circuit. Otherwise testing equipment (ohmmeter) could be damaged.

▼ **CAUTION :** When disconnecting wires other than RED wire, wires must never touch solenoid positive terminal.

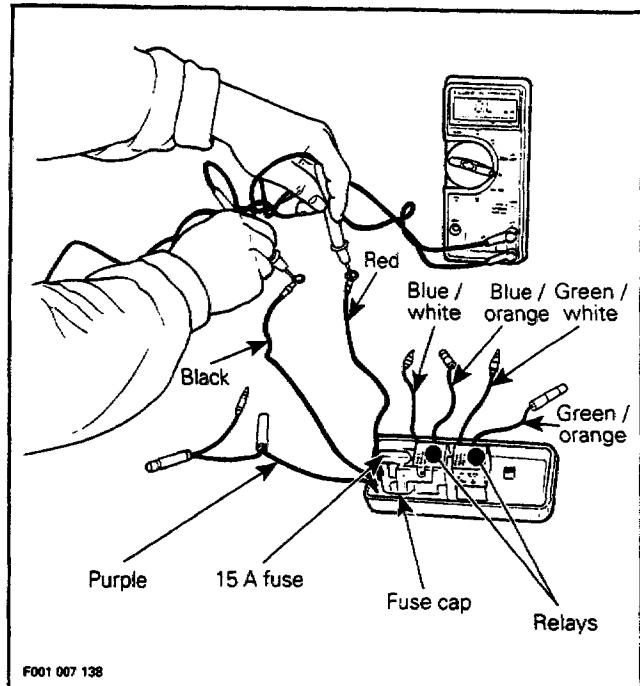
VTS control module testing equipment :

Use an ohmmeter with an input impedance up to 20 mega ohm (2 000 000 ohm).

Refer to the following chart for VTS control module testing. Always respect polarity in chart.

Meter (-) lead	Meter (+) lead	Minimum value	Wires will be connected to :
Black	Red	1 MΩ	Solenoid
Red	Black	1 MΩ	
Black	Purple	200 kΩ	VTS Switch / buzzer / Starter switch
Purple	Black	1 MΩ	
Black	Blue / white	140 kΩ	VTS Switch position "UP"
Blue / white	Black	140 kΩ	
Black	Green / white	140 kΩ	VTS Switch position "DOWN"
Green / white	Black	140 kΩ	
Black	Blue / orange	0 Ω	Motor position "UP"
Blue / orange	Black	0 Ω	
Black	Green / orange	0 Ω	Motor position "DOWN"
Green / orange	Black	0 Ω	
Green / orange	Blue / orange	0 Ω	Motor
Blue / orange	Green / orange	0 Ω	

○ **NOTE :** These values are minimum. If obtained values are even or higher than these, the module should function properly.



Most of circuit can be tested with an ohmmeter but a 100 % test doesn't mean the VTS control module in perfect condition.

○ **NOTE :** Sometimes only parts replacement can solve the problem.

▼ **CAUTION :** Whenever connecting VTS control module, always have battery disconnected from circuit. If VTS control module must be connected when circuit is activated, always connect RED wire last to solenoid positive terminal.

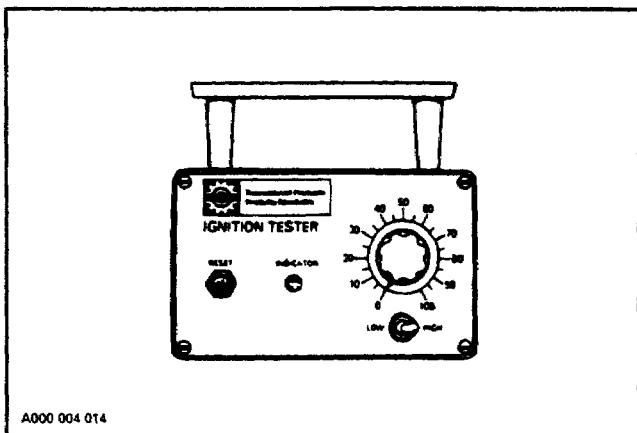
▼ **CAUTION :** Whenever connecting wires, never connect PURPLE and RED wires together. Damage could occur to VTS control module.

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Sub-Section 06 (CDI AND CHARGING SYSTEMS)

BOMBARDIER IGNITION TESTER

The remaining items can be easily checked with Bombardier ignition tester (P / N 295 000 008).



For more information concerning operation and maintenance of the tester, refer to its instruction manual.

Use of Bombardier Ignition Tester

This tester can verify generating coil, ignition module, ignition coil and battery charging coil.

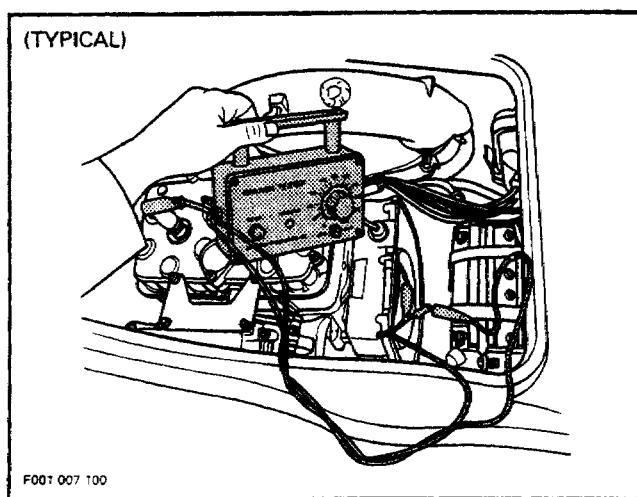
Always make sure that tester batteries are in good condition.

Test Condition

All tests are performed on watercraft at cranking speed with spark plugs installed.

Always proceed in the following order :

1. Connect tester P and N clip leads as indicated for each specific test.



2. Follow test procedure sequence.
3. Install cap over tether cord switch and depress starting button until light turns on, or otherwise, for a maximum of five seconds.
4. If engine starts when performing some test, allow it to idle while observing indicator. Then, shut engine off.
5. After every test that lights the indicator lamp, RESET the indicator circuit by depressing the reset button.

Analysis of Test Results

Indicator Lamp Lights at Specific Setting

Output is as specified. Test results should repeat three times. If readings do not repeat, output is erratic and cause should be investigated (loose connections or components, etc.).

Indicator Lamp Lights at Lower Setting

This indicates that the output is less than that designed to operate in a satisfactory manner. However, before coming to the conclusion of a faulty condition be certain that correct engine cranking conditions were met before condemning the tested part.

Indicator Lamp Does Not Light

One component is defective. Proceed as instructed to find defective component.

Intermittent Ignition Problems

In dealing with intermittent problems there is no easy diagnosis. For example, problems that occur only at normal engine operating temperature have to be tested under similar conditions.

In most cases of temperature and / or vibration failure, only parts replacement can solve the problem as most of these failures return to normal when engine is not running.

Multiple Problems

There is always the possibility of more than one faulty part. If after a component has been replaced, the problem still persists, carefully repeat the complete test procedure to find the other faulty part.

Safety Precautions

◆ **WARNING :** To prevent powerful electric shocks while cranking engine, neither touch any electronic ignition components (ignition coil, high tension wire, wire harness, etc.) nor tester lead clips. Also make sure that tester leads do not touch any metallic object. Ventilate bilge at least two minutes prior to performing any test.

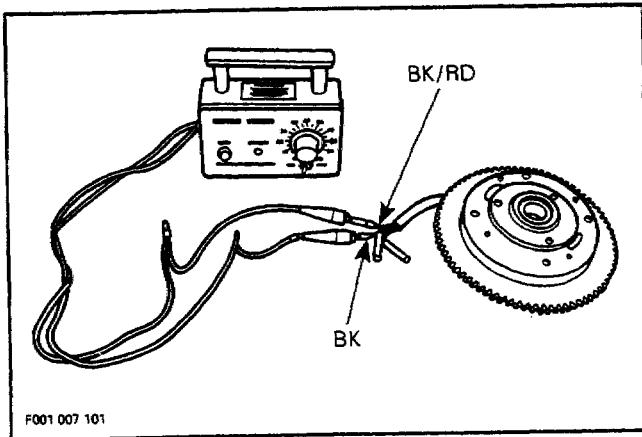
TESTS

Magneto and Generating Coil Output (Single Coil)

1. Disconnect BLACK / RED wire between ignition coil / ignition module and magneto. Disconnect BLACK ground wire.
2. Connect tester wires then set switch and dial as follows :

NOTE : BLACK wire must be connected to ground in order to start engine.

Tester wires	Component wires	Tester switch position	Tester dial position
N	BLACK / RED of magneto harness	LOW	85
P	BLACK of magneto harness		



3. Start engine and observe indicator.
4. Push reset button and repeat step 3 twice.

Results :

- a) Indicator lamp lights : Ignition generating coil output is up to specifications.
- b) Indicator lamp does not light : The problem is a faulty ignition generating coil. Replace it.

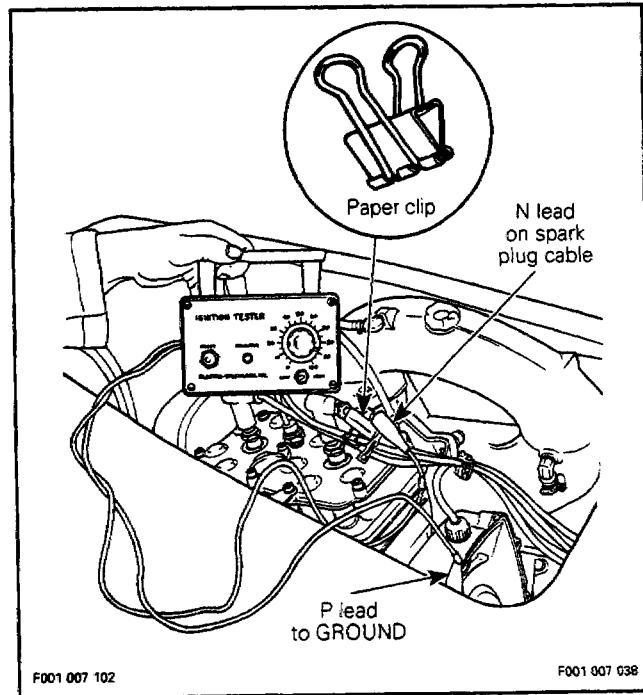
Ignition Coil Output (Single Generating Coil)

A paper clip of approximately 20 mm (3/4 in) will be used as a test adapter for the following test.

1. Install the test adapter to spark plug cable close to MAG side spark plug.

2. Connect tester wires then set switch and dial as follows :

Tester wires	Component wires	Tester switch position	Tester dial position
N	Tester adapter (paper clip) on spark plug cable	LOW	35
P	Engine Ground		



3. Start engine and observe indicator.

NOTE : If engine starts, allow it to idle while observing indicator. Then, shut engine off.

4. Push reset button and repeat step 3 twice.

Results :

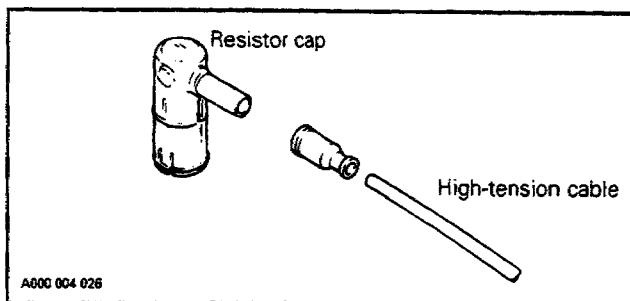
- a) Indicator lamp lights : Ignition coil is OK.
- b) Indicator lamp does not light on one or both cylinder(s) : Ignition coil is faulty. Replace it.

Section 07 ELECTRICAL

Sub-Section 06 (CDI AND CHARGING SYSTEMS)

SUMMARY TABLE

Test to perform	Tester wires	Component wires	Switch	Dial
Generating coil output	N	BLACK / RED of magneto harness	LOW	85
	P	BLACK of magneto harness		
Ignition coil output	N	Test adapter on MAG spark plug cable	LOW	35
	P	Engine ground		



TESTS

Magneto and High Speed Generating Coil Output

1. Disconnect BLACK / RED and WHITE wires between ignition module and magneto.
2. Connect tester wires then set switch and dial as follows :

Tester wires	Component wires	Tester switch position	Tester dial position
N	BLACK / RED of magneto harness	LOW	85
	WHITE of magneto harness		

IGNITION COMPONENTS RESISTANCE MEASUREMENT

As an alternate method, ignition components can be checked with an ohmmeter (preferably a digital one). Proceeding by elimination, check magneto generating coil then ignition coil / ignition module.

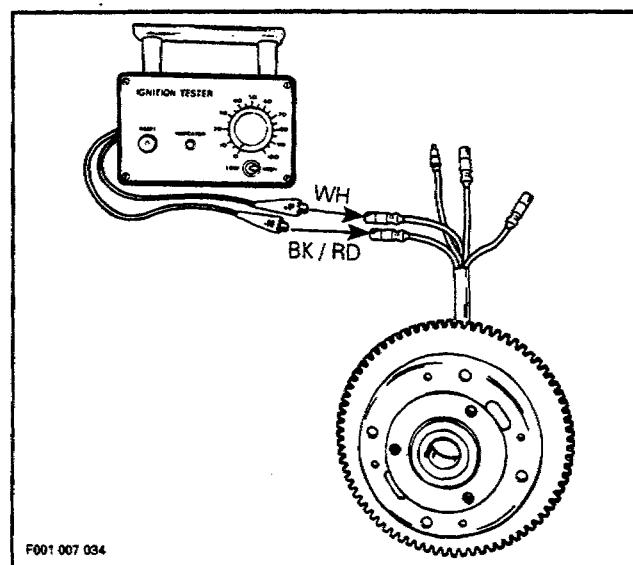
Disconnect connectors at ignition coil and magneto junction. Check resistance between each terminal with a high-sensitivity ohmmeter. Refer to the following table for values and wire colors.

NOTE : An ignition coil with good resistance measurement can still be faulty. Voltage leak can occur at high voltage level which is not detectable with an ohmmeter.

MAGNETO		
PART NAME	WIRE COLOR	RESISTANCE (OHM) (Ω)
Generating coil (single)	BLACK with BLACK / RED	40 - 76
IGNITION COIL		
PART NAME	WIRE COLOR	RESISTANCE (OHM) (Ω)
Secondary winding	End of each spark plug cable, spark plug caps removed	9 - 15 k

NOTE : A short circuit will read zero (0 ohm) (or close to) on ohmmeter.

The spark plug caps must be removed from high tension cables, because they are resistor caps. The cap resistance is 4.48 K ohms.



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Sub-Section 06 (CDI AND CHARGING SYSTEMS)

3. Start engine and observe indicator.
4. Push reset button and repeat step 3 twice.

Results :

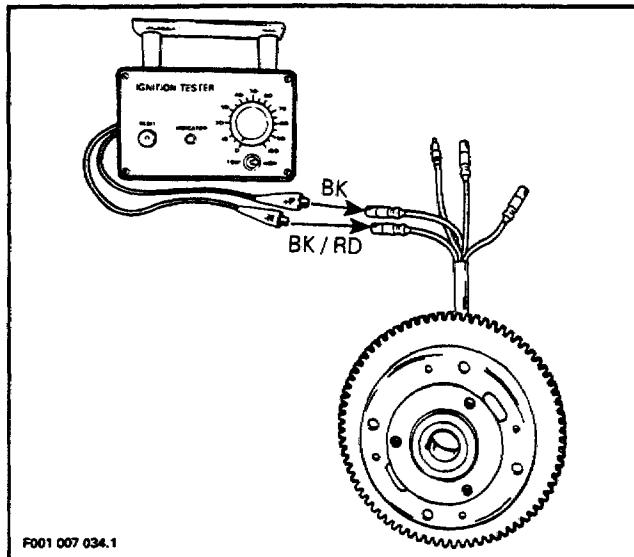
- a) **Indicator lamp lights** : High speed generating coil is OK. Proceed with low speed generating coil test.
- b) **Indicator lamp does not light** : The problem is a faulty high speed generating coil. Replace it.

Magneto and Low Speed Generating Coil

1. Disconnect BLACK / RED wire between ignition module and magneto. Disconnect BLACK ground wire.
2. Connect tester wires then set switch and dial as follows :

NOTE : BLACK wire must be connected to ground in order to start engine.

Tester wires	Component wires	Tester switch position	Tester dial position
N	BLACK / RED of magneto harness		From 20 to 35
P	BLACK of magneto harness	HIGH	



3. Start engine and observe indicator.
4. Push reset button and repeat step 3 twice.

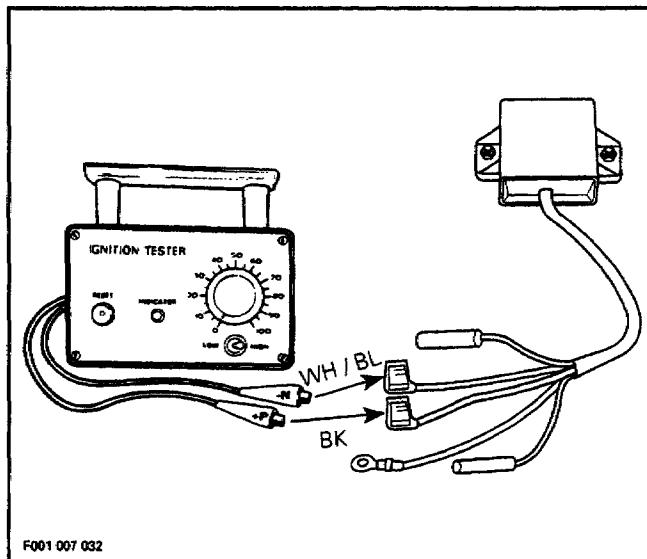
Results :

- a) **Indicator lamp lights** : Low speed generating coil is OK. Proceed with ignition module test.
- b) **Indicator lamp does not light** : Low speed generating coil is faulty. Replace it.

Ignition Module

1. Disconnect WHITE / BLUE and BLACK wires between ignition module and coil.
2. Connect tester wires then set switch and dial as follows :

Tester wires	Component wires	Tester switch position	Tester dial position
N	WHITE / BLUE of ignition module		From 70 to 75
P	BLACK of ignition module	HIGH	



3. Start engine and observe indicator.
4. Push reset button and repeat step 3 twice.

Results :

- a) **Indicator lamp lights** : Ignition module is OK. Proceed with ignition coil test.
- b) **Indicator lamp does not light** : Ignition module is faulty. Replace it.

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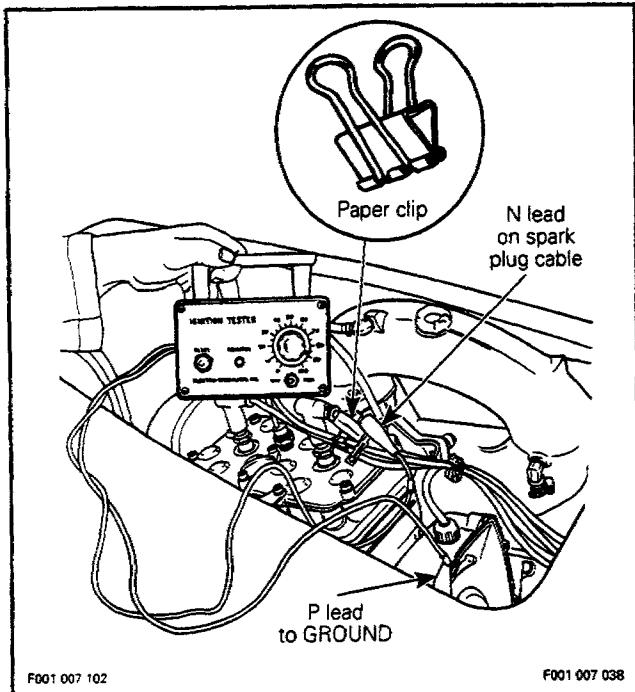
Sub-Section 06 (CDI AND CHARGING SYSTEMS)

Ignition Coil Output

A paper clip of approximately 20 mm (3/4 in) will be used as a test adapter for the following test.

1. Install the test adapter to spark plug cable close to MAG side spark plug.
2. Connect tester wires then set switch and dial as follows :

Tester wires	Component wires	Tester switch position	Tester dial position
N	Tester adapter (paper clip) on spark plug cable	LOW	70
P	Engine Ground		



3. Start engine and observe indicator.

NOTE : If engine starts, allow it to idle while observing indicator. Then, shut engine off.

4. Push reset button and repeat step 3 twice.

Results :

- a) Indicator lamp lights : Ignition coil is OK.
- b) Indicator lamp does not light on one or both cylinder(s) : Ignition coil is faulty. Replace it.

SUMMARY TABLE

Test to perform	Tester wires	Component wires	Switch	Dial
High speed generating coil	N	BLACK / RED of magneto harness	LOW	85
	P	WHITE of magneto harness		
Low speed generating coil	N	BLACK / RED of magneto harness	HIGH	From 20 to 35
	P	BLACK of magneto harness		
Ignition module	N	WHITE / BLUE of ignition module	HIGH	From 70 to 75
	P	BLACK of ignition module		
Ignition coil	N	Test adapter on MAG spark plug cable	LOW	70
	P	Engine ground		

Section 07 ELECTRICAL

Sub-Section 06 (CDI AND CHARGING SYSTEMS)

IGNITION COMPONENTS RESISTANCE MEASUREMENT

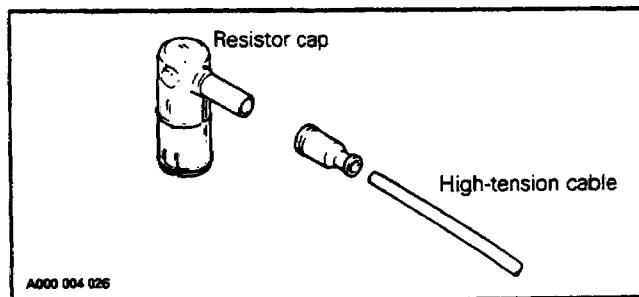
As an alternate method, ignition components can be checked with an ohmmeter (preferably a digital one). Proceeding by elimination, check magneto generating coils then ignition coil. If everything is OK then it is a malfunction of ignition module.

Disconnect wires at ignition module, ignition coil and magneto junction. Check resistance or continuity between each terminal with a high-sensitivity ohmmeter. Refer to the following table for values and wire colors.

NOTE : An ignition coil with good resistance measurement can still be faulty. Voltage leak can occur at high voltage level which is not detectable with an ohmmeter.

NOTE : A short circuit will read zero (0 ohm) (or close to) on ohmmeter.

The spark plug caps must be removed from high tension cables, because they are resistor caps. The cap resistance is 4.48 K ohms.



	PART NAME	WIRE COLOR	RESISTANCE (OHM) (Ω)
MAGNETO	High speed generating coil	WHITE with BLACK / RED	2.8 - 4.2
	Low speed generating coil	BLACK with BLACK / RED	120 - 180
IGNITION COIL	Primary winding	BLACK with WHITE / BLUE	0.23 - 0.43
	Secondary winding	End of each spark plug cable, spark plug caps removed	5.85 - 6.50 k
	Insulation	Check each wire of primary and secondary windings with ground for short circuit	open circuit (∞)

Section 07 ELECTRICAL

Sub-Section 06 (CDI AND CHARGING SYSTEMS)

BATTERY CHARGING SYSTEM

GENERAL

Magneto

It is the primary source of electrical energy. It transforms magnetic field into electric current through a three-pole coil. It outputs Alternating Current AC.

Rectifier / Regulator

A half-wave rectifier receives magneto AC current and transforms it into Direct Current DC to allow battery charging. Battery is the DC source for electric starter, multi-purpose electronic module / engine speed limiter, engine overheat beeper and accessories.

Included in the same unit, a regulator keeps voltage at a steady level to prevent any damage to components.

TESTING PROCEDURE

 **NOTE :** First, ensure that battery is in good condition prior to performing the following test using current indicator such as Snap-on MT 110.

Current Test

Proceed as follows :

- Start engine.
- Install tester over battery positive cable.
- Bring engine to approximately 5500 RPM.

Depending on battery charge, current reading should be approximately 5 A (amperes). If not, check magneto output prior to concluding that rectifier is faulty.

Voltage Test

Proceed as follows :

- Start engine.
- Connect a voltmeter (set on DC volt scale) on battery posts.
- Bring engine to approximately 5500 RPM.

If voltmeter reads over 15 volts, regulator is defective. Replace it.

 **NOTE :** Whatever the voltmeter type used (peak voltage or RMS), the voltage must not exceed 15 V. A faulty regulator will allow voltage to exceed 15 V as engine speed is increased.

 **CAUTION :** During this test the battery cables must be reconnected to the battery.

Magneto, Battery Charging Coil (Single Generating Coil System)

With Bombardier Ignition Tester

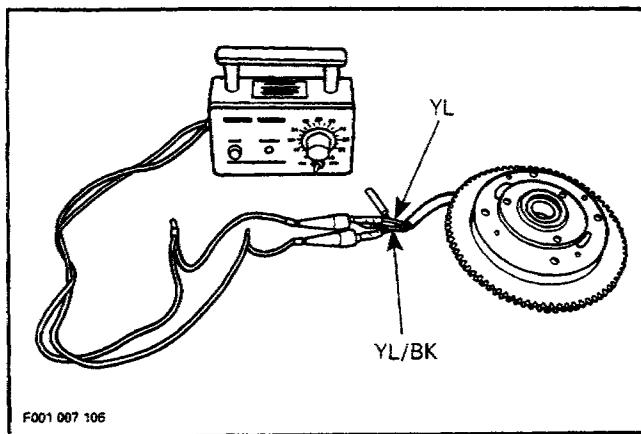
Operate it as for ignition system verifications.

1. Disconnect YELLOW and YELLOW / BLACK wires coming from magneto wiring harness.
2. Connect tester wires then set switch and dial as follows :

Tester wires	Component wires	Tester switch position	Tester dial position
N	YELLOW of magneto harness		
P	YELLOW / BLACK of magneto harness	LOW	70

Section 07 ELECTRICAL

Sub-Section 06 (CDI AND CHARGING SYSTEMS)



Tester wires	Component wires	Tester switch position	Tester dial position
N	YELLOW of magneto harness	LOW	85
	YELLOW / BLACK of magneto harness		

3. Start engine and observe indicator.
4. Push reset button and repeat step 3 twice.

Results :

- a) **Indicator lamp lights** : Battery charging coil output is up to specifications.
- b) **Indicator lamp does not light** : Battery charging coil is faulty. Replace it.

Resistance Measurement

As an alternate method, battery charging coil can be checked with an ohmmeter (preferably a digital one).

Use the following table :

MAGNETO		
PART NAME	WIRE COLOR	RESISTANCE (OHM) (Ω)
Battery charging coil	YELLOW with YELLOW / BLACK of magneto harness	0.05 - 0.6

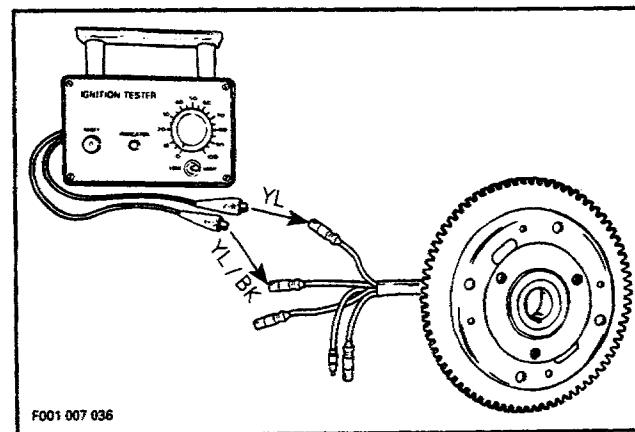
NOTE : A short circuit will read zero (0 ohm) (or close to) on ohmmeter.

Magneto, Battery Charging Coil (Double Generating Coil System)

With Bombardier Ignition Tester

Operate it as for ignition system verifications.

1. Disconnect YELLOW and YELLOW / BLACK wires coming from magneto wiring harness.
2. Connect tester wires then set switch and dial as follows :



3. Start engine and observe indicator.
4. Push reset button and repeat step 3 twice.

Results :

- a) **Indicator lamp lights** : Battery charging coil output is up to specifications.
- b) **Indicator lamp does not light** : Battery charging coil is faulty. Replace it.

Resistance Measurement

As an alternate method, battery charging coil can be checked with an ohmmeter (preferably a digital one).

Use the following table :

PART NAME	WIRE COLOR	RESISTANCE (OHM) (Ω)
MAGNETO	Battery charging coil	YELLOW with YELLOW / BLACK of magneto harness
MAGNETO	Insulation	Check each wire with ground for short circuit

NOTE : A short circuit will read zero (0 ohm) (or close to) on ohmmeter.

Section 07 ELECTRICAL

Sub-Section 07 (SPARK PLUGS)

DESIGN SYMBOLS USED ON NGK SPARK PLUGS

First letter prefix for thread and hexagon size

Second and third letter prefix for construction feature, except single prefix

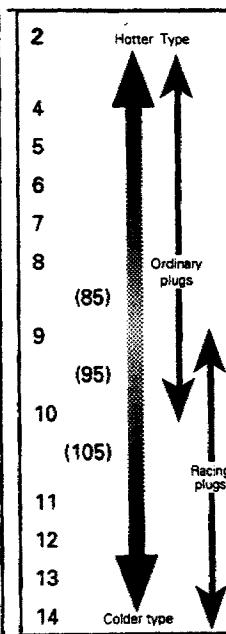
Heat rating number

First letter suffix for thread reach

Second letter suffix for construction feature, etc.

Letter	Thread size	Hexagon size
A	18 mm	25.4 mm
B	14 mm	20.6 mm
C	10 mm	16.0 mm
D	12 mm	18.0 mm
F	7/8 in-18	23.8 mm
G	PF 1/2 in-14	23.8 mm

Letter	Construction feature
B	Hexagon size 20.6 mm
C	Hexagon size 16.0 mm
G	Hexagon size 23.8 mm
L	Compact type (SHORTY)
M	Compact type (BANTAM)
P	Projected insulator nose type
R	Resistor type
S	Shielded type
U	Surface discharge type



Letter	Thread reach
None	22.5 mm (thread dia. PF1/2 in-14 mm)
	16.0 mm (thread dia. 7/8 in-18 mm)
L	11.2 mm
H	12.7 mm (racing type 12.5 mm)
E	19.0 mm (racing type 18.0 mm)
F	Conical seat type
A - F	10.9 mm
B - F	11.2 mm
B M-F	7.8 mm
BE - F	17.5 mm

Letter	Construction feature, etc.
A	Specials
B	Special plug for Honda vehicles
C	Competition type
G	Racing plugs, center electrode of nickel alloy
GV	Racing plugs, center electrode of precious metal
N	Racing plugs, nickel electrode
P	Racing plugs, platinum ground electrode
R	Shielded resistor plugs
S	Copper core center electrode (super)
V	Center electrode of precious metal
W	Tungsten electrode
X	Series gap plugs
Y	V-Grooved center electrode
Multiple ground electrodes type	
K	2 T 3
M	2 Q 4
Others	Except for above letters, there are special plugs of J, L, Z, etc.

(*Standard regulation is drawn here. There also exists a few extraordinary symbols.)

B **P** **6** **E** **S** **11**

Wide gap type (mm)

Section 07 ELECTRICAL

Sub-Section 07 (SPARK PLUGS)

DISASSEMBLY

First unscrew the spark plug one turn.

Clean the spark plug and cylinder head with pressurized air then completely unscrew.

HEAT RANGE

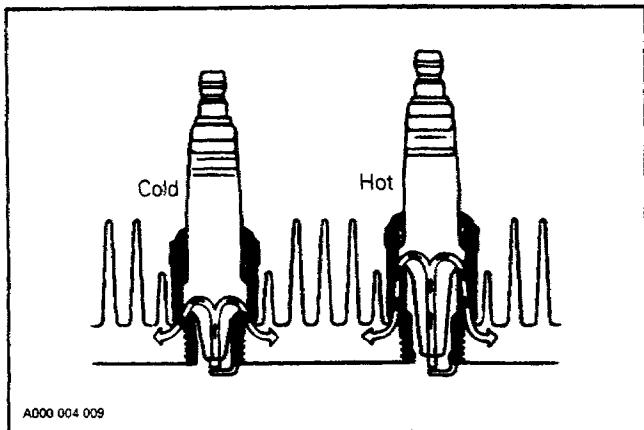
The proper operating temperature or heat range of the spark plugs is determined by the spark plug ability to dissipate the heat generated by combustion.

The longer the heat path between the electrode tip to the plug shell, the hotter the spark plug operating temperature will be – and inversely, the shorter the heat path, the colder the operating temperature will be.

A "cold" type plug has a relatively short insulator nose and transfers heat very rapidly into the cylinder head.

Such a plug is used in heavy duty or continuous high speed operation to avoid overheating.

The "hot" type plug has a longer insulator nose and transfers heat more slowly away from its firing end. It runs hotter and burns off combustion deposits which might tend to foul the plug during prolonged idle or low speed operation.



CAUTION : Severe engine damage might occur if a wrong heat range plug is used.

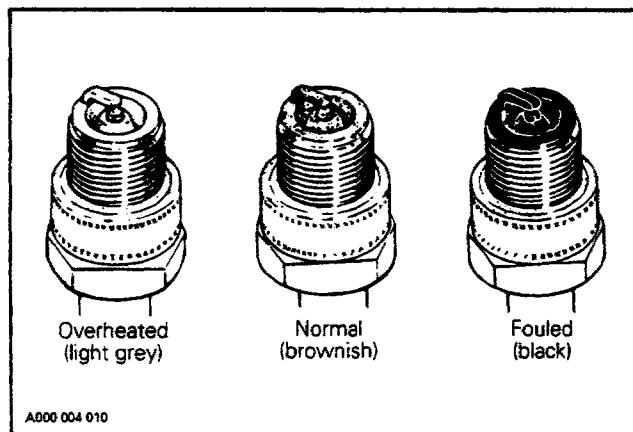
A too "hot" plug will result in overheating and pre-ignition, etc.

A too "cold" plug will result in fouling (shorting the spark plug) or may create carbon build up which can heat up red-hot and cause pre-ignition or detonation.

FOULING

Fouling of the spark plug is indicated by irregular running of the engine, decreased engine speed due to misfiring, reduced performance, and increased fuel consumption. This is due to a loss of compression. Other possible causes are : prolonged idling, or running on a too rich mixture due to a faulty carburetor adjustment or incorrect fuel. The plug face of a fouled spark plug has either a dry coating of soot or an oily, glossy coating given by an excess either of oil or of oil with soot. Such coatings form a conductive connection between the center electrode and ground.

SPARK PLUG ANALYSIS

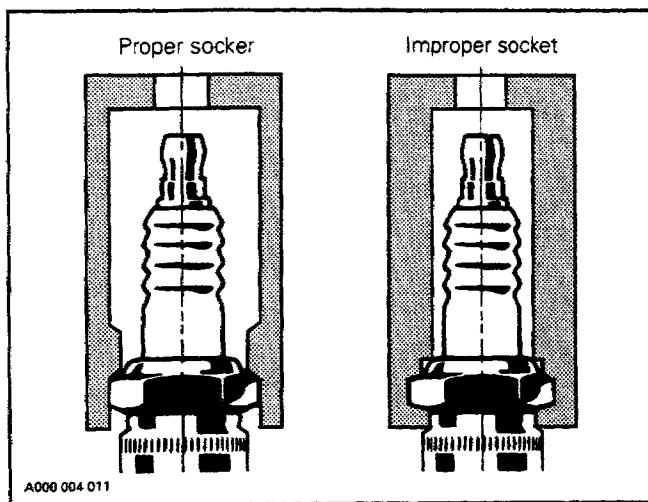


The plug face (and piston dome) reveals the condition of the engine, operating condition, method of driving and fuel mixture. For this reason it is advisable to inspect the spark plug at regular intervals, examining the plug face (i.e. the part of the plug projecting into the combustion chamber) and the piston dome.

SPARK PLUG INSTALLATION

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

1. Using a wire feeler gauge, set electrode gap according to chart below.
2. Apply antiseize lubricant (P / N 293 550 001) over the spark plug threads to prevent possible seizure.
3. Hand screw spark plug into cylinder head and tighten with a torque wrench and a proper socket.



SPARK PLUG CHART

Models	Engine type	Spark plugs	Torque N·m (lbf·ft)	Gap mm (inch)
5806 (SP) 5807 (SPX) 5808 (SPI) 5813 (GTS) 5820 (EXPLORER) 5861 (GTX)	587	NGK BR7ES	24 (17)	0.50 (0.020)
5852 (XP)	657	NGK BR8ES	24 (17)	0.50 (0.020)

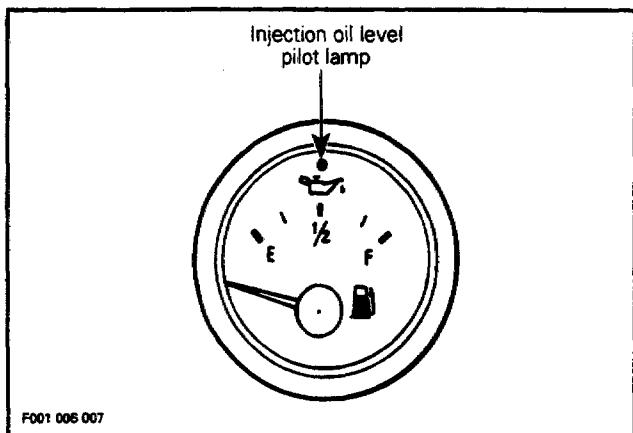
INSTRUMENTS

GENERAL

The oil / fuel level gauge has a pointer which indicates fuel level. To verify if fuel pointer works, first touch starter switch button to activate electrical system for about 20 to 30 seconds.

NOTE : The electrical system can be activated without tether cord install.

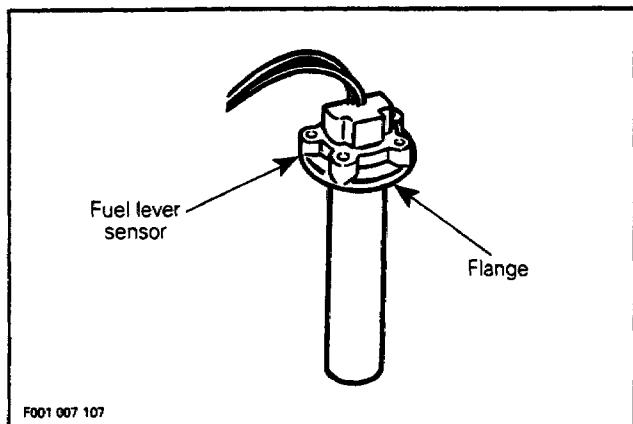
The oil level pilot lamp is part of the fuel level gauge. It will light when injection oil level is low.



Fuel Level Sensor Verification (SPX model (5807) 1st Run and Explorer (5820))

The fuel level sensor with its integrated float gives to fuel gauge its reading.

To verify fuel sensor a resistance test should be performed with an ohmmeter allowing the float to move up through a sequence.

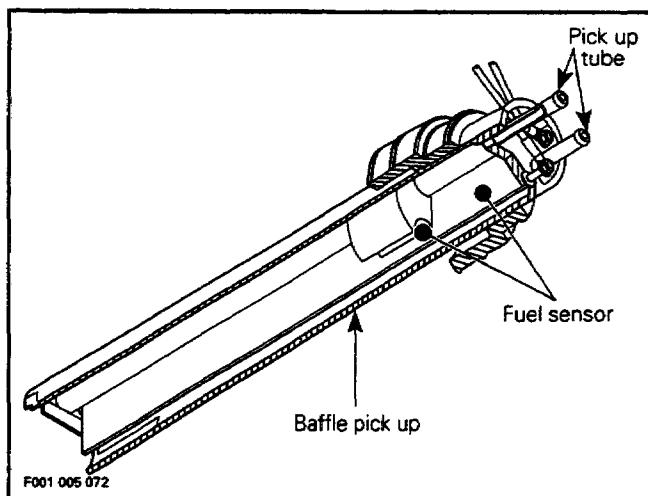


The resistance measured between BLACK / GREEN and GREEN wires must be in accordance with fuel level (measured from under the flange) as specified in the following chart.

Fuel Baffle Pick Up Sensor Verification

The baffle pick up has an integrated fuel sensor on models which are provided with an oil / fuel level gauge.

To verify fuel sensor a resistance test should be performed with an ohmmeter allowing the float to move up through a sequence.



The resistance measured between BLACK / GREEN and GREEN wires must be in accordance with fuel level (measured from under the flange) as specified in the following chart.

FUEL LEVEL AND RESISTANCE		
	FUEL LEVEL (mm)	RESISTANCE (Ω)
From 33.1 @ 55.6	(1-5/16 @ 2-3/16) (Full)	0.0 ± 0.1
From 55.6 @ 79.3	(2-3/16 @ 3-1/8)	17.8 ± 0.2
From 79.3 @ 103	(3-1/8 @ 4-1/16)	27.8 ± 0.3
From 103 @ 126.7	(4-1/16 @ 5)	37.8 ± 0.4
From 126.7 @ 150.4	(5 @ 5-15/16)	47.8 ± 0.5
From 150.4 @ 174.1	(5-15/16 @ 6-13/16)	57.8 ± 0.6
From 174.1 @ 197.8	(6-13/16 @ 7-3/4)	67.8 ± 0.7
From 197.8 @ 221.5	(7-3/4 @ 8-11/16)	77.8 ± 0.8
From 221.5 @ 246.2	(8-11/16 @ 9-11/16) (Empty)	89.8 ± 0.9

Section 07 ELECTRICAL

Sub-Section 08 (INSTRUMENTS)

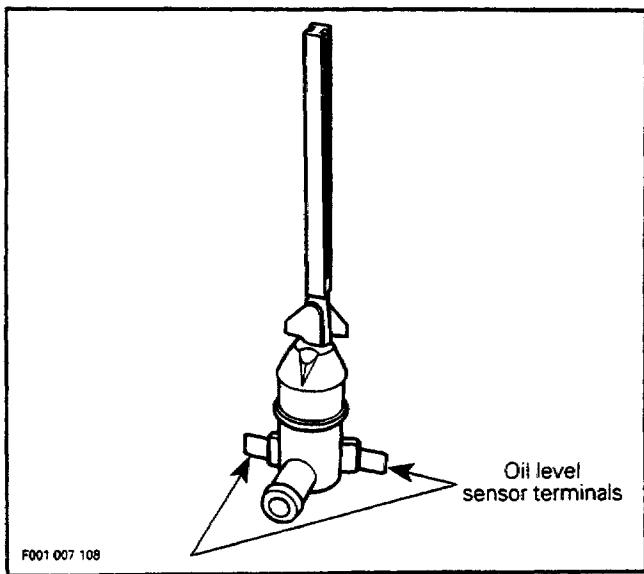
Oil Level Sensor Verification

The oil level sensor completes the ground for the oil injection pilot light.

With the oil down to caution level, contacts are made to complete the ground circuit.

To verify oil level sensor a resistance test should be performed with an ohmmeter between BLACK / PURPLE and PURPLE wire terminals.

There should be no resistance (0 ohm) between terminals. If a resistance is noticed sensor is defective.

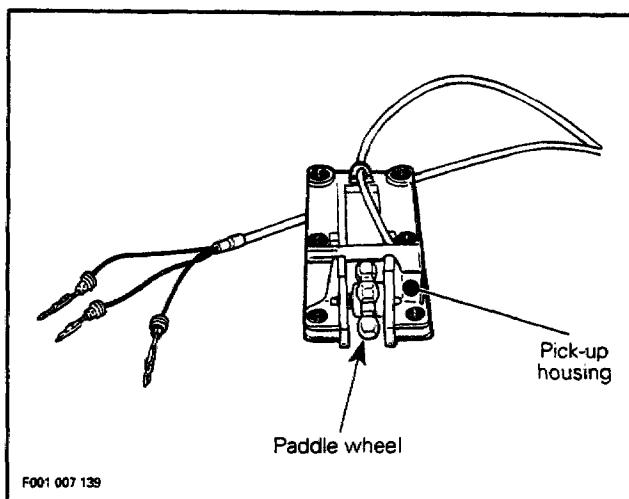


CAUTION : Whenever connecting wires, never connect RED / PURPLE and RED wires together. Damage could occur to multi-purpose electronic module.

Speed Sensor Verification (GTX Model (5861) only)

The speedometer gives a reading through a speed sensor. Speed sensor is installed in center of ride shoe. It works with the water flow which turns a magnetic paddle wheel that triggers an electronic pick-up that in turn sends a speed signal to the speedometer.

The paddle wheel is protected by the pick-up housing.



To verify speed sensor a resistance test should be performed with an ohmmeter. Disconnect speed sensor wires from inside bilge.

Refer to the following chart for speed sensor testing. Always respect polarity in chart.

Meter (-) lead	Meter (+) lead	Approx. value
red / brown	black / brown	∞
black / brown	red / brown	21.8 M Ω
yellow / black	black / brown	3.6 M Ω
black / brown	yellow / black	∞
red / brown	yellow / black	∞
yellow / black	red / brown	3 M Ω

Section 07 ELECTRICAL

Sub-Section 08 (INSTRUMENTS)

VTS Motor (XP Model (5852) only)

Motor condition can be checked with an ohmmeter. Disconnect wiring harness, install test probes on both BLUE / ORANGE and GREEN / ORANGE wires. Measure resistance, it should be close to 1.5 ohm.

Ensure motor wire connections to the VTS module are not reversed. If so, when pushing on VTS switch UP button the nozzle will go down and vice versa.

If motor seems to jam and it has not reached the end of its stroke, the following test could be performed.

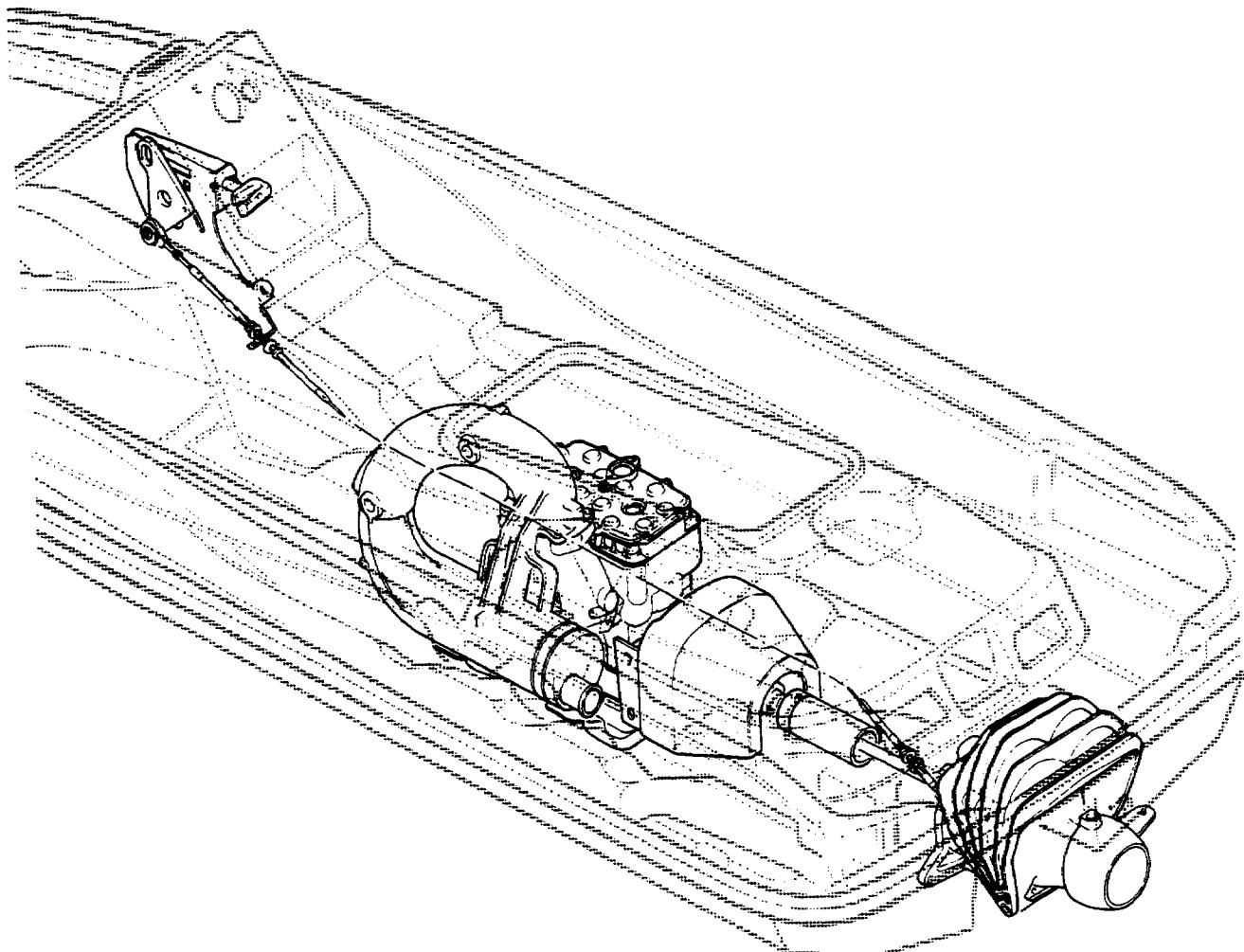
First remove motor, refer to PROPULSION AND DRIVE SYSTEMS 08-03 then refer to **disassembly**. Then manually rotate worm to verify VTS system actuating mechanism for free operation.

Connect motor through a 15 A fuse directly to the battery.

Connect wires one way then reverse polarities to verify motor rotation in both ways.

If VTS actuating mechanism is correct and the motor turns freely in both ways, VTS module could be defective.

