MARINER OUTBOARDS

MERCURY OUTBOARDS

SERVICE MANUAL

MODELS
75 • 75 MARATHON • 75 SEA PRO
90 • 100 • 115 • 125 • 65/80 JET

With Serial Numbers

United States . . . 0D283222 and Above
Belgium . . . . 09793577 and Above

Printed in U.S.A.

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90-830234R3 DECEMBER 1997

Notice

Throughout this publication, “Dangers”, “Warnings” and “Cautions” (accompanied by the International HAZARD Symbol ⚠) 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

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, or like or similar products manufactured and marketed by Mercury Marine, that they have been trained in the recommended servicing procedures of these products which includes the use of mechanics’ 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 products 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 the time of publication. As required, revisions to this manual will be sent to all dealers contracted by us to sell and/or service these products.

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

Cleanliness and Care of Outboard Motor

A marine power product is a combination of many machined, honed, polished and lapped surfaces with tolerances that are measured in the ten thousands of an inch./mm. When any product component is serviced, care and cleanliness are important. Throughout this manual, it should be understood that proper cleaning, and protection of machined surfaces and friction areas is a part of the repair procedure. This is considered standard shop practice even if not specifically stated.

Whenever components are removed for service, they should be retained in order. At the time of installation, they should be installed in the same locations and with the same mating surfaces as when removed.

Before raising or removing and outboard engine from a boat, the following precautions should be adhered to:

1. Check that flywheel is secured to end of crankshaft with a locknut and lifting eye is threaded into flywheel a minimum of 5 turns.
2. Connect a hoist of suitable strength to the lifting eye.

In addition, personnel should not work on or under an outboard which is suspended. Outboards should be attached to work stands, or lowered to ground as soon as possible.

We reserve the right to make changes to this manual without prior notification.

Refer to dealer service bulletins for other pertinent information concerning the products described in this manual.

Propeller Information

For in-depth information on marine propellers and boat performance – see your Authorized Dealer for the illustrated "What You Should Know About Quicksilver Propellers... and Boat Performance Information" (90-86144).

How To Use This Manual

The manual is divided into SECTIONS (shown, right) which represents major components and systems.

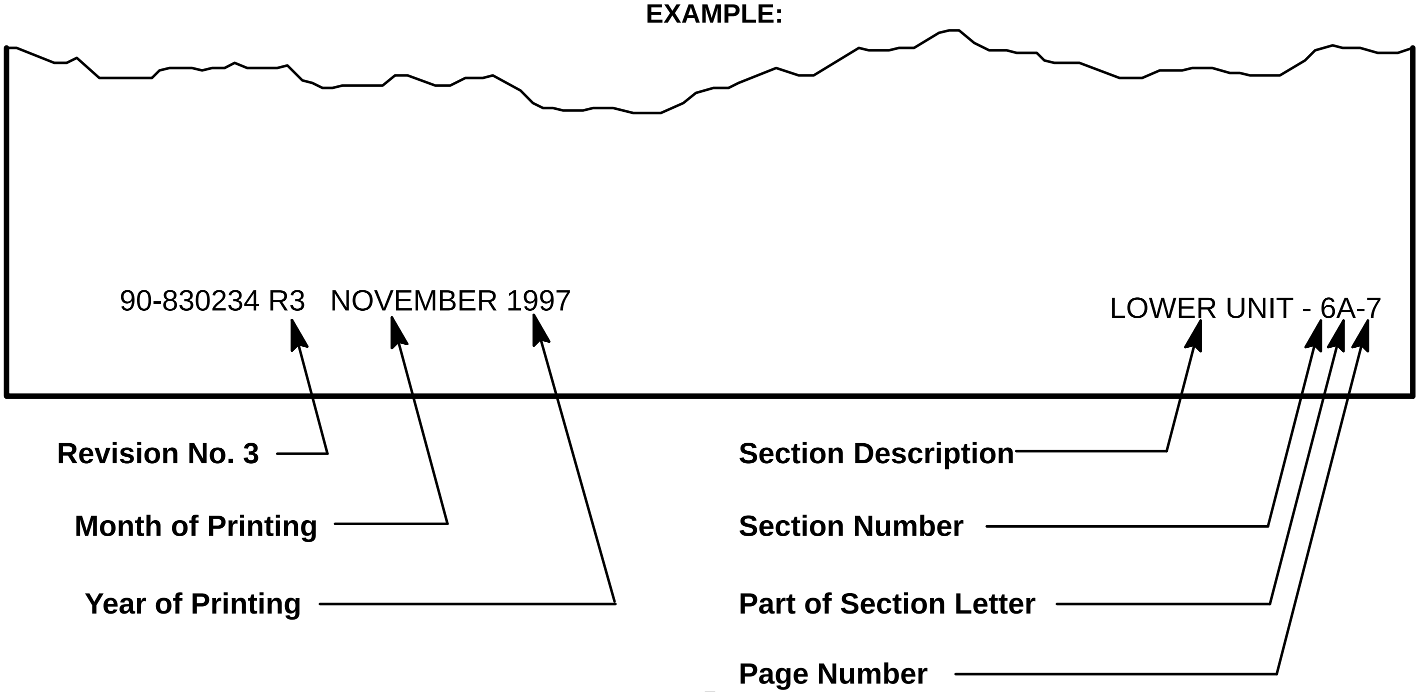
Some SECTIONS are further divided into PARTS. Each PART has a title page. A "Table of Contents" for the particular PART is printed on the back page of the title page.

SECTIONS and PARTS are listed on the "Service Manual Outline" sheet which immediately follows the cover of this book.

Page Numbering

Two number groups appear at the bottom of each page. The example below is self-explanatory.

EXAMPLE:



Service Manual Outline

IMPORTANT INFORMATION

1

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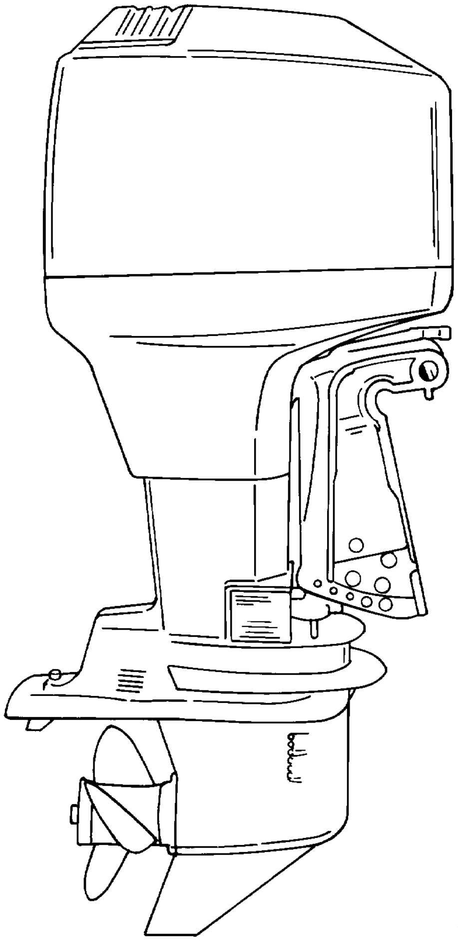

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SPECIFICATIONS

Table of Contents

Master Specifications

Model 65/80 Jet/75/90/100/115/125		
HORSEPOWER (KW)	**Model 75** **Model 65 Jet/90** **Model 100** **Model 80 Jet/115** **Model 125**	75 (55.9) 90 (67.1) 100 (74.6) 115 (85.8) 125 (93.2)
OUTBOARD WEIGHT	**Model 65 Jet** **Model 75/90** **Model 80 Jet** **Model 100/115/125**	315 lbs. (143kg) 305 lbs. (139kg) 357 lbs. (162kg) 348 lbs. (158kg)
CYLINDER BLOCK	**Model 65 Jet/75/90** **Type** **Displacement** **Model 80 Jet/100/115/125** **Type** **Displacement**	 In-line 3 Cylinder, 2 Cycle, Loop Charged 84.6 cu. in. (1387cc) In-Line 4 Cylinder, 2 Cycle, Loop Charged 112.8 cu. in. (1848.8cc)
STROKE	**Length**	2.93 in. (74.42mm)
CYLINDER BORE	**Diameter (Standard)** **Taper/Out of Round Maximum** **Bore Type**	3.50 in. (88.9mm) 0.003 in. (0.076mm) Cast Iron
PISTON	**Piston Type** **Standard** **0.015 in. (0.381mm) Oversize** **0.030 in. (0.762mm) Oversize**	Aluminum 3.495 in. (88.773mm) 3.510 in. (89.154mm) 3.525 in. (89.535mm)
REEDS	**Reed Stand Open (Max.)** **Reed Stop (Max.)**	0.020 in. (0.50mm) Not Adjustable
TEMPERATURE SWITCH	**Temperature Normal** **190°F ± 8° (88°C ± 4°C)** **170°F ± 8° (77°C ± 4°C)**	Open – No Continuity Closed – Continuity Open – No Continuity
GEAR HOUSING	**Model 75/90** **Gear Ratio** **Gearcase Capacity** **Forward Gear - No. of Teeth-Type** **Pinion Gear - No. of Teeth-Type** **Pinion Height** **Forward Gear Backlash** **Water Pressure @ RPM** **Model 100/115/125** **Gear Ratio** **Gearcase Capacity** **Forward Gear - No. of Teeth-Type** **Pinion Gear - No. of Teeth-Type** **Pinion Height** **Forward Gear Backlash** **Water Pressure @ RPM**	 2.3:1 22.5 fl. oz. (655ml) 30 13 0.025 in. (0.64mm) 0.012 in. to 0.019 in. (0.30mm to 0.48mm) 10 to 15 PSI (69 to 103 kPa) @ 5250 RPM 2.07:1 22.5 fl. oz. (655ml) 29 14 0.025 in. (0.64mm) 0.015 in. – 0.022 in. (0.38mm – 0.55mm) 10 – 15 PSI @ 5250 RPM
FUEL SYSTEM	**Fuel** **Recommended Gasoline** **Recommended Oil** **Gasoline/Oil Ratio** **Fuel Pressure – @ Idle** **– @ WOT**	Gasoline and Oil Unleaded 87 Octane Minimum Quicksilver TC-W II or TC-W3 Outboard Oil 50:1 (25:1 Break-In) 3-1/2 PSI 6 PSI

Model 65/80 Jet/75/90/100/115/125		
OIL INJECTION	**Model 65 Jet/75/90** **Oil Tank Capacity/Approx. Time** **Max. Run Time Per Tank @ WOT** **Oil Remaining When Alarm Sounds** **Max. Run Time @ W.O.T. After Alarm Sounds** **Gasoline/Oil Ratio @ Idle** **Gasoline/Oil Ratio @ W.O.T** **Output @ 700 RPM for 15 Minutes with Pump @ Full Open**	 1 gallon (3.78 liters) 6 Hours 1 qt. (.95 liters) 1 Hour Approx. 80:1 50:1 22cc Min.
	Model 80 Jet/100/115/125 **Oil Tank Capacity/Approx. Time** **Max. Run Time Per Tank @ WOT** **Oil Remaining When Alarm Sounds** **Max. Run Time @ W.O.T. After Alarm Sounds** **Gasoline/Oil Ratio @ Idle** **Gasoline/Oil Ratio @ W.O.T** **Output @ 700 RPM for 15 Minutes with Pump @ Full Open**	 1.4 gal. (5.3Liter) 5 hrs. 1 qt. (0.95Liter) 50 min. 80:1 50:1 29cc Minimum
STARTING SYSTEM	**Manual Start - Commercial 75** **Manual Start - All Electric Models** **Electric Start - Model 65 Jet/75/90** **Starter Draw (Under Load)** **Starter Draw (No Load)**	Recoil Starter Emergency Starter Rope 120 Amperes 75 Amperes
	Electric Start - Model 80Jet/100/115/125 **Starter Draw (Under Load)** **Starter Draw (No Load)** **Battery Rating**	 150 Amperes 75 Amperes Min. Reserve Cap. Rating of 100 Min. and CCA of 350 Amperes

Model 65/80 Jet/75/90/100/115/125		
CHARGING SYSTEM	**Alternator Model**	Alternator Output @ 5250 RPM
	3 Cyl. Manual – Black & Red Stator	10 Amperes
	3 Cyl. Electric – Black Stator **Stamped 398-9710A3** **Serial Number** **USA 0D283222 – 0G280043** **Belgium 09793577 – 09879064**	16 Amperes
	3 Cyl. Electric – Black Stator **Stamped 398-9873A24** **Serial Number** **USA 0G280044 – 0G404505** **Belgium 09879065 – 09916672**	14 Amperes
	3 Cyl. Electric – Red Stator **Stamped 398-832075A3** **Serial Number** **USA 0G404506 and Above** **Belgium 09916673 and Above**	16 Amperes
	4 Cyl. Electric – Black Stator **Stamped 398-9710A31** **Serial Number** **USA 0D283222 – 0G301750** **Belgium 09793577 – NA**	16 Amperes
	4 Cyl. Electric – Black Stator **Stamped 398-9710A33** **Serial Number** **USA 0G301751 – 0G404616** **Belgium NA – 09916721**	16 Amperes
	4 Cyl. Electric – Red Stator **Stamped 398-832075A3** **Serial Number** **USA 0G404617 and Above** **Belgium 09916722 and Above**	16 Amperes
IGNITION SYSTEM	**Model 65 Jet/75/90**	
	Type	Capacitor Discharge
	Spark Plug Type (NGK)	NGK BUHW-2
	Spark Plug Gap	Surface Gap
	Optional (Inductor Plug)	NGK BUZHW-2
	Model 80 Jet/100/115/125	
	Type	Capacitor Discharge
	Spark Plug Type	NGK BP8H-N-10
	Spark Plug Gap	0.040 in. (1.0mm)
	Optional (Inductor Plug)	BPZ8H-N-10
CARBURETOR	**Idle RPM**	675 ± 25 RPM
	Wide Open Throttle (WOT) RPM	
	– Model 75/80 Jet/100/115/125	4750 – 5250
	– Model 65 Jet/90	5000 – 5500
	Idle Mixture Screw Adjustment (Preset - Turns Out)	
	Model 75Work/75	1-1/8 ± 1/4 TURN
	Model 65 Jet/90	1-1/4 ± 1/4 TURN
	Model 80 Jet/100/115/125	1 – 1-1/2 TURNS
	Float Setting	9/16 in. (± 0.015 in.) 12.29mm (± 0.38 mm)
	Float Weight	7 Grams (± 0.4 Grams)

Model 65/80 Jet/75/90/100/115/125		
	Main Jet	
	– Model 75	
	WME-29 – Carb #1	.050
	– Carb #2	.052
	– Carb #3	.050
	WME-41/46 – Carb #1	.052
	– Carb #2	.052
	– Carb #3	.052
	WME-59 – Carb #1	.052
	– Carb #2	.054
	– Carb #3	.052
	WME-59 – Carb #3A	.054
	WME-75 – Carb #1	.052
	– Carb #2	.054
	– Carb #3	.054
	WME-77 – Carb #1	.054
	– Carb #2	.054
	– Carb #3	.054
	– Model 75 Work	
	WME-30 – Carb #1	.050
	– Carb #2	.052
	_ Carb #3	.050
	WME-47/48/76	
	– Carb #1	.054
	– Carb #2	.054
	– Carb #3	.054
	WME-60/61 – Carb #1	.054
	– Carb #2	.054
	– Carb #3	.054
	– Model 65 Jet/90	
	WME-31 – Carb #1	.062
	– Carb #2	.064
	– Carb #3	.062
	WME-49/62 – Carb #1	.062
	– Carb #2	.064
	– Carb #3	.062
	WME-62-3A – Carb #3	.064
	WME-78 – Carb #1	.062
	– Carb #2	.064
	– Carb #3	.064

Model 65/80 Jet/75/90/100/115/125		
CARBURETOR	– Model 100	
	WME-32 – Carb #1	.046
	– Carb #2	.048
	– Carb #3	.052
	– Carb #4	.052
	WME-50 – Carb #1	.048
	– Carb #2	.050
	– Carb #3	.048
	– Carb #4	.052
	WME-50-3A – Carb #3	.050
	WME-79 – Carb #1	.048
	– Carb #2	.050
	– Carb #3	.050
	– Carb #4	.052
	Model 115	
	WME-33 – Carb #1	.052
	– Carb #2	.056
	– Carb #3	.056
	– Carb #4	.060
	Model 80Jet/115	
	WME-40 – Carb #1	.066
	– Carb #2	.068
	– Carb #3	.068
	– Carb #4	.070
	WME-40 – Carb #1A	.060
	– Carb #2A	.070
	– Carb #3A	.070
	– Carb #4A	.074
	WME-51 – Carb #1	.062
	– Carb #2	.062
	– Carb #3	.060
	– Carb #4	.064
	WME-51-3A – Carb #3	.062
	WME-80 – Carb #1	.060
	– Carb #2	.064
	– Carb #3	.062
	– Carb #4	.064

Model 65/80 Jet/75/90/100/115/125		
CARBURETOR		.
	Model 125	
	WME-34 – Carb #1	.066
	– Carb #2	.068
	– Carb #3	.070
	– Carb #4	.072
	WME-52 – Carb #1	.070
	– Carb #2	.080
	– Carb #3	.078
	– Carb #4	.082
	WME-52-3A – Carb #3	.080
	WME-81 – Carb #1	.070
	– Carb #2	.080
	– Carb #3	.080
	– Carb #4	.082
	Vent Jet	
	WME-46/47/48/49	.094
	WME-32/33/34/40/50/51/52/59/60/61/62/ 75/76/77/78/79/80/81	None
TIMING	**Idle (All Models 1994/1995/1996/1997)**	
	Model 65 Jet/75/90	2° ATDC – 6° BTDC
	Model 80 Jet/100/115/125	4° ATDC – 2° BTDC
	Maximum BTDC (1994/1995)	
	@ Cranking Speed	
	– Model 75	20° BTDC
	– Model 65/80 Jet/90/100/115/125	22° BTDC
	@ 3000 RPM	
	– Model 75	18° BTDC
	– Model 65/80 Jet/90/100/115/125	20° BTDC
	Maximum BTDC (1996/1997)	
	@ Cranking Speed	
	– Model 75	20° BTDC
	– Model 65/Jet/90	22° BTDC
	– Model 80 Jet/100/115/125	25° BTDC
	@ 3000 RPM	
	– Model 75	18° BTDC
	– Model 65/Jet/90	20° BTDC
	– Model 80 Jet/100/115/125	23° BTDC
	Firing Order	
	1994/1995	
	Model 65 Jet/75/90	1-3-2
	Model 80 Jet/100/115/125	1-3-2-4
	1996/1997/1998	
	Model 65 Jet/75/90	1-2-3
	Model 80 Jet/100/115/125	1-3-2-4

IMPORTANT INFORMATION

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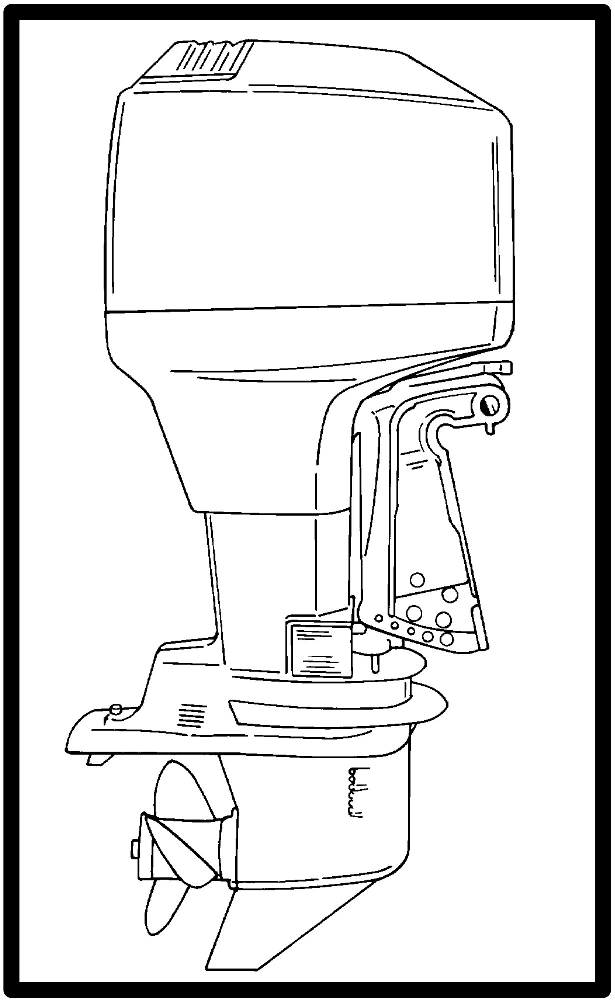

MAINTENANCE

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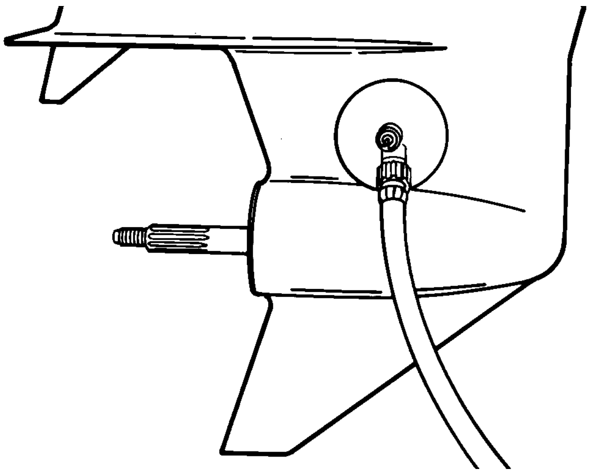
Specifications

Gearcase Lubricant Capacity

Gearcase Ratio	Capacity
2.07:1 2.30:1	22.5 fl. oz. (655ml) 22.5 fl. oz. (655ml)

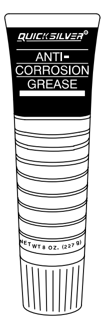
Special Tools

Quicksilver Flushing Attachment (44357A2)

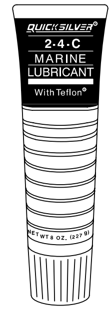


Quicksilver Lubricant/Sealant

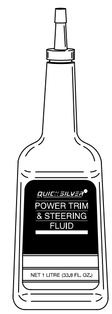
1. Quicksilver Anti-Corrosion Grease P/N 92-78376A6



2. 2-4-C Marine Lubricant with Teflon P/N 92-825407A12

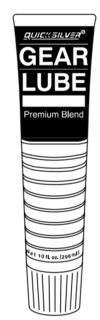


3. Quicksilver Power Trim and Steering Fluid P/N 92-190100A12



4. Quicksilver SAE 30W 4 Cycle Engine Oil (92-97959)

5. Gear Lube-Premium Blend P/N 92-19007A24



Inspection And Maintenance Schedule

To keep your outboard in the best operating condition, it is important that your outboard receive the periodic inspections and maintenance listed in the Inspection and Maintenance Schedule. We urge you to keep it maintained properly to ensure the safety of you and your passengers and retain its dependability.

WARNING

Neglected inspection and maintenance service of your outboard or attempting to perform maintenance or repair on your outboard if you are not familiar with the correct service and safety procedures could cause personal injury, death, or product failure.

Before Each Use

1. Check that lanyard stop switch stops the engine.
2. Visually inspect the fuel system for deterioration or leaks.
3. Check outboard for tightness on transom.
4. Check steering system for binding or loose components.
5. Visually check steering link rod fasteners for proper tightness.
6. Check propeller blades for damage.

After Each Use

1. Flush out the outboard cooling system if operating in salt or polluted water.
2. Wash off all salt deposits and flush out the exhaust outlet of the propeller and gear case with fresh water if operating in salt water.

Every 100 Hours of Use or Once yearly, Whichever occurs first

1. Lubricate all lubrication points. Lubricate more frequently when used in salt water.
2. Inspect and clean spark plugs.
3. Check engine fuel filter for contaminants.
4. Adjust carburetor(s) (if required).
5. Check engine timing setup.
6. Check corrosion control anodes. Check more frequently when used in salt water.
7. Drain and replace gear case lubricant.
8. Lubricate splines on the drive shaft.
9. Check and adjust valve clearance, if necessary.
10. Check power trim fluid.
11. Inspect battery.
12. Check control cable adjustments.
13. Remove engine deposits with Quicksilver Power Tune Engine Cleaner.
14. Check tightness of bolts, nuts, and other fasteners.

Every 300 Hours of Use or Three Years

1. Replace water pump impeller (more often if overheating occurs or reduced water pressure is noted).

Before Periods of Storage

1. Refer to Storage procedure (this section).

Flushing The Cooling System

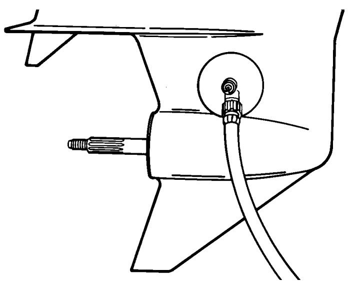
Flush the internal water passages of the outboard with fresh water after each use in salt, polluted or muddy water. This will help prevent a buildup of deposits from clogging the internal water passages.

Use a Quicksilver accessory (or equivalent) flushing attachment.

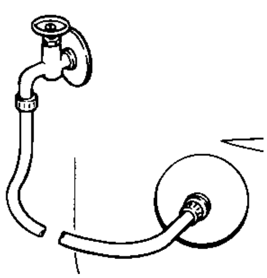
⚠ WARNING

To avoid possible injury when flushing, remove the propeller. Refer to Propeller Replacement.

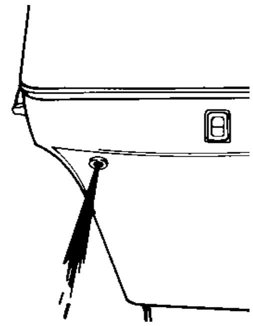
1. Remove propeller (refer to Propeller Replacement). Install the flushing attachment so the rubber cups fit tightly over the cooling water intake.



2. Attach a water hose to the flushing attachment. Turn on the water and adjust the flow so water is leaking around the rubber cups to ensure the engine receives an adequate supply of cooling water.



3. Start the engine and run it at idle speed in neutral shift position.
4. Adjust water flow (if necessary) so excess water continues leaking out from around the rubber cups to ensure the engine is receiving an adequate supply of cooling water.
5. Check for a steady stream of water flowing out of the water pump indicator hole. Continue flushing the outboard for 3 to 5 minutes, carefully monitoring water supply at all times.



6. Stop the engine, turn off the water, and remove the flushing attachment. Reinstall the propeller.

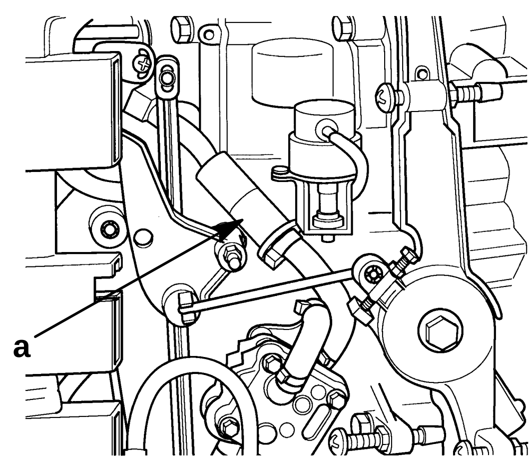
Fuel System

⚠ WARNING

Avoid serious injury or death from gasoline fire or explosion. Carefully follow all fuel system service instructions. Always stop the engine and DO NOT smoke or allow open flames or sparks in the area while servicing any part of the fuel system.

Before servicing any part of the fuel system, stop engine and disconnect the battery. Drain the fuel system completely. Use an approved container to collect and store fuel. Wipe up any spillage immediately. Material used to contain spillage must be disposed of in an approved receptacle. Any fuel system service must be performed in a well ventilated area. Inspect any completed service work for sign of fuel leakage.

Fuel Line Filter



a - Fuel Filter

1. Inspect the fuel line filter. If the filter appears to be contaminated, remove and replace.

IMPORTANT: Visually inspect for fuel leakage from the filter connections by squeezing the primer bulb until firm, forcing fuel into the filter.

Fuel line Filter – Non-Oil Injected Models

Inspect the sight bowl (b) for water accumulation. The sight bowl is equipped with a float (d) that floats on water. Also inspect the filter element (e) for sediment. Clean filter as follows.

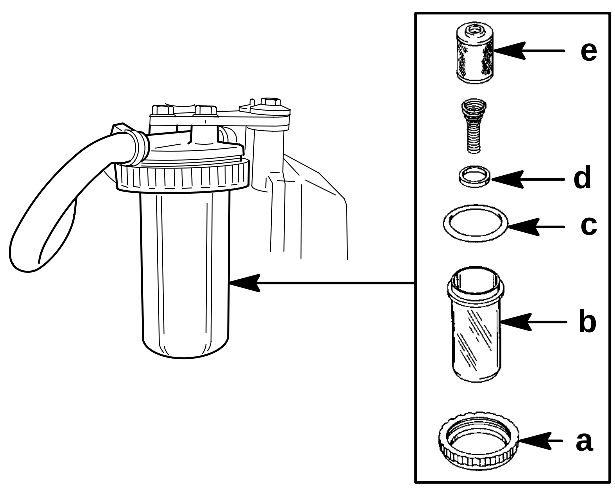
REMOVAL

1. Turn the engine off.
2. Turn off cap (a) and remove the sight bowl.
3. Remove the filter element (e) and wash it with cleaning solvent.

INSTALLATION

4. Reinstall filter element (open end up).
5. Place the O-ring seal (c) onto the sight bowl and reinstall sight bowl with cap. Tighten cap securely.

IMPORTANT: Visually inspect for fuel leakage from the filter by squeezing the primer bulb until firm, forcing fuel into the filter.



a - Cap
b - Sight Bowl
c - O-ring Seal
d - Float
e - Filter

Fuel Line Inspection

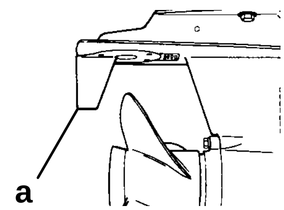
Visually inspect the fuel line and primer bulb for cracks, swelling, leaks, hardness, or other signs of deterioration or damage. If any of these conditions is found, the fuel line or primer bulb must be replaced.

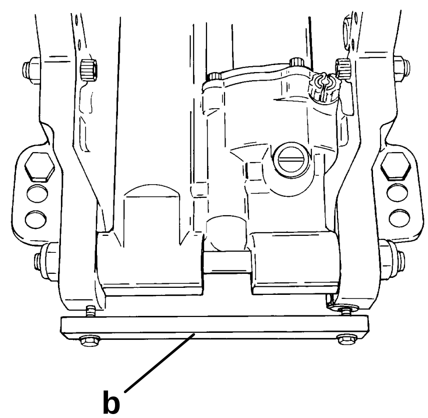
Corrosion Control Anode

Your outboard has 2 corrosion control anodes. An anode helps protect the outboard against galvanic corrosion by sacrificing its metal to be slowly eroded instead of the outboard metals.

Each anode requires periodic inspection especially in salt water which will accelerate the erosion. To maintain this corrosion protection, always replace the anode before it is completely eroded. Never paint or apply a protective coating on the anode as this will reduce effectiveness of the anode.

1. One of the anodes is the trim tab (a) installed on the gear case. A second anode (b) is installed on the bottom of the transom bracket assembly.



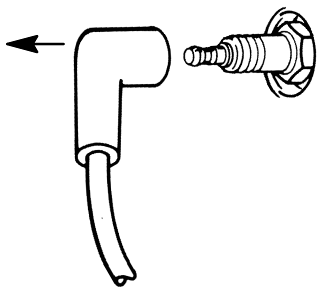


a - Trim Tab
b - Anode

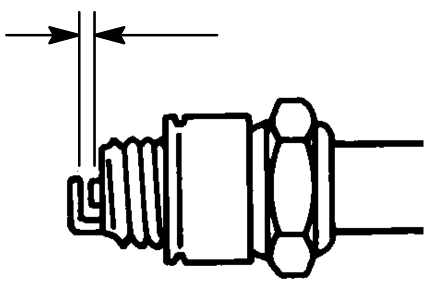
Spark Plug Inspection

Inspect spark plugs at the recommended intervals.

1. Remove the spark plug leads by twisting the rubber boots slightly and pull off.



2. Remove the spark plugs to inspect and clean. Replace spark plug if electrode is worn or the insulator is rough, cracked, broken, blistered or fouled.
3. Set the spark plug gap, where applicable. See Specification Chart.



4. Before reinstalling spark plugs, clean away dirt on the spark plug seats. Install plugs finger tight, and tighten 1/4 turn or torque to 20 lb. ft. (27 N·m).

Battery Inspection

The battery should be inspected at periodic intervals to ensure proper engine starting capability.

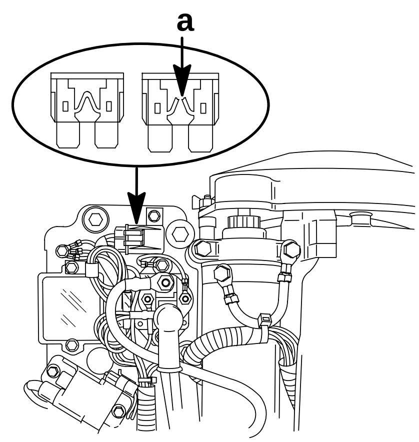
IMPORTANT: Read the safety and maintenance instructions which accompany your battery.

1. Turn off the engine before servicing the battery.
2. Add water as necessary to keep the battery full.
3. Make sure the battery is secure against movement.
4. Battery cable terminals should be clean, tight, and correctly installed. Positive to positive and negative to negative.
5. Make sure the battery is equipped with a nonconductive shield to prevent accidental shorting of battery terminals.

Fuse Replacement – Electric Start Models

The electric starting circuit is protected from overload by an SFE 20 AMP fuse. If the fuse is blown, the electric starter motor will not operate. Try to locate and correct the cause of the overload. If the cause is not found, the fuse may blow again. Replace the fuse with a fuse of the same rating.

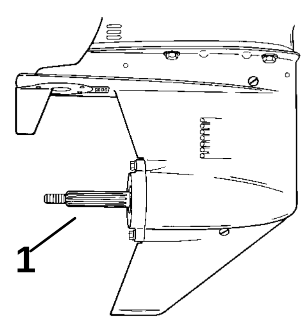
Open the fuse holder and look at the silver colored band inside the fuse. If band is broken (a), replace the fuse. Replace fuse with a new fuse with the same rating.



Lubrication Points

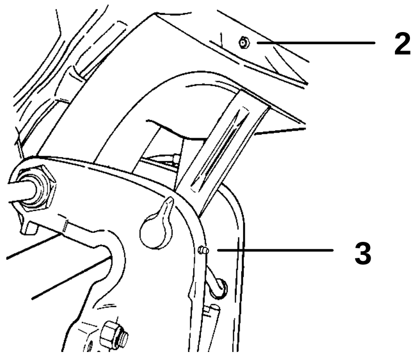
Lubricate Point 1 with Quicksilver Anti-Corrosion Grease or 2-4-C Marine Lubricant with Teflon

1. Propeller Shaft – Refer to Propeller Replacement for removal and installation of the propeller. Coat the entire propeller shaft with lubricant to prevent the propeller hub from corroding and seizing to the shaft.

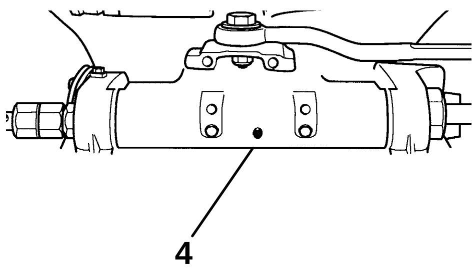


NOTE: *Lubricate points 2 thru 6 with Quicksilver 2-4-C Marine Lubricant with Teflon or Special Lubricant 101.*

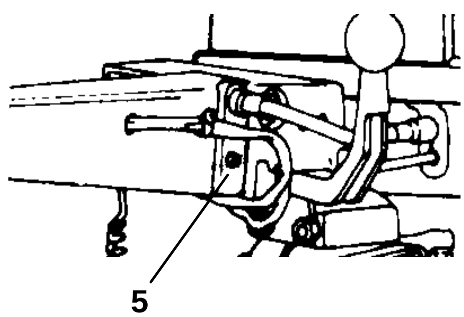
2. Swivel bracket – Lubricate through fitting.
3. Tilt support lever – Lubricate through fitting.



4. Tilt tube – Lubricate through fitting.



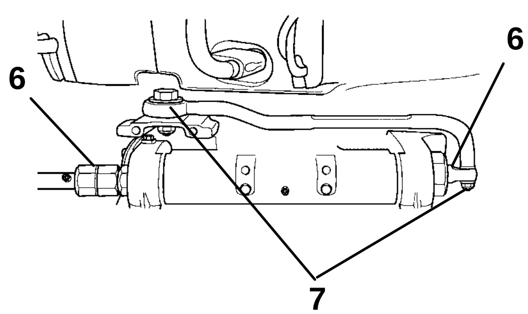
5. Tiller Handle – Lubricate through fitting.



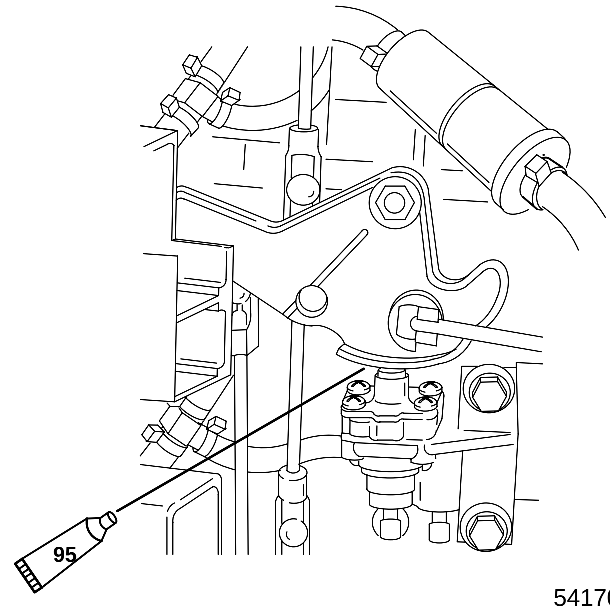
6. Steering cable grease fitting (if equipped) – Rotate steering wheel to fully retract the steering cable end into the outboard tilt tube. Lubricate through fitting.

Lubricate point 7 with SAE 30W oil.

7. Steering link rod pivot points – lubricate points.



NOTE: *4 CYL. MODELS*



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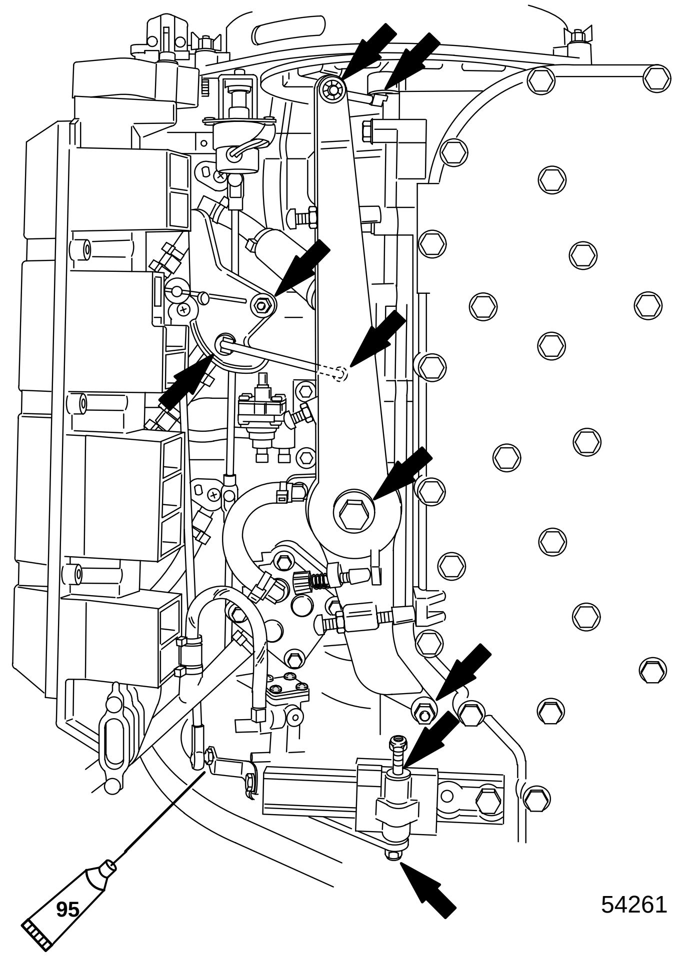
95 2-4-C With Teflon (92-825407A12)

Lubrication Point for Accelerator Pump Cam on 4 Cylinder Models Only



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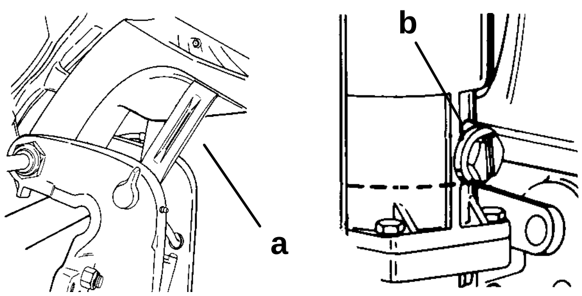
95 2-4-C With Teflon (92-825407A12)

Lubrication Points are indicated with Arrows

Checking Power Trim Fluid

1. Tilt outboard to the full up position and engage the tilt support lock.
2. Remove fill cap and check fluid level. the fluid level should be even with the bottom of the fill hole. Add Quicksilver Power Trim and Steering Fluid. If not available, use automotive (ATF) automatic transmission fluid.



a - Tilt Support Lock
b - Fill Cap

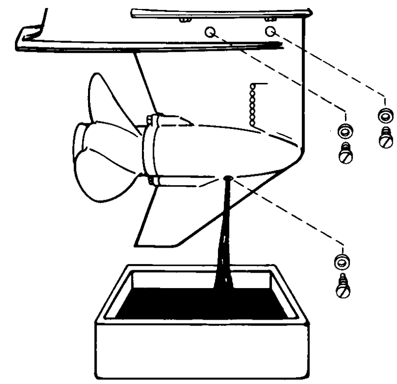
Gear Case Lubrication

When adding or changing gear case lubricant, visually check for the presence of water in the lubricant. If water is present, it may have settled to the bottom and will drain out prior to the lubricant, or it may be mixed with the lubricant, giving it a milky colored appearance. If water is noticed, have the gear case checked by your dealer. Water in the lubricant may result in premature bearing failure or, in freezing temperatures, will turn to ice and damage the gear case.

Whenever you remove the fill/drain plug, examine the magnetic end for metal particles. A small amount of metal filings or fine metal particles indicates normal gear wear. An excessive amount of metal filings or larger particles (chips) may indicate abnormal gear wear and should be checked by an authorized dealer.

DRAINING GEAR CASE

1. Place outboard in a vertical operating position.
2. Place a drain pan below outboard.
3. Remove vent plugs and fill/drain plug and drain lubricant.



GEAR CASE LUBRICANT CAPACITY

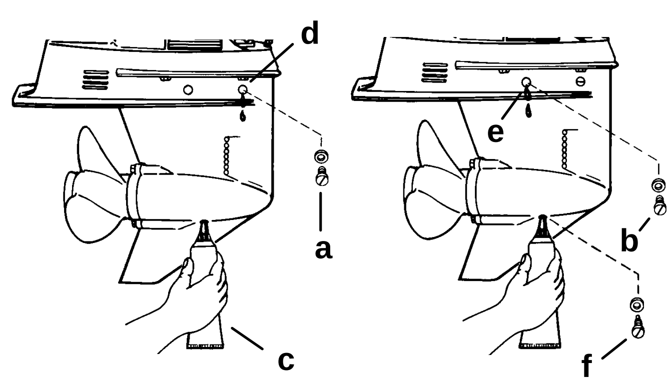
Gear case lubricant capacity is approximately 22.5 fl. oz. (666 ml).

Checking Lubricant Level and Filling Gear Case

1. Place outboard in a vertical operating position.
2. Remove the front vent plug (a) and rear vent plug (b).

IMPORTANT: Replace sealing washers if damaged.

3. Place lubricant tube (c) into the fill hole and add lubricant until it appears at the front vent hole (d). At this time install the front vent plug and sealing washer (a).



4. Continue adding lubricant until it appears at the rear vent hole (e).
5. Stop adding lubricant. Install the rear vent plug and sealing washer (b) before removing lubricant tube.
6. Remove lubricant tube and reinstall cleaned fill/drain plug and sealing washer (f).

Storage Preparation

The major consideration in preparing your outboard for storage is to protect it from rust, corrosion, and damage caused by freezing of trapped water.

The following storage procedures should be followed to prepare your outboard for out-of-season storage or prolonged storage (two months or longer).

⚠ CAUTION

Never start or run your outboard (even momentarily) without water circulating through the cooling water intake in the gear case to prevent damage to the water pump (running dry) or overheating of the engine.

Fuel System

IMPORTANT: Gasoline containing alcohol (ethanol or methanol) can cause a formation of acid during storage and can damage the fuel system. If the gasoline being use contains alcohol, it is advisable to drain as much of the remaining gasoline as possible from the fuel tank, remote fuel line, and engine fuel system.

Fill the fuel system (tank, hoses, fuel pump, and carburetor) with treated (stabilized) fuel to help prevent formation of varnish and gum. Proceed with following instructions.

1. Portable Fuel Tank – Pour the required amount of Quicksilver Gasoline Stabilizer (follow instructions on container) into fuel tank. Tip fuel tank back and forth to mix stabilizer with the fuel.
2. Permanently Installed Fuel Tank – Pour the required amount of Quicksilver Gasoline Stabilizer (follow instructions on container) into a separate container and mix with approximately one quart (one liter) of gasoline. Pour this mixture into fuel tank.
3. Place the outboard in water or connect flushing attachment for circulating cooling water. Run the engine for ten minutes to allow treated fuel to reach the carburetor.

Protecting External Outboard Components

1. Lubricate all outboard components listed in the Inspection and Maintenance Schedule.
2. Touch up any paint nicks.
3. Spray Quicksilver Corrosion Guard on external metal surfaces (except corrosion control anodes).

Protecting Internal Engine Components

1. Remove the spark plugs and inject a small amount of engine oil inside of each cylinder.
2. Rotate the flywheel manually several times to distribute the oil in the cylinders. Reinstall spark plugs.
3. Change the engine oil.

Gear Case

1. Drain and refill the gear case lubricant (refer to maintenance procedure).

Positioning Outboard for Storage

Store outboard in an upright (vertical) position to allow water to drain out of outboard.

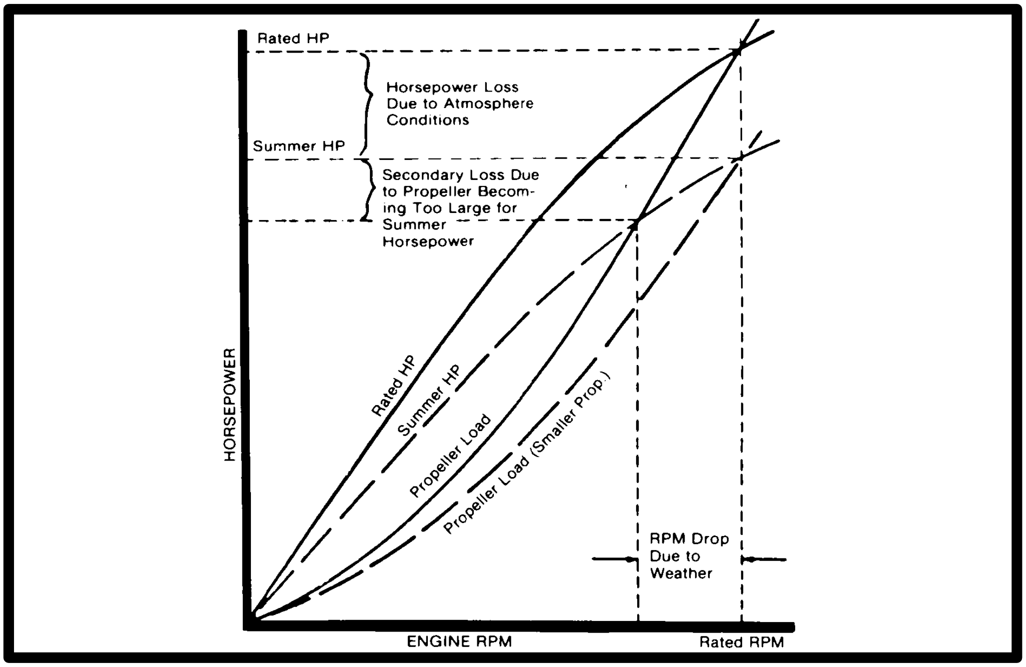
⚠ CAUTION

If outboard is stored tilted up in freezing temperature, trapped cooling water or rain water that may have entered the propeller exhaust outlet in the gear case could freeze and cause damage to the outboard.

Battery Storage

1. Follow the battery manufacturer's instructions for storage and recharging.
2. Remove the battery from the boat and check water level. Recharge if necessary.
3. Store the battery in a cool, dry place.
4. Periodically check the water level and recharge the battery during storage.

IMPORTANT INFORMATION



GENERAL INFORMATION

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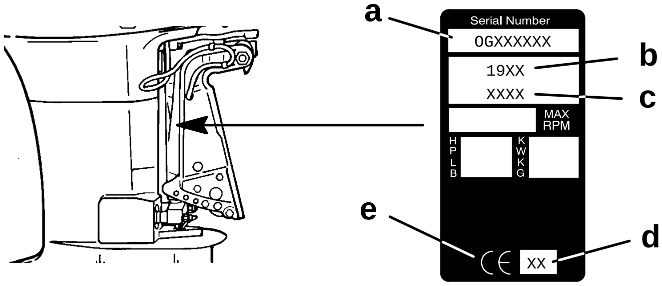
Serial Number Location

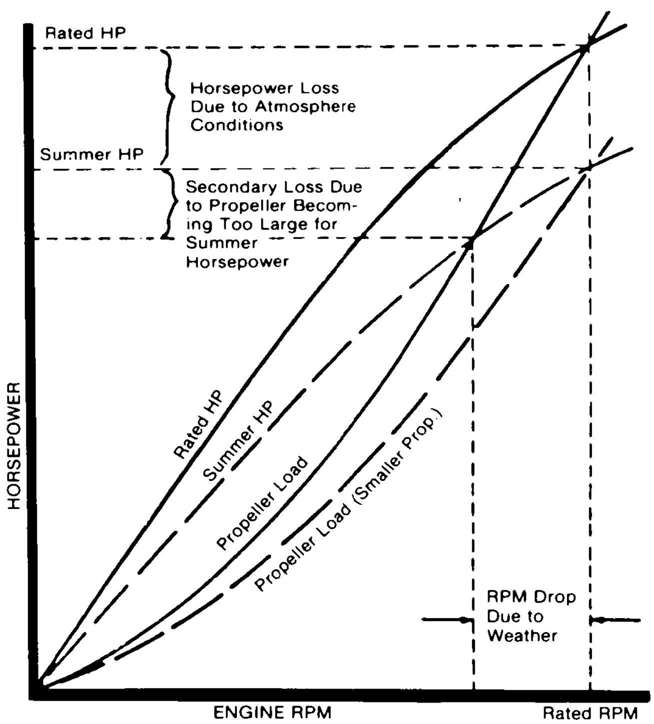
The Outboard serial number is located on the lower starboard side of the engine block. A serial number is also located on the starboard side of the swivel bracket.



a - Serial Number
b - Model Year
c - Model Description
d - Year Manufactured
e - Certified Europe Insignia

Conditions Affecting Performance

Weather



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.

Corporations internationally have settled on adoption of I.S.O. (International Standards Organization) engine test standards, as set forth in I.S.O. 3046 standardizing the computation of horsepower from data obtained on the dynamometer, correcting all values to the power that the engine will produce at sea level, at 30% relative humidity at 77° F (25° C) temperature and a barometric pressure of 29.61 inches of mercury.

Summer Conditions of high temperature, low barometric pressure and high humidity all combine to reduce the engine power. This, in turn, is reflected in decreased boat speeds--as much as 2 or 3 miles-per-hour (3 or 5 Km per-hour) in some cases. (Refer to previous chart.) Nothing will regain this speed for the boater, but the coming of cool, dry weather.

In pointing out the practical consequences of weather effects, an engine--running on a hot, humid summer day--may encounter a loss of as much as 14% of the horsepower it would produce on a dry, brisk spring or fall day. The horsepower, that any internal combustion engine produces, depends upon the density of the air that it consumes and, in turn, this density is dependent upon the temperature of the air, its barometric pressure and water vapor (or humidity) content.

Accompanying this weather-inspired loss of power is a second but more subtle loss. At rigging time in early spring, the engine was equipped with a propeller that allowed the engine to turn within its recommended RPM range at full throttle. With the coming of the summer weather and the consequent drop in available horsepower, this propeller will, in effect, become too large. Consequently, the engine operates at less than its recommended RPM.

Due to the horsepower/RPM characteristics of an engine, this will result in further loss of horsepower at the propeller with another decrease in boat speed. This secondary loss, however, can be regained by switching to a smaller pitch propeller that allows the engine to again run at recommended RPM.

For boaters to realize optimum engine performance under changing weather conditions, it is essential that the engine have the proper propeller to allow it to operate at or near the top end of the recommended maximum RPM range at wide-open-throttle with a normal boat load.

Not only does this allow the engine to develop full power, but equally important is the fact that the engine also will be operating in an RPM range that discourages damaging detonation. This, of course, enhances overall reliability and durability of the engine.

Boat

WEIGHT DISTRIBUTION

1. Proper positioning of the weight inside the boat (persons and gear) has a significant effect on the boat's performance, for example:
   a. Shifting weight to the rear (stern)
      (1.) Generally increases top speed.
      (2.) If in excess, can cause the boat to porpoise.
      (3.) Can make the bow bounce excessively in choppy water.
      (4.) Will increase the danger of the following - wave splashing into the boat when coming off plane.
   b. Shifting weight to the front (bow)
      (1.) Improves ease of planing off.
      (2.) Generally improves rough water ride.
      (3.) If excessive, can make the boat veer left and right (bow steer).

BOTTOM

For maximum speed, a boat bottom should be nearly a flat plane where it contacts the water and particularly straight and smooth in fore-and-aft direction.

1. **Hook:** Exists when bottom is concave in fore-and-aft direction when viewed from the side. When boat is planing, "hook" causes more lift on bottom near transom and allows bow to drop, thus greatly increasing wetted surface and reducing boat speed. "Hook" frequently is caused by supporting boat too far ahead of transom while hauling on a trailer or during storage.
2. **Rocker:** The reverse of hook and much less common. "Rocker" exists if bottom is convex in fore-and-aft direction when viewed from the side, and boat has strong tendency to porpoise.
3. **Surface Roughness:** Moss, barnacles, etc., on boat or corrosion of outboard's gear housing increase skin friction and cause speed loss. Clean surfaces when necessary.

WATER ABSORPTION

It is imperative that all through hull fasteners be coated with a quality marine sealer at time of installation. Water intrusion into the transom core and/or inner hull will result in additional boat weight (reduced boat performance), hull decay and eventual structural failure.

CAVITATION

Cavitation is caused by water vapor bubbles forming either from a sharp edge or angle on the gear case or from an irregularity in the propeller blade itself. These vapor bubbles flow back and collapse when striking the surface of the propeller blade resulting in the erosion of the propeller blade surface. If allowed to continue, eventual blade failure (breakage) will occur.

Engine

DETONATION

Detonation in a 2-cycle engine resembles the "pinging" heard in an automobile engine. It can be otherwise described as a tin-like "rattling" or "plinking" sound.

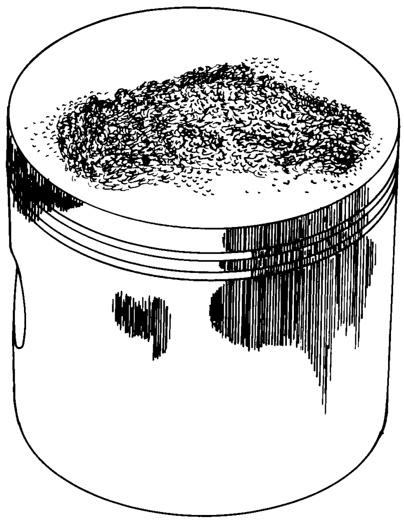
Detonation is an explosion of an unburned portion of the fuel/air charge after the spark plug has fired. Detonation creates severe shock waves in the engine, and these shock waves often find or create a weakness: The dome of a piston, cylinder head/gasket, piston rings or piston ring lands, piston pin and roller bearings.

A few of the most common causes of detonation in a marine 2-cycle application are as follows:

- Over-advanced ignition timing.
- Use of low octane gasoline.
- Propeller pitch too high (engine RPM below recommended maximum range).
- Lean fuel mixture at or near wide-open-throttle.
- Spark plugs (heat range too hot - incorrect reach - cross-firing).
- Inadequate engine cooling (deteriorated cooling system).
- Combustion chamber/piston deposits (result in higher compression ratio).

Detonation usually can be prevented if:

1. The engine is correctly set up.
2. Diligent maintenance is applied to combat the detonation causes.



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Damaged Piston Resulting from Detonation

Following Complete Submersion

Submerged While Running (Special Instructions)

When an engine is submerged while running, the possibility of internal engine damage is greatly increased. If, after engine is recovered and with spark plugs removed, engine fails to turn over freely when turning flywheel, the possibility of internal damage (bent connecting rod and/or bent crankshaft) exists. If this is the case, the powerhead must be disassembled.

Salt Water Submersion (Special Instructions)

Due to the corrosive effect of salt water on internal engine components, complete disassembly is necessary before any attempt is made to start the engine.

Fresh Water Submersion (Special Instructions)

1. Recover engine as quickly as possible.
2. Remove cowling.
3. Flush exterior of outboard with fresh water to remove mud, weeds, etc. DO NOT attempt to start engine if sand has entered powerhead, as powerhead will be severely damaged. Disassemble powerhead if necessary to clean components.
4. Remove spark plugs and get as much water as possible out of powerhead. Most water can be eliminated by placing engine in a horizontal position (with spark plug holes down) and rotating flywheel.
5. Pour alcohol into carburetor throats (alcohol will absorbed water). Again rotate flywheel.
6. Turn engine over and pour alcohol into spark plug openings and rotate flywheel.
7. Turn engine over (place spark plug openings down) and pour engine oil into throat of carburetors while rotating flywheel to distribute oil throughout crankcase.
8. Again turn engine over and pour approximately one teaspoon of engine oil into each spark plug opening. Again rotate flywheel to distribute oil in cylinders.
9. Remove and clean carburetors and fuel pump assembly.
10. Dry all wiring and electrical components using compressed air.
11. Disassemble the engine starter motor and dry the brush contacts, armature and other corrodible parts.
12. Reinstall spark plugs, carburetors and fuel pump.
13. Attempt to start engine, using a fresh fuel source. If engine starts, it should be run for at least one hour to eliminate any water in engine.
14. If engine fails to start, determine cause (fuel, electrical or mechanical). Engine should be run within 2 hours after recovery of outboard from water, or serious internal damage may occur. If unable to start engine in this period, disassemble engine and clean all parts. Apply oil as soon as possible.

Propeller Selection

For in-depth information on marine propellers and boat performance - written by marine engineers - see your Authorized Dealer for the illustrated "**What You Should Know About Quicksilver Propellers... and Boat Performance Information**" (Part No. 90-86144).

For best all around performance from your outboard/ boat combination, select a propeller that allows the engine to operate in the upper half of the recommended full throttle RPM range with the boat normally loaded (refer to Specifications). This RPM range allows for better acceleration while maintaining maximum boat speed.

If changing conditions cause the RPM to drop below the recommended range (such as warmer, more humid weather, operation at higher elevations, increased boat load or a dirty boat bottom/gear case) a propeller change or cleaning may be required to maintain performance and ensure the outboard's durability.

Check full-throttle RPM using an accurate tachometer with the engine trimmed out to a balanced-steering condition (steering effort equal in both directions) without causing the propeller to "break loose".

Refer to "Quicksilver Accessory Guide" for a complete list of available propellers.

1. Select a propeller that will allow the engine to operate at or near the top of the recommended full throttle RPM range (listed in "**Specifications**," preceding) with a normal load. Maximum engine speed (RPM) for propeller selection exists when boat speed is maximum and trim is minimum for that speed. (High RPM, caused by an excessive trim angle, should not be used in determining correct propeller.) Normally, there is a 150-350 RPM change between propeller pitches.
2. If full throttle operation is below the recommended range, the propeller MUST BE changed to one with a lower pitch to prevent loss of performance and possible engine damage.
3. After initial propeller installation, the following common conditions may require that the propeller be changed to a lower pitch:
   a. Warmer weather and great humidity will cause an RPM loss.
   b. Operating in a higher elevation causes an RPM loss.
   c. Operating with a damaged propeller or a dirty boat bottom or gear housing will cause an RPM loss.
   d. Operation with an increased load (additional passengers, equipment, pulling skiers, etc.).

Propeller Installation

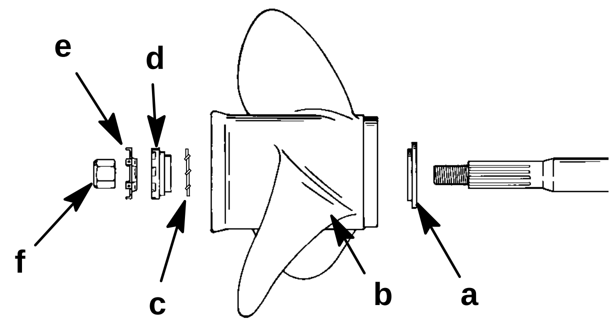
⚠ WARNING

If the propeller shaft is rotated while the engine is in gear, there is the possibility that the engine will crank over and start. To prevent this type of accidental engine starting and possible serious injury caused from being struck by a rotating propeller, always shift outboard to neutral position and remove spark plug leads when you are servicing the propeller.

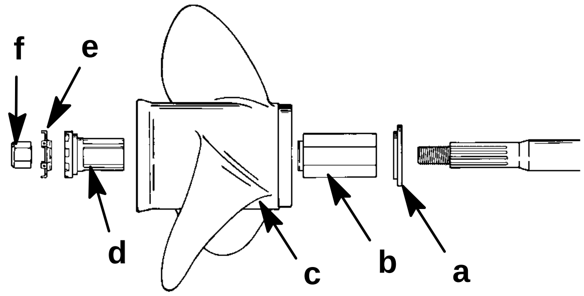
1. Shift outboard to neutral (N) position.
2. Remove leads from spark plugs to prevent engine from starting.
3. Coat the propeller shaft with Quicksilver Anti–Corrosion Grease.

IMPORTANT: To prevent the propeller hub from corroding and seizing to the propeller shaft, especially in salt water, always apply a coat of Quicksilver Anti-Corrosion Grease to the entire shaft at the recommended maintenance intervals and also each time the propeller is removed.

4. Flo-Torque I Drive Hub Propellers – Install thrust washer (a), propeller (b), continuity washer (c), thrust hub (d), propeller nut retainer (e), and propeller nut (f) onto the shaft.



5. Flo-Torque II Drive Hub Propellers – Install forward thrust hub (a), replaceable drive sleeve (b), propeller (c), thrust hub (d), propeller nut retainer (e) and propeller nut (f) onto the shaft.



6. Place a block of wood between gear case and propeller and torque propeller nut to 55 lb. ft. (75 N·m).
7. Secure propeller nut by bending three of the tabs into the thrust hub grooves.

Power Trim System

General Information

The power trim system is filled at the manufacturer and is ready for use.

Trim outboard through entire trim and tilt range several times to remove any air from the system.

The trim system is pressurized and is not externally vented.

Power Trim Operation

With most boats, operating around the middle of the "trim" range will give satisfactory results. However, to take full advantage of the trimming capability there may be times when you choose to trim your outboard all the way in or out. Along with an improvement in some performance aspects comes a greater responsibility for the operator, and this is being aware of some potential control hazards. The most significant control hazard is a pull or "torque" that can be felt on the steering wheel or tiller handle. This steering torque results from the outboard being trimmed so that the propeller shaft is not parallel to the water surface.

⚠ WARNING

Avoid possible serious injury or death. When the outboard is trimmed in or out beyond a neutral steering condition, a pull on the steering wheel or tiller handle in either direction may result. Failure to keep a continuous firm grip on the steering wheel or tiller handle when this condition exists can result in loss of boat control as the outboard can turn freely. The boat can now "spin out" or go into a very tight maximum turn which, if unexpected, can result in occupants being thrown within the boat or out of the boat.

Consider the following lists carefully:

TRIMMING IN OR DOWN CAN:

1. Lower the bow.
2. Result in quicker planing off, especially with a heavy load or a stern heavy boat.
3. Generally improve the ride in choppy water.
4. Increase steering torque or pull to the right (with the normal right hand rotation propeller).
5. In excess, lower the bow of some boats to a point where they begin to plow with their bow in the water while on plane. This can result in an unexpected turn in either direction called "bow steering" or "over steering" if any turn is attempted or if a significant wave is encountered.

⚠ WARNING

Avoid possible serious injury or death. Adjust outboard to an intermediate trim position as soon as boat is on plane to avoid possible ejection due to boat spin-out. Do not attempt to turn boat when on plane if outboard is trimmed extremely in or down and there is a pull on the steering wheel or tiller handle.

TRIMMING OUT OR UP CAN:

1. Lift the bow higher out of the water.
2. Generally increase top speed.
3. Increase clearance over submerged objects or a shallow bottom.
4. Increase steering torque or pull to the left at a normal installation height (with the normal right hand rotation propeller).
5. In excess, cause boat "porpoising" (bouncing) or propeller ventilation.
6. Cause engine overheating if any water intake holes are above the water line.

Trim "In" Angle Adjustment

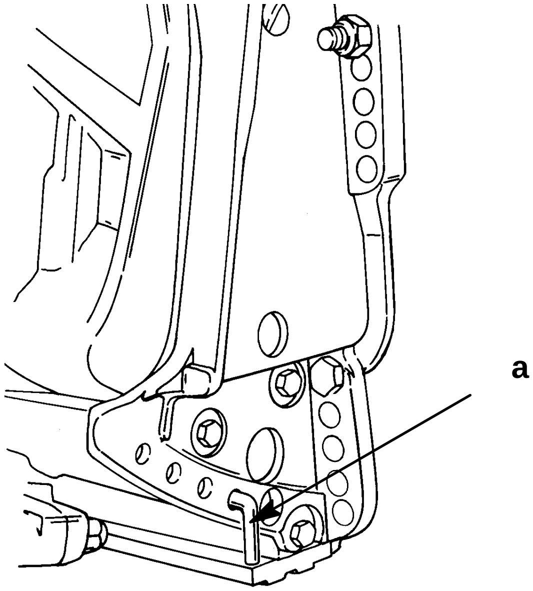
Some outboard boats, particularly some bass boats, are built with a greater than normal transom angle which will allow the outboard to be trimmed further "in" or "under". This greater trim "under" capability is desirable to improve acceleration, reduce the angle and time spent in a bow high boat, altitude during planing off, and in some cases, may be necessary to plane off a boat with aft live wells, given the variety of available propellers and height range of engine installations.

However, once on plane, the engine should be trimmed to a more intermediate position to a avoid a bow-down planing condition called "plowing". Plowing can cause "bow steering" or "over steering" and inefficiently consumes horsepower. In this condition, if attempting a turn or encountering a diagonal, moderate wake, a more abrupt turn than intended may result.

In rare circumstances, the owner may decide to limit the trim in. This can be accomplished by repositioning the tilt stop pins into whatever adjustment holes in the transom brackets is desired.

⚠ WARNING

Avoid possible serious injury or death. Adjust outboard to an intermediate trim position as soon as boat is on plane to avoid possible ejection due to boat spin-out. Do not attempt to turn boat when on plane if outboard is trimmed extremely in or down and there is a pull on the steering wheel or tiller handle.



a - Stainless Steel Tilt Pin (P/N 17-49930A1)

Compression Check

1. Remove spark plugs.
2. Install compression gauge in spark plug hole.
3. Hold throttle plate at W.O.T.
4. Crank the engine over until the compression reading peaks on the gauge. Record the reading.
5. Check and record compression of each cylinder. The highest and lowest reading recorded should not differ by more than 15% (see example chart below). A reading below 120 psi might indicate a total engine wear problem.

Example of compression test differences

Maximum (psi)	Minimum (psi)
180	162
150	127.5

6. Compression check is important because an engine with low or uneven compression cannot be tuned successfully to give peak performance. It is essential, therefore, that improper compression be corrected before proceeding with an engine tuneup.
7. Cylinder scoring: If powerhead shows any indication of overheating, such as discolored or scorched paint, visually inspect cylinders for scoring or other damage as outlined in Section 4 "**Powerhead**."

Painting Procedures

Cleaning & Painting Aluminum Propellers & Gear Housings

⚠ WARNING

Avoid serious injury from flying debris. Avoid serious injury from airborne particles. Use eye and breathing protection with proper ventilation.

PROPELLERS

1. Sand the entire area to be painted with 3M 120 Regalite Polycut or coarse Scotch-Brite, disc or belts.
2. Feather edges of all broken paint edges. Try not to sand through the primer.
3. Clean the surface to be painted using PPG Industries DX330 Wax and Grease Remover or equivalent (Xylene or M.E.K.).
4. If bare metal has been exposed, use Quicksilver's Light Gray Primer.
5. Allow a minimum of 1 hour dry time and no more than 1 week before applying the finish coat.
6. Apply the finish coat using Quicksilver's EDP Propeller Black.

GEAR HOUSINGS

The following procedures should be used in refinishing gear housings. This procedure will provide the most durable paint system available in the field. The materials recommended are of high quality and approximate marine requirements. The following procedure will provide a repaint job that compares with a properly applied factory paint finish. It is recommended that the listed materials be purchased from a local Ditzler Automotive Finish Supply Outlet. The minimum package quantity of each material shown following is sufficient to refinish several gear housings.

Procedure:

1. Wash gear housing with a muriatic acid base cleaner to remove any type of marine growth, and rinse with water, if necessary.
2. Wash gear housing with soap and water, then rinse.
3. Sand blistered area with 3M 180 grit sandpaper or P180 Gold Film Disc to remove paint blisters only. Feather edge all broken paint edges.
4. Clean gear housing thoroughly with (DX-330) wax and grease remover.
5. Spot repair surfaces where bare metal is exposed with (DX-503) alodine treatment.

IMPORTANT: Do not use any type of aerosol spray paints as the paint will not properly adhere to the surface nor will the coating be sufficiently thick to resist future paint blistering.

6. Mix epoxy chromate primer (DP-40) with equal part catalyst (DP-401) per manufacturers instructions, allowing proper induction period for permeation of the epoxy primer and catalyst.
7. Allow a minimum of one hour drying time and no more than one week before top coating assemblies.
8. Use Ditzler Urethane DU9000 for Mercury Black, DU34334 for Mariner Grey, and DU35466 for Force Charcoal, and DU33414M for Sea Ray White. Catalyze all three colors with Ditzler DU5 catalyst mixed 1:1 ratio. Reduce with solvents per Ditzler label.

⚠ CAUTION

Be sure to comply with instructions on the label for ventilation and respirators. Using a spray gun, apply one half to one mil even film thickness. Let dry, flash off for five minutes and apply another even coat of one half to one mil film thickness. This urethane paint will dry to the touch in a matter of hours, but will remain sensitive to scratches and abrasions for a few days.

9. The type of spray gun used will determine the proper reduction ratio of the paint.

IMPORTANT: Do not paint sacrificial zinc trim tab or zinc anode.

10. Cut out a cardboard "plug" for trim tab pocket to keep paint off of mating surface to maintain good continuity circuitry between trim tab and gear housing.

Decal Application

Decal Removal

1. Mark decal location before removal to assure proper alignment of new decal.
2. Carefully soften decal and decal adhesive with a heat gun or heat blower while removing old decal.
3. Clean decal contact area with a 1:1 mixture of isopropyl alcohol and water.
4. Thoroughly dry decal contact area and check for a completely cleaned surface.

Instructions for “Wet” Application

NOTE: *The following decal installation instructions are provided for a “Wet” installation.* ***All*** *decals should be applied wet.*

TOOLS REQUIRED

1. Plastic Squeegee*
2. Stick Pin
3. Dish Washing **Liquid/Detergent without ammonia**** “Joy” and “Drift” are known to be compatible for this process.

* Automotive Body Filler Squeegee

** Do not use a soap that contains petroleum based solvents.

SERVICE TIP: Placement of decals using the “Wet” application will allow time to position decal. Read entire installation instructions on this technique before proceeding.

TEMPERATURE

IMPORTANT: Installation of vinyl decals should not be attempted while in direct sunlight. Air and surface temperature should be between 60°F (15°C) and 100°F (38°C) for best application.

SURFACE PREPARATION

IMPORTANT: Do not use a soap or any petroleum based solvents to clean application surface.

Clean entire application surface with mild dish washing liquid and water. Rinse surface thoroughly with clean water.

DECAL APPLICATION

1. Mix $^1/_2$ ounce (16 ml) of dish washing liquid in one gallon (4 l) of cool water to use as wetting solution.

NOTE: *Leave protective masking, if present, on the face of decal until final steps of decal installation. This will ensure that the vinyl decal keeps it’s shape during installation.*

2. Place the decal face down on a clean work surface and remove the paper backing from “adhesive side” of decal.
3. Using a spray bottle, flood the entire “adhesive side” of the decal with the pre-mixed wetting solution.
4. Flood area where the decal will be positioned with wetting solution.
5. Position pre-wetted decal on wetted surface and slide into position.
6. Starting at the center of the decal, “**lightly**” squeegee out the air bubbles and wetting solution with overlapping strokes to the outer edge of the decal. Continue going over the decal surface until all wrinkles are gone and adhesive bonds to the cowl surface.
7. Wipe decal surface with soft paper towel or cloth.
8. **Wait 10 - 15 minutes.**
9. Starting at one corner, “carefully and slowly” pull the masking off the decal surface at a 180° angle.

NOTE: *To remove any remaining bubbles, pierce the decal at one end of the bubble with stick pin and press out the entrapped air or wetting solution with your thumb (moving toward the puncture).*

IMPORTANT INFORMATION

1

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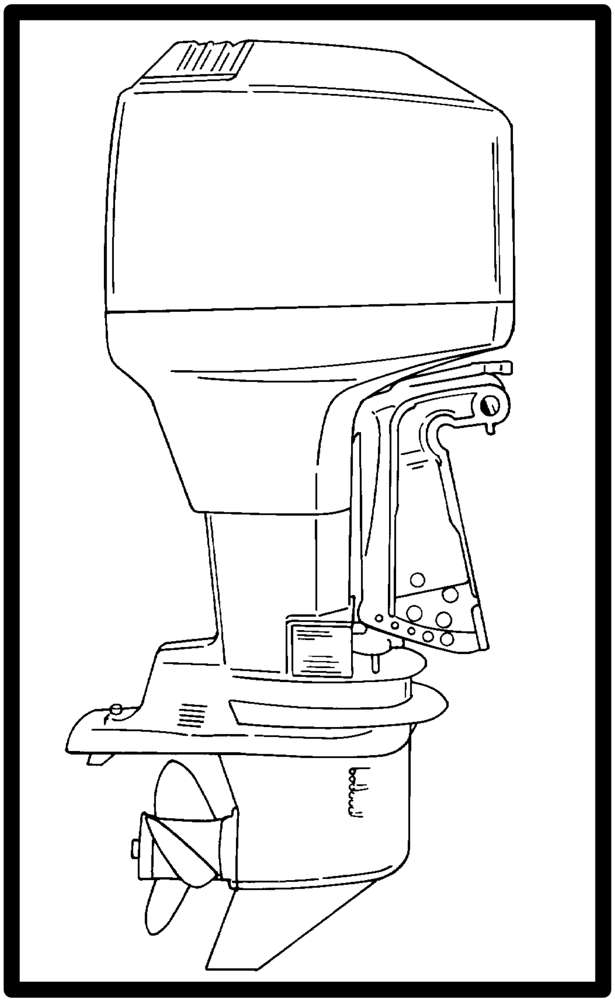


OUTBOARD INSTALLATION

Table of Contents

Notice to Installer and Owner

This manual as well as safety labels posted on the outboard use the following safety alerts to draw your attention to special safety instructions that should be followed.

⚠ 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 injury or product or property damage.

Boat Horsepower Capacity

U.S. COAST GUARD CAPACITY	
MAXIMUM HORSEPOWER	XXX
MAXIMUM PERSON CAPACITY (POUNDS)	XXX
MAXIMUM WEIGHT CAPACITY	XXX

Do not overpower or overload your boat. Most boats will carry a required capacity plate indicating the maximum acceptable power and load as determined by the manufacturer following certain federal guidelines. If in doubt, contact your dealer or the boat manufacturer.

⚠ WARNING

Using an outboard that exceeds the maximum horsepower limit of a boat can: 1. cause loss of boat control 2. place too much weight at the transom altering the designed flotation characteristics of the boat or 3. cause the boat to break apart particularly around the transom area. Overpowering a boat can result in serious injury, death, or boat damage.

Outboard Remote Control

The remote control connected to your outboard must be equipped with a start-in-gear protection device. This prevents the engine from starting when the outboard is in gear.

⚠ WARNING

Avoid serious injury or death from a sudden unexpected acceleration when starting your engine. The design of this outboard requires that the remote control used with it must have a built in start-in-gear protection device.

Selecting Accessories For The Outboard

Genuine Mercury Marine Quicksilver Accessories have been specifically designed and tested for your outboard.

Mercury Marine Quicksilver accessories are available from Mercury Marine dealers.

Some accessories not manufactured or sold by Mercury Marine are not designed to be safely used with your outboard or outboard operating system. Acquire and read the installation, operation, and maintenance manuals for all your selected accessories.

⚠ WARNING

Check with your dealer before installation of accessories. The misuse of acceptable accessories or the use of unacceptable accessories can result in serious injury, death, or product failure.

Selecting Steering Cables and Remote Control Cables

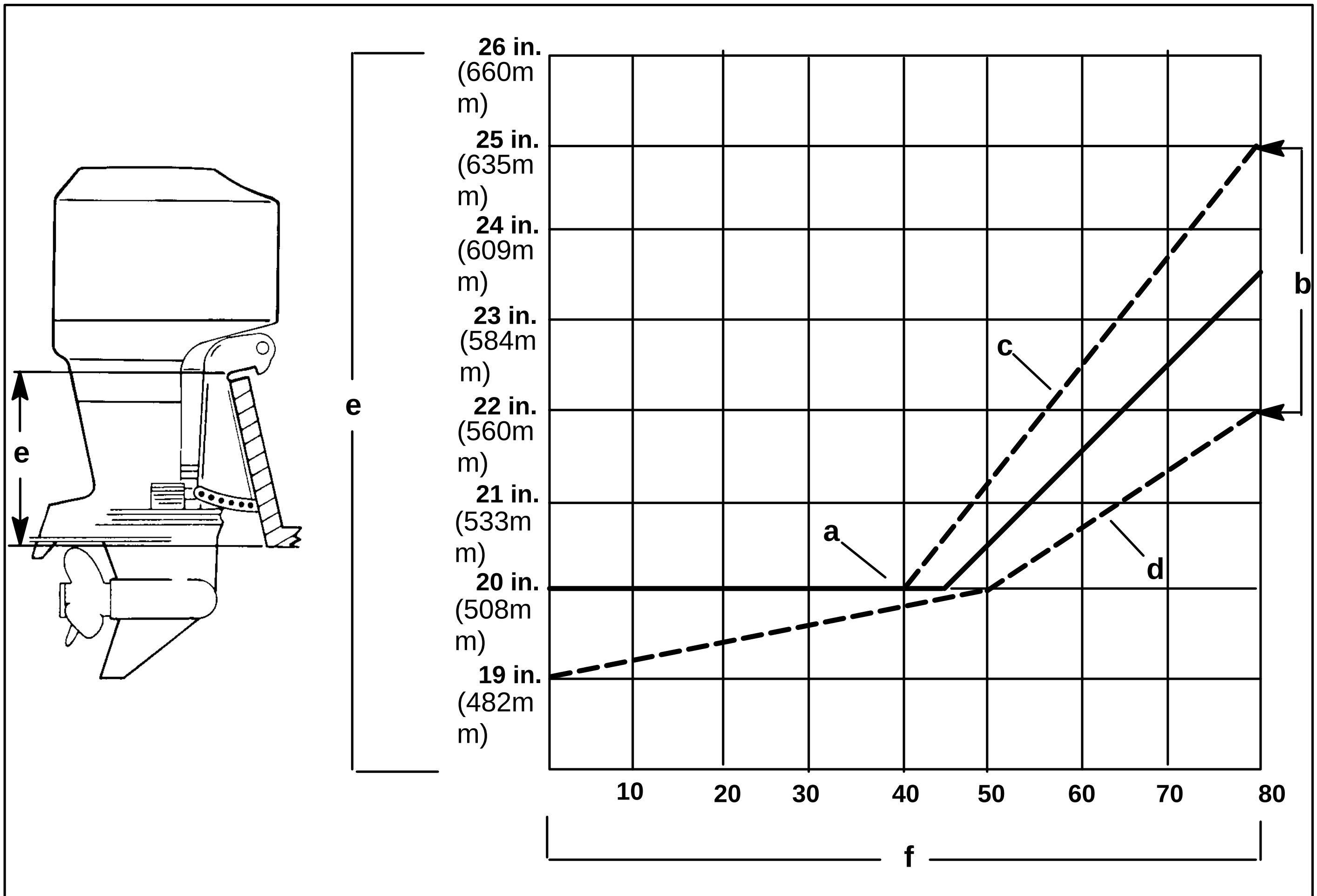
Refer to “Quicksilver Accessories Guide” to determine correct length of steering cables and remote control cables.

IMPORTANT: Steering cables and remote control cables must be the correct length. Sharp bends on too-short cables result in “kinks”; too-long cables require unnecessary bends and/or loops. Both conditions place extra stress on the cables.

Determining Recommended Outboard Mounting Height

⚠ WARNING

Boat instability can occur at high speeds by installing engine at the wrong transom height. Contact the boat manufacturer for their recommendations for a specific engine installation.



NOTE: Add 5 in. (127mm) for XL models and 10 in. (254mm) for XXL models to listed outboard mounting height.

a. This solid line is recommended to determine the outboard mounting height.

IMPORTANT: Increasing the height of outboard generally will provide the following: 1) Less steering torque, 2) more top speed, 3) greater boat stability, but, 4) will cause more prop "break loose" which may be particularly noticeable when planing off or with heavy load.

b. These broken lines represent the extremes of known successful outboard mounting height dimensions.

c. This line may be preferred to determine outboard mounting height dimension, if maximum speed is the only objective.

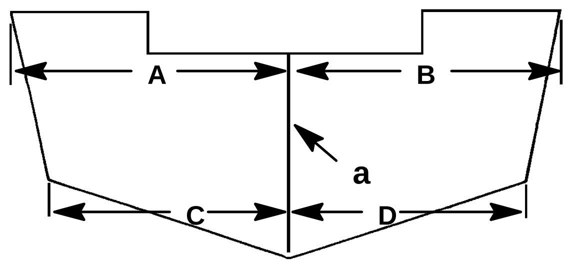
d. This line may be preferred to determine outboard mounting height dimension for dual outboard installation.

e. Outboard mounting height (height of outboard transom brackets from bottom of boat transom). For heights over 22 in. (560mm), a propeller, that is specifically designed for surfacing operation, such as the "Laser" and "Mirage" series, usually are preferred.

f. Maximum boat speed anticipated.

Locating Center Line Of The Outboard

Locate (and mark with pencil) the vertical centerline (a) of boat transom.



a - Centerline of Transom

NOTE: *Dimensions “A” & “B” and “C” & “D” are equal length.*

IMPORTANT: During installation of dual outboards, the following is recommended. A minimum of 221/2 inches (570mm) centerline to centerline width is recommended. This is required to alleviate cowling interference during lock to lock turns if one outboard would be in the full tilt position, while the other outboard(s) are in the vertical running position.

Drilling Outboard Mounting Holes

IMPORTANT: Before drilling any mounting holes, carefully read “Determining Recommended Outboard Mounting Height,” preceding. There is a 3/4 inch (19mm) difference between outboard mounting holes in transom brackets.

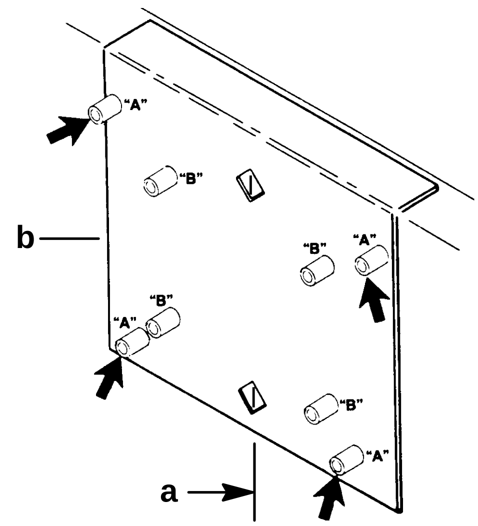
⚠ WARNING

DO NOT, under any circumstances, allow upper outboard mounting bolts to be closer than 1 inch (25.4mm) from top of boat transom. Upper mounting bolts must never be installed thru shims.

NOTE: *When drilling into a fiberglass boat, place masking tape directly onto boat where mounting holes will be drilled to help prevent fiberglass from chipping.*

Use a 17/32 inch (13.5mm) diameter drill bit and drill 4 mounting holes perpendicular to and thru transom.

IMPORTANT: If using “Transom Drilling Fixture” (part number 91–98234A2), use drill guide holes marked “A” when drilling outboard mounting holes.



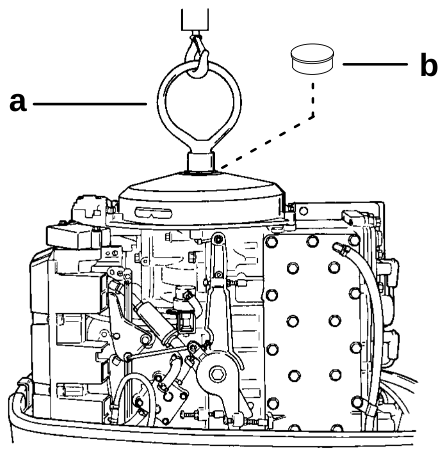
a – Centerline of Transom
b – Transom Drilling Fixture (91–98234A2)

Lifting Outboard

⚠ WARNING

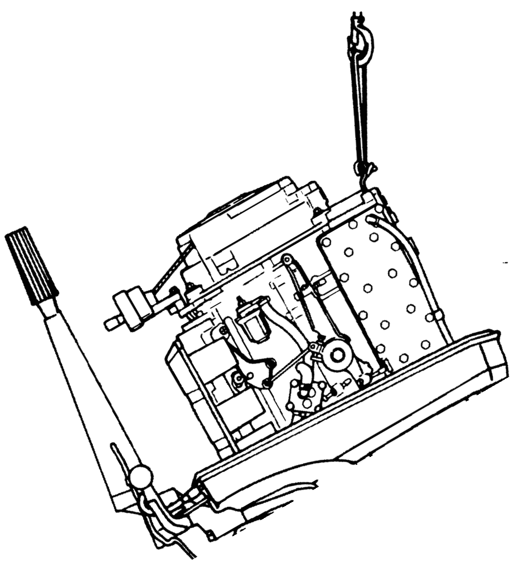
Verify that the lifting ring is threaded into the flywheel a minimum of 5 turns and that hoist has a maximum lift capacity over 500 lbs. (227 kg) BEFORE lifting outboard.

1. Electric Start Models – Remove plastic cap from center of flywheel. Thread lifting ring into flywheel hub a minimum of 5 turns. Replace plastic cap after installation.



a - Lifting Ring
b - Plastic Cap – Replace After Installation

2. Manual Start Models – Use lifting eye on engine and lift outboard on boat transom.



Installing Outboard To Boat Transom

IMPORTANT: If boat is equipped with thru tilt tube steering, steering cable end must be installed into tilt tube of outboard (port outboard only for dual outboard installations) before securing outboard to transom. Refer to "Steering Cable and Steering Link Rod Installation" following.

Refer to "Determining Recommended Outboard Motor Mounting Height", preceding and position outboard on boat transom, to align mounting holes in transom bracket that will place the outboard nearest to the recommended mounting height.

⚠ CAUTION

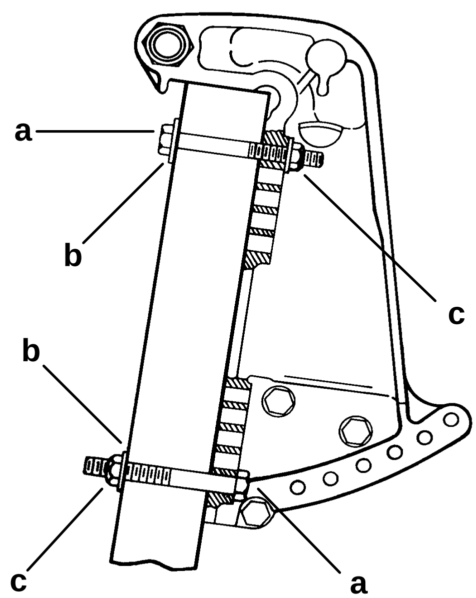
Marine sealer must be used on shanks bolts to make a water-tight installation.

IMPORTANT: DO NOT use an impact driver when tightening transom bolts.

Apply marine sealer to shanks of mounting bolts (not threads) and secure outboard to transom with 4 bolts, flat washers and locknuts, as shown. Be sure that installation is water-tight.

⚠ WARNING

Before operation, the outboard must be correctly installed with four mounting bolts shown. Failure to correctly fasten outboard could result in outboard ejecting off boat transom causing serious injury, death, or property damage.



a - 1/2 Inch Diameter Bolts
b - Flat Washers
c - Locknuts

Single Steering Cable and Steering Link Rod Installation

***NOTE:** These instructions are for single cable–single outboard installations. Instructions for mounting dual engines are included with the applicable dual engine attaching kit. Refer to "Quicksilver Accessories Guide" to determine correct kit.*

Refer to "Quicksilver Accessories Guide" to determine correct length of steering cable.

IMPORTANT: Steering cable must be correct length. Sharp bends on too-short of a cable result in "kinks;" too-long of a cable require unnecessary bends and/or loops. Both conditions place extra stress on the cable.

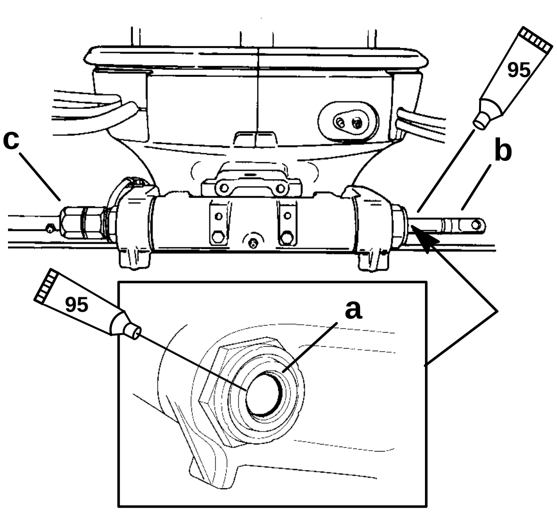
Install steering mount and steering wheel in accordance with installation instructions that accompany each.

Installing Ride Guide Steering Cable To The Outboard

IMPORTANT: Before installing steering cable in tilt tube, lubricate entire cable end with Quicksilver 2-4-C Marine Lubricant.

***NOTE:** Ride Guide steering cable is lubricated at the factory and requires no additional lubrication at initial installation.*

1. Lubricate seal (a) inside of outboard tilt tube and entire cable end (b) with Quicksilver 2-4-C Marine Lubricant.
2. Insert steering cable end thru outboard tilt tube and secure steering cable to tilt tube with steering cable attaching nut (c), as shown. Torque nut to 35 lb. ft. (47.5 N·m).



95 2-4-C With Teflon (92-825407A12)

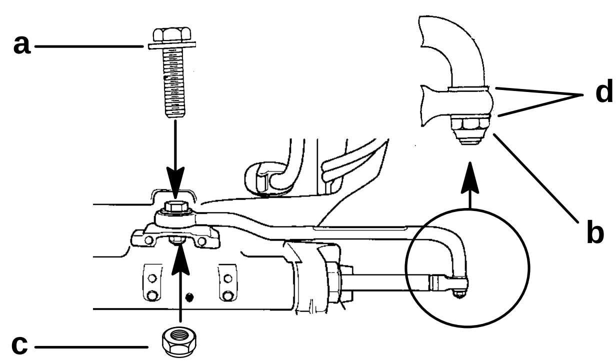
Steering Link Rod Installation

IMPORTANT: The steering link rod that connects the steering cable to the engine must be fastened using special washer head bolt ("a" – Part Number 10-14000) and self locking nuts ("b"& "c"– Part Number 11-34863). These locknuts must never be replaced with common nuts (non locking) as they will work loose and vibrate off freeing the link rod to disengage.

⚠ WARNING

Disengagement of a steering link rod can result in the boat taking a full, sudden, sharp turn. This potentially violent action can cause occupants to be thrown overboard exposing them to serious injury or death.

3. Assemble steering link rod to steering cable with two flat washers (d) and nylon insert locknut ("b" – Part Number 11-34863). Tighten locknut (b) until it seats, then back nut off 1/4 turn.
4. Assemble steering link rod to engine with special washer head bolt ("a" – Part Number 10-14000) and nylon insert locknut ("c"– Part Number 11-34863). First torque bolt (a) to 20 lb. ft. (27.0 N·m), then torque locknut (c) to 20 lb. ft. (27.0 N·m).



⚠ WARNING

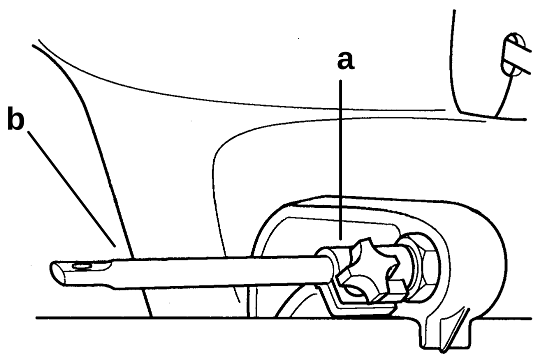
After installation is complete (and before operating outboard), check that boat will turn right when steering wheel is turned right and that boat will turn left when steering wheel is turned left. Check steering thru full range (left and right) and at all tilt angles to assure interference-free movement.

Co-Pilot Installation (Tiller Handle models)

⚠ WARNING

Avoid possible serious injury or death from loss of boat control. The Co-pilot assembly must be installed and adjusted to maintain sufficient steering friction to prevent the outboard from steering into a full turn if the tiller handle is released.

1. Thread the friction collar (a) onto the starboard side of the tilt tube. Tighten securely and position the adjustment knob toward front of outboard.
2. Insert pilot rod (b) into the friction collar.

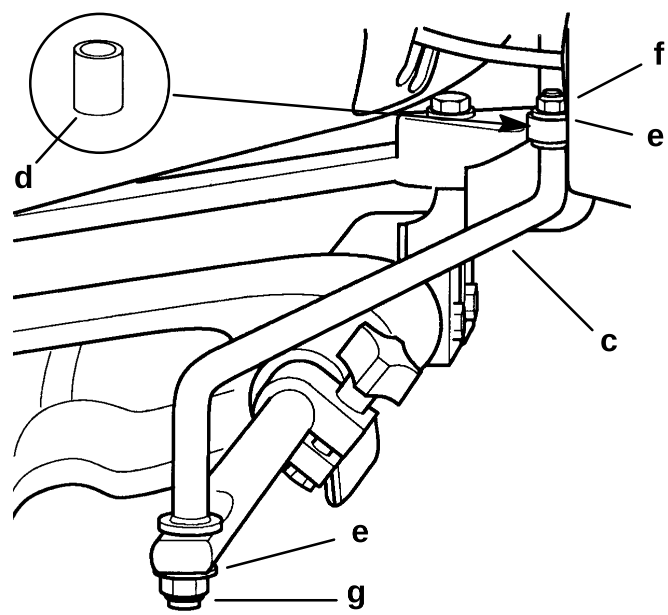


IMPORTANT: The co-pilot link rod (c) must be fastened using self locking nylon insert locknuts ("f"& "g"– Part Number 11-45592).These locknuts must never be replaced with common nuts (non locking) as they will work loose and vibrate off freeing the link rod to disengage.

⚠ WARNING

Disengagement of the co-pilot link rod can result in the boat taking a full, sudden, sharp turn. This potentially violent action can cause occupants to be thrown overboard exposing them to serious injury or death.

3. Lubricate both ends of the link rod with Quicksilver 2-4-C w/Teflon Marine Lubricant. Install link rod between the tiller handle mount and pilot rod as shown.



c - Co-Pilot Link Rod

d - Spacer (Hidden) - Place in the Upper Mounting Hole For The Link Rod.

e - Flat Washer

f - Locknut - Torque to 120 lb. in. (13.6 N·m)

g - Locknut - Tighten Until it Seats; DO NOT exceed 120 lb. in. (13.6 N·m), Then Back Off The Locknut 1/4 Turn.

Remote Control Installation

Refer to “Quicksilver Accessories Guide” to determine correct length of remote control cables.

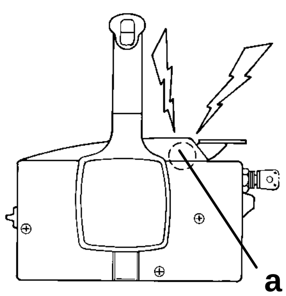
IMPORTANT: Remote control cables must be correct length. Sharp bends on too-short cables result in “kinks;” too-long cables require unnecessary bends and/or loops. Both conditions place extra stress on the cables.

IMPORTANT: Install control cables to remote control and mount remote control BEFORE attaching control cables to engine. Refer to installation instructions included with remote control.

Required Side Mount Remote Control or Ignition Key Switch Assembly

Boats Equipped with Side Mount Remote Control

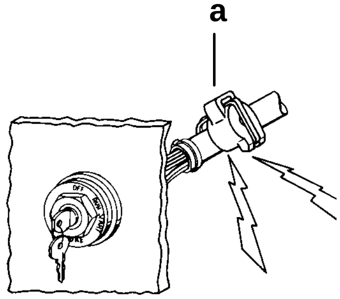
A Quicksilver Commander 2000 series Side Mount Remote Control equipped with a warning horn must be used with this outboard. This warning horn is necessary for the engine warning system.



a -Warning Horn

Boats Equipped with Panel Or Console Mount Remote Control

A Quicksilver Ignition Key/Choke Assembly equipped with a warning horn must be used with this engine. This warning horn is necessary for the engine warning system.



a - Warning Horn

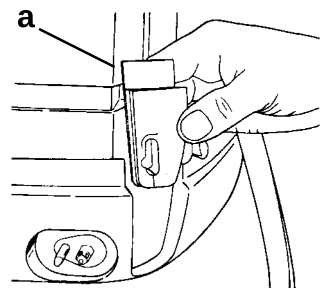
Shift and Throttle Cable Installation To The Outboard

Install the shift cable and throttle cable into the remote control and mount the remote control following instructions which are provided the remote control.

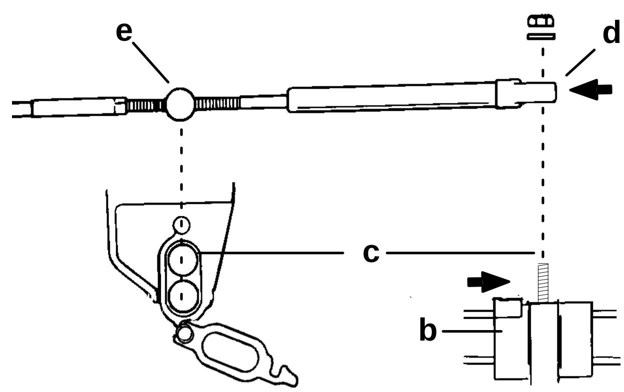
NOTE: *Install the shift cable before the throttle cable. The shift cable is the first cable to move when the remote control handle is moved into gear.*

Shift Cable Installation

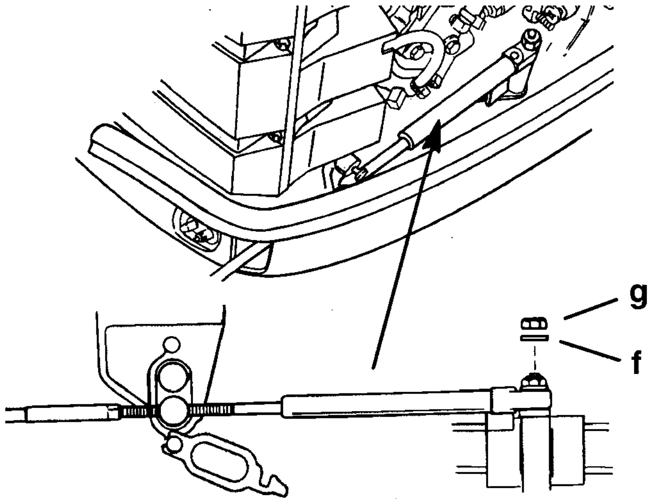
1. Pull up the cowl seal and remove the port side rubber grommet (a).



2. Position the remote control and outboard into neutral.
3. Slide shift actuator (b) toward the rear of engine (reverse gear) until resistance is felt. Measure distance (c) between mounting stud and barrel retainer.
4. Push the cable end (d) in (towards cable barrel) until resistance is felt. Adjust the cable barrel (e) to attain distance (c).



5. Place cable barrel into retainer and fasten the cable end to mounting stud with nylon washer (f) and locknut (g). Tighten locknut against the nylon washer, then back-off the locknut 1/4 turn.



6. Check shift cable adjustments as follows:

   a. With remote control in forward the propshaft should lock solidly in gear. If it does not, adjust the cable barrel closer to the cable end guide.

   b. Shift remote control into neutral. The propshaft should turn freely without drag. If not, adjust the barrel away from the cable end guide. Repeat steps a and b.

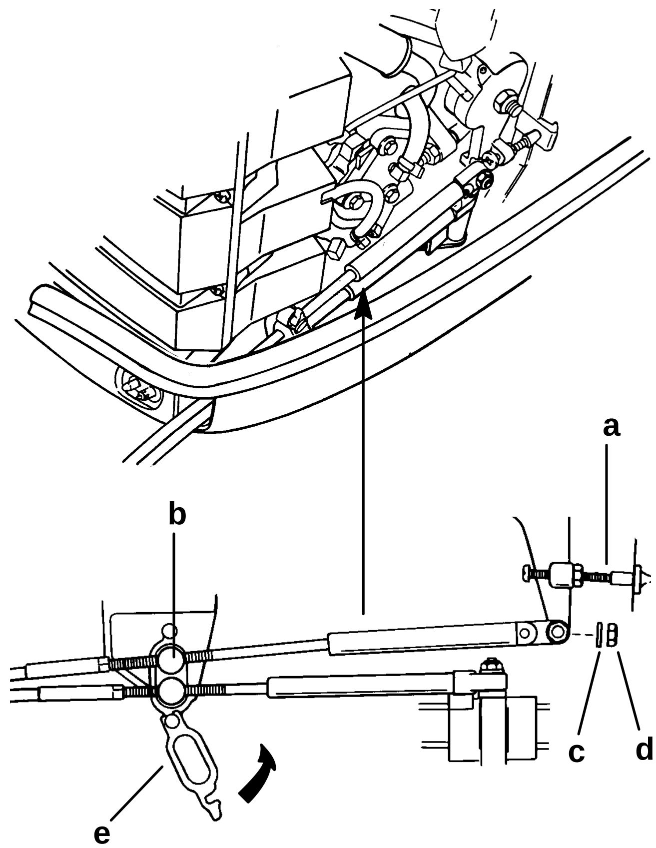
   c. Shift remote control into reverse while turning propeller. The propshaft should lock solidly in gear. If not, adjust the barrel away from the cable end guide. Repeat steps a thru c.

   d. Return remote control handle to neutral. The propeller should turn freely without drag. If not, adjust the barrel closer to the cable end guide. Repeat steps a thru d.

Throttle Cable Installation

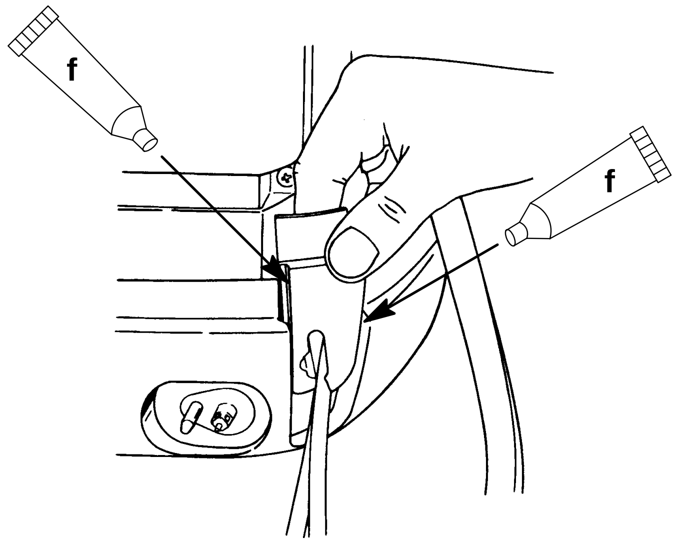
NOTE: *Attach Shift cable to engine prior to attaching throttle cable.*

1. Position the remote control handle into neutral detent.
2. Position adjustment screw (a) against the stop.
3. Adjust throttle cable barrel (b) so the barrel will be able to slip into the retainer when the cable end is on the mounting stud and there is a slight preload against the stop.
4. Check preload on throttle cable by placing a thin piece of paper between adjustment screw and stop. Preload is correct when the paper can be removed without tearing, but has some drag in it. Readjust cable barrel if necessary.
5. Place the throttle cable barrel into the top retainer hole and the cable end on the cable mounting stud. Fasten throttle cable to the mounting stud with nylon washer (c) and locknut (d). Tighten locknut against the nylon washer, then back-off the locknut 1/4 turn.
6. Lock the cable barrels in-place with cable latch (e).



7. Lubricate the port side rubber grommet and reinstall into cowl. Slip the grommet over the control cables. Push the cowl seal back into place.

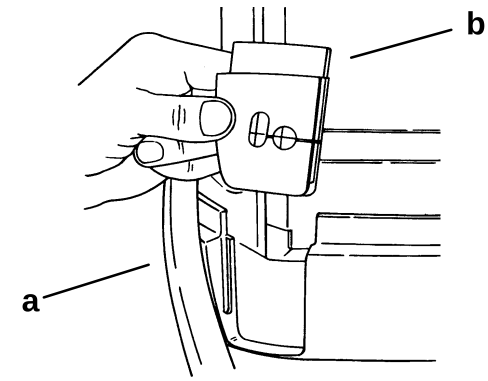
NOTE: *The rubber grommet has to be lubricated to ease installation.*



f – Lubricant

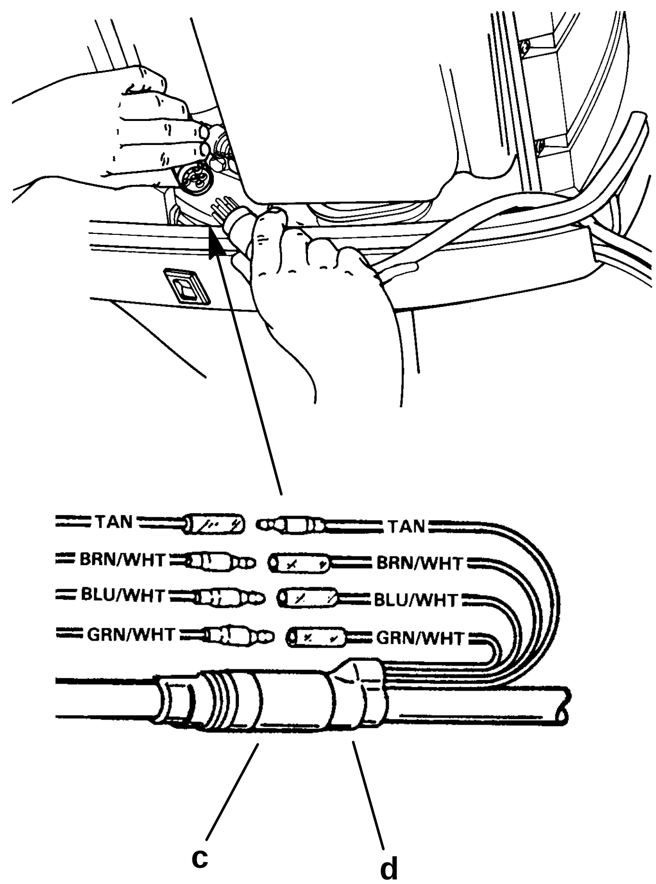
Connecting Remote Wiring Harness To The Engine

1. Pull up the cowl seal (a) and remove the starboard side rubber grommet (b).

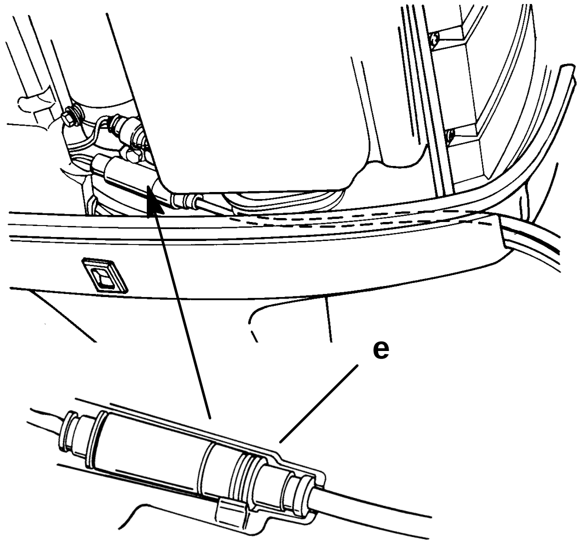


2. Take hold of the engine connector (c) and install the remote wiring harness plug (d). Connect additional wire leads (if equipped) as shown.

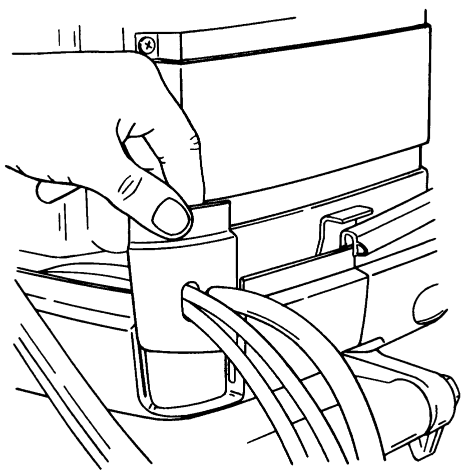
NOTE: *The rubber grommet can to be lubricated to ease installation.*



3. Push the connector and plug into the holder (e).



4. Insert the battery cables and remote wiring harness into the rubber grommet. Reinstall the starboard side rubber grommet into the cowl. Push the cowl seal back in place.



Battery Connections

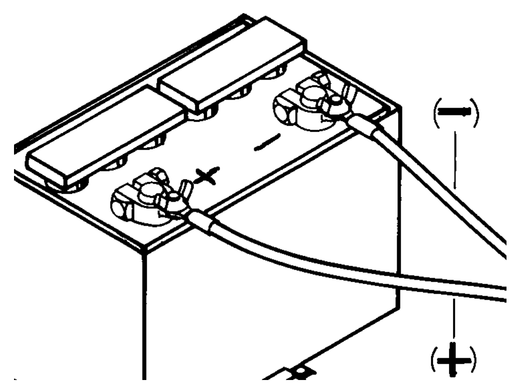
⚠ CAUTION

For dual outboard installations, the black (–) battery cable of each engines starter motor ground circuit, MUST BE connected to each other by a common circuit (cable) capable of carrying the starting current of each engine's starter motor. [i.e. A locally obtained battery cable connected between the negative (–) terminal of each outboards cranking battery].

⚠ CAUTION

Failure to observe correct polarity when connecting battery cables to battery, will result in damage to the charging system.

1. Connect battery cables (from engine) to battery. Connect red battery cable to positive terminal and black battery cable to negative (–) battery terminal.



Set Up Instructions For Oil Injection System

⚠ CAUTION

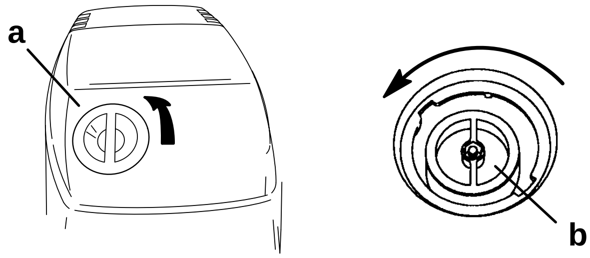
Oil injected engines additionally, must be run on a 50:1 gasoline/oil mixture during the engine break-in period. Refer to engine break-in procedure in the Operation & Maintenance Manual.

⚠ CAUTION

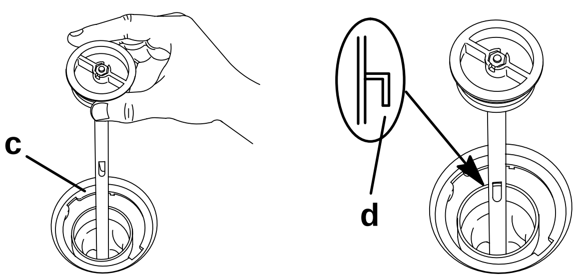
If an electric fuel pump is to be used on engines with oil injection, the fuel pressure at the engine must not exceed 4 psig. If necessary, install a pressure regulator between electrical fuel pump and engine and set at 4 psig maximum.

