MAIN MENU

merCruiser

SERVICE MANUAL

Number 16

MARINE ENGINES

GM V-8
454 CID (7.4L) / 502 CID (8.2L)

Book 1 of 2
Sections 1 thru 4

Printed in U.S.A.

90-823224--2 796

Notice

Throughout this publication, "Dangers," "Warnings" and "Cautions" are used to alert the mechanic to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. Observe them carefully!

These "Safety Alerts" alone cannot eliminate the hazards that they signal. Strict compliance to these special instructions when performing the service, plus "common sense" operation, are major accident prevention measures.

⚠ DANGER

DANGER - Immediate hazards which will result in severe personal injury or death.

⚠ WARNING

WARNING - Hazards or unsafe practices which could result in severe personal injury or death.

⚠ CAUTION

CAUTION - Hazards or unsafe practices which could result in minor personal injury or product or property damage.

Notice to Users of This Manual

This service manual has been written and published by the service department of Mercury Marine to aid our dealers, mechanics and company service personnel when servicing the products described herein.

It is assumed that these personnel are familiar with the servicing procedures of these products, of like or similar products manufactured and marketed by Mercury Marine, and that they have been trained in the recommended servicing procedures for these products which include the use of mechanic's common hand tools and the special Mercury Marine or recommended tools from other suppliers.

We could not possibly know of and advise the service trade of all conceivable procedures by which a service might be performed and of the possible hazards and/or results of each method. We have not undertaken any such wide evaluation. Therefore, anyone who uses a service procedure and/or tool, which is not recommended by the manufacturer, first must completely satisfy himself that neither his nor the product's safety will be endangered by the service procedure selected.

All information, illustrations and specifications contained in this manual are based on the latest product information available at time of publication.

It should be kept in mind, while working on the product, that the electrical system and ignition system are capable of violent and damaging short circuits or severe electrical shocks. When performing any work where electrical terminals could possibly be grounded or touched by the mechanic, the battery cables should be disconnected at the battery.

Any time the intake or exhaust openings are exposed during service they should be covered to protect against accidental entrance of foreign material which could enter the cylinders and cause extensive internal damage when the engine is started.

It is important to note that, during any maintenance procedure, replacement fasteners must have the same measurements and strength as those removed, whether metric or customary. Numbers on the heads of the metric bolts and on surfaces of metric nuts indicate their strength. Customary bolts use radial lines for this purpose, while most customary nuts do not have strength markings. Mismatched or incorrect fasteners can result in damage or malfunction, or possible personal injury. Therefore, fasteners removed should be saved for re-use in the same locations whenever possible. Where the fasteners are not satisfactory for re-use, care should be taken to select a replacement that meets the same specifications as the original.

Engine Mechanical Components

Many of the engine mechanical components are designed for marine applications. Unlike automotive engines, marine engines are subjected to extended periods of heavy load and wide-open-throttle operation and, therefore, require heavy-duty components. Special marine engine parts have design and manufacturing specifications which are required to provide long life and dependable performance. Marine engine parts also must be able to resist the corrosive action of salt or brackish water that will rust or corrode standard automotive parts within a short period of time.

Failure to use recommended Quicksilver service replacement parts can result in poor engine performance and/or durability, rapid corrosion of parts subjected to salt water and possibly complete failure of the engine.

Use of parts other than recommended service replacement parts, will void the warranty on those parts which are damaged as a result of the use of other than recommended replacement parts.

Replacement Parts

⚠ WARNING

Electrical, ignition and fuel system components on MerCruiser Engines and Stern Drives are designed and manufactured to comply with U.S. Coast Guard Rules and Regulations to minimize risks of fire or explosion.

Use of replacement electrical, ignition or fuel system components, which do not comply to these rules and regulations, could result in a fire or explosion hazard and should be avoided.

When servicing the electrical, ignition and fuel systems, it is extremely important that all components are properly installed and tightened. If not, any electrical or ignition component opening would permit sparks to ignite fuel vapors from fuel system leaks, if they existed.

V-8 Models Covered in This Manual

Gen V Engines

Model	Serial Number
Stern Drive Engines	
MCM 7.4L Bravo	OD830779 to OF800699
MCM 7.4L Bravo Three	OD838819 to OF800699
MCM 7.4LX MPI	OF595275 to OF801999
MCM 454 Magnum (Carburetor)	OD837587 to OF801999
MCM 454 Magnum EFI, EFI/MP and MPI	OF111570 to OF802349
MCM 502 Magnum (Carburetor)	OD831432 to OF114528
MCM 502 Magnum EFI, EFI/MP, MPI	OD840650 to OF802599
Inboard Engines	
MIE 7.4L (Carburetor)	OD840300 to OF820141
MIE 7.4L EFI/MP and MPI	OF490697 to OF820103
MIE 8.2L (Carburetor)	OD857200 to OF819619
Ski Engines	
MIE 454 Magnum EFI, EFI/MP and MPI Tournament Ski	OF215800 to OF820099

Gen VI Engines

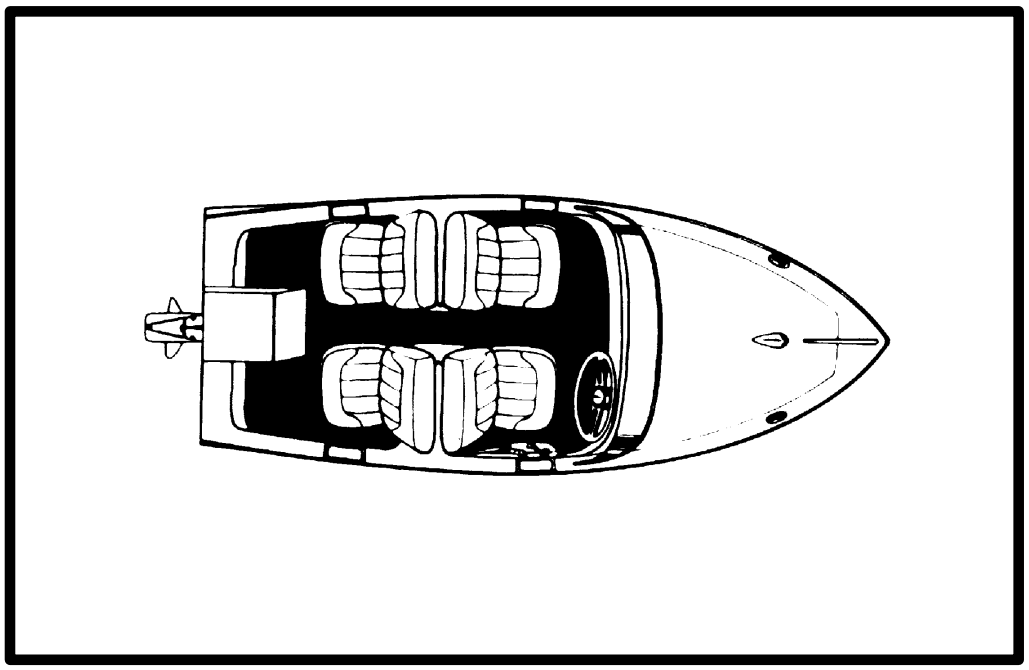
Model	Serial Number
Stern Drive Engines	
MCM Bravo 7.4L (Carburetor)	OF800700 and above
MCM 7.4LX EFI	OF820000 and above
MCM 7.4LX MPI	OF802000 and above
MCM 454 Magnum (Carburetor)	OF801700 and Above
MCM 454 MPI	OF802350 and above
MCM 502 MPI	OF802600 and above
Inboard Engines	
MIE 7.4L (Carburetor)	OF820142 and above
MIE 7.4L EFI	OF874815 and above
MIE 7.4L MPI	OF820104 and above
MIE 8.2L MPI	OF775694 and OF775695
MIE 8.2L MPI	OF819620 and above

Service Manual Outline

IMPORTANT INFORMATION

1

A



GENERAL INFORMATION

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Introduction

This comprehensive overhaul and repair manual is designed as a service guide for the models previously listed. It provides specific information, including procedures for disassembly, inspection, assembly and adjustment to enable dealers and service mechanics to repair and tune these engines.

Before attempting repairs or tune-up, it is suggested that the procedure first be read through to gain knowledge of the methods and tools used and the cautions and warnings required for safety.

How to Use This Manual

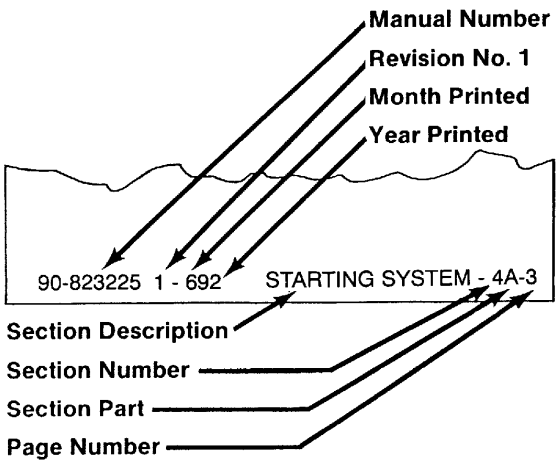
This manual is divided into sections which represent major components and systems.

Some sections are further divided into parts which more fully describe the component.

Sections and section parts are listed on the “Service Manual Outline” page following “V-8 Models Covered in This Manual” page.

Page Numbering

Two number groups appear at the bottom of each page. Following is an example and description.



