



THE FORCE BEHIND THE FUN.™

ENGINE OWNER'S
MANUAL SD1075

VERSION 1

Table of Contents

SECTION 1: INTRODUCTION

PROPOSITION 65.....	1
SAFETY WARNINGS	1
REPLACEMENT PARTS.....	1
SAFE BOATING	2
WARRANTY.....	2-5

SECTION 2: SAFE BOATING

CARBON MONOXIDE EXPOSURE.....	6
-------------------------------	---

SECTION 3: ENGINE IDENTIFICATION

ENGINE TYPE.....	7
MODEL SPECIFICATIONS.....	8

SECTION 4: ELECTRONIC SEQUENTIAL FUEL INJECTION

INFORMATION	9
--------------------------	---

SECTION 5: ENGINE ALARMS AND INSTRUMENTATION

DIGITAL ALARMS	10
INSTRUMENTATION	11

SECTION 6: SSVEC FUSE AND RELAY ENCLOSURE 12-15

SECTION 7: PRECAUTIONS

OIL LEVEL	16
HYDROLOCK.....	16

SECTION 8: ENGINE OPERATING INSTRUCTIONS

GASOLINE REQUIREMENTS.....	17
OIL REQUIREMENTS	17
STARTING ENGINE EFI.....	17
ENGINE BREAK-IN/25 HOUR INSPECTION	17-18

SECTION 9: WINTERIZATION

4.3/5.7L RAW WATER COOLED ENGINES	19
FULL CLOSED COOLED ENGINES.....	20

HALF CLOSED COOLED ENGINES	21-22
FULL CLOSED INBOARD JET ENGINES.....	23

SECTION 10: ENGINE MAINTENANCE

SCHEDULED MAINTENANCE BY OWNER.....	24
SCHEDULED MAINTENANCE BY QUALIFIED TECHNICIAN	25
CRANKCASE OIL CHANGE	26
OIL FILTERS	27
FLAME ARRESTOR	28
G-FORCE FUEL SYSTEM	28
BATTERY CABLES	29
MULTIPLE ENGINE BATTERY PRECAUTIONS - EFI	29
ALTERNATOR BELT TENSION.....	29
SEA WATER PUMP IMPELLER REPLACEMENT	29
CLOSED COOLING SYSTEM	30
FILLING CLOSED COOLING SYSTEM.....	30-31

SECTION 11: ENGINE DIAGNOSTICS AND CODES..... 32-34

SECTION 12: TROUBLE SHOOTING

ENGINE WILL NOT TURN OVER	35
ENGINE CRANKS BUT WILL NOT START	35
ENGINE RUNS POORLY AT HIGH RPM.....	36
HIGH SPEED MISS.....	36
FUEL SYSTEM - RICH.....	37
FUEL SYSTEM - LEAN	37
POOR FUEL ECONOMY.....	37
ENGINE STARTS AND STOPS.....	38
OIL PRESSURE - LOW	38
OIL PRESSURE - HIGH.....	38
EXCESSIVE OIL CONSUMPTION	39
ENGINE OVERHEATING.....	39
WATER IN ENGINE CYLINDER OR BASE	40

SECTION 13: INSTALLATION INSTRUCTIONS

ENGINE COMPARTMENT.....	41
ENGINE MOUNTING.....	41
ENGINE ROTATION.....	41
ENGINE BED	41
COOLING SYSTEM	41-42
EMISSION-RELATED INSTALLATION INSTRUCTIONS.....	42
EXHAUST PIPING.....	42
ELECTRICAL CONNECTION	43
BATTERIES.....	43
DUAL ENGINES.....	43
BATTERY ISOLATORS.....	43
ENGINE BATTERY SPECIFICATIONS	44
BATTERY CABLE LENGTH REQUIREMENTS	44
SPECIAL FUEL INSTRUCTIONS FOR 6.2 550 HP ENGINES	44
LSA AIRBOAT INSTALLATION	45
ADAPTER HARNESS	46
HEATER CONNECTIONS	47
PRESTART CHECKLIST	48

WARRANTY REGISTRATION TRANSFER..... 49

SERVICE LOG..... 50-52

1. Introduction

MARINE POWER would like to thank you again for your purchase. The pleasure and peace of mind derived from your new engine is in direct proportion to the amount of care that it is given. We have tried to include as much as possible in our Engine Owner's Manual to help you as the customer. READ THIS MANUAL THOROUGHLY AND COMPLETELY before attempting to operate your MARINE POWER engine. We ask that you become familiar with the components and the maintenance schedules. If you have any questions or concerns regarding this manual or your newly purchased MARINE POWER Engine, please feel free contact your nearest MARINE POWER dealer or distributor.

Proposition 65

WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

"Safety Warnings" and additional information or instructions are used to alert the installer/operator of possible safety hazards in performing certain service or maintenance procedures incorrectly or carelessly.

These "Safety Warnings" alone cannot eliminate the hazards that they signal. Strict compliance with these warning instructions while performing service and maintenance procedures, plus "common sense"

operation, are major accident prevention measures.

Safety Warnings

DANGER

Signals serious damage, failure or breakdown of equipment; severe injury or high probability of death to the user if proper precautions are not taken. This signal word is applied in extreme situations.

WARNING

Indicates a potential hazard which could result in personal injury.

CAUTION

Indicates a hazard which could result in damage to equipment.

Replacement Parts

Use of replacement parts (i.e. automotive, after-market, etc.) in the electrical, ignition and fuel systems, which are not U.S. Coast Guard approved, could cause a fire or explosion hazard and must be avoided.

Always request that genuine MARINE POWER Engine replacement parts be used in any repairs or maintenance being performed on your engine(s).

DANGER

Electrical, ignition and fuel system components are designed and manufactured to comply with U.S. Coast Guard rules and regulations to minimize the possibility of fire or explosion hazard.

1. Introduction

Safe Boating

The waterways are becoming increasingly crowded and, in order to enjoy them safely, the operator should acquaint himself/herself with safe boating practices. Boating safely and seamanship courses are offered by the following national and state organizations:

- Power Squadrons
- Coast Guard Auxiliary
- Red Cross
- State, provincial or local agencies in charge of water safety enforcement

MARINE POWER recommends that all power boat operators attend one of these courses.

To help locate a course being offered near you, contact Boat U.S. Foundation's toll-free national boating safety hotline, 1-800-336-BOAT, and in Virginia, 1-800-245-BOAT.

The Federal Boat Safety Act of 1971 requires that registration of marine products sold in the United States be maintained by the manufacturer and dealers of those products. It is imperative that MARINE POWER HOLDING, LLC receive your WARRANTY REGISTRATION/SEA TRIAL form properly completed for warranty purposes and to comply with federal regulation. This registration also enables us to contact you, if it should become necessary, to change or improve the product for

your protection.

WARRANTY REGISTRATION MUST BE RECEIVED WITHIN 10 DAYS AFTER DATE OF PURCHASE BY FIRST OWNER.

Please read the Limited Warranty document that is included with your engine registration papers and in this manual. This document explains your warranty coverage. Please note that no warranty repairs are to be performed without prior authorization from the Marine Power Distributor in your area. Contact your selling dealer directly for any required warranty repairs.

For more information, you may also visit our web site at www.marinepowerusa.com.

Again, thanks for choosing MARINE POWER.

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CALIFORNIA AND U.S. ENVIRONMENTAL PROTECTION AGENCY EMISSIONS CONTROL WARRANTY STATEMENT

Your Warranty Rights and Obligations

The California Air Resources Board, U.S. E.P.A., and MARINE POWER HOLDING, LLC are pleased to explain the emission control system warranty on your Inboard engine. New Inboard engines must be designed, built and equipped to meet California and EPA's stringent anti-smog standards. MARINE POWER HOLDING, LLC must warrant the emission control system on your Inboard engine for the periods of time listed on the next page, provided there has been no abuse, neglect or improper maintenance of your inboard engine.

Your emission control system may include parts such as fuel injection system, the ignition system and catalytic converter. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, MARINE POWER HOLDING, LLC will repair your inboard engine at no cost to you, including diagnosis, parts and labor.

1. Introduction

Manufacturer's Emission Warranty Coverage

Engine Type	Power Rating	Electronic Components	Mechanical Components
Outboard Marine	Less than or equal to 110 kW (150 HP)	3 Years or 350 Hours	3 Years or 350 Hours

Owner's Warranty Responsibilities

As the Outboard engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. MARINE POWER HOLDING, LLC recommends that you retain all receipts covering maintenance on your outboard engine, but MARINE POWER HOLDING, LLC cannot deny warranty solely for the lack of receipts or your failure to ensure the performance of all schedule maintenance. MARINE POWER highly recommends that the selling dealer do Warranty Registration along with a completed Statement of Sea Trial in order to facilitate any warranty work necessary in the future.

As the Outboard engine owner, you should however be aware that MARINE POWER HOLDING, LLC may deny you warranty coverage if your Outboard engine or part has failed due to abuse, neglect or improper maintenance or unapproved modifications.

You are responsible for presenting your Outboard engine to a MARINE POWER HOLDING, LLC distribution center as soon as a problem exists. The warranty

repairs will be complete within a reasonable amount of time, not to exceed 30 days.

1. MARINE POWER HOLDINGS, LLC ("Marine Power") warrants to the first owner purchasing at retail and all subsequent owners, of every Marine Power Outboard marine engine manufactured after January 1, 2008, that the emissions control devices on Marine Power Inboard marine engines are free from defects in materials and workmanship when manufactured and will remain so for the stated period in the above table. Marine Power warrants that each Marine Power Outboard marine engine and factory installed accessories designed, built and equipped with all applicable regulations adopted by the Air Resources Board pursuant to its authority in Chapters 1 and 2, Part 5, Division 26 of the Health and Safety Code; and the U. S. Environmental Protection Agency pursuant its authority in Chapter 9 of Title 5 of the U.S. Code to be free from defects in materials and workmanship that cause the failure of a warranted part to be identified in all material respects to that part as described in the

engine manufacturer application for certification.