Filling The Oil Injection System

1. Open the cowl cap (a). Turn the oil fill cap (b) to the left and remove.



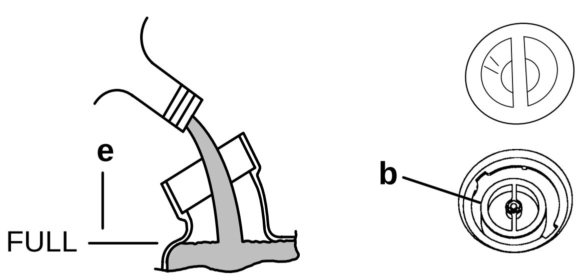
2. Use the dipstick (c) to check oil level.
3. Hook the dipstick (d) on the tank during filling.



4. Slowly fill the oil tank with the specified oil. <u>Do Not overfill</u> – add only enough oil to bring the oil level up to the bottom of the fill neck (e).

Note:The oil tank capacity for three cylinder models is 3.2 qt. (3.0 liters) and four cylinder models is 5.13 qt. (4.9 liters).

5. Install oil filler cap (b) and re-tighten. Reinstall the cowl cap.



Bleeding Air From The Oil Injection System

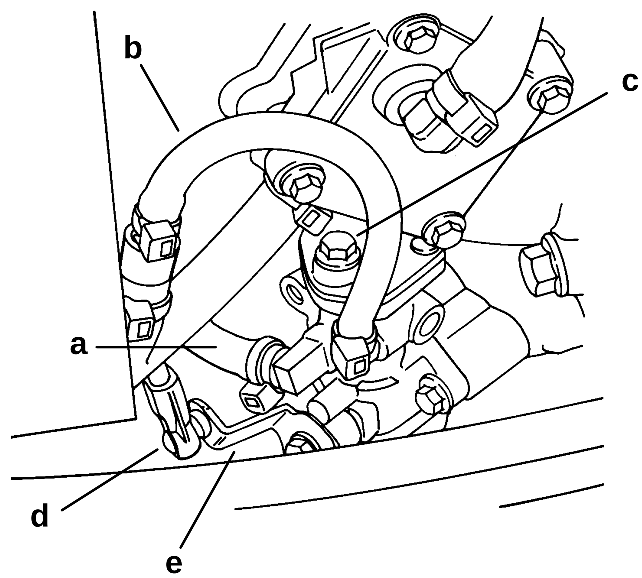
IMPORTANT: If air exists in either the oil pump inlet hose (a) or oil pump outlet hose (b), the air MUST BE bled from the hose(s) or engine damage may occur.

BLEEDING AIR FROM THE OIL PUMP INLET HOSE

1. With the engine not running, place a shop towel below the oil pump.
2. Loosen bleed screw (c) four turns and allow oil to flow out of the bleed hole until no air bubbles exist in the inlet hose (a).

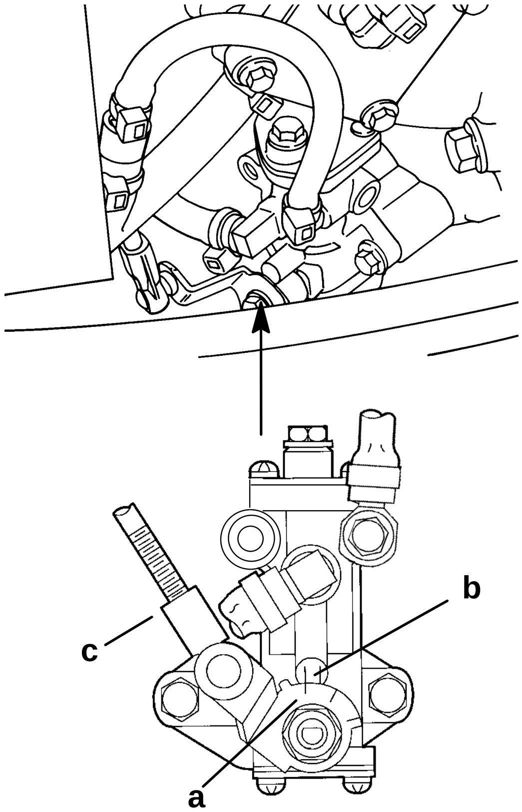
BLEEDING AIR FROM THE OIL PUMP OUTLET HOSE

3. If any air bubbles are present in the outlet hose (b), they can be purged from the hose by removing link rod (d) from the oil pump and rotating the pump arm (e) full clockwise while operating engine at 1000 to 1500 RPM.



Adjusting The Oil Injection Pump

When carburetor linkage is at idle position, alignment mark (a) on oil injection arm should be in-line with mark (b) on pump as shown. If necessary, adjust link rod (c).



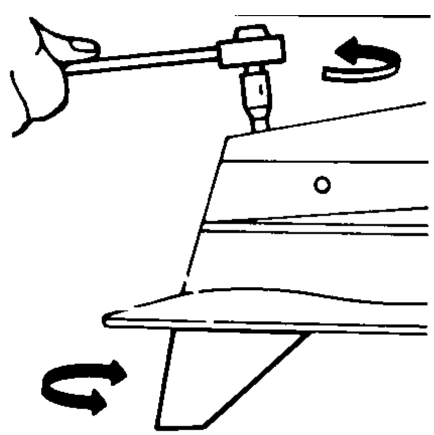
Trim Tab Adjustment

Propeller steering torque will cause your boat to pull in one direction. This steering torque is a normal thing that results from your outboard not being trimmed so the propeller shaft is parallel to the water surface. The trim tab can help to compensate for this steering torque in many cases and can be adjusted within limits to reduce any unequal steering effort.

NOTE: *Trim tab adjustment will have little effect reducing steering torque if the outboard is installed with the anti-ventilation plate approximately 2 inches (50mm) or more above the boat bottom.*

Operate your boat at normal cruising speed, trimmed to desired position. Turn your boat left and right and note the direction the boat turns more easily.

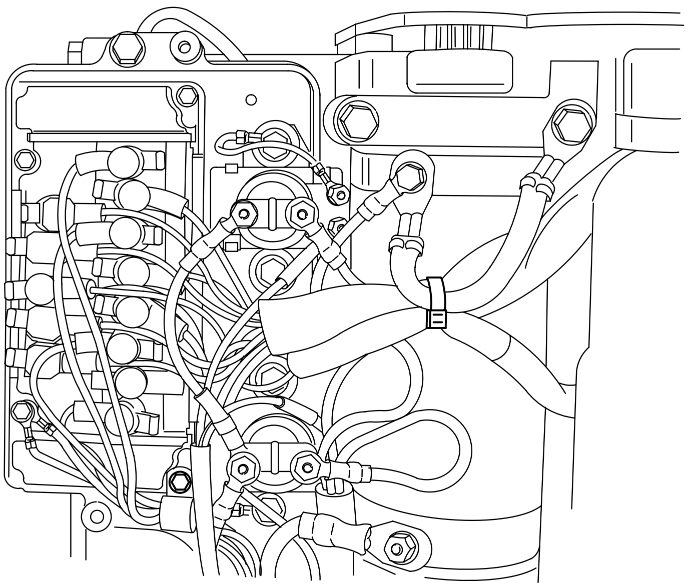
If adjustment is necessary, loosen trim tab bolt and make small adjustments at a time. If the boat turns more easily to the left, move the trailing edge of trim tab to the left. If the boat turns more easily to the right move the trailing edge of trim tab to the right. Retighten bolt and retest.



ELECTRICAL

2

A



IGNITION

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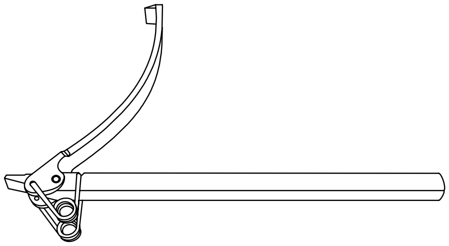
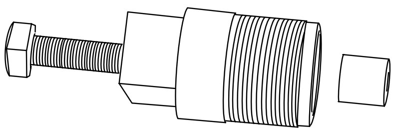
Special Tools

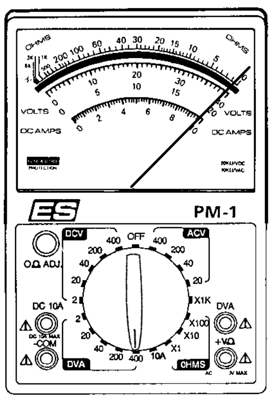
1. Flywheel Holder 91-52344



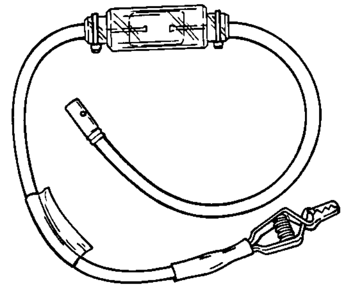
2. Flywheel Puller 91-73687A1



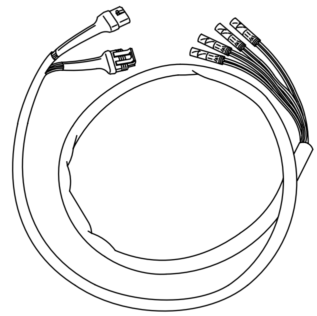
3. Volt/Ohm/DVA Meter 91-99750



4. Spark Gap Tester 91-63998A1

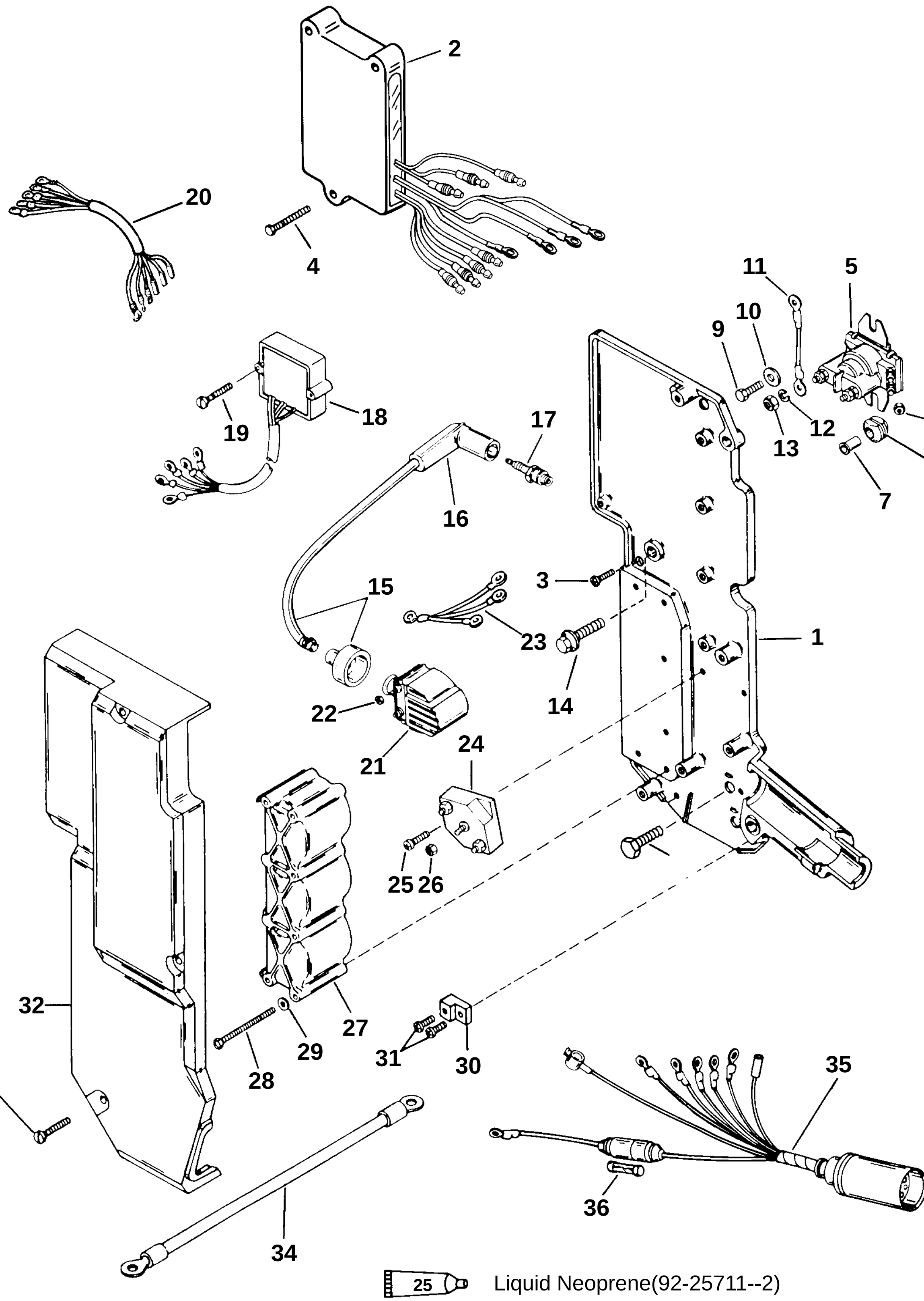


5. CDM Test Harness 84-825207A2



3 Cylinder Electrical Components (USA-0G127499/BEL-9836632 & BELOW)

IMPORTANT: All eyelet electrical connections should be coated with LIQUID NEOPRENE after respective screw, bolt or nut is tightened.

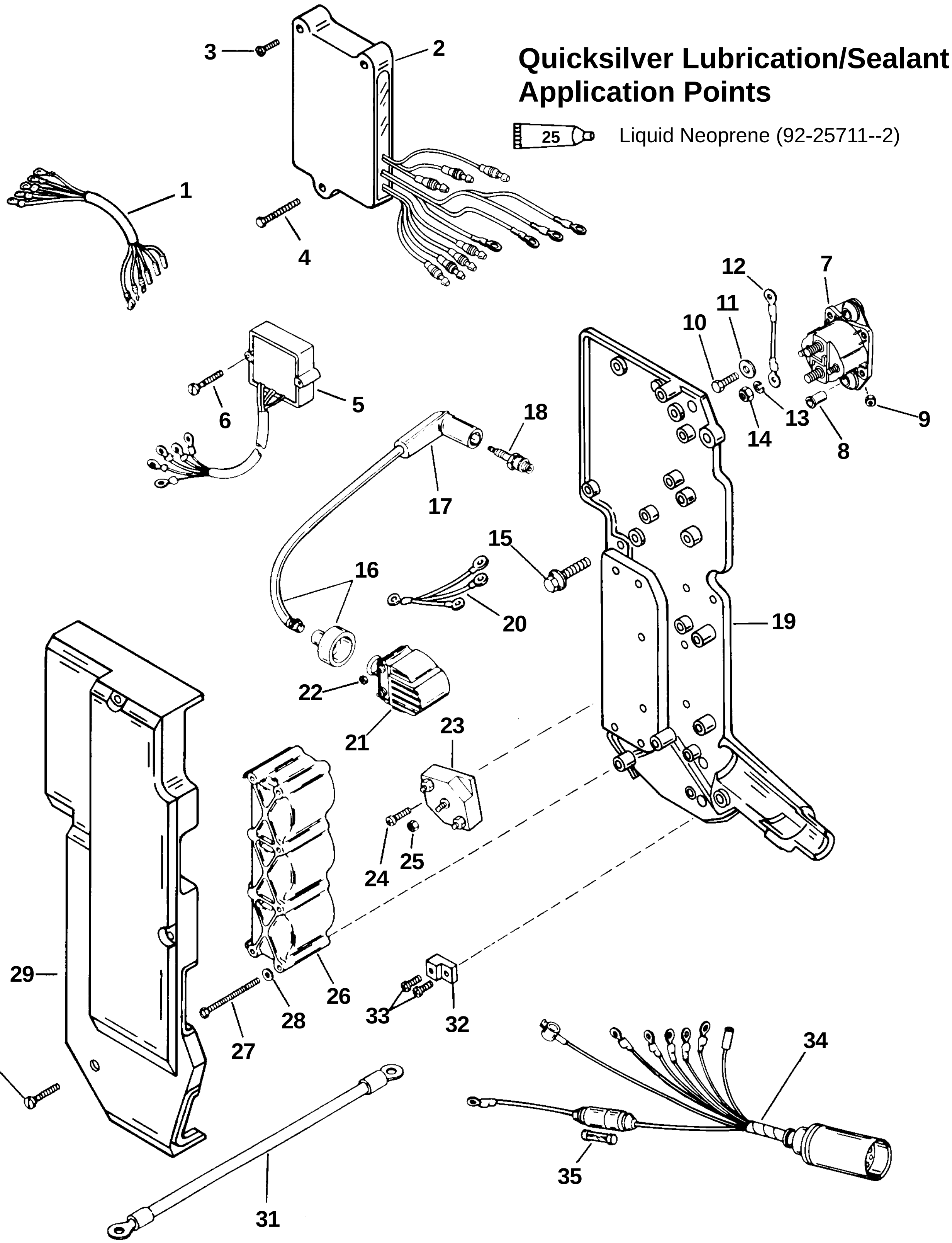


Liquid Neoprene(92-25711--2)

3 Cylinder Electrical Components (USA-0G127499/BEL-9836632 & BELOW)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	IGNITION PLATE			
2	1	SWITCH BOX ASSEMBLY			
3	1	SCREW(10-16 x 7/16 IN.)		Drive Tight	
4	3	SCREW(M5 x .8 x 30)	40		4.5
5	1	STARTER SOLENOID			
6	2	GROMMET			
7	2	BUSHING			
8	2	NUT(8-32)	20		2.3
9	2	SCREW	40		4.5
10	2	WASHER			
11	1	WIRE(BLACK)			
12	2	LOCKWASHER(1/4 IN.)			
13	2	NUT(1/4-20)	50		5.6
14	3	SCREW		13.5	18.3
15	1	HIGH TENSION CABLE			
16	3	PROTECTOR			
17	3	SPARK PLUG(NGK #BUHW-2)		20	27
	3	SPARK PLUG(BELGIUM/CANADA)(NGK#BUZHW-2)		20	27
	3	SPARK PLUG(BELGIUM/CANADA)(NGK#BUZHW)		20	27
18	1	VOLTAGE REGULATOR			
19	2	SCREW	70		7.9
20	1	HARNESS			
21	3	IGNITION COIL ASSEMBLY			
22	6	NUT	30		3.4
23	1	CABLE–ignition coil(BLACK - 3-1/4 IN.)			
24	1	RECTIFIER			
25	2	SCREW	30		3.4
26	3	NUT	20		2.3
27	1	COVER			
28	6	SCREW	20		2.3
29	6	WASHER			
30	1	TERMINAL BLOCK			
31	2	SCREW		Drive Tight	
32	1	COVER			
33	3	SCREW	30		3.4
34	1	BATTERY CABLE **(POSITIVE)**			
	1	BATTERY CABLE **(NEGATIVE)**			
35	1	ENGINE HARNESS **(ELECTRIC)**			
36	1	FUSE(20 AMP)			

Electrical Components
(USA-0G127500 thru 0G437999)(BEL-9836633 thru 9926999)



Quicksilver Lubrication/Sealant Application Points

25 Liquid Neoprene (92-25711--2)

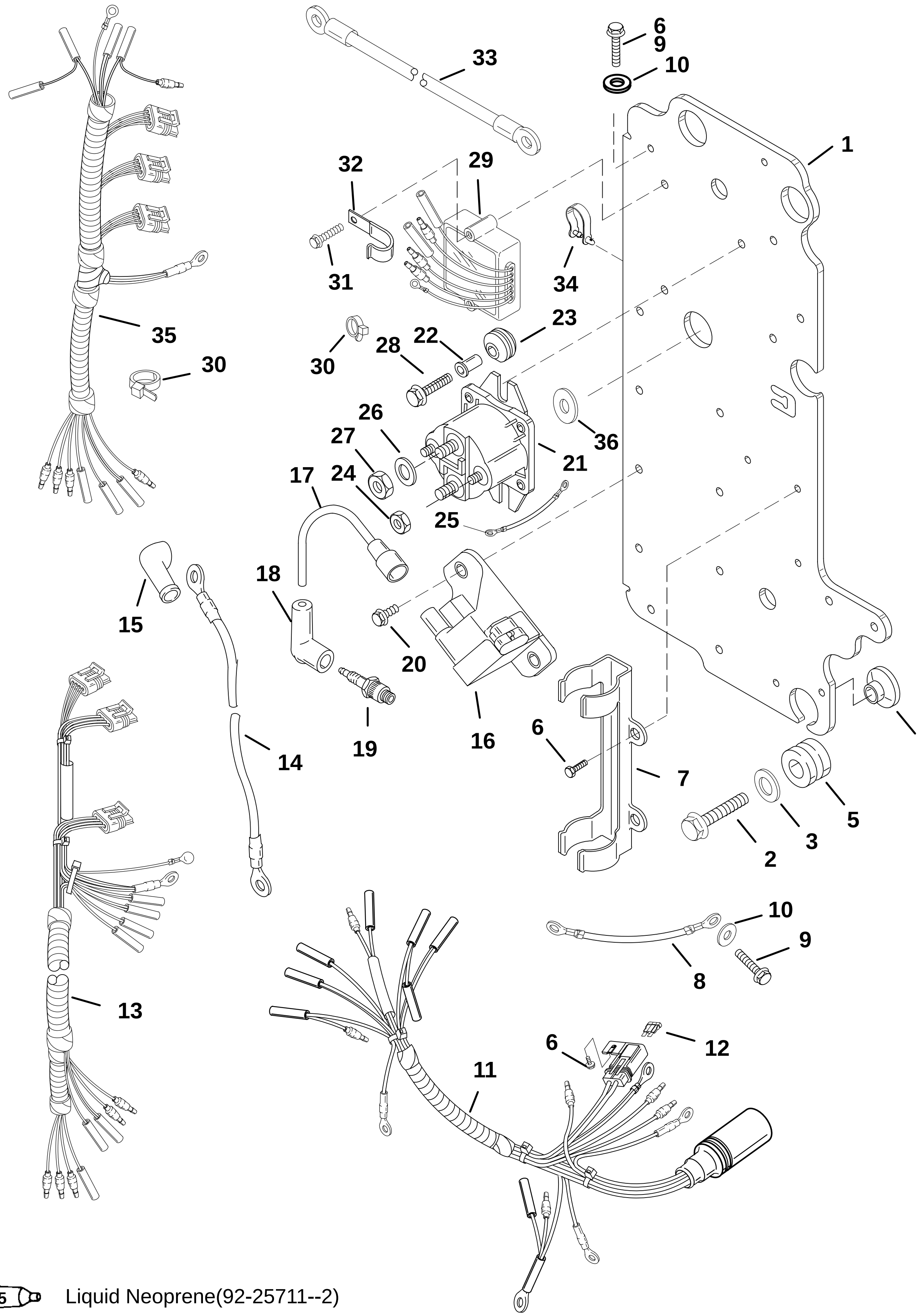
IMPORTANT: All eyelet electrical connections should be coated with LIQUID NEOPRENE after respective screw, bolt or nut is tightened

Electrical Components
(USA-0G127500 thru 0G437999)(BEL-9836633 thru 9926999)

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	HARNESS			
2	1	SWITCH BOX			
3	1	SCREW (M5 x 12)			
4	3	SCREW (M5 x .8 x 30)	40		4.5
5	1	VOLTAGE REGULATOR			
6	2	SCREW	70		7.9
7	1	STARTER SOLENOID			
8	2	BUSHING			
9	2	NUT (8-32)	20		2.3
10	2	SCREW	40		4.5
11	2	WASHER			
12	1	WIRE (BLACK – 3-1/2 IN.)(Use where Applicable)			
	1	WIRE (BLACK – 5 IN.)			
	1	WIRE (BLACK – 6 IN.)			
	1	WIRE (RED – 7-1/2 IN.)(Use where Applicable)			
13	2	LOCKWASHER (5/16 IN.)			
14	2	NUT (5/16-8)	50		5.6
15	3	SCREW		13.5	18.3
16	1	HIGH TENSION CABLE			
17	3	PROTECTOR			
18	3	SPARK PLUG (NGK #BUHW-2)		20	27
	3	SPARK PLUG (BELGIUM/CANADA)(NGK#BUZHW-2)		20	27
	3	SPARK PLUG (BELGIUM/CANADA)(NGK#BUZHW)		20	27
19	1	IGNITION PLATE			
20	1	CABLE–ignition coil (BLACK - 7 IN.)			
	1	CABLE–ignition coil (BLACK - 3-1/4 IN.)			
21	3	IGNITION COIL ASSEMBLY			
22	6	NUT	30		3.4
23	1	RECTIFIER			
24	2	SCREW	30		3.4
25	2	NUT	20		2.3
26	1	COVER			
27	6	SCREW	20		2.3
28	6	WASHER			
29	1	COVER			
30	3	SCREW (M5 x .08 x 30)	30		3.4
31	1	BATTERY CABLE **(POSITIVE)**			
	1	BATTERY CABLE **(POSITIVE-ELEC.-NON/OIL)**			
	1	BATTERY CABLE **(NEGATIVE)**			
32	1	TERMINAL BLOCK **DOUBLE QTY.'S**			
33	2	SCREW **FOR ELECTRIC MODELS**	Drive Tight		
34	1	ENGINE HARNESS **(ELECTRIC)**			
35	1	FUSE (20 AMP)			

3 Cylinder Electrical Components (USA-S/N-0G438000/BEL-9937000 & UP)

IMPORTANT: All eyelet electrical connections should be coated with LIQUID NEOPRENE after respective screw, bolt or nut is tightened.

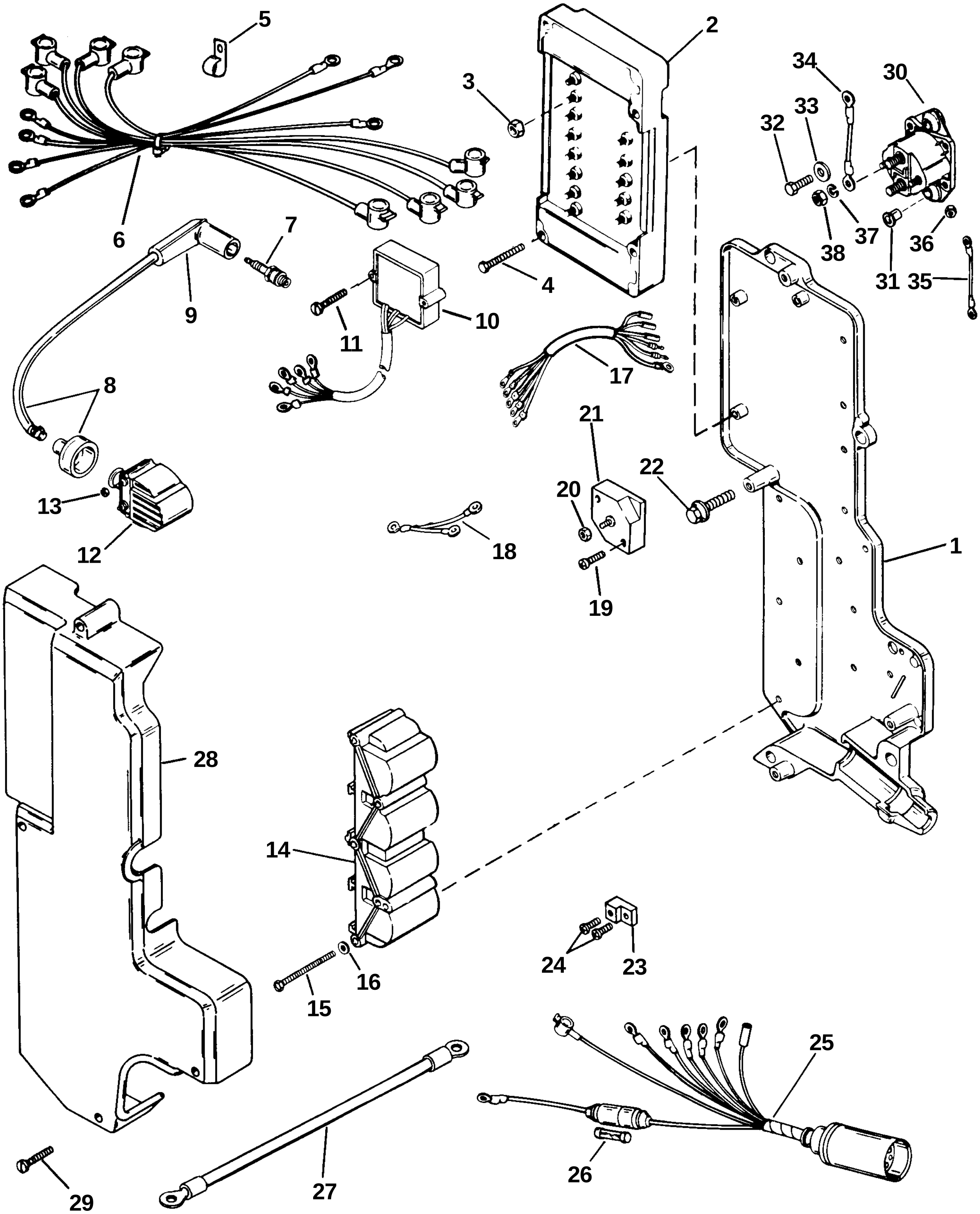


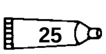
25 Liquid Neoprene(92-25711--2)

3 Cylinder Electrical Components
(USA-S/N-0G438000/BEL-9937000 & UP)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	IGNITION PLATE			
2	3	SCREW(M8 x 30)			
3	3	WASHER			
4	3	BUSHING			
5	3	GROMMET			
6	4	SCREW(M5 x 12) **ELECTRIC**			
7	1	CLAMP			
8	1	CABLE(10 IN.)			
9	2	SCREW(M5 x 12)			
10	2	WASHER			
11	1	HARNESS-Engine			
12	1	FUSE **ELECTRIC**			
13	1	HARNESS-Ignition			
14	1	BATTERY CABLE **(POSITIVE)**			
15	1	BOOT			
16	3	CDM			
17	3	HI–TENSION CABLE			
18	3	BOOT			
19	3	SPARK PLUG(NGK #BUHW-2)		20	27
	3	SPARK PLUG(BELGIUM/CANADA)(NGK#BUZHW)		20	27
20	6	SCREW(M6 x 16)			
21	1	STARTER SOLENOID			
22	2	BUSHING			
23	2	GROMMET			
24	2	NUT(8-32) **ELECTRIC**			
25	1	CABLE			
26	2	LOCKWASHER(5/16 IN.)			
27	2	NUT(5/16-8)			
28	2	SCREW(M6 x 25)			
29	1	VOLTAGE REGULATOR			
30	1	STA–STRAP			
31	2	SCREW(M6 x 35)			
32	1	J CLIP			
33	1	CABLE			
34	2	CLAMP			
35	1	HARNESS-Engine **(MANUAL)**			
36	1	WASHER			

4 Cylinder Electrical Components (S/N-USA-437999/BEL-9926999 & BELOW)





Liquid Neoprene (92-25711--2)

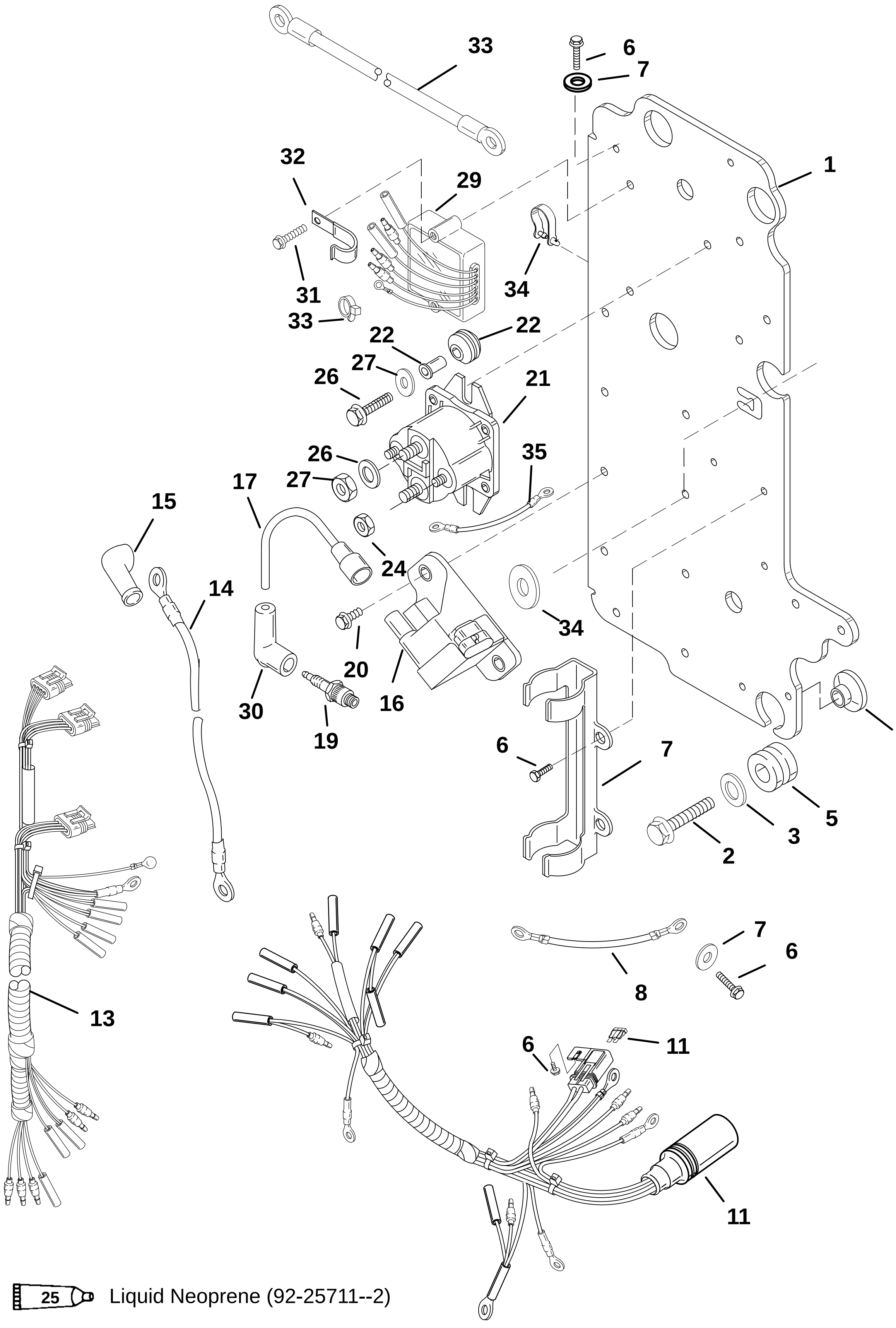
IMPORTANT: All eyelet electrical connections should be coated with LIQUID NEOPRENE after respective screw, bolt or nut is tightened.

4 Cylinder Electrical Components (S/N-USA-437999/BEL-9926999 & BELOW)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
–	2	PLUG–female wires			
1	1	IGNITION PLATE			
2	1	SWITCH BOX ASSEMBLY			
3	13	NUT	20		2.3
4	4	SCREW	40		4.5
5	1	J-CLIP			
6	1	PRIMARY HARNESS ASSEMBLY			
7	4	SPARK PLUG (NGK #BP8H-N-10)		20	27
	4	SPARK PLUG (CAN/BEL-NGK#BPZ8H-N-10)		20	27
8	1	HIGH TENSION CABLE **(S/N–USA–0G301750/BEL–9885504 & BELOW)**			
	1	HIGH TENSION CABLE **(S/N–USA–0G301751/BEL–9885505 & UP)**			
9	4	PROTECTOR			
10	1	VOLTAGE REGULATOR			
11	2	SCREW	70		7.9
12	4	IGNITION COIL ASSEMBLY			
13	8	NUT	20		2.3
14	1	COVER			
15	5	SCREW	20		2.3
16	5	WASHER			
17	1	HARNESS			
18	1	CABLE (6-1/2 IN.)			
	1	CABLE (4-3/4 IN.)			
19	2	SCREW	30		3.4
20	3	NUT **Use Where Applicable**	20		2.3
21	1	TERMINAL BLOCK			
22	4	SCREW		13.5	18.3
23	2	TERMINAL BLOCK			
24	4	SCREW	Drive Tight		
25	1	ENGINE WIRING HARNESS			
26	1	FUSE (20 AMP)			
27	1	BATTERY CABLE **(POSITIVE)**			
	1	BATTERY CABLE **(NEGATIVE)**			
28	1	COVER			
29	3	SCREW **(50 MM)**	30		3.4
	1	SCREW **(30 MM)**	40		4.5
30	1	STARTER SOLENOID			
31	2	BUSHING			
32	2	SCREW	40		4.5
33	2	WASHER			
34	AR	WIRE (BLACK)			
35	1	WIRE **(RED - 4-1/4 IN.)(Use where applicable)**			
	1	WIRE **(RED - 11-1/2 IN.)**			
36	2	NUT	20		2.3
37	2	LOCKWASHER (5/16 IN.)			
38	2	NUT (5/16-18)			

4 Cylinder Electrical Components (USA-S/N-0G438000/BEL-9937000 & UP)

IMPORTANT: All eyelet electrical connections should be coated with LIQUID NEOPRENE after respective screw, bolt or nut is tightened.



Liquid Neoprene (92-25711--2)

4 Cylinder Electrical Components (USA-S/N-0G438000/BEL-9937000 & UP)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	IGNITION PLATE			
2	3	SCREW (M8 x 30)			
3	3	WASHER			
4	3	BUSHING			
5	3	GROMMET			
6	5	SCREW (M5 x 12)			
7	2	WASHER			
8	1	CLAMP			
9	1	CABLE (10 IN.)			
10	1	HARNESS-Engine			
11	1	FUSE			
12	1	HARNESS-Ignition			
13	1	BATTERY CABLE **(POSITIVE)**			
14	1	BOOT			
15	4	CDM **(S/N-USA-0G589999/BEL-9973099 & BELOW)**			
	4	CDM **(S/N-USA-0G590000/BEL-9973100 & UP)**			
16	4	HI–TENSION CABLE			
17	4	BOOT			
18	4	SPARK PLUG (NGK #BP8H-N-10)		20	27
	4	SPARK PLUG (NGK#BPZ8H-N-10)		20	27
19	8	SCREW (M6 x 16)			
20	1	STARTER SOLENOID			
21	2	BUSHING			
22	2	GROMMET			
23	2	NUT (8-32)			
24	2	LOCKWASHER (5/16 IN.)			
25	2	NUT (5/16-8)			
26	2	SCREW (M6 x 25)			
27	1	WASHER			
28	1	VOLTAGE REGULATOR			
29	2	SCREW (M6 x 35)			
30	1	J CLIP			
31	1	CABLE			
32	2	CLAMP			
33	1	STA–STRAP			
34	1	WASHER			
35	1	CABLE			

Description

The outboard ignition system is alternator-driven with distributor-less capacitor discharge. Major components of the ignition system are the flywheel, stator, trigger, switch box, ignition coils and spark plugs.

The stator assembly is mounted stationary below the flywheel and has 2 capacitor charging coils. The flywheel is fitted with permanent magnets inside the outer rim. As the flywheel rotates the permanent magnets pass the capacitor charging coils. This causes the capacitor charging coils to produce AC voltage. The AC voltage then is conducted to the switch box where it is rectified and stored in a capacitor.

The trigger assembly (also mounted under the flywheel) has 3 coils – 3 cylinder models and 2 coils for 4 cylinder models. The flywheel has a second set of permanent magnets (located around the center hub). As the flywheel rotates the second set of magnets pass the trigger coils. This causes the trigger coils to produce an AC voltage that is conducted to an electric Silicon Controlled Rectifier (SCR) in the switch box.

The switch discharges the capacitor voltage into the ignition coil at the correct time and firing order sequence.

Capacitor voltage is conducted to the primary side of the ignition coil. The ignition coil multiplies this voltage high enough to jump the gap at the spark plug.

The preceding sequence occurs once-per-engine-revolution for each cylinder.

Spark timing is changed (advanced/retarded) by rotating the trigger assembly which changes each trigger coil position in relation to the permanent magnets on the flywheel center hub.

IMPORTANT: If the engine misfires, runs rough or does not start, the ignition system should be checked using a Multi-Meter/DVA Tester (91-99750), or a voltmeter (capable of measuring 400 volts DC, or higher) and Direct Voltage Adaptor (91-89045).

Test Procedures

Direct Voltage Adapter (DVA) Tests

⚠ WARNING

DANGER - HIGH VOLTAGE/SHOCK HAZARD! Do not touch ignition components and/or metal test probes while engine is running and/or being “cranked.” STAY CLEAR OF SPARK PLUG LEADS. To assure personal safety, each individual spark plug lead should be grounded to engine.

⚠ CAUTION

To protect against meter and/or component damage, observe the following precautions:

- **400 VDC* test position (or higher) MUST BE used for all tests.**
- **INSURE the Positive (+) lead/terminal of DVA is connected to the Positive (+) receptacle of meter.**
- **DO NOT CHANGE meter selector switch position while engine is running and/or being “cranked.”**
- **Switch box MUST BE GROUNDED during tests. Running or “cranking” engine with switch box ungrounded may damage switch box.**

* If using a meter with a built-in DVA, the DVA/400 VDC test position should be used.

***NOTE:** Test leads are not supplied with the DVA. Use test leads supplied with meter.*

Test procedures and specifications are provided for **checking primary ignition voltage** while the engine is **running** and/or being **“cranked.”**

TROUBLESHOOTING TIPS:
3 CYLINDER MODELS –

1. Intermittent, weak, or no spark output at **one** spark plug usually indicates a **bad GROUND, SPARK PLUG, COIL, SWITCH BOX or TRIGGER.**
2. Intermittent, weak, or no spark output at all **three** spark plugs usually indicates a **bad STATOR, SWITCH BOX or STOP CIRCUIT. A defective WHITE/BLACK Lead for the trigger will also cause intermittant, weak or no spark at all 3 cylinders as this lead is the return path for all 3 triggers.**

TROUBLESHOOTING TIPS:
4 CYLINDER MODELS –

1. Intermittent, weak, or no spark output at **two** spark plugs usually indicates a **bad TRIGGER.**
2. Intermittent, weak, or no spark output at all **four** spark plugs usually indicates a **bad STATOR, SWITCH BOX or STOP CIRCUIT.**
3. Intermittent, weak, or no spark at any **one** spark plug usually indicates a bad **GROUND, SPARK PLUG, COIL, or SWITCH BOX.**

Test Sequence

1-A) Check primary input voltage to coils. (See Test Chart).

1. If voltage readings to coil(s) are **BELOW** specification, proceed with **Step 2-A.**
2. If voltage readings to coil(s) are **WITHIN** specifications, proceed with **Step 1-B.**

1-B) Check coils for spark. [Connect Spark Gap Tester (91-63998A1) between coil high voltage tower and spark plug.]

1. No spark or weak spark. **COIL** is bad.
2. Spark is OK, proceed with **Step 1-C.**

1-C) If Step 1-A and 1-B check OK, replace spark plugs.

If problem exists after replacing spark plugs, proceed with **Step 1-D.**

1-D) If Steps 1-A, 1-B, and 1-C check OK, check ignition timing.

1. If ignition timing **does not** check to specification (or a sudden or unexplained timing change occurs) check trigger advance linkage for loose and/or broken parts and check trigger magnet ring (on flywheel hub) for looseness and/or a shift in position.
2. If ignition checks to specification and engine does not run or runs poorly, **trouble exists with fuel system or engine mechanical.**

2-A) Check switch box "stop" circuit. (See Test Chart).

1. If reading is **BELOW** specifications, proceed with **Step 2-B.**
2. If reading is **ABOVE** specifications, the **Trigger** or **Switch Box** is bad (test trigger as outlined in this service manual section; if trigger checks OK, replace switch box and repeat check).
3. If reading is **WITHIN** specifications, proceed with **Step 3-A.**

2-B) Check ignition switch/wiring, as follows:

⚠ CAUTION

To prevent engine from starting, remove spark plug leads from ALL spark plugs and ground leads to engine.

1. Disconnect **ignition switch and stop switch** leads from switch box and isolate the leads.
2. Repeat check in **Step 2-A.**
3. If reading is still **BELOW** specification, proceed with **Step 3-A.**
4. If reading is **WITHIN** specification, **either the ignition switch, stop switch,** or **wiring** is bad.

3-A) Check stator low speed and high speed input to switch box. (See Test Chart).

1. If either the low speed or high speed reading to switch box is **BELOW** specification, **Stator** or **Switch Box** is bad (test stator as outlined in this service manual section; if stator checks to specification replace switch box and repeat check).
2. If both the low speed and high speed reading are **WITHIN** specification, replace switch box and repeat test.

Ignition System DVA Specifications Test Chart

IMPORTANT: BEFORE attempting the ignition system checks, following, read the preceding pages of these instructions to become familiar with the proper test sequence and procedures (particularly any “Safety Warnings” and “Cautions”). ALL tests are performed with lead wires connected – terminals exposed. SWITCH BOX MUST BE GROUNDED (CASE TO ENGINE BLOCK) FOR ALL TESTS – IF NOT, SWITCH BOXES MAY BE DAMAGED.

3 Cylinder Stators
75 Manual with 9 Ampere Stator 398-9873A20, USA-0D283222 thru 0G227199
75/90 Electric with 16 Ampere Stator 398-9710A3, USA-0D283222 thru 0G280043
Belgium-09793577 thru 09879064

ADI Test Seq.	Test	Selector Sw. Position	DVA Leads		Voltage Reading(1) @ 300-1000 RPM	Voltage Reading @ 1000-4000 RPM
			Red	Black		
1-A	Coil Primary	400 VDC*	Coil (+) Terminal	Coil (–) Terminal	150-250	180-280
2-A	Sw. Box – Stop Circuit	400 VDC*	Black/Yellow (3) Sw. Box Terminal	Ground	200-360	200-360
3-A 4-A	Stator – Low Speed	400 VDC*	Blue Sw. Box Terminal	Ground	200-300	200-330
3-A 4-A	Stator – High Speed	400 VDC*	Red Sw. Box Terminal	Ground	20-90	130-300
5-A	Sw. Box – Bias	20 VDC or 40 VDC	[See Note (1)] Ground	White/Black Sw. Box Terminal	2-10	10-30

4 Cylinder with 16 Ampere Stator 398-9710A31
USA-0D283222 thru 0G301750
Belgium-09793577 thru 09885527

ADI Test Seq.	Test	Selector Sw. Position	DVA Leads		Voltage Reading(1) @ 300-1000 RPM	Voltage Reading @ 1000-4000 RPM
			Red	Black		
1-A	Coil Primary	400 VDC*	Coil (+) Terminal	Coil (–) Terminal	150-250	180-280
2-A	Sw. Box – Stop Circuit	400 VDC*	Black/Yellow (3) Sw. Box Terminal	Ground	200-360	200-360
3-A 4-A	Stator – Low Speed	400 VDC*	Blue Sw. Box Terminal	Ground	200-300	190-310
3-A 4-A	Stator – High Speed	400 VDC*	Red Sw. Box Terminal	Ground	20-90	140-310
5-A	Sw. Box – Bias	20 VDC or 40 VDC	[See Note (1)] Ground	White/Black Sw. Box Terminal	2-10	10-30

(1) Using meter only, REVERSE LEAD POLARITY; connect leads as specified.

* If using a meter with a built-in DVA, place selector switch in the DVA/400 VDC position.

3 Cylinder Stators
75 Manual with 9 Ampere Stator 398-9873A21, USA-0D227200 and Above
75/90 Electric with 14 Ampere Stator 398-9873A24, USA-0G280044 thru 0G404505 Belgium-09879065 thru 09916672

ADI Test Seq.	Test	Selector Sw. Position	DVA Leads		Voltage @ 300 RPM	Voltage @ 1000 RPM	Voltage @ 4000 RPM
			Red	Black			
1-A	Coil Primary	400 VDC*	Coil (+) Terminal	Coil (–) Terminal	145-175	210-250	200-240
2-A	Sw. Box – Stop Circuit	400 VDC*	Black/Yellow (3) Sw. Box Terminal	Ground	215-265	280-340	260-320
3-A 4-A	Stator – Low Speed	400 VDC*	Blue Sw. Box Terminal	Ground	215-265	280-340	260-320
3-A 4-A	Stator – High Speed	400 VDC*	Red Sw. Box Terminal	Ground	10-15	45-55	205-255
5-A	Sw. Box – Bias	20 VDC or 40 VDC	[See Note (1)] Ground	White/Black Sw. Box Terminal	2-10	10-30	10-30

4 Cylinder with 16 Ampere Stator 398-9710A33
USA-0G301751 and Above
Belgium - 09885528 thru 09916721

ADI Test Seq.	Test	Selector Sw. Position	DVA Leads		Voltage @ 300 RPM	Voltage @ 1000 RPM	Voltage @ 4000 RPM
			Red	Black			
1-A	Coil Primary	400 VDC*	Coil (+) Terminal	Coil (–) Terminal	110-140	250-300	215-265
2-A	Sw. Box – Stop Circuit	400 VDC*	Black/Yellow (3) Sw. Box Terminal	Ground	160-200	315-385	270-330
3-A 4-A	Stator – Low Speed	400 VDC*	Blue Sw. Box Terminal	Ground	160-200	315-385	270-330
3-A 4-A	Stator – High Speed	400 VDC*	Red Sw. Box Terminal	Ground	8-10	27-33	165-205
5-A	Sw. Box – Bias	20 VDC or 40 VDC	[See Note (1)] Ground	White/Black Sw. Box Terminal	2-10	10-30	10-30

(1) Using meter only, REVERSE LEAD POLARITY; connect leads as specified.

* If using a meter with a built-in DVA, place selector switch in the DVA/400 VDC position.

⚠ WARNING

When testing or servicing the ignition system, high voltage is present, be extremely cautious! DO NOT TOUCH OR DISCONNECT any ignition parts while engine is running, while key switch is on, or while battery cables are connected.

⚠ CAUTION

Failure to comply with the following items may result in damage to the ignition system.

1. **DO NOT reverse battery cable connections. The battery negative cable is (-) ground.**
2. **DO NOT "spark" battery terminals with battery cable connections to check polarity.**
3. **DO NOT disconnect battery cables while engine is running.**
4. **DO NOT crank engine when switch box is not grounded to engine.**

A process of elimination must be used when checking the ignition system without a Multi-Meter/DVA Tester (91-99750) or a voltmeter (capable of measuring 400 volts DC, or higher) and Direct Voltage Adaptor (91-89045), as the switch box and ignition coils cannot be thoroughly checked with conventional test equipment.

All other components can be tested with an ohmmeter. Before troubleshooting the ignition system, check the following:

1. Make sure that electrical harness, ignition switch and/or emergency stop switch are not the source of the problem.
2. Check that plug-in connectors are fully engaged and terminals are free of corrosion.
3. Make sure that wire connections are tight and free of corrosion.
4. Check all electrical components, that are grounded directly to engine, and all ground wires to see that they are grounded to engine.
5. Check for disconnected wires, and short and open circuits.

STATOR LOW AND HIGH SPEED OHM TEST

NOTE: *Stator can be tested without removing from engine.*

1. Disconnect stator leads from switch box.
2. Use an ohmmeter and perform the following tests.

IMPORTANT: If stator is mounted on engine, black stator lead must be grounded to powerhead when testing.

3 CYLINDER STATORS
75 MANUAL WITH 9 AMPERE STATOR
398-9873A20
USA-0D283222 THRU 0G227199
75/90 ELECTRIC WITH 16 AMPERE STATOR
398-9710A3
USA-0D283222 THRU 0G280043
BELGIUM-09793577 THRU 09879064

Test Leads	Resistance (OHMS)	Scale Reading (x_________)
Between Blue Stator Lead and Red Stator Lead (Low Speed)	3600-4200	3.6-4.2 (R x 1000)
Between Red Stator Lead and Engine Ground* (Hi-Speed)	90-140	90-140 (R x 1)

4 CYLINDER WITH 16 AMPERE STATOR
398-9710A31
USA-0D283222 THRU 0G301750
BELGIUM-09793577 THRU 09885527

Test Leads	Resistance (OHMS)	Scale Reading (x_________)
Between Blue Stator Lead and Blue/Wht Stator Lead (Low Speed)	6800-7600	6.8 - 7.6 (R x 1000)
Between Red Stator Lead and Red/White Stator Lead (Hi-Speed)	90-140	90-140 (R x 1)

3 CYLINDER STATORS
75 MANUAL WITH 9 AMPERE STATOR
398-9873A21
USA-0D227200 AND ABOVE
75/90 ELECTRIC WITH 14 AMPERE STATOR
398-9873A24
USA-0G280044 – 0G404505
BELGIUM-09879065 – 09916672

Test Leads	Resistance (OHMS)	Scale Reading (x_________)
Between Blue Stator Lead and Red Stator Lead (Low Speed)	1100-1600	1.1-1.6 (R x 1000)
Between Red Stator Lead and Engine Ground* (Hi-Speed)	30-35	30-35 (R x 1)

* Connect test lead to BLACK stator lead if stator is removed from engine.

4 CYLINDER WITH 16 AMPERE STATOR 398-9710A33 USA-0G301751 – 0G404616 BELGIUM - 09885528 – 09916721

Test Leads	Resistance (OHMS)	Scale Reading (x________)
Between Blue Stator Lead and Blue/Wht Stator Lead (Low Speed)	1000-1400	1.0-1.4 (R x 1000)
Between Red Stator Lead and Red/White Stator Lead (Hi-Speed)	15-30	15-30 (R x 1)

***NOTE:** Above readings are for a cold engine (room temperature). Resistance will increase slightly, if engine is warm.*

3. If meter readings are other than specified, replace stator assembly.

IGNITION COIL TEST

IMPORTANT: Ohmmeter tests can only detect certain faults in the ignition coil. Replace ignition coil, if ohmmeter readings (listed in chart, following) are not as specified. If coil tests OK, and coil is still suspected of being faulty, use Multi-Meter/ DVA Tester (91-99750) or a voltmeter (capable of measuring 400 volts DC, or higher) and Direct Voltage Adaptor (91-89045) to thoroughly check coil.

1. Disconnect wires from coil terminals.
2. Pull spark plug lead out of coil tower.
3. Use an ohmmeter and perform the following tests.

Test Leads	Resistance (OHMS)	Scale Reading (x________)
Between (+) and (–) Coil Terminals	.02-.04*	.02-.04* (R x 1)
Between Coil Tower and (–) Coil Terminal	800-1100**	8-11** (R x 100)

* The primary DC resistance of these coils generally is less than one (1) OHM. If a reading resembling a short is obtained, this would be acceptable.

** Copper wire is an excellent conductor, but it will have a noticeable difference in resistance from cold to hot temperatures. Reasonable variations from these readings are acceptable.

4. If meter readings are not as specified, replace ignition coil.

TRIGGER TEST

1. Disconnect all trigger leads from switch box.
2. Use an Ohmmeter and perform the following tests.

3 CYLINDER TRIGGER SPECIFICATIONS

Test Leads	Resistance (OHMS)	Scale Reading (x________)
Between Brown Trigger Lead and White/Black Trigger Lead	1100-1400	11-14 (R x 100)
Between White Trigger Lead and White/Black Trigger Lead	1100-1400	11-14 (R x 100)
Between Violet Trigger Lead and White/Black Trigger Lead	1100-1400	11-14 (R x 100)

***NOTE:** Above readings are for a cold engine (room temperature). Resistance will increase slightly, if engine is warm.*

4 CYLINDER TRIGGER SPECIFICATIONS

Test Leads	Resistance (OHMS)	Scale Reading (x________)
Between Brown Trigger Lead and Black Trigger Lead	700-1000	7-10 (R x 100)
Between White Trigger Lead and Violet Trigger Lead	700-1000	7-10 (R x 100)

***NOTE:** Above readings are for a cold engine (room temperature). Resistance will increase slightly, if engine is warm.*

3. If meter readings are not as specified, replace trigger.

ADI Ignition using a RED Stator with an Adapter Module

Red stators require an adapter module that is connected between the stator and switch box. Without the adapter module, the voltage supplied by the stator would exceed the voltage capability of the switch box.

RED Stator with Adaptor and Ignition Coils

RED Stator DVA Test

Test	Selector Switch Position	RED DVA Lead	BLACK DVA Lead	Voltage @ 300 RPM	Voltage @ 1000 RPM	Voltage @ 4000 RPM
Coil Primary	400 VDC*	Coil (+) Terminal	Coil (–) Terminal	130 Volts Minimum	195 to 275	195 to 275
Stop Circuit	400 VDC*	Black/Yellow Sw. Box Terminal	Ground	190 Volts Minimum	275 to 320	260 to 320
Blue Sw. Box Terminal	400 VDC*	Blue Sw. Box Terminal	Ground	190 Volts Minimum	275 to 320	260 to 320
Blue/White Sw. Box Terminal	400 VDC*	Blue/White Sw. Box Terminal	Ground	190 Volts Minimum	275 to 320	260 to 320
Switch Box Bias	20 VDC or 40 VDC	Ground (1)	White/Black Switch Box Terminal (1)	2 to 10	10 to 30	10 to 30

(1) Using meter only, REVERSE LEAD POLARITY; connect leads as specified

NOTE: *If using a meter with a built -in DVA, place selector switch in the DVA/400 VDC position.*

Electric Start Engines

Red Stator Resistance Test (all wires disconnected)		R x 1 Ohms Scale
Positive Meter Lead (+)	**Negative Meter Lead (–)**	
Connect to White/Green stator lead	Connect to Green/White stator lead	660 - 710
Connect to Yellow stator lead	Connect to Yellow stator lead	0.165 - 0.181

Manual Start Engines

Red Stator Resistance Test (all wires disconnected)		R x 1 Ohms Scale
Positive Meter Lead (+)	**Negative Meter Lead (–)**	
Connect to White/Green stator lead	Connect to Green/White stator lead	660 - 710
Connect to Blue/White	Connect to Black	130 - 145
Connect to Yellow stator lead	Connect to Yellow stator lead	0.17 - 0.19

NOTE: *Resistance varies greatly with temperature. Measurements should be made within an ambient range of 65 to 85 degrees F°.*

NOTE: *The stator for manual start engines have a BLUE/WHITE and a BLACK wire which provide power for the over-heat horn and overspeed limiter module.*

Troubleshooting Procedures

ALL MODELS –

If the DVA reading is **HIGH** (particularly @ 1000 RPM) the ADAPTER MODULE is defective.

If the DVA reading is **LOW**, the stator, adapter module or switch box may be defective. Refer to the particular engine model procedure, following, to isolate the problem.

3 CYLINDER MODELS –

- Disconnect the BLUE adapter lead from the switch box.
- Connect the DVA meter between the BLUE adapter lead and ground.
- Crank the engine (manual or electric).
- If the DVA is normal (190 to 260 volts), the **switch box is defective**.
- If the DVA reading is still low, either the stator or the adapter is defective.
- Disconnect the GREEN/WHITE and WHITE/GREEN stator leads from the adapter.
- Measure the resistance between the GREEN/WHITE and WHITE/GREEN stator leads.
- If the resistance is normal (660 to 710 ohms), the **adapter is defective**.
- If the resistance is incorrect, the **stator is defective**.

4 CYLINDER MODELS –

- Disconnect the BLUE adapter lead from the switch box.
- Connect the DVA meter between the BLUE adapter lead and ground.
- Crank the engine (manual or electric).
- If the DVA reading is normal, reconnect the BLUE adapter lead to the switch box.
- Disconnect the BLUE/WHITE adapter lead from the switch box.
- Connect the DVA meter between the BLUE/WHITE adapter lead and ground.
- Crank the engine (manual or electric).
- If the DVA reading is normal (190 to 260 volts), the **switch box is defective**.
- If either of the DVA readings is still low, either the stator or the adaptor is defective.
- Disconnect the GREEN/WHITE and WHITE/GREEN stator leads from the adapter.
- Measure the resistance between the GREEN/WHITE and WHITE/GREEN stator leads.
- If the resistance is normal (660 to 710 ohms), the **adapter is defective**.
- If the resistance is incorrect, the **stator is defective**.

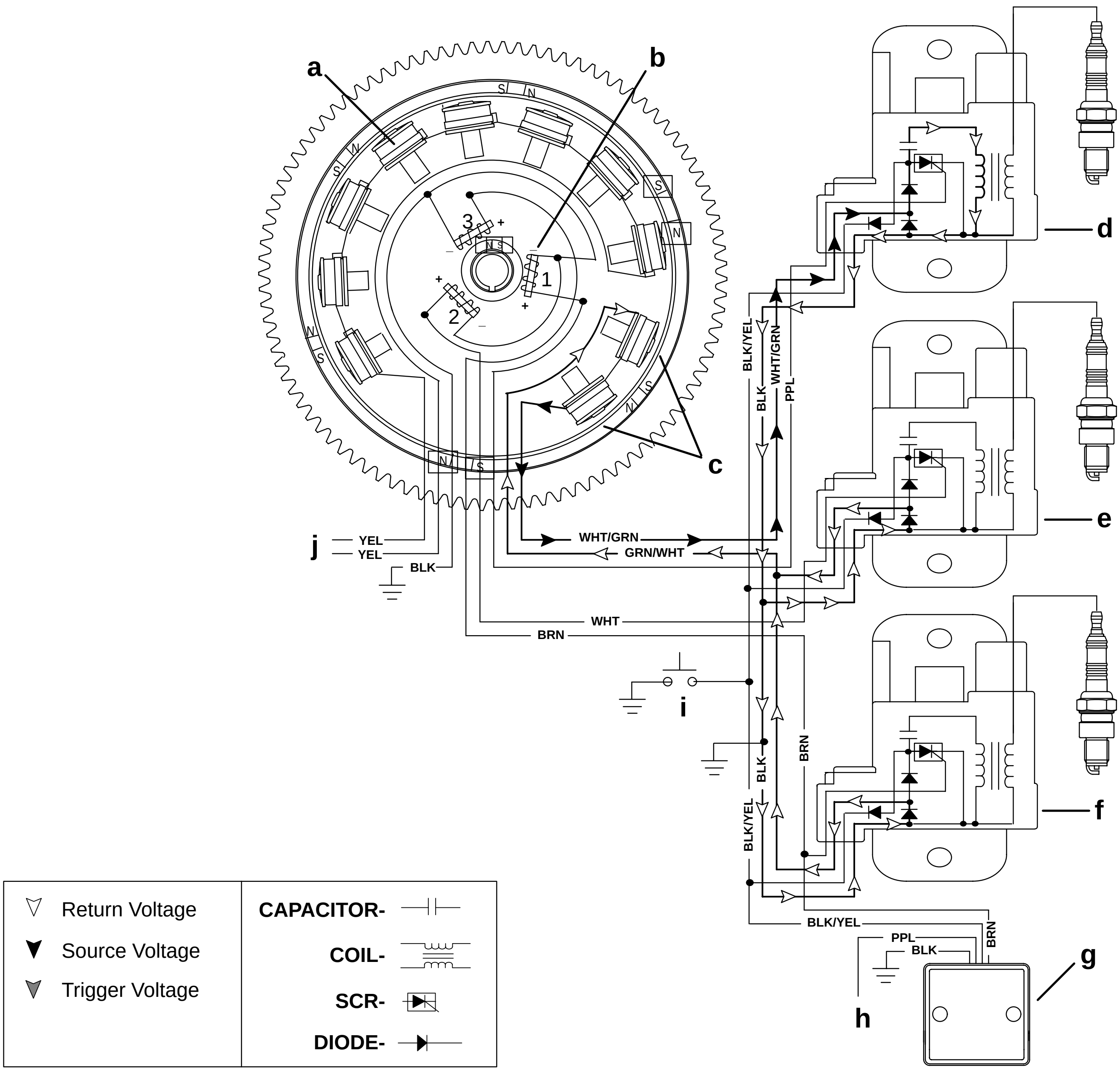
Theory of Operation

This outboard ignition system is alternator driven (distributor-less) capacitor discharge system. Major components of the ignition system are the flywheel, stator, trigger, capacitor discharge modules (CDM's) and spark plugs. Each capacitor discharge module functions as a combination switchbox and secondary ignition coil.

NOTE: *The following schematics are for 3 cylinder models. The circuitry would be very similar for the 4 cylinder models with the addition of a another CDM. 3 cylinder models have 3 trigger coils and 4 cylinder models have 4 trigger coils.*

Capacitor Charging #1 CDM

The STATOR assembly is mounted to the block below the flywheel and has 3 CAPACITOR CHARGING COILS wound in series. The FLYWHEEL is fitted with 6 permanent magnets inside the outer rim. The flywheel rotates the permanent magnets past the capacitor charging coils causing the coils to produce AC voltage (260-320 volts). The AC voltage is then conducted to the CAPACITOR DISCHARGE MODULES (CDM), where it is rectified (DC) and stored in a capacitor. The stator voltage return path is through the ground wire of the other CDM and back through that CDM's charging coil wire to the capacitor charging coils.

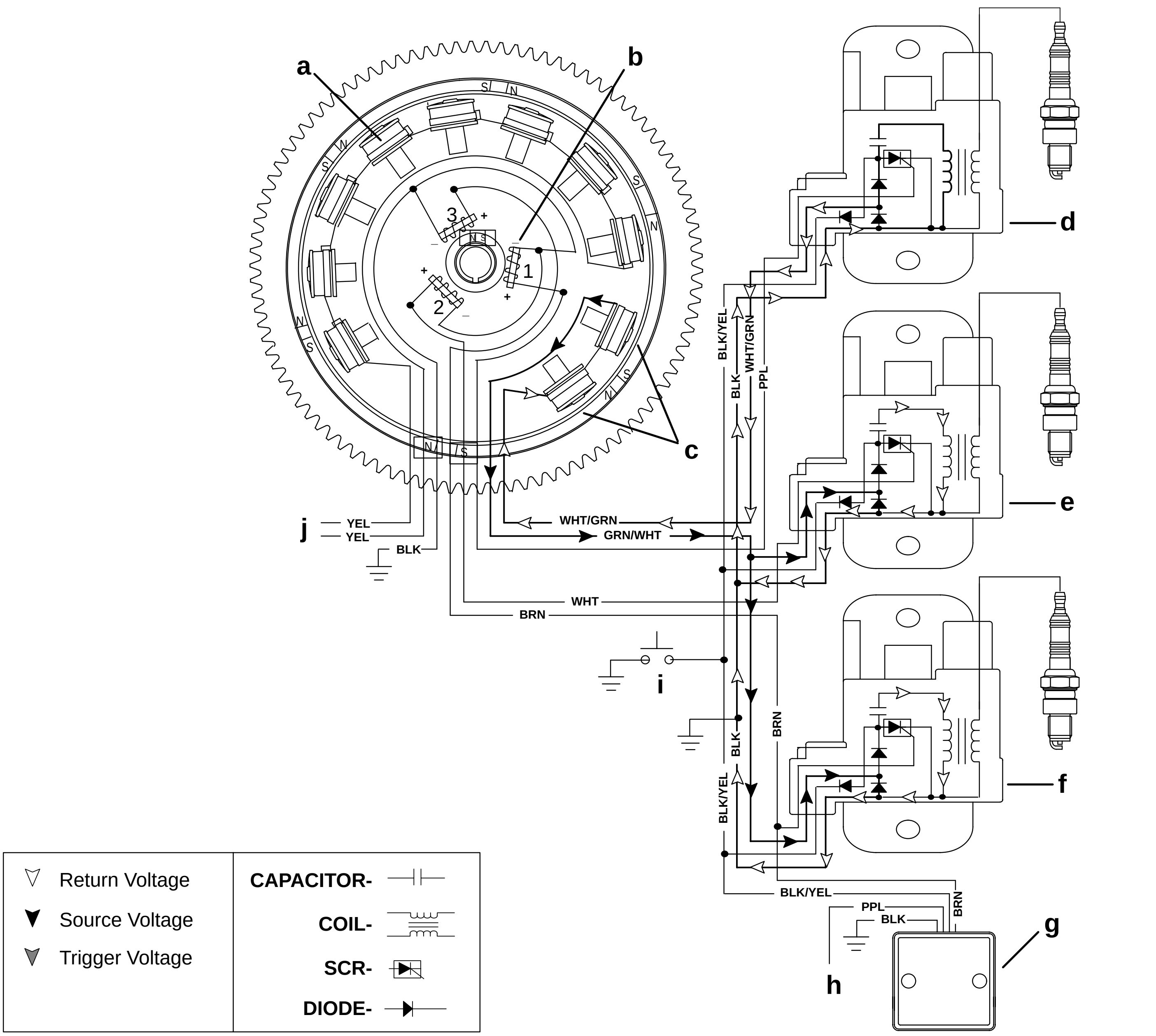


a - Battery Charging Coils
b - Trigger Coils
c - Capacitor Charge Coils
d - CDM #1
e - CDM #2
f - CDM #3
g - Rev. Limiter (Not Used On All Models)
h - To Ignition Switch
i - Stop Switch
j - To Voltage Regulator

Capacitor Charging #2 & #3 CDM

The flywheel rotates the permanent magnets past the capacitor charging coils causing the coils to produce AC voltage (260-320 volts). The opposite voltage pulse is then conducted to the CAPACITOR DISCHARGE MODULES (CDM), where it is rectified (DC) and stored in a capacitor. The stator voltage return path is through the ground wire of the other CDM and back through that CDM's charging coil wire to the capacitor charging coils.

***NOTE:** #1 CDM stator voltage return path is through either CDM #2 or #3. The return path for CDM #2 and #3 is through CDM #1, if #1 stator wire is disconnected the engine will die (the stator circuit is incomplete and the capacitors cannot be charged).*



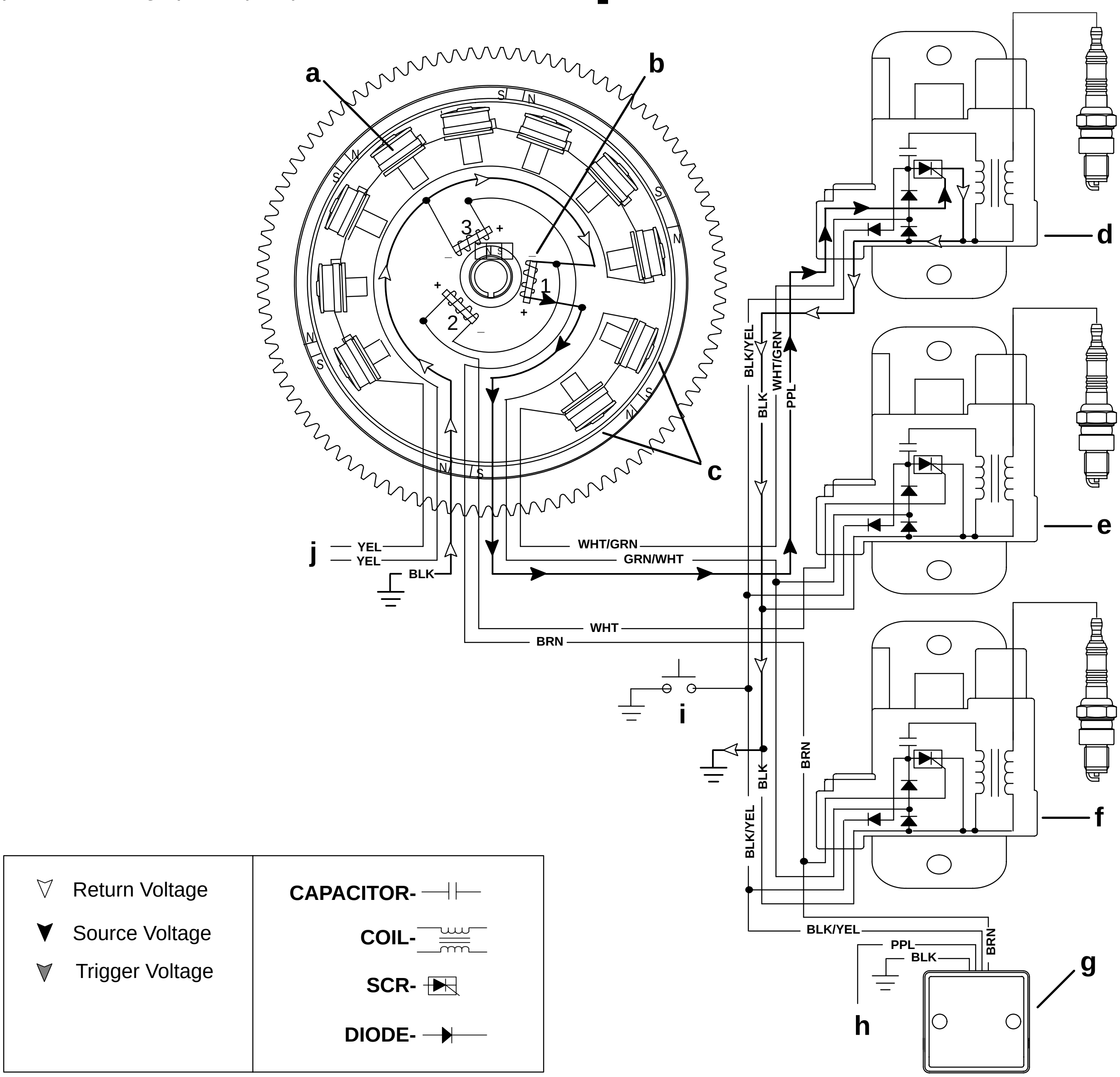
a - Battery Charging Coils
b - Trigger Coils
c - Capacitor Charge Coils
d - CDM #1
e - CDM #2
f - CDM #3
g - Rev. Limiter (Not Used On All Models)
h - To Ignition Switch
i - Stop Switch
j - To Voltage Regulator

#1 Cylinder Trigger Circuit

The TRIGGER assembly (also mounted under the flywheel) has one coil for each cylinder. These coils are mounted adjacent to the flywheel center hub. The center hub of the flywheel contains a permanent magnet with two north-south transitions.

As the flywheel rotates, the magnet north-south transitions pass the trigger coils. This causes the trigger coils to produce a voltage pulse which is sent to the respective capacitor discharge module (CDM). A positive voltage pulse (N-S) will activate the electronic switch (SCR) inside the capacitor discharge module (CDM). The switch discharges the capacitor voltage through the coil primary windings. The return voltage pulse exits the CDM through the ground wire and returns through the trigger ground.

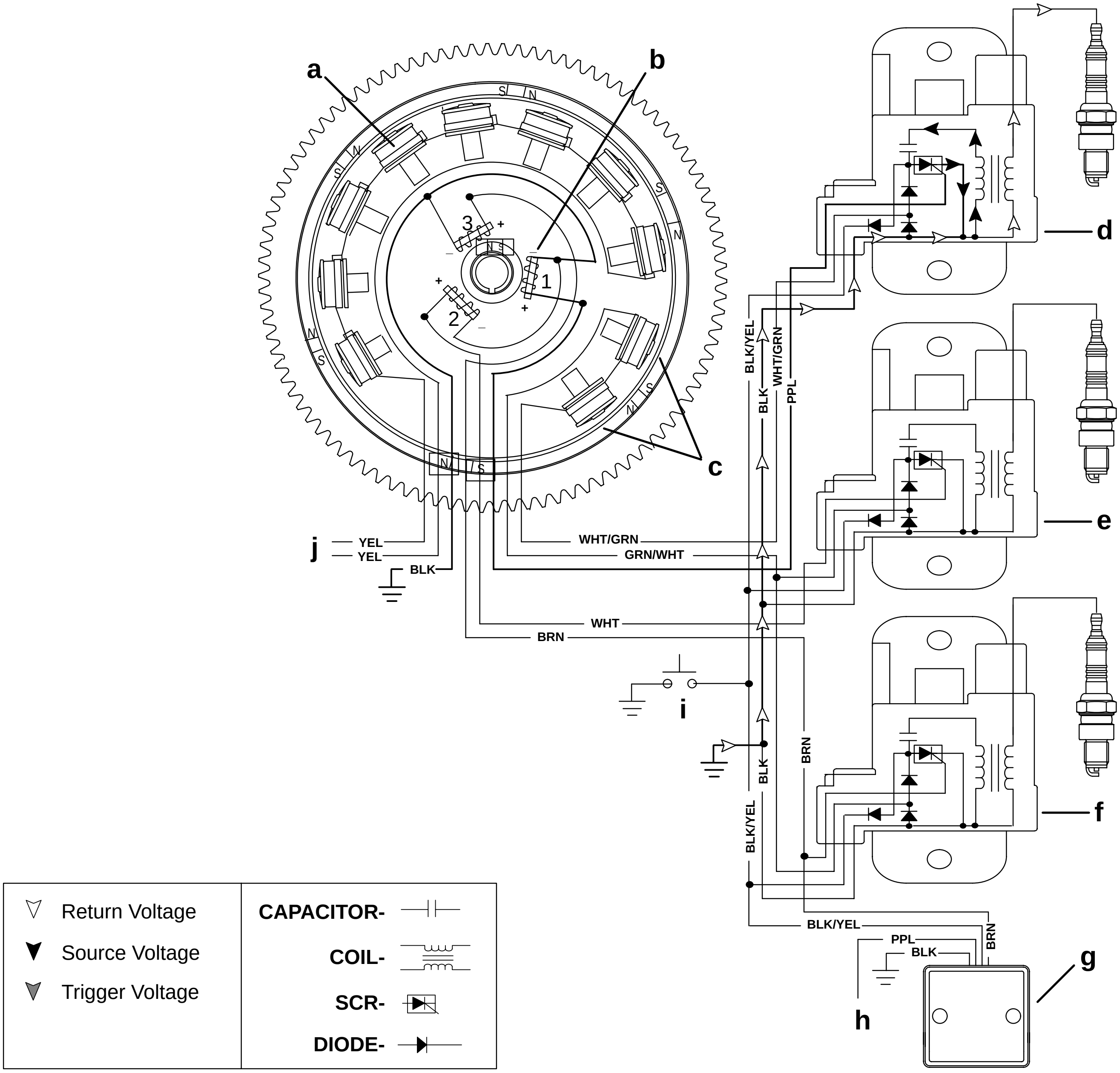
***NOTE:** 4 cylinder models have 4 triggers.*



a - Battery Charging Coils
b - Trigger Coils
c - Capacitor Charge Coils
d - CDM #1
e - CDM #2
f - CDM #3
g - Rev. Limiter (Not Used On All Models)
h - To Ignition Switch
i - Stop Switch
j - To Voltage Regulator

Ignition Coil Circuit

As the capacitor voltage flows through the primary windings of the ignition coil, a voltage is induced into the ignition coil secondary windings. This secondary voltage rises to the level required to jump the spark plug gap and return to ground. This secondary voltage can, if necessary, reach approximately 40,000 volts. To complete the secondary voltage path, the released voltage enters the ground circuit of CDM module.

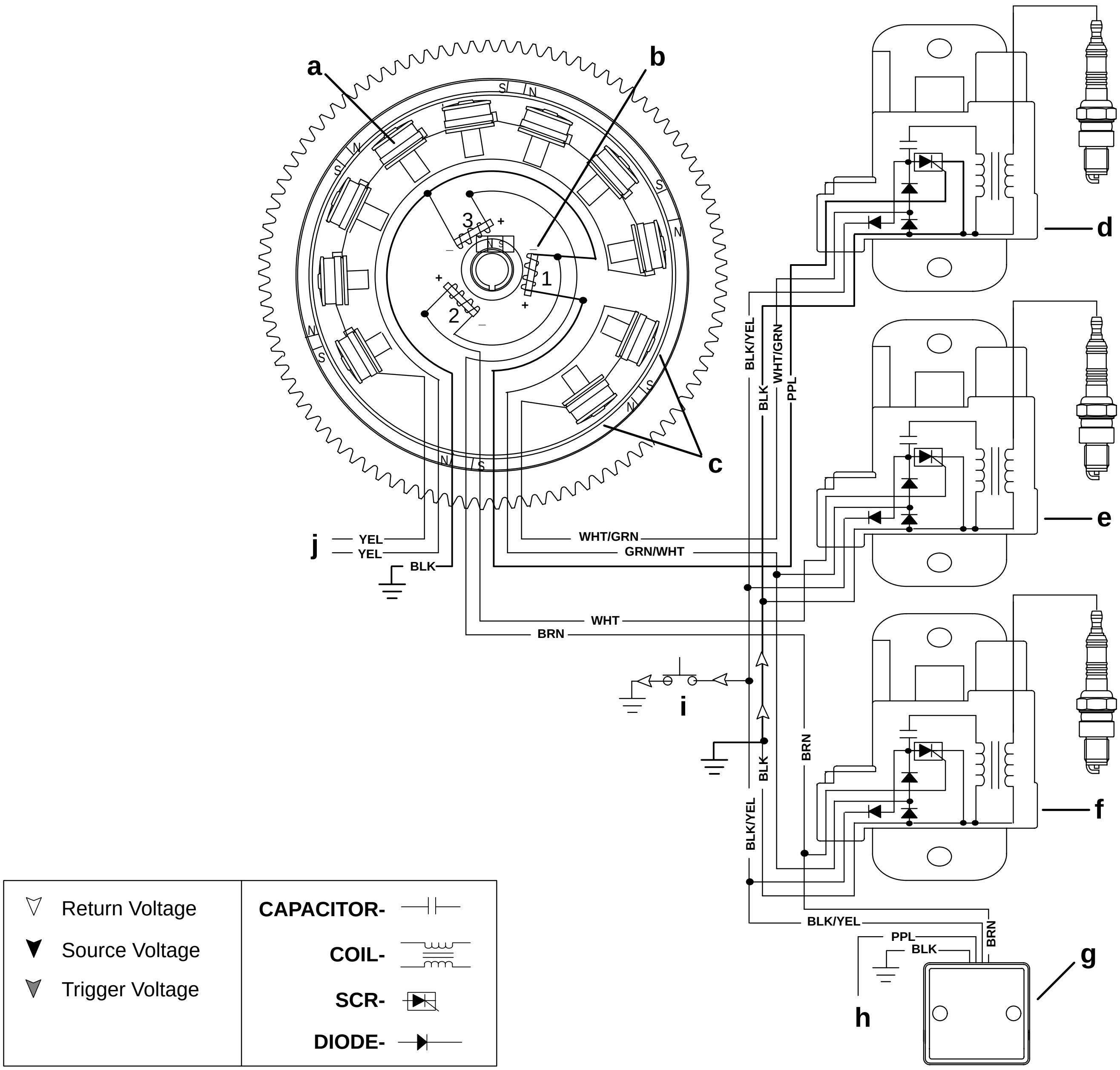


a - Battery Charging Coils
b - Trigger Coils
c - Capacitor Charge Coils
d - CDM #1
e - CDM #2
f - CDM #3
g - Rev. Limiter (Not Used On All Models)
h - To Ignition Switch
i - Stop Switch
j - To Voltage Regulator

Stop Circuit

To stop the engine, the stop switch is closed allowing the capacitor charge current from the stator to drain directly to ground.

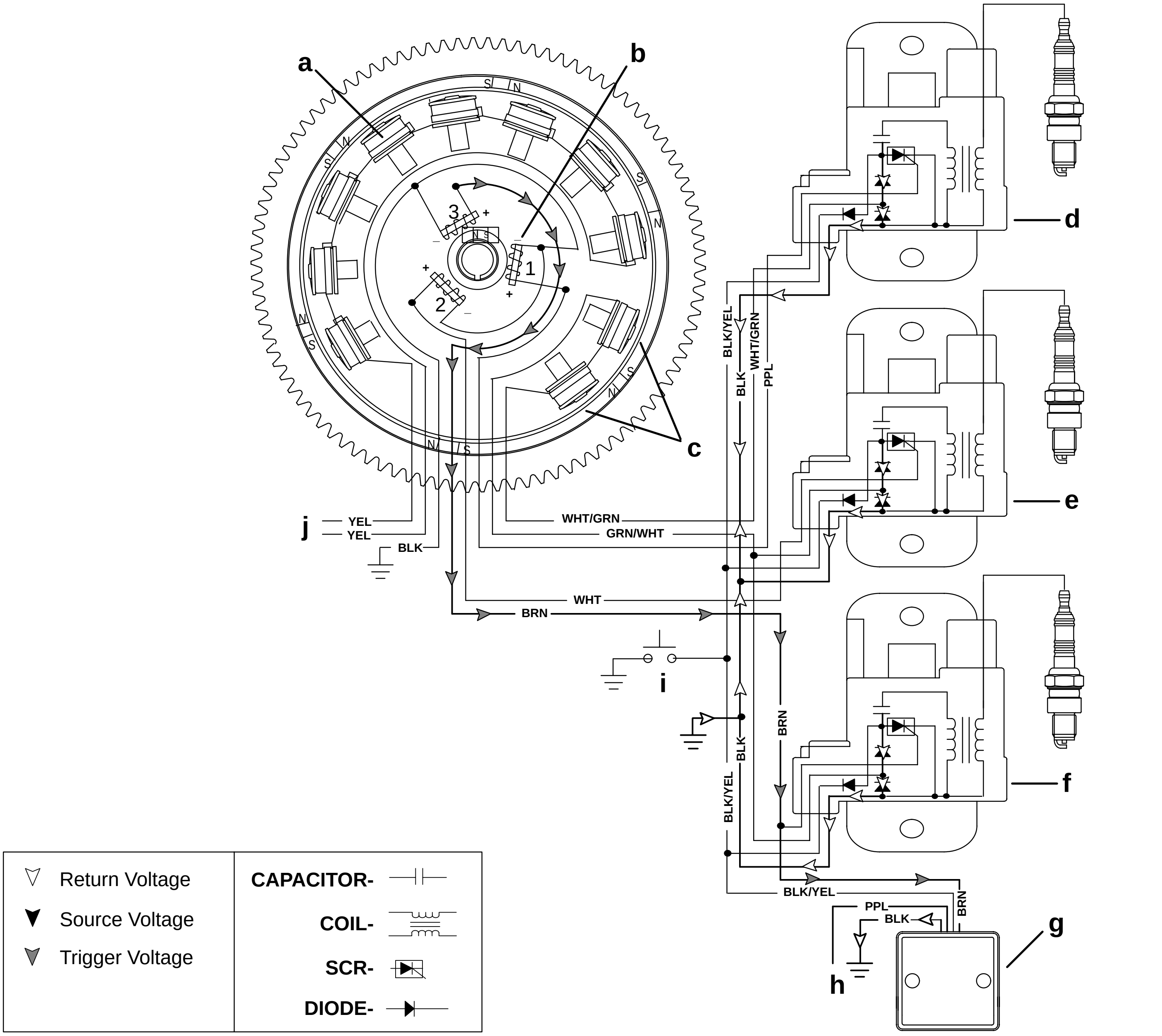
NOTE: The CDM contains a zener diode (not shown for clarity). This diode prevents overcharging of the capacitor (and possible failure) if the SCR does not receive a trigger pulse.



a - Battery Charging Coils
b - Trigger Coils
c - Capacitor Charge Coils
d - CDM #1
e - CDM #2
f - CDM #3
g - Rev. Limiter (Not Used On All Models)
h - To Ignition Switch
i - Stop Switch
j - To Voltage Regulator

Rev Limiter Circuit

The rev limiter is activated through the PURPLE wire when the key switch is rotated to the “on” position. The rev limiter uses a trigger signal (BROWN WIRE) to determine engine speed or rpm. If the engine speed exceeds the specified rpm, the rev limiter will ground out the CDM capacitor charge. The capacitor voltage flows through the BLACK/YELLOW wires into the rev limiter and to engine ground through the BLACK wire.



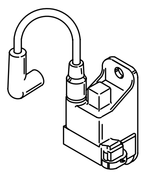
a - Battery Charging Coils
b - Trigger Coils
c - Capacitor Charge Coils
d - CDM #1
e - CDM #2
f - CDM #3
g - Rev Limiter
h - PURPLE Lead to Ignition Switch

RED Stator with CDM

Ignition Component Description

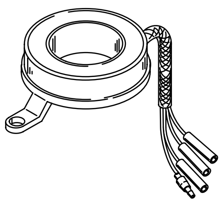
CAPACITOR DISCHARGE MODULE (CDM)

Each module contains an ignition coil and amplifier circuitry which produces approximately 45,000 volts at the spark plugs.



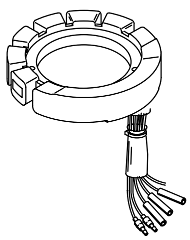
TRIGGER COIL

Located under flywheel. Is charged by single magnet on flywheel hub. Trigger pulses are sent to CDM.



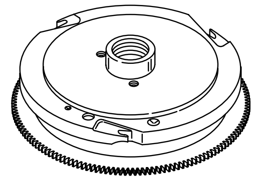
STATOR ASSEMBLY

Located under the flywheel in the stator assembly are 12 coils (6 for manual stator), 3 ignition charge coils and 9 auxiliary(3 for manual) power coils wound in series that provide voltage to the CDM's and battery/auxiliary circuits respectively.



FLYWHEEL

Contains 6 magnets (12 pole) around circumference. Has one magnet on inner hub for trigger. Outer magnets are for battery charge coils and ignition charge coils.



NOTE: *Electric start model flywheel shown.*

IMPORTANT: Before replacing ignition components:

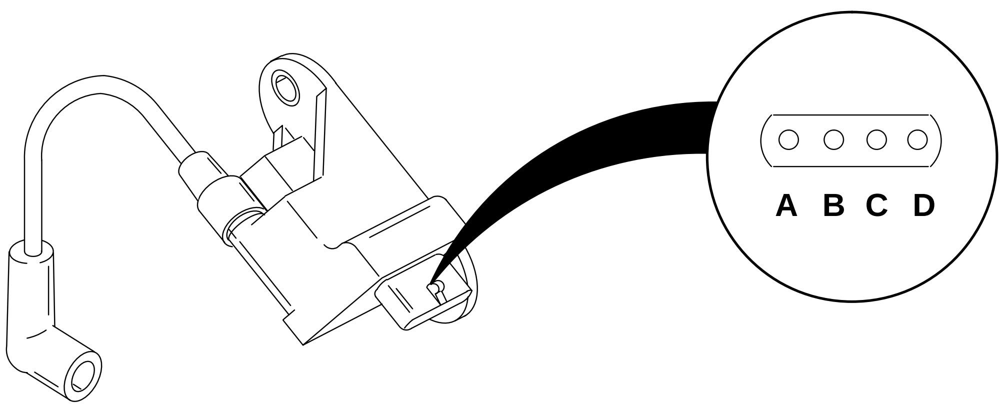
1. **Verify plug-in connectors are fully engaged.**
2. **Check that electrical components are grounded to ignition plate and that ignition plate is grounded to cylinder block.**
3. **Check for open or short circuits in wiring harness.**

CDM (P/N 827509) Trouble Shooting Flowchart

Chart 1

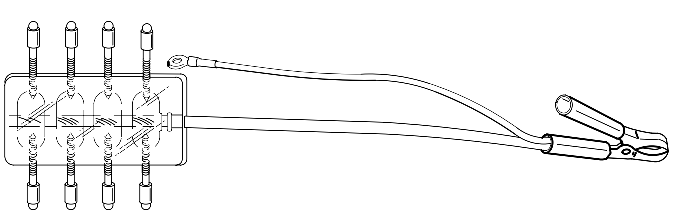
Step	Action	Value	Yes	No	Tools
1	Verify High Tension Leads, Spark Plug and Spark Boots are in good condition. Inspect wires for chafing. **Visual Inspection**	–	Step 2	Replace Failed Component Step 2	High Tension lead pin P/N 84-813706A56
2	Verify 4 Pin Connector Integrity **Visual Inspection**	–	Step 3	Repair/Replace Connector Components Step 3	–
3	Verify Ground from CDM connector to block	0.2 Ohms and below	Step 4	Correct Ground Path Step 4	DVA/Multimeter P/N 91-99750 Test Harness P/N 84-825207A2
4	Test all CDMs at Cranking with Spark Gap Tester **Spark on All CDMs?** Will spark jump a 7/16 in. (11.11 mm) gap?	7/16 in. (11.11 mm) gap	If at least one CDM has spark, continue with Chart #3	Continue with Chart #2	Spark Gap Tester P/N 91-850439

CDM (P/N 827509)

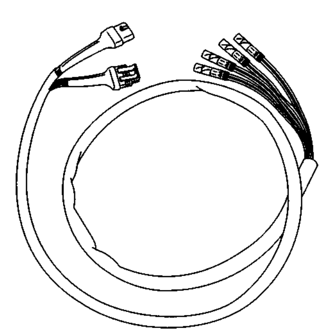


a - Ground
b - Black/Yellow
c - Trigger Connection
d - Stator Connection

Spark Gap Tester P/N 91-850439



CDM Test Harness 84-825207A2



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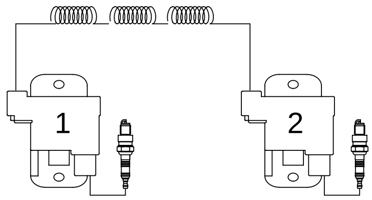
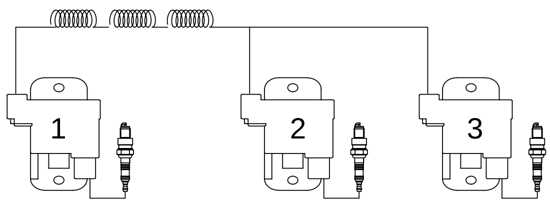
CDM Stop Diode Trouble Shooting

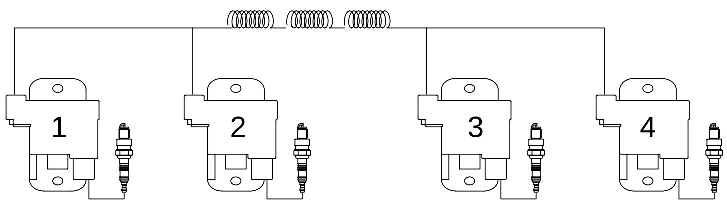
2 Cyl.:
CDM #1 gets its charging ground path through CDM #2
CDM #2 gets its charging ground path through CDM #1
A shorted Stop Diode in either CDM would prevent the opposite one from sparking.



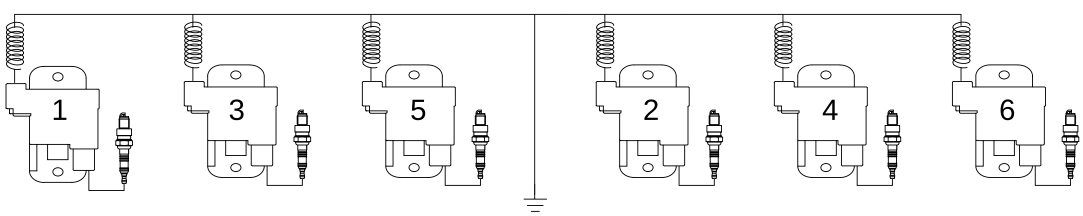
3 Cyl.:
CDM #1 gets its charging ground path through CDM #2 or #3
CDM #2 and #3 get their charging ground path through CDM #1
A shorted Stop Diode in CDM #1 would prevent CDMs #2 and #3 from sparking.
A shorted Stop Diode in CDM #2 or #3 would prevent CDM #1 from sparking.



4 Cyl.:
CDM #1 and #2 get their charging ground path through CDM #3 or #4
CDM #3 and #4 get their charging ground path through CDM #1 or #2
A shorted Stop Diode in CDM #1 or #2 would prevent CDMs #3 and #4 from sparking.
A shorted Stop Diode in CDM #3 or #4 would prevent CDM #1 and #2 from sparking.



6 Cyl.:
All CDMs get their charging ground path independently through the stator’s white leads.
A shorted Stop Diode in any one CDM will prevent at least 2 other CDMs from sparking



CDM Trouble Shooting Flowchart

Chart #2 (No Spark on any CDM)

Step	Action	Value	Yes	No	Tools
1	With the key switch ON: Verify continuity between BLK/YEL harness wire and ground. **This Test Checks:** Lanyard Switch Key Switch Rev Limiter (external) Chafed BLK/YEL wire CDM Stop Circuit	NO continuity	Step 2	Repair or Replace Component Run Engine Verify Repair Step 6	DVA/Multimeter P/N 91-99750
2	Check Stator Resistance between GRN/WHT and WHT/GRN Open circuit voltage at cranking should be no less than 100 Volts on the DVA	660-710 Ohms 2, 3 & 4 Cyl. Models 990 - 1210 Ohms 6 Cyl.	Step 3	Replace Stator Run Engine Verify Repair Step 6	DVA/Multimeter P/N 91-99750
3	Check Trigger/Crank Shaft Position Sensor Output: Cranking with CDM disconnected. Cranking with CDM connected.	1 Volt and above - CDM disconnected. 0.2 - 5 Volts- CDM connected.	Step 5	2, 3, & 4 Cyl Replace Trigger Run Engine Verify Repair Step 6 6 Cyl. - Step 4	DVA/Multimeter P/N 91-99750 TPI/CDM Test Harness 84-825207A2
4	V-6 Models Resistance Check Crank Position Sensor	900 - 1300 Ohms	Step 5	Replace Crank Position Sensor Run Engine Verify Repair Step 6	DVA/Multimeter P/N 91-99750
5	Test all CDMs at Cranking with Spark Gap Tester **Spark on All CDMs?** Will spark jump a 7/16 in. (11.11 mm) gap?	7/16 in. (11.11 mm) gap	Step 6	Verify All Preceding Steps	Spark Gap Tester P/N 91-850439
6	If mis-firing is in a repeatable range: Perform DVA readings on stator and trigger at all running speeds.*	Stator: 200 Volts and above Trigger: 2 Volts and above	Run Engine Verify Repair END	Refer to *Note Below	DVA/Multimeter P/N 91-99750 TPI/CDM Test Harness 84-825207A2

* Note: Stator tests will only isolate problem down to a charging pair. Further testing is necessary to determine faulty CDM. Disconnecting one CDM of the charging pair is recommended.

CDM Trouble Shooting Flowchart

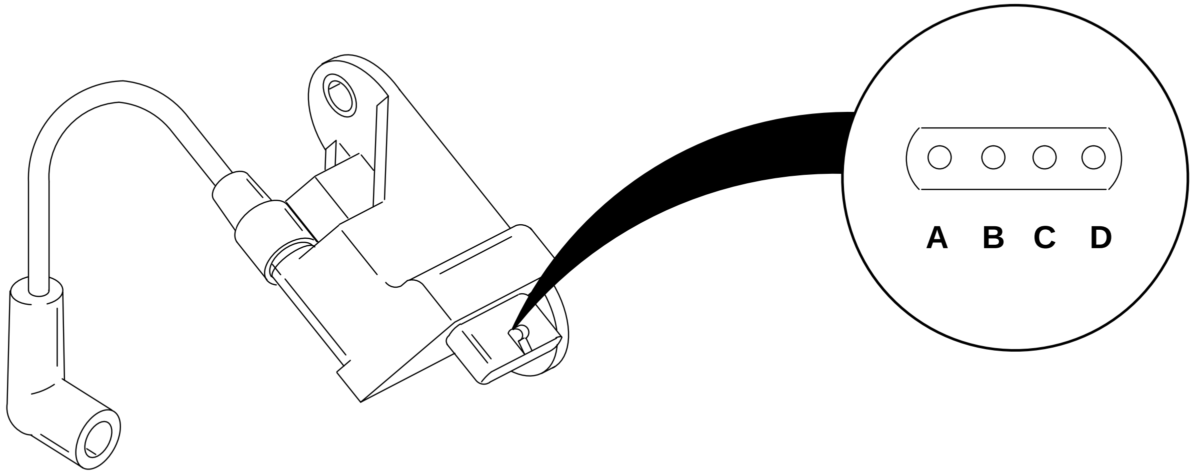
Chart #3 (At least one CDM has spark)

Step	Action	Value	Yes	No	Tools
1	Resistance Check ALL CDMs	Refer to chart	Step 3	Replace any CDMs that do not pass specifications even if they fire Step 2	DVA/Multimeter P/N 91-99750
2	Test all CDMs at Cranking with Spark Gap Tester **Spark on All CDMs** Will spark jump a 7/16 in. (11.11 mm) gap?	7/16 in. (11.11 mm) gap	Run Engine Verify Repair Step 6	Step 3	Spark Gap Tester P/N 91-850439
3	Check Trigger Output: Cranking with CDM disconnected. Cranking with CDM connected.	1 Volt and above - CDM disconnected. 0.2 - 5 Volts - CDM connected.	Step 5	2, 3, & 4 Cyl - Replace Trigger Run Engine Verify Repair Step 6 6 Cyl–Step 4	DVA/Multimeter P/N 91-99750 TPI/CDM Test Harness 84-825207A2
4	V6 Models Resistance Check Crank Position Sensor	900 - 1300 Ohms	Step 5	Replace Crank Position Sensor Run Engine Verify Repair Step 6	DVA/Multimeter P/N 91-99750
5	Test all CDMs at Cranking with Spark Gap Tester **Spark on All CDMs?** Will spark jump a 7/16 in. (11.11 mm) gap?	7/16 in. (11.11 mm) gap	Run Engine Verify Repair Step 6	Replace any non-firing CDMs Step 6	Spark Gap Tester P/N 91-850439
6	If mis-firing is in a repeatable range: Perform DVA readings on stator and trigger at all running speeds.*	Stator: 200 Volts and above Trigger: 2 Volts and above	Run Engine Verify Repair END	Refer to *Note Below.	DVA/Multimeter P/N 91-99750 TPI/CDM Test Harness 84-825207A2

* Note: Stator tests will only isolate problem down to a charging pair. Further testing is necessary to determine faulty CDM. Disconnecting one CDM of the charging pair is recommended.

CAPACITOR DISCHARGE MODULE

IMPORTANT: Spark plug wires are screwed into CDM.



a - Ground
b - Black/Yellow
c - Trigger Connection
d - Stator Connection

A resistance check is required and can be performed on the CDM as follows:

NOTE: *This test can be performed using the test harness (P/N 84-825207A2). Do Not connect the test harness plug to the stator/trigger engine wire harness.*

CAPACITOR DISCHARGE MODULE				
Circuit Test	**Connect Negative (–) Meter Lead To:**	**Connect Positive (+) Meter Lead To:**	**Ohms Scale**	**Results:**
Stop Diode Forward Bias	Green (D)/ or Green test harness lead	Black/Yellow (B)/ or Black/Yellow test harness lead	R x 100 Diode Reading*	Continuity
Stop Diode Reverse Bias	Black/Yellow (B)/ or Black/Yellow test harness lead	Green (D)/ or Green test harness lead	R x 100 Diode Reading*	No Continuity
Return Ground Path Diode, Reverse Bias	Green (D)/ or Green test harness lead	Ground Pin (A) or Black test harness lead	R x 100 Diode Reading*	No Continuity
Return Ground Path Diode, Forward Bias	Ground Pin (A)/ or Black test harness lead	Green (D)/ or Green test harness lead	R x 100 Diode Reading*	Continuity
CDM Trigger Input Resistance	Ground Pin (A)/ or Black test harness lead	White (C)/ or White test harness lead	R x 100	1000 - 1250 Ohms
Coil Secondary Impedance	Ground Pin (A) or Black test harness lead	Spark Plug Terminal (At Spark Plug Boot)	R x 100	900 - 1200 Ohms

*Diode Readings: Due to the differences in test meters, results other than specified may be obtained. In such a case, reverse meter leads and re-test. If test results then read as specified CDM is O.K. The diode measurements above will be opposite if using a Fluke equivalent multimeter.

Direct Voltage Adaptor (DVA) Test

⚠ CAUTION

DVA checks can be made while cranking engine with starter motor. To prevent engine from starting while being cranked, all spark plugs must be removed.

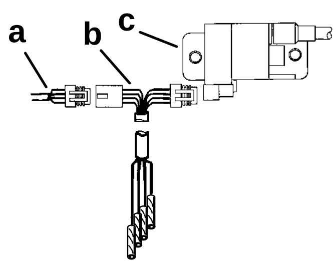
⚠ CAUTION

To protect against meter and/or component damage, observe the following precautions:

- **INSURE that the Positive (+) meter lead is connected to the DVA receptacle on the meter.**
- **DO NOT CHANGE meter selector switch position while engine is running and/or being "cranked".**

NOTE: *Each CDM is grounded through the engine wiring harness via the connector plug. It is not necessary to have the CDM mounted on the ignition plate for testing.*

1. Remove all spark plugs.
2. Insert spark gap tool (P/N 91-63998A1) into each spark plug boot and attach alligator clips to a good engine ground.
3. Disconnect remote fuel line from engine.
4. Make sure all CDMs are plugged in.
5. Test Stator and Trigger voltage to CDM:
   a. Install test harness 84-825207A2 between ignition harness and CDM.

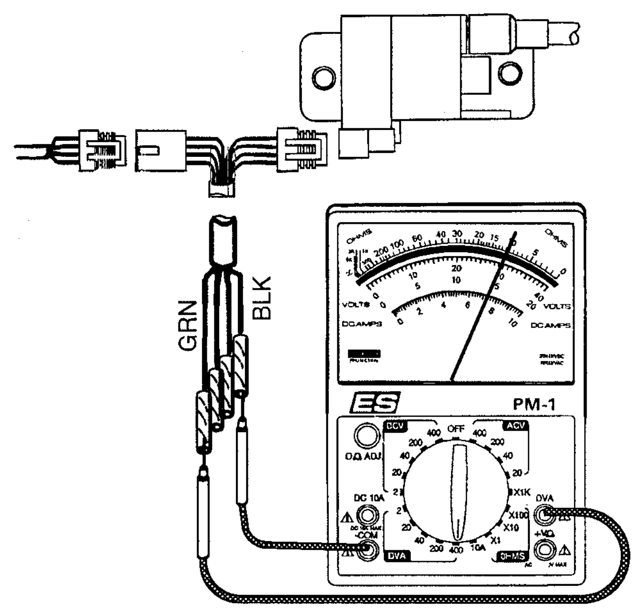


a - Stator/Trigger Harness
b - Test Harness 84-825207A2
c - Capacitor Discharge Module

   b. Test each CDM.

Red Stator Output Test @ Cranking Speed		400 DVA Scale
Positive Meter Lead (+)	**Negative Meter Lead (–)**	**DVA Reading**
Connect to Green Test Harness Lead	Connect to Black Test Harness Lead	100 - 350

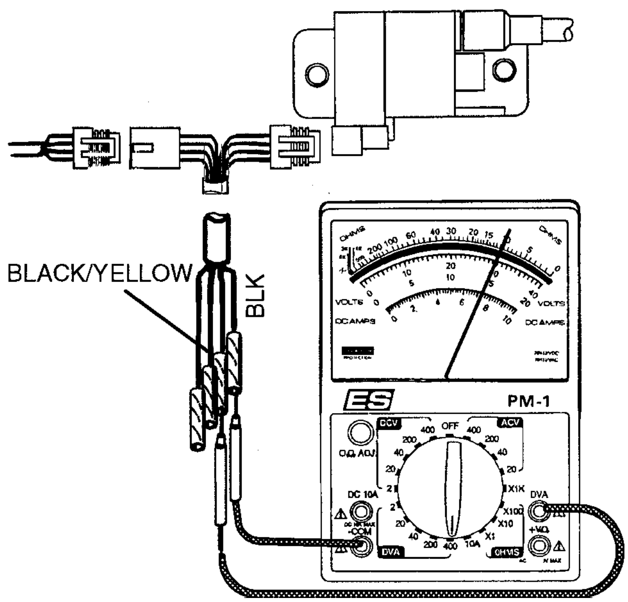
If only one CDM stator reading is below specifications, replace that CDM. If all CDM stator voltage readings are low, go to Testing Stator Resistance.



c. Test each CDM.

Stop Circuit Test @ Cranking Speed		400 DVA Scale
Positive Meter Lead (+)	**Negative Meter Lead (–)**	**DVA Reading**
Connect to Black/Yellow Test Harness Lead	Connect to Black Test Harness Lead	100 - 300

If CDM Stop Circuit reading is below specifications, replace that CDM.

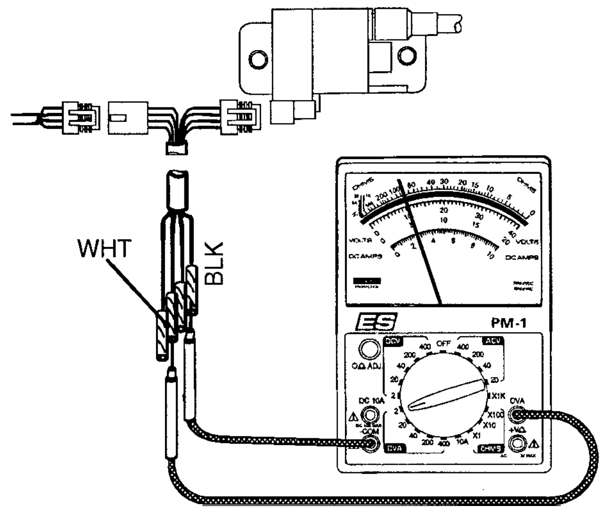


Test each CDM.

Trigger Output Test @ Cranking Speed		2 DVA Scale
Positive Meter Lead (+)	**Negative Meter Lead (–)**	**DVA Reading**
White Test Harness Lead	Black Test Harness Lead	0.2 - 5.0

If reading is below specifications replace trigger. If reading is above specifications check CDM.

NOTE: *If voltage remains low after installing a new trigger, replaced CDM.*



ENGINE RUNNING AT IDLE:

It is not necessary to perform this test if the voltage output was tested in the previous step CRANKING ENGINE.

Red Stator Output Test		400 DVA Scale
Positive Meter Lead (+)	**Negative Meter Lead (–)**	**DVA Reading**
Connect to Green Test Harness Lead	Connect to Black Test Harness Lead	200 - 350
Stop Circuit Output Test		**400 DVA Scale**
Positive Meter Lead (+)	**Negative Meter Lead (–)**	**DVA Reading**
Connect to Black/Yellow Test Harness Lead	Connect to Black Test Harness Lead	200 or Higher

If stator output is low, go to Testing Stator Resistance.

Trigger Output Test		20 DVA Scale
Positive Meter Lead (+)	**Negative Meter Lead (–)**	**DVA Reading**
White Test Harness Lead	Black Test Harness Lead	2 - 8 Volts

If reading is below specifications replace trigger. If reading is above specifications check CDM.

NOTE: *If voltage remains low after installing a new trigger, replace CDM.*

Resistance Tests

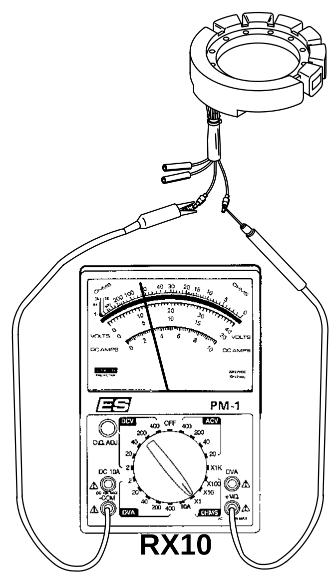
RED STATOR

1. Disconnect stator leads.

NOTE: *Resistance varies greatly with temperature. Measurements should be taken with an ambient temperature range of 65 to 85 degrees F.*

Red Stator Resistance Test		R x 10 Ohms Scale
Positive Meter Lead (+)	**Negative Meter Lead (–)**	
Connect to White/Green stator lead	Connect to Green/White stator lead	660-710
Connect to White/Green stator lead	Connect to engine ground	No continuity
Connect to Green/White stator lead	Connect to engine ground	No continuity

IMPORTANT: If all CDM stator output voltage is low and stator resistance tests are within specifications, then each CDM (one at a time) must be replaced with a CDM known to be good until stator output voltage returns to proper levels. This process of elimination will reveal a defective CDM.



TRIGGER

A resistance test is not used on the trigger. Test trigger as outlined under "Testing Voltage Output to CDM" - "Trigger Output Test".

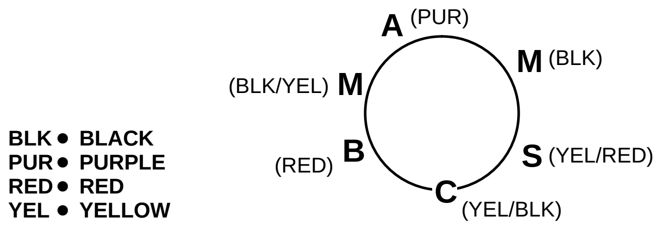
Ignition (Key) Switch Test

1. Disconnect remote control wiring harness and instrument panel connector.

NOTE: *Wiring diagram for control boxes is located in SECTION 2D.*

2. Set ohmmeter on R x 1 scale for the following tests:

COMMANDER KEY SWITCH



KEY POSITION	CONTINUITY SHOULD BE INDICATED AT THE FOLLOWING POINTS					
	BLK	BLK/YEL	RED	YEL/RED	PUR	YEL/BLK
OFF						
RUN						
START						
CHOKE*						

* Key switch must be positioned to "RUN" or "START" and key pushed in to actuate choke, for this continuity test.

3. If meter readings are other than specified in the preceding test, verify that switch and not wiring is faulty. If wiring checks OK, replace switch.

Flywheel Removal and Installation

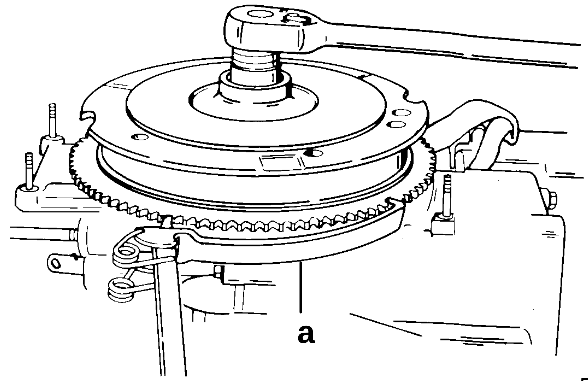
REMOVAL

1. Remove flywheel cover from engine.

⚠ WARNING

Engine could possibly start when turning flywheel during removal and installation; therefore, disconnect (and isolate) spark plug leads from spark plugs to prevent engine from starting.

2. Disconnect spark plug leads from spark plugs.
3. While holding flywheel with Flywheel Holder (91-52344), remove flywheel nut and washer.