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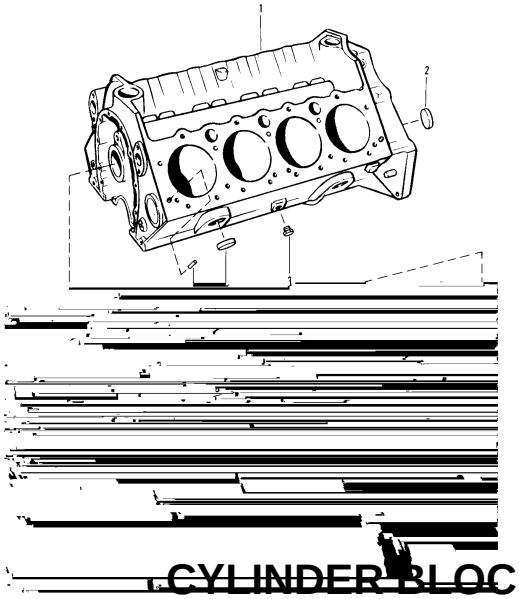
How To Read Parts Manual



CYLINDER BLOCK AND CAMSHAFT

M0033-**D8**

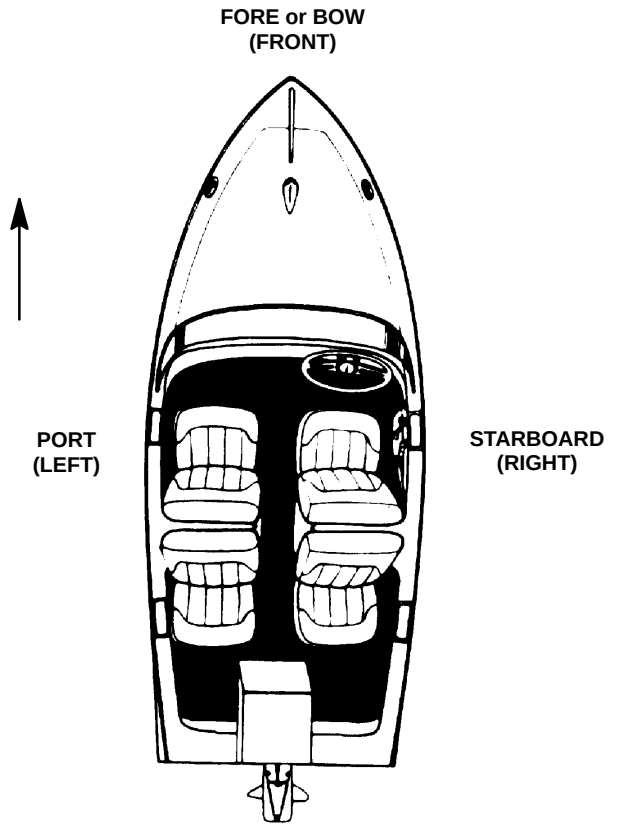
PART NO. (a)	REF. NO. (b)	DESCRIPTION (c)	QUAN. (d)
841-81631	1	CYLINDER BLOCK ASSEMBLY	1
N.S.S.	2	PLUG, expansion (1-1/4") (GM #3738306)	2
22-87238	3	DRAIN COCK, cylinder block	2
19-34270	4	PLUG, expansion - cylinder block (1-5/8" Diameter)	8
17-35465	5	PIN, dowel - block to head (5/16" Diameter)	4
22-72640	6	PLUG, expansion - camshaft bearing hole	1
23-85674	7	BEARING UNIT, camshaft (set)	1
72638	8	LIFTER, hydraulic valve	16
431-5943	9	CAMSHAFT	1
35378	10	CHAIN, camshaft timing	1
43-35338	11	SPROCKET, camshaft timing	1
43-48338	12	SPROCKET, crankshaft timing	1
10-34505	13	BOLT, camshaft timing sprockets (3/4")	3
12-39167	14	WASHER, camshaft timing sprocket bolt	3

(e) **841-8163 Cylinder Block Assembly includes only standard pistons, piston rings, crankshaft bearings and camshaft bearings.**

A. **Part Number:** For part ordering - Note N.S.S. for Reference Number 2, Plug, expansion - that means Not Sold Separately by Mercury Marine, however, in this case, the G.M. Part Number (for the plug) is given in the Description Column.
B. **Reference Number:** For part Shown on exploded parts view.
C. **Description:** This is the most important column because it gives:
1) Description of Part: Ref. No. 1 is a Cylinder Block Assembly, No. 9 is a Camshaft, etc.
2) What parts are included with a certain part: Notice how the Description of Part, for Ref. Nos. 1 and 8 thru 14, are at the left side of the column. Description of Part for Ref. Nos. 2 thru 7 are indented under "Cylinder Block Assembly". If Ref. No. 1 (Cylinder Block Assembly) was ordered, all indented parts (Ref. Nos 2thru 7) would come with the part. Ref. Nos. 8 thru 14 would not come with Ref. No. 1 and would have to be ordered separately. If 2 Cylinder Blocks were listed, both cylinder blocks would come with the indented parts. In some cases, an indented part will have another part indented under it. The second indented part will come with the first indented part.
3) Serial number break: If serial number information is listed, check product serial number to ensure that correct part is ordered.4) Special information: Many times special information will be shown after description such as; L.H. Rotation, R. H. Rotation, Filter up, Filter Down, etc. This will help in selecting the correct part.
D. **Quantity:** Quantity that has to be ordered.
E. **Special Information Block:** Additional information, part numbers for gasket sets, etc.

Directional References

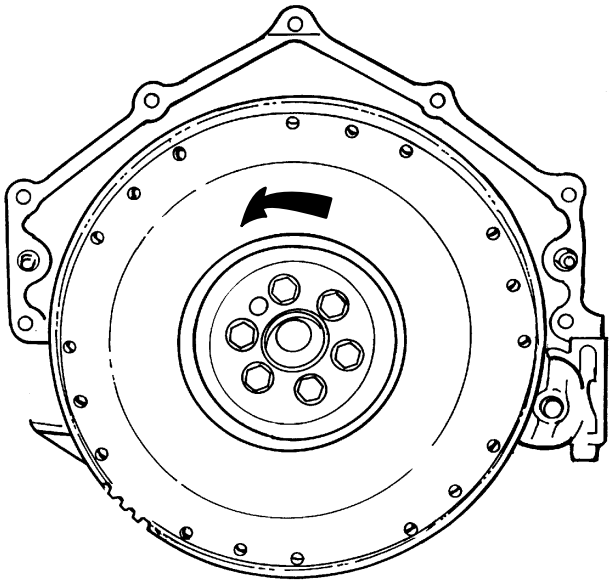
Front of boat is bow; rear is stern. Starboard side is right side; port side is left side. In this maintenance manual, all directional references are given as they appear when viewing boat from stern looking toward bow.



72000

Engine Rotation

Engine rotation is determined by observing flywheel rotation from the rear (stern end) of the engine looking forward (toward water pump end). Propeller rotation is not necessarily the same as engine rotation. When ordering replacement engine, short blocks or parts for engine, be certain to check engine rotation. Do not rely on propeller rotation in determining engine rotation.



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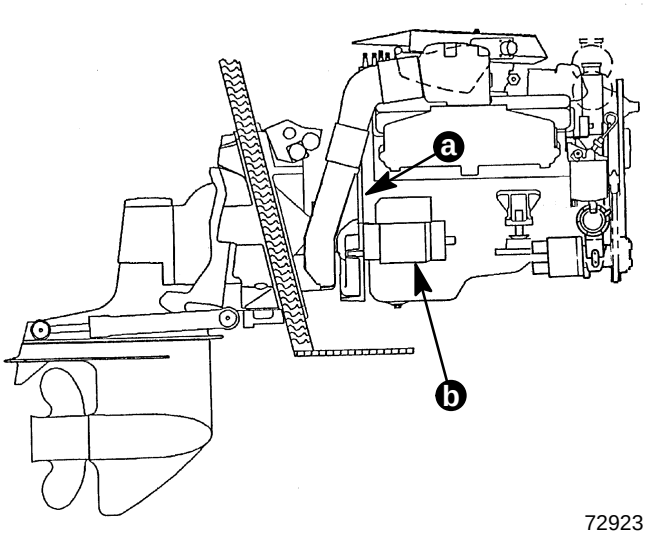
Standard Left-Hand Rotation

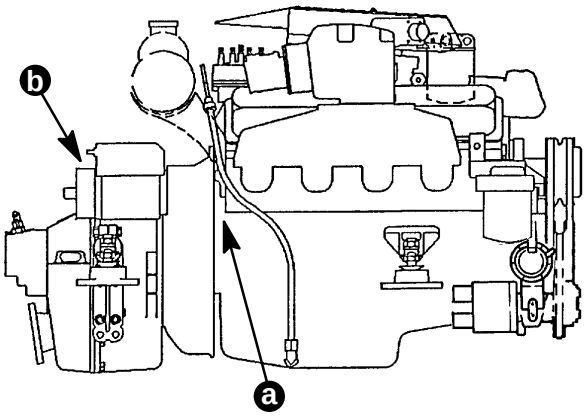
Engine Serial Number Locations



72923

Stern Drive (MCM)

a - Serial Number Plate
b - Starter Motor



72924

Inboard (MIE)

a - Serial Number Plate
b - Starter Motor

Propeller Information

Refer to the “Propeller” section in appropriate MerCruiser Stern Drive Service Manual, or order publication 90-86144-92, “Everything you need to know about propellers.”