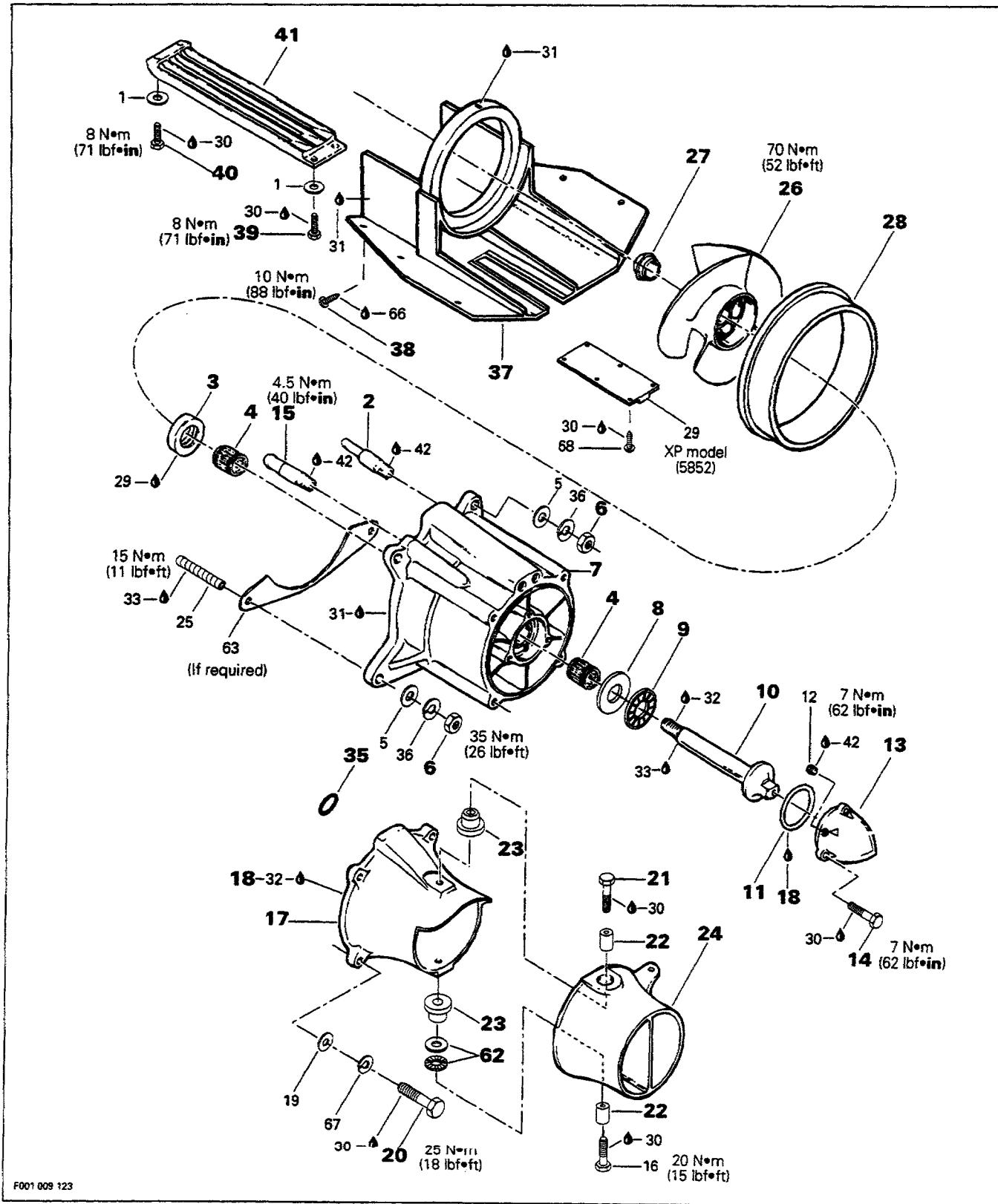
PROPULSION AND DRIVE SYSTEMS



Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

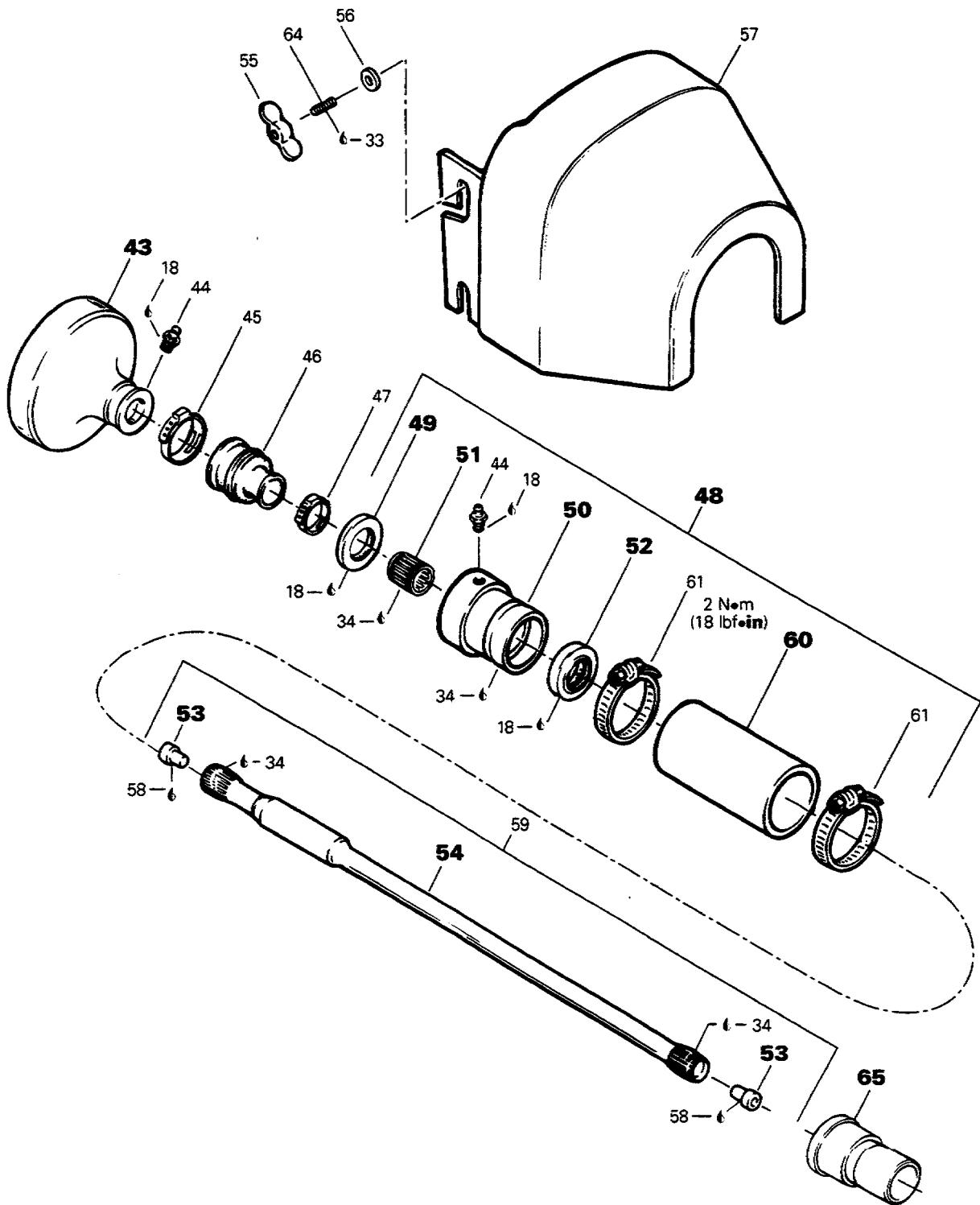
JET PUMP UNIT



Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

DRIVE SHAFT AND SEAL CARRIER



Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

COMPONENTS

1. Flat washer M6 (4)
2. Fitting (bailer pick-up) (2)
3. Seal (double lip)
4. Needle bearing (2)
5. Flat washer M10 (4)
6. Nut M10 (4)
7. Impeller housing
8. Thrust washer
9. Thrust bearing
10. Impeller shaft
11. O-ring
12. Plug
13. Housing cover
14. Hexagonal head screw M5 x 20 (3)
15. Fitting (pump)
16. Hexagonal head screw M8 x 30 (1)
17. Venturi
18. Loctite 515
19. Flat washer M8 (4)
20. Hexagonal head screw M8 x 35 (4)
21. Hexagonal head screw M8 x 25 (1)
22. Sleeve (2)
23. Bushing (2)
24. Nozzle
25. Stud M10 x 45 (4)
26. Impeller
27. Boot
28. Wear ring
29. Ride shoe plate (5852 model)
30. Loctite 242 (blue)
31. Loctite 598 ultra black
32. Loctite primer N
33. Loctite 271 (red)
34. Synthetic grease
35. O-ring (2)
36. Lock washer M10 (4)
37. Ride shoe
38. Countersunk Phillips screw M6 x 35 (6)
39. Hexagonal head screw M6 x 16 (2)
40. Hexagonal head screw M6 x 20 (2)
41. Grill
42. Loctite PST 592
43. PTO flywheel
44. Grease fitting (2)
45. Clamp
46. Rubber boot
47. Clamp
48. Seal carrier assembly
49. Seal (single lip)
50. Seal carrier
51. Needle bearing
52. Seal (double lip)
53. Damper
54. Drive shaft
55. Wing nut M8 (2)
56. Flat washer M8 (2)
57. PTO Flywheel guard
58. Loctite 414 super bonder
59. Drive shaft assembly
60. Protective hose
61. Gear clamp (2)
62. Locking disk (2) (5806, 5807, 5808 models)
63. Shim
64. Stud M8 x 15
65. Hull insert
66. Loctite 732 RTV silicone
67. Lock washer M8 (4)
68. Countersunk Phillips screw M5 x 10 (6) (5852 model)

Disconnect battery.

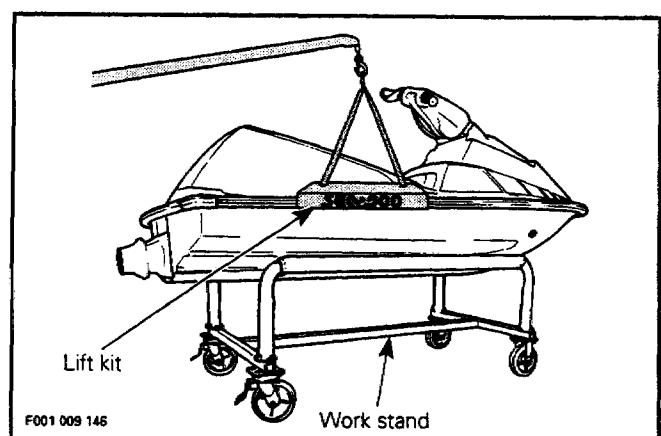
◆ **WARNING :** Battery black negative cable must always be disconnected first and connected last.

JET PUMP SERVICING

○ **NOTE :** This portion outlines some routine procedures. To obtain complete information concerning these procedures, inspection, parts, illustrations, sealing / thread locking products, tightening torques etc, refer to REMOVAL AND OVERHAUL and following portion.

To work on watercraft, securely install it on a stand. Thus, if access is needed to water inlet area, it will be easy to slide underneath watercraft. Working on the water intake grill, jet pump, ride shoe, etc, can be done by simply blocking the rear of vehicle above work stand.

A lift kit (P / N 298 760 000), (P / N 298 776 000), (P / N 298 780 000) can be used to install watercraft on a stand.



Impeller Condition and Impeller / Wear Ring Clearance

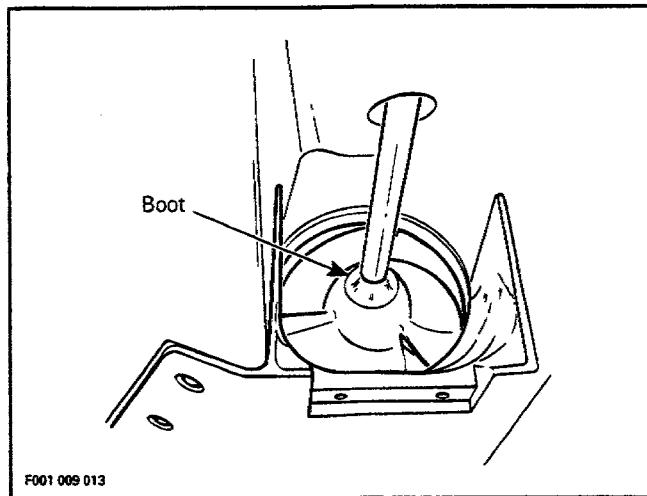
○ **NOTE :** These verifications can be performed without removing impeller housing and thus, avoiding cleaning and sealing jet pump to hull.

Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

Impeller Condition

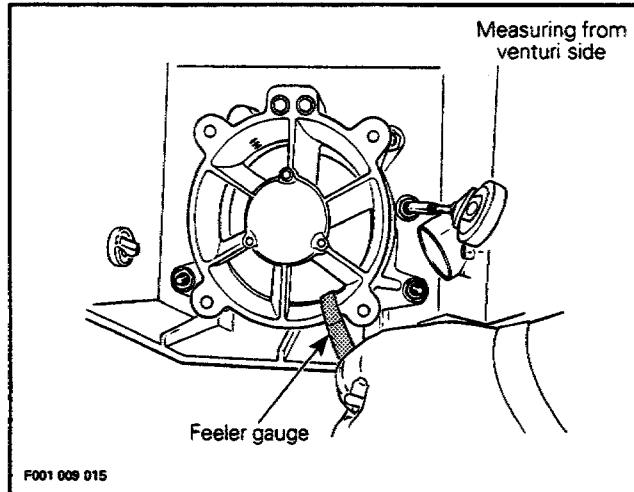
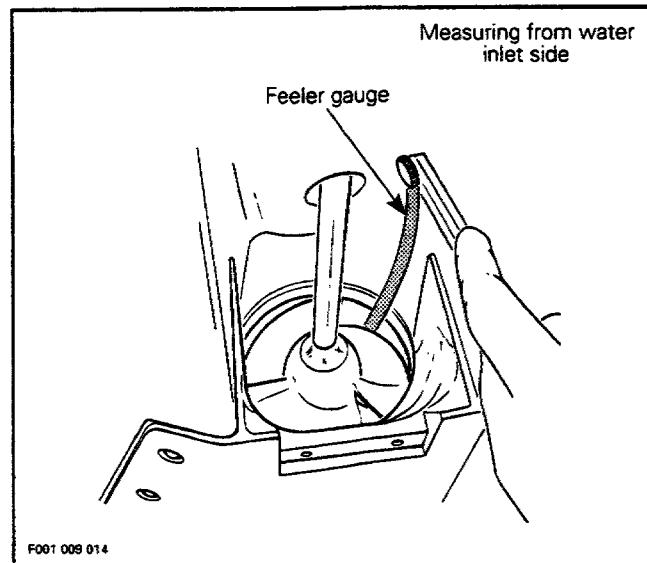
Impeller and boot condition can be quickly checked from underneath of the watercraft. Remove grill and look through water inlet opening.



Impeller / Wear Ring Clearance

This clearance is critical for jet pump performance.

Clearance can be checked from water inlet opening, after inlet grill removal, or from venturi side, after venturi / nozzle assembly removal, however this may be more difficult.



Using a long feeler gauge 30 cm (12 in) blades, measure clearance between impeller blade tip and wear ring. Measure each blade at its center. Clearance should not exceed .5 mm (.020 in). If clearance is greater, disassemble jet pump and inspect impeller and wear ring. Renew worn parts.

Oil Inspection / Replacement

Detach ball joint of steering cable from nozzle.

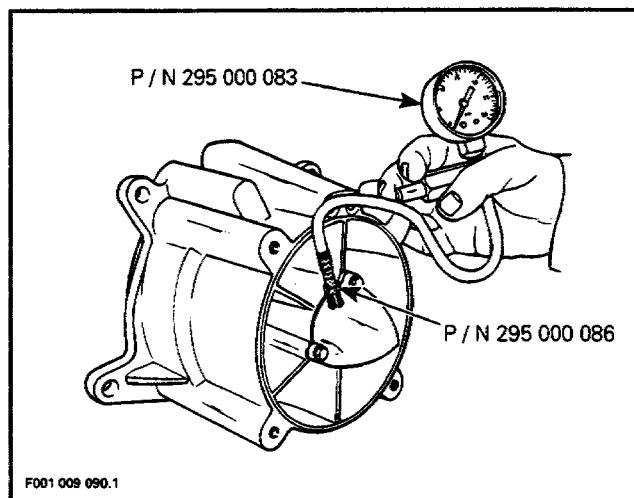
Remove four retaining screws from venturi.

Pull venturi and nozzle assembly from impeller housing.

Remove housing cover plug.

Check oil level, it should be at bottom of hole threads.

If oil level is low, check impeller shaft housing for leaks. Drain oil and use the following tools.



Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

Pressurize to a maximum of 70 kPa (10 PSI) during 10 minutes. If there is no pressure drop impeller housing does not leak.

If there is a pressure drop spray soapy water around housing cover. If bubbles are noticed, replace housing cover O-ring and / or housing cover. If there are no bubbles, impeller shaft, impeller shaft seal, or impeller housing is leaking through porosity and has to be replaced. Jet pump unit has to be overhauled.

If everything is correct, add proper amount of oil.

To check oil condition, insert a wire through opening then withdraw. A whitish oil indicates water contamination.

This may involve defective impeller shaft seal and / or O-ring of housing cover. Jet pump unit should be overhauled to replace seal.

To replace oil, remove housing cover.

Thoroughly clean reservoir and inside of cover with a solvent.

Reinstall cover with its O-ring and apply Loctite 515. Remove plug from cover.

Pour approximately 65 mL (2.2 oz) of oil through hole until oil reaches the bottom of hole threads. Use SEA-DOO JET PUMP SYNTHETIC OIL (P / N 293 600 011) only. Oil will penetrate slowly in housing, wait a few minutes and readjust oil level.

▼ **CAUTION : This is a synthetic oil. Do not mix with mineral based oil. Do not mix oil brands.**

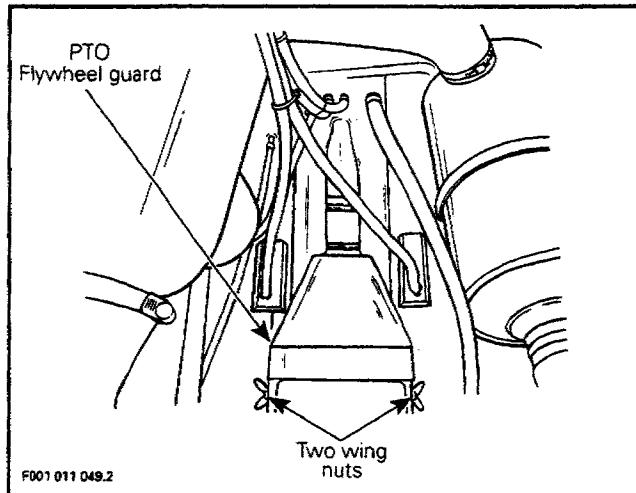
Properly reinstall removed parts.

REMOVAL AND OVERHAUL

○ **NOTE :** Whenever removing a part, visually check for damage such as : corrosion, crack, split, break, porosity, cavitation, deformation, distortion, heating discoloration, wear pattern, missing plating, missing or broken needle on needle bearing, water damage diagnosed by black-colored spots, etc. Renew any damaged part. As a quick check, manually feel clearance and end play, where applicable, to detect excessive wear.

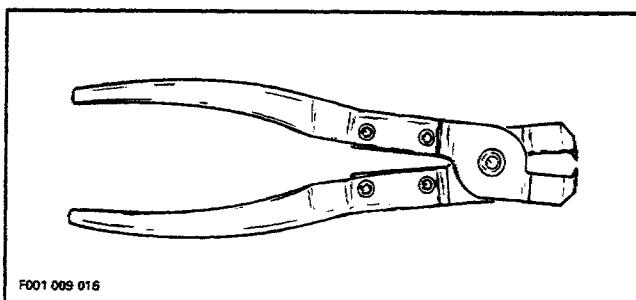
Remove air vent tube support from body opening (XP model (5852)).

Remove PTO flywheel guard.

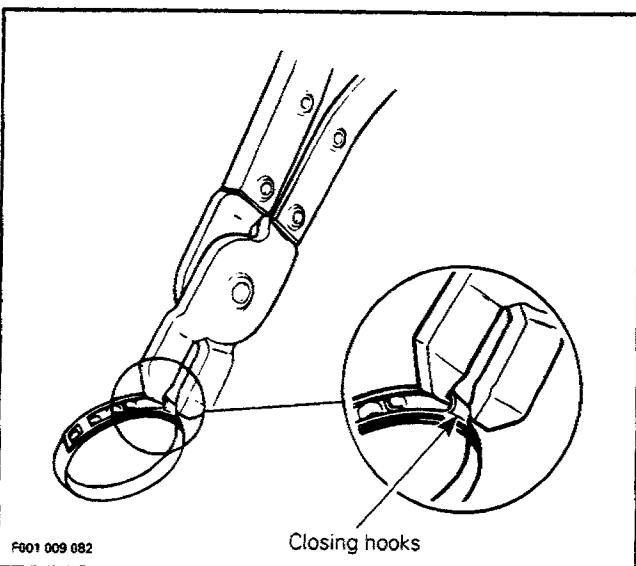


Unfasten **small** clamp on drive shaft boot as follows :

- Use pliers (P / N 295 000 069).



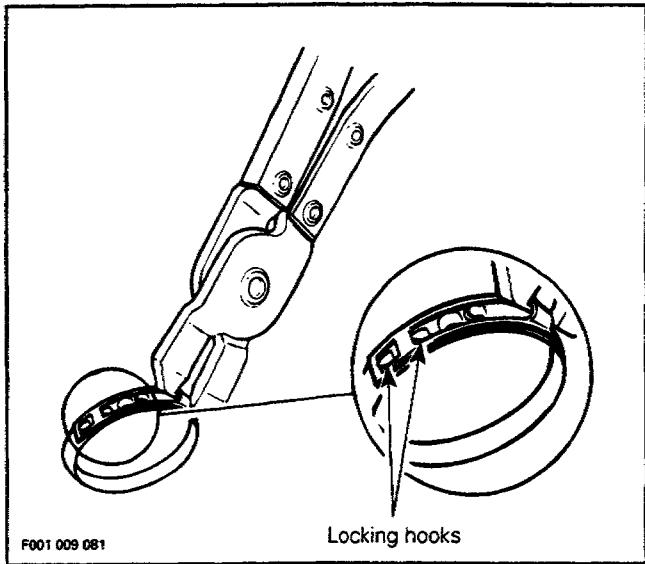
- Insert pointed tips of pliers in closing hooks.



Section 08 PROPULSION AND DRIVE SYSTEMS

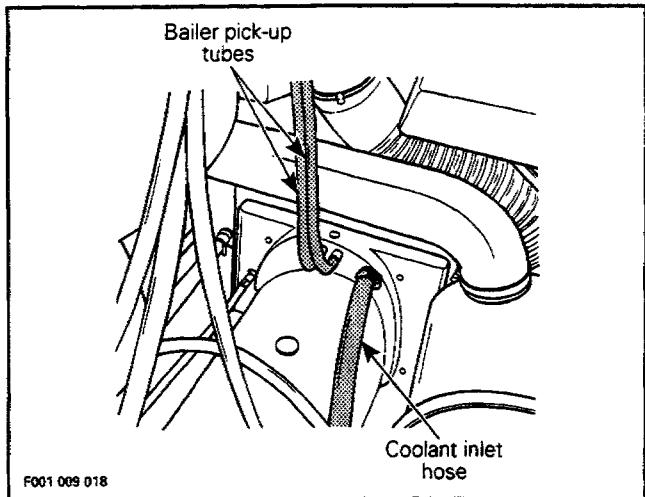
Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

- Squeeze pliers to draw hooks together and disengage windows from locking hooks.



- Keep clamp for later use.

From inside bilge, disconnect coolant inlet hose and both bailer pick-up tubes from impeller housing.



Remove ball joint fasteners to release steering cable from nozzle.

21,22,23,24,62, Screw, Sleeve, Bushing, Nozzle and Locking Disk (if applicable)

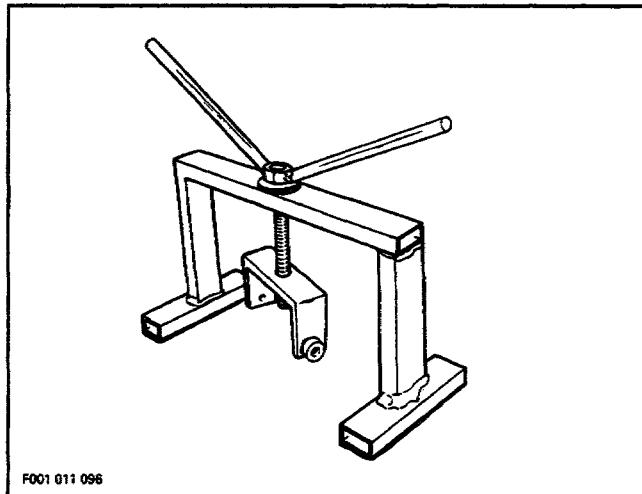
Remove two retaining screws, locking disks (if applicable) and withdraw nozzle.

Push sleeves and bushings out of nozzle.

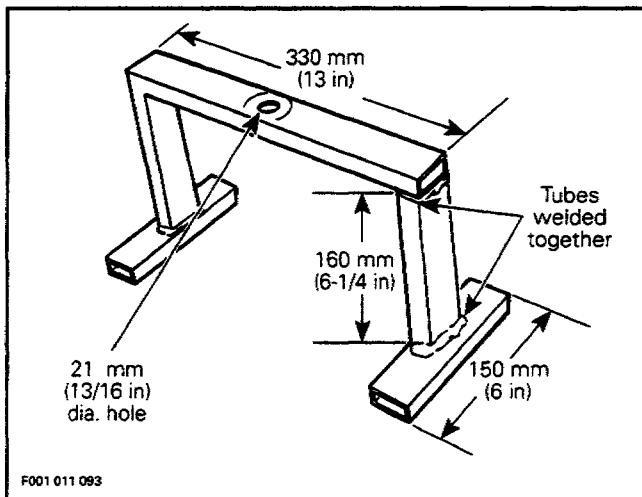
6,7, Nut and Impeller Housing

Remove nuts retaining impeller housing to hull.

Make the following tool to easily separate impeller housing from hull.



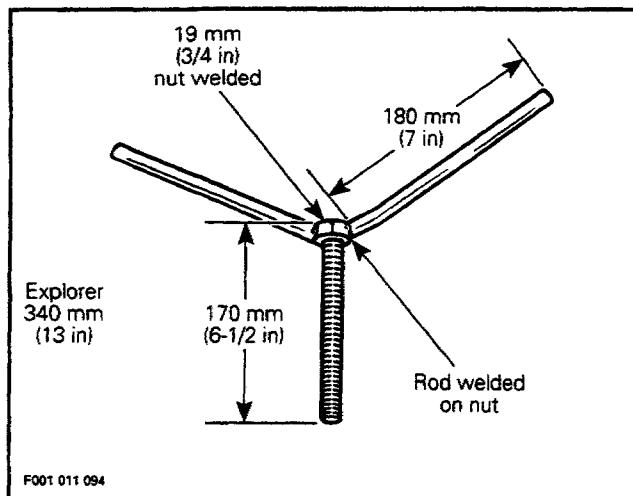
- Use rectangular tube 38 x 19 x 1.5 mm (1-1/2 x 3/4 x 1/16 in) thick. Five pieces of rectangular tube are needed. One piece 330 mm (13 in) long, two pieces 160 mm (6-1/4 in) long and two other pieces 150 mm (6 in) long.
- Drill one 21 mm (13/16 in) diameter hole in center of the 330 mm (13 in) tube.
- Weld rectangular tubes together as shown in the following illustration.



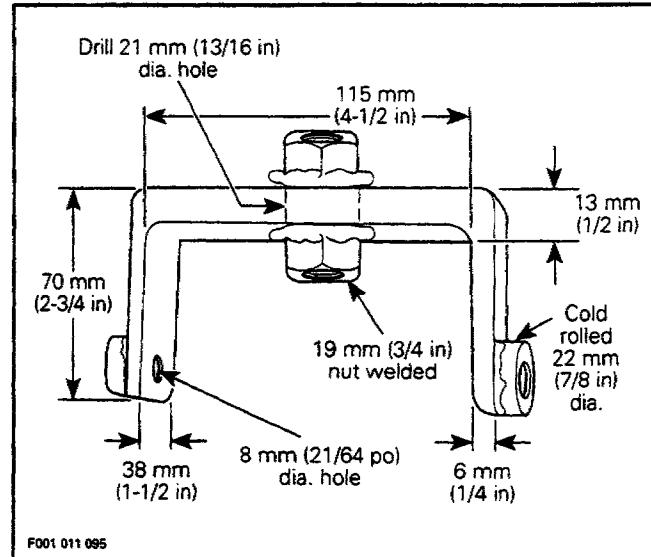
Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

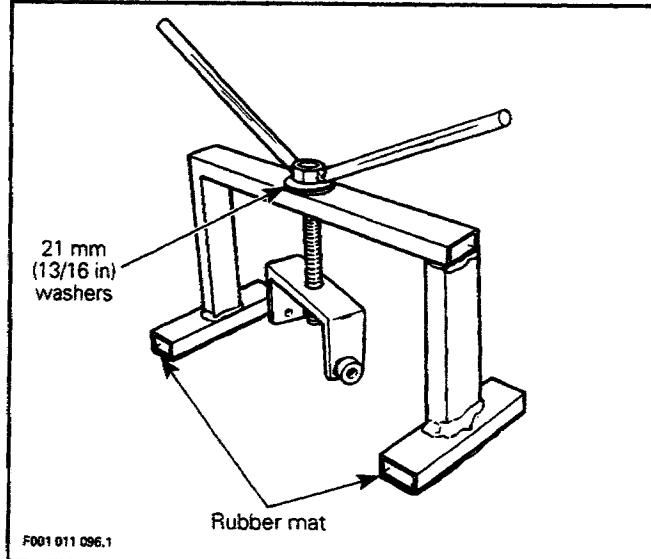
- Use threaded rod 19×170 mm (3/4 N.C. x 6-1/2 in) long. On one end install a 19 mm (3/4 in) diameter nut flush with the end and weld it.
- NOTE :** Use commercial grade threaded rod to eliminate the possibility of stripping threads.
- NOTE :** For the EXPLORER model the threaded rod length must be 340 mm (13 in).
- Weld two cold rolled rods 10×180 mm (3/8 x 7 in) long on the nut as shown in the following illustration.



- Use one steel flat bar 38×13 mm (1-1/2 x 1/2 in) thick x 115 mm (4-1/2 in) long or two flat bars 6 mm (1/4 in) thick welded together.
- Drill one 21 mm (13/16 in) diameter hole in center of flat bar.
- Align two 19 mm (3/4 in N.C.) diameter nuts over the hole already drilled in flat bar and weld them in place.
- Use two steel flat bars 38×6 mm (1-1/2 x 1/4 in) thick x 70 mm (2-3/4 in) long.
- Weld two pieces of cold rolled steel 22 mm (7/8 in) diameter x 10 mm (3/8 in) thick on each flat bar at the center end.
- Drill one 8 mm (21/64 in) diameter hole in center of each cold rolled bushing through flat bar.
- Weld flat bars together as shown in the following illustration.



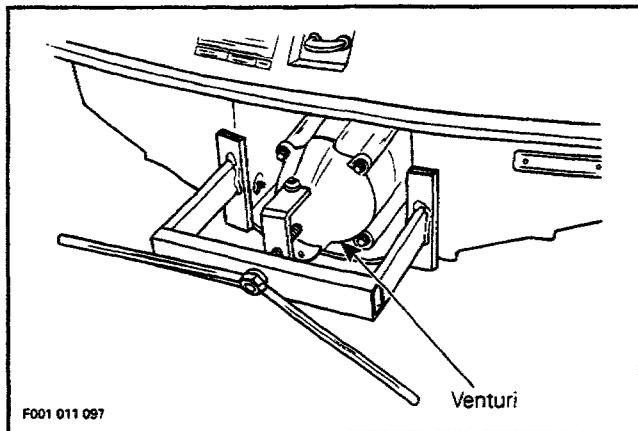
- Install two 21 mm (13/16 in) washers on threaded rod before final assembly.
- Glue a rubber mat or similar protective material on support to prevent scratching hull rear section.



Section 08 PROPULSION AND DRIVE SYSTEMS

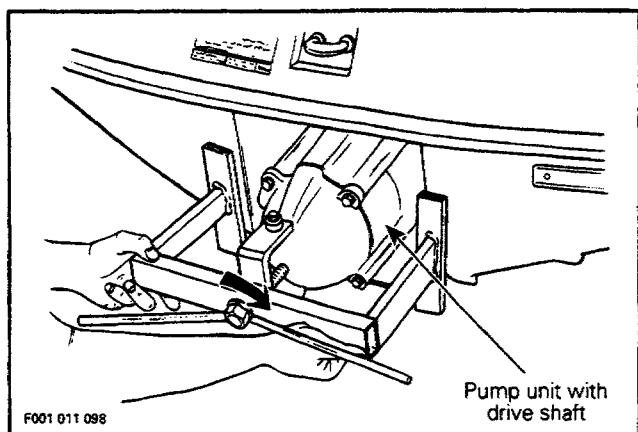
Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

Using screws previously removed from nozzle, install pump remover on venturi.



Rotate handle clockwise to remove jet pump. Withdraw pump unit and drive shaft together.

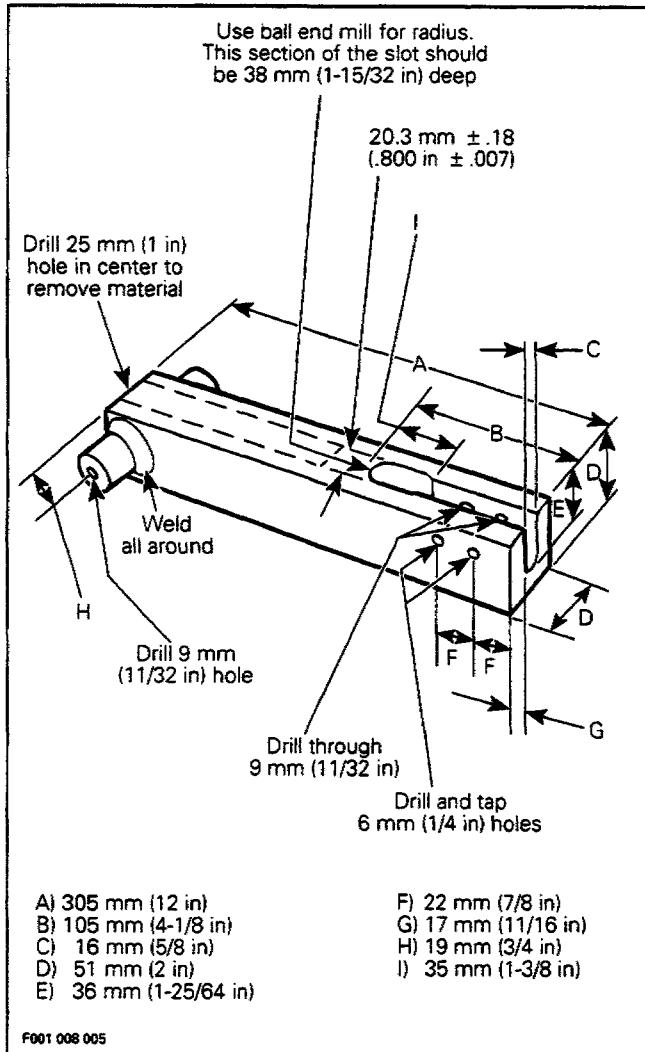
CAUTION : When removing pump unit a shim could have been installed between hull and pump housing be careful not to damage shim. If shim is not reinstalled engine and jet pump alignment will be altered.



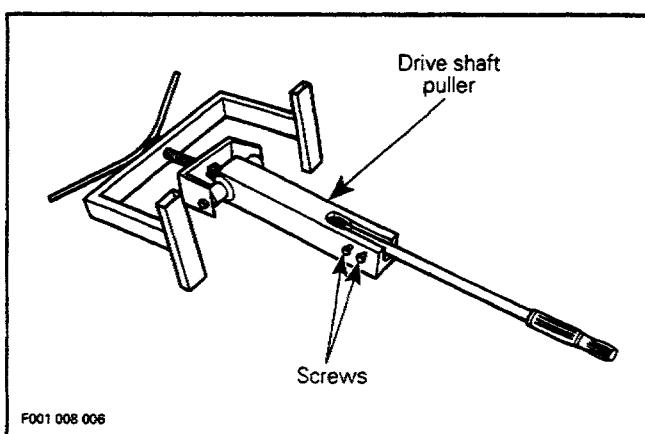
If the drive shaft is jammed into PTO flywheel or if bearing is seized on shaft at seal carrier level, make the following tool and use it in conjunction with pump remover to withdraw drive shaft.

Raw material :

- 1 aluminum alloy square 51 mm (2 in) x 305 mm (12 in).
- 2 aluminum rod 28.5 mm (1-1/8 in) dia. x 30 mm (1-3/16 in).



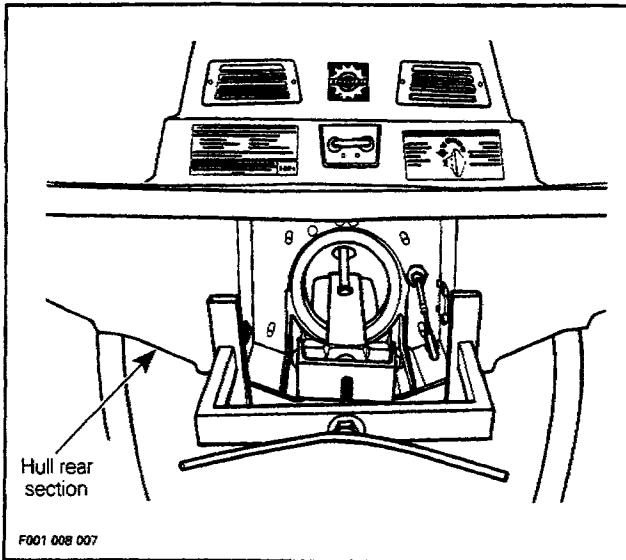
Mount on pump unit remover drive shaft puller, then install assembly on drive shaft using screws.



Section 08 PROPULSION AND DRIVE SYSTEMS

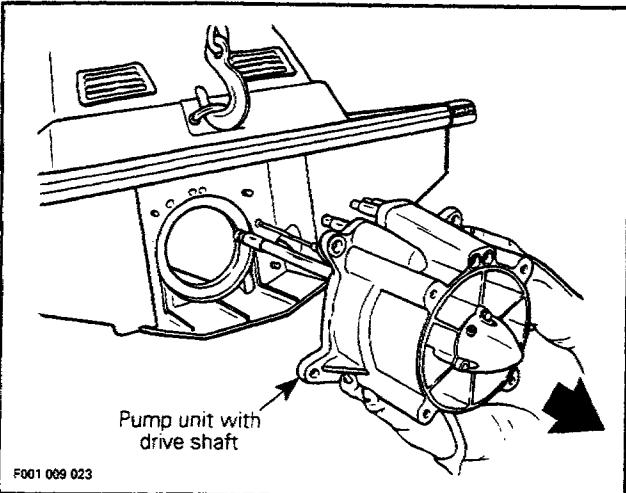
Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

▼ CAUTION : Be careful not to damage hull rear section or engine rubber mounts.



17,20,35, Venturi, Screw and O-ring

Remove four retaining screws and withdraw venturi.



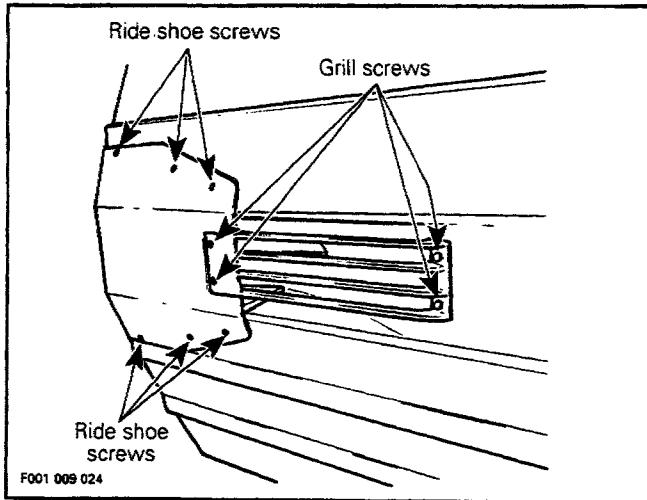
37,38,39,40,41, Ride Shoe, Screw and Grill

○ NOTE : Grill must be removed prior to ride shoe removal. Impeller housing must be removed to allow ride shoe removal.

○ NOTE : An impact screwdriver can be used to loosen tight screws.

Remove four retaining screws of grill then withdraw it.

Remove six retaining screws of ride shoe then withdraw it.



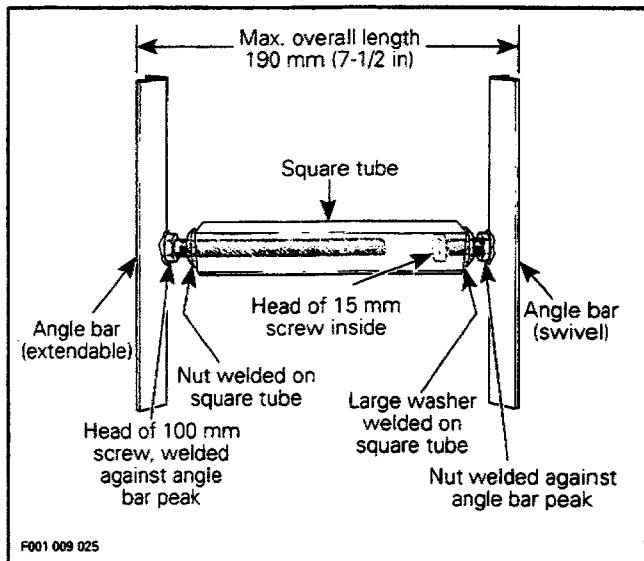
Make the following tool to easily separate ride shoe from hull.

▼ CAUTION : Prying ride shoe is likely to be damageable. Use special tool when ride shoe needs to be removed without damage.

- Use two steel angle bars 25 x 25 x 3 mm (1 x 1 x 1/8 in) thick x 225 mm (9 in) long.
- A kind of turnbuckle is needed to apply extension force between ride shoe and hull. Use a 25 mm (1 in) square tube by approximately 125 mm (5 in) long so that, with all parts welded, its overall length will not exceed 190 mm (7-1/2 in).
- On one end, weld a 10 mm (3/8 in) dia. nut.
- Weld the head of a 10 x 100 mm (3/8 x 4 in) screw on top of one angle bar then screw in square tube.
- Insert a 10 x 15 mm (3/8 x 1/2 in) screw through a large and thick washer or a suitable sleeve.
- Install a nut on screw. Do not fully tighten, ensure screw can easily rotate into washer. Weld the top of other angle bar to nut.
- Weld the washer to the remaining end of square tube.

Section 08 PROPULSION AND DRIVE SYSTEMS

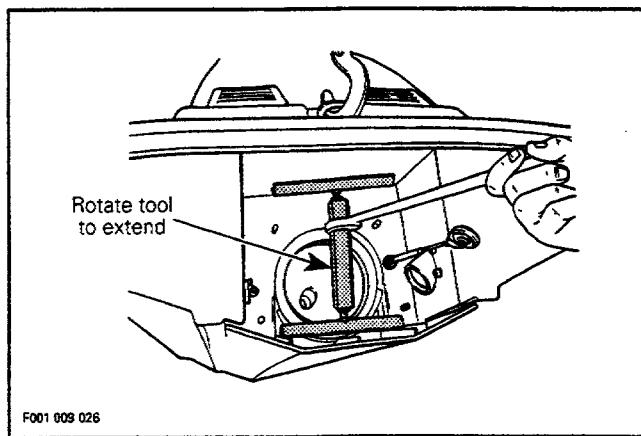
Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)



Insert special tool between ride shoe ribs and hull as shown.

CAUTION : Ensure lower part of tool sits at least on outer ribs in order to reduce applied pressure for removal. Ensure that tool is installed vertically.

Using a wrench, turn tool body so that it extends to unstick and release ride shoe from hull.



48,60, Seal Carrier Ass'y and Protective Hose

NOTE : Drive shaft / pump housing or engine must be removed to allow removal of seal carrier ass'y.

Since it is sealed to prevent water intrusion inside bilge, seal carrier ass'y should not be removed needlessly.

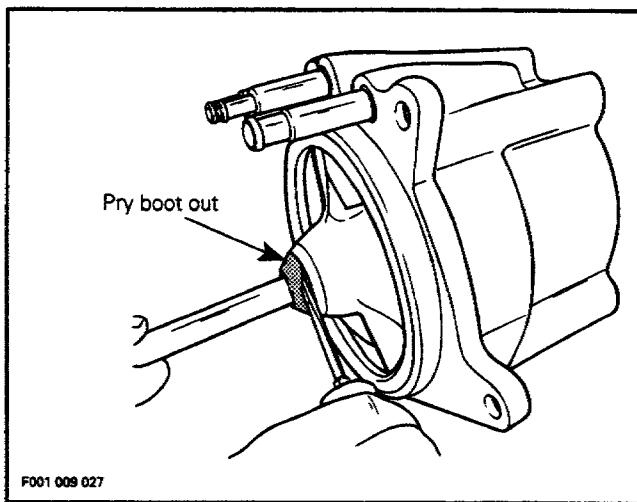
Loosen gear clamp holding seal carrier protective hose, then carefully pull hose and seal carrier from hull insert.

DISASSEMBLY

27, Boot

CAUTION : Do not pull drive shaft to release it from impeller, this could damage boot. Boot must be slipped out of impeller before removing drive shaft.

Insert a screwdriver blade between impeller and boot flange. Carefully pry boot all around to release from impeller. To ease this operation, apply liquid soap between boot and impeller, as they begin to separate.

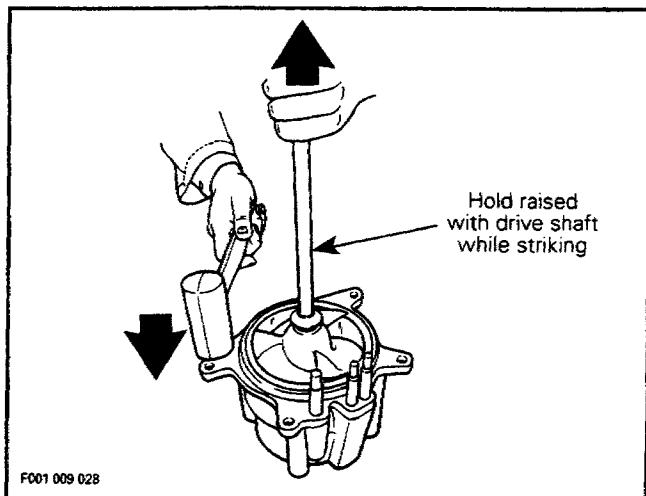


Withdraw drive shaft.

Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

NOTE : A jammed drive shaft can be removed by holding pump unit by drive shaft, slightly raised unit above a smooth surface, then strike all around of impeller housing with a fiber hammer. Corroded parts can be loosened by applying penetrating oil such as SEA-DOO LUBE (P / N 293 600 006).

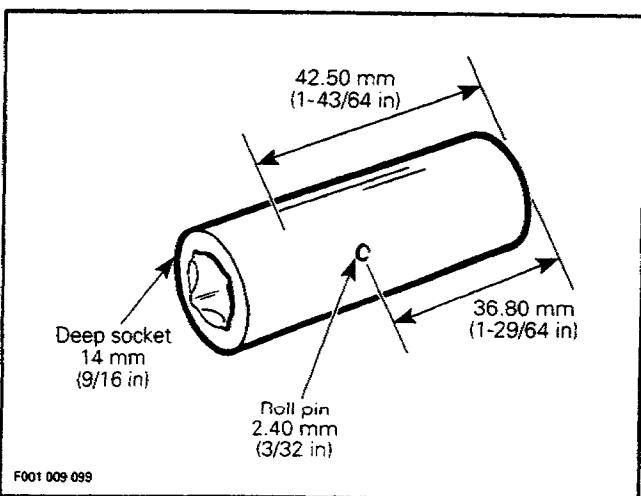


2,15, Fitting

Fittings can be removed with deep socket or vise grip. Do not contact hose mounting area.

Fitting can be removed from pump housing with following suggested tool :

- Use a deep socket 14 mm (9/16 in).
- Drill deep socket with a 14 mm (9/16 in) drill bit, starting at hexagon head end as shown in following illustration.
- Drill one 2.40 mm (3/32 in) hole in center of deep socket as shown in following illustration.
- Install 2.40 mm (3/32 in) roll pin in the center hole.



13,14, Housing Cover and Screw

With pump assembly in horizontal position, remove three retaining screws.

Place container under cover to catch oil.

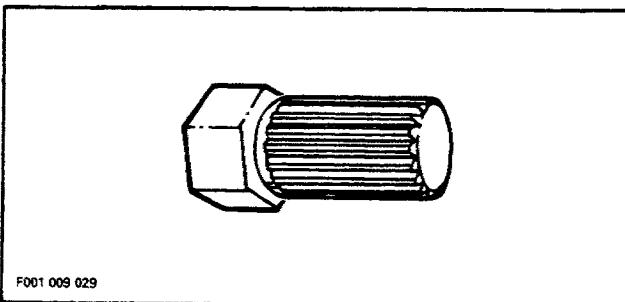
Using a fiber hammer, gently tap cover to release from impeller housing.

26, Impeller

Insert impeller shaft holder (P / N 295 000 082) on impeller shaft flat end.

Using two screws previously removed from venturi, secure shaft holder to housing. To ease removal heat impeller center with a propane torch to approximately 150°C (300°F) to break the Loctite bond.