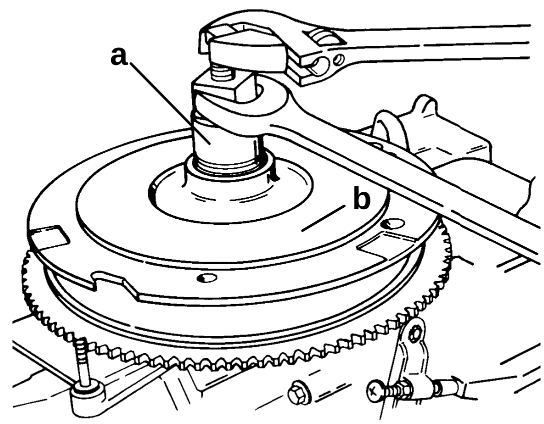


51123

a - Flywheel Holder (91-52344)

4. Install Crankshaft Protector Cap (91-24161) on the end of crankshaft, then install Flywheel Puller (91-73687A1) into flywheel.
5. Remove flywheel.

NOTE: *Neither heat or hammer should be used on flywheel to aid in removal as damage to flywheel or electrical components under flywheel may result.*



51124

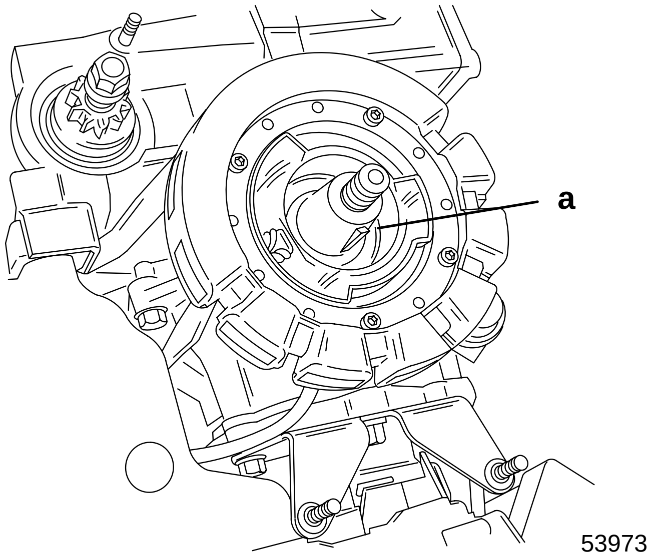
a - Flywheel Puller
b - Flywheel

INSTALLATION

⚠ WARNING

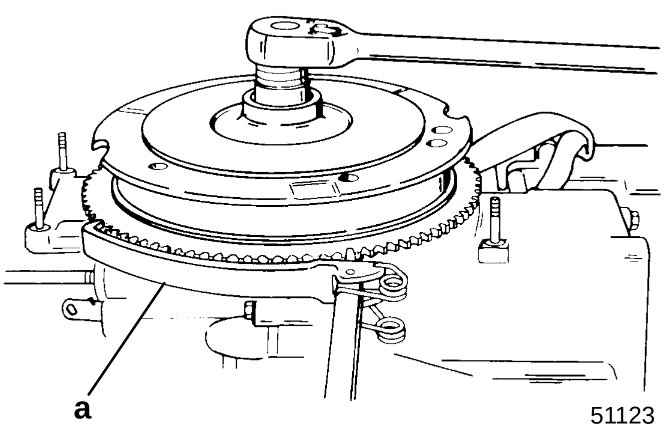
Engine could possibly start when turning flywheel during installation; therefore, disconnect (and isolate) spark plug leads from spark plugs to prevent engine from starting.

1. Disconnect spark plug leads from spark plugs.
2. Place flywheel key into slot in crankshaft.



a - Flywheel Key

3. Align slot in flywheel center bore with flywheel key and install flywheel onto crankshaft.
4. Install washer and locknut.
5. Hold flywheel with Flywheel Holder (91-52344); torque locknut to 100 lb. ft. (136 N·m).



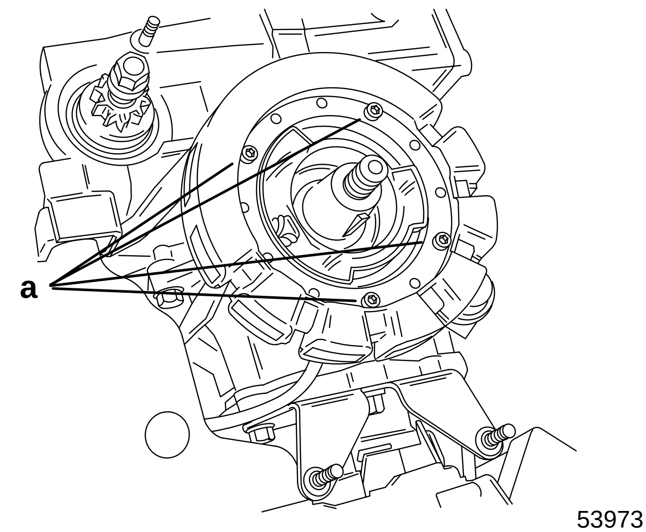
a - Flywheel Holder (91-52344)

6. Install flywheel cover.

Stator Removal and Installation

REMOVAL

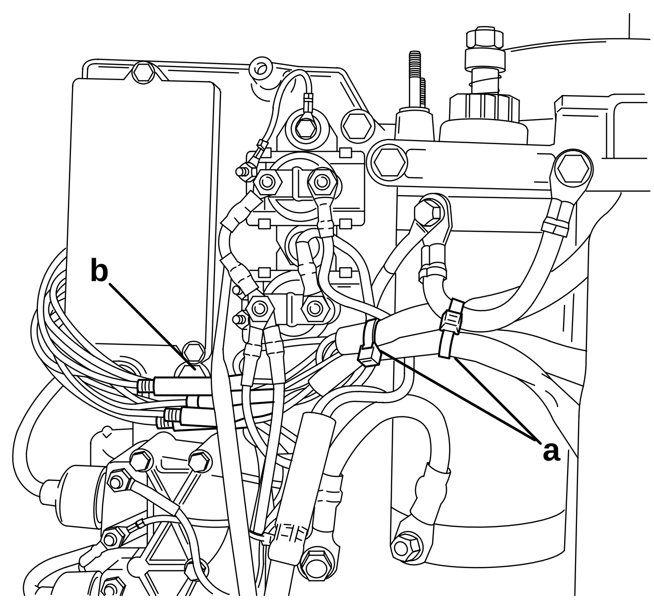
1. Remove flywheel; refer to “Flywheel Removal.”
2. Remove screws.



a - Screws

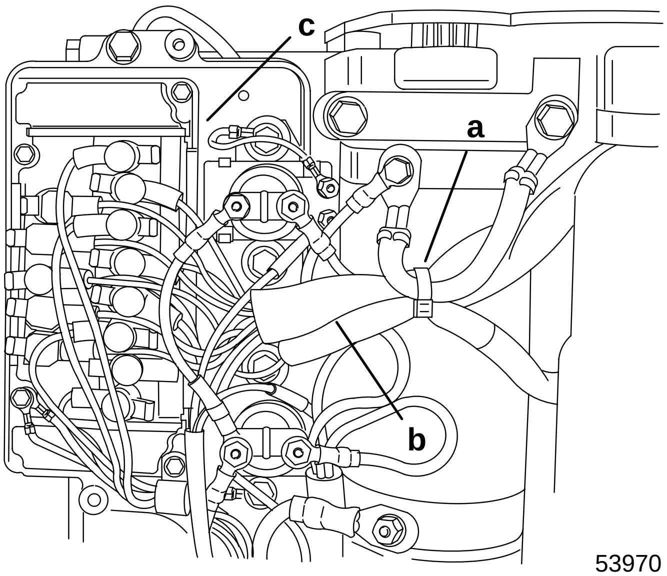
3. Remove starter motor as outlined in Section 2B.
4. Remove sta-straps.
5. Disconnect stator leads from switch box and remove stator.

3 Cylinder Models



a - Sta-Strap
b - Switch Box Bullet Connectors (Disconnect)

4 Cylinder Models

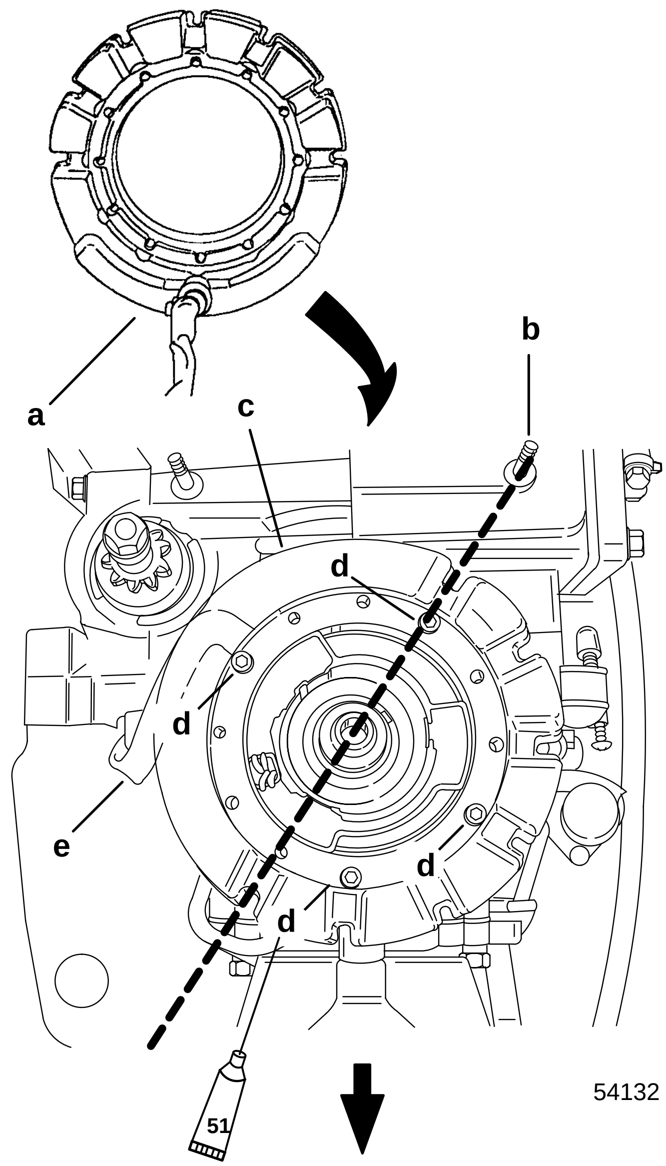


a - Sta-Strap
b - Stator Harness
c - Switch Box

INSTALLATION

Two styles of stators are currently being used on 1994 through 1996 model 75 - 125 outboards. These stators can be identified by a large rim or small rim on the underside of the stator where the stator harness exits the stator. These stators MUST BE INSTALLED AS SHOWN RESPECTIVELY OR PREMATURE STATOR FAILURE MAY OCCUR AS A RESULT OF STATOR INTERFERANCE WITH THE ENGINE BLOCK.

Small Rim Stator

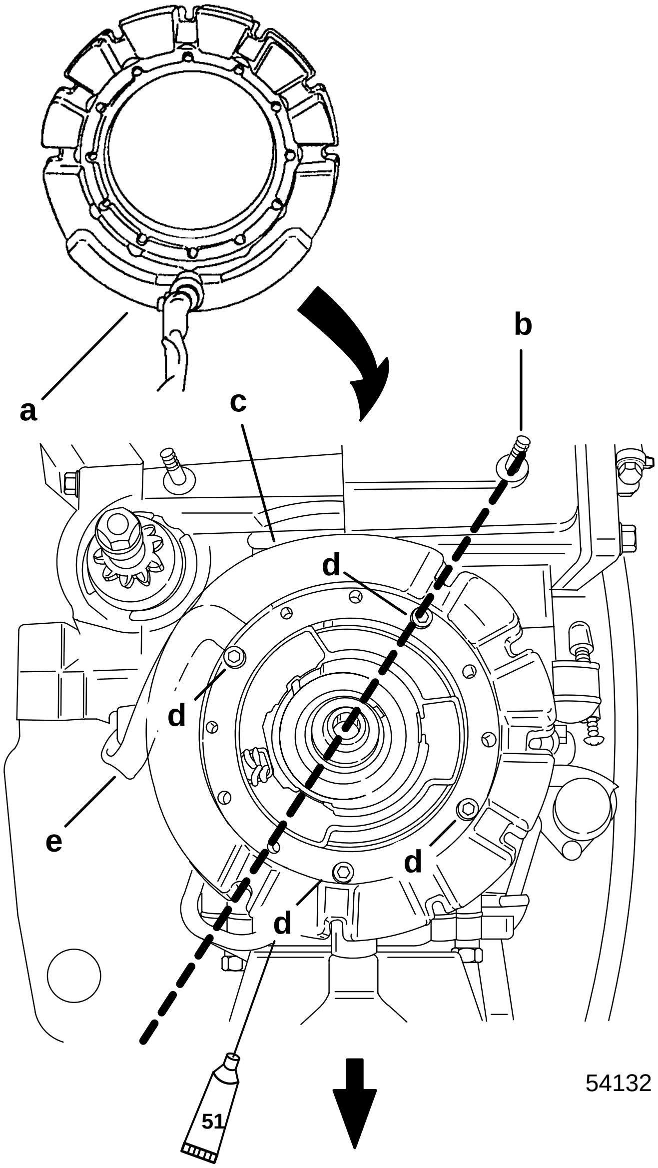


Front of Engine

51 Loctite 222 (92-809818)

a - Small Rim
b - Exhaust Cover Bolt
c - High/Low Speed Winding Module of Stator
d - Stator Screws [Apply Loctite 222 to threads] [Torque screws to 60 lb. in. (6.8 N·m)]
e - Stator Harness

Large Rim Stator

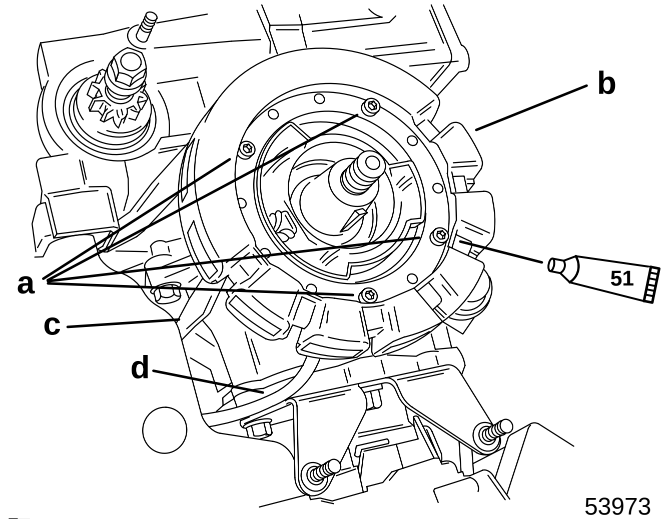


Front of Engine

51 Loctite 222 (92-809818)

a - Large Rim Stator
b - Flywheel Cover Stud
c - High/Low Speed Winding Module of Stator
d - Stator Screws [Apply Loctite 222 to threads] [Torque screws to 60 lb. in. (6.8 N·m)]
e - Stator Harness

1. Install stator as shown.

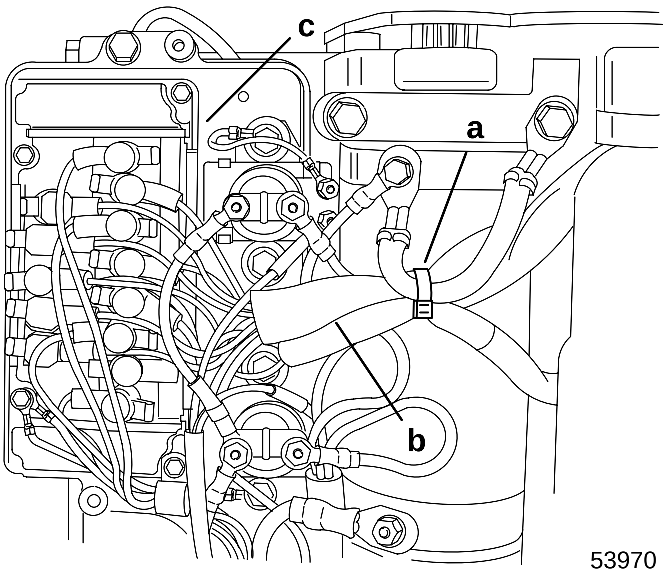


51 Loctite 222 (92-809818)

a - Screws; apply Loctite 222 on threads (unless Patch Screw used) and torque to 60 lbs. in. (6.6 N·m)
b - Stator
c - Stator Harness
d - Trigger Harness

2. Connect stator leads; refer to wiring diagrams in Section 2D.
3. Install sta-strap.
4. Install starter motor; refer to Section 2B.

4 Cylinder Models



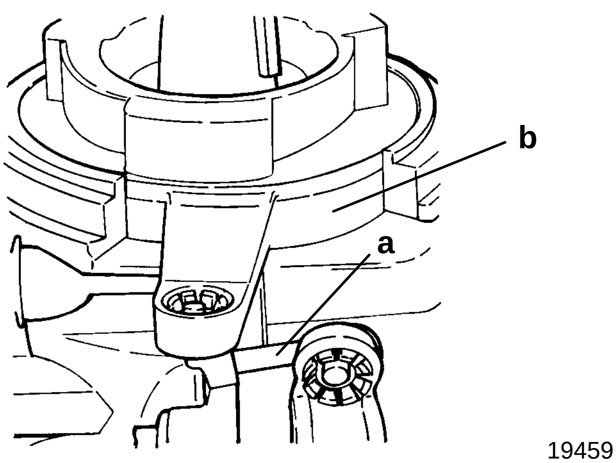
a - Sta-Strap
b - Stator Harness
c - Switch Box

5. Install flywheel; refer to “Flywheel Installation”, preceding.

Trigger Removal and Installation

REMOVAL

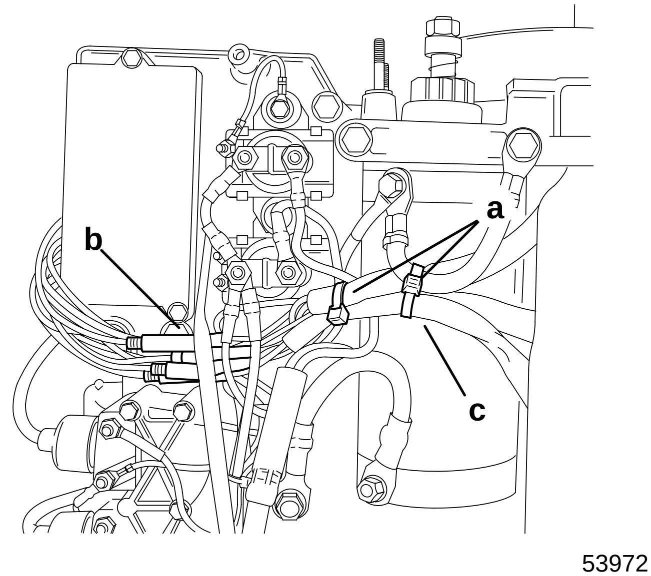
1. Remove flywheel and stator; refer to “Flywheel” and “Stator” removal, preceding.
2. Disconnect link arm and remove trigger.



a - Link Arm
b - Trigger

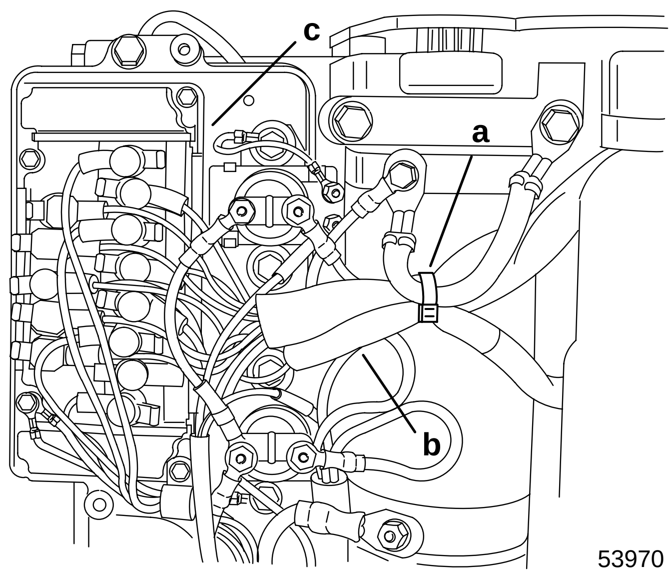
3. Remove starter motor; refer to Section 2B.
4. Remove sta-strap.
5. Disconnect trigger leads from switch box and remove trigger.

3 Cylinder Models



a - Sta-straps
b - Bullet Connectors; Disconnect Trigger Leads
c - Trigger Harness

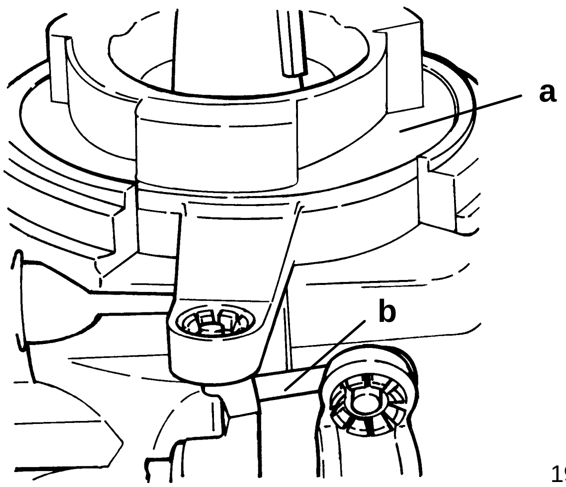
4 Cylinder Models



a - Sta-Strap
b - Trigger Harness
c - Switch Box

INSTALLATION

1. Install trigger and connect link arm.

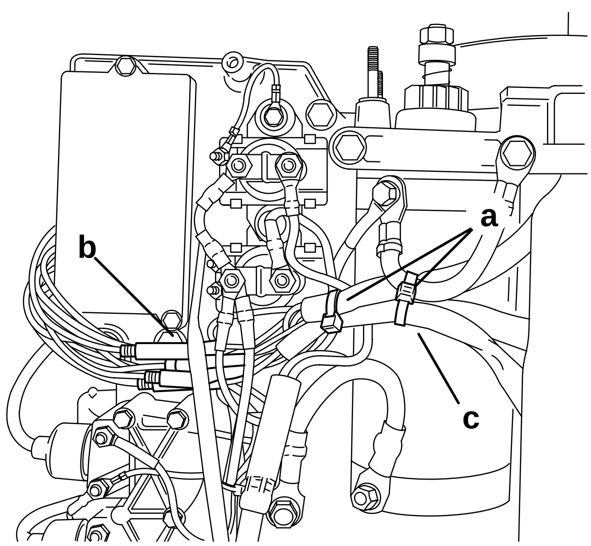


19459

a - Trigger
b - Link Arm

2. Connect trigger leads to switch box; refer to wiring diagrams in Section 2D.
3. Install sta-strap.
4. Install starter motor; refer to Section 2B.

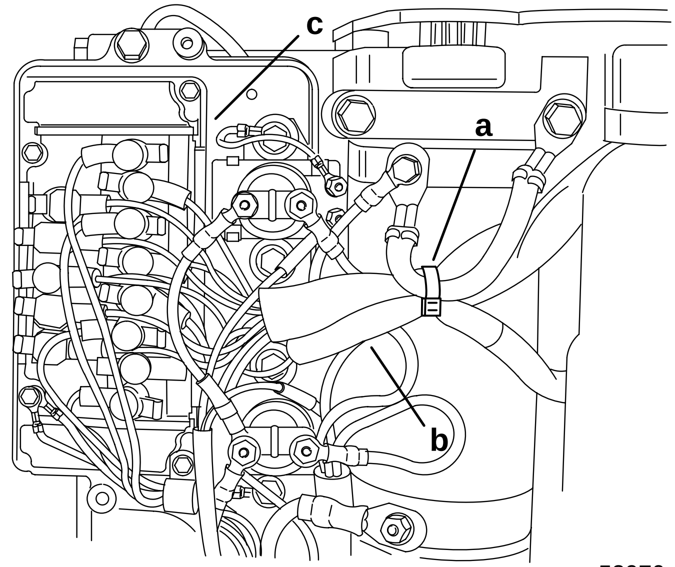
3 Cylinder Models



53792

a - Sta-Straps
b - Bullet Connectors; Connect Trigger Leads
c - Trigger Harness

4 Cylinder Models



53970

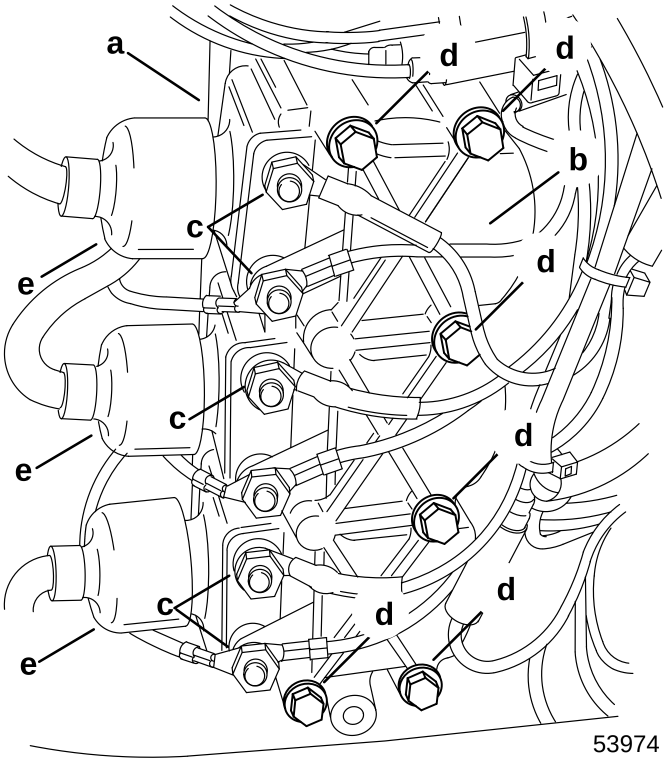
a - Sta-Strap
b - Trigger Harness
c - Switch Box

5. Install stator; refer to “Stator Installation,” preceding.
6. Install flywheel; refer to “Flywheel Installation,” preceding.

Ignition Coil Removal and Installation

Refer to wiring diagrams in Section 2D when connecting wires.

3 Cylinder Models

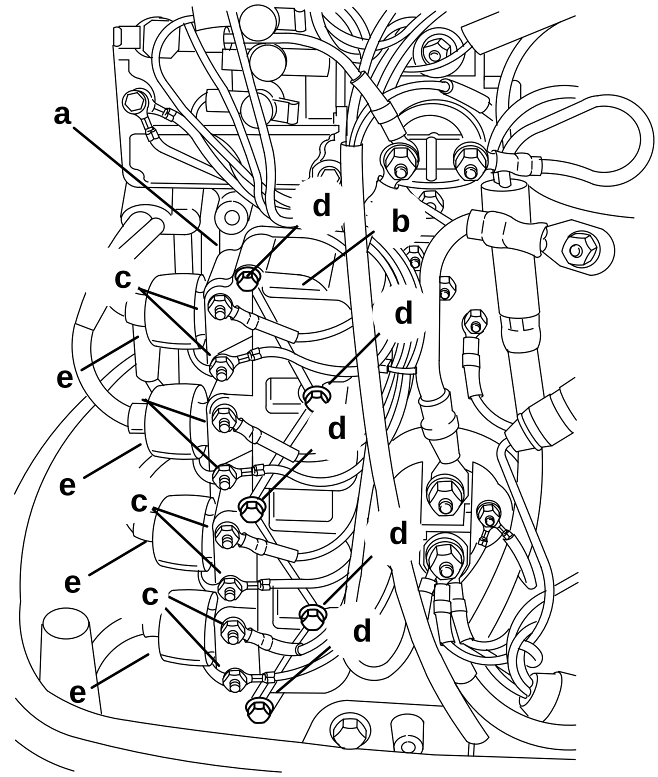


53974

a - Coils
b - Cover
c - Hex Nuts; coat with Quicksilver Liquid Neoprene
d - Bolts; torque to 20 lb. in. (2.3 N·m)
e - Coil Tower Boots; form a water tight seal between coil tower and spark plug lead using Quicksilver Insulating Compound

Refer to wiring diagrams in Section 2D when connecting wires.

4 Cylinder Models



53975

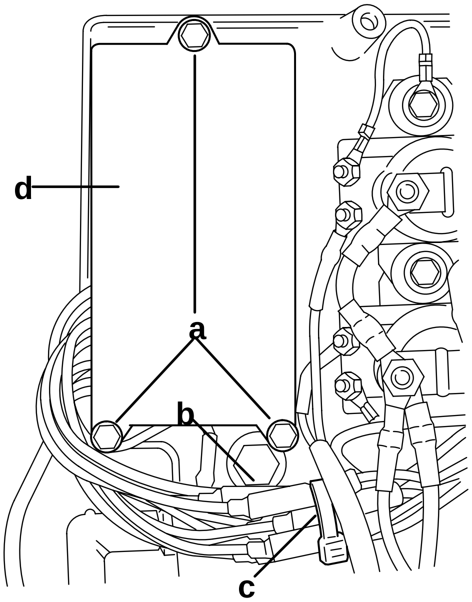
25 Liquid Neoprene (92-25711--2)

a - Coils
b - Cover
c - Hex Nuts; coat with Quicksilver Liquid Neoprene
d - Bolts; torque to 20 lb. in. (2.3 N·m)
e - Coil Tower Boots; form a water tight seal between coil tower and spark plug lead using Quicksilver Insulating Compound

Switch Box Removal and Installation

Refer to wiring diagrams in Section 2D when connecting wires.

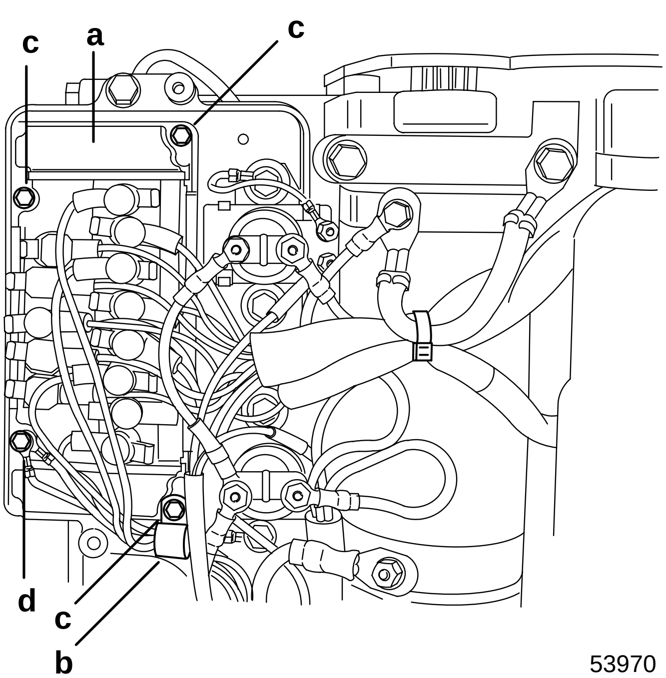
3 Cylinder Models



53971

a - Bolts [Torque to 40 lb. in. (4.5 N·m)]
b - Bullet Connectors
c - Sta-Strap
d - Switch Box

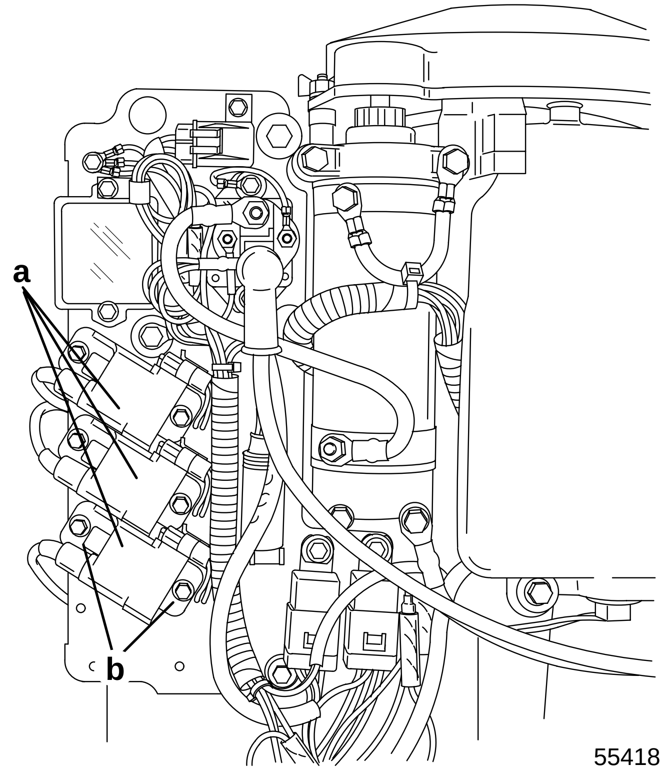
4 Cylinder Models



53970

a - Switch Box
b - J-Clip
c - Bolt [Torque to 40 lb. in. (4.5 N·m)]
d - Screw (Secure coil ground wires under screw)

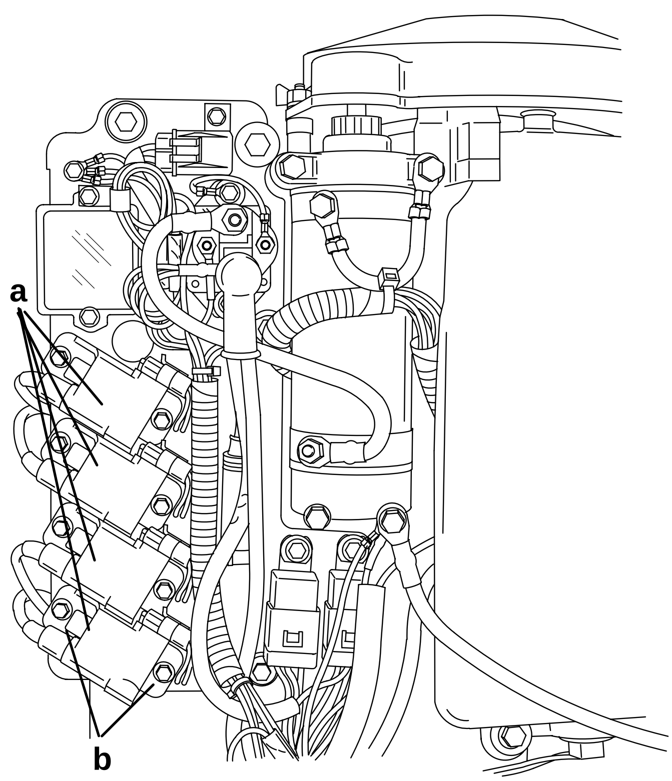
3 Cylinder Models w/CDM Ignition



55418

a - CDM
b - Bolt – Torque to 60 lb. in. (6.8 N·m)

4 Cylinder Models w/CDM Ignition



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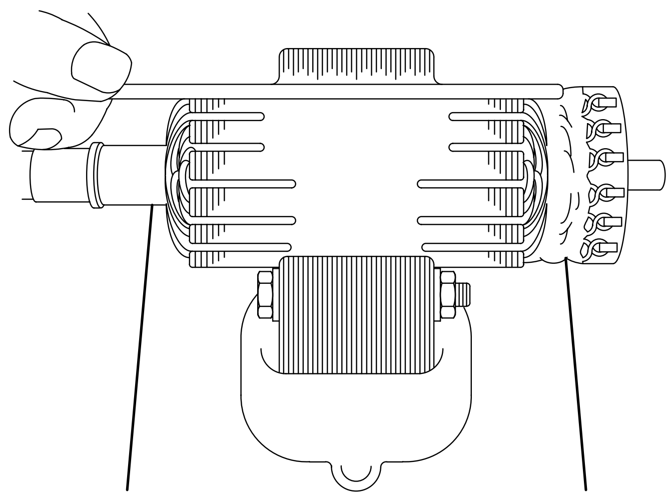
a - CDM
b - Bolt – Torque to 60 lb. in. (6.8 N·m)

ELECTRICAL

2
B



CHARGING AND STARTING SYSTEM

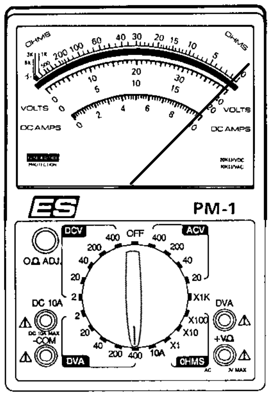
Table of Contents

Specifications

STARTING SYSTEM	**Manual Start**	**- Commercial 75**	Recoil Starter
	Manual Start	**- All Electric Models**	Emergency Starter Rope
	Electric Start	**- Model 65 Jet/75/90**	
		Starter Draw (Under Load)	120 Amperes
		Starter Draw (No Load)	75 Amperes
	Electric Start	**- Model 80Jet/100/115/125**	
		Starter Draw (Under Load)	150 Amperes
		Starter Draw (No Load)	75 Amperes
	Battery Rating		Min. Reserve Cap. Rating of 100 Min. and CCA of 350 Amperes
CHARGING SYSTEM	**Alternator Model**		Alternator Output @ 5250 RPM
	3 Cyl. Manual – Black & Red Stator		10 Amperes
	3 Cyl. Electric – Black Stator **Stamped 398-9710A3** **Serial Number** **USA 0D283222 – 0G280043** **Belgium 09793577 – 09879064**		16 Amperes
	3 Cyl. Electric – Black Stator **Stamped 398-9873A24** **Serial Number** **USA 0G280044 – 0G404505** **Belgium 09879065 – 09916672**		14 Amperes
	3 Cyl. Electric – Red Stator **Stamped 398-832075A3** **Serial Number** **USA 0G404506 and Above** **Belgium 09916673 and Above**		16 Amperes
	4 Cyl. Electric – Black Stator **Stamped 398-9710A31** **Serial Number** **USA 0D283222 – 0G301750** **Belgium 09793577 – 09885527**		16 Amperes
	4 Cyl. Electric – Black Stator **Stamped 398-9710A33** **Serial Number** **USA 0G301751 – 0G404616** **Belgium 09885528 – 09916721**		16 Amperes
	4 Cyl. Electric – Red Stator **Stamped 398-832075A3** **Serial Number** **USA 0G404617 and Above** **Belgium 09916722 and Above**		16 Amperes

Special Tools

1. Volt/Ohm/DVA Meter 91-99750



2. Hydrometer (obtain locally)
3. Ammeter (obtain locally)

Battery

Precautions

When charging batteries, an explosive gas mixture forms in each cell. A portion of this gas escapes thru holes in vent plugs and may form an explosive atmosphere around battery if ventilation is poor. This explosive gas may remain in or around battery for several hours after it has been charged. Sparks or flames can ignite this gas and cause an internal explosion which may shatter the battery.

The following precautions should be observed to prevent an explosion.

1. DO NOT smoke near batteries being charged or which have been charged very recently.
2. DO NOT break live circuits at terminals of batteries because a spark usually occurs at the point where a live circuit is broken. Always be careful when connecting or disconnecting cable clamps on chargers. Poor connections are a common cause of electrical arcs which cause explosions.
3. DO NOT reverse polarity of battery cables on battery terminals.

⚠ CAUTION

If battery acid comes into contact with skin or eyes, wash skin immediately with a mild soap. Flush eyes with water immediately and see a doctor.

Operating Engine Without Battery

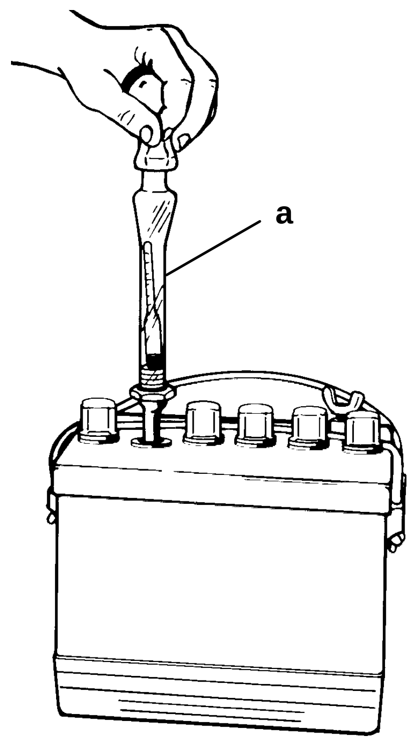
If desired (or in an emergency), engines equipped with an alternator can be started and operated without a battery (either disconnected or removed) if “Warning”, below, is followed.

⚠ WARNING

Before operating engine with battery leads disconnected from battery, disconnect stator leads (YELLOW) from rectifier. Insulate (tape) stator lead ring terminals.

Specific Gravity Readings

Use a hydrometer to measure specific gravity of electrolyte in each cell.



a - Hydrometer

Hydrometer measures percentage of sulphuric acid in battery electrolyte in terms of specific gravity. As a battery drops from a charged to a discharged condition, acid leaves the solution and chemically combines with the plates, causing a decrease in specific gravity of electrolyte. An indication of concentration of electrolyte is obtained with a hydrometer.

When using a hydrometer, observe the following points:

1. Hydrometer must be clean (inside and out) to insure an accurate reading.

2. Never take hydrometer readings immediately after water has been added. Water must be thoroughly mixed with electrolyte by charging for at least 15 minutes at a rate high enough to cause vigorous gassing.
3. If hydrometer has built-in thermometer, draw liquid in several times to ensure correct temperature before taking reading.
4. Hold hydrometer vertically and draw in just enough liquid from battery cell so that float is free-floating. Hold hydrometer at eye level so that float is vertical and free of outer tube, then take reading at surface of liquid. Disregard curvature where liquid rises against float stem due to capillary action.
5. Avoid dropping electrolyte on boat or clothing, as it is extremely corrosive. Wash off immediately with baking soda solution.

Specific gravity of electrolyte varies not only with percentage of acid in liquid but also with temperature. As temperature drops, electrolyte contracts, so that specific gravity increases. Unless these variations in specific gravity are taken into account, specific gravity obtained by hydrometer may not give a true indication of concentration of acid in electrolyte.

A fully charged battery will have a specific gravity reading of approximately 1.270 at an electrolyte temperature of 80° F (27° C). If electrolyte temperature is above or below 80° F, additions or subtractions must be made in order to obtain a hydrometer reading corrected to 80° F standard. For every 10° F (3.3° C) above 80° F, add 4 specific gravity points (.004) to hydrometer reading. Example: A hydrometer reading of 1.260 at 110° F (43° C) would be 1.272 corrected to 80° F, indicating a fully charged battery.

For every 10° below 80° F, subtract 4 points (.004) from the reading. Example: A hydrometer reading of 1.272 at 0° F (–18° C) would be 1.240 corrected to 80° F, indicating a partially charged battery.

SPECIFIC GRAVITY CELL COMPARISON TEST

This test may be used when an instrumental tester is not available. To perform this test, measure specific gravity of each cell, regardless of state of charge, and interpret results as follows: If specific gravity readings show a difference between highest and lowest cell of .050 (50 points) or more, battery is defective and should be replaced.

Electrolyte Level

Check electrolyte level in battery regularly. A battery in use in hot weather should be checked more frequently because of more rapid loss of water. If electrolyte level is found to be low, then distilled water should be added to each cell until liquid level rises approximately 3/16″ (4.8mm) over plate. DO NOT OVERFILL, because this will cause loss of electrolyte and result in poor performance, short life and excessive corrosion.

⚠ CAUTION

During service, only distilled water should be added to the battery, not electrolyte.

Charging a Discharged Battery

The following basic rules apply to any battery charging situation:

1. Any battery may be charged at any rate (in amperes) as long as spilling of electrolyte (from violent gassing) does not occur and as long as electrolyte temperature does not exceed 125° F (52° C). If spewing of electrolyte occurs, or if electrolyte temperature exceeds 125° F, charging rate (in amperes) must be reduced or temporarily halted to avoid damage to the battery.
2. Battery is fully charged when, over a 2-hour period at a low charging rate (in amperes), all cells are gassing freely (not spewing liquid electrolyte), and no change in specific gravity occurs. Full charge specific gravity is 1.260-1.275, corrected for electrolyte temperature with electrolyte level at 3/16” (4.8mm) over plate. For most satisfactory charging, lower charging rates in amperes are recommended.
3. If, after prolonged charging, specific gravity of at least 1.230 on all cells cannot be reached, battery is not in optimum condition and will not provide optimum performance; however, it may continue to provide additional service, if it has performed satisfactorily in the past.
4. To check battery voltage while cranking engine with electric starter motor, place red (+) lead of tester on positive (+) battery terminal and black (–) lead of tester on negative (–) battery terminal. If the voltage drops below 9-1/2 volts while cranking, the battery is weak and should be recharged or replaced.

Winter Storage of Batteries

Battery companies are not responsible for battery damage, either in winter storage or in dealer stock, if the following instructions are not observed:

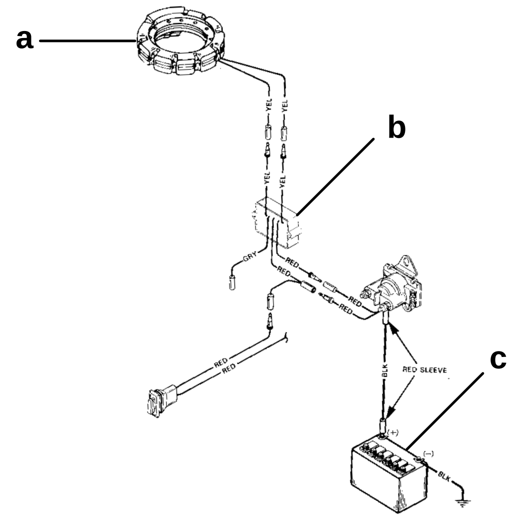
1. Remove battery from its installation as soon as possible and remove all grease, sulfate and dirt from top surface by running water over top of battery. Be sure, however, that vent caps are tight beforehand, and blow off all excess water thoroughly with compressed air. Check water level, making sure that plates are covered.
2. When adding distilled water to battery, be extremely careful not to fill more than 3/16″ (4.8mm) over plate inside battery. Battery solution or electrolyte expands from heat caused by charging. Overfilling battery will cause electrolyte to overflow (if filled beyond 3/16″ over plate).
3. Grease terminal bolts well with Quicksilver 2-4-C w/teflon, and store battery in COOL-DRY place. Remove battery from storage every 30-45 days, check water level (add water if necessary), and put on charge for 5 or 6 hours at 6 amperes. DO NOT FAST CHARGE.
4. If specific gravity drops below 1.240, check battery for reason, and then recharge. When gravity reaches 1.260, discontinue charging. To check specific gravity, use a hydrometer, which can be purchased locally.
5. Repeat preceding charging procedure every 30-45 days, as long as battery is in storage. When ready to place battery back in service, remove excess grease from terminals (a small amount is desirable on terminals at all times), recharge again as necessary and reinstall battery.

⚠ WARNING

Hydrogen and oxygen gases are produced during normal battery operation or charging. Sparks or flame can cause this mixture to ignite and explode, if they are brought near the battery. Sulphuric acid in battery can cause serious burns, if spilled on skin or in eyes. Flush or wash away immediately with clear water.

BLACK Stator Battery Charging System Troubleshooting

MODELS EQUIPPED WITH REGULATOR (BLACK STATOR)



a - Stator
b - Regulator
c - Battery

The charging system may be damaged by: 1) reversed battery cables, 2) running the engine with battery cables disconnected and stator leads connected to rectifier, and 3) an open circuit, such as a broken wire or loose connection.

A fault in the battery charging system usually will cause the battery to become undercharged. Check battery electrolyte level, and charge battery. See “Electrolyte Level”, and “Charging a Discharged Battery”.

If battery will NOT accept a satisfactory charge, replace battery.

If battery accepts a satisfactory charge, determine the cause of the charging system problem as follows.

1. Check for correct battery polarity [RED cable to positive (+) battery terminal]. If polarity was incorrect, check for damaged rectifier. See “Rectifier Test”, following.
2. Check for loose or corroded battery connections.
3. Visually inspect wiring between stator and battery for cuts, chafing; and disconnected, loose or corroded connection.
4. Excessive electrical load (from too many accessories) will cause battery to run down.

If visual inspection determines that battery connections and wiring are OK, perform the following stator and rectifier tests.

9 Ampere (Manual Start) BLACK Stator Output Test

The 9 ampere stator that comes with manual start models is NOT designed to produced its rated amperage at low engine speeds (to charge batteries) but rather as a power source for running lights. However, if a rectifier kit is installed on the engine to enable the stator to charge a battery, the following approximate output can be checked at the listed RPM with an in–series ammeter:

	RPM	AMPERES
9 Ampere BLACK Stator	Idle	0.0
	1000	0.0
	2000	6.0
	3000	9.0
	4000	10.0
	5000	10.0

BLACK Stator Ohms Test (Alternator Coils Only)

NOTE: *Stator can be tested without removing from engine.*

1. Disconnect both YELLOW (stator leads) from terminals on rectifier (or terminal block).
2. Use an ohmmeter and perform the following test.

IMPORTANT: If stator is mounted on engine, black stator lead (if provided) must be grounded to powerhead when testing.

3. Replace stator if readings are outside ranges shown.

BLACK STATOR

Test Leads	Resistance (Ohms)	Scale Reading (x________)
9/14/16 AMPERE STATORS		
Between YELLOW stator leads	.1 – .5	.1 – .5 (R x 1)
Between either YELLOW stator lead and engine ground**	No Continuity	No Continuity (R x 1000)

* **DC resistance of these windings generally is less than 1.5 ohms. If a reading (resembling a short) is obtained, this would be acceptable.**

** **If stator is removed from engine, connect test lead to black stator lead, if provided.**

4. If meter readings are other than specified, replace stator.

BLACK Stator 14 and 16 Ampere Alternator System Test

1. Check battery voltage at battery with engine running.
2. If battery voltage is above 14.5 volts, replace voltage regulator/rectifier. Check condition of battery as overcharging may damage battery.
3. If battery voltage is below 14.5 volts, charge battery; refer to “Charging a Discharged Battery”, preceding. If battery can NOT be satisfactorily charged, replace battery.
4. If battery accepts a satisfactory charge, check battery voltage while cranking engine; refer to “Charging a Discharged Battery”, preceding. If cranking voltage is not acceptable, replace battery.
5. If cranking voltage is acceptable, disconnect larger diameter RED wire from STARTER SOLENOID terminal.
6. Remove smaller diameter RED wire (SENSE LEAD) from STARTER SOLENOID terminal and connect to the POSITIVE (+) terminal of a 9 VOLT transistor battery. Ground the NEGATIVE (–) terminal of the 9 VOLT battery to the engine.
7. Connect RED (+) ammeter lead to larger diameter RED wire, and BLACK (–) ammeter lead to POSITIVE terminal on STARTER SOLENOID.
8. Secure wires away from flywheel.
9. With engine running at the indicated RPM’s, the ammeter should indicate the following approximate amperes:

	RPM	AMPERES
14 Ampere Stator	Idle	4.0
	1000	8.0
	2000	11.0
	3000	13.0
	4000	14.0
	5000	14.0

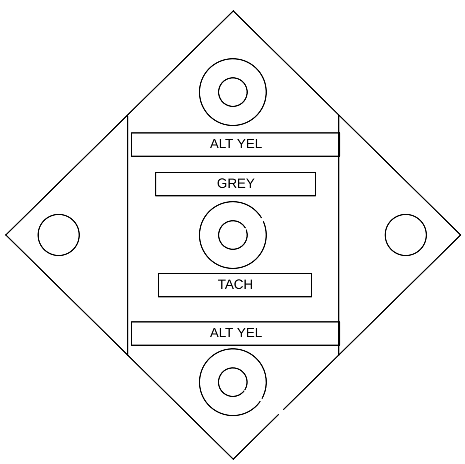
	RPM	AMPERES
16 Ampere Stator	Idle	5.0
	1000	10.0
	2000	16.0
	3000	17.0
	4000	18.0
	5000	18.0

10. A reading of 16 amperes (or 12 amperes for 15 ampere stator) at 3500 RPM indicates the charging system is functioning properly. The battery is discharging due to the amperage draw on the system is greater than the amperage output of the engine charging system.
11. If ammeter reads less than 18 amperes or 12 amperes respectively, test the stator; refer to “Stator Ohms Test (Alternator Coils Only)”, [18 Ampere Stator], preceding. If stator tests OK, replace voltage regulator/rectifier.

Tachometer Terminal Block

DESCRIPTION

This block is a junction point for stator and tachometer signal wiring. It contains no electrical components. This block is LIGHT GREY in color and is to be used ONLY with small, non-finned voltage regulators. No test is required for this terminal block.



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Tachometer Terminal Block

REMOVAL

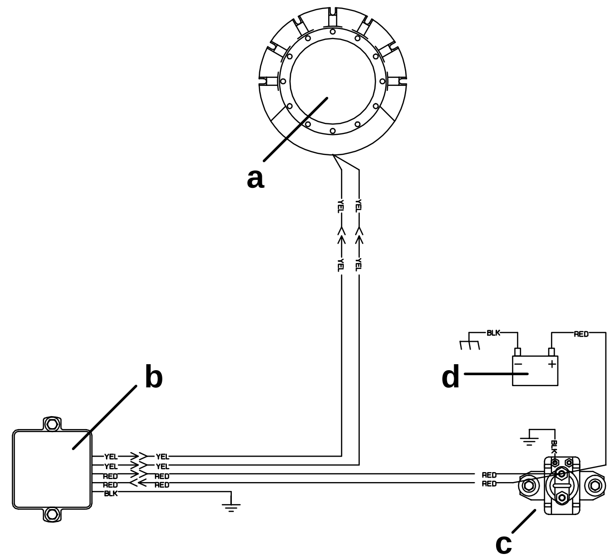
1. Remove two YELLOW alternator wires from block.
2. Remove GREY tachometer wire from block.
3. Remove two attaching screws and remove diode block.

INSTALLATION

1. Secure diode block to powerhead with two screws. Torque screws to 30 lb. in. (3.4 N·m).
2. Attach two YELLOW wires to “ALT YEL” terminals.
3. Attach GREY wire to “GREY TACH” terminal.

RED Stator Battery Charging System Troubleshooting

MODELS EQUIPPED WITH REGULATOR (RED STATOR)



a - Stator
b - Voltage Regulator/Rectifier
c - Start Solenoid
d - 12V Battery

The charging system may be damaged by: 1) reversed battery cables, 2) running the engine with battery cables disconnected and stator leads connected to rectifier, and 3) an open circuit, such as a broken wire or loose connection.

A fault in the battery charging system usually will cause the battery to become undercharged. Check battery electrolyte level, and charge battery. See “Electrolyte Level”, and “Charging a Discharged Battery”.

If battery will NOT accept a satisfactory charge, replace battery.

If battery accepts a satisfactory charge, determine the cause of the charging system problem as follows.

1. Check for correct battery polarity [RED cable to positive (+) battery terminal]. If polarity was incorrect, check for damaged rectifier. See “Rectifier Test”, following.
2. Check for loose or corroded battery connections.
3. Visually inspect wiring between stator and battery for cuts, chafing; and disconnected, loose or corroded connection.
4. Excessive electrical load (from too many accessories) will cause battery to run down.

If visual inspection determines that battery connections and wiring are OK, perform the following stator and rectifier tests.

STATOR OHMS TEST (ALTERNATOR COILS ONLY)

NOTE: *Stator can be tested without removing from engine.*

1. Disconnect both yellow (stator leads) from voltage regulator/rectifier, or terminal block.
2. Use an ohmmeter and perform the following test.

IMPORTANT: If stator is mounted on engine, black stator lead (if provided) must be grounded to powerhead when testing.

3. Replace stator if readings are outside ranges shown.

NOTE: *Resistance varies greatly with temperature. Measurements should be taken with an ambient temperature range of 65 to 85 degrees F.*

9 Ampere Manual Stator

Test Leads	Resistance (Ohms)	Scale Reading
Between Yellow Stator Leads	0.16 - 0.19*	R x 1
Between Either Yellow Stator Lead and Engine Ground	No Continuity	R x 1000

16 Ampere Stator

Test Leads	Resistance (Ohms)	Scale Reading
Between Yellow Stator Leads	0.16 - 0.19*	R x 1
Between Either Yellow Stator Lead and Engine Ground	No Continuity	R x 1000

* **DC Resistance of these windings generally is less than 1.5 Ohms. If a reading resembling a short is obtained, this would be acceptable.**

ALTERNATOR SYSTEMS TEST (RED STATOR)

9 Ampere Manual Stator

IMPORTANT: Rectifier (optional accessory) must be functioning properly for accurate test results to be obtained.

1. Remove RED lead from (+) terminal of rectifier.
2. Connect RED (+) ammeter lead to rectifier (+) terminal and BLACK (–) ammeter lead to RED rectifier lead.
3. With engine running at the indicated RPM, the ammeter should indicate the following approximate amperes:

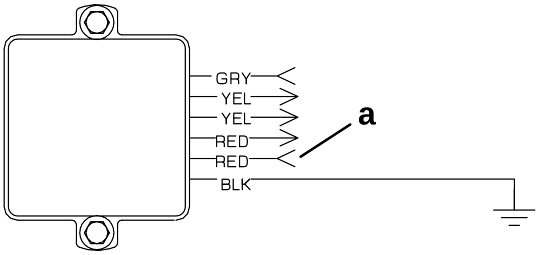
	RPM	AMPERES
9 Ampere Manual Stator	Idle	0
	1000	0.6
	2000	8.0
	3000	9.0
	4000	10.0
	5000	10.5

4. If proper ampere readings are not obtained, replace stator.

16 Ampere Stator

1. Check battery voltage at battery with engine running.
2. If battery voltage is above 14.5 volts, replace voltage regulator/rectifier. Check condition of battery as overcharging may damage battery.
3. If battery voltage is below 14.5 volts, charge battery; refer to “Charging a Discharged Battery”, preceding. If battery can NOT be satisfactorily charged, replace battery.
4. If battery accepts a satisfactory charge, check battery voltage while cranking engine; refer to “Charging a Discharged Battery”, preceding. If cranking voltage is not acceptable, replace battery.
5. If cranking voltage is acceptable, disconnect larger diameter RED harness wire from starter solenoid terminal.

6. Remove RED sense lead wire (A) from starter solenoid terminal and connect to the positive (+) terminal of a 9 volt transistor battery. Ground the negative (–) terminal of the 9 volt battery to the engine.



a - Red Sense Lead (Female Connector)

7. Connect RED (+) ammeter lead to larger diameter RED harness wire, and BLACK (–) ammeter lead to POSITIVE terminal on starter solenoid.
8. Secure starter wires away from flywheel.
9. With engine running at the indicated RPM's, the ammeter should indicate the following approximate amperes:

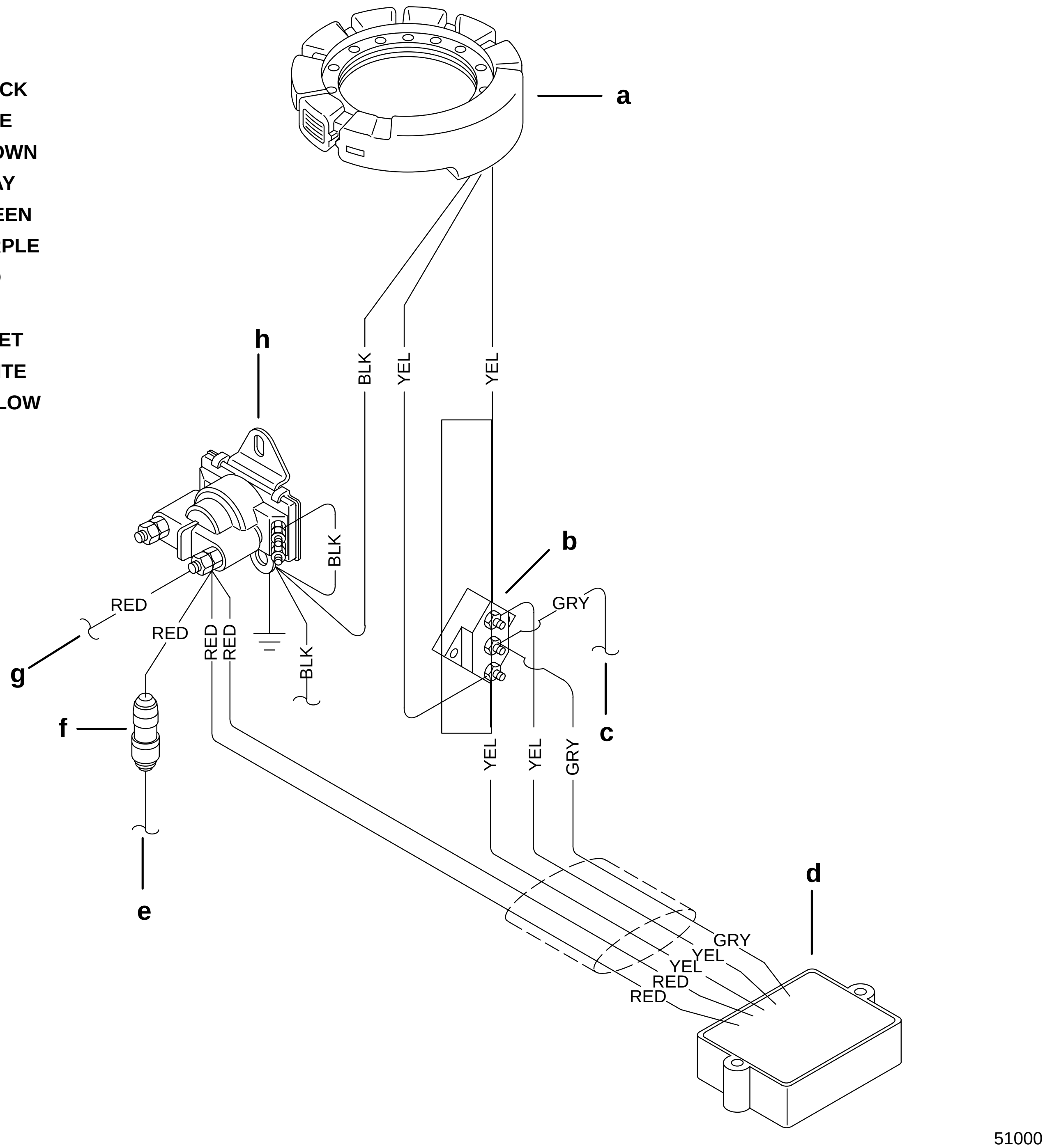
	RPM	AMPERES
16 Ampere Stator	Idle	2.8
	1000	9.3
	2000	16.0
	3000	17.0
	4000	17.5
	5000	17.5

10. A reading of 16 amperes at 2000 RPM indicates the charging system is functioning properly. The battery is being discharged because of the excessive amperage draw on the system (the draw is greater than the amperage output of the engine charging system).
11. If ammeter reads less than required amperes @ 3000 RPM, test the stator; refer to "**Stator Ohm Test (Alternator Coils Only)**". If stator tests OK, replace voltage regulator.

3 Cylinder 14 and 16 Ampere BLACK Stator Battery Charging Wiring Diagram

IMPORTANT: After electrical connections are made, coat all terminal connections using Quicksilver Liquid Neoprene (92-25711), to avoid corrosion.

BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW

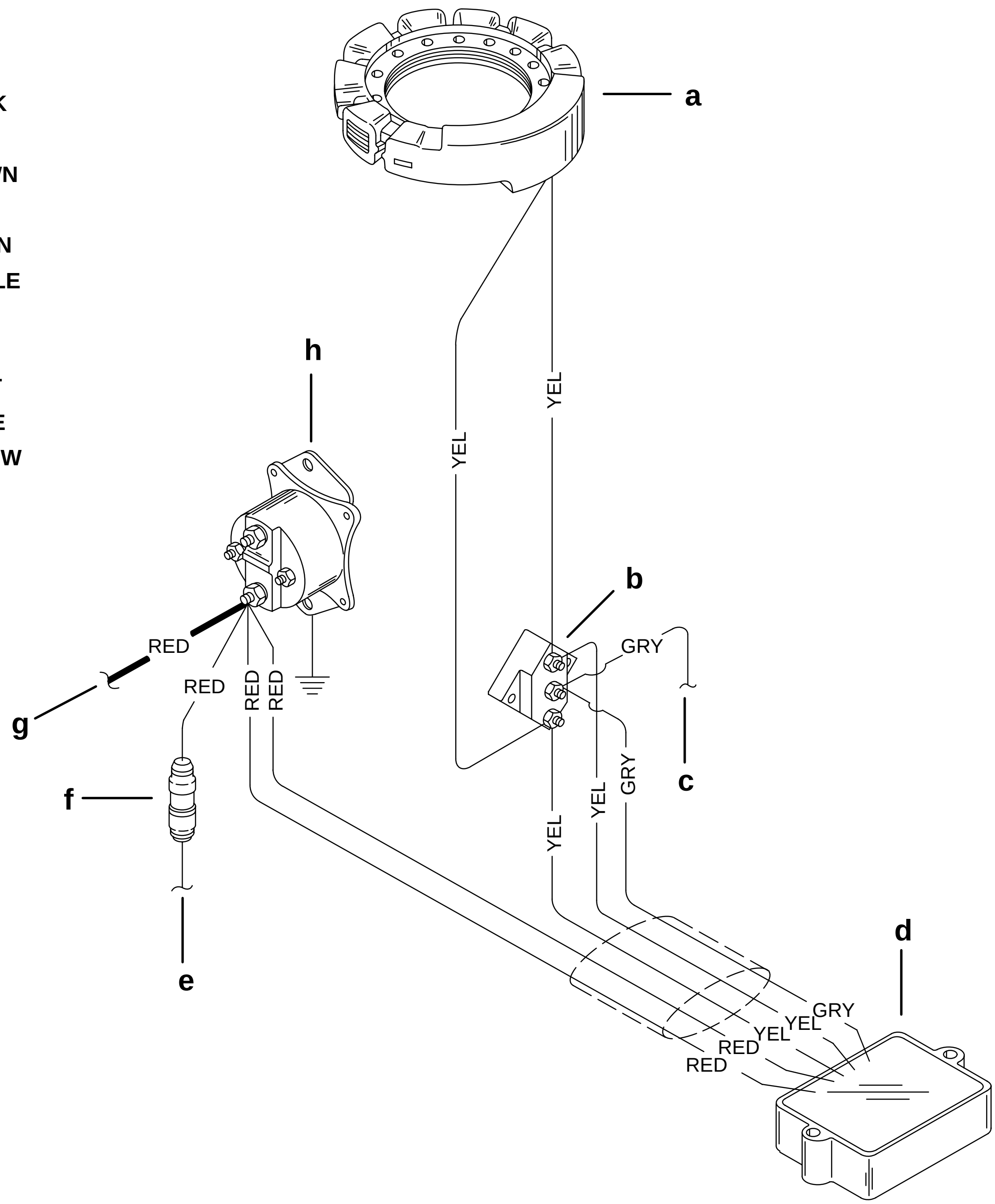


a - Stator
b - Terminal Block
c - To Tachometer
d - Voltage Regulator/Rectifier
e - To Remote Control Harness
f - 20 Ampere Fuse
g - Battery (+) Positive Terminal
h - Starter Solenoid

4 Cylinder 14 and 16 Ampere BLACK Stator Battery Charging Wiring Diagram

IMPORTANT: After electrical connections are made, coat all terminal connections using Quicksilver Liquid Neoprene (92-25711), to avoid corrosion.

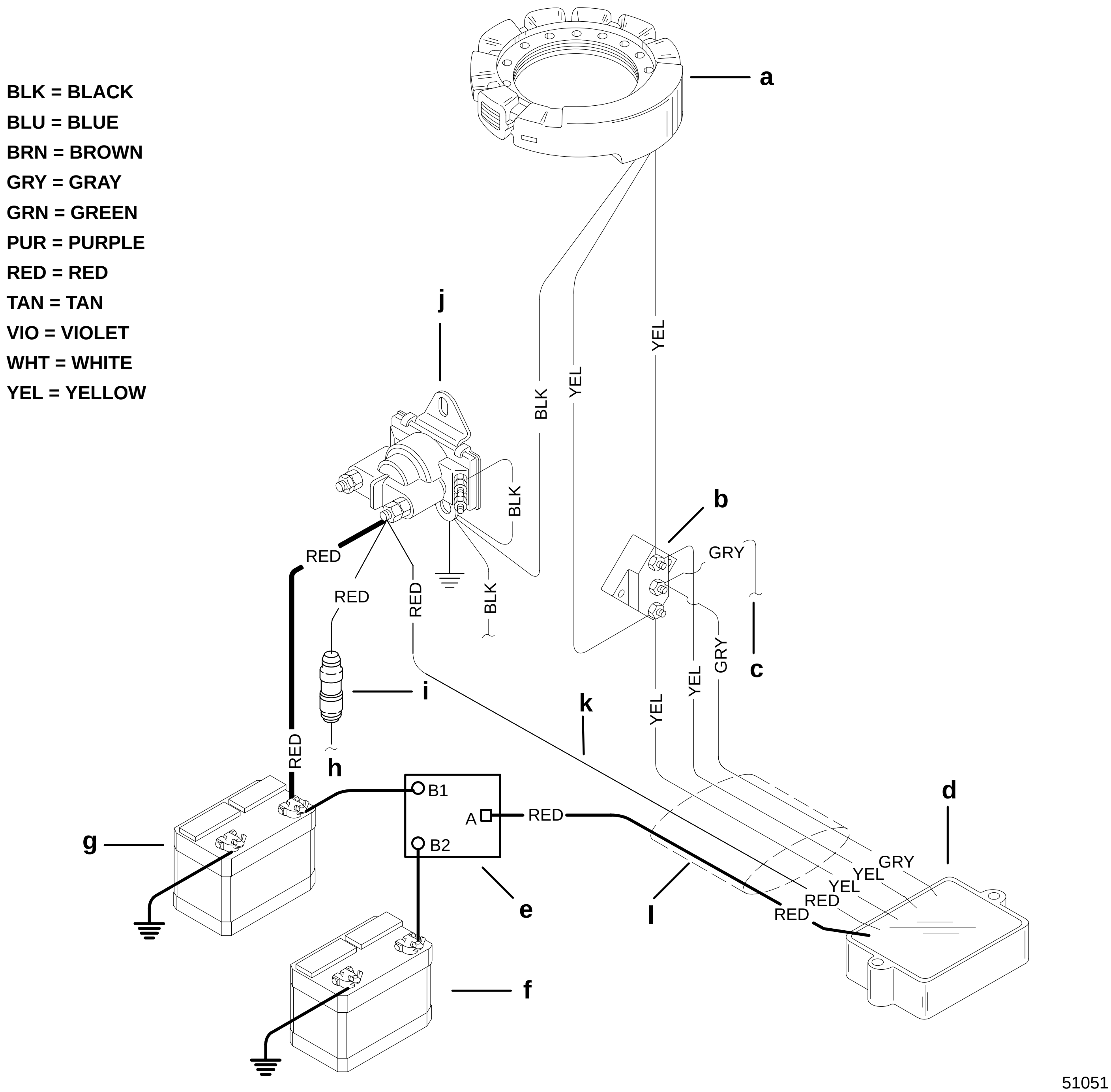
BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW



a - Stator
b - Terminal Block
c - To Tachometer
d - Voltage Regulator/Rectifier
e - To Remote Control Harness
f - 20 Ampere Fuse
g - Battery (+) Positive Terminal
h - Starter Solenoid

3 Cylinder Battery Charging Diagram (with BLACK STATOR) with Battery Isolator

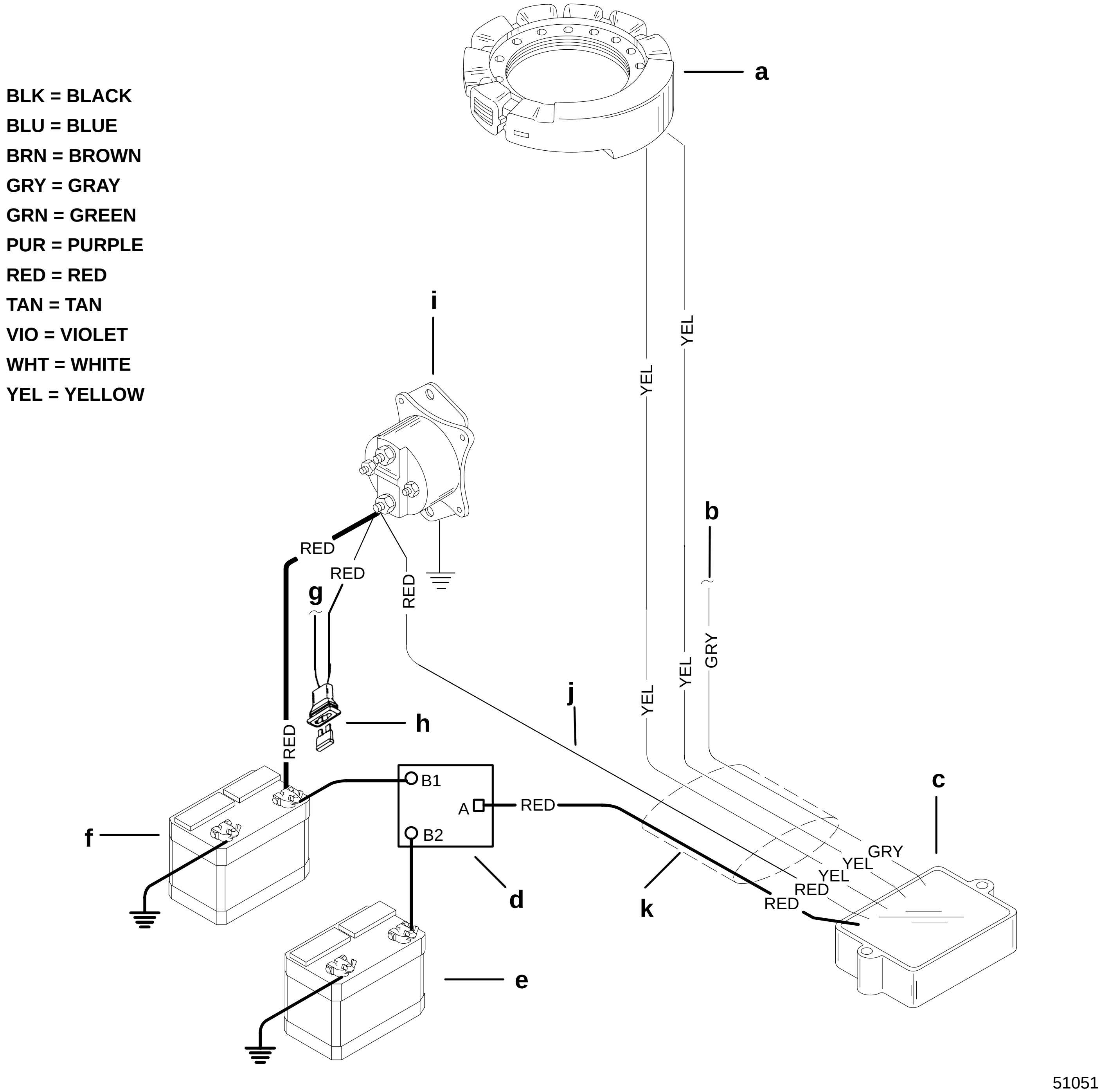
IMPORTANT: After electrical connections are made, coat all terminal connections using Quicksilver Liquid Neoprene (92-25711), to avoid corrosion.



a - Stator
b - Terminal Block
c - To Tachometer
d - Voltage Regulator/Rectifier
e - Battery Isolator
f - Auxiliary Battery
g - Start Battery
h - To Remote Control Harness
i - 20 Ampere Fuse
j - Starter Solenoid
k - Small Red (Sense)Lead
l - Large Red (Output) Lead

3 Cylinder Battery Charging Diagram (with RED STATOR) with Battery Isolator

IMPORTANT: After electrical connections are made, coat all terminal connections using Quicksilver Liquid Neoprene (92-25711), to avoid corrosion.

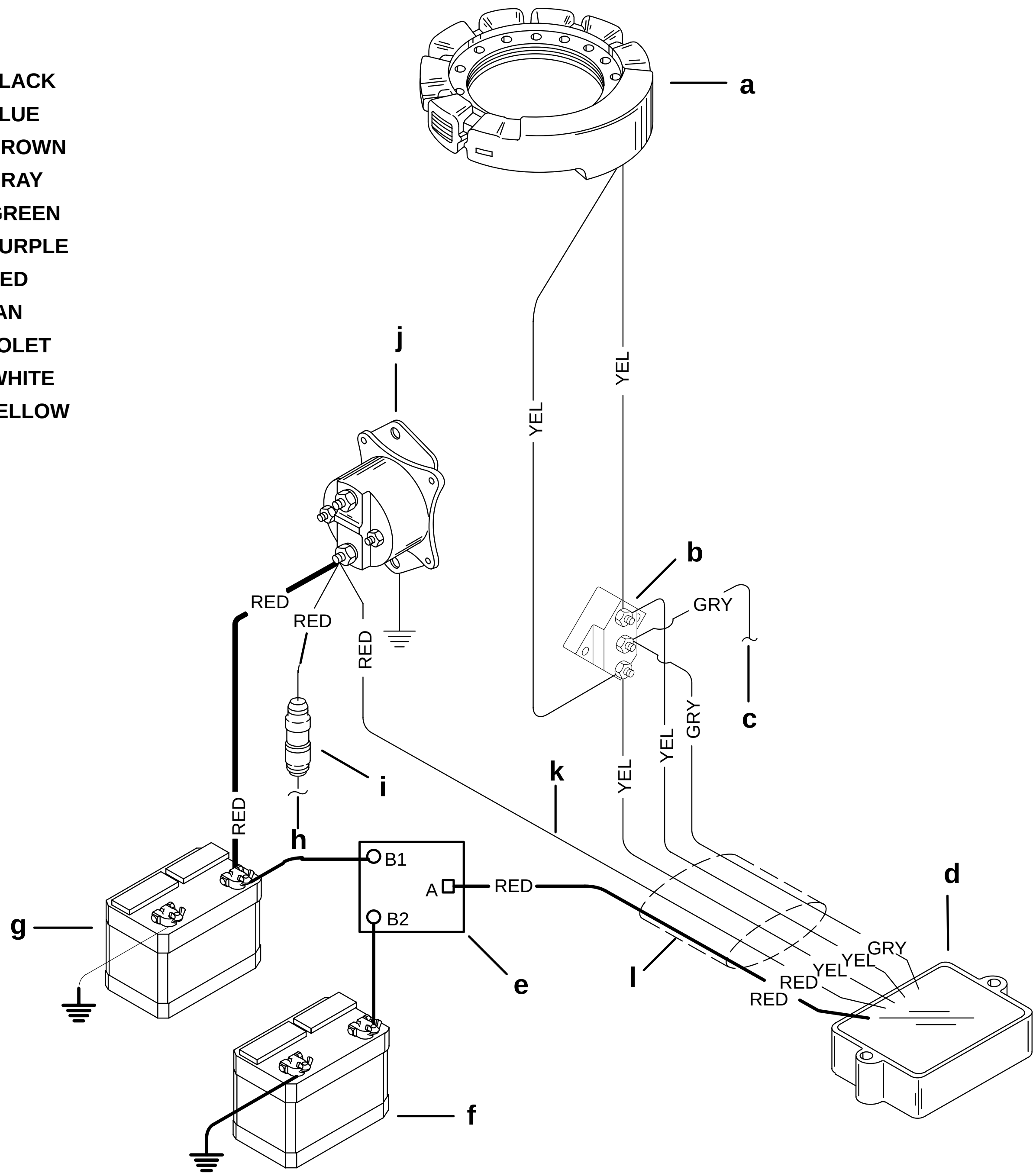


a - Stator
b - To Tachometer
c - Voltage Regulator/Rectifier
d - Battery Isolator
e - Auxiliary Battery
f - Start Battery
g - To Remote Control Harness
h - 20 Ampere Fuse
i - Starter Solenoid
j - Small Red (Sense)Lead
k - Large Red (Output) Lead

4 Cylinder Battery Charging Diagram (with BLACK Stator) with Battery Isolator

IMPORTANT: After electrical connections are made, coat all terminal connections using Quicksilver Liquid Neoprene (92-25711), to avoid corrosion.

BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW



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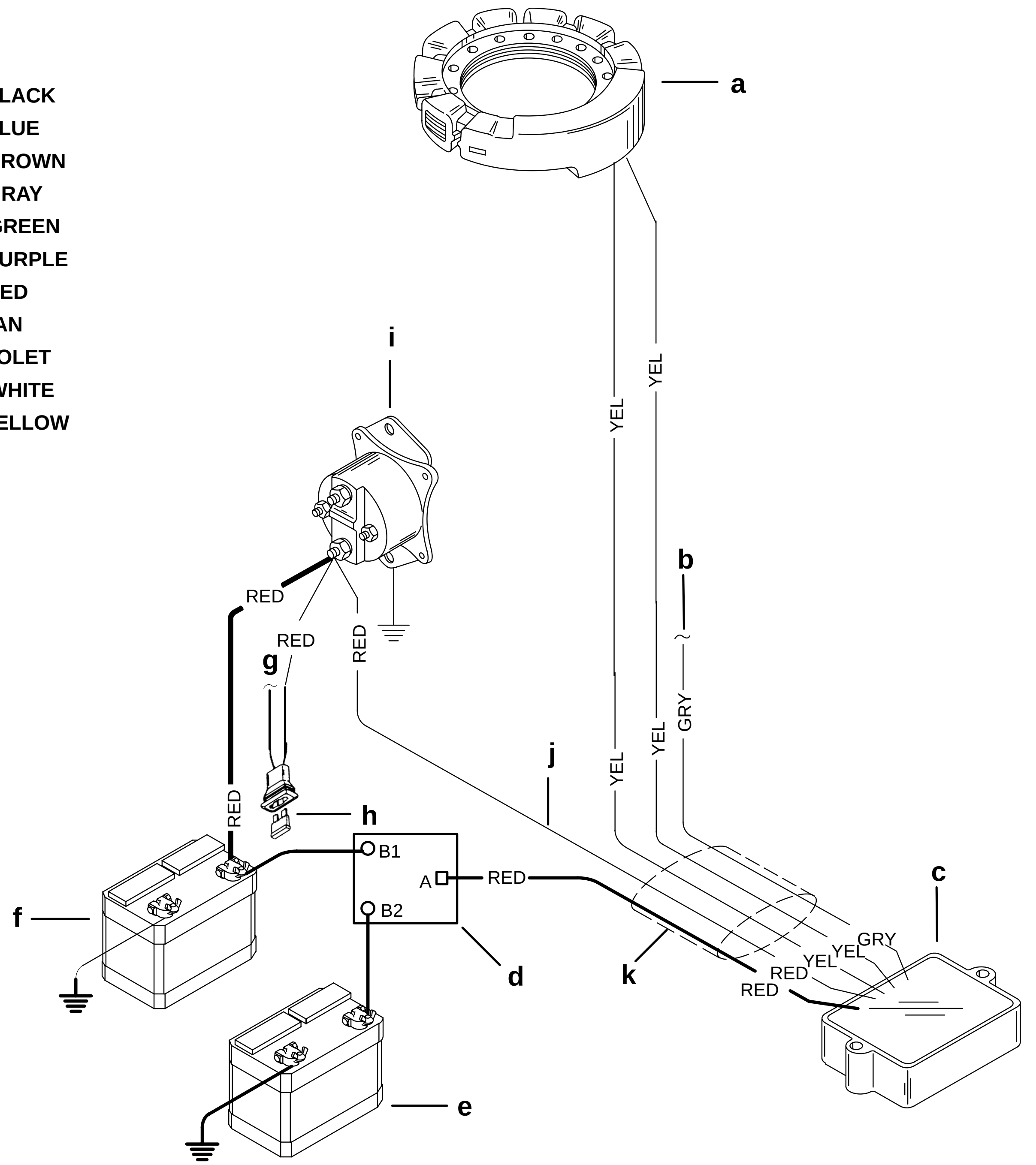
a - Stator
b - Terminal Block
c - To Tachometer
d - Voltage Regulator/Rectifier
e - Battery Isolator
f - Auxiliary Battery
g - Start Battery
h - To Remote Control Harness
i - 20 Ampere Fuse
j - Starter Solenoid
k - Small Red (Sense)Lead
l - Large Red (Output) Lead

4 Cylinder Battery Charging Diagram (with RED Stator) with Battery Isolator

IMPORTANT: After electrical connections are made, coat all terminal connections using Quicksilver Liquid Neoprene (92-25711), to avoid corrosion.

BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW



a - Stator
b - To Tachometer
c - Voltage Regulator/Rectifier
d - Battery Isolator
e - Auxiliary Battery
f - Start Battery
g - To Remote Control Harness
h - 20 Ampere Fuse
i - Starter Solenoid
j - Small Red (Sense) Lead
k - Large Red (Output) Lead

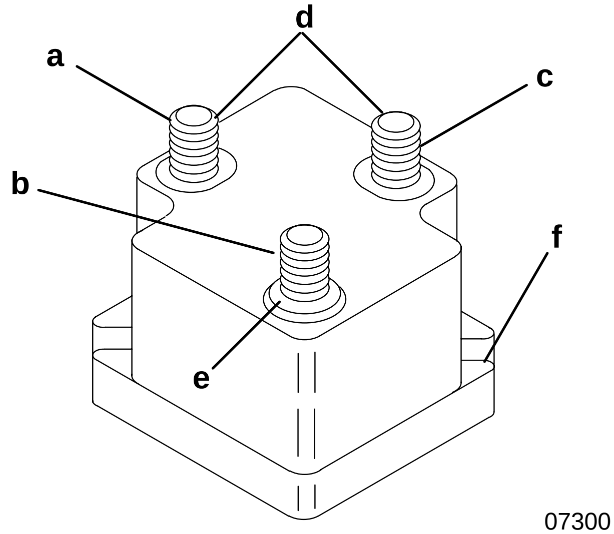
Rectifier Test

⚠ WARNING

Disconnect battery leads from battery before testing rectifier.

NOTE: *Rectifier can be tested without removing from engine.*

1. Disconnect all wires from terminals on rectifier.
2. Use an ohmmeter (R x 1000 scale) and perform the following test. Refer to illustration for rectifier terminal identification.



a - Terminal
b - Terminal
c - Terminal
d - Stator Terminals
e - Positive Terminal
f - Ground

Connect RED meter lead to ground, BLACK lead alternately to terminals “a” and “c”.

- Continuity Indicated. Connect BLACK meter lead to ground, RED lead alternately to terminals “a” and “c”.
  - No Continuity Indicated. Connect BLACK meter lead to terminal “b”, RED lead alternately to terminals “a” and “c”.
    - Continuity Indicated. Connect RED meter lead to terminal “b”, BLACK lead alternately to terminals “a” and “c”.
      - No Continuity Indicated. Rectifier tests OK.
      - Continuity Indicated. Replace Rectifier.
    - No Continuity Indicated. Replace Rectifier.
  - Continuity Indicated. Replace Rectifier.
- No Continuity Indicated. Connect BLACK meter lead to ground, RED lead alternately to terminals “a” and “c”.
  - No Continuity Indicated. Replace Rectifier.
  - Continuity Indicated. Connect BLACK meter lead to terminal “b”, RED lead alternately to terminals “a” and “c”.
    - Continuity Indicated. Replace Rectifier.
    - No Continuity Indicated. Connect RED meter lead to terminal “b”, BLACK lead alternately to terminals “a” and “c”.
      - No Continuity Indicated. Replace Rectifier.
      - Continuity Indicated. Rectifier tests OK.

Starting System

Starting System Components

The starting system consists of the following components:

1. Battery
2. Starter Solenoid
3. Neutral Start Switch
4. Starter Motor
5. Ignition Switch

Description

The function of the starting system is to crank the engine. The battery supplies electrical energy to crank the starter motor. When the ignition switch is turned to “Start” position, the starter solenoid is activated and completes the starting circuit between the battery and starter.

The neutral start switch opens the start circuit when the shift control lever is not in neutral. This prevents accidental starting when engine is in gear.

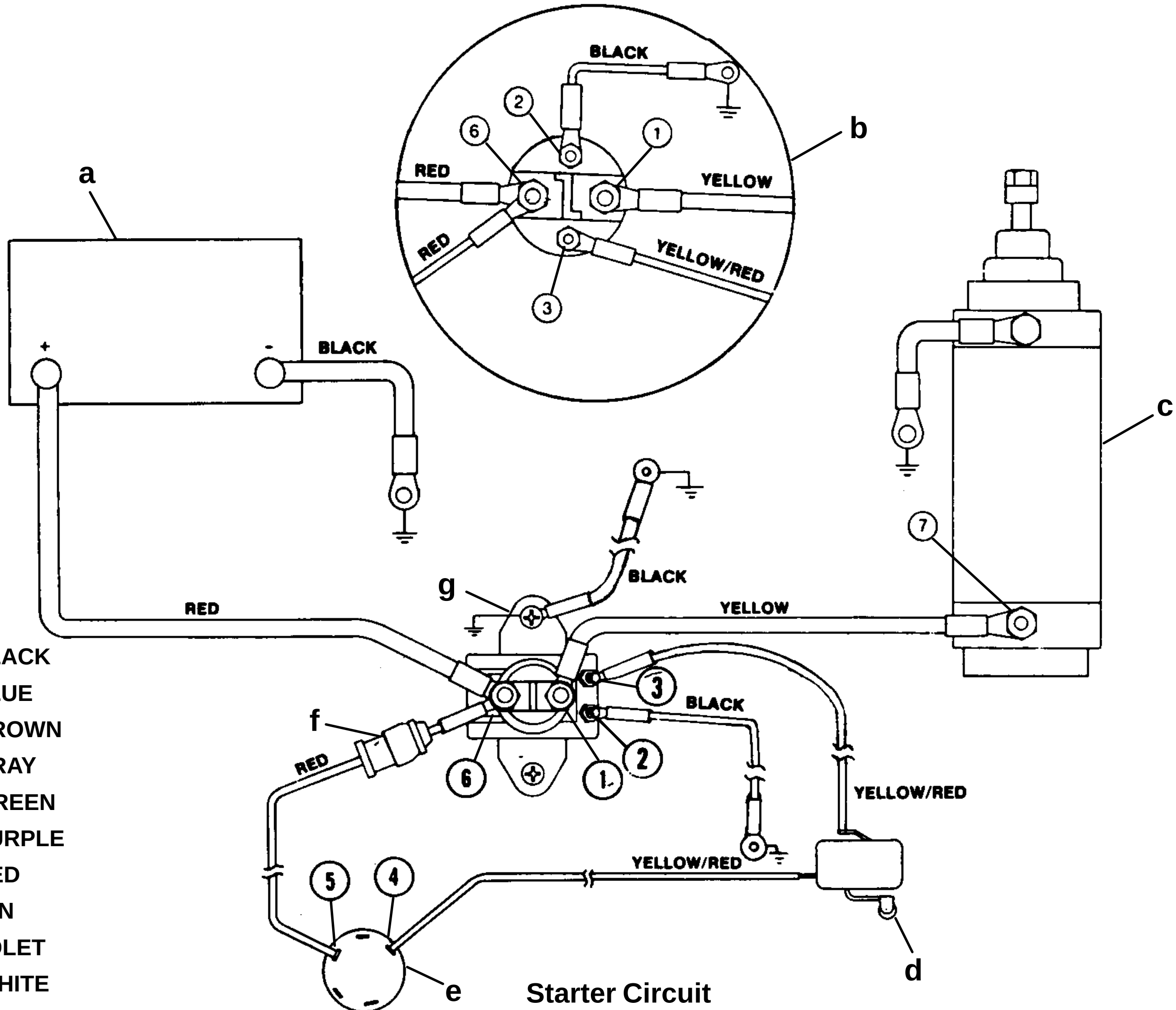
⚠ CAUTION

The starter motor may be damaged if operated continuously. DO NOT operate continuously for more than 30 seconds. Allow a 2 minute cooling period between starting attempts.

Troubleshooting the Starting Circuit

Before beginning the starting circuit troubleshooting flow chart, following, check first for the following conditions:

1. Make sure that battery is fully charged.
2. Check that control lever is in “neutral” position.
3. Check terminals for corrosion and loose connections.
4. Check cables and wiring for frayed and worn insulation.
5. Check in-line fuse in red wire; see diagram.



BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW

Starter Circuit

a - Battery
b - Starter Solenoid
c - Starter
d - Neutral Start Switch (Located in Control Housing)
e - Ignition Switch
f - Fuse Holder (If Equipped) (20 Amp Fuse)
g - Starter Solenoid

Starting Circuit Troubleshooting Flow Chart

Starter Motor Does Not Turn

SAFETY WARNING: Disconnect BLACK (starter motor) cable from starter solenoid test point 1 BEFORE making tests 1-thru-7 to prevent unexpected engine cranking.

TEST 1
Use an ohmmeter (R x 1 scale) and connect meter leads between NEGATIVE (–) battery post and common powerhead ground.

No continuity indicated; there is an open circuit in the BLACK negative (–) battery cable between the negative (–) battery post and the powerhead.

- Check cable for loose or corroded connections.
- Check cable for open.

Continuity Indicated

Proceed to TEST 2, on next page

TEST 2

a - Disconnect BLACK ground wire(s) from Test Point 2.
b - Connect voltmeter between common engine ground and Test Point 2.
c - Turn ignition key to "Start" position.

No voltage reading; proceed to TEST 3.

12 Volt Reading*
Check BLACK ground wire for poor connection or open circuit. Reconnect ground wire to starter solenoid; proceed to TEST 7.

TEST 3

a - Reconnect BLACK ground wire(s).
b - Connect voltmeter between common engine ground and Test Point 3.
c - Turn ignition key to "Start" position.

No voltage reading; proceed to TEST 4.

12 Volt Reading
Defective starter solenoid.

TEST 4

a - Connect voltmeter between common engine ground and Test Point 4.
b - Turn ignition key to "Start" position.

No voltage reading; proceed to TEST 5.

12 Volt Reading*
Neutral start switch is open, or YELLOW/RED wire is open between Test Points 4 and 3.

TEST 5

Connect voltmeter between common engine ground and Test Point 5.

No voltage reading; proceed to TEST 6.

12 Volt Reading*
Defective ignition switch.

TEST 6

Connect voltmeter between common engine ground and Test Point 6.

No voltage reading; check RED wire between battery (+) positive terminal and Test Point 6.

12 Volt Reading*
Check fuse in RED wire between test points 5 and 6.
Check for open RED wire between test points 5 and 6.

TEST 7

a - Connect voltmeter between common engine ground and Test Point 1.
b - Turn ignition key to "Start" position.

No voltage reading;
Defective starter solenoid.

12 Volt Reading*
Should hear solenoid click; proceed to Test 8.

TEST 8

a - Reconnect BLACK (starter motor) cable to starter solenoid Test Point 1.
b - Connect voltmeter between common engine ground and Test Point 7.
c - Turn ignition key to "Start" position.

No voltage reading; check BLACK cable for poor connection or open circuit.

12 Volt Reading*
Check BLACK ground cable at starter for loose or corroded connection, or open circuit. If cable is OK, check starter motor.

* Battery Voltage

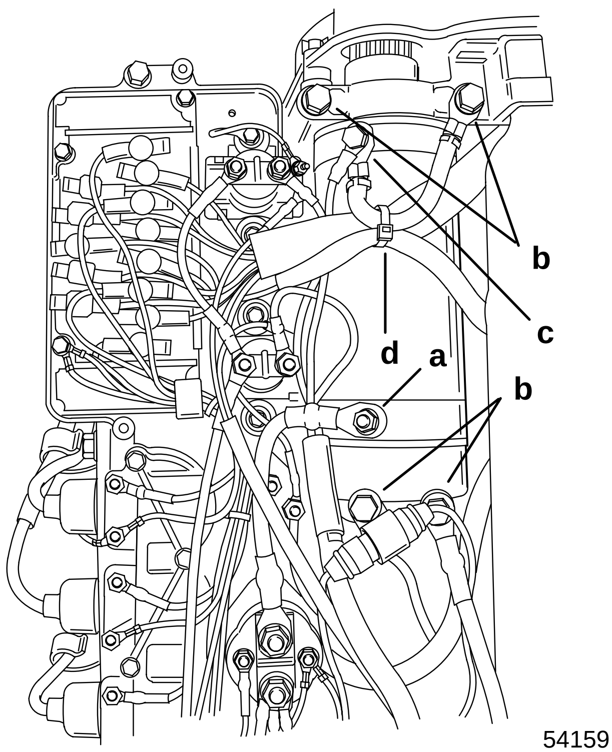
Starter Motor

Removal

CAUTION

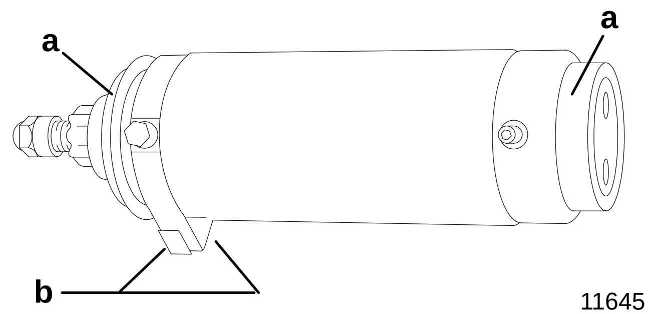
Disconnect battery leads from battery before removing starter.

1. Disconnect battery leads from battery.
2. Remove sta-strap.
3. Disconnect YELLOW cable.
4. Remove BLACK cable.
5. Remove 4 bolts and remove starter clamps.
6. Remove starter.



a - YELLOW Cable
b - Bolts (4)
c - BLACK Cable
d - Sta-Strap

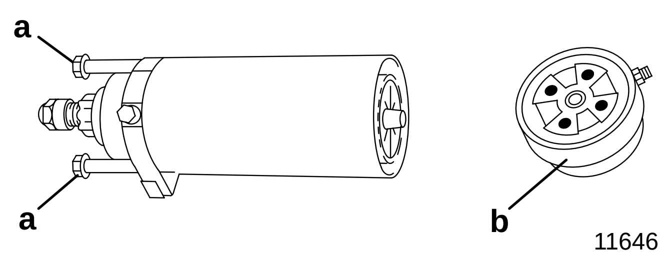
7. Remove 2 rubber collars and 2 rubber bumpers.



a - Rubber Collar
b - Rubber Bumpers

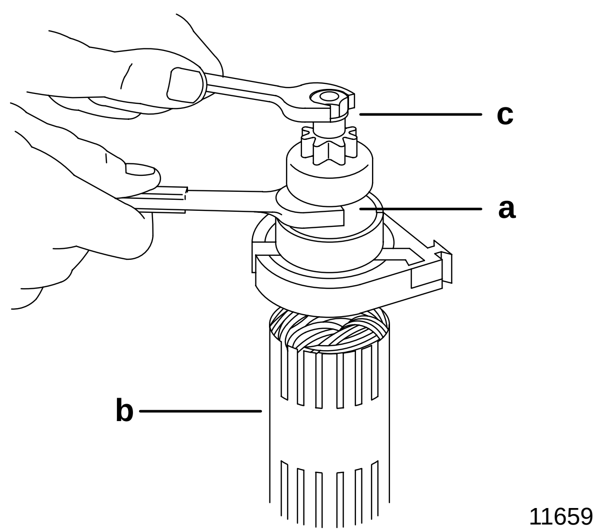
Disassembly

1. Remove 2 thru bolts and commutator end cap, taking care not to lose brush springs.



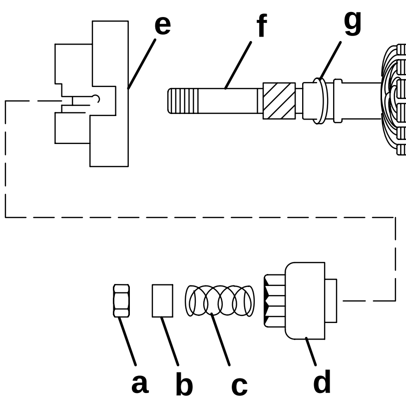
a - Thru Bolts
b - Commutator End Cap

2. Pull armature from starter frame.
3. Remove locknut.



a - Hold Armature Shaft With Wrench on Hex Portion of Drive Assembly
b - Armature
c - Nut

4. Remove components from armature.



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a - Locknut
b - Spacer
c - Spring
d - Drive Assembly
e - Drive End Cap
f - Armature Shaft
g - Washer

Starter Cleaning, Inspection and Testing

CLEANING AND INSPECTION

1. Clean all starter motor parts.
2. Check pinion teeth for chips, cracks or excessive wear.
3. Replace the drive clutch spring and/or collar if tension is not adequate or if wear is excessive.
4. Inspect brush holder for damage or for failure to hold brushes against commutator.
5. Replace brushes that are pitted or worn to less than 1/4″ (6.4mm) in length.
6. Inspect the armature conductor (commutator bar junction) for a tight connection. A loose connection (excessive heat from prolonged cranking melts solder joints) results in a burned commutator bar.
7. Resurface and undercut a rough commutator as follows:

⚠ CAUTION

Do not turn down the commutator excessively.

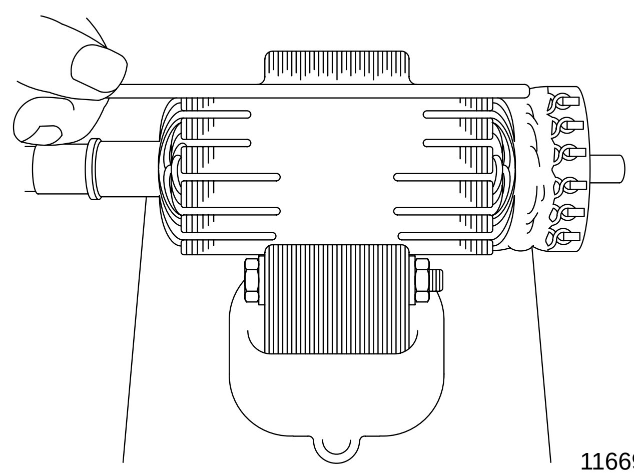
   a. Resurface the commutator and undercut the insulation between the commutator bars 1/32″ (0.8mm) to the full width of the insulation and so that the undercut is flat.
   b. Clean the commutator slots after undercutting.
   c. Sand the commutator lightly with No. 00 sandpaper to remove burrs, then clean the commutator.
   d. Recheck the armature on a growler for shorts as specified in the following procedure (“Testing”).

8. Open-circuited armatures often can be repaired. The most likely place for an open circuit is at the commutator bars, as a result of long cranking periods. Long cranking periods overheat the starter motor so that solder in the connections melts and is thrown out. The resulting poor connections then cause arcing and burning of the commutator bars.
9. Repair bars, that are not excessively burned, by resoldering the leads in bars (using rosin flux solder) and turning down the commutator in a lathe to remove burned material, then undercut the mica.
10. Clean out the copper or brush dust from slots between the commutator bars.
11. Check the armature for ground. See the following procedure (“Testing”).

Testing

ARMATURE TEST FOR SHORTS

Check armature for short circuits by placing on growler and holding hack saw blade over armature core while armature is rotated. If saw blade vibrates, armature is shorted. Recheck after cleaning between commutator bars. If saw blade still vibrates, replace armature.



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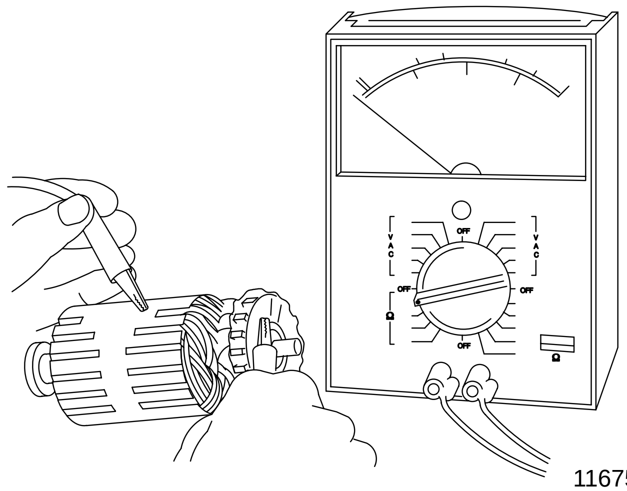
ARMATURE TEST FOR GROUND

1. Set ohmmeter to (R x 1 scale). Place one lead of ohmmeter on armature core or shaft and other lead on commutator.
2. If meter indicates continuity, armature is grounded and must be replaced.



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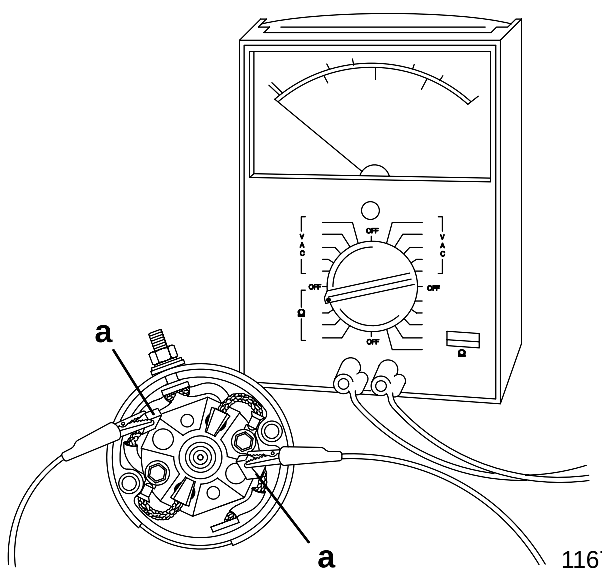
CHECKING POSITIVE BRUSHES AND TERMINAL

Set ohmmeter to (R x 1 scale). Connect meter leads between POSITIVE brushes. Meter must indicate full continuity or zero resistance. If resistance is indicated, inspect lead to brush and lead to POSITIVE terminal solder connection. If connection cannot be repaired, brushes must be replaced.



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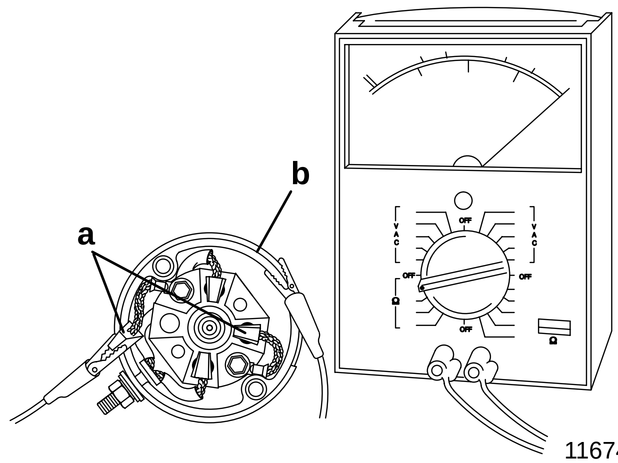
a - POSITIVE (+) Brushes

TESTING NEGATIVE BRUSHES FOR GROUND

Set ohmmeter to (R x 1 scale). Place one lead of the ohmmeter on the NEGATIVE brush and the other lead on the end cap (bare metal). If the meter indicates NO continuity, replace the NEGATIVE brush. Repeat this procedure on the other NEGATIVE brush.

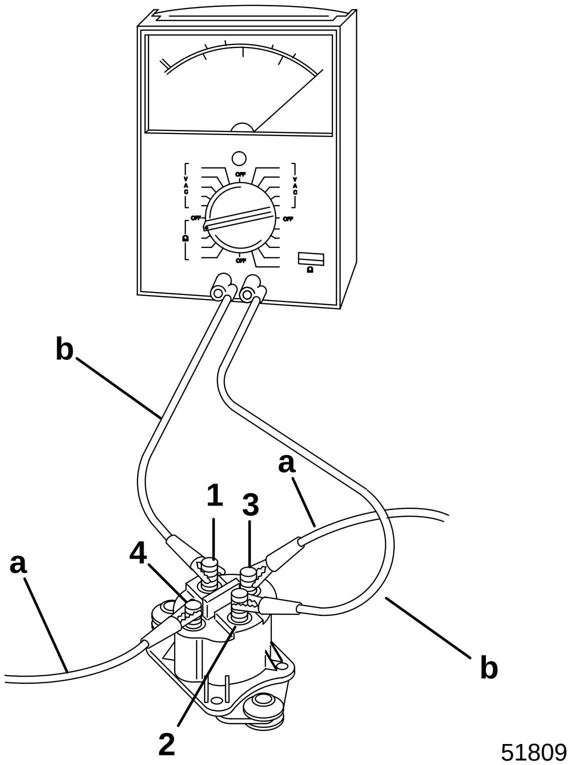


11674

a - NEGATIVE (–) Brushes
b - End Cap

STARTER SOLENOID TEST

1. Disconnect all wires from solenoid.
2. Use an ohmmeter (R x 1 scale) and connect meter leads between solenoid terminals 1 and 2.
3. Connect a 12-volt power supply between solenoid terminals 3 and 4. Solenoid should click and meter should read 0 ohms (full continuity).
4. If meter does not read 0 ohms (full continuity), replace solenoid.

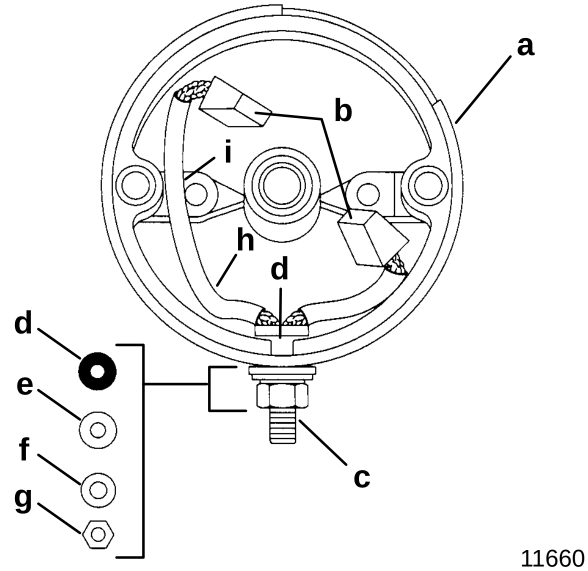


a - 12-Volt Supply
b - VOA Leads

Brush Replacement

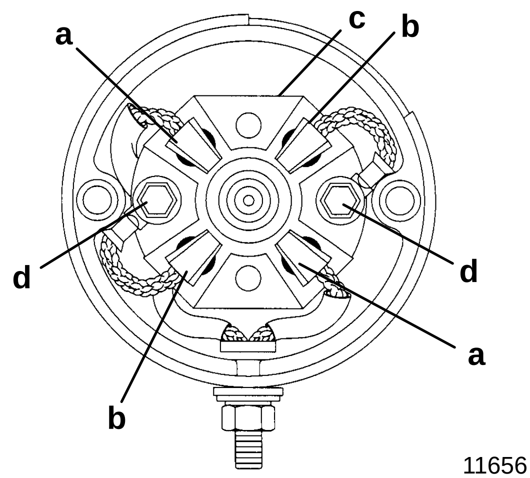
STARTER REASSEMBLY

1. If brushes were removed, replace as follows:
   a. Install POSITIVE brushes (along with POSITIVE terminal) into commutator end cap.



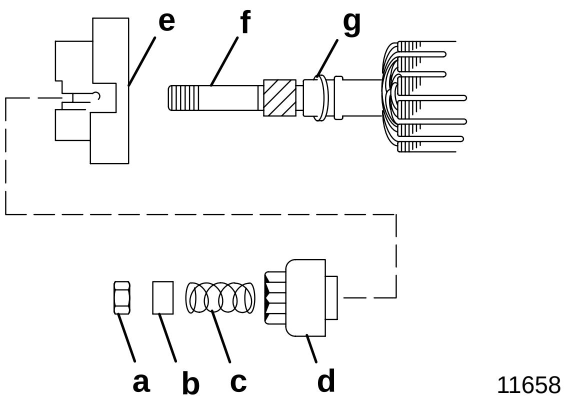
a - End Cap
b - POSITIVE Brushes
c - POSITIVE Terminal
d - Insulating Bushing
e - Washer
f - Split Washer
g - Hex Nut
h - Long Brush Lead
i - Push Lead into Slot

   b. Install NEGATIVE brushes (along with brush holder).



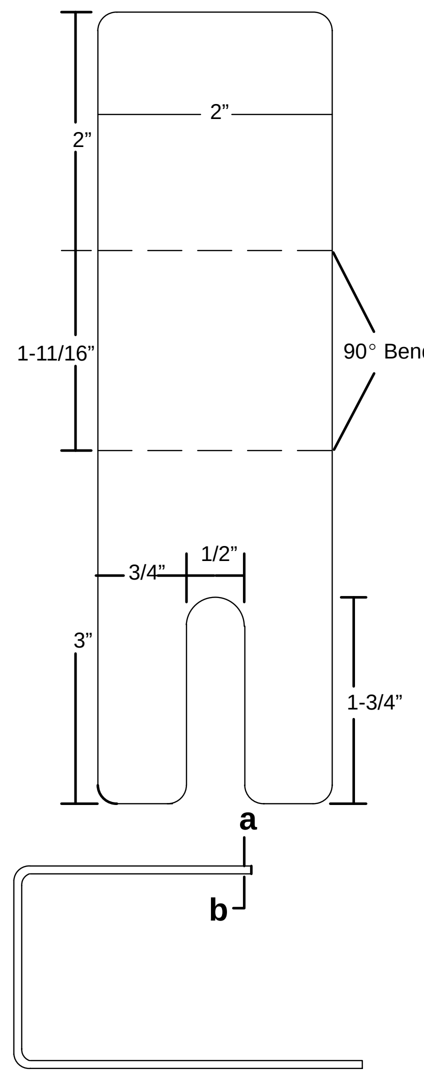
a - POSITIVE (+) Brushes
b - NEGATIVE (–) Brushes
c - Brush Holder
d - Bolts (Fasten NEGATIVE Brushes and Holder)

2. If removed, reinstall parts on armature shaft. Use a new locknut and tighten securely on end of shaft.



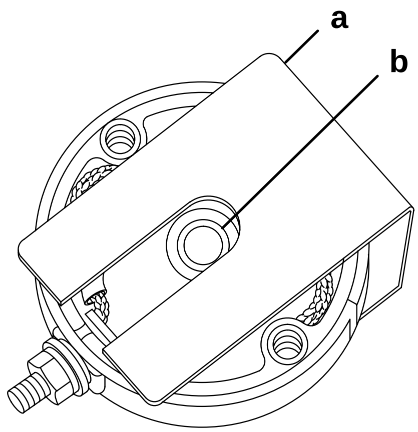
a - Locknut
b - Spacer
c - Spring
d - Drive Assembly
e - Drive End Cap
f - Armature Shaft
g - Washer

3. Lubricate helix threads on armature shaft with a drop of SAE 10W oil.
4. Lubricate bushing in drive end plate with a drop of SAE 10W oil.
5. Position armature into starter frame.
6. To prevent damage to brushes and springs when installing commutator end cap, it is recommended that a brush retaining tool be made as shown:



a - Brush Retainer Tool Layout (Full Size)
b - 18-Gauge Sheet Metal

7. Lubricate bushing (located in commutator end cap) with one drop of SAE 10W oil. DO NOT over lubricate.
8. Place springs and brushes into brush holder and hold in place with brush retainer tool.



