



EVINRUDE[®]



MFE
Technical Manual

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INTRODUCTION

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SAFETY INFORMATION



Before working on any part of the outboard, read the following SAFETY information.

This manual is written for qualified, trained technicians who are already familiar with the use of *Evinrude®/Johnson®* Special Tools. This manual is not a substitute for work experience. It is an organized guide for reference, repair, and maintenance of the outboard(s).

This manual uses the following signal words identifying important safety messages.

	DANGER	
Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.		

	WARNING	
Indicates a potentially hazardous situation which, if not avoided, CAN result in severe injury or death.		

	CAUTION	
Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate personal injury or property damage. It also may be used to alert against unsafe practices.		

IMPORTANT: Identifies information that will help prevent damage to machinery and appears next to information that controls correct assembly and operation of the product.

These safety alert signal words mean:

ATTENTION!
BECOME ALERT!
YOUR SAFETY IS INVOLVED!

Always follow common shop safety practices. If you have not had training related to common shop safety practices, you should do so to protect yourself, as well as the people around you.

It is understood that this manual may be translated into other languages. In the event of any discrepancy, the English version shall prevail.

To reduce the risk of personal injury, safety warnings are provided at appropriate times throughout the manual.

DO NOT make any repairs until you have read the instructions and checked the pictures relating to the repairs.

Be careful, and never rush or guess a service procedure. Human error is caused by many factors: carelessness, fatigue, overload, preoccupation, unfamiliarity with the product, and drugs and alcohol use, to name a few. Damage to a boat and outboard can be fixed in a short period of time, but injury or death has a lasting effect.

When replacement parts are required, use *Evinrude/Johnson Genuine Parts* or parts with equivalent characteristics, including type, strength and material. Using substandard parts could result in injury or product malfunction.

Torque wrench tightening specifications must be strictly followed. Replace any locking fastener (locknut or patch screw) if its locking feature becomes weak. Definite resistance to turning must be felt when reusing a locking fastener. If replacement is specified or required because the locking fastener has become weak, use only authorized *Evinrude/Johnson Genuine Parts*.

If you use procedures or service tools that are not recommended in this manual, YOU ALONE must decide if your actions might injure people or damage the outboard.



DANGER



Contact with a rotating propeller is likely to result in serious injury or death. Assure the engine and prop area is clear of people and objects before starting engine or operating boat. Do not allow anyone near a propeller, even when the engine is off. Blades can be sharp and the propeller can continue to turn even after the engine is off. Remove propeller before servicing and when running the outboard on a flushing device.

DO NOT run the engine indoors or without adequate ventilation or permit exhaust fumes to accumulate in confined areas. Engine exhaust contains carbon monoxide which, if inhaled, can cause serious brain damage or death.



WARNING



Wear safety glasses to avoid personal injury, and set compressed air to less than 25 psi (172 kPa).

The motor cover and flywheel cover are machinery guards. Use caution when conducting tests on running outboards. DO NOT wear jewelry or loose clothing. Keep hair, hands, and clothing away from rotating parts.

During service, the outboard may drop unexpectedly. Avoid personal injury; always support the outboard's weight with a suitable hoist or the tilt support bracket during service.

To prevent accidental starting while servicing, disconnect the battery cables at the battery. Twist and remove all spark plug leads.

The electrical system presents a serious shock hazard. DO NOT handle primary or secondary ignition components while outboard is running or flywheel is turning.

Gasoline is extremely flammable and highly explosive under certain conditions. Use caution when working on any part of the fuel system.

Protect against hazardous fuel spray. Before starting any fuel system service, carefully relieve fuel system pressure.

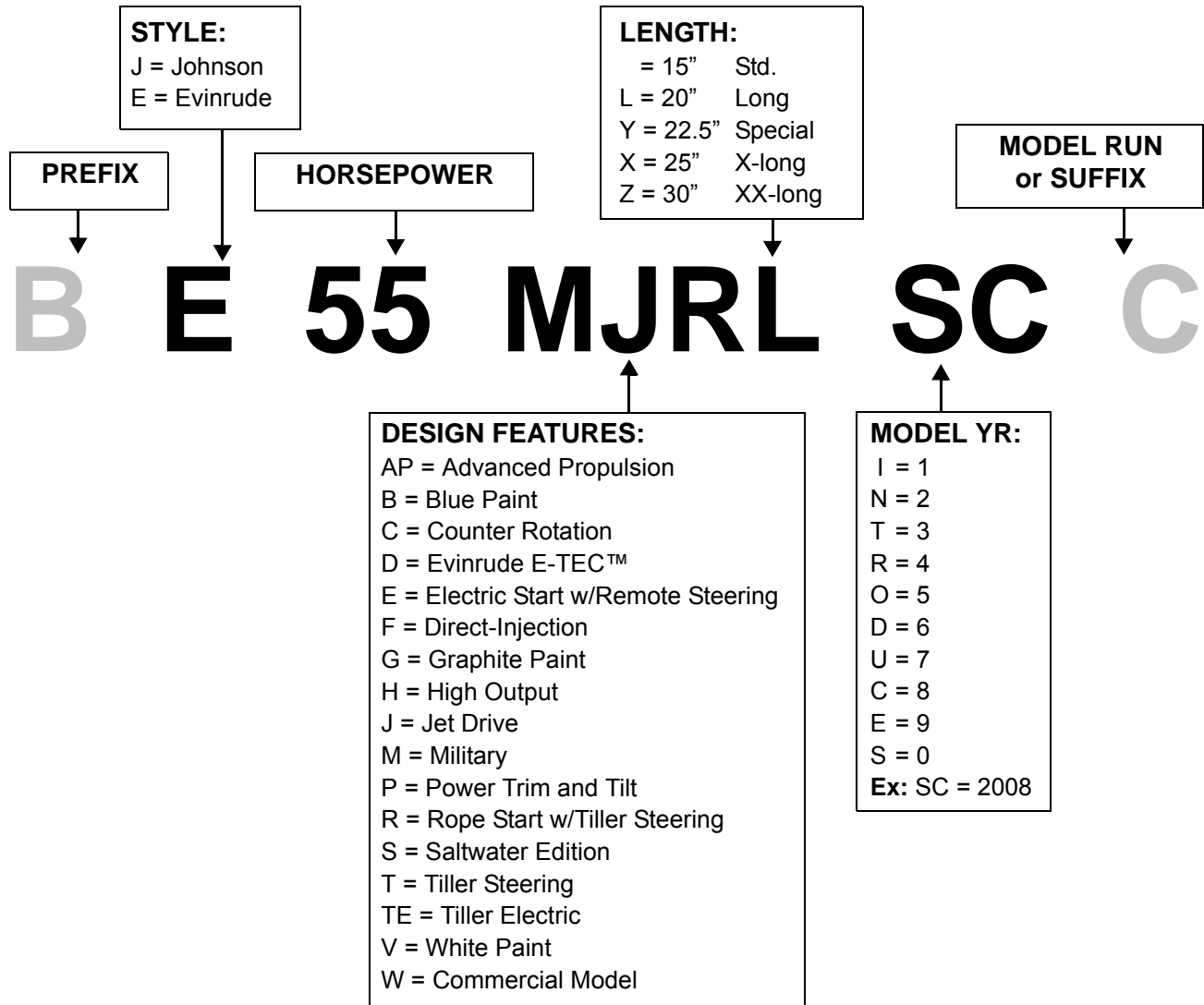
Do not smoke, or allow open flames or sparks, or use electrical devices such as cellular phones in the vicinity of a fuel leak or while fueling.

Keep all electrical connections clean, tight, and insulated to prevent shorting or arcing and causing an explosion.

Always work in a well ventilated area.

Replace any locking fastener (locknut or patch screw) if its locking feature becomes weak. Definite resistance to tightening must be felt when reusing a locking fastener. If replacement is indicated, use only authorized replacement or equivalent.

MODEL DESIGNATION



MODELS COVERED IN THIS MANUAL

This manual covers service information on all 2-cylinder, 52.7 cubic inch, *Evinrude E-TEC™ MFE 55* models.

Model Number	Start	Shaft	Drive
E55MRL***	Rope	20"	Propeller
E55MJRL***	Rope	20"	Jet Pump

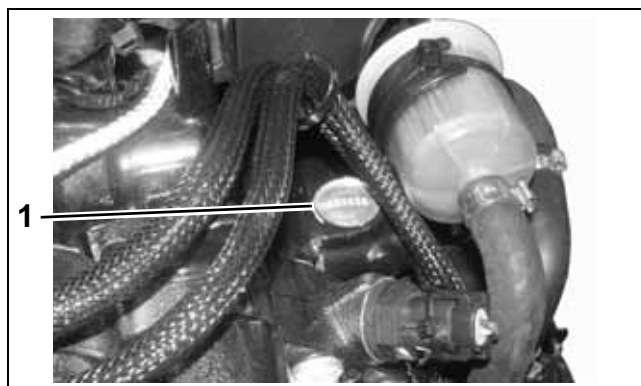
Identifying Model and Serial Numbers

Outboard model and serial numbers are located on the swivel bracket and on the powerhead.



1. Model and serial number

006611



1. Serial number

006610

SERVICE SPECIFICATIONS

MFE 55 Models		
ENGINE	Full Throttle Operating Range RPM	55 HP – 5500 to 6000 RPM
	Power	55 HP (41 kw) @ 5750 RPM
	Idle RPM in Neutral	750 ± 50 <i>EMM</i> Controlled
	Weight	MRL - 250 lbs. (113 kg) MJRL - 270 lbs. (122 kg))
	Lubrication	<i>Evinrude/Johnson XD100</i>
	Engine Type	In-line, 2 Cylinder, Two-Cycle
	Displacement	52.7 cu. in. (864 cc)
	Bore	3.601 in (91.47 mm)
	Stroke	2.588 in. (65.74 mm)
	Standard Bore	3.6005 to 3.6015 in. (91.45 to 91.48 mm)
	Top Crankshaft Journal	2.1870 to 2.1875 in. (55.55 to 55.56 mm)
	Center Crankshaft Journal	2.1870 to 2.1875 in. (55.55 to 55.56 mm)
	Bottom Crankshaft Journal	1.5747 to 1.5752 in. (40.0 to 40.01 mm)
	Rod Crankpin	1.3757 to 1.3762 in. (34.94 to 34.96 mm)
	Piston Ring End Gap, Both	0.011 to 0.023 in. (0.28 to 0.58 mm)
FUEL	Fuel/Oil Control	<i>EMM</i> Controlled
	Starting Enrichment	<i>EMM</i> Controlled
	Minimum (High) Fuel Pressure	24 to 28 psi (165 to 193 kPa)
	Minimum Fuel Lift Pump Pressure	3 psi (21 kPa)
	Maximum Fuel Inlet Vacuum	4 in. Hg.
	Heavy Fuels	JP4, JP5, JP8, Jet A, Jet B, Kerosene
	Gasoline Based Fuels	Gasoline, Gasohol, 87AKI (R+M)/2 or 90 RON minimum
	Emergency Fuel	Diesel DFM-F76, BioDiesel IMPORTANT: If outboard must be run on diesel, it should then be run on gasoline to clean internal components.
	Additives	<i>2+4</i> ® <i>Fuel Conditioner, Fuel System Cleaner</i> Use of other additives may result in engine damage. See Fuel Requirements on p. 39 for additional information

MFE 55 Models		
ELECTRICAL	Minimum Battery Requirements	(with Electric Start Kit) 640 CCA (800 MCA) or 800 CCA (1000 MCA) below 32° F (0° C)
	Alternator	55-Amp, system current 25-Amp, available for battery charging
	Tachometer Setting	6 pulse (12 pole)
	Engine Fuse	P/N 967545 – 10 A
COOLING	Thermostat	143°F (62°C)
	Maximum Temperature	212°F (100°C)
	Water pressure	11 psi minimum @ 5000 RPM
IGNITION	Type	Capacitor Discharge
	Firing Order	1-2
	Ignition Timing	<i>EMM</i> Controlled
	RPM Limit in Gear	6250
	RPM Limit in Neutral	1800
	Crankshaft Position Sensor Air Gap	Fixed
	Spark Plug	Refer to Emission Control Information Label <i>Champion</i> [†] QC10WEP @ 0.028 ± .003 in. (0.76 mm)
GEARCASE	Gear Ratio	12:32 (.375)
	Lubricant	<i>HPF XR Gearcase Lube</i>
	Capacity	22 fl. oz. (650 ml)
	Shift Rod Height	21.38 (543 mm) ± one-half turn
	Shift Cable Stroke	1.125 to 1.330 in. (28.6 to 33.8 mm) measured between NEUTRAL and FORWARD

INTRODUCTION

ABBREVIATIONS USED IN THIS MANUAL

ABBREVIATIONS USED IN THIS MANUAL

Units of Measurement

A	Amperes
amp-hr	Ampere hour
fl. oz.	fluid ounce
ft. lbs.	foot pounds
HP	horsepower
in.	inch
in. Hg	inches of mercury
in. lbs.	inch pounds
kPa	kilopascals
ml	milliliter
mm	millimeter
N·m	Newton meter
P/N	part number
psi	pounds per square inch
RPM	revolutions per minute
°C	degrees Celsius
°F	degrees Fahrenheit
ms	milliseconds
µs	microseconds
Ω	Ohms
V	Volts
VAC	Volts Alternating Current
VDC	Volts Direct Current

List of Abbreviations

ABYC	American Boat & Yacht Council
ATDC	after top dead center
AT	air temperature sensor
BPS	barometric pressure sensor
BTDC	before top dead center
CCA	cold cranking amps
CPS	crankshaft position sensor
EMM	Engine Management Module
ICOMIA	International Council of Marine Industry Associations
MCA	marine cranking amps
MWS	modular wiring system
NMEA	National Marine Electronics Assoc.
NTC	negative temperature coefficient
PTC	positive temperature coefficient
ROM	read only memory
S.A.F.E.™	speed adjusting failsafe electronics
SAC	start assist circuit
SAE	Society of Automotive Engineers
SYNC	synchronization
TDC	top dead center
TPS	throttle position sensor
WOT	wide open throttle
WTS	water temperature sensor

STANDARD TORQUE SPECIFICATIONS

Size	In. Lbs.	Ft. Lbs.	N-m
No. 6	7-10	0.58-0.83	0.8-1.1
No. 8	15-22	1.25-1.83	1.7-2.5
No. 10	24-36	2-3	2.7-4.0
No. 12	36-48	3-4	4.0-5.4
1/4 in.	60-84	5-7	7-9.5
5/16 in.	120-144	10-12	13.5-16.5
3/8 in.	216-240	18-20	24.5-27
7/16 in.	336-384	28-32	38-43.5

IMPORTANT: These values apply only when a specific torque for a specific fastener is not listed in the appropriate section. When tightening two or more screws on the same part, **DO NOT** tighten screws completely, one at a time.