Changing diameter, pitch or coupling of a propeller will affect engine RPM and boat performance. The blade configuration also will affect performance. Two like propellers, same pitch and diameter, from two different manufacturers also will perform differently.

It is the responsibility of the boat manufacturer and/or selling dealer to equip the boat with the correct propeller to allow the engine to operate within its specified RPM range at wide-open-throttle (W.O.T.).

Because of the many variables of boat design and operation, only testing will determine the best propeller for the particular application.

To test for correct propeller, operate boat (with an average load onboard) at W.O.T. and check RPM with an accurate tachometer. Engine RPM should be near top of the specified range so that, under heavy load, engine speed will not fall below specifications.

If engine exceeds the specified RPM, an increase in pitch and/or diameter is required.

If engine is below rated RPM, a decrease in pitch and/or diameter is required.

Normally, a change of approximately 150 RPM will be achieved for each single inch of pitch change of a propeller.

⚠CAUTION

If a propeller is installed that does not allow engine RPM to reach the specified full-throttle RPM range, the engine will “labor” and will not produce full power. Operation under this condition will cause excessive fuel consumption, engine overheating and possible piston damage (due to detonation). On the other hand, installation of a propeller, that allows engine to run above the specified RPM limit, will cause excessive wear on internal engine parts which will lead to premature engine failure.

Water Testing New Engines

Use care during the first 20 hours of operation on new MerCruiser engines or possible engine failure may occur. If a new engine has to be water-tested at full throttle before the break-in period is complete, follow this procedure.

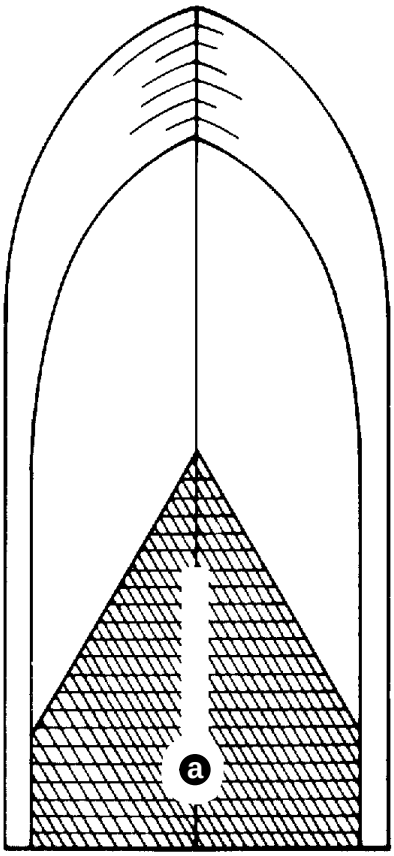
1. Start engine and run at idle RPM until normal operating temperature is reached.
2. Run boat up on plane.
3. Advance engine RPM (in 200 RPM increments) until engine reaches its maximum rated RPM.

IMPORTANT: Do not run at maximum RPM for more than 2 minutes.

Boat and Engine Performance

Boat Bottom

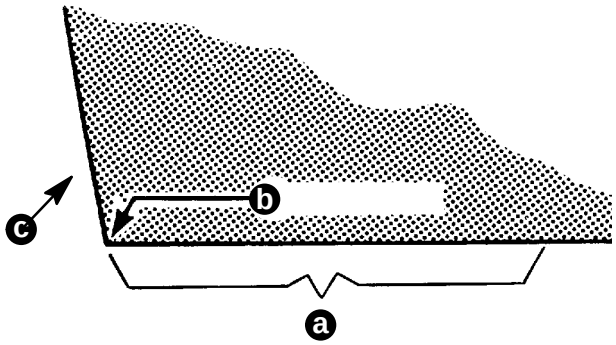
For maximum speed, a boat bottom should be as flat as possible in a fore-aft direction (longitudinally) for approximately the last 5 ft. (1.5 m).



72002

a - Critical Bottom Area

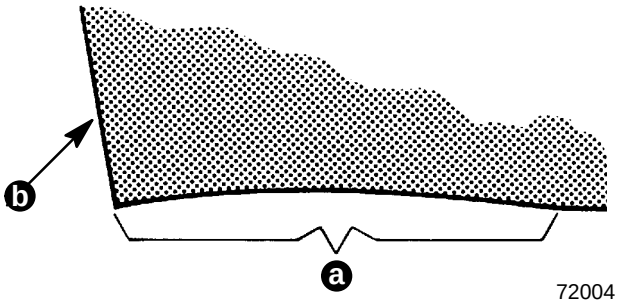
For best speed and minimum spray, the corner between the bottom and the transom should be sharp.



72003

a - Flat
b - Sharp Corner
c - Transom

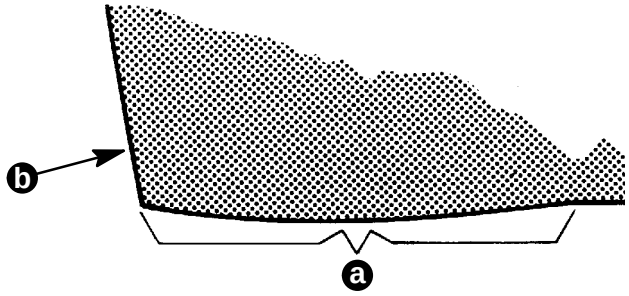
The bottom is referred to as having a “hook” if it is concave in the fore-and-aft direction. A hook causes more lift on the bottom near the transom and forces the bow to drop. This increases wetted surface and reduces boat speed. A hook, however, aids in planing and reduces any porpoising (rhythmical bouncing) tendency. A slight hook is often built in by the manufacturer. A hook also can be caused by incorrect trailering or storing the boat with support directly under the transom.



72004

a - Hook
b - Transom

A “rocker” is the reverse of a hook. The bottom is convex or bulged in the fore-and-aft direction. It can cause the boat to porpoise.



72005

a - Rocker
b - Transom

Any hook, rocker or surface roughness on the bottom, particularly in the all-important center-aft portion will have a negative effect on speed, often several miles per hour on a fast boat.

Marine Fouling

Fouling is an unwanted build-up (usually animal-vegetable-derived) occurring on the boat’s bottom and drive unit. Fouling adds up to drag, which reduces boat performance. In fresh water, fouling results from dirt, vegetable matter, algae or slime, chemicals, minerals and other pollutants. In salt water, barnacles, moss and other marine growth often produce dramatic build-up of material quickly. Therefore, it is important to keep the hull as clean as possible in all water conditions to maximize boat performance.

Antifouling paint, if required, may be applied to boat hull observing the following precautions.

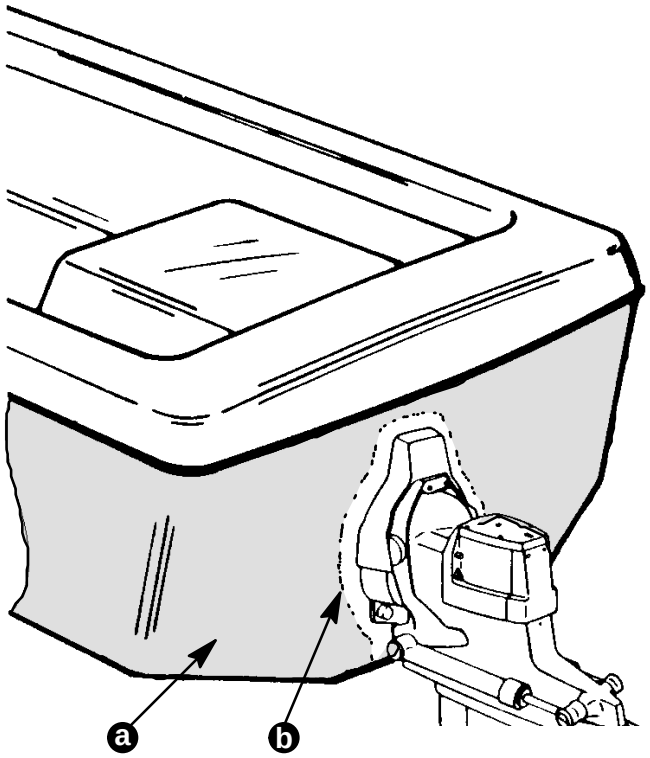
IMPORTANT: DO NOT paint anodes or MerCathode System reference electrode and anode, as this will render them ineffective as galvanic corrosion inhibitors.

⚠CAUTION

Avoid corrosion damage. Do not apply antifouling paint to MerCruiser drive unit or transom assembly.

IMPORTANT: If antifouling protection is required, Tri-Butyl-Tin-Adipate (TBTA) base antifouling paints are recommended on MerCruiser boating applications. In areas where Tri-Butyl-Tin-Adipate base paints are prohibited by law, copper base paints can be used on boat hull and boat transom. Corrosion damage that results from the improper application of antifouling paint will not be covered by the limited warranty. Observe the following:

Avoid an electrical interconnection between the MerCruiser Product, Anodic Blocks, or MerCathode System and the paint by allowing a minimum of 1 in. (26mm) UNPAINTED area on transom of the boat around these items.



71176

a - Antifouling Paint
b - MINIMUM 1 Inch (26 mm) UNPAINTED Area

Weight Distribution

Weight distribution is extremely important; it affects a boat’s running angle or attitude. For best top speed, all movable weight - cargo and passengers - should be as far aft as possible to allow the bow to come up to a more efficient angle (3 to 5 degrees). On the negative side of this approach is the problem that, as weight is moved aft, some boats will begin an unacceptable porpoise.