2. The warranty shall commence, on the date of delivery to the first retail purchaser or from the date the engine is first placed in service for demonstration or any other purpose prior to the sale to the first retail owner. However, in no event shall the duration of this Warranty exceed three (3) years measured from the original retail sale date.
3. Any warranted part that is not scheduled for replacement as required maintenance in the written instructions in the Owner's Manual will be warranted for the appropriate warranty period in the above table. If the part fails during the period of warranty coverage, the part will be repaired or replaced by Marine Power at a warranty station. Any such part repaired or replaced under warranty will be warranted for the remainder of the period.
4. Any warranted part that is scheduled only for regular inspection in the written instructions in the Owner's Manual will be warranted for the appropriate warranty period in the above table. A statement in such written instructions to the effect of "repair and replace as necessary" does not reduce the period of warranty coverage. Any such part repaired or replaced under warranty will be warranted for the remaining warranty period.
5. Any warranted part that is scheduled for replacement as required maintenance in the written

1. Introduction

instructions in the Owner's Manual will be warranted for the period of time before the first scheduled replacement date for the part. If the part fails before the first scheduled replacement, the part will be repaired or replaced by Marine Power at a warranty station. Any such part repaired or replaced under warranty will be warranted for the remainder of the period to the first scheduled replacement point for the part.

6. Repair or replacement of any warranted part under the warranty provisions of the article will be performed at a warranty station at no charge to the owner. Warranty services and repairs will be provided at all Marine Power distribution centers and trained marine dealers.
7. The engine owner will not be charged for diagnostic labor that is directly associated with diagnosis of a defective, emission related warranted part, provided that such diagnostic work is performed at a warranty station.
8. Marine Power is liable for damages to other engine components proximately caused by a failure under warranty of any warranted part.
9. Throughout the appropriate warranty period in the table from the previous page Marine Power will maintain a supply of warranted parts sufficient to meet the expected demands for such parts.

10. Any replacement part may be used in the performance of any warranty maintenance or repairs and will be provided without charge to the owner. Such usage will not reduce Marine Power's warranty obligations.

11. Add-on or modified parts, as defined in CCR, Section 1900 (b)(1) and (b)(10), Title 13, that are not exempted by the Air Resources Board will not be used. The use of any non-exempted add-on or modified parts by the ultimate purchaser will be grounds for disallowing a warranty claim made in accordance with this article statement. Marine Power will not be liable under this statement to warranted failures of warranted parts caused by the use of non-exempted add-on or modified part.

12. The following parts are covered by this general emissions warranty statement.

A) Fuel Metering System

- 1) Fuel Injectors
- 2) Fuel Pressure Regulator
- 3) Manifold Absolute Pressure Sensor
- 4) Throttle Position Sensor
- 5) Throttle Body
- 6) Coolant Temperature Sensor
- 7) Oxygen Sensors
- 8) Intake Valves

B) Air Induction System

- 1) Intake Manifold
- 2) Air Filter/Flame Arrestor

C) Ignition System

- 1) Spark Plugs
- 2) Electronic Ignition System
- 3) Spark Advance/Retard System
- 4) Ignition Coil and/or Control Module

D) Lubrication System

- 1) Oil Pump and Internal Parts

E) Positive Crankcase Ventilation (PCV) System

- 1) PCV Valve
- 2) Oil Filler Cap

F) Exhaust System

- 1) Exhaust Valves
- 3) Catalysts (if equipped)

G) Miscellaneous Items Used in Above Systems

- 1) Hoses, Clamps, Fittings, Tubing, Sealing Gaskets or Devices and Mounting Hardware
- 2) Pulleys, Belts and Idlers
- 3) Vacuum, Temperature, Check and Timer Sensitive Valves and Switches
- 4) Electronic Controls

1. Introduction

13. The repair or replacement of any warranted part otherwise eligible for coverage under this warranty may be denied from such warranty coverage if Marine Power demonstrates that the engine and/or part has been abused, neglected, or improperly maintained, and that such abuse, neglect, or improper maintenance was the direct cause of the need for repair or replacement of the part.
14. This Warranty will not apply to:
- A) Use of an accessories or parts not manufactured or sold by MARINE POWER.
 - B) Neglect, failure to follow maintenance schedules, accident, abnormal operations, misuse, negligence, improperly maintained, improperly operated or installed, racing or engine modification. Problems arising from installation, application, exhaust to engine, fuel lines to the engine, propping, cooling to the engine or engine damage due to defective electrical hookups.
 - C) Rust, corrosion or effects of weather.
 - D) Water ingestion through exhaust or intake system.
 - E) Detonation or operation with fuels, oils or lubricants which are not suitable for use with this product. Detonation causes: Poor fuel quality, overloading of engine, improper gear or propeller selection, engine overheating, excessive back pressure, incorrect ignition timing, excessive total timing.
 - F) Reimbursement for: Haul-out, launch, towing, storage charges, rental charges of any type, inconvenience of any type, loss of time or income, expense of returning a MARINE POWER product to a service facility, towing, lodging, loss or damage to personal property.
15. Marine Power reserves the right to limit warranty coverage on engines that have accumulated excessive hours through commercial use or any other non-typical operation.

2. Safe Boating

CAUTION

Carbon Monoxide Exposure

Carbon Monoxide is a odorless, colorless and tasteless gas that cannot be smelled, seen or tasted.

Sustained exposure to carbon monoxide gas may lead to brain damage, unconsciousness or death.

Carbon Monoxide is a hazardous gas that is produced when items containing carbon are burned. Items such as, but not limited to; wood, coal, gasoline, natural gas, propane or oil. Carbon Monoxide (CO) is found in many areas such as any type of internal combustion engines, heaters, charcoal grills, cooking ranges and any other open flame appliances. There are many possible variables for the accumulation of carbon monoxide. Wind direction, boat speed, vessel proximity to other vessels or structures are just a few of the possible variables that would permit exposure to carbon monoxide gases. It is important that regular inspections of the exhaust system are conducted and maintenance is properly performed by a qualified technician. Adequate air circulation in all areas of your boat are necessary in order to prevent build-up of carbon monoxide. Please contact your boat manufacturer if you have questions regarding these hazards.

For more information regarding safe boating

practices, and/or carbon monoxide poisoning on recreational boats, contact the following:

National Marine Manufacturers Association (NMMA)
200 East Randolph Drive, Suite 5100
Chicago, IL 60601
312-946-6200
www.nmma.org

United States Coast Guard
Office of Boating Safety Chicago, IL
CG Headquarters G-OPB-3
2100 Second Street, SW
Washington, DC 20593
202-267-0984
www.uscgboating.org

American Boat & Yacht Council, Inc. (ABYC)
3069 Solomons Island Road
Edgewater, MD 21037-1416
410-956-1050
www.abyc.com

/// 3. Engine Identification

Every Marine Power Engine is equipped with an Engine Identification Tag, also known as a Serial Number Tag. This tag contains information (model number and serial number) that will be required before any warranty work (if necessary) can be done.



///MARINEPOWER®

EMISSION CONTROL INFORMATION:

THIS MARINE ENGINE COMPLIES WITH U.S. EPA AND CALIFORNIA EXHAUST REGULATIONS FOR 2013 SPARK IGNITION MARINE ENGINES

ENG FAMILY: DMPEM06.240

ENGINE DISP: 6.2 L

FUEL: UNLEADED

MAXIMUM POWER: 320 KW

SPARK PLUG: 479111

DATE OF MANUFACTURE: 05/13

SPARK PLUG GAP: .060 IN

EMISSION CONTROLS: TWC, HO2S, PFI, EC

SEE OPERATORS MANUAL FOR MAINTENANCE SPECIFICATIONS

3. Engine Identification

1.0 L ECOTEC

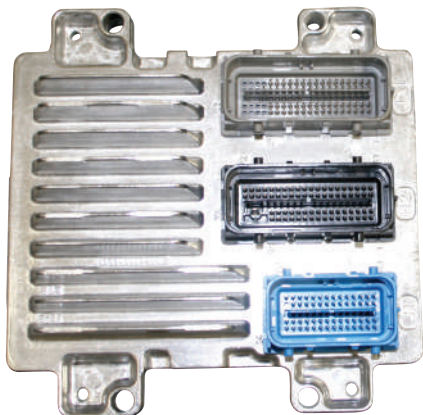
Engine Type	1.0L I-3				
Repower	YES				
Original Equipment	YES				
Unique Feature	2 PHASED OH CAM				
Displacement	999 CC				
Bore & Stroke	74 X 77.7 MM				
Compression Ratio	10.5:1				
Cylinder Block	ALUMINUM				
Cylinder Head	ALUMINUM				
Recommended Fuel	87 OCTANE				
Max RPM @ Wot	6200				
Idle RPM	850				
HP Fuel Pressure	57-62				
LP Fuel Pressure	5-7 IF APPLICATABLE				
Oil Pressure @ 2000 RPM	40				
Min Oil Pressure @ Idle	20				
Operating Temp RW Cooled					
Operating Temp FW Cooled	186-214F				
Sparkplug Type	AC DELCO 12622441				
Sparkplug Gap	.024-.028 "				
Timing @ Idle					
Timing @ 4000 RPM					
Firing Order	1-2-3				
Alternator Rating	130 AMP				
Crankcase Oil	5-30 DEXOS				
Oil Capacity	4.2 QUARTS				
Closed Cooling Fluid	50-50 ANTIFREEZE				
Closed Cooling Capacity	APPROX 2 GALLONS				

4. Electronic Sequential Fuel Injection Information

The engines covered in this manual are equipped with Electronic Sequential Fuel Injection. The main fuel system components include:

- The electric high and low pressure fuel pumps
- The throttle body assembly
- The fuel injectors

The fuel injection system is controlled by an Electronic Control Module (ECM). The ECM continually monitors information from the various sensors on the engine and configures the spark timing and fuel delivery for optimum performance. Additionally, the ECM protects the engine from over-revving and monitors the oil pressure and water temperature.