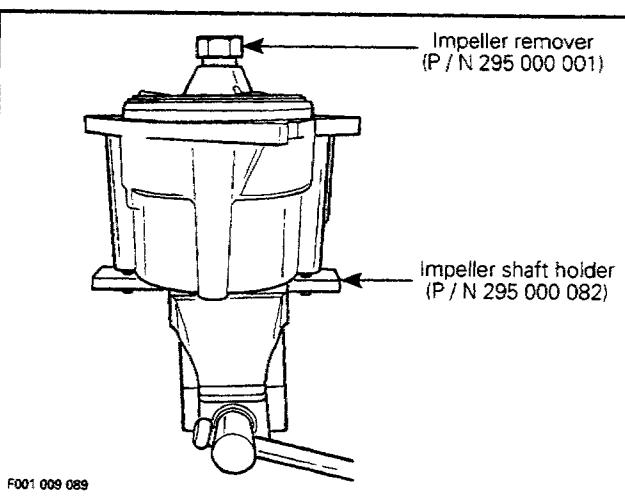
Impeller is loosen using impeller remover (P / N 295 000 001).



Install shaft holder in a vice.

Insert special tool in impeller splines.

Rotate impeller remover counterclockwise and unscrew completely impeller.



CAUTION : Never use any impact wrench to loosen impeller.

Section 08 PROPULSION AND DRIVE SYSTEMS

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To remove impeller, apply a rotating movement and pull at same time. Slide impeller out of housing and remove tool from impeller.

Remove two screws holding impeller housing to shaft holder.

Lift impeller housing away from impeller shaft.

Slide thrust washer and thrust bearing off from shaft.

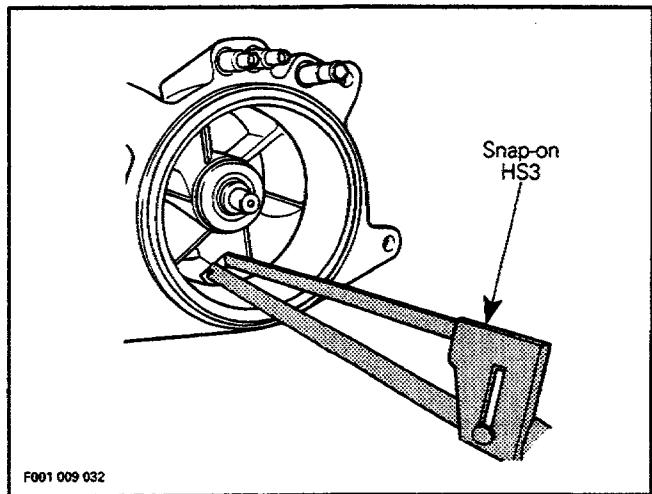
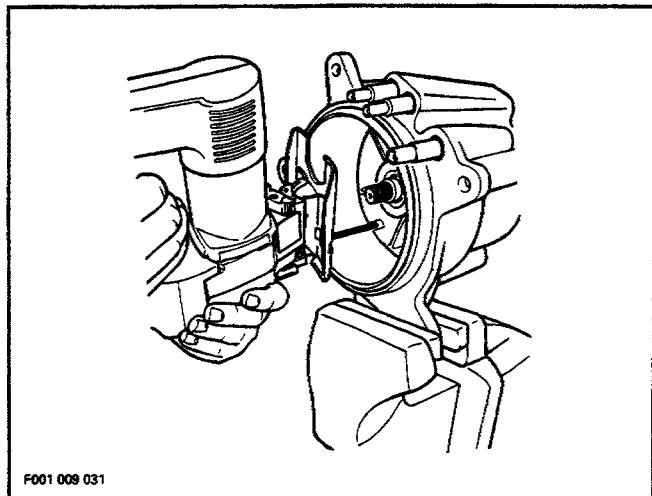
28. Wear Ring

Place impeller housing in a brass jaw vise so that it is firmly retained by a lug.

Cut wear ring.

NOTE : Wear ring can be cut using a jigsaw, a small buffer or a low clearance hacksaw such as Snap-on HS3 or equivalent.

CAUTION : When cutting ring, be careful not to damage impeller housing.



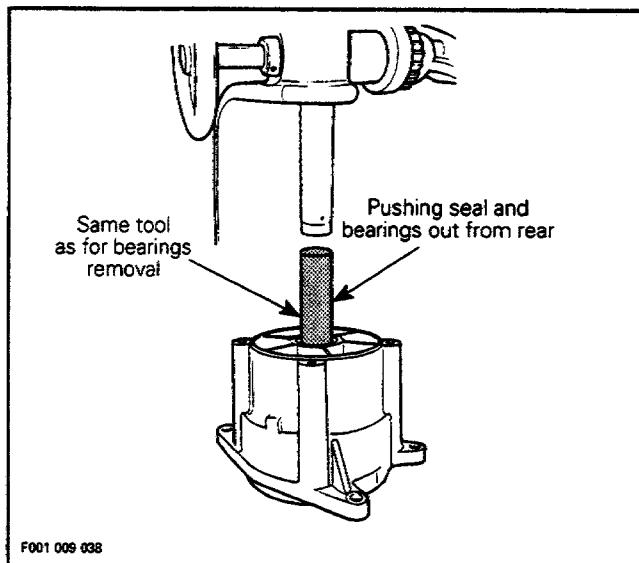
After cutting ring, insert a screwdriver blade between impeller housing and one end of ring.

Lift ring end so that both ends overlap each other.

Pull ring out.

3. Seal

NOTE : If bearings and seal need to be renewed, the special pusher described further on in bearing removal can be used. Simply insert pusher from the rear and push towards the front.

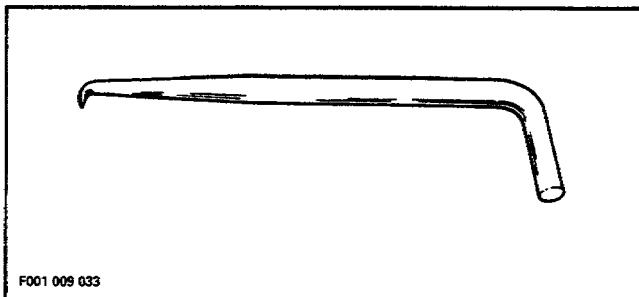


If only seal needs to be renewed, proceed as follows:

CAUTION : It is not recommended to push seal out with a punch. Housing and / or bearing(s) could be damaged.

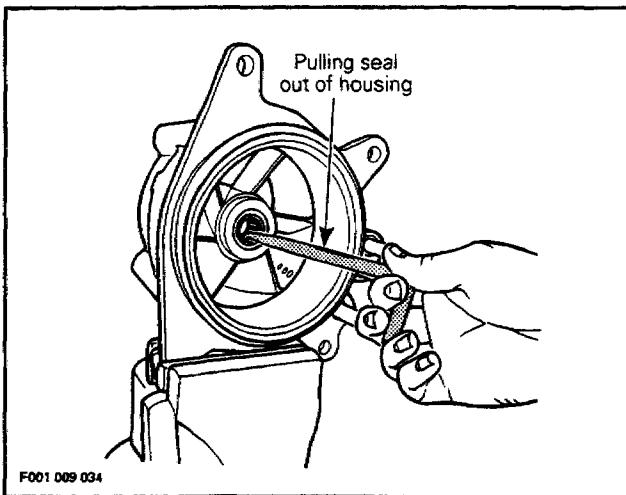
Seal should be removed using the following suggested tool.

Seal puller, Snap-on #S6129.

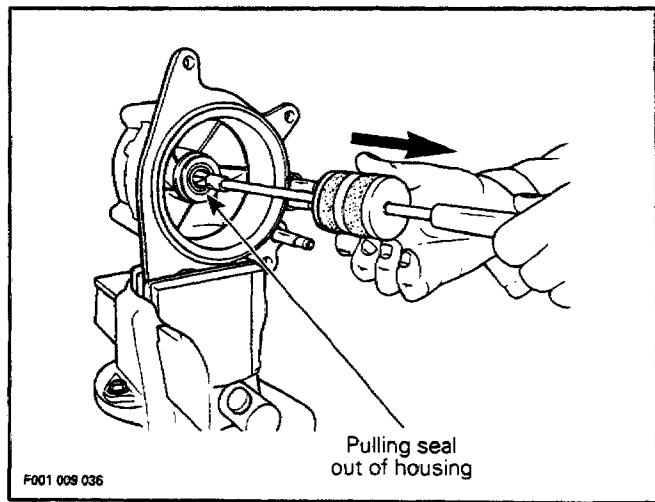


Section 08 PROPULSION AND DRIVE SYSTEMS

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F001 009 034



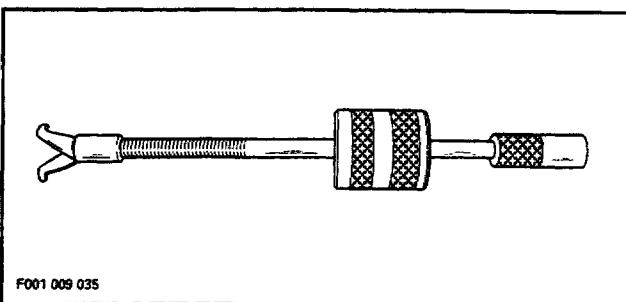
F001 009 036

Or, use a Snap-on hammer puller including :

Handle CJ93-1

Hammer CJ125-6

Claws CJ93-4



F001 009 035

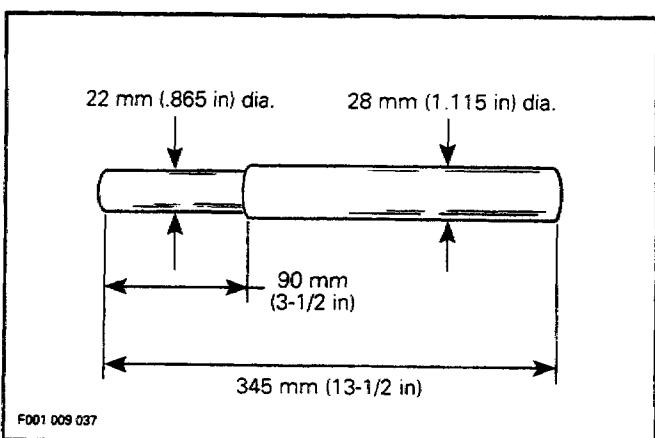
Close puller claws so that they can be inserted between seal and bearing. Holding claws, turn puller shaft clockwise so that claws open and tighten against seal. Slide puller sleeve outwards and gently tap puller end. Work with small strikes otherwise claws will slip out. As soon as seal begins to slide out, retighten claws to always maintain them tight against seal. Continue pulling until seal is out.

4. Needle Bearing

 **NOTE :** It is always recommended to renew both bearings, even if only one needs to be replaced.

Bearings can be easily removed with the following suggested pusher.

Use a 30 mm dia. x 345 mm long (1-1/8 dia. x 13-1/2 in) steel shaft. Machine shaft as per the following drawing.

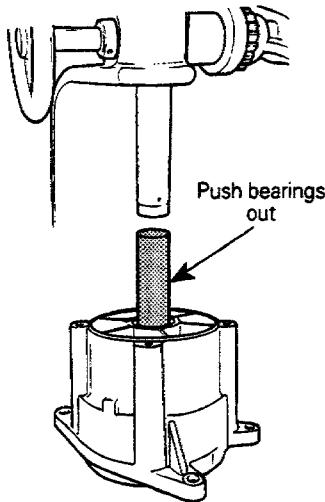


F001 009 037

Insert pusher into one bearing then push tool using a arbor press until bearings are out. However, care should be taken not to damage bearing journals.

Section 08 PROPULSION AND DRIVE SYSTEMS

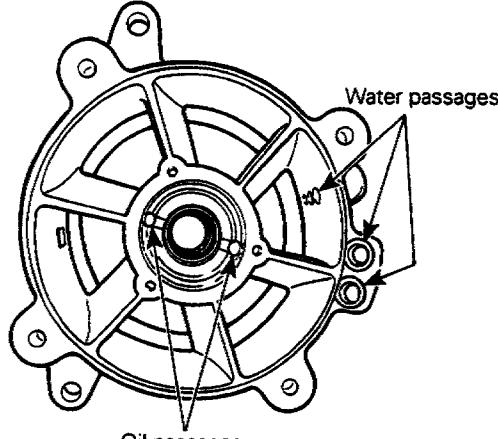
Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)



F001 009 038.1

Discard all O-rings and clean parts in a solvent.

Carefully check water passages (bailer pick-up, cooling system) and oil passages. Blow low pressure compressed air through them and make sure they are not clogged.



F001 009 039

NOTE : If seal is to be renewed at same time, simply insert pusher from the side opposite of seal then push seal and bearings out.

49,50,51,52, Seal, Seal Carrier and Needle Bearing

Seals and bearing can be removed using same suggested tools as for pump unit.

Properly support seal carrier when removing seals and bearing.

CLEANING

NOTE : Bailer tube fittings and cooling supply fitting can be removed to ease cleaning of impeller housing mating surface.

Most silicone can be removed with a scraper such as Snap-on #CS-A12.

Remaining silicone can be removed with a steel brush (disc) mounted on a drill.

Bombardier stripper (P / N 295 000 040) can be used to remove remaining silicone. Carefully apply on mating surfaces taking care not to exceed this area because paint will be damaged. Let product dissolve silicone then scrape it.

Properly clean all threads.

INSPECTION

26,43,54, Impeller, PTO Flywheel and Drive Shaft

Visually inspect drive shaft splines, impeller and PTO flywheel. Check for wear or deformation. Renew any damaged part.

NOTE : If PTO flywheel splines are very worn, a pipe wrench can be used to remove PTO flywheel instead of special tool (P / N 295 000 001). Refer to ENGINE 03-04 then look for **PTO flywheel and magneto**.

51,53,54, Needle Bearing, Damper and Drive Shaft

Wear

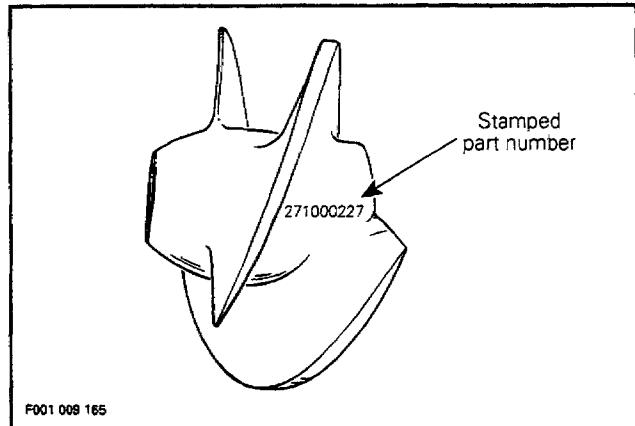
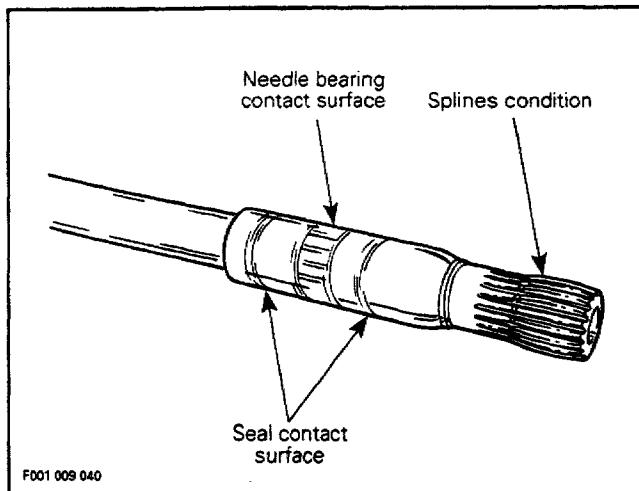
Visually inspect shape of dampers for deformation or other damage. Ensure they are firmly retained.

Inspect seal carrier needle bearing and its contact surface. Check for scoring, pitting, chipping or other evidence of wear.

With a finger tip, feel contact surfaces of bearing and seals. If any irregular surface is found, renew drive shaft.

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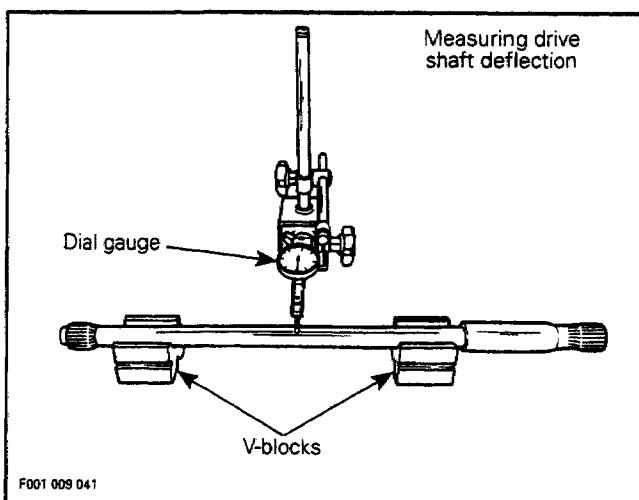


Deflection

Excessive deflection could cause vibration and damage to drive shaft splines, impeller, flywheel or seal carrier.

Install drive shaft in V-blocks and set a dial gauge in center of shaft. Slowly rotate shaft; difference between highest and lowest dial gauge reading is deflection. Refer to the following illustration.

Maximum permissible deflection is 0.5 mm (.020 in.).



VEHICLE MODEL NO.	IMPELLER P/N	MATERIAL	PITCH	
SP (5806)	271 000 235	Aluminum	18°	
SPX (5807)	271 000 230	Stainless steel	Progressive pitch 16°-20.5°	Stamped code 1150
SPI (5808)	271 000 227	Stainless steel	17.7°	
GTS (5813)	271 000 215	Stainless steel	17°	
XP (5852)	271 000 182	Stainless steel	Progressive pitch 15°-20.5°	
GTX (5861)	271 000 123	Stainless steel	18.3°	
EXPLORER (5820)	271 000 199	Stainless steel	17.7°	
Model 5806, 5808 and 5820 only	271 000 046 (optional)	Polished stainless steel	Pitch 17.7°	Stamped code 77

26,28, Impeller and Wear Ring

Examine impeller in wear ring for distortion.

Check if blade tips are blunted round, chipped or broken. Such impeller is unbalanced and will vibrate and damage wear ring, impeller shaft, shaft seal or bearings. Renew if damaged.

26, Impeller

Identification

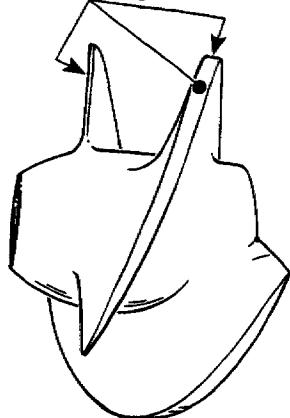
To identify the impellers refer to the following illustration and chart.

 NOTE : Aluminum impeller does not have any identification number.

Section 08 PROPULSION AND DRIVE SYSTEMS

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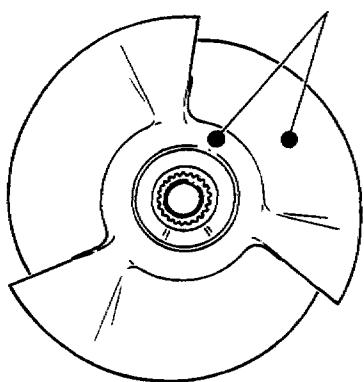
Replaced if blunted round or damaged



F001 009 042

Check impeller for cavitation damage, deep scratches or any other damage.

Check for cavitation, deep scratches or other damage



F001 009 043

Check wear ring for deep scratches, irregular surface or any apparent damage.

If impeller / wear ring clearance is too large and impeller is in good shape, renew wear ring.

4,10, Needle Bearing and Impeller Shaft

Wear

Inspect needle bearings and their contact surface. Check for scoring, pitting, chipping or other evidence of wear.

With a finger tip, feel contact surface of seal. If any irregular surface is found, renew impeller shaft.

Install bearings then install impeller shaft and rotate it. Make sure it turns smoothly.

Radial Play

Radial play is critical for jet pump unit life span.

Radial play of impeller shaft is checked with shaft in housing, without impeller.

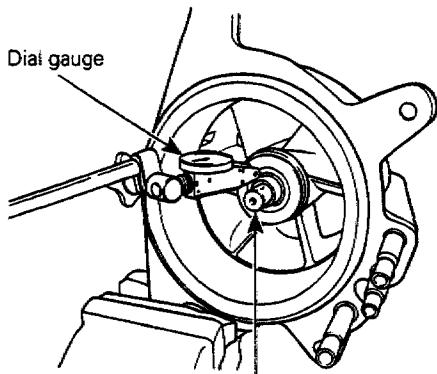
Retain housing in a brass jaw vise making sure not to damage housing lug.

Set a dial gauge and position its tip onto shaft end, close to end of threads.

Move shaft end up and down. Difference between highest and lowest dial gauge reading is radial play.

Maximum permissible radial play is 0.05 mm (.002 in).

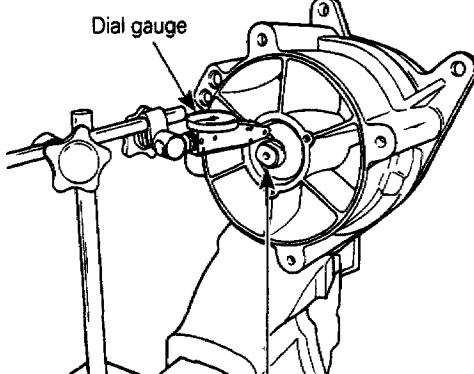
Measuring impeller shaft radial play



F001 009 044

To check both bearings, proceed the same way with other shaft end. Position gauge tip on diameter, close to flats on shaft.

Measuring impeller shaft radial play



F001 009 045

Measure close to flats at shaft end

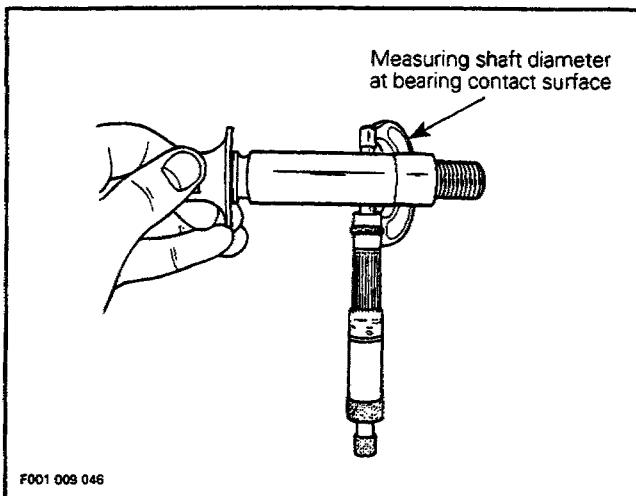
Section 08 PROPULSION AND DRIVE SYSTEMS

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Excessive play can come either from worn bearings or impeller shaft or damaged impeller housing bearing surfaces.

Measuring shaft diameter will determine defective part.

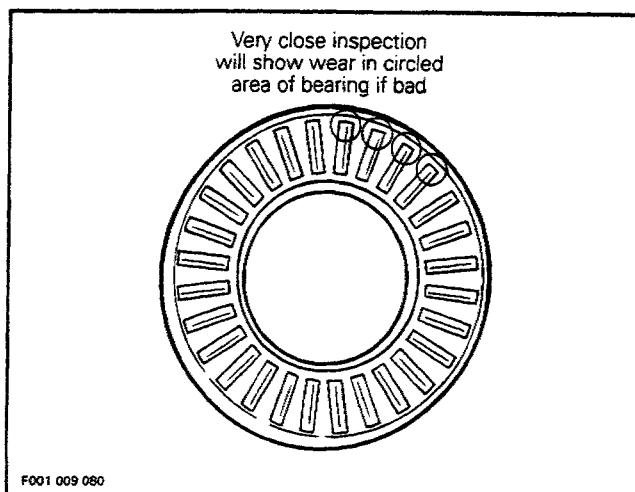
Using a micrometer, measure diameter on bearing contact surfaces. Minimum shaft diameter should be 22.24 mm (.876 in). A shaft within tolerance indicates worn bearings. Replace both bearings.



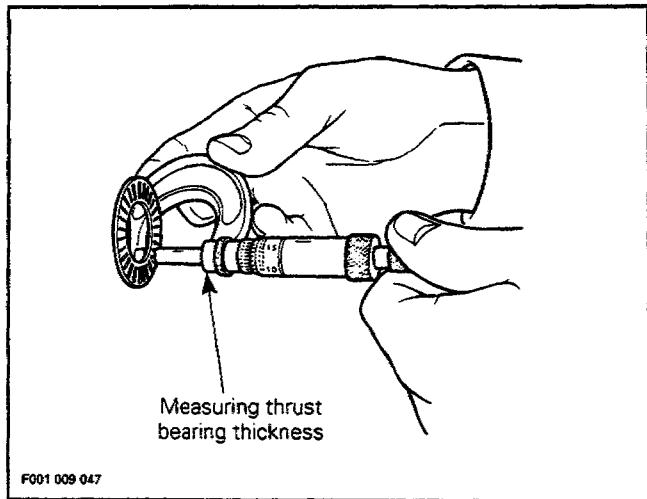
NOTE : If shaft is to be replaced, it is recommended to replace both bearings at same time. In addition, it is suggested to replace thrust bearing and thrust washer.

8.9, Thrust Washer and Thrust Bearing

Visually inspect thrust washer, thrust bearing and their contact surface. Check for scoring, pitting, chipping or other evidence of wear.



Measure thrust bearing thickness. If roller diameter is found smaller than 1.93 mm (.076 in), renew it.



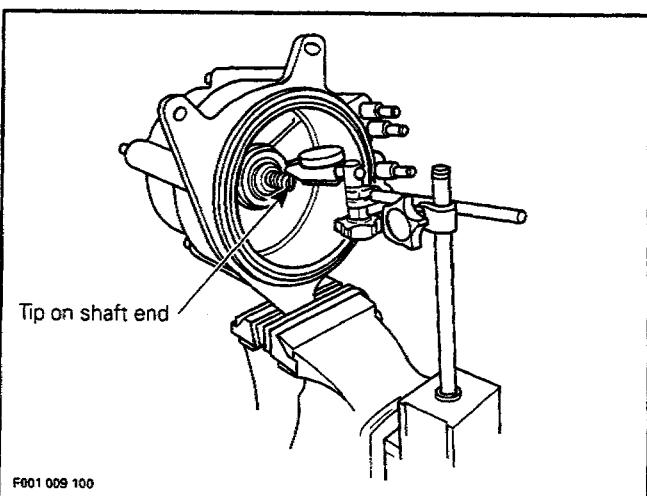
NOTE : When replacing either washer or bearing, it is recommended to renew both.

13, Housing Cover

End Play

End play of impeller shaft is checked with shaft in housing, without impeller and with housing cover installed.

Retain housing in a brass jaw vise making sure not to damage housing lug. Set a dial gauge and position its tip on the end of shaft. Move shaft end by pulling and pushing. Difference between highest and lowest dial gauge reading is end play. Maximum permissible end play (new) is 0.12 - 0.54 mm (.005 - .021 in).

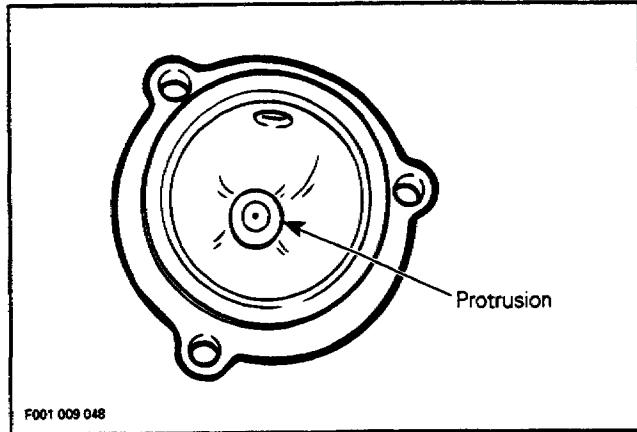


Section 08 PROPULSION AND DRIVE SYSTEMS

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Excessive play comes from worn protrusion inside housing cover.

Visually inspect protrusion inside cover. If worn, a small peak in center will be apparent.



3,49,52, Seal

Carefully inspect seal lips. Make sure that lips are not worn, distorted, cracked or present any other damages. Renew as necessary.

ASSEMBLY

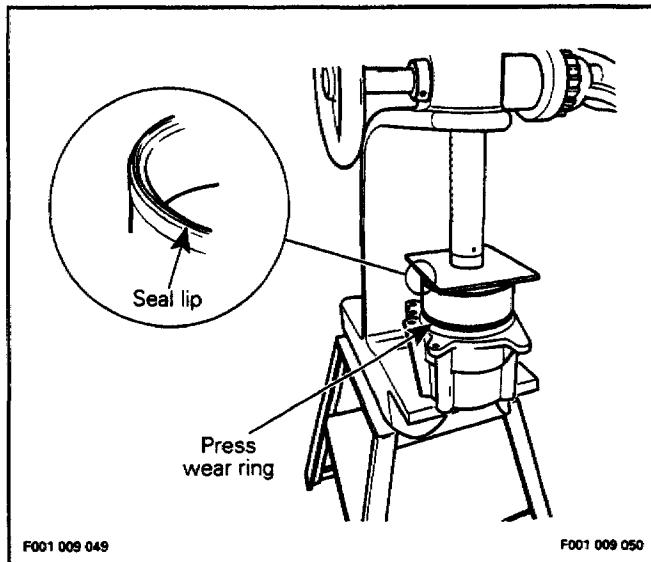
28, Wear Ring

The wear ring features a lip on one edge, position lip outwards of housing.

To ease insertion into housing, apply SEA-DOO LUBE (P / N 293 600 006) onto outside circumference of wear ring.

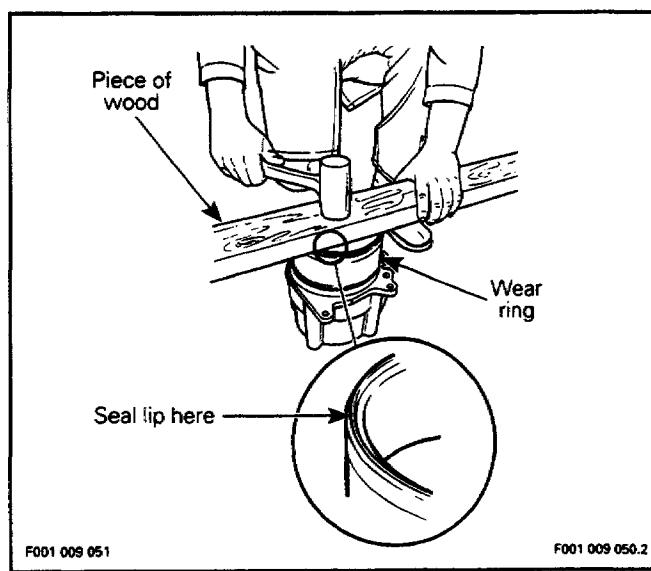
To install ring in housing, use a square steel plate approx. 180 x 180 mm x 6 mm thick (7 x 7 in x 1/4 in) and a press.

Manually engage ring in housing making sure it is equally inserted all around. Press ring until it seats into bottom of housing.



If a press is not readily available, a piece of wood such as a 2 x 4 x 12 in. long, can be used.

Manually engage ring in housing making sure it is equally inserted all around. Place wood piece over ring. Using a hammer, strike on wood to push ring. Strike one side then rotate wood piece about 90° and strike again. Frequently rotate wood piece so that ring slides equally all around until it seats into bottom of housing.

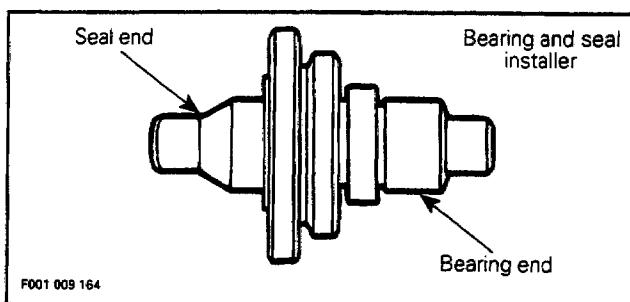
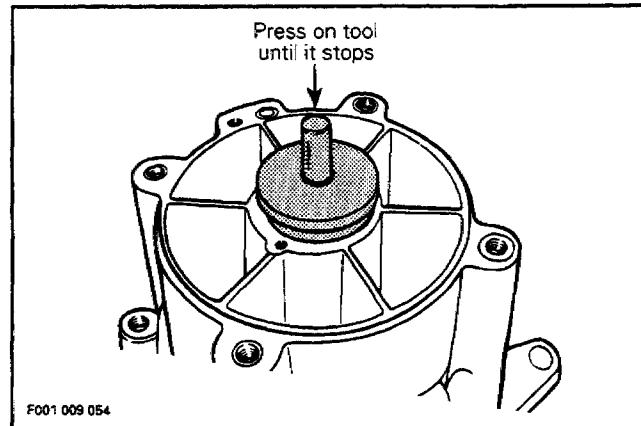
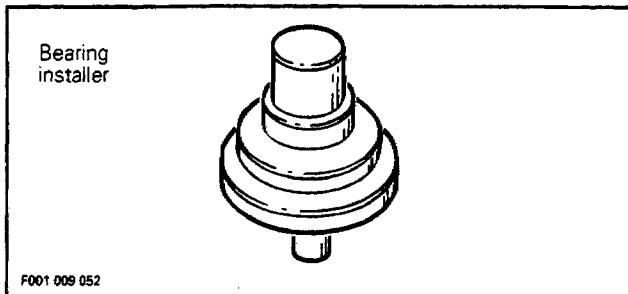


Section 08 PROPULSION AND DRIVE SYSTEMS

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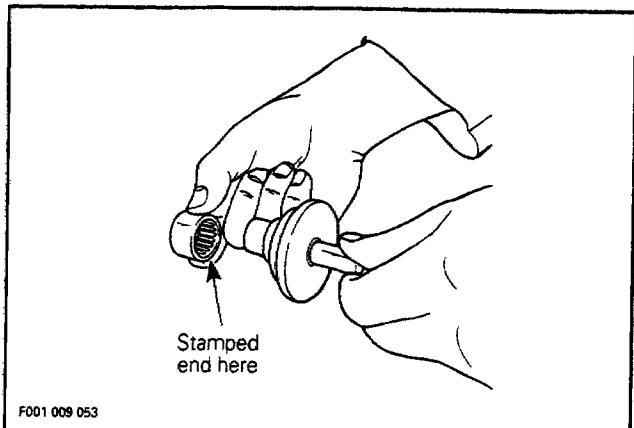
3.4, Seal and Needle Bearing

Bearings will be properly installed in housing using bearing installer tool (P / N 295 000 014) or use special tool (P / N 295 000 107) to install properly bearings and seal.

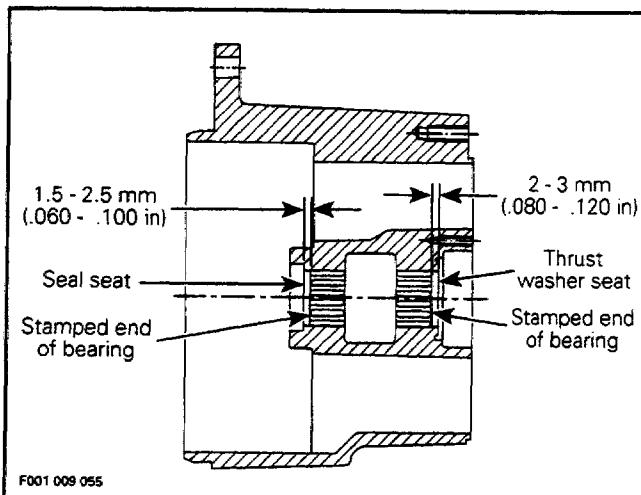


Stamped end of bearings (showing identification markings) must be located toward outside of housing.

Properly insert bearing on tool. Using an arbor press only, push tool until tool flange contacts housing. Proceed the same way for both bearings.



CAUTION : Never hammer the bearing into its housing.



The special tool (P / N 295 000 107) will be used to install seal in housing.

Seal must be installed so that lips raised edges are toward outside of housing (toward impeller).

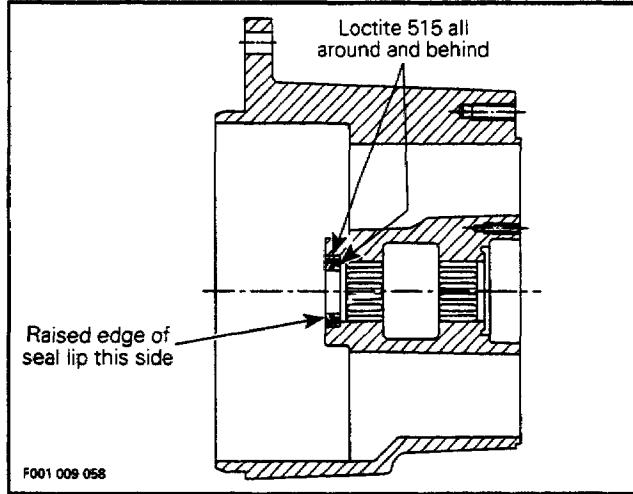
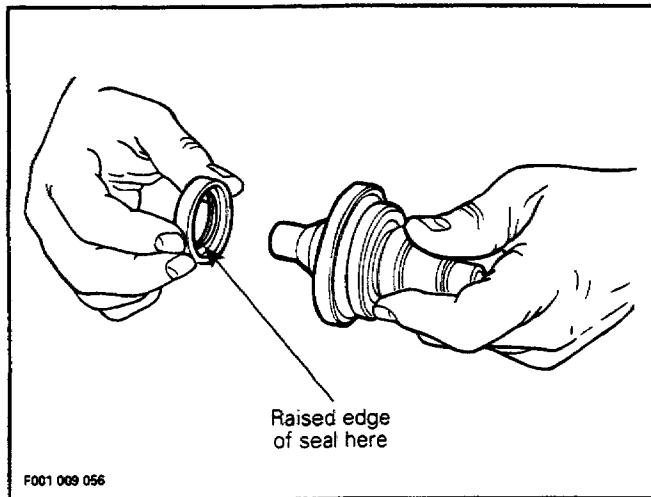
Apply Loctite 515 (P / N 293 800 007) in seal housing, all around outer diameter and on seal seat.

Properly insert seal on tool.

Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

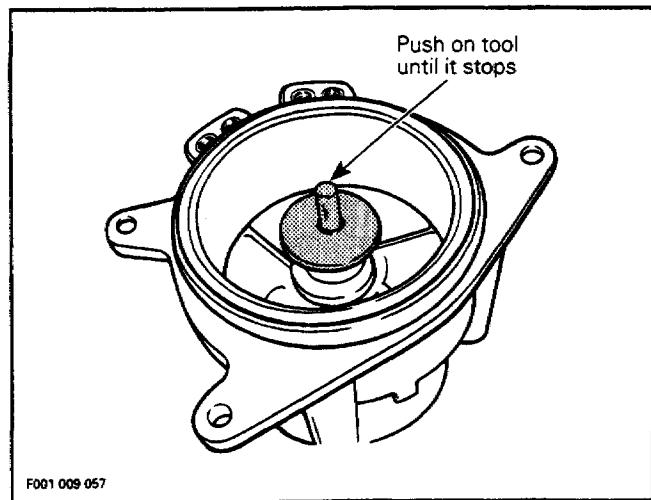
NOTE : Be careful when installing seals to pack seal with grease before inserting bearing / seal installer tool. Properly insert tool in seal with a rotating movement.



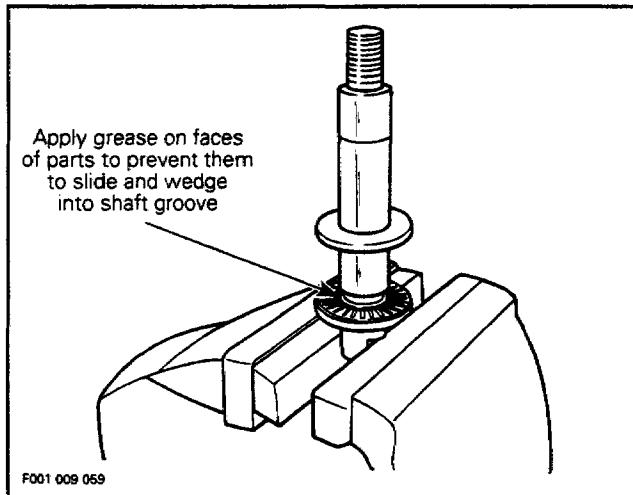
7,8,9,10,26, Impeller Housing, Thrust Washer, Thrust Bearing, Impeller Shaft and Impeller

Insert impeller shaft flats in a vise so that shaft is vertical.

Apply synthetic grease (P / N 293 550 010) on both sides of thrust bearing then insert onto shaft followed by thrust washer. Make sure bearing is leaning against shaft flange and washer is properly centered. Grease will prevent parts from sliding at installation and thus possibly wedging thrust bearing into shaft groove.



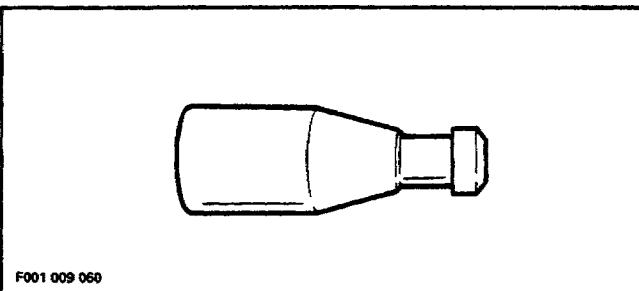
Apply synthetic grease (P / N 293 550 010) between seal lips.



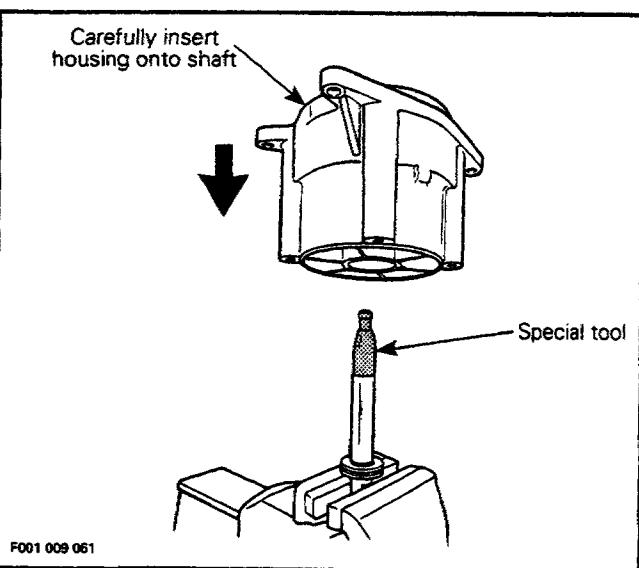
To prevent seal lip damage when inserting impeller shaft, use impeller shaft guide (P / N 295 000 002).

Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)



Insert tool onto shaft end then carefully slide housing over shaft.



Remove special tool.

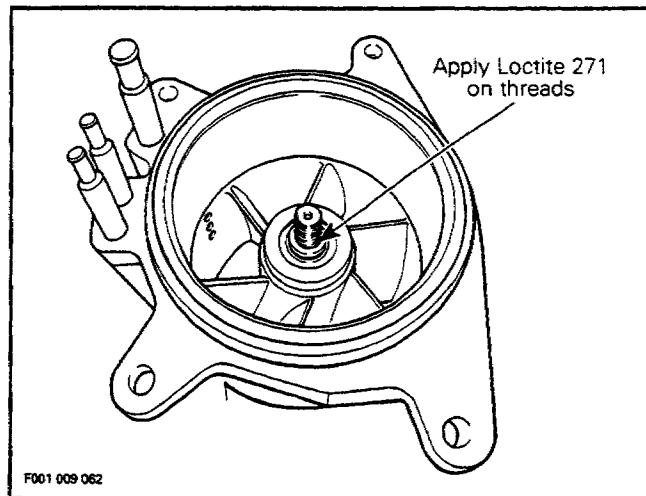
Brush and clean impeller shaft threads and impeller splines with Loctite Safety solvent 755 (P / N 293 800 019) or equivalent. Free threads and splines from any residue. Allow solvent to dry thoroughly.

CAUTION : Be careful not to damage impeller shaft diameter.

Apply Loctite primer N (P / N 293 600 012) on impeller shaft threads. Allow to dry for two minutes.

NOTE : Loctite primer is used to reduce Loctite 271 curing time and to activate stainless steel and aluminum surfaces for better bonding action. If applied, complete curing time is 6 hours, if not, 24 hours is needed.

Apply Loctite 271 red (P / N 293 800 005) to shaft threads.



CAUTION : Make sure thrust washer and bearing have not slipped in shaft groove.

Using two screws previously removed from venturi, secure impeller shaft holder (P / N 295 000 082) to housing. Install shaft holder in a vice.

NOTE : Pump pressurization should be performed at this time. If it leaks, it is easier to determine where. Refer to pump pressurization further in this section.

To ease impeller installation, apply liquid soap or Sea-Doo lube (P / N 293 600 006) on wear ring.

Insert impeller into wear ring. Manually rotate impeller and push so that it slides on impeller shaft threads. Carefully engage threads making sure they are well aligned.

Install impeller remover (P / N 295 000 001) into impeller splines and tighten.

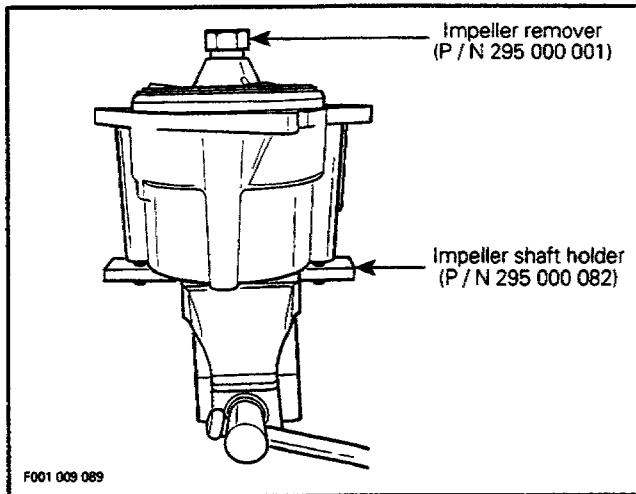
CAUTION : Make sure thrust washer and bearing are not wedged in shaft groove. To check, manually pull and push impeller housing, an axial play must be felt.

Torque impeller to 70 N·m (52 lbf·ft) then remove tools.

CAUTION : Never use any impact wrench to tighten impeller.

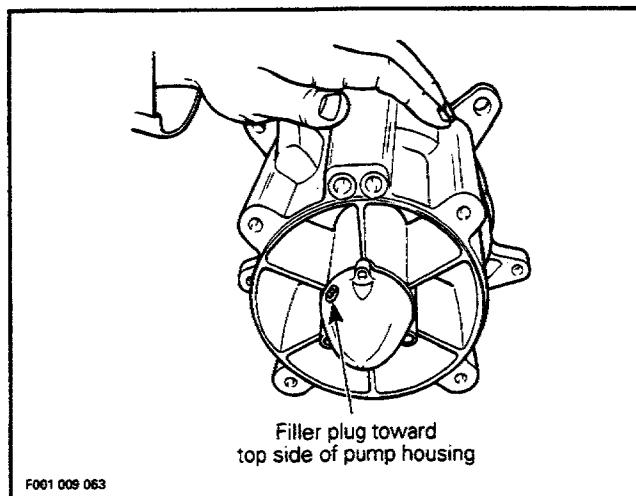
Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)



11,13,18, O-ring, Housing Cover, Loctite 515

Apply Loctite 515 (P / N 293 800 007) on O-ring and install on housing cover then carefully insert cover on impeller housing making sure to properly position plug on top side.



Apply Loctite 242 (blue) (P / N 293 800 015) on screw threads and evenly tighten cover screws. Torque to 7 N·m (62 lbf·in).

PUMP PRESSURIZATION

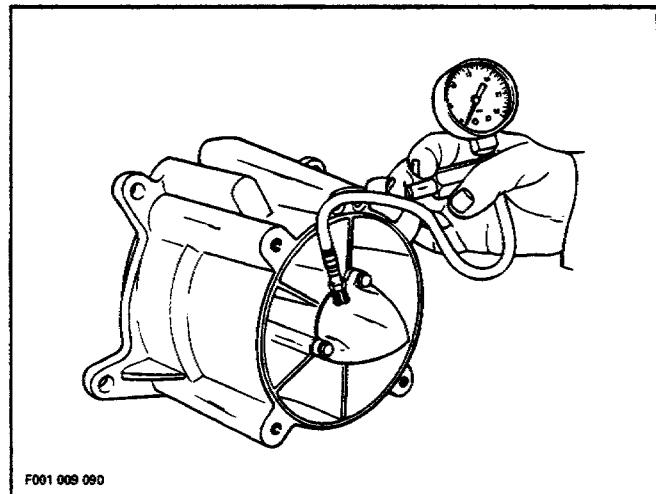
Whenever doing any type of repair on the pump, pressure test should be done to check for any leakage.

Pressure Test

Proceed as follows :

- Remove plug from housing cover. Drain oil.
- Apply Loctite PST 592 (P / N 293 800 018) on threads fitting (P / N 295 000 086) then secure on cover.
- Connect pump gauge tester (P / N 295 000 083) to fitting.
- Pressurize pump to a maximum of 70 kPa (10 PSI).

Pump must maintain this pressure for 10 minutes.



▼ CAUTION : Repair any leak, failure to correct a leak will lead to premature wear of pump components.

If there is a pressure drop spray soapy water around housing cover. If there are no bubbles, impeller shaft, impeller shaft seal, or impeller housing is leaking through porosity and has to be replaced. Jet pump unit has to be overhauled.

