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SAFETY NOTICE

This manual has been prepared as a guide to service the SEA-DOO, models 5804 (SP), 5811 (GT), 5850 (XP).

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 Catalog.

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 5804-5811-5850.

WATERCRAFT MODEL NUMBER
Can be found on U.S. Coast Guard approved label located on LH side of stern (rear) eyelet.

HULL IDENTIFICATION NUMBER (H.I.N.)
Can be found at RH rear side of hull, and inside it.

The five digits after "ZZN" are the watercraft serial number.

ZZN 1 2 3 4 5 X X X X

Serial number
ENGINE IDENTIFICATION NUMBER
(E.I.N.)

It is located on the upper side of the magneto housing.

ARRANGEMENT OF THIS MANUAL

The manual is divided into 13 major sections:
01 Service Tools
02 Periodic Inspection Chart
03 Engine
04 Cooling System
05 Fuel System
06 Oil System
07 Electrical
08 Propulsion and Drive Systems
09 Steering System
10 Hull/Body
11 Storage
12 Technical Data
13 Troubleshooting

Each section is divided in various sub-sections, and again, each sub-section has one or more division.

DEFINITION OF NUMBERING SYSTEM

Sections and Sub-Sections System

The manual makes use of a 2-part digital numbering system (i.e. 01-01), in which the first two-digits represents the section, the second two-digits the sub-section.

EX.: 03 ENGINE

01 Water-Flooded Engine Care
02 Removal and Installation
03 Top End
04 Flywheel and Magneto
05 Bottom End
06 Rotary Valve and Reservoir

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 catalog.

When ordering parts always refer to the specific model, parts catalog.

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.

\[\text{CAUTION} : \text{Pay attention to torque specifications.} \]

Some of these are in lb\(\text{f}\cdot\text{in}\) instead of lb\(\text{f}\cdot\text{ft}\). Use appropriate torque wrench.

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

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 subsection 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.

Technical Publications
Bombardier Inc.
Valcourt (Quebec) Canada
### SERVICE TOOLS

#### ENGINE

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<tr>
<th>SERVICE TOOL</th>
<th>PURPOSE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree wheel (mandatory) 295 000 007</td>
<td>To mark timing position of rotary valve, to check crankshaft alignment.</td>
<td>All models</td>
</tr>
<tr>
<td>BOMBARDIER ignition tester (mandatory) 295 000 008</td>
<td>To test engine electrical components.</td>
<td>All models</td>
</tr>
</tbody>
</table>

[Images of the tools are provided for reference.]
## Section 01 SERVICE TOOLS

<table>
<thead>
<tr>
<th>SERVICE TOOL</th>
<th>PURPOSE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubber pad (mandatory) 295 000 079</td>
<td>To avoid needles of connecting rod bearing from falling in crankcase.</td>
<td>All models</td>
</tr>
<tr>
<td>Piston pin puller ass’y (mandatory) 290 877 090</td>
<td>To remove piston pin.</td>
<td>All models</td>
</tr>
<tr>
<td>Locating sleeve (P/N 290 877 180)</td>
<td>Expansion sleeve (P/N 290 877 040)</td>
<td></td>
</tr>
<tr>
<td>Extracting nut (P/N 290 877 155)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piston circlip installer (mandatory) 295 000 077</td>
<td>To install circlips on pistons.</td>
<td>All models</td>
</tr>
<tr>
<td>SERVICE TOOL</td>
<td>PURPOSE</td>
<td>APPLICATION</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Puller plate (mandatory)</td>
<td>Used with extension handle to retain crankshaft. When removing/installing PTO flywheel and loosen/tighten MAG flywheel nut.</td>
<td>All models</td>
</tr>
<tr>
<td>290 876 080</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extension handle (mandatory)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>295 000 003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impeller / PTO flywheel remover/installer (mandatory)</td>
<td>Used to loosen/tighten PTO flywheel and impeller. Hold flywheel with puller plate and extension handle above.</td>
<td>All models</td>
</tr>
<tr>
<td>295 000 001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puller (mandatory)</td>
<td>Used with puller plate and extension handle to remove MAG flywheel.</td>
<td>All models</td>
</tr>
<tr>
<td>290 876 065</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Section 01 SERVICE TOOLS

<table>
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<tr>
<th>SERVICE TOOL</th>
<th>PURPOSE</th>
<th>APPLICATION</th>
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</thead>
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<tr>
<td>Puller with screws (mandatory) 290 876 298</td>
<td>To remove crankshaft bearings.</td>
<td>All models</td>
</tr>
<tr>
<td>Protective cap (both ends) (mandatory) 290 876 557</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ring (both ends) (mandatory) 290 977 490</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ring halves (PTO) (mandatory) 290 977 475</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance ring (MAG) (mandatory) 290 876 569</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ring halves (MAG) (mandatory) 290 278 025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SERVICE TOOL</td>
<td>PURPOSE</td>
<td>APPLICATION</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>--------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Distance gauge (mandatory)</td>
<td>To position outer crankshaft bearing on PTO side.</td>
<td>All models except 5801</td>
</tr>
<tr>
<td>290 876 826</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puller (mandatory)</td>
<td>To remove rotary valve shaft from crankcase.</td>
<td>All models</td>
</tr>
<tr>
<td>290 876 487</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pusher (mandatory)</td>
<td>To install end bearing of rotary valve shaft in crankcase.</td>
<td>All models</td>
</tr>
<tr>
<td>290 876 500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pusher (mandatory)</td>
<td>To install rotary valve shaft in crankcase.</td>
<td>All models</td>
</tr>
<tr>
<td>290 876 605</td>
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<td></td>
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</tbody>
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## SERVICE TOOLS

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<th>SERVICE TOOL</th>
<th>PURPOSE</th>
<th>APPLICATION</th>
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<td>Alignment tool (mandatory)</td>
<td>To align engine/jet pump whenever either one is removed and reinstalled.</td>
<td>All models</td>
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<tr>
<td>295 000 089</td>
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<td></td>
</tr>
<tr>
<td>Dial indicator (TDC gauge) (recommended)</td>
<td>To find TDC position. For ignition timing and rotary valve timing.</td>
<td>All models</td>
</tr>
<tr>
<td>295 000 065</td>
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<tr>
<td>Stroboscopic timing light (recommended)</td>
<td>To verify ignition timing.</td>
<td>All models</td>
</tr>
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<td>295 000 078</td>
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<td>SERVICE TOOL</td>
<td>PURPOSE</td>
<td>APPLICATION</td>
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<td>----------------------------------</td>
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<td>-------------</td>
</tr>
<tr>
<td>Ring compressor (recommended) 290 876 972</td>
<td>To compress piston ring when inserting piston in cylinder.</td>
<td>All models</td>
</tr>
<tr>
<td>Aligning tool (recommended) 290 876 900</td>
<td>To align cylinders by exhaust flanges at assembly.</td>
<td>All models</td>
</tr>
<tr>
<td>Centering tool (recommended) 290 876 922</td>
<td>To position coils on armature plate at assembly.</td>
<td>All models</td>
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### Section 01  SERVICE TOOLS

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<th>SERVICE TOOL</th>
<th>PURPOSE</th>
<th>APPLICATION</th>
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<tr>
<td>Nippondenso CDI tester (recommended)</td>
<td>To test engine ignition system components.</td>
<td>All models</td>
</tr>
<tr>
<td>295 000 080</td>
<td><strong>NOTE</strong>: This high quality tester use power source of 115 volts AC / 60 Hz.</td>
<td></td>
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### COOLING/FUEL/OIL SYSTEMS

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<th>APPLICATION</th>
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<tr>
<td>Pliers (mandatory)</td>
<td>To secure/cut ear clamps on oil/fuel lines</td>
<td>All models</td>
</tr>
<tr>
<td>295 000 070</td>
<td>and coolant hoses.</td>
<td></td>
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**Cutting clamp**

**Securing clamp**

**Securing clamp in limited access**

[Image: Pliers and clamps diagram]
## Section 01 SERVICE TOOLS

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<th>SERVICE TOOL</th>
<th>PURPOSE</th>
<th>APPLICATION</th>
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<tr>
<td>Hose pincher (mandatory)</td>
<td>To avoid leaks while working on oil/fuel lines.</td>
<td>All models</td>
</tr>
<tr>
<td>295 000 078</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gear holder (mandatory)</td>
<td>To remove/install retaining nut of oil injection pump gear.</td>
<td>All models</td>
</tr>
<tr>
<td>290 277 905</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump gauge tester (recommended)</td>
<td>To verify release pressure and leak at carburetor.</td>
<td>All models</td>
</tr>
<tr>
<td>295 000 083</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SERVICE TOOL</td>
<td>PURPOSE</td>
<td>APPLICATION</td>
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<tr>
<td>--------------------------------------------------------------</td>
<td>----------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Pump gauge tester (recommended) 295 000 085</td>
<td>To pressurize fuel system; to verify any leak.</td>
<td>All models</td>
</tr>
</tbody>
</table>

- **NOTE**: Must maintain a pressure of 34 kPa (5 PSI) during 10 minutes. Never pressurize over 34 kPa (5 PSI).

- **CAUTION**: Lubricate air pump piston seal using mild soap. Using hydrocarbon lubricant will destroy rubber seal.
## PROPULSION SYSTEM

<table>
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<th>SERVICE TOOL</th>
<th>PURPOSE</th>
<th>APPLICATION</th>
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<tbody>
<tr>
<td>Pliers (mandatory) 295 000 069</td>
<td>To remove/install drive shaft boot reusable stepless clamps.</td>
<td>All models</td>
</tr>
<tr>
<td>Impeller / PTO flywheel remover/ installer (mandatory) 295 000 001</td>
<td>Used to loosen/tighten impeller on shaft.</td>
<td>All models</td>
</tr>
<tr>
<td>Impeller shaft holder (mandatory) 295 000 082</td>
<td>Used to loosen/tighten impeller on shaft.</td>
<td>All models</td>
</tr>
<tr>
<td>SERVICE TOOL</td>
<td>PURPOSE</td>
<td>APPLICATION</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Bearing/seal installer (mandatory) 295 000 014</td>
<td>To install impeller shaft needle bearings and seal.</td>
<td>All models</td>
</tr>
<tr>
<td>Impeller shaft guide (mandatory) 295 000 002</td>
<td>To protect seal lip when installing impeller shaft in its housing.</td>
<td>All models</td>
</tr>
<tr>
<td>Alignment tool (mandatory) 295 000 089</td>
<td>To align engine/jet pump whenever either one is removed and reinstalled.</td>
<td>All models</td>
</tr>
</tbody>
</table>
## Section 01  SERVICE TOOLS

<table>
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<tr>
<th>SERVICE TOOL</th>
<th>PURPOSE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitting (recommended)</td>
<td>To pressurize pump assembly</td>
<td>All models</td>
</tr>
<tr>
<td>295 000 086</td>
<td>before installation, to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>verify if any leak.</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Must maintain a pressure of 70 kPa (10 PSI) during 10 minutes. Never pressurize over 70 kPa (10 PSI).
<table>
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<tr>
<th>SERVICE TOOL</th>
<th>PURPOSE</th>
<th>APPLICATION</th>
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</thead>
<tbody>
<tr>
<td>Dolley (recommended)</td>
<td>To handle watercraft in shop or on beach.</td>
<td>All models</td>
</tr>
<tr>
<td>295 000 004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beach wheels (recommended)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>295 000 005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shop lamp (recommended)</td>
<td>To facilitate repair when working inside the</td>
<td>All models</td>
</tr>
<tr>
<td>295 000 081</td>
<td>hull body.</td>
<td></td>
</tr>
<tr>
<td>▲ WARNING: Never use electric powered tools on watercraft unless first verifying that no gasoline leaks/fumes are present.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# PERIODIC INSPECTION CHART

**NOTE:** Shade area shows the maintenance frequency.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lubrication/corrosion protection of metallic components</td>
<td>Monthly 3 Months</td>
</tr>
<tr>
<td>Engine ignition timing</td>
<td>6 Months Yearly</td>
</tr>
<tr>
<td>Spark plugs, cleaning/adjustment</td>
<td></td>
</tr>
<tr>
<td>Throttle/choke cables, inspection/lubrication</td>
<td></td>
</tr>
<tr>
<td>Flame arrester element, inspection</td>
<td></td>
</tr>
<tr>
<td>Carburetor adjustment including choke/throttle cable adjustments and linkage</td>
<td></td>
</tr>
<tr>
<td>Oil injection pump adjustment</td>
<td></td>
</tr>
<tr>
<td>Fuel filter cleaning, oil filter inspection</td>
<td></td>
</tr>
<tr>
<td>Oil filter, replacement</td>
<td></td>
</tr>
<tr>
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<td>Drive shaft, lubricate grease fitting at PTO flywheel</td>
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<tr>
<td>Lubricate grease fitting at seal carrier</td>
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<td>Water intake grill condition</td>
<td></td>
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<tr>
<td>Hull condition</td>
<td></td>
</tr>
<tr>
<td>Cooling system flushing</td>
<td></td>
</tr>
</tbody>
</table>

- Every month in salt water use.
- These items have to be initially checked after three months. Thereafter, servicing to be made as specified in this chart.
- Daily flushing in salt water use.
WATER-FLOODED ENGINE

General

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

\[\text{CAUTION: A water-flooded engine must be properly lubricated, operated then lubricated again, otherwise parts will be seriously damaged.}\]

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.

\[\text{CAUTION: Crankcase drain plugs should have Loctite PST 567 (P/N 293 800 013) applied to threads before reinstalling.}\]

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

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

\[\text{WARNING: Ensure tether cord is removed from switch to prevent any spark.}\]

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

Crank engine again.

Reinstall spark plugs, then tether cord cap on switch.

Turn fuel value 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.

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

\[\text{NOTE: If engine does not start after several attempts, check ignition system for spark occurrence.}\]

Check crankshaft end seals, hydraulic lock may have pushed them out. Consider that center seals may have slipped out too. Refer to BOTTOM END 03-05 then look for crankshaft alignment.

\[\text{WARNING: Ventilate bilge at least two minutes prior to checking spark.}\]

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.

\[\text{CAUTION: Water must be supplied to cool engine with flush kit (P/N 295 000 038).}\]
## Components

<table>
<thead>
<tr>
<th>No.</th>
<th>Component Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hexagonal nut M8</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Lock washer M8</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Tuned pipe</td>
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</tr>
<tr>
<td>4</td>
<td>Gasket</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Lock washer M10</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Stud M6 x 26/16</td>
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</tr>
<tr>
<td>7</td>
<td>Engine Rotax 587</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Gasket (2)</td>
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<td>9</td>
<td>Engine support</td>
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<tr>
<td>10</td>
<td>Lock washer (8)</td>
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<tr>
<td>11</td>
<td>Allen screw M8 x 70</td>
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<td>Washer M8</td>
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<td>Allen screw M8 x 75</td>
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<td>14</td>
<td>Saddle</td>
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<td>15</td>
<td>Shim .40 mm (.016 in.) (3)</td>
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<tr>
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<td>Shim 1.40 mm (.055 in.) (3)</td>
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<tr>
<td>16</td>
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<td>17</td>
<td>Washer M8 (8)</td>
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<td>18</td>
<td>Hexagonal head screw M8 x 30</td>
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<tr>
<td>19</td>
<td>Exhaust manifold</td>
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<td>Flat washer M10</td>
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<tr>
<td>21</td>
<td>Nut M10</td>
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</tr>
<tr>
<td>22</td>
<td>Hose formed</td>
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</tr>
<tr>
<td>23</td>
<td>Camp (4)</td>
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</tr>
<tr>
<td>24</td>
<td>Exhaust outlet</td>
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</tr>
<tr>
<td>25</td>
<td>Lock washer M6</td>
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<tr>
<td>26</td>
<td>Hexagonal head screw M6 x 25</td>
<td>4</td>
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<tr>
<td>27</td>
<td>Muffler</td>
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</tr>
<tr>
<td>28</td>
<td>Muffler strap</td>
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<tr>
<td>29</td>
<td>Hose 90 mm</td>
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</tr>
<tr>
<td>30</td>
<td>Camp (1)</td>
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<tr>
<td>31</td>
<td>Rubber strip</td>
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<tr>
<td>32</td>
<td>Loctite 242</td>
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</tr>
<tr>
<td>33</td>
<td>Loctite 587 &quot;Ultra Blue&quot;</td>
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<td>34</td>
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<td>35</td>
<td>Rivet (4)</td>
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<tr>
<td>36</td>
<td>Hexagonal head screw M8 x 20</td>
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<tr>
<td>37</td>
<td>Washer (4)</td>
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<td>38</td>
<td>Rubber pad (1)</td>
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<tr>
<td>39</td>
<td>Shim .40 mm (.016 in.) (2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shim 1.30 mm (.051 in.) (2)</td>
<td></td>
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</tbody>
</table>
**Section 03 ENGINE**

**Sub-Section 02 (REMOVAL AND INSTALLATION)**

**COMPONENTS**

1. Hexagonal nut M8 (4)
2. Lock washer M8 (4)
3. Tuned pipe extension
4. Gasket
5. Stud M8 x 26 (4)
6. Exhaust manifold
7. Gasket (2)
8. Rotax engine 587
9. Engine support
10. Lock washer M6 (8)
11. Lock washer (4)
12. Lock washer M8 (10)
13. Allen screw M8 x 75 (8)
14. Shim 0.40 mm (0.016 in)
15. Shim 0.40 mm (0.016 in)
16. Rubber mount (4)
17. Flat washer 8 mm (4)
18. Hexagonal screw M8 x 30 (8)
19. Hexagonal screw M8 x 20 (4)
20. Flat washer 10 mm (4)
21. Elastic stop nut M10 (4)
22. Hose formed
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, 10 mL
33. Sealant Loctite 587 "Ultra Blue", 300 mL
34. Clamp
35. Rubber strip
36. Hexagonal screw M8 x 20 (4)
37. Exhaust cone

**GENERAL**

It is not necessary to remove engine from watercraft for TOP END servicing nor PTO FLYWHEEL AND MAGNETO. 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 look for removal and overhaul.

**Cooling and Exhaust Systems**

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

Disconnect hose from water outlet socket on engine, injection hose and vent tube from tuned pipe.

Loosen gear clamp from hose between bottom of tuned pipe and engine water inlet socket; insert a screwdriver through opening between tuned pipe, cylinder and magneto housing.

Loosen gear clamp on tuned pipe outlet.

NOTE: On some models the exhaust collar holding tuned pipe extension and tuned pipe has to be removed.
Open electrical box and disconnect wires of cable coming from magneto housing.

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

**Intake and Fuel Systems**

Loosen clamp of intake silencer hose on carburetor side.

Pivot intake silencer to rear of watercraft.

Remove both retaining screws of carburetor support from engine cover.

Turn fuel valve to OFF position.

Disconnect fuel supply line from carburetor.

Disconnect fuel return line from carburetor. Be careful not to drop any part.

Disconnect throttle and choke cables from carburetor.

Unscrew carburetor support from flame arrester cover.

Unscrew carburetor mount nuts then remove carburetor and flame arrester together; slightly lift it to release nuts as necessary.

Disconnect impulse line.

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

**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 starter mounting bolt, then **red** positive cable from starter post. Wrap insulating tape around red cable connector.

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

Remove throttle cable from oil injection pump.
Section 03  ENGINE
Sub-Section 02  (REMOVAL AND INSTALLATION)

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.

**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 tool.

- 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 hose, then disconnect.

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.

16,18, 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 line 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).

32,36, Loctite 242 and Screw

Apply Loctite 242 on screw threads and torque to 25 N•m (18 lbf•ft).

**NOTE**: Always use the engine/jet pump alignment tool (P/N 295 000 089) to check alignment for reinstallation.

Electrical Connections

First, install red positive cable on starter post and torque nut to 7 N•m (62 lbf•in) then black negative cable on starter mounting bolt apply Loctite 271 on threads torque to 22 N•m (16 lbf•ft). Apply Dielectric Grease (P/N 293 550 004) on connectors then cover with boot.

**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 cover. 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.

Torque cover screws to 2 N•m (18 lbf•in).

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Section 03 ENGINE
Sub-Section 02 (REMOVAL AND INSTALLATION)

5811 Model (1st Run) Only

19,11,12,13,14,30, Exhaust Manifold, Screw, Washer, Saddle and Clamp
Position clamp so that its screw will be accessible from top.
Position saddle so that its higher side is at bottom.
Install screws paying attention to their different length with washers as shown.

Torque screws in a criss-cross sequence to 20 N•m (15 lbf•ft).

All Models
1,3,4, Nut, Tuned Pipe, Gasket and Screw
Make sure that gasket is properly located on exhaust manifold prior to finalizing pipe installation.
Apply Loctite 242 on stud and retaining screw threads. Hand-tighten nuts only and assure that tuned pipe is against the saddle or the support rests on manifold.
To ease tuned pipe retaining screw installation a hexagonal bit socket such as Snap-on TMAM6 can be used.

^ CAUTION : If a gap is left, stress will eventually occur on tuned pipe and may cause cracking.
Torque nuts in a criss-cross sequence and screws to 25 N•m (18 lbf•ft).

^ CAUTION : Make sure that a sufficient gap is present between hull and tuned pipe, and also between clamp protrusion and hull.

5850 Model Only

Tuned Pipe Extension
Install tuned pipe extension to tuned pipe with exhaust collar. Position exhaust collar as illustrated. Do not tighten collar yet.

With hose removed, align extension outlet with muffler inlet.

NOTE : Due to tuned pipe extension angle, it may have to be rotated to obtain alignment.
Push extension until it touches tuned pipe, then slightly pull extension from tuned pipe to leave a small gap 2 mm (5/64 in) approximately between both.