Secondly, as weight is moved aft, getting on plane becomes more difficult.

Finally, the ride in choppy water becomes more uncomfortable as the weight goes aft. With these factors in mind, each boater should seek out what weight locations best suit his/her needs.

Weight and passenger loading placed well forward increases the “wetted area” of the boat bottom and, in some cases, virtually destroys the good performance and handling characteristics of the boat. Operation in this configuration can produce an extremely wet ride, from wind-blown spray, and could even be unsafe in certain weather conditions or where bow steering may occur.

Weight distribution is not confined strictly to fore and aft locations, but also applies to lateral weight distribution. Uneven weight concentration to port or starboard of the longitudinal centerline can produce a severe listing attitude that can adversely affect the boat’s performance, handling ability and riding comfort. In extreme rough water conditions, the safety of the boat and passengers may be in jeopardy.

Water in Boat

When a boat loses performance, check bilge for water. Water can add considerable weight to the boat, thereby decreasing the performance and handling.

Make certain that all drain passages are open for complete draining.

Elevation and Climate

Elevation has a very noticeable effect on the wide-open- throttle power of an engine. Since air (containing oxygen) gets thinner as elevation increases, the engine begins to starve for air. Humidity, barometric pressure and temperature do have a noticeable effect on the density of air. Heat and humidity thin the air. This phenomenon can become particularly annoying when an engine is propped out on a cool dry day in spring and later, on a hot, sultry day in August, doesn’t have its old zip.

Although some performance can be regained by dropping to a lower pitch propeller, the basic problem still exists. The propeller is too large in diameter for the reduced power output. The experienced marine dealer or a Quicksilver Propeller Repair Station can determine how much diameter to remove from a lower-pitch propeller for specific high-elevation locations. In some cases, a gear-ratio change to the drive unit to more reduction is possible and very beneficial. It is a known fact that weather conditions exert a profound effect on power output of internal combustion engines. Therefore, established horsepower ratings refer to the power that the engine will produce at its rated RPM under a specific combination of weather conditions.

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REMOVAL AND INSTALLATION

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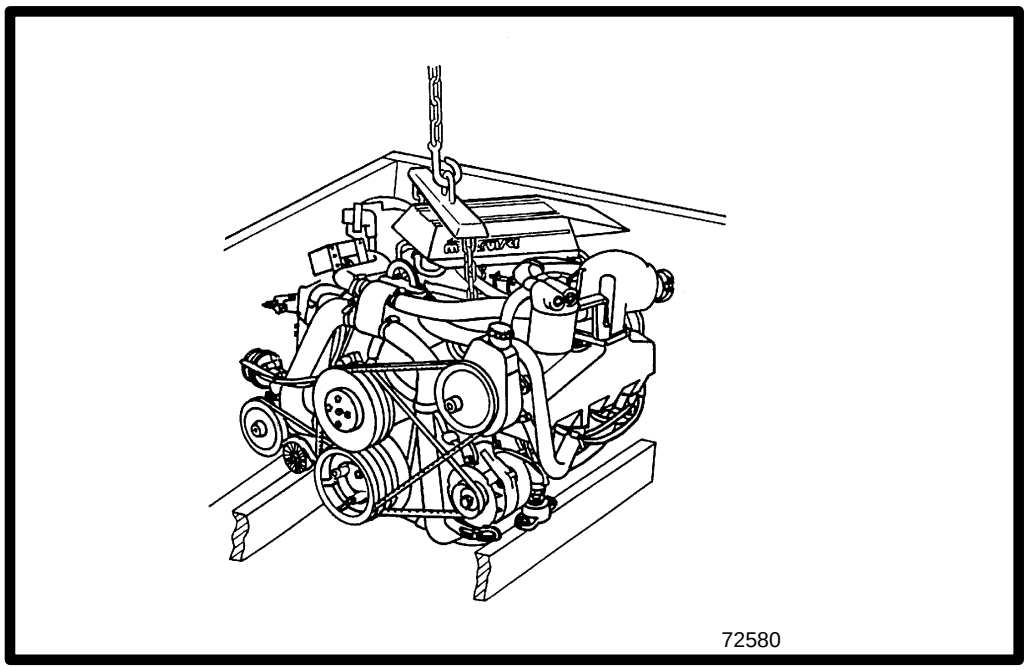
A



MCM MODELS - BRAVO AND BLACKHAWK DRIVES

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Torque Specifications

FASTENER LOCATION		Lb. In.	Lb. Ft.	N·m
Drive Unit Shift Cable	Cable Barrel	Spread Cotter Key		
	Cable End Guide	See Note		
Hose Clamps		Securely		
Rear Engine Mounts			35-40	47-54
Power Steering Fluid Hose Fitting				
Earlier Style Large			23	31
Small		100		11
Later Style			23	31
Rear Engine Mounts			35-40	47-54
Remote Control Shift Cables	Cable Barrel	Securely		
	Cable End Guide	See Note		
Remote Control Throttle Cable	Cable Barrel	Securely		
	Cable End Guide	See Note		

Note: Tighten, then back nut off one half turn.

Tools/Lubricants/Adhesives/Sealants

DESCRIPTION	PART NUMBER
Engine Alignment Tool	91-805475A1
Engine Coupler Spline Grease	91-816391A4
Liquid Neoprene	92-27511-2
Loctite Pipe Sealant With Teflon	Obtain Locally

Removal

IMPORTANT: Stern drive unit must be removed prior to engine removal. Refer to Stern Drive Service Manual.

Engine Removal

1. Disconnect battery cables from battery.
2. Remove instrument harness connector plug from engine harness receptacle after loosening clamp.

⚠WARNING

Be careful when working on fuel system. Gasoline is extremely flammable and highly explosive under certain conditions. Do not smoke or allow spark or open flame in area. Wipe up any spilled fuel immediately.

3. Using wrench to stabilize brass filter nut at fuel inlet, loosen fuel line fitting, disconnect and suitably plug fuel line to prevent fuel in tank from leaking into bilge.
4. Disconnect throttle cable from carburetor, or throttle body on Fuel Injection models, and retain locknuts and hardware.
5. Disconnect bullet connectors of trim sender wires (coming from transom assembly) from engine harness.

NOTE: *After wires are disconnected be sure to loosen them from clamps or sta-straps retaining them to engine or hoses.*

6. Disconnect MerCathode wires from MerCathode controller if mounted on engine (some models).
7. Disconnect seawater inlet hose from gimbal housing.
8. Disconnect exhaust elbow hoses (bellows).
9. Remove both shift cables from shift plate. Retain locknuts and hardware.
10. Disconnect any grounding wires and accessories that are connected to engine.
11. Disconnect (and suitably plug) fluid hoses from power steering control valve on transom.

⚠CAUTION

Center lifting eye (located on top of thermostat housing) is used for engine alignment only. DO NOT use to lift entire engine.

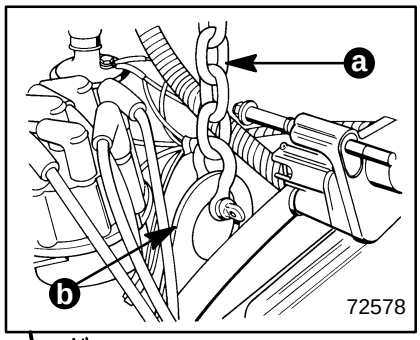
⚠CAUTION

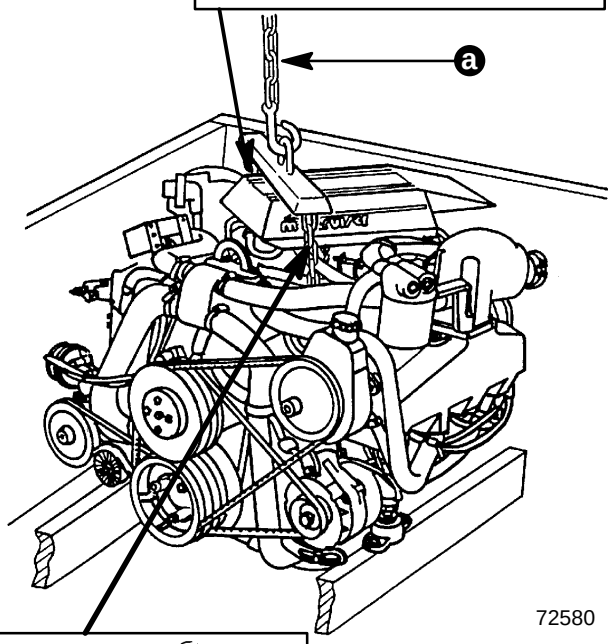
DO NOT allow lifting sling to hook or compress engine components or damage will occur.

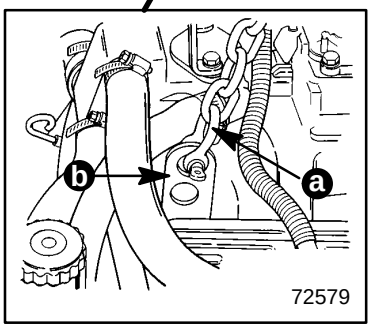
⚠CAUTION

Multi-Port engines MUST be lifted with a lifting arm or damage to engine components will occur.