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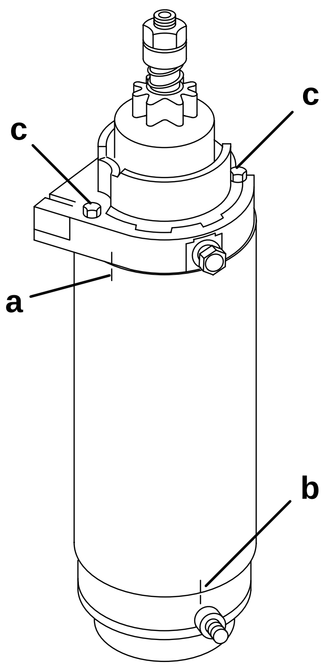
a - Brush Retainer Tool
b - Bushing (DO NOT Over Lubricate)

9. Install armature into starter frame and align match marks. Install commutator end cap onto starter frame and align match marks. Remove brush retainer tool. Install through bolts and torque to 70 lb. in. (7.9 N·m).

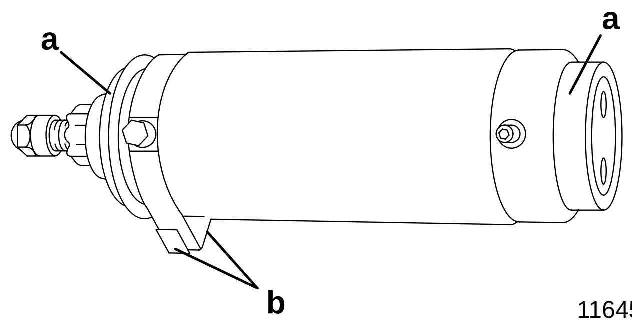


11646

a - Alignment Marks
b - Alignment Marks
c - Bolts [Torque to 70 lb. in. (7.9 N·m)]

INSTALLATION

1. Install 2 rubber collars and 2 rubber bumpers.



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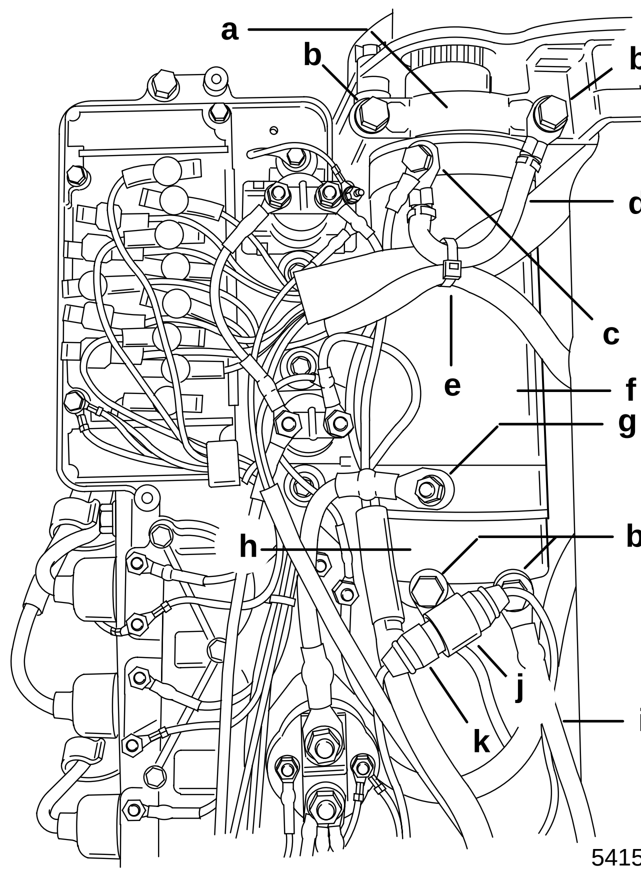
a - Rubber Collars
b - Rubber Bumpers

2. Install components as shown.
3. Connect battery leads to battery.



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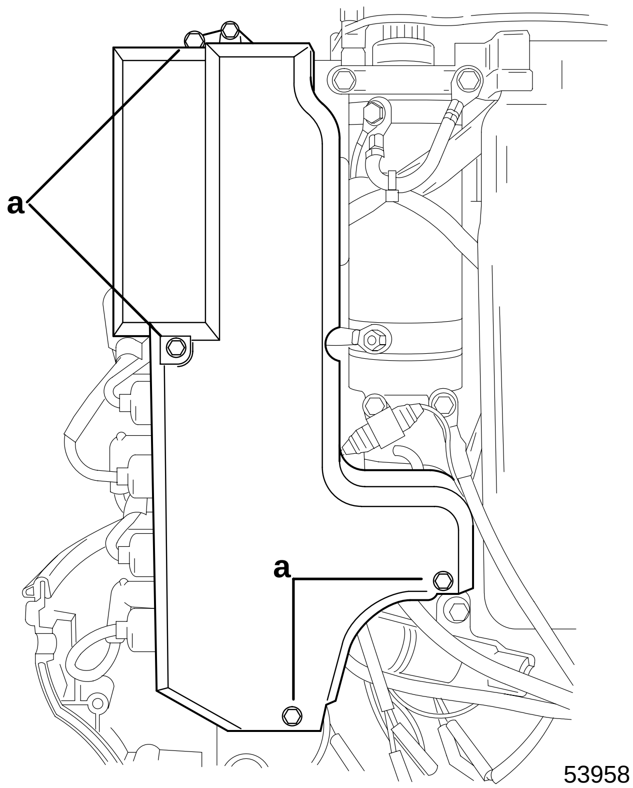
a - Clamp, upper
b - Bolts [Torque to 14.5 lb. ft. (19.7 N·m)]
c - Bolt and Lockwasher
d - BLACK Cable
e - Sta-strap
f - Starter
g - YELLOW Cable [Torque nut to 60 lb. in. (6.8 N·m)]
h - Clamp, lower
i - BLACK Negative (-) Battery Cable
j - J-Clip
k - Fuse Holder

4. Reinstall electrical plate cover. Torque bolts to 30 lb. in. (3.4 N·m).



a - Bolts [Torque to 30 lb. in. (3.4 N·m)]

ELECTRICAL

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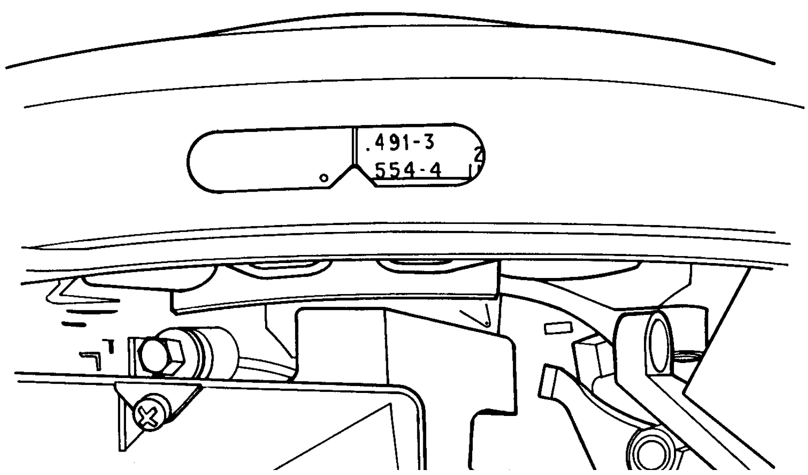

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TIMING/SYNCHRONIZING/ADJUSTING

Table of Contents

Timing/Synchronizing/ Adjusting (3 Cylinder Models)

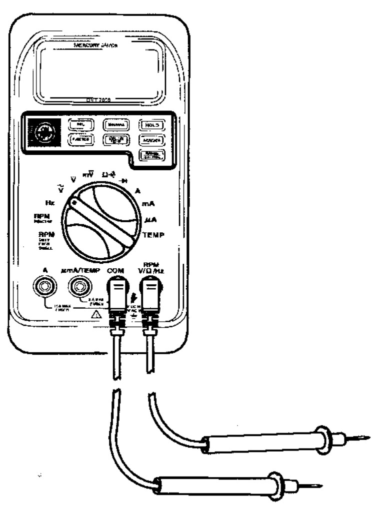
Specifications

65 JET, 75 and 90 Models

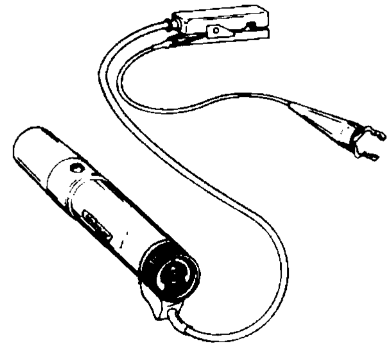
Full Throttle RPM Range	
Model 75	4750 - 5250
Model 65 JET/90	5000 - 5500
Idle RPM (in "FORWARD" Gear)	675 ± 25 RPM
Maximum Timing	
@ 3000 RPM	
–75	18° B.T.D.C.
–65JET/90	20° B.T.D.C.
@ Cranking Speed	
–75	20° B.T.D.C.
–65 JET/90	22° B.T.D.C.
Idle Timing	2° A.T.D.C. – 6° B.T.D.C.
Spark Plug	NGK BUHW-2
Firing Order	
1994/1995 Models	1-3-2
1996/97/98 Models	1-2-3

Special Tools

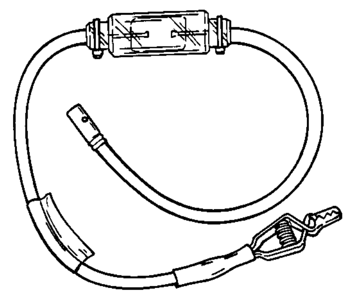
1. Service Tachometer* 91-854008A1



2. Timing Light* 91-99379



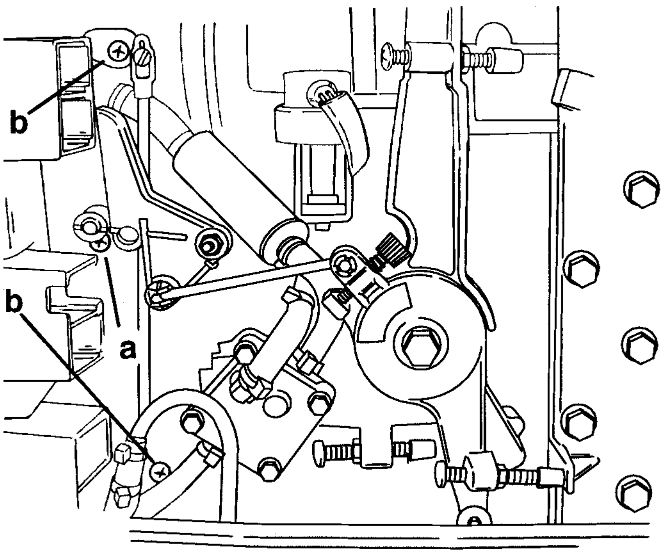
3. Spark Gap Tool 91-63998A1



* May be obtained locally.

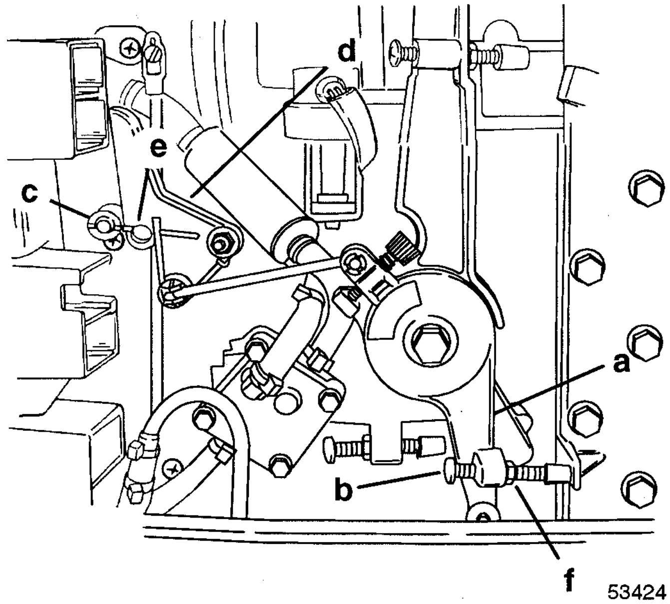
CARBURETOR SYNCHRONIZATION

1. Disconnect remote fuel line from engine.
2. Connect remote control electrical harness to engine wiring harness.
3. Remove throttle cable barrel from barrel retainer.
4. Remove sound air box cover to verify throttle shutters are closed.
5. Loosen screw (1) from throttle cam follower.
6. Loosen 2 synchronizing screws (2).



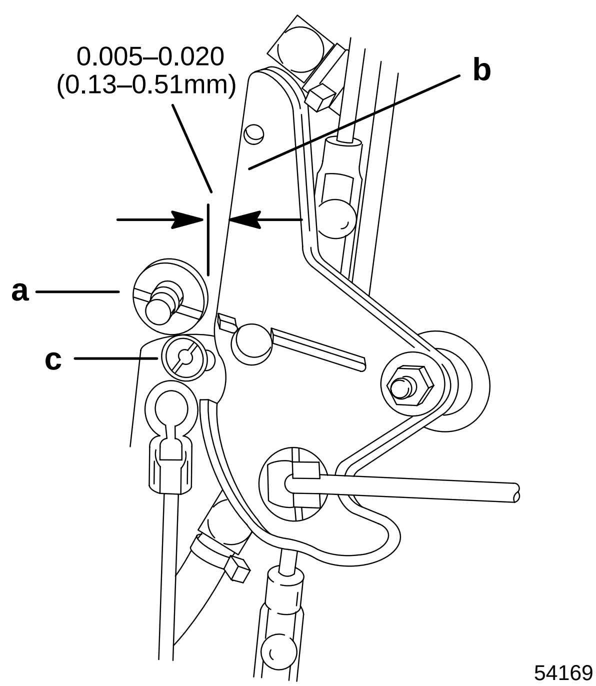
a - Cam Follower Adjustment Screw
b - Synchronizing Screws

7. Hold throttle arm so that idle stop screw is against stop.
8. Place roller of cam follower against throttle cam and adjust idle stop screw to align raised mark of throttle cam with center of cam follower roller. Tighten locknut.



a - Throttle Arm
b - Idle Stop Screw
c - Roller
d - Throttle Cam
e - Raised Mark
f - Lock Nut

9. Holding throttle arm at idle position, adjust cam follower, so that a clearance of 0.005 in. - 0.020 in. (0.13 - 0.51 mm) exists between roller of cam follower and throttle cam. Tighten set screw securing cam follower.



a - Roller
b - Throttle Cam
c - Cam Follower Adjustment Screw

TIMING ADJUSTMENTS

⚠ CAUTION

Engine is timed while cranking engine with starter motor. To prevent engine from starting when being cranked, all spark plugs must be removed, except no. 1 (top) cylinder plug.

IDLE TIMING ADJUSTMENT

1. Connect timing light to no. 1 (top) spark plug.

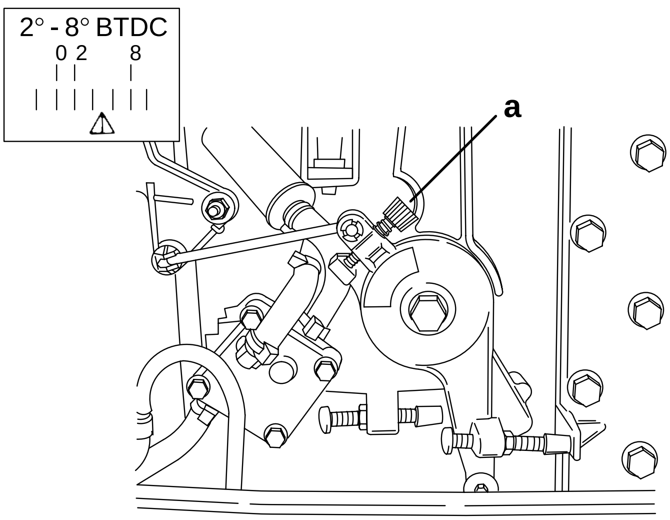
⚠ WARNING

Before cranking engine, keep clear of propeller as it may rotate.

2. Shift engine to **“Neutral”**.

IMPORTANT: To accurately time engine at cranking speed, a fully charged battery must be used.

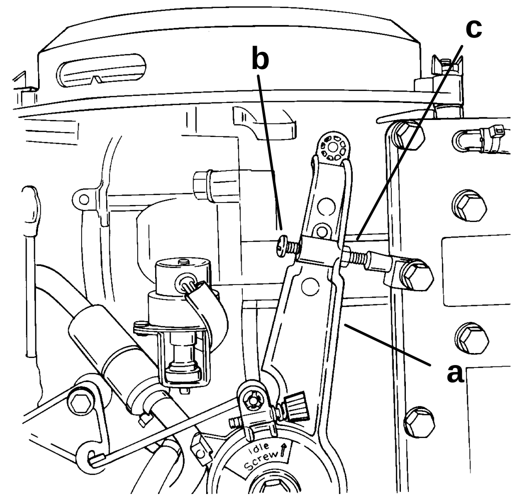
3. Holding throttle arm at idle position, crank engine with starter motor and adjust idle timing screw to align 5° BTDC timing mark of flywheel with timing pointer. Tighten locknut.



a - Idle Timing Screw

MAXIMUM TIMING

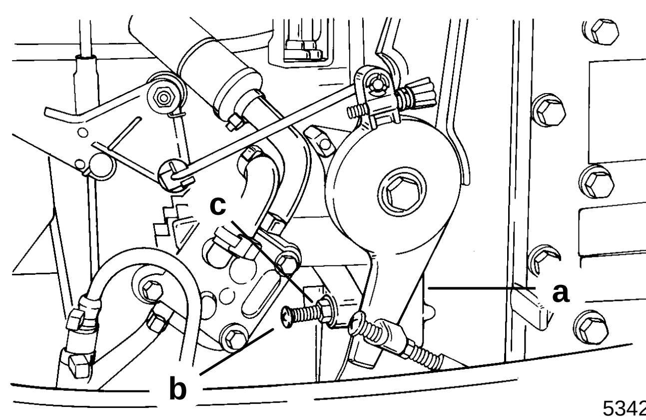
1. Hold control arm so that maximum spark advance screw is against stop.
2. Crank engine with starter motor and adjust maximum spark advance screw to align the specified BTDC timing mark on flywheel with timing pointer (due to the advance characteristic of this ignition system, this cranking speed adjustment will automatically be reduced by 2° at an engine speed of 3000 RPM). Tighten locknut.



a - Control Arm
b - Maximum Spark Advance Screw
c - Locknut

MAXIMUM THROTTLE

1. Hold throttle arm against full throttle stop screw. Adjust full throttle stop screw to allow throttle shutters to open fully, then turn stop screw in (clockwise) an additional 1/2 turn, to prevent throttle lever of center carburetor from acting as a stop. Tighten locknut.



a - Throttle Arm
b - Full Throttle Stop Screw
c - Locknut

INITIAL STARTING ADJUSTMENTS

NOTE: *For adjusting carburetor throttle linkage and synchronizing carburetors, see section “Timing/ Synchronizing/Adjusting” of this manual.*

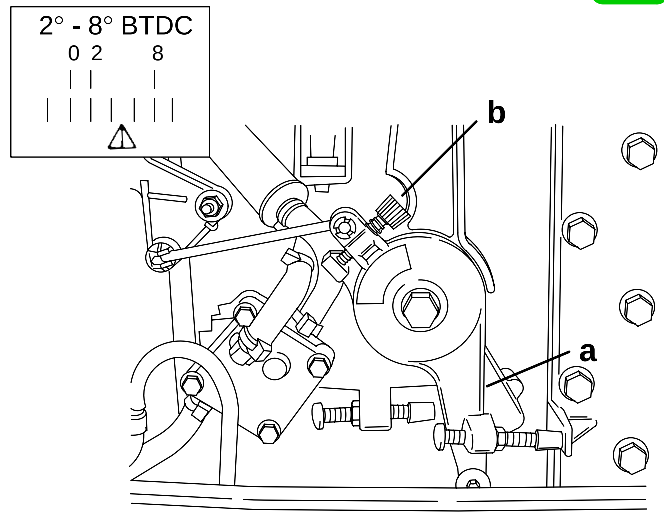
After service or replacement of carburetor, turn low speed mixture screw adjustment in (clockwise) until it seats lightly, then back off (each carburetor) to specifications **(65JET/75/90 –** 1 turn on #1 carb; 1 – 1-1/2 turns on #2 and #3 carbs). This will permit engine start-up.

LOW SPEED MIXTURE ADJUSTMENTS

1. Start engine and allow to warm up (run for several minutes). Throttle back to idle for about one minute to allow RPM to stabilize.
2. With engine running at idle speed (in water) in “Forward” gear (prop on), turn low speed mixture screw, IN (clockwise) until engine starts to “bog” down and misfire. Back out 1/4 turn or more.
3. Check for too lean mixture on acceleration.
4. DO NOT adjust leaner than necessary to attain reasonable smooth idling. When in doubt, stay on the slightly rich side of the adjustment.

IDLE ADJUSTMENT

1. With engine in water, connect electrical harness and fuel line to engine. Start engine and allow to warm up.
2. Shift into “Forward” gear and adjust carburetor low speed mixture screws properly (refer to “Carburetor” section).
3. Holding throttle arm at idle position, adjust idle timing screw to attain an engine idle RPM of 650-700 RPM in “Forward” gear. Turn off engine.



a - Throttle Arm
b - Idle Timing Screw

NOTE: *On this type of engine, idle RPM is adjusted exclusively with ignition timing.*

Throttle Cable Installation

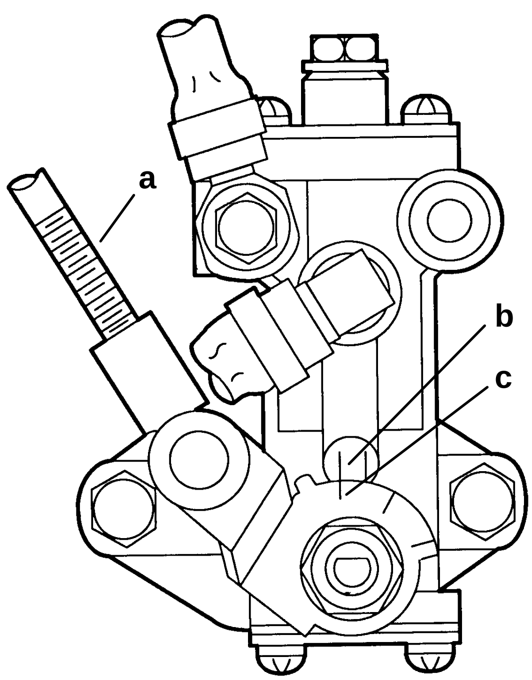
1. With end of throttle cable connected to throttle lever, hold throttle lever against idle stop. Adjust throttle cable barrel to slip into barrel retainer on cable anchor bracket with a very light preload of throttle lever against idle stop. Lock barrel in place.

IMPORTANT: Excessive preload on throttle cable will cause difficulty when shifting from forward to neutral. (Readjust throttle cable barrel, if necessary.)

2. Check preload on throttle cable by placing a thin piece of paper between idle stop screw and idle stop. Preload is correct when paper can be removed without tearing but has some drag on it. (Readjust throttle cable barrel, if necessary.)

CARBURETOR/OIL PUMP SYNCHRONIZATION

1. While holding throttle arm at idle position, adjust length of link rod so that stamped mark of oil pump body aligns with stamped mark of oil pump lever.



a - Link Rod
b - Stamped Mark of Oil Pump Body
c - Stamped Mark of Oil Pump Lever

2. Reinstall engine cowling.

Timing/Synchronizing/Adjusting (4 Cylinder Models)

Specifications

Models 80 JET/100/115/125

Full Throttle RPM Range	4750 - 5250
Idle RPM (in FORWARD Gear)	675 ± 25
Maximum Timing	
1994/1995 Models	
@ 3000 RPM	20° B.T.D.C.
@ Cranking Speed	22° B.T.D.C.
1996/97/98 Models	
@ 3000 RPM	23° B.T.D.C
@ Cranking Speed	25° B.T.D.C
Idle Timing	4°A.T.D.C. - 2° B.T.D.C.
Spark Plug Type	NGK BP8H-N-10 0.040 IN. (1.0MM)
Firing Order	1-3-2-4

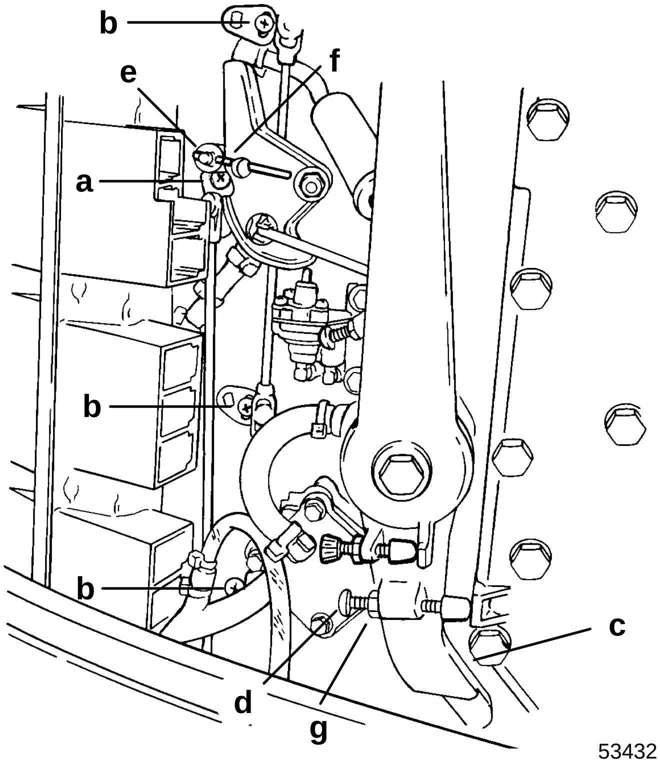
Special Tools

Part No.	Description
*91-59339	Service Tachometer
*91-99379	Timing Light
91-63998A1	Spark Gap Tool

CARBURETOR SYNCHRONIZATION

1. Remove sound box cover.
2. Loosen cam follower adjustment screw.
3. Loosen 3 synchronizing screws.
4. Look into throats of carburetors and verify all throttle shutters are completely closed.
5. Apply light down pressure on carburetor synchronizing shaft and tighten 3 synchronizing screws from top to bottom.
6. Recheck throttle shutters and make any necessary adjustment.
7. Hold throttle arm so that idle stop screw is against stop.

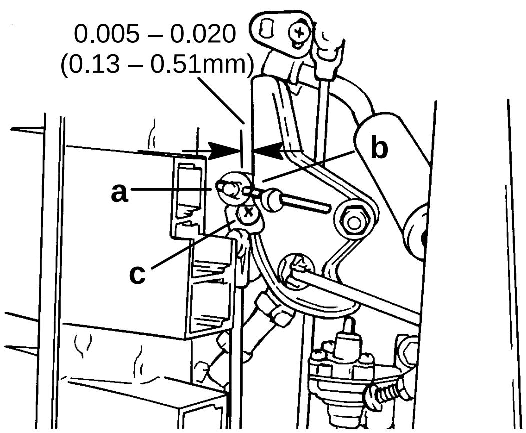
8. Place roller of cam follower against throttle cam and adjust idle stop screw to align raised mark of throttle cam with center of cam follower roller. Tighten locknut.



53432

a - Cam Follower Adjustment Screw
b - Synchronizing Screws
c - Throttle Arm
d - Idle Stop Screw
e - Roller
f - Throttle Cam
g - Locknut

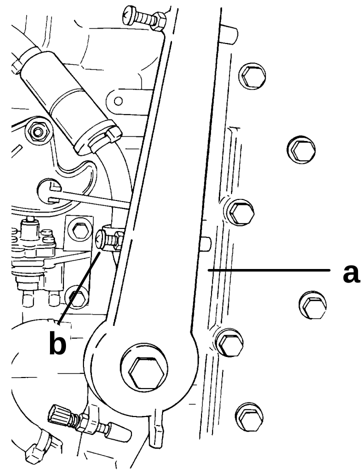
9. Holding throttle arm at idle position, adjust cam follower so that a clearance of 0.005 in. - 0.020 in. (0.13mm - 0.51mm) exists between roller and throttle cam. Tighten screw securing cam follower.



53433

a - Roller
b - Throttle Cam
c - Screw

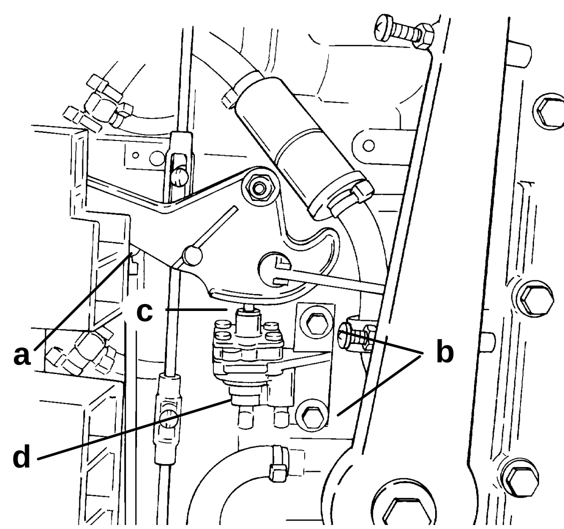
10. Hold throttle arm against full throttle stop. Adjust full throttle stop screw to allow throttle shutters to open fully. To prevent throttle shutters to act as a stop, screw in stop screw until there is a gap of 0.015 in. (0.40mm) between roller of cam follower and throttle lever.



53430

a - Throttle Arm
b - Full Throttle Stop Screw

11. Hold throttle cam in full throttle position. If necessary adjust acceleration pump adjusting bolts position so that a gap of 0.030 in. (0.76mm) exists between throttle cam and top of acceleration pump aluminum housing.



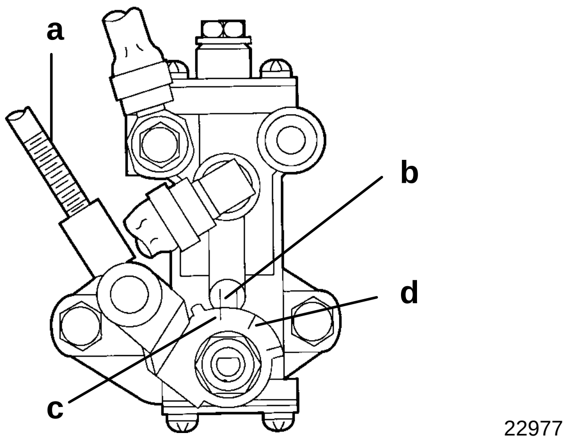
53429

a - Throttle Cam
b - Bolts
c - 0.030 in. (0.76mm) Gap
d - Accelerator Pump

CARBURETOR/OIL PUMP SYNCHRONIZATION

IMPORTANT: Some engines may have an additional stamped mark (d) which SHOULD NOT be used.

1. While holding throttle arm at idle position, adjust length of link rod so that stamped mark of oil pump body aligns with stamped mark of oil pump lever.



a - Link Rod
b - Mark of Oil Pump Body
c - Mark of Oil Pump Lever
d - Mark NOT Used

TIMING ADJUSTMENTS

⚠ CAUTION

Engine can be timed while cranking engine with starter motor. To prevent engine from starting when being cranked, all spark plugs should be removed.

NOTE: *If initial timing adjustments are made without engine running, then final timing checks should be made with engine running due timing advance characteristics of ignition system. Maximum engine RPM required to check maximum timing advance is 3000 RPM.*

1. Insert Spark Gap Tool (91-63998A1) in no. 1 (top) cylinder spark plug boot and attach alligator clip to good ground.
2. Remove throttle cable barrel from barrel retainer.

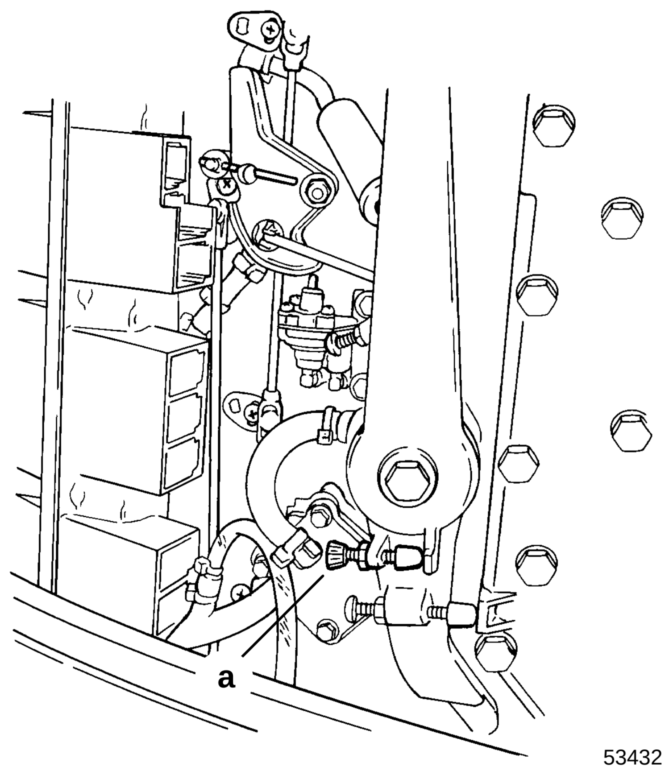
IDLE TIMING ADJUSTMENT

⚠ WARNING

Before cranking engine, keep clear of propeller, as it may rotate.

IMPORTANT: To accurately time engine at cranking speed, a fully charged battery must be used.

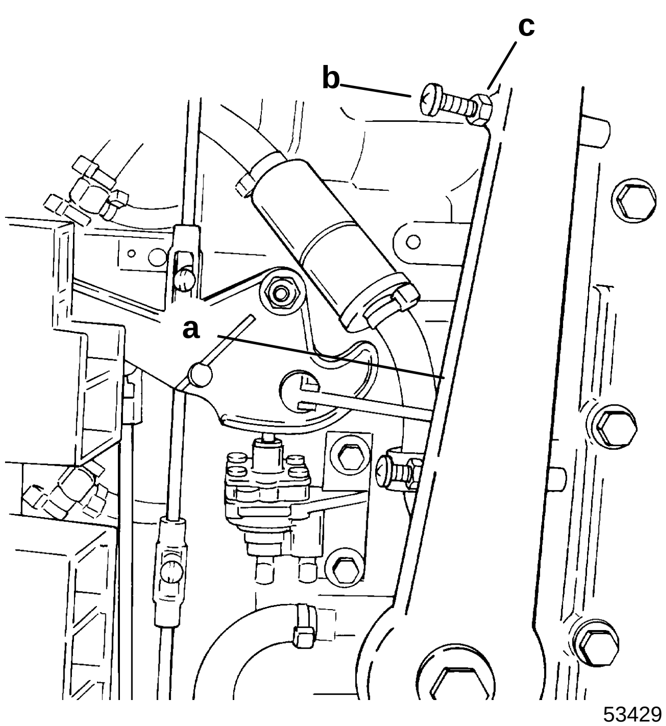
1. Connect timing light to no. 1 (top) spark plug lead.
2. Shift engine into neutral.
3. Holding throttle arm at idle position, crank engine with starter motor and adjust idle timing screw to align 2 degrees BTDC timing mark of flywheel with timing pointer.



a - Idle Timing Screw

MAXIMUM TIMING

1. Hold control arm against maximum advance stop. **1994/1995 Models –** Crank engine with starter motor and adjust maximum advance screw to align 22° BTDC mark on flywheel with timing pointer (due to the advance characteristics of ignition system, this cranking speed adjustment will automatically be reduced to 20° BTDC at engine speed of 3000 RPM). Tighten locknut. **1996/97/98 Models –** Crank engine with starter motor and adjust maximum advance screw to align 25° BTDC mark on flywheel with timing pointer (due to the advance characteristics of ignition system, this cranking speed adjustment will automatically be reduced to 23° BTDC at engine speed of 3000 RPM). Tighten locknut.



a - Control Arm
b - Maximum Advance Screw
c - Locknut

INITIAL STARTING ADJUSTMENTS

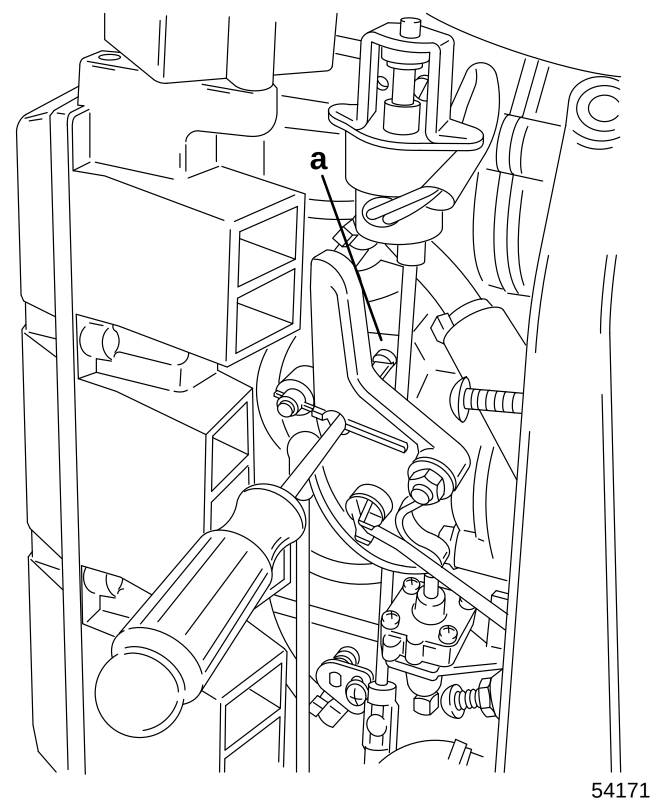
NOTE: *For adjusting carburetor throttle linkage and synchronizing carburetors, see section "Timing/ Synchronizing/Adjusting" of this manual.*

After service or replacement of carburetor, turn low speed mixture screw adjustment in (clockwise) until it seats lightly, then back off (each carburetor) to specifications **(80 JET/100/115/125 -** 1-1/2 turns). This will permit engine start-up.

LOW SPEED MIXTURE ADJUSTMENTS

NOTE: *Only the top two carburetors on four cylinder models have an adjustable low speed mixture screw.*

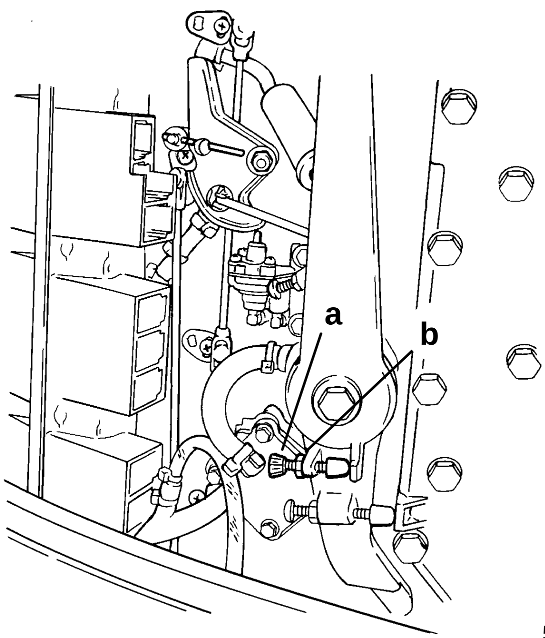
1. Start engine and allow to warm up (run for several minutes). Throttle back to idle for about one minute to allow RPM to stabilize.
2. With engine running at idle speed (in water) in "Forward" gear (prop on), turn low speed mixture screw, IN (clockwise) until engine starts to "bog" down and misfire. Back out 1/4 turn or more.
3. Check for too lean mixture on acceleration.
4. DO NOT adjust leaner than necessary to attain reasonable smooth idling. When in doubt, stay on the slightly rich side of the adjustment.



a - Low Speed Mixture Screw

Idle Adjustment

1. With engine in water, connect electrical harness and fuel line to engine. Start engine and allow to warm up.
2. Properly adjust carburetor low speed mixture screws. Refer to “Carburetor Adjustments” section 3A.
3. Holding throttle arm at idle position (throttle cable barrel removed from barrel retainer), adjust idle timing screw to attain an engine idle RPM of 650-700 RPM in “Forward” gear. Tighten locknut and turn off engine.



53432

a - Idle Timing Screw
b - Locknut

Throttle Cable Installation

1. With end of throttle cable connected to throttle lever, hold throttle lever against idle stop. Adjust throttle cable barrel to slip into barrel retainer on cable anchor bracket with a very light preload of throttle lever against idle stop. Lock barrel in place.

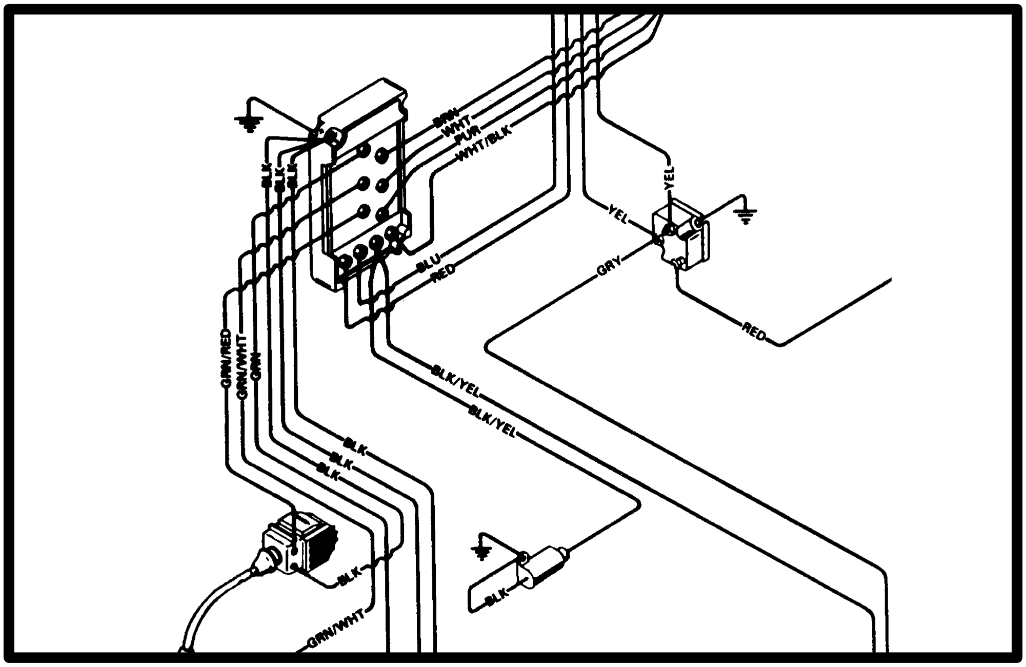
IMPORTANT: Excessive preload on throttle cable will cause difficulty when shifting from forward to neutral. (Readjust throttle cable barrel, if necessary.)

2. Check preload on throttle cable by placing a thin piece of paper between idle stop screw and idle stop. Preload is correct when paper can be removed without tearing, but has some drag on it. Readjust throttle cable barrel, if necessary.)
3. Reinstall sound box cover.

ELECTRICAL

2

D

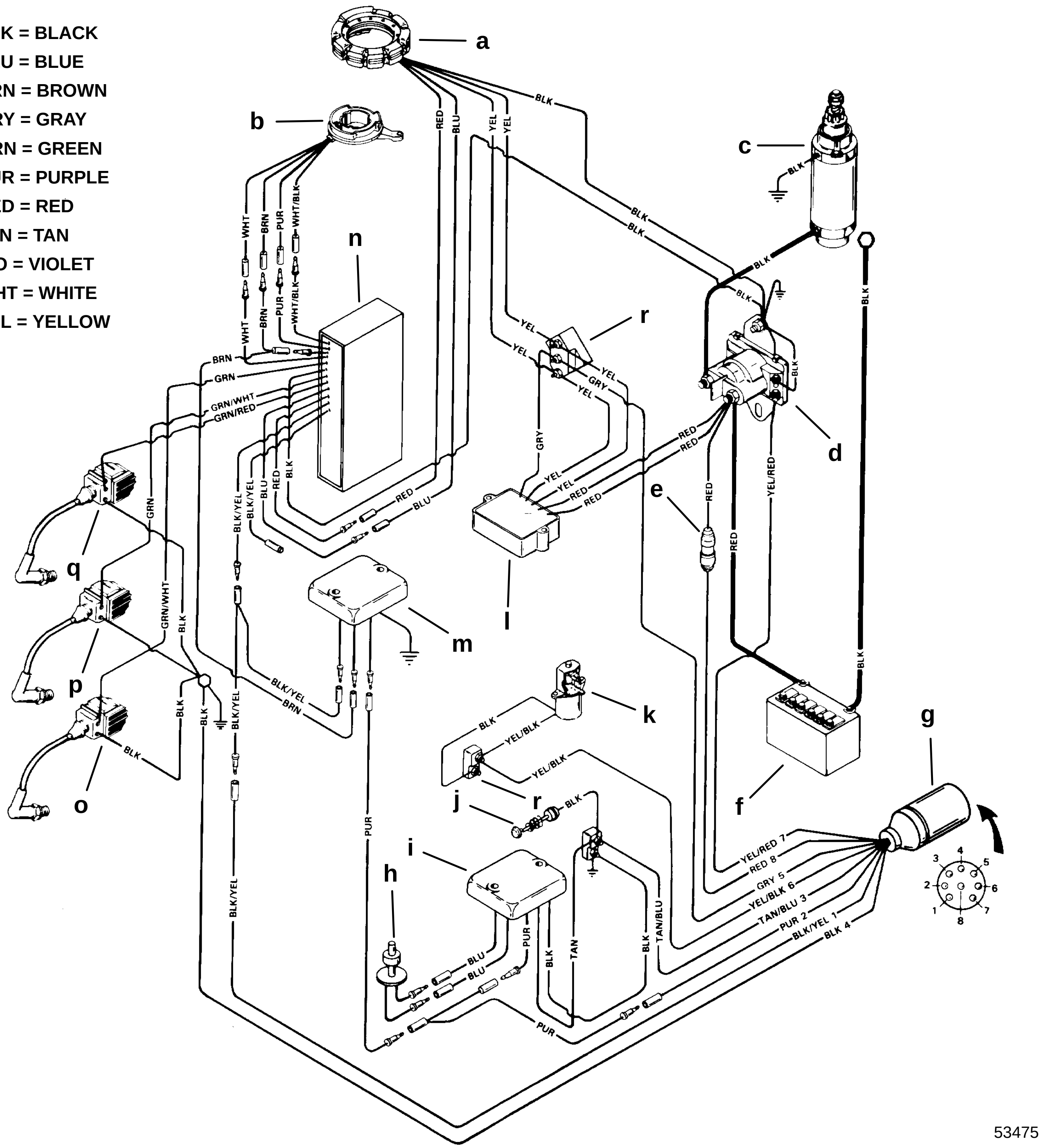


WIRING DIAGRAMS

Table of Contents

1994/1995 65 Jet Wiring Diagram Electric (1-3-2 Firing Order)

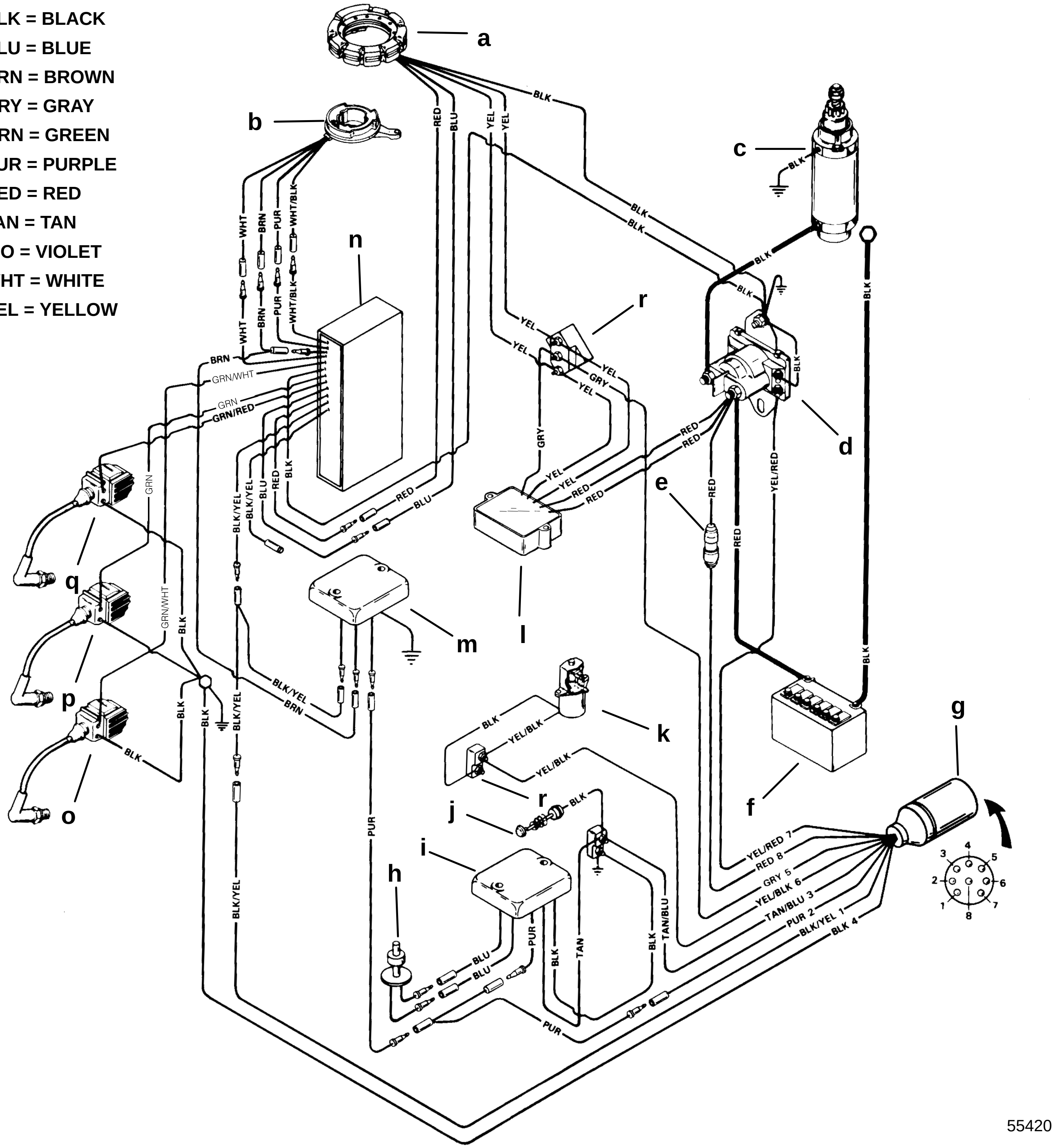
BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW



a - Stator
b - Trigger
c - Starter
d - Starter Solenoid
e - 20 Ampere Fuse
f - 12 Volt Battery
g - Engine Harness
h - Low Oil Sensor
i - Warning Module
j - Temperature Switch
k - Enrichment Valve
l - Voltage Regulator
m - RPM Limiter
n - Switch Box
o - Ignition Coil #3 Cylinder
p - Ignition Coil #2 Cylinder
q - Ignition Coil #1 Cylinder
r - Terminal Block

1996 65 Jet Wiring Diagram Electric (1-2-3 Firing Order)

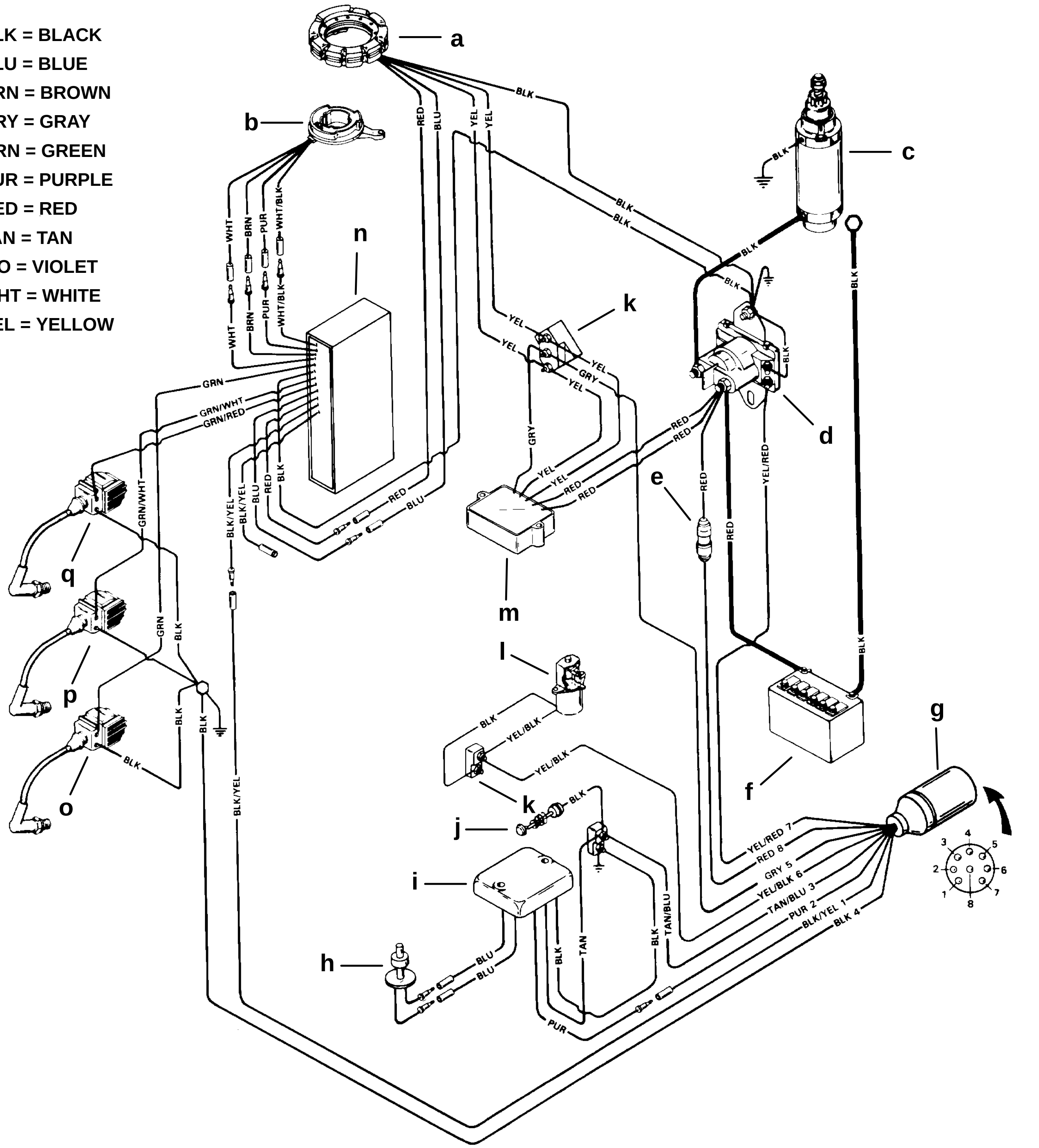
BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW



a - Stator
b - Trigger
c - Starter
d - Starter Solenoid
e - 20 Ampere Fuse
f - 12 Volt Battery
g - Engine Harness
h - Low Oil Sensor
i - Warning Module
j - Temperature Switch
k - Enrichment Valve
l - Voltage Regulator/Rectifier
m - RPM Limiter
n - Switch Box
o - Ignition Coil #3 Cylinder
p - Ignition Coil #2 Cylinder
q - Ignition Coil #1 Cylinder
r - Terminal Block

1994/1995 75/90 Wiring Diagram (1-3-2 Firing Order)

BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW

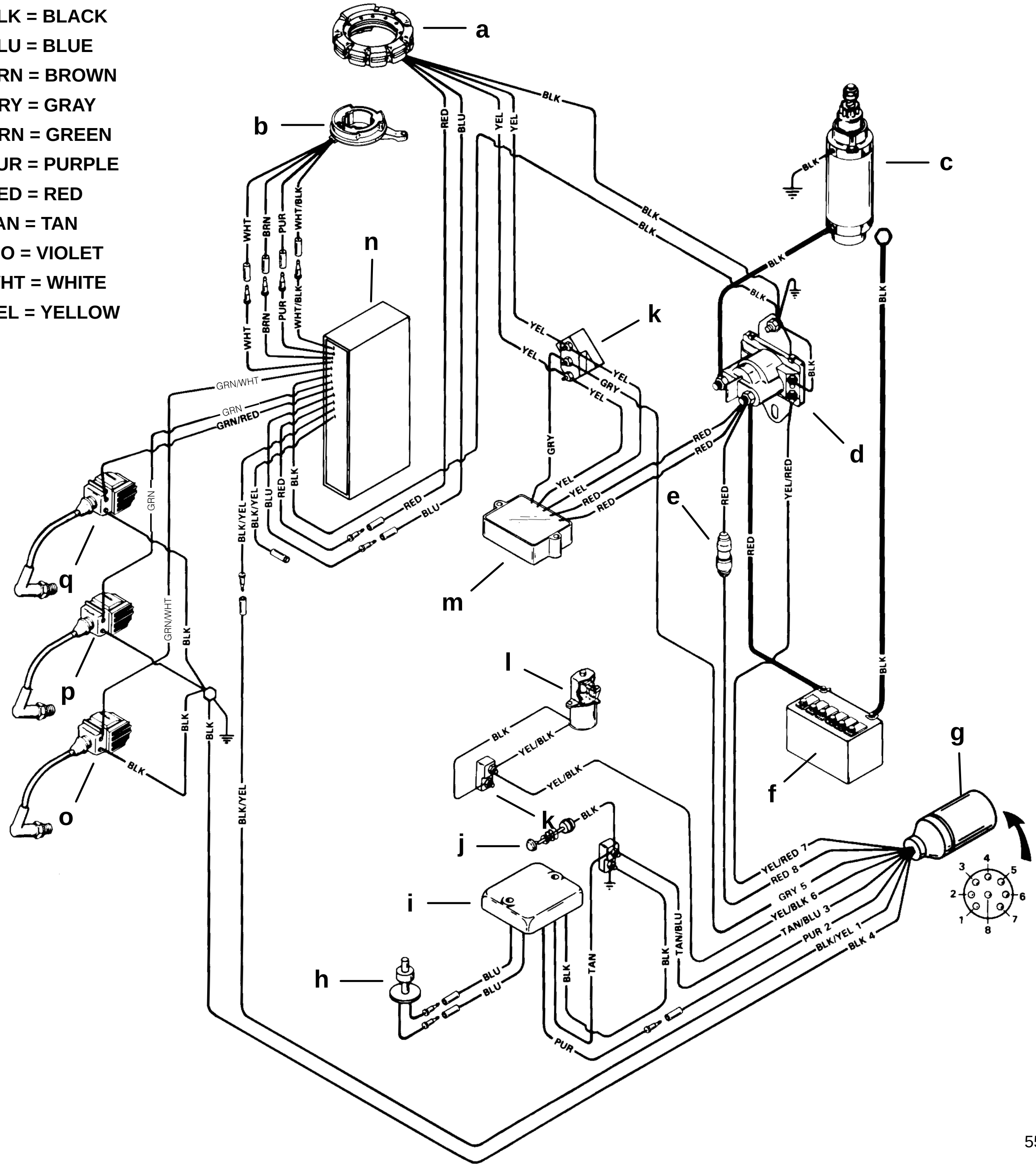


53476

a - Stator
b - Trigger
c - Starter
d - Starter Solenoid
e - 20 Ampere Fuse
f - 12 Volt Battery
g - Engine Harness
h - Low Oil Switch
i - Warning Module
j - Temperature Switch
k - Terminal Block
l - Enrichment Valve
m - Voltage Regulator/Rectifier
n - Switch Box
o - Ignition Coil #3 Cylinder
p - Ignition Coil #2 Cylinder
q - Ignition Coil #1 Cylinder

1996 75/90 Wiring Diagram (1-2-3 Firing Order)

BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW

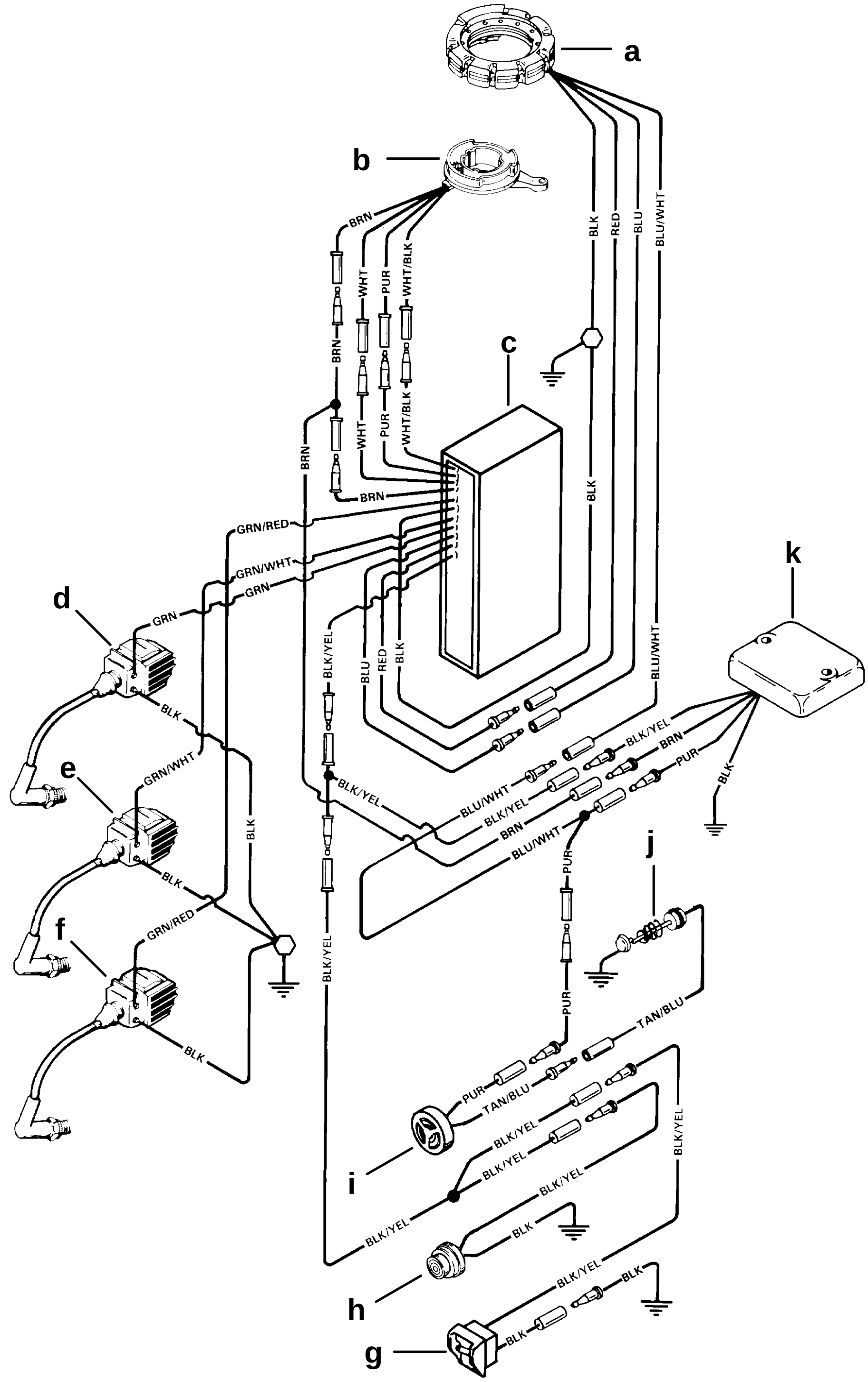


55421

a - Stator
b - Trigger
c - Starter
d - Starter Solenoid
e - 20 Ampere Fuse
f - 12 Volt Battery
g - Engine Harness
h - Low Oil Switch
i - Warning Module
j - Temperature Switch
k - Terminal Block
l - Enrichment Valve
m - Voltage Regulator/Rectifier
n - Switch Box
o - Ignition Coil #3 Cylinder
p - Ignition Coil #2 Cylinder
q - Ignition Coil #1 Cylinder

1994/1995 75 Work Model Wiring Diagram Manual Start (1-3-2 Firing Order)

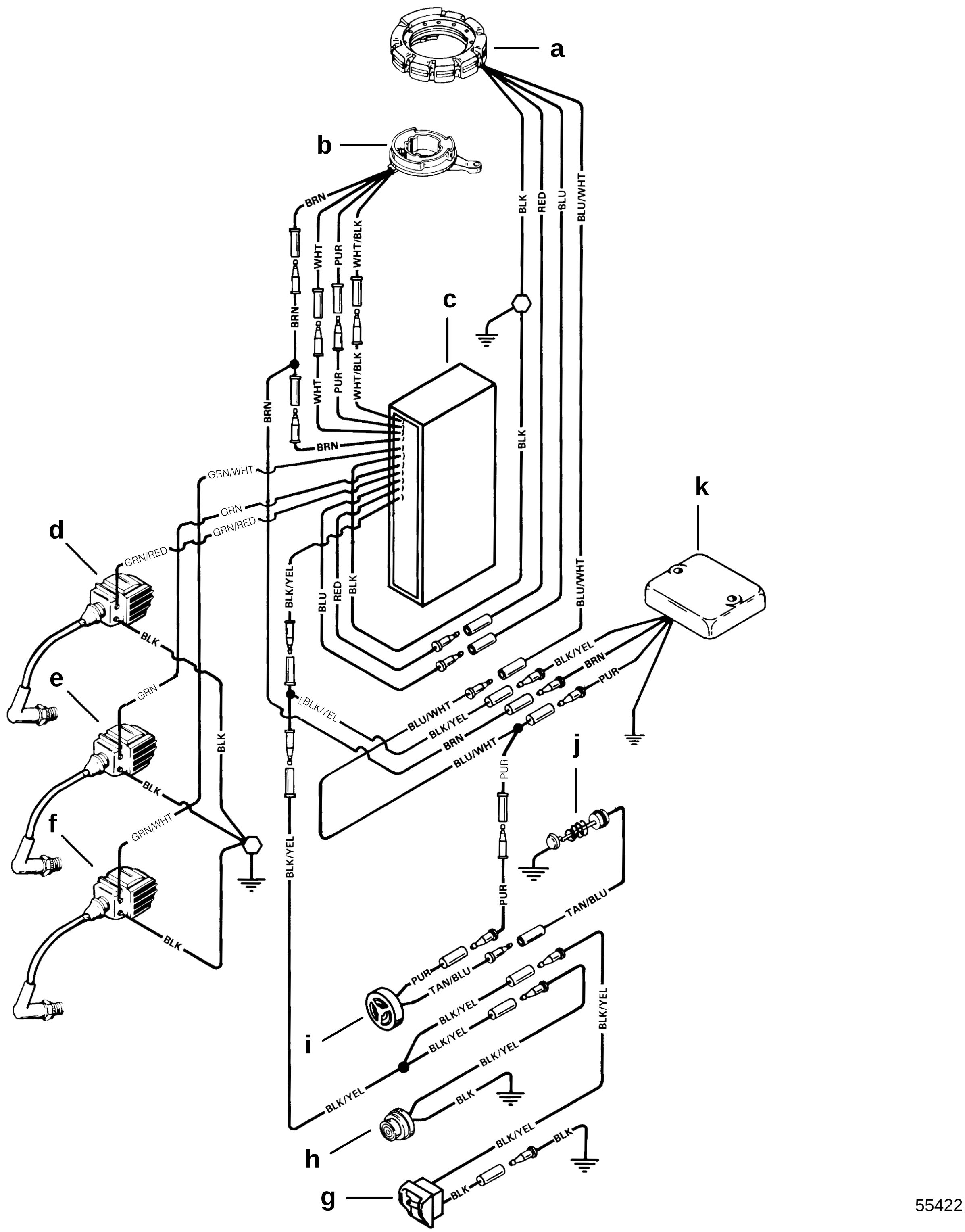
BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW



a - Stator
b - Trigger
c - Switch Box
d - Ignition Coil Cylinder #1
e - Ignition Coil Cylinder #2
f - Ignition Coil Cylinder #3
g - Emergency Stop Switch
h - Stop Button
i - Warning Horn
j - Temperature Switch
k - RPM Limiter

1996 75 Work Model Wiring Diagram Manual Start (1-2-3 Firing Order)

BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW

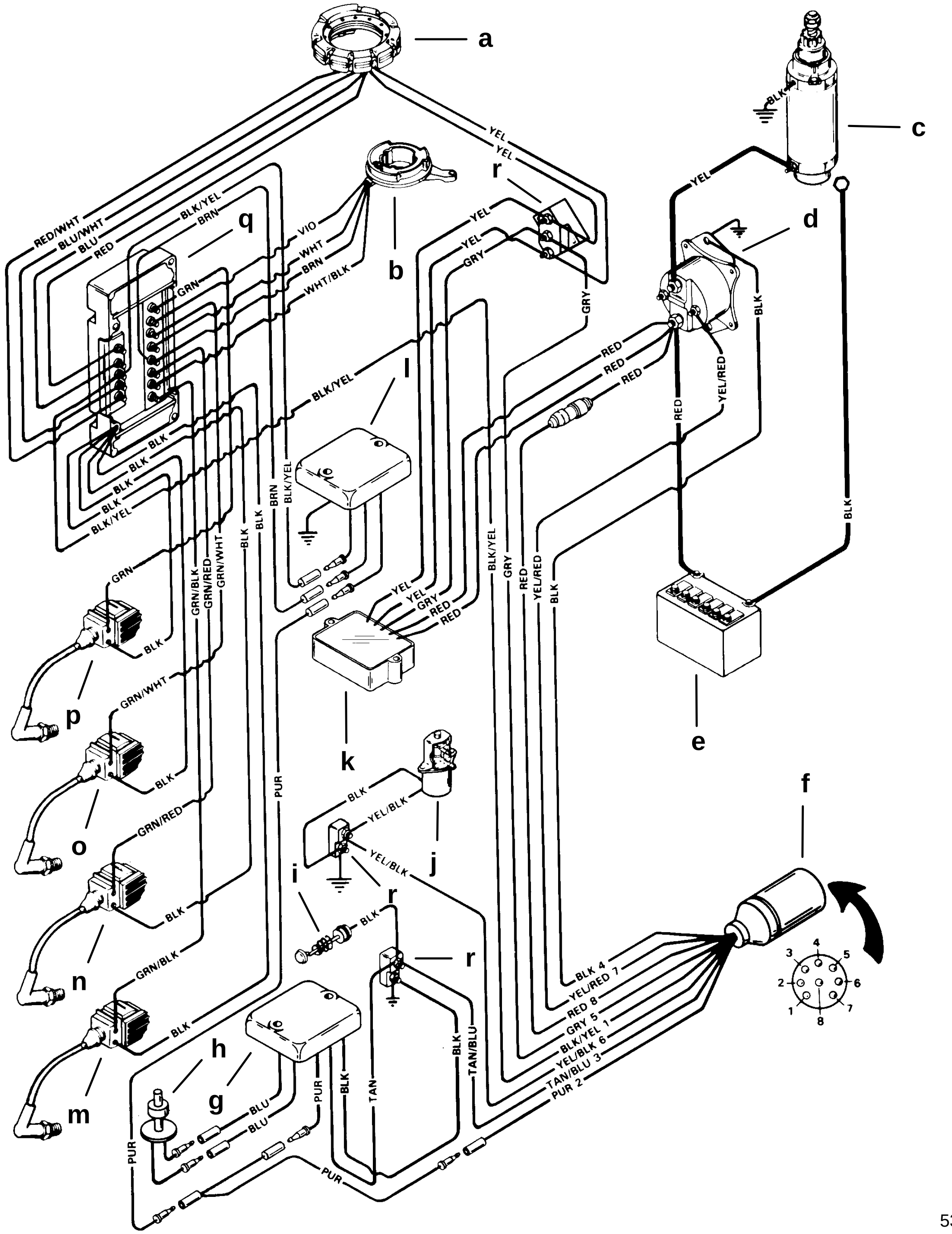


a - Stator
b - Trigger
c - Switch Box
d - Ignition Coil Cylinder #1
e - Ignition Coil Cylinder #2
f - Ignition Coil Cylinder #3

g - Emergency Stop Switch
h - Stop Button
i - Warning Horn
j - Temperature Switch
k - RPM Limiter

1994/1995/1996 80 Jet/100/115/125 Wiring Diagram

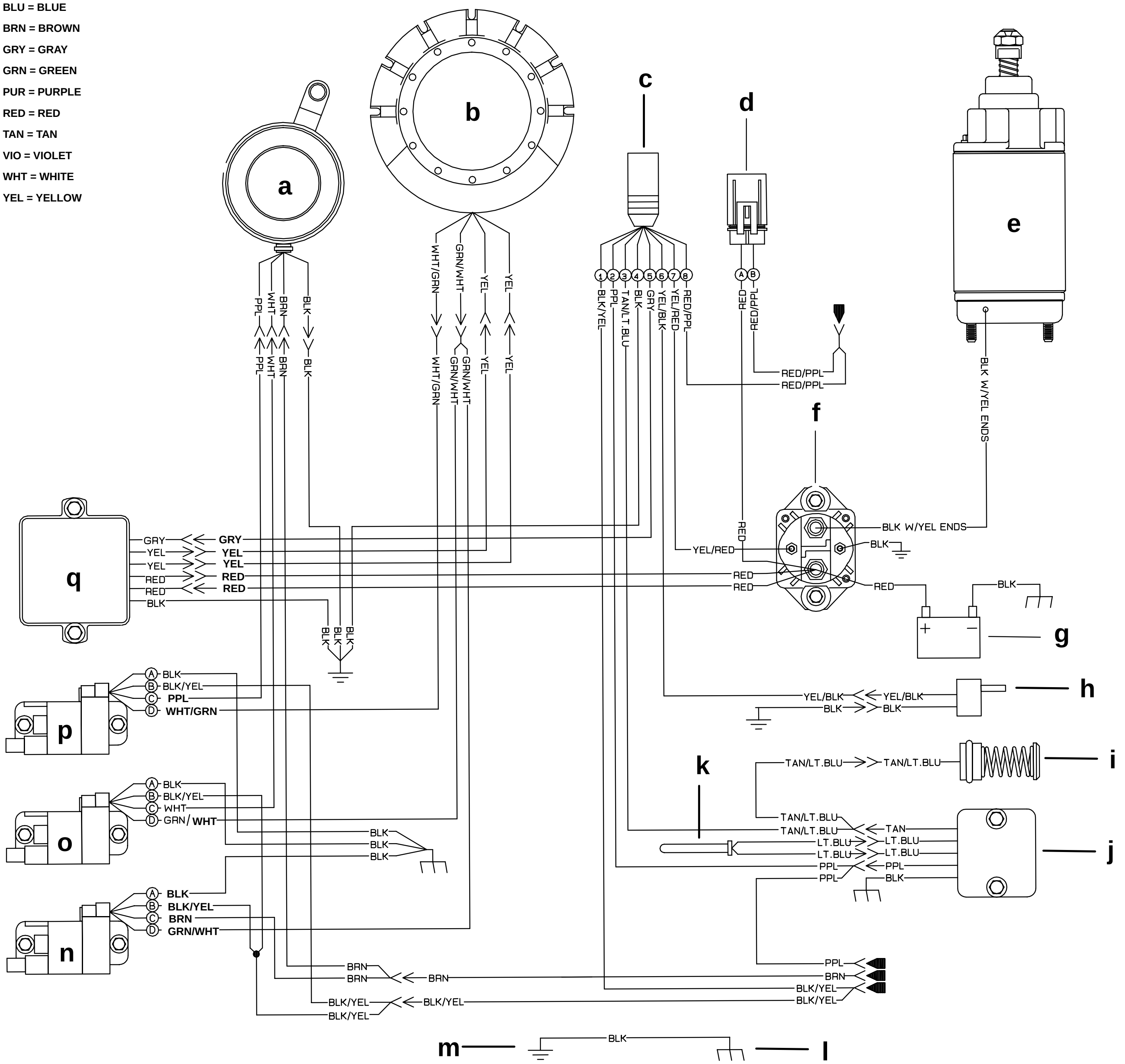
BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW



a - Stator
b - Trigger
c - Starter
d - Starter Solenoid
e - 12 Volt Battery
f - Engine Harness
g - Warning Module
h - Low Oil Sensor
i - Temperature Switch
j - Enrichment Valve
k - Voltage Regulator/Rectifier
l - RPM Limiter
m - Ignition Coil #4 Cylinder
n - Ignition Coil #3 Cylinder
o - Ignition Coil #2 Cylinder
p - Ignition Coil #1 Cylinder
q - Switch Box
r - Terminal Block

1997 65 Jet Wiring Diagram (w/CDM) (1-2-3 Firing Order)

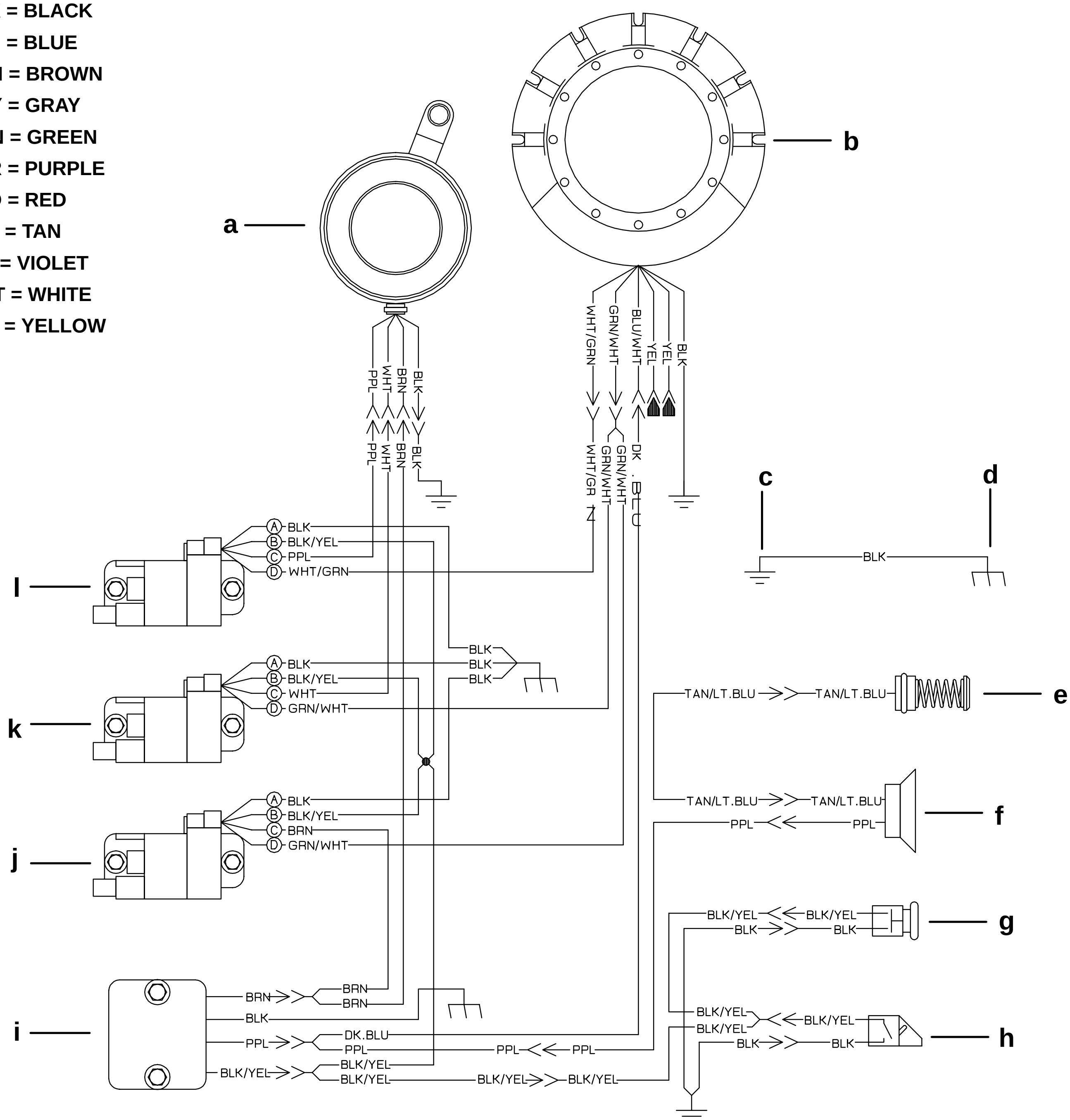
BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW



a - Trigger
b - Stator
c - Remote Control
d - 20 Ampere Fuse
e - Starter
f - Starter Solenoid
g - 12 Volt Battery
h - Fuel Enrichment Solenoid
i - Head Temperature Switch
j - Oil Warning Module
k - Oil Level Switch
l - Engine Block
m - Electrical Plate
n - CDM #3
o - CDM #2
p - CDM #1
q - Voltage Regulator

1997 75 Work Model Wiring Diagram (w/CDM) Manual Start (1-2-3 Firing Order)

BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW



a - Trigger
b - Stator
c - Electrical Plate
d - Engine Block
e - Temperature Switch
f - Warning Horn
g - Push Button Stop Switch
h - Lanyard Stop Switch
i - RPM Limiter
j - CDM #3
k - CDM #2
l - CDM #1

1997 75/90 Wiring Diagram (w/CDM) (1-2-3 Firing Order)

BLK = BLACK
BLU = BLUE
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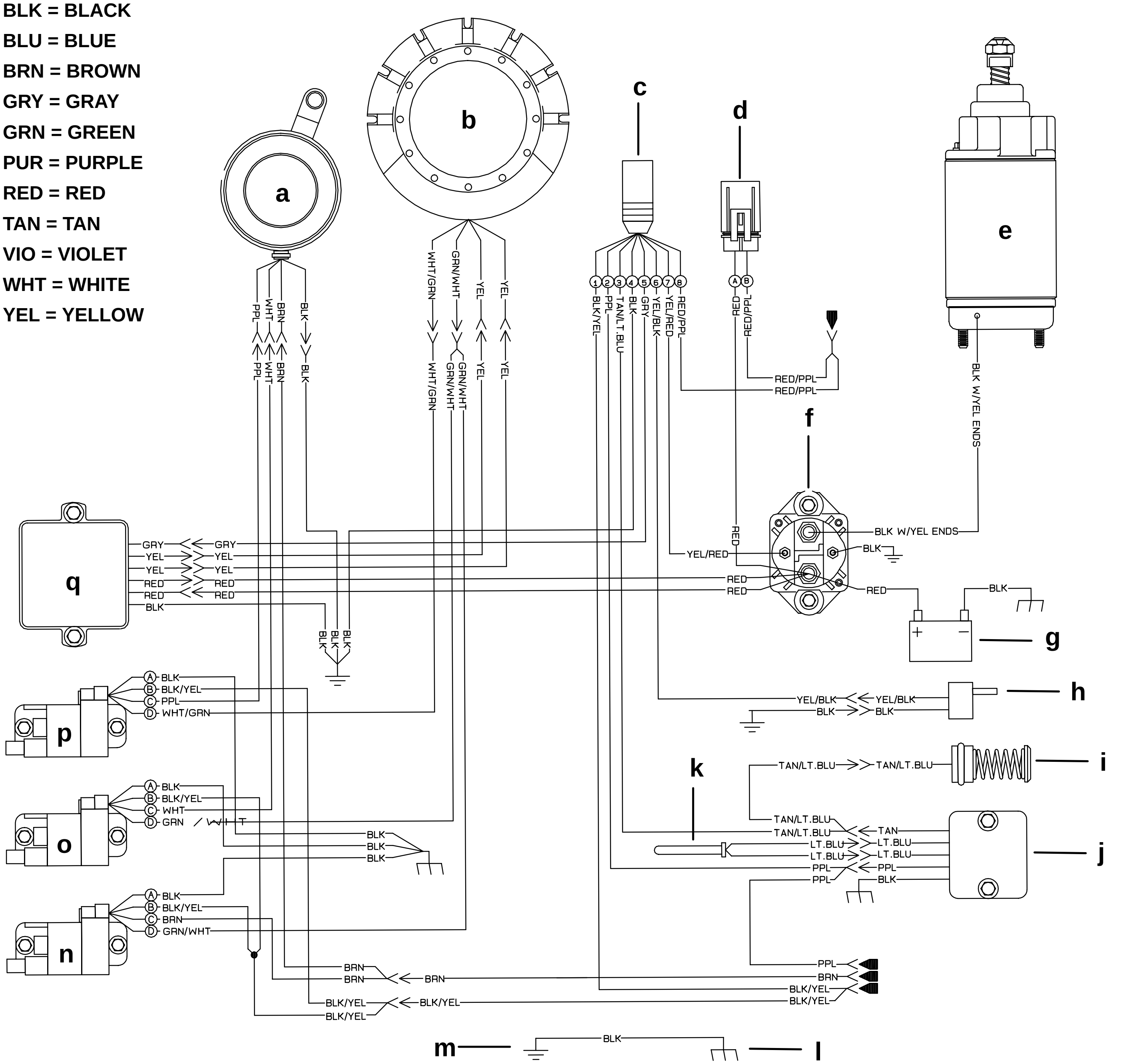
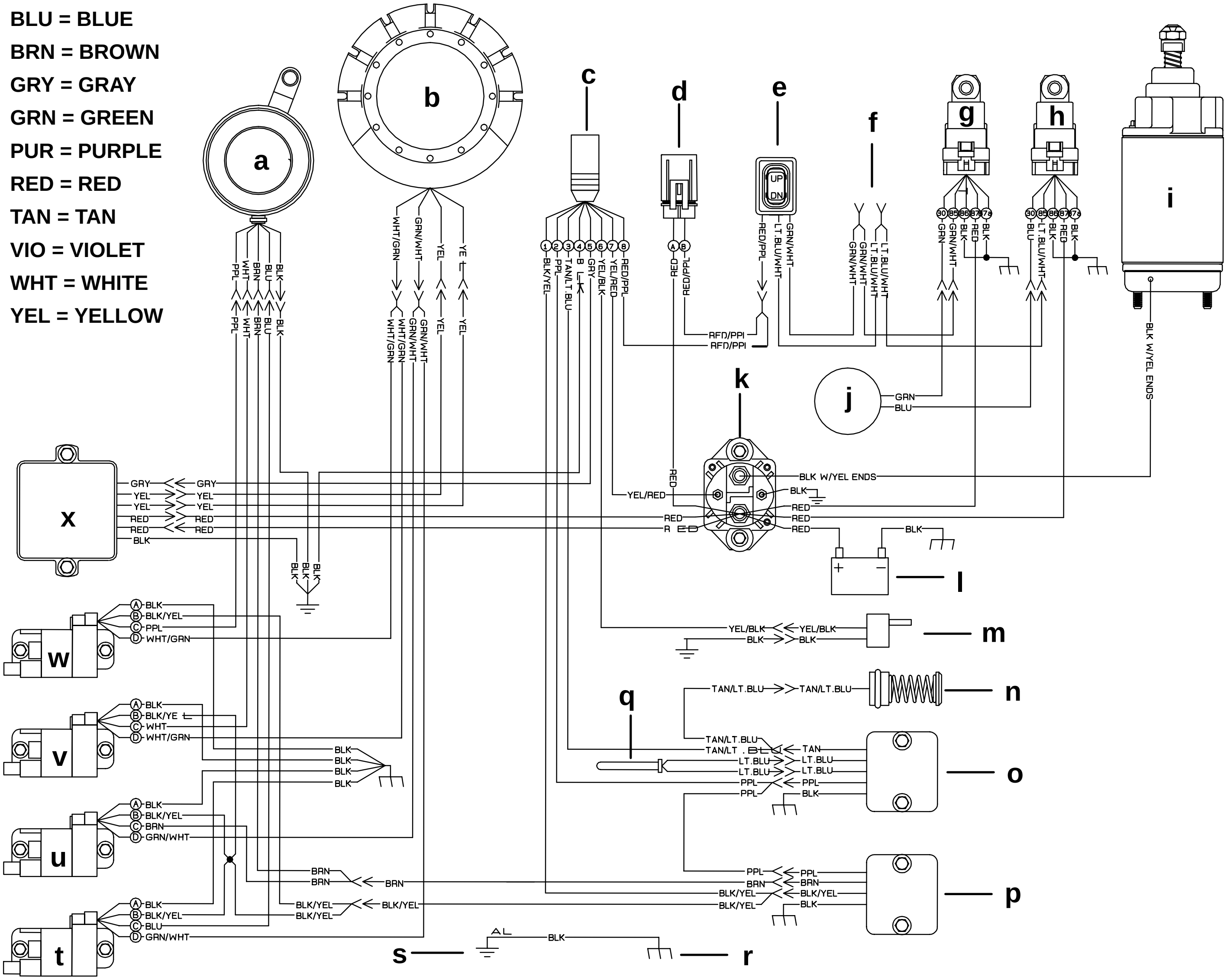
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW



a - Trigger
b - Stator
c - Remote Control
d - 20 Ampere Fuse
e - Starter
f - Starter Solenoid
g - 12 Volt Battery
h - Fuel Enrichment Solenoid
i - Head Temperature Switch
j - Oil Warning Module
k - Oil Level Switch
l - Engine Block
m - Electrical Plate
n - CDM #3
o - CDM #2
p - CDM #1
q - Voltage Regulator

1997 80 Jet/100/115/125 Wiring Diagram (w/CDM)

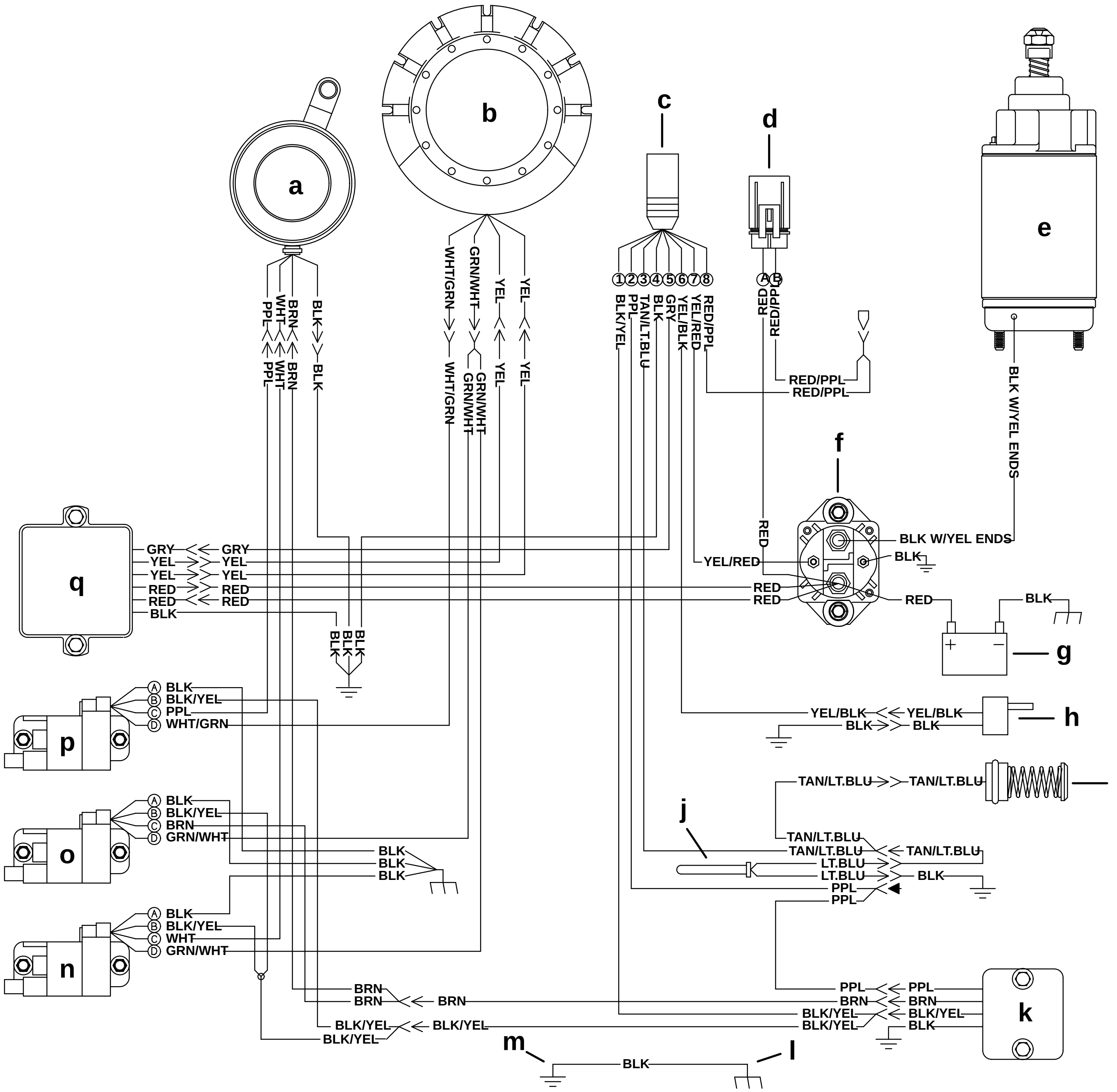
BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW



a - Trigger
b - Stator
c - Remote Control
d - 20 Ampere Fuse
e - Trim Switch
f - To Remote Trim Switch
g - Down Relay
h - Up Relay
i - Starter
j - Trim Pump
k - Starter Solenoid
l - 12 Volt Battery

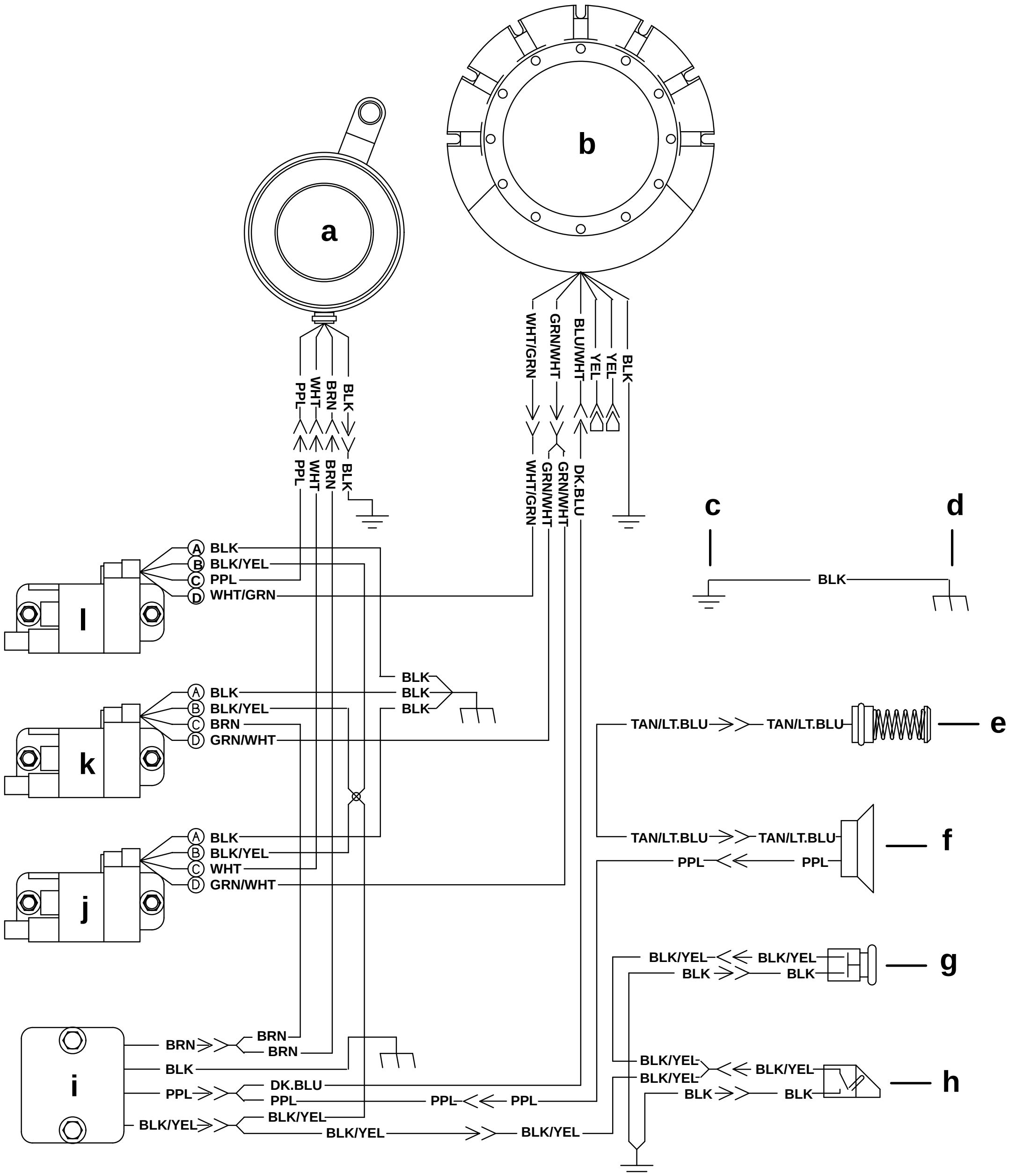
m - Fuel Enrichment Solenoid
n - Temperature Switch
o - Oil Warning Module
p - RPM Limiter Module
q - Oil Level Switch
r - Engine Block
s - Electrical Plate
t - CDM #4
u - CDM #3
v - CDM #2
w - CDM #1
x - Voltage Regulator

1998 65 Jet Wiring Diagram



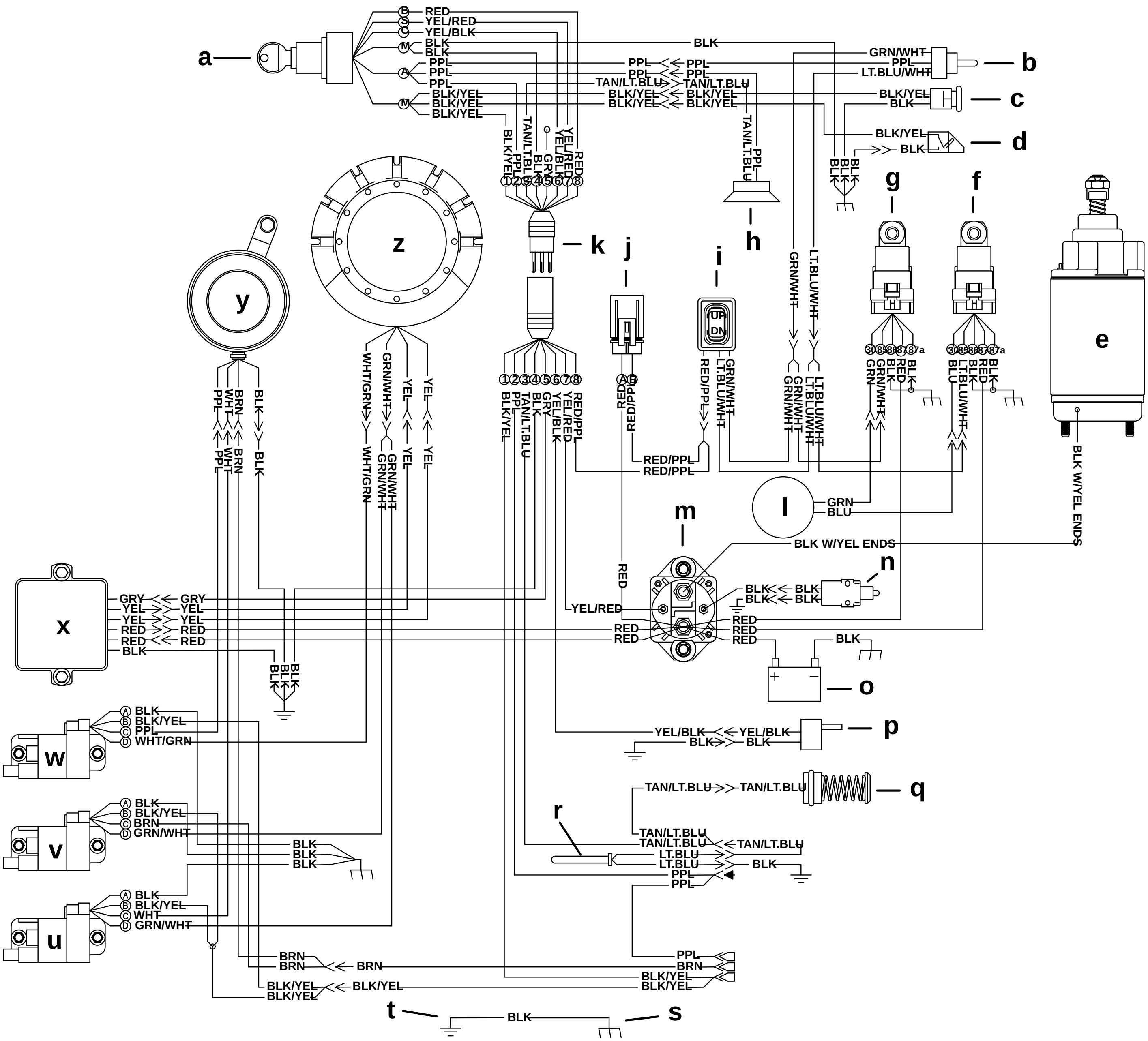
a - Trigger
b - Stator
c - Engine Harness
d - 20 Ampere Fuse
e - Starter Motor
f - Starter Solenoid
g - 12 Volt Battery
h - Fuel Enrichment Solenoid
i - Head Temperature Switch
j - Oil Level Switch
k - RPM Limiter
l - Block
m - Electrical Plate
n - CDM 3
o - CDM 2
p - CDM 1
q - Voltage Regulator

1998 75 Work Model Wiring Diagram



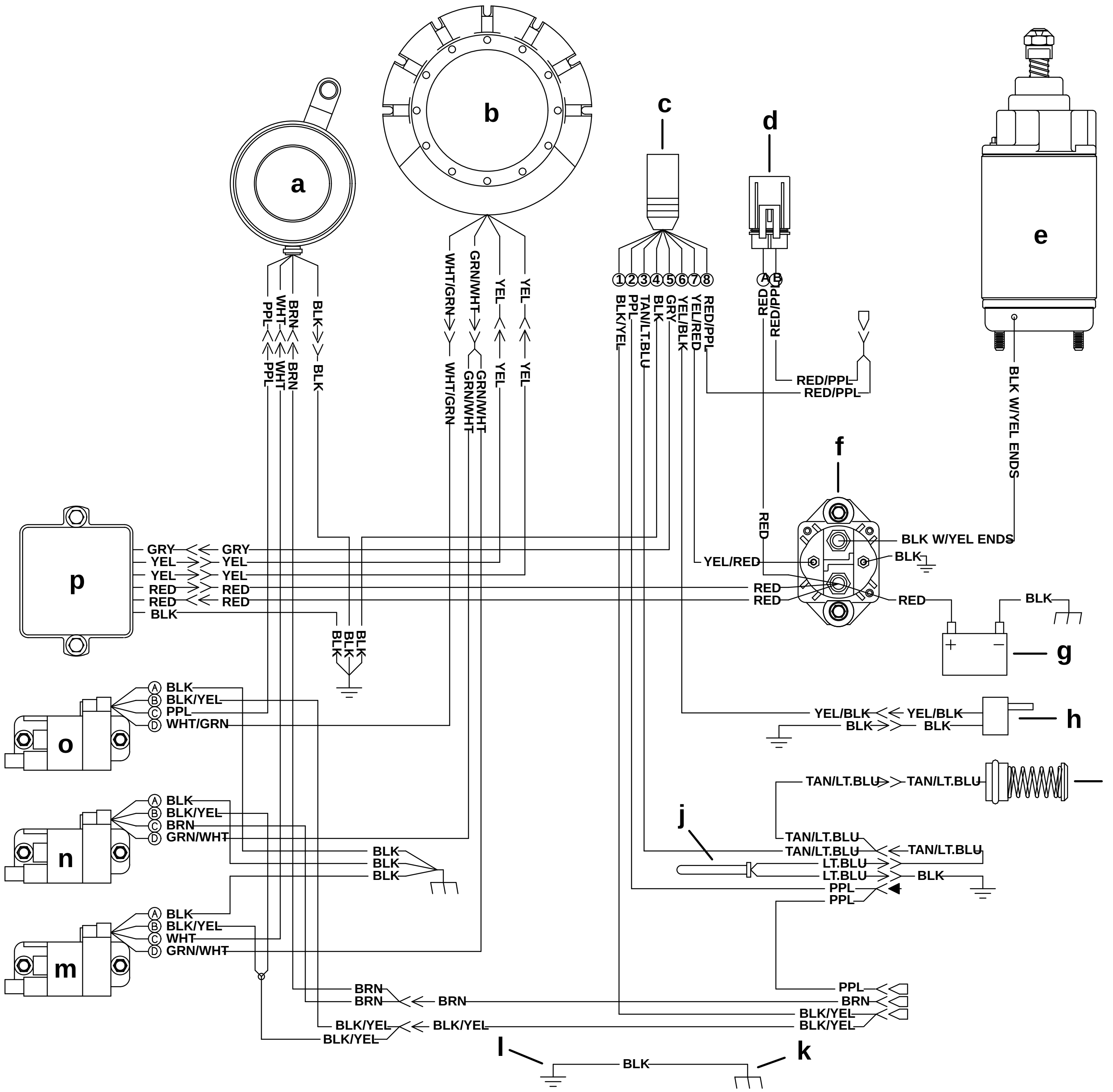
a - Trigger
b - Stator
c - Electrical Plate
d - Block
e - Temperature Switch
f - Warning Horn
g - Push Button Stop Switch
h - Lanyard Stop Switch
i - Rev. Limiter
j - CDM 3
k - CDM 2
l - CDM 1

1998 75 Electric Start Tiller Handle w/Power Trim Wiring Diagram



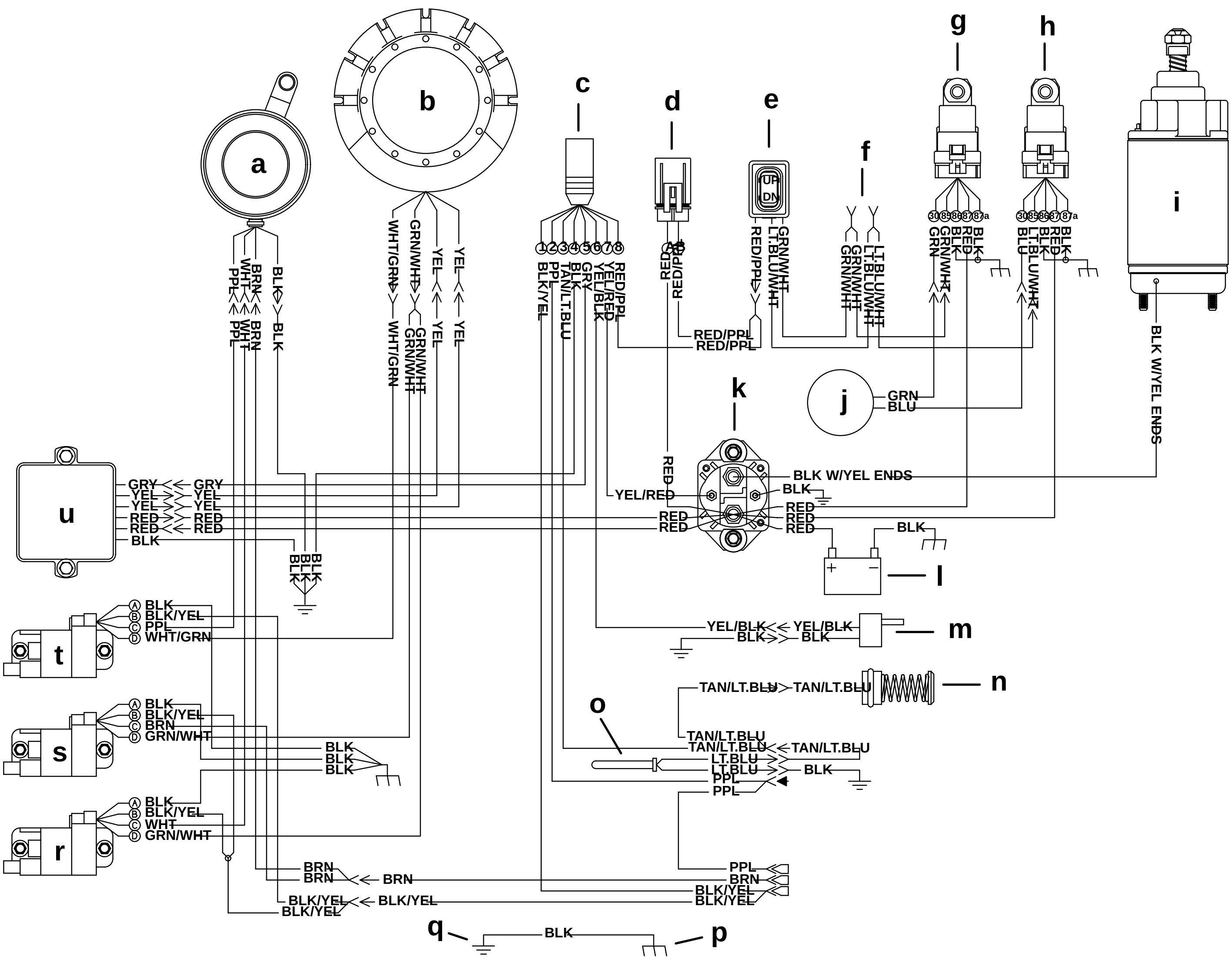
a - Ignition Switch
b - Tiller Handle Trim Switch
c - Push Button Stop Switch
d - Lanyard Stop Switch
e - Starter Motor
f - UP Trim Relay
g - DOWN Trim Relay
h - Warning Horn
i - Cowl Mounted Trim Switch
j - 20 Ampere Fuse
k - Engine Harness
l - Trim Motor
m - Starter Relay
n - Neutral Start Switch
o - 12 Volt Battery
p - Fuel Enrichment Solenoid
q - Head Temperature Switch
r - Oil Level Switch
s - Block
t - Electrical Plate
u - CDM 3
v - CDM 2
w - CDM 1
x - Voltage Regulator
y - Trigger
z - Stator

1998 75/90 Electric Start Wiring Diagram



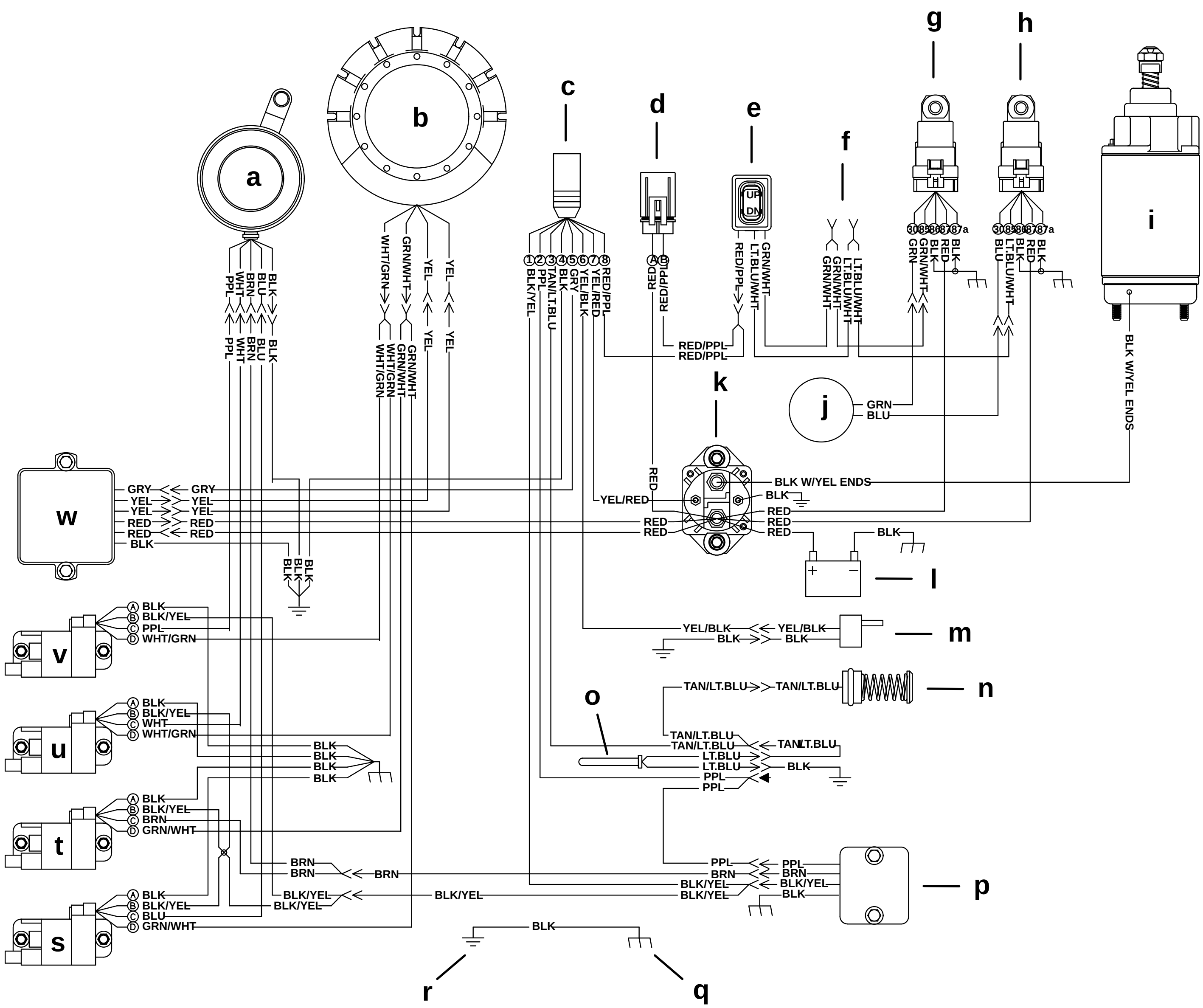
a - Trigger
b - Stator
c - Engine Harness
d - 20 Ampere Fuse
e - Starter Motor
f - Starter Solenoid
g - 12 Volt Battery
h - Fuel Enrichment Solenoid
i - Head Temperature Switch
j - Oil Level Switch
k - Block
l - Electrical Plate
m - CDM 3
n - CDM 2
o - CDM 1
p - Voltage Regulator