^ CAUTION : This gap is important to eliminate possible cracks due to vibration.
Tighten exhaust collar and torque to 2.5 N•m (22 lbf•in).

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

www.SeaDooManuals.net
https://www.boat-manuals.com/
All Models

Final Inspection
Check throttle cable condition then 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 tube to the battery. Ensure vent tube 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 flush kit (P/N 295 000 038).

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 (pure tung "green", zircon "brown") and AC current or use aluminum welding rod 5.55 mm (3/32 in) (#4043) to fill crack.
— Sand welding slightly to remove material surplus.
To verify leaks plug all holes and pressurize tuned pipe using compressed air at 124 kPa (18 PSI) while immersing it in water.

↑ CAUTION: Always ensure water passages are not blocked partially or completely while welding tuned pipe.
Section 03 ENGINE
Sub-Section 03 (TOP END)

TOP END

[Diagram of engine parts labeled with numbers and torque specifications]

https://www.boat-manuals.com/
### COMPONENTS

1. Allen screw M6 x 35 (2)
2. Lock washer (11)
3. Sensor switch
4. Allen screw M6 x 25 (19)
5. Bracket
6. Cylinder head cover
7. O-ring
8. Hexagonal screw M8 x 55 (12)
9. Sealing ring
10. Loctite 515
11. O-ring (2)
12. O-ring
13. Cylinder head
14. Hose nipple (2)
15. O-ring (2)
16. O-ring (2)
17. Hexagonal screw M8 x 70 (8)
18. Grease
19. Cylinder with sleeve (2)
20. Cylinder gasket
21. Semi-trapez ring (2)
22. Rectangular ring (2)
23. Piston (2)
24. Piston pin (2)
25. Circlip (4)
26. Needle bearing (2)
27. Cylinder sleeve
28. Gasket set
29. Loctite PST 567
30. Sealant Pl-32
31. Loctite primer N
32. Hose nipple
33. Loctite 242

### 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

Disconnect thermosensor wire.

Remove cylinder head cover.

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 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, 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.

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

⚠️ **CAUTION:** This engine design features cageless piston pin bearing. At piston disassembly, rollers may fall out, use rubber pad to prevent rollers from dropping in crankcase.

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

![Rubber pad](https://www.boat-manuals.com/image)

If other cylinder has been removed, completely cover its opening with a clean rag.
As an additional precautionary measure, a magnet can be installed under piston to catch rollers for removal.

NOTE: To remove MAG piston, PTO piston or ignition housing must be removed to allow access. To remove circlip, insert a pointed tool in piston notch then pry it out.

WARNING: Always wear safety glasses when removing piston circlips.

To extract piston pin, use piston pin puller (P/N 290 877 090) 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 clockwise to pull piston pin.

— By turning the spindle, pull out piston pin until it aligns with the reference mark 587 on the extractor sleeve.

— Rotate spindle counterclockwise 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 will 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 (0.826 in) dia.

\[\text{CAUTION: Recover rollers, make sure that 31 rollers are found for each piston.}\]

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 with a piece of broken ring.

INSPECTION
Visually inspect all parts for corrosion damage.
Inspect piston for damage. Light scratches can be sand-ed 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.

<table>
<thead>
<tr>
<th>MEASUREMENTS</th>
<th>TOLERANCES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NEW PARTS</td>
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<tr>
<td></td>
<td>(min.)</td>
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<tr>
<td>Cylinder Taper</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Cylinder Out of Round</td>
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<td>Cylinder / Piston Clearance</td>
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<tr>
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<tr>
<td>Clearance</td>
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<td>(.001 in)</td>
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<tr>
<td></td>
<td>0.08 mm</td>
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<tr>
<td></td>
<td>(.003 in)</td>
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<tr>
<td></td>
<td>0.25 mm</td>
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<td>(.010 in)</td>
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</tbody>
</table>

\[\text{NOTE: Replacement cylinder sleeves are available if necessary. Consult a specialized shop for installation.}\]

\[\text{NOTE: 0.25 and 0.5 mm oversize piston and rings are available if necessary.}\]
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.

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.

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.
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.

**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.

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.
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. Carefully cover crankcase opening as for disassembly. Installation of roller bearing and piston pin using proper service tool piston pin puller (P/N 290 877 090), proceed as follows:

- Replacement bearings are held in place by a locating sleeve outside and two plastic cage halves inside.
- Push the inner halves out of the bearing as per following illustration.

- Push needle bearing together with expansion sleeve out of the locating sleeve into the connecting rod bore.
- Use any suitable pusher 21 mm (.826 in.) dia. as a tool. Make sure thrust washers are present each side of rollers.

---

-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:

- Align replacement roller bearing with connecting rod bore.
Section 03 ENGINE
Sub-Section 03 (TOP END)

— Carefully push inner plastic sleeve into connecting rod bore; outer plastic ring will release rollers.

— Place piston over connecting rod and align bores, then gently tap piston pin with a fiber hammer to push out inner plastic ring on opposite side. Support piston from opposite side.

— 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.
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).

⚠️ 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).

— 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.

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

Ring end gap aligned with piston locating pin

Slide cylinder over piston.

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 290 876 900) or exhaust manifold itself.

NOTE: If manifold has been used for exhaust flanges alignment, remove it for engine installation in watercraft.
17, 18, 19, Screw, Grease and Cylinder
Apply grease (P/N 293 550 010) below screw head. Install and torque screws in a criss-cross sequence for each cylinder to 20 N•m (15 lbf•ft).

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

8, 11, 12, 13, Screw, O-ring and Cylinder Head
Apply 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. Install and torque screws to 20 N•m (15 lbf•ft) as per following illustrated sequence.

1, 4, 6, Screw and Cylinder Head Cover
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 ignition housing support and flame arrester support.

**NOTE:** Hand-tighten screws only. Final torque should be carried on after flame arrester/carburter and ignition housing installation, once engine is in the watercraft.

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

1. Spark plug protector (2)
2. Spark plug (2)
3. Grease “Dielectric”, 150 g
4. Hexagonal head screw M8 x 20 (2) (1st series)
5. Lock washer 8 mm (2)
6. Support
7. Grommet (2)
8. Ignition housing
9. Tie rap (2)
10. Loctite 242, 10 mL
12. Ignition coil
13. Screw Tappet M6 x 25
14. Helical tape 130 mm
15. Ignition module
16. Washer M6 (2)
17. Cable holder
18. Lock washer 8 mm (4)
19. Hexagonal socket head cap screw M8 x 25
20. Washer 5.5 (2)
21. Lock washer 5 mm (2)
22. Hexagonal socket head cap screw M5 x 18 (2)
23. Harness assembly
24. Generating coil
25. Insulation sheath
26. Insulation sheath
27. PTO side flywheel
28. Anti-seize lubricant
29. Loctite 615
30. Magneto flywheel ass’y
31. Ring gear 77 teeth
32. Ignition cover
33. Self tapping screw M5 x 25 (12)
34. Lock washer M22
35. Hexagonal nut M22
36. O-ring
37. Loctite 648
38. High tension cable set
39. Ring terminal (2)
40. Female connector 3.96 (4)
41. Male connector 3.96 (4)
42. Protection mat
43. Protection cover
44. Screw Tappet M5 x 16 (2)
45. Holding strip
46. Screw Tappet M4 x 8 (2)
47. Grommet
48. Sensor wire with plug assembly
49. Grommet
50. Silicone 732 RTV, 90 mL
51. Harness (without connector)
52. Armature plate assembly
53. Woodruff key 3 x 3.7
54. Grommet
55. Loctite primer N
56. Screw Tappet M8 x 16 (2) (2nd series)

## GENERAL

The following procedures can be performed without removing engine from watercraft. However, electrical box and battery removal will be required. Also withdraw jet pump unit ass’y, refer to PROPULSION AND DRIVE SYSTEMS 08-01 then look for removal and overhaul.

To ease the removal of PTO flywheel heat center of flywheel with a heat gun to break bond.

**WARNING**: Never use a torch in the engine compartment. Electrolyte or fuel vapors can be present it may ignite and possibly cause personal injuries.

## REMOVAL

Remove ignition housing support (if applicable).

### 32, 33, Ignition Cover and Screw

Remove screws and 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) and extension handle (P/N 295 000 003).

![Extension handle](https://www.boat-manuals.com/)

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

Using three M8 x 25 mm screws, secure puller plate on MAG flywheel so that puller ribs are against flywheel. Install extension handle on end of puller plate.

Insert special tool in PTO flywheel splines.

Rotate MAG flywheel so that extension handle end stops on work table for PTO flywheel loosening. PTO flywheel is loosen using impeller remover (P/N 295 000 001).

Using a suitable wrench or socket, unscrew PTO flywheel COUNTERCLOCKWISE when facing it.
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Sub-Section 04 (PTO FLYWHEEL AND MAGNETO)

30. Magneto Flywheel
With puller plate properly secured as for PTO flywheel removal, rotate MAG flywheel so that extension handle end stops on work table for loosening.

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.

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).

31. 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.

22,52, Screw and Armature Plate Ass’y
To ease reassembly and further ignition timing, indexing marks should be made on armature plate and crankcase.
Remove both retaining screws and withdraw armature plate.
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.
- Find manufacturer's mark on armature plate. In line with this mark, punch another mark on adjacent crankcase lug.
- At assembly, align armature plate mark (previously punched) with the end of the same locating lug on the new crankcase.
From now on, these marks will be used for further assembly positioning as a pre-timing position.

8,19, 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.

8,19, Ignition Housing and Screw
Apply Loctite 515 Gasket Eliminator (P/N 293 800 007) on housing/crankcase mating surfaces. Some engines may have a gasket.

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.

Apply Loctite 242 (blue) (P/N 293 800 015) on screw threads then torque them in a criss-cross sequence to 22 N•m (16 lbf•ft).

After housing installation, make sure before reinstalling electric starter, that inlet socket is installed on crankcase.

22,52, 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).

31, 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.

CAUTION: At MAG flywheel installation, ring gear teeth chamfer and starter clutch should be facing each other.

30,35, MAG Flywheel and Nut

Apply Loctite 242 (blue) (P/N 293 800 015) on crankshaft taper.
Position Woodruff key, MAG flywheel, apply Loctite 242 (blue) and install fasteners on crankshaft.
Torque nut to 105 N•m (77 lbf•ft).

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

27, 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.

Ignition Timing

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

32,33, Ignition Housing Cover and Screw

Properly install O-ring in cover. Torque screws in a criss-cross sequence to 4 N•m (35 lbf•in).

NOTE: Use silicone 732 RTV on the O-ring and wipe off silicone excess.
**COMPONENTS**

1. Crankcase ass'y
2. Lock washer 8 mm (14)
3. Hexagonal socket head cap screw M8 x 45 (6)
4. Hexagonal head screw M8 x 65 (6)
5. Allen screw M8 x 75 (2)
6. Stud M10 x 25/18 (4)
7. Retaining ring
8. Retaining shim
9. Oil seal
10. Ball bearing 6207 (2)
11. Anti-seize lubricant, 355 mL
12. Distance ring
13. O-ring (2)
14. Crankshaft
15. Distance ring
16. O-ring (2)
18. Distance ring
19. Ball bearing 6206 (2)
20. Oil seal
21. Shim 30.4/51/1
22. O-ring (2)
23. Drain plug
24. Hose nipple
25. Loctite 515, 50 mL
26. Loctite 242, 10 mL
27. Loctite PST 567
28. Water inlet socket
29. Hexagonal head screw M6 x 20 (2)
30. Loctite 242, 10 mL
31. O-ring

**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 be twisted on connecting rod journal on any or both cylinder(s).

![Crankshaft Alignment at Center Main Journal](image)

NOTE: The following verifications 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.
Section 03 ENGINE
Sub-Section 05 (BOTTOM END)

— With the other hand, slowly rotate engine by PTO fly-wheel.

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 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.

To remove water inlet socket, electric starter must be removed.

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
- 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.

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).
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:

<table>
<thead>
<tr>
<th>MEASUREMENTS</th>
<th>TOLERANCES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NEW PARTS</td>
</tr>
<tr>
<td>Crankshaft Deflection</td>
<td>N.A.</td>
</tr>
<tr>
<td>(mm)</td>
<td></td>
</tr>
<tr>
<td>Connecting Rod Big End Axial Play</td>
<td>0.40 mm</td>
</tr>
<tr>
<td>(mm)</td>
<td>(.016 in)</td>
</tr>
</tbody>
</table>

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.

NOTE: If bearings are to be renewed, 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 # 157 (P/N 285 000 0401).

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

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.

(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.

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

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.

3,5, Screw
Torque crankcase screws to 22 N•m (16 lbf•ft) as per following illustrated sequence.

4, Screw
Apply Loctite 515 (P/N 293 800 007) on screw threads.

6, Stud
At assembly in crankcase, apply Loctite 515 (P/N 293 800 007) on stud threads.

Finalizing Assembly
31,32, Water Inlet Socket and Screw
If water inlet socket has been removed from crankcase, reinstall it with its bigger end (inlet) pointing towards ignition housing.

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

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

Big end towards ignition housing
Install before electric starter
Torque to 7 Nm (62 lbf•in)

Install before engine support or ignition housing
Section 03  ENGINE
Sub-Section 06  (ROTARY VALVE AND RESERVOIR)

COMPONENTS

5. Ball bearing 6201
6. C-clip
7. Spring holder cup
8. Spring
9. Gear 14 teeth
10. O-ring
11. Shim 0.5 mm
12. Distance sleeve 24.5 mm
13. Shim 0.5 mm
14. Ball bearing 6203
15. Oil seal
16. Rotary valve shaft
17. Snap ring
18. Rotary valve
19. O-ring
20. Rotary valve cover
21. Dowel pin
22. Lock washer 8 mm (4)
23. Hexagonal head screw M8 x 20 (4)
24. Rubber ring
25. Loctite 648

NOTE: Some reference numbers are deliberately missing.
COMPONENTS

1. Oil level indicator cap
2. Clamp (2)
3. Rivet (4)
4. O-ring
5. Adapter
6. Gasket
7. Clamp (2)
8. Hose
9. Oil tank
10. Grommet (2)
11. Grommet (2)
12. 90° Elbow (2)

13. 90° Elbow
14. 90° Elbow (1)
15. Filter
16. Hose 6 mm
17. Hose 12 mm
18. Hose 6 mm
19. One way check valve
20. Strap
21. Tie rap
22. Tie rap
23. Tie mount

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

ROTARY VALVE COVER AND VALVE GAP

A gap of 0.2 - 0.3 mm (.008 in - .013 in) must be maintained between rotary valve and crankcase.

To measure this gap, remove rotary valve cover and its O-ring.

Using soldering wire for electronic applications (tin with resin core, approximately 0.8 mm (.030 in) dia.), install three short pieces 13 mm (1/2 in) long over rotary valve. If necessary, apply grease to hold in position.

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

Remove cover then clean and measure compressed tin thickness, it must be within specified tolerance. Otherwise check cover for wear/ warpage and crankcase; renew defective parts.

NOTE: If gap is found under tolerance, sand surface with fine sand paper on a surface plate, rub part against lightly oiled sand paper.

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.

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

GENERAL

Engine must be removed from watercraft to work on rotary valve shaft/ components. Refer to REMOVAL AND INSTALLATION for procedures.

Bottom end must be opened to remove rotary valve shaft.

DISASSEMBLY

20,23, Rotary Valve Cover and Screw

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

16,17, Snap Ring and Rotary Valve Shaft

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.

6, 7, Circlip and Spring Holder Cup

If it is necessary to disassemble components of rotary valve shaft assembly, compress spring by holder cup to remove circlip.

12, Distance Sleeve

To remove distance sleeve use a bearing extractor such as Snap-on #CJ-950 as illustrated. Heat distance sleeve to approximately 150°C (300°F) to break the Loctite bond and press shaft out.

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

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

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

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 sandpaper on a surface plate. Surface part against oiled sandpaper.

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

### TOLERANCES

<table>
<thead>
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<th>MEASUREMENTS</th>
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<tr>
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<td>NEW PARTS</td>
</tr>
<tr>
<td>Rotary Valve Cover and Valve Gap</td>
<td>N.A.</td>
</tr>
<tr>
<td>Rotary Valve Shaft Deflection</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

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

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

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

Position ball bearing shielded side towards rotary valve.

Push bearing until it stops on its seat.

15.16. Seal, Rotary Valve Shaft
Apply lithium grease on seal lips. Position seal with shielded portion against shaft splines.
Apply Loctite 648 (green) (P/N 290 899 788) inside of distance sleeve.
14,16, Bearing and Rotary Valve Shaft
Install ball bearing as illustrated.

16,17, Rotary Valve Shaft Ass’y and Snap Ring

\[ \text{CAUTION: Crankcase halves must be separated and crankshaft must not be present to install rotary valve shaft ass’y in crankcase.} \]

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

Push shaft until it stops on bearing seat.

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

ROTARY VALVE TIMING

When the same crankcase is reassembled or a replacement crankcase is installed, \textit{never} use timing mark ridge if any for timing method. For rotary valve timing a TDC gauge (P/N 295 000 065) is required.

Installation on Same Crankcase or Replacement Crankcase

A degree wheel (P/N 295 000 007) is required to measure rotary valve opening and closing angles in relation with MAG side piston. Degree wheel will be installed on rotary valve shaft for measurements.
Section 03 ENGINE
Sub-Section 06 (ROTARY VALVE AND RESERVOIR)

Rotary valve must be set so that timing occurs as follows:

<table>
<thead>
<tr>
<th>WATERCRAFT MODEL</th>
<th>OPENING BTDC</th>
<th>CLOSING ATDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>5804</td>
<td>115 $\pm\frac{3}{5}$</td>
<td>80 $\pm\frac{5}{3}$</td>
</tr>
<tr>
<td>5811</td>
<td>115 $\pm\frac{3}{5}$</td>
<td>65 $\pm\frac{5}{3}$</td>
</tr>
<tr>
<td>5850</td>
<td>115 $\pm\frac{3}{5}$</td>
<td>65 $\pm\frac{5}{3}$</td>
</tr>
</tbody>
</table>

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.

- Position rotary valve on shaft splines to have edges as close as possible to these marks.

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

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

20,23, 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.
## COMPONENTS

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Section 04  COOLING SYSTEM
Sub-Section 02  (CIRCUIT)

TECHNICAL DATA

Type: TLCS (total loss cooling system)
Coolant pressure: Pressure build-up at impeller housing (no water pump)
Flow control: Calibrated outlet sockets at exhaust outlet and drain line (no thermostat)
System bleeding: Self-bleed type (hose at uppermost point of circuit)
System draining: Self-drain type (hose at lowest point of circuit)
System flushing: A flush kit is available
Overheating beeper: Turns on at 96-99°C (205-210°F)
FLUSHING

When the watercraft is operated in unclean water and 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 engine to severe damage.

Flushing is necessary when the watercraft is operated in:

- salt water
- unclean water
- shallow water where underwater ground 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 evacuate 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 part when engine is running.

A convenient flush kit (P/N 295 000 038) can permanently be installed on the watercraft to ease flushing. For flush kit installation and flushing procedure refer to instruction sheet included with the kit.

**NOTE:** If a flush kit is not installed on watercraft, disconnect outlet hose at exhaust socket. Insert garden hose nozzle into hose end for flushing.

Proceed as follows:

1. Remove seat to allow access of cooling system.
2. Disconnect outlet hose at exhaust socket and insert garden hose nozzle into hose end. Do not open water tap yet.
3. Start the engine then immediately open the water tap.

**CAUTION:** Always start the engine before opening the water tap. Otherwise, water will backflow 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. Disconnect garden hose from outlet hose and connect hose to exhaust socket.
7. Wipe off any residual water on the engine.
8. Reinstall seat and properly latch.

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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.

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

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

NOTE: Tether cord cap must be over its switch so that beeper works.

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.

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 indicating that water circulates.
### Section 05  FUEL SYSTEM

Sub-Section 01  (FUEL CIRCUIT)

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### AIR INTAKE

1. Allen screw M6 x 25 (2)
2. Cover adaptor
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 silencer
14. Inlet tube (2)
15. Synthetic grease
16. Screw M4 x 6
17. Perforated 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 (8)
24. Allen screw M6 x 12 (2)
25. Allen screw M6 x 30 except SP (5804) (4)
26. Nut M6 (2)
CARBURETORS

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

CLEANING

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

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, 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 outlet line.
Disconnect impulse line.
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.

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).

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

12, 21, Choke Valve and Throttle Valve
When installing butterfly into 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
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.
Section 05  FUEL SYSTEM
Sub-Section 03  (CARBURETORS)

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 150-170 kPa (21-25 PSI), pressure will drop to approximately 97-110 kPa (14-16 PSI) then stop.

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.

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 PS for 30 seconds. Otherwise, hold carburetor upside down over oil to needle valve and apply pressure.
Check for bubbles. If they come from seat O-ring, but the oil 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 sea.

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

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.

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.
Section 05  FUEL SYSTEM
Sub-Section 03  (CARBURETORS)

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.

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

Pressure Test

Proceed as follows:

— Open storage compartment cover and remove basket.
— Remove vent hose from tube at adapter.
— Connect pump gauge tester (P/N 295 000 085) to tube adapter.
— 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.

ADJUSTMENTS

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 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.

◆ 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 and turn adjustment nut as necessary.

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

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 1-1/2 to 2 turns.

Start and warm engine.

CAUTION: Water must be supplied to cool engine with flush kit (P/N 295 000 038).

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

52. Idle Speed Screw

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 wire of magneto side to measure engine speed.

Start engine and bring to normal operating temperature.

CAUTION: Water must be supplied to cool engine with flush kit (P/N 295 000 038).