The following sensors constantly provide information to the ECM.

- Engine Coolant Temperature (ECT) Sensor
- Engine Oil Pressure Sensor
- Manifold Absolute Pressure (MAP) Sensor
- Knock Sensor
- Camshaft Positioning (CMP) Sensor
- Crankshaft Positioning (CKP) Sensor
- Intake Air Temperature (IAT) Sensor (combined with the MAP sensor on the 5.7)
- Throttle Position (TPS) Sensor
- Pedal Position (PPS) Sensor
- Pre-Catalyst O2 (O2) Sensor (Catalyst equipped engines)
- Post-Catalyst O2 (O2) Sensor (Catalyst equipped engines)

Engines may include one or more of the following optional sensors.

- Engine Oil Temperature Sensor
- Fuel Pressure Sensor
- Transmission Oil Temperature Sensor
- Exhaust Manifold Temperature Sensor

- Barometric Pressure (BARO) Sensor
- Super Charger Inlet Pressure (SCIP) Sensor

5. Engine Alarms and Instrumentation

Digital Alarms

If, for any reason, one or more of these sensors or associated wiring malfunctions, the ECM's built in self-diagnostic system sets a trouble code and turns on the Malfunction Indicator Light (MIL) or sounds a buzzer to alert the operator of a malfunction.

The MIL, buzzer and gauges can signal that something is wrong before it becomes serious enough to cause an expensive repair. Paying attention to the MIL, buzzer and gauges could also save you or others from injury. The MIL may be replaced by verbiage such as "Service Required" on boats equipped with electronic instrumentation.

The MIL or "Service Required" notice comes on when there is a problem with an engine function. Gauges can also indicate when there is a problem with an engine functions. Often gauges and the MIL (Service Required) work together to let you know that there is a problem with your engine.

In most cases, when the "MIL" is on, the engine(s) may lose some performance and/or efficiency, but remain running adequately. Also, the light may go out or become intermittent, but a trouble code will be logged for future diagnosis. In any case, the operator must obtain service by an authorized dealer to determine and repair the exact cause of the malfunction.

The engine ECM is programmed to control the engine

alarm system. This system is configured to turn on an instrument panel mounted indicator ("MIL" or "Check Engine") light, and, optionally, an audible ("buzzer") alarm to warn the operator of engine problems.

If the "MIL" lights and/or the "buzzer" sounds during operation, the operator should scan the instrument panel readings for possible sources of trouble. Conditions that may cause alarm activation include:

- Low Oil Pressure
- Engine Overheat (High Temperature)
- Electronic Throttle Malfunction
- Engine Misfire

See Section 11: Engine Diagnostics and Codes for more information.

If the boat is equipped with CAN-Buss Messaging (Electronic Instrumentation), the main screen will likely display a "Service Required" message when the ECM records an active trouble code.

IMPORTANT: A failure with the Electronic Throttle will result in idle only operation of the engine. In some cases, the throttle may be reset by turning the key off and then restarting the engine. The operator should contact his servicing dealer to determine the exact cause of the failure.

Drive Applications

Marine Power Engines are compatible with a variety of drive systems. Depending on the operator's boat type, the engine may be coupled to a thru-shaft mudboat propeller, a shallow-water gear drive, or a mudboat belt drive. Please familiarize yourself with your drive system and note the requirements it may impact on your engine configuration. Such things as cooling water supply, wiring connections and engine options may be unique to your installation.

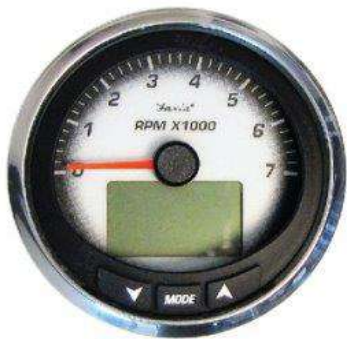
5. Engine Alarms and Instrumentation

Instrumentation

Boat builders use many different types of instrumentation in their boats. The operator should understand his instrumentation and note any abnormal operating conditions.

Advanced Engine Control and Monitoring System Multiple Gauge Options and Displays for engine function and diagnostics

Faria 4" Tachometer with digital display screen



Instrumentation Installation Instructions

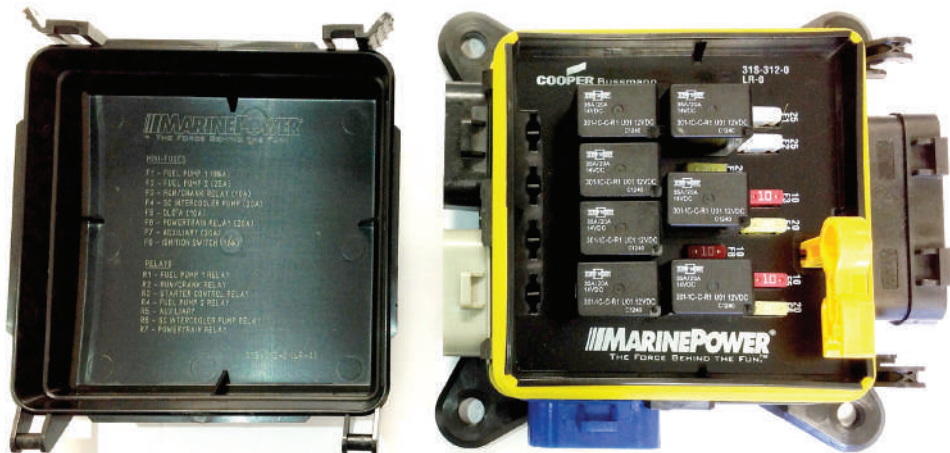
Note the wiring diagram in the appendix. The MIL lamp should be connected to ignition power at the dash and the green/white wire in the engine harness. An alarm buzzer if used should be connected to the blue/white wire in the harness and dash ignition power on the power side.

MIL lamps or alarm buzzers are not needed if a canbus gauge is used. Note that instrumentation should be connected to the yellow(can-high) and green(can-low) in the engine harness.