12. Support engine with suitable sling through lifting eyes on engine and remove front and rear engine mounting bolts. Retain hardware.







a - Suitable Sling
b - Engine Lifting Eyes

13. Carefully remove engine. DO NOT hit power steering control valve.

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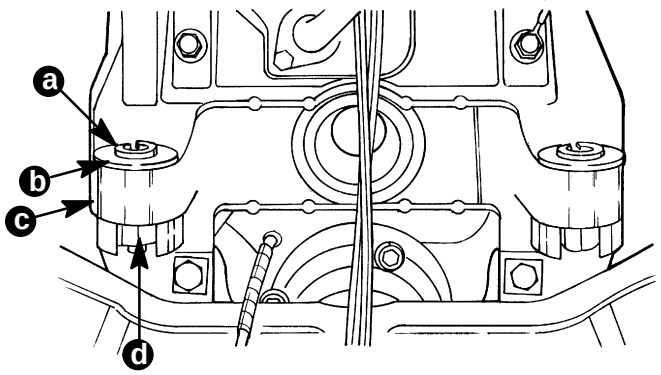
Installation

Engine Installation/Alignment

1. Follow instructions “a”- “e”:
   a. Be certain fiber washers (cemented in place) on inner transom plate are present. Inspect fiber washers. Replace if worn or damaged.
   b. Install double wound lockwashers onto inner transom plate inside fiber washer.
   c. Be certain rear engine mount locknuts are in position as shown.
   d. Lubricate exhaust bellows with soap and water to ease installation.
   e. Lubricate engine coupler splines with Quicksilver Engine Coupler Spline Grease.



72023

a - Double Wound Lockwasher
b - Fiber Wound Lockwasher (Cemented In Place)
c - Inner Transom Plate Mount (Engine Support)
d - Locknuts (Engine Mounting Bolts)

⚠CAUTION

Center lifting eye (located on top of thermostat housing) is used for engine alignment only. DO NOT use to lift entire engine.

⚠CAUTION

DO NOT allow lifting sling to hook or compress engine components or damage will occur.

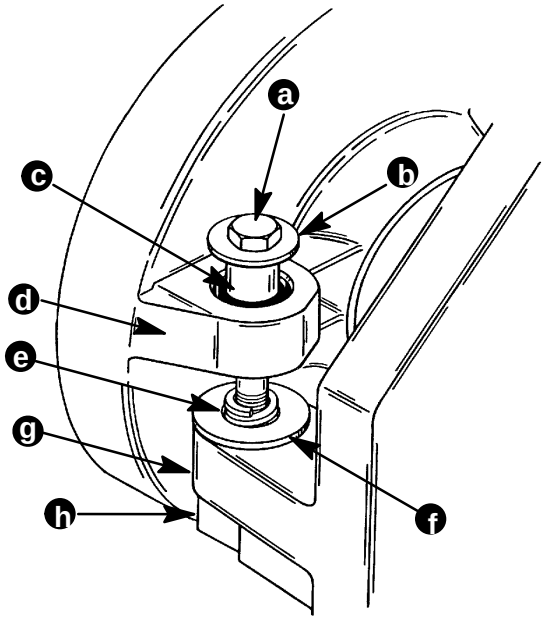
⚠CAUTION

Fuel Injection engines MUST be lifted with a lifting arm or damage to engine components will occur.

2. Attach a suitable sling to lifting eyes on engine and adjust so that engine is level when suspended. **(Refer to “Removal” section for location of lifting eyes.)**
3. Lift engine into position (in boat), using an overhead hoist.
4. Align rear engine mounts with inner transom plate mounts while simultaneously aligning exhaust tubes with exhaust pipe hoses (bellows).

IMPORTANT: Engine attaching hardware must be installed in sequence shown.

5. Install both rear engine mounting bolts and hardware as shown. Torque to 35-40 lb. ft. (47-54 N·m).



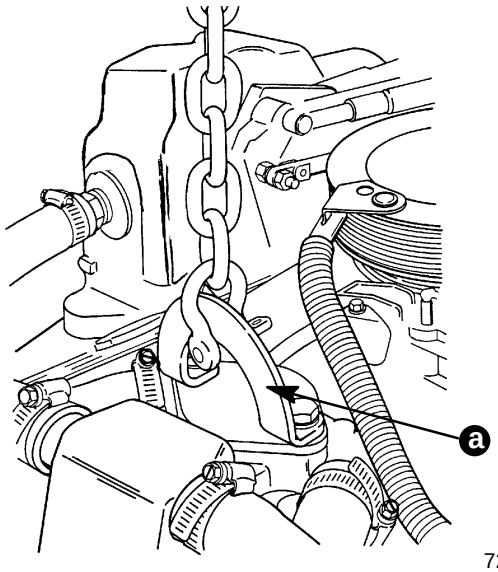
72535

a - Bolt, Rear Engine Mounting
b - Washer, Large Steel
c - Metal Spacer
d - Rear Engine Mount
e - Double Wound Lockwasher
f - Fiber Washer
g - Inner Transom Plate Mounts
h - Locknut (Hidden In This View)

⚠CAUTION

When lowering engine into position DO NOT set engine on shift cable. Shift cable outer casing can be crushed causing difficult or improper shifting.

6. Set engine down on stringers and relieve hoist tension. Disconnect sling from engine lifting eyes and switch sling to center lifting eye.



72024

a - Center Lifting Eye

⚠CAUTION

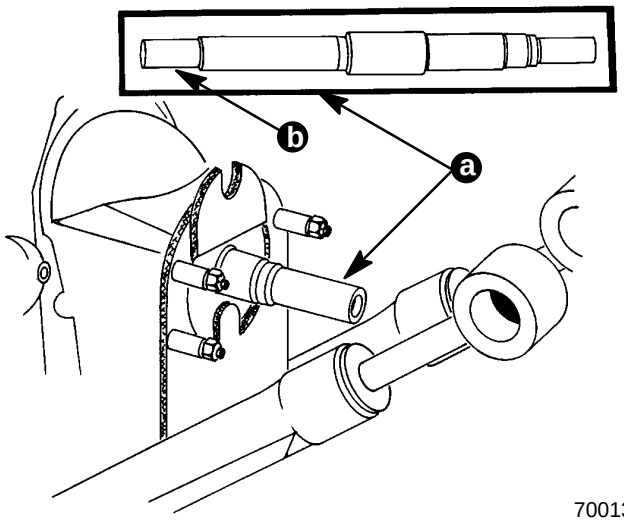
DO NOT use an alignment tool from another manufacturer. Alignment tools other than Quicksilver Alignment Tool 91-805475A1, may cause improper alignment and damage to gimbal bearing and/or engine coupler.

⚠CAUTION

To avoid damage to gimbal bearing, engine coupler, or alignment tool:

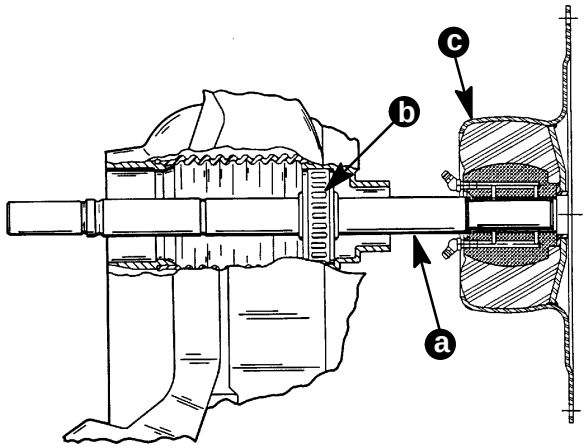
- **DO NOT attempt to force alignment tool!**
- **DO NOT raise or lower engine with alignment tool inserted (or partially inserted) in gimbal bearing or engine coupler.**

7. Align engine as follows:
   a. Attempt to insert solid end of Quicksilver Alignment Tool through gimbal bearing and into engine coupler splines. If it will not insert easily proceed to following.
   b. If the tool does not fit, remove it and carefully raise or lower the from end of the engine, as necessary, and attempt to insert the alignment tool.
   c. Repeat step “b” until the alignment tool installs easily **(SLIDES IN AND OUT FREELY WITH TWO FINGERS**) all the way into and out of engine coupler splines.



70013

a - Alignment Tool (Use Only Quicksilver Alignment Tool (91-805475A1)
b - Insert This End of Alignment Tool through Gimbal Housing Assembly



27647

a - Alignment Tool
b - Gimbal Bearing
c - Engine Coupler

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IMPORTANT: Turn both front engine mount adjustment nuts an equal amount in direction required to align engine.

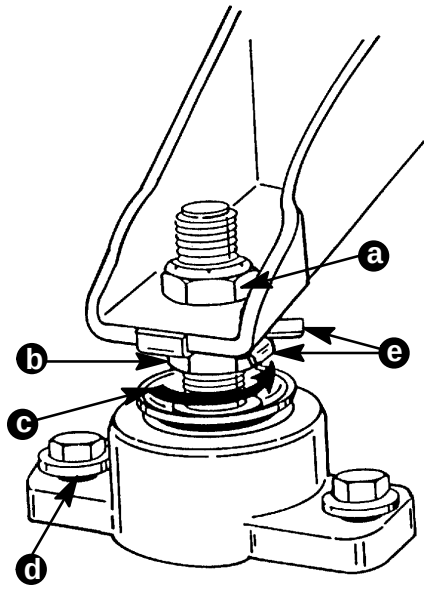
d. Adjust front engine mounts until they rest on boat stringers.

e. Relieve hoist tension entirely and fasten both front mounts to boat stringer using appropriate hardware (lag bolts or thru-bolts, etc.).

f. Recheck alignment with alignment tool. Tool must enter coupler splines freely. If not, readjust front mounts.

g. When alignment is correct, tighten locknut or nut with lockwasher on each mount securely.

h. Bend tab washer down against flat on adjusting nut.