WARNING

Torque wrench tightening specifications must be strictly adhered to. Replace any locking fastener (locknut or patch screw) if its locking feature becomes weak. Definite resistance to turning must be felt when reusing a locking fastener.

If replacement is specified or required because the locking fastener has become weak, use only authorized *Evinrude/Johnson Genuine Parts*.

PRODUCT REFERENCES

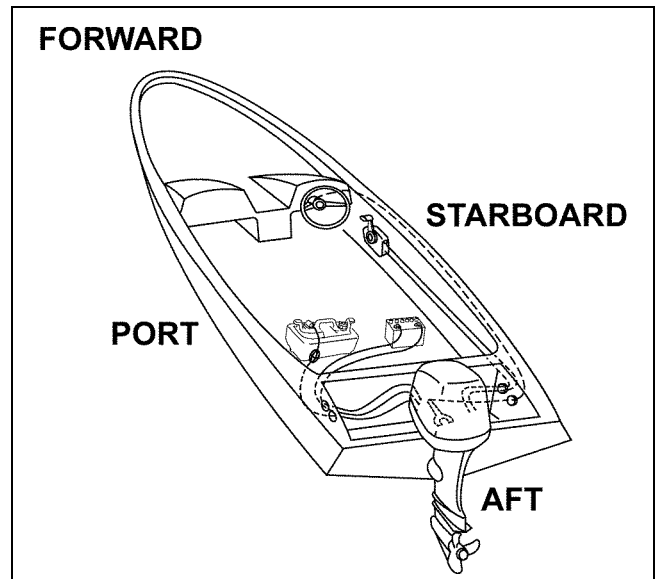
BRP US Inc. reserves the right to make changes at any time, without notice, in specifications and models and also to discontinue models. The right is also reserved to change any specifications or parts, at any time, without incurring any obligation to equip same on models manufactured prior to date of such change. Specifications used are based on the latest product information available at the time of publication.

The continuing accuracy of this manual cannot be guaranteed.

All photographs and illustrations used in this manual may not depict actual models or equipment, but are intended as representative views for reference only.

Certain features or systems discussed in this manual might not be found on all models in all marketing areas.

All service technicians must be familiar with nautical orientation. This manual often identifies parts and procedures using these terms.



Nautical Orientation

006411

NOTES

Technician's Notes

Related Documents

Bulletins	
Instruction Sheets	
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SERVICE TOOLS and SHOP AIDS

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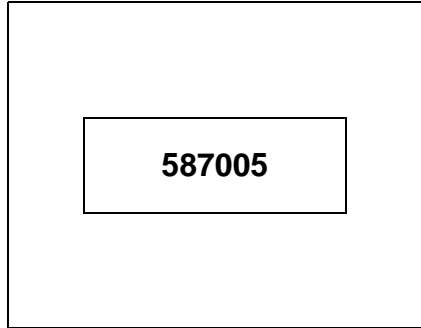
SERVICE TOOLS AND SHOP AIDS

DIAGNOSTIC TOOLS

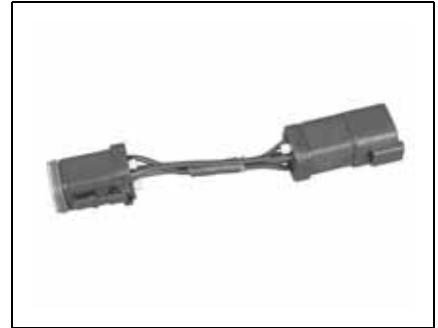
DIAGNOSTIC TOOLS



Diagnostic Software P/N 764642 764624



Diagnostic power supply P/N 587005 000000



Bootstrap tool P/N 586551 002276



Interface cable P/N 437955 45583

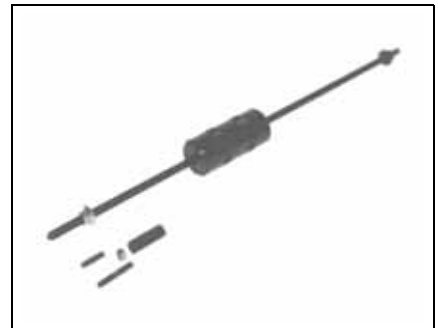
UNIVERSAL TOOLS



Universal Puller Set P/N 378103 32885



Slide hammer adapter P/N 340624 39435



Slide hammer P/N 391008 CO1577



Flywheel holder P/N 771311 42938



Lifting eye P/N 321537 23701



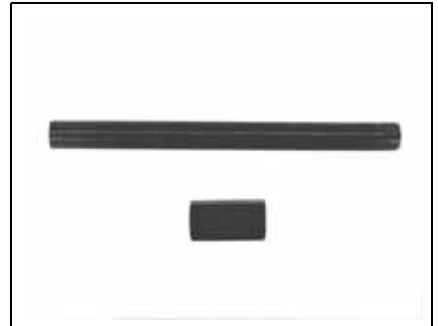
Slide hammer adapter P/N 390898 15356



Lifting ring assembly P/N 396748 000669



Tilt tube nut wrench P/N 342680 46879



Tilt tube service kit P/N 434523 33249



Slide hammer P/N 432128 15345



Temperature gun P/N 772018 45240



Fresh water flusher P/N 500542 50110



Puller Bridge - 432127 23146



Remover, ball socket P/N 342226 002584



Installer, ball socket P/N 342225 002583



Small puller jaws P/N 432131 23150



Large puller jaws P/N 432129 23148



Bearing puller jaws P/N 432130 23149

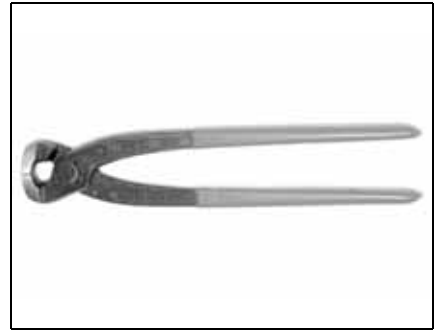
SERVICE TOOLS AND SHOP AIDS
ELECTRICAL / IGNITION TOOLS



Syringe P/N 346936 50243

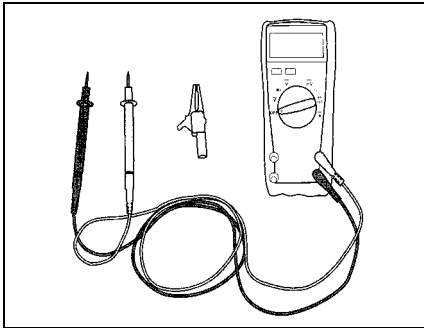


Twist-Grip™ Remover P/N COA6017
 390767



Oetiker† pincers, P/N 350860 001081

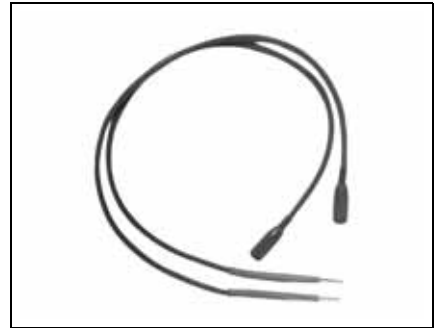
ELECTRICAL / IGNITION TOOLS



Digital multimeter DRC7265
 Ohms resolution 0.01
 Purchase through local supplier



Peak reading voltmeter 49799
 P/N 507972



Test probe kit P/N 342677 45241



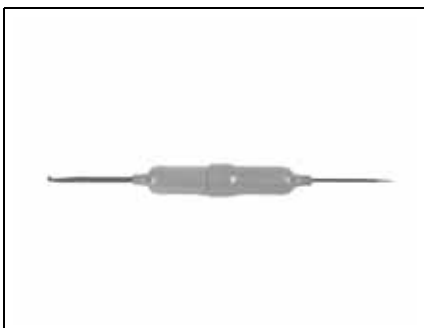
Stator Test Adapter P/N 5005799 002273



Crimping pliers P/N 322696 30387



AMP† connector tools 002277
 Primary Lock Tool P/N 777077
 Secondary Lock Tool P/N 777078
 Release Tool P/N 351413
 Lock Installer P/N 777079

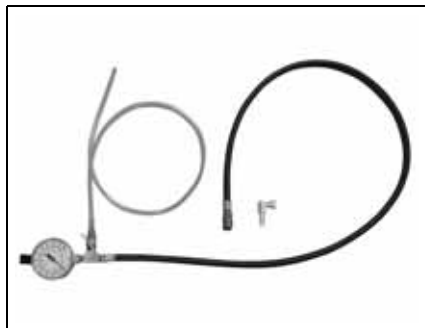


Connector tool P/N 342667 42004



Tachometer/timing light P/N 507980 49789

FUEL /OIL SYSTEM TOOLS



Fuel pressure gauge (60 PSI) 005339
P/N 5007100
90° fitting, P/N 353322



Fuel pressure gauge (15 PSI) 004560
P/N 5006397
90° fitting, P/N 353322



Nipple Kit P/N 5005844 002465

POWERHEAD TOOLS



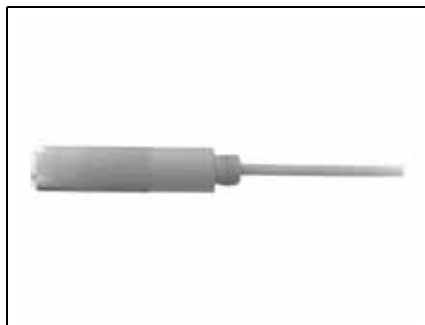
Cylinder bore gauge P/N 771310 45303



Rod cap alignment fixture 21596
P/N 396749



Crankshaft bearing and sleeve installer P/N 338647 21953B



Piston stop tool P/N 342679 46543
Replacement tip P/N 5006098



Torquing socket P/N 331638 000797



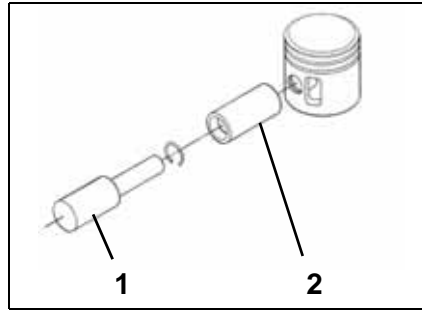
Wrist pin bearing installer 41029
P/N 336660

SERVICE TOOLS AND SHOP AIDS

GEARCASE TOOLS



Wrist pin pressing tool 23668
P/N 326356

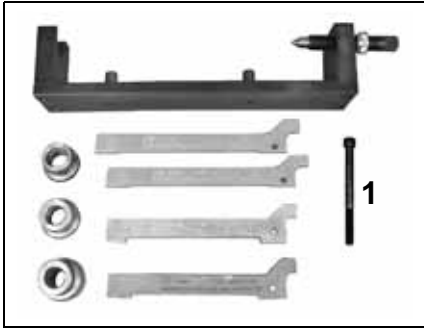


1. Wrist pin retaining ring driver DR1641
P/N 318599
2. Wrist pin cone P/N 318600



Ring compressor – standard CO3768
P/N 336314

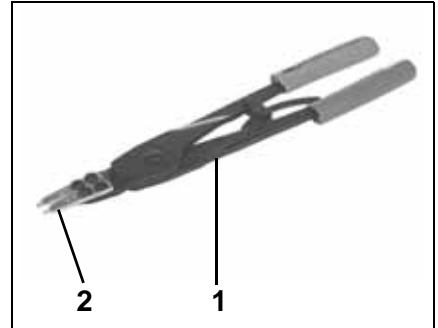
GEARCASE TOOLS



Universal Driveshaft Shimming Tool 002601
P/N 5005925
1. Lower Driveshaft Shimming Bolt
(S2 gearcase) P/N352878



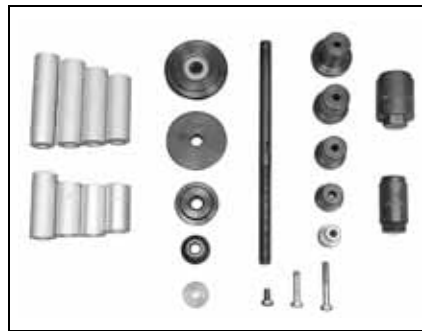
Gearcase pressure tester 49794
P/N 507977 (Stevens P/N S-34)
Gearcase vacuum tester
P/N 507982 (Stevens P/N V-34)