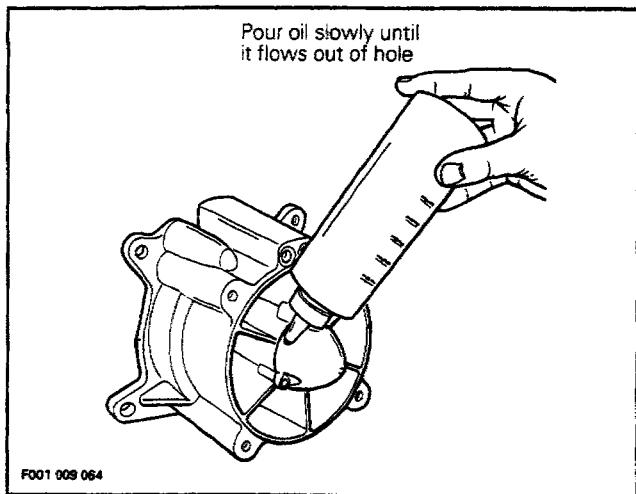
Place housing horizontally as in its operating position so that fitting in cover is located in top. Remove fitting from cover. Pour SEA-DOO JET PUMP SYNTHETIC OIL (P / N 293 600 011) in reservoir until oil comes level with bottom of hole. Let oil penetrates in housing and after a few minutes pour oil again until it is level with bottom of hole. Oil capacity is 65 mL (2.2 oz).

▼ CAUTION : This is a synthetic oil. Do not mix with mineral based oil. Do not mix oil brands.

○ NOTE : When filling, oil must be poured into cover quite slowly to allow complete housing fill.

Section 08 PROPULSION AND DRIVE SYSTEMS

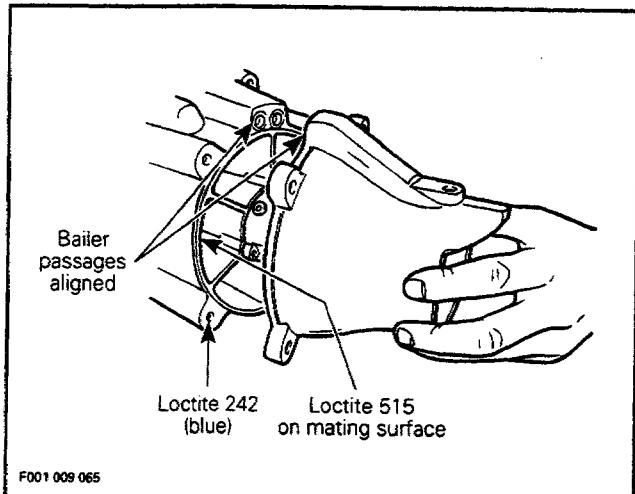
Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)



Apply Loctite PST 592 (P / N 293 800 018) on plug threads then secure it on cover.

17,20,35, Venturi, Screw and O-ring

Install new O-rings around bailer passages. Position venturi with bailer passages on top. Apply Loctite 515 Gasket Eliminator (P / N 293 800 007) on mating surface. Apply Loctite 242 (blue) (P / N 293 800 015) on threads and install screws and washers then torque to 25 N·m (18 lbf·ft) in a criss-cross sequence.



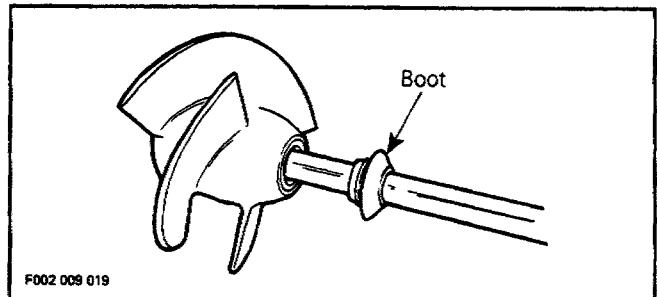
NOTE : On aluminum material it is recommended to use Loctite primer N (P / N 293 600 012) to reduce curing time and to increase gap filling capability. Refer to manufacturer's instructions.

2,15, Fitting

Apply Loctite PST 592 (P / N 293 800 018) on plastic fitting threads. Then thread fittings into pump housing until threads are bottomed.

27, Boot

Slide a new boot on drive shaft. To ease installation, apply some liquid soap on outer circumference of boot.

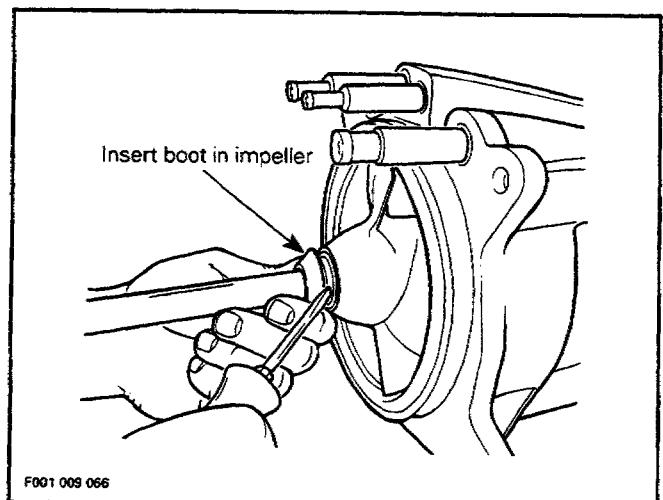


Clean drive shaft splines with Loctite solvent 755 (P / N 293 800 019). Free splines from any residue. Allow solvent to dry thoroughly.

Generously apply synthetic grease (P / N 293 550 010) on drive shaft splines and impeller splines.

Make sure rubber damper is on drive shaft end.

Insert drive shaft in impeller then carefully insert boot in impeller. Use screwdriver blade to push on boot.

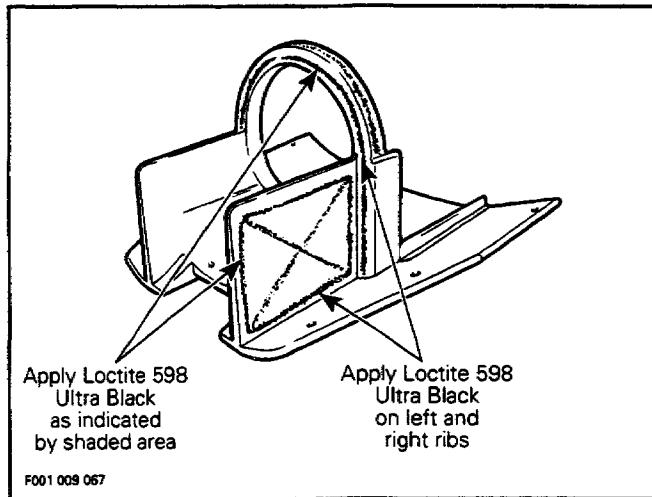


37,38,39,40,41, Ride Shoe, Screw and Grill

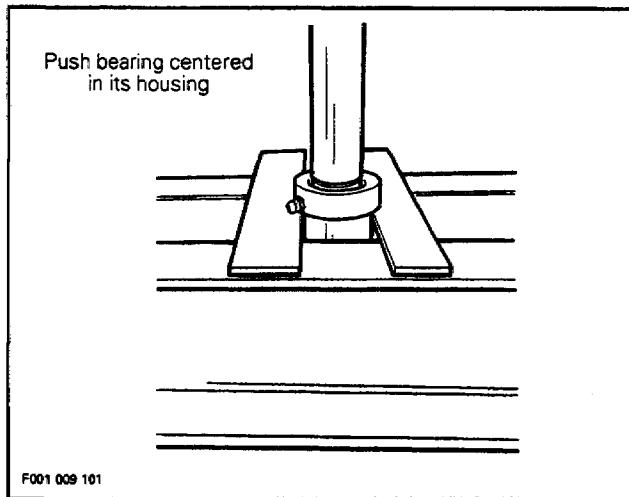
Apply Loctite 598 Ultra Black (P / N 293 800 030) or (P / N 293 800 028) on ride shoe as shown in the following illustration.

Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)



F001 009 067



F001 009 101

Carefully install ride shoe on hull. Apply Loctite 242 (blue) (P / N 293 800 015) on screw threads, install and tighten in a criss-cross sequence. Torque to 10 N•m (88 lbf•in).

From inside of bilge, apply Loctite 732 RTV Silicone (P / N 293 800 006) on end of screws to completely seal hull.

Apply Loctite 242 (blue) (P / N 293 800 015) on grill screw threads, install and tighten. Torque screws to 8 N•m (71 lbf•in).

50,51, Seal Carrier and Needle Bearing

Properly support seal carrier when installing seals and bearing.

CAUTION : Ensure to install stamped end of bearing (showing identification markings) first on pusher. Bearing damage will occur if not done properly.

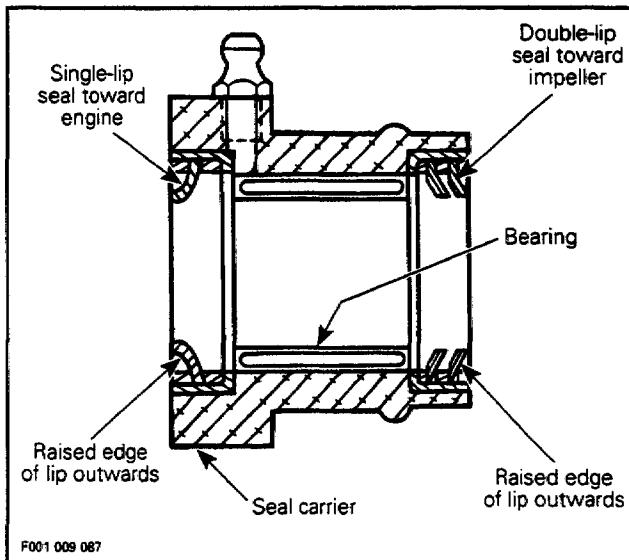
Push bearing with same pusher used at disassembly. Center bearing in longitudinal axis of housing.

CAUTION : Never hammer the bearing into its housing.

49,50,52, Seal and Seal Carrier

Install double-lip seal toward impeller side and single lip seal toward engine side.

On both seals, raised edge of lip must be located outwards of seal carrier.

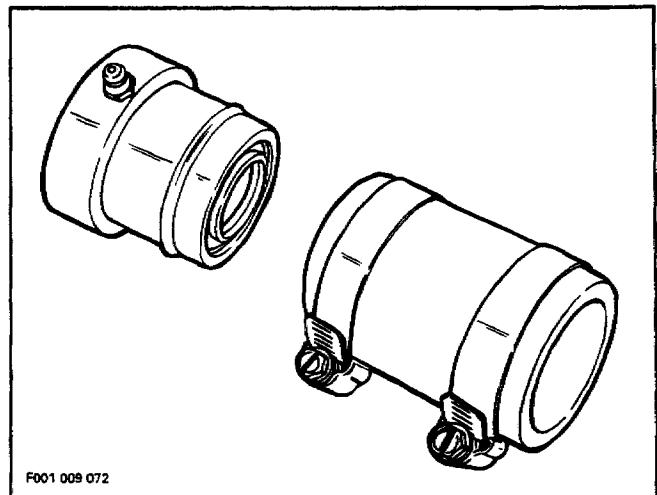
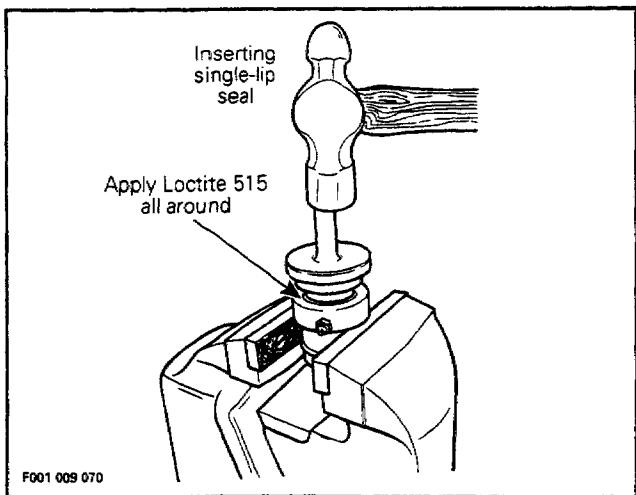


Apply Loctite 515 (P / N 293 800 007) all around seals outside diameter.

Single-lip seal can be carefully inserted, using a suitable pusher to avoid seal damage. Push seal until it comes flush with its housing.

Section 08 PROPULSION AND DRIVE SYSTEMS

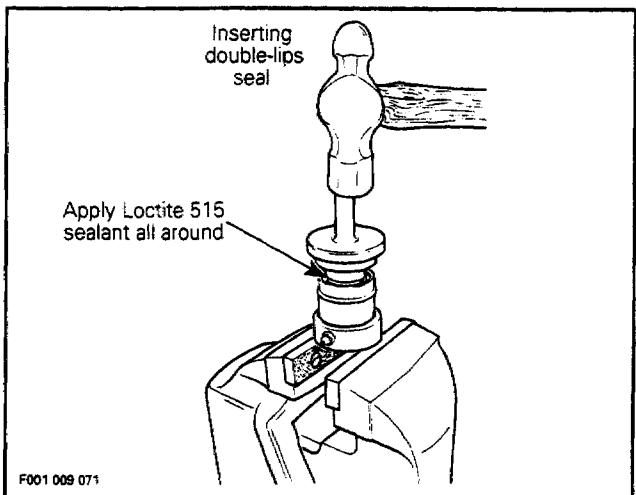
Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)



It is recommended to use a suitable pusher to avoid lip damage on double-lip seal.

Push seal until it comes flush with its housing.

 **NOTE :** Always install seal with its protector facing the impeller.



Pack seals and bearing with synthetic grease (P / N 293 550 010).

Install seal carrier and protective hose to hull insert with gear clamps.

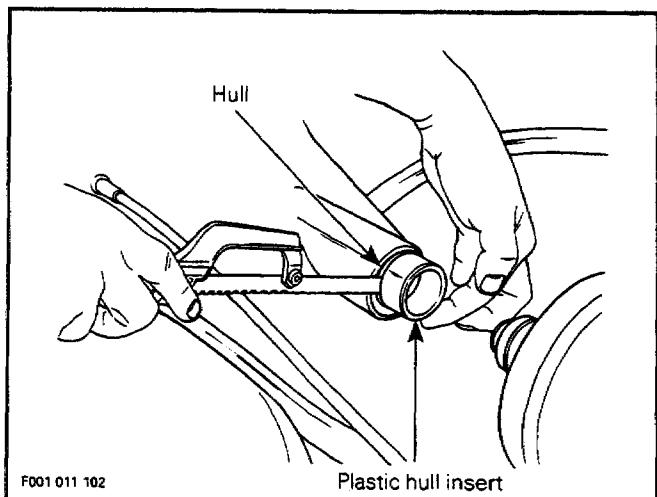
 **NOTE :** Seal carrier gear clamps should not be tightened until jet pump is installed, to insure perfect alignment.

INSTALLATION

65, Hull Insert

For hull insert repair proceed as follows:

Cut plastic hull insert flush with hull using a saw.



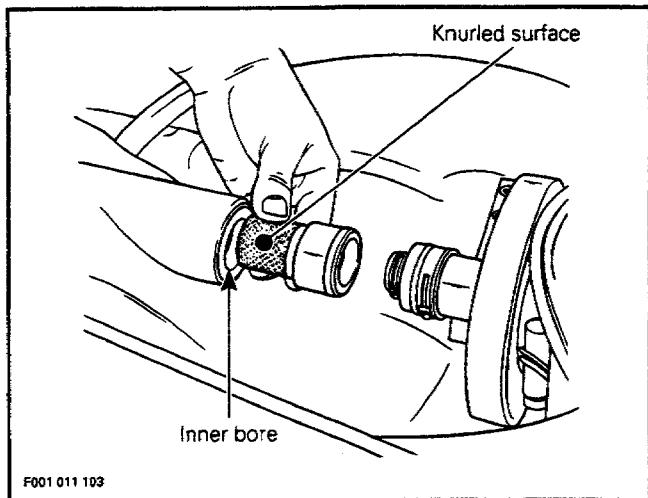
Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

Mix epoxy glue (3M-05900), follow manufacturer instructions.

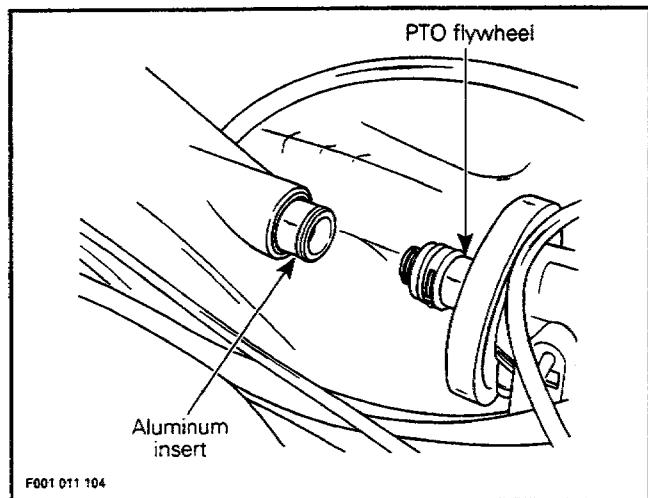
Apply epoxy glue on aluminum insert (P / N 292 000 075) knurled surface and on plastic insert inner bore.

CAUTION : A clearance between plastic insert and aluminum insert could possibly be noticed. If so, ensure to fill gap with epoxy glue to obtain aluminum insert adhesion.



Install insert into plastic hull insert.

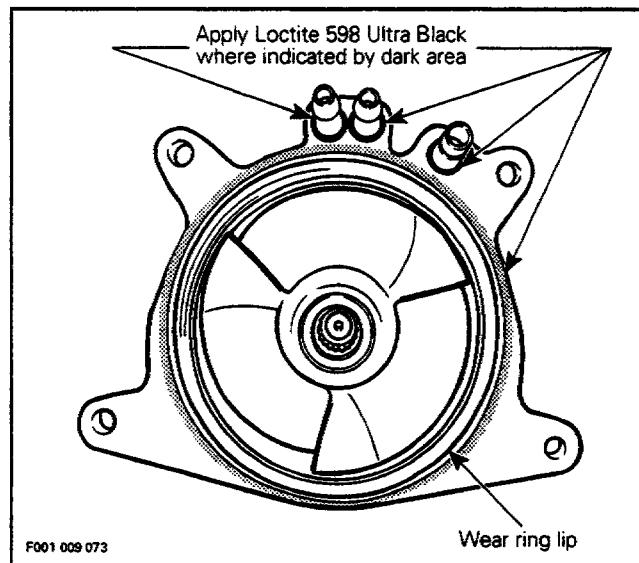
NOTE : Align aluminum insert as much as possible with PTO flywheel.



NOTE : The epoxy glue curing time is 30 minutes.

Pump Unit

Apply Loctite 598 Ultra black (P / N 293 800 030) or (P / N 293 800 028) on pump as shown in the following illustration.



Make sure rubber damper is on drive shaft end.

CAUTION : Some watercraft have a shim between hull and pump, if shim has been removed ensure to reinstall it. If not install, engine and jet pump alignment will be altered.

Put a piece of tape over drive shaft splines to prevent damage to seal carrier seals.

Insert drive shaft end through hull tunnel. Slide through seal carrier being careful not to damage seals. Push on pump until shaft comes close to PTO flywheel.

CAUTION : When sliding the drive shaft through seal carrier, the double lip seal could be folded over. This could cause a seal carrier bearing failure.

Remove tape from drive shaft splines. Generously apply synthetic grease (P / N 293 550 010) on drive shaft splines and PTO flywheel splines.

Section 08 PROPULSION AND DRIVE SYSTEMS

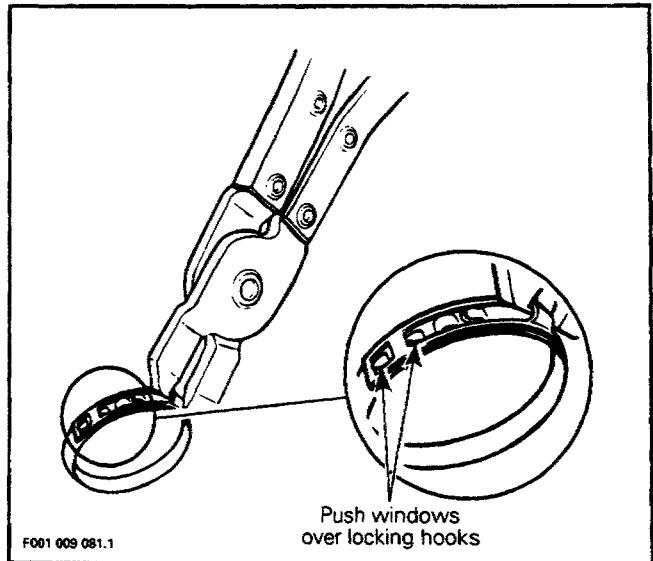
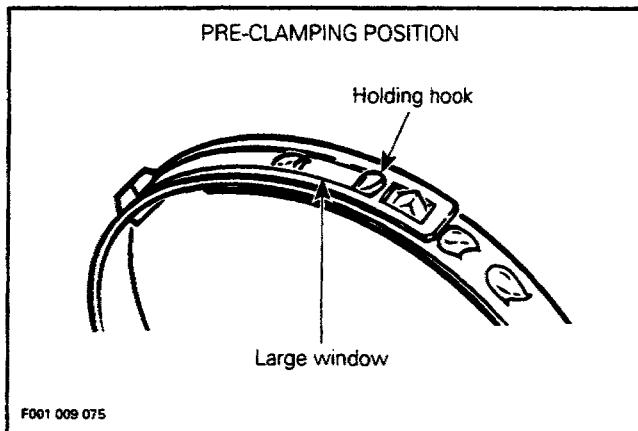
Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

While holding pump, guide and engage shaft splines in PTO flywheel. Rotate shaft to properly index splines. Make sure boot is well positioned over shaft end.

If necessary, tap pump end with a rubber hammer until retaining nuts and washers can be installed. Apply Loctite 242 (blue) (P / N 293 800 015) on threads and equally tighten nuts in a criss-cross sequence and torque to 35 N·m (26 lbf·ft).

Secure boot clamp as follows :

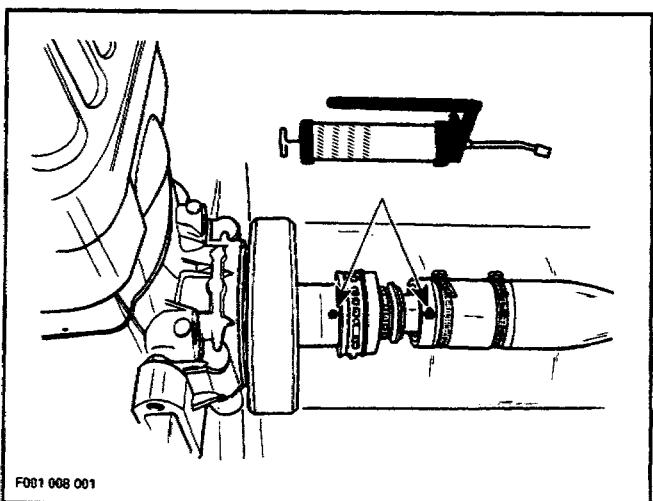
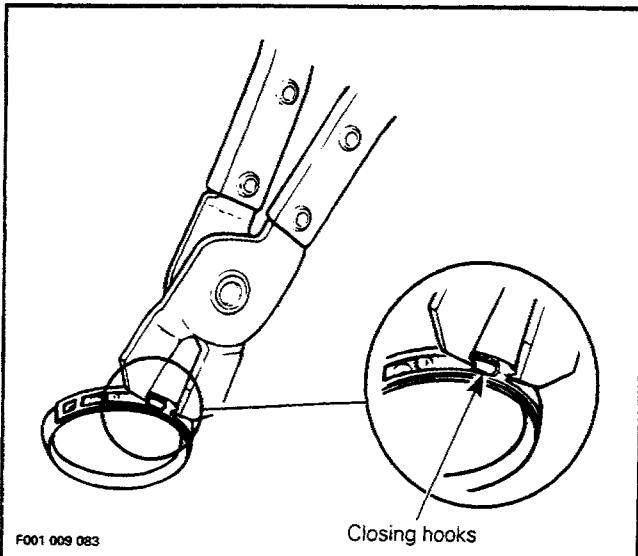
- Use pliers (P / N 295 000 069) as for removal.
- Manually engage holding hook in large window. This is a pre-clamping position only.



Using a grease gun, carefully lubricate, with synthetic grease (P / N 293 550 010), at grease fitting until boot is just beginning to expand. From this point, immediately stop.

Secure seal carrier protective hose to hull insert with gear clamps. Lubricate at seal carrier grease fitting until grease is just coming out on engine side. From this point immediately stop.

- Insert pointed tips of pliers first in closing hooks.



Secure flywheel guard to engine studs with washers and wing nuts.

Secure coolant inlet hose and both bailer tubes to impeller housing.

Reinstall air vent tube support onto body (XP model (5852)).

- Squeeze pliers. When both large and small windows are directly over the two locking hooks, press those windows down to engage hooks in windows.

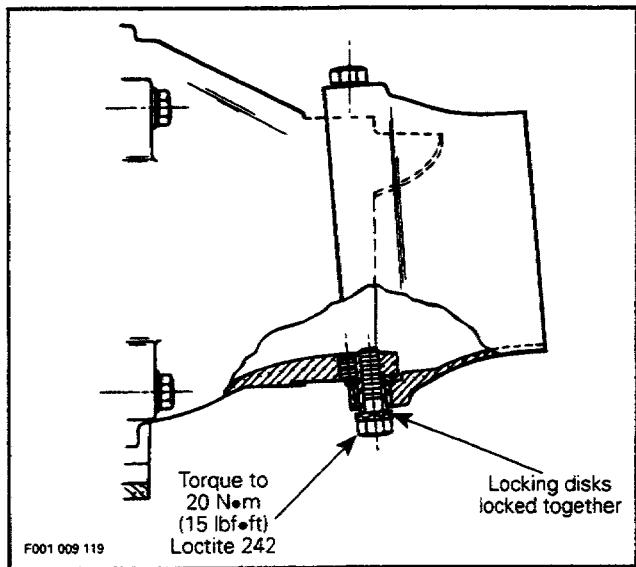
Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 01 (PROPULSION AND DRIVE SYSTEMS)

21,22,23,24, Screw, Sleeve, Bushing and Nozzle

Insert bushings in nozzle, positioning their flanges from inside of nozzle. Apply SEA-DOO LUBE (P / N 293 600 006) on outer circumference of sleeve then insert in nylon bushings.

Install nozzle on venturi, position its steering arm on RH side. Apply Loctite 242 (blue) on threads. Install screws position bottom screw in one of the holes with locking disks (if applicable) then torque to 20 N·m (15 lbf·ft).



◆ **WARNING :** Whenever removing screw always renew both locking disks. The recommended Loctite must be applied on screw threads and screw must be torqued as specified.

Reinstall steering cable ball joint on nozzle and check handlebar / nozzle alignment.

Manually turn nozzle from side to side ; it must pivot easily.

○ **NOTE :** To ease steering operation, inside of nylon bushings can be slightly enlarged with a 13 mm (1/2 in) round file (rat tail type).

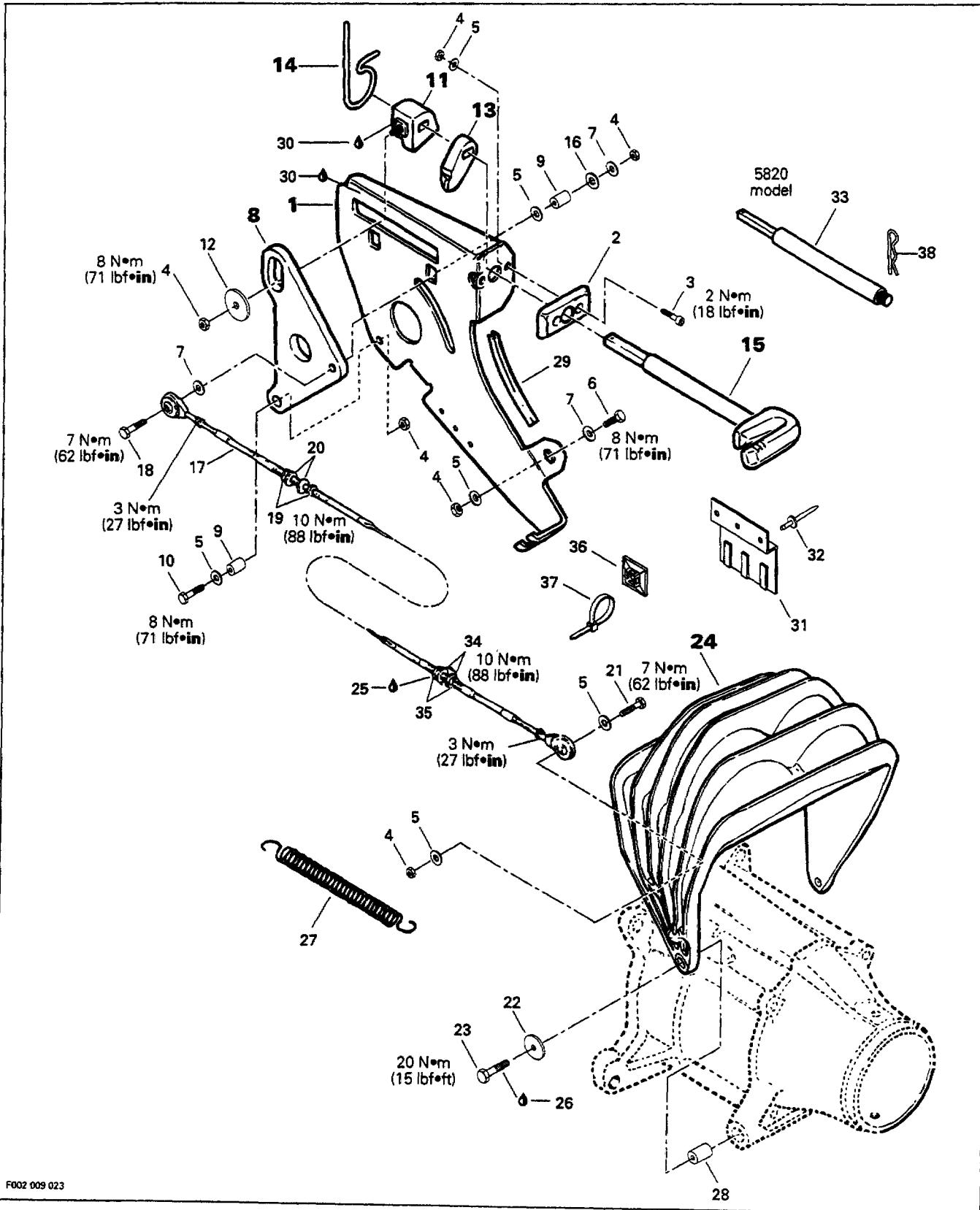
Slightly lubricate wear ring with SEA-DOO LUBE (P / N 293 600 006) before starting to minimize friction during initial start.

To allow impeller adjustment into wear ring, start engine to let impeller rotate for a few seconds.

▼ **CAUTION :** Water must be supplied to cool engine with coupler hose (P / N 295 500 099).

Section 08 PROPULSION AND DRIVE SYSTEMS
Sub-Section 02 (REVERSE SYSTEM)

REVERSE SYSTEM



Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 02 (REVERSE SYSTEM)

COMPONENTS

1. Reverse support plate
2. Guide plate
3. Allen screw M6 x 20 (2)
4. Elastic stop nut M6 (7)
5. Flat washer M6 (6)
6. Hexagonal head screw M6 x 20
7. Flat washer M6 (3)
8. Triangular lever
9. Bushing (2)
10. Hexagonal head screw M6 x 25
11. Sliding block
12. Flat washer M6
13. Locking lever
14. Spring
15. Reverse handle
16. Plastic washer M10
17. Reverse cable
18. Hexagonal head screw M6 x 40
19. Adjustment nut (2)
20. Washer (2)
21. Hexagonal head screw M6 x 45
22. Flat washer M8 (2)
23. Hexagonal head screw M8 x 35 (2)
24. Reverse gate
25. Loctite 598 Ultra Black
26. Loctite 242
27. Reverse gate spring (2)
28. Sleeve (2)
29. Protector
30. Synthetic grease
31. Wiring harness support
32. Rivet 1/8 (2)
33. Reverse shaft (5820 model)
34. Jam nut 7/16 (2)
35. Washer 7/16 (2)
36. Tie mount
37. Tie rap
38. Wave pin (5820 model)

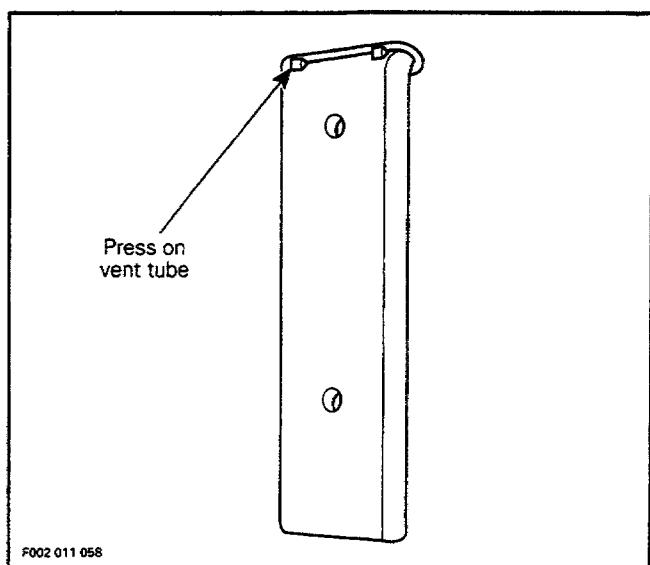
GENERAL

It is not necessary to remove reverse system from watercraft for servicing. However reverse system removal is necessary to replace reverse support plate.

DISASSEMBLY

Remove storage basket from watercraft.

Press on vent tube upper part to enable to withdraw tube from body.



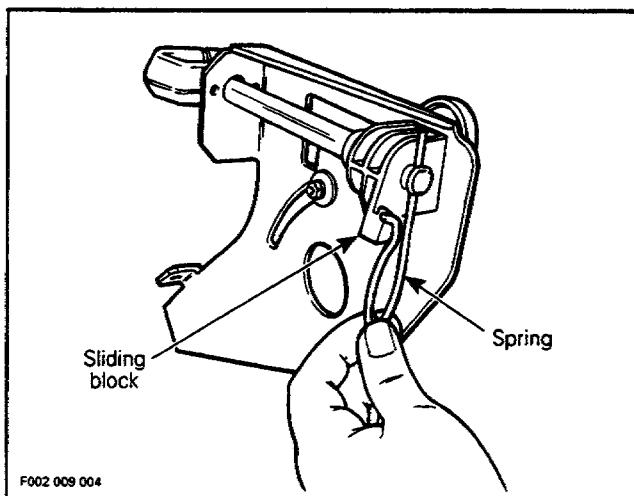
◆ **WARNING :** Vent tube must be in place to provide proper bilge ventilation.

13,14,15, Locking Lever, Spring and Reverse Handle

To remove reverse handle, unhook spring from sliding block and pull spring from reverse handle stem.

○ **NOTE :** For the Explorer model (5820) remove wave pin from reverse shaft and rotate reverse handle clockwise to remove it.

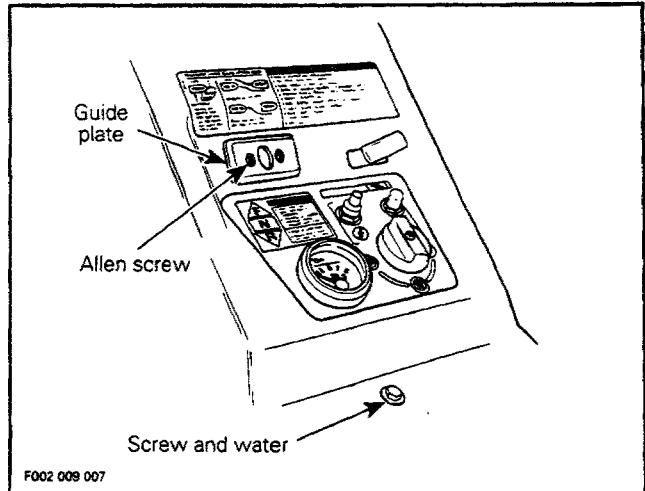
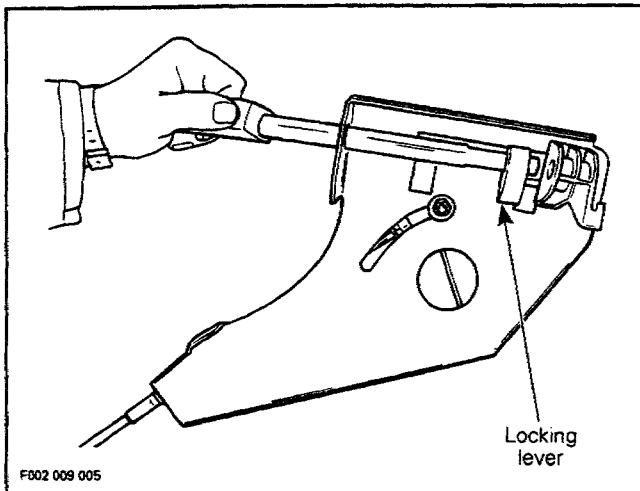
○ **NOTE :** In order to have access to the following items on the Explorer model (5820), console and ventilation plate must be removed.



Withdraw reverse handle stem and locking lever from sliding block, then slide off locking lever from stem.

Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 02 (REVERSE SYSTEM)

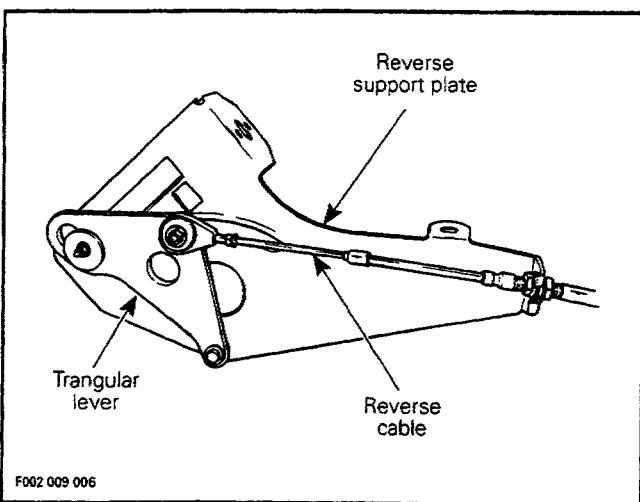


8.11, Triangular Lever and Sliding Block

Remove screw, lock nut, washers and bushing holding reverse cable to triangular lever.

Remove lock nut and washer holding sliding block to triangular lever and to support plate.

Remove screw, lock nut, washer and bushing holding triangular lever to reverse support plate.



1, Reverse Support Plate

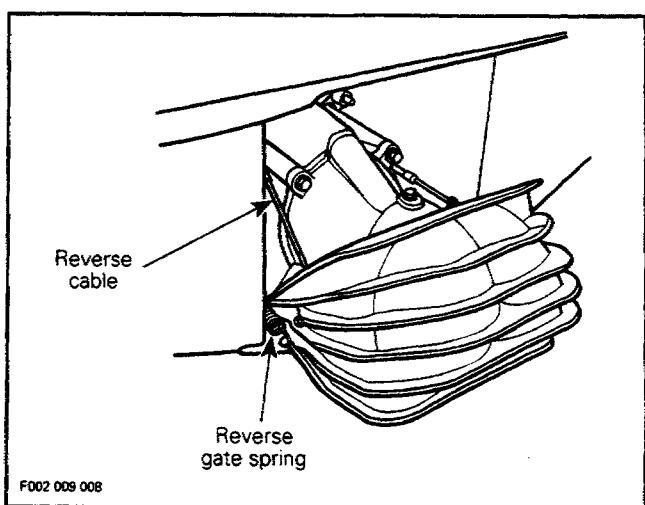
In order to have access to screw holding lower part of reverse support plate, remove front seat by pulling on each side to release it from body.

Remove screw, lock nut and washers holding support plate lower part.

Remove two Allen screws, lock nut and washer holding guide plate and support plate.

24, Reverse Gate

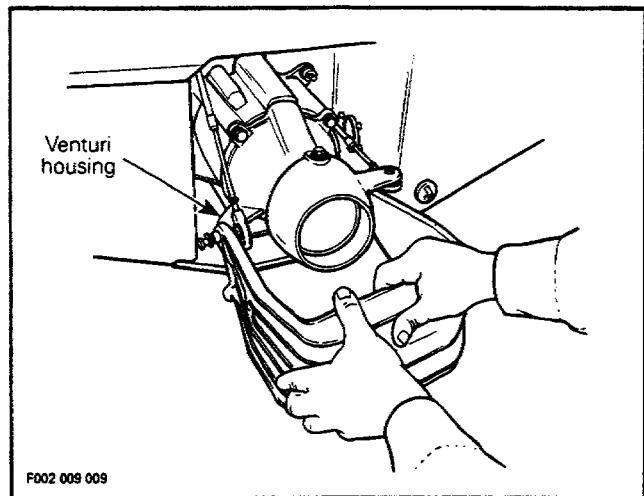
Unhook reverse gate springs and remove reverse cable from left side of reverse gate.



Unscrew reverse gate retaining screws from venturi housing, then remove gate.

Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 02 (REVERSE SYSTEM)



8.11, Triangular Lever and Sliding Block

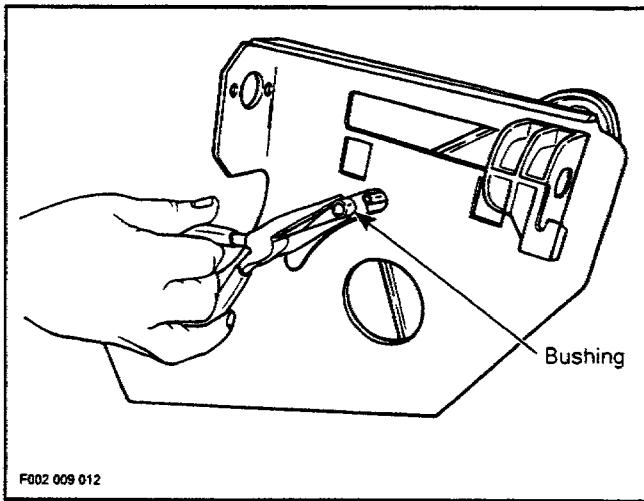
Insert bushing in triangular lever and then install lever to reverse support. Install reverse cable to triangular lever with bushing, plastic washer and flat washers.

NOTE : The plastic washer is installed to opposite side of reverse cable on support plate.

Torque cable screw to 7 N·m (62 lbf·in).

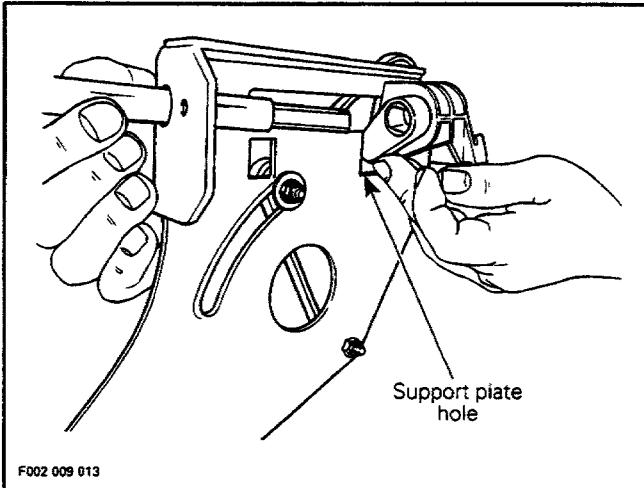
Torque triangular lever lower screw to 8 N·m (71 lbf·in).

Install sliding block to lever and torque nut to 8 N·m (71 lbf·in).



13,14,15, Locking Lever, Spring and Reverse Handle

Insert locking lever end in support plate hole then align lever and sliding block holes.



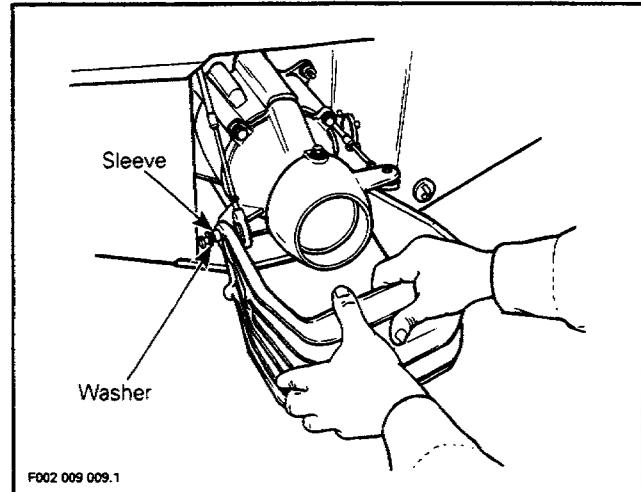
ASSEMBLY

Assembly is essentially the reverse of disassembly procedures. However pay particular attention to the following.

24, Reverse Gate

Install reverse gate with sleeve and washer. Apply Loctite 242 (P/N 293 800 015) on threads and torque to 20 N·m (15 lbf·ft).

CAUTION : Always hook reverse gate springs in order to ease reverse gate operation.



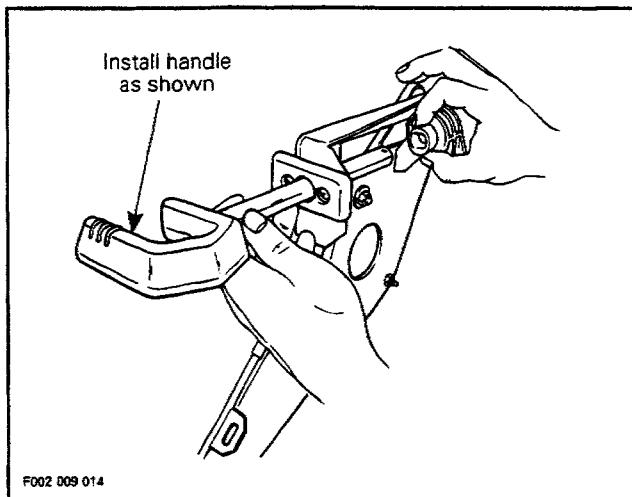
1, Reverse Support Plate

For reverse support plate installation torque screw to 8 N·m (71 lbf·in) and Allen screws to 2 N·m (18 lbf·in).

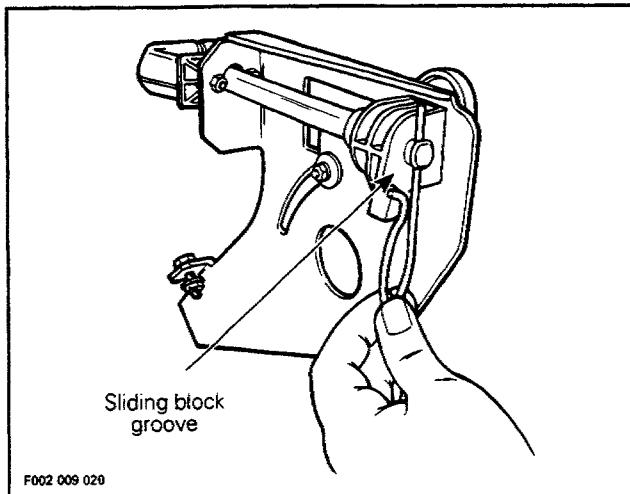
Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 02 (REVERSE SYSTEM)

NOTE : Always install reverse handle with its open end facing left side of watercraft, then push handle stem or reverse shaft (Explorer model (5820)) through lever and sliding block holes.



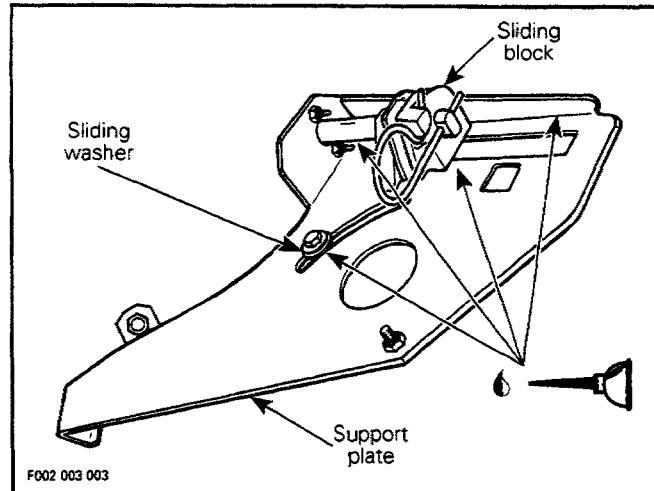
Insert spring in handle stem hole and then install curved end in sliding block groove.



NOTE : At reverse handle installation on the Explorer model (5820) rotate reverse handle counterclockwise and install wave pin to lock reverse shaft and reverse handle together.

Reverse Handle System Lubrication

Lubricate sliding block support plate sliding area and triangular lever with synthetic grease (P/N 293 550 013). Also lubricate sliding washer and reverse handle stem.

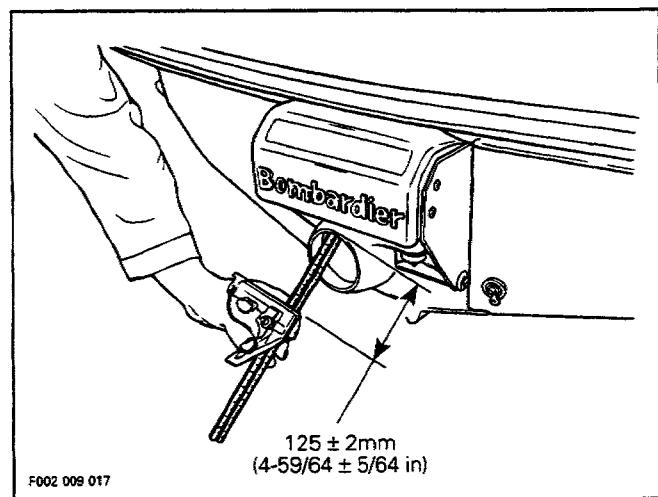


ADJUSTMENTS

Reverse Gate

Position handlebar in a straight ahead position, nozzle should be parallel to rear of watercraft.