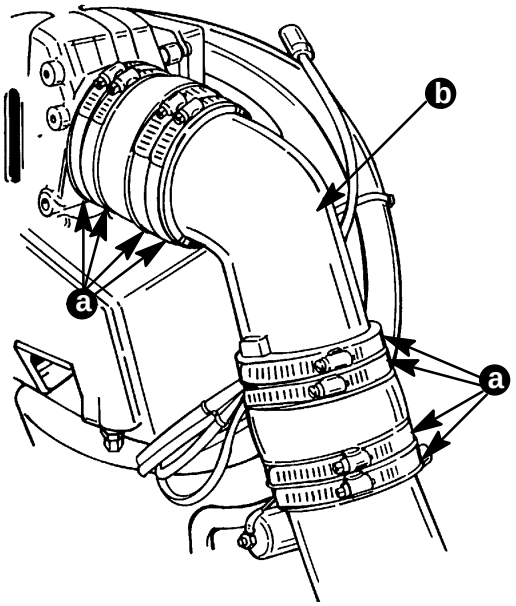
72922

a - Locknut
b - Adjustment Nut
c - Turn Adjustment Nut In This Direction (Counterclockwise) To Raise Front Of Engine
d - Slotted Hole To Front Of Engine
e - Tab Washer

i. Remove alignment tool if not already removed.

8. Tighten all exhaust system hose clamps securely as follows (use two hose clamps on each connection):

a. **On Engines with Thru-Prop Exhaust:**



72537

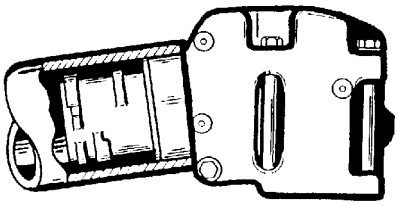
a - Hose Clamps - Tighten Securely
b - Exhaust Tube - Long Tube, Port Side - Short Tube, Starboard Side

b. **On Engines with Thru-Transom Exhaust:**

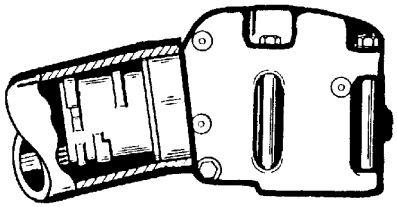
NOTICE (THRU-TRANSOM EXHAUST)

Exhaust hoses must be connected to exhaust elbows so that they do not restrict the flow of discharge water from exhaust elbow. If hoses are connected incorrectly, discharge water from exhaust elbow will not flow around entire inside diameter of hose. This will cause a hot spot in the hose which may eventually burn through.

CORRECT



INCORRECT



72538

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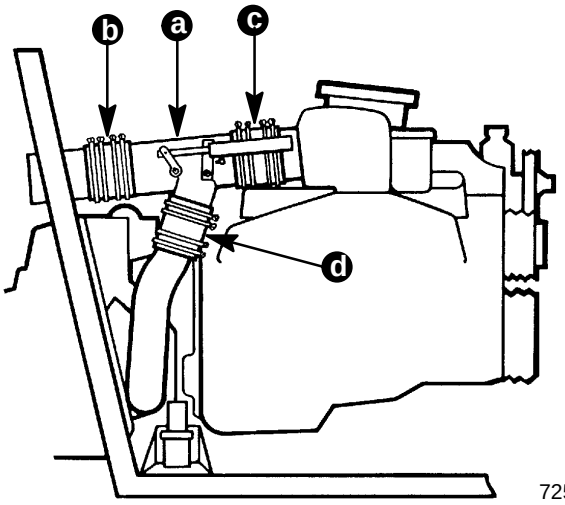
c. **On Engines with Silent Choice Exhaust System:**



72539

a - Silencer Valve
b - Exhaust Hose and Clamps For Thru Transom
c - Exhaust Hose and Clamps For Intermediate Exhaust Pipe
d - Exhaust Hose and Clamps For Exhaust Pipe

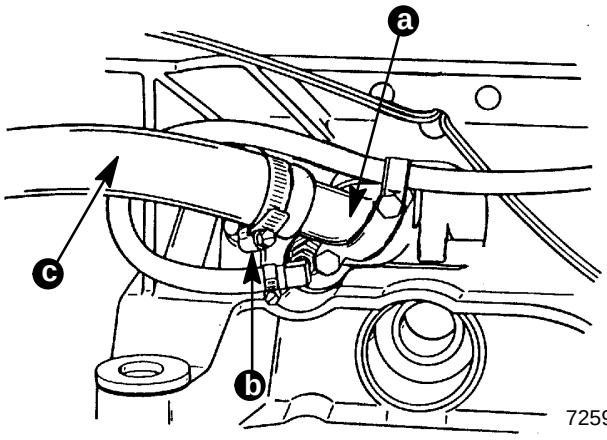
9. Proceed to “Engine Connections” section instructions following.

Engine Connections

IMPORTANT: When routing all wire harnesses and hoses, be sure they are routed and secured to avoid coming in contact with hot spots on engine and avoid contact with moving parts.

1. Connect seawater hose to water tube at gimbal housing with hose clamp. Tighten clamp securely.

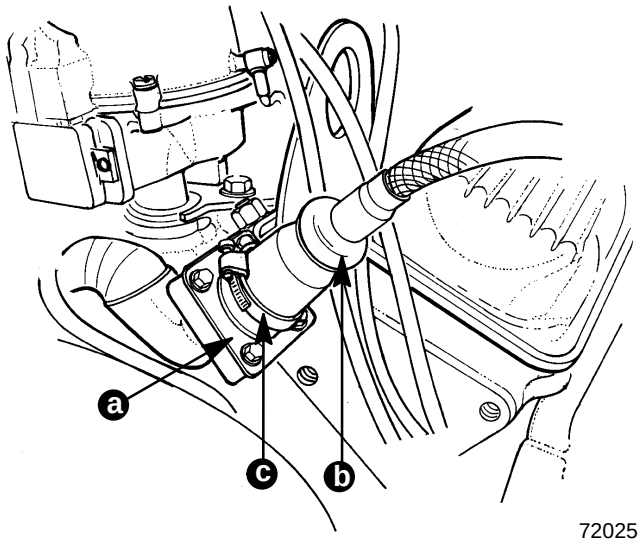
NOTE: *In the following view the engine is not in position, for visual clarity in this step.*



72590

a - Water Inlet Tube
b - Hose Clamp (Tighten Securely)
c - Seawater Inlet

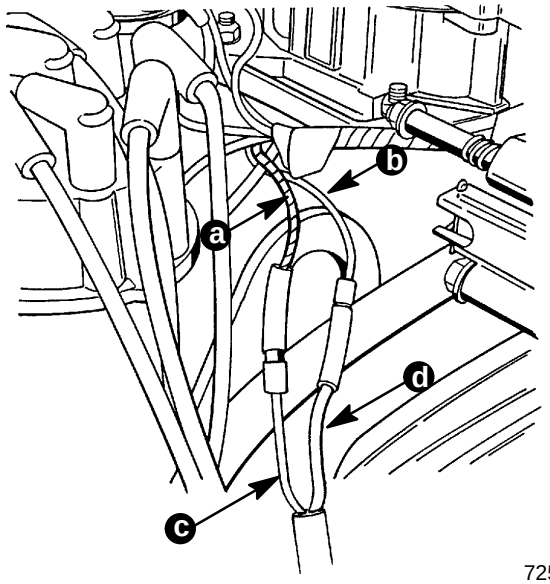
2. Connect instrument harness to engine harness with hose clamp. Tighten clamp securely.



72025

a - Engine Wiring Harness Receptacle Bracket
b - Instrumentation Wiring Harness Plug
c - Hose Clamp - Tighten Securely

3. Connect trim position sender leads from gimbal housing to leads from engine harness.



72582

a - BROWN/WHITE (From Engine Harness)
b - BLACK (From Engine Harness)
c - BLACK (From Transom)
d - BLACK (From Transom Assembly)

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⚠ WARNING

Be careful when working on fuel system. Gasoline is extremely flammable and highly explosive under certain conditions. Do not smoke or allow spark or open flame in area. Wipe up any spilled fuel immediately.

FUEL SUPPLY CONNECTIONS

⚠ WARNING

Avoid gasoline fire or explosion. Improper installation of brass fittings or plugs into fuel pump or fuel filter base can crack casting and/or cause a fuel leak.