1. Retaining ring pliers 2036
P/N 331045
2. Replacement tip set
P/N 395967



Gearcase filler 49790
P/N 501882



Universal Pinion Bearing Remover
and installer kit P/N 5005927 002805



Universal shift rod height gauge 32872
P/N 389997

SERVICE TOOLS AND SHOP AIDS
GEARCASE TOOLS

1



Holding Socket P/N 334995 16302



Driveshaft seal protector P/N 312403 23692



Prop shaft housing seal installer P/N 326551 32973



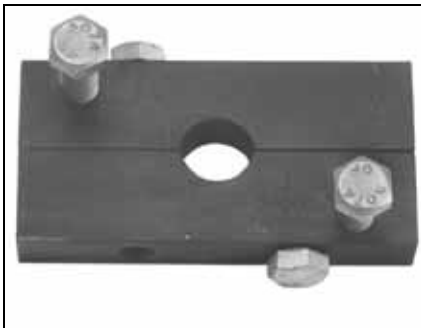
Backing plate P/N 325867 23621



Nut starting tool P/N 320675 40372



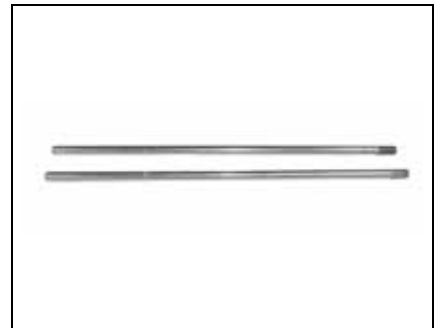
Seal Installer P/N 342665 42233



Puller P/N 387206 47254

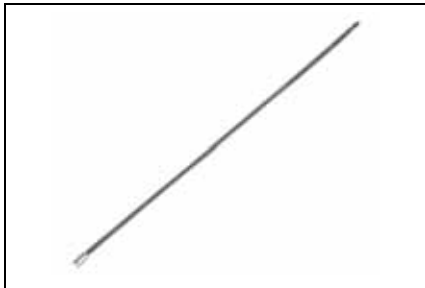


Bearing Installer P/N 326562 32962



Guide rods P/N 383175 000828

MANUAL STARTER TOOLS



Starter rope threading tool 23682
P/N 378774



Starter spring winder/installer CO3583
P/N 392093

SHOP AIDS



Cleaning Solvent P/N 771087



D.P.L. Spray P/N 777183



Oil - XD30™ P/N 777219



"6 in 1" Multi-Purpose Lubricant P/N 777192



Oil - XD50™ P/N 777225



HPF XR™ Gear Lube P/N 778749



Oil - XD100™ P/N 777118



Anti-Corrosion Spray P/N 777193



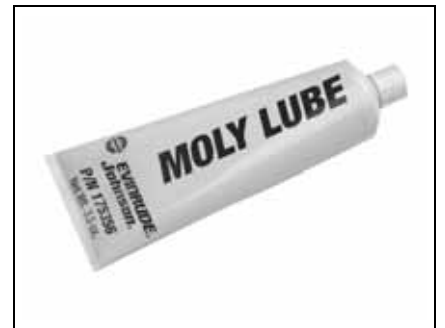
HPF PRO Gearcase Lube P/N 778755



Engine Tuner P/N 777185



Silicone spray P/N 775630



Moly Lube P/N 175356

SERVICE TOOLS AND SHOP AIDS

SHOP AIDS



Storage Fogging Oil
P/N 777186



Power Trim/Tilt and Power Steering Fluid
P/N 775612



Electrical Grease P/N 503243



Lubriplate† 777 P/N 317619



Black Neoprene Dip P/N 909570



2 + 4™ Fuel conditioner P/N 775613



Triple-Guard® Grease P/N 508298



Starter Bendix Lube P/N 337016



Gel-Seal and Gasket Remover P/N 771050



Needle Bearing Grease, P/N 378642



Biodegradable TNT Fluid
P/N 763439



Permatex® No. 2, P/N 910032



GE[†] RTV Silicone Sealant P/N 263753



Gasket Sealing Compound P/N 317201



Thermal Joint Compound P/N 322170



Fuel System Cleaner P/N 777184



Pipe Sealant with Teflon P/N 910048



Instant Bonding Adhesive P/N 509955



Gel-Seal II P/N 327361



Locquic Primer P/N 772032



1. Screw Lock P/N 500417
(Loctite[†] Purple 222 equivalent)
2. Nut Lock P/N 500421
(Loctite Blue 242 Equivalent)
3. Ultra Lock P/N 500423
(Loctite Red 271 Equivalent)



Carbon Guard™ P/N 775629



Adhesive 847 P/N 776964

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INSTALLATION AND PREDELIVERY

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BOAT RIGGING

Battery Installation

IMPORTANT: *MFE 55* models can be used to charge an accessory boat battery by installing a battery cable, P/N 584348, to the existing solenoid on the outboard. Also, electric start capability is available through the installation of Electric Start Kit, P/N 5005580.

Each outboard requires its own starting battery. Select a battery that meets or exceeds the minimum requirements.

Minimum 12 Volt Battery Recommendations

Outboard Model	Battery Rating
<i>MFE 55</i> (With electric start kit)	640 CCA (800 MCA), or 800 CCA (1000 MCA) below 32° F (0° C) 107 amp-hr in extreme applications

Location and Preparation

Proper installation will prevent battery movement while underway.

- Secure all batteries in protected locations.
- Place battery as close to the outboard as possible.
- Battery location must provide access for periodic maintenance.
- Use battery mounting trays or battery boxes on all battery installations.
- Connections and terminals must be covered with an insulator.
- Battery connections must be clean and free from corrosion.

- Read and understand the safety information supplied with the battery before installation.

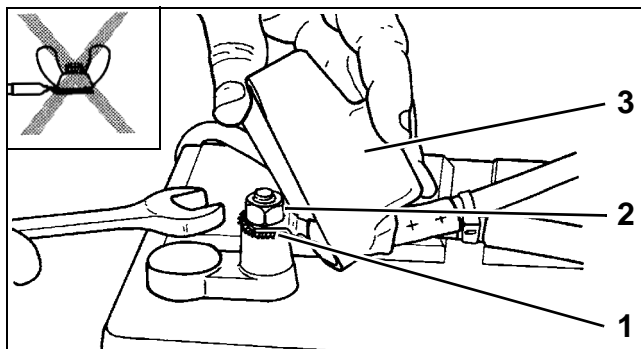
WARNING

Keep the battery connections clean, tight, and insulated to prevent their shorting or arcing and causing an explosion. If the battery mounting system does not cover the connections, install protective covers. Check often to see that connections stay clean and tight.

Connections

IMPORTANT: Connect the battery positive (+) cable to the battery positive (+) post **FIRST**. Connect the battery negative (-) cable to the battery negative (-) post **LAST**.

Install a starwasher on the threaded battery post. Stack cables from the outboard, then cables from accessories. Finish this connection with a hex nut.



Marine Style Battery Post

1. Starwasher
2. Hex nut
3. Terminal Insulator

DR5103

IMPORTANT: Do not use wing nuts to fasten ANY battery cables. Wing nuts can loosen and cause electrical system damage not covered under warranty.

Tighten all connections securely. Apply *Triple-Guard* grease to prevent corrosion.

Battery Cable Requirements

Evinrude/Johnson outboards are shipped with stranded copper battery cables for typical installations in which the starting battery is positioned close to the transom.

Specialized outboard installations with extended length battery cables require an increased wire size. Refer to the following table.

1 to 10 Ft. (.3 to 3 m)	4 Gauge
11 to 15 Ft. (3.4 to 4.6 m)	2 Gauge
16 to 20 Ft. (4.9 to 6.1 m)	1 Gauge

IMPORTANT: Inadequate battery cables can affect the performance of an outboard's high amperage start circuit and the cranking speed of the outboard. **DO NOT** use aluminum wire cables. Use **ONLY** AWG stranded copper wire cables.

Battery Switches and Multiple Batteries

A multiple battery setup, including marine battery selector switches, can provide flexibility in single and dual outboard installations.

Refer to **Battery and Switch Wiring Diagrams** on p. 28 for battery connection options.

The battery selection function can be used for emergency starting if a primary battery becomes discharged.

The OFF position of the battery selector switch can be used to minimize battery discharge during periods of non-use.

Typical battery functions

Primary

- Used as starting battery under normal operating conditions.
- Red (+) cable connected to battery selector switch.
- Primary battery is charged by connection to main red (+) outboard battery cable.

Secondary

- Used as back-up starting battery under abnormal operating conditions.
- Red (+) cable connected to battery selector switch.
- Secondary battery is charged independently from primary battery.

Accessory

- Not used as starting battery.
- Isolated from outboard start function.
- No red (+) cable connected to battery selector switch.

IMPORTANT: Never connect an external battery isolator to the stator of an *Evinrude* outboard.

Battery Switch Requirements

Battery switches must meet the following requirements.

- The switch must be approved for marine use.
- Switch amperage rating should be adequate for the outboard it will be used on.
- Use one battery switch for each outboard installed.
- Use the appropriate sized wire and terminals for all connections.
- Use AWG stranded copper wire.

Battery Switch Location

- Always locate battery switch as close to the battery(s) as possible.
- Locate switch so that it cannot be accidentally bumped or switched.
- Refer to the battery switch manufacturer's installation instructions for specific information related to the installation of switch.
- Fasten all battery switches to solid surfaces.
- Route wiring as directly as possible.
- Support the battery switch as needed to prevent abrasion.
- Use appropriate wiring and connectors.
- Seal all connections and terminals with liquid neoprene or electrical sealer to prevent corrosion.

IMPORTANT: Insulate all battery positive (+) terminals to prevent shorting.

INSTALLATION AND PREDELIVERY

BOAT RIGGING

Battery Switch Operation

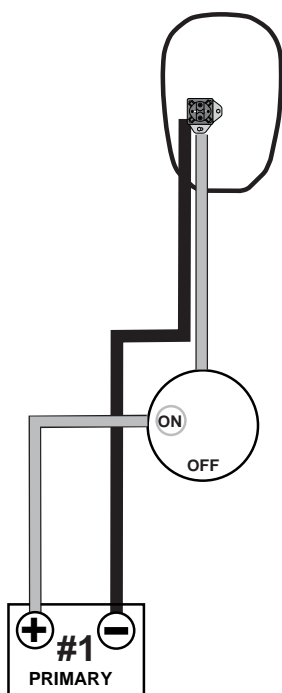
- Select the primary battery for normal operation.
- Secondary batteries should only be selected for emergency starting.
- ALL or BOTH switch position is for emergency starting only.

Provide operator with the documentation supplied by the battery switch manufacturer. Make sure that the operator is informed of proper battery switch operation.

IMPORTANT: The negative (-) terminals of a multiple 12-volt battery installation must be connected together.

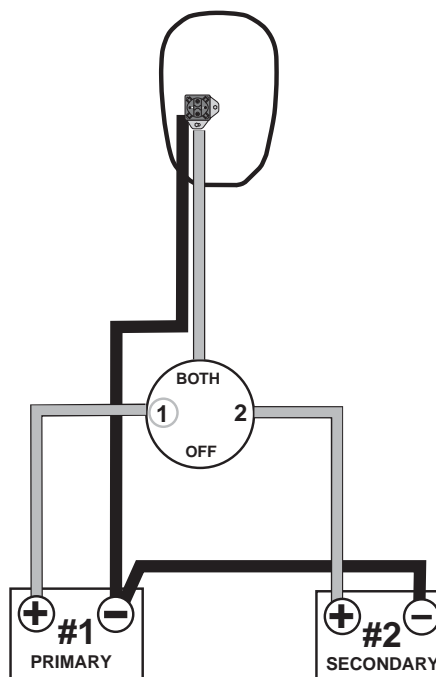
Battery and Switch Wiring Diagrams

One outboard: Battery disconnect



000135rev1

One outboard: One primary starting battery; one secondary battery



000136rev2

Fuel System Requirements

Overview

Boat fuel systems must meet minimum specifications to insure the proper delivery of fuel to the outboard.

The guidelines established by the ABYC and U.S. Coast Guard should always be followed.

- Permanent fuel tanks must be properly vented outside of the hull.
- Remote fuel tank gas fills must be grounded.
- Permanent fuel tank pickups should have the correct anti-siphon valve installed to prevent fuel flow if a leak occurs in the fuel distribution system. Refer to ABYC Standard H-24.

Fuel Hose

All fuel hoses must be designated as fuel hose and approved for marine use.

- Use only fuel lines (or copper tubing) that meet the outboard minimum I.D. requirement.
- "USCG Type A1" fuel hose must be used between permanent fuel tanks and motor well fittings on inaccessible routings.
- Use "USCG Type B1" for fuel hose routings in motor well areas.
- Permanently installed fuel hoses should be as short and horizontal as possible.
- Use corrosion-resistant metal clamps on permanently installed fuel hoses.
- Multi-outboard applications require separate fuel tank pickups and hoses. (A fuel selector switch may be used for "kicker" motors as long as it has enough flow capacity for the larger outboard.)

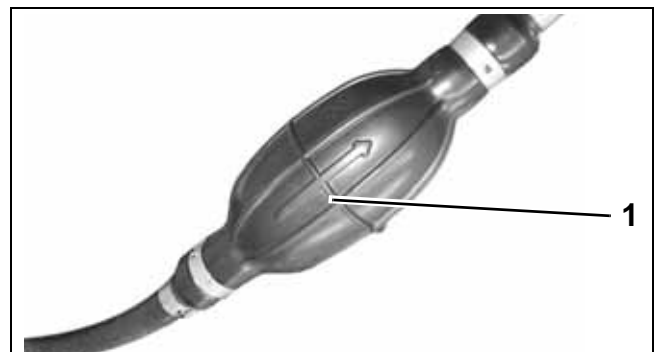
Fuel System Primer

Outboards require a priming system capable of refilling the fuel system after periods of non-use.

Primer bulbs that meet the outboard's minimum inside diameter fuel line requirements are used on most outboards.

Install the primer bulb in the fuel supply hose as follows:

- The primer bulb should be installed in an accessible location.
- The arrow on the primer bulb must point in the direction of fuel flow.
- The fuel primer bulb must be positioned in the fuel supply hose so the primer bulb can be held with the arrow pointing "up" during priming.



1. Arrow indicates direction of fuel flow

000124

An alternative to a primer bulb is a U.S. Coast Guard approved marine primer pump. Electric primer pumps offer the convenience of outboard priming from a dash-mounted momentary switch.

INSTALLATION AND PREDELIVERY BOAT RIGGING

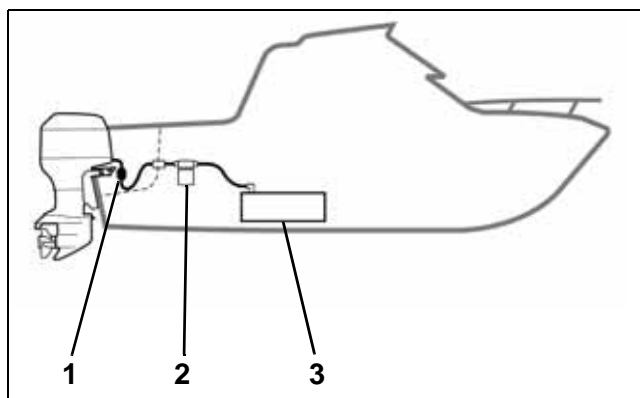
Fuel Filters

Boat-mounted fuel filters and water-separating fuel filter assemblies must meet the required fuel flow and filter specification. The filter must be mounted to a rigid surface above the “full” level of the fuel tank and accessible for servicing.