1998 75/90 Electric Start w/Power Trim Wiring Diagram



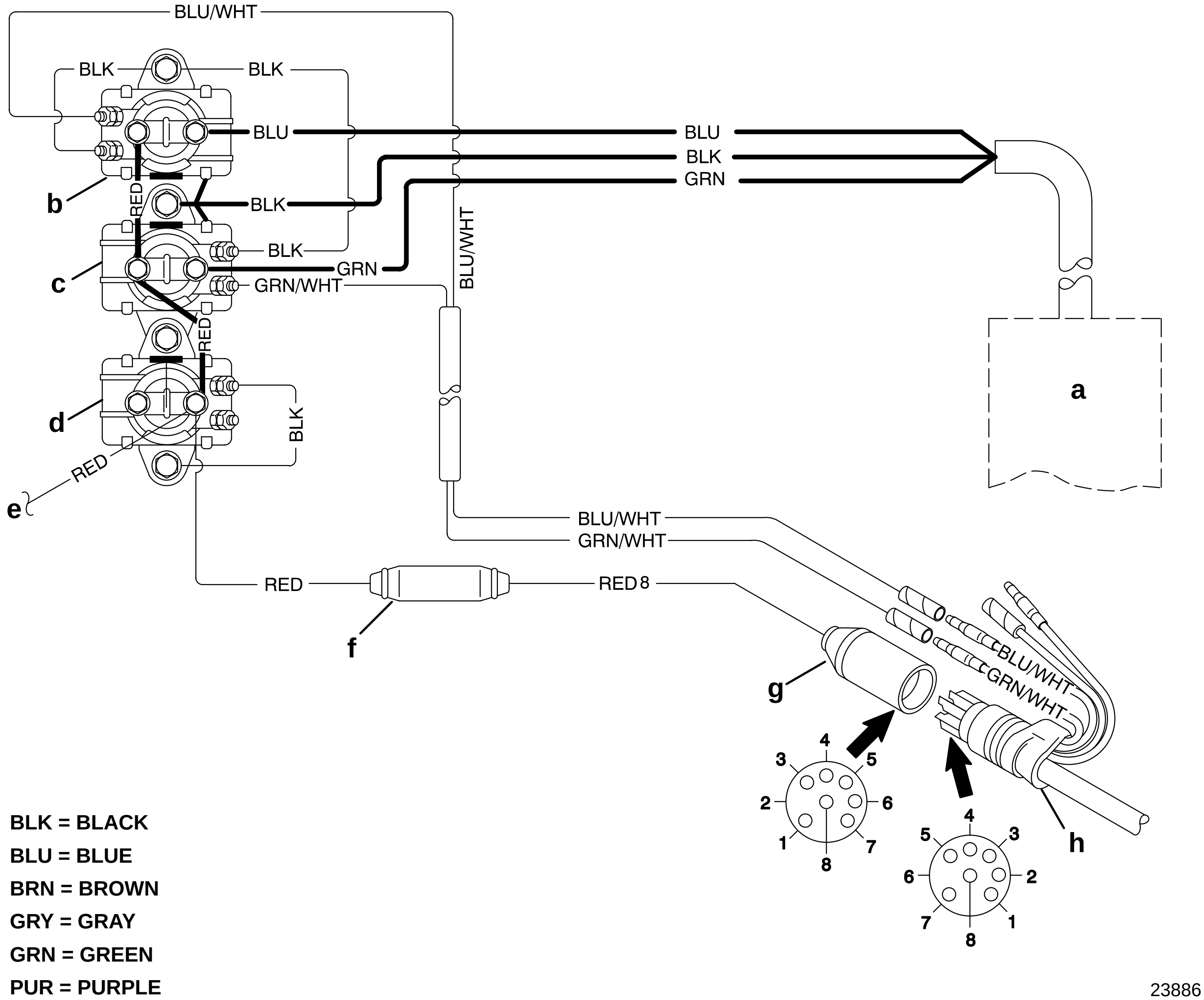
a - Trigger
b - Stator
c - Engine Harness
d - 20 Ampere Fuse
e - Cowl Mounted Power Trim Switch
f - To Remote Control Trim Switch
g - DOWN Trim Relay
h - UP Trim Relay
i - Starter Motor
j - Trim Motor
k - Starter Solenoid
l - 12 Volt Battery
m - Fuel Enrichment Solenoid
n - Head Temperature Switch
o - Oil Level Switch
p - Block
q - Electrical Plate
r - CDM 3
s - CDM 2
t - CDM 1
u - Voltage Regulator

1998 80 Jet/100/115/125 Wiring Diagram



a - Trigger
b - Stator
c - Engine Harness
d - 20 Ampere Fuse
e - Cowl Mounted Power Trim Switch
f - To Remote Control Trim Switch
g - DOWN Trim Relay
h - UP Trim Relay
i - Starter Motor
j - Trim Motor
k - Starter Solenoid
l - 12 Volt Battery
m - Fuel Enrichment Solenoid
n - Head Temperature Switch
o - Oil Level Switch
p - RPM Limiter
q - Block
r - Electrical Plate
s - CDM 4
t - CDM 3
u - CDM 2
v - CDM 1
w - Voltage Regulator

Power Trim System Wiring Diagram (3 Cylinder Models Using COMMANDER 2000 Side Mount Remote Control)



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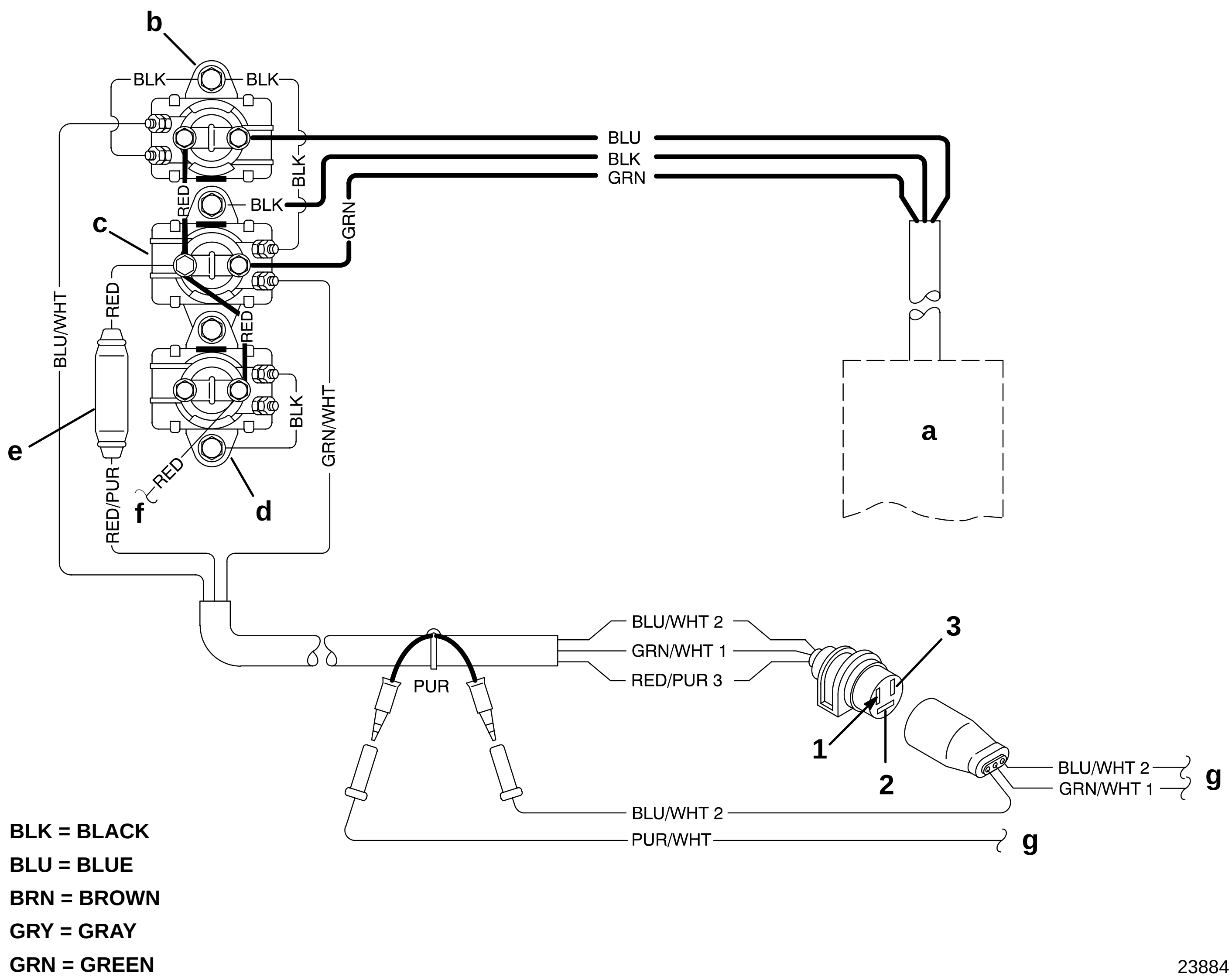
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW

a - Power Trim Pump Motor
b - Trim Solenoid "UP"
c - Trim Solenoid "DOWN"
d - Engine Starter Motor Solenoid
e - Red (+) Battery Cable
f - Fuse Holder (20 Amp Fuse)
g - Engine Wiring Harness Connector
h - Remote Control Wiring Harness Connector

Power Trim System Wiring Diagram (3 Cylinder Models Using COMMANDER Side Mount Remote Control)



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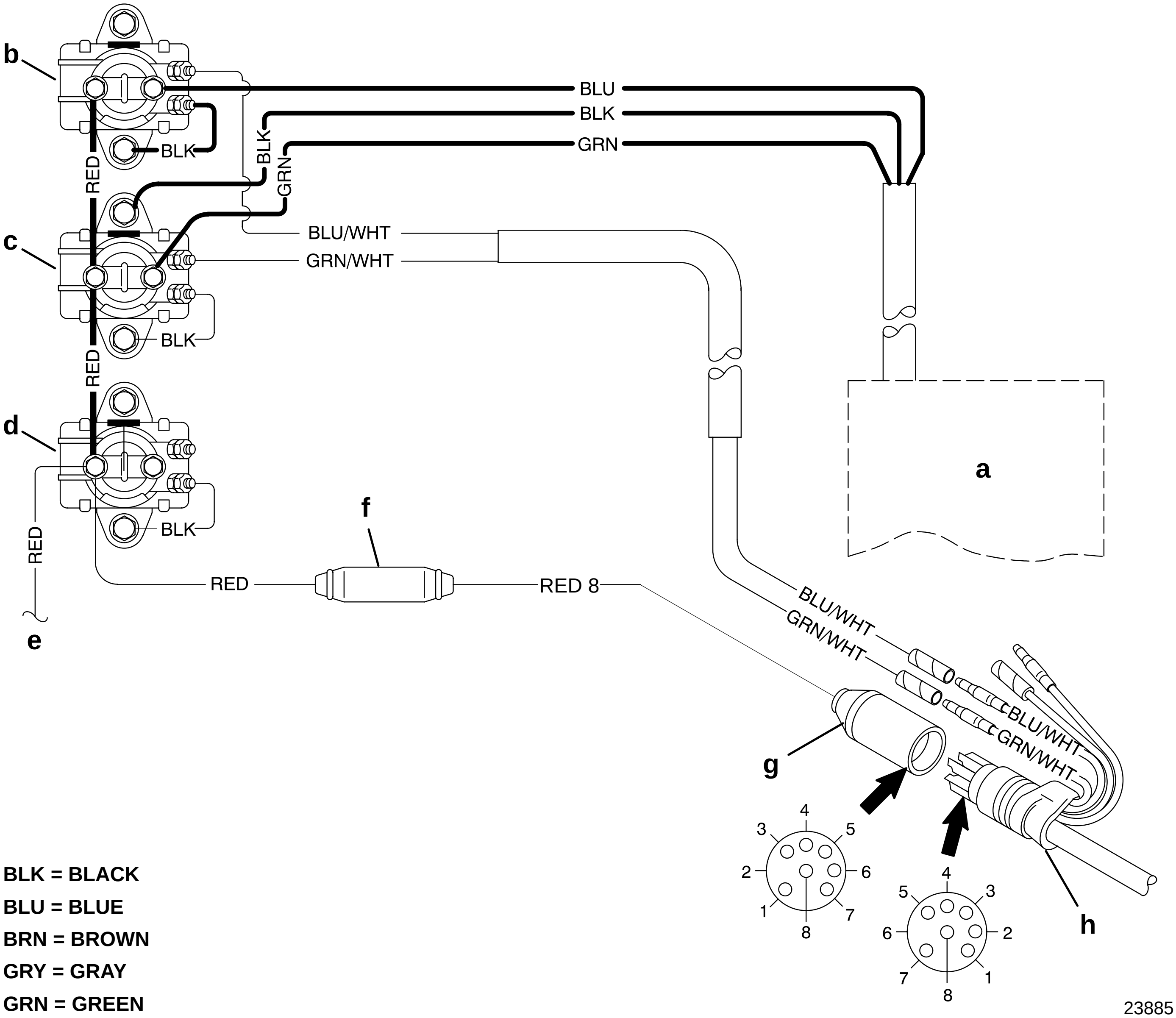
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW

a - Power Trim Pump Motor
b - Trim Solenoid "UP"
c - Trim Solenoid "DOWN"
d - Engine Starter Motor Solenoid
e - Fuse Holder (20 Amp Fuse)
f - Red (+) Battery Cable
g - Wires from Remote Control

Power Trim System Wiring Diagram (4 Cylinder Models Using COMMANDER 2000 Side Mount Remote Control)



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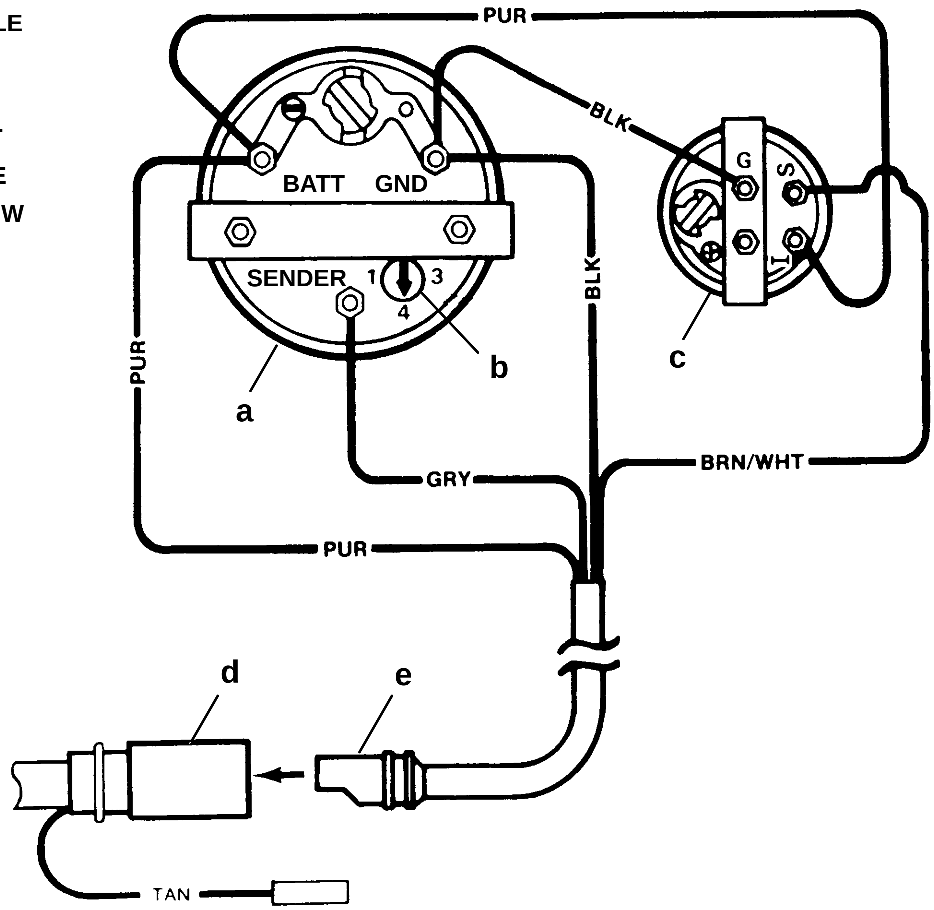
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW

a - Power Trim Pump Motor
b - Trim Solenoid “UP”
c - Trim Solenoid “DOWN”
d - Engine Starter Motor Solenoid
e - Red (+) Battery Cable
f - Fuse Holder (20 Amp Fuse)
g - Engine Wiring Harness Connector
h - Remote Control Wiring Harness Connector

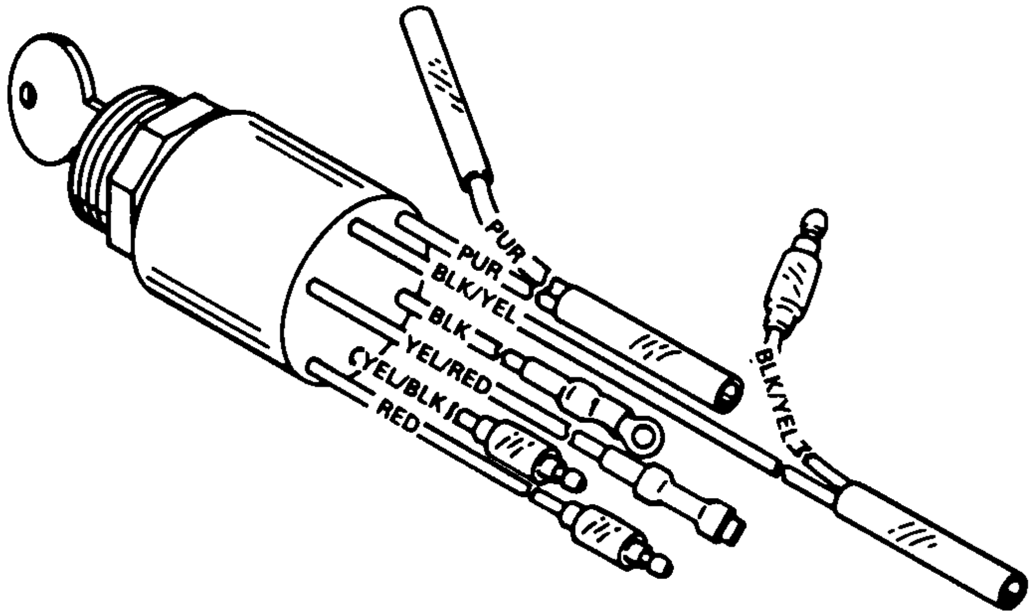
Tachometer (With Adjustable Dial) and Trim Indicator Gauge Wiring Diagram

BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW



a - Tachometer
b - Position Dial to Point Toward “4”
c - Trim Indicator Gauge (Optional)
d - Tachometer/Accessories Harness Plug from Remote Control
e - Tachometer/Accessories Harness

Key/Choke Switch Continuity Test
(COMMANDER 2000 Side Mount Remote Control)



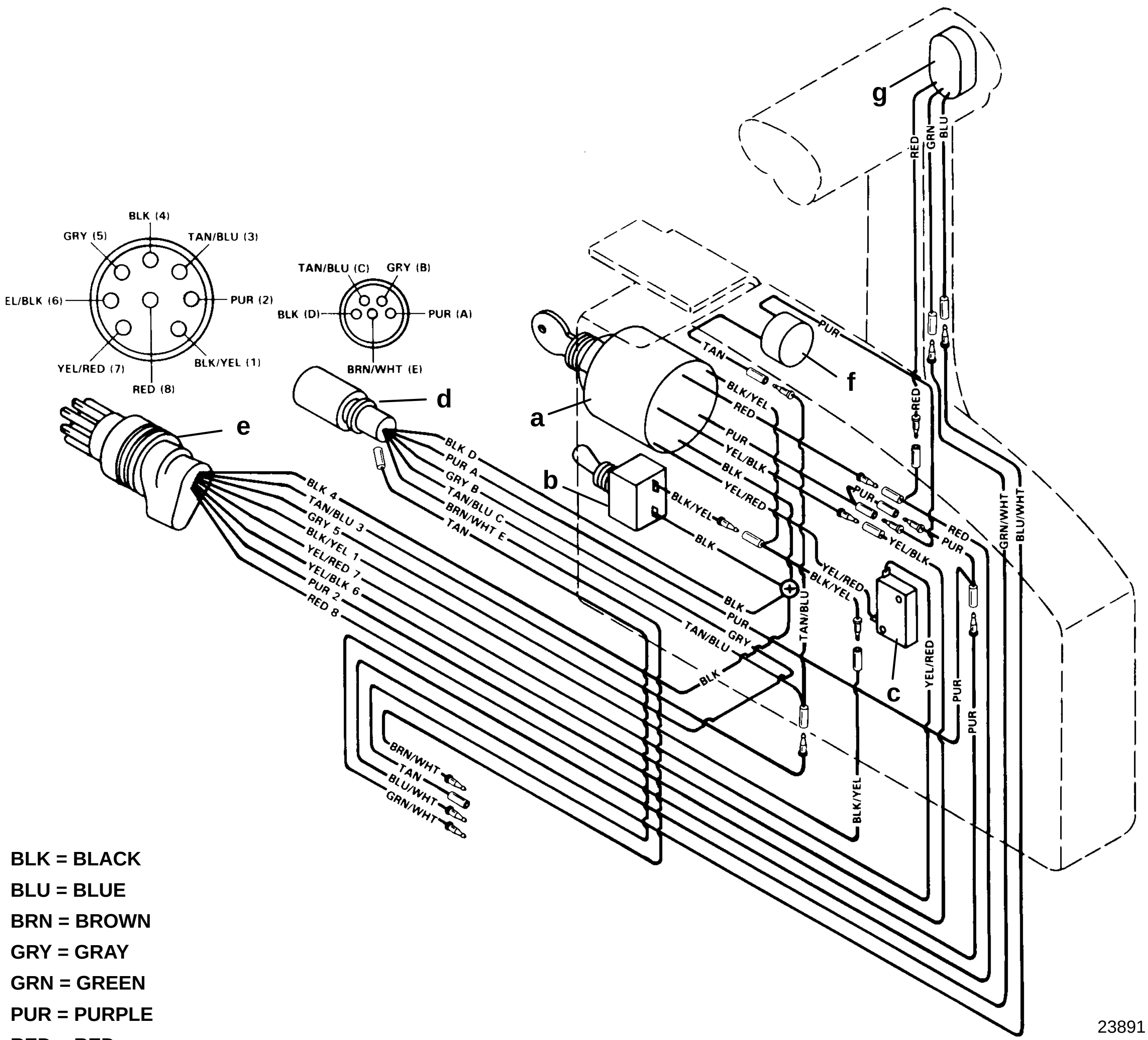
“OFF”	**BLK/YEL – BLK**
“RUN”	**RED – PUR**
“START”	**RED – PUR – YEL/RED**
PUSH (CHOKE)*	**RED – YEL/BLK**

***Key switch must be positioned to “RUN” or “START” and key pushed in to actuate choke, for this continuity test.**

23894

BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW

COMMANDER 2000 Side Mount Remote Control
(Power Trim/Tilt Electric Start with Warning Horn) Wiring Diagram



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BLU = BLUE

BRN = BROWN

GRY = GRAY

GRN = GREEN

PUR = PURPLE

RED = RED

TAN = TAN

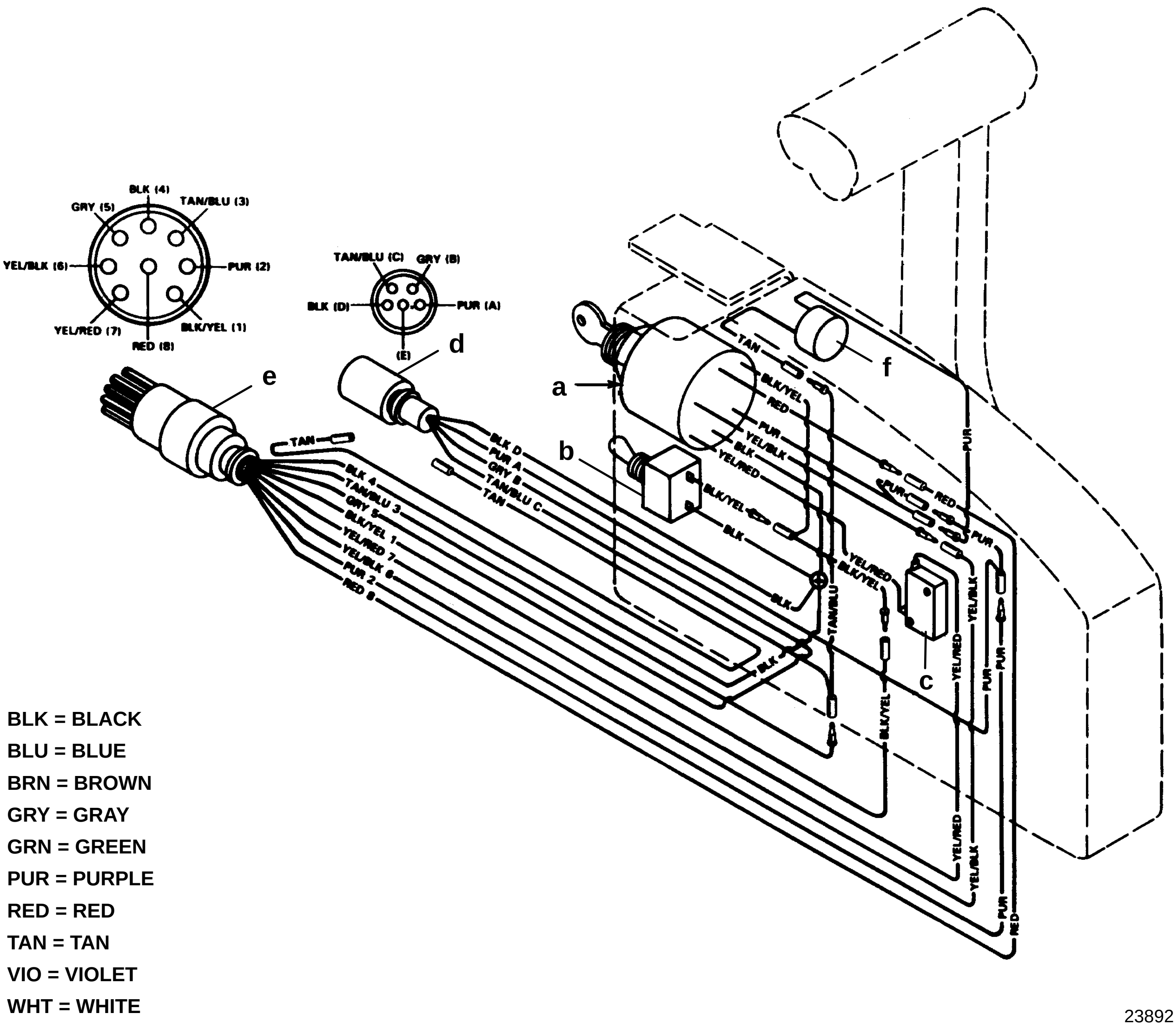
VIO = VIOLET

WHT = WHITE

YEL = YELLOW

a - Ignition/Choke Switch
b - Emergency Stop Switch
c - Neutral Start Switch
d - Tachometer/Accessories Harness Connector
e - Wiring Harness Connector
f - Warning Horn
g - Trim/Tilt Switch

COMMANDER 2000 Side Mount Remote Control (Electric Start with Warning Horn) Wiring Diagram



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BRN = BROWN

GRY = GRAY

GRN = GREEN

PUR = PURPLE

RED = RED

TAN = TAN

VIO = VIOLET

WHT = WHITE

YEL = YELLOW

a - Ignition/Choke Switch

b - Emergency Stop Switch

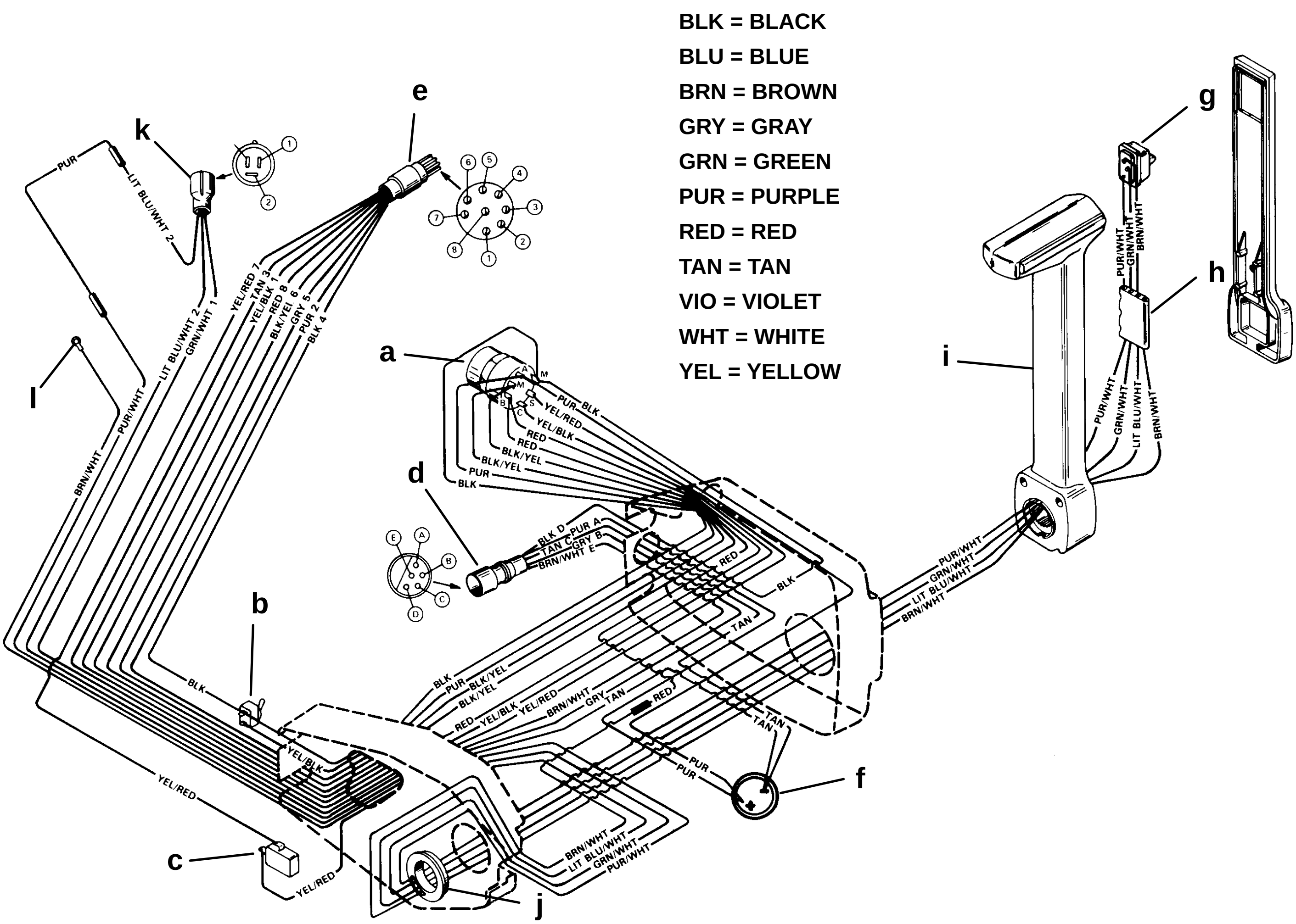
c - Neutral Start Switch

d - Tachometer/Accessories Harness Connector

e - Wiring Harness Connector

f - Warning Horn

COMMANDER 2000 Side Mount Remote Control (Power Trim/Tilt Electric Start with Warning Horn) Wiring Diagram



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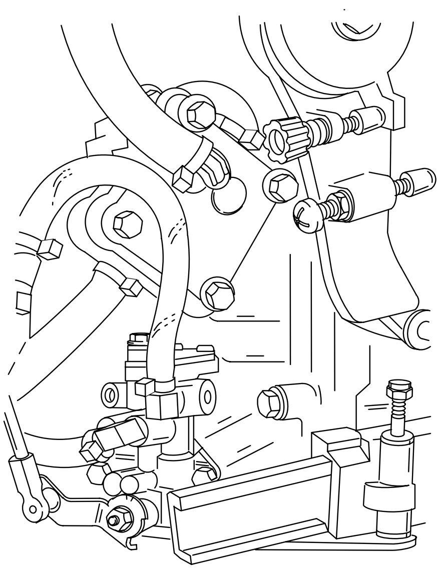
a - Ignition/Choke Switch
b - Emergency Stop Switch
c - Neutral Start Switch
d - Tachometer/Accessories Harness Connector
e - Wiring Harness Connector
f - Warning Horn
g - Trim/Tilt Switch
h - Wire Retainer
i - Control Handle
j - Trim Harness Bushing
k - Trim Harness Connector
l - Lead to Trim Indicator Gauge

FUEL SYSTEM



FUEL PUMP

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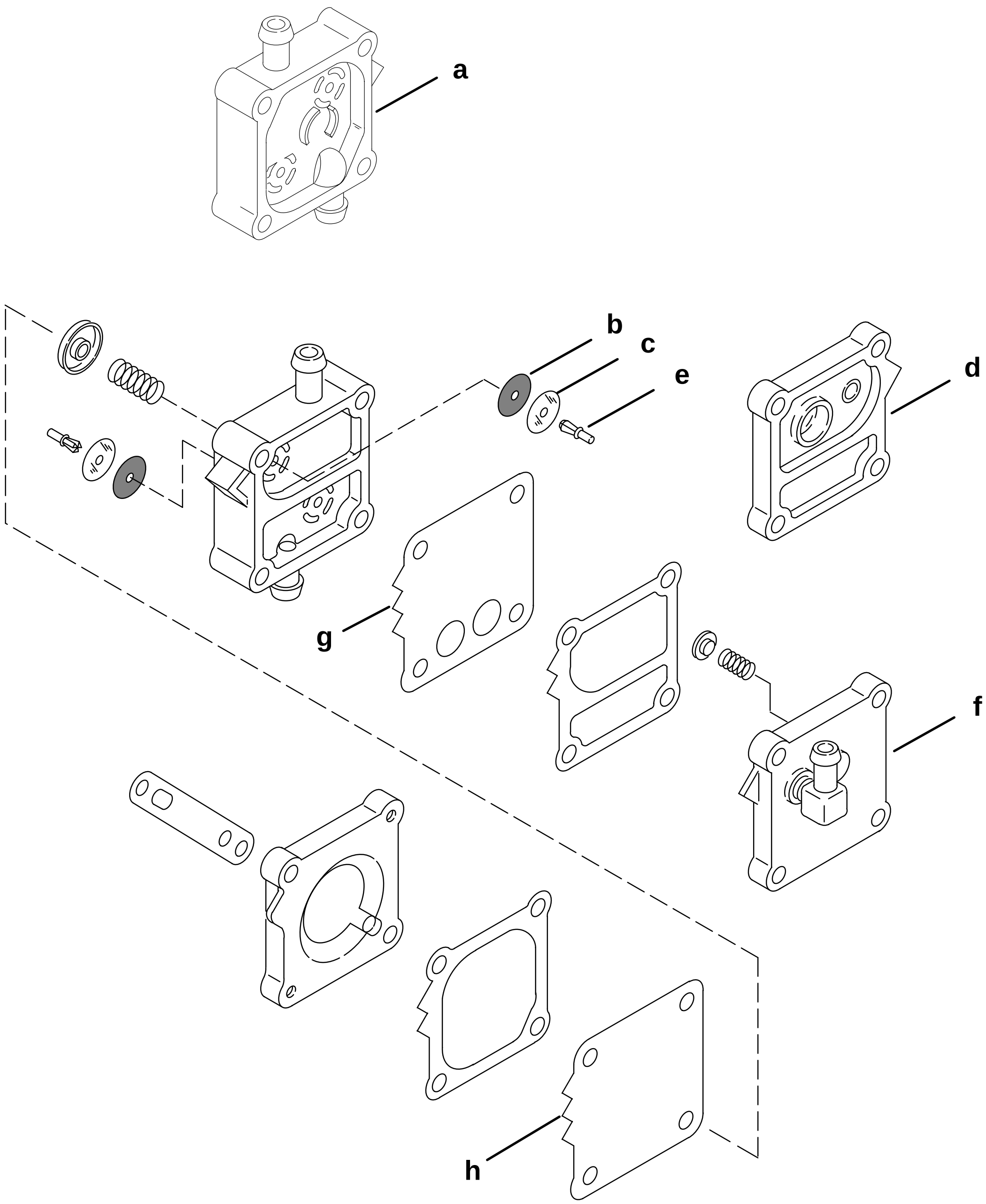
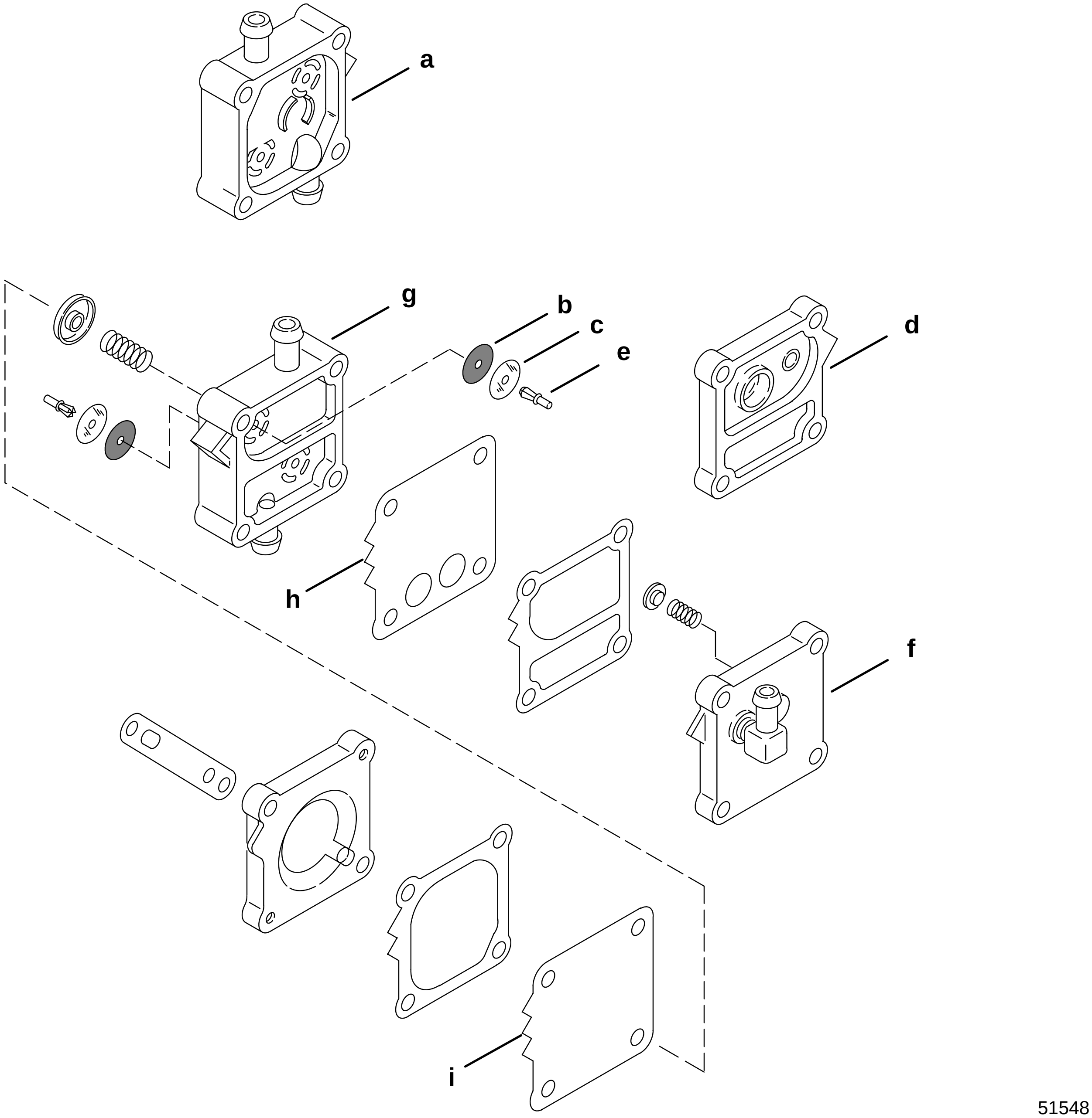
Notes:

65 Jet 75-90 (3 cyl.)



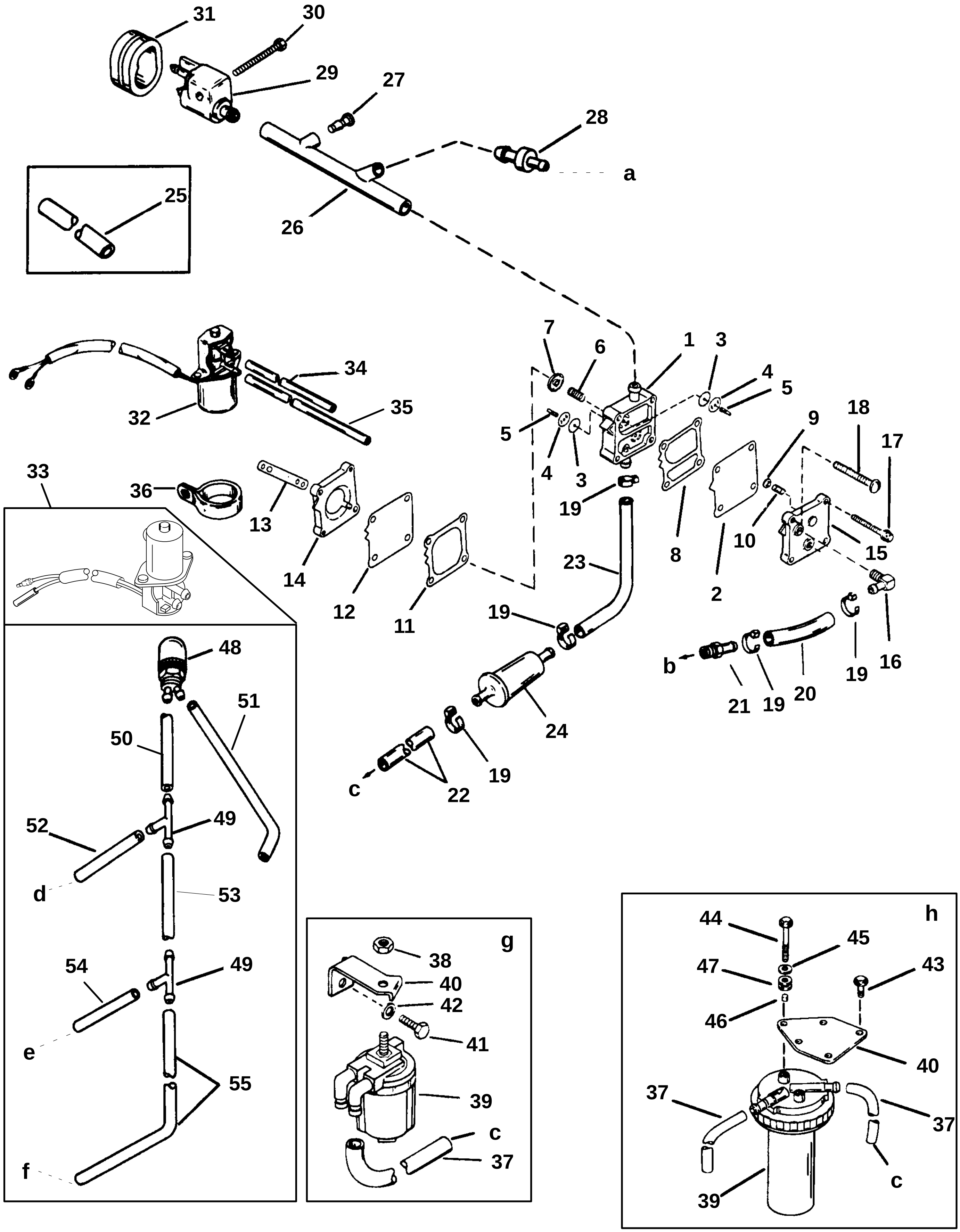
a - Body (Opposite Side View)
b - Rubber Valve
c - Plastic Disc
d - Cover (Opposite Side View)
e - Plastic Check Valve Retainer
f - Cast Aluminum Cover
g - Three Tabs
h - Three Tabs

80 Jet-100-115-125 (4 cyl.)



a - Body (Opposite Side View)
b - Rubber Valve
c - Plastic Disc
d - Cover (Opposite Side View)
e - Plastic Check Valve Retainer
f - Cast Aluminum Cover
g - Body
h - Three Tabs
i - Three Tabs

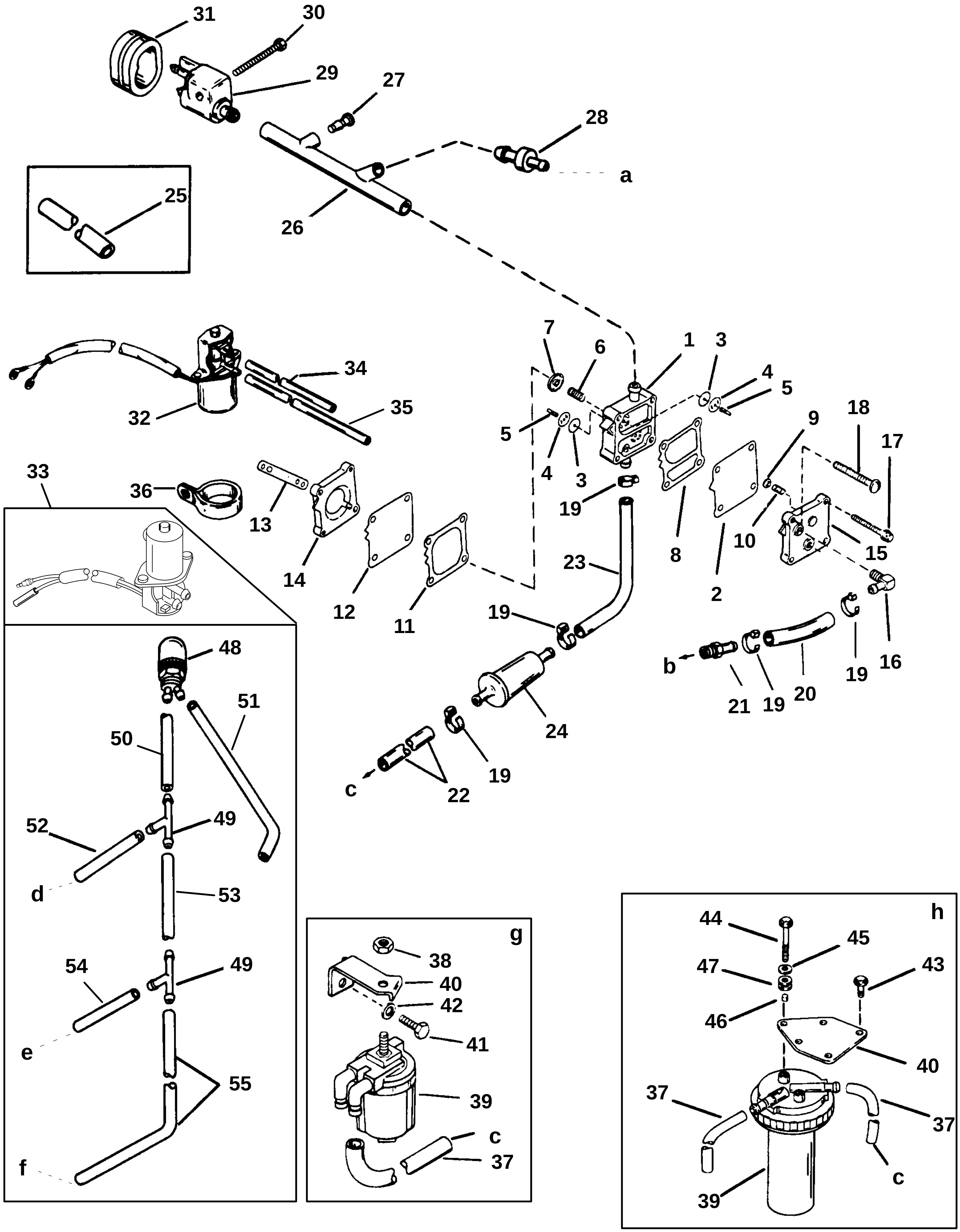
Fuel Pump (65 Jet/75/90)



A = TO OIL PUMP B = TO CRANKCASE C = TO CARBURETOR D = TO TOP CARBURETOR
E = TO CENTER CARBURETOR F = TO BOTTOM CARBURETOR G = DESIGN I H = DESIGN II

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	FUEL PUMP ASSEMBLY			
2	1	DIAPHRAGM KIT			
3	2	CHECK VALVE			
4	2	CHECK VALVE			
5	2	RETAINER			
6	1	SPRING			
7	1	CAP			
8	1	GASKET–boost			
9	1	CAP			
10	1	SPRING			
11	1	GASKET–pulse			
12	2	DIAPHRAGM			
13	1	GASKET			
14	1	BASE			
15	1	PLATE			
16	1	ELBOW			
17	2	SCREW–fuel pump(M5 x 40)	55		6.2
18	2	SCREW–pump to block(M6 x 50)	55		6.2
19	AR	STA-STRAP			
20	1	TUBING(2-1/2 IN.)			
21	1	NIPPLE			
22	1	TUBING(2 IN.)			
23	1	FUEL LINE **OIL INJECTION**			
24	1	FUEL FILTER			
25	1	TUBING(6 IN.)**(NON OIL INJECTED)**			
26	1	MOLDED HOSE			
27	1	PLUG **OIL INJECTED**			
28	1	CHECK VALVE			
29	1	FUEL CONNECTOR			
–	1	O RING			
30	1	SCREW(M6 x 35)	60		6.8
31	1	GROMMET			
32	1	ENRICHER VALVE **(S/N-0G437999/BEL-9926999 & BELOW)**			
33	1	ENRICHER VALVE **(S/N-0G438000/BEL-9927000 & UP)**			
34	1	TUBING(15 IN.)			
35	1	TUBING(8 IN.)**(Use W/WME–29/30/31/41/46/47/48/49 Carbs)**			
	1	TUBING(11-1/2 IN.)**(Use W/WME–59/60/61/62/ 75/76/77/78 Carbs)**			
36	1	CLAMP			
–	1	GASKET SET			
–	1	**POWERHEAD**			

Fuel Pump (65 Jet/75/90)

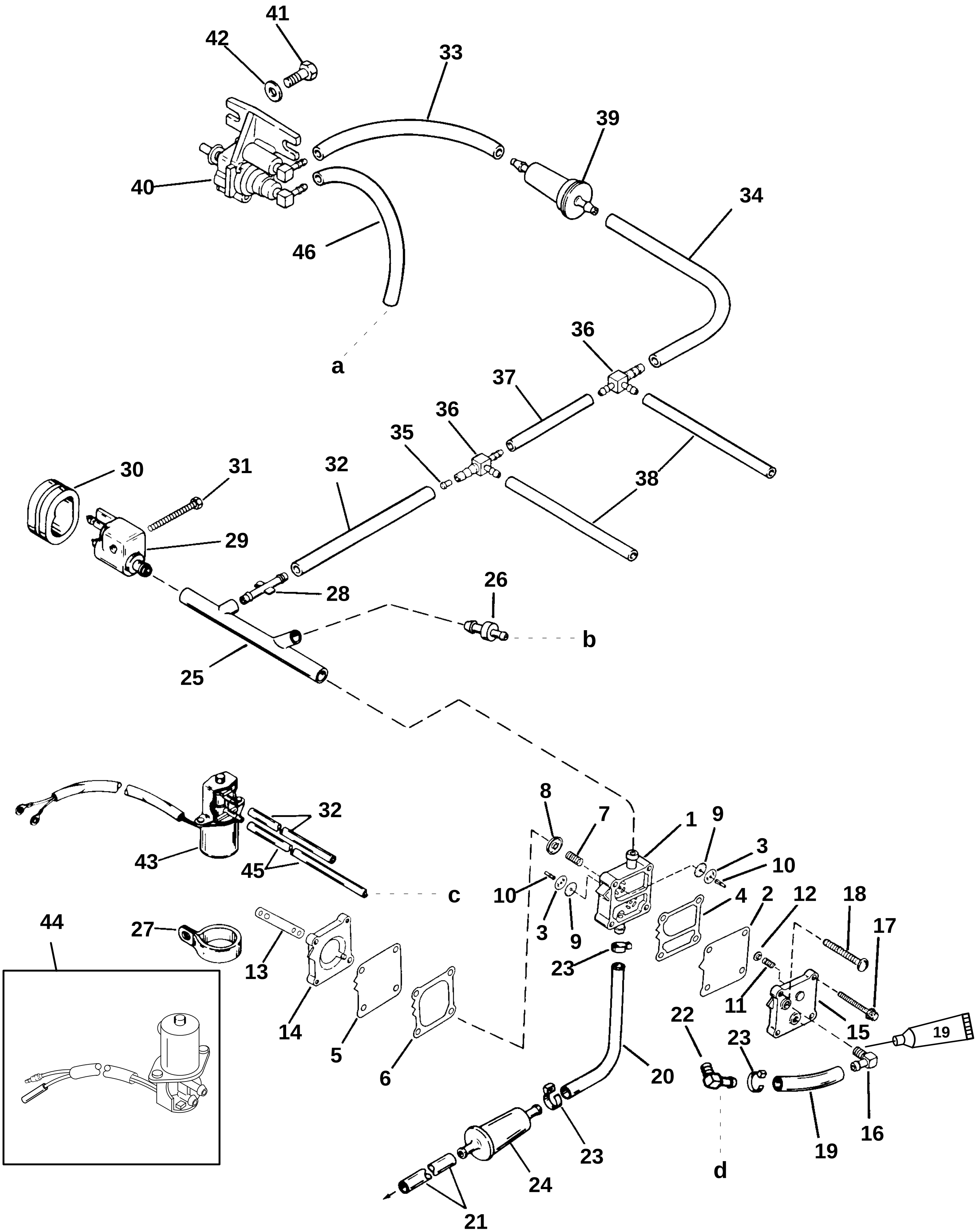


A = TO OIL PUMP B = TO CRANKCASE C = TO CARBURETOR D = TO TOP CARBURETOR
E = TO CENTER CARBURETOR F = TO BOTTOM CARBURETOR G = DESIGN I H = DESIGN II

Fuel Pump (65 Jet/75/90)

REF. NO.	QTY.	DESCRIPTION		TORQUE	
			lb. in.	lb. ft.	N·m
37	1	TUBING			
38	1	NUT		Drive Tight	
39	1	FUEL FILTER			
40	1	BRACKET **NON OIL INJECTED**			
41	1	SCREW **DESIGN I**		Drive Tight	
42	1	WASHER			
37	2	TUBING(17 IN.)			
39	1	FUEL FILTER			
40	1	BRACKET			
43	2	SCREW(M6 x 14) **NON OIL INJECTED**		Drive Tight	
44	2	SCREW(M6 x 30) **DESIGN II**		Drive Tight	
45	2	WASHER			
46	2	BUSHING			
47	2	GROMMET			
48	1	PRIMER BULB			
49	2	TEE FITTING			
50	1	TUBING(6 IN.)			
51	1	TUBING(9-1/2 IN.) **MANUAL**			
52	1	TUBING(2-1/2 IN.)			
53	1	TUBING(2-1/2 IN.)			
54	1	TUBING(2-1/2 IN.)			
55	1	TUBING(6 IN.)			

Fuel Pump (80 Jet/100/115/125)



19 Perfect Seal (92-34227-1)

A=TO LOWER TEE B=TO OIL PUMP C=TO UPPER TEE D=TO CRANKCASE

Fuel Pump (80 Jet/100/115/125)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	FUEL PUMP ASSEMBLY			
2	1	DIAPHRAGM KIT			
3	1	CHECK VALVE			
4	1	GASKET–boost			
5	2	DIAPHRAGM			
6	1	GASKET–pulse			
7	1	SPRING			
8	1	CAP			
9	2	CHECK VALVE			
10	2	RETAINER			
11	1	SPRING			
12	1	CAP			
13	1	GASKET			
14	1	BASE			
15	1	PLATE			
16	1	ELBOW			
17	2	SCREW–fuel pump (M5 x 40)	55		6.2
18	2	SCREW–pump to block (M6 x 50)	55		6.2
19	1	TUBING (4 IN.)			
20	1	TUBING (8-1/2 IN.)			
21	1	TUBING (2 IN.)			
22	1	ELBOW			
23	AR	STA-STRAP			
24	1	FUEL FILTER			
25	1	MOLDED HOSE			
26	1	CHECK VALVE			
27	1	CLAMP (Use where applicable)			
28	1	CONNECTOR			
29	1	FUEL CONNECTOR			
–	1	O RING–fuel connector			
30	1	GROMMET			
31	1	SCREW (M6 x 35)	60		6.8
32	2	TUBING (15 IN.)			
33	1	TUBING (13 IN.)			
34	1	TUBING (1-1/4 IN.)			
35	1	FLOW RESTRICTOR			
36	2	TEE FITTING			
37	1	TUBING (4-1/2 IN.)			
38	2	TUBING (2-1/2 IN.)			
39	1	FUEL FILTER			
40	1	ACCELERATOR PUMP (REPAIR KIT 1395-811287)			
41	2	SCREW (M6 x 16)	130		14.7
42	2	WASHER			
43	1	ENRICHNER VALVE			
44	1	ENRICHNER VALVE **(1 MALE/1 FEMALE TERMINAL)**			
45	1	TUBING (15 IN.) (USE WITH BRASS FITTING)			
	1	TUBING (11-1/2) (USE WITH NYLON FITTING)			
46	1	TUBING (5-1/4 IN.)			

Theory Of Operation

The fuel pump is a crankcase-pressure-operated, diaphragm-type pump. Crankcase pulsating pressure (created by the up-and-down movement of piston) is transferred to fuel pump by way of a passage (hole) between crankcase and fuel pump.

When piston is in an upward motion, a vacuum is created in the crankcase, thus pulling in a fuel/air mixture (from carburetor) into crankcase. This vacuum also pulls in on the fuel pump diaphragm, thus the inlet check valve (in fuel pump) is opened and fuel (from fuel tank) is drawn into fuel pump.

Downward motion of the piston forces the fuel/air mixture out of the crankcase into the cylinder. This motion also forces out on the fuel pump diaphragm, which, in turn, closes the inlet check valve (to keep fuel from returning to fuel tank) and opens the outlet check valve, thus forcing fuel to the carburetors.

CHECKING FOR RESTRICTED FUEL FLOW CAUSED BY ANTI-SIPHON VALVES

While anti-siphon valves may be helpful from a safety stand-point, they clog with debris, they may be too small, or they may have too heavy a spring. Summarizing, the pressure drop across these valves can, and often does, create operational problems and/or powerhead damage by restricting fuel to the fuel pump and carburetor(s). Some symptoms of restricted (lean) fuel flow, which could be caused by use of an anti-siphon valve, are:

- Loss of fuel pump pressure
- Loss of power
- High speed surging
- Preignition/detonation (piston dome erosion)
- Outboard cuts out or hesitates upon acceleration
- Outboard runs rough
- Outboard quits and cannot be restarted
- Outboard will not start
- Vapor lock

Since any type of anti-siphon device must be located between the outboard fuel inlet and fuel tank outlet, a simple method of checking [if such a device (or bad fuel) is a problem source] is to operate the outboard with a separate fuel supply which is known to be good, such as a remote fuel tank.

If, after using a separate fuel supply, it is found that the anti-siphon valve is the cause of the problem, there are 2 solutions to the problem; either (1) remove the anti-siphon valve or (2) replace it with a solenoid-operated fuel shutoff valve.

Testing

Install clear fuel hose(s) between fuel pump and carburetor(s). Run engine, and inspect fuel passing thru hose(s) for air bubbles. If air bubbles are found, see "Air Bubbles in Fuel Line," below. If air bubbles are NOT found, see "Lack of Fuel Pump Pressure," continued on next page.

Troubleshooting Fuel Pump

PROBLEM: Air BUBBLES IN FUEL LINE	
Possible Cause	**Corrective Action**
Low fuel in fuel tank.	Fill tank with fuel.
Loose fuel line connection.	Check and tighten all connections.
Fuel pump fitting loose.	Tighten fitting.
A hole or cut in fuel line.	Check condition of all fuel lines and replace any found to be bad.
Fuel pump anchor screw(s) loose.	Tighten all screws evenly and securely.
Fuel pump gasket(s) worn out.	Rebuild fuel pump.

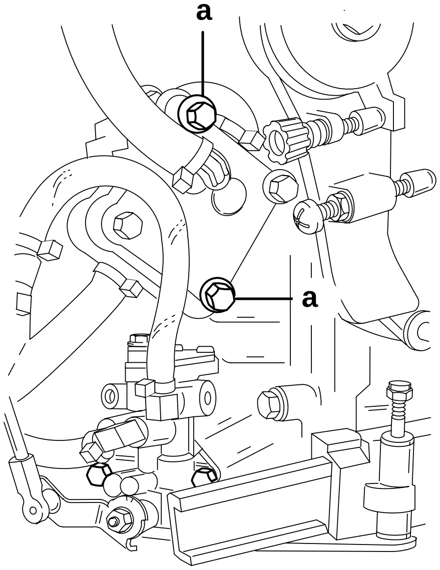
PROBLEM: Lack of Fuel Pump Pressure	
Possible Cause	**Corrective Action**
An anti-siphon valve.	Read "Checking for Restricted Fuel Flow, Caused by Anti-Siphon Valves" preceding.
Air in fuel line.	"Air Bubbles in Fuel Line", preceding.
A dirty or clogged fuel filter.	Clean or replace fuel filter.
The fuel pickup in fuel tank clogged or dirty.	Clean or replace pickup.
Worn out fuel pump diaphragm.	Rebuild fuel pump.
Defective (hole or crack) check valve(s) in fuel pump (unlikely).	Rebuild fuel pump.
Broken check valve retainer.	Rebuild fuel pump.
Pulse hole plugged.	Remove fuel pump and clean out hole.

Troubleshooting Fuel Pump (continued)

PROBLEM: Lack of Fuel Pump Pressure	
Possible Cause	**Corrective Action**
Hole in pulse hose (1 pulse hose).	Replace pulse hose.
Loose pulse hose.	Tighten connection.
Boost diaphragm gasket distorted or out of place.	Check seal between mating surfaces where “rib” divides pulse chamber – gasket must align with rib; check for distorted gasket. Align or replace gasket if necessary.

Removal

- Disassemble by removing 2 hex-head bolts; remove/disassemble fuel pump parts.



a - Bolts – Fuel Pump

Fuel Pump – Cleaning/Inspection

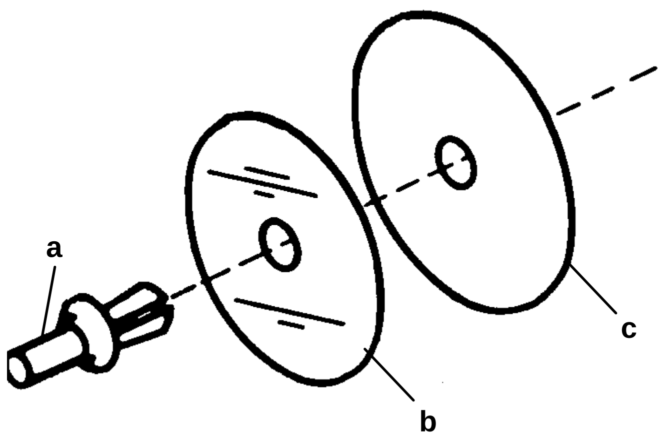
Clean fuel pump housing, check valves, pulse chamber, and pump base in solvent, and dry all but check valves with compressed air.

Inspect each check valve (2 ea.), for cracks and/or holes. Check each black rubber disc (2 ea.) to see that the black coating is not coming off. Unless damaged while disassembled, replacement is seldom necessary. Inspect the Check Valve Assembly on Chamber Plate (check by both pressure and suction to hose barb), to see that check ball is moving and functioning (1-3 psi (6.8 – 20.5 kPa required).

Inspect fittings on fuel pump housing for looseness or any signs of fuel or air leaks. Replace or tighten fitting if leak is found, or replace chamber Plate Assembly.

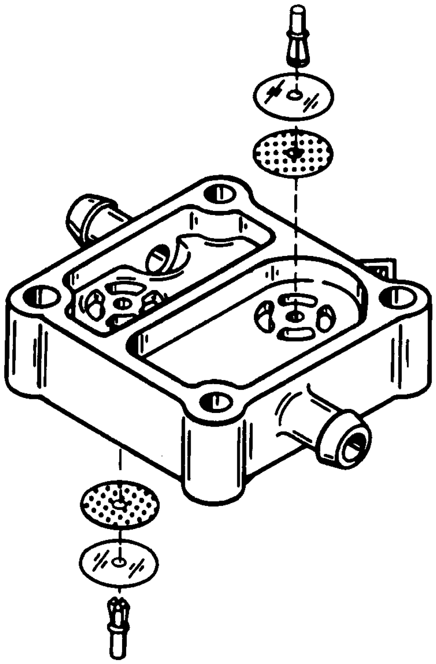
Check Valve Reassembly

1. Insert retainer thru plastic disc and rubber check valve.



a - Retainer
b - Plastic Disc
c - Check Valve

2. Install check valves and retainers into fuel pump body.



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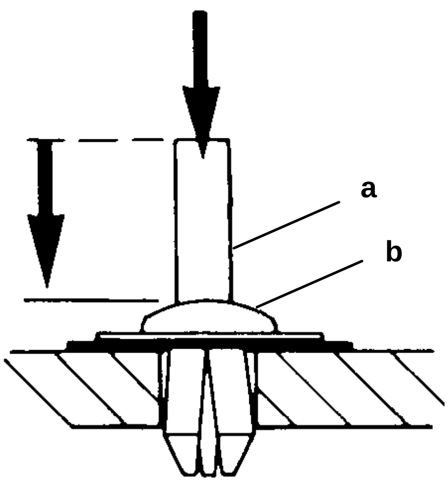
3. Reinstall rod into retainer cap and, use a small hammer or hammer and punch to tap rod down into retainer until flush with top of retainer.



a - Rod
b - Retainer Cap

Reassembly

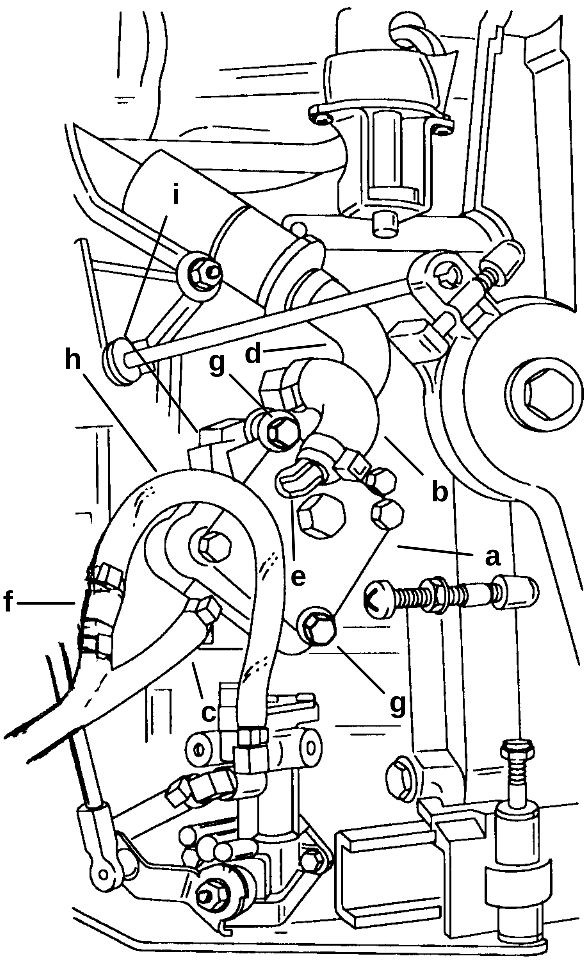
IMPORTANT: ALWAYS REPLACE GASKETS.

After reassembling check valve in fuel pump body, using the following procedure will help insure proper reassembly:

1. Insert two 3 in. minimum length 1/4″ bolts (not the fuel pump bolts) OR 1/4″ dowels, through the opposite large holes (6mm bolt holes) in the chamber plate, as locating dowels, and turn plate upside down so that the inner side is facing up.
2. Insert coil spring and cap in place.
3. Place Boost Chamber GASKET over dowels (bolts) and lower onto Chamber Plate -- BE SURE that gasket directional alignment is correct and that “V-tabs” are aligned.
4. Place Boost DIAPHRAGM over dowels, and lower to assembly.
5. Place Fuel Pump Body over dowels, and lower to assembly.
6. Insert Coil Spring and Cap in pump body.
7. Place Fuel Pump DIAPHRAGM over dowels, and lower to assembly.
8. Place Pulse Chamber GASKET over dowels, and lower to assembly.
9. Place Fuel Pump Base over dowels, and lower to assembly.
10. Grasp assembly firmly and clamp together with hands--turn over, and insert the 5mm Fuel Pump BOLTS (hex-head); After tightening, remove dowels (1/4″ bolts) used for locators.
11. Check that the directional alignment of all parts is correct and that the “V-Tabs” are aligned.

Installation of Fuel Pump

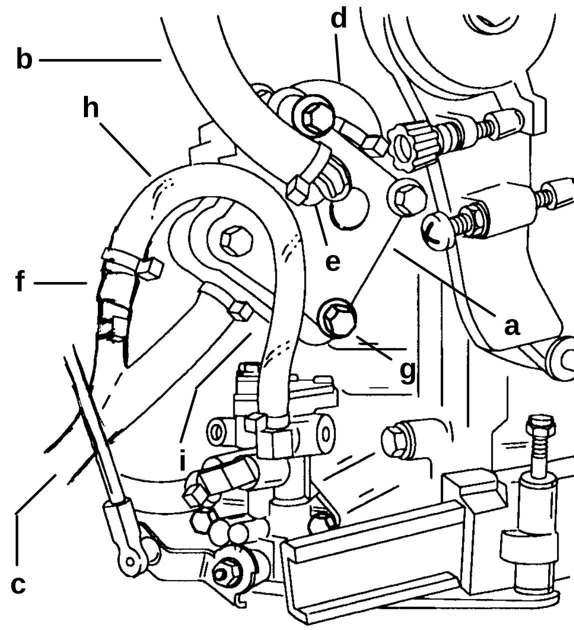
MODEL 65 JET, 75, 90



53991

a - Fuel Pump
b - Pulse Hose
c - Inlet Hose
d - Outlet Hose (Replace with Molded Hose)
e - Elbow [Apply PERFECT SEAL (92-34227--1) to threads]
f - Check Valve
g - Screws [Torque to 40 lb. in. (4.5 N·m)]
h - Clear Tubing [5.5 in. (139.7mm)]
i - Gasket (Cylinder Block to Fuel Pump) (HIDDEN)

MODEL 80 JET, 100, 115, 125



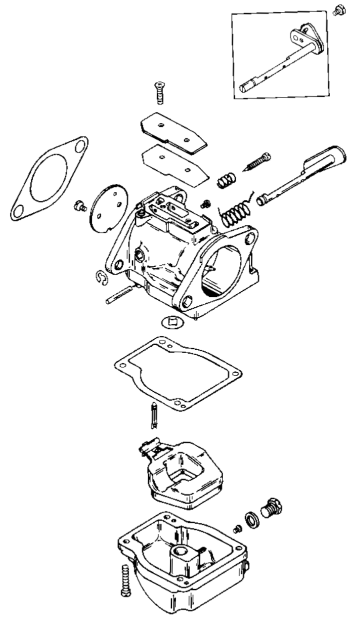
53992

a - Fuel Pump
b - Pulse Hose
c - Inlet Hose
d - Outlet Hose
e - Elbow [Apply PERFECT SEAL (92-34227--1) to threads]
f - Check Valve
g - Bolts [Torque to 40 lb. in. (4.5 N·m)]
h - Clear Tubing [8 in. (203.2mm)]
i - Gasket (Cylinder Block to Fuel Pump) (HIDDEN)

FUEL SYSTEM

3

B



CARBURETOR

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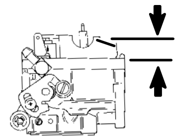
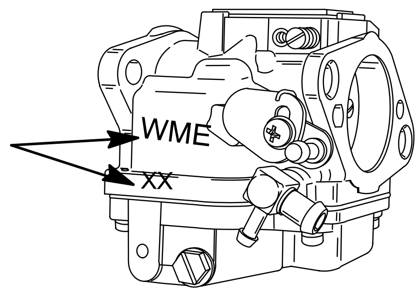
Specifications

CARBURETOR	**Idle RPM (In Forward Gear)** **Wide Open Throttle (WOT) RPM** **Model 65 Jet/90** **Model 75/80 Jet/100/115/125** **Float Height** 	675 ± 25 5000-5500 4750-5250 9/16 in. (14.29 mm)

WME Carburetor Chart

NOTE: *Carburetor Number Stamped on Side of Carburetor Body.*



Model	Year	Carburetor Number	Main Fuel Jet	Preset Idle Screw Turns Open
75 ELPTO	1994	29 -1 -2 -3	0.050 in. 0.052 in. 0.050 in.	1/2 1-1/4 1-1/4
75 MLH	1994	30 -1 -2 -3	0.050 in. 0.052 in. 0.050 in.	1/2 1-1/4 1-1/4
90	1994	31 -1 -2 -3	0.062 in. 0.064 in. 0.062 in.	1/2 1-1/2 1-1/2
100	1994/1995 S/N 0G151655 and below	31 -1 -2 -3 -4	0.046 in. 0.048 in. 0.052 in. 0.052 in.	1-1/4 1-1/4 NA NA
100	1995 S/N 0G151566 and above 7/6/94	32 -1A -2A -3A -4A	0.046 in. 0.050 in. 0.054 in. 0.056 in.	1-1/4 1-1/4 NA NA
115	1994 S/N 0G073756 and below	33 -1 -2 -3 -4	0.050 in. 0.056 in. 0.056 in. 0.060 in.	1-1/2 1-1/2 NA NA
125	1994/1995	34 -1 -2 -3 -4	0.066 in. 0.068 in. 0.070 in. 0.072 in.	1-1/2 1-1/2 NA NA

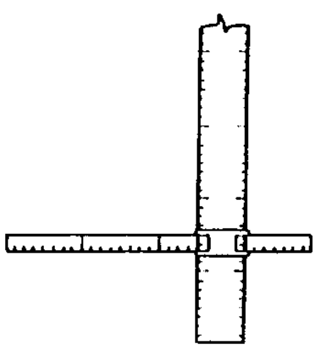
Model	Year	Carburetor Number	Main Fuel Jet	Preset Idle Screw Turns Open
115	1994/1995 S/N 0G073757 thru 0G143416 2/1/94 – 6/19/97	40 -1 -2 -3 -4	0.066 in. 0.068 in. 0.068 in. 0.070 in.	1-1/2 1-1/2 NA NA
115	1995 S/N 0G143417 and above 6/20/94	40 -1A -2A -3A -4A	0.066 in. 0.070 in. 0.070 in. 0.074 in.	1-1/2 1-1/2 NA NA
75 ELH	1994	41 -1 -2 -3	0.052 in. 0.052 in. 0.052 in.	1/2 1-1/2 1-1/2
75 ELPTO	1995	46 -1 -2 -3	0.052 in. 0.052 in. 0.052 in.	1/2 1-1/2 1-1/2
75 MLH	1995	47 -1 -2 -3	0.054 in. 0.054 in. 0.054 in.	1/2 1-1/8 1-1/8
75 ELH	1995	48 -1 -2 -3	0.054 in. 0.054 in. 0.054 in.	1/2 1-1/4 1-1/4
65 Jet/90	1995	49 -1 -2 -3	0.062 in. 0.064 in. 0.062 in.	1/2 1-1/4 1-1/4
100	1996/1997	50 -1 -2 -3 -3A* -4	0.048 in. 0.050 in. 0.048 in. 0.050 in. 0.052 in.	1-1/2 1-1/2 NA NA NA
80 Jet/115	1996/1997	51 -1 -2 -3 -3A* -4	0.062 in. 0.062 in. 0.060 in. 0.062 in. 0.064 in.	1-1/2 1-1/2 NA NA NA
125	1996/1997	52 -1 -2 -3 -3A* -4	0.070 in. 0.080 in. 0.078 in. 0.080 in. 0.082 in.	1-1/2 1-1/2 NA NA NA
75 ELPTO	1996/1997	59 -1 -2 -3 -3A*	0.052 in. 0.054 in. 0.052 in. 0.054 in.	1-1/8 1-1/8 1-1/8 1-1/8
75 MLH	1996/1997	60 -1 -2 -3	0.054 in. 0.054 in. 0.054 in.	1-1/4 1-1/4 1-1/4

Model	Year	Carburetor Number	Main Fuel Jet	Preset Idle Screw Turns Open
75 ELH	1996/1997	61 -1 -2 -3	0.054 in. 0.054 in. 0.054 in.	1-1/8 1-1/8 1-1/8
65 Jet/90	1996/1997	62 -1 -2 -3 -3A*	0.062 in. 0.064 in. 0.062 in. 0.064 in.	1-1/4 1-1/4 1-1/4 1-1/4
75 ELPTO	1998	75 -1 -2 -3	0.052 in. 0.054 in. 0.054 in.	1-1/8 1-1/8 1-1/8
75 MLH	1998	76 -1 -2 -3	0.054 in. 0.054 in. 0.054 in.	1-1/8 1-1/8 1-1/8
75 ELH	1998	77 -1 -2 -3	0.054 in. 0.054 in. 0.054 in.	1-1/8 1-1/8 1-1/8
65 Jet/90	1998	78 -1 -2 -3	0.062 in. 0.064 in. 0.064 in.	1-1/4 1-1/4 1-1/4
100	1998	79 -1 -2 -3 -4	0.048 in. 0.050 in. 0.050 in. 0.052 in.	1-1/2 1-1/2 1-1/2 1-1/2
80 Jet/115	1998	80 -1 -2 -3 -4	0.060 in. 0.064 in. 0.062 in. 0.064 in.	1-1/2 1-1/2 1-1/2 1-1/2
125	1998	81 -1 -2 -3 -4	0.070 in. 0.080 in. 0.080 in. 0.082 in.	1-1/2 1-1/2 1-1/2 1-1/2

*Late 1996 running change:
75/90 S/N 0G428199 (4/15/96)
100-125 S/N 0G428125 (4/12/96)

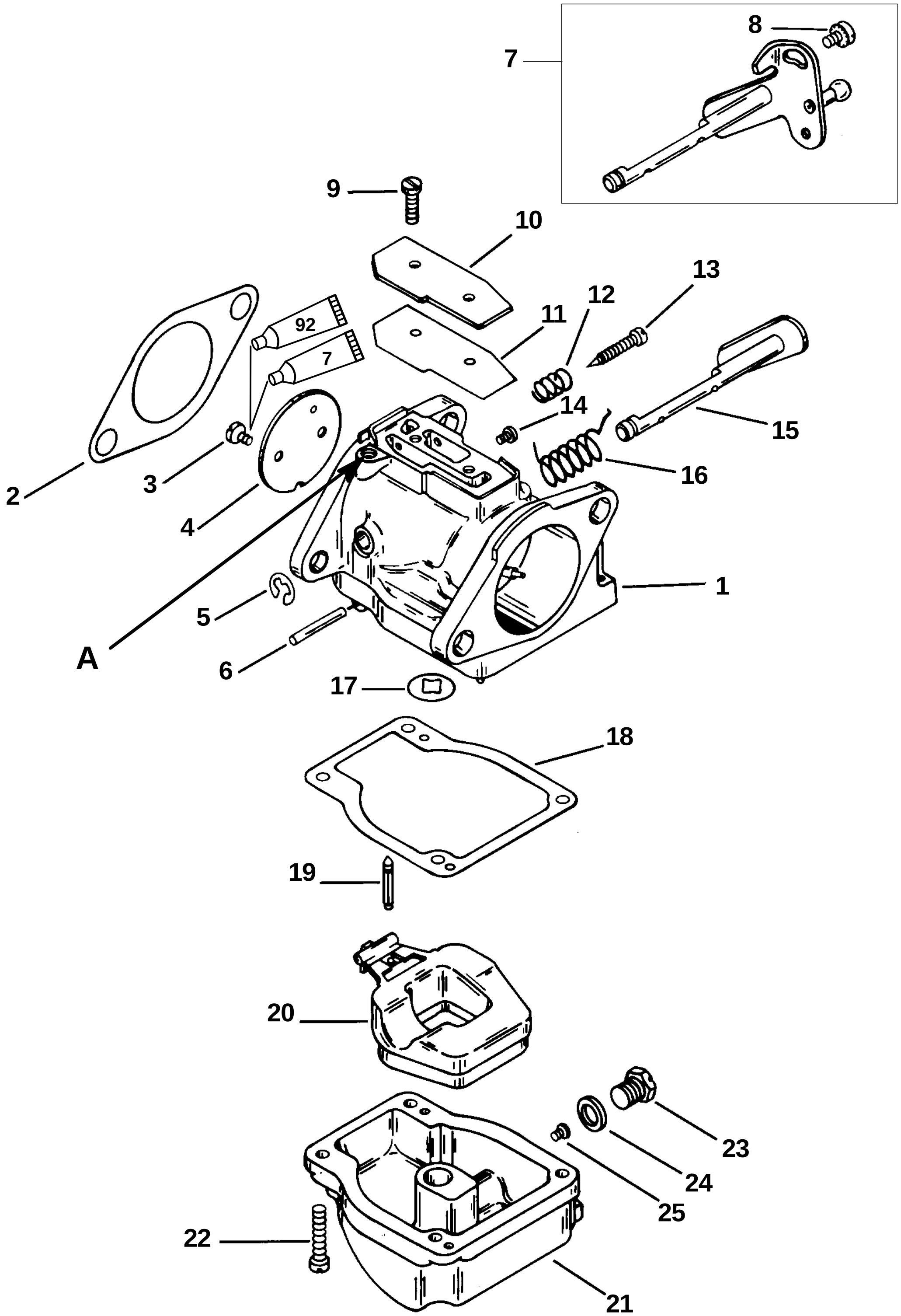
Special Tools

P/N 91-36392 Carburetor Scale



73656

Carburetor (WME–29/30/31/41/46/47/48/49)



7 Loctite 271 (92-809820)

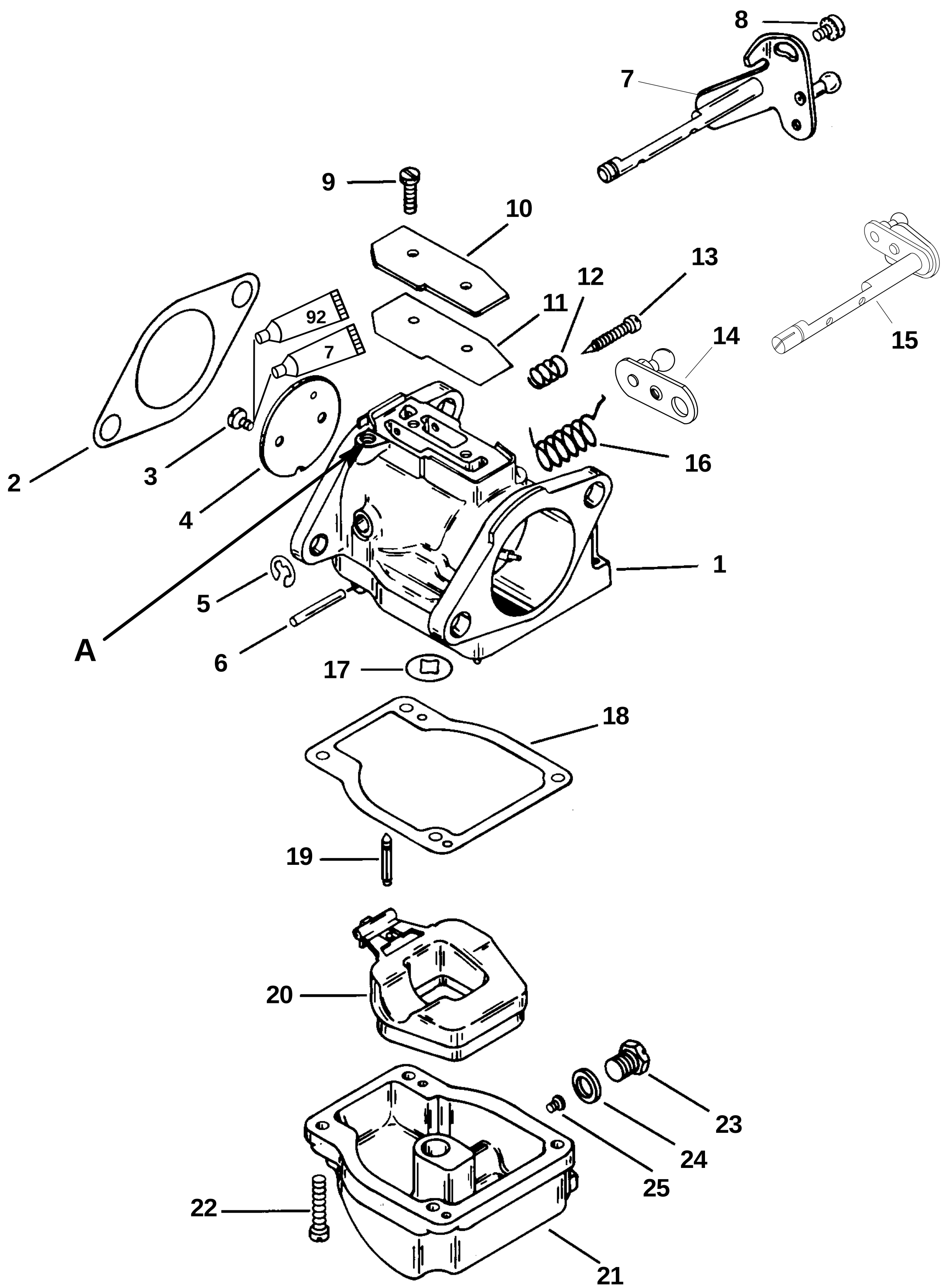
92 Loctite 7649 Primer (92-809824)

A – DO NOT touch this adjustment. This is preset by the manufacturer and is NOT for field service. Conventional carb cleaners will not affect the sealant securing this adjustment

Carburetor (WME–29/30/31/41/46/47/48/49)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	CARBURETOR (TOP)			
	1	CARBURETOR (CENTER) **75 MANUAL-WME-47**			
	1	CARBURETOR (BOTTOM)			
	1	CARBURETOR (TOP)			
	1	CARBURETOR (CENTER) **75 ELECTRIC-WME-46**			
	1	CARBURETOR (BOTTOM)			
	1	CARBURETOR (TOP)			
	1	CARBURETOR (CENTER) **75 ELECTRIC-WME-48**			
	1	CARBURETOR (BOTTOM) **NON –OIL**			
	1	CARBURETOR (TOP)			
	1	CARBURETOR (CENTER) **90-WME-49**			
	1	CARBURETOR (BOTTOM)			
2	3	GASKET–flange			
3	6	SCREW–throttle valve	6		0.7
4	3	THROTTLE VALVE **(WME-29/30/31/41)**			
	3	THROTTLE VALVE **(WME-46/47/48/49)**			
5	3	RETAINING RING			
6	3	FLOAT SHAFT			
7	1	THROTTLE SHAFT (CENTER)			
8	2	SCREW-lever adjustment			
9	6	SCREW	18		2.0
10	3	COVER PLATE			
11	3	GASKET–cover plate			
12	3	SPRING–idle needle			
13	2	IDLE NEEDLE			
14	3	JET (.094)**(WME-29)**	6		0.7
15	2	THROTTLE SHAFT (UPPER/LOWER)			
16	3	SPRING–throttle return			
17	3	GASKET–nozzle well			
18	3	GASKET–fuel bowl			
19	3	INLET NEEDLE VALVE			
20	3	FLOAT			
21	1	FUEL BOWL (UPPER)**(WME-30/46/47/49)**			
	1	FUEL BOWL (UPPER)**(WME-29/31/41/48)**			
	2	FUEL BOWL (CENTER/LOWER)			
22	12	SCREW–fuel bowl	18		2.0
23	3	PLUG	22		2.5
24	3	SEAL–drain plug			
25	AR	MAIN FUEL JET (.050)**(75)**	14		1.6
	AR	MAIN FUEL JET (.052)**(75)**	14		1.6
	AR	MAIN FUEL JET (.054)**(75)**	14		1.6
	2	MAIN FUEL JET (.062)**(90)**	14		1.6
	1	MAIN FUEL JET (.064)**(90)**	14		1.6
	2	MAIN FUEL JET (.044)**(Belgium)**	14		1.6
	1	MAIN FUEL JET (.046)**(Belgium)**	14		1.6

Carburetor (WME–59/60/61/62/75/76/77/78/82/83)



7 Loctite 271 (92-809820)

92 Loctite 7649 Primer (92-809824)

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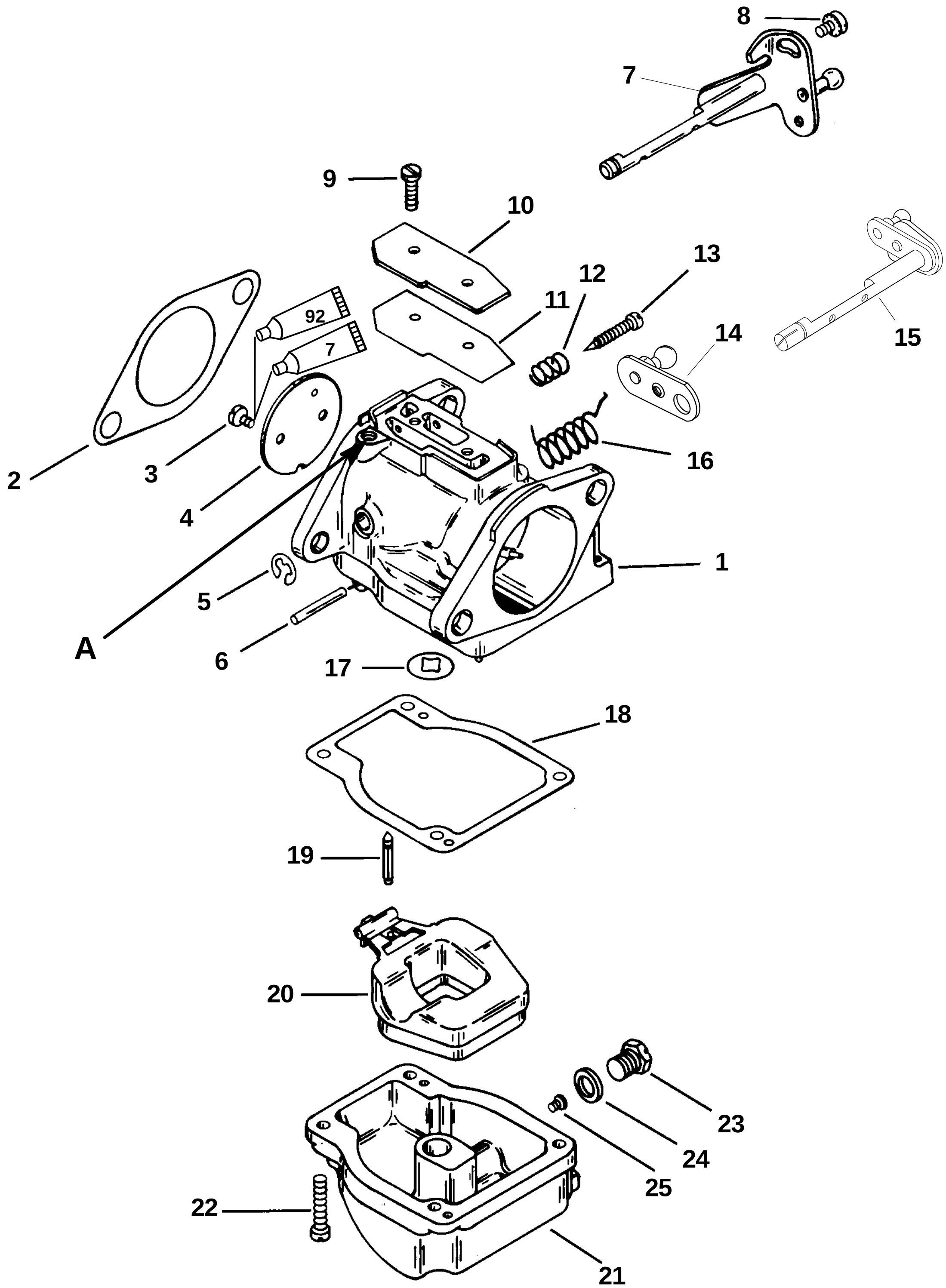
Carburetor (WME–59/60/61/62/75/76/77/78/82/83)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	CARBURETOR (TOP)			
	1	CARBURETOR (CENTER) **75 MANUAL-WME-76**			
	1	CARBURETOR (BOTTOM)			
	1	CARBURETOR (TOP)			
	1	CARBURETOR (CENTER) **75 ELECTRIC-WME-75**			
	1	CARBURETOR (BOTTOM)			
	1	CARBURETOR (TOP)			
	1	CARBURETOR (CENTER) **75 ELECTRIC-WME-77**			
	1	CARBURETOR (BOTTOM) **NON –OIL**			
	1	CARBURETOR (TOP)			
	1	CARBURETOR (CENTER) **90-WME-78**			
	1	CARBURETOR (BOTTOM)			
	1	CARBURETOR (TOP)			
	1	CARBURETOR (CENTER) **75 MANUAL-WME-82**			
	1	CARBURETOR (BOTTOM)			
	1	CARBURETOR (TOP)			
	1	CARBURETOR (CENTER) **75 ELECTRIC-WME-83**			
	1	CARBURETOR (BOTTOM) **NON –OIL**			
	1	CARBURETOR (TOP)			
	1	CARBURETOR (CENTER) **90-WME-62**			
	1	CARBURETOR (BOTTOM)			
2	3	GASKET–flange			
3	6	SCREW–throttle valve	6		0.7
4	3	THROTTLE VALVE			
5	3	RETAINING RING			
6	3	FLOAT SHAFT			
7	1	THROTTLE SHAFT (CENTER)			
8	2	SCREW-lever adjustment			
9	6	SCREW	18		2.0
10	3	COVER PLATE			

Carburetor (WME–59/60/61/62/75/76/77/78/82/83)



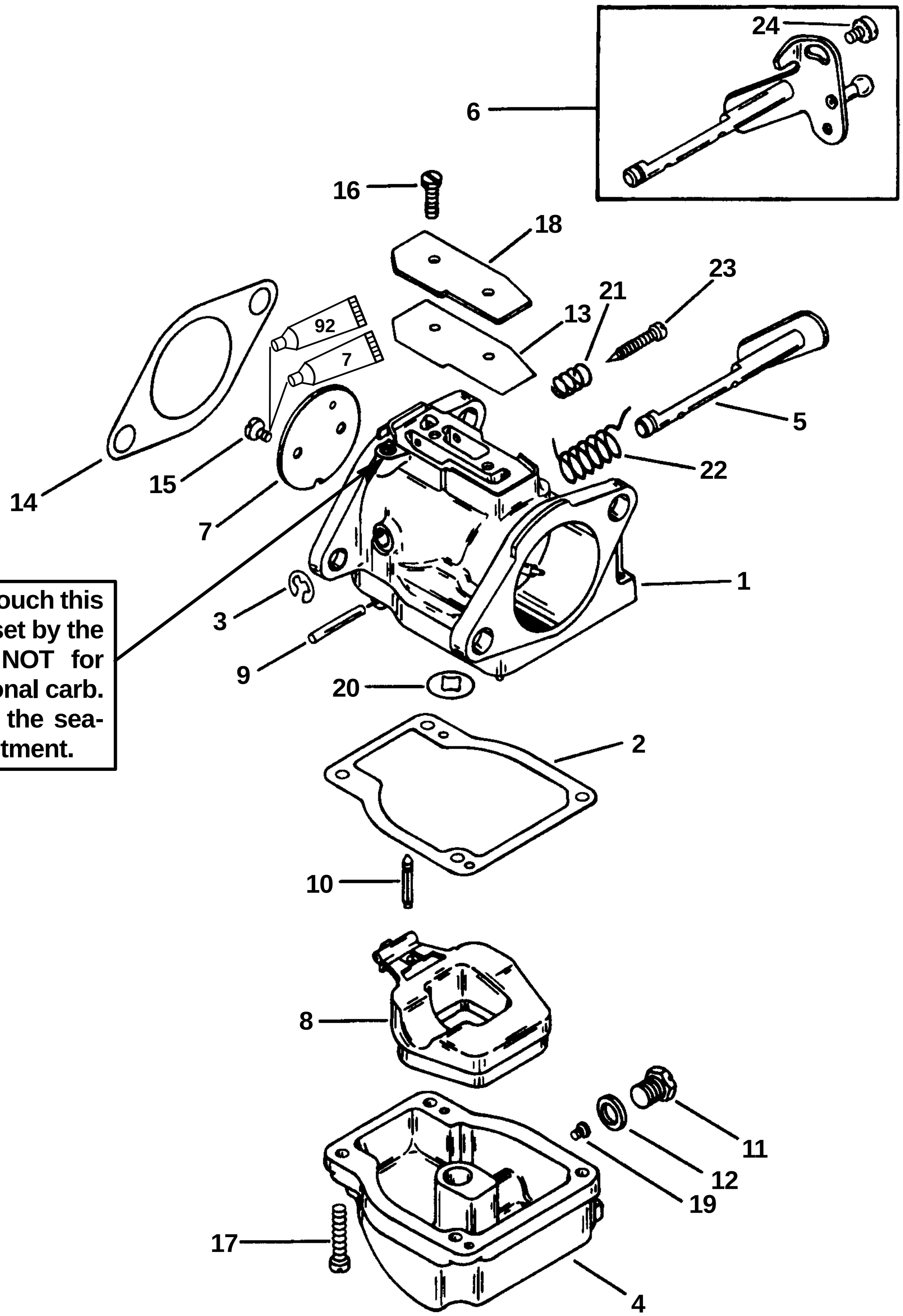
7 Loctite 271 (92-809820)

92 Loctite 7649 Primer (92-809824)

Carburetor (WME–59/60/61/62/75/76/77/78/82/83)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
11	3	GASKET–cover plate			
12	3	SPRING–idle needle			
13	2	IDLE NEEDLE			
14	2	THROTTLE LEVER (TOP/BOTTOM)			
15	2	THROTTLE SHAFT (TOP/BOTTOM)			
16	3	SPRING–throttle return			
17	3	GASKET–nozzle well			
18	3	GASKET–fuel bowl			
19	3	INLET NEEDLE VALVE			
20	3	FLOAT			
21	1	FUEL BOWL (UPPER)**(WME-60)**			
	2	FUEL BOWL (CENTER/LOWER)**(WME–60)**			
	3	FUEL BOWL **(WME–59/61/62/75/76/77/78)**			
22	12	SCREW–fuel bowl	18		2.0
23	3	PLUG KIT	22		2.5
24	3	SEAL–drain plug			
25	2	MAIN FUEL JET (.052)(TOP)**(WME–59)**			
	1	MAIN FUEL JET (.054)(CENTER/BOTTOM)**(WME–59)**			
	3	MAIN FUEL JET (.054)**(WME–60/61/76/77)**			
	2	MAIN FUEL JET (.062)(TOP)**(WME–62)**			
	1	MAIN FUEL JET (.064)(CENTER/BOTTOM)**(WME–62)**			
	2	MAIN FUEL JET (.044)**(Belgium)**	14		1.6
	1	MAIN FUEL JET (.052)(TOP)**(WME–75)**			
	2	MAIN FUEL JET (.054)(CENTER/BOTTOM)**(WME–75)**			
	1	MAIN FUEL JET (.062)(TOP)**(WME–78)**			
	2	MAIN FUEL JET (.064)(CENTER/BOTTOM)**(WME–78)**			

Carburetor–WME-32/32A/33/34/40/40A



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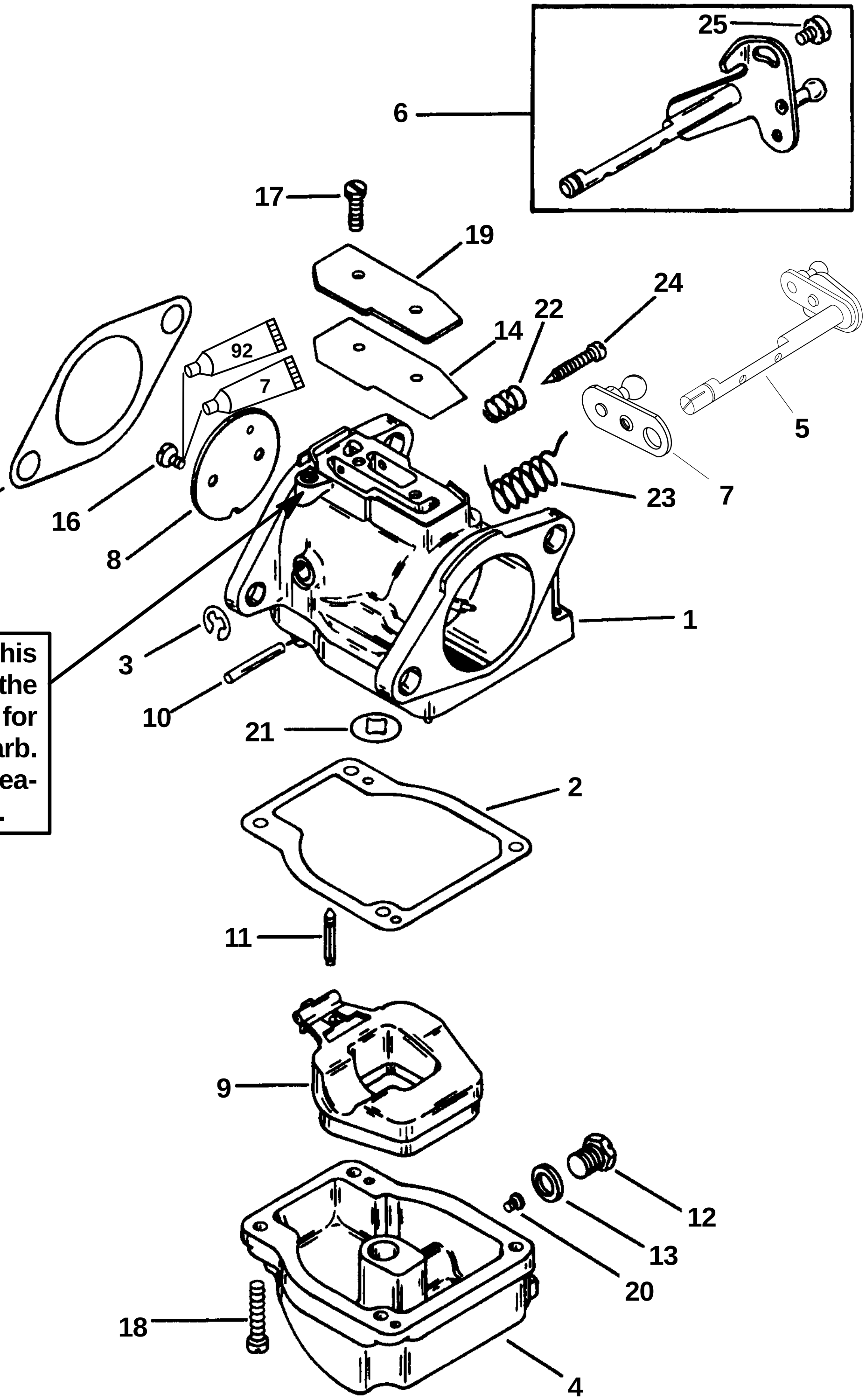
7 Loctite 271 (92-809820)

92 Loctite 7649 Primer (92-809824)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	CARBURETOR			
	1	CARBURETOR **100 - WME-32/32A**			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR **115 - WME-33**			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR **115 - WME-40/40A**			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR **125 - WME-34**			
	1	CARBURETOR			
	1	CARBURETOR			
2	4	GASKET–fuel bowl			
3	4	RETAINING RING			
4	AR	FUEL BOWL			
	1	FUEL BOWL **(WME-40-TOP)**			
5	3	THROTTLE SHAFT **(WME-1/3/4)**			
6	1	THROTTLE SHAFT **(WME-2)**			
7	4	THROTTLE VALVE			
8	4	FLOAT			
9	4	FLOAT SHAFT			
10	4	INLET NEEDLE VALVE			
11	4	PLUG			
12	4	SEAL–drain plug			
13	4	GASKET–cover plate			
14	4	GASKET–flange			
15	8	SCREW–throttle valve	6		0.7
16	8	SCREW–cover plate	18		2.1
17	16	SCREW–fuel bowl	18		2.1
18	4	COVER PLATE			
19	1	MAIN FUEL JET (.046) **(WME-32-1/32A-1)**	14		1.6
	1	MAIN FUEL JET (.048) **(WME-32-2)**	14		1.6
	1	MAIN FUEL JET (.050) **(WME-33-1/32A-2)**	14		1.6
	2	MAIN FUEL JET (0.52) **(WME-32-3/4)**	14		1.6
	1	MAIN FUEL JET (.054) **(WME-32A-3)**	14		1.6
	2	MAIN FUEL JET (.056) **(WME-33-2/3/32A-4)**	14		1.6
	1	MAIN FUEL JET (.062) **(WME-33-4)**	14		1.6
	1	MAIN FUEL JET (.066) **(WME-34-1/40-1/40A-1)**	14		1.6
	AR	MAIN FUEL JET (.068) **(WME-34-2/40-2/3)**	14		1.6
	1	MAIN FUEL JET (.070) **(WME-34-3/40-4/40A-2/3)**	14	**(WM**	1.6
	1	MAIN FUEL JET (.072) **(WME-34-4/40A-4)**	14	**E-34**	1.6
20	4	GASKET–nozzle well		**-2/40**	
21	4	SPRING–idle needle		**-2/3)**	
22	4	SPRING–throttle return		14	
23	4	IDLE NEEDLE			
24	2	SCREW			

Carburetor–WME-50/51/52/79/80/81



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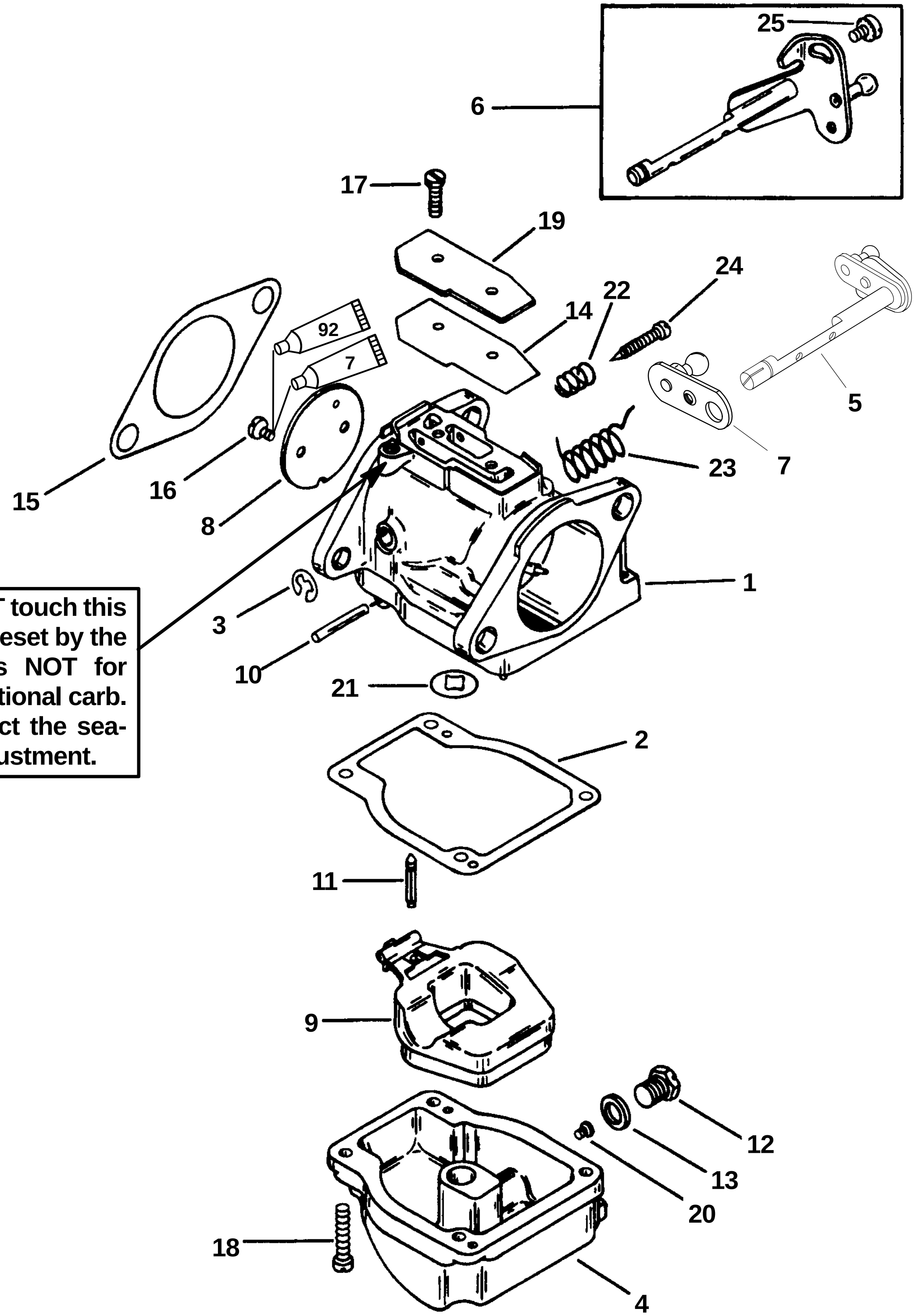
7 Loctite 271 (92-809820)

92 Loctite 7649 Primer (92-809824)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	CARBURETOR			
	1	CARBURETOR **100 - WME-50**			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR **115 - WME-51**			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR **125 - WME-52**			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR **100 - WME-79**			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR **115 - WME-80**			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR			
	1	CARBURETOR **125 - WME-81**			
	1	CARBURETOR			
	1	CARBURETOR			
2	4	GASKET–fuel bowl			
3	4	RETAINING RING			
4	4	FUEL BOWL			
5	3	THROTTLE SHAFT (WME-1/3/4)			
6	1	THROTTLE SHAFT (WME-2)			
7	3	THROTTLE LEVER (WME-1/3/4/)			
8	4	THROTTLE VALVE **(WME-50/51/52/81)**			
	4	THROTTLE VALVE **(WME-79/80)**			
9	4	FLOAT			
10	4	FLOAT SHAFT			
11	4	INLET NEEDLE VALVE			
12	4	PLUG			
13	4	SEAL–drain plug			
14	4	GASKET–cover plate			
15	4	GASKET–flange			

Carburetor–WME-50/51/52/79/80/81



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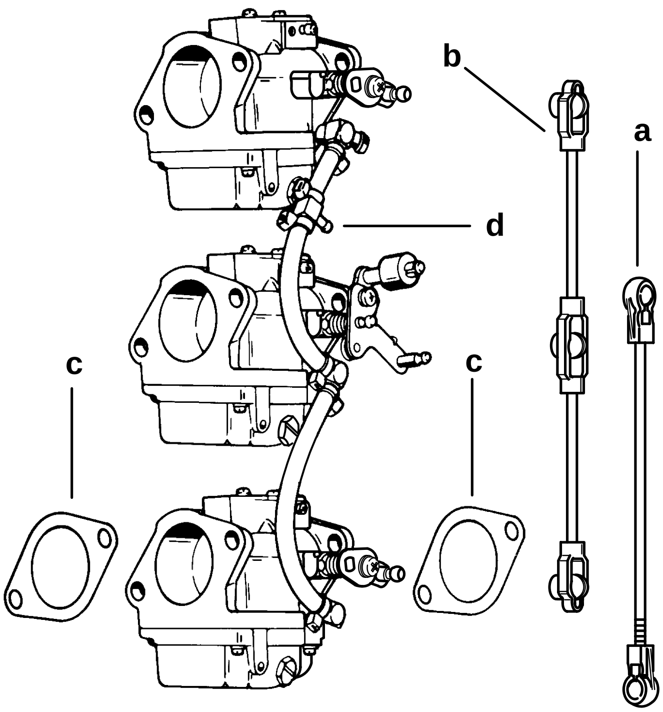
7 Loctite 271 (92-809820)

92 Loctite 7649 Primer (92-809824)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
16	8	SCREW–throttle valve	6		0.7
17	8	SCREW–cover plate	18		2.0
18	16	SCREW–fuel bowl	18		2.0
19	4	COVER PLATE			
20	1	MAIN FUEL JET (.048) **(WME-50-1)**	14		1.6
	2	MAIN FUEL JET (.050) **(WME-50-2/3)**	14		1.6
	1	MAIN FUEL JET (.052) **(WME-50-4)**	14		1.6
	3	MAIN FUEL JET (.062) **(WME-51–1/2/3)**	14		1.6
	1	MAIN FUEL JET (.070) **(WME-52-1)**	14		1.6
	2	MAIN FUEL JET (.080) **(WME-52-2/3)**	14		1.6
	1	MAIN FUEL JET (.082) **(WME-52-4)**	14		1.6
	1	MAIN FUEL JET (.048) **(WME-79-1)**	14		1.6
	2	MAIN FUEL JET (.050) **(WME-79-2/3)**	14		1.6
	1	MAIN FUEL JET (.052) **(WME-79-4)**	14		1.6
	1	MAIN FUEL JET (.060) **(WME-80-1)**	14		1.6
	1	MAIN FUEL JET (.064) **(WME-51-4/80-2/4)**	14		1.6
	3	MAIN FUEL JET (.062) **(WME-80–3)**	14		1.6
	1	MAIN FUEL JET (.070) **(WME-81-1)**	14		1.6
	2	MAIN FUEL JET (.080) **(WME-81-2/3)**	14		1.6
	1	MAIN FUEL JET (.082) **(WME-81-4/52-4)**	14		1.6
21	4	GASKET–nozzle well			
22	2	SPRING–idle needle			
23	4	SPRING–throttle return			
24	2	IDLE NEEDLE			
25	3	SCREW			

Fuel System (Linkage)

3 Cylinder Carburetor/Linkage Arrangement

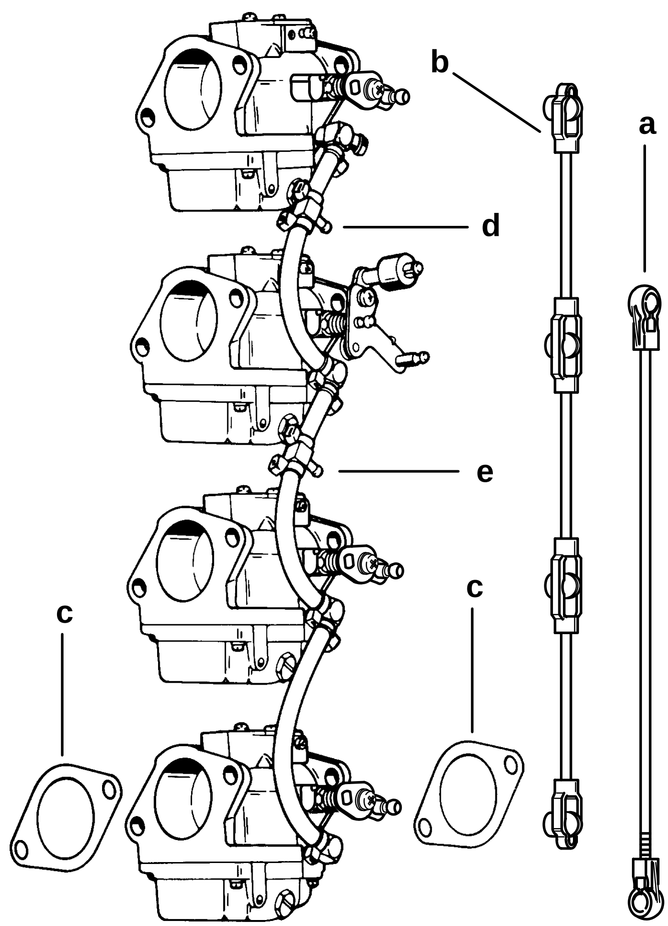


3 Cylinder Models

54138

a - Oil Injection Pump Link
b - Throttle Link
c - Gasket
d - Fuel Enrichment Fitting

4 Cylinder Carburetor/Linkage Arrangement



4 Cylinder Models

54137

a - Oil Injection Pump Link
b - Throttle Link
c - Gasket
d - Fuel Enrichment Fitting
e - Accelerator Pump Fitting

Adjustments

Idle Mixture Screw Adjustment

INITIAL STARTING ADJUSTMENT

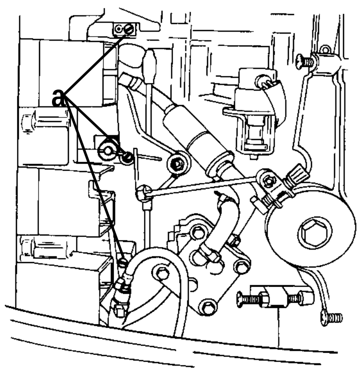
Turn idle mixture screw in (clockwise) until it seats LIGHTLY--then back-off (each carburetor) the correct number of turns (See Specifications).