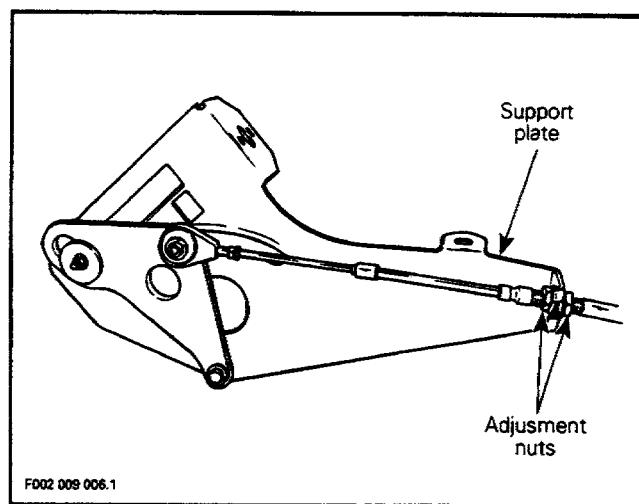
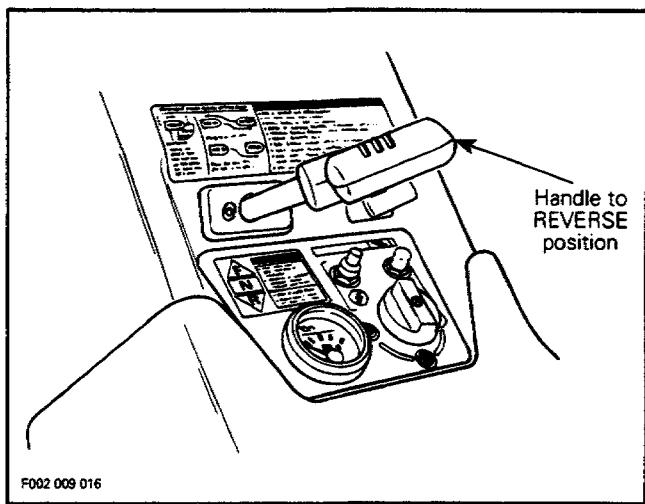
Using a square, set it to $125 \pm 2 \text{ mm}$ ($4-59/64 \pm 5/64 \text{ in}$), then position square end at the top middle of nozzle.



Pull reverse handle to REVERSE position.

Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 02 (REVERSE SYSTEM)

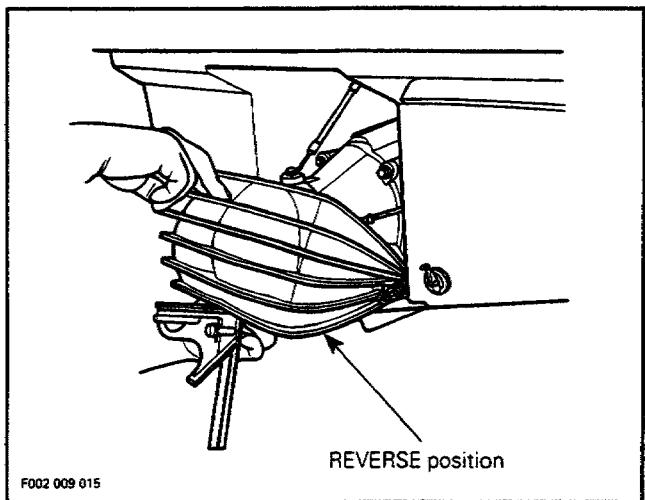


With the gate down to REVERSE position it should be at the specification.

NOTE : Push slightly on the gate in order to recover spring tension and to obtain proper position of the gate.

Tighten adjustment nuts and recheck gate position.

NOTE : If reverse gate adjustment is not done adequately, performance and steering control will be reduced at reverse position.

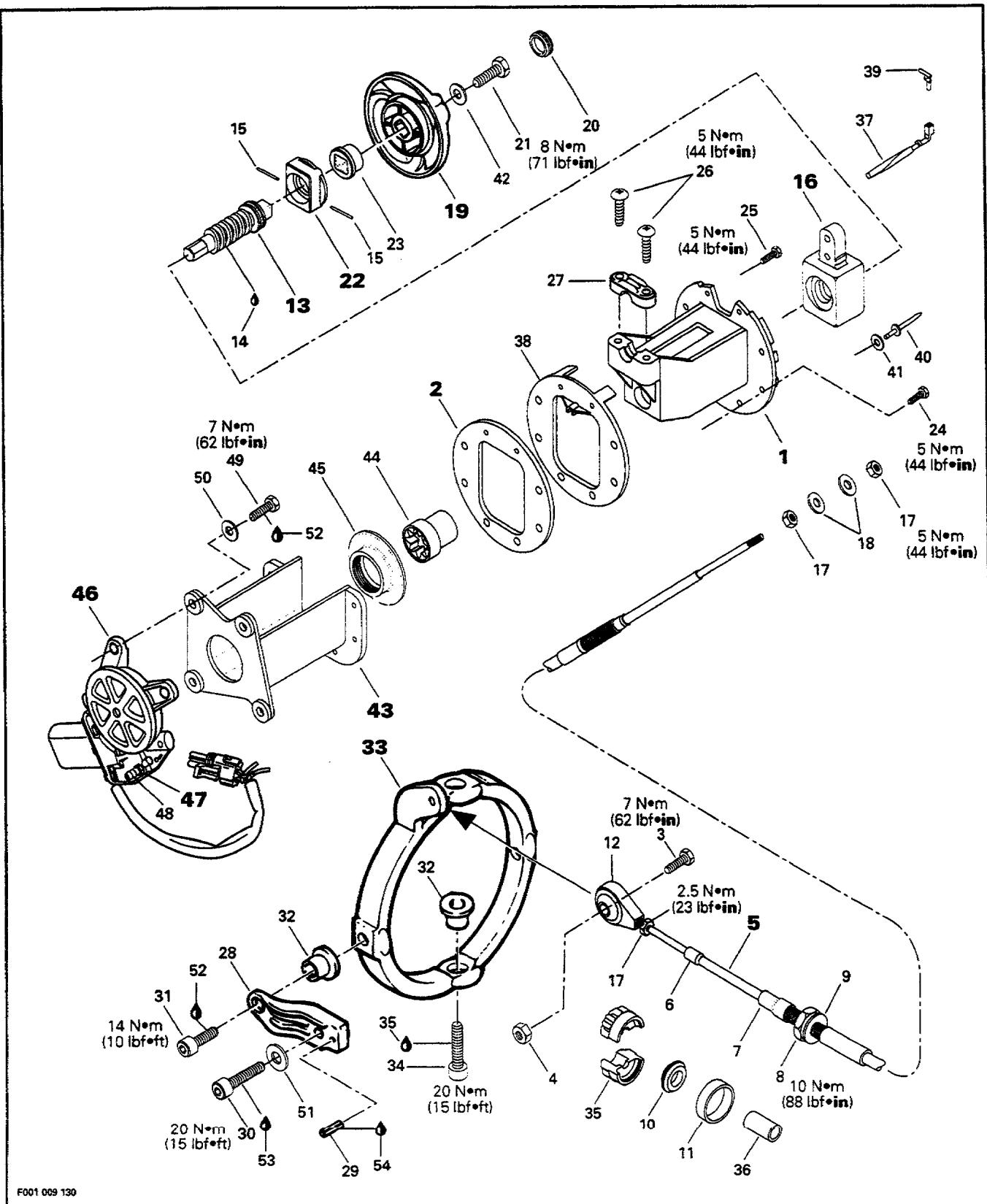


If reverse gate needs to be readjusted, it can be done at support plate with adjustment nuts. Turn cable nuts to obtain position.

Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 03 (VARIABLE TRIM SYSTEM (VTS))

VARIABLE TRIM SYSTEM



Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 03 (VARIABLE TRIM SYSTEM (VTS))

COMPONENTS

1. Housing	19. Trimming knob	37. Twisted rod
2. Gasket	20. Snap cap	38. Spacer
3. Hexagonal screw M6 x 30	21. Hexagonal screw M6.3 x 35	39. Position indicator
4. Elastic stop nut M6	22. Retaining block	40. Rivet (2)
5. Trim cable	23. Knob adaptor	41. Washer (2)
6. Small boot	24. Tapping screw (2)	42. Washer
7. Large boot	25. Tapping screw (4)	43. Motor support
8. Jam nut	26. Phillips screw (2)	44. Motor adaptor
9. Washer	27. Retaining plate	45. Seal
10. Rubber washer	28. Arm (2)	46. Electric motor
11. Ring retainer	29. Spring pin (2)	47. Seal washer (not illustrated)
12. Ball joint	30. Allen screw M8 x 20 (2)	48. Fitting
13. Worm	31. Allen screw M8 x 8 (2)	49. Hexagonal screw M6 x 16 (4)
14. Synthetic grease	32. Plastic bushing (4)	50. Lock washer M6 (4)
15. Retaining pin (2)	33. Trimming ring	51. Washer M8 (2)
16. Sliding collar	34. Allen screw M8 x 10 (2)	52. Loctite 242
17. Nut	35. Half ring (2)	53. Loctite 271
18. Flat washer M5 (2)	36. Spacer	54. Loctite 609

GENERAL

It is not necessary to remove variable trim system (VTS) from watercraft for servicing. However, variable trim system removal is necessary to replace either worm, sliding collar, housing gasket and housing.

DISASSEMBLY

In order to obtain an easy access to either trim cable or electric motor, remove storage basket from watercraft.

Disconnect battery.

◆ WARNING : Battery black negative cable must always be disconnected first and connected last.

Electric Motor

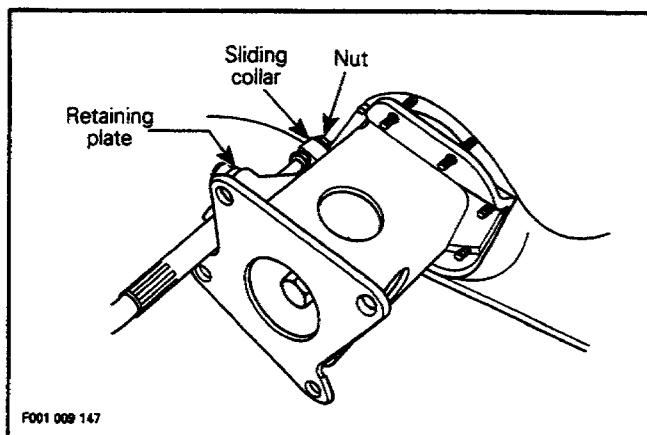
To replace motor, disconnect wiring harness and remove screws holding motor to motor support.

O NOTE : At removal, the motor adaptor and its seal might come off.

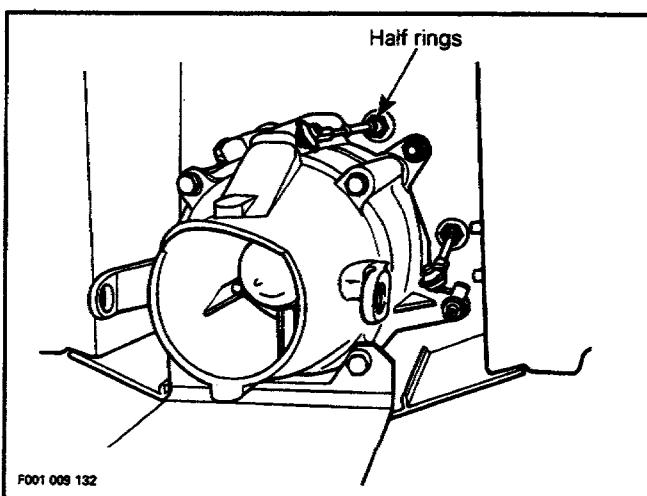
5. Trim Cable

To replace trim cable, remove nut from the end of cable at sliding collar. Untighten screws from retaining plate and slide off cable from housing.

O NOTE : To ease cable removal and installation the motor should be removed.



Remove ball joint from trim ring then unscrew ball joint from cable. Remove half rings, ring retainer and rubber washer from cable at the outside of hull. Pull out cable from inside the hull.



Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 03 (VARIABLE TRIM SYSTEM (VTS))

1,2,19, Housing Ass'y, Gasket and Trimming Knob

To remove housing assembly, remove motor and withdraw trim cable from sliding collar and from housing.

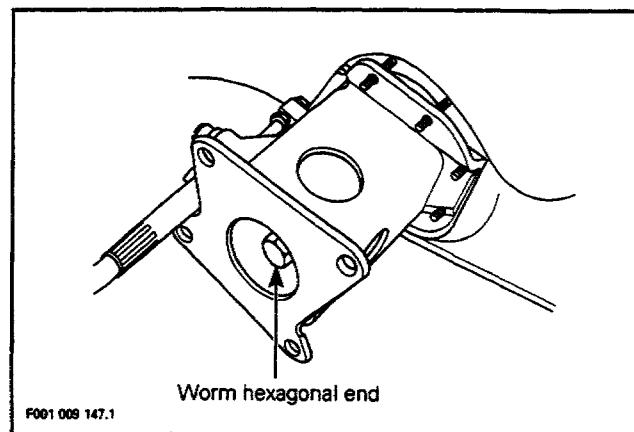
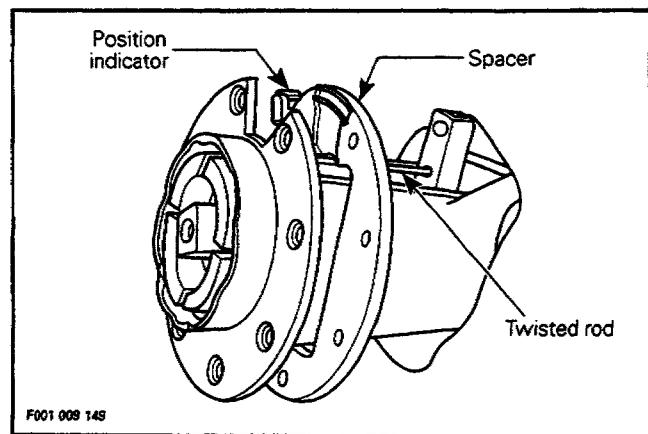
Remove snap cap from trimming knob center, remove screw then pull knob and remove knob adapter from worm.

Drill rivets which hold housing to body, remove screws holding housing and motor support to body then pull out housing assembly from body.

NOTE : To withdraw housing assembly from body, the sliding collar must be moved towards motor end.

To move sliding collar, install a 13 mm (1/2 in) socket on worm hexagonal end.

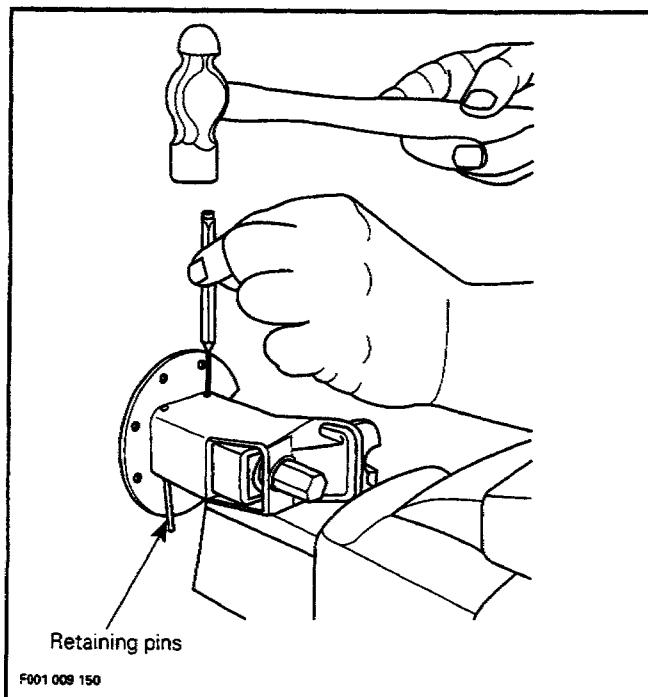
Remove position indicator from twisted rod end and slide off spacer from housing. Pull twisted rod from sliding collar.



13,16, Retaining block, Worm and Sliding Collar

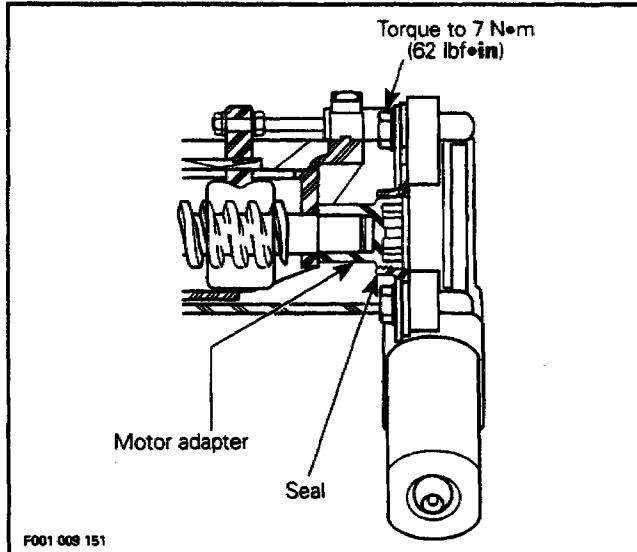
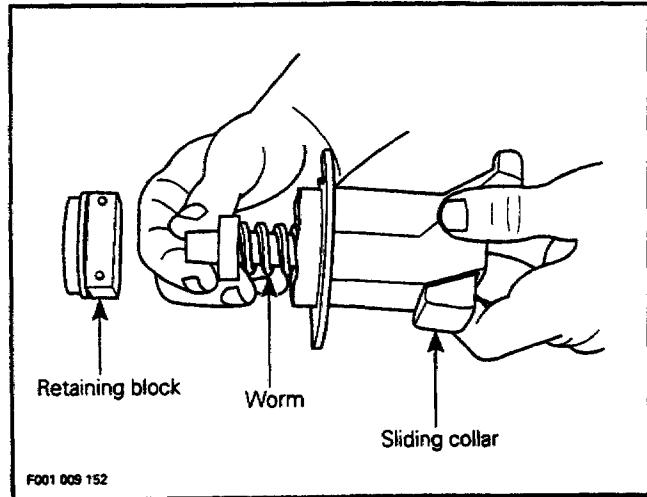
Remove retaining pins from retaining block and housing then remove retaining block.

Unscrew worm and remove sliding collar from housing.



Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 03 (VARIABLE TRIM SYSTEM (VTS))



ASSEMBLY

Assembly is essentially the reverse of disassembly procedures. However pay particular attention to the following.

13.16, Worm and Sliding Collar

Whenever replacing either worm or sliding collar, always lubricate worm with synthetic grease (P / N 293 550 010).

1, Housing Ass'y and Motor Support

At housing and motor support installation, position the long screws on motor support recess edge side. Torque all screws to 5 N·m (44 lbf·in).

Electric Motor

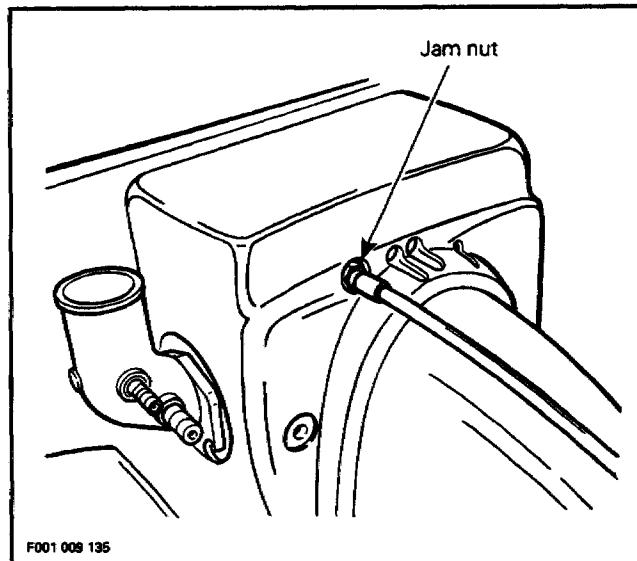
Install motor with the motor adapter, ensure to position seal on adapter to eliminate possible water intrusion in motor.

NOTE : Always lubricate adapter gear side with synthetic grease (P / N 295 550 010).

Apply Loctite 242 (P / N 293 800 015) on screw threads and install screws with lock washers and torque to 7 N·m (62 lbf·in).

5, Trim Cable

Install cable from inside the hull and install flat washer, spacer and torque jam nut to 10 N·m (88 lbf·in).



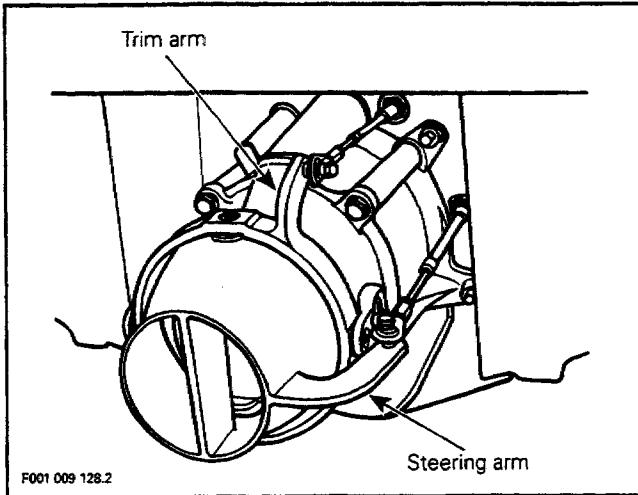
Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 03 (VARIABLE TRIM SYSTEM (VTS))

ADJUSTMENTS

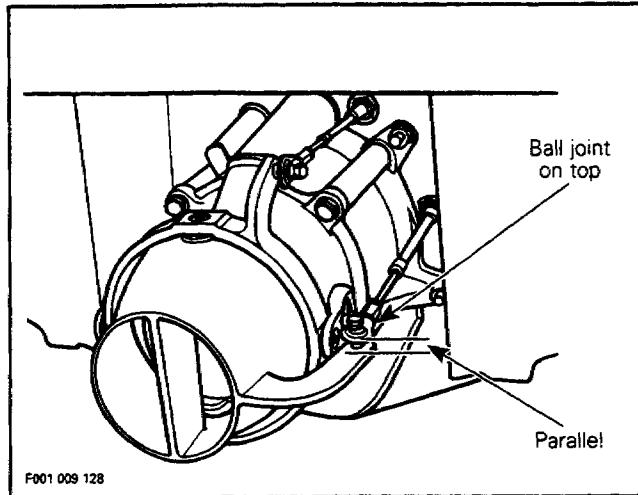
33, Trim Ring

Make sure jet pump nozzle steering arm is on right side and that trim arm is above venturi housing.



Ensure ball joint is on top of steering arm.

Make sure screw is installed on top of ball joint and that ball joint is parallel to steering arm. Secure ball joint with a lock nut and torque to 7 N·m (62 lbf·in).

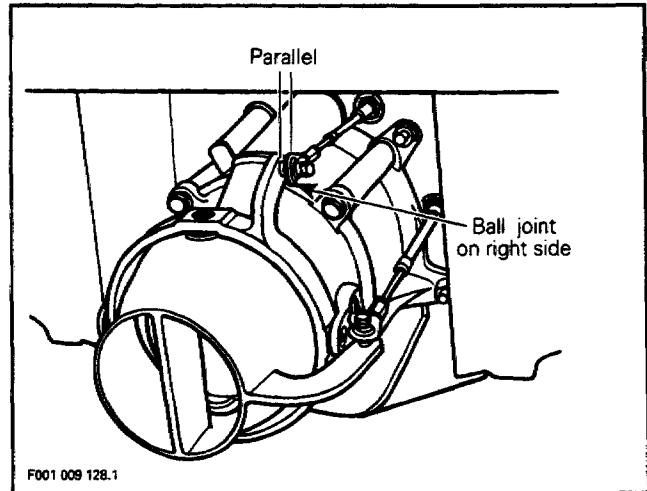


5, Trim Cable

Install ball joint and thread it in completely.

Secure ball joint on right side of trim arm using screw and nut. Make sure screw is installed on right side of trim arm and that ball joint is parallel to trim arm.

Torque screw to 7 N·m (62 lbf·in).

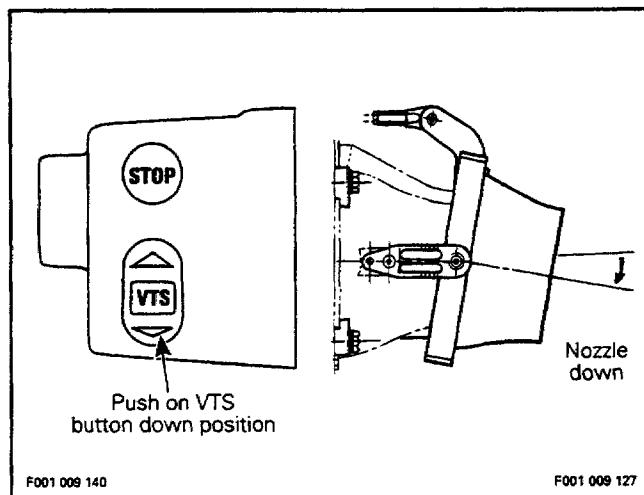


Torque ball joint lock nut to 2.5 N·m (23 lbf·in).

CAUTION : Ball joints must be installed face to face. Damage to cables could result if not done properly.

16, Sliding Collar

Push on VTS button down position, the sliding collar must move towards motor end until it stops. Make sure the nozzle is in down position.



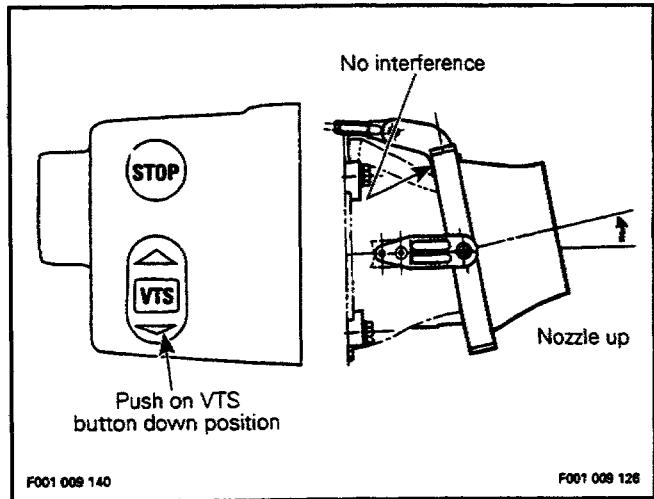
Install cable in sliding collar with washer and nut on each side. Torque nuts to 5 N·m (44 lbf·in). Install retaining plate over cable housing.

NOTE : Push cable as far as possible in sliding collar without moving trim ring from its down position.

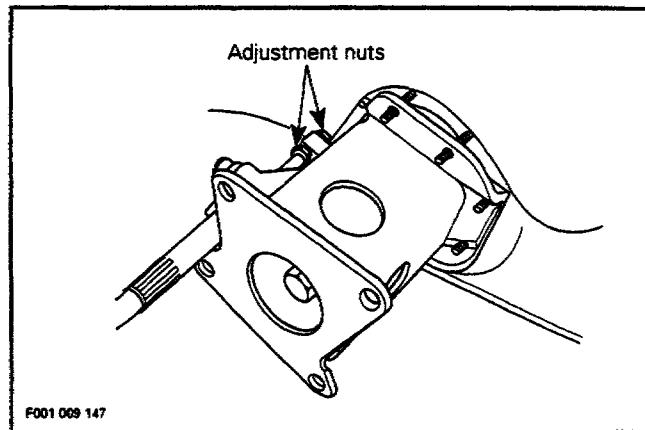
Section 08 PROPULSION AND DRIVE SYSTEMS

Sub-Section 03 (VARIABLE TRIM SYSTEM (VTS))

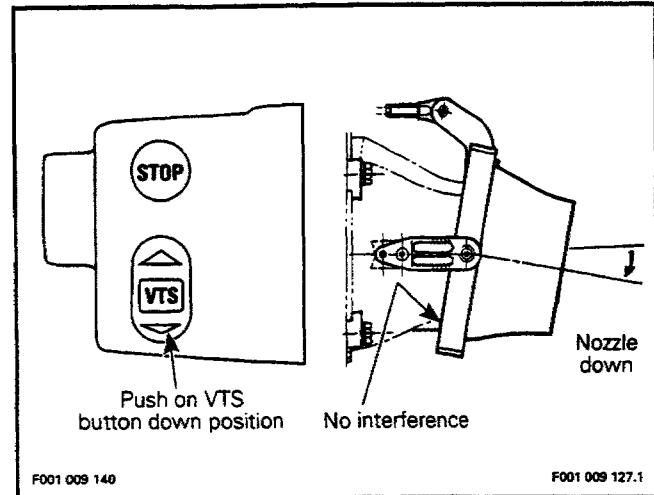
Push on VTS button up position until the sliding collar stops. The nozzle should be up (10°) without interfering with venturi housing.



If trim ring needs to be readjusted, it can be done at sliding collar with adjustment nuts.

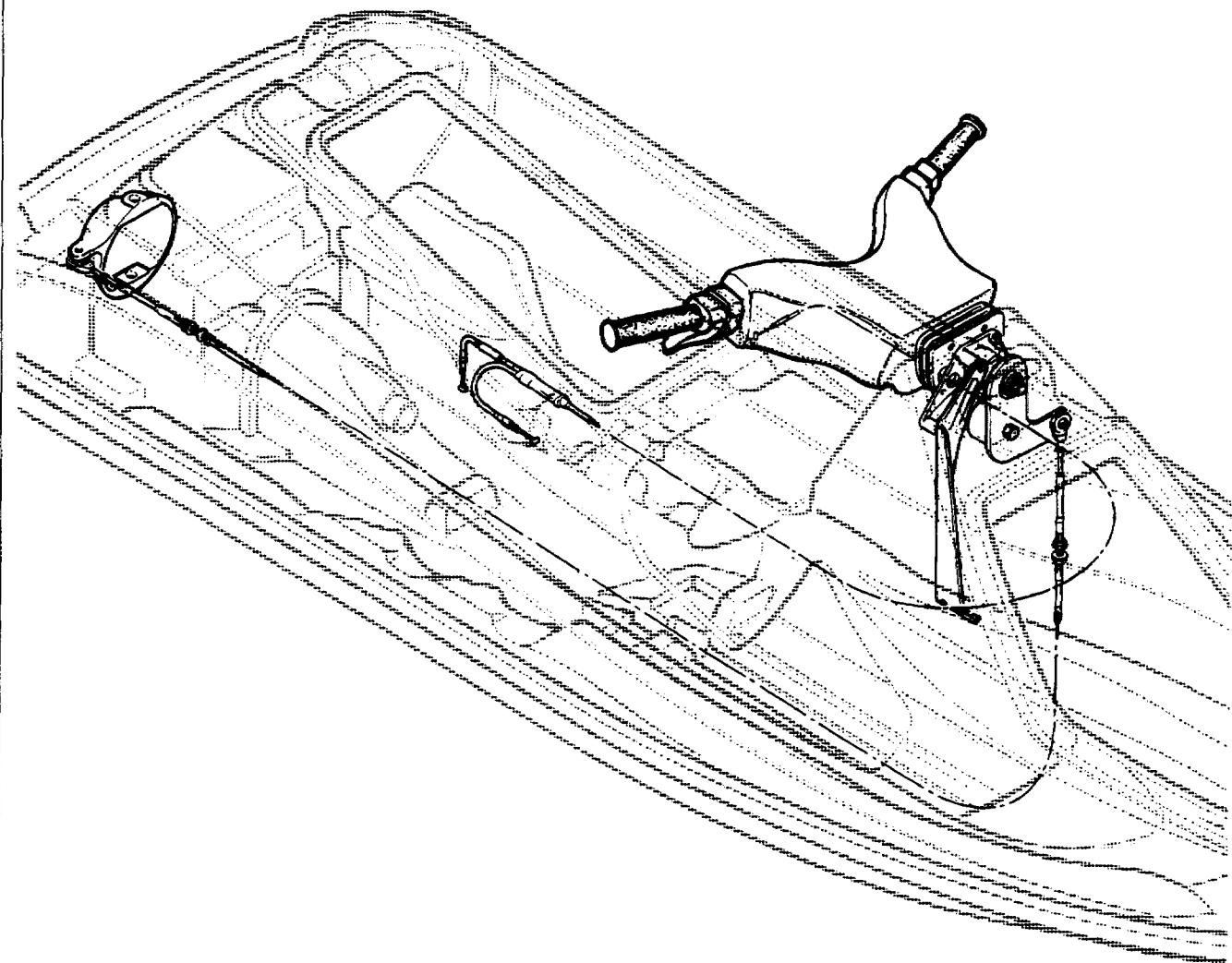


Push on VTS button down position until sliding collar stops. The nozzle must be down (10°) and it must not interfere with venturi housing.



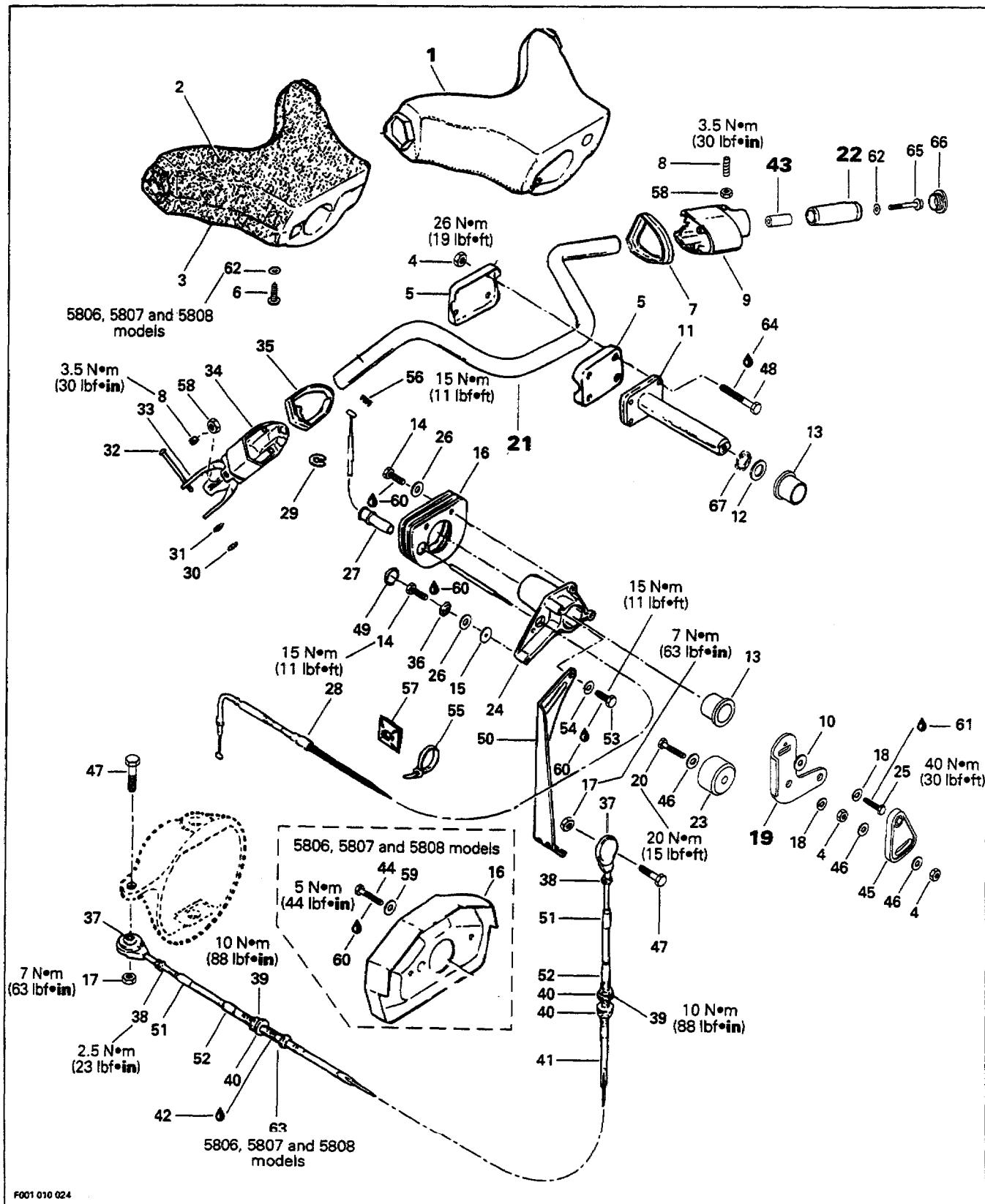
▼ CAUTION : Trim ring and / or nozzle must not interfere at any position. Damage to cables and / or venturi housing will occur if adjustments are not done adequately.

STEERING SYSTEM



Section 09 STEERING SYSTEM
Sub-Section 01 (STEERING SYSTEM)

STEERING SYSTEM



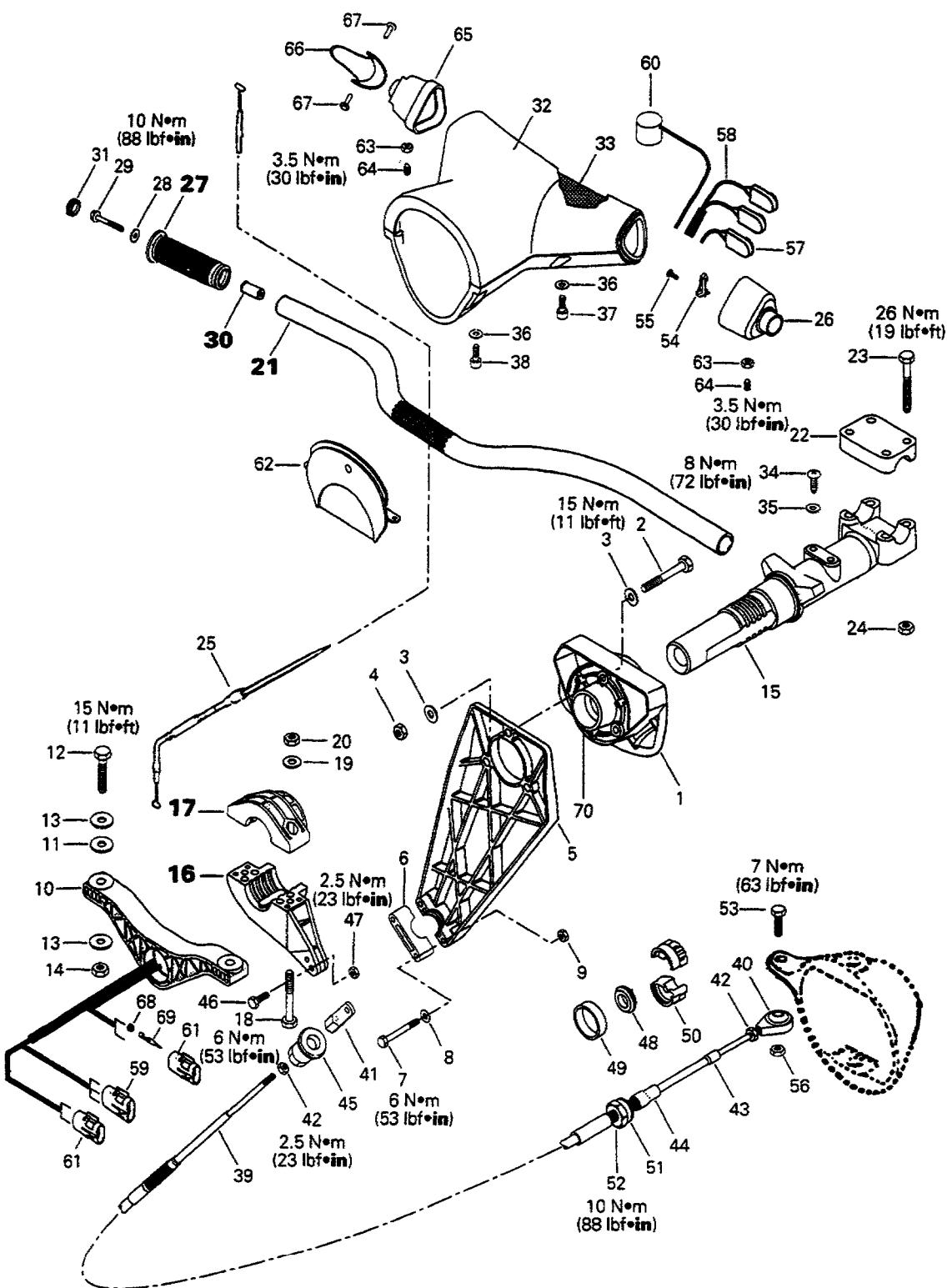
Section 09 STEERING SYSTEM

Sub-Section 01 (STEERING SYSTEM)

COMPONENTS

- 1. Cover
- 2. Foam (top)
- 3. Foam (bottom)
- 4. Elastic stop nut M8 (6)
- 5. Steering clamp (2)
- 6. Phillips screw (4)
- 7. Adapter
- 8. Set screw (2)
- 9. Left handle housing
- 10. Large flat washer
- 11. Steering Stem
- 12. Washer (shim)
- 13. Bushing (2)
- 14. Hexagonal head screw M8 x 25 (4)
- 15. Plastic washer (2)
- 16. Collar
- 17. Elastic stop nut M6 (2)
- 18. Lock washer M8 (2)
- 19. Steering stem arm
- 20. Hexagonal head screw M8 x 45
- 21. Handlebar
- 22. Grip (2)
- 23. Stopper bushing
- 24. Steering support
- 25. Hexagonal head screw M8 x 25
- 26. Washer 8 mm (4)
- 27. Grommet
- 28. Throttle cable
- 29. Circlip
- 30. Circlip
- 31. Washer
- 32. Pin
- 33. Throttle handle
- 34. Throttle handle housing
- 35. Adapter
- 36. Retaining washer (2)
- 37. Ball joint (2)
- 38. Nut 10-32 (2)
- 39. Jam nut 7/16 (4)
- 40. Washer 7/16 (3)
- 41. Cable
- 42. Loctite U Black
- 43. Grip retainer (2)
- 44. Hexagonal head screw M6 x 20 (2)
- 45. Locking plate
- 46. Flat washer M8 (3)
- 47. Hexagonal head screw M6 x 30 (2)
- 48. Hexagonal head screw M8 x 55 (4)
- 49. Snap cap (2)
- 50. Cable support
- 51. Small boot
- 52. Large boot
- 53. Hexagonal head screw M8 x 16 (2)
- 54. Lock washer M8 (2)
- 55. Tie rap
- 56. Locking tab
- 57. Tie-mount
- 58. Hexagonal nut M6 (2)
- 59. Flat washer M6 (2)
- 60. Loctite 242
- 61. Loctite 271
- 62. Flat washer M6 (6)
- 63. Flat washer 7/16
- 64. Anti-seize lubricant
- 65. Screw M 6.3 x 45 (2)
- 66. Cap (2)
- 67. Spring washer

STEERING SYSTEM XP MODEL (5852)



Section 09 STEERING SYSTEM

Sub-Section 01 (STEERING SYSTEM)

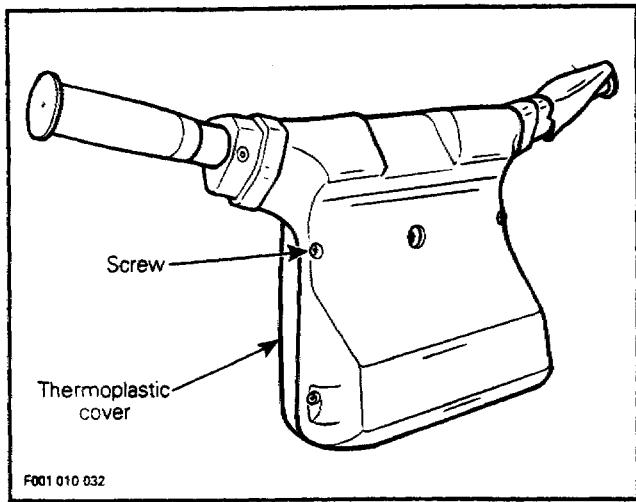
COMPONENTS

1. Rear support	25. Throttle cable	48. Rubber washer
2. Hexagonal screw M8 x 65 (3)	26. Housing	49. Ring retainer
3. Flat washer M8 (6)	27. Grip (2)	50. Half ring (2)
4. Elastic stop nut M8 (3)	28. Flat washer M6	51. Flat washer
5. Steering cable bracket	29. Hexagonal screw M6.3 x 2.2 x 45 (2)	52. Jam nut
6. Retaining plate	30. Grip retainer (2)	53. Hexagonal screw M6 x 30
7. Hexagonal screw M6 x 50 (2)	31. Cap (2)	54. Retainer plate
8. Flat washer M6 (2)	32. Cover	55. Tapping screw
9. Elastic stop nut M6 (2)	33. Top foam	56. Nut M6
10. Front support	34. Taptite hexagonal screw 1/4-20 (2)	57. Stop switch assembly
11. Plastic washer (2)	35. Flat washer M6 (2)	58. "VTS" switch assembly
12. Hexagonal screw M8 x 40 (2)	36. Flat washer M5 (4)	59. Female tab housing (3 ways)
13. Flat washer M8 (4)	37. Allen screw (2)	60. Buzzer assembly
14. Elastic stop nut (2)	38. Allen screw (2)	61. Female tab housing (2 ways) (2)
15. Steering stem	39. Steering cable	62. Plate
16. Steering stem arm	40. Ball joint	63. Elastic nut M6 (2)
17. Steering stem arm support	41. Joint	64. Set screw M6 x 12 (2)
18. Allen screw M6 x 25 (2)	42. Nut 10-32 (2)	65. Throttle handle housing
19. Flat washer M6 (2)	43. Small boot (2)	66. Throttle handle
20. Elastic stop nut M6 (2)	44. Large boot (2)	67. Pin
21. Handlebar	45. Adjustment nut	68. Wire seal
22. Steering clamp	46. Hexagonal screw M6 x 25	69. Male terminal
23. Hexagonal screw M8 x 50 (4)	47. Elastic stop nut M6	70. Synthetic grease
24. Elastic stop nut M8 (4)		

REMOVAL AND ASSEMBLY

1. Cover

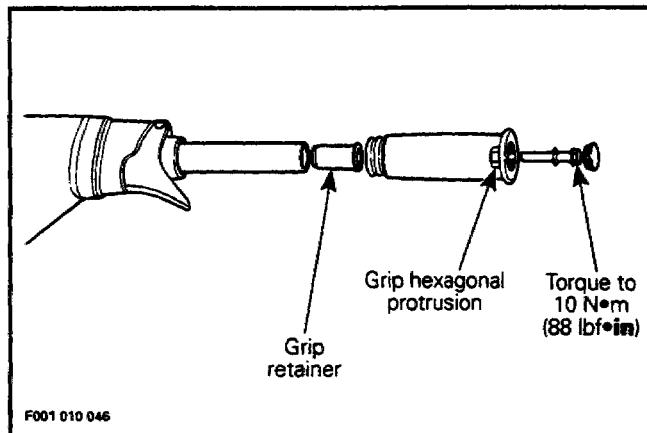
To replace the cover, just remove and reinstall four screws and washers.



22,43, Grip and Grip Retainer

To remove grip, just pull out cap from grip end and remove screw. To verify grip retainer for damage, remove it from handlebar.

NOTE : At grip retainer installation on XP (5852) model, slide grip retainer key into handlebar slot. At grip installation, ensure to insert properly grip hexagonal protrusion into grip retainer.



Install flat washer and screw, torque screw to 10 N·m (88 lbf·in).

▼ **CAUTION :** Ensure to install flat washer because screw will damage grip end.

19,21, Steering Stem Arm and Handlebar (All Models Except XP (5852))

Insert throttle cable through dashboard hole and slide grommet on cable.

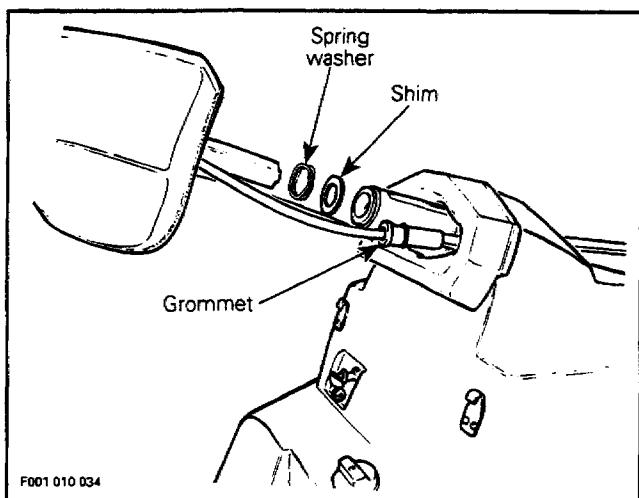
Insert grommet in dashboard hole and pull it from inside bilge.

○ **NOTE :** To ease installation, apply water on grommet.

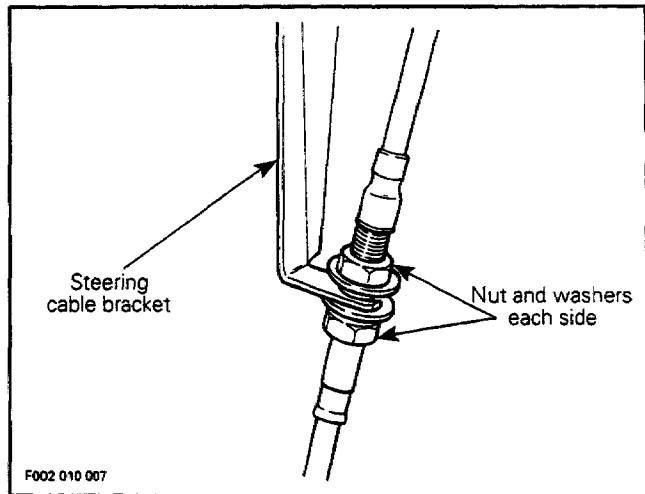
Insert wires of engine overheating beeper / engine stop switch through grommet.

Insert spring washer and the shim onto steering stem.

Insert handlebar ass'y into steering column support.