JARDUM DISPLAY OPTIONS

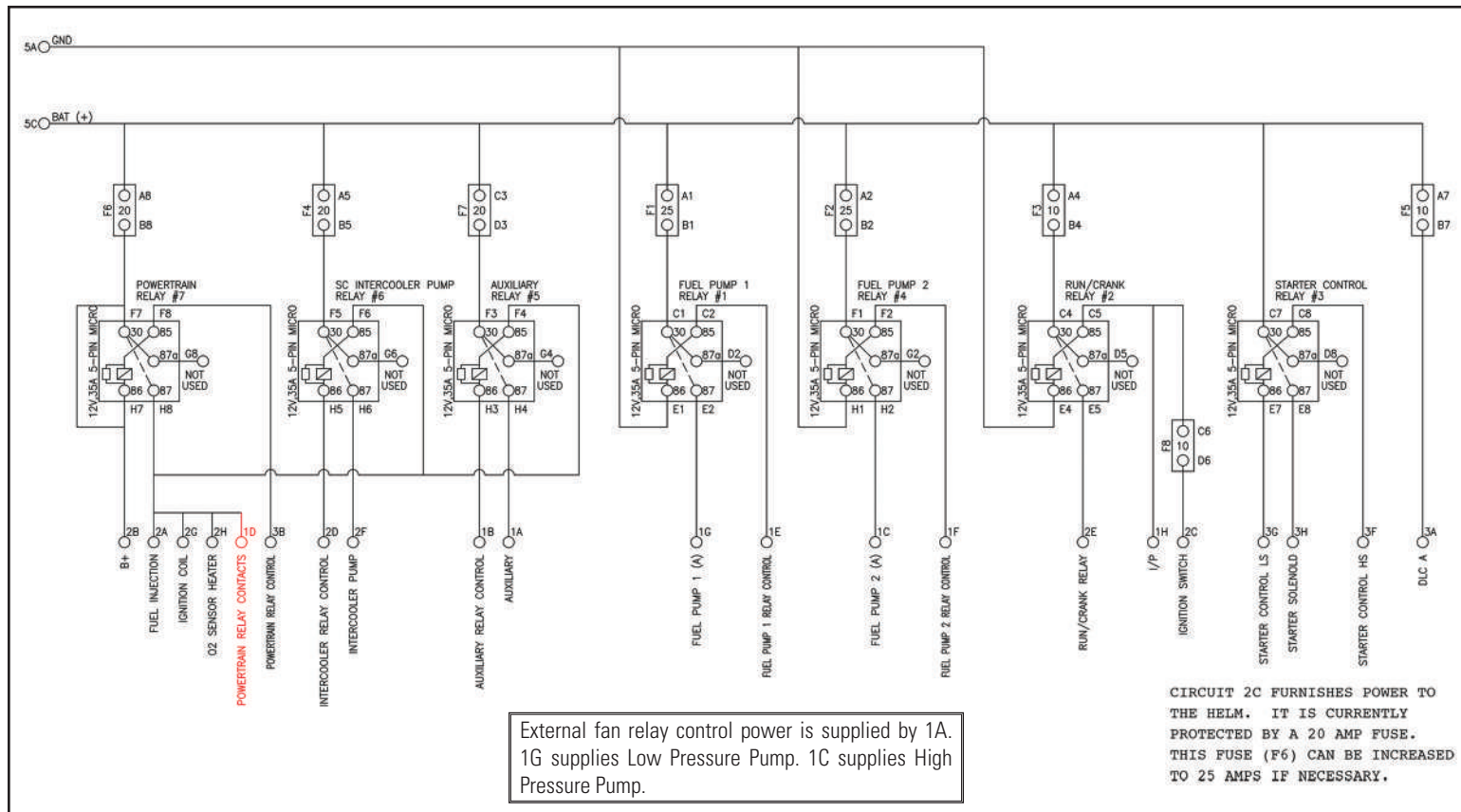


6. SSVEC Fuse and Relay Enclosure

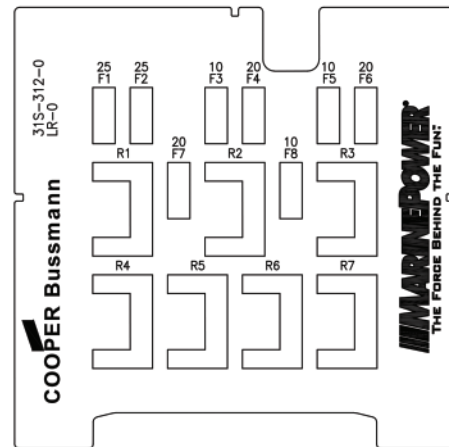
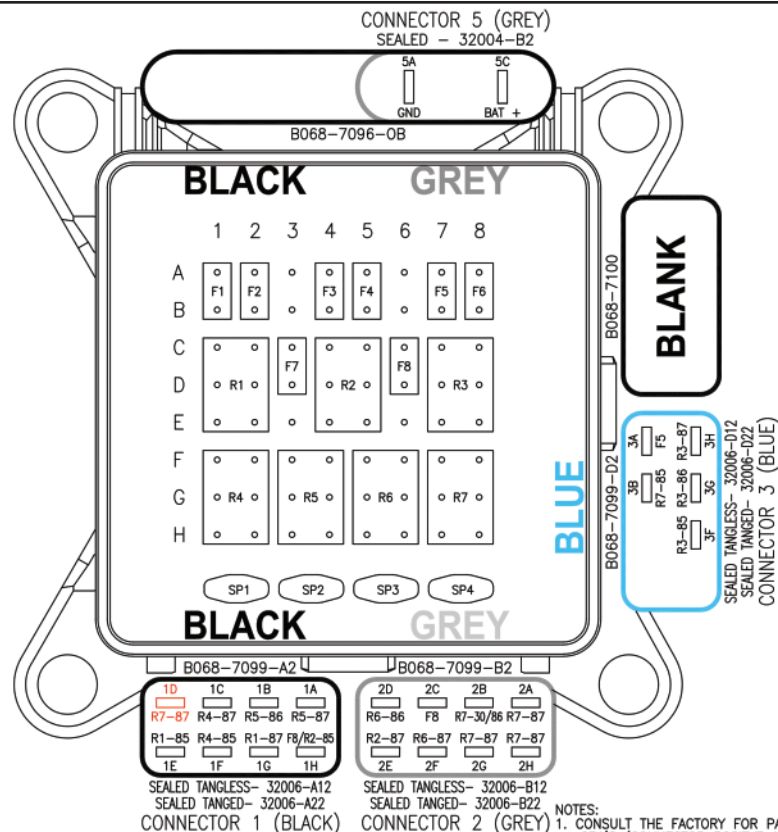


All relays and fuses are located in the Severe Service Vessel Electrical Center (SSVEC). This enclosure is capable of withstanding direct water spray. Additionally, it contains a Goretex vent which allows humid vapors to escape without allowing water in.

6. SSVEC Fuse and Relay Enclosure



6. SSVEC Fuse and Relay Enclosure



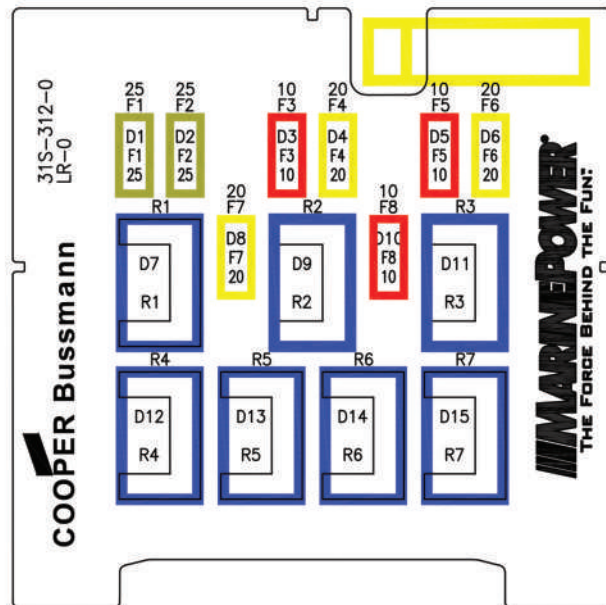
NOTES:

1. CONSULT THE FACTORY FOR PART NUMBERS FOR TPA'S (TERMINAL POSITIVE ASSURANCE), CPA'S (CONNECTOR POSITIVE ASSURANCE), RECOMMENDED TERMINALS ETC.

6. SSVEC Fuse and Relay Enclosure

DEVICE PLACEMENT			
POSITION	REFERENCE	DEVICE	PART #
D1	F1	MINI FUSE	ATM-25UNP-N
D2	F2	MINI FUSE	ATM-25UNP-N
D3	F3	MINI FUSE	ATM-10UNP-N
D4	F4	MINI FUSE	ATM-20UNP-N
D5	F5	MINI FUSE	ATM-10UNP-N
D6	F6	MINI FUSE	ATM-20UNP-N
D7	R1	12V,35A 5-PIN MICRO	B120-7016J
D8	F7	MINI FUSE	ATM-20UNP-N
D9	R2	12V,35A 5-PIN MICRO	B120-7016J
D10	F8	MINI FUSE	ATM-10UNP-N
D11	R3	12V,35A 5-PIN MICRO	B120-7016J
D12	R4	12V,35A 5-PIN MICRO	B120-7016J
D13	R5	12V,35A 5-PIN MICRO	B120-7016J
D14	R6	12V,35A 5-PIN MICRO	B120-7016J
D15	R7	12V,35A 5-PIN MICRO	B120-7016J

DEVICE TOTALS		
DEVICE	PART #	AMOUNT
MINI FUSE	ATM-10UNP-N	3
MINI FUSE	ATM-20UNP-N	3
MINI FUSE	ATM-25UNP-N	2
12V,35A 5-PIN MICRO	B120-7016J	7



7. Precautions

Oil Level

Check the oil level before each engine start up and every eight (8) hours of continuous operation. It should be understood that internal combustion engines will use a certain amount of oil during operation as a cooling and lubricating agent (especially during break-in period). Oil consumption should decrease after approximately 100 hours of operation.

IMPORTANT: The space between the “FULL” and “ADD” marks on the dipstick represent one quart. It is not necessary to add oil unless the level is at or below the “ADD” mark.

Engine dipstick level may change due to the angle of installation. Ensure that “high” oil level is properly marked accordingly.

When adding crankcase oil, DO NOT OVERFILL.

If crankcase is overfilled, it will cause foaming or aeration of oil in the oil pan. This will effect oil pressure which may result in severe internal engine damage.

Hydrolock

Hydrolock describes a condition in which water enters the cylinder of an engine. Water is not compressible and can cause catastrophic damage. Do not try to start an engine that shows sign of having water in the cylinders.

To remove water from engine cylinders, take the following steps:

1. Remove all spark plugs.
2. Remove coil wire.
3. Crank engine for 15 seconds.
4. If there are any abnormal sounds STOP ENGINE immediately and contact your MARINE POWER dealer.
5. Change engine oil & filters.
6. Replace spark plugs and reattach coil wire.
7. Start engine. If there are any abnormal sounds STOP ENGINE immediately and contact your MARINE POWER dealer.

8. Engine Operating Instructions

Gasoline Requirements

Marine Power calibrates their engines for use with high quality lead-free gasoline with a minimum octane rating of 87. Additionally, Marine Power uses octane scaling calibrations where applicable. Octane scaling enables the engine to “learn up” if a higher octane fuel (such as 92) is purchased. There is a noticeable performance difference with higher octane fuels. If the boat is used in heavily loaded conditions (i.e. heavily ballasted to produce large wakes for surfing or wakeboarding) Marine Power recommends the use of premium fuel (92 octane minimum).

The use of gasoline containing ethanol is very prevalent. Marine Power engines are calibrated to operate on fuel containing up to 10% ethanol (E10). Do not use fuel with ethanol content higher than 10% (E10).

Ethanol blended fuel acts as a solvent and will absorb moisture. Excessive moisture can cause lean conditions, vapor lock and shortened fuel life. The solvent characteristic can cause gum, sludge and other particles to be loosened up and carried through the fuel system.

Marine Power recommends the use of fuel stabilizer such as Sta-Bil. Fuel stabilizer is recommended for winter storage and should also be used if you expect to use less than a full tank of fuel over a 2-3 week period of time. Follow the label instructions whenever adding fuel stabilizer to the fuel tank.

Oil Requirements

Marine Power recommends the following:

Engine	Brand/Weight
1.0L	5W-30 Dexos
1.4L	5W-30 Dexos

Marine Power recommends that the engine oil be changed every 75 hours of engine operation, but no less frequently than once each calendar year, and that the engine oil filter be replaced every time the engine oil is changed.

Starting Engine EFI

DO NOT operate engine without water being supplied to raw water pump as pump impeller and engine will be damaged.



WARNING

Gasoline vapors are highly explosive under certain conditions.

Place shift lever in the neutral position.

If this is the initial start on a new engine turn the ignition (key) switch to the on (run) position (first detent on key switch) and wait for 10 seconds. Turn the ignition off and repeat this procedure 2-3 times or until you hear the fuel pump prime. Then turn the key to the

start (crank) position (2nd detent). It is not necessary to hold the key switch in this position as the Marine Power “SMART START” will take over. If the fuel pump is primed the engine should start within 3-5 seconds. After the engine starts, idle speed (RPM) will be controlled by the ECM. The idle RPM will be elevated following a cold start until the engine warms to its normal operating temperature.

Check the boat’s instrument panel for any service warnings or alarms.

Check operation of throttle and shift controls.

Check fuel tank fill level before leaving the trailer or dock.