LOW SPEED MIXTURE ADJUSTMENT

NOTE: *Only the top two carburetors on four cylinder models have adjustable idle mixture screws.*

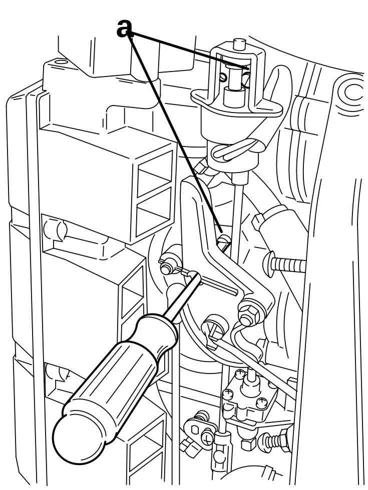
RUNNING QUALITY ADJUSTMENT

1. Position outboard at level trim. With gear case submerged, start outboard and allow to warm up. Throttle outboard back to idle for about one minute.
2. Shift outboard into forward gear. Turn low speed mixture "in" (clockwise) until outboard starts to bog down and misfire. Turn mixture screw out 1/4 turn or more.



53422

3 Cylinder Models



4 Cylinder Models

54171

a - Low Speed Mixture Screw

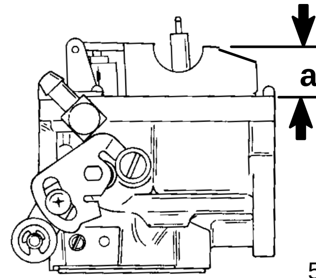
3. Check for too lean mixture on acceleration.
4. DO NOT adjust leaner than necessary to attain reasonably smooth idling. When in doubt, stay on the slightly rich side of the adjustment.

Idle Speed Adjustment

1. Adjust engine idle RPM as outlined in Section 2C "Timing/Synchronizing/Adjusting."

Float Adjustment

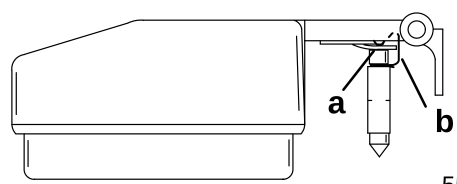
1. Remove carburetor as outlined in "Carburetor Removal" in this section.
2. Remove fuel bowl and gasket and check float level using a carburetor scale (gasket removed).



52372

a - 9/16 in. (14.29 mm)

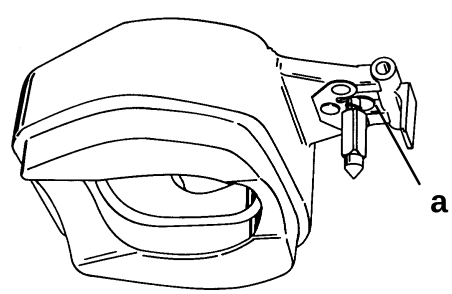
3. Attach Spring Clip on Inlet Needle to metal float tab and place needle into its seat.



55883

a - Metal Float Tab
b - Spring Clip

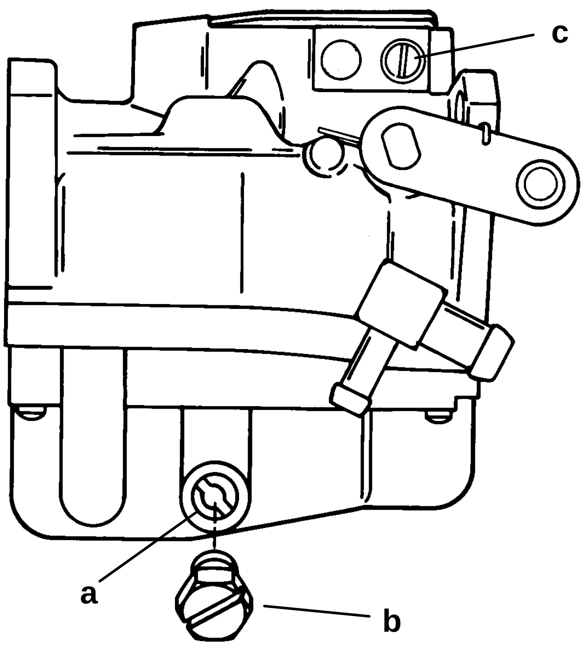
4. If necessary, adjust float level by bending metal tab (on float) to which inlet needle is clipped.



a - Bend Tab Here for Float Level Adjustment

Main (High Speed) Jet Adjustment

The carburetor has a fixed high speed jet. Extreme changes in weather (temperature and humidity) and/or elevation may result in a too lean or rich fuel mixture at wide-open-throttle, which may require a change in the high speed jet. A smaller size main jet will lean the fuel mixture, and a larger size jet will enrich the fuel mixture.



a - High Speed Jet
b - Bowl Drain Plug
c - Idle Mixture Screw

Jet Orifice Size Chart

NOTE: *10-32 Thread Size*

Jet Orifice Size-inches	Part Number
0.034	19266034
0.036	19266036
0.038	19266038
0.040	19266040
0.042	1399-5315
0.044	1395-7394
0.046	1399-5317
0.048	1395-6246
0.050	1395-6028
0.052	1395-6359
0.054	1399-5225
0.056	1399-5213
0.058	1395-7831
0.060	1395-6487
0.062	1399-4217
0.064	1399-4216
0.066	1399-4215
0.068	1395-6029
0.070	1395-6030
0.072	1395-6207
0.074	1399-3794
0.076	1399-3796
0.078	1395-6680
0.080	1395-6201
0.082	1399-3518
0.084	1399-3517
0.086	1395-5815
0.088	1395-6202
0.090	1395-6247
0.092	1395-5733
0.094	1395-8423
0.096	1399-6249
0.098	1395-7335

High Altitude Jet Chart

Factory installed main fuel jets are normally adequate for proper performance up to approximately 5000 feet (1524m) above sea level. Between 2000 feet (609.6m) and 5000 feet (1524m) the reduction of the main fuel jet(s) may result in improved performance and fuel economy. Above 5000 feet, however, it is recommended that main jet size be reduced as shown per 1000 feet (304.8m) in the following chart. **RETURN TO LOWER ELEVATION.** Carburetor jet changes must be reversed to avoid a lean fuel condition when used at low elevation.

Feet **Meter**	1000 304.8	2000 609.6	3000 914.4	4000 1219.2	5000 1524	6000 1828.8	7000 2133.6	8000 2438.4	9000 2743.2	10000 3048	11000 3352.8	12000 3657.6
Jet Size												
0.034	0.034	0.034	0.032	0.032	0.032	0.032	0.032	0.032	0.030	0.030	0.030	0.030
0.036	0.036	0.036	0.034	0.034	0.034	0.034	0.034	0.032	0.032	0.032	0.032	0.032
0.038	0.038	0.038	0.036	0.036	0.036	0.036	0.036	0.034	0.034	0.034	0.034	0.034
0.040	0.040	0.040	0.038	0.038	0.038	0.038	0.038	0.036	0.036	0.036	0.036	0.034
0.042	0.042	0.042	0.040	0.040	0.040	0.040	0.038	0.038	0.038	0.038	0.038	0.036
0.044	0.044	0.044	0.042	0.042	0.042	0.042	0.040	0.040	0.040	0.040	0.038	0.038
0.046	0.046	0.046	0.044	0.044	0.044	0.044	0.042	0.042	0.042	0.042	0.040	0.040
0.048	0.048	0.048	0.046	0.046	0.046	0.046	0.044	0.044	0.044	0.042	0.042	0.042
0.050	0.050	0.050	0.048	0.048	0.048	0.046	0.046	0.046	0.046	0.044	0.044	0.044
0.052	0.052	0.050	0.050	0.050	0.050	0.048	0.048	0.048	0.048	0.046	0.046	0.046
0.054	0.054	0.052	0.052	0.052	0.052	0.050	0.050	0.050	0.048	0.048	0.048	0.048
0.056	0.056	0.054	0.054	0.054	0.054	0.052	0.052	0.052	0.050	0.050	0.050	0.048
0.058	0.058	0.056	0.056	0.056	0.056	0.054	0.054	0.054	0.052	0.052	0.052	0.050
0.060	0.060	0.058	0.058	0.058	0.056	0.056	0.056	0.054	0.054	0.054	0.052	0.052
0.062	0.062	0.060	0.060	0.060	0.058	0.058	0.058	0.056	0.056	0.056	0.054	0.054
0.064	0.064	0.062	0.062	0.062	0.060	0.060	0.060	0.058	0.058	0.058	0.056	0.056
0.066	0.066	0.064	0.064	0.064	0.062	0.062	0.062	0.060	0.060	0.060	0.058	0.058
0.068	0.068	0.066	0.066	0.066	0.064	0.064	0.064	0.062	0.062	0.060	0.060	0.060
0.070	0.070	0.068	0.068	0.068	0.066	0.066	0.064	0.064	0.064	0.062	0.062	0.062
0.072	0.072	0.070	0.070	0.070	0.068	0.068	0.066	0.066	0.066	0.064	0.064	0.062
0.074	0.074	0.072	0.072	0.070	0.070	0.070	0.068	0.068	0.068	0.066	0.066	0.064
0.076	0.076	0.074	0.074	0.072	0.072	0.072	0.070	0.070	0.068	0.068	0.068	0.066
0.078	0.078	0.076	0.076	0.074	0.074	0.074	0.072	0.072	0.070	0.070	0.068	0.068
0.080	0.080	0.078	0.078	0.076	0.076	0.076	0.074	0.074	0.072	0.072	0.070	0.070
0.082	0.082	0.080	0.080	0.078	0.078	0.076	0.076	0.076	0.074	0.074	0.072	0.072
0.084	0.084	0.082	0.082	0.080	0.080	0.078	0.078	0.076	0.076	0.076	0.074	0.074
0.086	0.086	0.084	0.084	0.082	0.082	0.080	0.080	0.078	0.078	0.076	0.076	0.074
0.088	0.088	0.086	0.086	0.084	0.084	0.082	0.082	0.080	0.080	0.078	0.078	0.076
0.090	0.090	0.088	0.088	0.086	0.086	0.084	0.084	0.082	0.082	0.080	0.080	0.078
0.092	0.092	0.090	0.090	0.088	0.088	0.086	0.086	0.084	0.084	0.082	0.082	0.080
0.094	0.094	0.092	0.092	0.090	0.090	0.088	0.088	0.086	0.086	0.084	0.084	0.082
0.096	0.096	0.094	0.094	0.092	0.092	0.090	0.090	0.088	0.086	0.086	0.084	0.084
0.098	0.098	0.096	0.096	0.094	0.092	0.092	0.090	0.090	0.088	0.088	0.086	0.086

Fuel System Troubleshooting

General Information

Problems that are thought to be caused by the fuel system may, in reality, be something completely different. Items, that are shown below, could give the impression that there is a problem in the fuel system.

1. Propeller
2. Spark Plugs
3. Ignition Timing
4. Ignition Spark Voltage
5. Cylinder Compression
6. Reed Valves

Typical symptoms and solutions in troubleshooting a fuel system are shown below.

Problem: Engine Floods

Possible Cause	Corrective Action
Dirt or debris are preventing inlet needle from seating	Flush out inlet seat and clean inlet needle
Worn inlet needle	Replace
Punctured float	Replace
Incorrect float setting	Reset float

Problem: Engine Runs Too Rich

Possible Cause	Corrective Action
Fuel level too high	Reset float to correct level
Carburetor floods	See preceding “Engine Floods”
Idle nozzle air holes plugged	Blow out with compressed air
Restricted air flow	Inspect cowl air inlet and carburetor for obstructions
Main fuel jet loose	Re-tighten jet

Problem: Fuel Blow Back Out Of Carburetor

Possible Cause	Corrective Action
Chipped or broken reeds on reed block	Replace reeds

Problem: Rough Idle

Possible Cause	Corrective Action
Excessive pre-load on reeds	Replace reeds

Problem: Engine Turns Over But Will Not Start Or Starts Hard When Cold

Possible Cause	Corrective Action
Improper starting procedure used.	Review starting procedure as outlined in “Operation and Maintenance Manual”.
Fuel tank empty or too low. Improperly mixed fuel. Contaminants (water, dirt, etc.) in fuel.	Check fuel in tank and replace or add whichever is necessary.
Fuel tank air vent closed or restricted.	Check air vent on fuel tank. Air vent must be open all the way and free from any contaminants.
Pinched, cut, restricted fuel line or loose fuel line connection.	Inspect all fuel lines and replace as needed. Tighten fuel line connections.
Dirty or restricted fuel filter.	Inspect and replace or clean all fuel filters.
Choke solenoid or enrichment valve not operating.	Inspect solenoid or valve and wiring. Replace as re-quired.
Needle and seat in carburetor that is either stuck open (flooding) or closed (no fuel).	Refer to carburetor disassembly in this section.
Improper carburetor jet, restricted jet or idle mixture screw out of adjustment.	Refer to carburetor adjustments in this section.
Improper float level.	Refer to carburetor adjustments in this section.
Low fuel pump pressure.	Refer to Section 3A “Fuel Pump”.
Defective anti-siphon valve.	Refer to Section 3A “Fuel Pump”.
Needle and seat in carburetor that is either stuck open or closed.	Refer to carburetor adjustments in this section.
Improper float level.	Refer to carburetor adjustments in this section.
Carburetor loose on intake manifold.	Check tightness of carburetor nuts.
Reed block loose or gasket defective.	Using a pressure oil can, apply 2-cycle oil around reed block housing/crankcase housing matching surfaces and carburetor base. If engine RPM changes, tighten bolts/nuts or replace gaskets as required.
Improperly routed or restricted bleed hose(s).	Refer to bleed hose routing in Section 4A “Power-head”.
Damaged fuel pump diaphragm.	Refer to Section 3A “Fuel Pump”.
Carburetor mixing chamber cover leaking air.	Tighten screws or replace gasket.
Off idle holes plugged.	Blow with compressed air.
Main nozzle or idle nozzle air bleed holes plugged.	Blow with compressed air.
Damaged reeds.	Refer to Section 4A “Powerhead” for reed inspec-tion.
Fuel pick-up outlet tube in fuel tank cracked.	Replace.

Problem: Unable to Reduce Engine RPM to Slow Idle

Possible Cause	Corrective Action
Chipped or broken reeds on reed block.	Replace reeds.

Problem: Engine Runs Too Lean

Possible Cause	Corrective Action
Carburetor is loose. Air leaks past mixing chamber cover.	Tighten bolts securely. Tighten cover or replace gasket.
Fuel level is too low.	Reset float level.
Clogged high speed jet.	Inspect jet for varnish or debris and clean.
Restricted fuel flow to carburetor.	Check fuel lines and filter(s) for restricted flow.
Incorrect high speed jet.	Refer to main jet chart and replace with proper jet.
Idle mixture set too lean.	Adjust to run richer (turn idle mix screw counterclockwise).
Air leakage into fuel system.	Inspect fuel line connections, hose clamps, fuel pump and fuel outlet tube (located in fuel tank) for loose fittings.
Anti-siphon valve restricting fuel flow.	Refer to Section 3A for checking for restriction of fuel flow caused by anti-siphon valve.

Problems:
-Engine Idles Rough And Stalls
-Engine Runs Uneven Or Surges
-Engine Will Not Accelerate

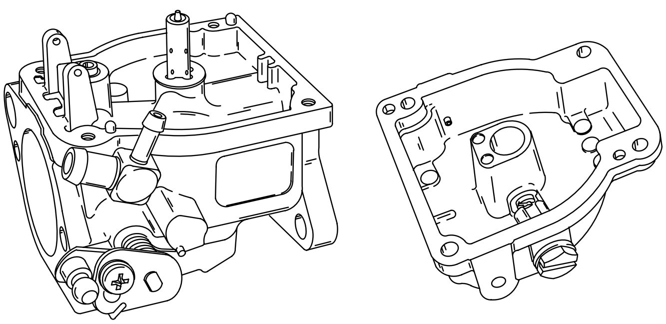
Possible Cause	Corrective Action
Fuel tank air vent closed or restricted.	Air vent must be open all the way and free from restrictions.
A pinched, cut or restricted fuel line; also loose fuel line connection.	Check all fuel lines and replace as needed. Check and tighten all fuel line connections.
A dirty or restricted fuel filter.	Check, replace, or clean all fuel filters.
Restricted filter in fuel tank.	Clean by rinsing in clean lead-free gasoline or kerosene.
Improperly mixed fuel; contaminants (water, dirt, etc,) in fuel.	Check fuel and replace, if necessary.
An inlet needle (in carburetor) that is either stuck open or closed. (A needle, that is stuck open, will cause a flooding condition. A needle, that is stuck closed, will prevent fuel from entering carburetor.)	Remove and replace with new inlet needle.
Incorrect idle mixture adjustment.	Re-adjust.
Carburetor is loose.	Tighten bolts securely.
Chamber cover leaking air.	Tighten or replace gasket.
Off idle holes plugged.	Blow out with compressed air.
Main nozzle or idle nozzle air bleed holes plugged.	Blow out with compressed air.
Improper main jet or restricted jet.	Clean or replace with proper jet (refer to “Main Jet Chart”).
Damaged reed(s).	Inspect reeds as outlined in Section 4A.
A crack in the fuel pick-up outlet tube (located in fuel tank).	Replace.

Inspection

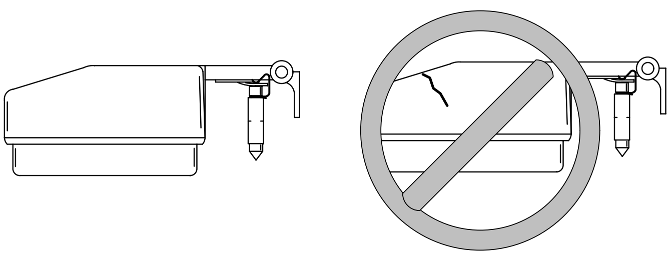
⚠ CAUTION

Do not use steel wire for cleaning the jets as this may enlarge the jet diameters and seriously affect performance. Use a petroleum based solvent for cleaning and blow out all passages with compressed air.

1. Inspect carburetor body. Replace if cracked or damaged.



2. Inspect float. Replace if cracked or damaged.



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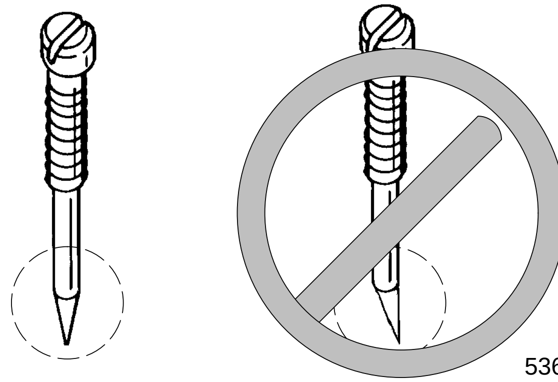
3. Inspect idle mixture screw. Replace if bent or damaged.



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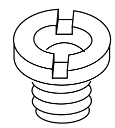
4. Inspect main jet. Clean if contaminated.



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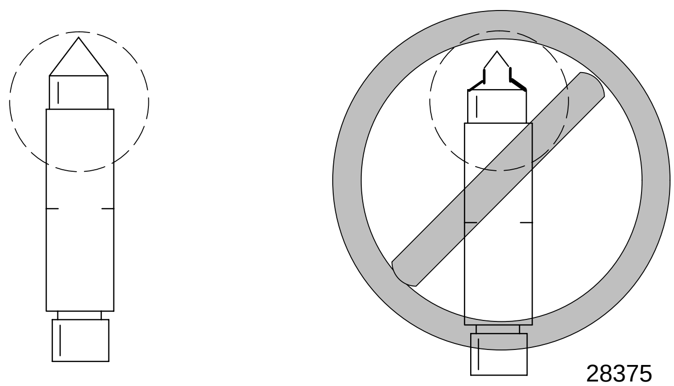
5. Inspect inlet needle valve. Replace if end is worn or grooved.



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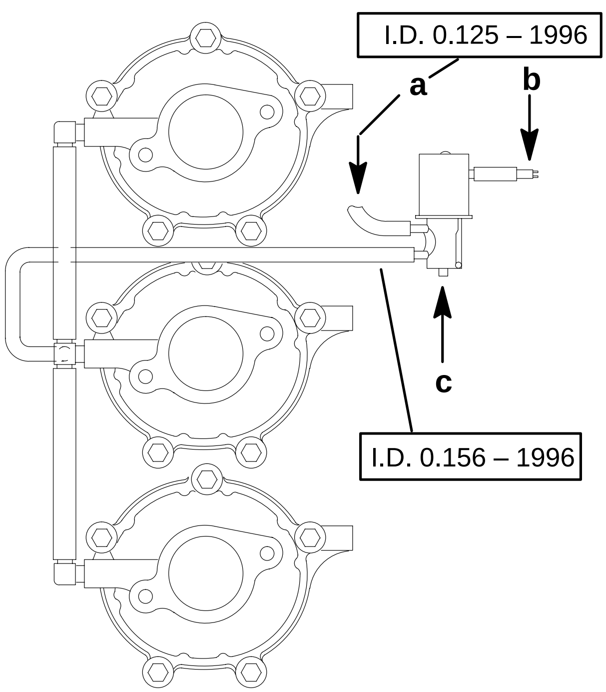
Enrichener System

Description for Three Cylinder Engines

1995 and Earlier – Fuel flows (gravity fed) from top carburetor float bowl to fuel enrichment valve.
1996/1997/1998 – Enrichener is pressurized by fuel from a T-fitting in the fuel hose between the top and middle carburetors.

Valve is electrically opened when key is turned to the "ON" position and pushed in (and held in). Fuel is supplied to engine through fittings located in the top, middle, and bottom carburetors. Valve returns to the closed position when key (or choke button) is released. Valve can be operated manually by PRESSING and HOLDING button located at bottom of valve.

Enrichener Valve Hose Installation - Three Cylinder Engines

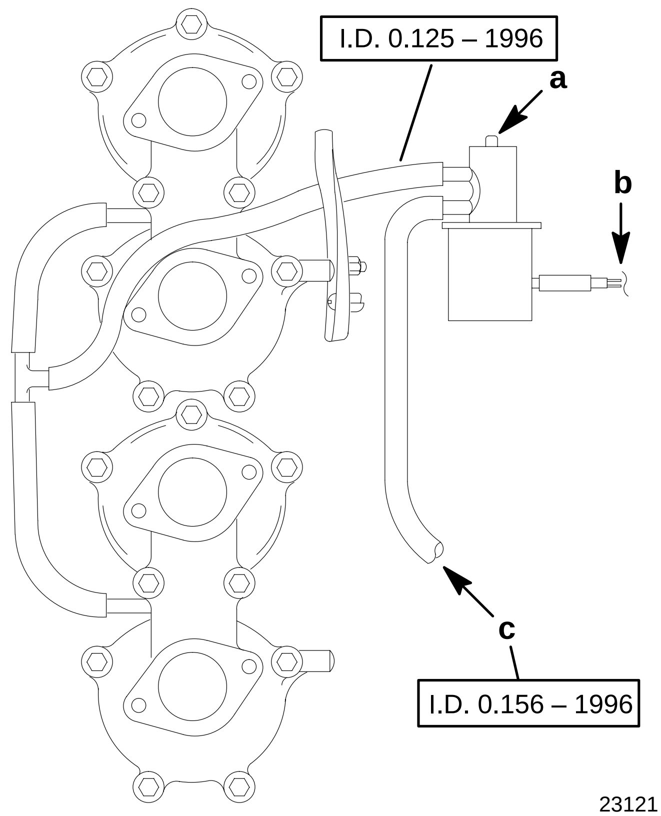


a - **94/95 Models –** Connect to Fitting on Side of Carburetor
96/97/98 Models – Connect to Fitting between Top and Middle Carburetors
b - Electrical Harness
c - Enrichener Valve Manual Operation Button

Description for Four Cylinder Engines

Enrichener valve receives fuel from a T-fitting between #1 and #2 carburetors. Valve is electrically opened when ignition key is turned to the "ON" position and pushed in (and held in). Fuel is dispensed to T-fittings on intake manifold of cylinders #2 and #4. Internal passages route fuel from cylinders #2 and #4 to cylinders #1 and #3. Valve returns to the closed position when key (or choke button) is released. Valve can be operated manually by PRESSING and HOLDING button located on top of valve.

Enrichener Valve Hose Installation - Four Cylinder Engines



a - Enrichener Valve Manual Operation Button
b - Electrical Harness
c - Connect to Fitting between #1 and #2 Carburetors

IMPORTANT: Use of enrichener if engine is warm could result in engine flooding.

ENRICHENER VALVE TEST

Push key (or choke button) in. Valve should click.

No Click

Check for battery voltage to YELLOW/BLACK wire at terminal block on engine when key (or choke button) is pushed in.

Click

Squeeze primer bulb until bulb is firm. Remove lower hose from fitting on enrichener valve. Place a container under valve, then push key (or choke button). Check for fuel flow from fitting.

Battery Voltage Indicated

Check for loose or corroded connection between YELLOW/BLACK wire and black wire (under same screw at terminal block).

Check that other BLACK wire at terminal block is properly grounded.

Repair connection(s) as necessary, then push key (or choke button) in. If enrichener valve DOES NOT click, replace valve.

No Voltage Indicated

Check for open in YELLOW/BLACK wire between key switch (or choke button) and terminal block.

Fuel Flow from Fitting

Valve is O.K. Check hoses and fittings from valve to carburetors for leaks or obstructions.

No Fuel Flow from Fitting

Remove upper hose from fitting on enrichener valve. If fuel flows from hose, replace valve. If not, check hose and carburetor fitting for leaks or obstructions.

Acceleration Pump Circuit Operation - Four Cylinder Engines

ACCELERATOR PUMP - Receives pressurized fuel from T-fitting in fuel line between #1 and #2 carburetors. Pump is actuated by throttle cam. Pumps to two check valve/injector nozzles in #3 and #4 cylinder boost passages.

FUEL FILTER - 74 micron filter. Prevents debris from plugging check valve/injector nozzles.

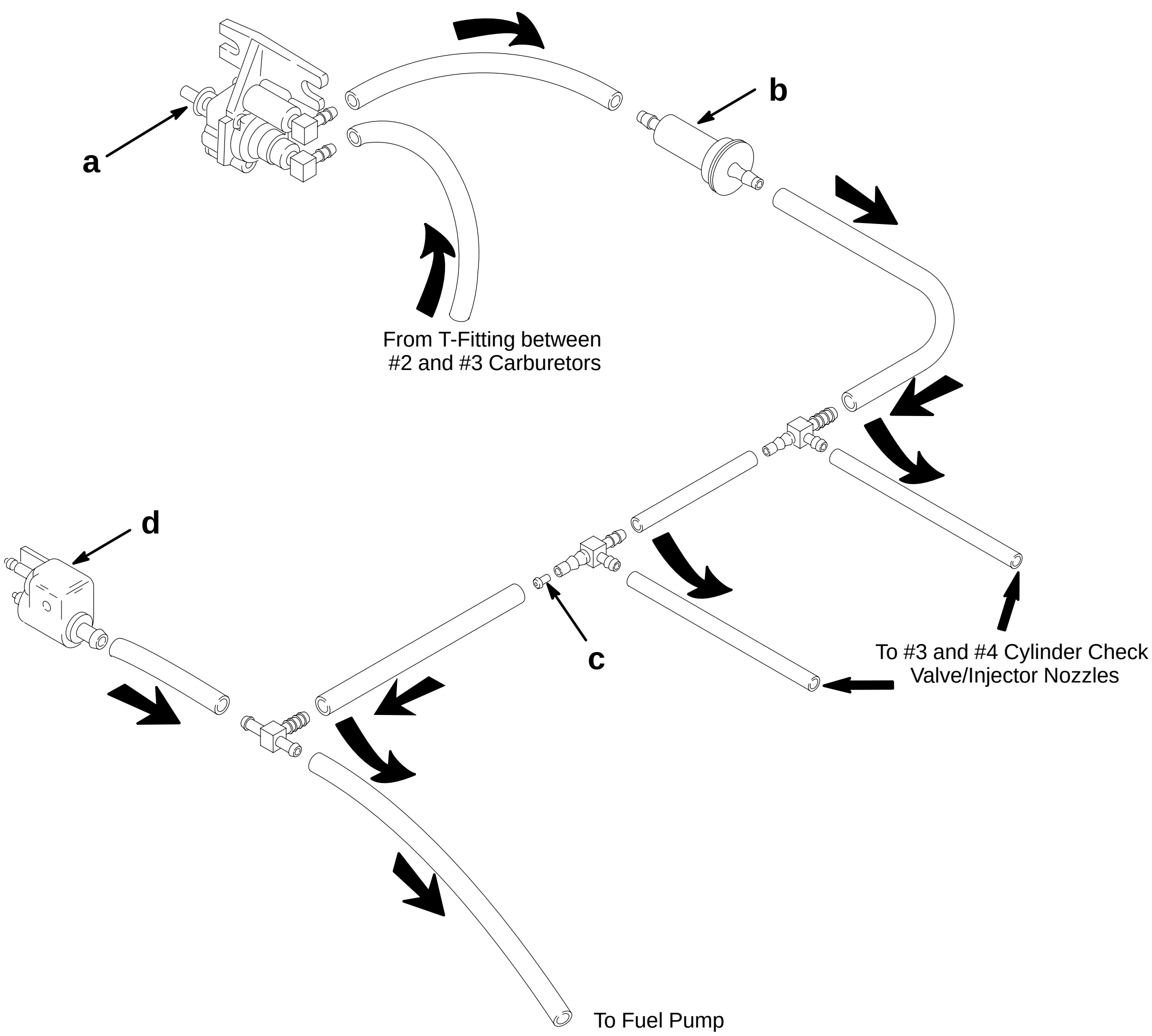
CHECK VALVE/INJECTOR NOZZLE - 2 assemblies, one each for #3 and #4 cylinders. Fuel passes from check valve thru 0.026 inch orifice (injector nozzle) and into respective cylinder boost passage.

FLOW RESTRICTOR - Helps equalize pressure within the accelerator pump circuit while allowing air or any vapor which has formed to pass through and be vented at the carburetors.

FUEL CONNECTOR - Spring loaded shut off valve which connects boat fuel tank with outboard fuel system.

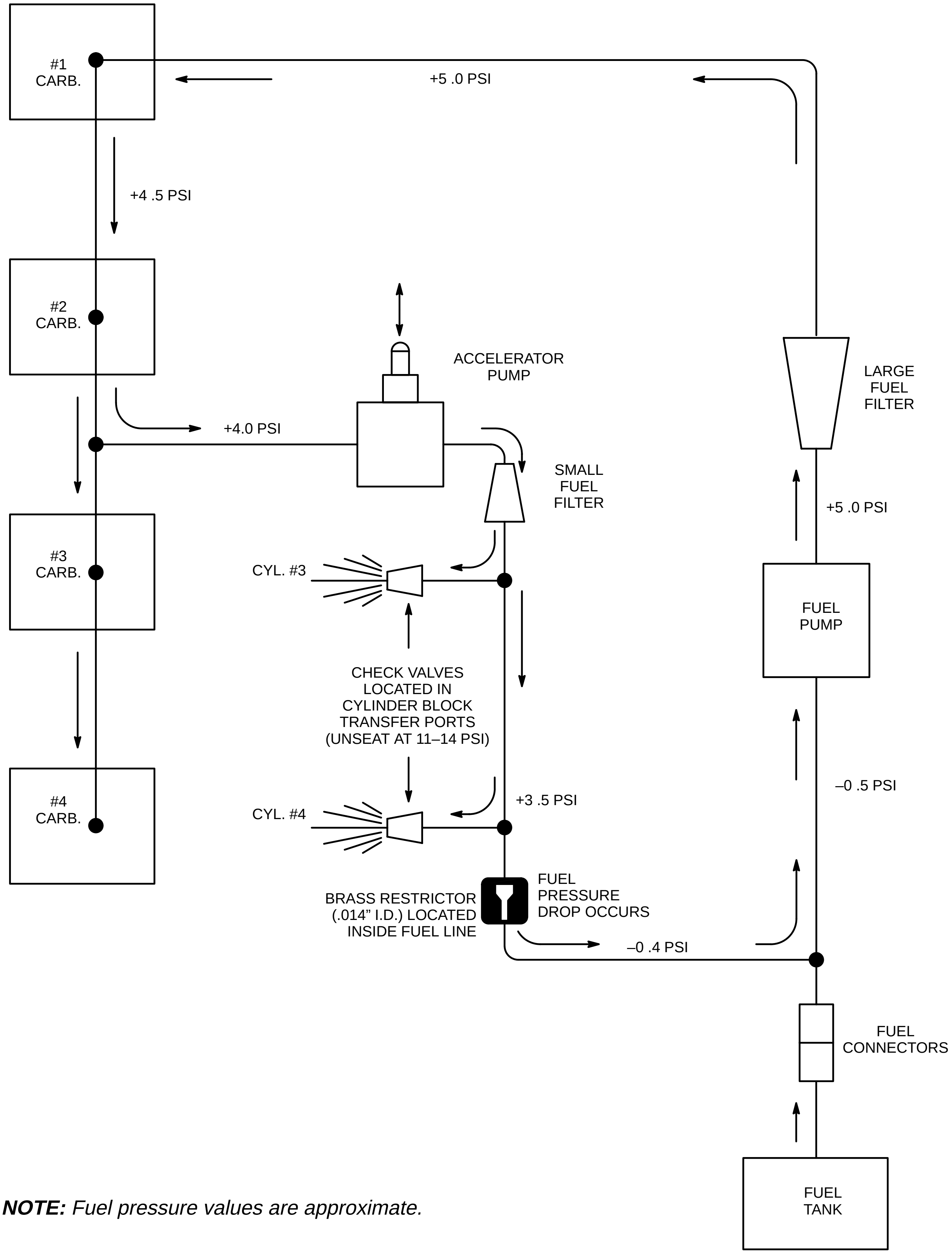
IMPORTANT: The distance between the accelerator pump and the throttle cam determines the amount of fuel the accelerator pump will discharge. If accelerator pump is moved or replaced, refer to SECTION 2C for correct positioning of accelerator pump.

ACCELERATOR PUMP FUEL FLOW CIRCUIT



a - Accelerator Pump
b - Fuel Filter
c - Flow Restrictor
d - Fuel Connector

Acceleration Pump Fuel Flow Circuit for Four Cylinder Engines

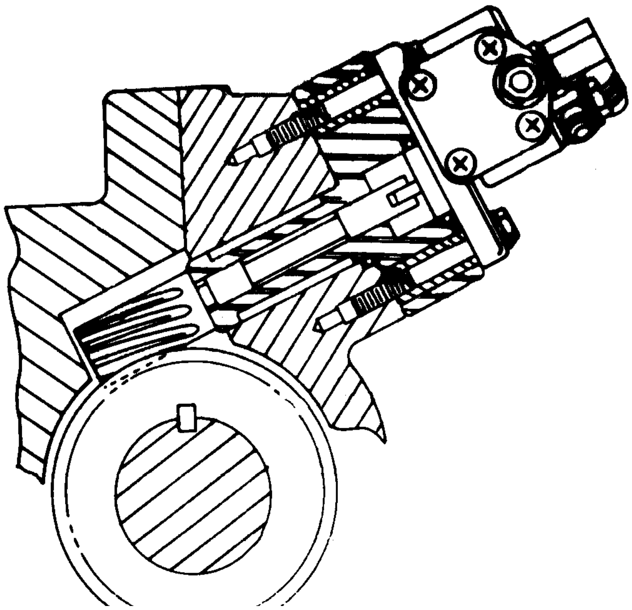


NOTE: *Fuel pressure values are approximate.*

FUEL SYSTEM

3

C



OIL INJECTION

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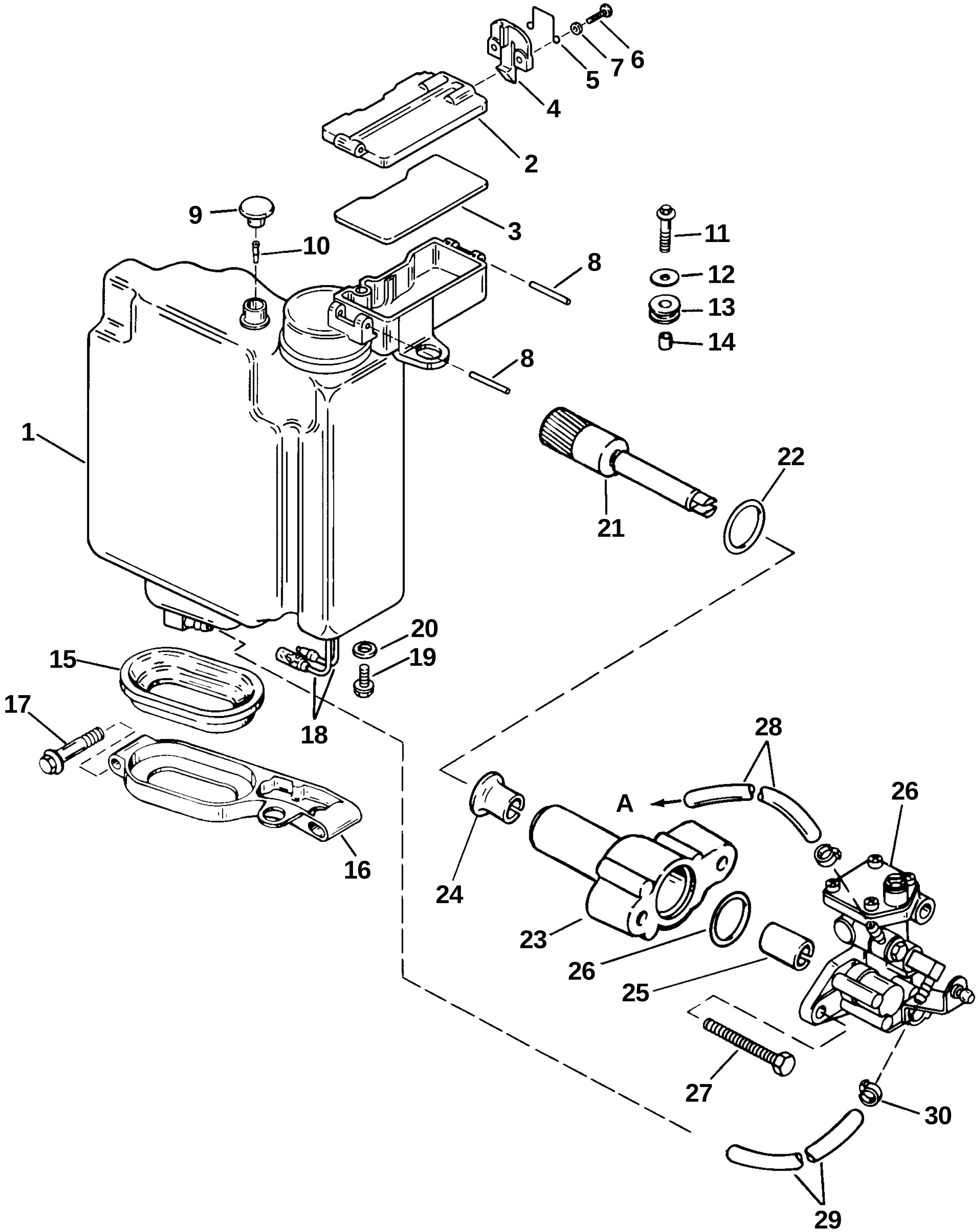
Notes:

Oil Injection Components (S/N–USA–0G301750/BEL–9885504 & BELOW)

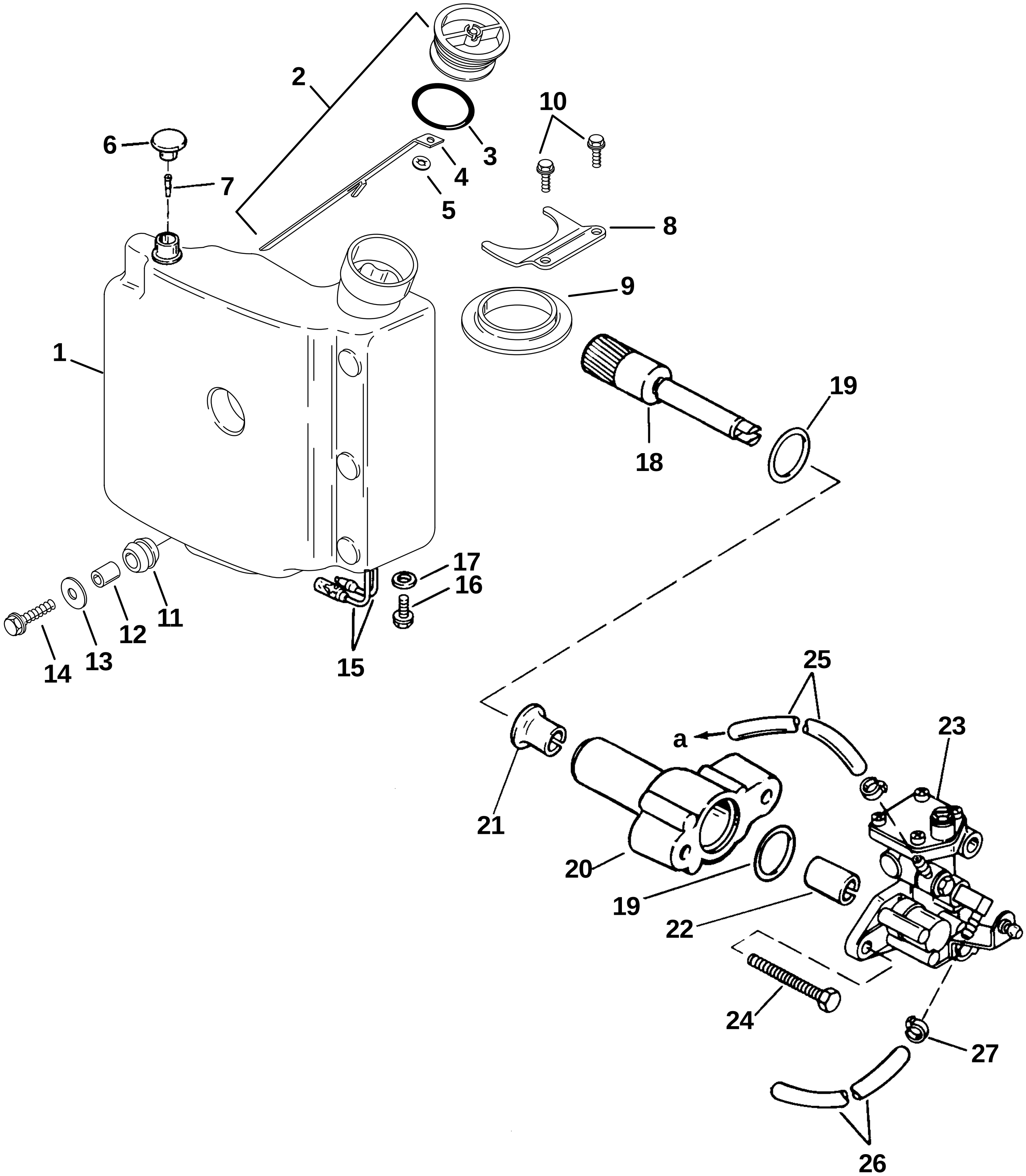


A = TO FUEL PUMP

Oil Injection Components
(S/N–USA–0G301750/BEL–9885504 & BELOW)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	lb. ft.	N·m
1	1	OIL TANK ASSEMBLY			
2	1	COVER ASSEMBLY			
3	1	GASKET			
4	1	LATCH			
5	1	SPRING			
6	2	SCREW	35		4.0
7	2	WASHER			
8	1	GROOVE PIN			
8	1	ROLL PIN (.093 x 1.250)			
9	1	VENT ASSEMBLY			
10	1	VALVE			
11	1	SCREW	50		5.6
12	1	WASHER			
13	1	GROMMET			
14	1	BUSHING			
15	1	BOOT			
16	1	BASE			
17	2	SCREW		15	20.3
18	1	SWITCH ASSEMBLY			
19	1	SCREW	Drive Tight		
20	1	WASHER			
21	1	DRIVEN GEAR			
22	2	O-RING			
23	1	ADAPTOR ASSEMBLY			
24	1	BUSHING			
25	1	JOURNAL BUSHING			
26	1	OIL PUMP			
27	2	SCREW	60		6.8
28	1	TUBING (5-1/2 IN.)			
29	1	TUBING (11 IN.)			
30	AR	STA-STRAP **(8 IN.)**			
30	AR	STA-STRAP **(5-1/2 IN.)**			

Oil Injection Components (S/N–USA–0G301751/BEL–9885505 & UP)



A = TO FUEL PUMP

Oil Injection Components (S/N–USA-0G301751/BEL–9885505 & UP)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	OIL TANK			
2	1	CAP ASSEMBLY			
3	1	O RING			
4	1	DIPSTICK			
5	1	NUT	Push Nut		
6	1	VENT ASSEMBLY			
7	1	VALVE			
8	1	BRACKET			
9	1	BOOT			
10	2	SCREW (M6X20)	65		7.5
11	1	GROMMET			
12	1	BUSHING			
13	1	WASHER			
14	1	SCREW (M8X35)		15	20.5
15	1	SWITCH ASSEMBLY			
16	1	SCREW	Drive Tight		
17	1	WASHER			
18	1	DRIVEN GEAR			
19	2	O-RING			
20	1	ADAPTOR ASSEMBLY			
21	1	BUSHING			
22	1	JOURNAL BUSHING			
23	1	OIL PUMP			
24	2	SCREW	60		7.0
25	1	TUBING (5-1/2 IN.)			
26	1	TUBING (11 IN.)			
27	AR	STA-STRAP **(8 IN.)**			
	AR	STA-STRAP **(5-1/2 IN.)**			
–	1	**GASKET SET**			

Description

⚠ CAUTION

Be careful not to get dirt or other contamination in tank, hoses or other components of the oil injection system.

⚠ CAUTION

Engines with oil injection must be run on a fuel/oil ratio of 50:1 in the fuel tank, in addition to the oil supplied by the oil injection system, for the first 30 gallons of fuel. Refer to break-in procedure in the Operation and Maintenance Manual.

⚠ CAUTION

If an electric fuel pump is to be used on engines with oil injection, the fuel pressure at the engine must not exceed 4 psig (27.4kPa). If necessary, install a pressure regulator between electric fuel pump and engine and set at 4 psig (27.4kPa) maximum.

The major components of the oil injection system are an oil tank, oil pump, and low oil warning system.

The oil tank is attached to the powerhead and holds oil for delivery to the oil pump.

Oil is gravity fed to the oil pump via a hose.

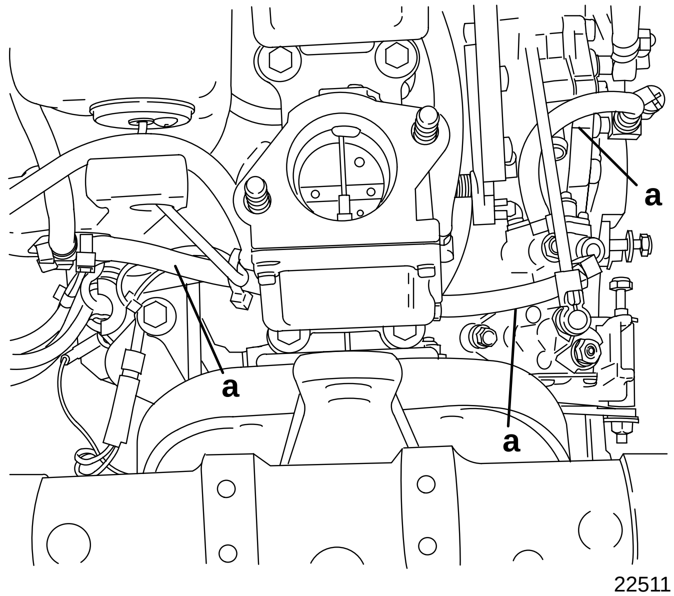
The oil pump injects oil into the fuel line prior to the fuel pump and is driven by the crankshaft.

A link rod is connected between the throttle linkage and oil pump lever. When the throttle position is changed, the link rod rotates the oil pump valve, which changes the fuel/oil ratio from approximately 80:1 at idle speed, to 50:1 at wide-open-throttle.

The oil tank is equipped with a low oil sensor and a magnetic float. When oil level in oil tank drops to approximately 1 quart (.95 liter), the magnetized float will complete the circuit between the low oil sensor leads, causing the warning horn to sound.

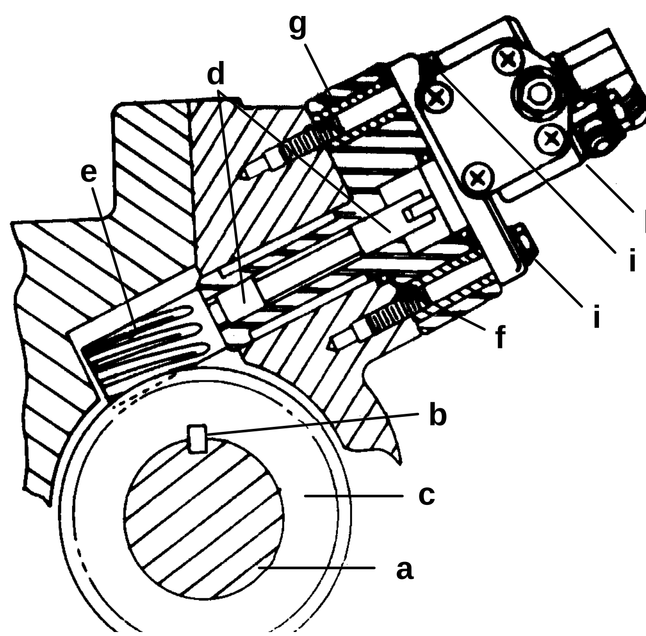
IMPORTANT: Warning horn is also connected to the powerhead temperature sensor. If the warning horn sounds, either the oil level in oil tank is low, or the powerhead is overheated.

Hose Connections



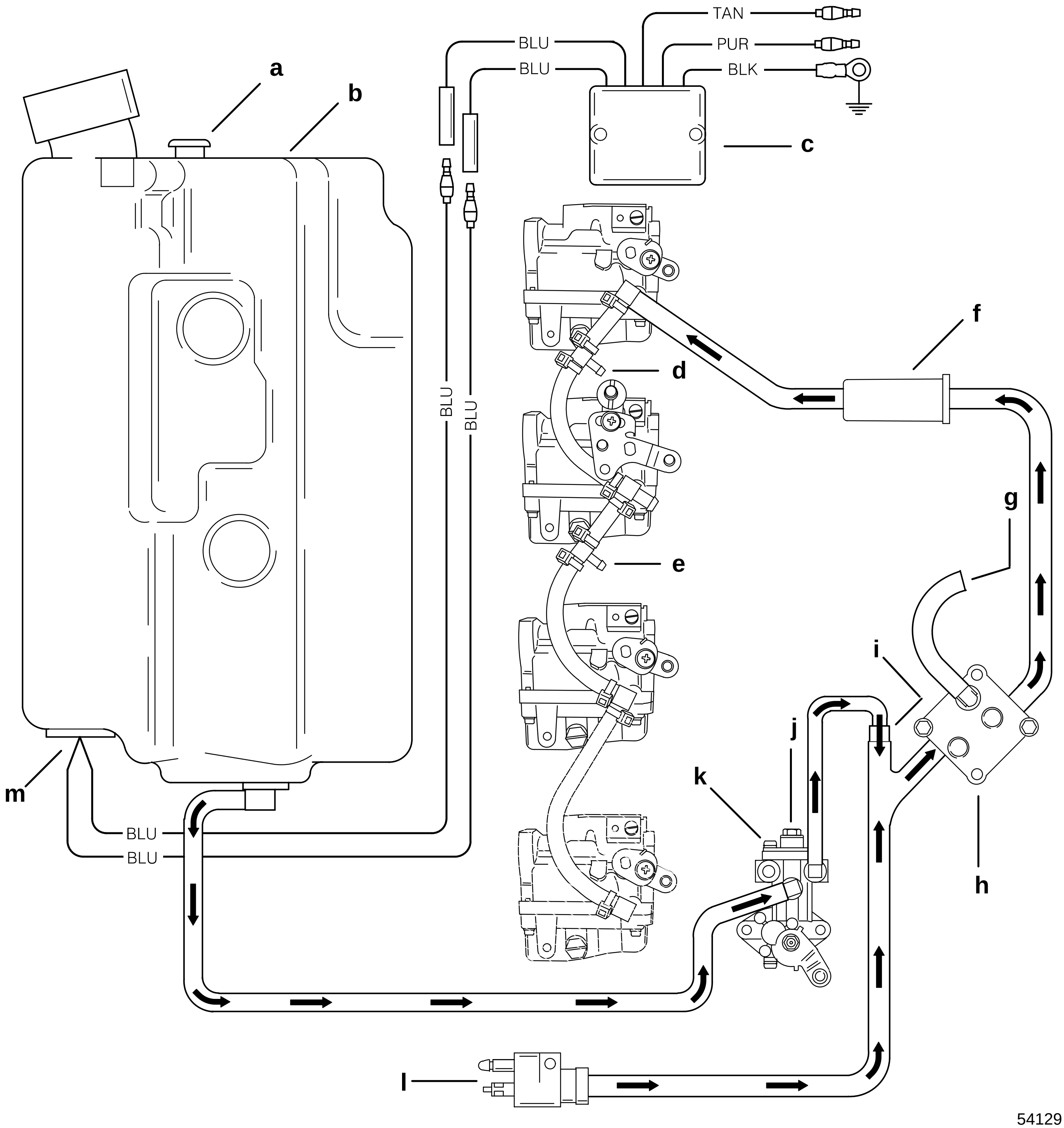
a - Oil Hose Connections

Oil Pump Drive System



a - Crankshaft
b - Drive Key
c - Drive Gear
d - Apply Quicksilver 2-4-C w/Teflon on Both Areas
e - Driven Gear
f - O-Rings [0.739″ (18.8mm) I.D. x 0.809″ (20.6mm) O.D.]
g - Spacer
h - Oil Pump
i - Bolts; Torque to 60 lb. in. (6.8 N·m)

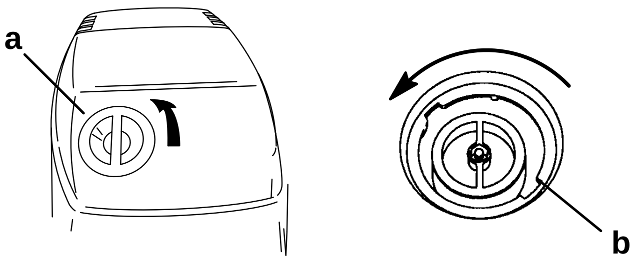
3 and 4 Cylinder Oil Flow Diagram



a - Oil Tank Vent
b - Oil Tank
c - Low Oil/Overheat Warning Module
d - Fuel Enrichment Valve Fuel Fitting
e - Accelerator Pump Fitting (4 Cylinder Models Only)
f - Fuel Filter
g - To Crankcase Pulse Fitting
h - Fuel Pump
i - 2 psi (13.7kPa) Check Valve
j - Oil Pump Bleed Valve
k - Oil Pump
l - Fuel Inlet Fitting
m - Low Oil Sensor

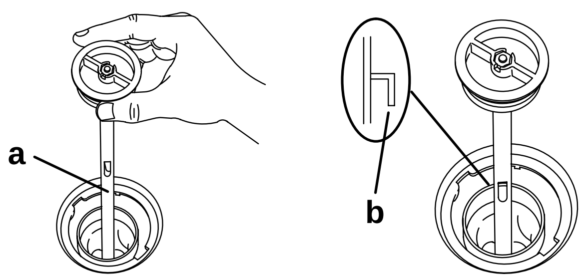
Filling Oil Tank

1. Quicksilver 2-Cycle Outboard Oil is recommended for this oil injection system. In an emergency, when Quicksilver 2-Cycle Outboard Oil is not available, substitute a high quality 2-cycle oil that is intended for outboard use and meets BIA rating TC-WII or TC-W3, shown on oil container. BIA rating TC-W is the Boating Industry Association's designation for approved, 2-cycle water-cooled outboard oils.
2. Open cowl cap. Turn the oil fill cap to the left and remove.



a - Cowl Cap
b - Oil Fill Cap

3. Use the dipstick to check oil level.
4. Hook the dipstick on the tank during filling.

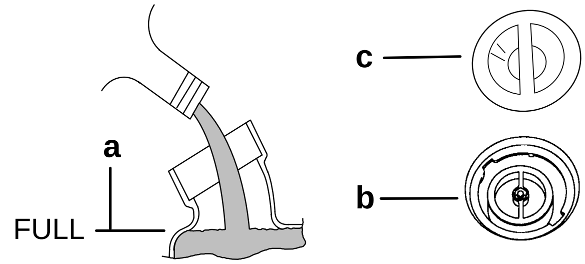


a - Dipstick
b - Hook

5. Slowly fill the oil tank with the specified oil. DO NOT OVERFILL – add only enough oil to bring the oil level up to the bottom of the fill neck.

NOTE: *The oil tank capacity for 3 cylinder models is 3.2 qt. (3.0 liters) and 4 cylinder models is 5.13 qt. (4.9 liters).*

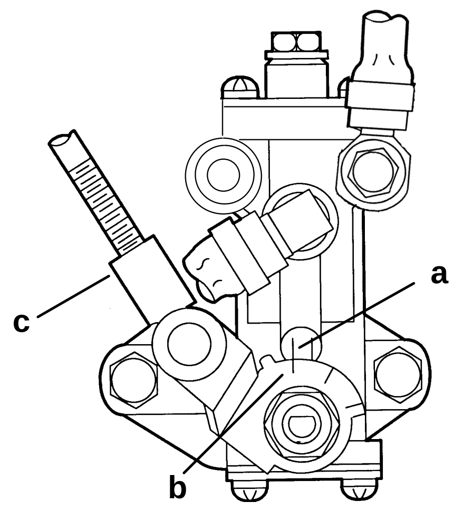
6. Install oil filler cap and re-tighten. Reinstall the cowl cap.



a - Bottom of Fill Neck
b - Oil Filler Cap
c - Cowl Cap

Carburetor/Oil Pump Synchronization

1. While holding throttle arm at idle position, adjust length of link rod so that stamped mark of oil pump body aligns with stamped mark of oil pump lever, and lever is in closed position.



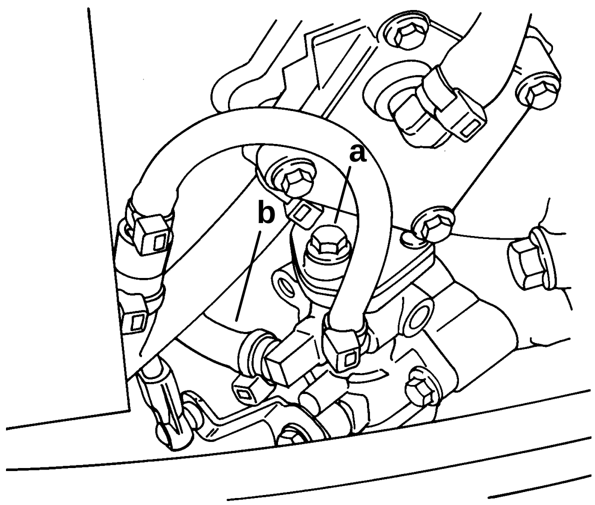
a - Mark on Body
b - Mark, Fully Closed on Lever
c - Link Rod

Bleeding Air from Oil Injection System

IMPORTANT: If air exists in either oil pump hose (inlet or outlet), the air MUST BE bled from the hose(s) before operating engine.

Bleeding Air from Oil Pump Inlet Hose

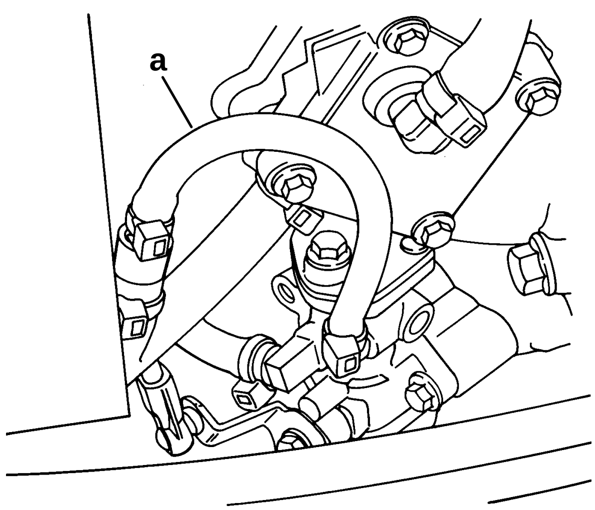
1. With engine not running, place a shop towel below the oil pump. Loosen bleed screw three to four turns and allow oil to flow from bleed hole until no air bubbles are present in inlet hose. Torque bleed screw to 25 lb. in. (2.8 N·m). This procedure also allows oil pump to fill with oil.



a - Bleed Screw
b - Inlet Hose

Bleeding Air from Oil Pump Outlet Hose

1. Purge air from outlet hose, by running engine at idle speed, until no air bubbles are present in outlet hose.

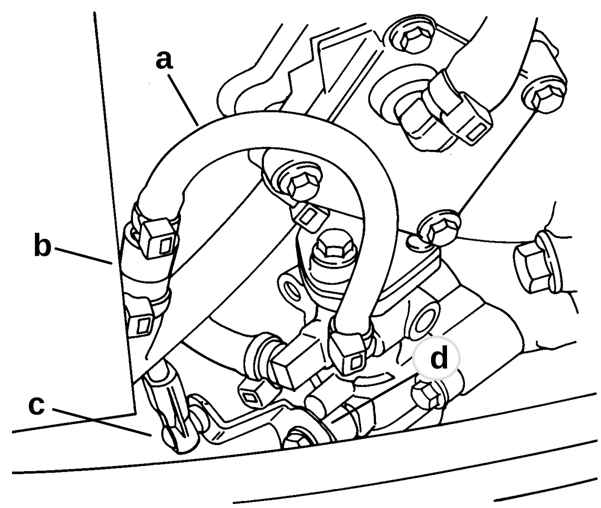


a - Outlet Hose

Oil Pump Test

***NOTE:** A graduated container is required to perform this test.*

1. Connect engine to remote fuel tank containing a 50:1 fuel/oil mixture (25:1 if during break-in period).
2. Attach flush device to outboard or place outboard in test tank.
3. Remove top cowling.
4. Disconnect oil outlet hose from fuel pump fitting.
5. Plug fuel line fitting.
6. Remove link rod end from oil flow regulator.
7. Rotate oil pump regulator full counterclockwise and hold it in this position, (wide-open pump position).
8. Attach an accurate service tachometer to engine.
9. Place end of hose into graduated container.



a - Outlet Hose
b - Fuel Line Fitting
c - Link Rod End
d - Pump Regulator

10. Run engine at 700 RPM for 15 minutes.
11. Stop engine. Check amount of oil pump discharge. For 3 cylinder engines, discharge should be 18.7 cc minimum. For 4 cylinder engines, discharge should be 25.5 cc minimum.

***NOTE:** Pump output specifications are derived at 70°F (56.7°C) degrees room temperature. Cooler or warmer test temperature will result in LESS oil pump discharge.*

Low Oil Sensor Test

NOTE: *Low oil sensor is located in bottom of oil tank.*

1. **1997 and Prior Models** – Disconnect low oil sensor leads (BLUE) between oil tank and warning module.
   1998 Models – Disconnect low oil sensor leads (Light/Blue) from Tan/Blue and Black leads.
2. Using an ohmmeter, perform both tests in chart, following.

Oil Level in Oil Tank	Test Leads Between	Scale Reading (x________)
1/2 Full to Full	Low Oil Sensor Leads (BLUE)	No Continuity* (R x 1)
Empty	Low Oil Sensor Leads (BLUE)	Continuity** (R x 1)

* If continuity is indicated, check to see if float (located inside oil tank) is stuck in place or if magnet (attached to bottom of float) has come loose. If float checks O.K., replace sensor.

** If continuity is NOT indicated, check to see if float (located inside oil tank) is stuck in place. If float is NOT stuck in place, replace sensor (bottom of oil tank – remove screw and retract sensor).

Warning Horn System

DESCRIPTION

Major components of the warning horn system are an ignition switch, warning horn, low oil sensor, powerhead and temperature sensor.

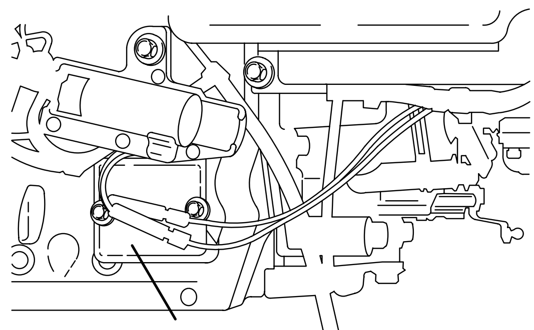
With the ignition switch in the "Run" position, electrical current is routed thru the warning horn and supplied to the powerhead temperature sensor and low oil sensor. If the powerhead overheats or the oil level in the oil tank drops below approximately 1 quart (.95 liter), the electrical circuit is completed and the warning horn will sound.

Low Oil Condition – Indicated by an INTERMITTANT BEEPING sound.

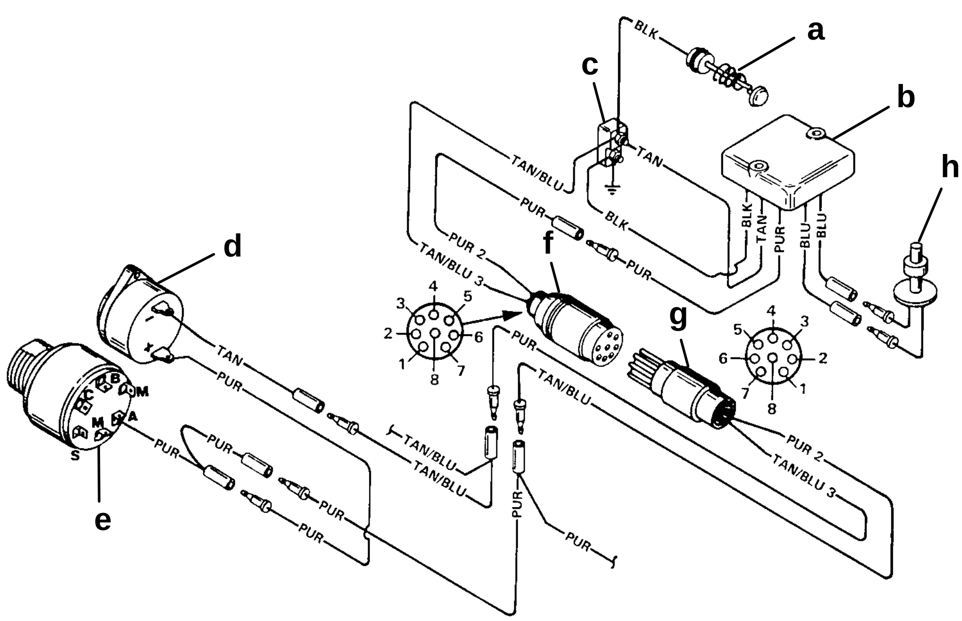
Overheat Condition – Indicated by a CONTINUOUS BEEPING sound.

WARNING HORN SYSTEM CHECK

1. Turn ignition key switch to "Run" position.
2. Warning horn will BEEP once.
3. Turn key switch to "Off" position.



a - Warning Module



a - Powerhead Temperature Sensor
b - Warning Module
c - Terminal Block
d - Warning Horn
e - Ignition Switch
f - Engine Harness
g - Remote Control Harness
h - Low Oil Sensor

Oil Injection System Troubleshooting Chart

(Models with Warning Module)

Troubleshooting the Oil Injection System

If a problem occurs with the oil injection system and the warning horn sounds in a pulsating manner, stop engine and check if problem is caused by (1) low oil level – 1 quart remaining, (2) the oil injection pump, or (3) a faulty warning module.

1. Open the engine cowling and check oil level in engine reservoir. If oil level is approximately one quart or less, the problem is low oil level. Add oil to reservoir.

***NOTE:** There is a safety reserve of oil left in the reservoir after the low oil warning is sounded. There is enough oil for approximately 50 minutes of full throttle operation on four cylinder engines and approximately 1 hour of full throttle operation on three cylinder engines.*

2. If there is more than 1 quart of oil in the reservoir, then the problem may be in the oil injection pump. DO NOT run engine on straight gas when a problem may be in the oil injection pump. Engine can be run by connecting a remote fuel tank of 50:1 gas and oil mixture to engine.

Troubleshooting Chart

PROBLEM: Warning horn does not sound when ignition key is turned to "ON" position.

POSSIBLE CAUSE	CORRECTIVE ACTION
Horn malfunction or open (TAN) wire between horn and engine	Disconnect tan lead from main engine wiring harness at terminal block on engine. Ground this tan lead to engine ground. Warning horn should sound. If not, check tan wire between horn and engine for open circuit and check horn.
Warning Module	Check if all warning module leads are connected to harness leads. If so, warning module may be faulty.
Using incorrect side mount remote control or ignition/choke assembly.	Refer to Quicksilver Accessory Guide for correct components

PROBLEM: Warning horn stays on when ignition key is turned to "ON" position.

POSSIBLE CAUSE	CORRECTIVE ACTION
Engine overheat sensor	If horn sounds a continuous "beep", the engine overheat sensor may be faulty. Disconnect overheat sensor (BLACK Wire) and turn ignition key to "ON" position. If horn still sounds a continuous "beep", the warning module is faulty. Replace module and retest. If "beep" does not sound, then engine overheat sensor is faulty. Replace and retest.
Warning Module	If horn continues to sound on intermittent "beep", the warning module is faulty or oil level is too low.

PROBLEM: Warning horn sounds when engine is running. Oil level in engine reservoir is full.

POSSIBLE CAUSE	CORRECTIVE ACTION
Defective low oil sensor	Disconnect both low oil sensor leads (LIGHT BLUE) from bullet connectors. Connect an ohmmeter between leads. There should be no continuity through sensor. If continuity exists, sensor is faulty.
Drive system of oil injection pump	Refer to page 3C-9, "Oil Pump Test" to determine if oil pump is operating properly.
Warning Module	Replace warning module.

FUEL SYSTEM

3

D

MERCURY MARINE

Emission Control Information | **1848 cc** | **1998**

PART # 37–855211 11

This engine conforms to 1998 Model Year U.S. EPA regulations for marine SI engines.

This engine is certified to operate on regular 87 octane unleaded fuel (R+M)/2

Refer to Owners Manual for required maintenance.

Exhaust Emission Control Systems: None

Idle Speed (in gear): 675 RPM

Engine Lubricants: Quicksilver Premium Plus TC-W3 2-Cycle Outboard Oil

Fuel/Oil Ratio: 50:1 Oil Injection Variable

Timing: Idle: 4° ATDC – 2° BTDC WOT:23° BTDC

Spark Plug: CHAMPION QL77CC | Gap: 0.040

Family: WM9XM02.0210

FEL: 145.00 GM/KW-HR

Valve Clearance (Cold) mm

Intake: N/A Exhaust: N/A

125 HP

JAN FEB MAR APR MAY JUNE JULY AUG SEP OCT NOV DEC

EMISSIONS

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Exhaust Emissions Standards

Through the Environmental Protection Agency (EPA), the federal government has established exhaust emissions standards for all new marine engines sold in the U.S.

What Are Emissions?

Emissions are what comes out of the exhaust system in the exhaust gas when the engine is running. They are formed as a result of the process of combustion or incomplete combustion. To understand exhaust gas emissions, remember that both air and fuel are made of several elements. Air contains oxygen and nitrogen among other elements; gasolene contains mainly hydrogen and carbon. These four elements combine chemically during combustion. If combustion were complete, the mixture of air and gasoline would result in these emissions: water, carbon dioxide and nitrogen, which are not harmful to the environment. But combustion is not usually complete. Also, potentially harmful gases can be formed during and after combustion.

All marine engines must reduce the emission of certain pollutants, or potentially harmful gases, in the exhaust to conform with levels legislated by the EPA. Emissions standards become more stringent each year. Standards are set primarily with regard to three emissions: hydrocarbons (HC), carbon monoxide (CO) and oxides of nitrogen (NOx).

Hydrocarbons – HC

Gasoline is a hydrocarbon fuel. The two elements of hydrogen and carbon are burned during combustion in combination with oxygen. But they are not totally consumed. Some pass through the combustion chamber and exit the exhaust system as unburned gases known as hydrocarbons.

Carbon Monoxide – CO

Carbon is one of the elements that make up the fuel burned in the engine along with oxygen during the combustion process. If the carbon in the gasoline could combine with enough oxygen (one carbon atom with two oxygen atoms), it would come out of the engine in the form of carbon dioxide (CO_2). CO_2 is a harmless gas. But carbon often combines with insufficient oxygen (one carbon atom with one oxygen atom). This forms carbon monoxide, CO. Carbon monoxide is the product of incomplete combustion and is a dangerous, potentially lethal gas.

Oxides of Nitrogen - NOx

NOx is a slightly different byproduct of combustion. Nitrogen is one of the elements that makes up the air going into the engine. Under extremely high temperatures it combines with oxygen to form oxides of nitrogen (NOx). This happens in the engine's combustion chambers when temperatures are too high. NOx itself is not harmful, but when exposed to sunlight it combines with unburned hydrocarbons to create the visible air pollutant known as smog. Smog is a serious problem in California as well as many other heavily populated areas of the United States.

Controlling Emissions

There are two principle methods of reducing emissions from a two-stroke-cycle marine engine. The first method is to control the air/fuel ratio that goes into the combustion chamber. The second is to control the time when this air/fuel mixture enters the combustion chamber. Timing is important, to prevent any unburned mixture from escaping out of the exhaust port.

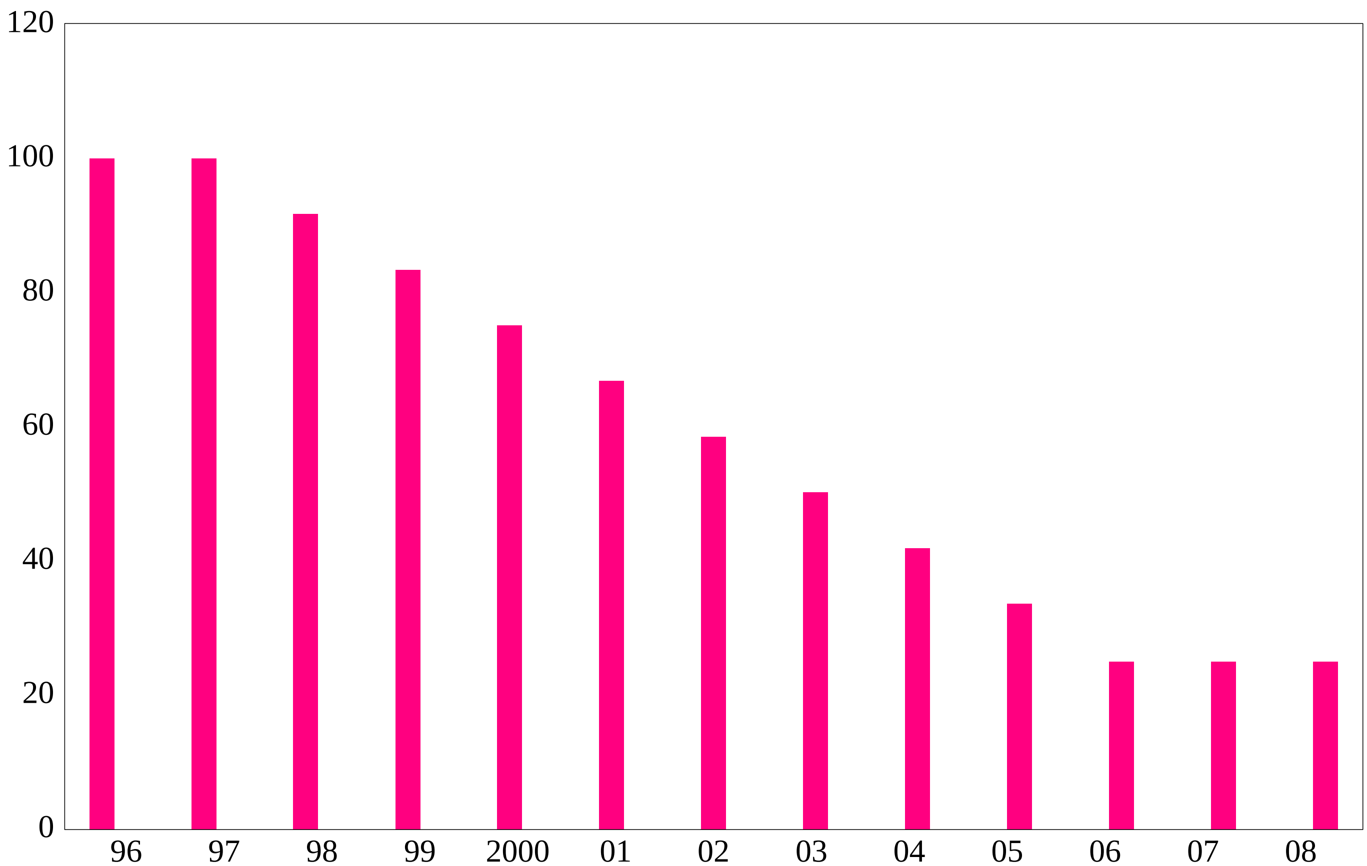
Stoichiometric (14.7:1) Air/Fuel Ratio

In the search to control pollutants and reduce exhaust emissions, engineers have discovered that they can be reduced effectively if a gasoline engine operates at an air/fuel ratio of 14.7:1. the technical term for this ideal ratio is stoichiometric. An air/fuel ratio of 14.7:1 provides the best control of all three elements in the exhaust under almost all conditions. The HC and CO content of the exhaust gas is influenced significantly by the air/fuel ratio. At an air/fuel ratio leaner than 14.7:1, HC and CO levels are low, but with a ratio richer than 14.7:1 they rise rapidly. It would seem that controlling HC and CO by themselves might not be such a difficult task; the air/fuel ratio only needs to be kept leaner than 14.7:1. However, there is also NOx to consider.

As the air/fuel ratio becomes leaner, combustion temperatures increase. Higher combustion temperatures raise the NOx content of the exhaust. But, enrichening the air/fuel ratio to decrease combustion temperatures and reduce NOx also increases HC and CO, as well as lowering fuel economy. So the solution to controlling NOx - as well as HC and CO - is to keep the air/fuel ratio as close to 14.7:1 as possible.

OUTBOARD HYDROCARBON EMISSIONS REDUCTIONS

8 1/3% ↓ PER YEAR OVER 9 MODEL YEARS



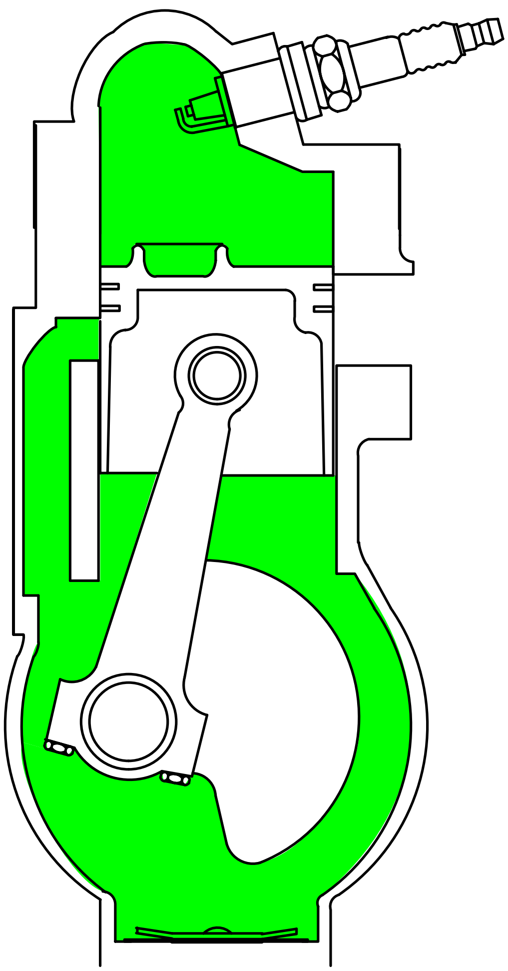
STRATIFIED VS HOMOGENIZED CHARGE

DFI engines use a stratified charge inside the combustion chamber to aid in reducing emissions. All other models use a homogenized charge. The difference between the two is:

Homogenized Charge

A homogenized charge has the fuel/air particles mixed evenly throughout the cylinder. This mixing occurs inside the carburetor venturi, reed blocks and crankcase. Additional mixing occurs as the fuel is forced through the transfer system into the cylinder.

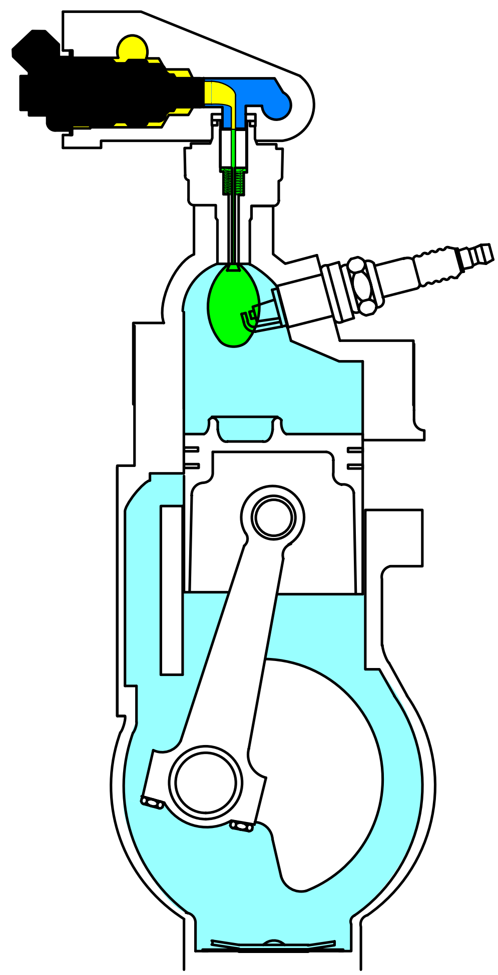
The homogenized charge is easy to ignite as the air/fuel ratio is approximately 14.7:1.



Stratified Charge

A stratified charge engine only pulls air through the transfer system. The fuel required for combustion is forced into the cylinder through an injector placed in the top of the cylinder (head). The injector sprays a fuel/air mixture in the form of a bubble into the cylinder. Surrounding this bubble is air supplied by the transfer system. As the bubble is ignited and burns, the surrounding air provides almost complete combustion before the exhaust port opens.

A stratified charge is hard to ignite, the fuel/air bubble is not evenly mixed at 14.7:1 and not easily ignited.



Emissions Information

Manufacturer's Responsibility:

Beginning with 1998 model year engines, manufacturers of all marine propulsion engines must determine the exhaust emission levels for each engine horsepower family and certify these engines with the United States Environmental Protection Agency (EPA). A certification decal/emissions control information label, showing emission levels and engine specifications directly related to emissions, **must** be placed on each engine at the time of manufacture.

Dealer Responsibility:

When performing service on all 1998 and later outboards that carry a certification, attention must be given to any adjustments that are made that affect emission levels.

Adjustments must be kept within published factory specifications.

Replacement or repair of any emission related component must be executed in a manner that maintains emission levels within the prescribed certification standards.

Dealers are **not** to modify the engine in any manner that would alter the horsepower or allow emission levels to exceed their predetermined factory specifications.

Exceptions include manufacturers prescribed changes, such as that for altitude adjustments.

Owner Responsibility:

The owner/operator is required to have engine maintenance performed to maintain emission levels within prescribed certification standards.

The owner/operator is **not** to modify the engine in any manner that would alter the horsepower or allow emissions levels to exceed their predetermined factory specifications.

Exceptions:

- Carburetor jets may be changed for high altitude use in accordance with factory recommendations.
- Single engine exceptions may be allowed with permission from the EPA for racing and testing.

EPA Emission Regulations:

All new 1998 and later outboards manufactured by Mercury Marine are certified to the United States Environmental Protection Agency as conforming to the requirements of the regulations for the control of air pollution from new outboard motors. This certification is contingent on certain adjustments being set to factory standards. For this reason, the factory procedure for servicing the product must be strictly followed and, whenever practicable, returned to the original intent of the design.

The responsibilities listed above are general and in no way a complete listing of the rules and regulations pertaining to the EPA laws on exhaust emissions for marine products. For more detailed information on this subject, you may contact the following locations:

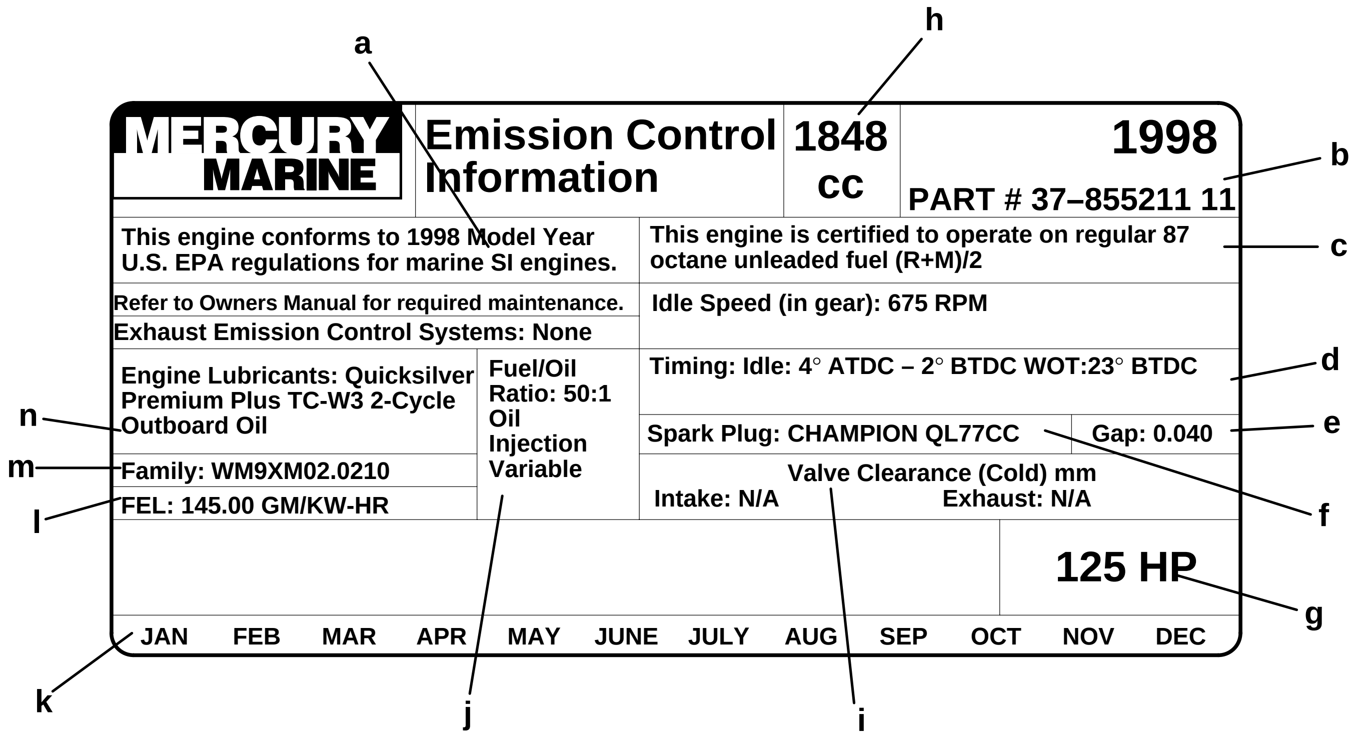
VIA U.S. POSTAL SERVICE:
Office of Mobile Sources
Engine Programs and Compliance Division
Engine Compliance Programs Group (6403J)
401 M St. NW
Washington, DC 20460

VIA EXPRESS or COURIER MAIL:
Office of Mobile Sources
Engine Programs and Compliance Division
Engine Compliance Programs Group (6403J)
501 3rd St. NW
Washington, DC 20001

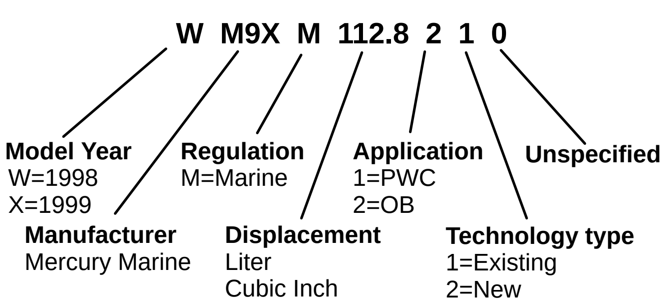
EPA INTERNET WEB SITE:
http:/www.epa.gov/omswww

CERTIFICATION LABEL:

The certification label must be placed on each engine at the time of manufacture and must be replaced in the same location if damaged or removed. Shown below is a typical certification label and is not representative of any one model. Label shown below is not to scale; (shown at twice the normal size).



- a - Spark Ignition (SI)
- b - Model year of engine and production decal part number
- c - Type and octane of fuel used to establish emission levels
- d - Timing specifications when adjustable
- e - Spark plug gap in thousandths of an inch
- f - Recommended spark plug for best engine performance
- g - Engine Horsepower rating
- h - Cubic Centimeter
- i - Valve Clearance (Four Stroke engines only)
- j - Recommended oil/fuel ratio for best engine performance and minimal emissions
- k - Month of production (Boxing month will punched)
- l - FEL: Represents (Mercury Marine) statement of the maximum emissions output for the engine family
- m - Family example:

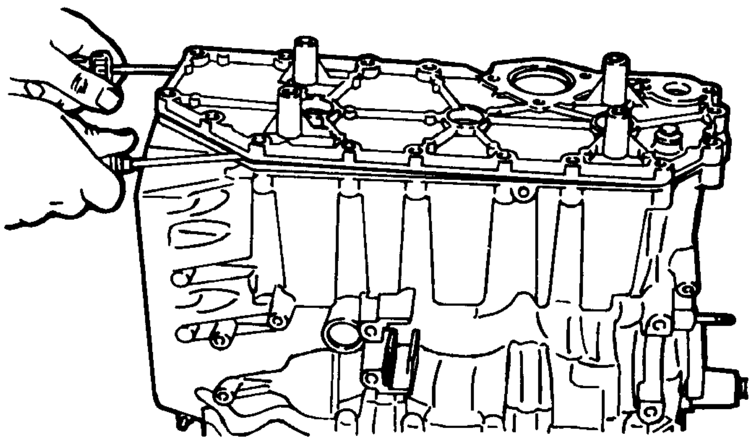


- n - Engine lubricants recommended by the manufacturer

Decal Location for 1998 Models:

Model	Production Part No.	Service Part No.	Location on Engine
Merc/Mar 85 C.I. (75 – 90 H.P.)	37-855211 10	37-855577 10	Block Exhaust Cover
Merc/Mar 113 C.I. (100 – 115 – 125 H.P.)	37-855211 11	37-855577 11	Block Exhaust Cover

POWERHEAD



20032

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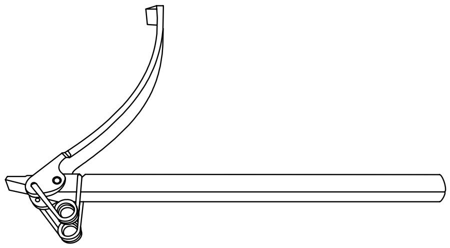
Specifications

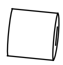
HORSEPOWER (KW)	**Model 75** **Model 65 Jet/90** **Model 100** **Model 80 Jet/115** **Model 125**	75 (55.9) 90 (67.1) 100 (74.6) 115 (85.8) 125 (93.2)
OUTBOARD WEIGHT	**Model 65 Jet** **Model 75/90** **Model 80 Jet** **Model 100/115/125**	315 lbs. (143kg) 305 lbs. (139kg) 357 lbs. (162kg) 348 lbs. (158kg)
CYLINDER BLOCK	**Model 65 Jet/75/90** **Type** **Displacement** **Model 80 Jet/100/115/125** **Type** **Displacement**	 In-line 3 Cylinder, 2 Cycle, Loop Charged 84.6 cu. in. (1387cc) In-Line 4 Cylinder, 2 Cycle, Loop Charged 112.8 cu. in. (1848.8cc)
STROKE	**Length**	2.93 in. (74.42mm)
CYLINDER BORE	**Diameter (Standard)** **Taper/Out of Round Maximum** **Bore Type**	3.50 in. (88.9mm) 0.003 in. (0.076mm) Cast Iron
PISTON	**Piston Type** **Standard** **0.015 in. (0.381mm) Oversize** **0.030 in. (0.762mm) Oversize**	Aluminum 3.495 in. (88.773mm) 3.510 in. (89.154mm) 3.525 in. (89.535mm)
REEDS	**Reed Stand Open (Max.)** **Reed Stop (Max.)**	0.020 in. (0.50mm) Not Adjustable

Tools for Powerhead Repair

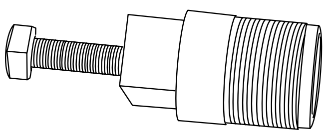
1. Flywheel Holder 91-52344



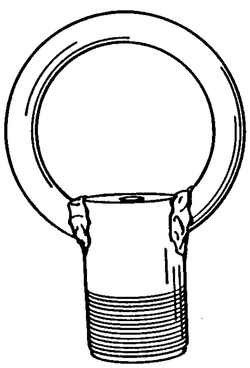
2. Protector Cap 91-24161



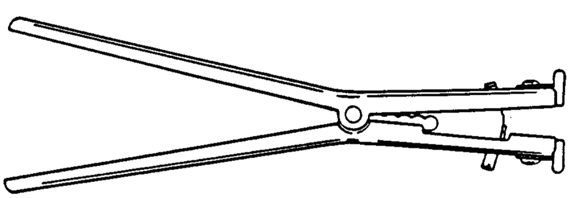
3. Flywheel Puller 91-73687A1



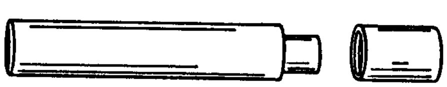
4. Lifting Eye 91-90455



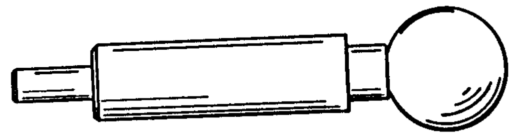
5. Piston Ring Expander 91-24697



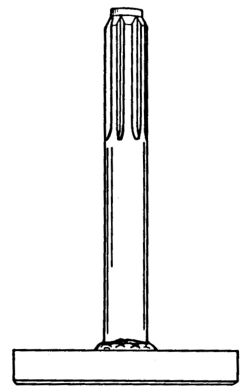
6. Piston Pin Tool 91-74607A1



7. Lockring Installation Tool 91-77109A2/A3



8. Powerhead Stand 91-812549



General Information

DISASSEMBLY AND REASSEMBLY

If complete disassembly is not necessary, start at appropriate spot; start reassembly at point disassembly stopped.

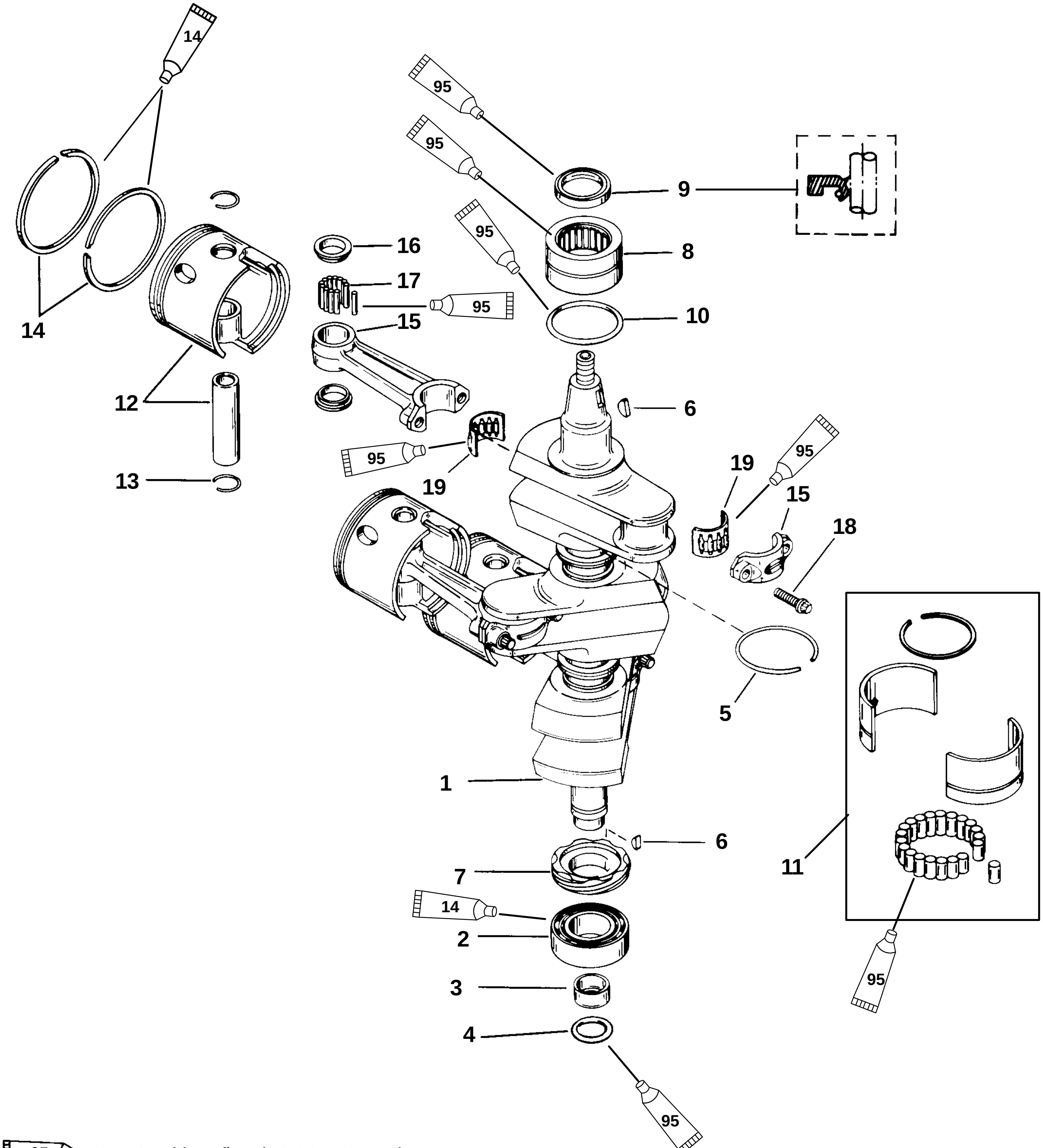
If major powerhead repairs are being done, remove powerhead from lower unit. It is not necessary to remove powerhead for:

a. Visual check for scoring or broken rings (cylinder walls and pistons), by viewing through exhaust ports.

b. Minor external repair (i.e. - ignition system, carburetors, reed blocks, thermostat checks, etc.).

Notes:

Crankshaft, Pistons and Connecting Rods (3 Cyl.)