- **Apply #592 Loctite Pipe Sealant with Teflon to threads of brass fitting or plug. DO NOT USE TEFLON TAPE.**
- **Thread brass fitting or plug into fuel pump or fuel filter base until finger tight.**
- **Tighten fitting or plug an additional 1-3/4 to 2-1/4 turns using a wrench. DO NOT OVER-TIGHTEN.**
- **Install fuel line. To prevent over-tightening, hold brass fitting with suitable wrench and tighten fuel line connectors securely.**
- **Check for fuel leaks.**

4. Connect fuel line from fuel tank(s) to engine. Make certain connections are secure. Check for leaks.
5. Connect throttle cable using hardware retained and adjust following instructions “a” or “b”:

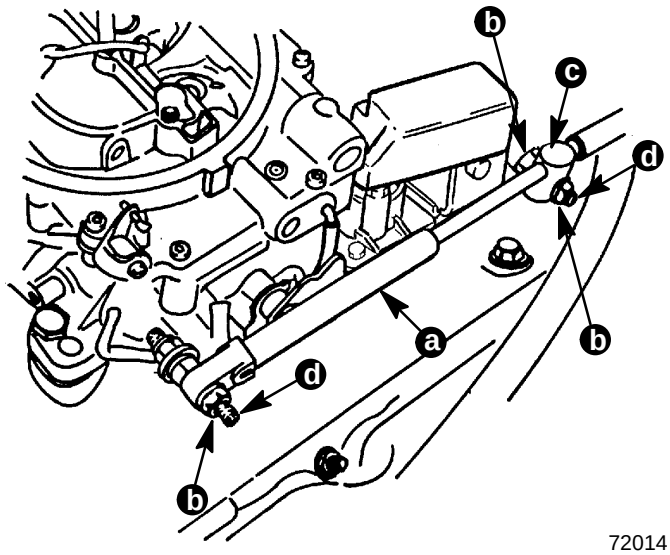
Throttle Connections

WEBER 4 BARREL CARBURETOR

1. Place remote control handle(s) in neutral, idle position.

IMPORTANT: Be sure that cable is routed in such a way as to avoid sharp bends and/or contact with moving parts. DO NOT fasten any items to throttle cable. Outer cable must be free to move when cable is actuated.

2. Install cable end guide on throttle lever, then push cable barrel lightly toward throttle lever end. (This will place a slight preload on cable to avoid slack in cable when moving remote control lever.) Adjust barrel on throttle cable to align with anchor stud.
3. Secure throttle cable with hardware (retained) as shown. Tighten cable end guide nut until it bottoms out and then back off one full turn. Tighten cable barrel securely. DO NOT OVER-TIGHTEN, as cable must pivot freely.

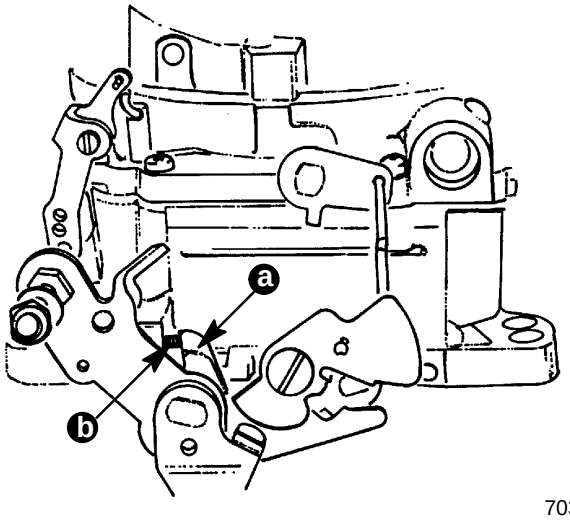


72014

a - Cable End Guide
b - Attaching Hardware (DO NOT Over-Tighten)
c - Cable Barrel
d - Anchor Studs

4. Place remote control throttle lever in the wide-open-throttle (W.O.T.) position. Check to ensure that throttle shutters (valves) are completely open and throttle shaft lever contacts carburetor body casting.

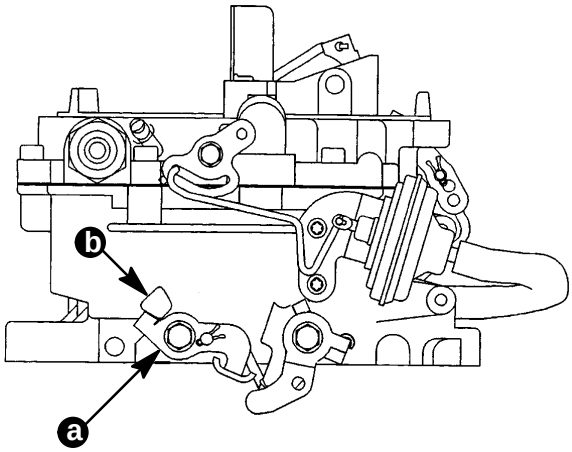
5. Return remote control throttle lever to idle position and check to ensure that throttle lever contacts idle speed adjustment screw.



70392

Idle Position

a - Throttle Lever Contacts (b) In idle Position
b - Idle Speed Adjustment Screw



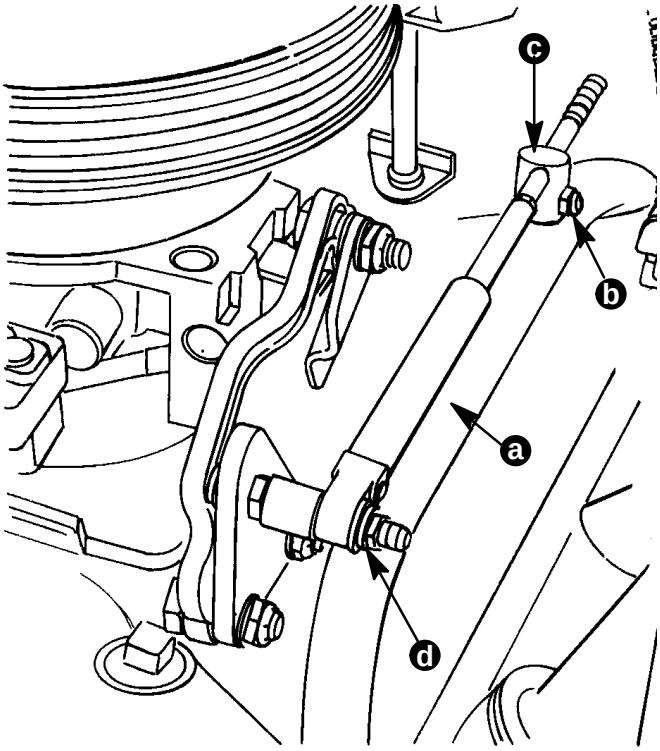
71159

Wide-Open-Throttle Position

a - Throttle Shaft Lever Contacts (b) At W.O.T. Position
b - Carburetor Body Casting

THROTTLE BODY INJECTION

1. Install cable end guide on throttle lever, then push cable barrel end lightly toward throttle lever end. (This will place a slight preload on shift cable to avoid slack in cable when moving remote control lever). Adjust barrel on throttle cable to align with hole in anchor plate.
2. Secure throttle cable with hardware as shown and tighten securely.
3. Place remote control throttle level in the wide open throttle (W.O.T.) position. Check to ensure that throttle plates are completely open.
4. Return remote control throttle lever to idle position.



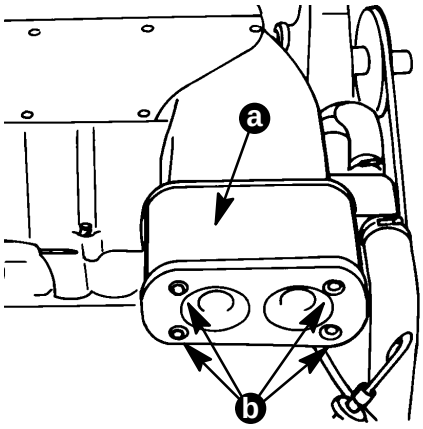
a - Cable End Guide
b - Flat Washer and Locknut - Tighten Until Bottoms Out, Then Back Off One Half Turn
c - Cable Barrel
d - Flat Washer and Locknut

MULTI-PORT INJECTION

1. Place remote control handle(s) in neutral idle position.

IMPORTANT: Be sure that cable is routed in such a way to avoid sharp bends and/or contact with moving parts. DO NOT fasten any items to throttle cable. Outer cable must be free to move when cable is actuated.

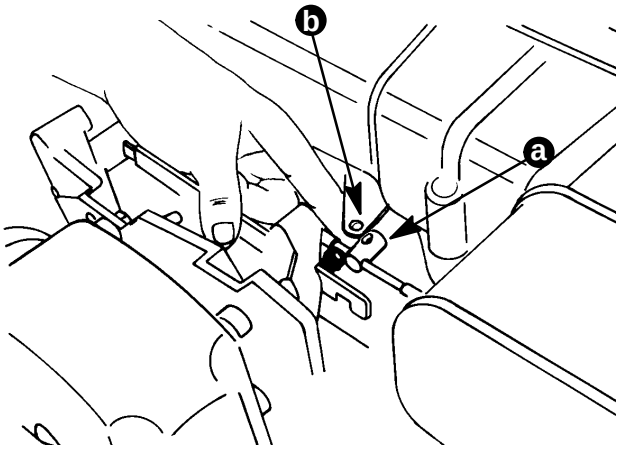
2. Remove flame arrestor.



71481

a - Flame Arrestor (Earlier Style)
b - Locknuts

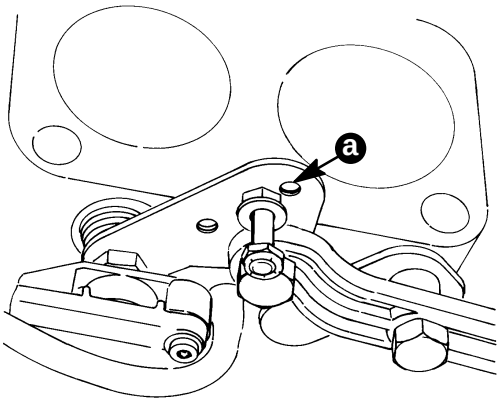
3. Install cable end guide on throttle lever, then push cable barrel end lightly toward throttle lever end. (This will place a slight preload on shift cable to avoid slack in cable when moving remote control lever). Adjust barrel on throttle cable to align with hole in anchor plate. Ensure hole in barrel positions cable as shown.