Engine Break-In/25 Hour Inspection

To insure the maximum life of your Marine Power Engine, the following engine break-in guidelines are recommended.

Marine Power considers the first ten (10) hours of engine operation to be the break-in period.

During this break-in period:

Do not operate the engine at wide-open throttle.

Do not operate the boat at or near the maximum capacity specified on the USCG label.

Limit the maximum engine speed to 3500 RPM

/// 8. Engine Operating Instructions

Avoid running the engine at a constant/steady RPM for sustained periods of time. (i.e. vary the throttle/engine speed frequently)

Check the engine oil level at the beginning of each boating day, and after each 2-3 hours of engine operation. Any time oil level is checked look for milky discoloration, if found consult with your dealer.

After the first ten (10) hours of engine operation but before twenty-five (25) hours return the boat to your dealer for its first engine oil and filter change and initial engine inspection. (Check drive manufacturer recommendations for initial service).

Engine Oil Filter – Replace at Every Oil Change

**Part Numbers:
Marine Power # 397580**



/// 9. Winterization

Extended Storage and Storage in Below Freezing Temperature

WARNING

These operations should be performed only by qualified marine service personnel.

1.0L Water Cooled Engines

REGULATOR/FILTER

1. Shut down engine and change engine oil and filters. (Refer to Section 10: Engine Maintenance.)
2. Verify that coolant antifreeze mixture is sufficient for expected temperatures.
3. Refer to drive manufacturer instructions for drive storage.
4. Any engine stored for thirty (30) days or longer needs a fuel stabilizer. We recommend that Sta-Bil be added to the fuel per the manufacturer's directions. This will prevent the formation of harmful varnish in the fuel system.

FUEL LINE
CONNECTIONS

POSITIVE BATTERY
CONNECTION 

ECM

FUEL PUMP
CONNECTIONS

SSVEC



10. Engine Maintenance

Scheduled Maintenance By Owner

Service	Engine Startup Each Day	After 10 Hours of Operation	Every 50 Hours of Operation	Every 100 Hours of Operation
Check Engine Oil Level *	✓		✓	✓
Inspect Fuel Lines and Connections for Leaks	✓			✓
Check Coolant Level in Tank	✓			✓
Inspect Entire Power Package for Leaks (Water, Fuel, Oil, Exhaust, etc.)		✓	✓	✓
Inspect Belts for Tension and Wear		✓	✓	✓
Inspect Battery (Terminals and Fluid Levels)		✓	✓	✓
Check Battery Connection to Engine		✓	✓	✓
Check Drive Fluid Level	✓		✓	✓
Lubricate Starter Pinion and Shaft			✓	✓

* Engine Start-Up Each Day and Once Every Eight (8) Hours of Operation.

10. Engine Maintenance

Scheduled Maintenance By Qualified Technician

Service	Engine Startup Each Day	After 10 Hours of Operation	Every 50 Hours of Operation	Every 100 Hours of Operation
Change Engine Oil and Filters	✓	✓		✓
Change Filter on Fuel/Water Separator (if equipped)		✓		✓
Check Engine Mounts (Tightness)	✓		✓	✓
Check Manifold Bolts for Tightness	✓	✓	✓	✓
Check for Loose, Damaged or Missing Engine Parts			✓	✓
Check Wire Harness Plugs for Corrosion and Connections			✓	✓
Check Condition of Spark Plugs (Replace if Necessary)				✓
Inspect Hoses for Deterioration			✓	✓
Check Propeller and Shaft Alignment				✓
Change Flame Arrestor				✓
Clean and Inspect Flame Arrestor and Crank Case Vent Hose			✓	✓
Change Fuel Filter/Regulator				✓
Change Coolant				✓

10. Engine Maintenance

This manual provides basic information on routine maintenance of Marine Power Engines. Whether the reader is an experienced marine mechanic or a first time boat owner, we strongly suggest you thoroughly read these procedures BEFORE you attempt any procedure. Make sure you are familiar with the tools suggested and the methods recommended. Safety is our first concern. If repair required is beyond your expertise, please contact your dealer or other qualified technician. This manual contains guidelines to convey a particular level of risk:

DANGER

Hazards that will result in severe injury or death.

WARNING

Hazards that could result in severe injury or death. Caution: Hazards which could result in minor injury or property damage.

Please be careful.

Electrical, ignition and fuel system components on Marine Power Engines comply with U.S. Coast Guard (USCG) Rules and Regulations to minimize risks of fire and explosion. Use of replacement electrical, ignition and fuel components which do not comply with these rules and regulations could result in a fire or explosion and must be avoided. The electrical and ignition system is capable of violent electrical shock. Always disconnect the battery cables when performing any work where the cables could touch.

Take care to properly install and tighten all components when servicing the electrical, ignition and fuel systems. If the installation is not correct, sparks could ignite fuel vapors from the fuel system.

If you are doing repair work around the intake or exhaust openings, always protect those openings against foreign matter entering the cylinders. Care must be taken to use exact replacement parts. Damage could result if mismatched. If a grade 5 hex head bolt is removed, the same grade 5, hex head bolt must be replaced. If you cannot re-use the same bolt, do not improvise. Performance could be sacrificed without original Marine Power parts or parts recommended by Marine Power. A marine environment is a tough one. Parts subjected to salt water can rapidly corrode and engine failure could result. Warranty on Marine Power Engines could also be affected if other than recommended replacement parts are used.

Crankcase Oil Change

IMPORTANT! Start engine and operate until normal temperature is reached. Warm oil flows more freely carrying away more impurities. Remove the oil into a suitable container. Some oil will remain in the pan and engine. It is a small quantity but may make the new oil appear used.

WARNING

The Federal Water Pollution Control Act prohibits the discharge of oil or oily waste into or upon the navigable waters and contiguous zone of the United States, if such discharge causes a film upon, or discoloration of, the surface of the water, or causes an emulsion or sludge beneath the surface of the water. Violators are subject to a penalty of \$5,000.00.

After replacing drained oil, start engine and run for 5 minutes to circulate oil throughout. Inspect entire engine for leakage. Shut off engine and wait 5 minutes for oil to drain back into pan. Check level with dipstick. Add oil to proper level if needed.

10. Engine Maintenance

⚠ CAUTION

DO NOT overfill crankcase with oil. Agitation or splashing of oil may cause it to become aerated, which will affect oil pressure and may result in internal engine damage from lack of lubrication. Oil being splashed by reciprocating engine parts onto the walls of the cylinder in greater quantity than the rings can control will subsequently be drawn into the combustion chamber and burned. Continuous operation under these conditions can cause carbon to form on chamber surfaces, which will adversely affect engine performance and may lead to premature engine repair.

Oil Filters

NOTE: Lay a towel or catch basin under the filter(s) to catch any spilled oil.

Unscrew old filter by using an oil filter wrench and turn counter clockwise. Once removed, clean mounting base. Be sure old gasket is removed from mounting base.

Apply thin film of oil (do not use grease) to filter gasket. Be sure gasket is seated properly in base of oil filter.

Hand tighten filter, plus ½ turn, after gasket contacts mounting base. Use a filter wrench if necessary. Do not over tighten.

Check to see that oil shows “FULL” on dipstick.

Start engine. Turn on water. Run for approximately 5 minutes and inspect for leaks.

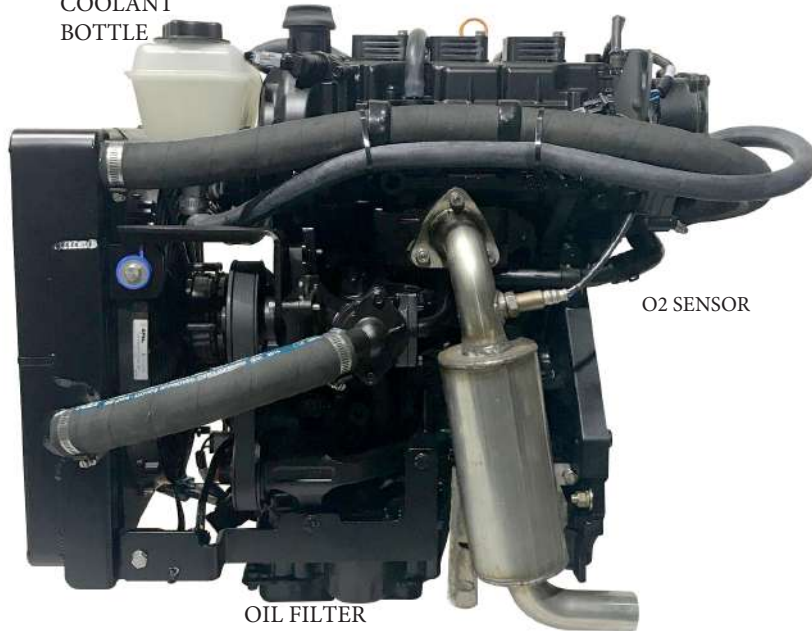
Check to see that oil shows “FULL” on dipstick.

Start engine. Run for approximately 5 minutes and inspect for leaks.

Shut off engine and wait 5 minutes for oil to drain back into pan. Check level with dipstick. Add oil to proper level if needed.

**ALWAYS COI
POWER SERV
PROBLEM.**

COOLANT
BOTTLE



O2 SENSOR

OIL FILTER

10. Engine Maintenance

Flame Arrestor

Clean the flame arrestor regularly.