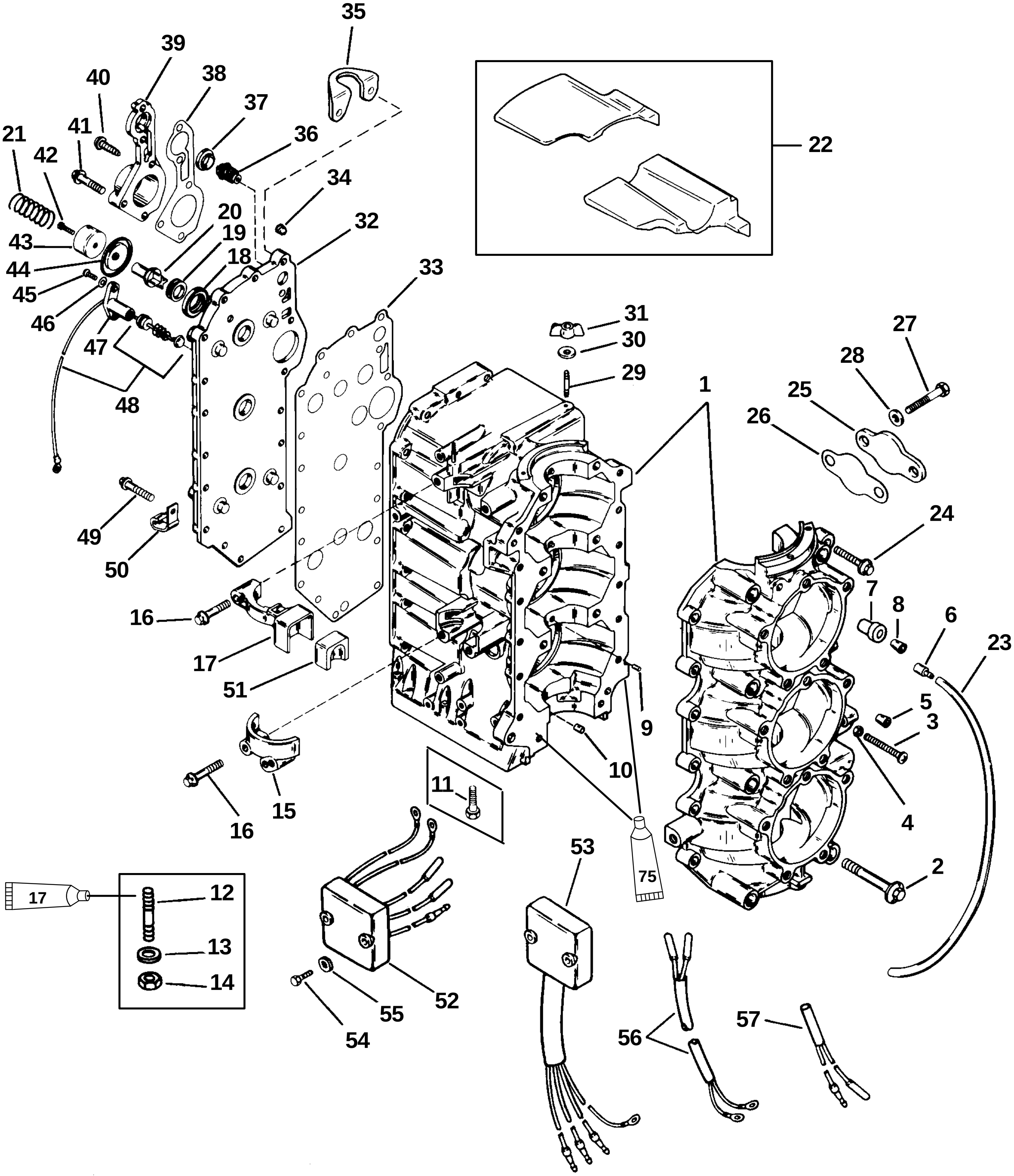
95 2-4-C With Teflon (92-825407A12)

14 2 Cycle Outboard Oil (92-13249A24)

Crankshaft, Pistons and Connecting Rods (3 Cyl.)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	CRANKSHAFT			
2	1	BALL BEARING(LOWER)			
3	1	WEAR SLEEVE			
4	1	O-RING			
5	1	RING ASSEMBLY			
6	2	KEY			
7	1	DRIVER GEAR			
8	1	ROLLER BEARING ASSEMBLY(UPPER)			
9	1	OIL SEAL			
10	1	O-RING			
11	2	ROLLER BEARING ASSEMBLY			
12	3	PISTON ASSEMBLY **(STANDARD)**			
	AR	PISTON ASSEMBLY **(.015 O.S.)**			
	AR	PISTON ASSEMBLY **(.030 O.S.)**			
13	6	LOCK RING			
14	1	PISTON RING ASSEMBLY **(STANDARD)**			
	AR	PISTON RING ASSEMBLY **(.015 O.S.)**			
	AR	PISTON RING ASSEMBLY **(.030 O.S.)**			
15	3	CONNECTING ROD ASSEMBLY			
16	6	WASHER			
17	87	NEEDLE BEARING			
18	6	SCREW	Apply Light Oil to Threads and Bolt Face; 1st Torque - 15 lb. in.(1.7 N·m) - Recheck Alignment; 2nd Torque - 30 lb. ft.(47.6 N·m); Turn Bolt an additional 90 degrees after 2nd Torque		
19	3	ROLLER BEARING ASSEMBLY			

Cylinder Block (3 cyl.) (USA-0G127499/BEL-9836632 & BELOW)

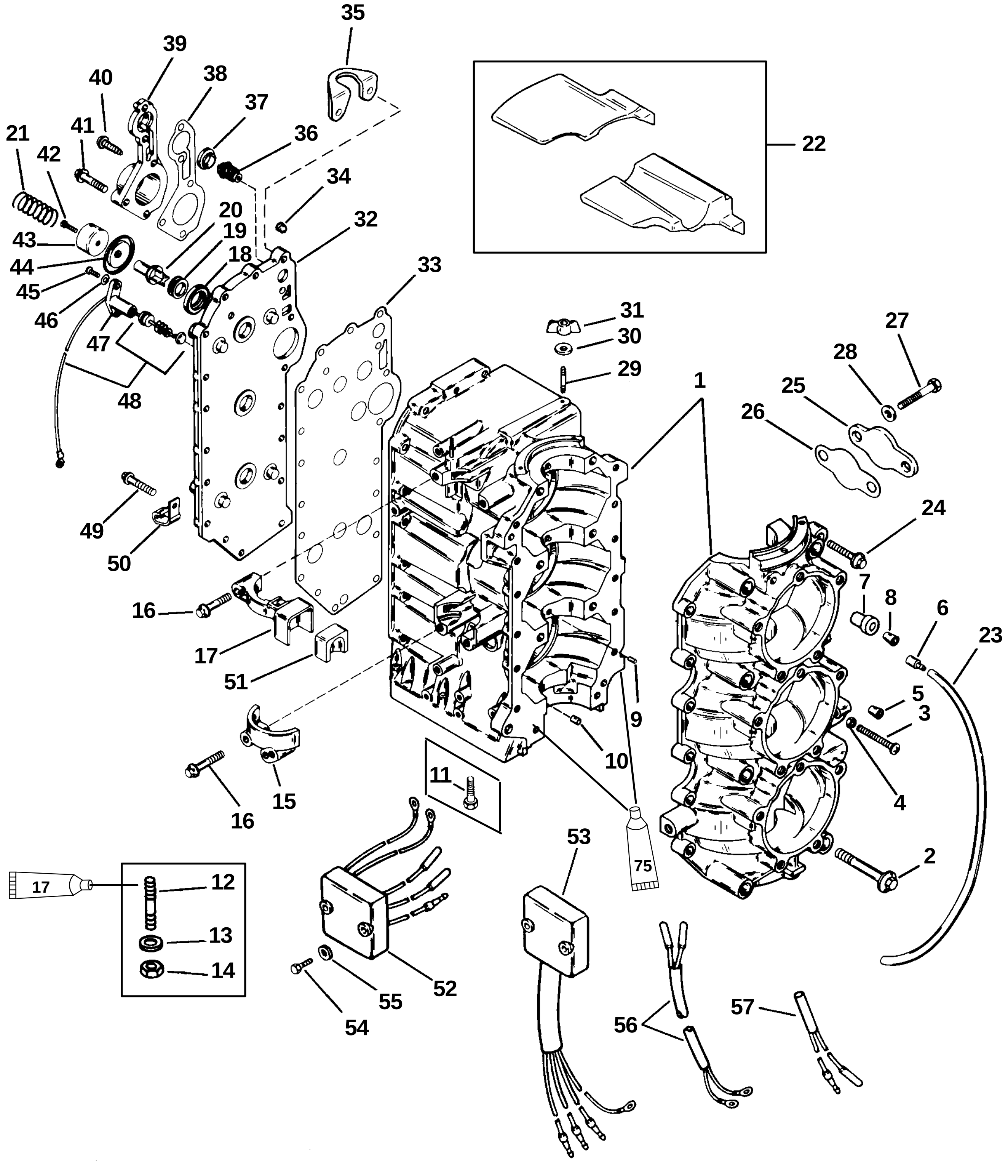


17 Loctite 35 (92-59328-1)

75 Loctite Master Gasket (92-12564-1)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	CYLINDER BLOCK ASSEMBLY			
2	8	SCREW			
3	1	ADJUSTING SCREW		25	33.9
4	1	NUT			
5	1	CAP			
6	1	CHECK VALVE (PRESS-IN)			
7	1	CARRIER ASSEMBLY			
8	2	CHECK VALVE			
9	3	DOWEL PIN (BEARING RACE)			
10	1	DOWEL PIN			
11	8	SCREW **(DESIGN I)**		25	33.9
12	8	STUD			
13	8	WASHER **DESIGN II**			
14	8	NUT		45	61
15	1	COVER (BOTTOM)			
16	4	SCREW		12.5	16.9
17	1	COVER (TOP)			
18	1	CARRIER **Use where applicable**			
19	1	GROMMET			
20	1	POPPET VALVE			
21	1	SPRING			
22	1	PLUG KIT			
23	1	TUBING (19 IN.)			
24	12	SCREW		18	24.4
25	1	COVER			
26	1	GASKET **NON OIL INJECTION**			
27	2	SCREW	60		6.8
28	2	WASHER			
29	2	STUD			
30	2	WASHER			
31	2	NUT	Drive Tight		

Cylinder Block (3 cyl.)
(USA-0G127499/BEL-9836632 & BELOW)

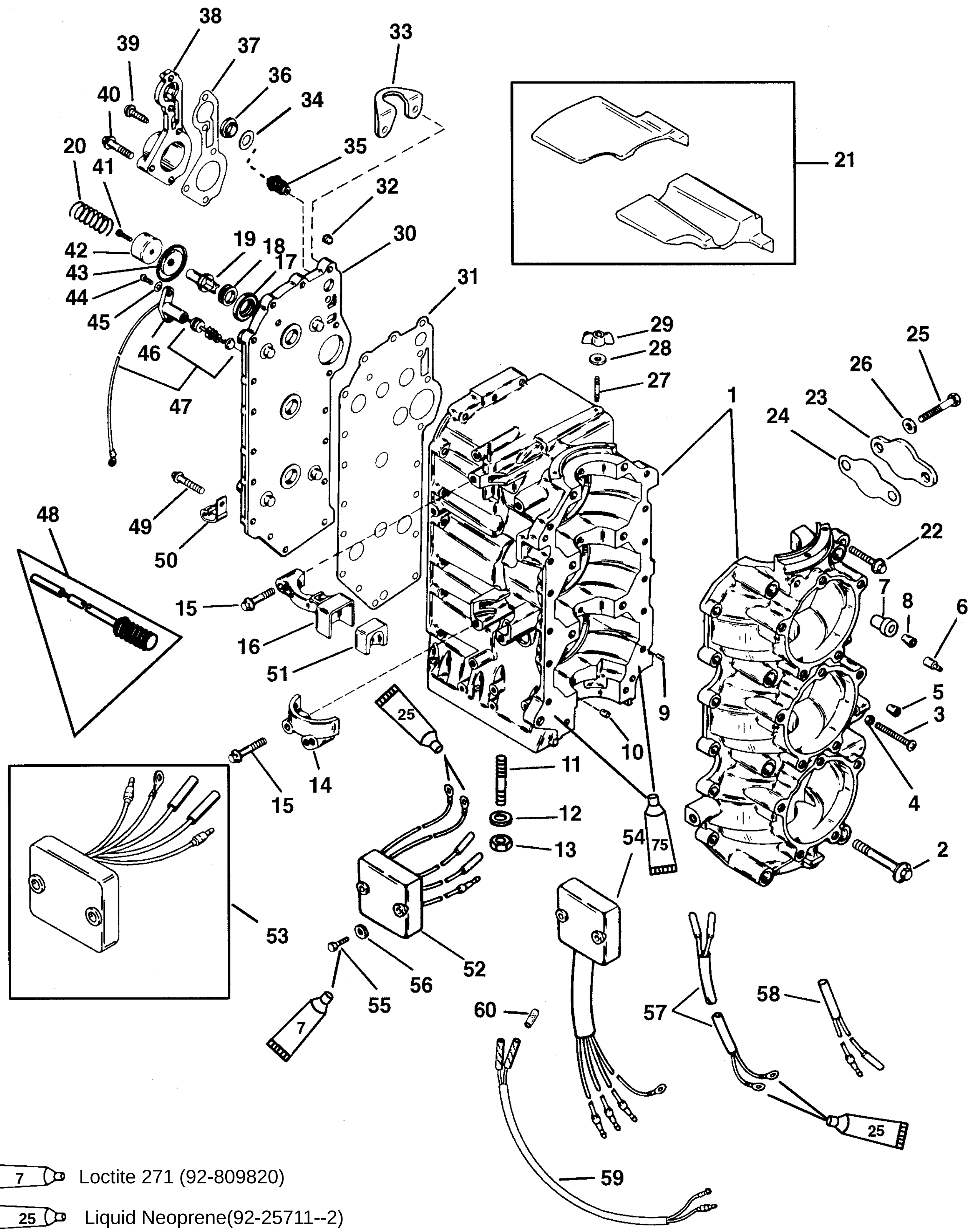


17 Loctite 35 (92-59328-1)

75 Loctite Master Gasket (92-12564-1)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
32	1	COVER ASSEMBLY			
33	1	GASKET			
34	1	PIPE PLUG			
35	1	LIFTING EYE			
36	1	THERMOSTAT			
37	1	GASKET			
38	1	GASKET			
39	1	COVER			
40	1	SCREW–air vent hole			
41	5	SCREW (35 MM)		18	24.4
42	1	SCREW	Drive Tight		
43	1	WASHER			
44	1	DIAPHRAGM			
45	2	SCREW	Drive Tight		
46	1	WASHER			
47	1	RETAINER			
48	1	TEMPERATURE SENDER **(ELECTRIC)**			
	1	TEMPERATURE SENDER **(MANUAL)**			
49	14	SCREW		18	24.4
50	4	CLAMP			
51	1	BOOT			
52	1	OIL WARNING MODULE			
53	1	REV LIMITER **(NON OIL INJECTION)**			
54	2	SCREW (M6 x 1 x 50)	80		9.0
	2	SCREW (M6 x 1 x 30)	80		9.0
55	2	WASHER			
56	1	HARNESS–speed limiter **(NON OIL INJECTION)**			
57	1	HARNESS ADAPTOR			

Cylinder Block (3 Cyl.)
(USA-0G127500/BEL-9836633 & UP)



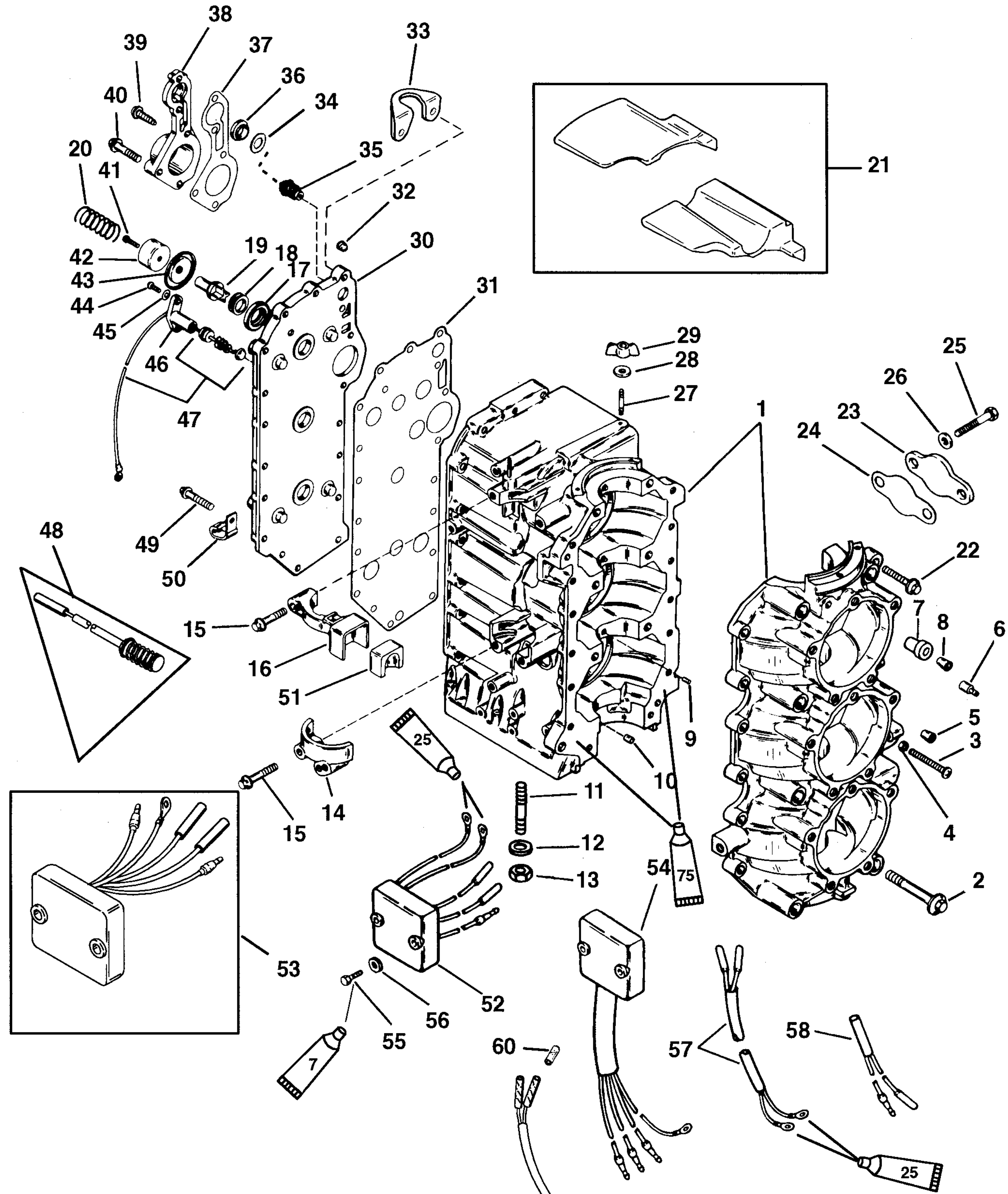
7 Loctite 271 (92-809820)

25 Liquid Neoprene(92-25711--2)

75 Loctite Master Gasket(92-12564-1)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	CYLINDER BLOCK ASSEMBLY			
2	8	SCREW(M10 x 80)		25	33.9
3	1	ADJUSTING SCREW(M6 x 55)			
4	1	NUT			
5	1	CAP			
6	1	CHECK VALVE(PRESS-IN)			
7	1	CARRIER ASSEMBLY			
8	2	CHECK VALVE			
9	3	DOWEL PIN(BEARING RACE)			
10	1	DOWEL PIN			
11	8	STUD(M10 x 136)			
12	8	WASHER			
13	8	NUT		45	61
14	1	COVER(BOTTOM)			
15	4	SCREW(M8 x 50)		12.5	16.9
16	1	COVER(TOP)			
17	1	CARRIER **Use where applicable**			
18	1	GROMMET			
19	1	POPPET VALVE			
20	1	SPRING			
21	1	PLUG KIT			
22	12	SCREW(M8 x 35)		18	24.4
23	1	COVER			
24	1	GASKET **NON OIL INJECTION**			
25	2	SCREW(M5 x 12)	50		5.6
26	2	WASHER			
27	2	STUD			
28	2	WASHER			
29	2	NUT	Drive Tight		

Cylinder Block (3 Cyl.)
(USA-0G127500/BEL-9836633 & UP)



7 Loctite 271 (92-809820)

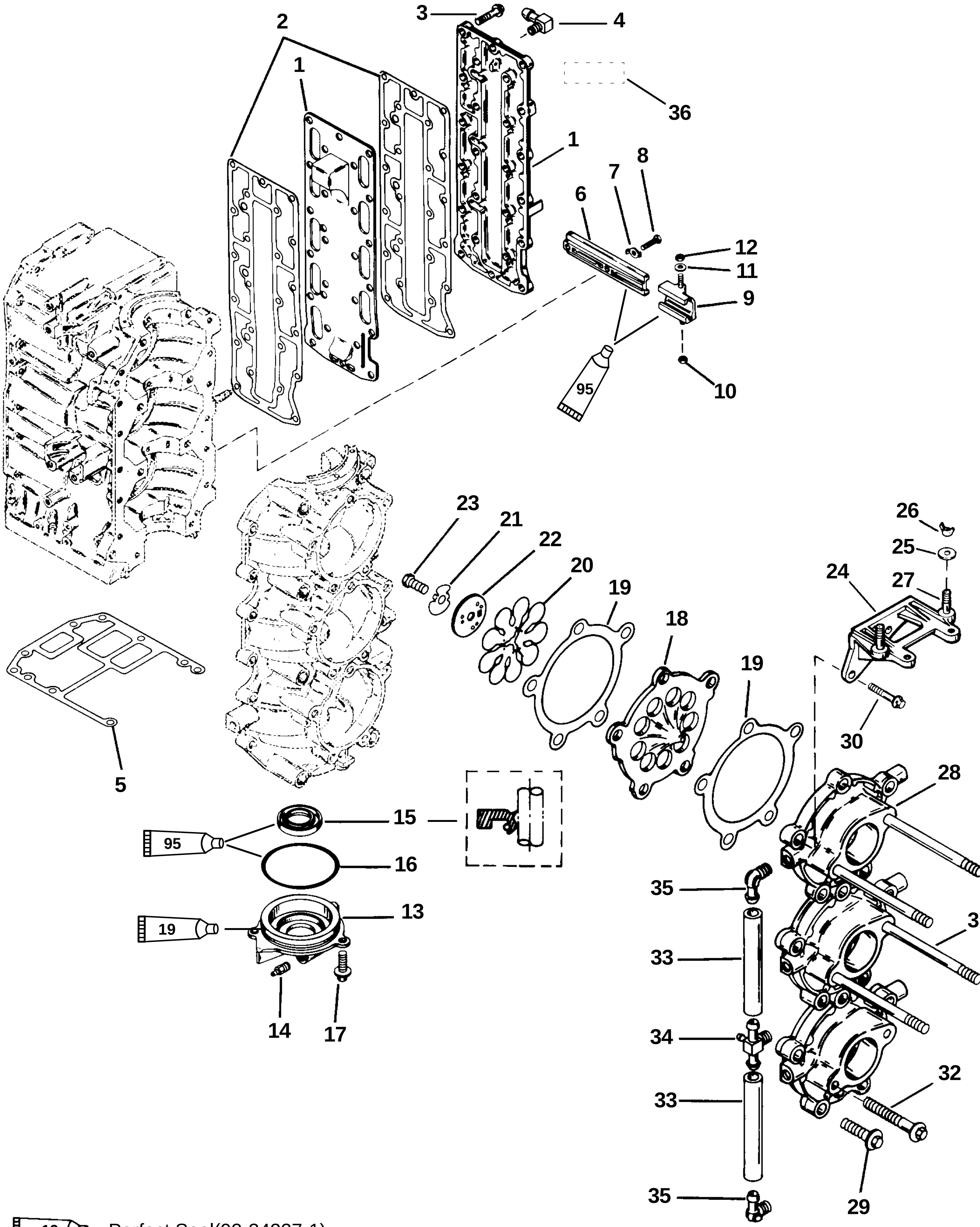
25 Liquid Neoprene(92-25711--2)

75 Loctite Master Gasket(92-12564-1)

CYLINDER BLOCK (USA-S/N-0G127500/BEL-9836633 & UP)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	lb. ft.	N·m
30	1	COVER ASSEMBLY			
31	1	GASKET			
32	1	PIPE PLUG			
33	1	LIFTING EYE NON OIL INJECTION			
34	1	WASHER			
35	1	THERMOSTAT (OIL INJECTION)			
36	1	GASKET			
37	1	GASKET			
38	1	COVER			
39	1	SCREW–air vent hole (Use where Applicable)			
40	5	SCREW (M8 x 35)		18	24.4
41	1	SCREW(10-16 x 3/4)	Drive Tight		
42	1	WASHER			
43	1	DIAPHRAGM			
44	2	SCREW (10-16 x 5/8)	Drive Tight		
45	2	WASHER			
46	1	RETAINER			
47	1	TEMPERATURE SENDER (DESIGN I)			
48	1	TEMPERATURE SENDER (DESIGN II)			
49	14	SCREW (M8 x 35)		18	24.4
50	2	CLAMP			
51	1	BOOT			
52	1	OIL WARNING MODULE **USA-S/N-0G127500 thru 0G437999** **BEL-9836633 thru 9926999**			
53	1	OIL WARNING MODULE **USA-S/N-0G438000 thru 0G589999/BEL-9927000 thru 9973099)**			
54	1	REV LIMITER **(ELECTRIC)** **USA-S/N-0G127500 thru 0G437999**			
	1	REV LIMITER **(MANUAL)** **BEL-S/N9836633 thru 9926999**			
	1	REV LIMITER **(ELECTRIC)** **USA-S/N-0G438000 thru 0G589999**			
	1	REV LIMITER **(MANUAL)** **BEL-9927000 thru 9973099**			
	1	REV LIMITER **(ELECTRIC)** **USA-S/N-0G590000/BEL-9973100 & UP**			
	1	REV LIMITER **(MANUAL)**			
55	2	SCREW (M6 x 1 x 50)	80		9.0
	2	SCREW (M6 x 1 x 30)	80		9.0
56	2	WASHER			
57	1	HARNESS–speed limiter **(NON OIL INJECTION)**			
58	1	HARNESS ADAPTOR **(ELECTRIC NON OIL INJECTION**			
59	1	HARNESS-Adaptor **(USA-S/N-0G590000/BEL-9973100 & UP)**			
60	1	PLUG			

Induction Manifold and Reed Block (3 Cyl.)



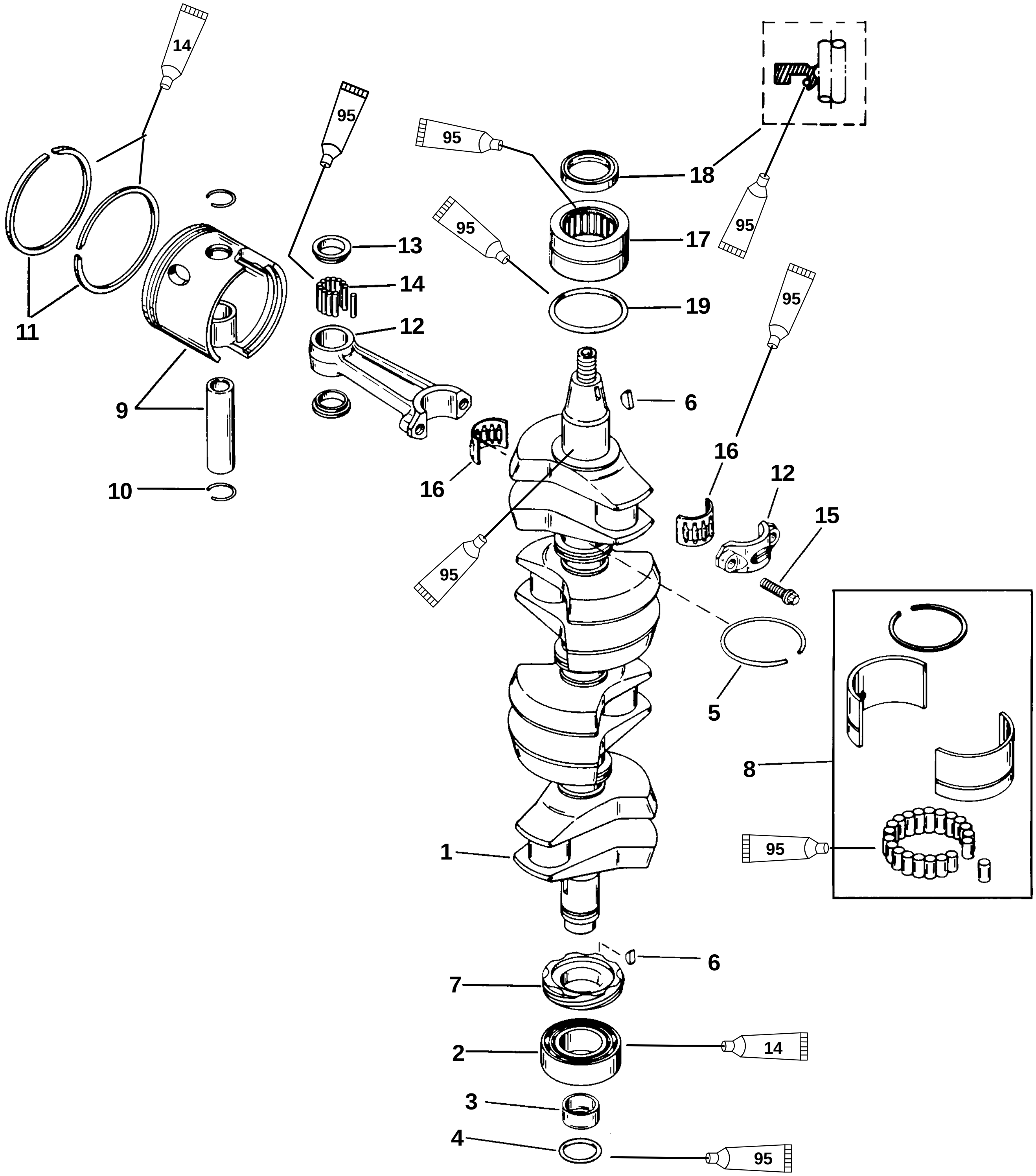
19 Perfect Seal(92-34227-1)

95 2-4-C With Teflon(92-825407A12)

Induction Manifold and Reed Block (3 Cyl.)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	EXHAUST COVER/PLATE KIT			
2	2	GASKET			
3	24	SCREW(M8 x 35)		18	24.4
4	1	ELBOW			
5	1	GASKET			
6	1	SHIFT RAIL			
7	2	TAB WASHER			
8	2	SCREW(M8 X 25)		18	24.4
9	1	SLIDE			
10	1	NUT	Drive Tight; But Joint Must Pivot Freely		
11	1	WASHER			
12	1	NUT			
13	1	LOWER END CAP ASSEMBLY			
14	1	CHECK VALVE			
15	1	OIL SEAL			
16	1	O-RING			
17	3	SCREW(M10 X 25)		18	24.4
18	3	REED BLOCK ASSEMBLY			
19	6	GASKET			
20	3	REED SET			
21	3	TAB WASHER			
22	3	RETAINER			
23	3	SCREW(M6 x 16)	80		9.0
24	1	BRACKET **(NON OIL-INJECTION)**			
	1	BRACKET **(OIL-INJECTION)**			
25	2	WASHER			
26	2	WING NUT	Drive Tight		
27	2	STUD			
28	3	INDUCTION MANIFOLD			
29	13	SCREW(M8 x 35)		18	24.4
30	2	SCREW(M8 x 40)		18	24.4
31	4	STUD(M8 x 132)			
32	2	SCREW(#3 Cylinder)(M8 x 110)	100		11.3
33	2	TUBING(4 IN.)			
34	1	TEE FITTING **(ELECTRIC)**			
	1	TEE FITTING **(MANUAL)**			
35	2	ELBOW			
36	1	DECAL-EPA INFO **(1998)**			
–	1	GASKET SET			
–	1	**POWERHEAD**			

Crankshaft, Pistons and Connecting Rods (4 Cyl.)



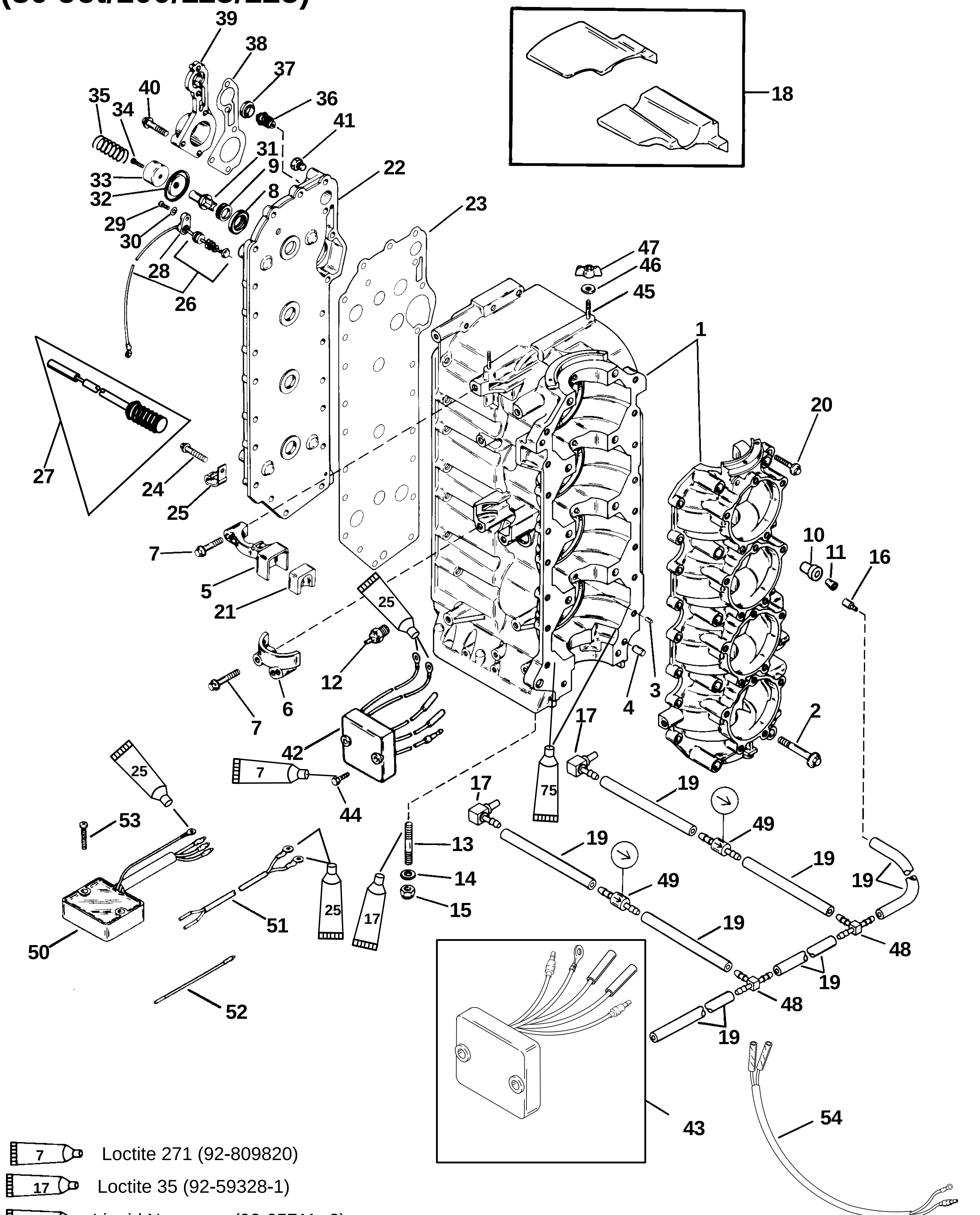
14 2 Cycle Outboard Oil (92-13249A24)

95 2-4-C With Teflon (92-825407A12)

Crankshaft, Pistons and Connecting Rods (4 Cyl.)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	lb. ft.	N·m
1	1	CRANKSHAFT ASSEMBLY			
2	1	BALL BEARING **(LOWER)**			
3	1	WEAR SLEEVE			
4	1	O-RING			
5	2	RING ASSEMBLY			
6	2	KEY			
7	1	DRIVER GEAR			
8	3	ROLLER BEARING ASSEMBLY			
9	4	PISTON ASSEMBLY **(STANDARD)**			
9	AR	PISTON ASSEMBLY **(.015 O.S.)**			
9	AR	PISTON ASSEMBLY **(.030 O.S.)**			
10	8	LOCK RING			
11	1	PISTON RING ASSEMBLY **(STANDARD)**			
11	AR	PISTON RING ASSEMBLY **(.015 O.S.)**			
11	AR	PISTON RING ASSEMBLY **(.030 O.S.)**			
12	4	CONNECTING ROD ASSEMBLY			
13	8	WASHER			
14	116	NEEDLE BEARING			
15	8	SCREW	Apply Light Oil to Threads and Bolt Face: 1st Torque - 15 lb. in. (1.7 N·m); 2nd Torque - 30 lb. ft. (40.7 N·m) Turn bolt an additional 90° after 2nd Torque		
16	4	ROLLER BEARING ASSEMBLY			
17	1	ROLLER BEARING ASSEMBLY **(UPPER)**			
18	1	OIL SEAL			
19	1	**O-RING**			

Cylinder Block and Crankcase (80 Jet/100/115/125)



7 Loctite 271 (92-809820)

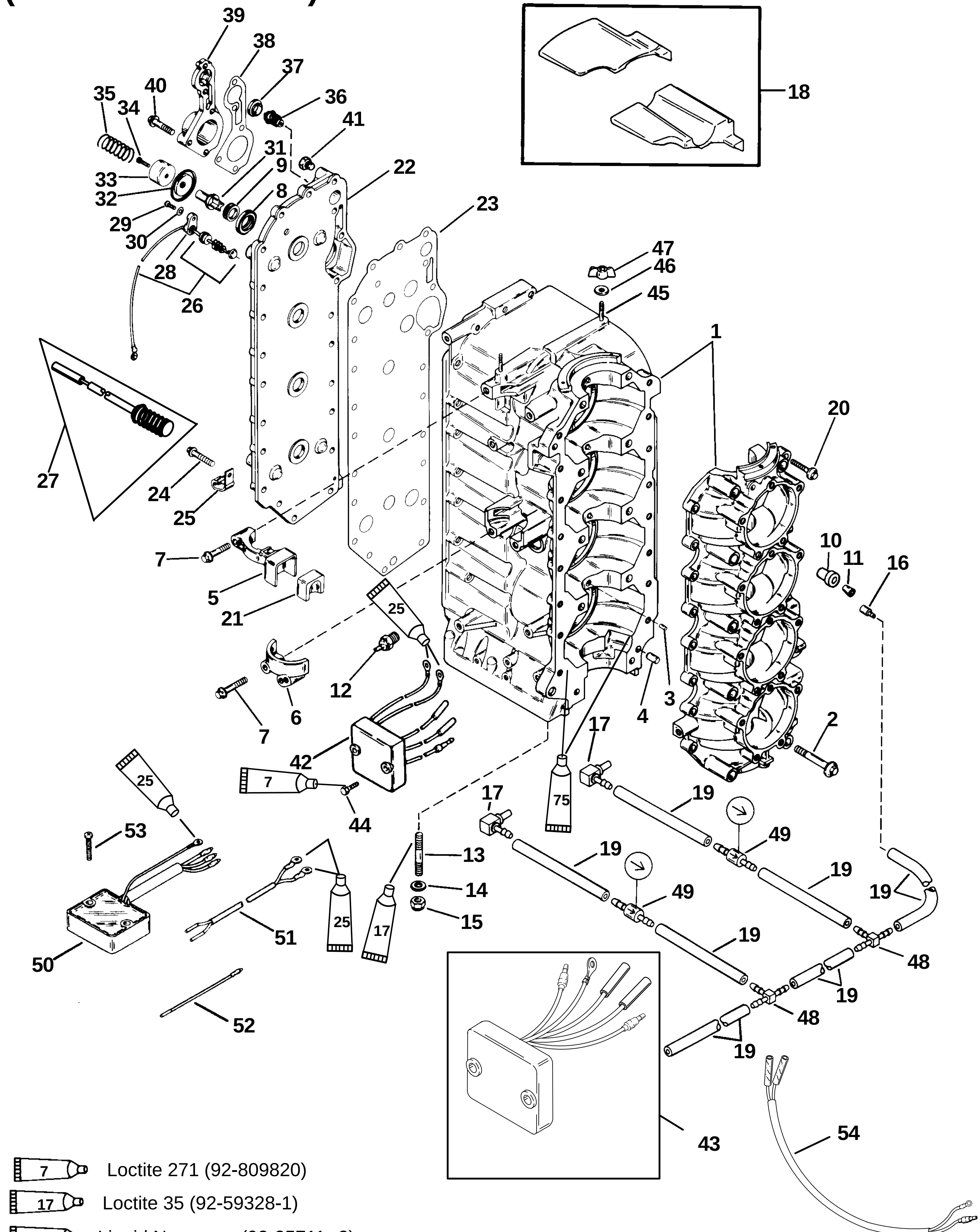
17 Loctite 35 (92-59328-1)

25 Liquid Neoprene (92-25711--2)

75 Loctite Master Gasket (92-12564-1)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	CYLINDER BLOCK **USA-S/N-0G437999 /BEL-9926999 & BELOW**			
	1	CYLINDER BLOCK **USA-S/N-0G438000 /BEL-9927000 & UP**			
2	10	SCREW (M10 x 80)		25	33.9
3	4	DOWEL PIN (BEARING RACE)			
4	1	DOWEL PIN			
5	1	COVER **(TOP)**			
6	1	COVER **(BOTTOM)**			
7	4	SCREW (M8 x 50)		12.5	16.9
8	1	CARRIER			
9	1	GROMMET			
10	1	CARRIER ASSEMBLY			
11	3	CHECK VALVE			
12	2	CHECK VALVE			
13	8	STUD (M10)			
14	8	WASHER			
15	8	NUT		45	61
16	1	CHECK VALVE (PRESS-IN)			
17	2	FITTING **(S/N–USA–0G301750/BEL–9885504 & BELOW)**			
18	1	PLUG KIT			
19	1	TUBING **(S/N–USA–0G301750/BEL–9885504 & BELOW)**			
20	16	SCREW (8 x 35)		18	24.4
21	1	BOOT			
22	1	COVER			
23	1	GASKET			
24	18	SCREW (M8 x 35)		18	24.4
25	5	CLAMP			

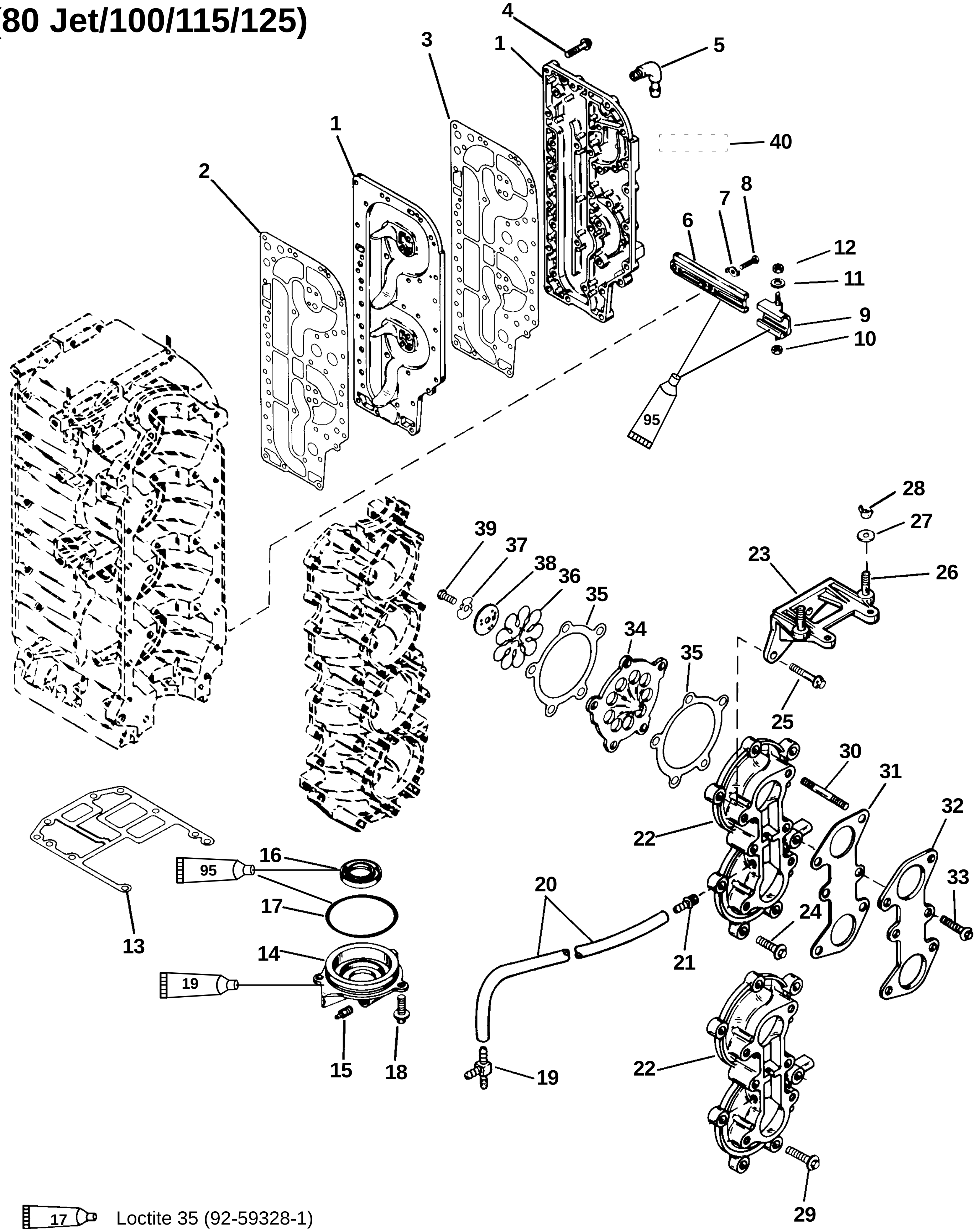
Cylinder Block and Crankcase (80 Jet/100/115/125)



7	Loctite 271 (92-809820)
17	Loctite 35 (92-59328-1)
25	Liquid Neoprene (92-25711--2)
75	Loctite Master Gasket (92-12564-1)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	lb. ft.	N·m
26	1	TEMPERATURE SENDER (35-1/2 IN.)(RING TERMINAL)			
27	1	TEMPERATURE SENDER (22-1/2 IN.)(FEMALE TERMINAL)			
28	1	RETAINER			
29	1	SCREW	Drive Tight		
30	1	WASHER			
31	1	POPPET VALVE			
32	1	DIAPHRAGM			
33	1	WASHER			
34	1	SCREW (10-16 x 3/4 IN.)	Drive Tight		
35	1	SPRING			
36	1	THERMOSTAT			
37	1	GASKET			
38	1	GASKET			
39	1	COVER			
40	1	SCREW (M8 x 35)		18	24.4
	4	SCREW (M8 x 55)		18	24.4
41	1	PIPE PLUG			
42	1	OIL WARNING MODULE **USA-S/N-0G437999 /BEL-9926999 & BELOW**			
43	1	OIL WARNING MODULE **USA-S/N-0G438000 thru 0G589999 /BEL-9927000 thru 9973099**			
44	2	SCREW (M6 x 30)	80		9.0
45	2	STUD			
46	2	WASHER			
47	2	WING NUT	Drive Tight		
48	2	FITTING (TEE) **S/N–USA–0G301750/**			
49	2	CHECK VALVE **BEL–9885504 & BELOW**			
50	1	REV LIMITER **USA-S/N-0G589999 /BEL-9973099 & BELOW**			
	1	REV LIMITER **USA-S/N-0G590000 /BEL-9973100 & UP**			
51	1	HARNESS–Adaptor-Rev Limiter Use where applicable			
52	1	HARNESS–Adaptor			
53	2	SCREW (M6 x 50)	80		9.0
	2	SCREW (M6 x 30)			
54	1	HARNESS-Adaptor			

Induction Manifold and Reed Block (80 Jet/100/115/125)

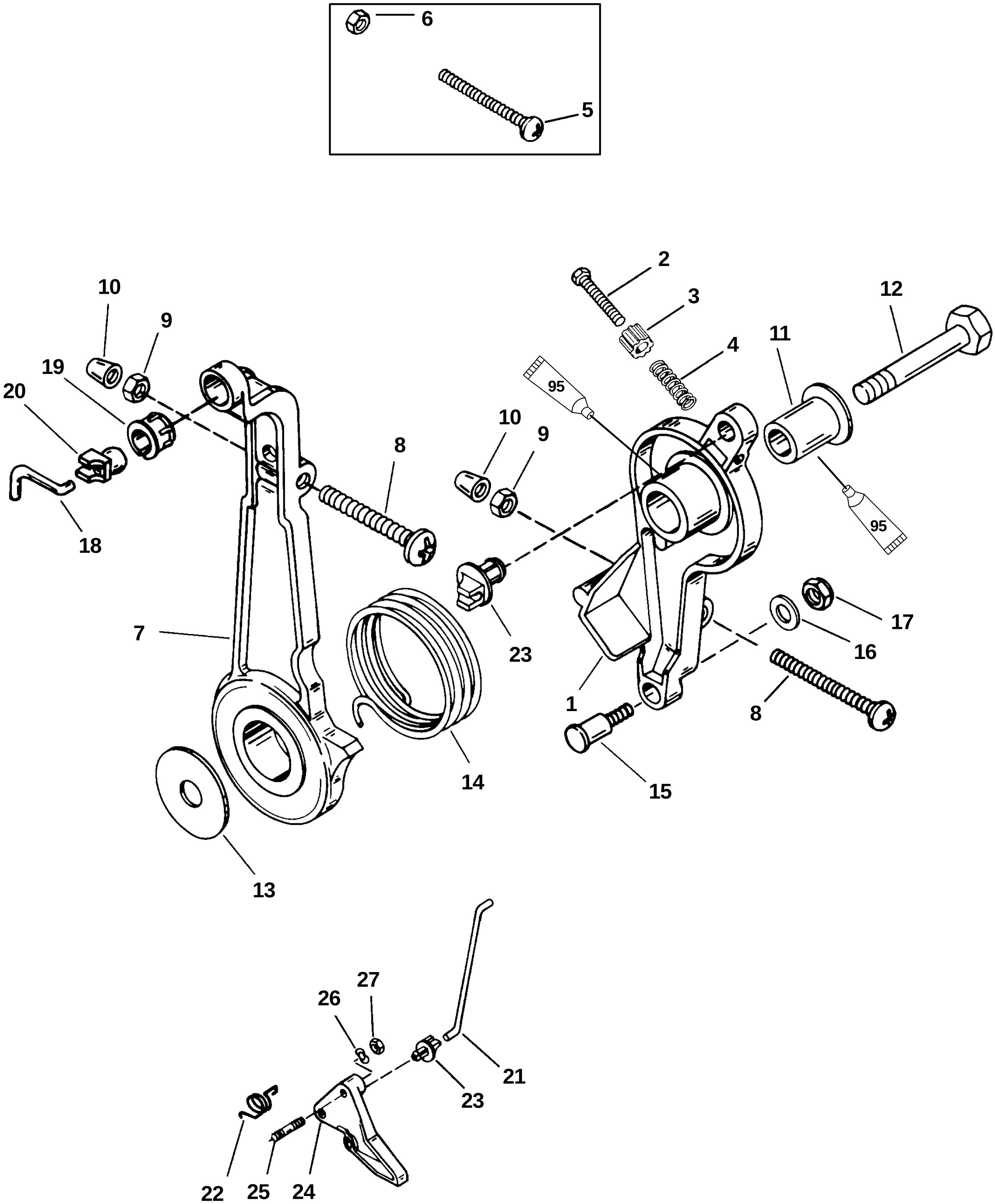


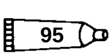
17	Loctite 35 (92-59328-1)
19	Perfect Seal (92-34227-1)
95	2-4-C With Teflon (92-825407A12)

Induction Manifold and Reed Block (80 Jet/100/115/125)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	EXHAUST COVER PLATE KIT			
2	1	GASKET			
3	1	GASKET			
4	35	SCREW (M8 x 35)		18	24.4
5	1	ELBOW			
6	1	SHIFT RAIL			
7	2	TAB WASHER			
8	2	SCREW (M8 x 25)	60		6.8
9	1	SLIDE			
10	1	NUT			
11	1	WASHER			
12	1	NUT	Drive Tight; But Joint Must be Free to Pivot		
13	1	GASKET			
14	1	LOWER END CAP ASSEMBLY			
15	1	CHECK VALVE			
16	1	OIL SEAL			
17	1	O-RING			
18	3	SCREW (M10 x 25)	150		16.9
19	1	TEE FITTING			
20	2	HOSE (5-1/2 IN.)			
21	2	FITTING (STRAIGHT)			
22	2	INDUCTION MANIFOLD			
23	1	BRACKET			
24	12	SCREW (M8 x 35)		18	24.4
25	2	SCREW (M8 X 40)		12.5	16.9
26	2	STUD			
27	2	WASHER			
28	2	WING NUT	Drive Tight		
29	2	SCREW (#4 cylinder)		18	24.4
30	6	STUD (#1, 2, 3 cylinder)			
31	2	GASKET			
32	2	COVER			
33	4	SCREW (M8 x 55)		12.5	16.9
34	4	REED BLOCK ASSEMBLY			
35	8	GASKET			
36	4	REED SET			
37	4	TAB WASHER			
38	4	RETAINER			
39	4	SCREW (M6 x 16)	80		9.0
40	1	DECAL-EPA INFO (1998)			
–	1	**GASKET SET**			
–	1	**POWERHEAD**			

Throttle Lever and Linkage (65 Jet/75/90 Models)



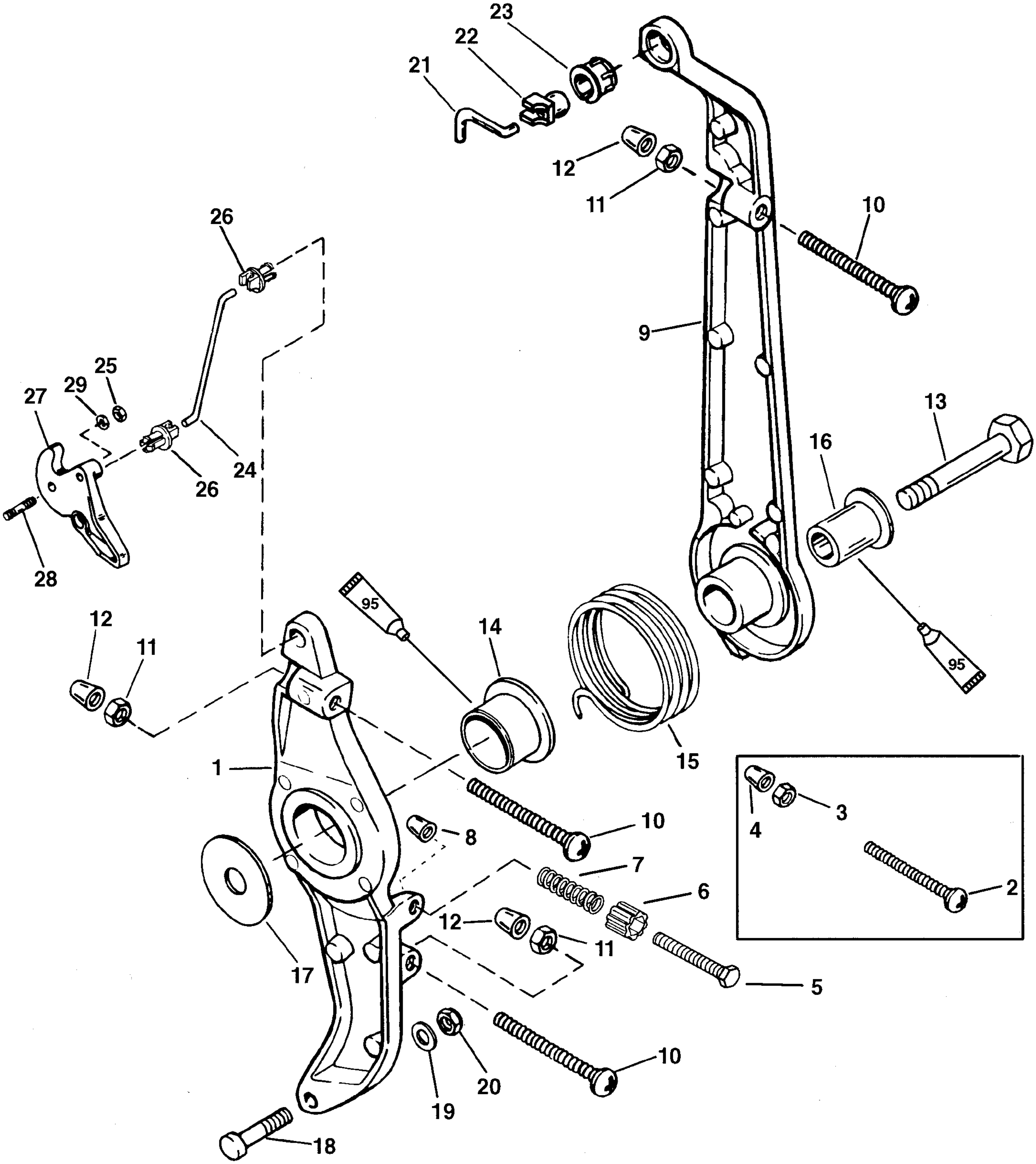


2-4-C With Teflon (92-825407A12)

Throttle Lever and Linkage (65 Jet/75/90 MODELS)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	THROTTLE LEVER			
2	1	SCREW			
3	1	CAP **DESIGN II**			
4	1	SPRING			
5	1	ADJUSTING SCREW **DESIGN I**			
6	1	JAM NUT			
7	1	SPARK ADVANCE LEVER			
8	2	ADJUSTING SCREW (6 MM)			
9	2	JAM NUT			
10	2	NYLON CAP			
11	1	BUSHING			
12	1	SCREW	Tighten Securely; But Arm Must Pivot Freely		
13	1	WASHER			
14	1	SPRING			
15	1	PIN			
16	1	WASHER			
17	1	NUT	Tighten Nut Secure-ly; Then Back Off Nut 1/4 Turn		
18	1	SPARK ADVANCE ROD			
19	2	SWIVEL BASE			
20	2	SWIVEL BALL			
21	1	THROTTLE ROD			
22	1	SPRING			
23	2	BUSHING			
24	1	THROTTLE CAM			
25	1	STUD			
26	1	WASHER			
27	1	NUT	Drive Tight; But Joint Must Be Free To Pivot		

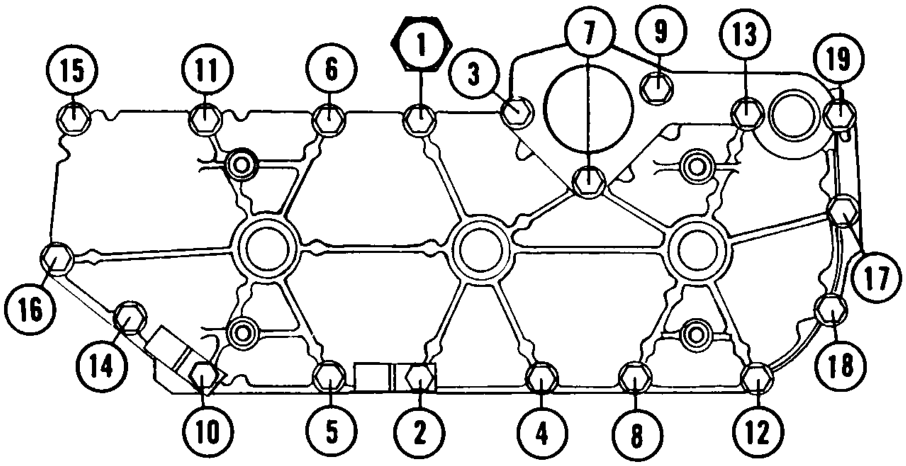
Throttle Lever
(Models 80Jet/100/115/125)



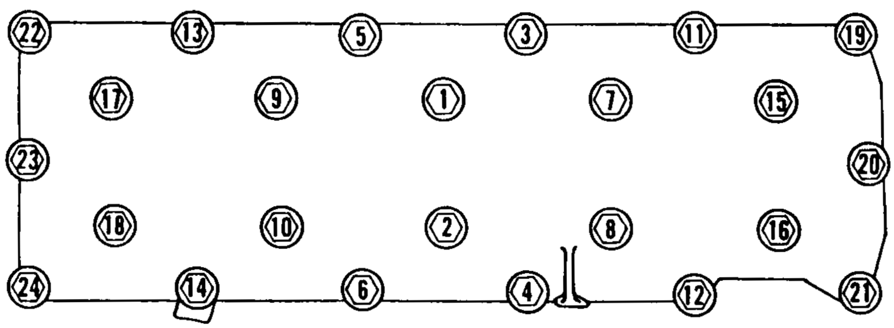
95 2-4-C With Teflon (92-825407A12)

REF. NO.	QTY.	DESCRIPTION		TORQUE lb. in.	lb. ft.	N·m
1	1	THROTTLE LEVER				
2	1	ADJUSTING SCREW	DESIGN I			
3	1	JAM NUT	DESIGN I			
4	1	NYLON CAP	DESIGN I			
5	1	SCREW (M5 x 40)	DESIGN II			
6	1	CAP	DESIGN II			
7	1	SPRING	DESIGN II			
8	1	NYLON CAP	DESIGN II			
9	1	SPARK ADVANCE LEVER				
10	3	ADJUSTING SCREW (M6 x 55)				
11	3	JAM NUT				
12	3	NYLON CAP				
13	1	SCREW (M10 x 45)		Tighten Screw Securely; But Arm Must Be Free To Pivot		
14	1	BUSHING				
15	1	SPRING				
16	1	BUSHING				
17	1	WASHER				
18	1	PIN				
19	1	WASHER				
20	1	NUT		Tighten Nut Securely; Then Back Off 1/4 Turn		
21	1	SPARK ADVANCE ROD				
22	1	SWIVEL BALL				
23	1	SWIVEL BASE				
24	1	LINK				
25	1	NUT		Drive Tight; But Joint Must be Free to Pivot		
26	2	BUSHING				
27	1	THROTTLE CAM				
28	1	STUD				
29	1	WASHER				

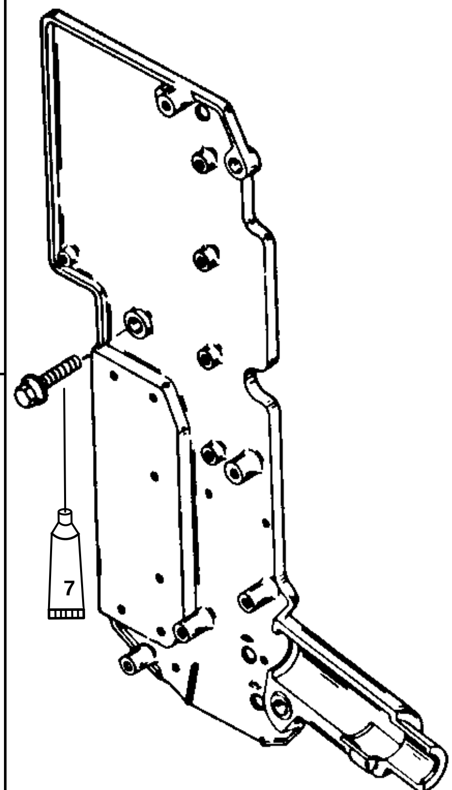
Cylinder Block Cover
18 lb. ft. (24.4 N·m)



Exhaust Cover (and Divider Plate)
18 lb. ft. (24.4 N·m)

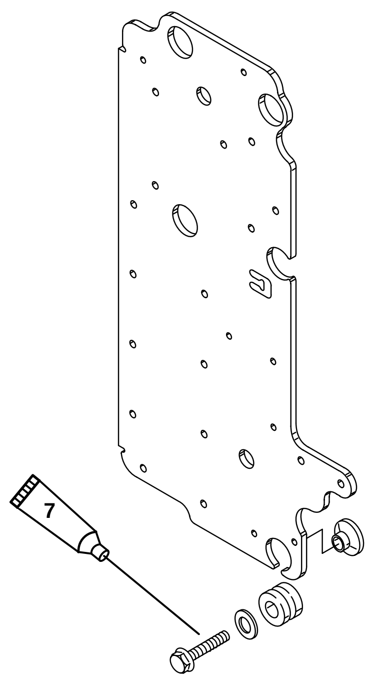


USA - 437999/BEL-9926999 & BELOW
Electrical Component Plate
13.5 lb. ft. (18.3 N·m)
Loctite 271 Required.



7 Loctite 271 (92-809820)

USA -438000/BEL-9937000 & UP
Electrical Component Plate
200 lb. in. (22.6 N·m)
Loctite 271 Required.

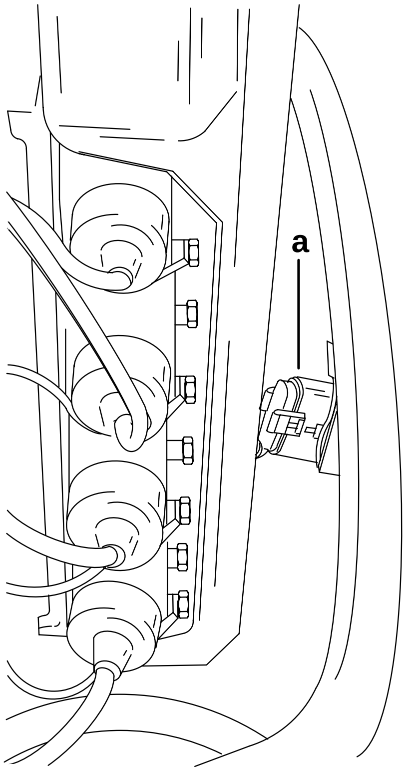


7 Loctite 271 (92-809820)

We recommend that you read the sub-section on reassembly BEFORE proceeding. There are specifics relating to this engine which are NOT applicable to prior engines.

Powerhead Removal

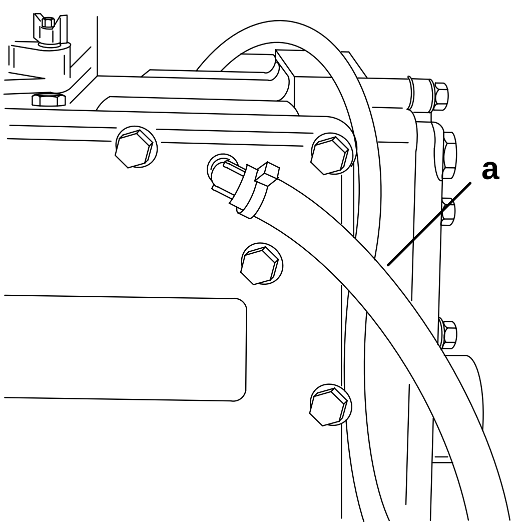
- Remove top cowl.
- Disconnect bullet connectors in cowl mounted trim switch harness.



53952

a - Cowl Mounted Trim Switch

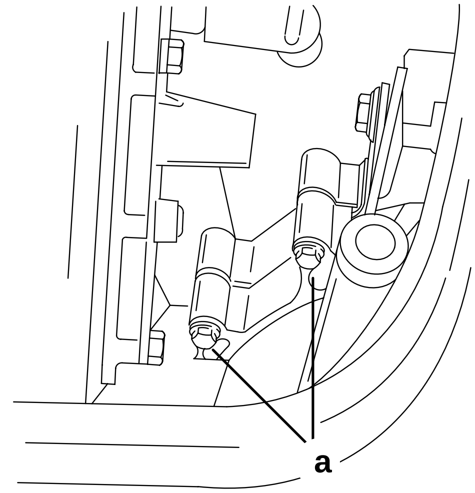
- Remove tell-tale hose from exhaust cover.



53956

a - Hose

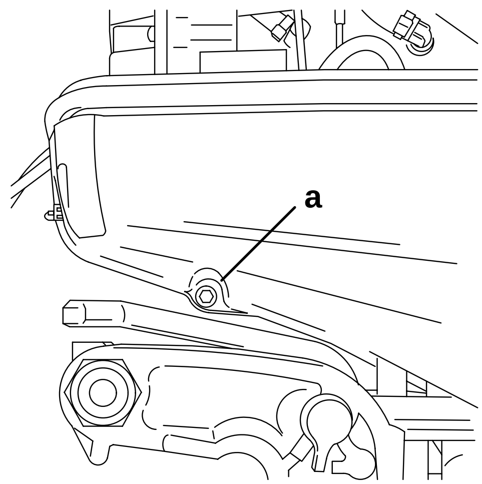
- Remove 2 bolts securing aft end of lower cowling.



53953

a - Bolts

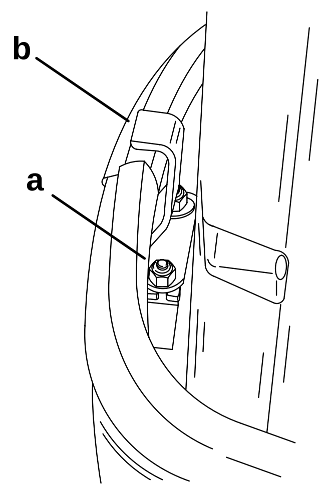
- Remove bolt securing forward portion of lower cowling.



53954

a - Bolt

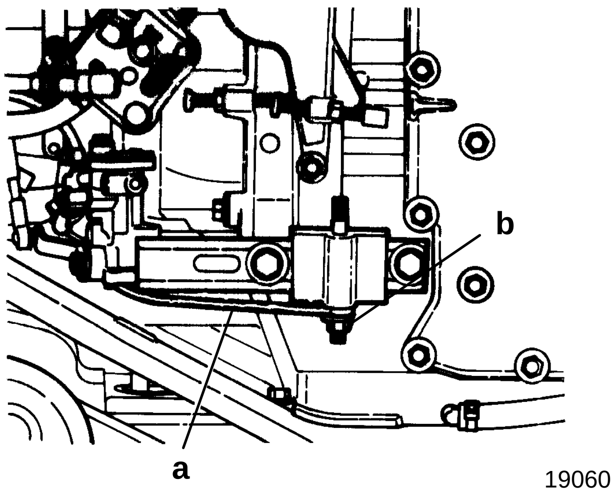
- Loosen PORT nut securing front latch to bottom cowl and remove STARBOARD bottom cowl.



53955

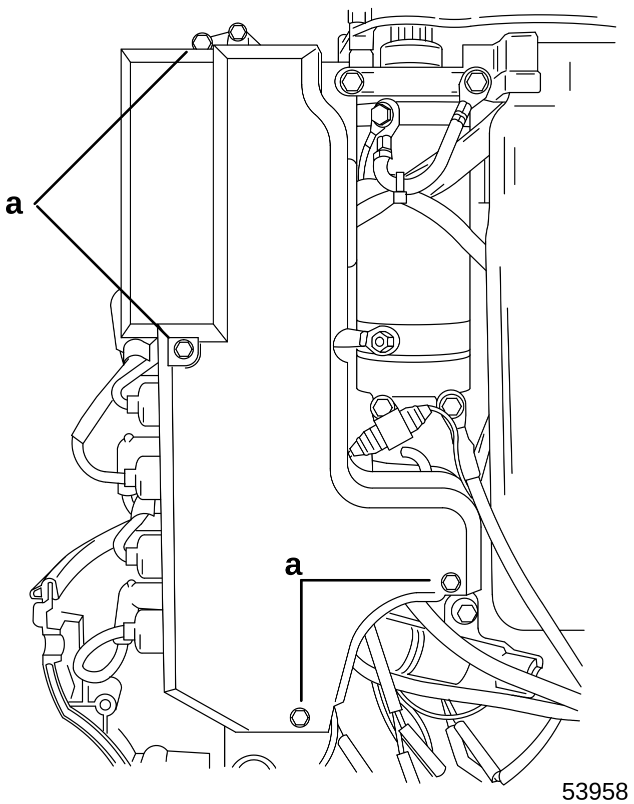
a - Nut
b - Latch

- Remove shift arm linkage at stud.



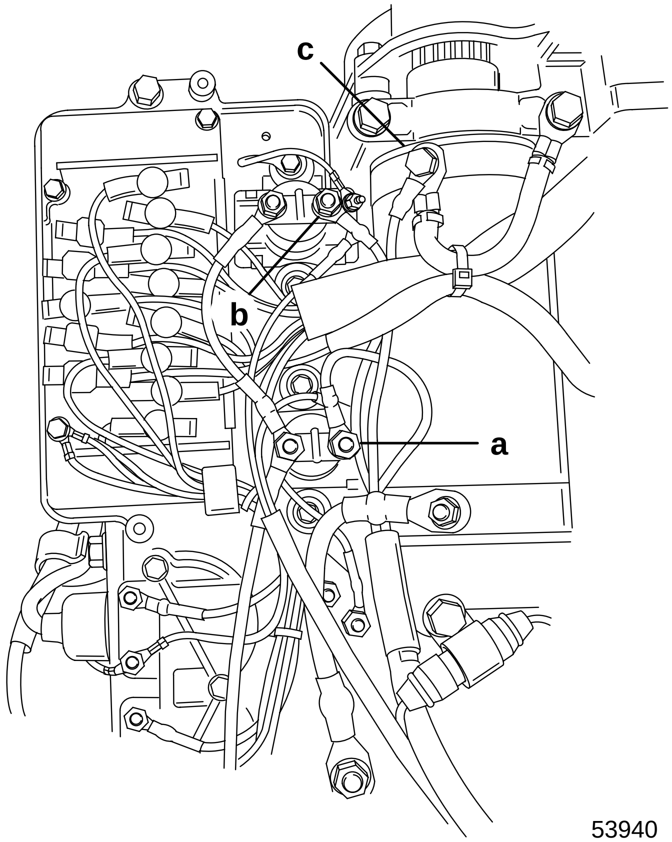
a - Shift Arm Linkage
b - Stud

- Remove 4 bolts securing electrical plate cover and remove cover.



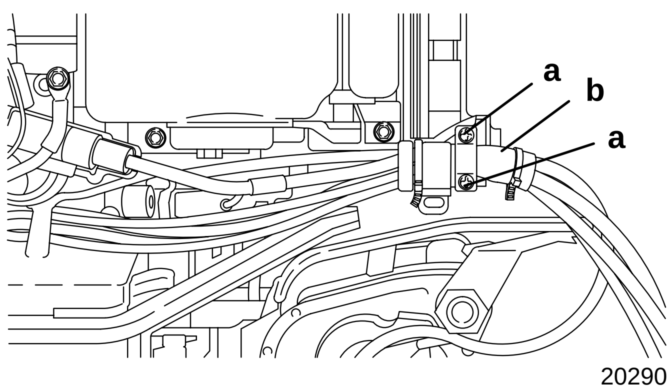
a - Bolts

- Remove 2 nuts securing GREEN and BLUE trim harness leads to solenoids. Remove bolt securing BLACK trim harness lead.



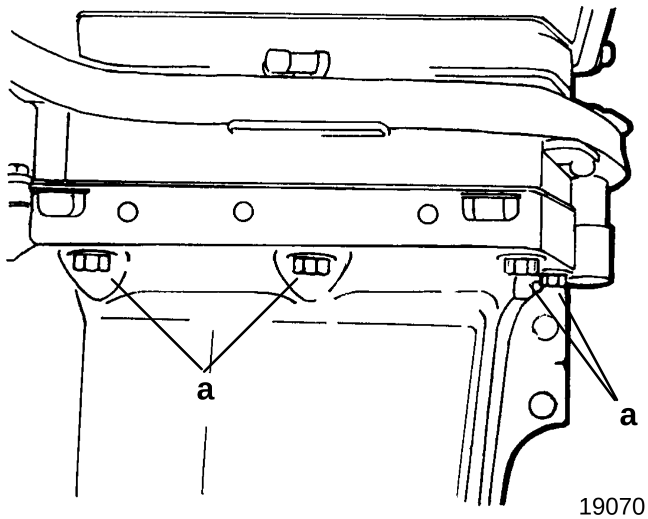
a - GREEN Trim Lead
b - BLUE Trim Lead
c - BLACK Trim Lead

- Remove 2 screws and clamp which secure control box electrical harness to engine.



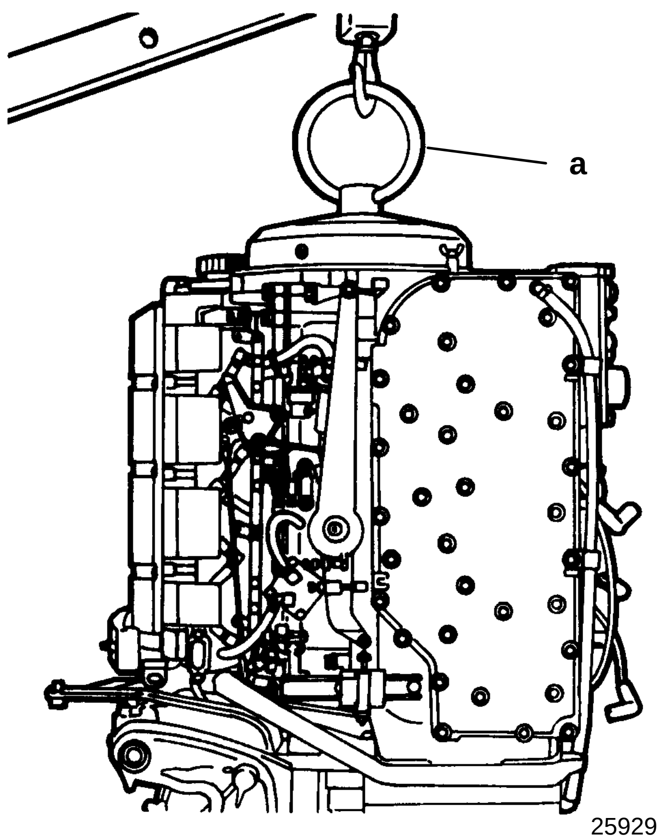
a - Screws
b - Clamp

- Remove 8 powerhead to driveshaft housing mounting nuts and washers (4 each side).



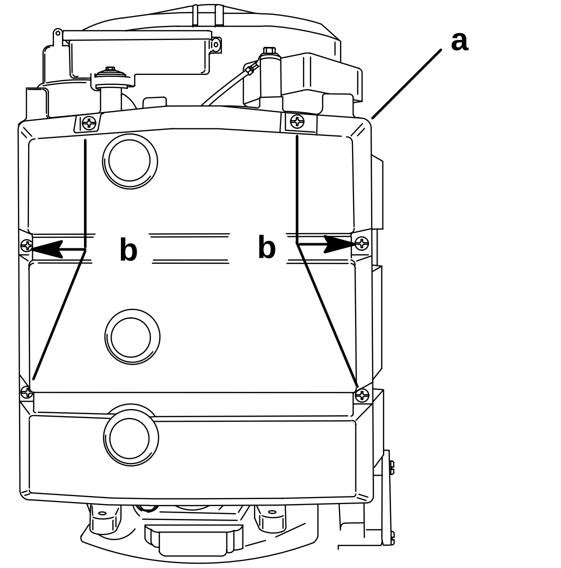
a - Nuts and Washers (4 Each Side)

- Screw lift eye (91-90455) into flywheel at least 5 full turns.
- Use suitable lifting device to remove powerhead from driveshaft housing and install on powerhead stand.



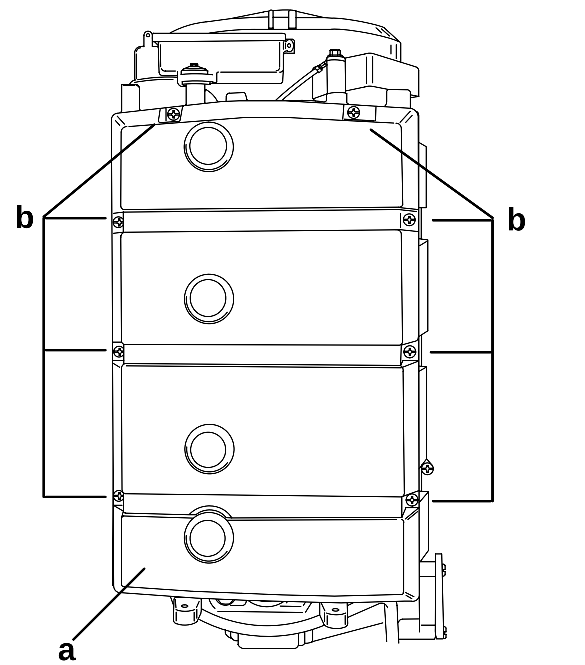
a - Lift Eye (91-90455)

- Remove Air Box Cover by removing 6 screws.



3 Cylinder Models 53977

a - Air Box Cover
b - Screws

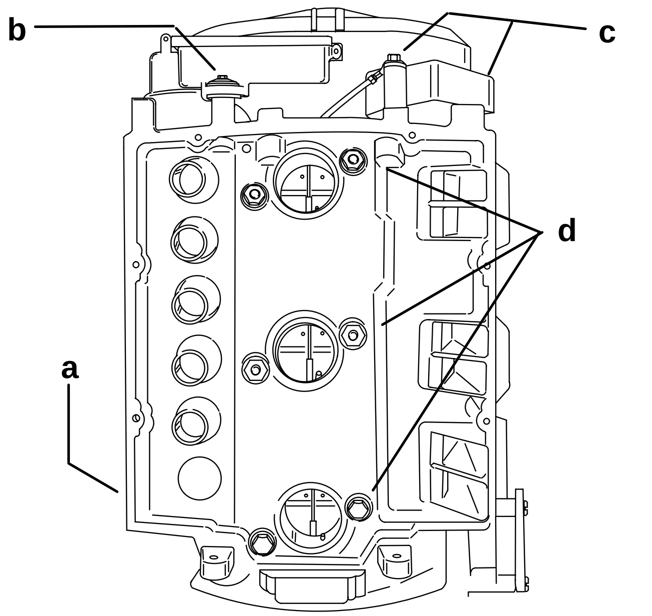


4 Cylinder Models 53976

a - Air Box Cover
b - Screws

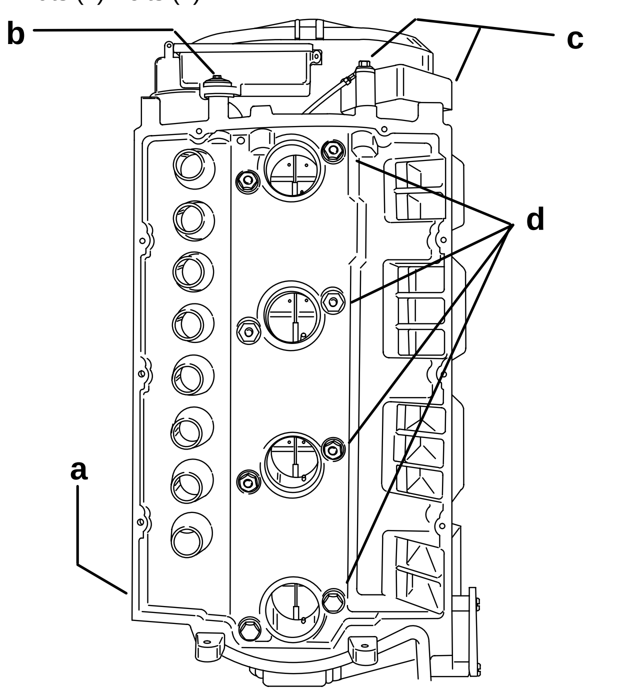
- Remove bolt from lower oil tank support (starboard side of engine, base).
- Remove bolt from upper oil tank support.
- Remove 2 bolts securing voltage regulator.
- Remove air box by removing nuts/bolts and pulling off of carburetor studs.

- Disconnect oil lines - remove oil reservoir.



3 Cylinder Models 53978

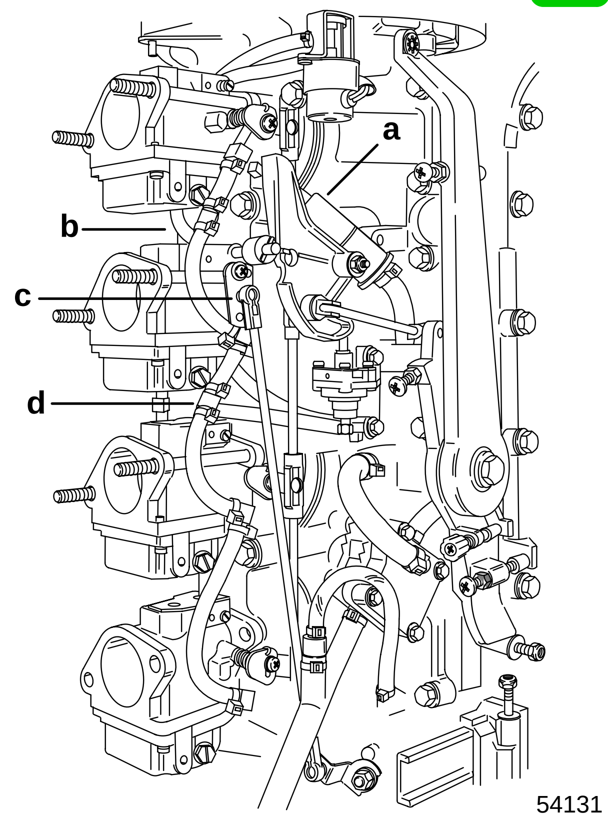
a - Bolt – Lower Oil Tank Support
b - Bolt – Upper Oil Tank Support
c - Bolts – Voltage Regulator
d - Nuts (4) Bolts (2)



4 Cylinder Models 53979

a - Bolt – Lower Oil Tank Support
b - Bolt – Upper Oil Tank Support
c - Bolts – Voltage Regulator
d - Nuts (6) Bolts (2)

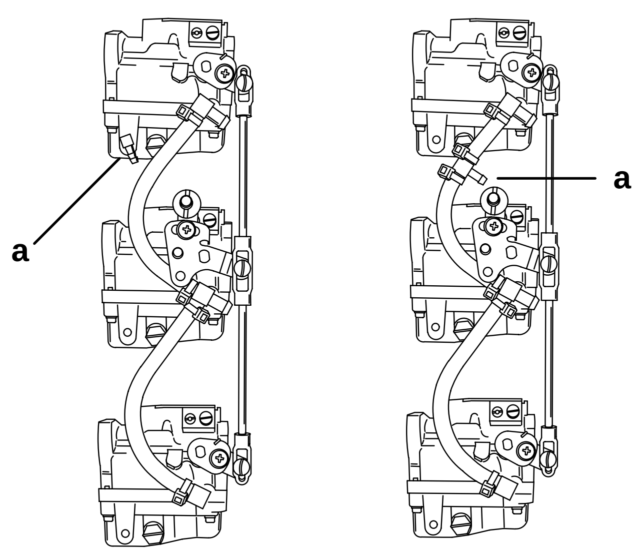
- Disconnect Oil Pump Linkage.
- Remove main fuel hose and fuel enrichment hose. Lift carburetors off as 1-unit assembly.



54131

a - Main Fuel Hose
b - Fuel Enrichment Hose
c - Oil Pump Linkage
d - Accelerator Pump Hose (4 Cylinder Models Only)

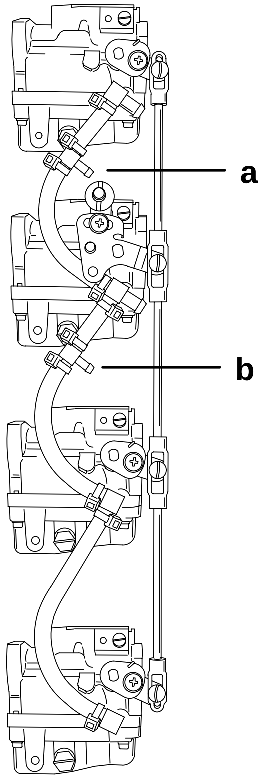
- Remove carburetors as an assembly.



1994/1995 **1996/1997/1998**

3 Cylinder Models 54133

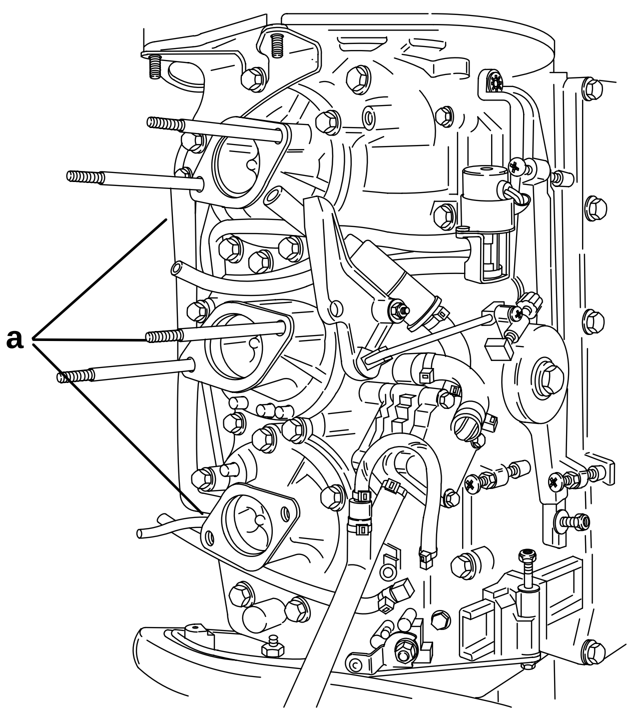
a - Fuel Enrichment Fitting



4 Cylinder Models 54134

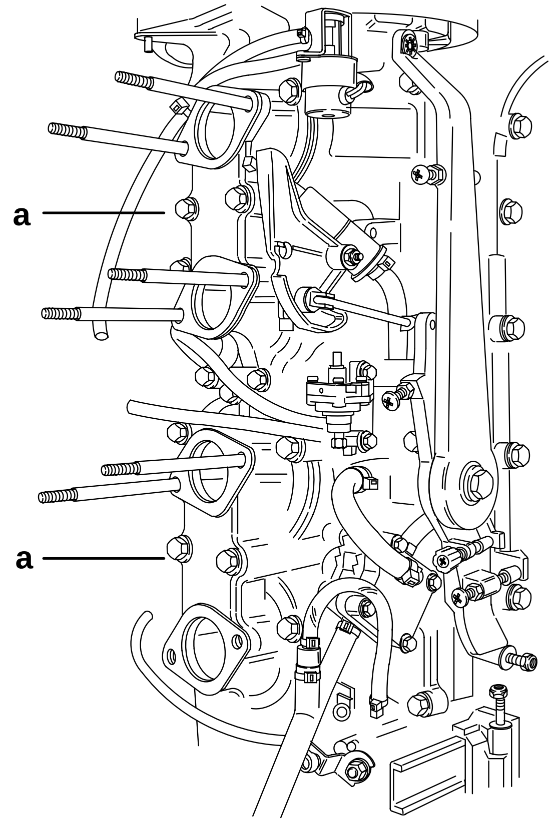
a - Fuel Enrichment Fitting
b - Accelerator Pump Fitting

- Remove intake manifolds.



3 Cylinder Models 54136

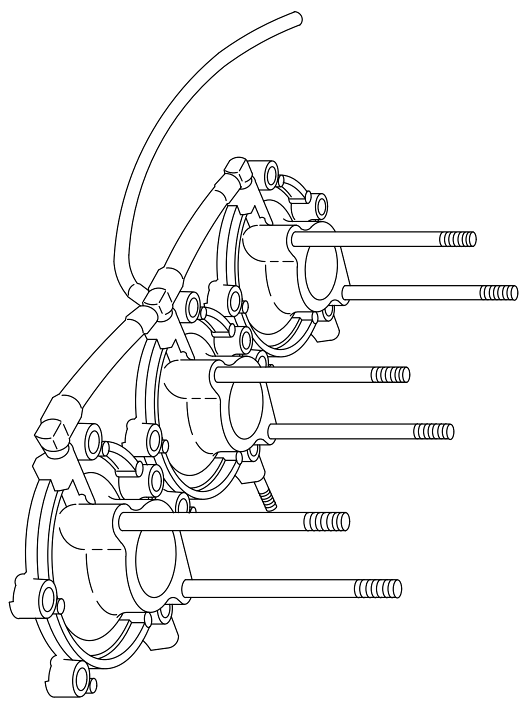
a - Intake Manifolds



4 Cylinder Models 54135

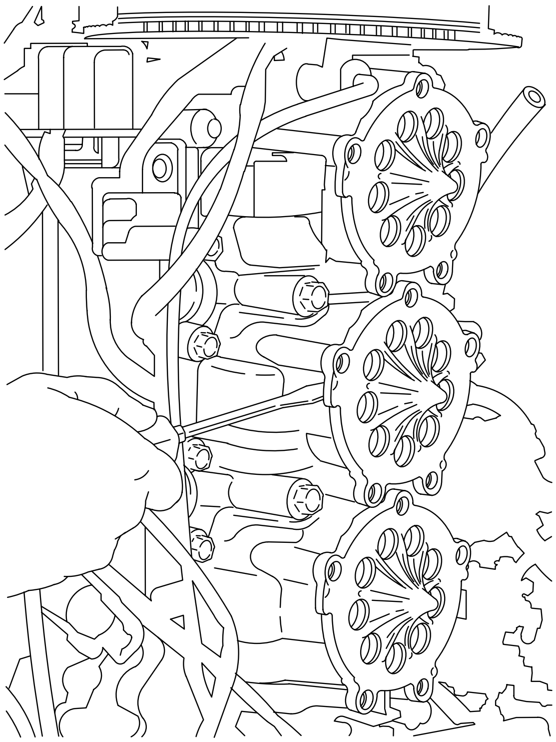
a - Intake Manifolds

- Remove intake manifolds as an assembly.



3 Cylinder Models 19330

- Pry off each reed-block, as shown, using screwdriver.

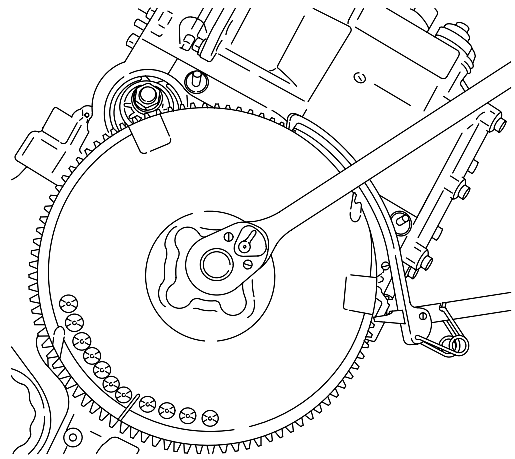


19549

Flywheel Removal

DO NOT strike end of puller center bolt to remove flywheel, or damage may result to crankshaft or bearings.

- Remove flywheel cover from powerhead.
- While holding flywheel with Flywheel Holder (91-52344), remove flywheel nut and washer.



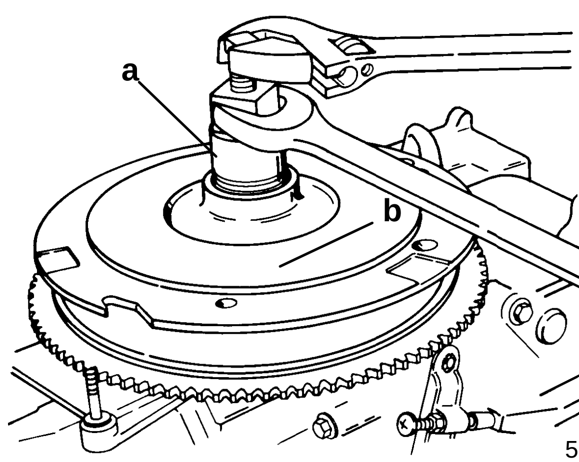
20344

Crankshaft damage may result if a protector cap is not used between crankshaft and puller.

- Install a crankshaft Protector Cap (91-24161) on end of crankshaft, then install Flywheel Puller (91-73687A1) into flywheel.

NOTE: *Neither heat nor hammer should be used on flywheel to aid in removal as damage to flywheel or electrical components under flywheel may result.*

- Remove flywheel.

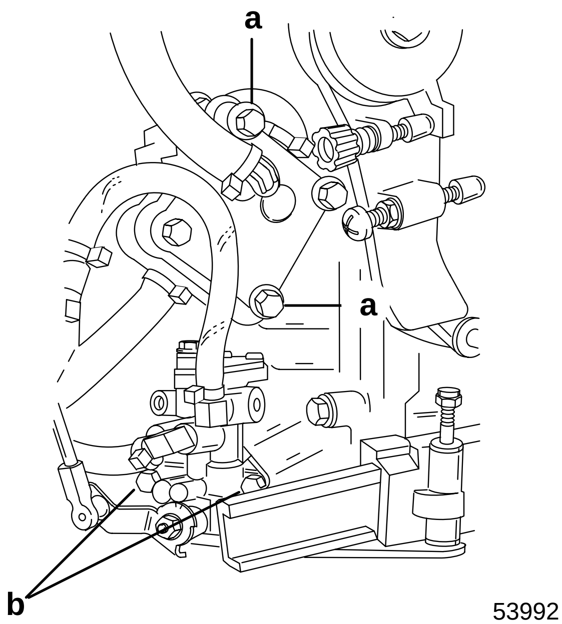


51124

a - Flywheel Puller (91-73687A1)
b - Flywheel

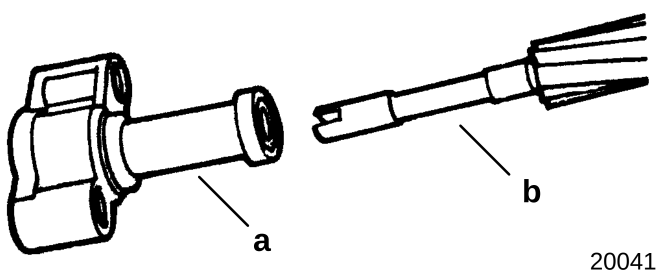
Powerhead Disassembly

- Remove fuel pump by removing 2 screws.
- Remove oil injection pump by removing 2 bolts.
- Remove hoses to fuel pump and oil injection pump.



a - Bolts – Fuel Pump
b - Bolts – Oil Pump

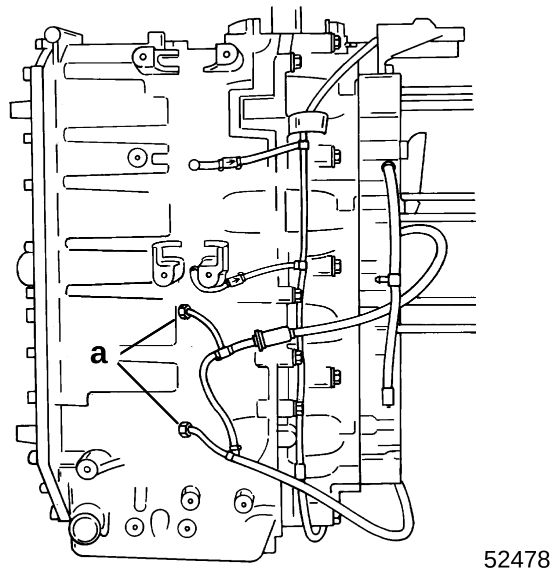
- Remove oil injection pump shaft and housing.



a - Pump Housing
b - Pump Shaft

- **4 Cylinder Models Only –** Remove accelerator pump hoses from #3 and #4 cylinder check valve fittings.

- Remove check valves.



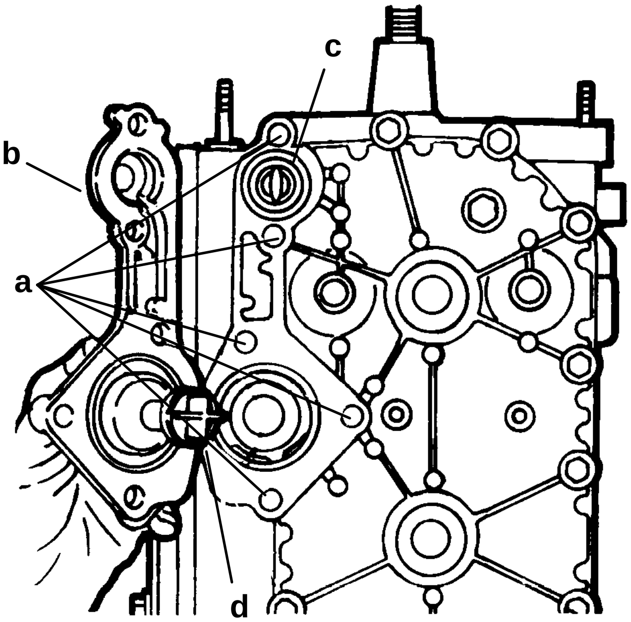
a - Check Valve (4 Cylinder Models Only)

- Accelerator check valves can be tested for proper performance as follows:

1. Spray a small amount of WD-40 into barbed end of check valve.
2. Blow out excess WD-40 with high pressure air.
3. Apply suction to barbed end with small air vacuum hand pump.
4. Apply suction until valve opens (22-28 inches of vacuum).
5. Within 30 seconds after stopping suction, vacuum should not fall below 5.0 hg.

NOTE: *Accelerator check valves should not be installed in block while honing operations are being performed nor reinstalled until all block cleaning procedures have been completed.*

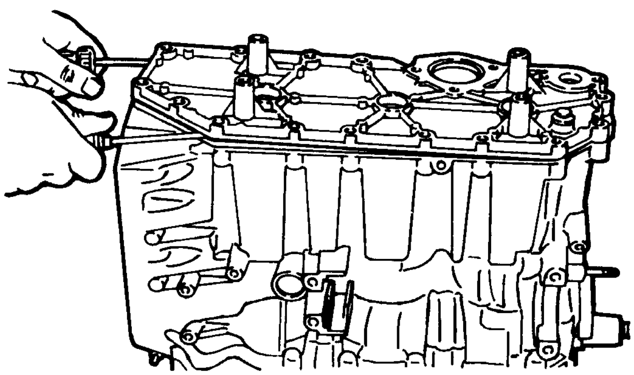
- Remove thermostat housing and components.



25907

a - Bolts
b - Thermostat Cover
c - Thermostat
d - Poppet Valve

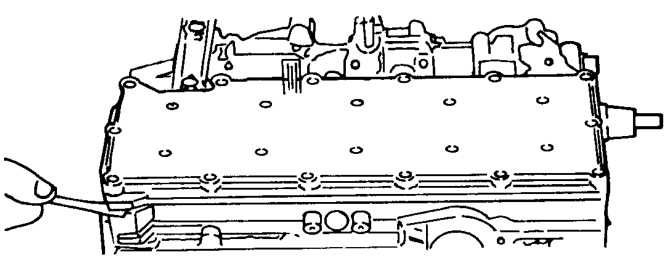
- Remove cylinder block cover.



20039

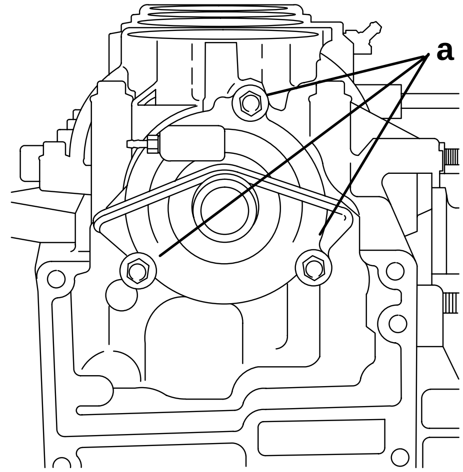
NOTE: *There are “pry-slots” on casting as shown by screwdriver positions.*

- Remove exhaust cover and divider plate.



20029

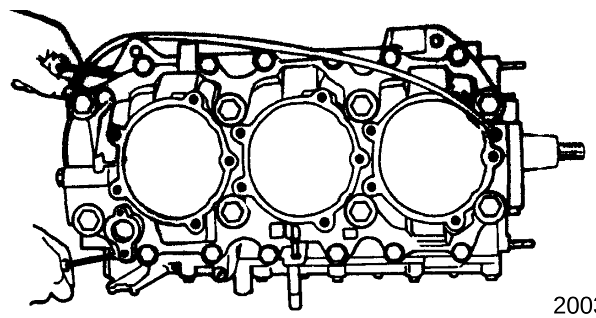
- Remove 3 bolts from crankcase end cap (lower).



20020

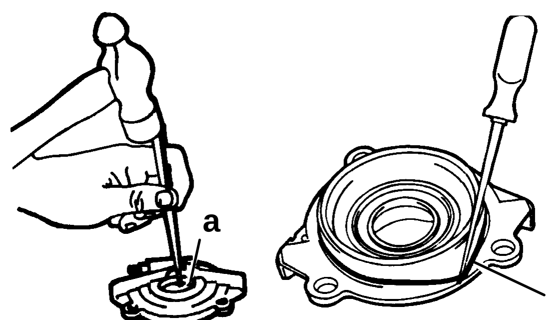
a - End Cap Bolts

- Remove crankcase bolts, and cover.



20032

- Remove crankcase end cap (lower).
- Remove oil seal and O-ring seal.



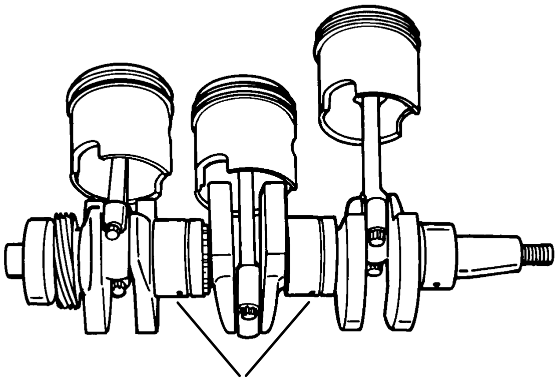
20342 20341

a - Oil Seal
b - O-Ring

- Some models may have a wear sleeve with an O-ring seal. See page 4-39.

- Crankshaft may be removed as an assembly, or by component parts.

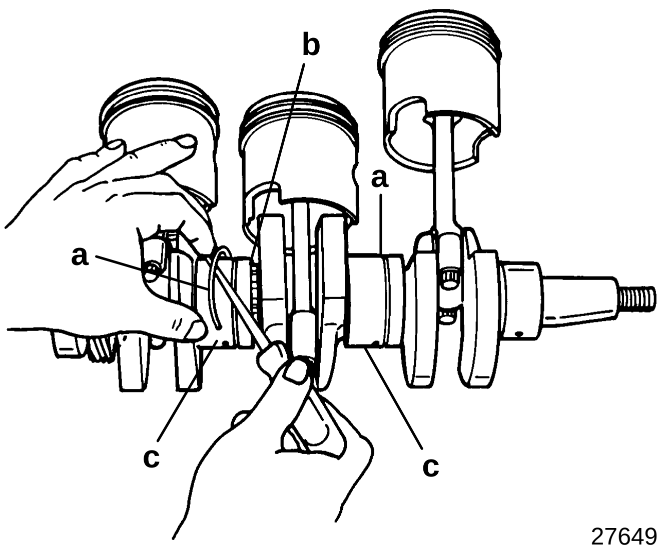
IMPORTANT: Rod caps MUST be reassembled on the same rod - in the same direction. Re-bolt cap to rod immediately or mark rods and caps.



19314

a - Main Bearings

- Remove main roller bearing assemblies (2) from crankshaft as follows;
- Remove retaining ring.
- Remove race.
- Remove main roller bearings.



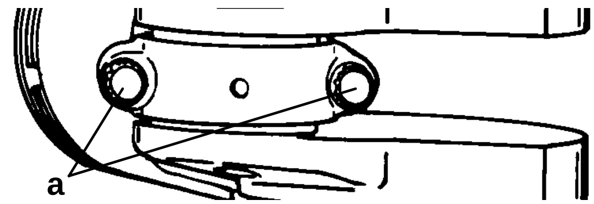
27649

a - Retaining Ring
b - Race
c - Main Roller Bearings

- Remove 2 bolts, each rod cap, using a 3/8″, 12 point socket.

IMPORTANT: Before disassembly, use a carbide-tip scriber to mark caps and rods, to return pistons to proper cylinder.

- Remove piston assembly from crankshaft; reattach caps to respective rods, as each is removed. CAPS MUST BE INSTALLED IN SAME DIRECTION ON SAME ROD, or mating surfaces will not seat properly.

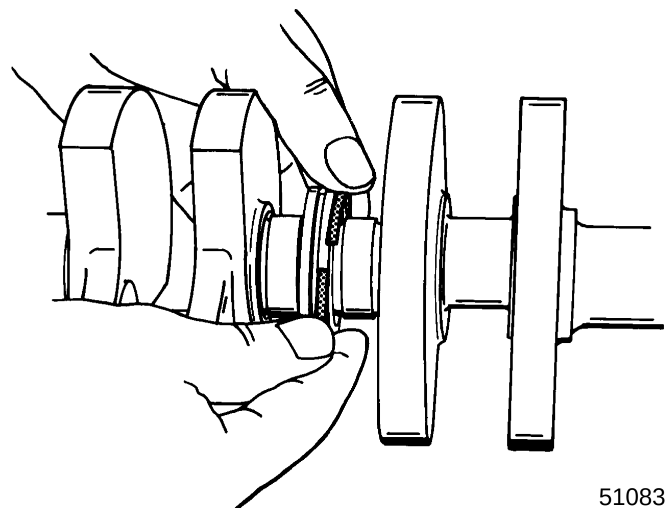


19328

a - Bolts

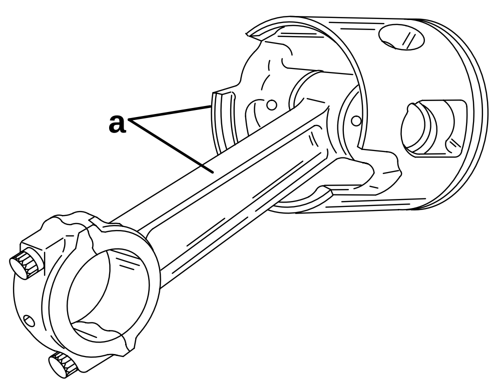
IMPORTANT: BOTH the piston rod and rod cap bolt holes are threaded. The rod cap and rod must be aligned and held tight together when threading in rod cap bolts. Check mating surfaces to be sure that they are tight together after bolt enters the threads in the piston rod.

- Remove main bearing sealing rings - 2 per center main journal.



51083

- Using an awl, scribe identification number of connecting rod on inside of piston. Reassemble piston on same connecting rod.

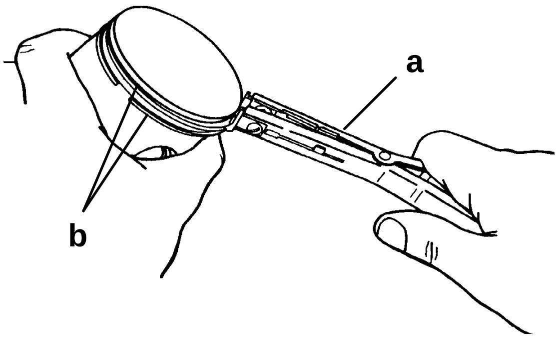


53985

a - Scribe Mark

- Use piston ring expander (91-24697) to remove piston rings. Always install new piston rings.

NOTE: *Cylinders must be honed in order for new rings to seat properly.*

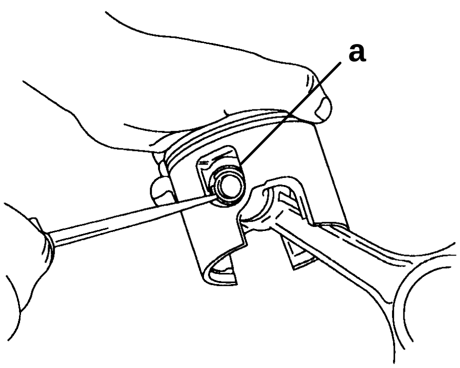


51081

a - Piston Ring Expander (P/N 91-24697)
b - Piston Rings

Eye protection MUST BE worn while removing piston pin lockrings from piston.

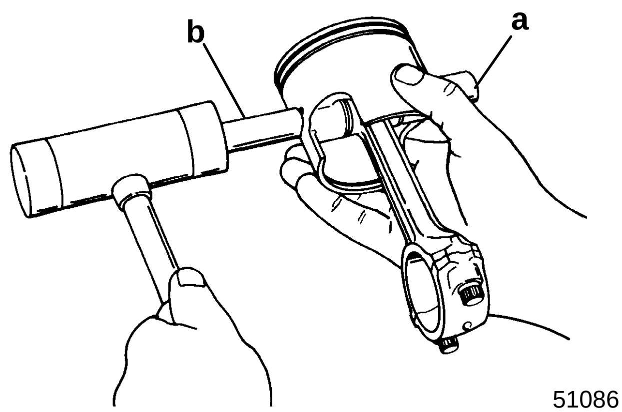
- Using an awl, remove piston pin lockrings from both ends of piston pin. Never re-use piston pin lockpins. Hold shop cloth over lockring area when snapping out lockrings.



53986

a - Lockrings

- Support piston and tap out piston pin, using service tool 91-74607A2, as shown.

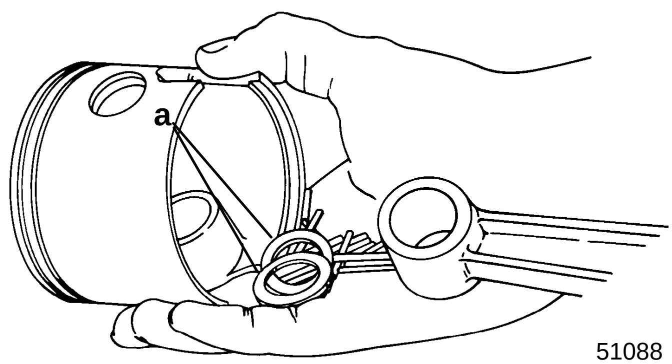


51086

a - Piston Pin
b - Wrist Pin Tool (91-74607A2)

- Remove piston pin needle bearings (29 per piston pin) and locating washers (2 per piston) as shown.

IMPORTANT: We recommend that you use new needle bearings at reassembly for lasting repair. However, if needle bearings must be re-used, keep each set of bearings identified for reassembly on same connecting rod.

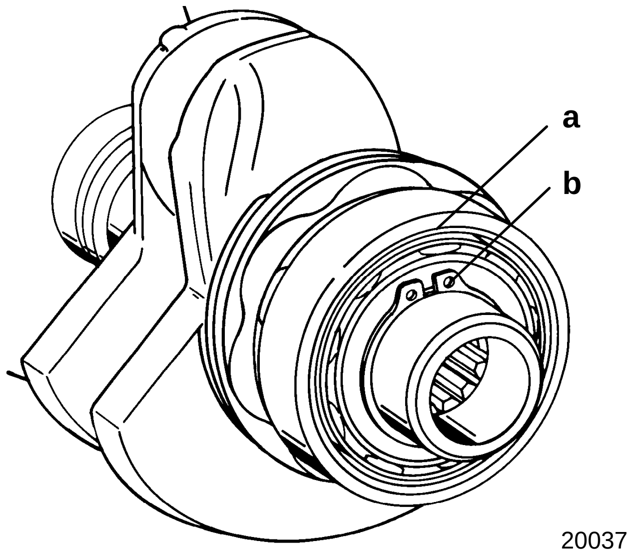


51088

a - Locating Washers

- Inspect crankshaft bearing.

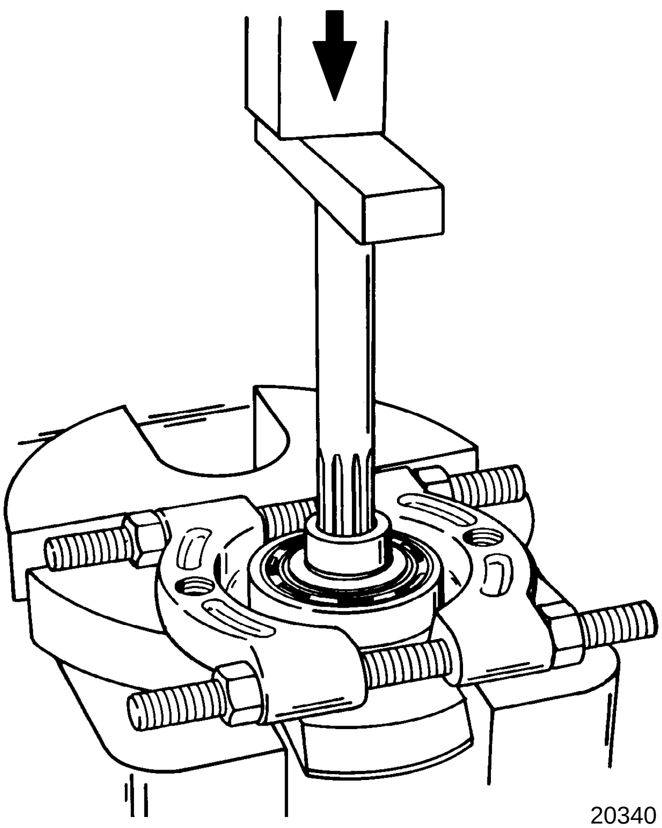
- Only if removal is necessary, remove retaining ring, using a pair of snap-ring pliers.



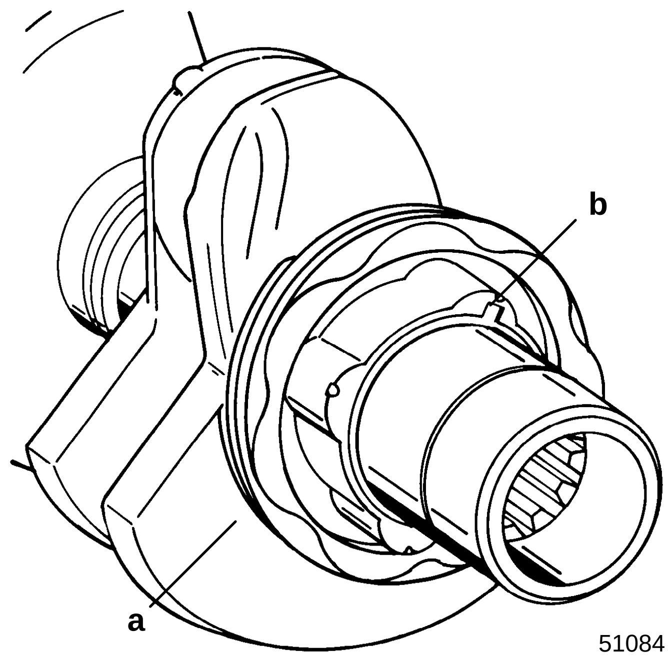
a - Crankshaft Bearing
b - Retaining Ring

NOTE: *There is NO main bearing retaining ring or retaining ring groove in the crankshaft on the following outboards: 75/90/100/115/125 -- SERIAL NUMBER OC259434 and above.*

- Press crankshaft out of bearing, as shown.



- If oil pump drive gear replacement is necessary, remove gear after pressing off main bearing (slides-off shaft). Lower crankshaft seal carrier.

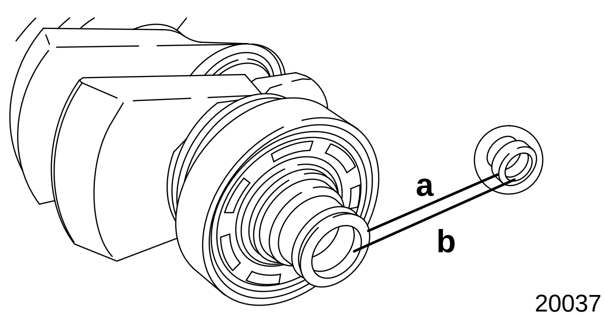


a - Oil Drive Gear
b - Key

- Seal carrier is press-fitted into the spline end of crankshaft.

NOTE: *Seal should be replaced as a routine procedure without regard to appearance, to prevent water leakage into crankshaft/driveshaft splines.*

- Remove seal by prying out of carrier, using an awl.
- Inspect seal carrier for damage or looseness.
- If replacement of carrier is necessary, use a pliers to pull carrier from crankshaft, or tap gently off with screwdriver and mallet.

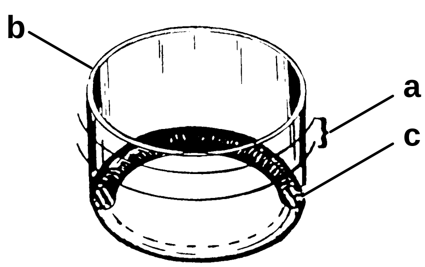


a - Seal Carrier
b - Seal

- Some models may be equipped with the following sleeve , which retains an O-ring seal . The sleeve is pushed over the crankshaft end until it bottoms-out on a crank flange, leaving space for the O-ring between the sleeve lip and the end of the crank-shaft. Pop out the O-ring with an awl - replace the O-ring seal.

IMPORTANT: The End Cap (lower) inside seal rides on the "wear sleeve" . If the outer surface of the sleeve is grooved or corroded/pitted, replace by pulling off the sleeve with pliers--it may be necessary to heat the sleeve to release the Loctite sealant. Replace O-ring AFTER wear-sleeve is installed on crankshaft.

- To install the sleeve, apply Loctite 271 to the crankshaft; align sleeve squarely with crank-shaft, place a block of wood over end of sleeve, and tap lightly until it bottoms-out. Wipe off excess sealant. The sleeve is lightweight (31-gauge) stainless steel - DO NOT collapse the end contour or otherwise distort its shape.

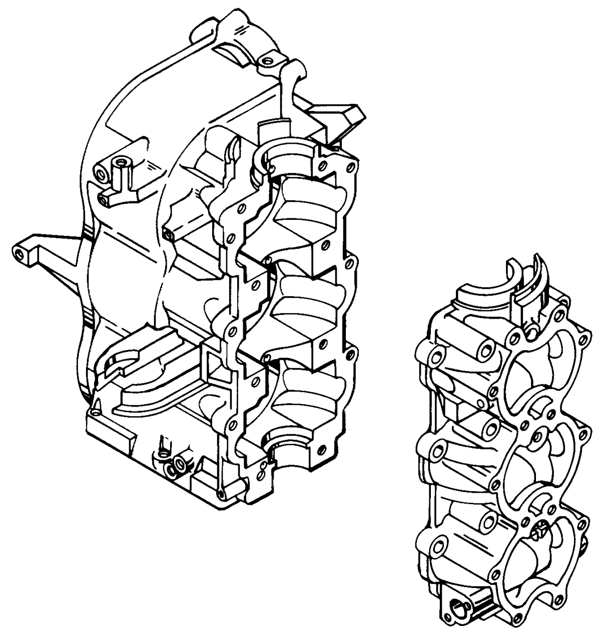


a - Wear Sleeve Surface
b - Carrier
c - O-ring

Cleaning and Inspection

Cylinder Block and Crankcase Cover

IMPORTANT: Crankcase cover and cylinder block are a matched, line-bored assembly and never should be mismatched by using a different crankcase cover or cylinder block.



- Inspect cylinder block and crankcase cover for cracks or fractures.
- Check gasket surfaces for nicks, deep grooves, cracks and distortions that could cause compression leakages.
- Check that all water passages in cylinder block are not obstructed. Check locating pins in cylinder block that they are tight.
- Check crankcase cover fuel/bleed passages that they are not obstructed. Verify that check valves in crankcase cover are not damaged.
- Thoroughly clean cylinder block and crankcase cover. Verify that all sealant and old gaskets are removed from matching surfaces. Clean all carbon deposits from exhaust ports.
- Inspect spark plug holes for stripped or damaged threads.

If crankcase cover and cylinder block is to be submerged in a very strong cleaning solution, it will be necessary to remove the crankcase cover/cylinder block bleed system from cover/cylinder block to prevent damage to hoses and check valves.

CYLINDER BORE SIZE	
Piston Size	**Cylinder Block Finish Hone**
Standard Diameter	3.501 in. (88.77mm)
0.015 Oversize	3.516 in. (89.15mm)
0.030 Oversize	3.531 in. (89.54mm)

- Inspect cylinder bores for scoring (a transfer of aluminum from piston to cylinder wall). Cylinder wall scoring usually can be “cleaned up” by honing or reboring.

When reboring cylinder block, remove hone frequently and check condition of cylinder walls. DO NOT hone any more than absolutely necessary, as hone can remove cylinder wall material rapidly.