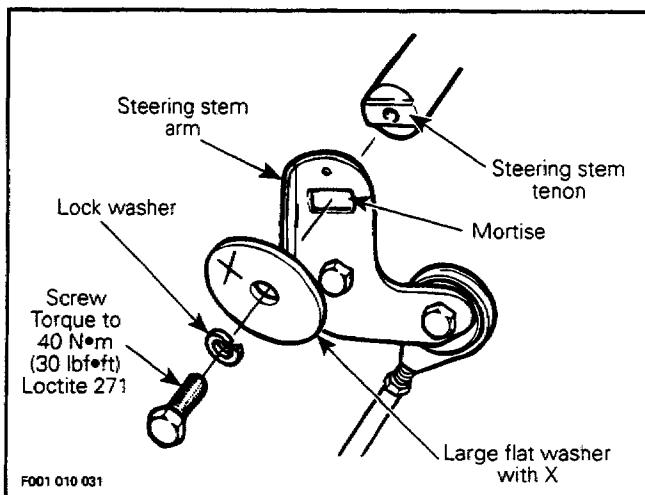


Install steering cable in its bracket with one washer and one nut each side of bracket.



Ensure to interlock nuts prior to torque to 10 N·m (88 lbf·in) using a crowfoot wrench such as Snap-on FRH220S.

Properly position steering stem arm on steering stem as shown. Make sure to insert stem tenon into arm mortise. Apply Loctite 271 (P / N 293 800 005) on screw threads, install large flat washer, lock washer and screw. Torque to 40 N·m (30 lbf·ft).



▼ **CAUTION :** Always install large flat washer with the X stamped side facing the lock washer.

◆ **WARNING :** The recommended torque and Loctite must be applied on screw.

Position a flat washer on steering stopper screw then install locking plate over steering stem head screw.

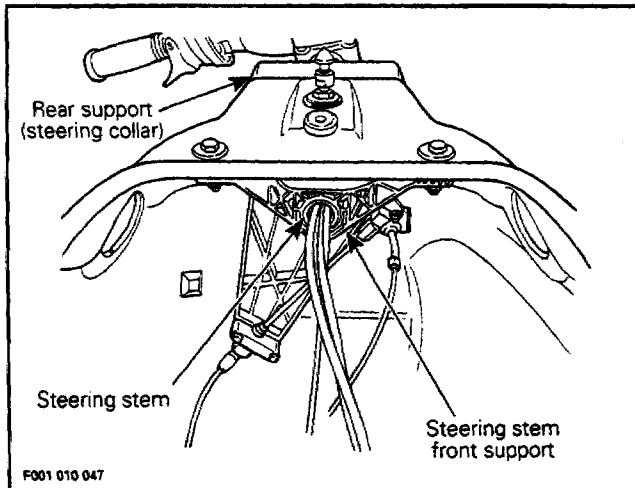
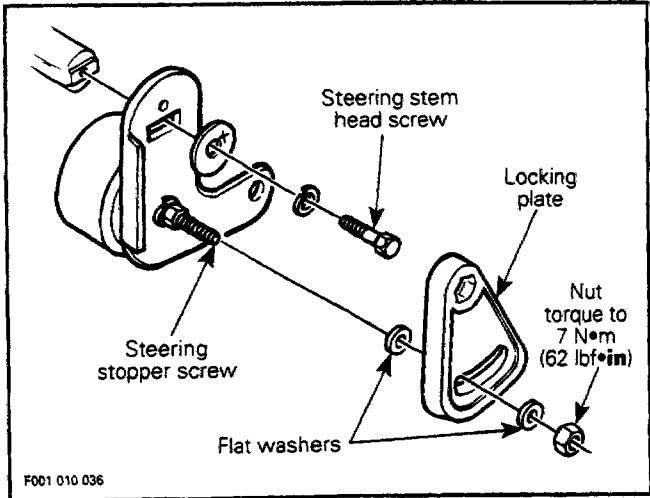
Ensure steering stopper screw is positioned into locking plate slot.

○ **NOTE :** The locking plate can be turned over to obtain its proper position.

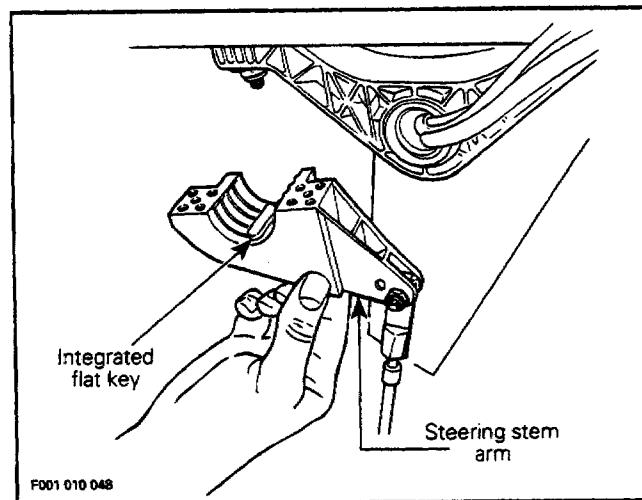
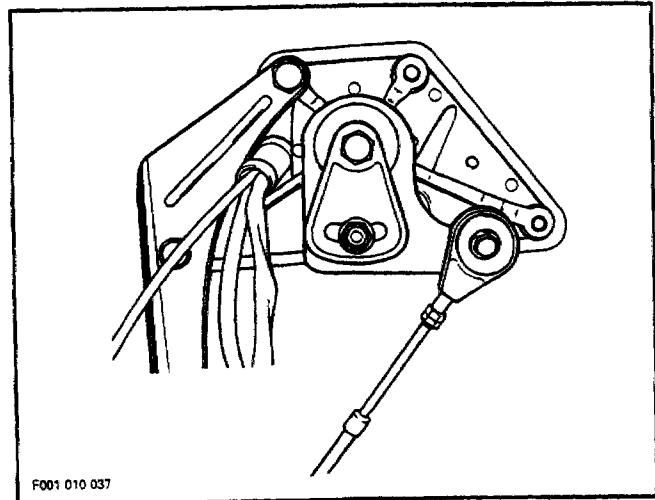
Section 09 STEERING SYSTEM

Sub-Section 01 (STEERING SYSTEM)

Install a flat washer and secure locking plate using a stop nut. Torque to 7 N·m (62 lbf·in).



Position steering stem arm onto steering stem and ensure to insert stem arm integrated flat key into steering stem groove.



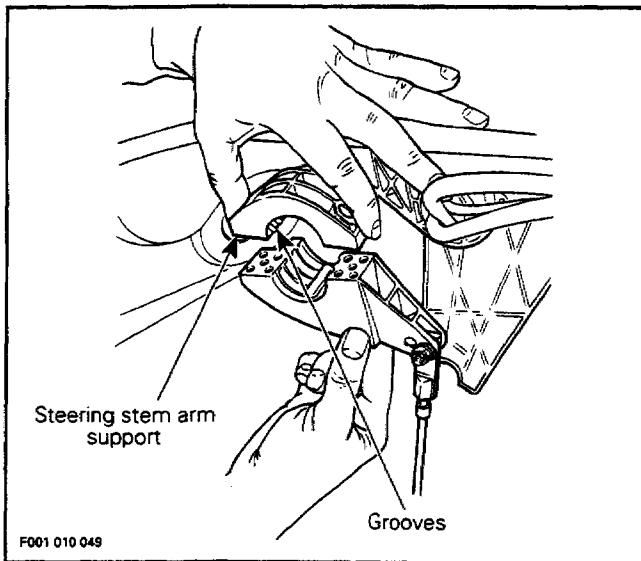
Steering Stem Arm, Steering Stem Arm Support and Handlebar (XP Model (5852) Only)

Insert throttle cable and wiring harnesses through rear support (steering collar) and through steering stem front support.

Insert handlebar ass'y into rear support and through steering stem front support.

 **NOTE :** Always lubricate steering stem rear and front supports with synthetic grease (P / N 293 550 010).

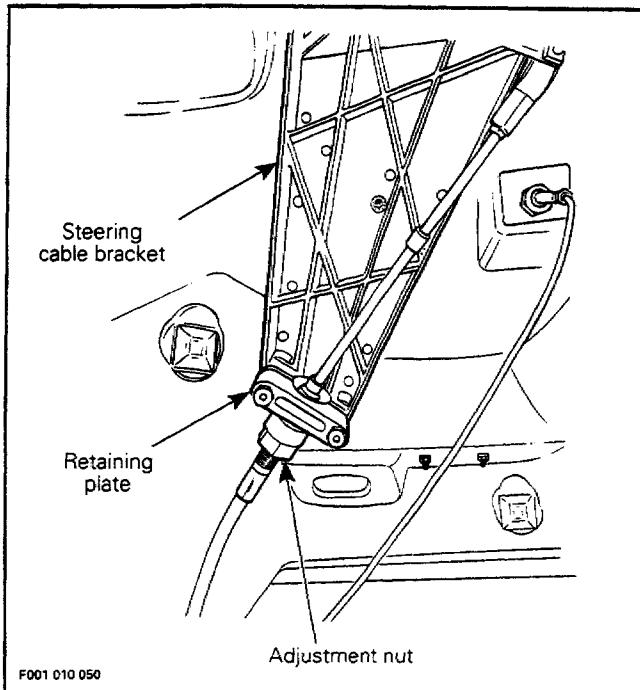
Position steering stem arm support onto steering stem ensuring the support grooves seat onto steering stem protrusions.



Secure steering stem arm and its support onto steering stem using elastic stop nut, flat washer and screw. Torque screws to 6 N·m (53 lbf·in).

CAUTION : Always ensure to insert steering stem arm integrated flat key into steering stem groove and to insert steering stem arm support grooves onto steering stem protrusions.

Install steering cable with its adjustment nut onto bracket with the retaining plate. Secure retaining plate using elastic stop nut, flat washer and screw. Torque screws to 6 N·m (53 lbf·in).



ADJUSTMENT

Steering and Jet Pump Nozzle

Make the following tool to ease alignment.

Raw Material :

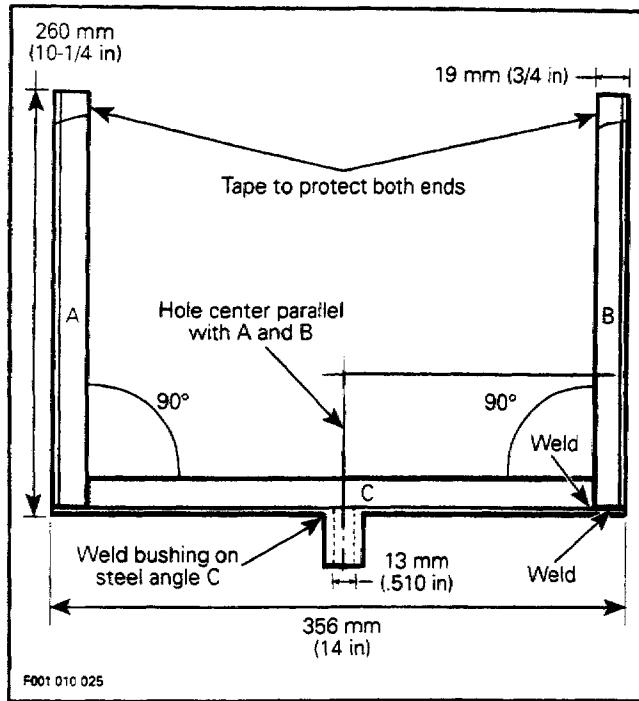
- 2 steel angle : 19 mm x 254 mm (3/4 x 10 in).
- 2 steel angle : 19 mm x 356 mm (3/4 x 14 in).
- 1 bushing : 13 mm (.510 in) inside diameter, 19 mm (3/4 in) long.
- 1 rod : 12.7 mm x 230 mm (.500 x 9 in).
- 1 spring pin : 19 mm (3/4 in) long.
- 2 rods for hooks (bolt with head removed) : 152 mm (6 in) x 6 mm (1/4 in) with a threaded portion of at least 65 mm (2-1/2 in).
- 2 bushings : 7 mm (9/32 in) inside diameter, 10 mm (3/8 in) outside diameter, 19 mm (3/4 in) long.
- 2 wing nuts : 6 mm (1/4 in).

Weld steel angles A, B, C and bushing as per illustration and pay attention to the following :

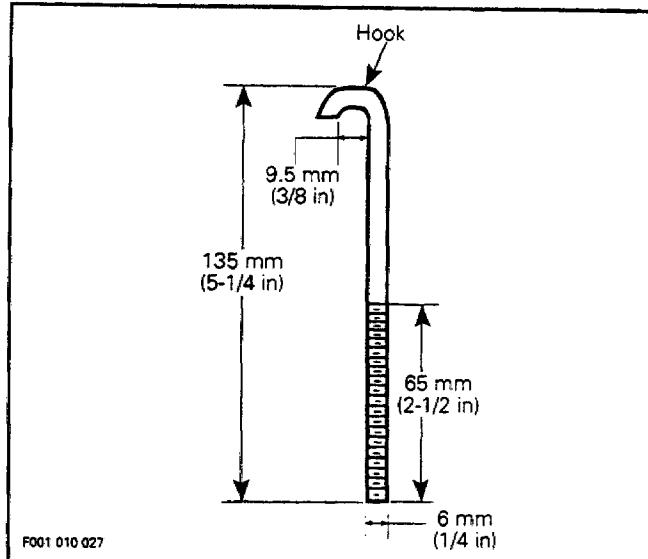
- Dimension 260 mm (10-1/4 in) must be respected on both side.
- Steel angles A and B and hole center of bushing must be parallel.
- Weld bushing on steel angle C and drill steel angle.

Section 09 STEERING SYSTEM

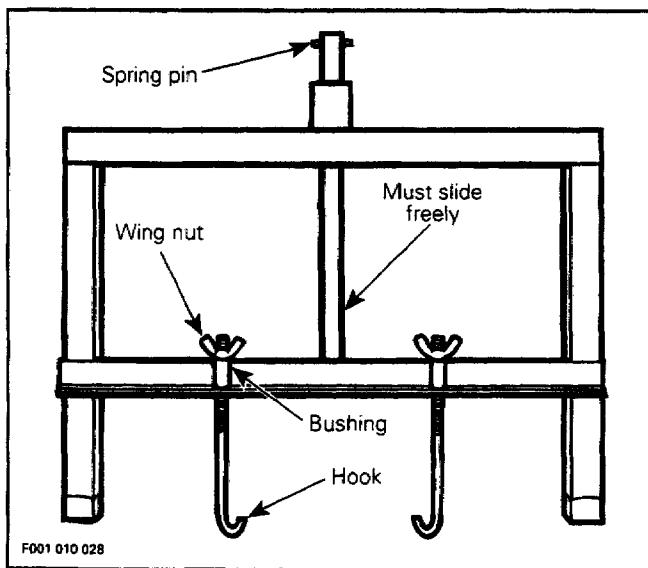
Sub-Section 01 (STEERING SYSTEM)



Heat the unthreaded end of the 6 mm (1/4 in) rod and bend it as per following illustration.



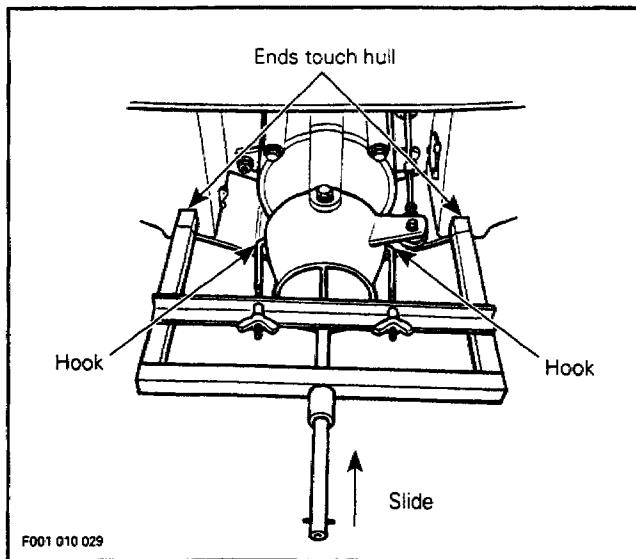
Assemble tool as per illustration.



Hook tool on jet pump nozzle and slide it until both ends touch hull.

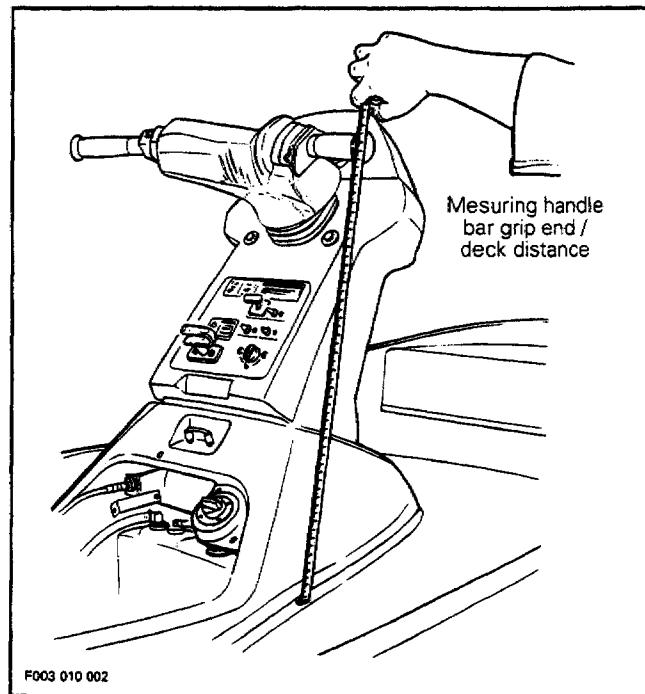
Section 09 STEERING SYSTEM

Sub-Section 01 (STEERING SYSTEM)

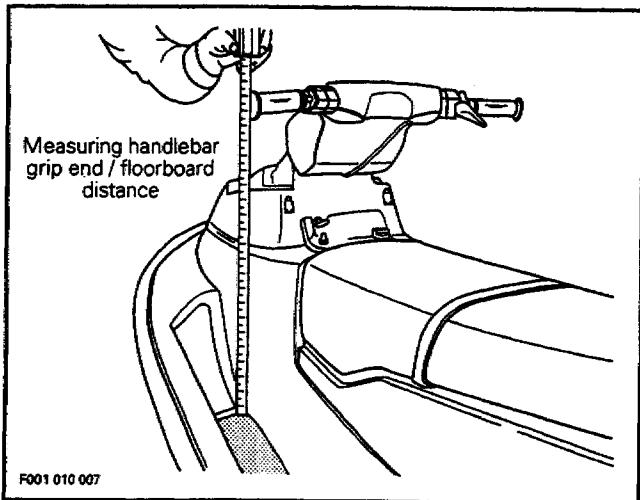


F001 010 029

Verify handlebar position by measuring each side the distance from handlebar grip end to floorboard. They have to be equal.



F003 010 002

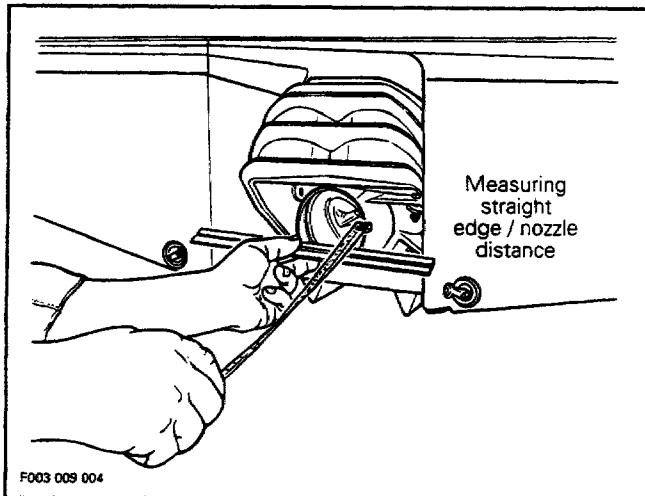


F001 010 007

Explorer Model Only

Position handlebar in straight ahead position by measuring each side the distance from handlebar grip end to deck.

Check jet pump nozzle position by placing a straight edge on hull rear section. The distance from straight edge to either side of nozzle must be the same.

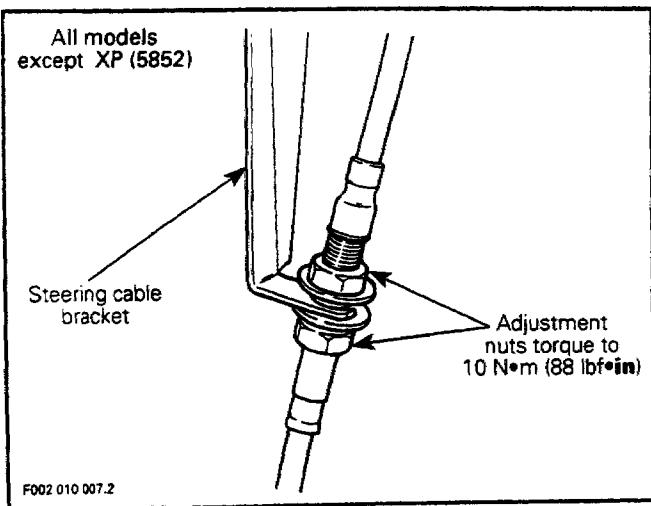


F003 009 004

Steering alignment adjustment should be performed on outer cable adjustment nuts on steering cable bracket near steering stem.

Section 09 STEERING SYSTEM

Sub-Section 01 (STEERING SYSTEM)

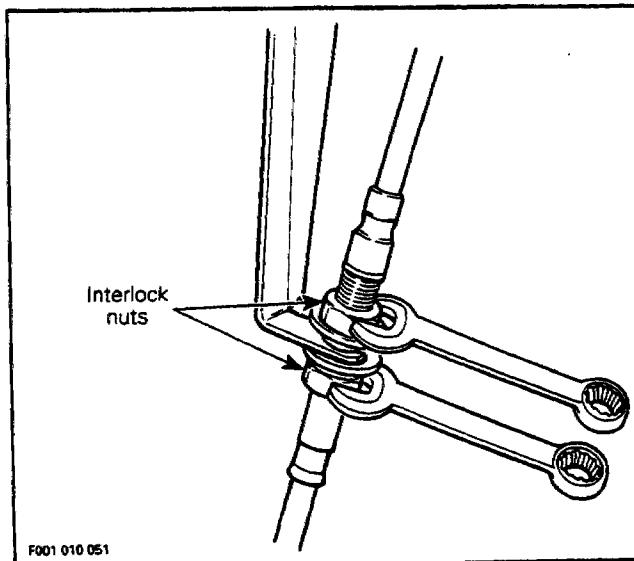


Remove alignment tool and verify the following before tightening nuts or screws.

Adjust nut(s) so that nozzle pivots from side to side but does not contact venturi housing on either side. To verify, insert a paper sheet or a feeler gauge 0.13 mm (.005 in) between nozzle and venturi.

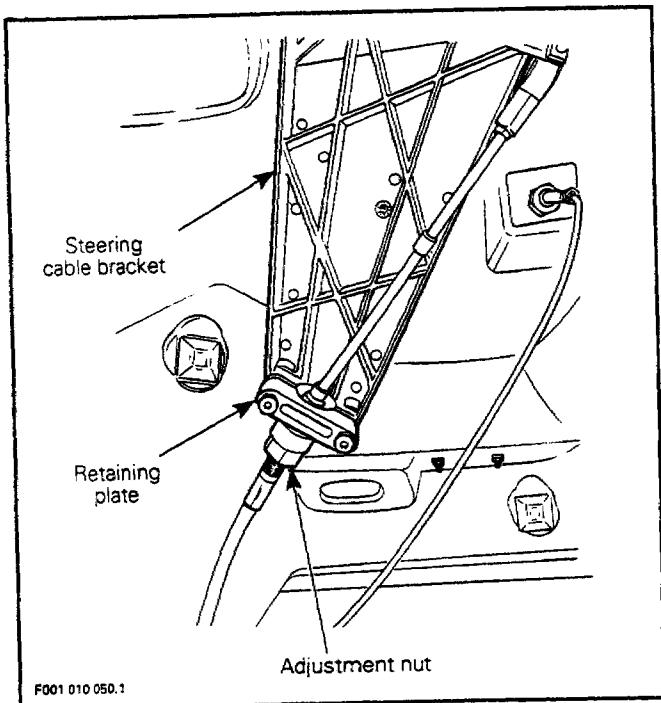
After adjustment, properly tighten nuts.

Ensure to interlock nuts prior to torque to 10 N•m (88 lbf•in) using a crowfoot wrench such as Snap-on FRH 220S.



NOTE : On XP model (5852) steering alignment adjustment should be performed with adjustment nut on steering cable.

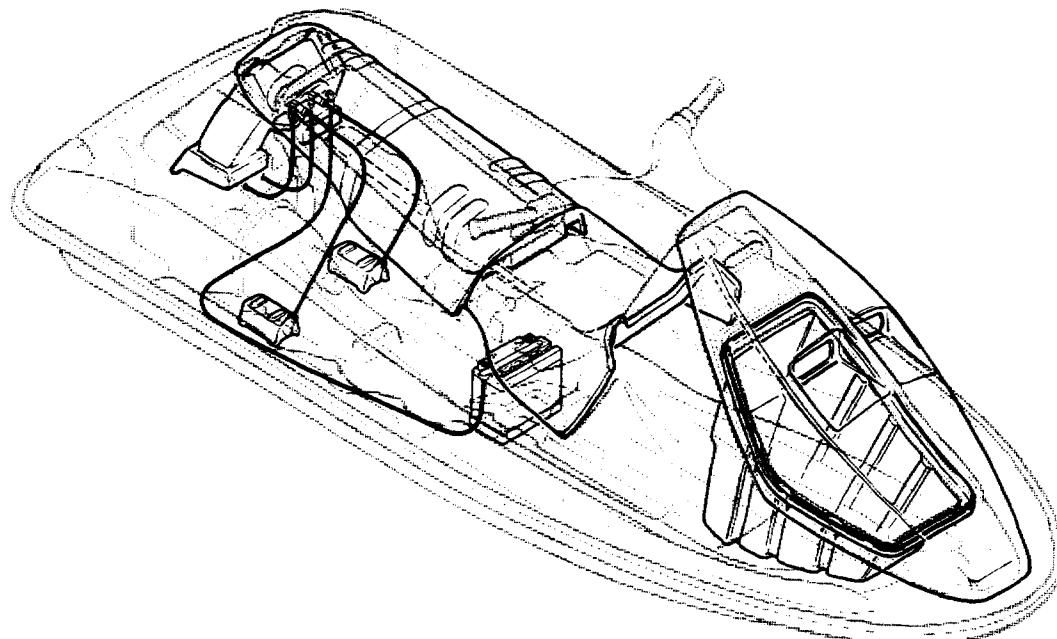
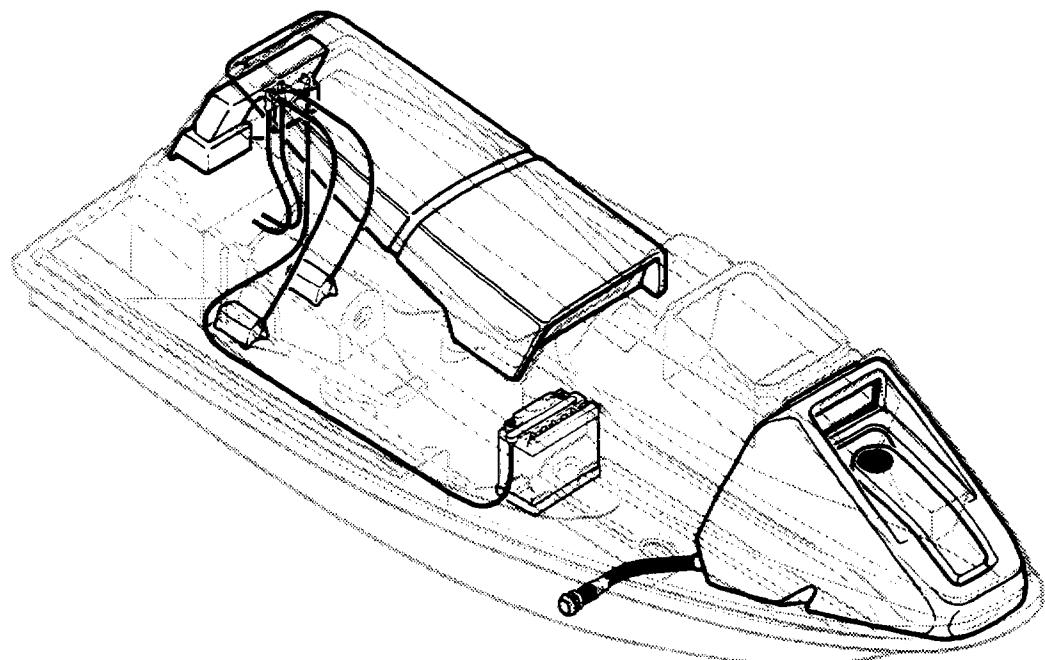
Loosen retaining plate screws and rotate adjustment nut accordingly.



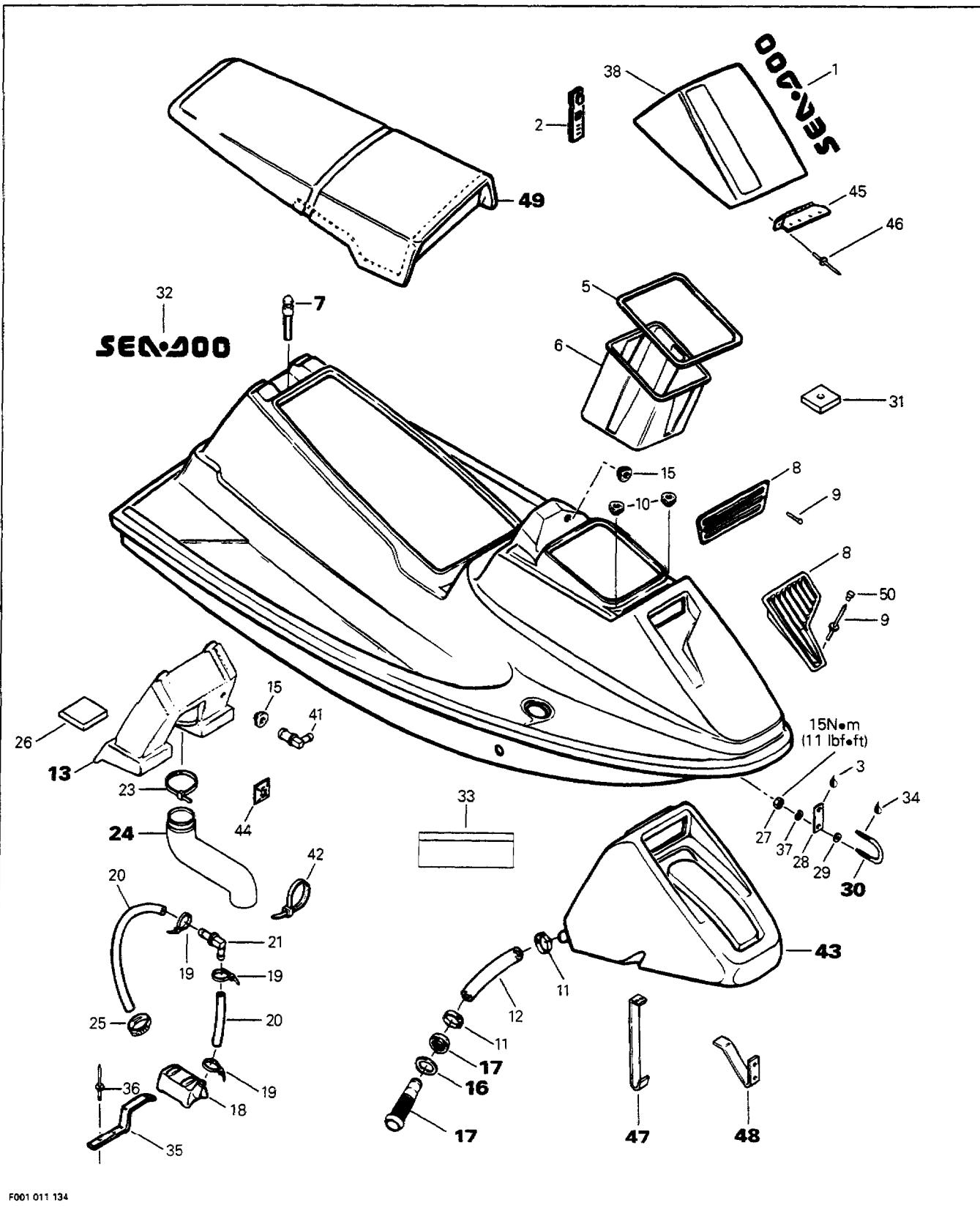
For XP (5852) model torque retaining plate screws to 6 N•m (53 lbf•in).

WARNING : Ensure handlebar and jet pump nozzle operate freely from side to side and that jet pump nozzle does not contact the side of venturi housing.

HULL / BODY



HULL/BODY



Section 10 HULL / BODY

Sub-Section 01 (HULL / BODY)

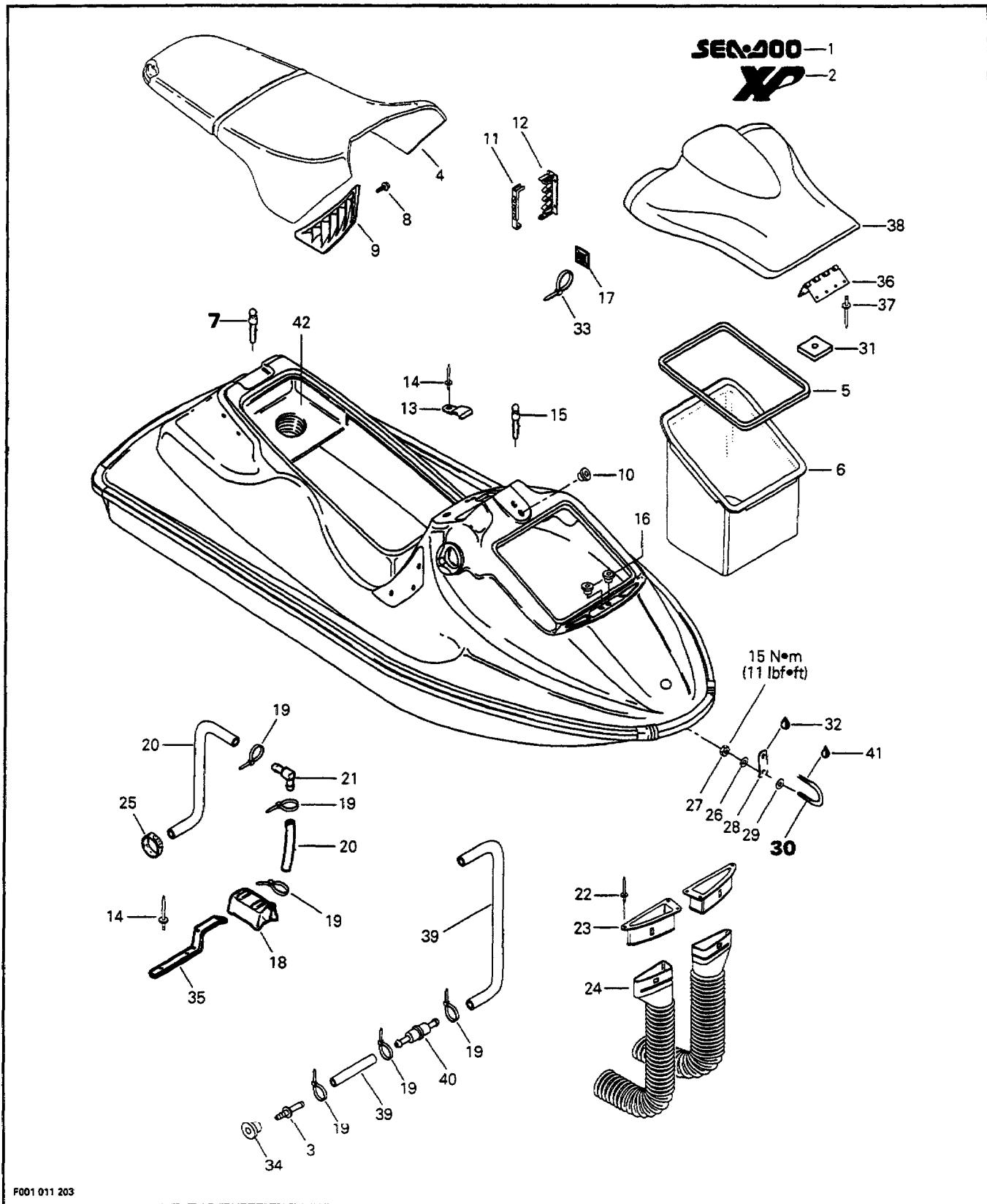
COMPONENTS

- 1. "Sea-Doo" sticker
- 2. Latch (2)
- 3. Silicone 732 RTV
- 5. Seal
- 6. Storage basket
- 7. Lock pin
- 8. Grill
- 9. Rivet (2)
- 10. Grommet
- 11. Clamp (4)
- 12. Hose
- 13. Rear baffle
- 15. Grommet
- 16. Gasket (2)
- 17. Fitting (2)
- 18. Bailer pick-up (2)
- 19. Tie rap
- 20. Hose
- 21. Elbow fitting 90°
- 23. Tie rap (2)
- 24. Rear vent hose
- 25. Gear clamp (2)
- 26. Floater (2)
- 27. Elastic stop nut M8 (2)
- 28. Plate
- 29. Washer M8 (2)
- 30. Tow hook
- 31. Neopren pad
- 32. "Sea-Doo" sticker (2)
- 33. "Fuel" sticker
- 34. Loctite 271
- 35. Spring clip (2)
- 36. Rivet (4)
- 37. Lock washer (2)
- 38. Storage cover
- 41. Elbow fitting 90°
- 42. Tie rap
- 43. Water tank trap
- 44. Tie mount
- 45. Hinge
- 46. Rivet (5)
- 47. Rear bracket (2)
- 48. Front bracket
- 49. Seat
- 50. Cap

 NOTE : Some reference numbers are deliberately missing.

Section 10 HULL / BODY
Sub-Section 01 (HULL / BODY)

HULL / BODY XP (5852) MODEL



Section 10 HULL / BODY

Sub-Section 01 (HULL / BODY)

COMPONENTS

1. "Sea-Doo" sticker	22. Rivet
2. "XP" sticker	23. Vent adaptor (2)
3. Straight fitting	24. Vent tube (2)
4. Seat	25. Tridon clamp
5. Seal	26. Lock washer M8 (2)
6. Storage basket	27. Elastic stop nut M8 (2)
7. Lock pin	28. Plate
8. Screw (2)	29. Washer M8 (2)
9. Intake grill (2)	30. Tow hook
10. Grommet	31. Neoprene pad
11. Tie-block clip	32. Silicone "732 RTV"
12. Tie-block	33. Tie rap
13. Cable clip	34. Grommet
14. Rivet	35. Spring clip (2)
15. Lock pin	36. Hinge
16. Grommet (2)	37. Rivet
17. Tie mount	38. Storage cover
18. Bailer pick-up (2)	39. Vent hose 6 mm
19. Tie rap	40. Water eliminator valve
20. Hose 8 mm	41. Loctite 271
21. Elbow fitting 90° (2)	42. Air vent tube support

GENERAL

In the situation when the water tank trap could possibly move from its position, the following procedures can be performed without removing jet pump unit ass'y and engine from watercraft. However if water tank trap is broken these assemblies will have to be removed from watercraft.

REMOVAL

30,43, Tow Hook and Water Tank Trap

Drill storage cover rivets and remove cover.

Remove fuel tank from watercraft and pull water tank trap from its position.

WARNING : The fuel valve must be set to OFF. Remove fuel cap slowly. Fuel may be under pressure and might spray out when removing cap. Fuel is flammable and explosive under certain conditions. Always work in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity. Always wipe off any fuel spillage from the watercraft.

Remove tow hook nuts.

NOTE : From this point if water tank trap is broken the jet pump unit and engine removal will be required. Withdraw jet pump unit ass'y, refer to PROPULSION AND DRIVE SYSTEMS 08-01 then look for removal.

Withdraw engine, refer to ENGINE 03-02 then look for removal.

16,17, Gasket and Fitting

This procedure can be used to repair the water tank trap fittings.

Remove the air intake grill then remove gear clamp holding drain hose to fitting.

Remove fitting from water tank.

13,24, Rear Baffle and Vent Hose

Remove air silencer, exhaust formed hose, rear vent hose and then the rear baffle.

NOTE : Verify if glue remains on rear baffle, if none install a new baffle.

CAUTION : Verify if glue remaining on rear baffle comes off easily. If it does install a new baffle. If not install the same baffle. Disregarding the installation of a new baffle when required will result into the same situation shortly.

CLEANING

Clean glue left on water tank trap, rear baffle (if applicable) and body surfaces.

NOTE : It is not necessary to remove all the glue but it is important to have smooth surfaces in order to get a good adherence.

INSTALLATION

Installation is essentially the reverse procedures. However pay particular attention to the following.

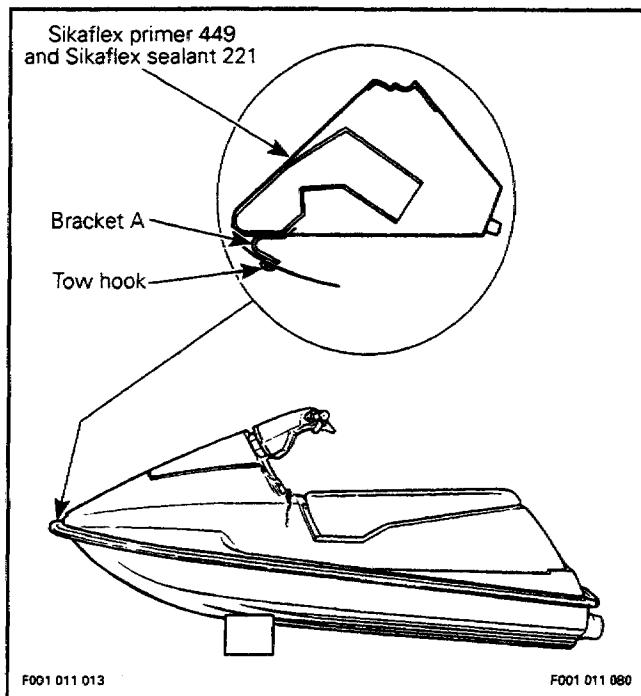
30,43,47,48, Tow Hook, Water Tank Trap, Rear Bracket and Front Bracket

Install bracket A (P / N 291 000 214) on tow hook and apply Loctite 271 (P / N 293 800 005) on treads then reinstall nuts.

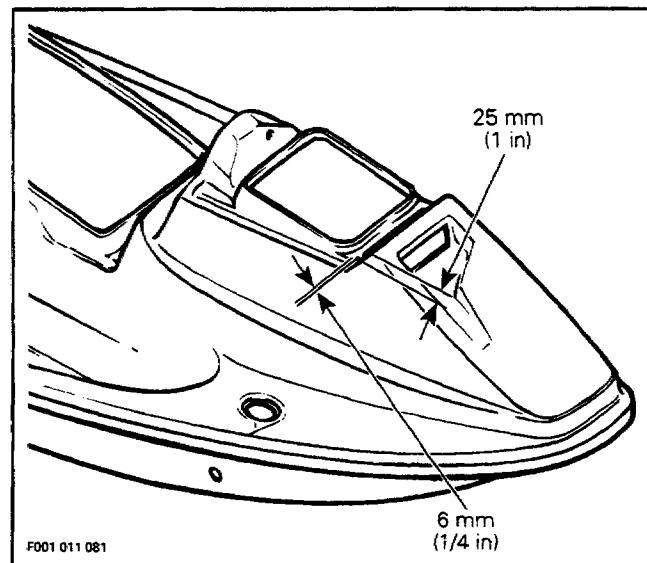
Apply Sikaflex primer 449 (P / N 293 530 012) on water tank trap and body surfaces.

CAUTION : Allow at least 30 minutes for primer to cure.

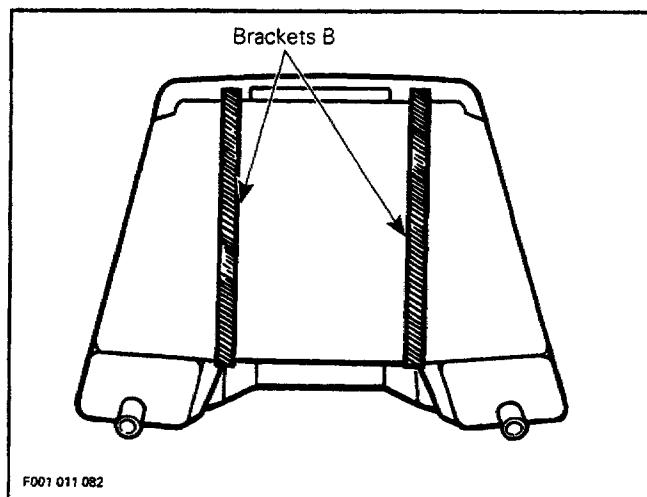
Apply Sikaflex sealant 221 (P / N 293 530 011) on water tank trap and slide it back to its position.



Drill a 5mm (3/16 in) hole each side storage cover hinge position as illustrated.



Install brackets B (P / N 291 000 213) to support the rear section of tank and secure them with M5 stainless screws (P / N 210 000 009) and lock nuts (P / N 212 000 004).



Install fuel tank and storage cover.

To install engine, refer to ENGINE 03-02 then look for installation.

Install jet pump unit ass'y, refer to PROPULSION AND DRIVE SYSTEMS 08-01 then look for installation.

Verify tightness of all fuel lines and clamps and pressurize fuel system. For pressurization procedure refer to FUEL SYSTEM 05-03.

Section 10 HULL / BODY

Sub-Section 01 (HULL / BODY)

◆ WARNING : If any leak is found do not start the engine and correct the leak. Failure to correct a leak could lead to an explosion. If any fuel spillage and / or leak had occurred the bilge should be cleaned with hot water and detergent or bilge cleaner to remove fuel deposits.

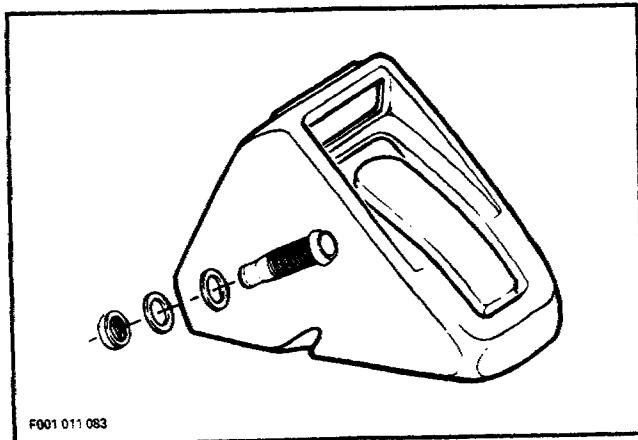
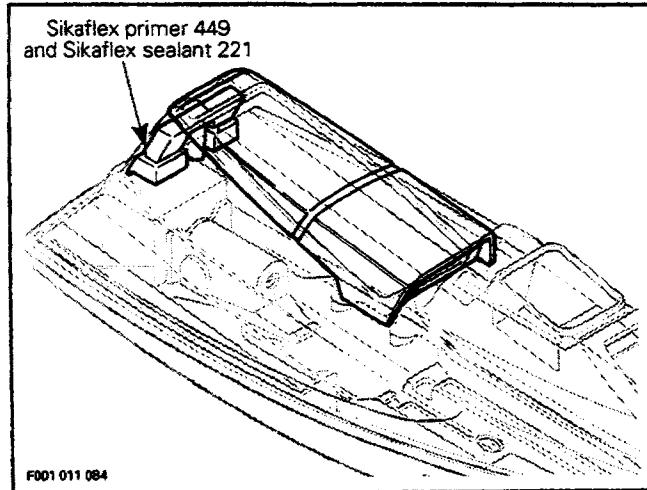
Before using watercraft wait three days for Sikaflex curing time.

16,17, Gasket and Fitting

Slide gasket on fitting. Install through air intake hole the fitting in water tank trap.

Install on the outside of tank a second gasket on the fitting, install the nut and then tighten until the gaskets are compressed.

Install drain hose on the fitting and tighten with gear clamp.



13,24, Rear Baffle and Vent Hose

Apply Sikaflex primer 449 (P / N 293 530 012) on rear baffle and body sections to be sealed.

▼ CAUTION : Allow at least 30 minutes for primer to cure.

Apply Sikaflex sealant 221 (P / N 293 530 011) on rear baffle section to be sealed.

Install rear baffle on body, align properly rear inlet grill openings and hold in position with a light pressure. Reinstall rear vent hose, exhaust formed hose and air silencer.

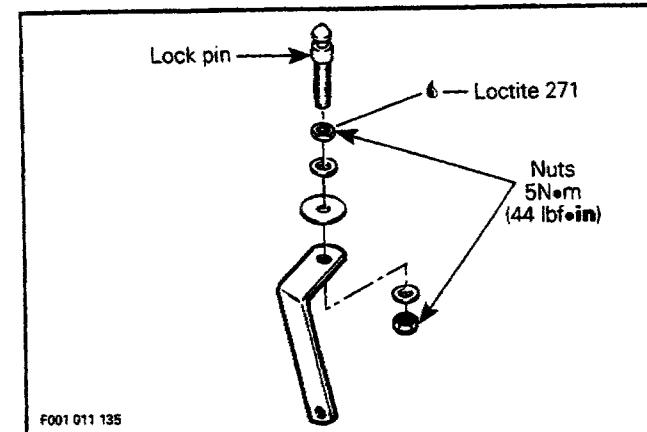
Before using the watercraft wait three days for Sikaflex curing time.

7,49, Lock Pin and Seat

Adjust front and rear hooks so that when seat is latched, seal is compressed to insure a water-tight fit.

To adjust rear hook untighten lock pin nuts.

Thread in or out lock pin as needed.



Install seat and verify if seal is compressed.

Remove seat.