Fuel Filter Assembly, P/N 174176, meets all requirements for a water-separating fuel filter.



0070



Typical Fuel Supply Configuration

DRC6797

1. Primer bulb
2. Water separating fuel filter
3. Anti-siphon valve, in fuel pick-up of tank

IMPORTANT: Avoid using “in-line” fuel filters. The filter area and flow characteristics may not be adequate for high horsepower outboards.

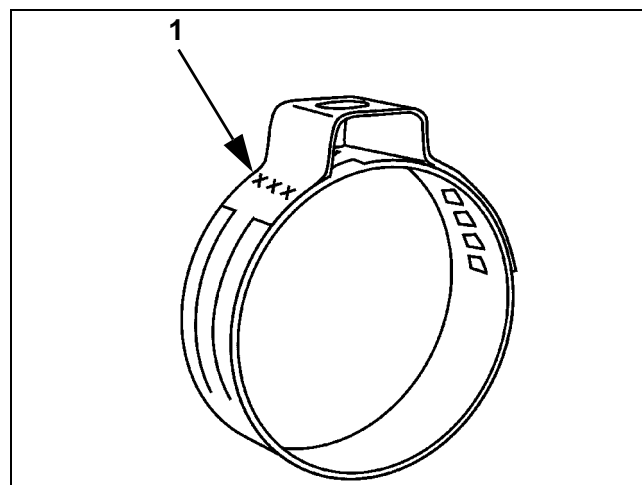
Outboard Fuel System Recommendations

Component	MFE 55 Models
Fuel tank pickup tube	5/16 in. (7.9 mm) min. I.D.
Fuel fittings	1/4 in. (6.4 mm) min. I.D.
Fuel supply hoses	5/16 in. (7.9 mm) min. I.D.
Fuel tank pickup screen	100 mesh, 304 grade stainless steel wire, 0.0045 in. wire diameter, 1 in. (25 mm) long
Antisiphon valve	2.5 in. (63.5 mm) Hg maximum pressure drop at 20 gph (76 l/hr) flow
Remote fuel filter	0.4 in. Hg maximum pressure drop at 20 gph (76 l/hr) flow, 150 in. ² (1290 cm ²) of filter area
Maximum fuel pump lift height	Fuel pump should not be located more than 30 in. (76.2 cm) above bottom of fuel tank

Oetiker Clamp Servicing

Use *Oetiker*[†] clamps for making hose connections. These clamps provide corrosion resistance, minimize the potential for abrasion of rigging components, and provide solid, permanent connections.

The selection and installation of an *Oetiker* clamp is essential in the proper sealing of hose connections. The clamp identification numbers appear in millimeters on the side of the clamp, near the top of the ear. Refer to **Oetiker Stainless Steel Stepless Clamps** chart for actual dimensions.



1. Clamp identification numbers 000093

WARNING

DO NOT re-use Oetiker clamps. Fuel leakage could contribute to a fire or explosion.

The nominal size of the clamp should be chosen so that, when it is assembled on the connecting part, the outside diameter of the hose lies approximately in the middle of the clamping range of the clamp.

Oetiker Stainless Steel Stepless Clamps

CLAMP NO.		NOMINAL O.D.		INCHES		MILLIMETERS	
Replacement	Clamp I.D.	Inches	MM	Open	Closed	Open	Closed
346930	95	3/8	9.5	0.374	0.307	9.5	7.8
348838	105	13/32	10.5	0.413	0.346	10.5	8.8
349516	113	7/16	11.3	0.445	0.378	11.3	9.6
347107	133	1/2	13.3	0.524	0.425	13.3	10.8
347108	138	17/32	13.8	0.543	0.449	13.8	11.3
346931	140	34/64	14	0.551	0.453	14	11.5
346785	145	9/16	14.5	0.571	0.472	14.5	12
346786	157	5/8	15.7	0.618	0.52	15.7	13.2
348839	170	11/16	17	0.669	0.571	17	14.5
346150	185	23/32	18.5	0.728	0.602	18.5	15.3
346151	210	13/16	21	0.827	0.701	21	17.8
346152	256	1	25.6	1.008	0.882	25.6	22.4
346153	301	1 3/16	30.1	1.185	1.063	30.1	26.9
349759	316	1 1/4	31.6	1.244	1.122	31.6	28.4
349729	410	1 5/8	41	1.614	1.492	41	37.9

INSTALLATION AND PREDELIVERY BOAT RIGGING

Clamp Installation

A constant stress should be applied to close the ear clamps. This method ensures a positive stress on the hose and does not result in excessive compression or expansion of the band material.

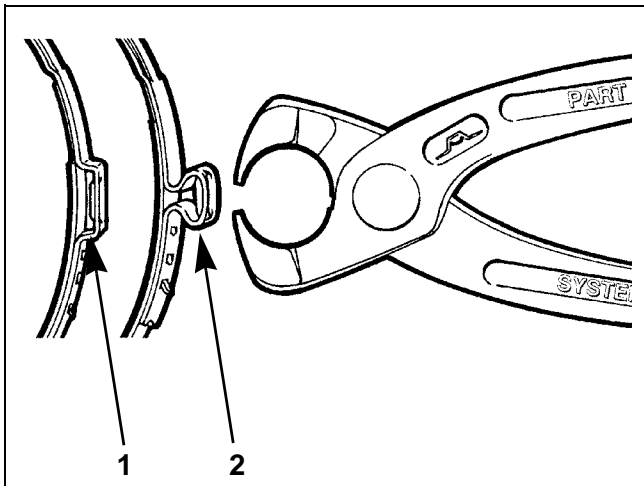
IMPORTANT: Use only *Oetiker* recommended tools to close *Oetiker* stepless clamps.

Oetiker pincers, P/N 350860, are available in the *Evinrude/Johnson Genuine Parts and Accessories Catalog*.



DP0886

- Position correct size clamp over hose.
- Install hose on fitting.
- Close clamp ear fully with *Oetiker* pincers (pliers).

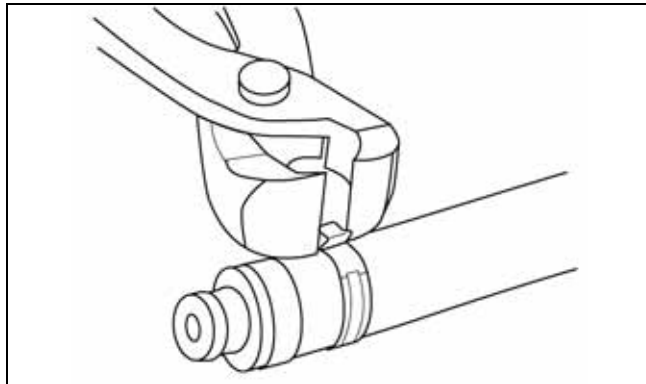


1. Open clamp
2. Closed clamp

000092

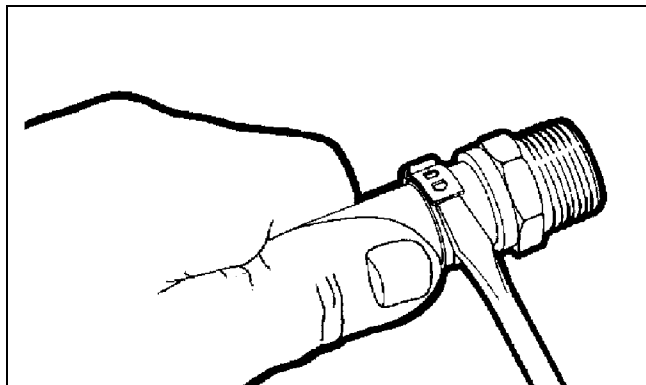
Clamp Removal

Method 1: Position *Oetiker* pincers across clamp ear and cut clamp.



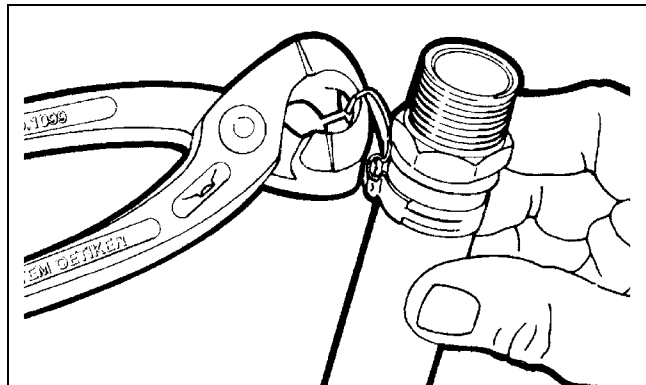
000108

Method 2: Lift end of stepless clamp with screwdriver.



000090

Method 3: Use *Oetiker* pincers (pliers) to grip clamp. Pull clamp off of connection and discard.



000091

OUTBOARD INSTALLATION

Hull Preparation

Maximum Capacity

WARNING

Do not overpower the boat by installing an outboard that exceeds the horsepower indicated on the boat's capacity plate. Overpowering could result in loss of control.

Before installing outboard:

- Refer to the boat manufacturer's certification label for maximum horsepower rating.
- Refer to ABYC Standards to determine the maximum horsepower capacity for boats without certification labeling.



1029A

Mounting Surface

Inspect transom surface before mounting outboard.

- The transom should meet ABYC Standards.
- The transom must be flat and cannot have any protrusions.
- The transom angle should be approximately 14 degrees.
- Check transom strength and height.

The stern brackets must contact the flat surface of the transom. Modify trim that prevents the stern brackets from resting against the transom surface. Do not modify stern brackets.

WARNING

DO NOT install an outboard on a curved or irregular surface. Doing so can wear, bind, and damage components, causing loss of control.

Transom Clearances

Make sure the transom and splash well area provide adequate clearances.

- The top edge of the transom should be wide enough to allow full steering travel. The ABYC standard for most single outboard installations is 33 in. (84 cm).
- Check cable and hose routing clearances.
- Make sure there is clearance for mounting bolts and washers. Check the inside area of the transom for obstructions prior to drilling holes.

Water Flow

Inspect the hull area directly in front of the mounting location.

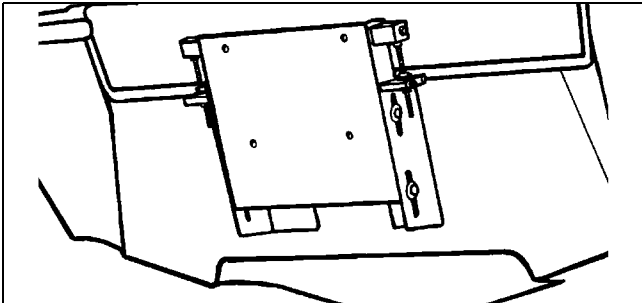
- Boat-mounted equipment should not create turbulence in the water flow directly in front of the outboard's gearcase. Turbulence or disruptions in the water flow directly in front of the gearcase will affect engine cooling and propeller performance.
- Avoid locating outboard centerlines within 3 in. (76 mm) of bottom strakes on dual-outboard installations.

INSTALLATION AND PREDELIVERY OUTBOARD INSTALLATION

Transom Brackets and Jack Plates

When mounting an outboard on boats equipped with transom brackets or jack plates, refer to the manufacturer's recommendations.

- Confirm maximum weight and horsepower capacities.
- Jack plate assemblies must provide a one-piece mounting surface to support the outboard, hydraulic unit, and steering system.



DR5704

Mounting Hardware



WARNING



Use all mounting hardware supplied with the outboard to help ensure a secure installation. Substituting inferior hardware can result in loss of control.

Refer to the outboard's parts catalog for alternate length mounting bolts or replacement parts.

- Use only *Evinrude/Johnson Genuine Parts* or parts of equivalent type, strength, and material.
- Use the mounting hardware provided with outboard whenever possible.

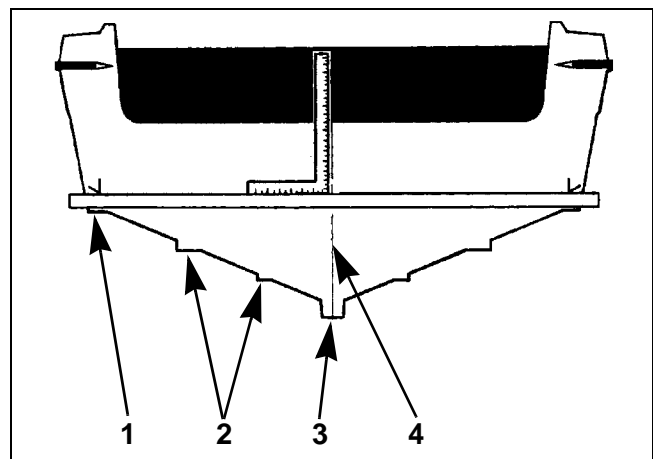
Transom Measuring and Drilling

Hull Centerline

Use the chines of the boat as reference points to locate the centerline of the boat transom.

Use a straightedge to draw a line connecting the port and starboard chines.

Use a framing square to accurately place a vertical line on the transom. The centerline of the hull should be in line with the keel, and perpendicular to the midpoint of the line connecting the chines.



1. Chine
2. Strake
3. Keel
4. Hull centerline

DR5568

Transom Height

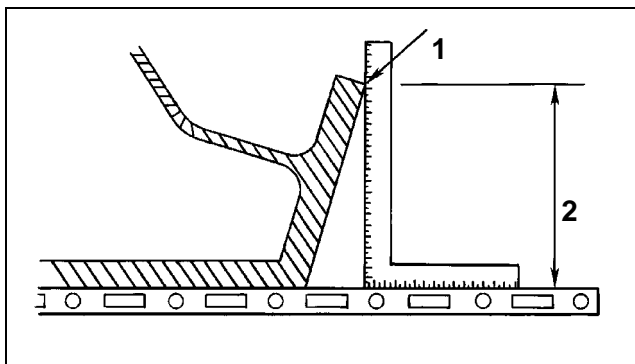
Make sure the transom height matches the length of the outboard to be installed.