1. Remove fastener from flame arrestor.
2. Clean with a suitable solvent and blow dry.
3. Reverse steps to assemble.

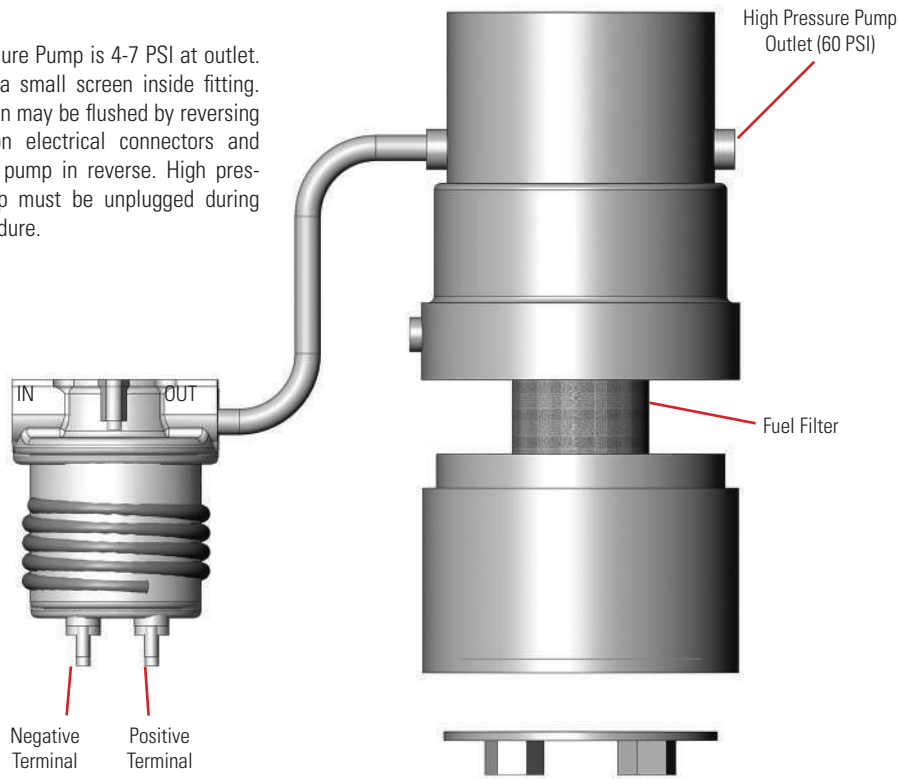
G-Force Fuel System

1. Position catch basin under filter.
2. Remove cooling cover.
3. Unscrew canister bowl.
4. Pull element down from pump.
5. Push new element (Part #396007) on pump until click is felt.
6. Replace O-ring (included with filter).
7. Re-install canister bowl on unit - snug tight only.
8. Two 10-second key ups should prime system.

LOW PRESSURE
PUMP
MAY NOT BE USED
ON SD1075
APPLICATIONS

Fuel Flow Schematic

Low Pressure Pump is 4-7 PSI at outlet. Inlet has a small screen inside fitting. This screen may be flushed by reversing polarity on electrical connectors and operating pump in reverse. High pressure pump must be unplugged during this procedure.



10. Engine Maintenance

Battery Cables

WARNING

Do not recharge a weak battery in a boat. Remove and recharge in a ventilated area away from fuel vapors, sparks or flames. Electrical systems in a marine environment require periodic attention. Continued use of a weak battery or dirty terminals can cause solenoid or starter problems. Clean battery and terminals every 100 hours. Note the condition of your battery cables. When reconnecting battery cables make sure that the RED cable is on the (+) terminal and the BLACK cable is on the (-) terminal. Black is ground.

Multiple Engine Battery Precautions - EFI

The alternator is designed to charge the battery that supplies electrical power to the engine. When batteries for two separate engines are connected, one alternator will supply all the charging current for both batteries. In normal instances, the other engine's alternator will not be required to supply any charging current. The Electronic Control Module (ECM) requires a steady, stable voltage source. In multiple engine operation, an electrical onboard device may cause a sudden drain of voltage at the engine's battery. The voltage may go below the ECM's minimum required voltage of nine (9)

volts and the idle alternator on the other engine may now start charging. This could cause a voltage "spike" in the engine's electrical system. In these cases, the ECM could shut off. When the voltage returns to the required range, the ECM will reset itself. The engine should begin to run normally. However, this ECM shut down occurs so rapidly that the engine just appears to have an ignition miss. In multi-EFI power packages, each engine must be connected to its own battery. This provides the required voltage source for the ECM. In these applications where battery switches are used, it is important that each switch be positioned to allow each engine to run off its own individual battery. DO NOT run engines with the battery switches in "BOTH" or "ALL" positions. This will allow the other engine's battery to be used in case of emergency to start the engine with the dead battery.

Alternator Belt Tension

WARNING

Make sure ignition key is removed and engine is not running before inspecting belts.

1.0/1.4L Engines: Serpentine belt system maintains tension with a spring-loaded tensioner. Normally, no maintenance is required.

Closed Cooling System

Surge Tank: The surge tank replaces the radiator/keel cooler filler neck and pressure cap and is pressure capable. Maintain the appropriate level in the surge tank at all times. If coolant is consistently low, additional inspection for leaks in the cooling system may be required.

Filling Closed Cooling System

WARNING

Do not remove pressure cap when engine is hot. Coolant is under pressure and may be forced out causing personal injury. After engine is cooled, remove cap slowly to allow pressure to escape.

IMPORTANT! The closed cooling system must remain filled year-round with the proper mixture of 50% antifreeze/50% water to assure protection of system during the lowest exposed temperatures. Insure that all drain plugs are installed and tightened. Fill system with 50/50 antifreeze/water mixture. After initial fill, start engine and continue filling surge tank. Engine must be purged of air by bleeding system. Engines may be bled in a variety of ways; however, the most efficient method requires a vacuum fill apparatus.

11. Engine Diagnostics and Codes

Name	Description	Trouble Code	MIL Lamp	Buzzer	Reduce RPM	Comments
Boost Control	ECM detects either an over boost or problem with circuit.	66035	X		X	Only applies to supercharged engines.
Barometric Sensor	Sensor alerts ECM if barometric measurement is to high or to low.	108	X			
Cam Phaser	ECM sets code if sensor fails diagnostic test.	65570	X		X	Limits RPM to 4000. Often caused by high or low engine oil level.
Cam Sensor	ECM sets code if sensor fails diagnostic test.	65723	X			
Cam Gov Message	ECM sets code if specific OEM controller message is lost.	65560	X			Normally only applies to tow sport applications.
Cam Bus Hardware	ECM sets code when it detects problem with can bus circuit.	65559	X			
Catalyst Efficiency Test	ECM detects failed catalyst efficiency test.	65675-76	X			75 indicates odd bank, 76 even bank.
Coolant Temp Sensor	Sensor fails diagnostic test.	110	X			
Coolant Temp Warning	Sensor alerts ECM if coolant temperature is above 220° F.	110	X			Code clears at 95° F. Reduces RPM to 2500.
Coolant Temp Warning Extreme	Sensor alerts ECM if coolant temperature is above 239° F.	110	X	X	X	Code clears at 220° F. Reduces RPM to 2500.
Crank Sensor	ECM sets code if sensor fails diagnostic test.	636	X			Typically won't start if code is triggered. Check tightness of sensor and electrical connections.
EST	ECM sets code if ignition coil fails diagnostic test.	65541-48	X			Last digit corresponds to coil number.
Electronic Throttle Control	ECM sets code if dual sensors out of range.	65604-05	X		X	Limits RPM to 1000. Check pedal adjustment.
Electronic Throttle Control	ECM sets code if dual sensors do not agree.	65610-13	X		X	Limits RPM to 1000. Pedal may need replacement.
Electronic Throttle Control	ECM sets code if it detects throttle body issues.	65615-18	X		X	Limits RPM to 1000. Check for stuck throttle body blade.
Fuel Pressure Sensor	Sensor fails diagnostic test.	94	X			
Fuel Pressure Error	Sensor alerts ECM if fuel pressure is too high or to low.	94	X		X	Check or replace filters. If problem persists then further diagnostics needed. Reduces RPM to 2500.
Fuel Pump Relay 1	ECM detects abnormal relay current or voltage.	66017	X			
Fuel Pump Relay 2	ECM detects abnormal relay current or voltage.	66025	X			
Gear Temp	Sensor alerts ECM if gear oil temperature is above 300° F.	174		X	X	Not normally used in jet or repower applications. Used for Towboats.
Knock Sensor	ECM sets code if sensor fails diagnostic test.	65551-52	X			51 indicates odd side. 52 even side. Cooler pump relay.

11. Engine Diagnostics and Codes

Name	Description	Trouble Code	MIL Lamp	Buzzer	Reduce RPM	Comments
Inter Cooler Replay	ECM detects abnormal relay current or voltage.	66030	X			Only applicable on supercharged engines. Driver controls intercooler pump relay.
Injector	ECM sets code if injector fails diagnostic test.	651-658	X			Last digit corresponds to injector number. Typically shorted wire or injector shorted out.
Manifold Absolute Pressure	ECM sets code if sensor fails diagnostic test.	106	X			
Manifold Air Temperature Sensor	ECM sets code if sensor fails diagnostic test.	105	X			Not all engines are equipped with this sensor.
Manifold Air Temperature Warning	Sensor alerts ECM if inlet air temperature is too high.	105	X		X	On supercharged engines check intercooler system. Reduces RPM to 2500.
Malfunction Indicator Lamp Driver	ECM sets code if driver fails diagnostic test.	66003	X			Boat may not be equipped with MIL light.
Main Health Coprocessor	ECM problem.	65580-82	X			Check the memory power, the main power and the ground on ECM. May need replacement.
Misfire	ECM detects cylinder misfire.	65591-99	X			Last digit corresponds to cylinder number. 99 is random cylinder misfire.
Oil Pressure Sensor	ECM sets code if sensor fails diagnostic test.	100	X			
Oil Pressure Warning	Sensor alerts ECM if oil pressure is too high or low.	100		X	X	Reduces RPM to 2500.
Oil Temperature Sensor	ECM sets code if sensor fails diagnostic test.	175	X			
Oil Temperature Warning	Sensor alerts ECM if engine oil temperature is above 300° F.	175		X	X	Reduces RPM to 2500. Not used on 5.7 Engines.
Oxy Fuel Trim	ECM sets code after detecting abnormally rich or lean condition.	65565-66	X			65 indicates odd bank, 66 even bank.
Oxy Heater	ECM sets code after detecting failure in O2 sensor heaters.	66019-22	X			19 = pre-o2 odd bank, 20 = pre-o2 even bank, 21 = post-o2 odd bank, 22 = post-o2 even bank.
Oxy Voltage	ECM sets code after detecting abnormal voltage at O2 sensors.	65561-64	X			61 = pre-o2 odd bank, 62 = post-o2 odd bank, 63 = pre-o2 even bank, 64 = post-o2 even bank.
Oxy Response	ECM sets code after determining O2 sensor response is slow.	65567-68	X			67 indicates odd bank, 68 even bank.
Powertrain Relay	ECM detects abnormal relay contact voltage.	66013-66014	X			
Supercharger Inlet Pressure Sensor	Supercharger inlet pressure too high or too low.	3563	X			Only applicable on supercharged engines.