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.
TWIN CARBURETORS

DISASSEMBLY

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

ASSEMBLY

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.
Section 05 FUEL SYSTEM
Sub-Section 01 (CARBURETORS)

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.

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

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 (0.020 in).

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

O WARNING: Always verify tightness of clamps and hoses.

Carburetor Mount Nuts

Install lock washers and apply Loctite 242 (P/N 293 80C 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.

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).

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

Flame Arrester

Always verify if flame arrester is dirty or restricted.

O WARNING: Never operate watercraft without flame arrester.

ADJUSTMENTS

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.

O NOTE: To have access to pilot jet or main jet, check valve housing assembly must be removed.
Section 05  FUEL SYSTEM
Sub-Section 03  (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.

Ensure carburetor butterflies are fully open at full throttle position. At this position throttle stop lever is almost in contact (10.5 mm (1/64 in)) with carburetor body.

NOTE : Ensure lock tab on throttle handle is installed over cable barrel opening.

⚠️ WARNING : Make sure idle set screw contacts stopper when throttle lever is fully released at handlebar.
Section 05 FUEL SYSTEM
Sub-Section 03 (CARBURETORS)

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

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.

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.
Start and warm engine.

CAUTION: Water must be supplied to cool engine with flush kit (P/N 295 000 038).
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.

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 wire of magneto side to measure engine speed.

Start engine and bring to normal operating temperature.

⚠️ **CAUTION**: Water must be supplied to cool engine with flush kit (P/N 295 000 038).

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.
Section 06  OIL SYSTEM
Sub-Section 01  (OIL INJECTION RESERVOIR)

COMPONENTS

1. Oil gauge
2. O-ring
3. Filler neck
4. Rivet 1/8 x .640 (4)
5. Clamp (2)
6. Gasket
7. Clamp (2)
8. Filler neck hose
9. Oil tank
10. Grommet (2)
11. Grommet (2)
12. Elbow fitting (2)
13. Elbow fitting
14. Elbow fitting
15. Oil filter
16. Hose 8 mm
17. Hose 12 mm
18. Hose 6 mm
19. Check valve
20. Strap
21. Tie rap
22. Tie rap
23. Tie mount (2)
24. Oetiker clamp
25. Oil level sender 5850 only
26. Float 5850 only
27. Grommet 5850 only

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.

19. Check Valve

Black side of check valve is the valve outlet.
OIL INJECTION PUMP, REPAIR AND ADJUSTMENT

PARTS IN ILLUSTRATION MARKED WITH X ARE NOT AVAILABLE AS SPARE PARTS.
Section 06  OIL SYSTEM
Sub-Section 02  (REPAIR AND ADJUSTMENT)

COMPONENTS

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

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).
Section 06  OIL SYSTEM  
Sub-Section 02  (REPAIR AND ADJUSTMENT)

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

Tighten adjustment nuts 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.

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 nuts to obtain pump mark alignment.

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 flush kit (P/N 295 000 038).
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.

Check that oil level in small oil lines is passed banjo fitting by about 25 mm (1 in) (this will be indicated by a clear section of small oil lines of about 25 mm (1 in)). 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.

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.

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

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 male terminal from connector housing use Snap-on TT600-4 tool.
WIRING DIAGRAM FOR 5850 MODEL

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

COLOR CODE
- RO = GREY
- WH = WHITE
- BR = BROWN
- BL = BLACK
- PN = PURPLE
- VL = YELLOW
- GR = GREEN

ENGINE STOP SWITCH (NORMALLY CLOSED)
STARTING SWITCH (NORMALLY OPEN)
TACHOMETER
FUEL AND OIL GAUGE
OIL SENSOR
FUEL SENSOR
BATTERY
STARTER
GENERATING COIL
IGNITION MODULE
SPARK PLUGS
ELECTRONIC IGNITION SYSTEM

This section is mainly divided in two parts, the first one using a top dead center gauge to verify 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 flywheel woodruff key.
2. Troubleshoot a flywheel corresponding to a different engine type.
3. Scribe the timing mark on a new service flywheel. Always verify flywheel timing mark position before checking ignition timing.

Verifying Flywheel Timing Mark Position
1. Disconnect MAG side spark plug wire and remove spark plug.
2. Unfasten electrical box than move box and battery away to allow access to ignition system.
3. Remove ignition housing cover.
4. Install and adjust a TDC gauge (P/N 295 000 065) in spark plug hole as follows:

   TDC gauge on MAG side

5. From this point, rotate flywheel back 1/4 turn then rotate it clockwise to reach 2.18 mm (.086 in) BTDC (Before Top Dead Center).
6. Check if flywheel mark aligns with mark on ignition housing.

IGNITION TIMING

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

(TYPICAL)

- Loosen adaptor lock nut then holding gauge with dial facing toward magneto, screw adaptor in spark plug hole.
- Slide gauge far enough into adaptor to obtain a reading then finger tighten adaptor lock nut.
- Rotate MAG flywheel clockwise 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.
If marks do not align, scribe a new one onto flywheel facing ignition housing mark. This new 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 CI) 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 ignition housing timing mark. 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 flywheel mark (or reference one previously scribed) aligns with ignition housing mark.

⚠️ **CAUTION**: If engine is to be run more than a few minutes, connect flush kit (P/N 295 000 038) to properly cool engine.

If timing marks align, timing is correct.

### IGNITION TIMING ADJUSTMENT

Timing is performed by moving armature plate, clockwise to retard spark occurrence or counterclockwise to advance.
Section 07 ELECTRICAL
Sub-Section 02 (IGNITION TIMING)

To retard

To advance

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

In this case, turn armature plate clockwise.

Retaining screws

When flywheel mark is on left side of ignition housing mark, it indicates **advanced** timing.

When flywheel mark is on right side of ignition housing mark, it indicates **retarded** timing.

Turn clockwise to retard
In this case, turn armature plate counterclockwise.

After adjustment, tighten armature plate retaining screws.

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

Reinstall removed parts.
Recheck ignition timing (make sure engine is cold).
TROUBLESHOOTING

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

* To test charging system, disconnect positive cable from battery and connect an ammeter between cable and battery post. Depending on battery charge, current draw will be about 0.5 A with a fully charged battery and 4 A for a discharged one.

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

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 tube is not obstructed.

HYDROMETER TEST

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.

Remove corrosion from battery cable terminals and battery posts using a firm wire brush.
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Sub-Section 03 (BATTERY)

A hydrometer measures the charge of a battery in terms of specific gravity of the electrolyte. Most hydrometers give a true reading at 27°C (80°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 27°C (80°F) and by subtracting .004 point for every 5.5°C (10°F) below 27°C (80°F).

This chart will be useful to find the correct reading.

<table>
<thead>
<tr>
<th>ELECTROLYTE TEMPERATURE</th>
<th>OPERATION TO PERFORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ºC</td>
<td>ºF</td>
</tr>
<tr>
<td>38</td>
<td>100</td>
</tr>
<tr>
<td>32</td>
<td>90</td>
</tr>
<tr>
<td>27</td>
<td>80</td>
</tr>
<tr>
<td>21</td>
<td>70</td>
</tr>
<tr>
<td>16</td>
<td>60</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>-1</td>
<td>30</td>
</tr>
<tr>
<td>-7</td>
<td>20</td>
</tr>
</tbody>
</table>

**EXAMPLE NO. 1**
Temperature below 27ºC (80ºF):
Hydrometer reading: 1.250
Electrolyte temperature: -7ºC (20ºF)
Subtract .024 Sp. Gr.
Corrected Sp. Gr. = 1.226

**EXAMPLE NO. 2**
Temperature above 27ºC (80ºF):
Hydrometer reading: 1.295
Electrolyte temperature: 38ºC (100ºF)
Add .008 Sp. Gr.
Corrected Sp. Gr. = 1.243

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 1.280 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.

During the storage period, recheck electrolyte level and specific gravity readings at least every 40 days. 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.

⚠️ CAUTION: Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

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.

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. Install vent tube, included in the battery kit, to battery elbow.

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

2. Remove caps and fill battery to UPPER LEVEL line with electrolyte (specific gravity: 1.260 at 20°C (68°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.

6. Connect a 2 A battery charger for 10 to 20 hours.

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

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

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

7. Disconnect battery charger.
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Sub-Section 03  (BATTERY)

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

11. Readjust electrolyte level.

9. Let battery settles for one hour.

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

10. Allow gas bubbles to escape by lightly shake battery.

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

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

WARNING: Vent tube must be free and open. A kinked or bent tube 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.

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 begins.

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 term of milliampere, 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 approximatively 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.
**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.

If the present charger is not adjustable to the proper current values, a rheostat can be connected in series with the battery to provide adjustment. 12 Ohm, 50 watt rheostats, such as ØHMITE - 0314 or MALLORY 50K 12P, are available from electronic parts supply shops and they are suitable for use with most chargers if the peak current is to be held below 2 A.

If you need an accurate ammeter, we recommend the use of : SHURITE - 5202 (0 to 3 A or - 5203 (0 to 5 A) available from electronic parts supply shops.

For example: Charging five batteries at a time requires a 10 A rated charger (5 x 2 A = 10 A).

**INSTALLATION OF BATTERY**

Install battery, connect red positive cable then black negative cable.

- **WARNING**: Battery black negative cable must always be disconnected first and connected last.

Apply silicone dielectric grease (P/N 293 550 004) or petroleum jelly on battery posts and connectors.

Ensure vent tube is properly installed on battery elbow and that it is not kinked or blocked.

- **WARNING**: Vent tube 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.

For a service application and a permanent installation, both ammeter and rheostat can be built into a small box adjacent to your charger.

⚠️ **CAUTION**: Adequate ventilation MUST be provided to cool the rheostat.

**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.
Section 07 ELECTRICAL
Sub-Section 04 (ELECTRIC STARTER)

COMPONENTS

1. Groove
2. Pinion stop collar
3. Pinion
4. Starter clutch assembly
5. Starter clutch housing
6. O-ring
7. Washer
8. Armature
9. Thrust washer
10. Yoke assembly
11. Brush holder
12. Commutator end frame
13. Waved washer (2)
14. Through bolt (2)
15. Gasket
16. External tooth lock washer 8 mm
17. Hexagonal head screw M8 x 30 (2)
18. Washer 5 mm (4)
19. Starter support
20. Elastic stop nut M5 (2)
21. Hexagonal head screw M8 x 16
22. Grease dielectric, 150 g
23. Washer 8 mm (3)
24. Loctite 271 (red)
25. Starter

STARTER SPECIFICATION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal output</td>
<td>0.6 kW</td>
</tr>
<tr>
<td>Voltage</td>
<td>12 V</td>
</tr>
<tr>
<td>Rated time</td>
<td>30 seconds</td>
</tr>
<tr>
<td>Rotation</td>
<td>Counterclockwise (viewed from pinion side)</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 2 kg (4.4 lb)</td>
</tr>
<tr>
<td>Performance</td>
<td>Test condition</td>
</tr>
<tr>
<td>Spec. at 20°C (68°F)</td>
<td>No load 11.5 V 20 A max. 5500 RPM</td>
</tr>
<tr>
<td></td>
<td>Load 8.5 V 170 A max. 2200 RPM 2 N•m (18 lbf•in)</td>
</tr>
<tr>
<td></td>
<td>Stall 5 V 350 A max. 0 RPM 3 N•m (27 lbf•in)</td>
</tr>
<tr>
<td>Battery</td>
<td>20 Ah</td>
</tr>
</tbody>
</table>

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.

https://www.boat-manuals.com/
# Section 07 ELECTRICAL

Sub-Section 04 (ELECTRIC STARTER)

## STARTING SYSTEM TROUBLESHOOTING TABLE

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starter does not turn.</td>
<td>Burnt fuse.</td>
<td>Check wiring condition and replace fuse.</td>
</tr>
<tr>
<td></td>
<td>Weak battery.</td>
<td>Recharge battery.</td>
</tr>
<tr>
<td></td>
<td>Poor contact of starter switch contact points.</td>
<td>Repair or replace switch.</td>
</tr>
<tr>
<td></td>
<td>Open circuit between starter switch and solenoid switch.</td>
<td>Repair.</td>
</tr>
<tr>
<td>Starter turns; but does not crank the engine.</td>
<td>Burnt or poor contact of solenoid switch contact disc.</td>
<td>Replace solenoid switch.</td>
</tr>
<tr>
<td></td>
<td>Poor contact of brush.</td>
<td>Straighten commutator and brush.</td>
</tr>
<tr>
<td></td>
<td>Burnt commutator.</td>
<td>Turn commutator in lathe.</td>
</tr>
<tr>
<td></td>
<td>Worn commutator segments.</td>
<td>Undercut mica.</td>
</tr>
<tr>
<td></td>
<td>Shorted armature.</td>
<td>Repair or replace armature.</td>
</tr>
<tr>
<td></td>
<td>Weak brush spring tension.</td>
<td>Replace spring.</td>
</tr>
<tr>
<td></td>
<td>Weak magnet.</td>
<td>Replace yoke assembly.</td>
</tr>
<tr>
<td></td>
<td>Worn bushings.</td>
<td>Replace bushings.</td>
</tr>
<tr>
<td></td>
<td>Weak battery.</td>
<td>Recharge battery.</td>
</tr>
<tr>
<td></td>
<td>Shorted battery cell(s).</td>
<td>Replace battery.</td>
</tr>
<tr>
<td></td>
<td>Poor contact of battery terminal(s).</td>
<td>Clean and tighten terminal(s).</td>
</tr>
<tr>
<td></td>
<td>Poor battery ground cable connection.</td>
<td>Clean and tighten.</td>
</tr>
<tr>
<td>Starter turns, but overrunning clutch pinion does not mesh with ring gear.</td>
<td>Worn clutch pinion gear.</td>
<td>Replace clutch.</td>
</tr>
<tr>
<td></td>
<td>Defective clutch.</td>
<td>Replace clutch.</td>
</tr>
<tr>
<td></td>
<td>Poor movement of clutch on splines.</td>
<td>Clean and correct.</td>
</tr>
<tr>
<td></td>
<td>Worn clutch bushing.</td>
<td>Replace clutch.</td>
</tr>
<tr>
<td></td>
<td>Worn starter bushing(s).</td>
<td>Replace bushing(s).</td>
</tr>
<tr>
<td></td>
<td>Worn ring gear.</td>
<td>Replace ring gear.</td>
</tr>
<tr>
<td></td>
<td>Melted solenoid switch contacts.</td>
<td>Replace solenoid switch.</td>
</tr>
<tr>
<td></td>
<td>Starter switch returns poorly.</td>
<td>Replace starter switch.</td>
</tr>
<tr>
<td></td>
<td>Sticking or defective starter clutch.</td>
<td>Lubricate or replace.</td>
</tr>
</tbody>
</table>

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Section 07  ELECTRICAL
Sub-Section 04  (ELECTRIC STARTER)

REMOVAL
Unfasten electrical box from hull.
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:
— tuned pipe
— 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.

1,2,3, Circlip, Pinion Stop Collar and Spring
Tap the pinion stop collar using a screwdriver. Remove circlip. Disassemble pinion stop collar and spring.

4,5,6,8, 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

NOTICE: 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.

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 (.047 in).

Overrunning Clutch

Pinion of overrunning clutch should turn smoothly in clockwise direction, and should not slip in a counterclockwise 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 look for ring gear.

Starter Switch

Switch condition can be checked with an ohmmeter. Install test probes on RED and YELLOW/RED wires of switch. Measure resistance, it should be high when button is released and must be close to zero (0) ohms 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 -12 V on BROWN 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.

1,2, 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.
INSTALLATION

Make sure that starter and engine mating surfaces are free of debris. Serious trouble may arise if starter is not properly aligned.

Install starter apply Loctite 271 on screw threads and torque screw to 22 N\(\cdot\)m (16 lbf\(\cdot\)ft).

Connect the red battery cable to the starter and torque nut to 5 N\(\cdot\)m (44 lbf\(\cdot\)in).

Then connect black cable to starter using a flat washer, a tooth washer and a screw with Loctite 271 on threads. Torque screw to 22 N\(\cdot\)m (16 lbf\(\cdot\)ft).

\(\blacksquare\) 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.

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.

\(\blacksquare\) CAUTION: Make sure end frame fits perfectly on yoke.
COMPONENTS

1. Spark plug protector (2)
2. Spark plug [2]
3. Grease dielectric, 150 g
4. Hexagonal head screw M8 x 20 (2)
5. Lock washer 8 mm (2)
6. Support
7. Protection cap (2)
8. Ignition housing
9. Tie rap (2)
10. Loctite 242, 10 ml
11. Ignition coil
12. Screw tapite M8 x 25 (4)
13. Helical tape 130 mm
14. Ignition module
15. Washer 6 mm (2)
16. Cable holder
17. Lock washer 8 mm (4)
18. Allen screw M8 x 25 (4)
19. Washer 5.5 (3)
20. Allen screw M5 x 18 (3)
21. Wiring harness assembly
22. Generator coil
23. Harness ass’y
24. Armature plate
25. Slotted head screw M5 x 35 (2)
26. Battery charging coil
27. Screw M6 x 25 (2)
28. Magneto flywheel ass’y
29. Ring gear 77 teeth
30. Ignition cover
31. Self tapping screw M5 x 25 (12)
32. Lock washer 22 mm
33. Hexagonal nut M22
34. O-ring
35. Loctite 648
36. Combined screw M4 x 8
37. Cable clamp
38. Splice connector (6)
39. Shrink tube 30 mm (6)
40. Protection mat
41. Protection cover
42. Screw tapite M6 x 16 (2)
43. Holding strip
44. Screw tapite M4 x 8 (2)
45. Cable grommet
46. Sensor wire with grommet assembly
47. Grommet
48. Silicone 732 RTV, 50 mL
49. Harness (without connector)
50. Armature place assembly
51. Wooduff key 3 x 3.7
52. Grommet
53. High tension cable set
54. Ring terminal (2)
55. Female connector 3.96 (4)
56. Male connector 3.96 (4)
57. Insulation sheath
58. Insulation sheath
59. Insulation sheath
60. Insulation sheath
61. Magneto 615 with primer N
62. Screw tapite M6 x 16 (2) (2nd serie)
63. Gasket

REMOVAL

Refer to ENGINE section 03-04 then look for PTO flywheel and magneto for parts removal.

DISASSEMBLY

24, Generating Coil

To replace generating coil :

- Heat the armature plate to 150°C (300°F) around the screw holes to break the Loctite bond.

CAUTION: Protect harness from flame.

- Remove screws.
- Cut the four 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.
- Insert the new wires into the old connector housing and install connectors.

Insert new wires

CAUTION: Replace the old wires in the connector with the same color coded new wires.
Section 07 ELECTRICAL
Sub-Section 05 (MAGNETO SYSTEM)

— Install a new receptacle connector to the black/yellow striped wire.
— 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.

28. Battery Charging Coil
To replace battery charging coil:
— Heat the armature plate to 150°C (300°F) around the screw holes to break the Loctite 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.

24, 27. Generating Coil and Screw
To install the new coil on the armature plate, remove the shipping nuts from the new coil and apply Loctite 242 (blue, medium strength) to screws before assembly.
Use magneto coil centering tool (P/N 290 876 922) and install so that it fits around armature plate before tightening screws.

41. Protector Tube
Position protector tubes over connections.
Section 07  ELECTRICAL
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28,29, 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.

ASSEMBLY

NOTE: Always apply dielectric grease on all electrical connections.

22,26, Screw and Armature Plate
Position the armature plate on the crankcase, aligning the marks on both parts.
Put a drop of Loctite 242 on screw threads and tighten.

12, Ignition Coil
When connecting wires to ignition coil, connect BLACK wire with "+" symbol underneath coil and WHITE/BLUE wire with "-" symbol.

INSTALLATION
Refer to ENGINE section 03-04 then look for PTO flywheel and magneto for installation.
Perform ignition timing.

CAUTION: Before reinstalling magneto, remove the loose epoxy from harness.
### COMPONENTS

1. Buzzer and stop switch assembly  
2. Hexagonal head screw M8 x 30 (2)  
3. Tether cord switch  
4. Ignition switch-starter  
5. Red battery cable (positive)  
6. Wiring harness  
7. Tie rap  
8. Switch nut  
9. Tether cord  
10. Cap  
11. Cover  
12. Protector cap (2)  
13. Rectifier  
14. Solenoid  
15. Starter cable  
16. Fuse holder (2)  
17. Fuse (2)  
18. Ground cable  
19. Ground cable  
20. Grommet (6)  
21. Self tapping screw M6.3 x 16 (2)  
22. Self tapping screw M6.3 x 38  
23. Washer (4)  
24. Lock nut M6  
25. Cap (6)  
26. External tooth lock washer  
27. Washer (2)  
28. Elastic stop nut 10-32 (2)  
29. Elastic stop nut 1/4-20 (2)  
30. "Dielectric" grease, 150 g  
31. Loctite 271 red  
32. Engine speed limiter  
33. Nut M5 (2)  
34. Flat washer (2)  
35. Mounting plate  
36. Self tapping screw M5 x 12 (2)
GENERAL

The Capacitor Discharge Ignition system includes the following components:

Ignition Module

It receives its primary electric current from magneto via a three-wire connector which charges a capacitor. It controls spark occurrence by discharging capacitor to primary winding of ignition coil.

Ignition Coil

It receives its energy from ignition module via a two-wire connector. It induces voltage to a high level in secondary winding to produce a spark at spark plug.

Magneto

It is the primary source of electrical energy. It transforms magnetic field into electric current through a low speed and a high speed coil.

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Engine Speed Limiter
It has three functions:
— Keeps high voltage away from tether cord switch.
— Provides engine stop by connecting YELLOW/BLACK wire with BROWN wire (ground).
— Limits engine RPM to prevent over-reving.