- A 19 to 21 in. (48.3 to 53.3 cm) transom height uses a 20 in. (50.8 cm) shaft outboard.
- The shaft length of the outboard being installed should come close to matching the transom height of the boat.

Determine transom height by measuring from the top edge of the transom, along the centerline.

Use a straightedge as a reference to extend the bottom of the boat.

Position the straightedge along centerline. The distance from the top edge of the straightedge to the top edge of the transom is the actual transom height.



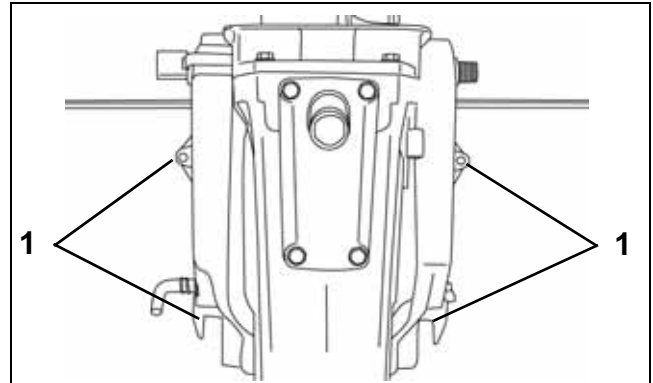
1. Top edge of transom
2. Actual transom height

DR5541

Transom Drilling Locations

Center the outboard on the transom (or mounting bracket) and tighten clamp screws by hand.

Use each stern bracket's mounting holes as a guide to drill four 11/32 in. (8.7 mm) holes through the transom.



TYPICAL

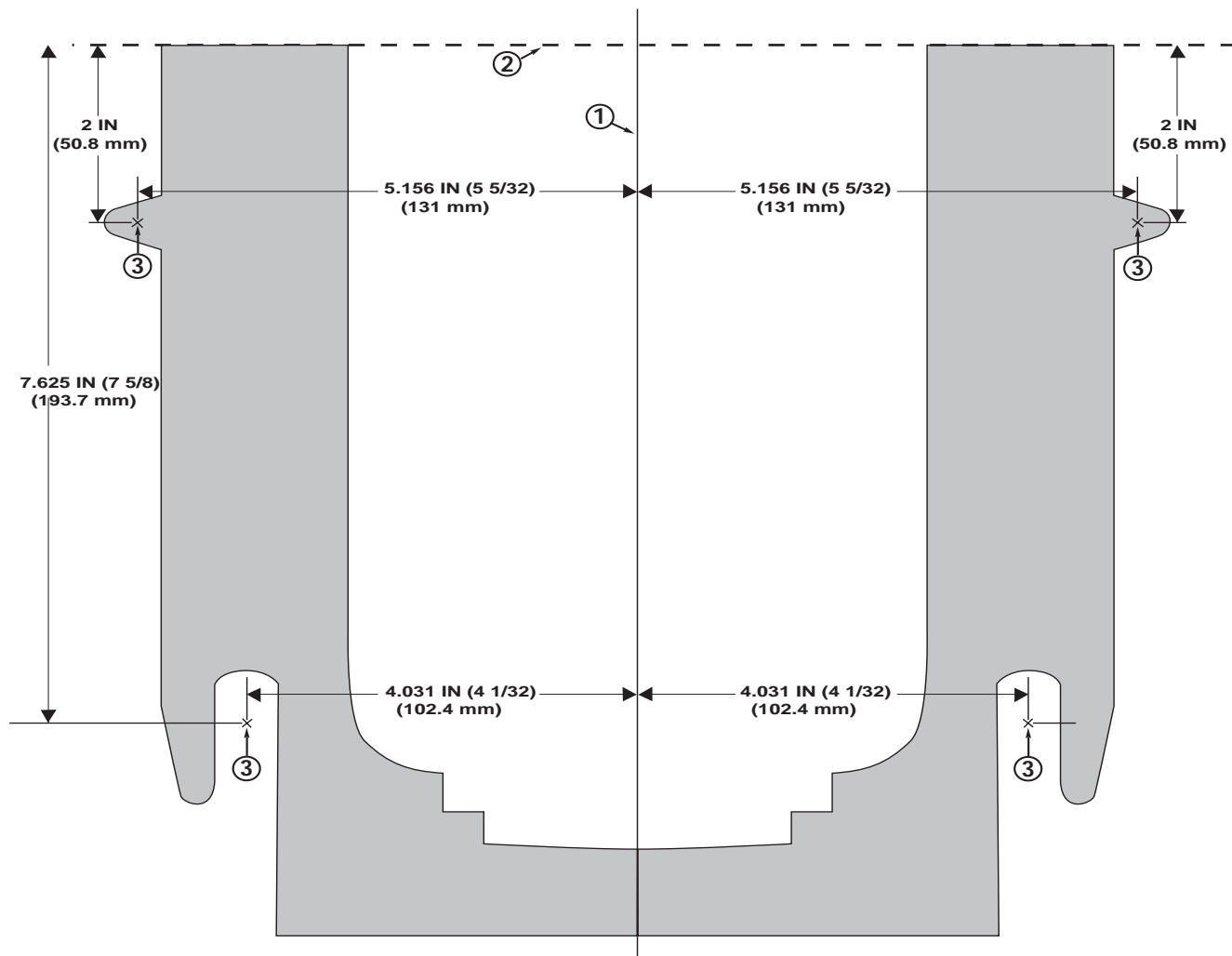
002215

INSTALLATION AND PREDELIVERY

OUTBOARD INSTALLATION

Drilling Diagram

IMPORTANT: This is not a template.



1. Center of Transom
2. Top of Transom
3. 11/32" Bolt Hole Locations

Lifting the Outboard

Lifting Fixtures

WARNING

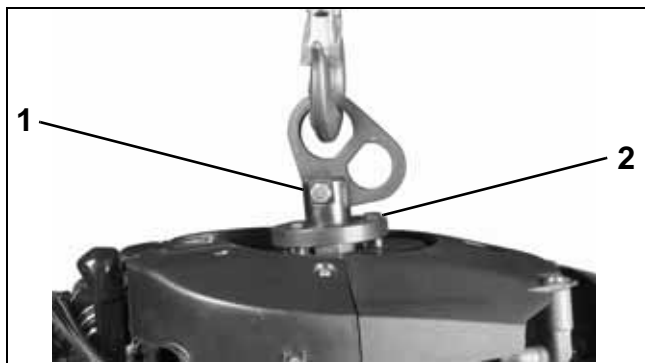
To avoid personal injury, make sure the lifting capacity of the hoist is at least twice the weight of the outboard.

DO NOT allow the lift hook or chain from the hoist to come in contact with any part of the engine during lifting.

Use correct Lifting Fixture to lift outboard:

Model	Lifting Fixture
MFE 55	P/N 396748

With recoil starter removed, place lifting tool on flywheel and seat the three screws completely. Refer to **RECOIL STARTER REMOVAL** on p. 269.



1. Lifting fixture
2. 1 1/8 in. screws

002098

IMPORTANT: Use only the 1 1/8 in. (short) screws, P/N 398067, included with the tool to avoid damage to electronic components under the flywheel.

Fasten appropriate chain hook to eye of tool. Carefully hoist outboard with chain.

CAUTION

If chain hooks or snap hooks are too large, the integrated lifting eye could break. The outboard could drop suddenly and cause serious damage.

Outboard Mounting

Mounting Height

Boat performance depends on outboard mounting height.

Generally, the anti-ventilation plate of the gear-case should be in alignment with the bottom of the hull. Conventional V-hulls often perform well with the anti-ventilation plate approximately 1 in. (25 mm) above the bottom of the hull.

Boats that exceed 50 MPH may benefit from higher outboard heights. Consult the boat manufacturer for specific outboard mounting height information for a particular hull.

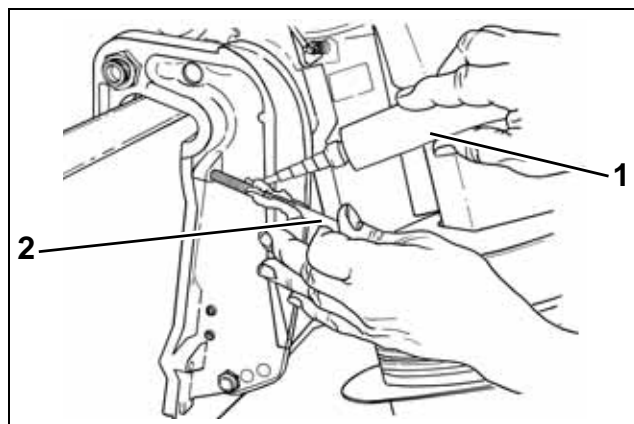
Test outboard and boat performance at different heights until the best performance is achieved.

IMPORTANT: Be sure that outboard water pressure is not adversely affected by the mounting height of the outboard.

Mounting Bolt Installation

IMPORTANT: Use a marine sealant rated for above or below waterline use. RTV silicone is not approved for below waterline use. Polyurethane sealants are not easily removed and may damage outboard or boat mounting surfaces.

Apply marine sealer under hex heads of bolts, on the mounting plates, and to the bolt shanks.



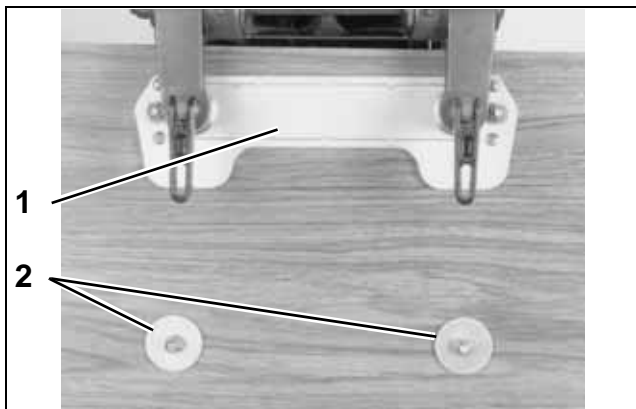
1. Marine sealer
2. Bolt

DR26500

INSTALLATION AND PREDELIVERY OUTBOARD INSTALLATION

Use Transom Mounting Kit, P/N 394219, to protect the transom and help prevent loss of outboard. The kit includes a transom mounting plate and hardware for fastening outboard to transom.

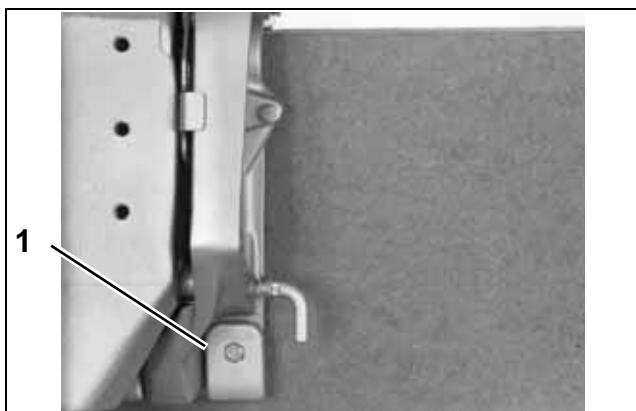
Install the mounting bolts through the stern brackets and transom. Install round backing plates and locknuts onto lower bolts and tighten securely.



1. Transom mounting plate
2. Round backing plates

18961

The kit also includes clamp pads, P/N 315774, which must be used to secure mounting bolts in slots at the bottom of the outboard stern brackets.



1. Clamp pad

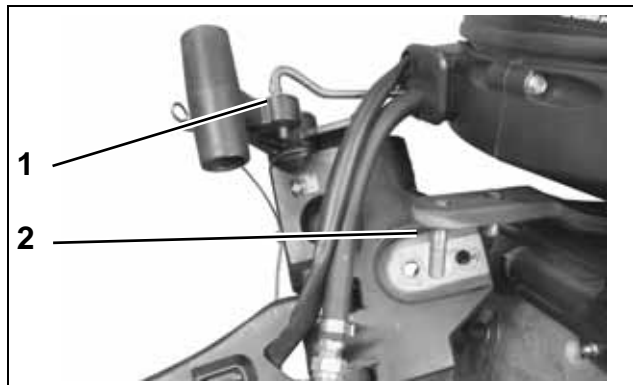
COB2505

Tiller Handle Attachment

The tiller handle can be removed without tools to minimize required storage space.

To attach tiller handle to the outboard:

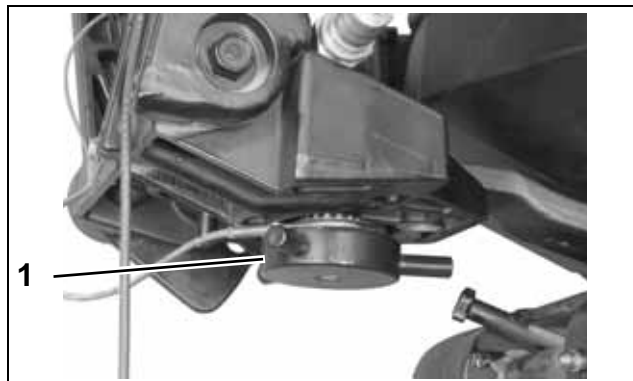
- Place shift rod through shift lever.



1. Shift rod
2. Steering arm studs

006515

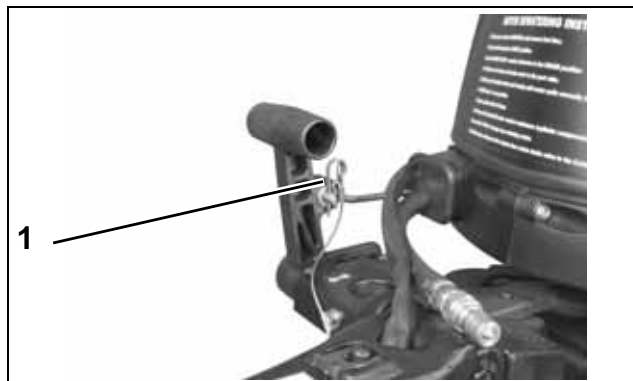
- Place tiller handle bracket on steering arm studs and secure with hand nut.