11. Engine Diagnostics and Codes

Name	Description	Trouble Code	MIL Lamp	Buzzer	Reduce RPM	Comments
Speed Sensor	ECM sets code if speed sensor fails diagnostic test.	84	X			Not normally used in jet or repower applications. Used in Towboat applications.
SVS Lamp	ECM detects issue with SVS circuit.	66004	X			This circuit controls the warning buzzer alarm.
System Voltage	ECM sets code if system voltage is below 10 or above 16.	627		X		Check alternator connections and for tight belt. May need replacement.
Throttle Position Sensor	ECM detects dual sensors out of range.	65601-02	X		X	Reduces RPM to 1000. Check throttle body connector.
Throttle Position Sensor	ECM detects dual sensors do not agree.	65610-13	X		X	Reduces RPM to 1000. Check throttle body connector.
5V Buffer	ECM detects out of range voltage on low voltage output pins.	65620-23	X			Used to supply voltage to engine sensors. It is a 5 volt reference.

12. Trouble Shooting

The following trouble shooting hints are not all inclusive, but are the most common found. In all cases, if the cause of the problem is outside your capability to repair or correct, contact your dealer.

Engine Will Not Turn Over

Possible Cause

Remedy

Low Battery or Bad Connection	Check/Charge/Replace. Requires 12 -14 volts
ECM B+ 18 ga. Wire not Powered	Must be Connected Directly to Battery or Battery Switch
Faulty Battery Cable	See Table for Proper Size
Blown Fuse	Check Fuses in SSEC Box
Faulty Neutral Switch	Replace
Bad Starter Solenoid or Motor	Replace
Shift Control in Gear	Take Out of Gear
Faulty Starter Relay	Check Relay in SSEC Box
Hydro Lock	Remove Spark Plug. Look for Water in the Cylinder

Engine Cranks But Will Not Start

Possible Cause

Remedy

Faulty Fuel Pump	Note That Low Pressure and High Pumps Are Operating
Insufficient Fuel Supply	Check Fuel Supply Shut Off Valve, Check Fuel Filter. 5.7/6.0/6.2L - Requires 60 PSI Fuel Pressure
Insufficient Cranking RPM	Check Battery Voltage. Voltage Should Be Over 12 volts
Bad/Old Fuel	Replace
Insufficient Fuel Supply	Approximately 60 PSI. Fuel Pressure Must Be Adequate at Wide Open Throttle at Full Load
Active Trouble Code	See Dealer
Leaky Valves	See Dealer

Ensure a tune up is done every 100 hours or every season.

12. Trouble Shooting

Engine Runs Poorly at High RPM

Possible Cause	Remedy
Low Grade or Old Fuel	Check/Clean/Replace
Active Trouble Code	See Dealer
Engine Overheating	See Engine Overheating on Page 45
Plugged Fuel Tank Vent	Check Vent Line for Blockage
Insufficient Fuel Supply	Approximately 60 PSI. Fuel Pressure Must Be Adequate at Wide Open Throttle at Full Load
Restricted Anti-Siphon Valve	Remove From Fuel Tank and Verify Spring Pressure
Low Compression	See Dealer

Engine performance can be greatly affected by boat hull and prop condition.

High Speed Miss

Possible Cause	Remedy
Water in Fuel	Inspect/Clean/Replace
Clogged Fuel Filter	Change Fuel Filter
Insufficient Fuel Supply	Approximately 60 PSI. Fuel Pressure Must Be Adequate at Wide Open Throttle at Full Load
Loose Ignition Connection	Check That All Connectors Are Attached
Detonation	Verify Fuel Pressure and Fuel Quality

NOTE: A Misfire will Cause a Trouble Code and RPM Reduction.

Fuel System - Rich

Possible Cause	Remedy
Dirty/Clogged Flame Arrester	Check/Clean/Replace
Malfunctioning Fuel Pressure Regulator	Verify That Fuel Pressure Is Not Too High

12. Trouble Shooting

Fuel System - Lean

Possible Cause

Remedy

Empty Fuel Tank

Fill Tank

Vapor Lock

Ventilate Engine Compartment to Reduce Temperature

Insufficient Fuel Supply

Approximately 60 PSI. Fuel Pressure Must Be Adequate at Wide Open Throttle at Full Load

Poor Fuel Economy

Possible Cause

Remedy

Boat Hull Dirty

Clean/Check/Adjust

Incorrect Prop Size or Damage

Verify with Dealer or Manufacturer

Clogged Flame Arrester

Check/Clean/Replace

Low Engine Compression

See Dealer

Engine Running Too Hot or Cold

Raw Water Engines Operate at 145° F. Closed Cooled Engines Operate at 165°-185° F

Incorrect Fuel Grade

Replace

Boat Overload

Check Specifications

Weight Distribution

Check Specifications

Plugged or Restricted Exhaust

Check Exhaust System

Engine Starts and Stops

Possible Cause

Remedy

Insufficient Fuel Supply

Approximately 60 PSI. Fuel Pressure Must Be Adequate at Wide Open Throttle at Full Load

Loss of Ignition Power

Check Ignition Switch, Main Engine Breaker, Engine Harness Connection

12. Trouble Shooting

Oil Pressure - Low

Possible Cause

Remedy

Low Oil Level in Crankcase	Refer to Section 13: Engine Identification on Page 15
Excessive Oil in Crankcase	Remove Excess Oil. Refer to Section 13: Engine Identification on Page 15 for Correct Oil Level
Erroneous Oil Gauge Readings	Contact Dealer to Perform a Mechanical Oil Pressure Check
Incorrect Dipstick	See Dealer
Incorrect Oil Viscosity or Diluted	Change to Proper Oil
Oil Pump Malfunctioning	See Dealer
Excessive Bearing Clearance	See Dealer

Low Oil Pressure Will Set a Trouble Code and Will Reduce Engine RPM.

Oil Pressure - High

Possible Cause

Remedy

Oil Too Thick - Wrong Viscosity	Change to Proper Oil
Erroneous Oil Gauge Readings	Contact Dealer to Perform a Mechanical Oil Pressure Check
Clogged or Restricted Oil Passage	See Dealer
Oil Valve Relief Valve Stuck Closed	See Dealer

Engine Overheating - Verify if Engine is Actually Overheating

Possible Cause

Remedy

Low Coolant Level	Add Coolant. Refer to Bleeding Procedure if Coolant was Low or Not Flowing into Tank
Loose Hose Connections	Check and Tighten Clamps
Sea Water Hose Kinked or Blocked	Verify Hose Routing and Condition
Drive Belt Broken	Replace

12. Trouble Shooting

Excessive Oil Consumption

Possible Cause	Remedy
External Leak	Clean/Check/Repair
Excessive Oil in Crankcase	Remove Excess Oil. Refer to Engine Identification on Page 15 for Correct Oil Level
Oil/Fuel Dilution	Change Oil
Extended Excessive RPM's	Reduce RPM's
Incorrect Oil Viscosity	Change to Proper Oil
Engine Vents Blocked	Unblock Vents
Defective Piston Rings	See Dealer
Defective Cylinders	See Dealer
Excessive Bearing Clearance	See Dealer

The Amount of Oil Used is Greatly Dependent Upon Engine Speed. Oil Usage Will be Greater at Higher RPM's.

Water in Engine Cylinder or Base

Possible Cause	Remedy
Operator Error	See Section 7: Precautions on Page 23. REMOVE Water from Engine Immediately
Cylinder Head Gasket Leak	Contact Dealer. REMOVE Water from Engine Immediately
Cracked Block or Cylinder Head	Contact Dealer. REMOVE Water from Engine Immediately
Intake Manifold Gasket	Contact Dealer. REMOVE Water from Engine Immediately

Remove water by removing spark plugs and turning the engine over by hand. Once water is removed spray cylinder with Marvel Mystery Oil or 2-Cycle Engine Oil. Drain all the oil and change the oil filter(s). Again, turn the engine over by hand to circulate the oil. Contact your dealer immediately to make the required repairs. Upon completion of repairs, run the engine and again change the oil.

13. Installation Instructions

NOTE: Before shipment, each engine has been carefully tested and inspected. It may be necessary to delete or add oil to the engine and drive for various engine installations. If engine is equipped with a closed cooling system, it is imperative to fill the system with a 50/50 mix of ethylene glycol base antifreeze and clean fresh water. Failure to use a 50/50 mixture of antifreeze and water can result in engine damage.

(See Section 3: Engine Identification)

Engine Compartment

The battery should be located as close as possible to the starter motor so that the battery leads can be kept short. EFI engines equipped with the SMART START option have a direct connection to the battery or battery switch. See MEFI 6 engine to boat harness figure.

Engine Mounting

Engine installation is very important. If the angle is severe (over 12 degrees) oil capacity may need to be adjusted.