CAUTION: Whenever replacing a component in ignition system, check ignition timing.
The first three items can be checked with known automotive equipment and other items as follows:

Engine Stop/Tether Cord Switches Verification

Engine Stop Switch
Disconnect the BLACK and GREY wires in the electrical box. Using an ohmmeter, connect test probes to switch BLACK and GREY 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 PURPLE and RED wires in the electrical box. Using an ohmmeter, connect test probes to switch PURPLE and RED wires. Measure resistance; it must be close to zero ohm when cap is over switch and an open circuit when removed.

Engine Speed Limiter

NOTE: It is located in the electric box cover underneath mounting plate.
A defective speed limiter may cause the following problems:
— No spark.
— Uninterrupted 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 6500 ± 200 RPM. If not, replace limiter.

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. Engine speed limiter.
7. Ignition module output.
8. Ignition coil output.
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 (low/high speed), 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.

IMPORTANT: Since protection cover is removed in ignition housing to access connectors, reinstall both BROWN wires to engine to complete ground circuit. Otherwise engine will not stop when engine stop button or tether cord are activated.

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.).

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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 High Speed Generating Coil Output
1. Disconnect three-wire connector from ignition module.
2. Connect tester wires then set switch and dial as follows:

<table>
<thead>
<tr>
<th>Tester wires</th>
<th>Component wires</th>
<th>Tester switch position</th>
<th>Tester dial position</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>BLACK/RED of magneto harness</td>
<td>LOW</td>
<td>85</td>
</tr>
<tr>
<td>P</td>
<td>BLACK/WHITE of magneto harness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Perform test. Push reset button and repeat test three times.

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 three-wire connector from ignition module harness.

2. Connect tester wires then set switch and dial as follows:

<table>
<thead>
<tr>
<th>Tester wires</th>
<th>Component wires</th>
<th>Tester switch position</th>
<th>Tester dial position</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>BLACK/RED of magneto harness</td>
<td>HIGH</td>
<td>From 20 to 35</td>
</tr>
<tr>
<td>P</td>
<td>BLACK of magneto harness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Perform test. Push reset button and repeat test three times.

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. Separate two-wire connector between ignition module and coil.

2. Connect tester wires then set switch and dial as follows:

<table>
<thead>
<tr>
<th>Tester wires</th>
<th>Component wires</th>
<th>Tester switch position</th>
<th>Tester dial position</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>WHITE/BLUE of ignition module</td>
<td>HIGH</td>
<td>From 70 to 75</td>
</tr>
<tr>
<td>P</td>
<td>BLACK of ignition module</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Perform test. Push reset button and repeat test three times.

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.
**Section 07 ELECTRICAL**  
Sub-Section 06 (CDI AND CHARGING SYSTEMS)

**Ignition Coil Output**

1. Install a test adapter such as a paper clip to spark plug cable close to MAG spark plug.
2. Connect tester wires then set switch and dial as follows:

<table>
<thead>
<tr>
<th>Tester wires</th>
<th>Component wires</th>
<th>Tester switch position</th>
<th>Tester dial position</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Paper clip on spark plug</td>
<td>LOW</td>
<td>70</td>
</tr>
<tr>
<td>P</td>
<td>Ground</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SUMMARY TABLE**

<table>
<thead>
<tr>
<th>Test to perform</th>
<th>Tester wires</th>
<th>Component wires</th>
<th>Switch</th>
<th>Dial</th>
</tr>
</thead>
<tbody>
<tr>
<td>High speed generating coil</td>
<td>N</td>
<td>BLACK/RED of magneto harness</td>
<td>LOW</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>BLACK/WHITE of magneto harness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low speed generating coil</td>
<td>N</td>
<td>BLACK/RED of magneto harness</td>
<td>HIGH</td>
<td>From 20 to 35</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>BLACK of magneto harness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition module</td>
<td>N</td>
<td>WHITE/BLUE of ignition module</td>
<td>HIGH</td>
<td>From 70 to 75</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>BLACK of ignition module</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition coil</td>
<td>N</td>
<td>paper clip on spark plug</td>
<td>LOW</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>Ground</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 connectors 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.

3. Perform test. Push reset button and repeat test three times.

**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.
**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.

<table>
<thead>
<tr>
<th>PART NAME</th>
<th>WIRE COLOR</th>
<th>RESISTANCE OHM (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High speed generating</td>
<td>BLACK/WHITE with BLACK/RED</td>
<td>2.8 - 4.2</td>
</tr>
<tr>
<td>Low speed generating</td>
<td>BLACK with BLACK/RED</td>
<td>120 - 180</td>
</tr>
<tr>
<td>Primary winding</td>
<td>BLACK with WHITE/BLUE</td>
<td>0.23 - 0.43</td>
</tr>
<tr>
<td>Secondary winding</td>
<td>End of each spark plug</td>
<td>5.85 - 6.50 K</td>
</tr>
<tr>
<td></td>
<td>cable, spark plug</td>
<td></td>
</tr>
<tr>
<td></td>
<td>protectors removed</td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td>Check each wire of primary</td>
<td>open circuit (∞)</td>
</tr>
<tr>
<td></td>
<td>and secondary windings with</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ground for short circuit</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**: A short circuit will read zero (0 ohm) or close to 0 ohm on ohmmeter.
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 full-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, 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.

Current Test
Proceed as follows:
— Start engine.

NOTE: Start engine before connecting cables. Otherwise ammeter may be damaged as current flow is much higher at starting.
— Disconnect positive cable from battery and connect an ammeter between cable and battery post.
— 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

With Bombardier Ignition Tester
Operate it as for ignition system verifications.
1. Disconnect wires coming from magneto wiring harness.
2. Connect tester wires then set switch and dial as follows:

<table>
<thead>
<tr>
<th>Tester wires</th>
<th>Component wires</th>
<th>Tester switch position</th>
<th>Tester dial position</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>YELLOW of magneto harness</td>
<td>LOW</td>
<td>85</td>
</tr>
<tr>
<td>P</td>
<td>YELLOW/BLACK of magneto harness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. Perform test. Push reset button and repeat test three times.

RESULTS
a) Indicator lamp lights: Battery charging coil output is OK.
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:

<table>
<thead>
<tr>
<th>PART NAME</th>
<th>WIRE COLOR</th>
<th>RESISTANCE OHM (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAGNETO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery charging coil</td>
<td>YELLOW with YELLOW/BLACK of magneto harness</td>
<td>0.21 - 0.31</td>
</tr>
<tr>
<td>Insulation</td>
<td>Check each wire with ground for short circuit</td>
<td>open circuit (∞)</td>
</tr>
</tbody>
</table>

NOTE: A short circuit will read zero (0 ohm) (or close to) on ohmmeter.
NIPPONDENSO IGNITION TESTER

CDI Module Diode Test
The ignition module includes the diode which controls the output of the generating coil according to the engine speed. This tester can diagnose this diode. The result will be indicated on the LED level indicator.

Spark Test
Uses the ignition coil on vehicle to test the high tension circuit.

BEFORE TESTING
To prevent engine from starting and erroneous indication on the LED level indicator, remove the spark plug(s).

CAUTION: To prevent dust or foreign matter from being introduced inside the cylinder(s) when cranking the engine, install a clean rag over the cylinder head.

Connect the power cord to the power source (115 volts AC/60 Hz).

CAUTION: To prevent any damage to the tester, do not try other power source than the above mentioned one and ensure that the tester is installed on a plane surface, away from vehicle vibrations.

CONNECTION OF TEST WIRE HARNESS

NOTE: A few terms found on the function selector of the Nippondenso CDI tester are different from the ones used in this section. Control unit and control unit diode will be described as ignition module and ignition module diode respectively, generator coil will be generating coil.

All CDI systems are designated as 4-5P ignition type. Therefore harness B from CDI tester kit must be used to perform all test (it matches with code no. 2 from CDI tester chart).

NOTE: This tester can test generating coil (high, low speed), ignition module (including diode test) and spark test.

TEST CONDITION
Generating Coil Test (HI and LO)
This test is performed on the vehicle at cranking speed. The two generating coils are called high and low speed generating coils. The tester indicates the output of these coils by switching HI and LO positions as follows.

HI: Output of high speed generating coil.
LO: Output of high and low speed generating coil.

Analysis of this test is diagnosed by the number of LED lit on the indicator.

CDI Module Test
The CDI tester bypasses the generating coil by sending its own alternating current to the ignition module.

The output of the ignition module will be indicated on the LED level indicator. Analysis of this test is diagnosed by the LED level indicator.
**Section 07 ELECTRICAL**

**Sub-Section 06 (CDI AND CHARGING SYSTEMS)**

<table>
<thead>
<tr>
<th>CODE NO.</th>
<th>IGNITION TYPE</th>
<th>ENGINE TYPE</th>
<th>TEST WIRE HARNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4.5P</td>
<td>587</td>
<td>B</td>
</tr>
</tbody>
</table>

a) Connect the test wire harness to the tester aligning the arrow marks.

b) Disconnect the connectors between magneto and ignition module.

⚠️ **CAUTION**: Never pull the wire harness to disconnect.

c) Securely connect the connectors of test wire harness B according to the following figures.

⚠️ **CAUTION**: When connecting, be sure that the test wire harness does not interfere with moving part of engine.

**Vehicle Wiring**

- Breakerless magneto
- Ignition coil
- Ignition module

**Test Wire Harness Linked with Vehicle Wiring**

- Breakerless magneto
- Ignition coil
- Ignition module
- Test wire harness B

**TEST**

a) Turn the power switch on. Then one LED or two LED will light to indicate the tester is operating. Reset the indication circuit by depressing the reset switch. One LED will remain to indicate the checker is operating.

⚠️ **NOTE**: After every test when the LED level indicator holds its indication a few minutes, reset the indication circuit by depressing the reset switch.

b) Set the selector to the desired position.

c) Perform each test.
Section 07  ELECTRICAL
Sub-Section 06  (CDI AND CHARGING SYSTEMS)

d) If the test results are over or lower than the limit, see "Analysis of test".

NOTE: Test should be repeated two or three times. If reading does not repeat, output is erratic and cause should be investigated. (Loose connection of components, etc.).

Spark Test
a) Before performing this test, ensure that the ignition module and its diode have been checked.

NOTE: Ensure that brown ground wire has been connected.
b) Disconnect the checker test wire harness from the ignition module output side.

d) Connect the grounding wire to the CDI checker and to a bare surface of the engine.

e) Set the selector to CONTROL UNIT position.
f) Remove the protection cap from the end of high-tension wire.

g) Keep a distance of 5 mm (3/16 in) or less between bare surface of the engine and end of high-tension cable and depress the START SWITCH. Then spark will take place between them.

WARNING: Ensure the area is well ventilated and that there is no flammable fumes.
Section 07 ELECTRICAL
Sub-Section 06 (CDI AND CHARGING SYSTEMS)

Ignition Module Test
a) To perform this test, switch can be at LO or HI position.
b) Set the selector to CONTROL UNIT position.
c) Depress START switch for five seconds minimum and read LED level indicator.
Reading should be from 4 to 5.

Ignition Module Diode Test
a) Set the selector to CONTROL UNIT DIODE position. Then, four or five LED will light. If four or five LED do not light, check the power source and that the selector and switches are positioned correctly.
b) Depress the START switch and read LED level indicator.
Reading should be from 6 to 8.

Generating Coil Test
a) This test should be performed at both HI and LO switch positions. Switch LO position and set the selector to GENERATOR COIL position.
b) Crank the engine and read the LED level indicator.
Reading should be from 2 to 8.
c) Switch to HI position and repeat procedure.
Reading should be from 2 to 8.

WARNING: Do not touch the high tension wire while doing the procedure. Hold high tension wire with an insulator.
ANALYSIS OF TEST RESULT

After every test, perform the diagnosis comparing with the diagnostic chart as shown below (as found on CDI checker).

<table>
<thead>
<tr>
<th>CODE NO.</th>
<th>IGNITION TYPE</th>
<th>CHECK PART</th>
<th>LEVEL INDICATOR</th>
<th>NG*</th>
<th>OK</th>
<th>HARNESS</th>
<th>ENGINE TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4-5P</td>
<td>Generator coil</td>
<td>HI</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LO</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control unit</td>
<td></td>
<td>2</td>
<td></td>
<td>B</td>
<td>587</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control unit diode</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
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<td>5</td>
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<td>6</td>
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<td>8</td>
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<td></td>
<td></td>
<td>9</td>
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</tr>
</tbody>
</table>

*NG = Not good

If the reading of the LED level indicator is outside of the shaded OK range, refer to "Analysis of test result" as described hereafter.
TROUBLESHOOTING CHART – NIPPONDENSO CDI SYSTEM

SPARK TEST
(Ignition module must have been checked first)

5 mm (3/16”) SPARK TAKES PLACE

IGNITION COIL AND HIGH TENSION WIRE ARE GOOD

CHECK IGNITION TIMING

5 mm (3/16”) SPARK DOES NOT TAKE PLACE

FAULTY IGNITION COIL OR HIGH TENSION WIRE

REPLACE IGNITION COIL OR HIGH TENSION WIRE

PERFORM A NEW SPARK TEST

www.SeaDooManuals.net

07-06-17

https://www.boat-manuals.com/
Section 07 ELECTRICAL
Sub-Section 06 (CDI AND CHARGING SYSTEMS)

IGNITION MODULE DIODE (SCR) TEST
(4-5P ONLY)

AFTER THE START SWITCH HAS BEEN DEPRESSED

READING DOES NOT CHANGE

IGNITION MODULE DIODE (SCR) IS OPEN-CIRCUITED

READING IS AT THE CORRECT VALUE

IGNITION MODULE DIODE IS GOOD

READING CHANGES, BUT IT IS LOWER THAN THE CORRECT VALUE

IGNITION MODULE DIODE (SCR) IS SHORT-CIRCUITED

REPLACE IGNITION MODULE

PERFORM A NEW IGNITION MODULE DIODE TEST

CHECK IGNITION TIMING

www.BoatManuals.net
07-06-19

https://www.boat-manuals.com/
NGK SPARK PLUG

NGK SPARK PLUG NUMBERING SYSTEM

Bombardier is using the BR7ES NGK spark plug type on the 1991 watercraft.

The heat range identification system is:

- High number → cold plug
- Low number → hot plug
# Section 07 ELECTRICAL
## Sub-Section 07 (SPARK PLUGS)

## DESIGN SYMBOLS USED ON NGK SPARK PLUGS

<table>
<thead>
<tr>
<th>First letter prefix for thread and hexagon size</th>
<th>Second and third letter prefix for construction feature, except single prefix</th>
<th>Heat rating number for construction feature</th>
<th>First letter suffix for thread reach</th>
<th>Second letter suffix for construction feature, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter</td>
<td>Thread size</td>
<td>Hexagon size</td>
<td>Letter</td>
<td>Construction feature</td>
</tr>
<tr>
<td>A</td>
<td>18 mm</td>
<td>20.8 mm</td>
<td>B</td>
<td>Hexagon size 20.8 mm</td>
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<tr>
<td>B</td>
<td>14 mm</td>
<td>20.8 mm</td>
<td>C</td>
<td>Hexagon size 16.0 mm</td>
</tr>
<tr>
<td>C</td>
<td>10 mm</td>
<td>16.0 mm</td>
<td>D</td>
<td>Hexagon size 23.8 mm</td>
</tr>
<tr>
<td>D</td>
<td>12 mm</td>
<td>16.0 mm</td>
<td>E</td>
<td>Compact type (SHORTY)</td>
</tr>
<tr>
<td>F</td>
<td>7/8 in-14</td>
<td>23.8 mm</td>
<td>M</td>
<td>Compact type (MAXIM)</td>
</tr>
<tr>
<td>G</td>
<td>PF12 in-14</td>
<td>23.8 mm</td>
<td>P</td>
<td>Resistant type</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R</td>
<td>Shielded type</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>S</td>
<td>Surface discharge type</td>
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<tr>
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<td>U</td>
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</tbody>
</table>

*Standard regulation is drawn here. There also exist a few extraordinary symbols.*

**BP6ES11**

Wide gap type (mm)
DISASSEMBLY

First unscrew the spark plug one turn.
Clean the spark plug and cylinder head with pressurize 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.

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 and/or fuel mixing. 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

![Spark Plug Analysis](https://www.boat-manuals.com/image)

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.

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.
Section 07  ELECTRICAL
Sub-Section 07  (SPARK PLUGS)

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 accord-
ing 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.

Proper socket

Improper socket

SPARK PLUG CHART

<table>
<thead>
<tr>
<th>Models</th>
<th>Engine type</th>
<th>Spark plugs</th>
<th>Torque Nm (lb-ft)</th>
<th>Gap mm (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5804 (SPI)</td>
<td>587</td>
<td>NGK BR7ES</td>
<td>27 (20)</td>
<td>0.60 (0.024)</td>
</tr>
<tr>
<td>5811 (GTI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5850 (XPI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## COMPONENTS

2. Fitting (bailer) (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. Allen set screw (2)
13. Housing cover
14. Hexagonal head screw M5 x 20 (3)
15. Fitting (pump)
16. Venturi
17. Loctite 515
18. Flat washer M8 (4)
19. Hexagonal head screw M8 x 35 (4)
20. Hexagonal head screw M8 x 25 (2)
21. Sleeve (2)
22. Bushing (2)
23. Nozzle
24. Stud M10 x 45 (4)
25. Impeller
26. Boot
27. Wear ring
28. Loctite 515
29. Loctite 242 (blue)
30. Loctite 597 superflex ultra blue
31. Loctite primer N
32. Loctite 271 (red)
33. Synthetic grease
34. O-ring (2)
35. Lock washer M10 (4)
36. Thrust washer
37. Countersunk phillips screw M6 x 35 (6)
38. Countersunk phillips screw M8 x 15 (2)
39. Hexagonal head screw M6 x 20 (2)
40. Grill
41. Loctite PST 592
42. Flywheel
43. Grease fitting (2)
44. Clamp
45. Rubber boot
46. Clamp
47. Seal carrier assembly
48. Seal (single lip)
49. Seal carrier
50. Needle bearing
51. Seal (double lip)
52. Damper
53. Drive shaft
54. Nut M8 (4)
55. Flat washer M8 (8)
56. Flywheel guard
57. Loctite 414 super bond
58. Drive shaft assembly
59. Protective hose
60. Gear clamp (2)
61. Washer
62. Shim
63. Stud M9 x 15
64. Hull insert
65. Loctite 732 RTV silicone

### WARNING

It is strongly recommended to remove fuse from fuse holder, in electric box, to prevent engine/propulsion system from unexpected rotation.

### 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 ride shoe, etc, can be done by simply blocking the rear of vehicle above work stand.

---

**NOTE:** These verifications can be performed without removing impeller housing and thus, avoiding cleaning and sealing 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 underside of the watercraft. Remove grill and look through water inlet opening.

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 0.5 mm (0.020 in). If clearance is greater, disassemble jet pump and inspect impeller and wear ring. Renew worn parts.

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.

Oil Inspection/Replacement
Detach ball joint of steering cable from nozzle.
Remove four retaining screws from venturi.
Pull venturi and nozzle assembly apart.
Remove housing cover plug.
Check oil level, it should be to bottom of hole threads. If oil level is low, check impeller shaft seal and/or housing cover O-ring for leaks using the following tools.
Pressurize to a maximum of 70 kPa (10 PSI) during 10 minutes. If there is no pressure drop seals, O-ring, impeller shaft bushing located at seal level and metal porosity of impeller housing do not leak.

If there is a pressure drop spray soapy water around housing cover. If there is no bubbles, impeller shaft seal, bushing or impeller housing is leaking 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 repair boot or seal.

To replace oil, remove housing cover.

Thoroughly clean reservoir and inside of cover with a solvent.

Reinstall cover with its O-ring and Loctite 515 and 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 flywheel guard.
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.

6.7, Nut and Impeller Housing
Remove nuts retaining impeller housing to hull.
Make the following tool to easily separate impeller housing from hull.

— Keep clamp for later use.
From inside bilge, disconnect coolant inlet hose and both bailing tubes from impeller housing.

— 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 16 mm (5/8 in) diameter hole in center of the 330 mm (13 in) tube.
— Weld rectangular tubes together as shown in the following illustration.

Remove ball joint fasteners to release steering cable from nozzle.

21,22,23,24,62, Screw, Sleeve, Bushing, Nozzle and Washer
Remove two retaining screws and withdraw nozzle.
Push sleeves and bushings out of nozzle.
— Use threaded rod 13 x 170 mm (1/2 in. x 6-1/2 in.) long. On one end install a 13 mm (1/2 in.) diameter nut flush with the end and weld it.

— Weld two cold rolled rods 10 x 180 mm (3/8 x 7 in.) long on the nut as shown in the following illustration.

— Use one steel flat bar 38 x 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 16 mm (5/8 in) diameter hole in center of flat bar.

— Align a 13 mm (1/2 in N.C.) diameter nut over the hole already drilled in flat bar and weld it in place.

— Use two steel flat bars 38 x 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 thru flat bar.

— Weld flat bars together as shown in the following illustration.

— Install two 18 mm (5/8 in) washers on threaded rod before final assembly.

— Glue a rubber mat or similar protective material on support to prevent scratching hull rear section.
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.

37,38,39,40,41, Ride Shoe, Screw and Grill

**NOTE:** Grill must be removed prior to removing ride shoe. 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.

17,20,35, Venturi, Screw and O-ring
Remove four retaining screws and withdraw venturi. Keep O-ring for future use.