1. Hand nut

006516

- Install washer and retaining clip on shift rod.



1. Retaining clip

006517

FUEL AND OIL PRIMING

Fuel Requirements



WARNING



Gasoline is extremely flammable and highly explosive under certain conditions. Improper handling of fuel could result in property damage, serious injury or death.

Always turn off the outboard before fueling.

Never permit anyone other than an adult to refill the fuel tank.

Do not fill the fuel tank all the way to the top or fuel may overflow when it expands due to heating by the sun.

Remove portable fuel tanks from the boat before fueling.

Always wipe off any fuel spillage.

Do not smoke, allow open flames or sparks, or use electrical devices such as cellular phones in the vicinity of a fuel leak or while fueling.

MFE 55 models are designed to use several different fuel types. Refer to **Fuel Selector Switch** on p. 48.

Heavy Fuels:

Approved heavy fuels include:

- JP4, JP5, JP8
- Jet A, Jet B
- Kerosene

Gasoline:

Use unleaded automotive gasoline with an octane rating equal to or higher than:

- 87 (R+M)/2 AKI, or 90 RON.

Use unleaded gasoline that contains methyl tertiary butyl ether (MTBE) **ONLY** if the MTBE content does not exceed 15% by volume.

Use alcohol-extended fuels **ONLY** if the alcohol content does not exceed:

- 10% ethanol by volume

- 5% methanol with 5% cosolvents by volume

Emergency Fuels:

In an emergency situation when no other fuel is available, diesel DFM-E76 or BioDiesel can be used for a maximum of ten hours **ONLY**.

Idle and low speed operation (below 3000 RPM) should be avoided to prevent spark plug fouling when operating on diesel DFM-E76 or BioDiesel.

IMPORTANT: If the outboard **MUST** be run on diesel, it should then be run on gasoline for a minimum of 20 minutes to clean internal engine components.

Fuel Additives (gasoline only)

The only fuel additives approved for use are:

- Evinrude/Johnson 2+4[®] fuel conditioner
- Evinrude/Johnson Fuel System Cleaner

Use of other fuel additives can result in poor performance or engine damage.

Evinrude/Johnson 2+4 Fuel Conditioner will help prevent gum and varnish deposits and will remove moisture from the fuel system. It can be used continuously and should be used during any period when the outboard is not being operated on a regular basis.

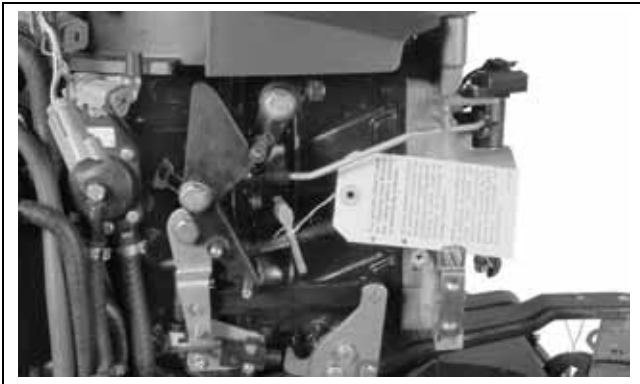
Evinrude/Johnson Fuel System Cleaner helps keep fuel injectors in good condition.

INSTALLATION AND PREDELIVERY FUEL AND OIL PRIMING

Fuel System Priming

Vent Line Clamp

In compliance with Federal Regulations, all outboards with a fuel vapor separator must be shipped with a vent line clamp installed. This clamp must be removed before priming the fuel system or starting the outboard for the first time.



002552

IMPORTANT: Failure to remove the clamp may cause fuel starvation and poor running qualities.

Priming the Fuel System

WARNING

Fuel vapors are highly flammable. Perform the following procedure in a well ventilated area. Extinguish all smoking materials and make certain no ignition sources are present.

Use the fuel primer bulb to fill the Vapor separator.

The high-pressure fuel circuits and injectors will prime as the outboard is cranked with the starter.

Observe all fuel lines, both in the boat and on the outboard. Repair any fuel leaks.

WARNING

Failure to check for fuel leaks could allow a leak to go undetected, resulting in fire or explosion and may cause personal injury or property damage.

Oil Requirements

IMPORTANT: Failure to follow these recommendations could void the outboard warranty if a lubrication-related failure occurs.

Evinrude/Johnson XD100 is the only oil recommended for use with *MFE* models.

If *XD100* oil is not available, an oil that meets NMMA TC-W3 certification may be used in an emergency.

XD100 oil must be used when operating in temperatures under 32°F, (0°C).

Oil Injection Rate

The Engine Management Module (*EMM*) controls the rate of oil injection based on engine RPM. This rate can be adjusted for powerhead break-in. Use *Evinrude Diagnostics* software to access this feature.

Break-In Oiling

IMPORTANT: DO NOT add oil in the fuel tank on *MFE* models.

The Engine Management Module (*EMM*) automatically supplies extra oil to the engine during the first two hours of operation, above 2000 RPM.

Follow these steps for outboard set-up:

- Use *Evinrude Diagnostics* software to make sure the break-in program has been started. Refer to **Oil Control Settings** on p. 87.
- The oil tank should be filled and the oil level marked for reference.

IMPORTANT: The operator must monitor the oil tank level to confirm oil consumption. This may require several hours of operation above idle speed.

Oil Supply Priming



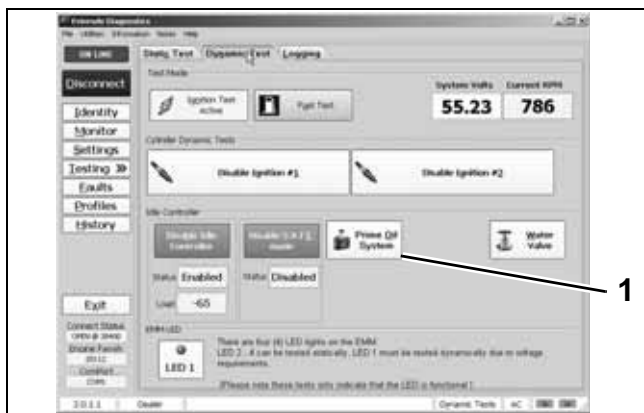
WARNING



Always use caution while working around machinery with moving parts. The following set-up procedures require running tests that are performed with the outboard's motor cover removed.

IMPORTANT: Refer to **OPERATION** section before running outboard.

Start the outboard and use *Evinrude Diagnostics* software oil priming function for a minimum of 90 seconds to make sure the system is completely primed.

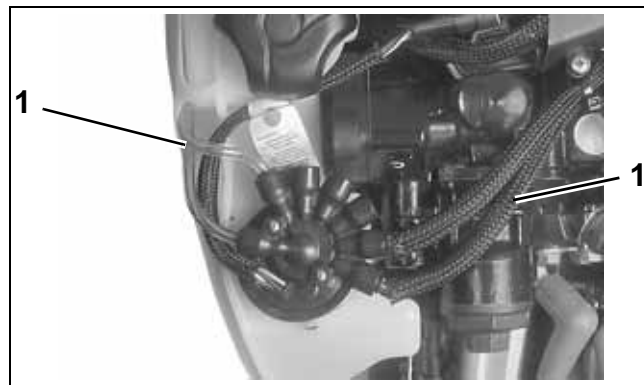


Dynamic Tests Screen

1. Prime oil button

006546

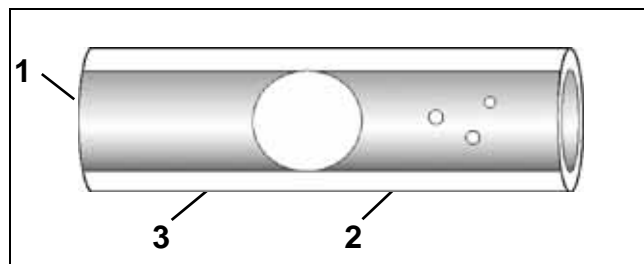
Observe oil flow through the oil distribution hoses.



1. Oil distribution hoses

006741

Small bubbles are acceptable. Large bubbles must be eliminated through continued priming.



1. Oil distribution hose
2. Small bubbles
3. Large bubbles

004398

IMPORTANT: All clear (blue) oil distribution hoses on the powerhead should fill with oil as the air is purged from the lines.

Repair any fuel or oil leaks.

The oiling system can also be primed using the Self-Winterizing feature if diagnostics software is not available. Refer to **STORAGE** on p. 66.

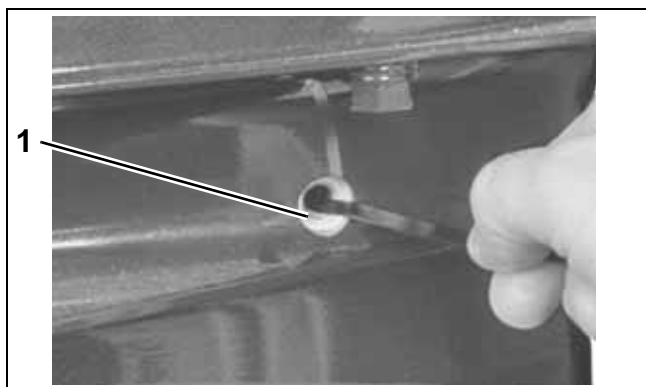
2

BEFORE START-UP

Gearcase Lubricant

With outboard vertical, check the gearcase lubricant level:

- Remove the lubricant level plug. Lubricant must be even with the bottom of the threaded hole.
- A clean tie strap can be used as a “dip stick” if the lubricant level is not obvious.
- Add *HPF XR* gearcase lubricant as needed.



1. Gearcase lubricant level

000072

Oil Level

Make sure oil tank contains an adequate supply of the correct lubricant for the outboard. Refer to **Oil Requirements** on p. 40.

When starting the outboard for the first time, refer to **Oil Supply Priming** on p. 41.

RUNNING CHECKS



WARNING



DO NOT run outboard without a water supply to the outboard's cooling system. Cooling system and/or powerhead damage could occur.



DANGER



DO NOT run the engine indoors or without adequate ventilation or permit exhaust fumes to accumulate in confined areas. Engine exhaust contains carbon monoxide which, if inhaled, can cause serious brain damage or death.



DANGER



Contact with a rotating propeller is likely to result in serious injury or death. Assure the engine and prop area is clear of people and objects before starting engine or operating boat. Do not allow anyone near a propeller, even when the engine is off. Blades can be sharp and the propeller can continue to turn even after the engine is off.

IMPORTANT: Refer to **OPERATION** section before running outboard.

Fuel System

Perform running checks of the fuel system by following these steps:

- Squeeze fuel primer bulb until hard or activate electric primer. Observe all fuel hoses and connections. Repair any leaks.
- Start outboard. Inspect all hoses and connections. Repair any leaks or misrouted hoses immediately.

Emergency Stop Switch

Check emergency stop function. With outboard running at IDLE, pull safety lanyard from emergency stop switch. Outboard must stop immediately.

Control Operation

Make sure that control can be easily moved into all gear and throttle settings. Do not shift when outboard is not running.

Start-In-Gear Prevention



WARNING



Make certain that the outboard will not start when in gear. The start-in-gear prevention feature is required by the United States Coast Guard to help prevent personal injuries.

Start outboard and shift to FORWARD.

Turn outboard OFF while control is in FORWARD.

Try to restart the outboard. Outboard should not start.

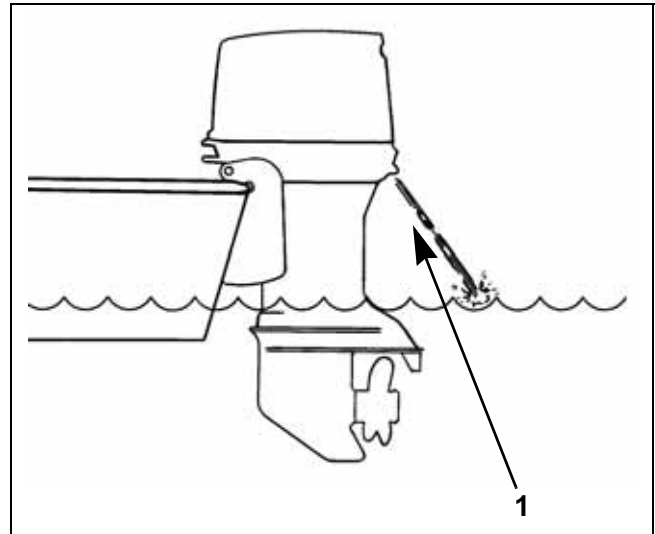
Shift back to NEUTRAL and restart outboard.

Shift to REVERSE. Turn outboard OFF while control is in REVERSE.

Try to restart the outboard. Outboard should not start.

Water Pump Overboard Indicator

A steady stream of water should flow from the overboard indicator.



1. Water pump overboard indicator

DRC4952

Operating Temperature

An outboard run at idle speed should achieve a temperature based on the engine's thermostatic control. In general, the powerhead temperature should reach at least 104°F (40°C) after five minutes of idling. Check that the powerhead reaches idle temperature. Refer to **SERVICE SPECIFICATIONS** on p. 8 for details.

Idle Speed

Make sure the outboard idles within the specified idle RPM range. If the outboard is run on a flushing device, the idle speed and quality may not be representative of actual in water use.

Break-In

New *MFE* models are delivered ready to run from the factory and require no additional break-in by the operator.

The Engine Management Module (*EMM*) automatically supplies extra oil to the engine during the first two hours of operation, above 2000 RPM.

Use the diagnostics software program to confirm that the break-in program has been started. Refer to **Oil Control Settings** on p. 87.