Engine Rotation

Directional references used in this section are given as if standing behind the boat, looking forward:

- Front of boat is bow
- Rear of boat is stern
- Right side is starboard

- Left side is port

Cooling System

The system is monitored by the water temperature gauge on the instrument panel and, in the case of EFI, the Engine Control Module. On EFI engines the ECM will activate the POWER REDUC-TION MODE if the engine temperature reaches 210° F. The POWER REDUCTION MODE reduces RPM to approximately 2500.

Emission-Related Installation Instructions

Failing to follow these instructions when installing a certified engine in a vessel violates federal law (40CFR 1068.105(b)) and is subject to fines or other penalties as described in the Clean Air Act. The installer and/or vessel manufacturer must meet the evaporative emission requirements of 40 CFR part 1060 and CFR 1045.112.

Any manufacturer installing a high performance engine must use enhanced evaporative control systems on any boat that is manufactured for sale, sold, or offered for sale in California, or that is introduced, delivered or imported into California for introduction into commerce.

Enhanced evaporative control system has designed the system components to meet or exceed the diurnal and permeation design specifications listed in the following table throughout the useful life of the engine.

PERMEATION STANDARDS [grams per sq. meter per day]	DIURNAL STANDARDS [grams per gal. per day]	TEST TEMP [degrees Celsius]
Fuel Hoses	15.0 — 23 ± 2	
Fuel Tank	1.5 — 28 ± 2	
Trailerable Boat	0.40	25.6 – 32.2
Non-trailerable Boat	0.16	27.6 – 30.2

Exhaust Piping

IMPORTANT: Damage caused by water in the engine will not be covered by the Marine Power warranty, unless this damage is a result of defective parts or workmanship by Marine Power.

Electrical Connection

NOTE: Marine Power EFI engines are equipped with "Smart Start" this feature is common in late model automobiles but is new to the boating industry. This feature enables the operator to start the engine by momentarily engaging the key switch, it is not necessary to hold the key switch. The ECM maintains the starter engagement until the engine starts. Once the engine starts, the ECM prevents the starter from engaging even if the operator mistakenly turns the key switch. To ensure proper operation of this feature, the engine wiring harness includes an 18 gauge wire coiled by the starter. This wire must be connected directly to the battery or the battery switch. Do not connect this

13. Installation Instructions

wire to the starter post as the voltage drops excessively at this location during starting.

Batteries

Tapered post connections with wing nut connections can be used. The tapered posts must be used for the engine battery cables while the wing nut connections should only be used for accessories. We highly recommend that wing nuts be replaced with regular nuts to increase the tightness of the connections.

Pay particular attention to ground connections. EFI engines are very dependent on secure ground connections. See typical ground location.

Dual Engines

Batteries: Vessels with twin engines should have a battery for each engine. The battery switch should be positioned so each engine is running off its own battery.

Battery Isolators

Many boats are equipped with auxiliary batteries. Such batteries are used to operate stereos, etc. Battery isolators can be used to charge an auxiliary battery. In these cases, the alternator output is connected to the center post on the isolator instead of the starter. The owner should familiarize himself with the isolator's operation.

Engine Battery Specifications

Model	Minimum Required Rating
3.0-5.7L	325 CCA
5.7-6.0L	550 CCA
6.0-8.1L	650 CCA
8.1-9.0L	750 CCA

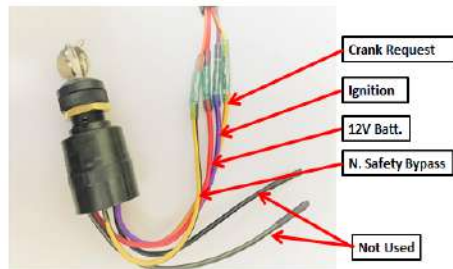
Battery Cable Length Requirements

Cable Length	Cable Gauge
Up to 3.5 ft.	4
3.5 - 6.0 ft.	2
6.0 - 7.5 ft.	1
7.5 - 9.5 ft.	0
9.5 - 12 ft.	00
12 - 15 ft.	000
15 - 19 ft.	0000

Hoses and Fittings: Use only USCG Approved fuel lines. Make sure that the fuel line routing is not touching any sharp edges. Fittings should be full flow design and not restricted tight 90 degree elbows.

Ignition Switch

Yellow/Black: Neutral Safety Bypass
Red: 12V Batt.
Purple: Ignition
Yellow/Red: Crank Request



13. Installation Instructions

Adapter Harness

PIN LOCATION	COLOR	GUAGE	LOCATION ON ENGINE	FUNCTION
A	GRN/WHT	18	J1-34	BUZZER
B	BLUE	14	TRIM RELAY	ENGINE TRIM
C	GRAY	18	J1-30 & J1-34	ANALOG TAACHOMETER
D	RED	12	GRAY BUSS CONN POS B	12V FOR IGNITION SWITCH (10 AMP FUSE)
E	PLUG	NA	NA	NA
F	BLACK	18	ENGINE GROUND	GROUND FOR NUETRAL SAFETY
G	GREEN	14	TRIM RELAY	ENGINE TRIM
H	BLU/WHT	18	J1-2	PPS2 SIGNAL
J	GRAY	18	J1-24	PPS1 3V+
K	BLK/WHT	18	J1-30	PPS2 RETURN
L	BLACK	18	J1-38	PPS1 RETURN
M	GRAY/WHT	18	J1-16	PPS2 3V+
N	RED/WHT	18	J1-20	12V+ SUPPLY TO ECM
P	YELLOW/RED	18	J3-2	CRANK REQUEST
R	PURPLE	14	GRAY BUSS CONN POS C	IGNITION POWER
S	ORGANGE	18	SPLICE TO J1-27	NUETRAL SAFETY BYPASS
T	YELLOW/BLK	18	J1-34 & J3-1	SHIFT INTERRUPT/LOAD ANTICIPATE
U	BLU/WHT	18	J1-52	MALFUNCTION INDICATOR LAMP
V	GREEN	18	J1-29	CAN LOW
W	YELLOW	18	J1-43	CAN HIGH
X	BLUE	18	J1-10	PPS1 SIGNAL

21-Pin Engine Harness to Boat Harness Connector

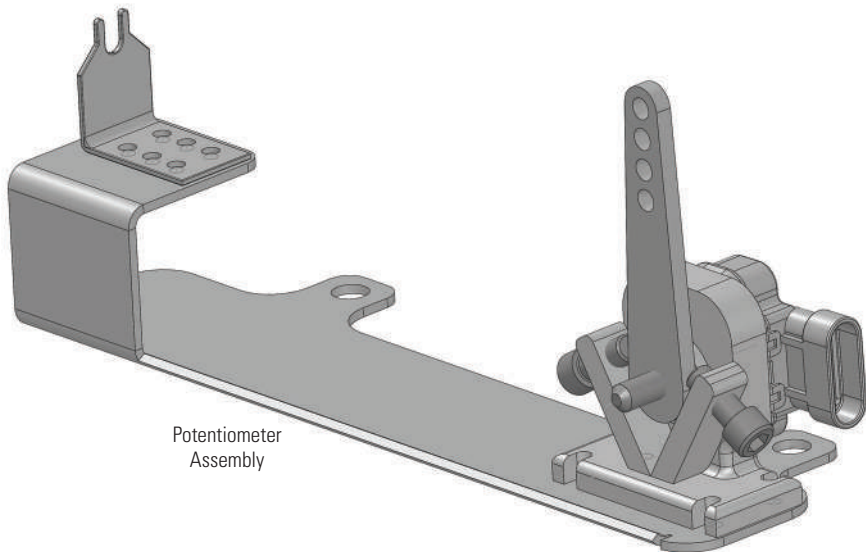


21-Pin Connector

13. Installation Instructions

Prestart Checklist

1. Check engine, transmission and V-drive (if applicable) oil levels. Also check for any oil leaks and repair as needed.
2. Check that all engine drain plugs are installed and tightened. New engines may be shipped with drain plugs removed
3. Check for proper coolant level. Closed cooling systems must be filled with a 50/50 mixture of ethylene glycol based anti-freeze and clean fresh water. (See Routine Maintenance Section for "Filling" instructions) When properly filled, ensure that any/all fill caps, fittings and hoses are properly secured and not leaking.
4. On engines equipped with Electronic Throttle Control (ETC) there may be a cable routed from the throttle control lever at the helm to a potentiometer located in the engine compartment. Make certain that this cable operates freely and is properly adjusted. **The adjustable potentiometer stop screws must not be used as the stop for the throttle lever/cable assembly at the helm.**
5. Check the drive shift cable/lever adjustment on drive applications with mechanical shift. If the drive is equipped with electric shift, check for proper operation of the shift solenoids (ahead and astern). Refer to your drive operation manual.
6. Verify that the engine will not start unless the shifter is in the neutral position.
7. Inspect the fuel system for leaks and repair as needed.
8. Check that all engine mounts are tight
9. Check that the battery is secure, and that all electrical connections are tight.



Potentiometer
Assembly



Warranty Registration Transfer

Please complete this form when engine ownership has been transferred. Transfer Registration To:



Date of Transfer (MM/DD/YY)

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Engine Serial Number

Engine Serial Number (If Dual Application)

--	--	--	--

Last Name

First Name

MI

[illegible]

Street Address

[illegible]

City

State

Zip Code

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New Owners Phone Number

Please enclose check or money order in the amount of \$300.00 per engine to be transferred. You may pay by credit card. Complete the information below.

☐ VISA ☐ MASTERCARD

Card Number: _____ Exp. Date: _____

Name As It Appears On the Credit Card: _____

Signature: _____

Mail completed form to: Warranty Registration Transfer, Marine Power, 17506 Marine Power Industrial Park, Ponchatoula, LA 70454

SERVICING DEALERS

**Note: If You Are Unable to Locate an Independent Servicing Dealer.
Please Contact a Marine Power Distributor Closest to You for Further Assistance.**

Date	Service/Maintenance Performed	Performed By	Operating Hours

Service Log

Date	Service/Maintenance Performed	Performed By	Operating Hours

Service Log

Date	Service/Maintenance Performed	Performed By	Operating Hours



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