Make the following tool to easily separate ride shoe from hull.
**Section 08  PROPELLION AND DRIVE SYSTEMS**

**Sub-Section 01  (PROPELLION AND DRIVE SYSTEMS)**

**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 150 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.

![Diagram](https://www.boat-manuals.com/)

**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 coming 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 flange of boot. 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.

**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.

![Diagram](https://www.boat-manuals.com/)
Withdraw drive shaft.

**NOTE:** A jammed drive shaft can be removed by holding pump unit by drive shaft, slightly raised above a smooth surface, then striking 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).

13,14, Housing Cover and Screw

Starting 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.
Insert impeller shaft holder (P/N 295 000 082) on flat end of impeller shaft.
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).

2,15, Fitting

Fittings can be removed with deep socket or vise grip. Do not contact hose mounting area.
Fitting can be remove 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 hexagone 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.

CAUTION: Never use any impact wrench to loosen impeller.
To remove impeller, apply a rotation 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 shaft.

After cutting ring, insert a screwdriver blade between impeller housing and one end of ring.
Lift ring and 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 in bearing removal (the following item), can be used to push the three parts at same time. 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.
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.

Insert pusher into one bearing then push tool using a arbor press until bearings are out. This remover tool may also be used with a hammer. However, care should be taken not to damage bearing journals.

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.
Section 08 PROPULSION AND DRIVE SYSTEMS
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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 out with a scraper such as Snap-on #CS-A12.
Remaining silicone can be removed with a steel brush (disc) mounted on a drill motor.
Bombardier stripper #157 (P/N 295 000 040) can be used to remove remaining silicone. Carefully apply on mating surfaces taking care not to extend outside of this area because paint will be damaged. Let product dissolve silicone then scrape it.
Properly clean all threads.
Discard all O-rings and clean parts in a solvent.
Carefully check water passages (bailer, cooling system) and oil passages. Blow low pressure compressed air through them and make sure they are not clogged.

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 needle bearing of seal carrier 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.

INSPECTION

26,43,54, Impeller, Flywheel and Drive Shaft

Visually inspect splines of drive shaft, impeller and flywheel. Check for wear or deformation. Renew any damaged part.
Section 08  PROPULSION AND DRIVE SYSTEMS
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26, Impeller

Identification
To identify the impellers refer to the following illustrations and chart.
Measure distance A and B.

Refer to the following chart to identify impellers.

<table>
<thead>
<tr>
<th>VEHICLE MODEL NO.</th>
<th>IMPPELLER P/N</th>
<th>MATERIAL</th>
<th>DEGREE</th>
<th>MEASUREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>5801</td>
<td>271 000 028</td>
<td>Aluminum</td>
<td>18°</td>
<td>178 mm (7&quot;)</td>
</tr>
<tr>
<td>5802</td>
<td>271 000 086</td>
<td>Aluminum</td>
<td>18°</td>
<td>192 mm (7-9/16&quot;)</td>
</tr>
<tr>
<td>5803</td>
<td>271 000 086</td>
<td>Aluminum</td>
<td>18°</td>
<td>58 mm (2-9/32&quot;)</td>
</tr>
<tr>
<td>5804</td>
<td>271 000 052</td>
<td>Stainless steel</td>
<td>17°</td>
<td>186 mm (7-21/64&quot;)</td>
</tr>
<tr>
<td>5810</td>
<td>271 000 115</td>
<td>Stainless steel</td>
<td>19°</td>
<td>50 mm (2-13/64&quot;)</td>
</tr>
<tr>
<td>5850</td>
<td>271 000 046 (optional)</td>
<td>Stainless steel</td>
<td>17.7°</td>
<td>57 mm (2-1/4&quot;)</td>
</tr>
<tr>
<td>5811</td>
<td>271 000 050</td>
<td>Polished stainless steel</td>
<td>17.7°</td>
<td>59 mm (2-21/64&quot;)</td>
</tr>
<tr>
<td>All models except 5850</td>
<td>271 000 046 (optional)</td>
<td>Polished stainless steel</td>
<td>17.7°</td>
<td>186 mm (7-21/64&quot;)</td>
</tr>
</tbody>
</table>

Stainless steel impeller can also be identified with a stamped code.
Refer to following illustration and chart.

<table>
<thead>
<tr>
<th>VEHICLE MODEL NO.</th>
<th>IMPPELLER P/N</th>
<th>MATERIAL</th>
<th>DEGREE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5810</td>
<td>271 000 052</td>
<td>Stainless steel</td>
<td>17°</td>
<td>7</td>
</tr>
<tr>
<td>5811</td>
<td>271 000 115</td>
<td>Stainless steel</td>
<td>19°</td>
<td>9</td>
</tr>
<tr>
<td>5850</td>
<td>271 000 046 (optional)</td>
<td>Stainless steel</td>
<td>17.7°</td>
<td>77</td>
</tr>
<tr>
<td>All models except 5850</td>
<td>271 000 046 (optional)</td>
<td>Polished stainless steel</td>
<td>17.7°</td>
<td>77</td>
</tr>
</tbody>
</table>

Place impeller on a flat surface and using a precision ruler measure at each end of the same blade. Measurement D minus measurement C equals B.
26.28, Impeller and Wear Ring
Examine impeller in wear ring for distortion.
Check if tips of blades 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.

Check impeller for cavitation damage, deep scratches or any other damage.

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.
With impeller shaft installed with bearings, rotate it and 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 end of shaft, 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 0.002 in.

Measuring impeller shaft radial play
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To check both bearings, proceed the same way with other end of shaft. Position tip of gauge on diameter, close to flats on shaft.

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.

Excessive play can come either from worn bearings or impeller shaft.

Measuring impeller shaft radial play

Measure close to flats at shaft end

Measuring thrust bearing thickness. If roller diameter is found smaller than 1.93 mm (.076 in), renew it.

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.

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, with impeller.

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).

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

If wear ring features a lip on one edge, position lip outwards of housing.

To ease insertion into housing, apply liquid soap 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.

Excessive play come from worn protrusion inside housing cover.

Visually inspect protrusion inside cover. If worn, a small peak in center will be apparent.

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. Work this way, frequently rotating wood piece so that ring slides equally all around until it seats into bottom of housing.

CAUTION: Never hammer the bearing into its housing.

3.4, Seal and Needle Bearing

Bearings and seal will be properly installed in housing using bearing installer tool (P/N 295 000 014).

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.

CAUTION: This tool has been designed to properly position bearings and seal thus, providing space for lubrication purposes. The tool flanges allow for this. If a different pusher type is being used, components must be properly positioned as follows.

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 for both bearings.
Bearing on impeller side must be 1.5 to 2.5 mm (.060 - .100 in) inside reservoir measured from seal seat. Bearing on venturi side must be 2 to 3 mm (.080 - .120 in) inside reservoir measured from thrust washer seat. Refer to following illustration.

Strike tool end with a hammer until tool flange contacts housing.

Apply synthetic grease (P/N 293 550 010) between seal lips.

Same tool will be used to install seal in housing.
Seal must be installed so that raised edges of lips 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.

7,8,9,10,26, Impeller Housing, Thrust Washer, Thrust Bearing, Impeller Shaft and Impeller
Insert flat edges of impeller shaft in a vise so that shaft is vertical.
Apply synthetic grease (P/N 293 550 010) both sides of thrust bearing then insert onto shaft followed by thrust washer. Properly center washer and bearing with shaft flange. Grease will prevent parts from sliding at installation and thus possibly wedging thrust bearing into shaft groove.

\( \text{CAUTION: Take care that no sealant contacts any roller of bearing.} \)
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.

\[\text{CAUTION}: \text{Be careful not to damage impeller shaft diameter.}\]

Apply Loctite primer N (P/N 293 600 012) on impeller shaft threads. Allow to dry for two minutes.

\[\text{NOTE}: \text{Loctite primer is used to reduce Loctite 271 curing time and to activate stainless steel and aluminum surfaces for better bonding action. If applied, complete curing time is six hours, if not, 24 hours is needed.}\]

Apply Loctite 271 red (P/N 293 800 005) to shaft threads.

To prevent seal lip damage when inserting impeller shaft, use impeller shaft guide (P/N 295 000 002).

Insert tool onto shaft end then carefully slide housing over shaft.

Carefully insert housing onto shaft.

\[\text{CAUTION}: \text{Make sure thrust washer and bearing have not slipped in shaft groove.}\]

Using two screws previously removed from venturi, secure impeller shaft holder (P/N 295 000 082) to housing. Install shaft holder in a vise.

To ease impeller installation, apply liquid soap or SeaDoo 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 threads. Carefully engage threads making sure they are well aligned.

Install impeller remover (P/N 295 000 001) into impeller splines and tighten.

\[\text{CAUTION}: \text{Make sure thrust washer and bearing are not wedged in shaft groove. To check, manually pull and push impeller housing, an axial play must be felt.}\]

Remove special tool.
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Torque impeller to 70 Nm (52 lbf ft) then remove tools.

\[\text{CAUTION: Never use any impact wrench to tighten impeller.}\]

![Impeller remover and Impeller shaft holder](image)

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.

![Impeller and Housing Cover](image)

Apply Loctite 242 (blue) (P/N 293 800 015) on screw threads and evenly tighten cover screws. Torque to 7 Nm (62 lbf in).

F001 009 063

PUMP PRESSURIZATION

Whenever doing any type of repair on the pump, pressure test should be done to verify if any leak.

Pressure Test

Proceed as follows:

- Remove plug from housing cover.
- 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 during 10 minutes.

![Pump Gauge Tester](image)

\[\text{CAUTION: Repair any leak, failure to correct a leak will lead to premature wear of pump components.}\]

If there is a pressure drop spray soapy water around housing cover. If there is no bubbles, impeller shaft seal bushing or impeller housing is leaking 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.

2,15, Fitting
Apply Loctite PST 592 (P/N 293 800 018) on plug then secure on cover.

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 blade of a screwdriver to push on boot.
37,38,39,40,41, Ride Shoe, Screw and Grill
Apply Loctite 587 Superflex Ultra Blue (P/N 293 800 016) on ride shoe as shown in the following illustration.

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 threads of grill screws, install and tighten. Torque both front screws (hexagonal head) to 8 N•m (71 lbf•in).

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.

50,51, Seal Carrier and Needle Bearing
Properly support seal carrier when installing seals and bearing.

Push bearing with same pusher used at disassembly. Center bearing in longitudinal axis of housing.

\textbf{CAUTION: Never hammer the bearing into its housing.}

Apply Loctite 515 (P/N 293 800 007) all around outside diameter of seals.

Single-lip seal can be carefully inserted, using special tool (P/N 295 000 014) to avoid seal damage. Push seal until it comes flush with its housing.
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It is recommended to use a special tool (P/N 295 000 014) to avoid lip damage on double-lip seal.

Push seal until it comes flush with its housing.

NOTE: Whenever replacing the double lip seal, an hydrodynamic seal should be installed. Always install seal with the protector facing the impeller.

NOTE: Seal carrier gear clamps should not be tightened until pump is installed, to insure perfect alignment.

INSTALLATION

65. Hull Insert
Cut plastic hull insert flush with hull using a saw.

Pack seals and bearing with synthetic grease (P/N 293 550 010).
Install seal carrier and protective hose to hull insert with gear clamps.

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.
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**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.

**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) includes a housing (P/N 295 000 090) and a shaft (P/N 295 000 093).

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 minute.
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- Insert shaft end into PTO flywheel.

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

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.

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

**Pump Unit**

Apply Loctite 587 Superflex Ultra Blue (P/N 293 800 016) on pump as shown in the following illustration.

**NOTE:** If wear ring does not feature a lip on its edge, apply additional silicone all around housing as shown.

**CAUTION:** Seal the wear ring to ride shoe contact area with Loctite 587 Superflex (P/N 293 800 016).

**CAUTION:** Whenever shims are used to correct alignment, never install more than 6 mm (0.240 in) shim thickness. If alignment cannot be obtained verify for engine support bending.
Make sure rubber damper is on drive shaft and.

⚠️ 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.

Insert drive shaft and through hull tunnel. Slide through seal carrier being careful not to damage seals. Push on pump until shaft comes close to flywheel.

⚠️ CAUTION: When sliding the drive shaft through seal carrier, the double lip seal (P/N 293 200 009) could be folded over. This could cause a seal carrier bearing failure.

While holding pump, guide and engage shaft splines in 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 pincer (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 293 650 010), 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.

Secure flywheel guard to engine studs by installing on studs a washer on each side of guard and apply Loctite 242 (P/N 293 800 015) on stud threads. Torque nuts to 5 N•m (44 lbf•in).

Secure coolant inlet hose and both baffle tubes to impeller housing.

21,22,23,24, Screw, Sleeve, Bushing and Nozzle

Insert bushings in nozzle, positioning their flanges from inside of nozzle. Apply LPS #3 lubricant or equivalent on outer circumference of sleeve then insert in nylon bushings.

Install nozzle on venturi, positioning its steering arm on RH side. Apply Loctite 242 (blue) on threads and install screws then torque to 20 N•m (15 lbf•ft).

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).

To allow impeller seats into wear ring, start engine so that impeller rotates for a moment.

Slightly lubricating wear ring with SEA-DOO LUBE (P/N 293 600 006) before starting insures no friction during initial start.

CAUTION: Water must be supplied to cool engine with flush kit (P/N 295 000 038).
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COMPONENTS
1. Reverse support plate
2. Guide plate
3. Allen screw M6 x 20 (2)
4. Elastic stop nut M6 (9)
5. Flat washer M6 (8)
6. Hexagonal head screw M6 x 20
7. Flat washer M6 (4)
8. Triangular lever
9. Bushing (4)
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 30 (2)
22. Right gate plate
23. Left gate plate
24. Reverse gate
25. Screw M6 x 20 (6)
26. Loctite 242
27. Reverse gate spring (2)
28. Sleeve (2)
29. Plastic washer (2)
30. Bushing (2)
31. Flat washer M6 (2)
32. Hexagonal head screw M6 x 30 (2)
33. Loctite 567 superflex ultra blue
34. Protector

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.
Slide off ring from lower air vent tube and remove retaining clips (dart) holding tubes together and then withdraw lower tube from upper tube.

11,13,14,15, Sliding Block, Locking Lever, Spring and Reverse Handle
To remove reverse handle, unhook spring from sliding block and pull spring from reverse handle stem.

Withdraw reverse handle stem and locking lever from sliding block, then slide off locking lever from stem.

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.
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Remove screw, lock nut, washer and bushing holding triangular lever to reverse support plate.

24. Reverse Gate
Unhook reverse gate springs and remove reverse cable from left side of reverse gate.

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.

Unscrew from both sides of venturi housing reverse gate retaining screws, then remove gate.
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 plastic 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).

8,11, Triangular Lever and Sliding Block

Insert bushing to triangular lever and then install lever to reverse support. Install reverse cable to triangular lever with bushing and plastic washer which is installed to opposite side of reverse cable on reverse support.

Torque cable screw to 3 N•m (27 lbf•in).

Torque lower screw of triangular lever to 8 N•m (71 lbf•in).

Install sliding block to lever and torque nut to 8 N•m (71 lbf•in).
Section 08  PROPULSION AND DRIVE SYSTEMS
Sub-Section 02  (REVERSE SYSTEM)

NOTE: Always install reverse handle with open end facing left side of watercraft, then push handle stem through lever and sliding block holes.

![Diagram of reverse handle installation](image1)

Insert spring in handle stem hole and then install curved end in sliding block groove.

![Diagram of reverse gate](image2)

24, Reverse Gate
Position handlebar in a straight ahead position, nozzle should be parallel to rear of watercraft.

NOTE: For reverse gate adjustment, always unhook springs from reverse gate.

Using a square set it to 122 ± 2 mm (4-13/16 ± 5/64 in), then position square end at the top middle of nozzle.

![Diagram of reverse gate adjustment](image3)

ADJUSTMENTS

15, Reverse Handle
Pull reverse handle to NEUTRAL and ensure handle is locked in position.
Section 08  PROPULSION AND DRIVE SYSTEMS
Sub-Section 02  (REVERSE SYSTEM)

With the gate down to NEUTRAL position it should be at the specification.

If reverse gate needs to be readjusted, it can be done at support plate with adjustment nuts. Turn cable nuts to obtain position.

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.
Section 09  STEERING SYSTEM

STEERING SYSTEM

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Sub-Section 01  (STEERING SYSTEM)

COMPONENTS

1. Cover
2. Foam (top)
3. Foam (bottom)
4. Elastic stop nut M8 (5)
5. Steering clamp
6. Steering support (4)
7. Adapter
8. Set screw (2)
9. Left handle housing
10. Tab washer
11. Stem steering
12. Washer (shim)
13. Bushing (2)
14. Hexagonal head screw M8 x 25 (4)
15. Plastic washer
16. Collar
17. Elastic stop nut M8 (2)
18. Washer
19. Steering stem arm
20. Allen screw M8 x 35
21. Handle bar
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
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 blue, 300 mL
43. Cap
44. Hexagonal screw M6 x 20
45. Glue
46. Flat washer M8
47. Hexagonal head screw M8 x 30 (2)
48. Hexagonal head screw M9 x 55 (4)
49. Snap cap
50. Cable support
51. Large boot
52. Small boot
53. Hexagonal screw M8 x 16 (2)
54. Lock washer M8 (2)
55. Tie rap
56. Locking tab
57. Tie mount
58. Hexagonal nut M6
59. Flat washer M6
60. Loctite 242
61. Loctite 271

ASSEMBLY

1. Cover

Prior to installation, soak handlebar cover in hot water. This allows even heating of cover and makes installation much easier.

NOTE: During installation the cover might have to be warmed again using a heat gun.

▼ CAUTION: Overheating could damage vinyl cover.

Slide cover over the left side handlebar until it reaches the middle of foam.

▼ CAUTION: Never pull on vinyl cover seamless area.

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Section 09  STEERING SYSTEM  
Sub-Section 01  (STEERING SYSTEM)

Pull cover over the right side handlebar taking care to grab it as illustrated.

Zip cover taking care to bring both sides together. Refer to following illustration.

Pull both sides of cover together before trying to zip it.

22,43, Grip and Cap
Remove adhesive left on handlebar by pealing off old glue or brushing old Sikaflex.
Apply glue (P/N 293 530 032) inside handlebar grip and install cap and grip. Rotate grip to evenly spread glue.

⚠️ CAUTION: Allow at least 30 minutes for glue to cure.

19,21, Steering Stem Arm and Handlebar
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 one of the two shims (0.8 mm (0.030 in) or 1.3 mm (0.050 in) onto steering stem.

⚠️ CAUTION: Never pull on cover around beeper hole.
Section 09  STEERING SYSTEM
Sub-Section 01  (STEERING SYSTEM)

Insert handlebar ass'y into steering column support.

Shim adjustment
Check steering column axial play. It should be between 0.25-0.75 mm (.010-.030 in). Replace shim as required.
Remove screw and apply Loctite 271 (red) (P/N 293 800 003) on screw threads, reinstall large flat washer, locking disks and screw. Torque to 40 N•m (30 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.
Install steering cable in its bracket with one washer and one nut each side of bracket.

Hand-tighten nut. Refer to ADJUSTMENTS for adjustment procedures.

ADJUSTMENT

Steering and Jet Pump Nozzle
Make the following tool to ease alignment.
Raw Material:
- 2 steel angle: 19 mm x 264 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 sides.
- Steel angles A and B and hole center of bushing must be parallel.
- Weld bushing on steel angle C and drill steel angle.

Drill two 6 mm (1/4 in) holes in steel angle D.
Weld steel angle D with the 12.7 mm (1/2 in) rod making sure both parts are at 90°.
Section 09  STEERING SYSTEM
Sub-Section 01  (STEERING SYSTEM)

Assemble tool as per illustration.

Hook tool on jet pump nozzle and slide it until both ends touch hull.

Verify handlebar position by measuring each side the distance from handlebar grip end to floorboard. They have to be equal.

Steering alignment adjustment should be performed on outer cable adjustment nuts on steering cable bracket near steering stem.

Remove alignment tool and verify the following before tightening nuts.
Adjust nuts 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 (0.005 in) between nozzle and venturi at indicated area.

After adjustment, properly tighten nuts.

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.
Section 10  HULL/BODY
Sub-Section 01 (HULL/BODY)

COMPONENTS

1. "Sea-Doo" sticker
2. Leach (2)
3. Silicone 732 RTV, 90 mL
4. Seal
5. Storage basket
6. Lock pin
7. Grill
8. Hose
9. Grommet
10. Clamp (4)
11. Hose
12. Rear baffle
13. Grommet
14. Gasket (2)
15. Fitting (2)
16. Hinge (2)
17. Tie rap
18. Front bracket
19. Rear bracket (2)
20. Float (2)
21. Elbow fitting 90°
22. Tie rap (2)
23. Rear vent hose
24. Gear clamp (2)
25. Float (2)
26. Elbow fitting M8 (2)
27. Elbow fitting M8 (2)
28. Plane
29. Washer M8 (2)
30. Tow hook
31. Rubber pad
32. "Sea-Doo" sticker (2)
33. "Fuel" sticker
34. Loc-tite 271, 10 mL
35. Spring clip (2)
36. Rivet (4)
37. Lock washer (2)
38. Storage cover
39. Elbow fitting 90°
40. Tie rap
41. Water tank trap
42. Tie mount
43. Hinge
44. Rivet (5)
45. Rear bracket (2)
46. Front bracket
47. Seat
48. Cap

NOTE: Some reference numbers are deliberately missing.
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 re-install 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.

Install brackets B (P/N 291 000 213) to support the rear section of tank and secure them with M6 stainless screws (P/N 210 000 004) and lock nuts (P/N 212 000 001).

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.