PROPELLERS

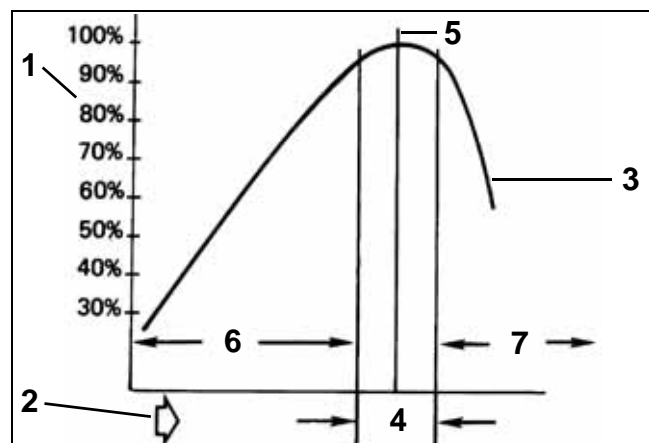
Propeller Selection

CAUTION

Selection of the wrong propeller could reduce engine service life, affect boat performance, or cause serious damage to the powerhead.

Water testing with various propeller designs and sizes is the best method of propeller selection.

The correct propeller, under normal load conditions, will allow the engine to run near the midpoint of the RPM operating range at full throttle. Refer to **SERVICE SPECIFICATIONS** on p. 8.



1. Percentage of horsepower (kw)
2. Engine RPM
3. Horsepower curve
4. Full throttle operating range
5. Midpoint of full throttle operating range, horsepower rating in kilowatts (kw)
6. Engine is overloaded at full throttle
7. Engine is overspeeding at full throttle

IMPORTANT: If the propeller blades have too much pitch, the engine will operate below its normal range at full throttle. Power will be lost, and powerhead damage could occur. If the propeller blades have too little pitch, the engine will operate above its normal range and damage from overspeeding could occur.

When selecting a propeller, consider the following:

- Use an accurate tachometer to determine the engine's full-throttle RPM.
- The outboard should be trimmed for top speed.
- Select a propeller that suits the customer's application and allows the engine to run near the midpoint of the full-throttle operating range when the boat has a normal load.
- Occasionally, one propeller will not cover a wide range of boat applications — heavy loads to high speed performance boating. In such cases, it might be necessary to have a propeller for each situation.
- Refer to the *Evinrude/Johnson Genuine Parts and Accessories Catalog* for propeller styles and sizes.

Propeller Hardware Installation

WARNING

When servicing the propeller, always shift the outboard to NEUTRAL, and twist and remove all spark plug leads so the engine cannot be started accidentally.

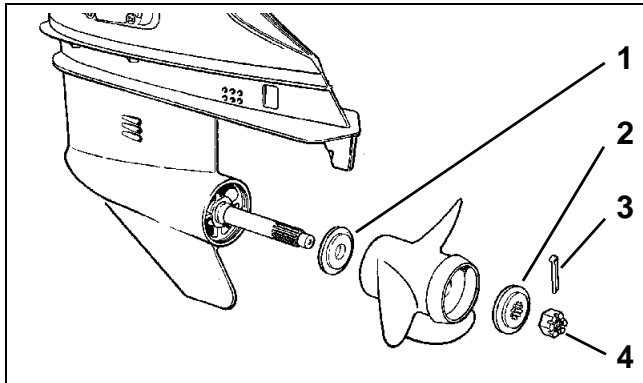
Apply *Triple-Guard* grease to the entire propeller shaft before installing the propeller.

Install thrust bushing onto propeller shaft with shoulder of thrust bushing facing aft. Taper of bushing must match taper of propshaft.

Install propeller on propeller shaft by aligning splines and pushing until seated on the thrust bushing.

IMPORTANT: Depending on propeller style, different thrust bushings, spacers, and cotter pin keepers are used. See the *Evinrude/Johnson Genuine Parts* book for a complete listing and descriptions.

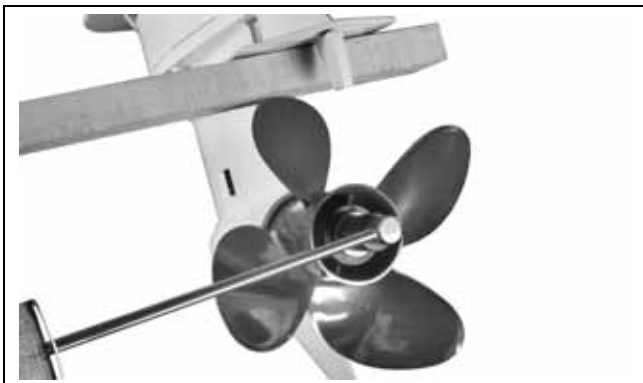
Install the spacer, engaging the propeller shaft splines.



1. Thrust bushing
2. Spacer
3. Cotter pin
4. Propeller Nut

CO2917

Wedge a block of wood between propeller blade and the anti-ventilation plate.



001992

Install the propeller nut and tighten to a torque of:

- 120 to 144 in. lbs. (13.5 to 16.5 N·m)

If cotter pin holes in the propeller nut and propeller shaft are not aligned, tighten the nut until they are in line. Do not loosen.

Insert a new cotter pin through the propeller nut and shaft. Bend its ends over the nut to secure the assembly.

IMPORTANT: After fastening propeller nut, make sure outboard is in NEUTRAL and carefully spin propeller. Propeller must turn freely and should not spin off center. If propeller appears to wobble, check for possible bent propeller shaft.

FINAL ADJUSTMENTS

Trim Tab Adjustment

WARNING

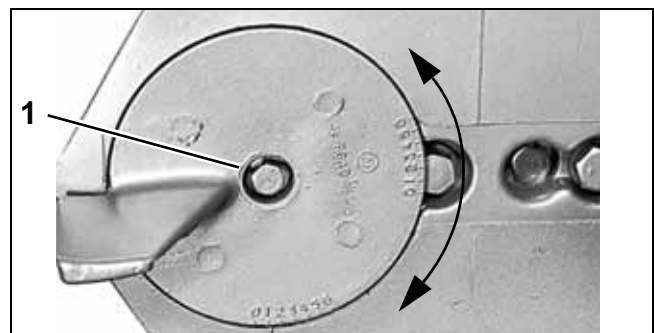
Improper trim tab adjustment can cause difficult steering and loss of control.

A propeller will generate steering torque when the propeller shaft is not running parallel to the water's surface. The trim tab is adjustable to compensate for this steering torque.

IMPORTANT: A single trim tab adjustment will relieve steering effort under only one set of speed, outboard angle and load conditions. No single adjustment can relieve steering effort under all conditions.

If the boat pulls to the left or right when its load is evenly distributed, adjust the trim tab as follows:

- With the engine OFF, loosen the trim tab screw. If the boat pulled to the right, move rear of the trim tab slightly to the right. If the boat pulled to the left, move rear of the trim tab slightly to the left.
- Tighten the trim tab screw to a torque of 35 to 40 ft. lbs. (47.5 to 54 N·m).



1. Trim tab screw

COA3663

Test the boat and, if needed, repeat the procedure until steering effort is as equal as possible.

Outboards with High Transom Heights

The trim tab may be above the surface of the water when the outboard is trimmed out. Steering effort might increase. Lower the trim setting to submerge the trim tab and to reduce steering effort.

OPERATION

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STARTING THE ENGINE



WARNING



DO NOT run outboard without a water supply to the outboard's cooling system. Cooling system and/or powerhead damage could occur.



DANGER



DO NOT run the engine indoors or without adequate ventilation or permit exhaust fumes to accumulate in confined areas. Engine exhaust contains carbon monoxide which, if inhaled, can cause serious brain damage or death.



DANGER



Contact with a rotating propeller is likely to result in serious injury or death. Assure the engine and prop area is clear of people and objects before starting engine or operating boat. Do not allow anyone near a propeller, even when the engine is off. Blades can be sharp and the propeller can continue to turn even after the engine is off.

Fuel Requirements

IMPORTANT: Refer to:

- Fuel Requirements on p. 39
- Fuel System Priming on p. 40

Oil Requirements

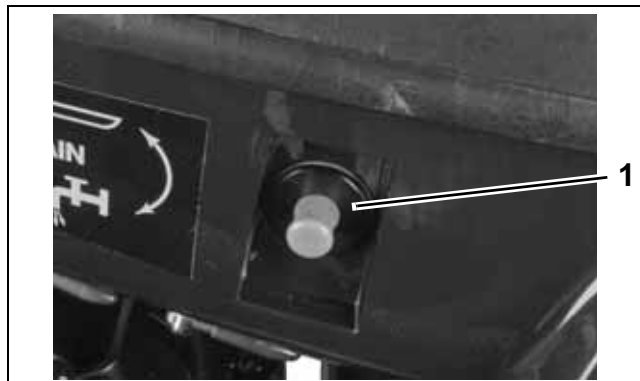
IMPORTANT: Refer to:

- Oil Requirements on p. 40
- Oil Supply Priming on p. 41

Fuel Selector Switch

The Engine Management Module (*EMM*) includes programs to allow the engine to run on several different types of fuel. You **MUST** select the correct program for the fuel being used.

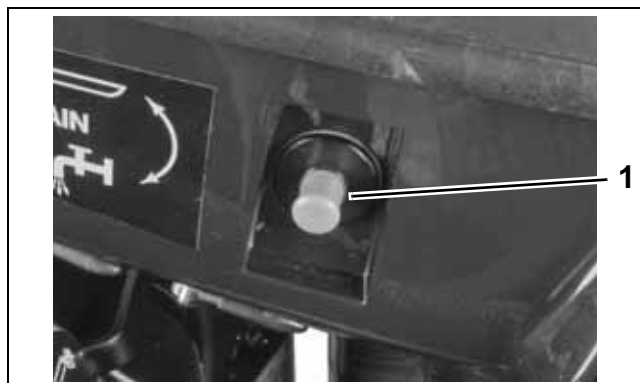
To use jet fuel or kerosene (Heavy Fuel), press the fuel selector switch IN.



1. Fuel selector switch IN.

004288

To use gasoline, pull the fuel selector switch OUT to expose the red indicator ring.



1. Fuel selector switch OUT (red line showing).

004289

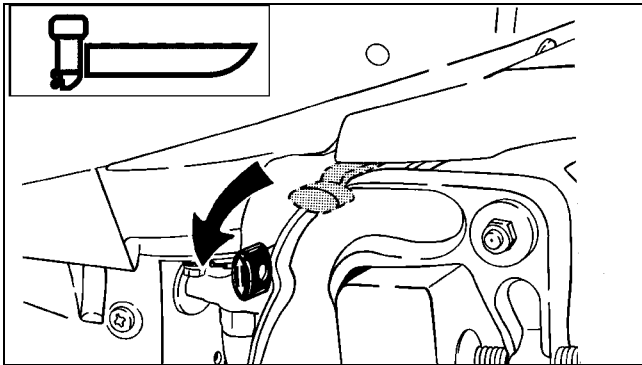
When switching from one fuel to another:

- Connect the fuel supply hose to the desired fuel supply.
- Adjust the selector switch for the new fuel.
- Restart the engine to reset the *EMM*—changing the switch has no effect while the engine is running.
- The *EMM* calculates when the previous fuel remaining in the engine has been used and switches the program at that time.
- The engine may run noticeably rough during the transition period.

IMPORTANT: Diesel is an emergency fuel **ONLY**. If diesel must be used, the fuel selector switch should be in the Heavy Fuel position.

Starting Procedure

Move the tilt/run lever to RUN position. Place motor in normal operating position.



DR4407A

Select the correct *EMM* fuel map for the fuel being used. Refer to **Fuel Selector Switch** on p. 48.

Snap fuel line connector onto engine connector.



005068

Squeeze fuel line primer bulb, outlet end up, until firm.



30924

IMPORTANT: If the fuel tank has a manual vent, be sure it is open.

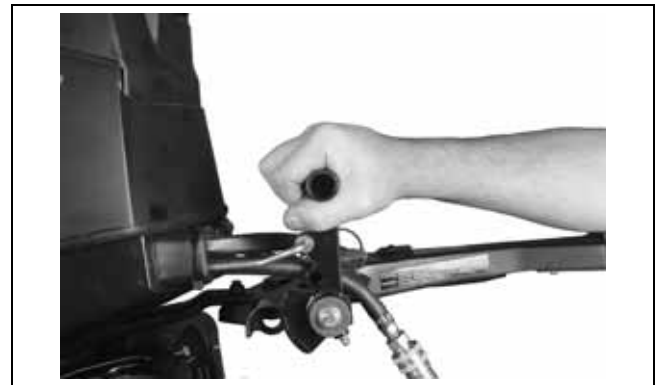
Connect the clip and lanyard assembly to the emergency stop switch. Clip must be installed to start engine. Snap the lanyard to a secure place on the operator's clothing. An extra clip is stored on the steering arm.



1. Emergency stop switch
2. Extra clip

29192

Move the shift lever to NEUTRAL. The engine will NOT start in gear.

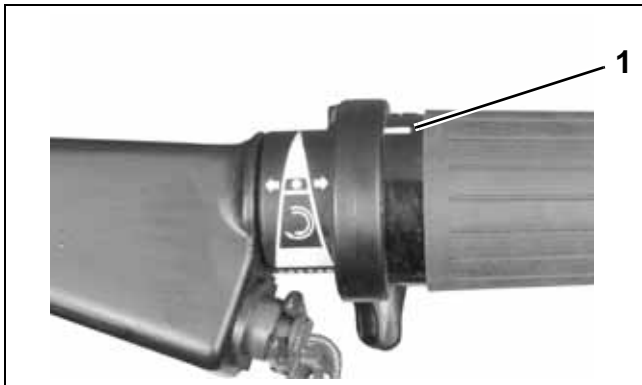


005046

OPERATION

STARTING THE ENGINE

Twist throttle grip to the slowest idle position.



1. Slow position

006518

IMPORTANT: DO NOT move the throttle from the fully closed position until the engine starts. Advancing the throttle before starting sends the wrong throttle position sensor signal to the *EMM* and will cause starting or running problems—the outboard may not accelerate above idle.

Pull starter handle slowly until starter engages, then pull hard. Short or slow pulls may not provide enough current to the *EMM* to start the engine.