71711

a - Cable Barrel
b - Anchor Plate

NOTE: *If Boat is equipped with Quicksilver Zero Effort Controls, the throttle cable mounting stud must be most forward position on throttle lever.*

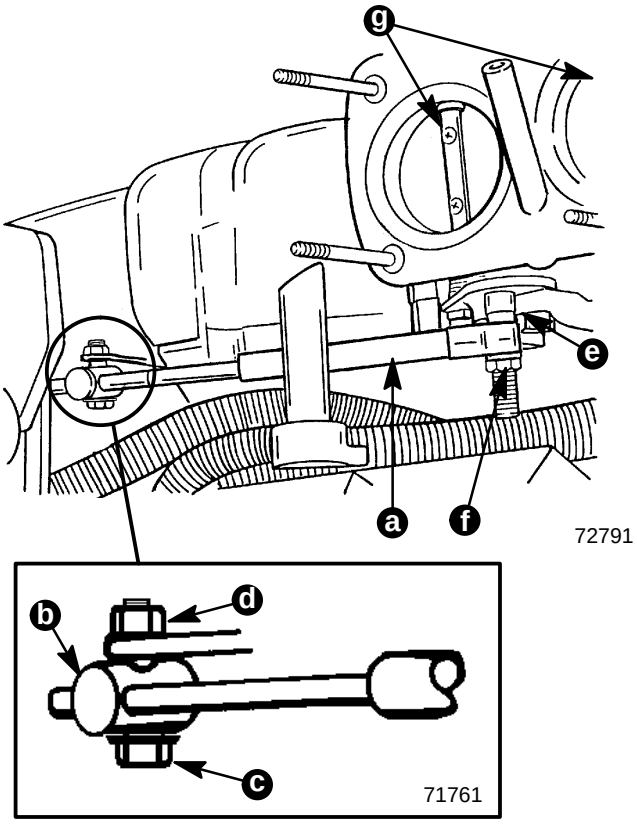


73855

a - Position For Zero Effort Controls

4. Secure throttle cable with hardware as shown and tighten securely.
5. Place remote control throttle level in the wide open throttle (W.O.T.) position. Check to ensure that throttle plates are completely open.

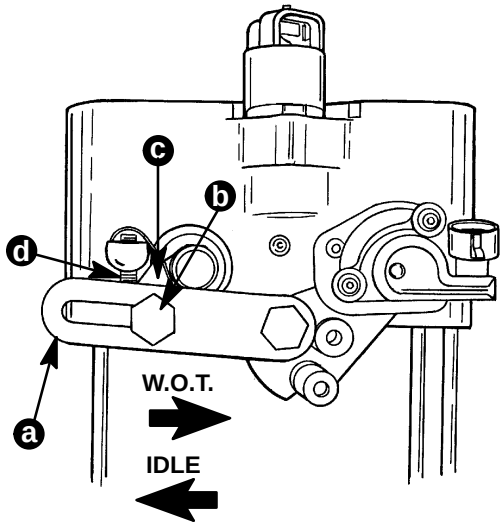
6. Return remote control throttle lever to idle position and check to ensure that throttle plates are completely closed.



72791

71761

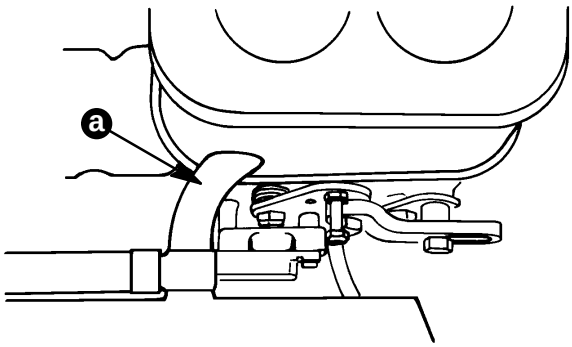
a - Cable End Guide
b - Cable Barrel
c - Bolt
d - Locknut
e - Throttle Lever
f - Flat Washer and Lockwasher
g - Throttle Plates



72794

a - Throttle Lever
b - Positive Stop Screw
c - Throttle Stop Lever
d - Throttle Stop Screw

7. Reinstall flame arrestor and tighten locknuts securely. Position crankcase vent hose against flame arrestor as shown.

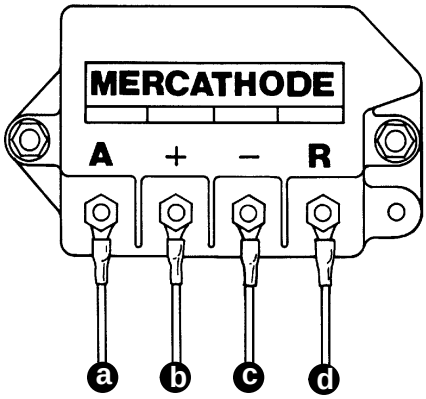


71764

a - Crankcase Vent Hose

IMPORTANT: Do not attach any accessory ground (–) wires to transom plate ground point. Accessory ground wires should only be attached to ground stud on engine.

8. Connect any grounding wires or accessories that may have been disconnected.
9. **Models with MerCathode:** Connect wires to MerCathode controller assembly as shown. Apply a thin coat of Quicksilver Liquid Neoprene to all connections.



22232

a - ORANGE Wire - From Electrode On Transom Assembly
b - RED/PURPLE Wire - Connect (Other End) to Positive (+) Battery Terminal
c - BLACK Wire - From Engine Harness
d - BROWN Wire - From Electrode on Transom Assembly

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IMPORTANT: Adjust shift cables as outlined in appropriate Stern Drive Service Manual.

10. Refer to appropriate Stern Drive Service Manual and install and adjust drive unit and remote control shift cables, using hardware retained.

IMPORTANT: After fluid hose installation in the following, bleed power steering system as outlined in SECTION 1B - "Maintenance" of this manual, or refer to the appropriate Stern Drive Service Manual.

⚠ CAUTION

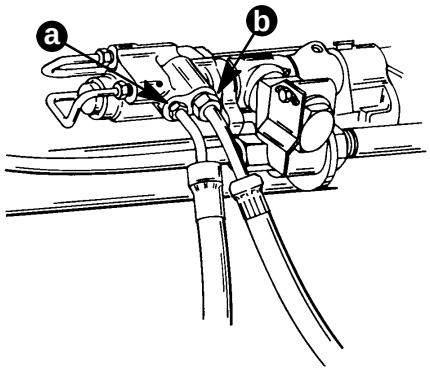
Route hoses exactly as shown below. This will help avoid stress on the hose fittings and will help avoid kinks in the hose.

IMPORTANT: Make hydraulic connections as quickly as possible to prevent fluid leakage.

IMPORTANT: Be careful not to cross-thread or over- tighten fittings.

11. Connect both hydraulic hose fittings.

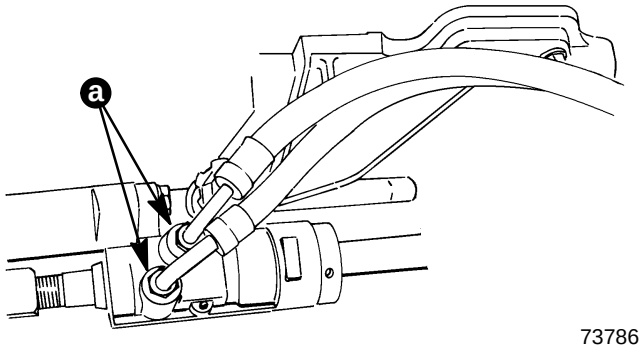
    a. **Earlier Style Control Valves:** Torque the large fitting to 23 lb. ft. (31 N·m). Torque the small fitting to 100 lb. in. (11 N·m).



22023

a - Small Fitting
b - Large Fitting

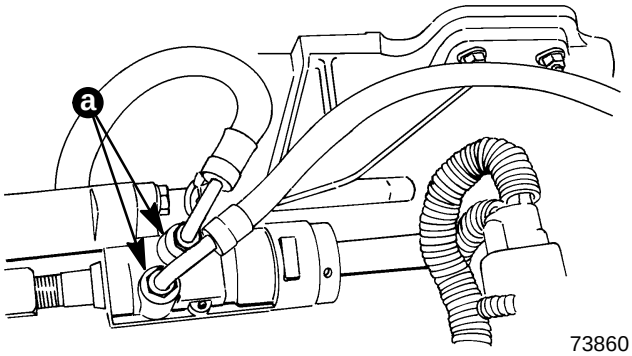
    b. **Later Style Control Valve:** Torque both fittings to 23 lb. ft. (31 N·m). Route hoses as shown for each model.



73786

All Models Except 502 EFI

a - Hose Fittings



73860

502 EFI with Oil Cooler Return Lines on the Starboard Side of the Cooler

a - Hose Fittings

12. Connect battery cables to battery by FIRST connecting positive (+) battery cable (usually RED) to positive (+) battery terminal. Tighten clamp securely. Then, connect negative (–) battery cable (usually BLACK) to negative (–) battery terminal. Tighten clamp securely.

NOTE: *Spray terminals with a battery connection sealant to help retard corrosion.*

THIS PAGE IS INTENTIONALLY BLANK TO ALLOW FOR CORRECTIONS OR ADDITIONS AT A LATER DATE