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 (P/N 293 250 006) on fitting (P/N 293 710 015). Install through air intake hole the fitting in water tank trap.
Install outside the 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.

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 untighten lock pin nuts.
Screw in or out lock pin.

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 seat and verify if seal is compressed.
Remove seat.
Torque nuts to 5 N·m (44 lbf·in).

Hull and Body Repair
Upper body is made of fiberglass. Hull is made of fiberglass featuring aluminum inserts to allow strong structural attachment points.
Fiberglass finish is made of Gelcote layer which gives its color and smooth finish.
Gelcote repair kit (P/N 295 500 009 or P/N 293 500 016) is available through regular channel.
Fiberglass repair kit is available through automotive or marine suppliers.
Section 11 STORAG\E

STORAGE

It is during winter or when the watercraft is not to be in use for prolonged time that a proper storage is a necessity. Storage during long period of inactivity consists of checking and replacing missing, broken or worn parts and protecting cooling system against freezing and corrosion.

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 the watercraft again, it will be in top condition.

ENGINE DRAINING

Check engine drain tube running from engine water distributor to exhaust outlet socket. Make sure there is no sand or other particles and it is not obstructed so that water can leave the engine. Clean tube and fitting (on exhaust outlet) as necessary.

\textbf{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.

\textbf{CAUTION} : Check engine drain tube for obstructions.

PROPULSION SYSTEM

Drain lubricant in impeller shaft reservoir. Clean with solvent then refill with 65 mL (2.2 U.S. oz) of Sea-Doo synthetic oil "polyester" 75W90GL5 type C gear lube (P/N 293 600 011).

\textbf{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 and with synthetic grease (P/N 293 550 010).

\textbf{CAUTION} : Do not lubricate excessively. Immediately stop when a slight movement is noticed on boot.

Lubricate at seal carrier grease fitting until grease is just coming out on engine side.

\textbf{CAUTION} : As soon as grease comes out the seal immediately stop lubricating to prevent seal damage and overheating.

\begin{center}
\includegraphics[width=0.8\textwidth]{image}
\end{center}

\textbf{CAUTION} : Never leave any clothing, tool or other objects near PTO flywheel and seal carrier.

WATERCRAFT RINSING

Thoroughly rinse the watercraft hull, bilge, engine compartment, etc., with fresh water.
Section 11 STORAGE

COOLING SYSTEM FLUSHING AND ENGINE INTERNAL LUBRICATION

Cooling system has to be flushed with fresh water to prevent salt, sand or dirt accumulation which might clog water passages. This will be achieved with the flush kit (P/N 295 000 038).

Engine must be lubricated to prevent corrosion on internal parts. This will be achieved by spraying some SEA-DOO LUBE (P/N 293 600 006) through air intake opening.

⚠️ CAUTION: Do not use outboard type storage lubricant. Using outboard lubricant may accelerate corrosion and damage engine components.

Flushing and lubrication will be done at the same time while engine is running.

If using a fuel stabilizer refer to fuel system before beginning procedure.

Procedure

Before using flush kit, 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 flush kit coupler hose to a garden hose.

⚠️ NOTE: To allow a more efficient flushing on watercraft equipped with a flush kit, install a hose pincer (P/N 295 000 076) between T-fitting and exhaust socket. This prevents water from exiting through exhaust socket.

⚠️ CAUTION: Never flush a hot engine. Always start engine first then open water flow. Severe engine damage could result if not done in this order.

Start engine then open water flow. Make sure engine operates during entire procedure.

⚠️ WARNING: Do not touch any electrical part when engine is running.

Spray some SEA-DOO LUBE through flame arrester cover keeping engine at a fast idle.

Remove clamp and move air intake silencer away.

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.

⚠️ WARNING: Perform this operation in a well ventilated area.

Press unlocking button to remove coupler hose. Re-install dust cap over tee fitting.

Remove both spark plugs and spray some SEA-DOO LUBE into each cylinder.

Crank the engine a few turns to distribute the oil on cylinder wall.

Apply anti-seize lubricant on spark plug threads then reinstall them.

Reinstall air intake silencer.

⚠️ CAUTION: Do not run the engine during the storage period.

FUEL SYSTEM

To prevent gum and varnish formation inside components, siphon all fuel from fuel tank or a fuel stabilizer, such as STA-BIL® (or equivalent), can be added in fuel tank to prevent fuel deterioration and avoid draining fuel system for storage. Follow manufacturer's instructions for proper use.
CAUTION: Fuel stabilizer should be added prior to engine lubrication to ensure carburetor(s) protection against varnish deposit.

WARNING: Remove fuel tank cap slowly. Fuel may be under pressure and might spray out. 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.

BATTERY

Remove and clean battery. Apply some dielectric grease (P/N 293 550 004) or petroleum jelly on battery posts and cable connectors.

Add distilled water if necessary then give the battery a full charge at a maximum rate of two amperes.

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 monthly.

ANTICORROSION TREATMENT

NOTE: Bilge cleaning should be done prior to anticorrosion treatment. Refer to additional recommended protection.

Wipe off any residual water in the engine compartment.

Spray some 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 antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

NOTE: The engine will not have to run during this operation.

Four hoses have to be disconnected to allow air to escape and antifreeze solution to completely fill cooling system water jackets.

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 engine. Pour about two liters (1/2 gal) of antifreeze solution through the funnel.

Ti up all hoses higher than tuned pipe.

NOTE: If hoses are not attached higher than tuned pipe, coolant will drain out.
Section 11 STORAGE

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 lube can be used on throttle cable end to power inject SEA-DOO LUBE into cable. Refer to a motorcycle parts supplier for availability.

Clean the bilge with hot water and 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 such as yellow paint (P/N 293 500 008), grey paint (P/N 293 500 009), mauve paint (P/N 293 500 020), blue paint (P/N 293 500 014) and Gelcite® repair kit (P/N 295 500 009) are available. Replace damaged labels/decals.

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 non-abrasive wax such as silicon wax. Protect the seat with vinyl protectant such as Armor All® or the equivalent.

\[ \text{CAUTION: Never clean apparent fiberglass and plastic parts with strong detergent, degreasing agent, paint thinner, acetone etc.} \]

If the watercraft is to be stored outside, cover it with an opaque tarpaulin to prevent sun rays and grime affecting the plastic components, watercraft finish as well as preventing dust accumulation.

\[ \text{CAUTION: The watercraft must never be left in water for storage.} \]

The seat should be partially left opened during storage. This will avoid engine compartment condensation and possible corrosion.

\[ \text{NOTE: If the watercraft is stored outside with seat partially opened and without a tarpaulin, remove the rear drain plug in order to avoid water build up in the bilge during rainfall. Tilt the watercraft to the rear so that the water can flow out of floorboard.} \]
# TECHNICAL DATA

## SI* METRIC INFORMATION GUIDE

### BASE UNITS

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<th>UNIT</th>
<th>SYMBOL</th>
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### PREFIXES

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### CONVERSION FACTORS

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*The international system of units abbreviates SI in all languages.

(1) To obtain the reverse sequence, divide by the given factor. To convert millimeters to inches, divide by 25.4.

**NOTE:** Conversion factors are rounded off to two decimals for easier use.

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### ENGINE

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<th>Engine type</th>
<th>ROTAX 587, water cooled</th>
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<td>Oil injection pump (Gear)</td>
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<td></td>
<td>Closing 80° ± 4 ATDC</td>
</tr>
<tr>
<td>Rotary valve plate opening</td>
<td>147°</td>
</tr>
<tr>
<td>Crankcase/rotary valve gap</td>
<td>0.2 - 0.3 mm (.008 - .013 in)</td>
</tr>
<tr>
<td>Connecting rod radial clearance</td>
<td>Min. 0.020 mm (.001 in)</td>
</tr>
<tr>
<td></td>
<td>Max. 0.033 mm (.0015 in)</td>
</tr>
</tbody>
</table>
## Section 12 TECHNICAL DATA

**Sub-Section 01 (SP, 5804 MODELS)**

### ELECTRICAL (engine)

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magneto generator output</td>
<td>180 W @ 5500 RPM</td>
</tr>
<tr>
<td>Ignition system, type</td>
<td>CDI, 4/5 p</td>
</tr>
<tr>
<td>Spark plug Make and type</td>
<td>NGK BR7EES</td>
</tr>
<tr>
<td>Gap</td>
<td>0.5 mm (.020 in)</td>
</tr>
<tr>
<td>Ignition timing</td>
<td>BTDC</td>
</tr>
<tr>
<td>Engine speed</td>
<td>6000 RPM</td>
</tr>
<tr>
<td>Generating coil Low speed</td>
<td>120 - 180 Ω</td>
</tr>
<tr>
<td>High speed</td>
<td>2.8 - 4.2 Ω</td>
</tr>
<tr>
<td>Battery charging coil</td>
<td>0.21 - 0.31 Ω</td>
</tr>
<tr>
<td>High tension coil Primary</td>
<td>0.23 - 0.43 Ω</td>
</tr>
<tr>
<td>Secondary</td>
<td>5.85 - 6.50 kΩ</td>
</tr>
<tr>
<td>Engine RPM limiter operation</td>
<td>6500 ± 200</td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:

### CARBURATION

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carburetor, type</td>
<td>Diaphragm</td>
</tr>
<tr>
<td>Carburetor number</td>
<td>270 500 089</td>
</tr>
<tr>
<td>Main jet</td>
<td>127.5</td>
</tr>
<tr>
<td>Pilot jet</td>
<td>75</td>
</tr>
<tr>
<td>Adjustment Low-speed mixture screw</td>
<td>1-1/2 turn</td>
</tr>
<tr>
<td>High speed screw</td>
<td>1/4</td>
</tr>
<tr>
<td>Idle speed (in water)</td>
<td>1300-1500 RPM</td>
</tr>
<tr>
<td>Fuel type</td>
<td>Regular unleaded</td>
</tr>
<tr>
<td>octane no.</td>
<td>91 Ron</td>
</tr>
<tr>
<td>Fuel return line orifice</td>
<td>0.5 mm (0.020 in)</td>
</tr>
<tr>
<td>Leak test (pop off pressure)</td>
<td>150-170 kPa (22-25 PSI)</td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:

### COOLING

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Total loss type - Direct flow from jet propulsion unit.</td>
</tr>
<tr>
<td>Thermostat</td>
<td>None</td>
</tr>
<tr>
<td>Overheating beeper setting</td>
<td>96-99°C (205-210°F)</td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:
## Section 12  TECHNICAL DATA
### Sub-Section 01  (SP, 5804 MODELS)

<table>
<thead>
<tr>
<th>PROPULSION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Propulsion system</td>
<td>Bombardier Formula pump</td>
</tr>
<tr>
<td>Jet pump type</td>
<td>Axial flow single stage</td>
</tr>
<tr>
<td>Impeller rotation (seen from rear)</td>
<td>Counterclockwise</td>
</tr>
<tr>
<td>Transmission</td>
<td>Direct drive</td>
</tr>
<tr>
<td>Coupling type</td>
<td>Crown splines</td>
</tr>
<tr>
<td>Oil type</td>
<td>SEA-DOO JET PUMP SYNTETIC OIL Polyclester 75W90 GL5 (P/N 293 600 011)</td>
</tr>
<tr>
<td>Steering (nozzle) pivoting angle</td>
<td>28°</td>
</tr>
<tr>
<td>Minimum required water level</td>
<td>60 cm (24 in)</td>
</tr>
<tr>
<td>Drive shaft deflection maximum</td>
<td>0.5 mm (.020 in)</td>
</tr>
<tr>
<td>Impeller outside diameter</td>
<td>New 139.5 mm (5.490 in)</td>
</tr>
<tr>
<td>Pump wear ring inside diameter</td>
<td>New 140.5 mm (5.530 in)</td>
</tr>
<tr>
<td>Impeller/wear ring clearance</td>
<td>Wear limit 0.5 mm (.020 in)</td>
</tr>
<tr>
<td>Impeller shaft end play (new)</td>
<td>0.12 - 0.54 mm (.005 - .021 in)</td>
</tr>
<tr>
<td>Impeller shaft side play</td>
<td>0.05 mm (.002 in)</td>
</tr>
<tr>
<td>Impeller pitch</td>
<td>18°</td>
</tr>
</tbody>
</table>

ADDITIONAL INFORMATION: Do not mix different trademark or type of oil.

<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of passenger (driver incl.)</td>
<td>2</td>
</tr>
<tr>
<td>Length, overall</td>
<td>244 cm (96 in)</td>
</tr>
<tr>
<td>Width, overall</td>
<td>105 cm (41.5 in)</td>
</tr>
<tr>
<td>Height, overall</td>
<td>92 cm (36.2 in)</td>
</tr>
<tr>
<td>Mass</td>
<td>166 kg (365 lb)</td>
</tr>
<tr>
<td>Load limit</td>
<td>160 kg (352 lb)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MATERIALS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hull</td>
<td>Composite</td>
</tr>
<tr>
<td>Air intake silencer</td>
<td>Thermoplastic</td>
</tr>
<tr>
<td>Flame arrester</td>
<td>Multi-layer wire screen</td>
</tr>
<tr>
<td>Exhaust muffler</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Steering padding</td>
<td>Polypropylene foam</td>
</tr>
<tr>
<td>Fuel tank</td>
<td>Polyethylene</td>
</tr>
<tr>
<td>Injection oil tank</td>
<td>Polyethylene</td>
</tr>
<tr>
<td>Seat</td>
<td>Polyurethane foam</td>
</tr>
</tbody>
</table>

ADDITIONAL INFORMATION:
Section 12  TECHNICAL DATA  
Sub-Section 01  (SP, 5804 MODELS)

<table>
<thead>
<tr>
<th>PERFORMANCE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump static thrust</td>
<td>167 kg (367 lb)</td>
</tr>
<tr>
<td>Max. fuel consumption at wide open throttle</td>
<td>16.6 L/h (4.4 U.S. gal/h)</td>
</tr>
<tr>
<td>Cruising time at full throttle</td>
<td>Fuel tank without reserve 1 hour 45 minutes, Fuel tank reserve 20 minutes</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>64 km/h (40 MPH) (35 kn)</td>
</tr>
</tbody>
</table>

ADDITIONAL INFORMATION:

<table>
<thead>
<tr>
<th>ELECTRICAL (vehicle)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>12 V, 20 A•h</td>
</tr>
<tr>
<td>Starting system fuse</td>
<td>8 A</td>
</tr>
<tr>
<td>Charging system fuse</td>
<td>15 A</td>
</tr>
</tbody>
</table>

ADDITIONAL INFORMATION:

<table>
<thead>
<tr>
<th>CAPACITIES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel tank</td>
<td>33 L (8.7 U.S. gal)</td>
</tr>
<tr>
<td>Impeller shaft reservoir</td>
<td>Capacity 65 mL (2.2 U.S. oz), Oil level height to bottom of cover hole</td>
</tr>
<tr>
<td>Cooling system</td>
<td>N.A.</td>
</tr>
<tr>
<td>Injection oil tank</td>
<td>2.8 L (95 U.S. fl oz)</td>
</tr>
</tbody>
</table>

ADDITIONAL INFORMATION:

<table>
<thead>
<tr>
<th>STANDARD EQUIPMENT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tether cord</td>
<td>STD</td>
</tr>
<tr>
<td>Tool kit</td>
<td>STD</td>
</tr>
<tr>
<td>Fuel tank reserve</td>
<td>STD</td>
</tr>
<tr>
<td>Overheating warning device</td>
<td>STD</td>
</tr>
<tr>
<td>Electric fuel level gauge</td>
<td>N.A.</td>
</tr>
<tr>
<td>Injection oil low level warning device</td>
<td>N.A.</td>
</tr>
<tr>
<td>Speedometer</td>
<td>N.A.</td>
</tr>
<tr>
<td>Tachometer</td>
<td>N.A.</td>
</tr>
<tr>
<td>Position lights</td>
<td>N.A.</td>
</tr>
<tr>
<td>Voltmeter</td>
<td>N.A.</td>
</tr>
<tr>
<td>Reverse</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

ADDITIONAL INFORMATION:
## Section 12  TECHNICAL DATA
Sub-Section 01  (SP, 5804 MODELS)

### TIGHTENING TORQUES

<table>
<thead>
<tr>
<th>Component</th>
<th>Torque</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust manifold screws</td>
<td>20 N•m</td>
<td>(15 lbf•ft)</td>
</tr>
<tr>
<td>Magneto flywheel nut</td>
<td>105 N•m</td>
<td>(77 lbf•ft)</td>
</tr>
<tr>
<td>Flywheel (PTO side)</td>
<td>110 N•m</td>
<td>(81 lbf•ft)</td>
</tr>
<tr>
<td>Crankcase screws M6</td>
<td>9 N•m</td>
<td>(80 lbf•in)</td>
</tr>
<tr>
<td>Crankcase screws M8</td>
<td>22 N•m</td>
<td>(16 lbf•ft)</td>
</tr>
<tr>
<td>Crankcase/engine support nuts</td>
<td>35 N•m</td>
<td>(26 lbf•ft)</td>
</tr>
<tr>
<td>Engine support/hull</td>
<td>25 N•m</td>
<td>(18 lbf•ft)</td>
</tr>
<tr>
<td>Cylinder head screws</td>
<td>20 N•m</td>
<td>(15 lbf•ft)</td>
</tr>
<tr>
<td>Crankcase/cylinder screws</td>
<td>20 N•m</td>
<td>(15 lbf•ft)</td>
</tr>
<tr>
<td>Tuned pipe flange nuts</td>
<td>25 N•m</td>
<td>(18 lbf•ft)</td>
</tr>
<tr>
<td>Tuned pipe fixation screws</td>
<td>25 N•m</td>
<td>(18 lbf•ft)</td>
</tr>
<tr>
<td>Cylinder head cover screws</td>
<td>9 N•m</td>
<td>(80 lbf•in)</td>
</tr>
<tr>
<td>Flame arrester screws</td>
<td>10 N•m</td>
<td>(18 lbf•ft)</td>
</tr>
<tr>
<td>Impeller on shaft</td>
<td>70 N•m</td>
<td>(52 lbf•ft)</td>
</tr>
<tr>
<td>Pump/hull</td>
<td>35 N•m</td>
<td>(26 lbf•ft)</td>
</tr>
<tr>
<td>Venturi/housing</td>
<td>25 N•m</td>
<td>(18 lbf•ft)</td>
</tr>
<tr>
<td>Nozzle/venturi</td>
<td>20 N•m</td>
<td>(15 lbf•ft)</td>
</tr>
<tr>
<td>Housing cover</td>
<td>7 N•m</td>
<td>(62 lbf•in)</td>
</tr>
<tr>
<td>Grill</td>
<td>8 N•m</td>
<td>(71 lbf•in)</td>
</tr>
<tr>
<td>Ride shoe</td>
<td>10 N•m</td>
<td>(88 lbf•in)</td>
</tr>
<tr>
<td>Flywheel guard nuts</td>
<td>5 N•m</td>
<td>(44 lbf•in)</td>
</tr>
<tr>
<td>Steering cable lock nuts</td>
<td>10 N•m</td>
<td>(88 lbf•in)</td>
</tr>
<tr>
<td>Steering support screws</td>
<td>15 N•m</td>
<td>(11 lbf•ft)</td>
</tr>
<tr>
<td>Steering collar screws</td>
<td>5 N•m</td>
<td>(44 lbf•in)</td>
</tr>
<tr>
<td>Steering stem screw</td>
<td>40 N•m</td>
<td>(29 lbf•ft)</td>
</tr>
<tr>
<td>Handlebar saddle screws, nuts</td>
<td>26 N•m</td>
<td>(19 lbf•ft)</td>
</tr>
<tr>
<td>Ignition housing cover</td>
<td>4 N•m</td>
<td>(35 lbf•in)</td>
</tr>
<tr>
<td>Electrical box/battery</td>
<td>4 N•m</td>
<td>(35 lbf•in)</td>
</tr>
<tr>
<td>Electrical box cover</td>
<td>2 N•m</td>
<td>(18 lbf•in)</td>
</tr>
<tr>
<td>Starter mounting screws</td>
<td>22 N•m</td>
<td>(16 lbf•ft)</td>
</tr>
<tr>
<td>Starter lock nuts</td>
<td>5 N•m</td>
<td>(44 lbf•in)</td>
</tr>
</tbody>
</table>