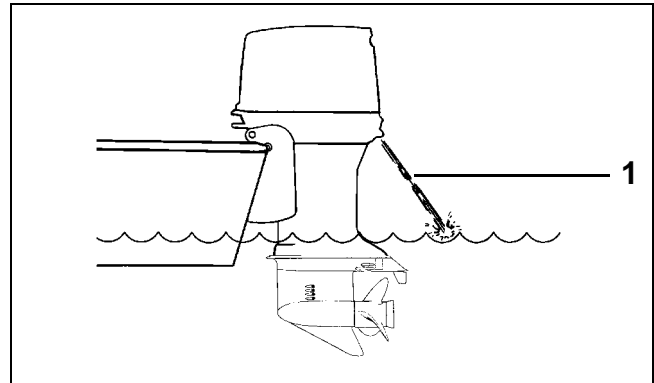


005047

Repeat, if needed, until outboard starts. To prevent damage to starter assembly, allow starter cord to rewind before releasing starter handle.

After Engine Starts

Check the water pump indicator. A steady stream of water indicates the water pump is working. If there is NOT a steady stream, STOP the engine. Refer to **Water Intake Screens** on p. 61.



1. Water pump overboard indicator

000977

Stopping the Engine

Slow engine to idle speed.

Move shift lever to NEUTRAL.

Press the stop button on the tiller handle until the outboard stops running.



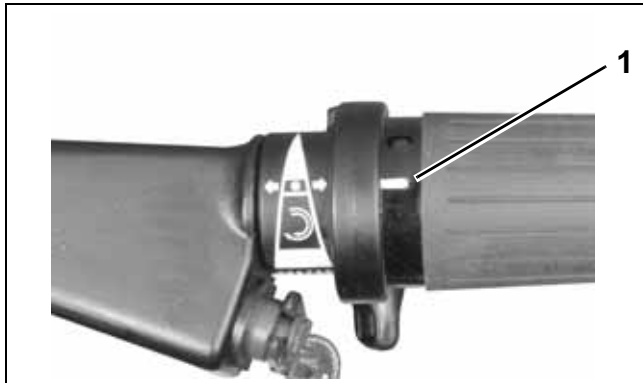
29285

SHIFTING AND SPEED CONTROL

IMPORTANT: To avoid gearcase damage:

- DO NOT try to shift motor into gear when engine is not running.
- When shifting, always wait until boat has slowed and engine is at idle speed.

With the outboard running, twist the throttle grip to shift position or slower.

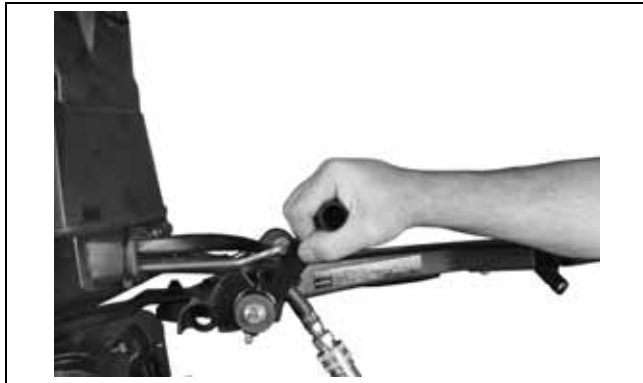


1. Shift position

006519

IMPORTANT: DO NOT shift motor with throttle control advanced beyond the shift position.

Move the shift lever with a firm, quick motion to FORWARD or REVERSE.

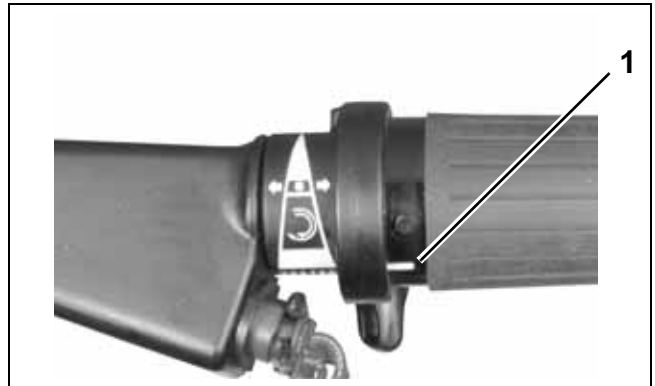


005048

Speed Control

With the outboard running, turn the Twist-Grip throttle control to change engine speed.

Note: Idle speed is controlled by the *EMM*.



1. Fast position

006520

Throttle Friction Adjustment

Adjust the throttle friction adjustment knob to reduce the effort required to hold a throttle setting.



WARNING



Tighten knob only enough to hold throttle at a constant engine speed. Overtightening will prevent quick throttle change in case of emergency.



002191



WARNING



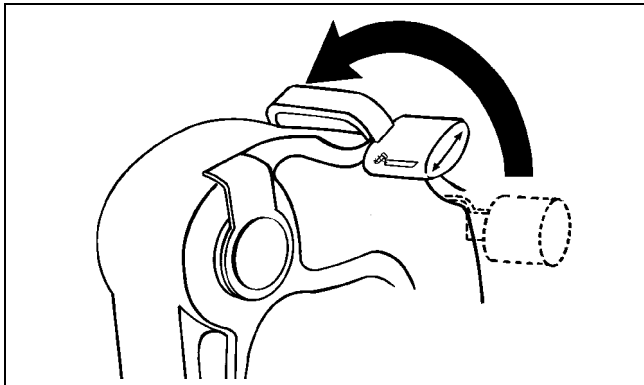
Do not operate motor in REVERSE with the tilt/run lever in TILT. Motor may tilt out of the water, resulting in loss of control.

MANUAL TILT

IMPORTANT: Use the tilt grip to tilt the outboard. Do not use the tiller handle as a lever.

Tilt UP

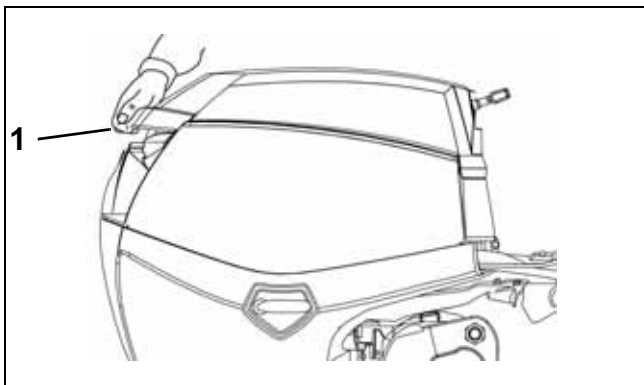
Move tilt/run lever to TILT position.



1. TILT position

DR3774

Grasp tilt strap or tilt grip on engine cover and tilt outboard to the full tilt position.



1. Tilt grip

002016

Tilt support will automatically engage.



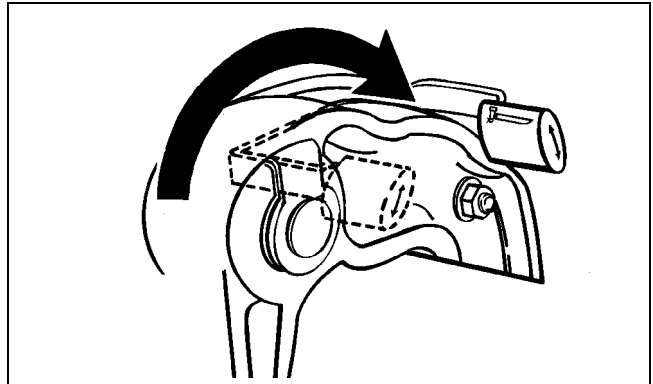
WARNING



While engine is tilted, leave tilt lever in the TILT position. When the tilt/run lever is in the RUN position, tilt support can release unexpectedly and allow motor to drop, creating a risk or serious personal injury or loss of control.

Tilt DOWN

Move tilt/run lever to RUN position.



1. RUN position

DR3772

Grasp tilt grip on engine cover and raise outboard slightly.

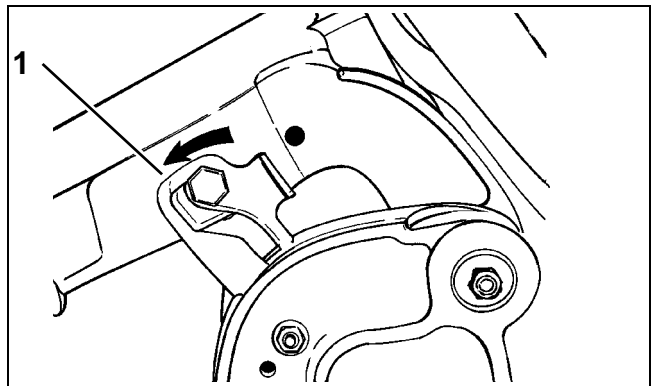
Tilt support will automatically disengage.

Slowly lower outboard to its normal operating position.

Tilt Support

Engage

Raise the outboard to full TILT position. Push tilt support bracket to "lock" position.

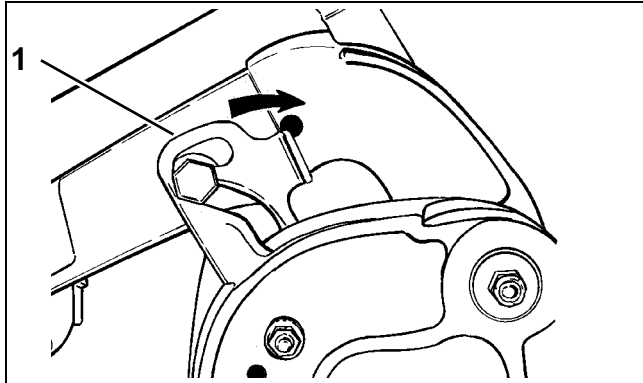


1. Tilt support bracket – lock position

DR3937

Disengage

Move tilt/run lever to RUN position. Tilt outboard fully and pull tilt support bracket to “unlock” position. Lower outboard.



1. Tilt support bracket – unlock position

DR3938

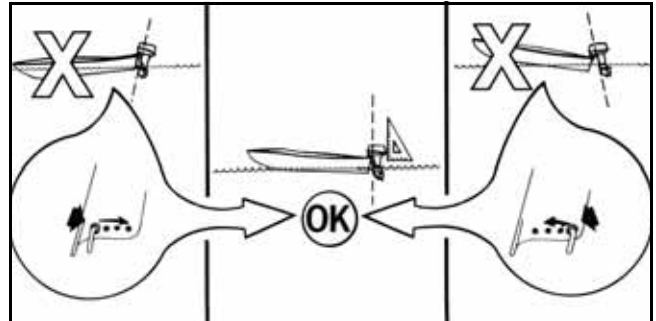
Trailer

Trailer your boat with the motor in a vertical position. If your trailer does not provide adequate road clearance, support the outboard with an accessory trailering bracket.

IMPORTANT: The outboard must be restrained when trailering. Bouncing during transport may damage the outboard and the boat’s transom.

IMPORTANT: Use of the tilt support bracket when trailering may cause damage to the outboard.

MOTOR ANGLE ADJUSTMENT



The outboard should be perpendicular to the water when the boat is underway at full speed. This adjustment can only be determined by water testing the boat. Set angle adjustment for your normal load.

Place motor in full tilt position. Refer to **Tilt Support** on page 52.

- Turn the angle adjusting rod handle up. Push in against spring so retainer will release, then slide rod assembly all the way out.
- Insert rod in desired position. Make sure rod passes through both stern brackets.
- Push in against spring and turn rod handle down. Make sure the retainer dropped into lock position.



WARNING



In rough water or crossing a wake, excessive bow-up trim may result in the boat’s bow suddenly rising upward, possibly ejecting or seriously injuring occupants.

Some boat/motor/propeller combinations may cause boat instability and/or high steering torque when operated at high speed at or near the outboard’s trim range limits (full bow-up or bow-down). Boat stability and steering torque can also vary in changing water conditions. If any adverse conditions occur, reduce throttle and/or adjust trim angle to maintain control.

OPERATION

DE-WATER PROCEDURE

DE-WATER PROCEDURE

De-water valves are available to quickly drain water from the engine if the *MFE* outboard is temporarily submerged during deployment, or during an accidental rollover.

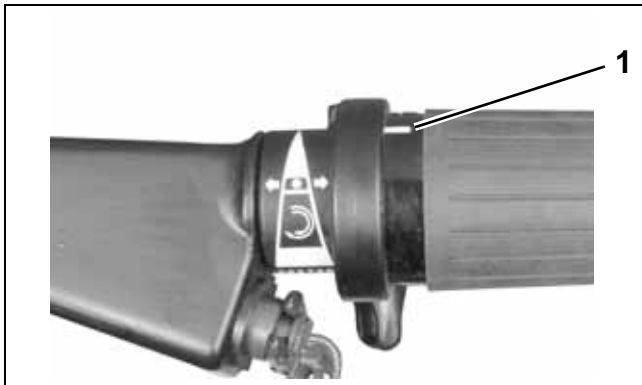
In these situations, de-water valves are available to quickly drain water from the engine so the outboard can be returned to use.

Once an outboard has been submerged in fresh or salt water, it must be serviced within three (3) hours of recovery. Immediate service can minimize the corrosive affect that air has on the polished surfaces of the crankshaft, connecting rods, and internal powerhead bearings.

IMPORTANT: If the outboard cannot be started or serviced immediately, it should be resubmerged in fresh water to avoid exposure to the atmosphere.

Place shift lever in NEUTRAL and remove the emergency stop clip and lanyard.

Twist throttle grip to slowest idle position.



1. Slow position

006518

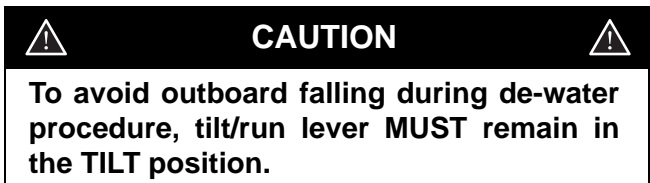
Turn the drain valves forward to the DRAIN position.



1. Drain valves in drain position

004350

Tilt outboard to the full tilt position and turn so the drain valves are on the lowest side.



Pull starter handle slowly until starter engages. Continue pulling with firm pressure to force water out of the engine.



005049



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