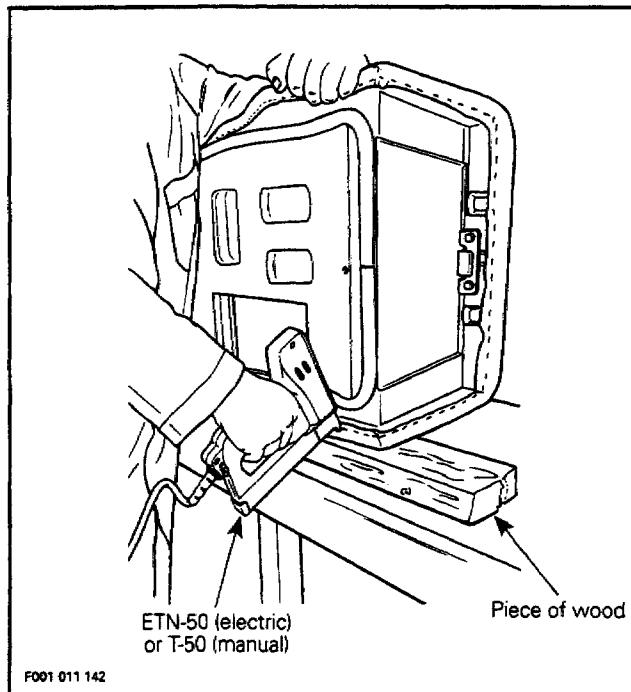
Torque nuts to 5 N·m (44 lbf·in).

Seat Cover

Install staples with an electric tacker such as Arrow tacker no. ETN-50 or with a manual tacker such as Arrow tacker no. T-50.

NOTE : For an easier installation it's highly recommended to use an electric tacker.

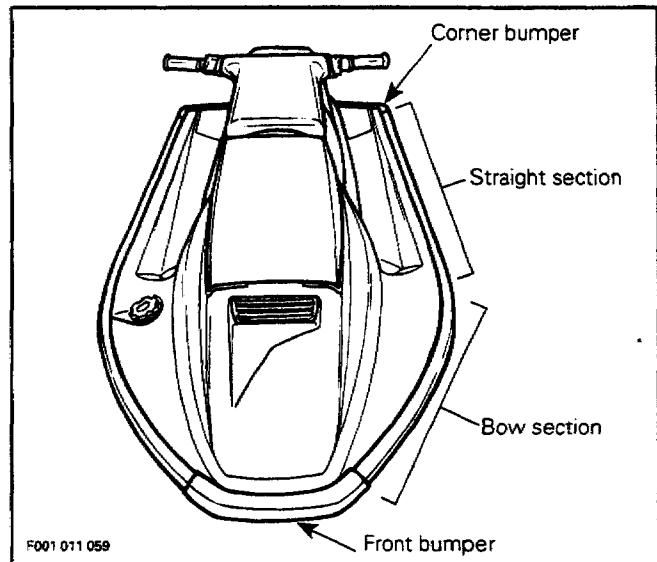
Ensure that the seat rest firmly against a hard surface such as a piece of wood. This is done to get the staples completely pushed in place.



After cover installation cut all around the excess of material.

Bumper

- 1 - Remove trim from side bumper rail.
- 2 - Drill pop rivets to remove side bumper rail.
- 3 - Mark hole positions on body straight and bow sections.



- 4 - Slide bumper rail under front bumper.
- 5 - Using a 4.80 mm (3/16 in) drill bit, drill first hole through bumper rail at front of bow section. Use locating mark as a guide. Then install a rivet.

CAUTION : When drilling, be careful not to damage bumper rail and / or hull.

- 6 - Position bumper rail properly onto body and cut excess length if necessary.
- 7 - Slide bumper rail in corner bumper.
- 8 - Using hole positions previously marked on body, drill holes in bumper rail and install rivets.
- 9 - Install trim using soapy water.
- 10 - Repeat procedure for the other side.

Section 10 HULL / BODY

Sub-Section 01 (HULL / BODY)

Hull and Body Repair

Body is made of fiberglass. Hull is made of fiberglass featuring aluminum inserts to allow strong structural attachment points.

Fiberglass finish is made of Gelcoat layer which gives its color and smooth finish.

Fiberglass repair kit is available through automotive or marine suppliers.

Gelcoat repair kits are available through regular channel.

Gelcote® kit (small repair) : P / N 295 500 100.

Gelcote paste (white, 300 mL (10 oz)) : P / N 293 500 016. This paste is included in kit P / N 295 500 100 but can be ordered separately.

Liquid Gelcote, (1 liter) : white : P / N 293 500 033
 mauve : P / N 293 500 034
 grey : P / N 293 500 035
 light grey : P / N 293 500 037
 green : P / N 293 500 038
 turquoise : P / N 293 500 039

How to use gelcote kit for small repair :

Clean damaged area free of wax, dirt, grease etc.

Enough paste should be mixed to make all repairs. Mix approximately 1 part pigment to 20 parts paste.

Place enough of the already matched pigmented paste on a piece of wood or cardboard. Mix four drops of hardener in 1 teaspoon of paste, mix thoroughly. This will give approximately 15 minutes of working time at 70°F or 21°C.

Apply mix to damaged area, working it into the area with a wooden or plastic spatula, squeeze off excess paste to the contour of the surrounding area. Care should be taken not to have excess paste on surrounding undamaged surface.

For higher gloss and greater smoothness, the repair should be covered with a piece of clear plastic release film and let to cure.

After approximately 2 hours remove the plastic film. Deep damage may require several applications. For a quality repair job you can sand repair area with 600 Grit Wet sand paper, then buff with a fine rubbing compound and wax.

How to use liquid gelcote (1 liter) for large repair :

Clean damaged area making sure it is free of any dirt, grease etc.

Before spraying, all fiberglass surface repairs should be done with Bombardier Small Repair Gelcote (P / N 293 500 016 or 295 500 100) to mask cracks.

Mixing of spray Gelcote :

Mix four drops of catalyst per teaspoon of Gelcote. This will allow you 15 minutes of working time at 21°C (70°F).

To mix one liter of Gelcote, 14 mL (1/2 oz) to 21 mL (3/4 oz) of catalyst is required.

Adding too much catalyst may change Gelcote color.

Spray the work area with the mix.

To ease spraying add acetone (10 % is sufficient) to the mix.

Allow to cure completely overnight.

Hand sand using a 400 - 600 grit wet paper.

Finish the repair area by rubbing or buffing with a fine rubbing compound. When using a power buffer, be sure not to cut through surface and do not keep buffer on the same area for a prolonged time, this prevents heat build-up and discoloration.

PAINTING

 **NOTE :** When using gelcoat it is not necessary to paint over it.

The following was prepared in conjunction with PPG Industries Inc. It contains a list of SEA-DOO parts with their respective PPG color codes and two painting procedures, CONCEPT™ the most commonly used and DELTA™ (with low VOC) mainly used in California.

PPG Industries Inc. sells paint and related products and these are **not** available through Bombardier Inc. network. To find your nearest PPG dealer dial one of the following numbers.

NORTH AMERICA	PACIFIC RIM
CANADA Phone : 1-800-363-2816	JAPAN Phone : 81-3-3280-2851
U.S.A. Phone : (216) 572-6100 (This phone number is also good for all countries. Communications are available in english, french and spanish)	KOREA Phone : 82-32-529-8141 82-32-523-8600 82-51-624-8221 82-2-792-2477
EUROPE	
DENMARK Phone : 45-31-54-9211	PORTUGAL Phone : 351-230-17-43
FRANCE Phone : 33-1-48-35-7777 33-27-14-9700 33-27-14-4600	SPAIN Phone : 34-3-588-2000 34-3-711-51-54 34-6-154-7035 34-83-54-0400 / 04
GERMANY Phone : 49-202-788-1	SWEDEN Phone : 46-479-14-445
ITALY Phone : 39-81-831-1222 39-2-37-701 39-131-7701	UNITED KINGDOM Phone : 44-21-455-9866 44-926-410-255

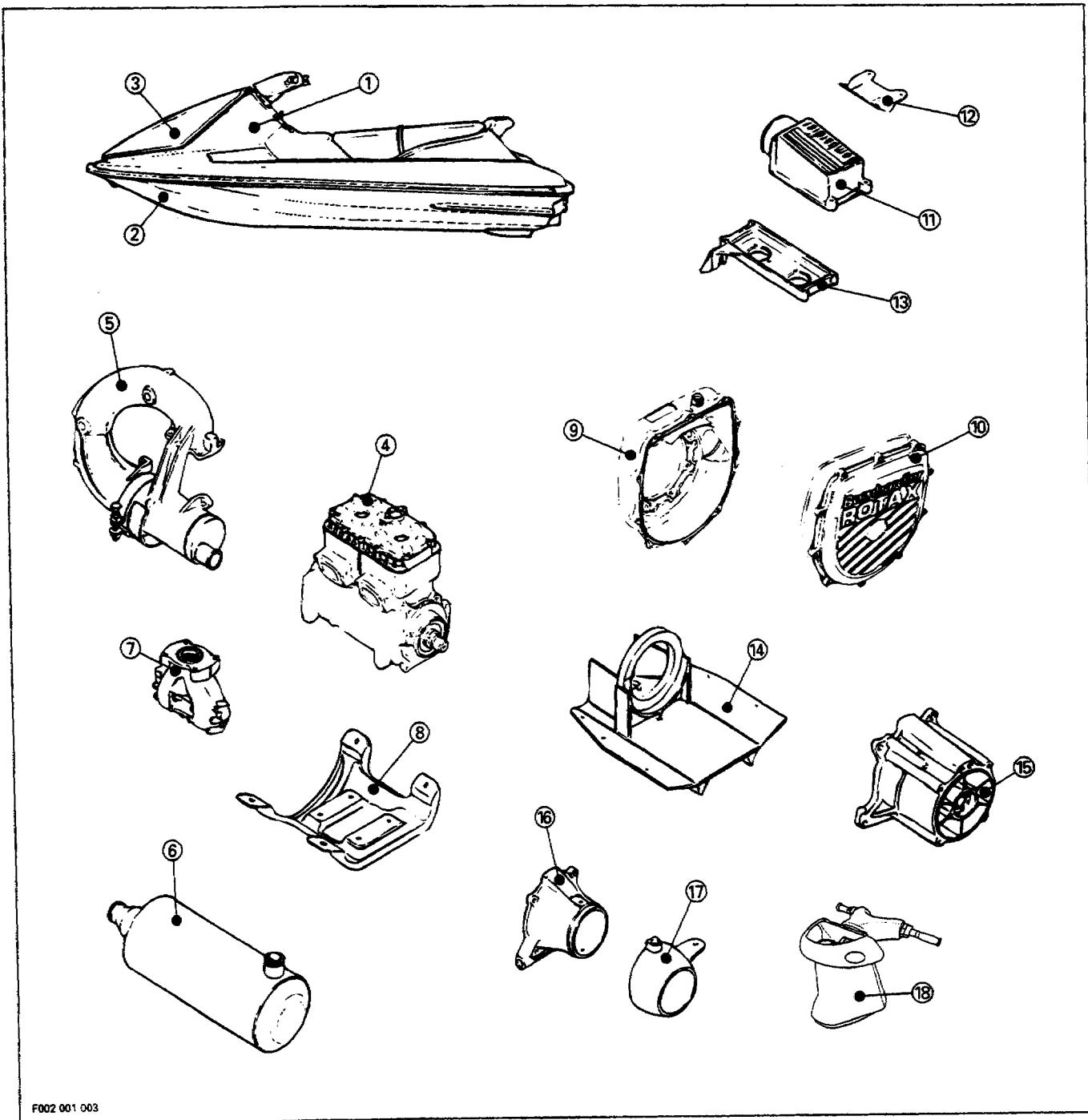
PPG paint for Sea-Doo is not available in spray can. For best result it must be applied by a professional painter.

For fast touch up on **metallic** parts only refer to the appropriate Bombardier *Sea-Doo parts catalog*, it contains a few spray can part numbers.

Section 10 HULL / BODY

Sub-Section 01 (HULL / BODY)

PARTS THAT CAN BE PAINTED



F002 001 003

- 1. Body
- 2. Hull
- 3. Storage cover
- 4. Engine
- 5. Tuned pipe
- 6. Muffler
- 7. Exhaust manifold
- 8. Engine support
- 9. Ignition housing

- 10. Ignition housing cover
- 11. Flame arrester cover
- 12. Flame arrester support
- 13. Flame arrester base
- 14. Ride shoe
- 15. Impeller housing
- 16. Venturi
- 17. Steering nozzle
- 18. Console

Section 10 HULL / BODY
Sub-Section 01 (HULL / BODY)

**PPG COLOR
CHART**

		SEA-DOO MODELS					
		SP (5806) SPI (5808)	SPX (5807)	XP (5852)	GTS (5813)	GTX (5861)	EXPLORER (5820)
1. Body	COLOR PPG no.	White 98223	White 98223	White 98223	White 98223	White 98223	White 98223
2. Hull	COLOR PPG no.	Light Grey 38287	Med. Blue 19518	Light Green 49580	White 98223	White 98223	White 98223
3. Storage cover	COLOR PPG no.	Not applicable	Not applicable	Not applicable	Lavender 59974	Magenta 59973	White 98223
4. Engine	COLOR PPG no.	White 98209	White 98209	White 98209	White 98209	White 98209	White 98209
5. Tuned pipe	COLOR PPG no.	Grey 38269	Grey 38269	Purple 59962	Grey 38269	Purple 59962	Grey 38269
6. Muffler	COLOR PPG no.	Grey 38269	Grey 38269	Purple 59962	Grey 38269	Purple 59962	Grey 38269
7. Exhaust manifold	COLOR PPG no.	White 98209	White 98209	White 98209	White 98209	White 98209	White 98209
8. Engine support	COLOR PPG no.	Black 9551	Black 9551	Black 9551	Black 9551	Black 9551	Black 9551
9. Ignition housing	COLOR PPG no.	White 98209	White 98209	White 98209	White 98209	White 98209	White 98209
10. Ignition housing cover	COLOR PPG no.	White 98209	White 98209	White 98209	White 98209	White 98209	White 98209
11. Flame arrestor cover	COLOR PPG no.	Grey 38269	Grey 38269	Not applicable	Grey 38269	Purple 59962	Grey 38269
12. Flame arrestor support	COLOR PPG no.	Grey 38269	Grey 38269	White 98209	Grey 38269	Purple 59962	Grey 38269
13. Flame arrestor base	COLOR PPG no.	Grey 38269	Grey 38269	Purple 59962	Grey 38269	Purple 59962	Grey 38269
14. Ride shoe	COLOR PPG no.	Black 9551	Black 9551	Black 9551	Black 9551	Black 9551	Black 9551
15. Impeller housing	COLOR PPG no.	Black 9551	Black 9551	Black 9551	Black 9551	Black 9551	Black 9551
16. Venturi	COLOR PPG no.	Black 9551	Black 9551	Black 9551	Black 9551	Black 9551	Black 9551
17. Steering nozzle	COLOR PPG no.	Black 9551	Black 9551	Black 9551	Black 9551	Black 9551	Black 9551
18. Console	COLOR PPG no.	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	White 98223

 NOTE : Due to natural discoloration it may be necessary to completely repaint the part.

Section 10 HULL / BODY

Sub-Section 01 (HULL / BODY)

CONCEPT™ PAINTING PROCEDURE

For additional information refer to *PPG P-Bulletin* no. 168.

SURFACE PREPARATION

Prepare and clean surface consistent with good painting practices.

Primer

DP Epoxy Primer / DP 401 Catalyst ; DX 1791 / 1792 (Prime before topcoating).

Primer Surfacer

K36 / K201, K200 / K201 or DZ KONDAR® Primer Surfacers.

 **NOTE :** KONDAR must be sealed before applying CONCEPT color.

Sealer

KTS30 2K Sealer, DP Epoxy Primer reduced as a sealer or DAS 1980 or DAS 1987.

Direct Gloss Color

How to Mix

Standard Air Dry : Mix CONCEPT Color 2:1:1 - two parts color with one part DT Reducer best suited to shop temperatures and one part DU 4 (below 85°F (29°C)) or DU 5 (above 85°F (29°C)) Hardener.

Standard Force Dry : Mix CONCEPT Color 2:1:1 - Application temperatures below 85°F (29°C) use DU 5 Hardener, above 85°F (29°C) use DU 6.

Medium Solids (MS) Application : For faster film build, when using solid colors, mix two parts CONCEPT color with half part DT Reducer and one part DU 5 or DU 6 Hardener. Select the DT Reducer appropriate for shop temperature.

Pot Life

Pot life of ready-to-spray CONCEPT color is six to eight hours at 70°F (21°C). Medium solids option is two to four hours at 70°F (21°C).

FULL PANEL AND OVERALL REPAIRS

Application

Apply one medium wet coat and give 5-10 minutes flash, followed by two wet coats with 15 minutes flash time between each coat. Adjust metallic on the last full wet coat. If necessary, apply a mist coat. For medium solids option apply two full wet coats.

Air Pressure

40-50 lbs. at-the-gun.

Dry Time

- Dust free : 30 minutes.
- Tack free : two to three hours.
- Tape print free : six hours.
- Dry to handle : six to eight hours at 70°F (21°C.).
- Force dry : 40 minutes at 140°F (60°C).

Faster dry times may be obtained by using 1/2 oz (15 mL) of DXR 81 Accelerator per sprayable quart, however, the pot life is reduced to two hours.

SPOT / PANEL REPAIRS

Application

Spray medium wet coat of color on the repair area and allow 5-10 minutes flash time. Apply two additional full coats until hiding is achieved, extending each coat beyond the previous coat. Flash 15 minutes between each coat. For medium solids option apply two full wet coats.

Blending

Add DT 95 Reducer to a second gun cup. Reduce the fluid feed of the gun and lower the air pressure to 30 PSI. Dust the dry edge until a slight wet look appears, then stop. Or mix reduced and catalyzed color with equal parts of reduced and catalyzed CONCEPT DCU 2020 Clear.

DELTA™ PAINTING PROCEDURE (with low VOC, mainly in California)

For additional information refer to *PPG P-Bulletin* no. 157.

SURFACE PREPARATION

Primer : DELTA™ PRIME DPU 166.

DELTA™ 2800, COLOR

How to Mix

Mix DELTA™ 2800 2:1, two parts Colors to one DU 6 Catalyst.

Application

Apply two coats of DELTA™ Polyurethane Color. Apply the first coat at 1.5 -1.8 wet mils. Allow a minimum of 15 minutes flash time prior application of the second coat. Apply a second coat of DELTA™ using the same technique as the first application, paying strict attention to gun set up and proper equipment choices.

RECOMMENDED SPRAY EQUIPMENT

Gun Manufacturer	DeVilbiss	Binks	Graco	HVLP
Gun Model	JGA	62	800N	Can Am Model 900
Fluid Tip Size	FF (0.055) 1.4 mm	63D (0.059) 1.5 mm	02N (0.047) 1.2 mm	HT #9072 (0.098) 2.5 mm
Air Cap	797 / 264	63PW	02 / 03	C9062
Gun Distance	10"-12"	10"-12"	10"-12"	10"-12"
Fluid Delivery oz. / min.	8-12	8-12	8-12	8-12
Air Pressure (At-the-Gun)	60-75#	60-75#	60-75#	9#

Dry Time (at 70°F (21°C))

- Dust free : 25-35 minutes.
- Tack free : Two and a half - three hours.
- Tape / Sand : Overnight.

Force Dry

Allow 20 minutes purge time at 80-90°F (27-32°C) before bake. Bake 75 minutes at 150°F (65°C) or 40 minutes at 180°F (82°C). Allow to cool after force dry, before sanding or taping.

Section 10 HULL / BODY

Sub-Section 01 (HULL / BODY)

DECALS

Removal

Using a heat gun warm up one end of decal for a few seconds until decal can roll off when rubbing with your finger.

Pull decal slowly and when necessary apply more heat to ease removal on the area that has to be peeled off.

To know when decal has enough heat : if decal tears while pulling off it needs to be heated for a few seconds longer. If decal tends to stretch while pulling off stop heating and wait a few seconds to let it cool, then peel off.

Installation

There are two types of decals used on watercraft. One having a protective film on back side and the other one a protective film on both sides. They are used on three types of materials ; plastic, gelcoat and metal.

INSTALLATION OF DECALS HAVING A PROTECTIVE FILM ON BACK SIDE ONLY

These decals usually contain written information (ex : warning) and are used on gelcoat or metal.

Clean surface with a good solvent such as ACRYLICLEAN DX 330 from PPG or equivalent (refer to manufacturer instructions).

Using a pencil and the decal as a template, mark the area where decal will be located.

Remove from decal one half of its back protective film and align decal with marks. Start sticking it from center and remove the other half of the film to stick it completely. Carefully squeegee decal beginning at center and working outward using, firm, short, overlapping strokes.

INSTALLATION OF DECALS HAVING A PROTECTIVE FILM ON BOTH SIDES

These decals usually contain graphics and are used on gelcoat or plastic.

Installation on gelcoat

Clean surface with a good solvent such as ACRYLICLEAN DX 330 from PPG or equivalent (refer to manufacturer instructions).

For best result apply an activator (P / N 293 530 036) to prepare the surface using a clean cloth. After a few seconds, when the activator evaporates, the surface is ready.

Using a pencil and the decal as a template mark the area where decal will be located.

For better adhesion a dry application is recommended, however, to ease decal installation a mild solution of soapy water can be sprayed over surface where decal will be installed.

Remove back protective film from decal and align decal with marks. When well aligned squeegee decal beginning at center and working outward using, firm, short, overlapping strokes.

Remove front protective film once decal has adhered to hull.

Installation on plastic (storage cover)

Clean surface with isopropyl alcohol.

Using a pencil and the decal as a template, mark the area where decal will be located.

Apply an activator (P / N 293 530 036) to prepare the surface using a clean cloth. After a few seconds, when the activator evaporates, the surface is ready.

CAUTION : Do not use soapy water to locate decal on plastic parts.

Remove back protective film from decal and carefully align decal with marks. When well aligned squeegee decal beginning at center and working outward using, firm, short, overlapping strokes.

Remove front protective film once decal has adhered.

REMOVAL

Deflate all tube sections. Remove front and rear retaining plates screws.

Spray soapy water all along hull slots.

Pull and slide tube toward front of watercraft.

▼ CAUTION : Whenever tube is folded, place a shield between lateral bumper and tube. If both parts touches for a certain period of time, permanent stains will remain on tube.

CLEANING

When the watercraft is operated in unclean water and particularly in salt water, tube must be rinsed frequently with fresh water.

Occasionally, wash the tube with warm water and soap (only use mild detergent).

Stubborn stains and scuff marks may be removed using methylethyl ketone, toluene or acetone.

▼ CAUTION : Never clean decals with strong detergent, methyl ethyl ketone, toluene or acetone. Limit application of these solvents on tube joints to avoid glue dilution.

INSTALLATION

Spray soapy water all along tube cordes.

○ NOTE : Tube must be deflated.

Starting with the rear of the tube, insert cordes in hull slot front openings and slide tube slowly toward the rear of the watercraft.

Once in place, secure front and rear retaining plates with screws.

TUBE REPAIR

How to Find Slow Leaks

Confirm with customer which tube section (s) is leaking.

○ NOTE : If customer complains of a general deflation of sections, it is most likely due to temperature variations that affects tube. Always adjust.

Inflate tube section to 21 kPa (3 PSI).

With valve cap removed, spray soapy water on valve. Check for air bubbles.

○ NOTE : If a leak is found, it is recommended to continue testing as the possibility of more than one leak.

If air bubbles are coming out around the valve, retighten valve using pliers.

If plunger is leaking, remove valve after tube inspection. Check for dirt or damage seal. Clean or replace valve as necessary.

Spray soapy water on tube section. Check for air bubbles.

○ NOTE : Half-deflate tube section to ease inspection near hull. Wash dirt accumulation.

Tears Repair of Less than 5 cm (2 in)

For best results, repairs should be performed at temperatures ranging from 18° to 25° C (64° F to 77° F). Avoid carrying out repairs in direct sunlight, rain or in high humidity conditions.

○ NOTE : Any major repair (rear bumper replacement, cord replacement, etc) must be performed only at the factory.

Deflate completely tube section to be repaired.

Cut a patch about 3 cm (1 in) larger than the tear all around. Always round corners.

Using only a pencil, trace on tube the patch position.

▼ CAUTION : Do not use pen or felt-tip pen as ink will permanently mark tube.

Sand thoroughly tube area with a 80 grit sandpaper.

○ NOTE : Protect surface in vicinity with masking tape.

○ NOTE : Supplied materials included in repair kit don't need to be sanded.

Remove masking tape.

Clean the patch and tube areas with a solvent such as methyl ethyl ketone, toluene or acetone. Allow solvent to completely evaporate.

Apply a thin layer of adhesive (included in repair kit or use Bostik 2402-A with hardener 2402-B) to the patch and tube. Allow adhesive to dry so that it is dry to the touch.

○ NOTE : Mix Bostik glue and hardener as per instruction on its package. Apply a second thin layer of adhesive on both parts.

Allow the second coat to dry until tacky to the touch; then, position the patch.

Smooth out the patch using a spoon-shaped tool beginning at center and working outward to remove all excess glue and air bubbles.

Allow 24 hours to dry before inflating.

Clean any glue excess.

Section 10 HULL / BODY

Sub-Section 02 (INFLATABLE TUBE)

Tears Repair of More than 5 cm (2 in)

For best results, repairs should be performed at temperatures ranging from 18° to 25° C (64° F to 77° F). Avoid carrying out repairs in direct sunlight, rain or in high humidity conditions.

NOTE : Any major repair (rear bumper replacement, cord replacement, etc) must be performed only at the factory.

Deflate completely tube section to be repaired.

Cut two patches about 3 cm (1 in) larger than the tear all around. Always round corners.

Using only a pencil, trace the patch position on tube.

CAUTION : Do not use pen or felt-tip pen as ink will permanently mark tube.

Sand thoroughly tube areas (inner and outer) with a 80 grit sandpaper.

NOTE : Protect the outer surface in vicinity with masking tape.

NOTE : Supplied materials included in repair kit don't need to be sanded.

Remove masking tape.

Clean the patch and tube areas with a solvent such as methylethyl ketone, toluene or acetone. Allow solvent to completely evaporate.

Apply a thin layer of adhesive (included in repair kit or use Bostik 2402-A with hardener 2402-B) to one patch and to inner section tube. Allow adhesive to dry so that it is dry to the touch.

NOTE : Mix Bostik glue and hardener as per instruction on its package. Apply a second thin layer of adhesive on both parts.

Allow the second coat to dry until tacky to the touch; then, position the patch.

NOTE : To ease patch installation, roll it tightly and insert it through the tube tear.

Smooth out the patch using a spoon-shaped tool beginning at center and working outward to remove all excess glue and air bubbles.

Repeat the same bonding procedure for the outer patch.

Allow 24 hours to dry before inflating.

Clean any glue excess.

Grab Handle Replacement

To replace a broken handle, proceed as follows :

Set tube section pressure to 14 kPa (2PSI). Using a heat gun, remove handle.

Clean tube surface with a solvent such as methylethyl ketone, toluene or acetone.

Sand thoroughly tube area and the new handle with a 80 grit sandpaper.

NOTE : Protect tube surface in vicinity with masking tape.

Remove masking tape.

Clean the handle and tube areas with a solvent such as methylethyl ketone, toluene or acetone. Allow solvent to completely evaporate.

Apply a thin layer of adhesive (included in repair kit or use Bostik 2402-A with hardener 2402-B) to the handle and tube. Allow adhesive to dry so that it is dry to the touch.

NOTE : Mix Bostik glue and hardener as per instruction on its package. Apply a second thin layer of adhesive on both parts.

Allow the second coat to dry until tacky to the touch; then, position the handle.

Smooth out the handle using a spoon-shaped tool beginning at center and working outward to remove all excess glue and air bubbles.

Allow 24 hours to dry.

Clean any glue excess.

Lateral Bumper Bonding

If part of the lateral bumper needs to be bonded, proceed as follows :

Set tube section pressure to 14 kPa (2PSI).

Clean tube and bumper surfaces with a solvent such as methylethyl ketone, toluene or acetone.

Sand thoroughly tube area with a 80 grit sandpaper.

NOTE : Protect tube surface in vicinity with masking tape.

Remove masking tape.

Clean tube area with solvent. Allow solvent to completely evaporate.

Apply a thin layer of adhesive (use Bostik no. 7127 or a PVC plastic glue) to the bumper and tube.

Allow adhesive to dry so that it is dry to the touch.

Apply a second thin layer of adhesive on both parts.

Allow the second coat to dry until tacky to the touch; then, install the lateral bumper.

Allow 24 hours to dry.

Clean any glue excess.

STORAGE

It is during winter or when the watercraft is not to be in use for a prolonged time that a proper storage is a necessity. Storage during long periods of inactivity consists of checking and replacing missing, broken or worn parts and protecting cooling system against freezing and corrosion and deflating tube of the EXPLORER.

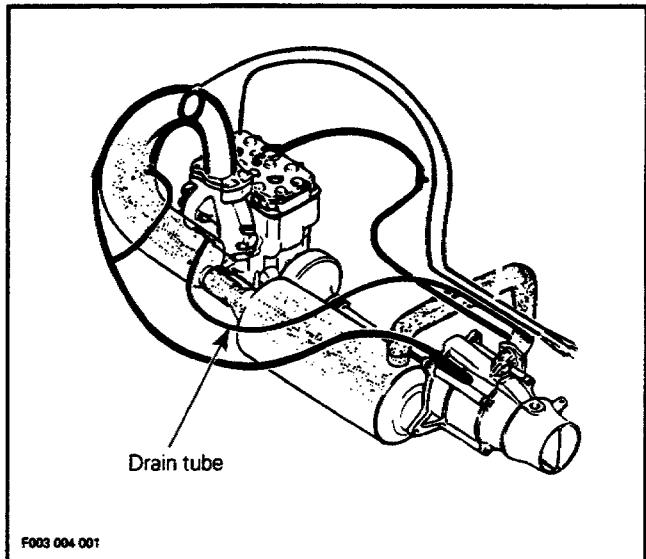
NOTE : If possible store the EXPLORER with its tube 90% inflated. If not possible, fold the tube onto deck and tie it loosely.

Proper lubrication and treatment should be performed to insure that parts do not become corroded and in general, preparing the watercraft so that when the time comes to use it again, it will be in top condition.

Engine Draining

Check engine drain tube running from engine manifold socket to exhaust outlet socket. Make sure there is no sand or other particles in it and that it is not obstructed so that water can leave the engine. Clean tube and fitting (on exhaust outlet) as necessary.

CAUTION : Water in engine drain tube must be free to flow out, otherwise water could be trapped in engine. Should water freeze in engine, severe damage will occur. Check engine drain tube for obstructions.



Fuel System

A fuel stabilizer, such as Sta-Bil® (or equivalent), can be added in fuel tank to prevent fuel deterioration and carburetor(s) gumming. Follow manufacturer's instructions for proper use.

CAUTION : Fuel stabilizer should be added prior engine lubrication to ensure carburetor(s) protection against varnish deposit.

WARNING : Fuel is flammable and explosive under certain conditions. Always work in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity. Always wipe off any fuel spillage from the watercraft.

Cooling System Flushing and Engine Internal Lubrication

Cooling system has to be flushed with fresh water to prevent salt, sand or dirt accumulation which will clog water passages. This will be achieved with the coupler hose (P / N 295 500 099).

Engine must be lubricated to prevent corrosion on internal parts. This will be achieved by spraying SEA-DOO LUBE (P / N 293 600 006) through air intake opening.

Procedure

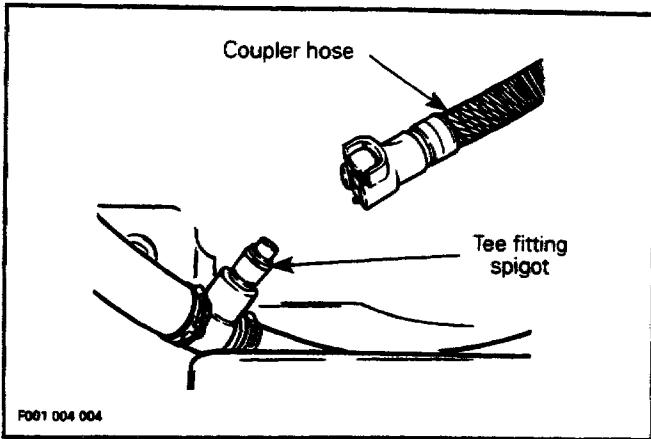
WARNING : Perform this operation in a well ventilated area.

1. Clean jet pump by spraying water in its inlet and outlet and then SEA-DOO LUBE.

WARNING : Always remove tether cord cap from switch to prevent accidental engine starting before cleaning the jet pump area. Engine must not be running for this operation.

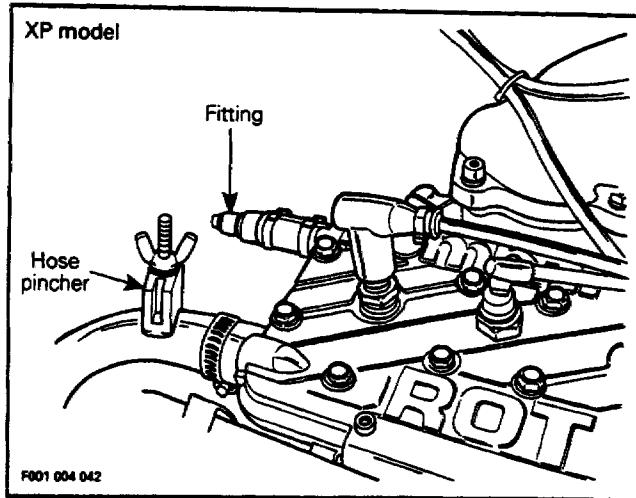
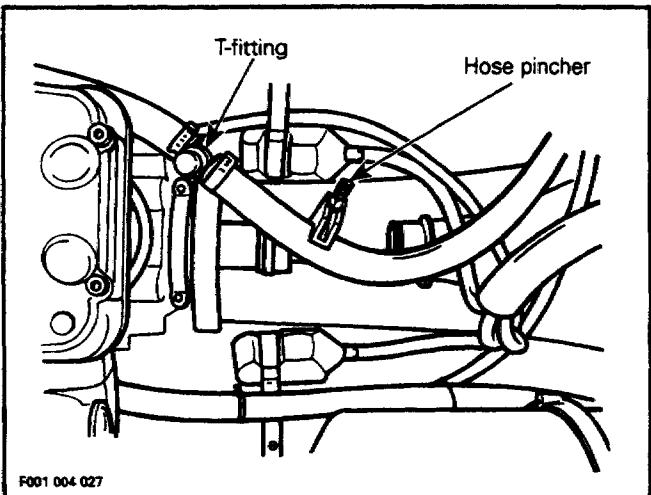
2. Remove seat to allow access of cooling system.
3. Remove dust cap from tee fitting spigot and attach coupler hose. Make sure coupler hose is properly locked to tee fitting spigot.

Section 11 STORAGE



Attach other end of coupler hose to a garden hose. Do not open water tap yet.

NOTE : To allow a more efficient flushing on watercraft, install a hose pincer (P / N 295 000 076) between T-fitting and exhaust socket. This prevents water from exiting through exhaust socket. Remove hose pincher after flushing operation.



4. Start the engine then immediately open the water tap.

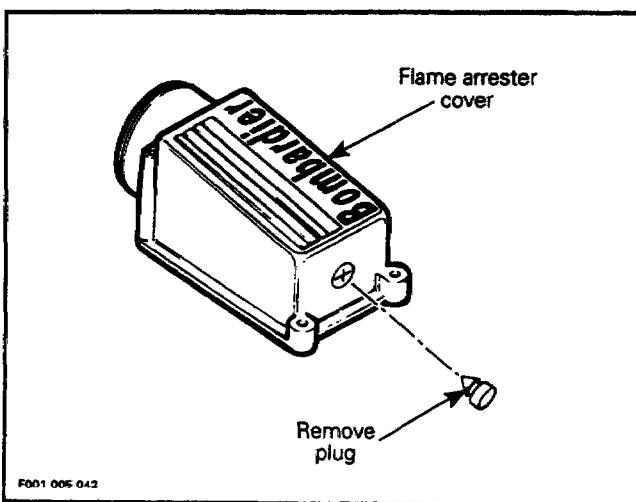
WARNING : Do not touch any electrical part or jet pump area when engine is running.

CAUTION : Never flush a hot engine. Always start the engine before opening the water tap. Otherwise, water will back flow through the tuned pipe into the engine and may cause damage to internal parts. Open water tap immediately after engine is started to prevent overheating. Follow this procedure exactly.

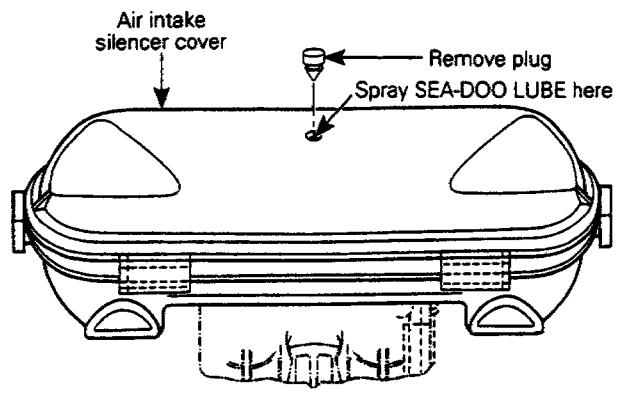
5. Run the engine about five minutes at a fast idle around 3500 RPM.

CAUTION : Never run engine longer than five minutes. Drive line seal has no cooling when watercraft is out of water.

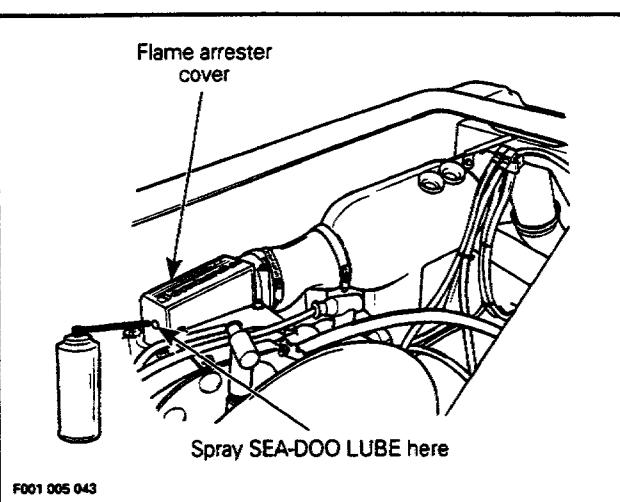
6. Remove plug from flame arrester cover.



XP model



7. Spray SEA-DOO LUBE (P / N 293 600 006) through flame arrester cover keeping engine at fast idle.



Lubrication of engine should be done at least for one minute. After approximately half a minute, close fuel tank valve to run engine out of fuel while lubricating.

▼ CAUTION : When engine begins to run irregularly because of fuel starvation, immediately stop water flow before engine dies. Severe engine damage could result if not done in this order.

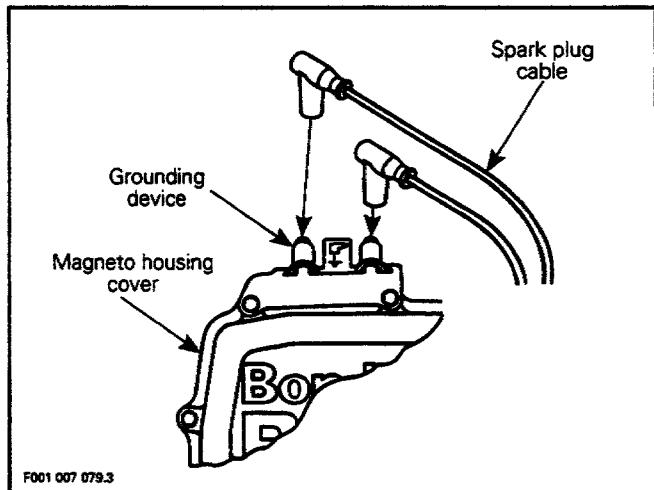
8. Close the water tap then stop the engine.

▼ CAUTION : Always close the water tap before stopping the engine. Follow this procedure exactly otherwise severe engine damage could occur.

9. Press unlocking button to remove coupler hose. Reinstall dust cap over tee fitting.

10. Wipe up any residual water on the engine.

11. Remove spark plug cables and connect them on the grounding device.



Remove both spark plugs and spray SEA-DOO LUBE into each cylinder.

Crank the engine a few turns to distribute the oil onto cylinder wall.

12. Apply anti-seize lubricant on spark plug threads then reinstall them.

13. Reinstall plug on flame arrester cover.

▼ CAUTION : Do not run the engine during the storage period.

Watercraft Rinsing

Thoroughly rinse the watercraft hull, bilge, engine compartment, with fresh water.

Propulsion System

Lubricant in impeller shaft reservoir should be drained and reservoir cleaned refilled with 65 mL (2.2 U.S. oz) of SEA-DOO synthetic oil polyolester (P / N 293 600 011) 75W 90 GL5 type "C" gear lube. Refer to PROPULSION AND DRIVE SYSTEMS 08-01 then look for oil inspection / replacement.

▼ CAUTION : Use only SEA-DOO jet pump oil or equivalent synthetic gear oil, otherwise component service life could be reduced. Do not mix oil brands or types.

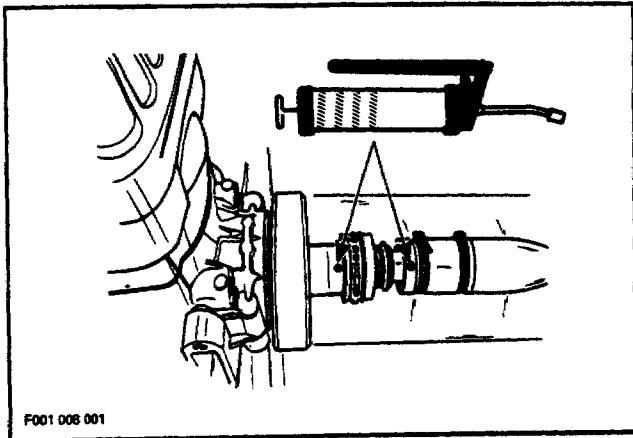
Lubricate drive shaft splines through grease fitting at PTO flywheel end with synthetic grease (P / N 293 550 010).

▼ CAUTION : Do not lubricate excessively. Immediately stop when a slight movement is noticed on rubber boot.

Section 11 STORAGE

Lubricate at seal carrier grease fitting until grease is just coming out on engine side.

▼ **CAUTION** : As soon as grease comes out the seal immediately stop lubricating to prevent seal damage and overheating.



▼ **CAUTION** : Never leave any clothing, tool or other objects near PTO flywheel and seal carrier.

Battery

Refer to BATTERY 07-03 then look for removal to remove and clean the battery. Apply some dielectric grease (P / N 293 550 004) or petroleum jelly on battery posts and all exposed cable connectors.

Add distilled water if necessary then give the battery a full charge at a maximum rate of two amperes.

Refer to BATTERY 07-03 then look for charging.

Store the battery on a wood shelf in a warm dry place away from direct sunlight.

To prevent battery sulphating and discharging, have it charged every month.

Anticorrosion Treatment

Wipe off any residual water in the engine compartment. Spray SEA-DOO LUBE over all metallic components in engine compartment.

Additional Recommended Protection

Cooling system may be filled with a 50 / 50 water / antifreeze solution.

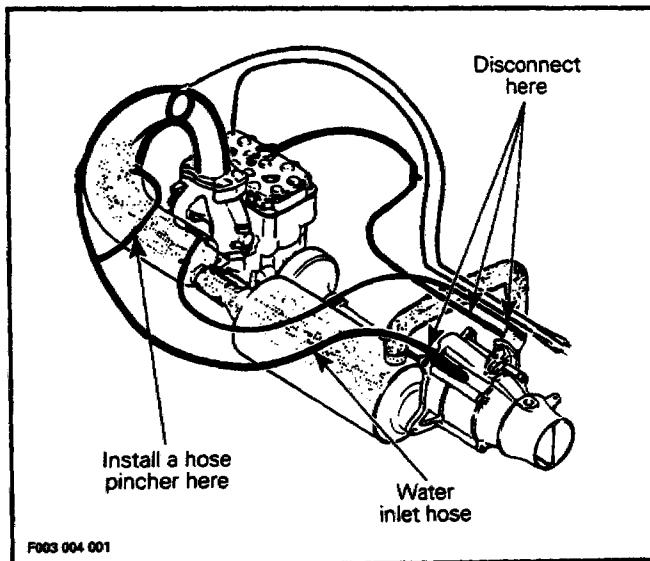
▼ **CAUTION** : Always use ethylene-glycol anti-freeze containing corrosion inhibitors specifically recommended for aluminum engines.

○ **NOTE** : The engine will not have to run during this operation.

Three hoses have to be disconnected to allow air to escape and antifreeze solution to completely fill cooling system water jackets.

Install a hose pincher on water injection hose.

Disconnect hoses where shown.

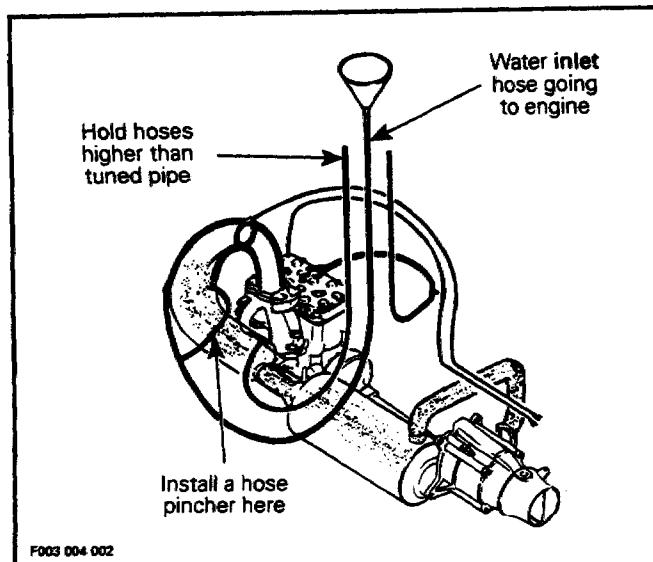


Raise all hoses above the highest point of tuned pipe and temporarily tie them together.

Insert a funnel into inlet hose going to the water inlet socket at tuned pipe. Pour about two liters (1/2 gal) of antifreeze solution through the funnel.

Tie up all hoses higher than tuned pipe.

○ **NOTE** : If hoses are not attached higher than tuned pipe, coolant will drain out.



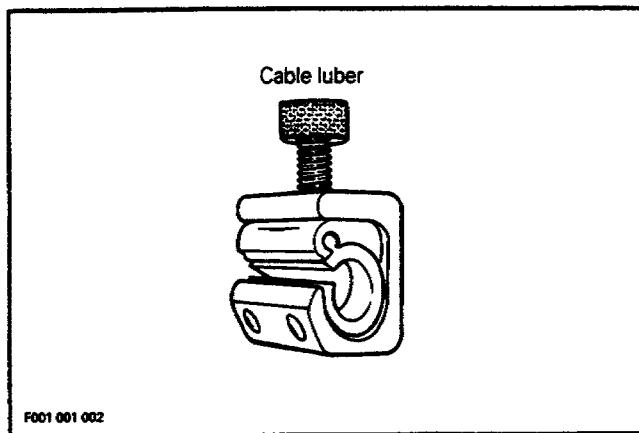
The following steps should be performed to provide the watercraft enhanced protection.

Remove muffler and drain out as much water as possible. Reinstall muffler.

OR : Disconnect one hose from muffler and pour some antifreeze liquid inside muffler. Reconnect hose.

Lubricate the throttle cable with SEA-DOO LUBE.

NOTE : A cable luber can be used on throttle cable end to inject SEA-DOO LUBE. Refer to a motorcycle parts supplier for availability.



Clean the bilge with hot water and mild detergent or with bilge cleaner. Rinse thoroughly. Lift front end of watercraft to completely drain bilge. If any repairs are needed to body or to the hull, touch up paint and Gelcote® repair kit are available. Refer to SERVICE TOOLS AND PRODUCTS 01-02. Replace damaged labels / decals.

NOTE : Bilge cleaning should be done prior anti-corrosion treatment.

Wash the body with soap and water solution (only use mild detergent). Rinse thoroughly with fresh water. Remove marine organisms from the hull. Apply a nonabrasive wax such as silicon wax.

CAUTION : Never clean apparent fiberglass and plastic parts with strong detergent, degreasing agent, paint thinner, acetone, etc.

Thoroughly wash inflatable tube (EXPLORER only) with fresh soapy water. Stubborn stains and scuff marks may be removed with a petroleum based solvent such as acetone or toluene then wash tube.

CAUTION : Never clean decals with strong detergent, methylethyl ketone, toluene or acetone. Limit application of these solvents on tube joints to avoid glue dilution.

If the watercraft is to be stored outside, cover it with an opaque tarpaulin to prevent sun rays and grime from affecting the plastic components, watercraft finish as well as preventing dust accumulation.

CAUTION : The watercraft must never be left in water for storage. Never leave the watercraft stored in direct sunlight. UV radiation will dull finishes.

The seat should be partially left opened during storage. This will avoid engine compartment condensation and possible corrosion.

NOTE : If the watercraft is stored outside with seat partially opened and without a tarpaulin, remove the rear drain plug(s) in order to avoid water build up in the bilge during rainfall. Tilt the watercraft to the rear so that water can flow out of floorboard.