**ADDITIONAL INFORMATION**: Apply where indicated
1. Loctite 242
2. Loctite 271
3. Loctite 515
<table>
<thead>
<tr>
<th>ENGINE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine type</td>
<td>ROTAX 587, water cooled</td>
</tr>
<tr>
<td>Induction type</td>
<td>Rotary valve</td>
</tr>
<tr>
<td>Exhaust system</td>
<td>Water cooled, water injected</td>
</tr>
<tr>
<td>Starting system</td>
<td>Electric start</td>
</tr>
<tr>
<td>Lubrication</td>
<td>VROI</td>
</tr>
<tr>
<td>Fuel/oil mixture</td>
<td></td>
</tr>
<tr>
<td>Oil injection pump</td>
<td>Gear</td>
</tr>
<tr>
<td>Oil type</td>
<td>SEA-DOO injection oil</td>
</tr>
<tr>
<td>Number of cylinders</td>
<td>2</td>
</tr>
<tr>
<td>Bore</td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td>76.0 mm (2.992 in)</td>
</tr>
<tr>
<td>First oversize</td>
<td>76.25 mm (3.002 in)</td>
</tr>
<tr>
<td>Second oversize</td>
<td>76.50 mm (3.022 in)</td>
</tr>
<tr>
<td>Stroke</td>
<td>64 mm (2.520 in)</td>
</tr>
<tr>
<td>Displacement</td>
<td>580.7 cm³ (35.44 in³)</td>
</tr>
<tr>
<td>Compression ratio (uncorrected)</td>
<td>11.5 : 1</td>
</tr>
<tr>
<td>Compression ratio (corrected)</td>
<td>5.9 : 1</td>
</tr>
<tr>
<td>Compression pressure</td>
<td>1070 kPa (155 PSI)</td>
</tr>
<tr>
<td>Engine maximum output</td>
<td>41 kW (55 hp) @ 5750 RPM</td>
</tr>
<tr>
<td>Engine maximum torque</td>
<td>70 N•m (51 lbf•ft) @ 5250 RPM</td>
</tr>
<tr>
<td>Cylinder head warpage</td>
<td>N.A.</td>
</tr>
<tr>
<td>Piston ring type and quantity</td>
<td>1 ST - 1 R</td>
</tr>
<tr>
<td>Ring end gap</td>
<td></td>
</tr>
<tr>
<td>New</td>
<td>0.25 - 0.40 mm (.010 - .016 in)</td>
</tr>
<tr>
<td>Wear limit</td>
<td>1.00 mm (.039 in)</td>
</tr>
<tr>
<td>Ring/piston groove clearance</td>
<td></td>
</tr>
<tr>
<td>New</td>
<td>0.03 - 0.08 mm (.001 - .003 in)</td>
</tr>
<tr>
<td>Wear limit</td>
<td>0.2 mm (.008 in)</td>
</tr>
<tr>
<td>Piston/cylinder wall clearance</td>
<td></td>
</tr>
<tr>
<td>New</td>
<td>0.06 - 0.07 mm (.002 - .003 in)</td>
</tr>
<tr>
<td>Wear limit</td>
<td>0.2 mm (.008 in)</td>
</tr>
<tr>
<td>Cylinder taper (maximum)</td>
<td>0.08 mm (.003 in)</td>
</tr>
<tr>
<td>Cylinder out of round (maximum)</td>
<td>0.05 mm (.002 in)</td>
</tr>
<tr>
<td>Connecting rod big end axial play</td>
<td></td>
</tr>
<tr>
<td>New</td>
<td>0.4 mm (.016 in)</td>
</tr>
<tr>
<td>Wear limit</td>
<td>1.2 mm (.047 in)</td>
</tr>
<tr>
<td>Crankshaft end-play</td>
<td>N.A.</td>
</tr>
<tr>
<td>Crankshaft deflection</td>
<td>0.08 mm (.003 in)</td>
</tr>
<tr>
<td>Rotary valve timing</td>
<td></td>
</tr>
<tr>
<td>Opening</td>
<td>115° ± 4 BTDC</td>
</tr>
<tr>
<td>Closing</td>
<td>65° ± 4 ATDC</td>
</tr>
<tr>
<td>Rotary valve plate opening</td>
<td>132°</td>
</tr>
<tr>
<td>Crankcase/rotary valve gap</td>
<td></td>
</tr>
<tr>
<td>Min.</td>
<td>0.2 - 0.3 mm (.008 - .013 in)</td>
</tr>
<tr>
<td>Max.</td>
<td>0.020 mm (.001 in)</td>
</tr>
<tr>
<td>Connecting rod radial clearance</td>
<td></td>
</tr>
<tr>
<td>Min.</td>
<td>0.033 mm (.0015 in)</td>
</tr>
</tbody>
</table>
### Section 12 TECHNICAL DATA
Sub-Section 02  (GT, 5811 MODELS)

#### ELECTRICAL (engine)

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magneto generator output</td>
<td>160 W @ 5500 RPM</td>
</tr>
<tr>
<td>Ignition system, type</td>
<td>CDI 4/5 p</td>
</tr>
<tr>
<td>Spark plug</td>
<td>Make and type</td>
</tr>
<tr>
<td>Gap</td>
<td>0.6 mm (.024 in)</td>
</tr>
<tr>
<td>Ignition timing</td>
<td>BTDC</td>
</tr>
<tr>
<td>Engine speed</td>
<td>6000 RPM</td>
</tr>
<tr>
<td>Generating coil</td>
<td></td>
</tr>
<tr>
<td>Low speed</td>
<td>120 - 180 Ω</td>
</tr>
<tr>
<td>High speed</td>
<td>2.8 - 4.2 Ω</td>
</tr>
<tr>
<td>Battery charging coil</td>
<td>0.21 - 0.31 Ω</td>
</tr>
<tr>
<td>High tension coil</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>0.23 - 0.43 Ω</td>
</tr>
<tr>
<td>Secondary</td>
<td>5.85 - 6.50 kΩ</td>
</tr>
<tr>
<td>Engine RPM limiter operation</td>
<td>6500 ± 200</td>
</tr>
</tbody>
</table>

**ADDITIONAL INFORMATION**

#### CARBURATION

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carburetor, type</td>
<td>Diaphragm</td>
</tr>
<tr>
<td>Carburetor number</td>
<td>P/N 270 500 093 MAG</td>
</tr>
<tr>
<td></td>
<td>P/N 270 500 092 PTO</td>
</tr>
<tr>
<td>Main jet</td>
<td>107.5</td>
</tr>
<tr>
<td>Pilot jet</td>
<td>65</td>
</tr>
<tr>
<td>Adjustment</td>
<td>Low-speed mixture</td>
</tr>
<tr>
<td>Low-speed mixture screw</td>
<td>1-1/8 turn</td>
</tr>
<tr>
<td>High speed screw</td>
<td>1/4</td>
</tr>
<tr>
<td>Idle speed (in water)</td>
<td>1300-1500 RPM</td>
</tr>
<tr>
<td>Fuel</td>
<td>Type</td>
</tr>
<tr>
<td>Regular unleaded</td>
<td>91 Ron</td>
</tr>
<tr>
<td>Octane no.</td>
<td></td>
</tr>
<tr>
<td>Fuel return line orifice</td>
<td>3.0 mm (0.118 in)</td>
</tr>
<tr>
<td>MAG</td>
<td></td>
</tr>
<tr>
<td>0.5 mm (0.020 in) PTO</td>
<td></td>
</tr>
<tr>
<td>Leak test (pop off pressure)</td>
<td>150-170 kPa (22-25 PSI)</td>
</tr>
</tbody>
</table>

**ADDITIONAL INFORMATION**

#### COOLING

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Total loss type - Direct flow from jet propulsion unit.</td>
</tr>
<tr>
<td>Thermostat</td>
<td>None</td>
</tr>
<tr>
<td>Overheating beeper setting</td>
<td>96 - 99°C (205 - 210°F)</td>
</tr>
</tbody>
</table>

**ADDITIONAL INFORMATION**
### PROPULSION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propulsion system</td>
<td>Bombardier Formula pump</td>
</tr>
<tr>
<td>Jet pump type</td>
<td>Axial flow single stage</td>
</tr>
<tr>
<td>Impeller rotation (seen from rear)</td>
<td>Counterclockwise</td>
</tr>
<tr>
<td>Transmission</td>
<td>Direct drive</td>
</tr>
<tr>
<td>Coupling type</td>
<td>Crown splines</td>
</tr>
<tr>
<td>Oil type</td>
<td>SEA-DOO JET PUMP SYNTHETIC OIL</td>
</tr>
<tr>
<td></td>
<td>Polyester 75W90 GL5 (P/N 293 600 011)</td>
</tr>
<tr>
<td>Steering (nozzle) pivoting angle</td>
<td>26°</td>
</tr>
<tr>
<td>Minimum required water level</td>
<td>60 cm (24 in)</td>
</tr>
<tr>
<td>Drive shaft deflection maximum</td>
<td>0.5 mm (.020 in)</td>
</tr>
<tr>
<td>Impeller outside diameter</td>
<td>139.5 mm (5.490 in)</td>
</tr>
<tr>
<td>Impeller wear ring wear limit</td>
<td>138.33 mm (5.450 in)</td>
</tr>
<tr>
<td>Pump wear ring inside diameter</td>
<td>New</td>
</tr>
<tr>
<td>Pump wear ring wear limit</td>
<td>140.5 mm (5.530 in)</td>
</tr>
<tr>
<td>Impeller wear ring wear limit</td>
<td>N.A.</td>
</tr>
<tr>
<td>Impeller wear ring wear limit</td>
<td>0.5 mm (.020 in)</td>
</tr>
<tr>
<td>Impeller wear ring wear limit</td>
<td>1.02 mm (.040 in)</td>
</tr>
<tr>
<td>Impeller shaft end play (new)</td>
<td>0.12 - 0.54 mm (.005 - .021 in)</td>
</tr>
<tr>
<td>Impeller shaft side play</td>
<td>0.05 mm (.002 in)</td>
</tr>
<tr>
<td>Impeller pitch</td>
<td>17°</td>
</tr>
<tr>
<td>Impeller material</td>
<td>Stainless steel</td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:
- Do not mix different trademark or type of oil.

### DIMENSIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of passengers (including driver)</td>
<td>3</td>
</tr>
<tr>
<td>Length, overall</td>
<td>303 cm (119.3 in)</td>
</tr>
<tr>
<td>Width, overall</td>
<td>121 cm (47.6 in)</td>
</tr>
<tr>
<td>Height, overall</td>
<td>95 cm (37.4 in)</td>
</tr>
<tr>
<td>Mass</td>
<td>209 kg (461 lb)</td>
</tr>
<tr>
<td>Load limit - passenger and luggage (10 kg)</td>
<td>226 kg (496 lb)</td>
</tr>
</tbody>
</table>

### MATERIALS

- Hull: Composite
- Air intake silencer: Thermoplastic
- Flame arrester: Multi-layer wire screen
- Exhaust muffler: Aluminum
- Steering padding: Polypylene foam
- Fuel tank: Polyethylene
- Injection oil tank: Polyethylene
- Seat: Polyurethane foam

### ADDITIONAL INFORMATION:
1. Refer to load limits

https://www.boat-manuals.com/
## Section 12 TECHNICAL DATA

Sub-Section 02 (GT, 5811 MODELS)

### PERFORMANCE

<table>
<thead>
<tr>
<th></th>
<th>kg</th>
<th>(lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump static thrust</td>
<td>227</td>
<td>(504)</td>
</tr>
<tr>
<td>Max. fuel consumption at wide open throttle</td>
<td>20 L/h (5.3 U.S. gal/h)</td>
<td></td>
</tr>
<tr>
<td>Cruising time at full throttle</td>
<td>1 hour 35 minutes</td>
<td></td>
</tr>
<tr>
<td>Fuel tank without reserve</td>
<td>15 minutes</td>
<td></td>
</tr>
<tr>
<td>Fuel tank reserve</td>
<td>58 km/h (36 MPH) (32 kn)</td>
<td></td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:

### ELECTRICAL (vehicle)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>12 V, 20 A•h</td>
</tr>
<tr>
<td>Starting system fuse</td>
<td>8 A</td>
</tr>
<tr>
<td>Charging system fuse</td>
<td>15 A</td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:

### CAPACITIES

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel tank</td>
<td>33 L (8.7 U.S. gal)</td>
</tr>
<tr>
<td>Impeller shaft reservoir</td>
<td>65 mL (2.2 U.S. oz)</td>
</tr>
<tr>
<td>Oil level height</td>
<td>To bottom of plug hole</td>
</tr>
<tr>
<td>Cooling system</td>
<td>N.A.</td>
</tr>
<tr>
<td>Injection oil tank</td>
<td>2.8 L (95 U.S. oz)</td>
</tr>
<tr>
<td>Storage basket</td>
<td>50 L (13052 in³)</td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:

### STANDARD EQUIPMENT

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tether cord</td>
<td>STD</td>
</tr>
<tr>
<td>Tool kit</td>
<td>STD</td>
</tr>
<tr>
<td>Fuel tank reserve</td>
<td>STD</td>
</tr>
<tr>
<td>Overheating warning device</td>
<td>STD</td>
</tr>
<tr>
<td>Electric fuel level gauge</td>
<td>OPT</td>
</tr>
<tr>
<td>Injection oil low level warning device</td>
<td>OPT</td>
</tr>
<tr>
<td>Reverse</td>
<td>STD</td>
</tr>
<tr>
<td>Luggage compartment</td>
<td>STD</td>
</tr>
<tr>
<td>Rear grab handle</td>
<td>STD</td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:
# Section 12 TEHNCIAL DATA
Sub-Section 02 (GT, 5811 MODELS)

## Tightening Torques

<table>
<thead>
<tr>
<th>Component</th>
<th>Torque Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust manifold screw/studs</td>
<td>20/6 N•m</td>
</tr>
<tr>
<td>Magneto flywheel nut</td>
<td>105 N•m</td>
</tr>
<tr>
<td>Flywheel (PTO side)</td>
<td>110 N•m</td>
</tr>
<tr>
<td>Crankcase screws M6</td>
<td>9 N•m</td>
</tr>
<tr>
<td>Crankcase/ engine support nuts</td>
<td>35 N•m</td>
</tr>
<tr>
<td>Engine support/hull</td>
<td>25 N•m</td>
</tr>
<tr>
<td>Cylinder head screws</td>
<td>20 N•m</td>
</tr>
<tr>
<td>Crankcase/cylinder screws</td>
<td>20 N•m</td>
</tr>
<tr>
<td>Tuned pipe flange nuts</td>
<td>25 N•m</td>
</tr>
<tr>
<td>Tuned pipe fixation screws</td>
<td>25 N•m</td>
</tr>
<tr>
<td>Cylinder head cover screws</td>
<td>9 N•m</td>
</tr>
<tr>
<td>Flame arrester screws</td>
<td>10 N•m</td>
</tr>
<tr>
<td>Flywheel guard studs</td>
<td>9 N•m</td>
</tr>
<tr>
<td>Impeller on shaft</td>
<td>70 N•m</td>
</tr>
<tr>
<td>Pump/hull</td>
<td>35 N•m</td>
</tr>
<tr>
<td>Venturi/housing</td>
<td>25 N•m</td>
</tr>
<tr>
<td>Nozzle/venturi</td>
<td>20 N•m</td>
</tr>
<tr>
<td>Housing cover</td>
<td>7 N•m</td>
</tr>
<tr>
<td>Grill</td>
<td>8 N•m</td>
</tr>
<tr>
<td>Ride shoe</td>
<td>10 N•m</td>
</tr>
<tr>
<td>Flywheel guard nuts</td>
<td>5 N•m</td>
</tr>
<tr>
<td>Reverse gate/housing</td>
<td>20 N•m</td>
</tr>
<tr>
<td>Cable/reverse</td>
<td>8 N•m</td>
</tr>
<tr>
<td>Steering cable lock nuts</td>
<td>10 N•m</td>
</tr>
<tr>
<td>Steering support screws</td>
<td>15 N•m</td>
</tr>
<tr>
<td>Steering collar screws</td>
<td>15 N•m</td>
</tr>
<tr>
<td>Steering stem screw</td>
<td>40 N•m</td>
</tr>
<tr>
<td>Handlebar saddle screws, nuts</td>
<td>26 N•m</td>
</tr>
<tr>
<td>Cable/nozzle</td>
<td>8 N•m</td>
</tr>
<tr>
<td>Ignition housing cover</td>
<td>4 N•m</td>
</tr>
<tr>
<td>Electrical box/battery</td>
<td>4 N•m</td>
</tr>
<tr>
<td>Electrical box cover</td>
<td>2 N•m</td>
</tr>
<tr>
<td>Starter mounting screws</td>
<td>22 N•m</td>
</tr>
<tr>
<td>Starter lock nuts</td>
<td>7 N•m</td>
</tr>
<tr>
<td>Storage cover hinge nuts</td>
<td>8 N•m (71 lbf•in)</td>
</tr>
</tbody>
</table>

Additional information: Apply where indicated

1. Loctite 242
2. Loctite 271
3. Loctite 515

Storage cover hinge nuts: 8 N•m (71 lbf•in)
**Section 12  TECHNICAL DATA**  
Sub-Section 03 (XP, 5850 MODELS)

## XP, 5850 MODELS

<table>
<thead>
<tr>
<th>ENGINE</th>
<th>ROTAX 587, water cooled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Induction type</td>
<td>Rotary valve</td>
</tr>
<tr>
<td>Exhaust system</td>
<td>Water cooled, water injected</td>
</tr>
<tr>
<td>Starting system</td>
<td>Electric start</td>
</tr>
<tr>
<td>Lubrication</td>
<td>Fuel/Oil mixture</td>
</tr>
<tr>
<td></td>
<td>Oil injection pump</td>
</tr>
<tr>
<td></td>
<td>Oil type</td>
</tr>
<tr>
<td>Number of cylinders</td>
<td>2</td>
</tr>
<tr>
<td>Bore</td>
<td>Standard</td>
</tr>
<tr>
<td></td>
<td>First oversize</td>
</tr>
<tr>
<td></td>
<td>Second oversize</td>
</tr>
<tr>
<td>Stroke</td>
<td>64 mm (2.520 in)</td>
</tr>
<tr>
<td>Displacement</td>
<td>580.3 cm³ (35.4 in³)</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>(uncorrected)</td>
</tr>
<tr>
<td></td>
<td>(corrected)</td>
</tr>
<tr>
<td>Compression pressure</td>
<td>N.A.</td>
</tr>
<tr>
<td>Engine maximum output</td>
<td>42 kW (56 hp) @ 5750 RPM</td>
</tr>
<tr>
<td>Engine maximum torque</td>
<td>69 N•m (51 lbf•ft) @ 5500 RPM</td>
</tr>
<tr>
<td>Cylinder head warpage</td>
<td>N.A.</td>
</tr>
<tr>
<td>Piston ring type and quantity</td>
<td>1 ST - 1 R</td>
</tr>
<tr>
<td>Ring end gap</td>
<td>New</td>
</tr>
<tr>
<td></td>
<td>Wear limit</td>
</tr>
<tr>
<td>Ring/piston groove clearance</td>
<td>New</td>
</tr>
<tr>
<td></td>
<td>Wear limit</td>
</tr>
<tr>
<td>Piston / cylinder wall clearance</td>
<td>New</td>
</tr>
<tr>
<td></td>
<td>Wear limit</td>
</tr>
<tr>
<td>Cylinder taper (maximum)</td>
<td>0.08 mm (.003 in)</td>
</tr>
<tr>
<td>Cylinder out of round (maximum)</td>
<td>0.05 mm (.002 in)</td>
</tr>
<tr>
<td>Connecting rod big end axial play</td>
<td>New</td>
</tr>
<tr>
<td></td>
<td>Wear limit</td>
</tr>
<tr>
<td>Crankshaft end play</td>
<td>N.A.</td>
</tr>
<tr>
<td>Crankshaft deflection</td>
<td>0.08 mm (.003 in)</td>
</tr>
<tr>
<td>Rotary valve timing</td>
<td>Opening</td>
</tr>
<tr>
<td></td>
<td>Closing</td>
</tr>
<tr>
<td>Rotary valve plate opening</td>
<td>132°</td>
</tr>
<tr>
<td>Crankcase / rotary valve gap</td>
<td>Min.</td>
</tr>
<tr>
<td></td>
<td>Max.</td>
</tr>
<tr>
<td>Connecting rod radial clearance</td>
<td>0.033 mm (.0015 in)</td>
</tr>
</tbody>
</table>
### Section 12 TECHNICAL DATA
Sub-Section 03 (XP, 5850 MODELS)

#### ELECTRICAL (engine)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magneto generator output</td>
<td>160 W @ 5500 RPM</td>
</tr>
<tr>
<td>Ignition system, type</td>
<td>CDI, 4/5 p</td>
</tr>
<tr>
<td>Spark plug Make and type</td>
<td>NGK BR7ES</td>
</tr>
<tr>
<td>Gap</td>
<td>0.5 mm (0.020 in)</td>
</tr>
<tr>
<td>Ignition timing</td>
<td>BTDC</td>
</tr>
<tr>
<td>Engine speed</td>
<td>6000 RPM</td>
</tr>
<tr>
<td>Generating coil Low speed</td>
<td>120 - 180 Ω</td>
</tr>
<tr>
<td>High speed</td>
<td>2.8 - 4.2 Ω</td>
</tr>
<tr>
<td>Battery charging coil</td>
<td>0.21 - 0.31 Ω</td>
</tr>
<tr>
<td>High tension coil Primary</td>
<td>0.23 - 0.43 Ω</td>
</tr>
<tr>
<td>Secondary</td>
<td>5.85 - 6.50 KΩ</td>
</tr>
<tr>
<td>Engine RPM limiter operation</td>
<td>6500 ± 200</td>
</tr>
<tr>
<td>ADDITIONAL INFORMATION:</td>
<td></td>
</tr>
</tbody>
</table>

#### CARBURATION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carburetor, type</td>
<td>Diaphragm</td>
</tr>
<tr>
<td>Carburetor number</td>
<td>270 500 093 MAG</td>
</tr>
<tr>
<td></td>
<td>270 500 092 PTO</td>
</tr>
<tr>
<td>Main jet</td>
<td>107.5</td>
</tr>
<tr>
<td>Pilot jet</td>
<td>65</td>
</tr>
<tr>
<td>Adjustment Low-speed mixture</td>
<td>1-1/4 turn</td>
</tr>
<tr>
<td>screw</td>
<td></td>
</tr>
<tr>
<td>High speed screw</td>
<td>1/4</td>
</tr>
<tr>
<td>Idle speed (in water)</td>
<td>1300-1500 RPM</td>
</tr>
<tr>
<td>Fuel type</td>
<td>Regular unleaded</td>
</tr>
<tr>
<td>octane no.</td>
<td>91 Ron</td>
</tr>
<tr>
<td>Fuel return line orifice</td>
<td>3 mm (0.118 in) MAG</td>
</tr>
<tr>
<td></td>
<td>0.5 mm (0.020 in) PTO</td>
</tr>
<tr>
<td>Leak test (pop off pressure)</td>
<td>150-170 kPa (22-25 PSI)</td>
</tr>
<tr>
<td>ADDITIONAL INFORMATION:</td>
<td></td>
</tr>
</tbody>
</table>

#### COOLING

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type Total loss type - Direct flow from jet propulsion unit.</td>
<td>None</td>
</tr>
<tr>
<td>Thermostat</td>
<td></td>
</tr>
<tr>
<td>Overheating beeper setting</td>
<td>96-99°C (205-210°F)</td>
</tr>
<tr>
<td>ADDITIONAL INFORMATION:</td>
<td></td>
</tr>
</tbody>
</table>
### PROPULSION

<table>
<thead>
<tr>
<th>Propulsion system</th>
<th>Bombardier Formula pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet pump type</td>
<td>Axial flow single stage</td>
</tr>
<tr>
<td>Impeller rotation</td>
<td>Counterclockwise</td>
</tr>
<tr>
<td>Transmission</td>
<td>Direct drive</td>
</tr>
<tr>
<td>Coupling type</td>
<td>Crown splines</td>
</tr>
<tr>
<td>Oil type</td>
<td>SEA-DOO JET PUMP SYNTHETIC OIL Polyolester 75W90 GL5 (P/N 293 600 011)</td>
</tr>
<tr>
<td>Steering (nozzle) pivoting angle</td>
<td>28°</td>
</tr>
<tr>
<td>Minimum required water level</td>
<td>60 cm (24 in)</td>
</tr>
<tr>
<td>Drive shaft deflection maximum</td>
<td>0.5 mm (.020 in)</td>
</tr>
<tr>
<td>Impeller outside diameter</td>
<td>New</td>
</tr>
<tr>
<td></td>
<td>Wear limit 138.33 mm 5.490 in</td>
</tr>
<tr>
<td>Pump wear ring inside diameter</td>
<td>New</td>
</tr>
<tr>
<td></td>
<td>Wear limit 140.5 mm (5.530 in)</td>
</tr>
<tr>
<td>Impeller / wear ring clearance</td>
<td>N.A.</td>
</tr>
<tr>
<td>Impeller / wear ring clearance</td>
<td>Wear limit 0.5 mm (.020 in)</td>
</tr>
<tr>
<td>Impeller / wear ring clearance</td>
<td>Wear limit 1.02 mm (.040 in)</td>
</tr>
<tr>
<td>Impeller shaft end play (new)</td>
<td>0.12 - 0.54 mm (.005 - .021 in)</td>
</tr>
<tr>
<td>Impeller shaft side play</td>
<td>0.05 mm (.002 in)</td>
</tr>
<tr>
<td>Impeller pitch</td>
<td>19°</td>
</tr>
</tbody>
</table>

**ADDITIONAL INFORMATION**: Do not mix different trademark or type of oil.

### DIMENSIONS

<table>
<thead>
<tr>
<th>Number of passenger (driver incl.)</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length, overall</td>
<td>244 cm (96 in)</td>
</tr>
<tr>
<td>Width, overall</td>
<td>105 cm (41.5 in)</td>
</tr>
<tr>
<td>Height, overall</td>
<td>92 cm (36.2 in)</td>
</tr>
<tr>
<td>Mass</td>
<td>166 kg (365 lb)</td>
</tr>
<tr>
<td>Load limit</td>
<td>160 kg (352 lb)</td>
</tr>
</tbody>
</table>

**MATERIALS**

- Hull: Composite
- Air intake silencer: Thermoplastic
- Flame arrester: Multi-layer wire screen
- Exhaust muffler: Aluminum
- Steering paddling: Polypropylene foam
- Fuel tank: Polyethylene
- Injection oil tank: Polyethylene
- Seat: Polyurethane foam

**ADDITIONAL INFORMATION**: 

[https://www.boat-manuals.com/](https://www.boat-manuals.com/)
## Section 12 TECHNICAL DATA

Sub-Section 03 (XP, 5850 MODELS)

### PERFORMANCE

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump static thrust</td>
<td>240 kg (533 lb)</td>
</tr>
<tr>
<td>Max. fuel consumption at wide open throttle</td>
<td>21.7 L/h (5.7 U.S. gal/h)</td>
</tr>
<tr>
<td>Cruising time at full throttle Fuel tank without reserve</td>
<td>1 hour 20 minutes</td>
</tr>
<tr>
<td></td>
<td>Fuel tank reserve</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>73 km/h (45 MPH) (39 kn)</td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:

### ELECTRICAL (vehicle)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>12 V, 20 A•h</td>
</tr>
<tr>
<td>Starting system fuse</td>
<td>8 A</td>
</tr>
<tr>
<td>Charging system fuse</td>
<td>15 A</td>
</tr>
<tr>
<td>Gauge system fuse</td>
<td>2 A</td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:

### CAPACITIES

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel tank</td>
<td>33 L (8.7 U.S. gal)</td>
</tr>
<tr>
<td>Impeller shaft reservoir Capacity</td>
<td>65 mL (2.2 U.S. oz)</td>
</tr>
<tr>
<td></td>
<td>Oil level height</td>
</tr>
<tr>
<td>Cooling system</td>
<td>N.A.</td>
</tr>
<tr>
<td>Injection oil tank</td>
<td>2.8 L (95 U.S. fl oz)</td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:

### STANDARD EQUIPMENT

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tether cord</td>
<td>STD</td>
</tr>
<tr>
<td>Tool kit</td>
<td>STD</td>
</tr>
<tr>
<td>Fuel tank reserve</td>
<td>STD</td>
</tr>
<tr>
<td>Overheating warning device</td>
<td>STD</td>
</tr>
<tr>
<td>Electric fuel level gauge</td>
<td>STD</td>
</tr>
<tr>
<td>Injection oil low level warning device</td>
<td>STD</td>
</tr>
<tr>
<td>Speedometer</td>
<td>N.A.</td>
</tr>
<tr>
<td>Tachometer</td>
<td>STD</td>
</tr>
<tr>
<td>Position lights</td>
<td>N.A.</td>
</tr>
<tr>
<td>Voltmeter</td>
<td>N.A.</td>
</tr>
<tr>
<td>Reverse</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION:

https://www.boat-manuals.com/
## TIGHTENING TORQUES

<table>
<thead>
<tr>
<th>Component</th>
<th>Torque Units</th>
<th>Torque (lb•ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust manifold screws</td>
<td>20 N•m</td>
<td>15 lb•ft</td>
</tr>
<tr>
<td>Magneto flywheel nut</td>
<td>105 N•m</td>
<td>77 lb•ft</td>
</tr>
<tr>
<td>Flywheel (PTO side)</td>
<td>110 N•m</td>
<td>81 lb•ft</td>
</tr>
<tr>
<td>Crankcase screws</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M6</td>
<td>9 N•m</td>
<td>6.5 lb•ft</td>
</tr>
<tr>
<td>M8</td>
<td>22 N•m</td>
<td>16 lb•ft</td>
</tr>
<tr>
<td>Crankcase/engine support nuts</td>
<td>35 N•m</td>
<td>26 lb•ft</td>
</tr>
<tr>
<td>Engine support/hull</td>
<td>25 N•m</td>
<td>18 lb•ft</td>
</tr>
<tr>
<td>Cylinder head screws</td>
<td>20 N•m</td>
<td>15 lb•ft</td>
</tr>
<tr>
<td>Crankcase/cylinder screws</td>
<td>20 N•m</td>
<td>15 lb•ft</td>
</tr>
<tr>
<td>Tuned pipe flange nuts</td>
<td>25 N•m</td>
<td>18 lb•ft</td>
</tr>
<tr>
<td>Tuned pipe fixation screws</td>
<td>25 N•m</td>
<td>18 lb•ft</td>
</tr>
<tr>
<td>Cylinder head cover screws</td>
<td>9 N•m</td>
<td>6.5 lb•ft</td>
</tr>
<tr>
<td>Flame arrester screws</td>
<td>10 N•m</td>
<td>7.5 lb•ft</td>
</tr>
<tr>
<td>Impeller on shaft</td>
<td>70 N•m</td>
<td>52 lb•ft</td>
</tr>
<tr>
<td>Pump/hull</td>
<td>35 N•m</td>
<td>26 lb•ft</td>
</tr>
<tr>
<td>Venturi/housing</td>
<td>25 N•m</td>
<td>18 lb•ft</td>
</tr>
<tr>
<td>Nozzle/venturi</td>
<td>20 N•m</td>
<td>15 lb•ft</td>
</tr>
<tr>
<td>Housing cover</td>
<td>7 N•m</td>
<td>5 lb•ft</td>
</tr>
<tr>
<td>Grill</td>
<td>8 N•m</td>
<td>6 lb•ft</td>
</tr>
<tr>
<td>Ride shoe</td>
<td>10 N•m</td>
<td>7.5 lb•ft</td>
</tr>
<tr>
<td>Flywheel guard nuts</td>
<td>5 N•m</td>
<td>4 lb•ft</td>
</tr>
<tr>
<td>Steering cable lock nuts</td>
<td>10 N•m</td>
<td>8 lb•ft</td>
</tr>
<tr>
<td>Steering support screws</td>
<td>15 N•m</td>
<td>11 lb•ft</td>
</tr>
<tr>
<td>Steering collar screws</td>
<td>5 N•m</td>
<td>4 lb•ft</td>
</tr>
<tr>
<td>Steering stem screw</td>
<td>40 N•m</td>
<td>29 lb•ft</td>
</tr>
<tr>
<td>Handlebar saddle screws, nuts</td>
<td>26 N•m</td>
<td>19 lb•ft</td>
</tr>
<tr>
<td>Ignition housing cover</td>
<td>4 N•m</td>
<td>3 lb•ft</td>
</tr>
<tr>
<td>Electrical box/battery</td>
<td>4 N•m</td>
<td>3 lb•ft</td>
</tr>
<tr>
<td>Electrical box cover</td>
<td>2 N•m</td>
<td>1.5 lb•ft</td>
</tr>
<tr>
<td>Starter mounting screws</td>
<td>22 N•m</td>
<td>16 lb•ft</td>
</tr>
<tr>
<td>Starter lock nuts</td>
<td>5 N•m</td>
<td>4 lb•ft</td>
</tr>
</tbody>
</table>

**ADDITIONAL INFORMATION:** Apply where indicated

1. Loctite 242
2. Loctite 271
3. Loctite 515

[https://www.boat-manuals.com/](https://www.boat-manuals.com/)

12-03-5
## Section 12 TECHNICAL DATA

<table>
<thead>
<tr>
<th>Legend</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATDC</td>
<td>After top dead center</td>
</tr>
<tr>
<td>BTDC</td>
<td>Before top dead center</td>
</tr>
<tr>
<td>CDI</td>
<td>Capacitor discharge ignition</td>
</tr>
<tr>
<td>N.A.</td>
<td>Not available</td>
</tr>
<tr>
<td>R</td>
<td>Rectangular</td>
</tr>
<tr>
<td>RPM</td>
<td>Revolutions per minute</td>
</tr>
<tr>
<td>ST</td>
<td>Semi-trapez</td>
</tr>
<tr>
<td>STD</td>
<td>Standard</td>
</tr>
<tr>
<td>VROI</td>
<td>Variable rate oil injection</td>
</tr>
</tbody>
</table>
# TROUBLESHOOTING

The following chart is provided to help in diagnosing the probable source of troubles.

## ENGINE WILL NOT START

<table>
<thead>
<tr>
<th>OTHER OBSERVATION</th>
<th>POSSIBLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine does not turn over</td>
<td>• Fuse open&lt;br&gt;• Discharged battery&lt;br&gt;• Battery connections&lt;br&gt;• Water/fuel hydrolock&lt;br&gt;• Starter or solenoid&lt;br&gt;• Seized engine&lt;br&gt;• Seized jet pump&lt;br&gt;• Jammed pump</td>
<td>• Check wiring then replace fuse&lt;br&gt;• Check/recharge&lt;br&gt;• Check/clean/tighten&lt;br&gt;• Check, refer to section 03-01&lt;br&gt;• Check, refer to section 07-04&lt;br&gt;• Check/repair as needed&lt;br&gt;• Check, refer to section 08-01&lt;br&gt;• Check/clean out debris</td>
</tr>
<tr>
<td>Engine slowly turns</td>
<td>• Discharged/weak battery&lt;br&gt;• Restriction in jet pump&lt;br&gt;• Seizure in jet pump&lt;br&gt;• Seal carrier seizure&lt;br&gt;• Partial engine hydrolock&lt;br&gt;• Partial engine seizure</td>
<td>• Check/charge/replace&lt;br&gt;• Check/clean pump&lt;br&gt;• Inspect, refer to section 08-01&lt;br&gt;• Check, refer to section 08-01&lt;br&gt;• Check, refer to section 03-01&lt;br&gt;• Check compression, refer to section 03-03</td>
</tr>
<tr>
<td>Engine turns over</td>
<td>• Tether cord removed&lt;br&gt;• Fuel tank empty&lt;br&gt;• Fuel water-contaminated&lt;br&gt;• Dirty fuel filter&lt;br&gt;• Fouled spark plugs&lt;br&gt;• Water in engine&lt;br&gt;• Misuse of choke (fuel flooded)&lt;br&gt;• Carburation&lt;br&gt;• Ignition&lt;br&gt;• Engine flooded — Needle valve stuck open</td>
<td>• Reinstall&lt;br&gt;• Refill&lt;br&gt;• Renew supply&lt;br&gt;• Clean/replace&lt;br&gt;• Replace&lt;br&gt;• Check, refer to section 03-01&lt;br&gt;• Use only with cold engine&lt;br&gt;• Check, refer to section 05-03&lt;br&gt;• Check, refer to section 07-02 and 07-06&lt;br&gt;• Check, refer to section 05-03</td>
</tr>
</tbody>
</table>
### ENGINE MISFIRES, RUNS IRREGULARLY

<table>
<thead>
<tr>
<th>OTHER OBSERVATION</th>
<th>POSSIBLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak spark</td>
<td>• Fouled, defective, worn spark plugs</td>
<td>• Check/verify heat range/replace</td>
</tr>
<tr>
<td></td>
<td>• Faulty RPM limiter</td>
<td>• Check, refer to section 07-06</td>
</tr>
<tr>
<td></td>
<td>• Faulty ignition</td>
<td>• Check, refer to section 07-06</td>
</tr>
<tr>
<td>Lean fuel mixture</td>
<td>• Fuel level low</td>
<td>• Check/refill</td>
</tr>
<tr>
<td></td>
<td>• Stale or water fouled fuel</td>
<td>• Check/siphon and refill</td>
</tr>
<tr>
<td></td>
<td>• Fuel filter dirty or restricted</td>
<td>• Check/clean/replace</td>
</tr>
<tr>
<td></td>
<td>• Carburation dirty or out of adjustment</td>
<td>• Check/clean/adjust, refer to section 05-03</td>
</tr>
<tr>
<td></td>
<td>• Leaking crankshaft seal, magneto or PTO</td>
<td>• Check/test, replace, refer to engine section 03-05</td>
</tr>
<tr>
<td></td>
<td>• Fuel valve restricted</td>
<td>• Check/replace</td>
</tr>
<tr>
<td></td>
<td>• Fuel tank up screen restricted</td>
<td>• Check/replace</td>
</tr>
<tr>
<td></td>
<td>• Loose carburetor, dry spark plugs</td>
<td>• Tighten carburetor</td>
</tr>
<tr>
<td>Rich fuel mixture/</td>
<td>• Partially closed choke</td>
<td>• Check/adjust choke cable</td>
</tr>
<tr>
<td>fouled spark plug</td>
<td>• Flame arrester dirty or restricted</td>
<td>• Check/clean/replace</td>
</tr>
<tr>
<td></td>
<td>• Carburetor adjustment or setting</td>
<td>• Check/clean/adjust, refer to section 05-03</td>
</tr>
<tr>
<td></td>
<td>• Main jet loose</td>
<td>• Check, refer to section 05-03</td>
</tr>
<tr>
<td></td>
<td>• Main jet O-ring damage</td>
<td>• Check/replace, refer to section 05-03</td>
</tr>
<tr>
<td></td>
<td>• Rotary valve shaft seal leaking</td>
<td>• Check/replace, refer to section 03-06</td>
</tr>
<tr>
<td></td>
<td>• Oil pump adjustment</td>
<td>• Check/adjust, refer to section 06-02</td>
</tr>
<tr>
<td></td>
<td>• Watercraft transportation</td>
<td>• Turn fuel valve to OFF</td>
</tr>
<tr>
<td>Difficult to start</td>
<td>• Incorrect rotary valve timing</td>
<td>• Check/adjust, refer to section 03-06</td>
</tr>
</tbody>
</table>
## Section 13  TROUBLESHOOTING

### ENGINE OVERHEATS

<table>
<thead>
<tr>
<th>OTHER OBSERVATION</th>
<th>POSSIBLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overheat beeper sounds</td>
<td>• Restricted jet pump water intake</td>
<td>• Check/clean</td>
</tr>
<tr>
<td></td>
<td>• Cooling system restriction</td>
<td>• Check/flush, refer to section 04-03</td>
</tr>
<tr>
<td></td>
<td>• Carburetor adjustment</td>
<td>• Check/clean/adjust, refer to section 05-03</td>
</tr>
<tr>
<td></td>
<td>• Grounded temperature sensor or sensor wire</td>
<td>• Check/replace/repair</td>
</tr>
</tbody>
</table>

### ENGINE CONTINUALLY BACKFIRES

<table>
<thead>
<tr>
<th>OTHER OBSERVATION</th>
<th>POSSIBLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak spark</td>
<td>• Fouled, defective spark plugs</td>
<td>• Clean/replace</td>
</tr>
<tr>
<td></td>
<td>• RPM limiter malfunction</td>
<td>• Check/replace, refer to section 07-06</td>
</tr>
<tr>
<td>Ignition timing</td>
<td>• Incorrect setting</td>
<td>• Check/reset, refer to section 07-02</td>
</tr>
<tr>
<td></td>
<td>• Flywheel key sheared</td>
<td>• Check/replace</td>
</tr>
<tr>
<td>Rotary disc valve</td>
<td>• Timing incorrect</td>
<td>• Check/reset, refer to section 03-06</td>
</tr>
<tr>
<td>Carburetor</td>
<td>• Carburation too lean</td>
<td>• Check/adjust, refer to section 05-03</td>
</tr>
</tbody>
</table>

### ENGINE DETONATION OR PINGING

<table>
<thead>
<tr>
<th>OTHER OBSERVATION</th>
<th>POSSIBLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition</td>
<td>• Timing too far advanced</td>
<td>• Check/reset</td>
</tr>
<tr>
<td></td>
<td>• Spark plug heat range too high</td>
<td>• Check/change to correct range</td>
</tr>
<tr>
<td>Engine temperature</td>
<td>• Engine overheating</td>
<td>• Check, refer to section 03-01 and 04-01</td>
</tr>
<tr>
<td></td>
<td>• Poor quality fuel</td>
<td>• Use good quality fuel</td>
</tr>
</tbody>
</table>
### Section 13 TROUBLESHOOTING

#### ENGINE LACKS ACCELERATION OR POWER

<table>
<thead>
<tr>
<th>OTHER OBSERVATION</th>
<th>POSSIBLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Weak spark</td>
<td>• Check/replace, refer to section 07-06</td>
</tr>
<tr>
<td></td>
<td>• Carburation, jetting too rich/lean</td>
<td>• Check/reset/rejet, refer to section 05-03</td>
</tr>
<tr>
<td></td>
<td>• Throttle does not reach full open</td>
<td>• Check/readjust</td>
</tr>
<tr>
<td></td>
<td>• Low compression</td>
<td>• Check/repair, refer to section 03-03</td>
</tr>
<tr>
<td></td>
<td>• Exhaust system restriction</td>
<td>• Check/clean</td>
</tr>
<tr>
<td></td>
<td>• Water in gas or oil</td>
<td>• Check/siphon/replace</td>
</tr>
<tr>
<td></td>
<td>• Debris in needle valve</td>
<td>• Check/clean, refer to section 05-03</td>
</tr>
</tbody>
</table>

#### ENGINE RUNS TOO FAST

<table>
<thead>
<tr>
<th>OTHER OBSERVATION</th>
<th>POSSIBLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet pump cavitation</td>
<td>• Faulty RPM limiter</td>
<td>• Check/refer to section 07-06</td>
</tr>
<tr>
<td></td>
<td>• Damaged leading edge of impeller</td>
<td>• Check/replace</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>NOTE:</strong> Leading edge damage contributes to poor performance from start. Trailling edge damage contributes to poor top performance and stator vane erosion.</td>
</tr>
<tr>
<td>Jet pump ventilation</td>
<td>• Pump housing or ride shoe air leak</td>
<td>• Check/reseal, refer to section 08-01</td>
</tr>
</tbody>
</table>

#### ABNORMAL NOISE FROM PROPULSION SYSTEM

<table>
<thead>
<tr>
<th>OTHER OBSERVATION</th>
<th>POSSIBLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Weeds/debris caught in pump intake or impeller</td>
<td>• Check/clean</td>
</tr>
<tr>
<td></td>
<td>• Low oil level in pump housing</td>
<td>• Check/troubleshoot source of leak/refill supply, refer to section 08-01</td>
</tr>
<tr>
<td></td>
<td>• Damaged or bent driveshaft</td>
<td>• Check/replace, refer to section 08-01</td>
</tr>
<tr>
<td></td>
<td>• Broken motor mounts</td>
<td>• Check/replace, refer to section 03-02</td>
</tr>
</tbody>
</table>