SP 5806, SPI 5808, SPX 5807 MODELS

ENGINE		SP (5806)	SPI (5808)	SPX (5807)
Engine type		Bombardier-Rotax 587, water cooled		
Induction type		Rotary valve		
Exhaust system	Type	Water cooled, water injected		
	Water injection fitting	4.6 mm (0.181 in)		
Starting system		Electric start		
Lubrication	Fuel / oil mixture	VROI (Variable rate of injection)		
	Oil injection pump	Gear		
	Oil type	SEA-DOO injection oil		
Number of cylinders		2		
Bore	Standard	76.0 mm (2.992 in)		
	First oversize	76.25 mm (3.002 in)		
	Second oversize	76.50 mm (3.012 in)		
Stroke		64 mm (2.520 in)		
Displacement		580.7 cm ³ (35.4 in ³)		
Compression ratio	(uncorrected)	11.5:1		
	(corrected)	6.5:1		
Engine maximum torque		64 N·m (47 lbf·ft) @ 5500 RPM	67 N·m (49 lbf·ft) @ 5750 RPM	
Cylinder head warpage		N.A.		
Piston ring type and quantity		1 Semi-Trapez — 1 Rectangular		
Ring end gap	New	0.25 - 0.40 mm (.010 - .016 in)		
	Wear limit	1.00 mm (.039 in)		
Ring / piston groove clearance	New	0.05 - 0.08 mm (.002 - .003 in)		
	Wear limit	0.2 mm (.008 in)		
Piston / cylinder wall clearance	Neuf	0.05 - 0.07 mm (.002 - .003 in)		
	Wear limit	0.2 mm (.008 in)		
Cylinder taper (maximum)		0.08 mm (.003 in)		
Cylinder out of round (maximum)		0.05 mm (.002 in)		
Connecting rod big end axial play	New	0.39 - 0.74 mm (.015 - .029 in)		
	Wear limit	1.2 mm (.047 in)		
Crankshaft deflection		0.08 mm (.003 in)		
Rotary valve timing	Opening	115°±5 BTDC	130°±5 BTDC	
	Closing	80°±5 ATDC	65°±5 ATDC	
Rotary valve plate opening		147°		
Crankcase / rotary valve gap		0.25 - 0.35 mm (.010 - .014 in)		
Connecting rod / crankshaft pin radial clearance	New	0.020 - 0.033 mm (.0008 - .0013 in)		
	Wear limit	0.050 mm (.002 in)		
Connecting rod / piston pin radial clearance	New	0.003 - 0.012 mm (.00012 - .00047 in)		
	Wear limit	0.015 mm (.00059 in)		
ADDITIONAL INFORMATION:				
Squish gap		1.3 - 1.7 mm (0.051 - 0.067 in)		

Section 12 TECHNICAL DATA

Sub-Section 01 (SP 5806, SPI 5808, SPX 5807 MODELS)

ELECTRICAL (engine)		SP (5806)	SPI (5808)	SPX (5807)
Magneto generator output		160 W @ 6000 RPM		
Ignition system, type		CDI 4/5 p		
Spark plug	Make and type	NGK BR7ES		
	Gap	0.5 mm (.020 in)		
Ignition timing	BTDC	2.65 mm (.104 in) (21° ± 1)		
	Engine speed (cold)	6000 RPM		
Generating coil		40 - 76 Ω		
Battery charging coil		.05 - .6 Ω		
High tension coil	Secondary	9 - 15 KΩ		
Engine RPM limiter operation		6550 ± 100		

ADDITIONAL INFORMATION:

CARBURETION		SP (5806)	SPI (5808)	SPX (5807)
Carburetor	Type	Diaphragm		
	Quantity	1	2	
Main jet		125	107.5	
Pilot jet		67.5	62.5	
Adjustment	Low-speed mixture screw	1 turn ± 1/4		1-1/4 turn ± 1/4
	High-speed screw	0		
	Idle speed (in water)	1400 RPM		
	Idle speed (out of water)	2400 RPM	3000 RPM	
Fuel	Type	Regular unleaded		
	Octane no.	87 (Ron + Mon) / 2		
Fuel return line orifice		0.5 mm (0.020 in)	0.5 mm (0.020 in)	(PTO side)
Leak test (pop off pressure)		150-200 kPa (22-29 PSI)		

ADDITIONAL INFORMATION:

COOLING		SP (5806)	SPI (5808)	SPX (5807)
Type		Open circuit - Direct flow from jet propulsion unit		
Thermostat		None		
Overheating beeper setting		96-99°C (205-210°F)		

ADDITIONAL INFORMATION:

Section 12 TECHNICAL DATA
Sub-Section 01 (SP 5806, SPI 5808, SPX 5807 MODELS)

PROPELLION		SP (5806)	SPI (5808)	SPX (5807)		
Propulsion system		Bombardier Formula Pump				
Jet pump type		Axial flow single stage				
Impeller rotation (seen from rear)		Counterclockwise				
Transmission		Direct drive				
Coupling type		Crown splines				
PROPELLION UNIT	Oil type	SEA-DOO JET PUMP SYNTHETIC OIL Polyester 75W90 GL5 (P/N 293 600 011)				
	Steering nozzle pivoting angle	26°				
	Trim nozzle pivoting angle	N.A.				
	Minimum required water level	60 cm (24 in)				
	Drive shaft deflection maximum	0.5 mm (.020 in)				
	Impeller outside diameter	139.5 mm (5.490 in)				
	Impeller / wear ring clearance	Wear limit (performance)	0.5 mm (.020 in)			
			1.02 mm (.040 in)			
	Impeller shaft end play (new)	0.12 - 0.54 mm (.005 - .021 in)				
	Impeller shaft side play	0.05 mm (.002 in)				
	Impeller pitch / material	18°/ aluminium	17.7°/ stainless steel	Progressive pitch 16°-20.5°/ stainless steel		
ADDITIONAL INFORMATION: Do not mix different trademarks or type of oil.						

DIMENSIONS		SP (5806)	SPI (5808)	SPX (5807)
Number de passenger (driver incl.)		2		
Length, overall		256 cm (100.5 in)		
Width, overall		105 cm (41.5 in)		
Height, overall		92 cm (36.2 in)		
Mass		167 kg (368 lb)	168 kg (370 lb)	
Load limit (passenger + luggage)		160 kg (352 lb)		
MATERIALS	Hull	Composite		
	Air intake silencer	Thermoplastic		
	Flame arrester	Multi-layer wire screen		
	Exhaust muffler	Aluminum		
	Steering padding	Thermoplastic elastomer with polystyrene foam		
	Fuel tank	Polyethylene		
	Injection oil tank	Polyethylene		
	Seat	Polyurethane foam		
ADDITIONAL INFORMATION:				

Section 12 TECHNICAL DATA

Sub-Section 01 (SP 5806, SPI 5808, SPX 5807 MODELS)

PERFORMANCE		SP (5806)	SPI (5808)	SPX (5807)
Pump static thrust		170 kg (375 lb)	200 kg (441 lb)	200 kg (441 lb)
Maximum fuel consumption at wide open throttle		20.8 L / h (5.5 U.S. gal / h)	22.7 L / h. (6 U.S. gal / h)	
Cruising time at full throttle	Fuel tank without reserve	1 hour 45 minutes		1 hour 20 minutes
	Fuel tank reserve	20 minutes		13 minutes
ADDITIONAL INFORMATION:				
ELECTRICAL (vehicle)		SP (5806)	SPI (5808)	SPX (5807)
Battery		12 V, 19 A•h		
Starting system fuse		5 A		
Charging system fuse		15 A		
ADDITIONAL INFORMATION:				
CAPACITIES		SP (5806)	SPI (5808)	SPX (5807)
Fuel tank		33 L (8.7 U.S. gal.)		
Impeller shaft reservoir	Capacity	65 mL (2.2 U.S. oz)		
	Oil level height	To bottom of cover hole		
Injection oil tank		2.8 L (95 U.S. fl oz)		
ADDITIONAL INFORMATION:				
STANDARD EQUIPMENT		SP (5806)	SPI (5808)	SPX (5807)
Tether cord		STD		
Tool kit		STD		
Fuel tank reserve		STD		
Overheating warning device		STD		
Electric fuel level gauge		OPT.		STD
Injection oil low level warning device		OPT.		STD
Tachometer		OPT.		
Variable trim system (VTS)		OPT.		
Reverse		N.A.		
Storage compartment		STD		
Rear grab handle		OPT.		STD
Extinguisher holder		STD		
ADDITIONAL INFORMATION:				

Section 12 TECHNICAL DATA

Sub-Section 01 (SP 5806, SPI 5808, SPX 5807 MODELS)

TIGHTENING TORQUES		SP (5806), SPI (5808) et SPX (5807)		
E N G I N E	Exhaust manifold, screws (8)	24 N·m	(17 lbf·ft)	
	Magneto ring nut	105 N·m	(77 lbf·ft)	
	Flywheel (PTO side)	110 N·m	(81 lbf·ft)	
	Crankcase screws	10 N·m	(88 lbf·in)	
	M6	24 N·m	(17 lbf·ft)	
	M8	24 N·m	(17 lbf·ft)	
	Crankcase / engine support nuts	35 N·m	(26 lbf·ft)	
	Engine support / hull	25 N·m	(18 lbf·ft)	(1)
	Cylinder head screws	24 N·m	(17 lbf·ft)	(1)
	Crankcase / cylinder screws	24 N·m	(17 lbf·ft)	(1)
	Tuned pipe flange nut and screws	25 N·m	(18 lbf·ft)	
	Tuned pipe fixation screws	25 N·m	(18 lbf·ft)	(1)
P U M P	Cylinder head cover screws	9 N·m	(80 lbf·in)	(1)
	Flame arrester screws	10 N·m	(88 lbf·in)	(1)
	Impeller on shaft	70 N·m	(52 lbf·ft)	(2)
	Pump / hull	35 N·m	(26 lbf·ft)	(1)
	Venturi / housing	25 N·m	(18 lbf·ft)	(1)
	Nozzle / venturi	20 N·m	(15 lbf·ft)	(1)
	Housing cover	7 N·m	(62 lbf·in)	(1)
S T E R I N G	Grill	8 N·m	(71 lbf·in)	(1)
	Ride shoe	10 N·m	(88 lbf·in)	(1)
	Steering cable nuts	10 N·m	(88 lbf·in)	
	Steering support screws	15 N·m	(11 lbf·ft)	(1)
	Steering collar screws	5 N·m	(44 lbf·in)	(1)
	Steering stem screw	40 N·m	(30 lbf·ft)	(2)
	Handlebar saddle screws, nuts	26 N·m	(19 lbf·ft)	
	Reverse gate / venturi	N.A.		
E L E C T R I C A L	Cable / reverse gate	N.A.		
	Steering cable / stem arm	7 N·m	(62 lbf·in)	
	Steering cable / nozzle	7 N·m	(62 lbf·in)	
	Ignition housing cover	5 N·m	(44 lbf·in)	
	Starter mounting screws	22 N·m	(16 lbf·ft)	(2)
	Starter lock nuts	6 N·m	(53 lbf·in)	
	Spark plug	24 N·m	(17 lbf·ft)	
ADDITIONAL INFORMATION : Apply where indicated		(1) Loctite 242		
		(2) Loctite 271		
		(3) Loctite 515		

Section 12 TECHNICAL DATA
Sub-Section 02 (GTS 5813, GTX 5861 MODELS)

GTS 5813, GTX 5861 MODELS

ENGINE		GTS (5813)	GTX (5861)		
Engine type		Bombardier-Rotax 587, water cooled			
Induction type		Rotary valve			
Exhaust system	Type	Water cooled, water injected			
	Water injection fitting size	4.6 mm (0.181 in)			
Starting system		Electric start			
Lubrication	Fuel / Oil mixture	VROI (Variable rate oil injection)			
	Oil injection pump	Gear			
	Oil type	SEA-DOO injection oil			
Number of cylinders		2			
Bore	Standard	76.0 mm (2.992 in)			
	First oversize	76.25 mm (3.002 in)			
	Second oversize	76.50 mm (3.012 in)			
Stroke		64 mm (2.520 in)			
Displacement		580.7 cm ³ (35.4 in ³)			
Compression ratio	(uncorrected)	11.5:1			
	(corrected)	6.5:1			
Engine maximum torque		64 N·m (47 lbf·ft) @ 5500 RPM	67 N·m (49 lbf·ft) @ 5750 RPM		
Cylinder head warpage		N.A.			
Piston ring type and quantity		1 Semi-Trapez — 1 Rectangular			
Ring end gap	New	0.25 - 0.40 mm (.010 - .016 in)			
	Wear limit	1.00 mm (.039 in)			
Ring / piston groove clearance	New	0.05 - 0.08 mm (.002 - .003 in)			
	Wear limit	0.2 mm (.008 in)			
Piston / cylinder wall clearance	New	0.05 - 0.07 mm (.002 - .003 in)			
	Wear limit	0.2 mm (.008 in)			
Cylinder taper (maximum)		0.08 mm (.003 in)			
Cylinder out of round (maximum)		0.05 mm (.002 in)			
Connecting rod big end axial play	New	0.39 - 0.74 mm (.015 - .029 in)			
	Wear limit	1.2 mm (.047 in)			
Crankshaft deflection		0.08 mm (.003 in)			
Rotary valve timing	Opening	115°±5 BTDC	130°±5 BTDC		
	Closing	80°±5 ATDC	65°±5 ATDC		
Rotary valve plate opening		147°			
Crankcase / rotary valve gap		0.25 - 0.35 mm (.010 - .014 in)			
Connecting rod / crankshaft pin radial clearance	New	0.020 - 0.033 mm (.0008 - .0013 in)			
	Wear limit	0.050 mm (.002 in)			
Connecting rod / piston pin radial clearance	New	0.003 - 0.012 mm (0.00012 - 0.00047 in)			
	Wear limit	0.015 mm (0.00059 in)			
ADDITIONAL INFORMATION:					
Squish gap					

Section 12 TECHNICAL DATA

Sub-Section 02 (GTS 5813, GTX 5861 MODELS)

ELECTRICAL (engine)		GTS (5813)	GTX (5861)
Magneto generator output		160 W @ 6000 RPM	
Ignition system, type		CDI 4/5 p	
Spark plug	Make and type	NGK BR7ES	
	Gap	0.5 mm (.020 in)	
Ignition timing	BTDC	2.65 mm (.104 in) (21° ± 1)	
	Engine speed (cold)	6000 RPM	
Generating coil		40 - 76 Ω	
Battery charging coil		.05 - .6 Ω	
High tension coil	Secondary	9 - 15 KΩ	
Engine RPM limiter operation		6550 ± 100	
ADDITIONAL INFORMATION:			
CARBURETION		GTS (5813)	GTX (5861)
Carburetor	Type	Diaphragm	
	Quantity	1	2
Main jet		125	107.5
Pilot jet		67.5	62.5
Adjustment	Low-speed mixture screw	1 turn ± 1/4	1-1/4 turn ± 1/4
	High-speed screw	0	
	Idle speed (in water)	1400 RPM	
	Idle speed (out of water)	2500 RPM	2800 RPM
Fuel	Type	Regular unleaded	
	Octane no.	87 (Ron + Mon) /2	
Fuel return line orifice		0.5 mm (0.020 in)	0.5 mm (0.020 in) (PTO side)
Leak test (pop off pressure)		150-200 kPa (22-29 PSI)	
ADDITIONAL INFORMATION:			
COOLING		GTS (5813)	GTX (5861)
Type		Open circuit - Direct flow from jet propulsion unit	
Thermostat		None	
Overheating beeper setting		96-99°C (205-210°F)	
ADDITIONAL INFORMATION:			

Section 12 TECHNICAL DATA
Sub-Section 02 (GTS 5813, GTX 5861 MODELS)

PROPELLION		GTS (5813)	GTX (5861)
Propulsion system		Bombardier Formula pump	
Jet pump type		Axial flow single stage	
Impeller rotation (seen from rear)		Counterclockwise	
Transmission		Direct drive	
Coupling type		Crown splines	
P R O P U L I O N U N I T	Oil type	SEA-DOO JET PUMP SYNTHETIC OIL Polyester 75W90 GL5 (P / N 293 600 011)	
	Steering nozzle pivoting angle	26°	
	Trim nozzle pivoting angle	N.A.	
	Minimum required water level	90 cm (36 in)	
	Drive shaft deflection maximum	0.5 mm (.020 in)	
	Impeller outside diameter	139.5 mm (5.490 in)	
	Impeller / wear ring clearance	Wear limit (performance)	0.5 mm (.020 in)
		Wear limit	1.02 mm (.040 in)
	Impeller shaft end play (new)	0.12 - 0.54 mm (.005 - .021 in)	
	Impeller shaft side play	0.05 mm (.002 in)	
ADDITIONAL INFORMATION:	Impeller pitch / material	17°/stainless steel	18.3°/stainless steel
	Do not mix different trademarks or type of oil.		
DIMENSIONS		GTS (5813)	GTX (5861)
Number of passenger (driver incl.)		3	
Length (overall)		302 cm (119.0 in)	
Width (overall)		119 cm (46.8 in)	
Height (overall)		95 cm (37.4 in)	
Mass		210 kg (465 lb)	
Load limit (passengers + luggage)		225 kg (496 lb)	
M A T E R I A L S	Hull	Composite	
	Air intake silencer	Thermoplastic	
	Flame arrester	Multi-layer wire screen	
	Exhaust muffler	Aluminum	
	Steering padding	Thermoplastic elastomer with polystyrene foam	
	Fuel tank	Polyethylene	
	Injection oil tank	Polyethylene	
	Seat	Polyurethane foam	
ADDITIONAL INFORMATION:			

Section 12 TECHNICAL DATA

Sub-Section 02 (GTS 5813, GTX 5861 MODELS)

PERFORMANCE		GTS (5813)	GTX (5861)
Pump static thrust		195 kg (429 lb)	210 kg (462 lb)
Maximum fuel consumption at wide open throttle		20.8 L/h (5.5 U.S. gal/h)	22.7 L/h. (6 U.S. gal/h)
Cruising time at full throttle	Fuel tank without reserve	1 hour 45 minutes	1 hour 20 minutes
	Fuel tank reserve	20 minutes	13 minutes
ADDITIONAL INFORMATION:			
ELECTRICAL (vehicle)		GTS (5813)	GTX (5861)
Battery		12 V, 19 A·h	
Starting system fuse		5 A	
Charging system fuse		15 A	
ADDITIONAL INFORMATION:			
CAPACITIES		GTS (5813)	GTX (5861)
Fuel tank		33 L (8.7 U.S. gal.)	
Impeller shaft reservoir	Capacity	65 mL (2.2 U.S. oz)	
	Oil level height	To bottom of cover hole	
Injection oil tank		2.8 L (95 U.S. fl oz)	
ADDITIONAL INFORMATION:			
STANDARD EQUIPMENT		GTS (5813)	GTX (5861)
Tether cord		STD	
Tool kit		STD	
Fuel tank reserve		STD	
Overheating warning device		STD	
Electric fuel level gauge		OPT.	STD
Injection oil low level warning device		OPT.	STD
Tachometer		OPT.	OPT.
Speedometer		OPT.	STD
Variable trim system (VTS)		N.A.	
Reverse		STD	
Storage compartment		STD	
Rear grab handle		STD	
Extinguisher holder		STD	
ADDITIONAL INFORMATION:			

Section 12 TECHNICAL DATA
Sub-Section 02 (GTS 5813, GTX 5861 MODELS)

TIGHTENING TORQUES		GTS (5813) and GTX (5861)		
E N G I N E	Exhaust manifold, screws (8)	24 N·m	(17 lbf·ft)	
	Magneto flywheel nut	105 N·m	(77 lbf·ft)	
	Flywheel (PTO side)	110 N·m	(81 lbf·ft)	
	Crankcase screws	10 N·m	(88 lbf·in)	
	M6	24 N·m	(17 lbf·ft)	
	M8	35 N·m	(26 lbf·ft)	
	Crankcase / engine support nuts	25 N·m	(18 lbf·ft)	(1)
	Engine support / hull	24 N·m	(17 lbf·ft)	(1)
	Cylinder head screws	24 N·m	(17 lbf·ft)	(1)
	Crankcase / cylinder screws	25 N·m	(18 lbf·ft)	(1)
P U M P	Tuned pipe flange nut and screws	25 N·m	(18 lbf·ft)	
	Tuned pipe fixation screws	25 N·m	(18 lbf·ft)	(1)
	Cylinder head cover screws	9 N·m	(80 lbf·in)	(1)
	Flame arrester screws	10 N·m	(88 lbf·in)	(1)
	Impeller on shaft	70 N·m	(52 lbf·ft)	(2)
	Pump / hull	35 N·m	(26 lbf·ft)	(1)
	Venturi / housing	25 N·m	(18 lbf·ft)	(1)
S T E E R I N G	Nozzle / venturi	20 N·m	(15 lbf·ft)	(1)
	Housing cover	7 N·m	(62 lbf·in)	(1)
	Grill	8 N·m	(71 lbf·in)	(1)
	Ride shoe	10 N·m	(88 lbf·in)	(1)
	Steering cable lock nuts	10 N·m	(88 lbf·in)	
	Steering support screws	15 N·m	(11 lbf·ft)	(1)
	Steering collar screws	5 N·m	(44 lbf·in)	(1)
	Steering stem screw	40 N·m	(30 lbf·ft)	(2)
E L E C T R I C A L	Handlebar saddle screws, nuts	26 N·m	(19 lbf·ft)	
	Reverse gate / venturi	20 N·m	(15 lbf·ft)	
	Cable / reverse gate	7 N·m	(62 lbf·in)	
	Steering gate / stem arm	7 N·m	(62 lbf·in)	
	Steering cable / nozzle	7 N·m	(62 lbf·in)	
	Ignition housing cover	5 N·m	(44 lbf·in)	
	Starter mounting screws	22 N·m	(16 lbf·ft)	(2)
ADDITIONAL INFORMATION: Apply where indicated		(1) Loctite 242		
		(2) Loctite 271		
		(3) Loctite 515		

Section 12 TECHNICAL DATA**Sub-Section 03 (XP 5852 MODEL)****XP 5852 MODEL**

ENGINE		XP (5852)
Engine type		Rotax 657, water cooled
Induction type		Rotary valve
Exhaust system	Type	Water cooled, water injected
	Water injection fitting ①	3.5 mm (.139 in)
	Gas cooling fitting ②	3.5 mm (.139 in)
Starting system		Electric start
Lubrication	Fuel / oil mixture	VROI (Variable rate oil injection)
	Oil injection pump	Gear
	Oil type	SEA-DOO injection oil
Number of cylinders		2
Bore	Standard	78.0 mm (3.07 in)
	First oversize	78.25 mm (3.08 in)
	Second oversize	78.50 mm (3.09 in)
Stroke		68 mm (2.68 in)
Displacement		650 cm ³ (39.67 in ³)
Compression ratio	(uncorrected)	12.25 : 1
	(corrected)	6.7 : 1
Engine maximum torque		80 N•m (59 lbf•ft) @ 6250 RPM
Cylinder head warpage		N.A.
Piston ring type and quantity		1 Semi-Trapez — 1 Rectangular
Ring end gap	New	0.25 - 0.40 mm (.010 - .016 in)
	Wear limit	1.00 mm (.039 in)
Ring / piston groove clearance	New	0.05 - 0.08 mm (.002 - .003 in)
	Wear limit	0.2 mm (.008 in)
Piston / cylinder wall clearance	New	0.06 - 0.09 mm (.0024 - .0035 in)
	Wear limit	0.15 mm (.0059 in)
Cylinder taper (maximum)		0.08 mm (.003 in)
Cylinder out of round (maximum)		0.05 mm (.002 in)
Connecting rod big end axial play	New	0.39 - 0.74 mm (.015 - .029 in)
	Wear limit	1.2 mm (.047 in)
Crankshaft deflection		0.08 mm (.003 in)
Rotary valve timing	Opening	130°±5 BTDC
	Closing	65°±5 ATDC
Rotary valve plate opening		147°
Crankcase / rotary valve gap		0.25 - 0.35 mm (.010 - .014 in)
Connecting rod / crankshaft pin radial clearance	New	0.020 - 0.033 mm (.0008 - .0013 in)
	Wear limit	0.050 mm (.002 in)
Connecting rod / piston radial clearance	New	0.003 - 0.012 mm (0.00012 - 0.00047 in)
	Wear limit	0.015 mm (0.00059 in)
ADDITIONAL INFORMATION: ① At tuned pipe ② At exhaust cone		
Squish gap		0.9 - mn (0.035 - 0.051 in)

Section 12 TECHNICAL DATA

Sub-Section 03 (XP 5852 MODEL)

ELECTRICAL (engine)		XP (5852)
Magneto generator output		160 W @ 6000 RPM
Ignition system, type		CDI, 4/5 p
Spark plug	Make and type	NGK BR8ES
	Gap	0.5 mm (.020 in)
Ignition timing	BTDC	2.59 mm (.102 in) (20° ± 1)
	Engine speed (cold)	6000 RPM
Generating coil	Low speed	120 - 180 Ω
	High speed	2.8 - 4.2 Ω
Battery charging coil		.21 - .31 Ω
High tension coil	Primary	0.23 - 0.43 Ω
	Secondary	3.85 - 7.15 KΩ
Engine RPM limiter operation		7050 ± 50
ADDITIONAL INFORMATION:		
CARBURETION		XP (5852)
Carburetor	Type	Diaphragm
	Quantity	2
Main jet		125
Pilot jet		60
Adjustment	Low-speed mixture screw	1-1/4 turn ± 1/4
	High-speed screw	0
	Idle speed (in water)	1500 RPM
	Idle speed (out of water)	3300 RPM
Fuel	Type	Regular unleaded
	Octane no.	87 (Ron + Mon)/2
Fuel return line orifice		0.5 mm (0.020 in) (PTO side)
Leak test (pop off pressure)		150-200 kPa (22-29 PSI)
ADDITIONAL INFORMATION:		
COOLING		XP (5852)
Type		Open circuit - Direct flow from jet propulsion unit
Thermostat		None
Overheating beeper setting		96-99°C (205-210°F)
ADDITIONAL INFORMATION:		

Section 12 TECHNICAL DATA

Sub-Section 03 (XP 5852 MODEL)

PROPELLION		XP (5852)
Propulsion system		Bombardier Formula pump
Jet pump type		Axial flow single stage
Impeller rotation (seen from rear)		Counterclockwise
Transmission		Direct drive
Coupling type		Crown splines
PROPELLION UNIT	Oil type	SEA-DOO JET PUMP SYNTHETIC OIL Polyolester 75W90 GL5 (P/N 293 600 011)
	Steering nozzle pivoting angle	26°
	Trimming nozzle pivoting angle	± 10°
	Minimum required water level	60 cm (24 in)
	Drive shaft deflection maximum	0.5 mm (.020 in)
	Impeller outside diameter	139.5 mm (5.490 in)
	Impeller / wear ring clearance	Wear limit (performance) 0.5 mm (.020 in)
		Wear limit 1.02 mm (.040 in)
	Impeller shaft end play (new)	0.12 - 0.54 mm (.005 - .021 in)
	Impeller shaft side play	0.05 mm (.002 in)
	Impeller pitch / material	Progressive pitch 15°-20.5°/ stainless steel
ADDITIONAL INFORMATION : Do not mix different brands or type of oil.		
DIMENSIONS		XP (5852)
Number of passenger (driver incl.)		2
Length, overall		256 cm (100.5 in)
Width, overall		105 cm (41.5 in)
Height, overall		92 cm (36.2 in)
Mass		169 kg (373 lb)
Load limit (passenger + luggage)		160 kg (352 lb)
MATERIALS	Hull	Composite
	Air intake silencer	Thermoplastic
	Flame arrester	Multi-layer wire screen
	Exhaust muffler	Aluminum
	Steering padding	Thermoplastic elastomer with polystyrene foam
	Fuel tank	Polyethylene
	Injection oil tank	Polyethylene
	Seat	Polyurethane foam
ADDITIONAL INFORMATION:		

Section 12 TECHNICAL DATA

Sub-Section 03 (XP 5852 MODEL)

PERFORMANCE		XP (5852)
Pump static thrust		230 kg (510 lb)
Maximum fuel consumption at wide open throttle		29.5 L / h. (7.8 U.S. gal / h)
Cruising time at full throttle	Fuel tank without reserve	1 hour 5 minutes
	Fuel tank reserve	10 minutes
ADDITIONAL INFORMATION:		
ELECTRICAL (vehicle)		XP (5852)
Battery		12 V, 19 A•h
Starting system fuse		5 A
Charging system fuse		15 A
VTS system fuse		15 A
ADDITIONAL INFORMATION:		
CAPACITIES		XP (5852)
Fuel tank		34 L (9 U.S. gal)
Impeller shaft reservoir	Capacity	65 mL (2.2 U.S. oz)
	Oil level height	To bottom of cover hole
Injection oil tank		4.5 L (153 U.S. fl oz)
ADDITIONAL INFORMATION:		
STANDARD EQUIPMENT		XP (5852)
Tether cord		STD
Tool kit		STD
Fuel tank reserve		STD
Overheating warning device		STD
Electric fuel level gauge		STD
Injection oil low level warning device		STD
Tachometer		STD
Speedometer		OPT.
Electric variable trim system (VTS)		STD
Reverse		N.A.
Storage compartment		STD
Rear grab handle		STD
Extinguisher holder		STD
ADDITIONAL INFORMATION:		

Section 12 TECHNICAL DATA
Sub-Section 03 (XP 5852 MODELS)

TIGHTENING TORQUES		XP (5852)	
E N G I N E	Exhaust manifold, screws (8)	24 N·m	(17 lbf·ft)
	Magneto flywheel nut	105 N·m	(77 lbf·ft)
	Flywheel (PTO side)	110 N·m	(81 lbf·ft)
	Crankcase screws	10 N·m	(88 lbf·in)
	M6	24 N·m	(17 lbf·ft)
	M8	35 N·m	(26 lbf·ft)
	Crankcase / engine support nuts	25 N·m	(18 lbf·ft) (1)
	Engine support / hull	24 N·m	(17 lbf·ft) (1)
	Cylinder head screws	24 N·m	(17 lbf·ft) (1)
	Crankcase / cylinder screws	25 N·m	(18 lbf·ft)
	Tuned pipe flange nut and screws	25 N·m	(18 lbf·ft)
	Cylinder head cover screws	10 N·m	(88 lbf·in) (1)
P U M P	Flame arrester screws	70 N·m	(52 lbf·ft) (2)
	Impeller on shaft	35 N·m	(26 lbf·ft) (1)
	Pump / hull	25 N·m	(18 lbf·ft) (1)
	Venturi / housing	20 N·m	(15 lbf·ft) (1)
	Nozzle / venturi	7 N·m	(62 lbf·in) (1)
	Housing cover	8 N·m	(71 lbf·in) (1)
	Grill	10 N·m	(88 lbf·in) (1)
	Ride shoe	7 N·m	(62 lbf·in)
S T E E R I N G	Trim cable / trim ring	7 N·m	(62 lbf·in)
	Steering cable / nozzle	15 N·m	(11 lbf·ft)
	Rear steering support screws (collar)	15 N·m	(11 lbf·ft)
	Front steering support screws	6 N·m	(53 lbf·in)
	Steering cable retaining plate	26 N·m	(19 lbf·ft)
	Handlebar saddle screws, nuts	N.A.	
	Reverse gate / venturi	N.A.	
	Cable /reverse gate	3 N·m	(26 lbf·in)
E L E C T R I C A L	Steering cable / stem arm	5 N·m	(44 lbf·in)
	Ignition housing cover	22 N·m	(16 lbf·ft) (2)
	Starter mounting screws	6 N·m	(53 lbf·in)
	Starter lock nuts	24 N·m	(17 lbf·ft)
	Spark plug	(1) Loctite 242	
		(2) Loctite 271	
ADDITIONAL INFORMATION: Apply where indicated		(3) Loctite 515	

Section 12 TECHNICAL DATA
Sub-Section 04 (EXPLORER 5820 MODEL)

EXPLORER 5820 MODEL

ENGINE		EXPLORER (5820)
Engine type		Rotax 587, water cooled
Induction type		Rotary valve
Exhaust system	Type	Water cooled, water injected
	Water injection fitting size	4.6 mm (.181 in)
Starting system		Electric start
Lubrication	Fuel / oil mixture	VROI (Variable rate oil injection)
	Oil injection pump	Gear
	Oil type	SEA-DOO injection oil
Number of cylinders		2
Bore	Standard	76.0 mm (2.992 in)
	First oversize	76.25 mm (3.002 in)
	Second oversize	76.50 mm (3.012 in)
Stroke		64 mm (2.520 in)
Displacement		580.7 cm ³ (35.4 in ³)
Compression ratio	(uncorrected)	11.5 : 1
	(corrected)	6.5 : 1
Engine maximum torque		67 N•m (49 lbf•ft) @ 5750 RPM
Cylinder head warpage		N.A.
Piston ring type and quantity		1 Semi-Trapez — 1 Rectangular
Ring end gap	New	0.25 - 0.40 mm (.010 - .016 in)
	Wear limit	1.00 mm (.039 in)
Ring / piston groove clearance	New	0.05 - 0.08 mm (.002 - .003 in)
	Wear limit	0.2 mm (.008 in)
Piston / cylinder wall clearance	New	0.05 - 0.07 mm (.002 - .003 in)
	Wear limit	0.2 mm (.008 in)
Cylinder taper (maximum)		0.08 mm (.003 in)
Cylinder out of round (maximum)		0.05 mm (.002 in)
Connecting rod big end axial play	New	0.39 - 0.74 mm (.015 - .029 in)
	Wear limit	1.2 mm (.047 in)
Crankshaft deflection		0.08 mm (.003 in)
Rotary valve timing	Opening	130°±5 BTDC
	Closing	65°±5 ATDC
Rotary valve plate opening		147°
Crankcase / rotary valve gap		0.25 - 0.35 mm (.010 - .014 in)
Connecting rod / crankshaft pin radial clearance	New	0.020 - 0.033 mm (.0008 - .0013 in)
	Wear limit	0.050 mm (.002 in)
Connecting rod / piston radial clearance	New	0.003 - 0.012 mm (0.00012 - 0.00047 in)
	Wear limit	0.015 mm (0.00059 in)
ADDITIONAL INFORMATION:		
Squish gap		1.3-1.7 mm (0.051 - 0.067 in)

Section 12 TECHNICAL DATA

Sub-Section 04 (EXPLORER 5820 MODEL)

ELECTRICAL (engine)		EXPLORER (5820)
Magneto generator output		160 W @ 6000 RPM
Ignition system, type		CDI, 4/5 p
Spark plug	Make and type	NGK BR7ES
	Gap	0.5 mm (.020 in)
Ignition timing	BTDC	2.65 mm (.104 in) (21° ± 1)
	Engine speed (cold)	6000 RPM
Generating coil		40 - 76 Ω
Battery charging coil		.05 - .6 Ω
High tension coil	Secondary	9 - 15 KΩ
Engine RPM limiter operation		6550 ± 100
ADDITIONAL INFORMATION:		
CARBURETION		EXPLORER (5820)
Carburetor	Type	Diaphragm
	Quantity	2
Main jet		107.5
Pilot jet		62.5
Adjustment	Low-speed mixture screw	1-1/4 turn ± 1/4
	High-speed screw	0
	Idle speed (in water)	1400 RPM
	Idle speed (out of water)	2800 RPM
Fuel	Type	Regular unleaded
	Octane no.	87 (Ron + Mon)/2
Fuel return line orifice		0.5 mm (0.020 in) (PTO side)
Leak test (pop off pressure)		150-200 kPa (22-29 PSI)
ADDITIONAL INFORMATION:		
COOLING		EXPLORER (5820)
Type		Open circuit - Direct flow from jet propulsion unit.
Thermostat		None
Overheating beeper setting		96-99°C (205-210°F)
ADDITIONAL INFORMATION:		

Section 12 TECHNICAL DATA
Sub-Section 04 (EXPLORER 5820 MODEL)

PROPELLION		EXPLORER (5820)
Propulsion system		Bombardier Formula pump
Jet pump type		Axial flow single stage
Impeller rotation (seen from rear)		Counterclockwise
Transmission		Direct drive
Coupling type		Crown splines
P R O P U L S I O N U N I T	Oil type	SEA-DOO JET PUMP SYNTHETIC OIL Polyolester 75W90 GL5 (P/N 293 600 011)
Steering nozzle pivoting angle		26°
Trimming nozzle pivoting angle		N.A.
Minimum required water level		90 cm (36 in)
Drive shaft deflection maximum		0.5 mm (.020 in)
Impeller outside diameter		139.5 mm (5.490 in)
Impeller / wear ring clearance	Wear limit (performance)	0.5 mm (.020 in)
	Wear limit	1.02 mm (.040 in)
Impeller shaft end play (new)		0.12 - 0.54 mm (.005 - .021 in)
Impeller shaft side play		0.05 mm (.002 in)
Impeller pitch / material		17.7°/stainless steel
ADDITIONAL INFORMATION: Do not mix different brands of type or oil.		
DIMENSIONS		EXPLORER (5820)
Nombre of passager (driver incl.)		5
Length, overall		396 cm (155.9 in)
Width, overall		206 cm (81.1 in)
Height, overall		119 cm (46.8 in)
Mass		295 kg (655 lb)
Load limit (passengers + luggage)		475 kg (1050 lb)
M A T E R I A L S	Hull	Composite
	Air intake silencer	Thermoplastic
	Flame arrester	Multi-layer wire screen
	Exhaust muffler	Aluminum
	Steering padding	Vinyl with polystyrene foam
	Fuel tank	Polyethylene
	Injection oil tank	Polyethylene
	Seat	Polyurethane foam
	Inflatable tube	Neopren, hypalon, polyester reinforced
ADDITIONAL INFORMATION:		

Section 12 TECHNICAL DATA

Sub-Section 04 (EXPLORER 5820 MODEL)

PERFORMANCE		EXPLORER (5820)
Pump static thrust		210 kg (462 lb)
Maximum fuel consumption at wide open throttle		22.7 L / h. (6 U.S. gal / h)
Cruising time at full throttle	Fuel tank without reserve	2 hours
	Fuel tank reserve	13 minutes
ADDITIONAL INFORMATION:		
ELECTRICAL (vehicle)		EXPLORER (5820)
Battery		12 V, 19 A•h
Starting system fuse		5 A
Charging system fuse		15 A
Blower system fuse		5 A
ADDITIONAL INFORMATION:		
CAPACITIES		EXPLORER (5820)
Fuel tank		48 L (12.6 U.S. gal)
Impeller shaft reservoir	Capacity	65 mL (2.2 U.S. oz)
	Oil level height	To bottom of cover hole
Injection oil tank		2.8 L (95 U.S. fl oz)
ADDITIONAL INFORMATION:		
STANDARD EQUIPMENT		EXPLORER (5820)
Tether cord		STD
Tool kit		STD
Fuel tank reserve		STD
Overheating warning device		STD
Electric fuel level gauge		STD
Injection oil low level warning device		STD
Tachometer		OPT.
Variable trim system (VTS)		N.A.
Reverse		STD
Storage compartment (front and rear)		STD
Rear grab bar		STD
Extinguisher holder		STD
ADDITIONAL INFORMATION:		

Section 12 TECHNICAL DATA
Sub-Section 04 (EXPLORER 5820 MODEL)

TIGHTENING TORQUES		EXPLORER (5820)		
E N G I N E	Exhaust manifold, screws (8)	24 N·m	(17 lbf·ft)	
	Magneto flywheel nut	105 N·m	(77 lbf·ft)	
	Flywheel (PTO side)	110 N·m	(81 lbf·ft)	
	Crankcase screws	10 N·m	(88 lbf·in)	
	M6	24 N·m	(17 lbf·ft)	
	M8	35 N·m	(26 lbf·ft)	
	Crankcase / engine support nuts	25 N·m	(18 lbf·ft)	(1)
	Engine support / hull	24 N·m	(17 lbf·ft)	(1)
	Cylinder head screws	24 N·m	(17 lbf·ft)	(1)
	Crankcase / cylinder screws	25 N·m	(18 lbf·ft)	(1)
P U M P	Tuned pipe flange nut and screws	25 N·m	(18 lbf·ft)	
	Tuned pipe fixation screws	25 N·m	(18 lbf·ft)	(1)
	Cylinder head cover screws	9 N·m	(80 lbf·in)	(1)
	Flame arrester screws	10 N·m	(88 lbf·in)	(1)
	Impeller on shaft	70 N·m	(52 lbf·ft)	(2)
	Pump /hull	35 N·m	(26 lbf·ft)	(1)
	Venturi / housing	25 N·m	(18 lbf·ft)	(1)
S T E E R I N G	Nozzle / venturi	20 N·m	(15 lbf·ft)	(1)
	Housing cover	7 N·m	(62 lbf·in)	(1)
	Grill	8 N·m	(71 lbf·in)	(1)
	Ride shoe	10 N·m	(88 lbf·in)	(1)
	Steering cable lock nuts	10 N·m	(88 lbf·in)	
	Steering support screws	15 N·m	(11 lbf·ft)	(1)
	Steering collar screws	5 N·m	(44 lbf·in)	(1)
	Steering stem screw	40 N·m	(30 lbf·ft)	(2)
E L E C T R I C A L	Handlebar saddle screws, nuts	26 N·m	(19 lbf·ft)	
	Reverse gate / venturi	20 N·m	(15 lbf·ft)	
	Cable / reverse gate	7 N·m	(62 lbf·in)	
	Steering cable / stem arm	7 N·m	(62 lbf·in)	
	Steering cable / nozzle	7 N·m	(62 lbf·in)	
	Ignition housing cover	5 N·m	(44 lbf·in)	
	Starter mounting screws	22 N·m	(16 lbf·ft)	(2)
ADDITIONAL INFORMATION: Apply where indicated		(1) Loctite 242		
		(2) Loctite 271		
		(3) Loctite 515		

TROUBLESHOOTING

The following chart is provided to help in diagnosing the probable source of troubles. It is a guideline and should not be assumed to have all causes for all problems.

ENGINE WILL NOT START

OTHER OBSERVATION	POSSIBLE CAUSE	REMEDY
Engine does not turn over	<ul style="list-style-type: none">• Tether cord worn or removed• Fuse open• 5A fuse keeps on burning• Discharged battery• Battery connections• Water / fuel hydrolock• Starter or solenoid• Seized engine• Seized jet pump• Jammed pump	<ul style="list-style-type: none">• Replace / reinstall• Check wiring then replace fuse• Check wiring then replace MPEM and fuse• Check / recharge• Check / clean/tighten• Check, refer to section 03-01• Check, refer to section 07-04• Check / repair as needed• Check, refer to section 08-01• Check / clean out debris
Engine slowly turns	<ul style="list-style-type: none">• Discharged / weak battery• Restriction in jet pump• Seizure in jet pump• Seal carrier seizure• Partial engine hydrolock• Partial engine seizure• Starter worn• Wear ring improperly installed	<ul style="list-style-type: none">• Check / charge/replace• Check / clean pump• Inspect, refer to section 08-01• Check, refer to section 08-01• Check, refer to section 03-01• Check compression, refer to section 03-03• Check, refer to section 07-04• Check / replace, refer to section 08-01
Engine turns over	<ul style="list-style-type: none">• Fuel tank empty• Fuel water-contaminated• Dirty fuel filter• Fouled spark plugs• Water in engine• Misuse of choke (fuel flooded)• Carburetion• Ignition• Engine flooded<ul style="list-style-type: none">— Needle valve stuck open• Choke(s) not closing completely• Excessive rotary valve clearance• Internal engine damage• Sheared flywheel key• Incorrect rotary valve timing	<ul style="list-style-type: none">• Refill• Renew supply• Clean / replace• Replace• Check, refer to section 03-01• Use only with cold engine• Check, refer to section 05-03• Check, refer to section 07-02 and 07-06• Check, refer to section 05-03• Adjust for complete closure• Check, refer to section 03-06• Check, refer to section 03-03 and 03-05• Check timing mark, refer to section 07-02• Check, refer to section 03-06

Section 13 TROUBLESHOOTING

OTHER OBSERVATION	POSSIBLE CAUSE	REMEDY
Engine turns over (contd.) <ul style="list-style-type: none">• No spark at spark plugs• Sparks occur at spark plugs when disconnecting BLACK / RED or WHITE wire from MPEM• MPEM BLACK and BLACK / RED or WHITE wires have a close circuit (0 reading on ohmmeter)• Fuel / oil gauge and tachometer give a reading while cranking	<ul style="list-style-type: none">• MPEM BLACK / RED or WHITE wire has touched a positive terminal (as the solenoid post)	<ul style="list-style-type: none">• Replace MPEM

Section 13 TROUBLESHOOTING

ENGINE MISFIRES, RUNS IRREGULARLY

OTHER OBSERVATION	POSSIBLE CAUSE	REMEDY
Weak spark	<ul style="list-style-type: none">• Fouled, defective, worn spark plugs• Faulty RPM limiter / stop switch• Faulty ignition• Sheared flywheel key	<ul style="list-style-type: none">• Check / verify heat range / gap / replace• Check, refer to section 07-06• Check, refer to section 07-06• Check timing mark, refer to section 07-02
Lean fuel mixture Dry spark plug (except when water fouled)	<ul style="list-style-type: none">• Fuel level low• Stale or water fouled fuel• Fuel filter dirty or restricted• Carburetion dirty or out of adjustment• Leaking crankshaft seal(s), rotary valve cover O-ring(s)• Fuel valve restricted• Loose carburetor	<ul style="list-style-type: none">• Check / refill• Check / siphon and refill• Check / clean/replace• Check / clean / adjust, refer to section 05-03• Check / test / replace, refer to engine section 03-05 and 03-06• Check / replace• Tighten carburetor(s)
Rich fuel mixture Fouled spark plug	<ul style="list-style-type: none">• Partially closed choke(s)• Flame arrester dirty or restricted• Carburetor adjustment or setting • Main jet loose• Main jet O-ring damage • Rotary valve shaft seal leaking • Oil pump adjustment• Watercraft transportation• Worn, needle(s) and seat(s)• Excessive rotary valve clearance	<ul style="list-style-type: none">• Check / adjust choke cable• Check / clean / replace• Check / clean / adjust, refer to section 05-03• Check, refer to section 05-03• Check / replace, refer to section 05-03• Check / replace, refer to section 03-06• Check / adjust, refer to section 06-02• Turn fuel valve to OFF• Check, refer to section 05-03• Check, refer to section 03-06
Difficult to start	<ul style="list-style-type: none">• Incorrect rotary valve timing• Excessive rotary valve clearance	<ul style="list-style-type: none">• Check / adjust, refer to section 03-06• Check, refer to section 03-06

Section 13 TROUBLESHOOTING

ENGINE OVERHEATS

OTHER OBSERVATION	POSSIBLE CAUSE	REMEDY
Overheat beeper sounds	<ul style="list-style-type: none">• Restricted jet pump water intake• Cooling system restriction• Grounded temperature sensor or sensor wire	<ul style="list-style-type: none">• Check / clean• Check / flush, refer to section 04-03• Check / repair / replace

ENGINE CONTINUALLY BACKFIRES

OTHER OBSERVATION	POSSIBLE CAUSE	REMEDY
Weak spark	<ul style="list-style-type: none">• Fouled, defective spark plugs• RPM limiter malfunction	<ul style="list-style-type: none">• Clean / replace• Check / replace, refer to section 07-06
Ignition timing	<ul style="list-style-type: none">• Incorrect setting• Flywheel key sheared	<ul style="list-style-type: none">• Check / reset, refer to section 07-02• Check / replace
Rotary disc valve	<ul style="list-style-type: none">• Timing incorrect	<ul style="list-style-type: none">• Check / reset, refer to section 03-06
Carburetor	<ul style="list-style-type: none">• Carburetion too lean	<ul style="list-style-type: none">• Check / adjust, refer to section 05-03
Engine	<ul style="list-style-type: none">• Intake leak / crankshaft seal failure	<ul style="list-style-type: none">• Pressure check engine to 48 kPa (7 PSI)

ENGINE DETONATION OR PINGING

OTHER OBSERVATION	POSSIBLE CAUSE	REMEDY
Ignition	<ul style="list-style-type: none">• Timing too far advanced• Spark plug heat range too high	<ul style="list-style-type: none">• Check / reset• Check / change to correct range
Engine temperature	<ul style="list-style-type: none">• Engine overheating• Poor quality fuel	<ul style="list-style-type: none">• Check, refer to section 03-01 and 04-01 or to engine overheat• Use good quality fuel

Section 13 TROUBLESHOOTING

ENGINE LACKS ACCELERATION OR POWER

OTHER OBSERVATION	POSSIBLE CAUSE	REMEDY
	<ul style="list-style-type: none">• Weak spark• Carburetion, jetting too rich / lean• Throttle does not reach full open• Low compression• Exhaust system restriction• Water in gas or oil• Debris in needle valve• Impeller trailing edge damaged• Twisted crankshaft	<ul style="list-style-type: none">• Check / replace, refer to section 07-06• Check / reset / reject, refer to section 05-03• Check / readjust• Check / repair, refer to section 03-03• Check / clean• Check / siphon / replace• Check / clean, refer to section 05-03• Check / replace, refer to section 08-01• Check, refer to section 03-05

ENGINE RUNS TOO FAST

OTHER OBSERVATION	POSSIBLE CAUSE	REMEDY
Engine RPM too high	<ul style="list-style-type: none">• Faulty RPM limiter• Improper impeller pitch (too low)	<ul style="list-style-type: none">• Check, refer to section 07-06• Check / replace, refer to section 08-01
Jet pump cavitation	<ul style="list-style-type: none">• Damaged leading or trailing edge of impeller	<ul style="list-style-type: none">• Check / replace <p> NOTE : Leading edge damage contributes to poor performance from start. Trailing edge damage contributes to poor top performance and stator vanes erosion.</p>
Jet pump ventilation	<ul style="list-style-type: none">• Pump housing or ride shoe air leak	<ul style="list-style-type: none">• Check / reseal, refer to section 08-01

ABNORMAL NOISE FROM PROPULSION SYSTEM

OTHER OBSERVATION	POSSIBLE CAUSE	REMEDY
	<ul style="list-style-type: none">• Weeds / debris caught in pump intake or impeller• Low oil level in pump housing• Damaged or bent drive shaft• Broken motor mounts• Rusted / worn hull seal carrier	<ul style="list-style-type: none">• Check / clean• Check / troubleshoot source of leak / refill supply, refer to section 08-01• Check / replace, refer to section 08-01• Check / replace, refer to section 03-02• Check / repair, refer to section 08-01