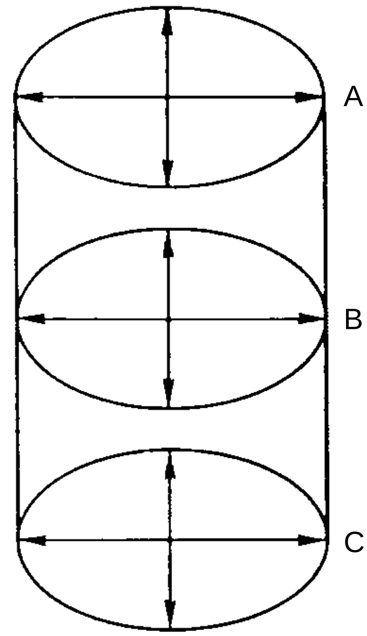
HONING PROCEDURE

- Follow hone manufacturer’s recommendations for use of hone cleaning and lubrication during honing.

IMPORTANT: After honing, bores should be thoroughly cleaned with hot water and detergent. Scrub well with stiff bristle brush and rinse with hot water. If any abrasive material is allowed to remain in the cylinder bore, it will cause a rapid wear of new piston rings and cylinder bore. After cleaning, bores should be swabbed several times with 2 cycle engine oil and a clean cloth. Wipe excess oil with clean, dry cloth. Cylinders should not be cleaned with kerosene or gasoline. Clean remainder of cylinder block.

- Hone all cylinder walls just enough to de-glaze.

- Measure cylinder bore inside diameter (with an inside micrometer) of each cylinder, as shown below. Check for tapered, out-of-round (“egg-shaped”) and oversize bore.



- If a cylinder bore is tapered, out-of-round or worn more than **0.003 in. (0.08mm)** from standard “Cylinder Block Finish Hone” diameter (refer to chart), it will be necessary to rebore that cylinder(s) to designated oversize bore and install oversize piston(s) and piston rings during reassembly.

NOTE: *The weight of an oversize piston is approximately the same as a standard size piston; therefore, it is not necessary to rebore all cylinders in a block just because one cylinder requires reboring.*

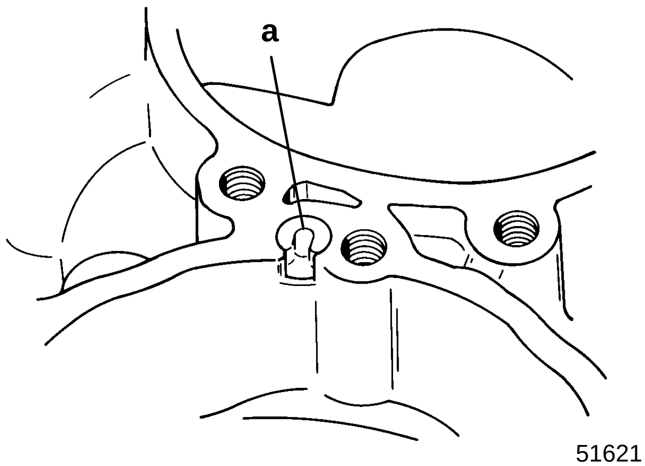
IMPORTANT: Ports must be deburred after honing.

- After honing and thoroughly cleaning cylinder bores, apply 2 cycle outboard oil to cylinder walls to prevent rusting.

Check Valves

REMOVAL

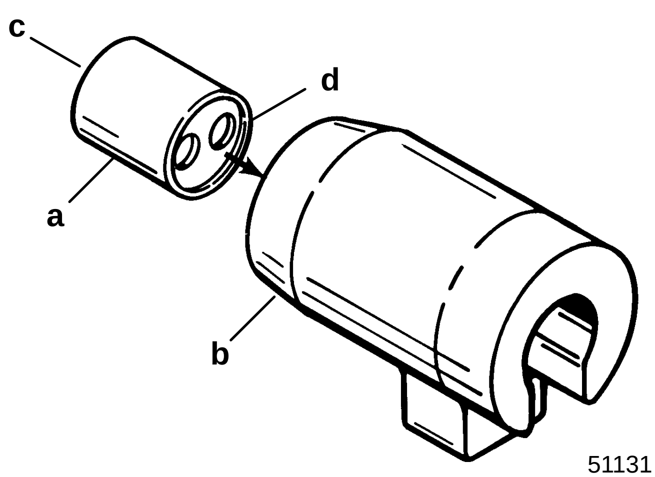
- Remove carburetors and intake manifold/reed block assemblies.
- Grasp carrier and remove carrier/check valve assembly from crankcase cover.



a - Carrier/Check Valve Assembly

- Push check valve out of carrier. If nylon ball within check valve is stuck or carrier is charred, replace check valve and/or carrier as required.

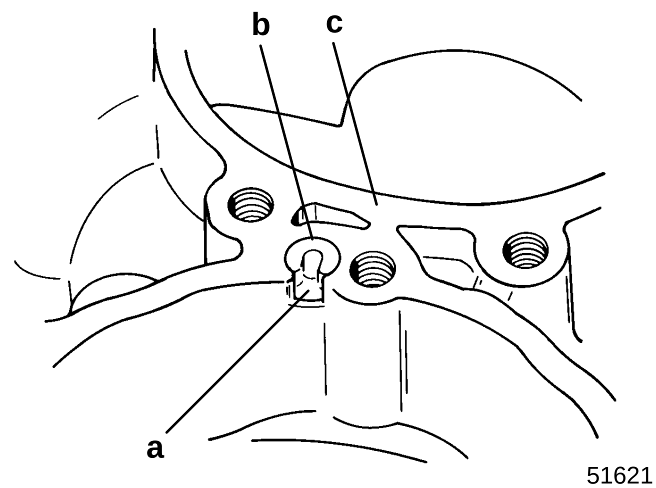
IMPORTANT: SINGLE HOLE side of check valve MUST FACE CRANKCASE.



a - Check Valve
b - Carrier
c - Single Hole
d - Double Hole

INSTALLATION

- Install check valve (if removed) inside of carrier (single hole of valve faces tapered end of carrier).
- Align carrier tab with slot in crankcase cover and insert check valve/carrier assembly into cover.



a - Check Valve/Carrier Assembly
b - Slot
c - Crankcase Cover

- Clean mating surfaces of crankcase cover and intake manifold. Install new gaskets.
- Install intake manifold/reed block assemblies to crankcase cover. Refer to PAGE 4-58 for torque specification and tightening sequence.
- Install carburetors. Torque carburetor (AIR BOX) stud nuts to 100 lb. in. (11.3 N·m).
- Carburetors MUST BE SYNCHRONIZED. Refer to SECTION 2C for proper procedures.
- Reinstall air box cover.
- Reinstall top cowling.

Piston and Piston Rings

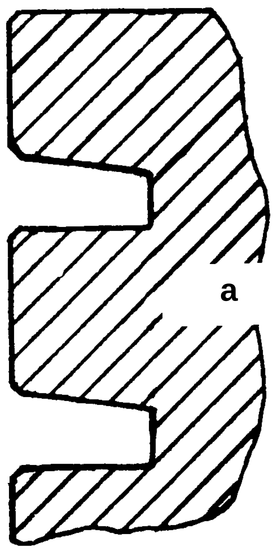
IMPORTANT: If engine was submerged while engine was running, piston pin and connecting rod may be bent. If piston pin is bent, piston must be replaced. Piston pins are not sold separately because of matched fit into piston. If piston pin is bent, connecting rod must be checked for straightness (refer to "Connecting Rods" for checking straightness).

- Inspect piston for scoring and excessive piston skirt wear.

- Check tightness of piston ring locating pins. Locating pins must be tight.
- Thoroughly clean pistons. Carefully remove carbon deposits, with a soft wire brush or carbon remover solution. DO NOT burr or round off machined edges.
- Inspect piston grooves for wear and carbon accumulation. If necessary, scrape carbon from piston ring grooves being careful not to scratch sides of grooves. Refer to procedure for cleaning piston ring grooves.

CLEANING PISTON RING GROOVES

IMPORTANT: The piston rings are half-keystone rings – (tapered on the top side) - follow cleaning and inspection carefully! Chromed ring is installed on top.



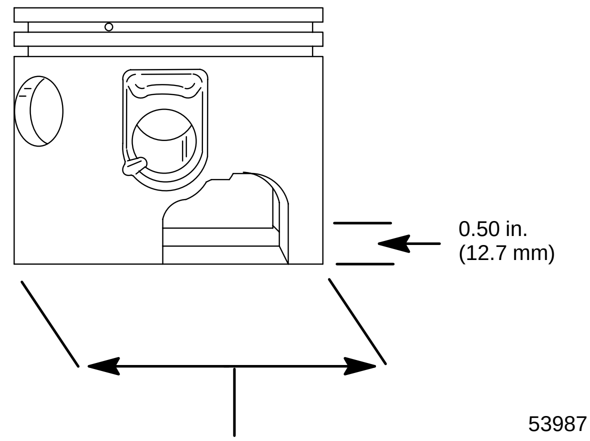
a - Enlarged View of Piston Ring Grooves

Care must be taken not to scratch the side surfaces of ring groove. Scratching the side surfaces of the ring groove will cause damage to the ring groove.

- Use a bristle brush and carbon remover solution to remove carbon from side surfaces.
- A tool can be made for cleaning the inner diameter of the tapered ring grooves. The tool can be made from a broken tapered piston ring with the side taper removed to enable inside edge of the ring to reach the inside diameter of the groove. Carefully scrape the carbon from inner diameter of ring grooves. Care must be taken not to damage the grooves by scratching the surfaces of the grooves.

MEASURING PISTON SKIRT

Measure piston skirt at right angle (90°) to piston pin centerline, 0.50 in. (12.7mm) up from bottom edge of skirt.



PISTON SIZE	PISTON SKIRT DIAMETER	CYLINDER BORE FINISH HONE
Standard Piston	3.495 in. (85.62mm)	3.501 in. (88.77mm)
0.015 in. (0.38mm) Oversize	3.510 in. (86.00mm)	3.516 in. (89.15mm)
0.030 in. (0.75mm) Oversize	3.525 in. (86.39mm)	3.531 in. (89.52mm)

Crankshaft

- Inspect crankshaft to drive shaft splines for wear. (Replace crankshaft, if necessary.)
- Check crankshaft for straightness. Total maximum runout for crankshaft is 0.006 (0.15mm). Replace as necessary.
- Inspect crankshaft oil seal surfaces. Sealing surfaces must not be grooved, pitted or scratched. (Replace as necessary.)
- Check all crankshaft bearing surfaces for rust, water marks, chatter marks, uneven wear and/or overheating. (Refer to "Connecting Rods.")
- If necessary, clean crankshaft surfaces with crocus cloth as shown.

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- Thoroughly clean (with solvent) and dry crankshaft and crankshaft ball bearings. Recheck surfaces of crankshaft. Replace crankshaft if surfaces cannot be properly "cleaned up". If crankshaft will be reused, lubricate surfaces of crankshaft with light oil to prevent rust. DO NOT lubricate crankshaft ball bearings at this time.

⚠ WARNING

DO NOT spin-dry crankshaft ball bearing with compressed air.

Connecting Rods

If necessary, clean connecting rod surfaces as follows:

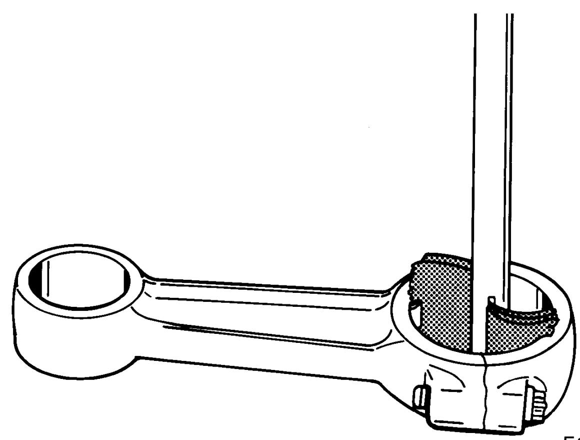
- Attach end caps to connecting rods. Following these directions, tighten rod cap attaching bolts to specifications. Recheck alignment. Refer to 4-53.

Crocus cloth MUST BE USED to clean bearing surface at crankshaft end of connecting rod. DO NOT use any other type of abrasive cloth.

- Clean crankshaft end of connecting rod by using crocus cloth placed in a slotted 3/8 in. (9.5mm) diameter shaft, as shown. Insert shaft in a drill press and operate press at full speed while keeping connecting rod at a 90° angle to slotted shaft.

IMPORTANT: Clean connecting rod just enough to clean bearing surfaces. DO NOT continue to clean after marks are removed from bearing surfaces.

- Clean piston pin end of connecting rod, using same method as above. Use 320 grit carborundum cloth instead of crocus cloth.
- Thoroughly wash connecting rods to remove abrasive grit. Recheck bearing surfaces of connecting rods. Replace any connecting rod that cannot be properly polished. Lubricate bearing surfaces of connecting rods which will be reused with 2 cycle engine oil to prevent rust.



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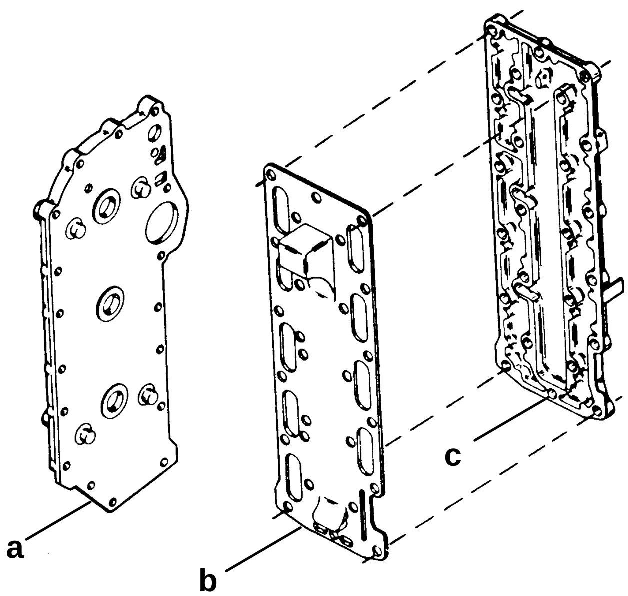
Cylinder Cover, Exhaust Divider Plate and Exhaust Cover

- Thoroughly clean cylinder cover and gasket surfaces.
- Inspect cylinder cover. Check for cracks which could cause water leakage.
- Replace cylinder cover as necessary.
- Thoroughly clean gasket surfaces of exhaust divider plate and exhaust manifold cover.
- Inspect exhaust divider plate and exhaust manifold cover for grooves, cracks or distortion that could cause leakage. Replace parts as necessary.

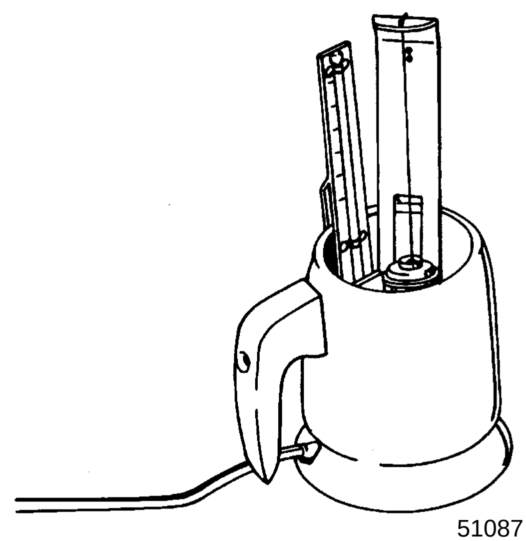


a - Cylinder Cover
b - Divider Plate
c - Exhaust Cover

Thermostat

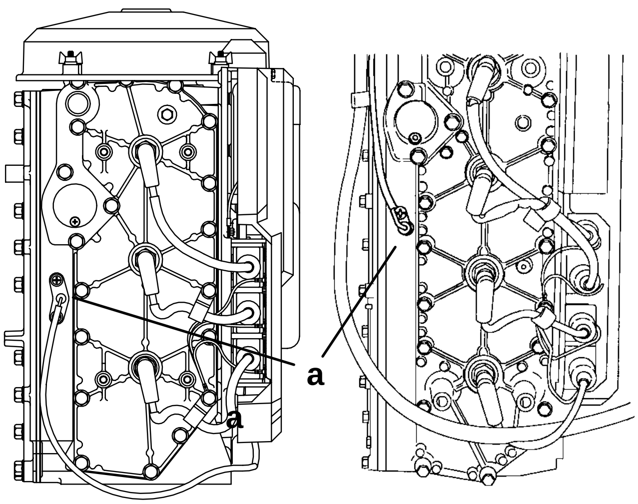
Wash thermostat with clean water. Using a thermostat tester, similar to the one shown, test thermostat as follows:

- Open thermostat valve, then insert a thread between valve and thermostat body. Allow valve to close against thread.
- Suspend thermostat (from thread) and thermometer inside tester so that neither touches the container. Bottom of thermometer must be even with bottom of thermostat to obtain correct thermostat opening.
- Fill thermostat tester with water to cover thermostat.
- Plug tester into electrical outlet.
- Observe temperature at which thermostat begins to open. Thermostat will drop off thread when it starts to open. Thermostat must begin to open when temperature reaches 5° F (3° C) above designated stamping on bottom of thermostat.
- Continue to heat water until thermostat is completely open.
- Unplug tester unit.
- Replace thermostat, if it fails to open at the specified temperature, or if it does not fully open.



Temperature Switch Test 190°F (88°C)

The 190°F (88°C) temperature switch is located in outer side of cylinder head as shown.

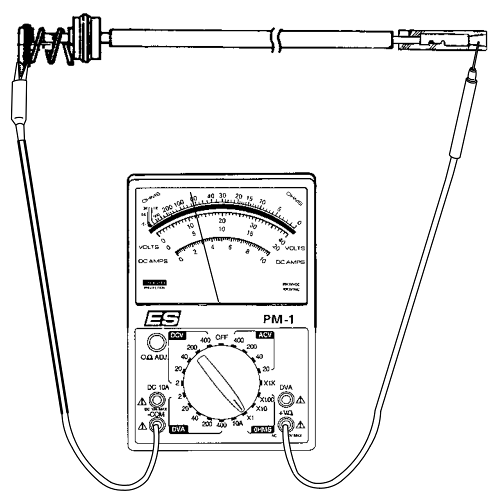


3 Cylinder Models **4 Cylinder Models**

a - Temperature Switch

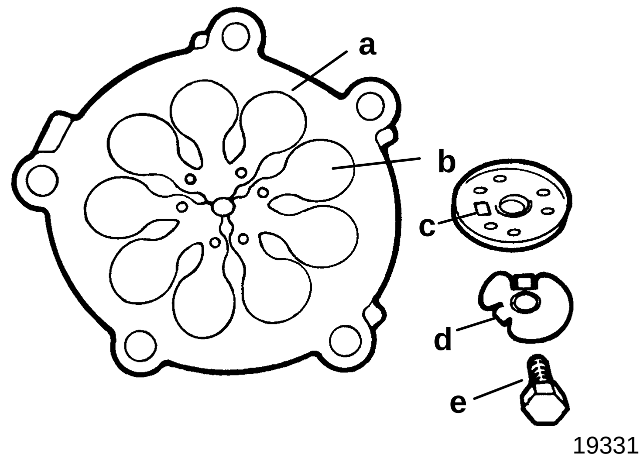
During normal engine operating temperature, the switch electrical circuit is open. The switch will close when the temperature reaches 190°F ± 8°F (88°C ± 4°C). Reset of the switch to open circuit occurs at 170°F ± 8°F (77°C ± 4°C).

To test, place switch end into water with thermometer and heat to 190°F ± 8°F (88°C ± 4°C). Take out and perform ohms test. Compare to specifications. If switch does not fall within specifications, replace switch.



Reed Blocks

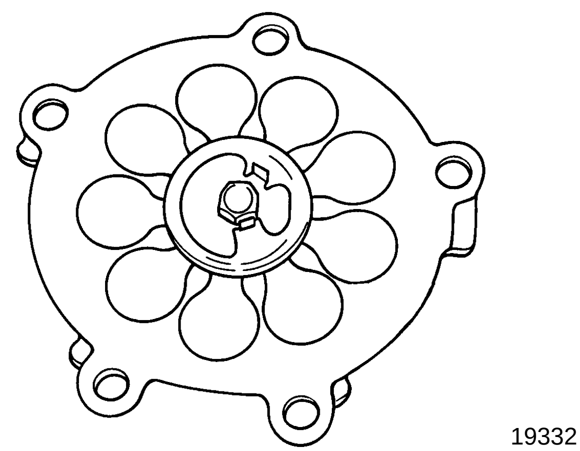
***NOTE:** Do not disassemble reed block unless necessary. It may be necessary to apply heat to bolt to soften Loctite® before removal.*



a - Reed Block
b - Reed (3 Sets)
c - Retaining Washer
d - Tab Washer
e - Bolt

IMPORTANT: Do not "flop" (reverse) the reed for additional use - replace reed when necessary.

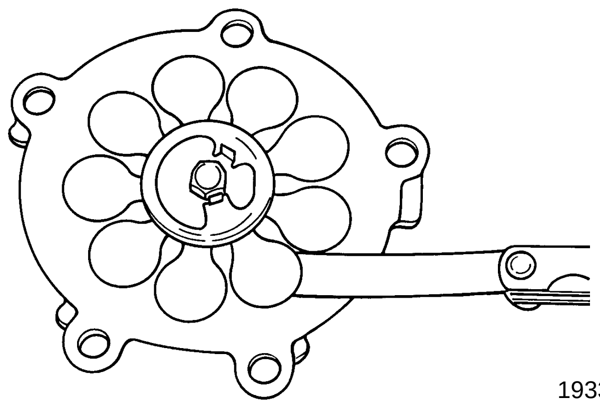
BACKSIDE - REED BLOCK ASSEMBLED



There are 3 reed segments. Reed should lie flat. There should be no preload (pressure between reed and reed-block), but a slight preload is tolerable.

The maximum allowable opening between reed and reed-block is 0.020 in. (0.51mm). This must be checked with a flat blade feeler gauge, as shown.

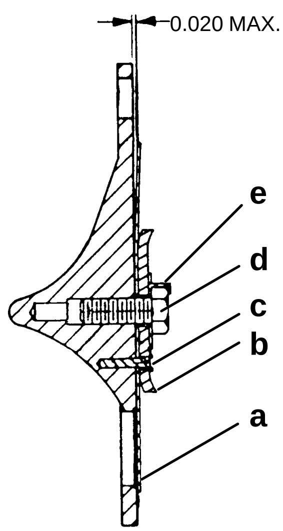
If the opening exceeds 0.020 in. (0.51mm), or if the reed is chipped, cracked, or otherwise damaged, replace.



19337

Replace locking tab-washer. DO NOT REUSE.

If reed block was disassembled, reassemble by locating reeds on pins with retaining washer. Use new tab washer. Insert bolt, and torque to 80 lb. in. (9.0 N·m); then, if necessary, continue the torque to align flat on hex-head to locking tab - Do not exceed 100 lb. in. (11.3 N·m) torque. Bend up tab to secure bolt position.



a - Reeds
b - Retaining Washer
c - Pins
d - Bolt
e - Locking Tab

Powerhead Reassembly and Installation

General Information

Before proceeding with powerhead reassembly, be sure that all parts to be reused have been carefully cleaned and thoroughly inspected, as outlined in “Cleaning and Inspection”. Parts, which have not been properly cleaned (or which are questionable), can severely damage an otherwise perfectly good powerhead within a few minutes of operation. All new powerhead gaskets must be installed during assembly.

During reassembly, lubricate parts with Quicksilver 2-Cycle Outboard Oil whenever 2-cycle oil is specified and Quicksilver 2-4-C w/Teflon whenever grease is specified.

A torque wrench is essential for correct reassembly of powerhead. Do not attempt to reassemble powerhead without using a torque wrench.

EXAMPLE: If Exhaust Cover bolts require a torque of 220 lb. in. (24.9 N·m), a) tighten all bolts to 73 lb. in. (8.2 N·m), following specified torque sequence, b) tighten all bolts to 146 lb. in. (16.5 N·m), following torque sequence, then finally, c) tighten all bolts to 220 lb. in. (24.9 N·m), following torque sequence.

End Cap

Clean thoroughly, including seal and O-ring seats; remove perfect seal residue and clean cap-to-head mating surfaces.

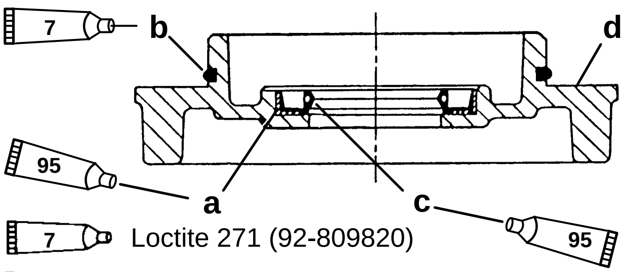
Apply a thin bead of Loctite 271 to outer face on end cap oil seal. Wipe off excess Loctite® after installing.

Using suitable mandrel, press oil seal into cap until fully seated. Remove any excess Loctite.

NOTE: *Lip of seal goes in (towards flywheel).*

Lubricate oil seal lip with 2-4-C w/Teflon.

Lubricate O-ring seal with 2-4-C w/Teflon; install in groove.



7 Loctite 271 (92-809820)

95 2-4-C With Teflon (92-825407A12)

a - Outer Face
b - O-Ring
c - Seal Lip
d - Mating Surface

Any GREASE used for bearings INSIDE the Powerhead MUST BE gasoline soluble. Use only Quicksilver 2-4-C w/Teflon (92-825407A12). If other lubricants are used inside the Powerhead, damage to engine may occur.

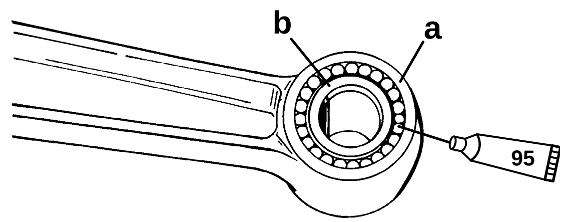
Assembling Rod to Piston

Place clean needle bearings on a clean sheet of paper and lubricate with Quicksilver 2-4-C w/Teflon (92-825407A12).

NOTE: *There are 29 needle bearings per piston.*

Never intermix new needle bearings with used needle bearings at the same connecting rod end. Never intermix needle bearings on one connecting rod with those of another connecting rod. Should one (or more) piston pin needle bearing of a connecting rod require replacement (or should one or more be lost), replace all of that connecting rod's piston pin needle bearings.

Place sleeve, which is part of Piston Pin Tool (91-74607A1), into connecting rod and install needle bearing around sleeve, as shown.

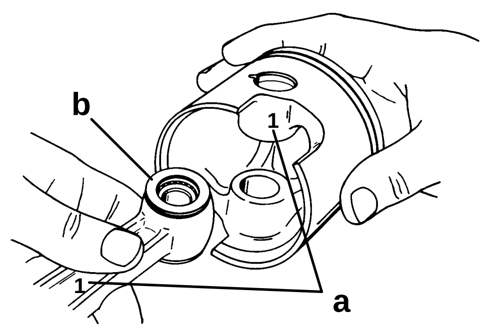


95 2-4-C With Teflon (92-825407A12)

19537

a - Needle Bearings (29)
b - Sleeve [From Piston Pin Tool (91-74607A2)]

Place locating washers on connecting rod; keeping locating washers in place, carefully place piston over end of rod. Use disassembly marks for matching rod to piston and direction of insertion (which side of rod is "UP").



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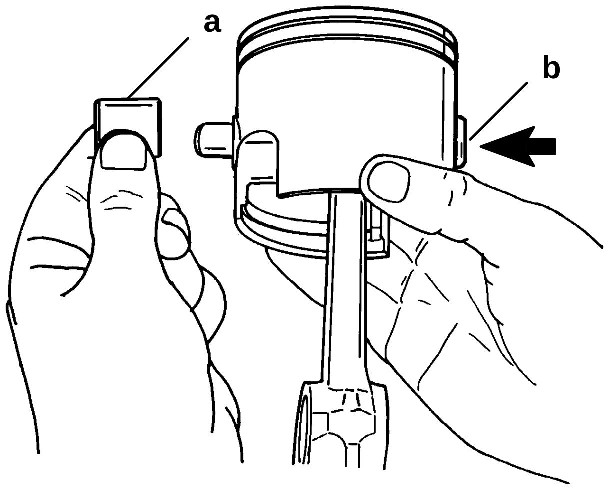
a - Scribed Identification Number
b - Locating Washer

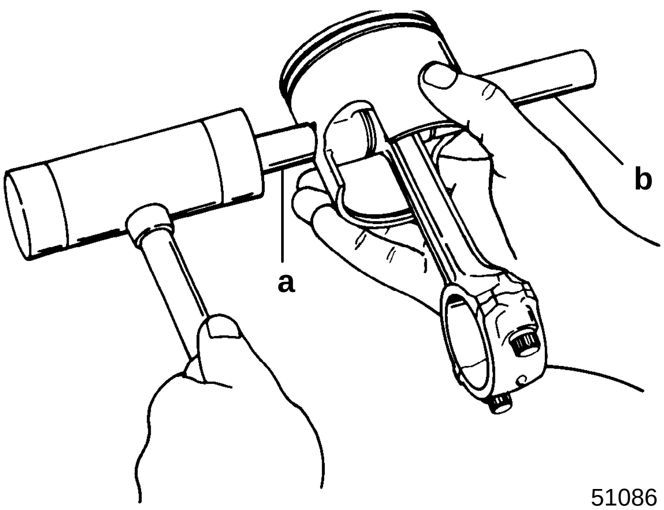
Insert piston pin tool through piston in the direction shown, pushing out sleeve.



51080

a - Sleeve
b - Piston Pin Tool (91-74607A2)

Place piston pin over end of tool, and tap into position (driving tool out other side).



51086

a - Piston Pin
b - Piston Pin Tool

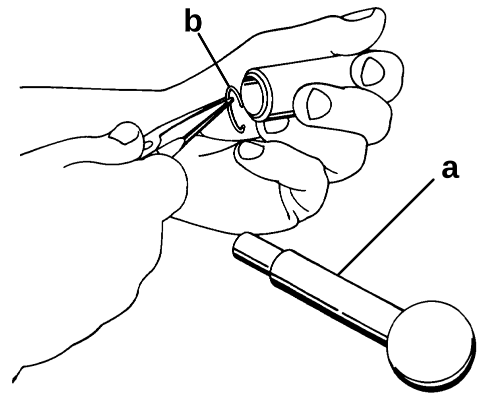
⚠ WARNING

Eye protection must be worn while installing piston pin lockrings.

Install new piston pin lockrings (each side of piston) using Lockring Tool (91-77109A2).

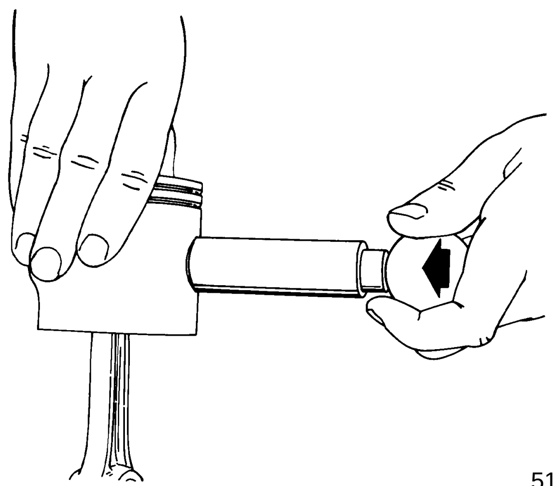
Make sure lockrings are properly seated in piston grooves.

Do not reuse piston pin lockrings. Use only new lockrings and make sure they are properly seated in piston grooves.



51086

a - Lockring Installation Tool (91-77109A2)
b - Lockring (2)



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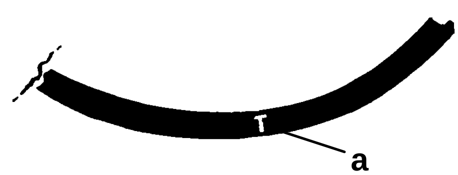
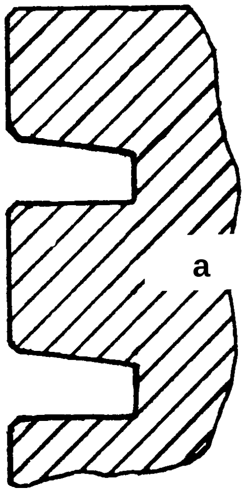
Piston Ring Installation

IMPORTANT: Piston ring side with letter or mark must be facing up.



a - Piston Ring

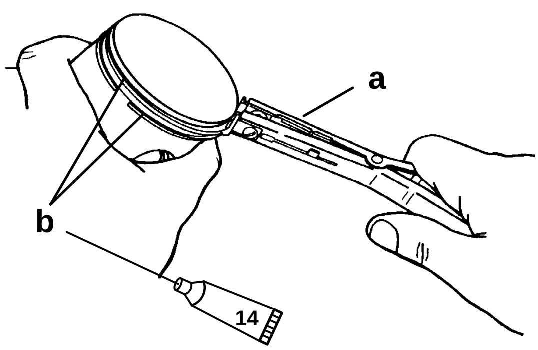
Piston rings are TAPERED top side, and flat (rectangular) on the bottom side (half-keystone rings).

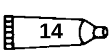


a - Enlarged View of Piston Ring Grooves

Care must be taken not to scratch the side surfaces of ring groove. Scratching this area will damage the ring groove.

1. Install piston rings using Piston Ring Expander Tool. Spread rings just enough to slip over piston.
2. Check piston rings to be sure they fit freely in groove. Lubricate rings and cylinder wall with 2-cycle oil.

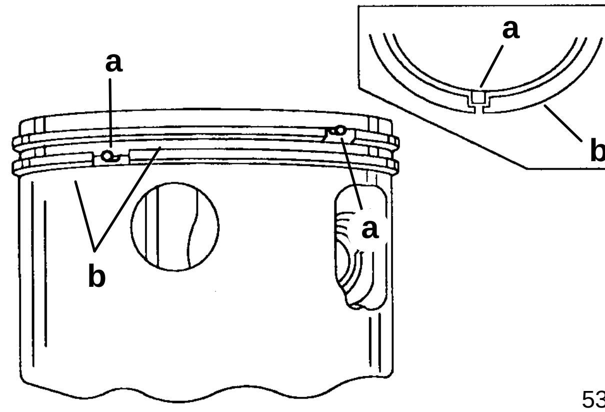




2 Cycle Outboard Oil (92-826666A24) 51081

a - Piston Ring Expander
b - Piston Rings

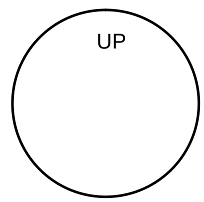
3. Align piston ring end gaps with ring locating pins as shown. Check locating pins making sure they are tight.



53988

a - Locating Pin
b - Piston Rings

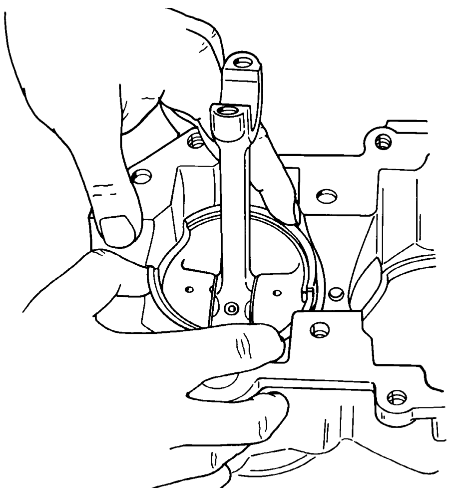
4. Remove connecting rod cap from connecting rod being installed.
5. Install each piston with “UP” identification facing flywheel end. Pistons MUST be installed in this direction.



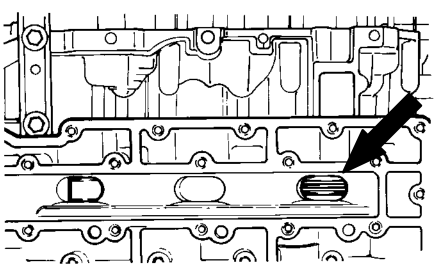
Pistons must be installed very carefully into cylinders. Piston rings cannot be inspected thru exhaust ports.

6. Bottom end of cylinder bore has taper which permits the insertion of the piston into block without using a piston ring compressor. Place piston carefully into cylinder.

Check rings by viewing through exhaust ports while depressing rings with a screwdriver. If no spring tension is there (ring fails to "spring" back), the ring is probably broken and must be replaced before installing the crankshaft.



51087



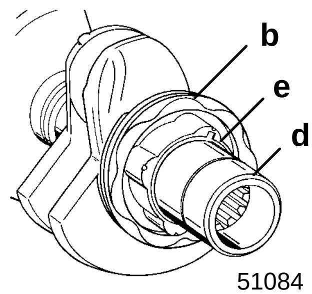
20338

Crankshaft Installation

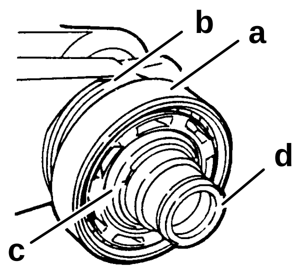
- If Lower Bearing and Gear were removed from crankshaft, reassemble using arbor press and suitable mandrel for bearing; gear slides on. (NOTE keyway and key in gear to crankshaft assembly.)
- Install main bearing retaining ring after pressing main bearing tight against the oil gear.

NOTE: *There is NO main bearing retaining ring or retaining ring groove in the crankshaft on the following outboards:*

75/90/100/115/125 - Serial Number 0C 259434 and above



51084

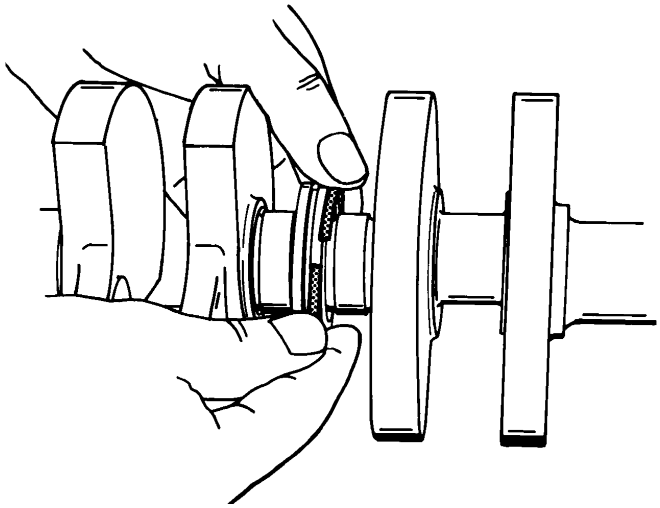


25949

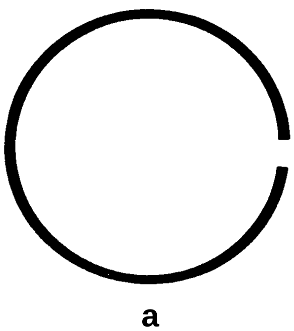
a - Lower Bearing
b - Gear
c - Retaining Ring
d - Seal Carrier
e - Key

- If Seal Carrier above was removed, replace by placing a piece of wood on carrier and tapping gently with a mallet, keeping carrier "square" during insertion, seal fully to crankshaft. See page 4-39 -- (Powerhead Disassembly, this Section), for wear-sleeve reinstallation, if so equipped.

- Install 2 ring seals into slot between each center main bearing and position ring seal end gaps 180° apart.



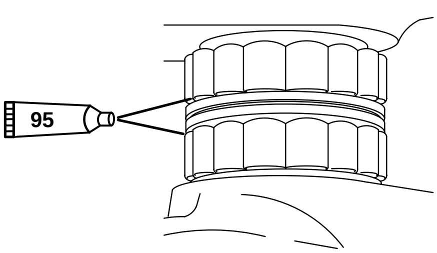
51083



a - Ring Seal 2 Each Center Main

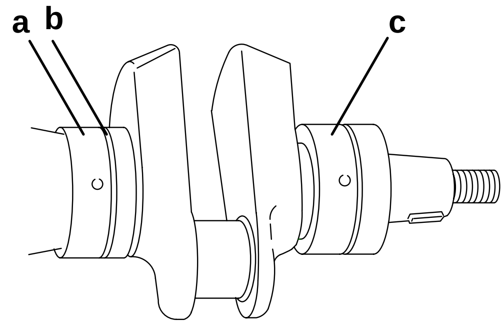
Any GREASE used for bearings INSIDE the Powerhead MUST BE gasoline soluble. Use only Quicksilver 2-4-C w/Teflon (92-825407A12). If other lubricants are used inside the Powerhead, damage to engine may occur.

Grease crankshaft journal with 2-4-C w/Teflon to hold bearings in place. Position bearings on journal, 32 each center main bearing.



95 2-4-C With Teflon (92-825407A12) 20046

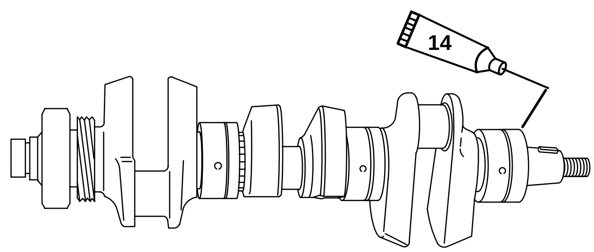
Attach bearing races with holes toward lower gear end of crankshaft. Secure each main bearing race with retaining ring.



20040

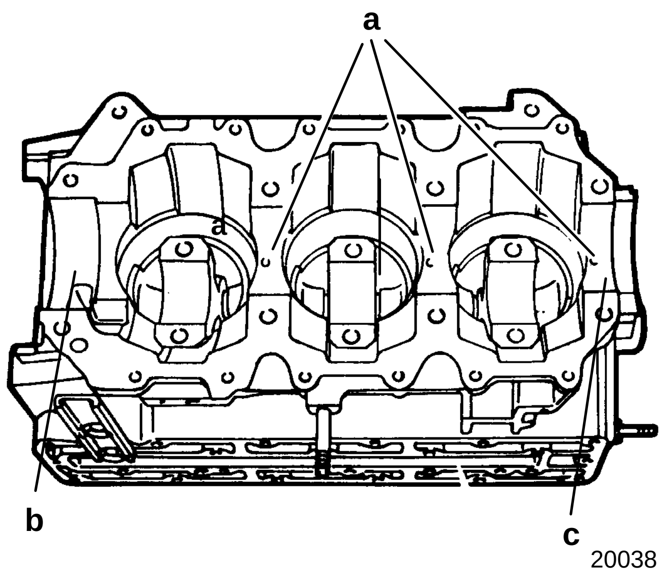
a - Main Bearing Race
b - Retaining Ring
c - Top Main Bearing

To install top main bearing, lubricate needle bearing with light oil, and slide bearing assembly, (holes toward lower end), onto shaft.

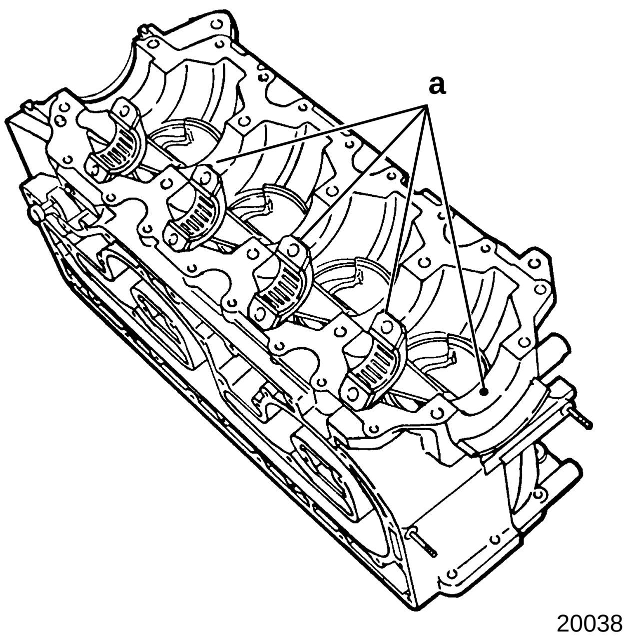


14 2 Cycle Outboard Oil (92-826666A24) 20040

Position Cylinder Block and Piston Rods, as shown. Note locating pins.



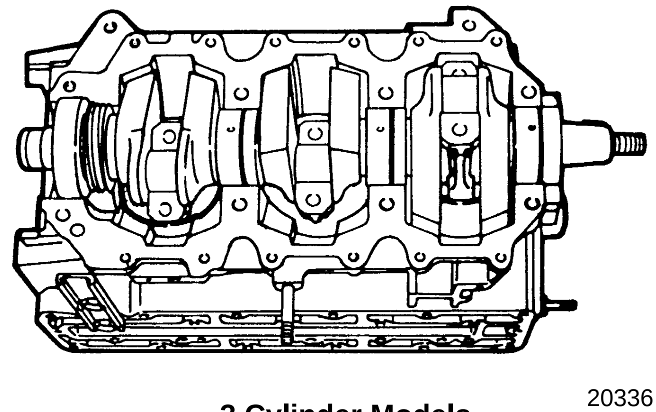
3 Cylinder Models



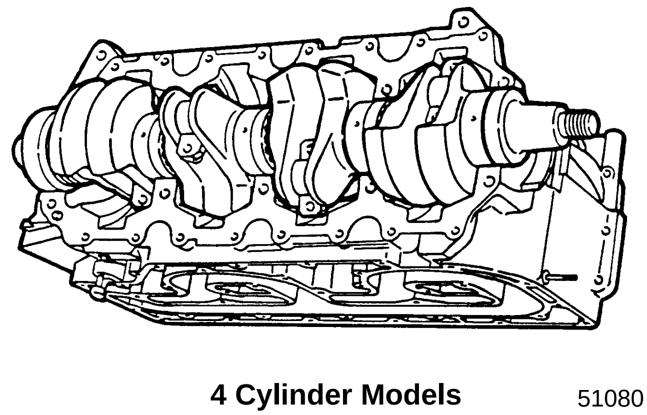
4 Cylinder Models

a - Locating Pins
b - Lower (Gear) End
c - Flywheel End (Top)

Place crankshaft into cylinder block; align and seat top and center main bearings so that locating pins on block mate with holes in each bearing race.



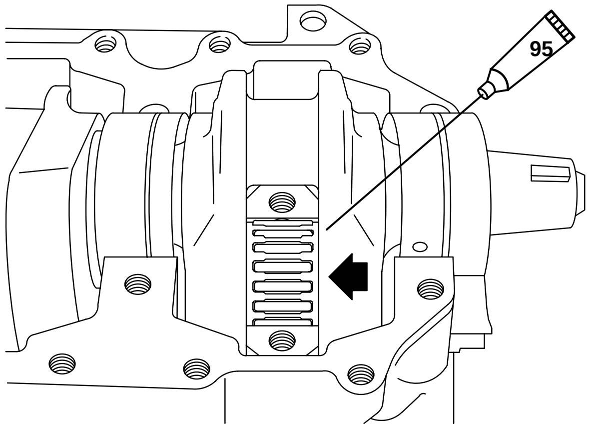
3 Cylinder Models



4 Cylinder Models

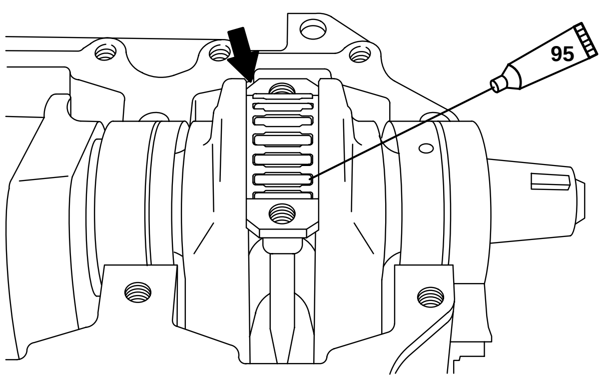
INSTALLING RODS TO CRANKSHAFT

- Pull rod up to position shown.
- Grease rod, bearing area, with 2-4-C w/Teflon - lay roller bearings out on clean sheet of paper and grease each bearing.
- Place Bearing Cage in position.
- Place Bearings in cage.



95 2-4-C With Teflon (92-825407A12) 20045

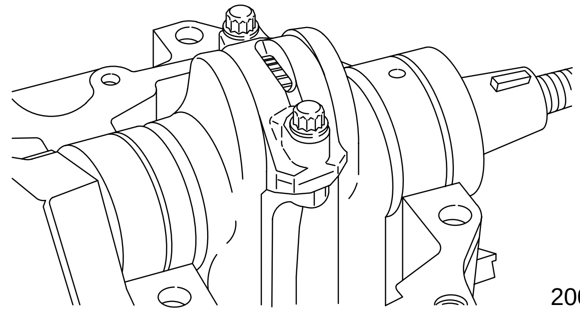
- Grease crankshaft journal with 2-4-C w/Teflon.
- Pull-up rod into contact with crankshaft journal.
- Place Bearing Cage on crankcase journal.
- Place Bearings into cage.
- Align bearing cages with rod-to-cap mating surfaces.



95 2-4-C With Teflon (92-825407A12) 20030

NOTE: *Apply light oil to connecting rod bolt face and threads prior to installation.*

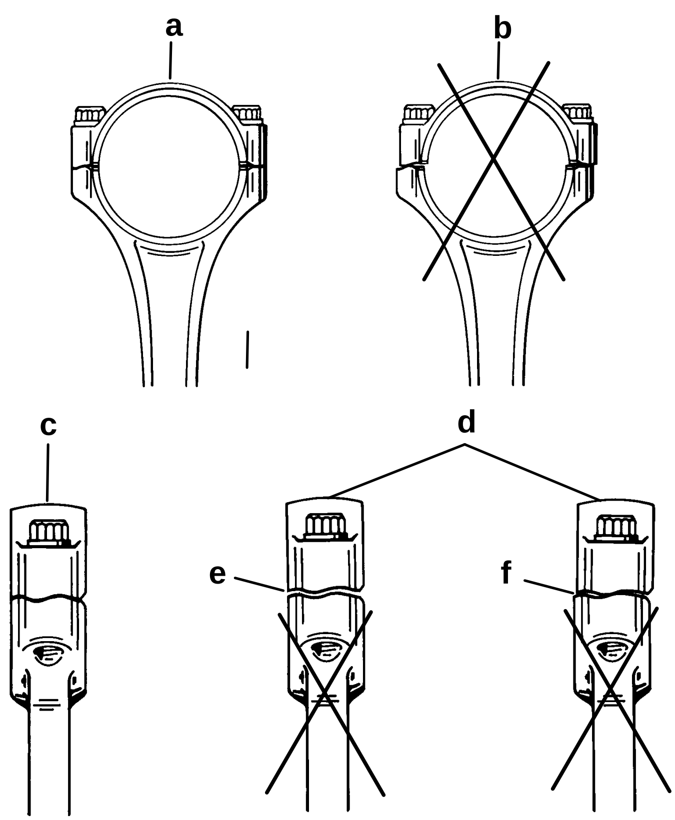
- Place Rod Cap carefully over cage and bearings, and while holding cap tight to rod, and rod tight to journal, insert bolt and lightly tighten, observing cap-to-rod alignment. Install other bolt, rechecking alignment.



20033

Connecting Rod Cap Alignment

1. Check each connecting rod for correct alignment by carefully running fingernails up and down edge of rod cap. If not aligned, a ridge can be seen or felt at the separating line. Correct any misalignment.



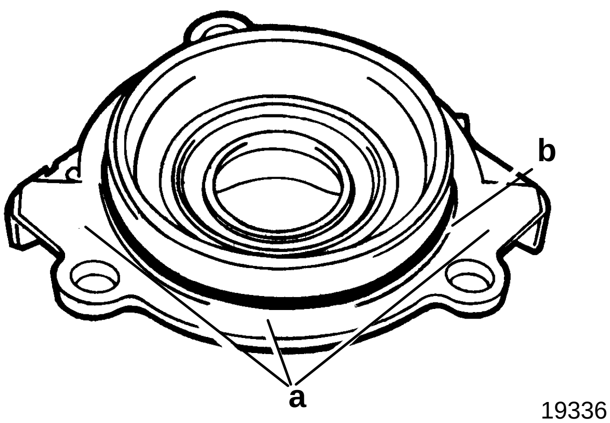
51224

a - Front View – Correct
b - Front View – Incorrect
c - Side View – Correct
d - Side View – Incorrect
e - Space
f - Ridge

2. When connecting rods are attached, and bolts drawn down finger tight, torque rod-cap bolts to 15 lb. in. (1.7 N·m). Recheck alignment. **Retorque 5/16 in. bolts to 30 lb. ft. (40.7 N·m).** Recheck alignment. Turn each rod-cap bolt 90° further after 30 lb. ft. reading is acquired.

- Replace lower crankshaft End Cap.

1. Coat mating surface with Perfect Seal. DO NOT coat O-ring seal.
2. Bolt to block (2 bolts) - finger tighten - lightly.

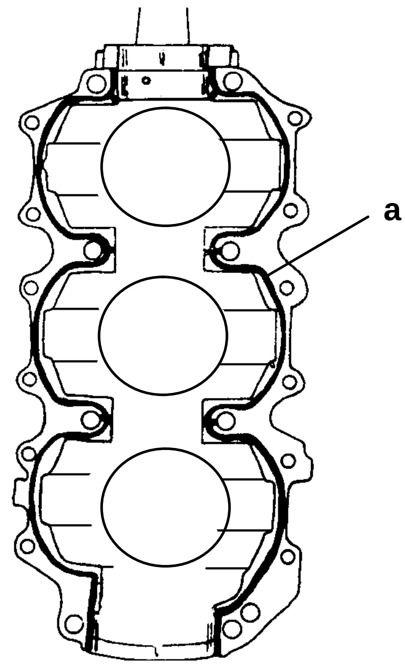


a - Mating Surface
b - O-ring Seal

Crankcase Cover to Block

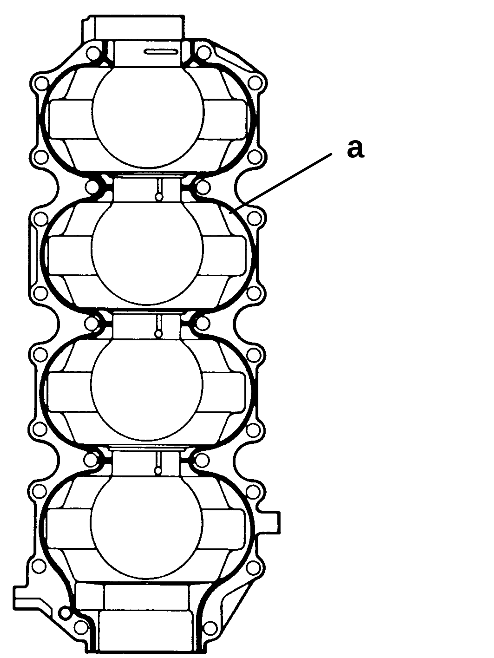
LOCTITE MASTER GASKET SEALANT, 92-12564-1 is used; it comes as a kit, which includes Primer and Sealant. Instructions contained in the kit MUST BE FOLLOWED EXACTLY. (Clean both surfaces).

IMPORTANT: Extend sealer to edge on each center main journal to prevent blow-by between cylinders.



3 Cylinder Models

a - Sealant "Bead Pattern" indicated by bold line



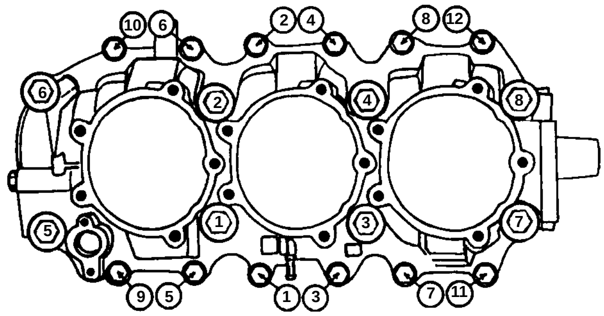
4 Cylinder Models

a - Sealant "Bead Pattern" indicated by bold line

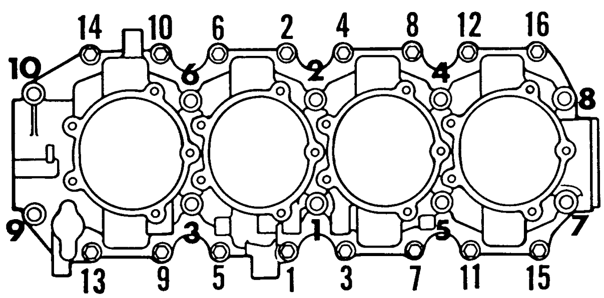
REATTACH CRANKCASE COVER

- After the application of the Loctite Master Gasket Sealing Kit, place crankcase cover onto block, and align.
- Recheck that bolt holes and bolts are clean to assure accurate torque.
- Insert bolts - note 2 sizes and finger tighten.
- Install last end cap bolt in remaining (End Cap to Cover) hole.
- Torque Crankcase Cover Bolts.

IMPORTANT: This is a Double Torque Pattern.



3 Cylinder Models



4 Cylinder Models

Torque large bolt sequence first.

1st Torque Pattern (#1-8) on Large Bolts - 25 lb. ft. (33.9 N·m)

2nd Torque Pattern (#1-12) on Small Bolts - 18 lb. ft. (24.4 N·m)

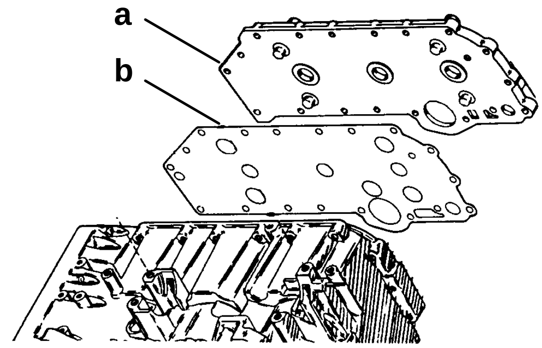
- Torque all (lower) end cap bolts (3 bolts) to 18 lb. ft. (24.4 N·m).
- Reattach bleed line hose.

NOTE: *Inspect ALL hoses on reinstallation; replace when necessary.*

Note on Major Cover Gaskets: These are new gaskets impregnated with a coating that causes the gasket to retain torque. It is not necessary to use sealant on gasket, or Loctite on bolts.

Cylinder Block Cover

- Align cover and gasket on block.

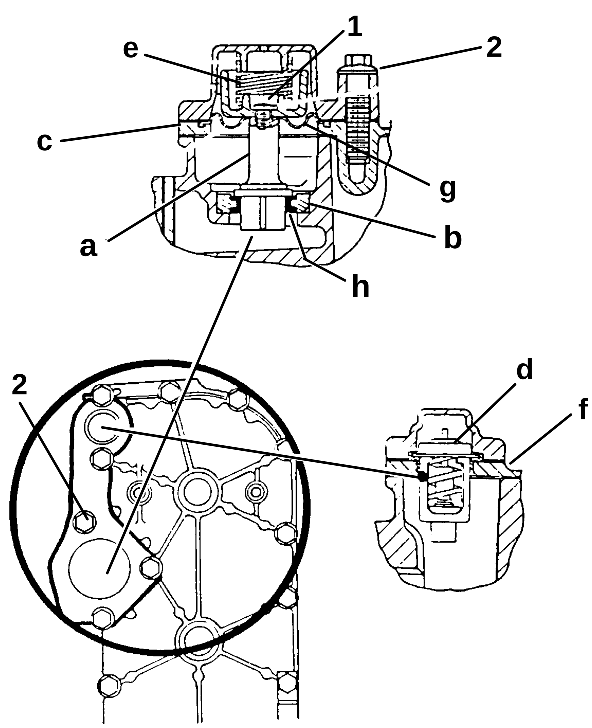


a - Cover
b - Gasket

- Install thermostat cover and components, as follows:

1. Insert poppet valve (a) into valve seat (b).
2. Install cover gasket (c) over poppet.
3. Insert thermostat (d) into well.
4. Align cover, with poppet spring (e) seated as shown.
5. Depress cover, and insert bolts - finger tighten.

Note seating of thermostat gasket (f) and poppet diaphragm (g). These, and carrier (h) are replaceable when necessary.



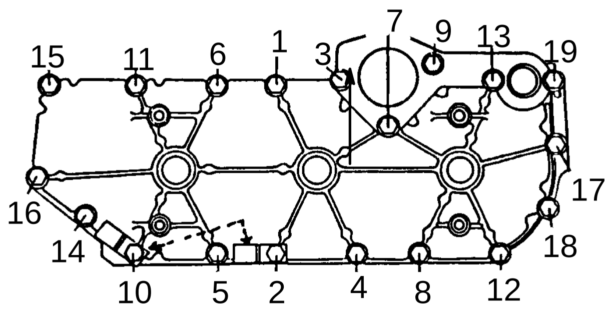
1 - Screw – Drive Tight
2 - Thermostat/Poppet Valve Cover Screws – Torque to 18.lb.ft (24.5Nm)

- Position clips, align cover holes and insert bolts - finger tighten (located under bolts #2 and 10).
- Insert remaining cover bolts - finger tighten.

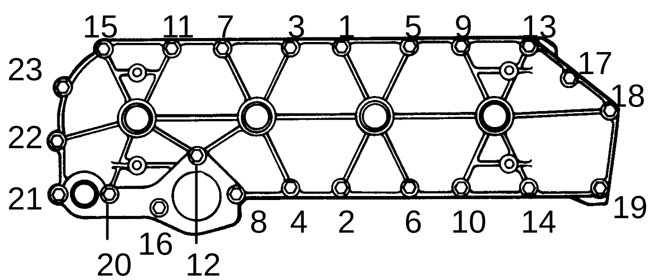
NOTE: *Keep clips positioned, as shown, during torque sequence.*

CYLINDER HEAD COVER TORQUE SEQUENCE

All Cover Bolts: 18 lb. ft. (24.4 N·m)



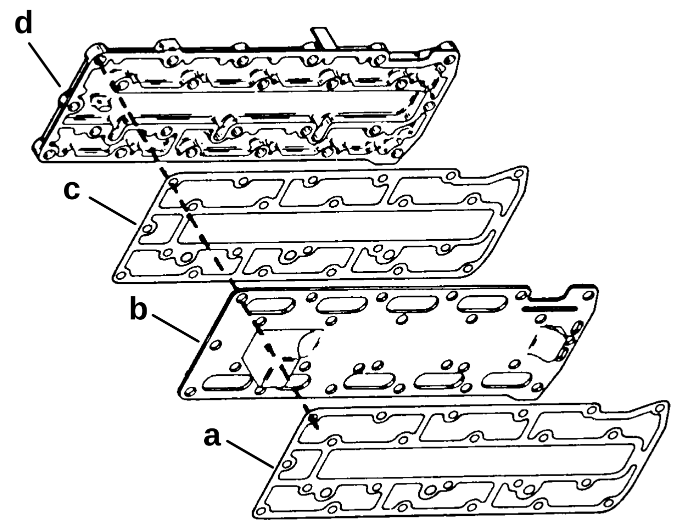
3 Cylinder Models



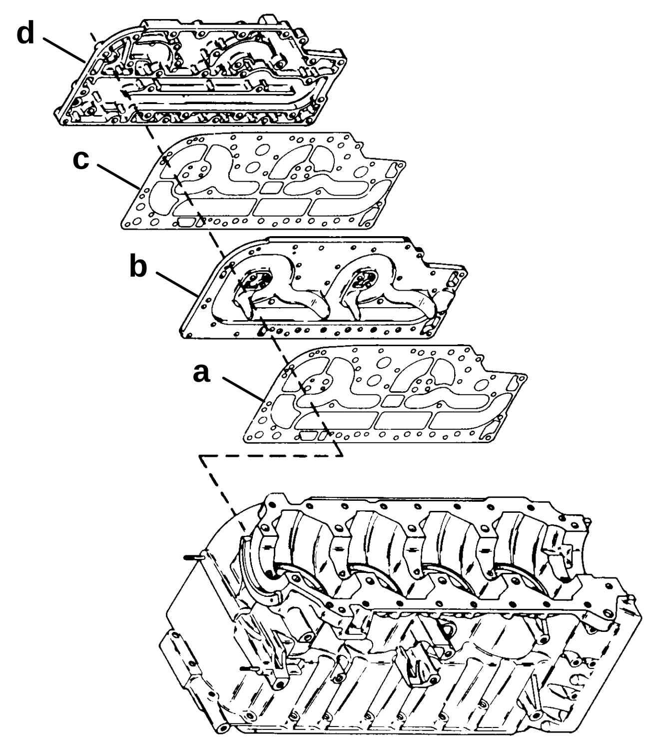
4 Cylinder Models 23014

Exhaust Plate Cover and Exhaust Divider Plate

- Assemble in order shown.
  - a. Exhaust Plate Gasket
  - b. Divider Plate
  - c. Exhaust Plate Gasket
  - d. Exhaust Plate Cover



3 Cylinder Models

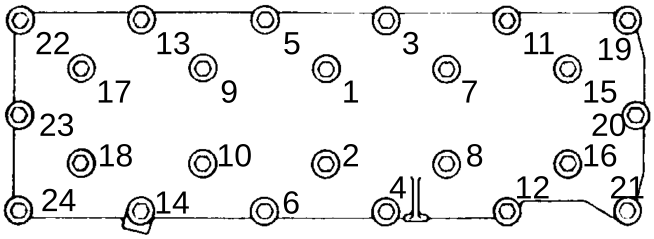


4 Cylinder Models 51523

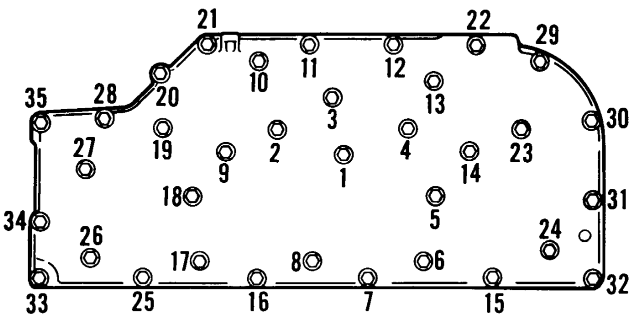
- Insert bolts (24) and finger tighten.
- Torque bolts in sequence.

EXHAUST PLATE COVER TORQUE SEQUENCE

All Cover Bolts: 18 lb. ft. (24.4 N·m)



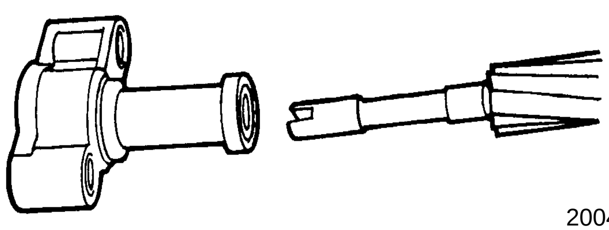
3 Cylinder Models



4 Cylinder Models

- Reinstall Oil Injection Pump Shaft and housing; check O-rings - replace as necessary.

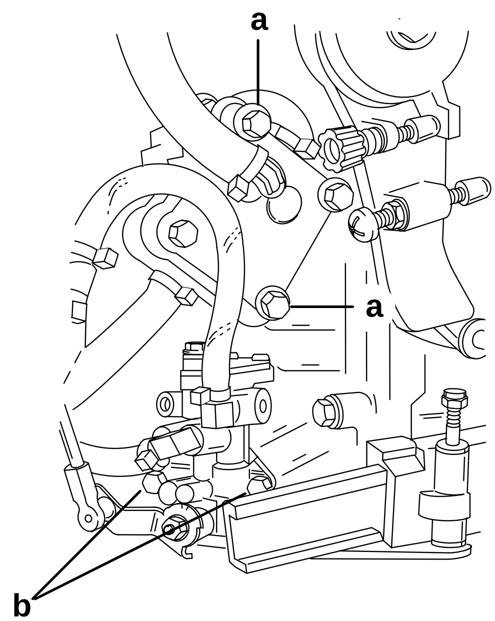
IMPORTANT: Insure that gears engage properly and that the O-rings are seated properly on reassembly, or an oil injection failure could occur, resulting in possible powerhead damage.



20041

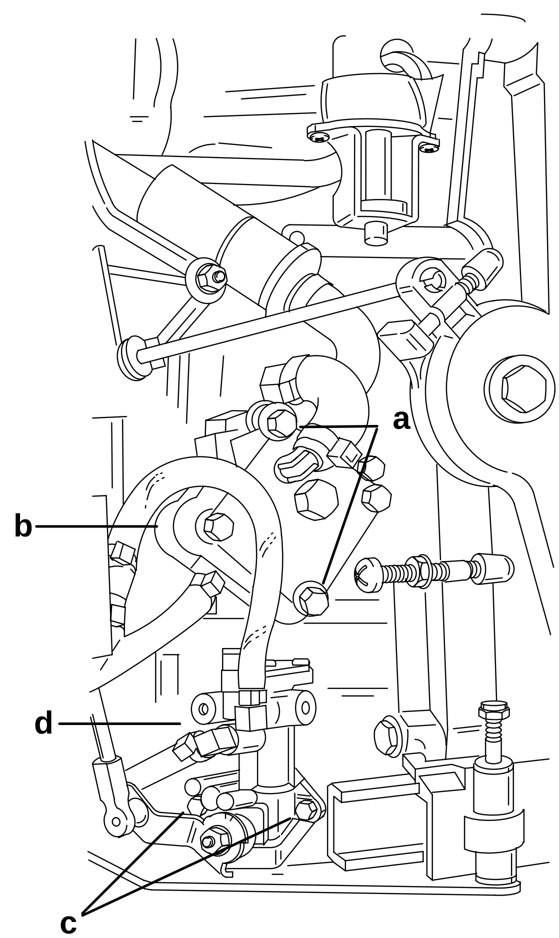
IMPORTANT: After reinstalling shaft and housing, turn crankshaft - make sure oil pump shaft turns.

- Reinstall Oil Injection Pump – 2 bolts. Torque to 60 lb. in. (6.8 N·m).
- Reinstall Fuel Pump – 2 bolts. Torque to 40 lb. in. (4.5 N·m).
- Reattach fuel/oil line hoses and secure with sta-straps.



3 Cylinder Models 53992

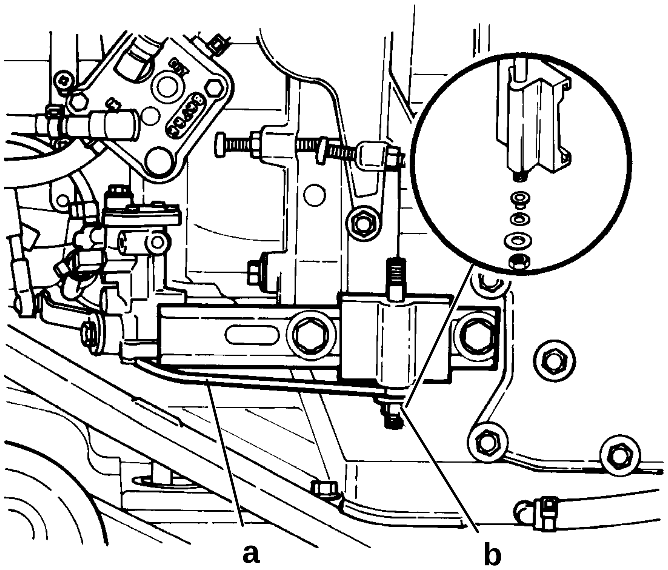
a - Bolts [Torque to 40 lb. in. (4.5 N·m)]
b - Bolts [Torque to 60 lb. in. (6.8 N·m)]



4 Cylinder Models 53991

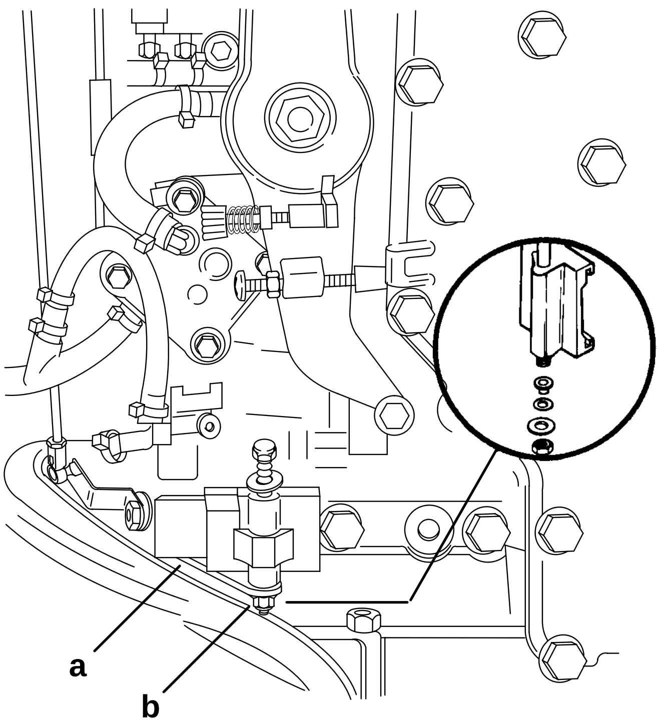
a - Bolts [Torque to 40 lb. in. (4.5 N·m)]
b - Fuel Pump
c - Bolts [Torque to 60 lb. in. (6.8 N·m)]
d - Oil Pump

- Reattach shift arm linkage on stud.



3 Cylinder Models 19544

a - Shift Arm Linkage
b - Stud



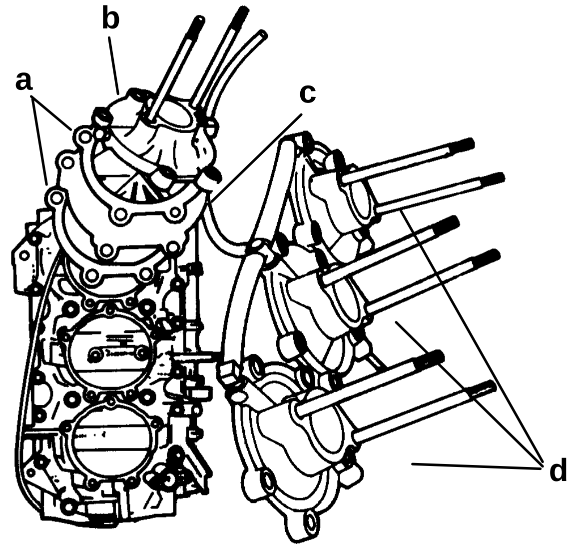
4 Cylinder Models 53980

a - Shift Arm Linkage
b - Stud

NOTE: *For specific information on rewiring, see Section 2D, "Wiring Diagrams" (this manual).*

Intake Manifold and Reed Block Installation

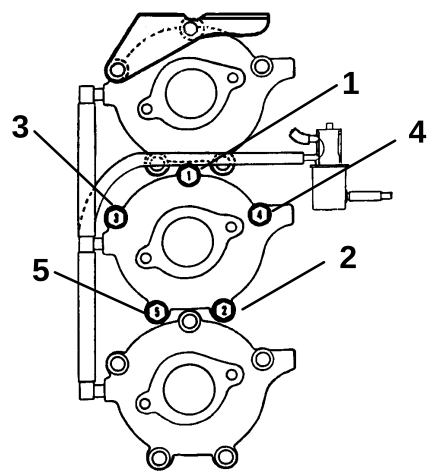
Reinstall Reed Block Housings and Intake Manifolds.



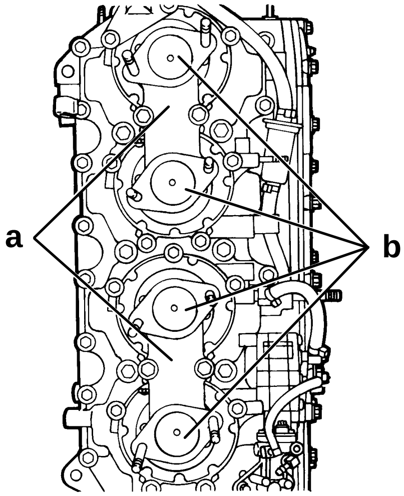
3 Cylinder Models 19574

a - Gasket
b - Intake Manifold
c - Reed Block Assembly
d - Install Intake Manifold as One Unit

INTAKE MANIFOLD - TORQUE SEQUENCE

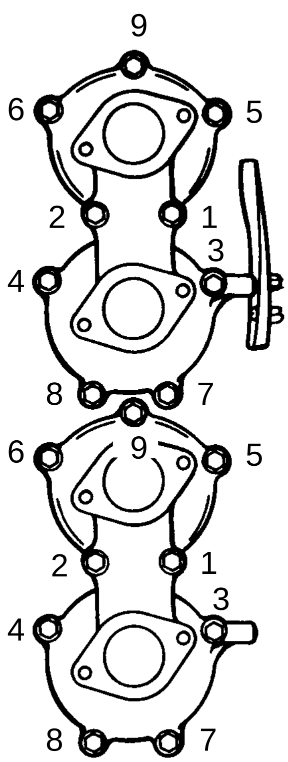


3 Cylinder Models



4 Cylinder Models 25914

a - Intake Manifolds
b - Reed Block Assemblies

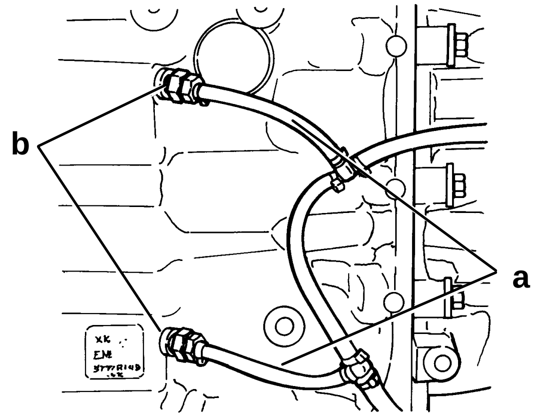


4 Cylinder Models

Torque each intake manifold, in sequence, to 18 lb. ft. (24.4 N·m).

Accelerator Pump Installation (4 Cylinder Models)

- Install accelerator pump check valves and hoses.

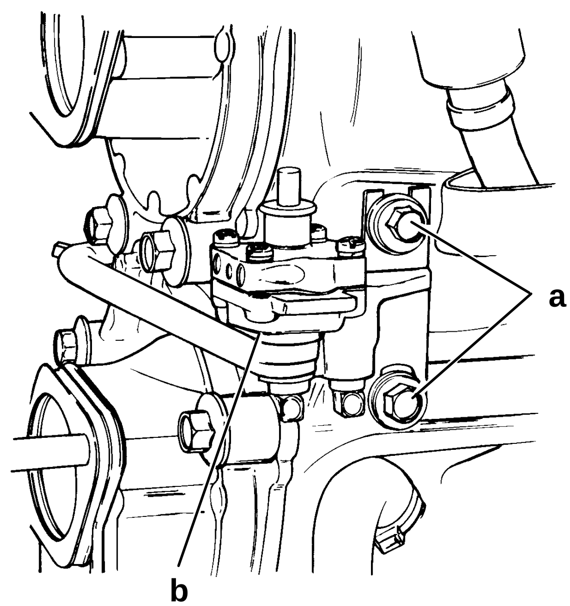


4 Cylinder Models 25913

a - Accelerator Pump Hoses
b - Check Valves

- Install accelerator pump with 2 bolts. Torque bolts to 130 lb. in. (14.7 N·m).

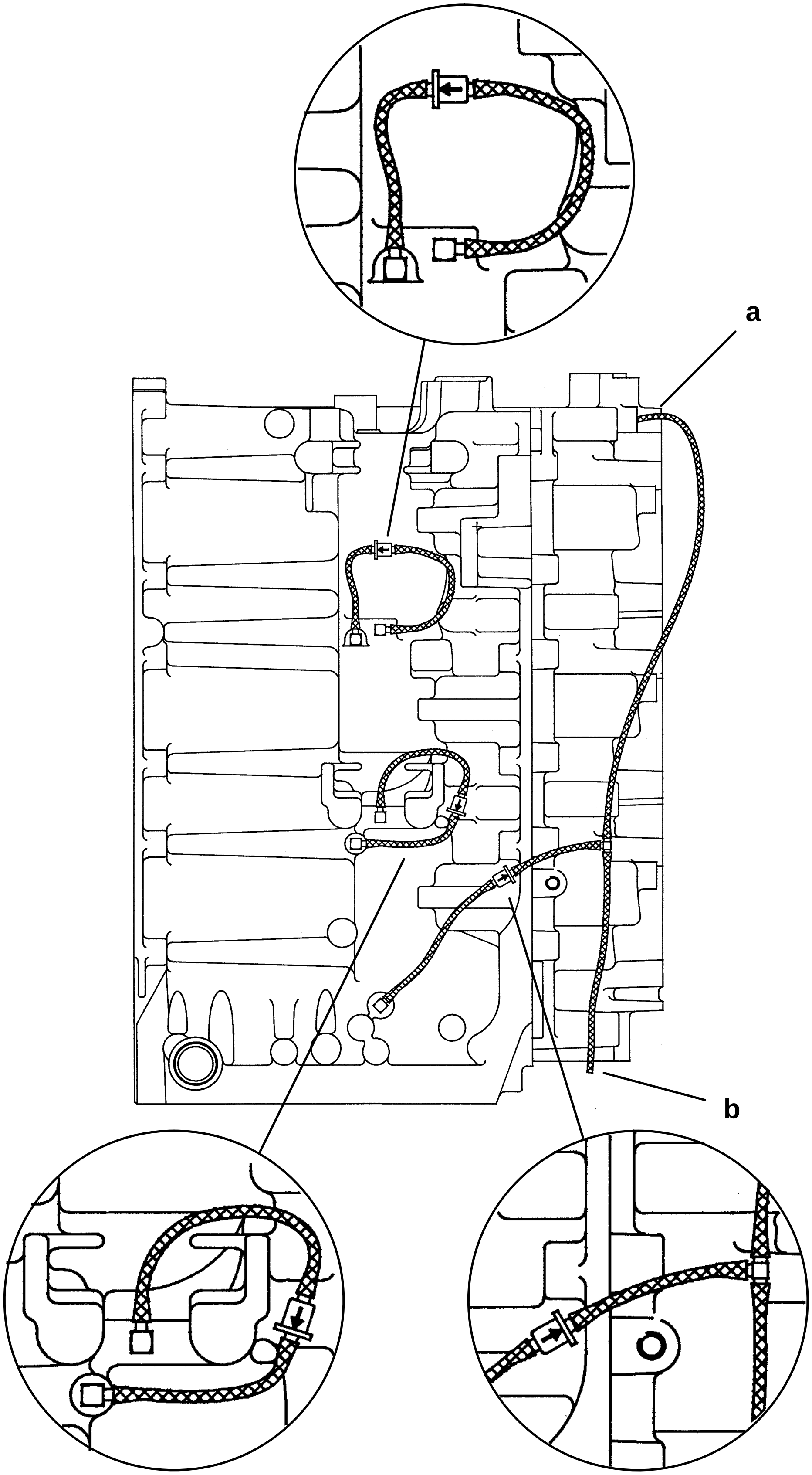
NOTE: *After powerhead reassembly is complete, refer to Section 2C for proper positioning of accelerator pump against throttle cam.*



4 Cylinder Models 25963

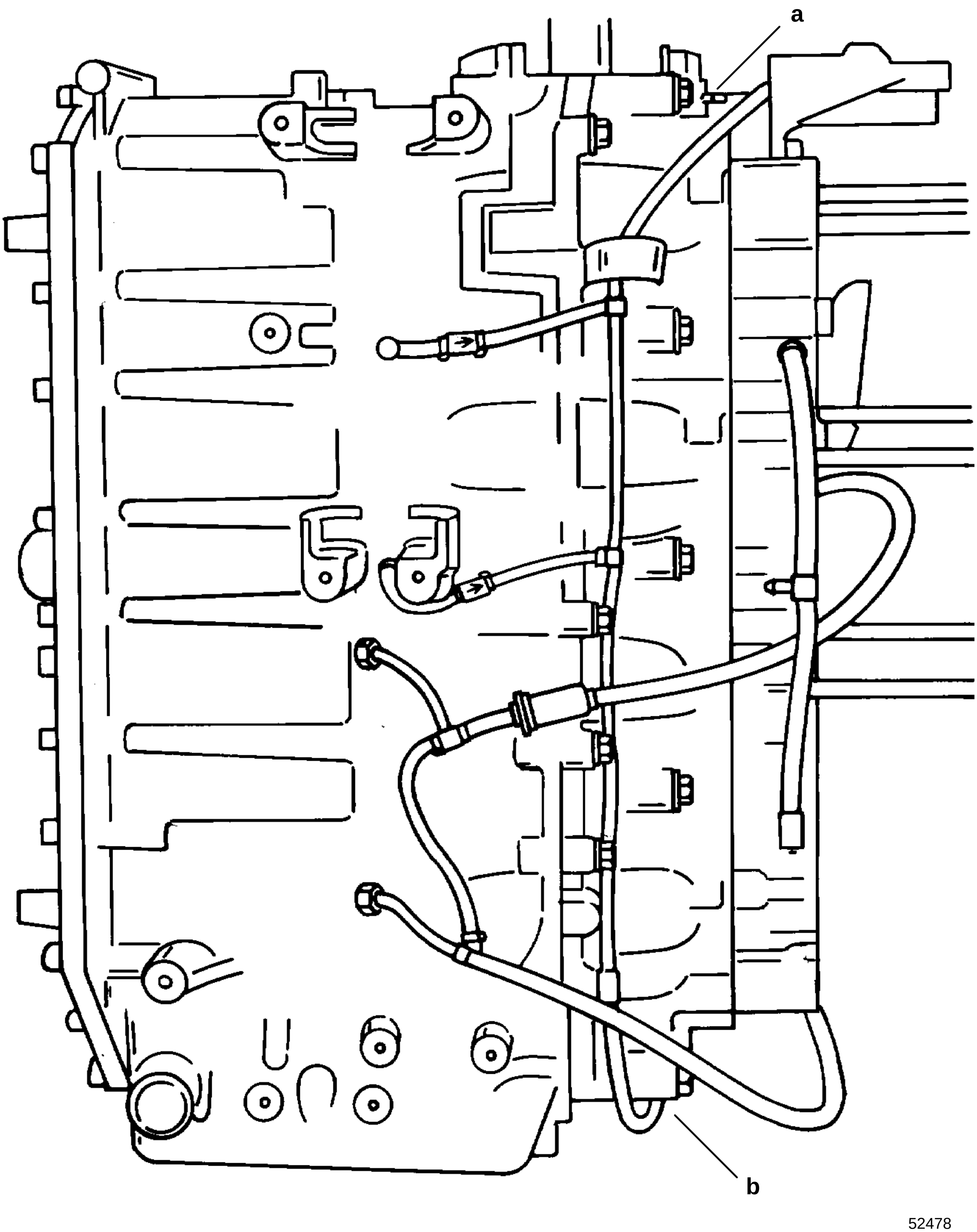
a - Bolts [Torque to 130 lb. in. (14.7 N·m)]
b - Accelerator Pump

3 Cylinder Bleed Hose Routing



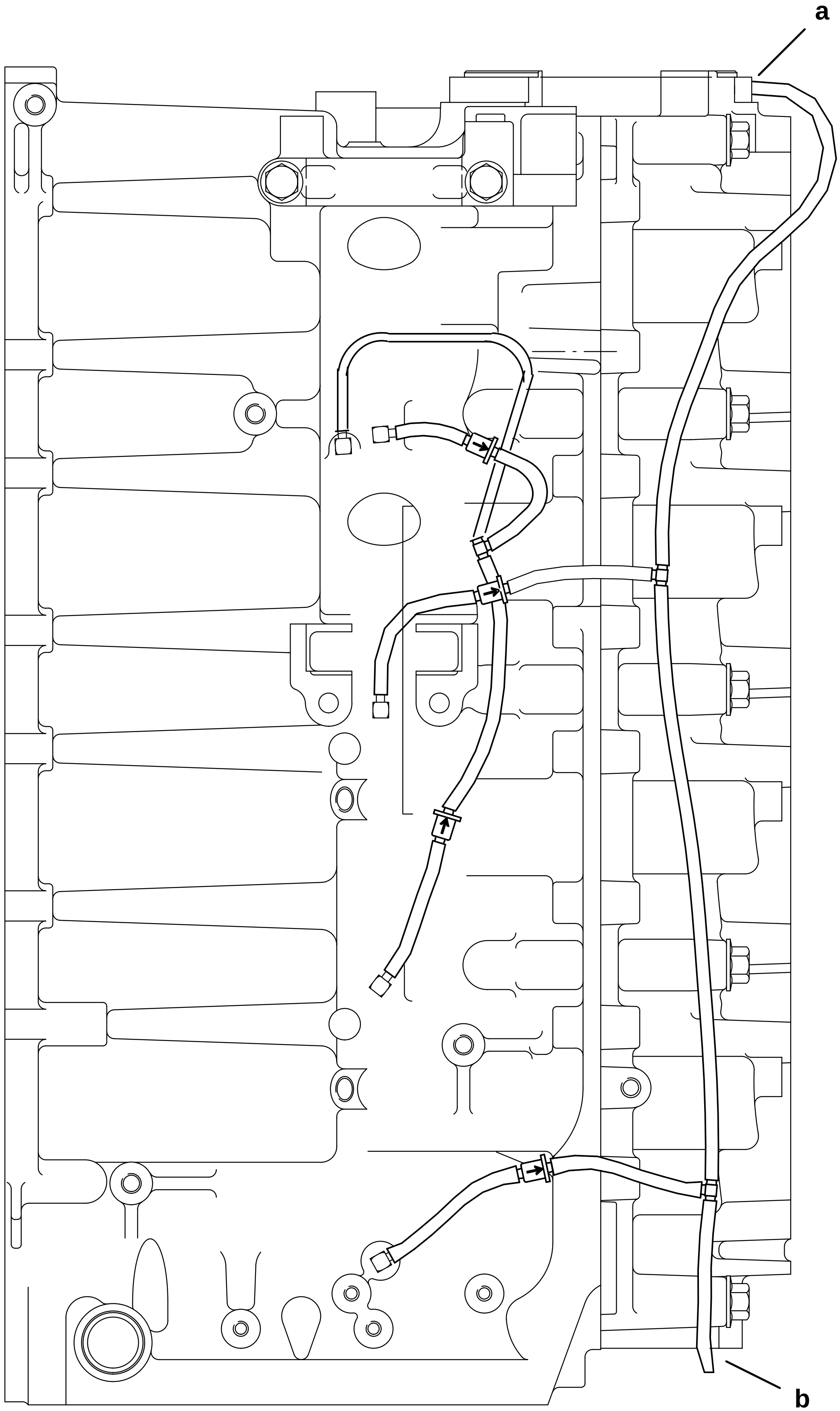
a - Pressed-In Check Valve
b - Threaded Check Valve

4 Cylinder Bleed Hose Routing (1995 and Prior)



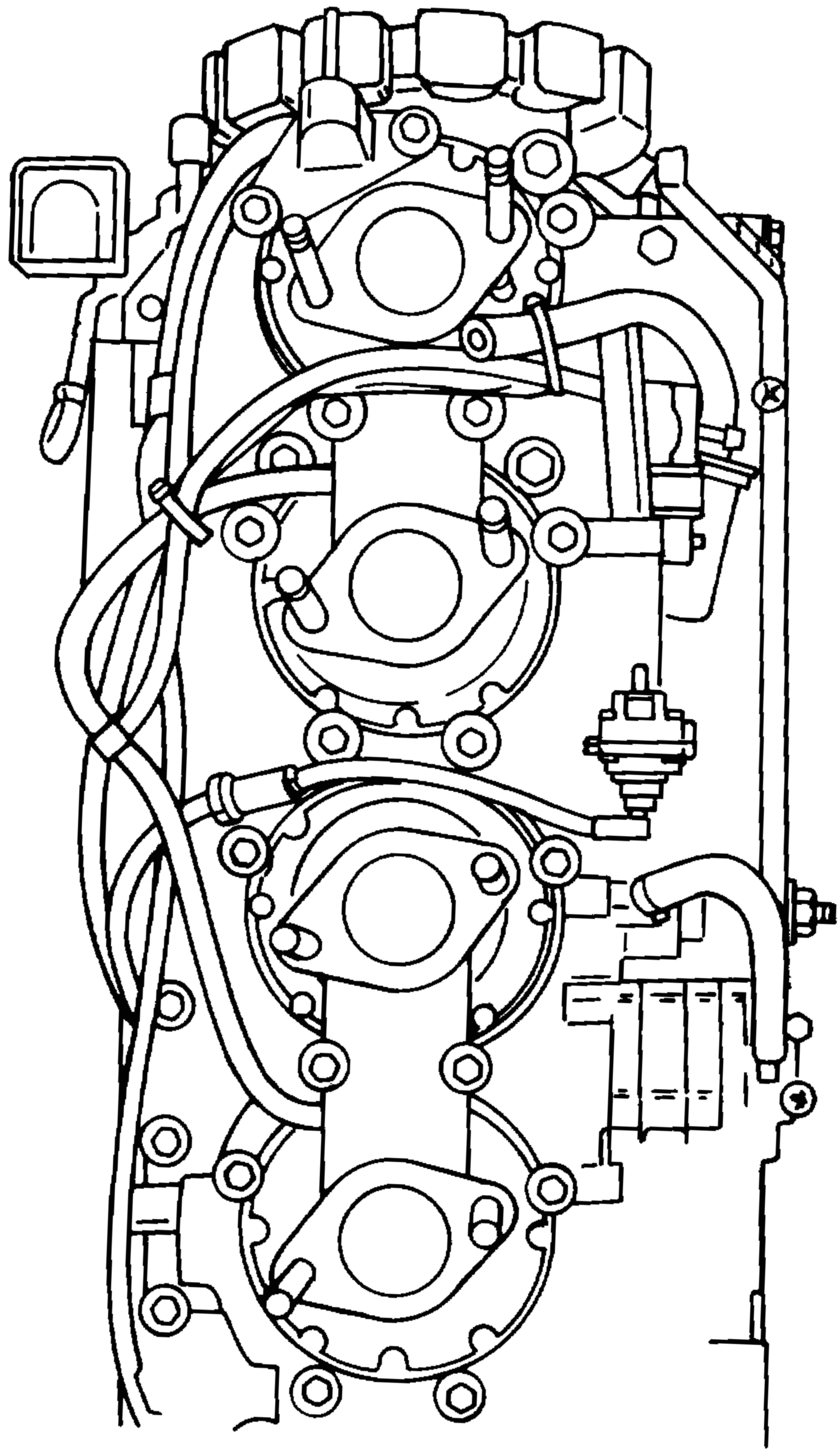
a - Pressed-In Check Valve
b - Threaded Check Valve

4 Cylinder Bleed Hose Routing (1996 and Newer)

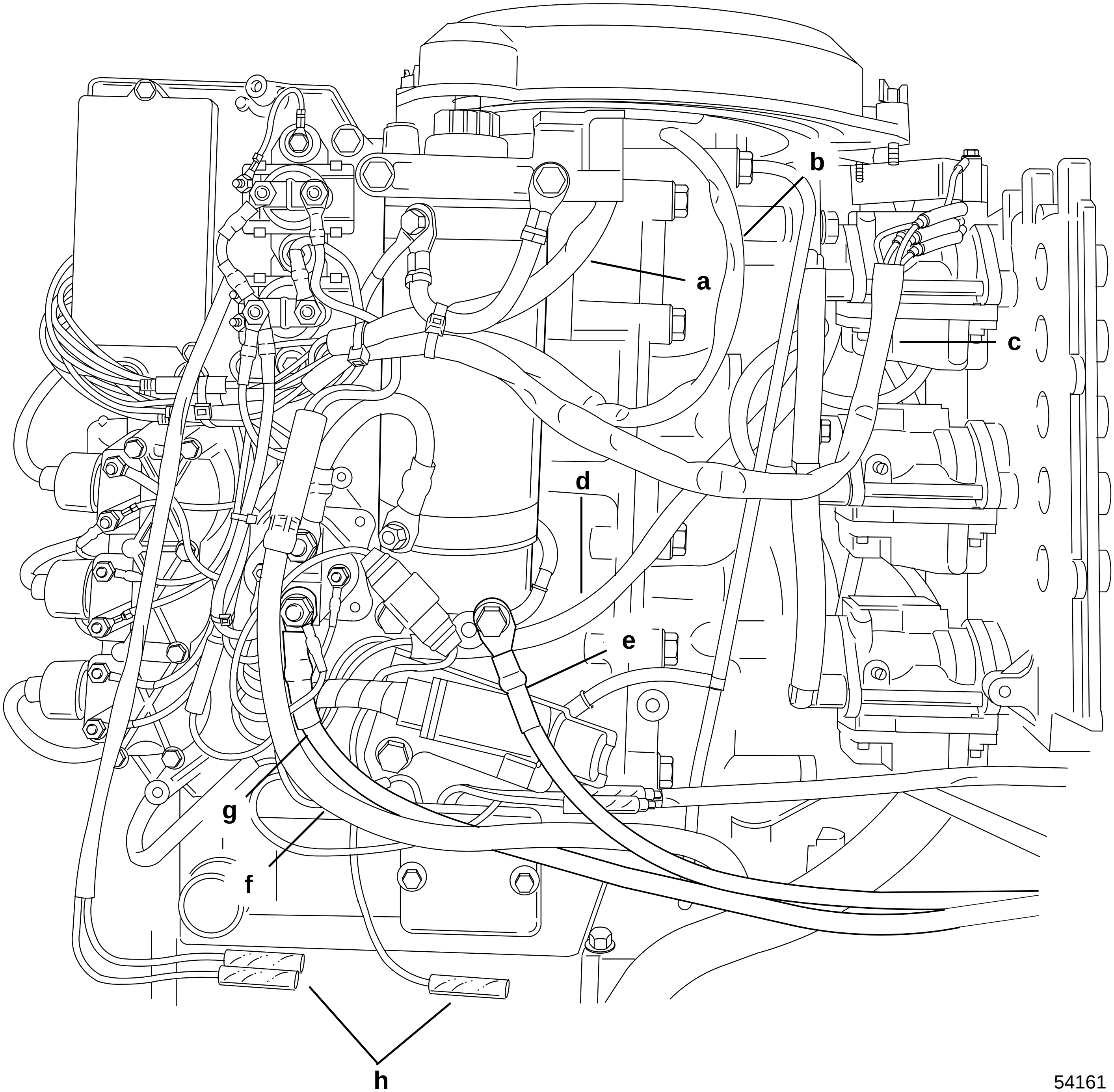


a - Pressed-In Check Valve
b - Threaded Check Valve

4 Cylinder Fuel Enrichment/Accelerator Pump Hose Routing

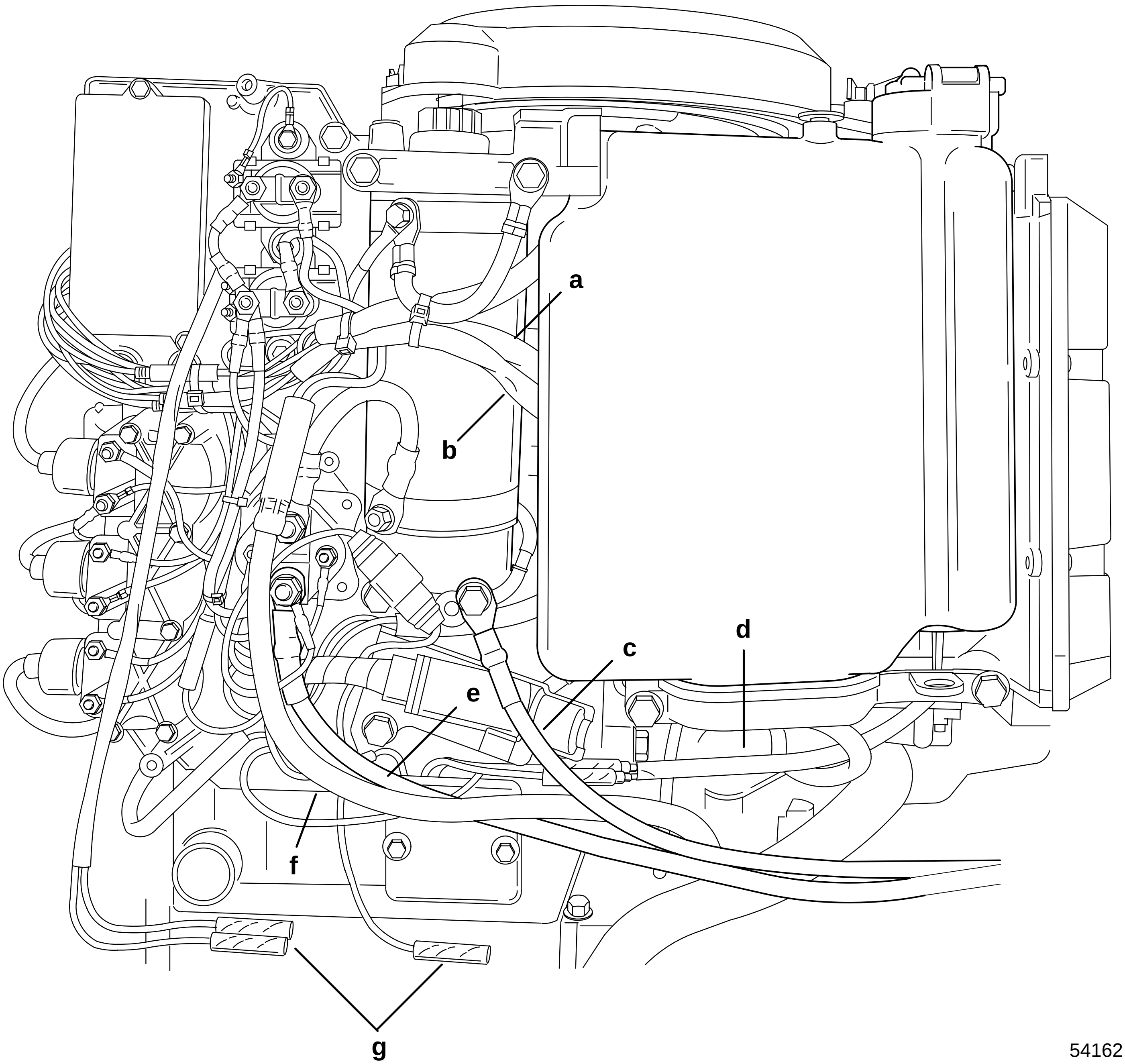


1994 and Newer 3 Cylinder Harness Routing (without Oil Reservoir Installed)



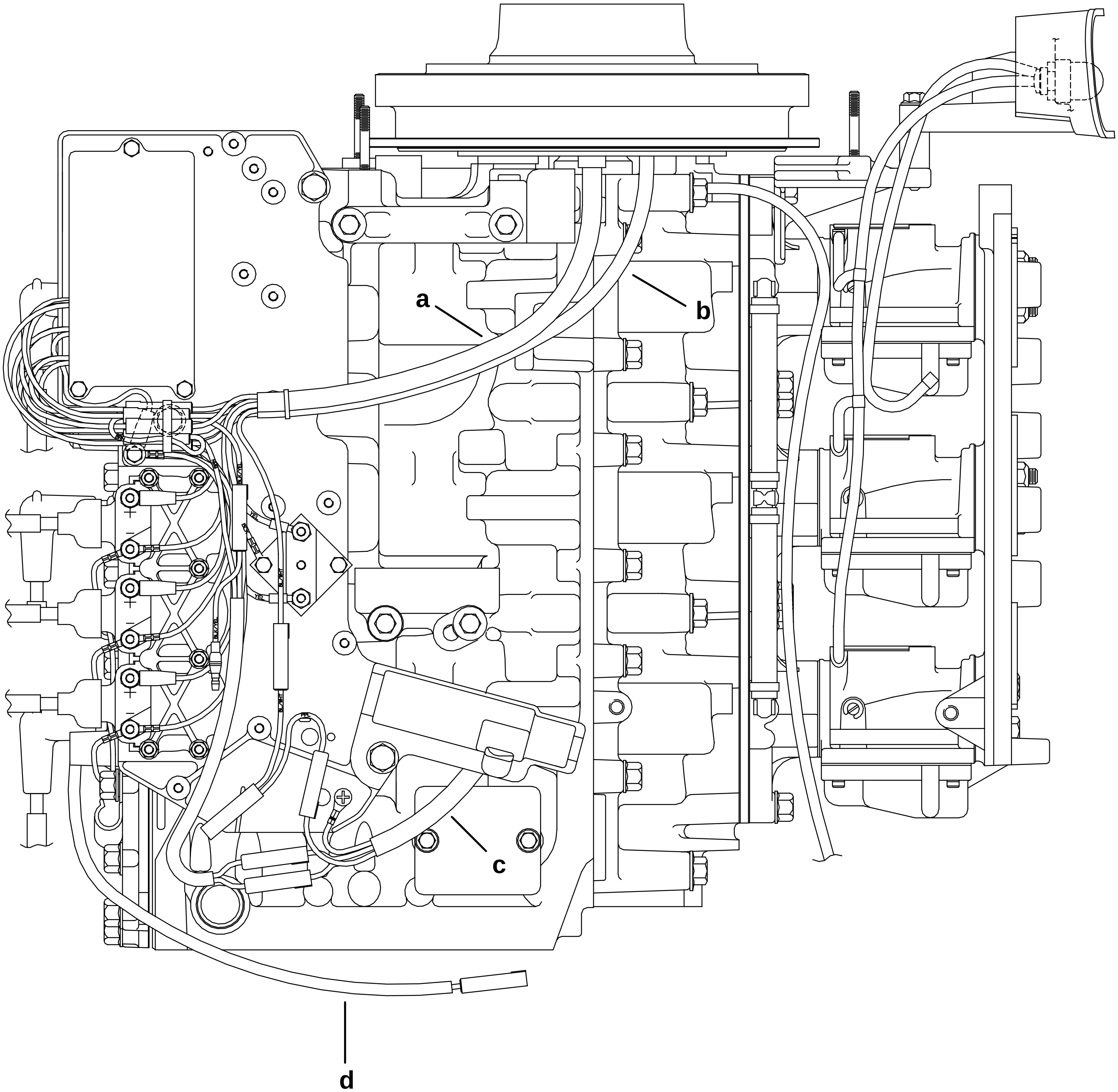
a - Stator Harness
b - Trigger Harness
c - Voltage Regulator Harness
d - Fuel Enrichment Harness
e - NEGATIVE (–) Battery Cable
f - Power Trim Harness
g - POSITIVE (+) Battery Cable
h - Lower Cowl Trim Harness

1994 and Newer 3 Cylinder Harness Routing (with Oil Reservoir Installed)



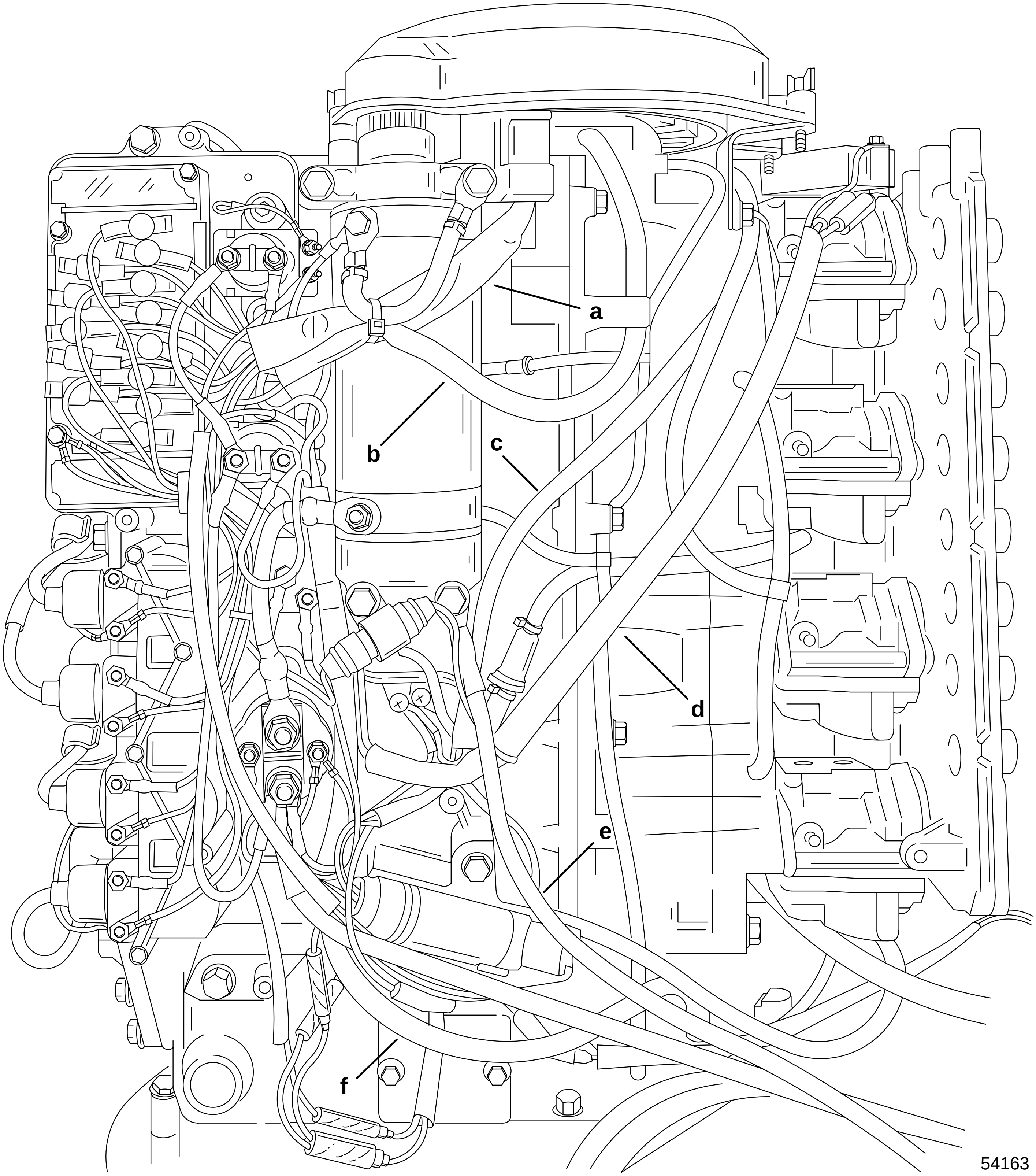
a - Trigger Harness
b - Voltage Regulator Harness
c - NEGATIVE (–) Battery Cable
d - Low Oil Warning Module Harness
e - POSITIVE (+) Battery Cable
f - Power Trim Harness
g - Lower Cowl Power Trim Harness

3 Cylinder Manual Start Harness Routing



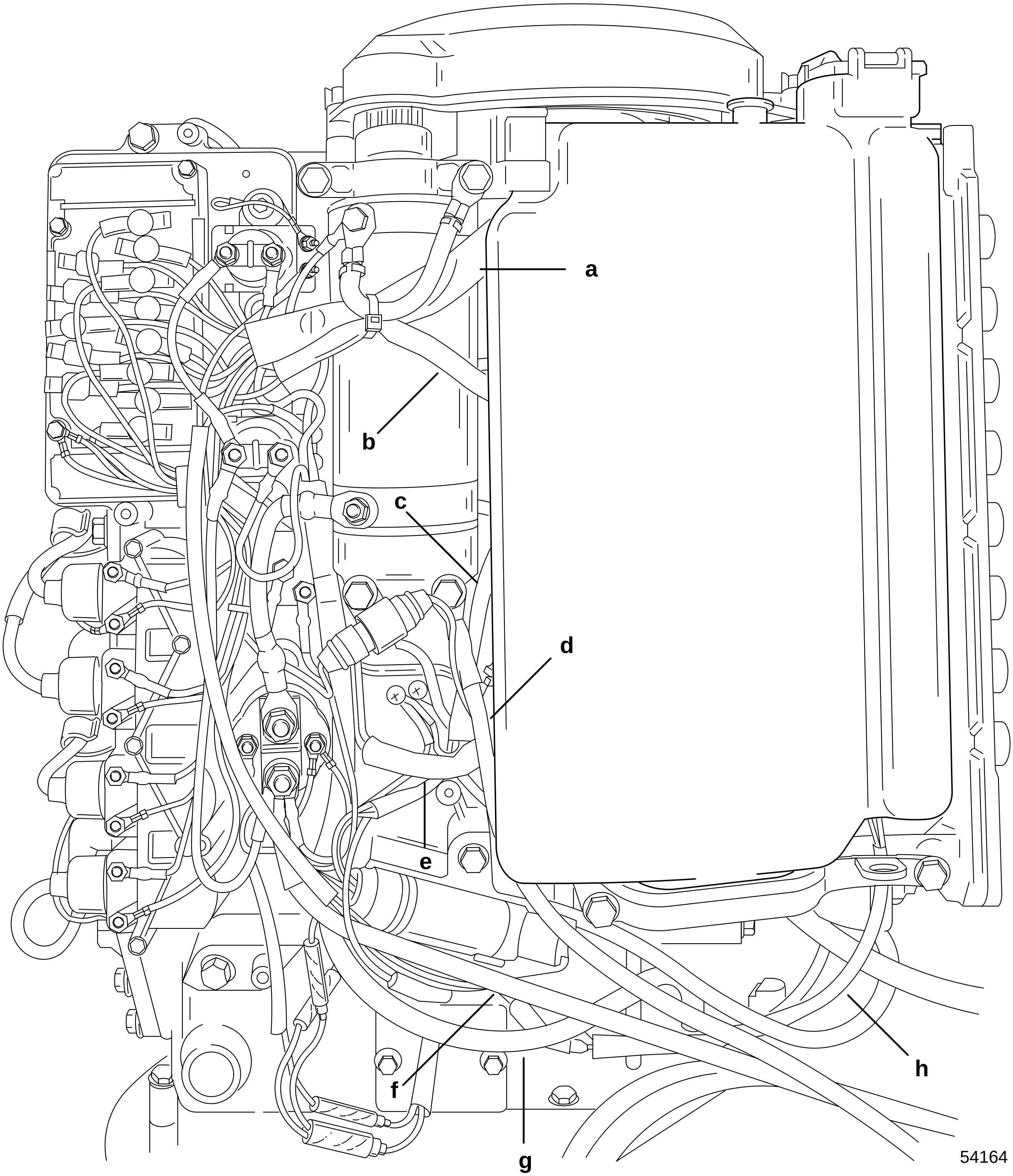
a - Stator Harness
b - Trigger Harness
c - RPM Limiter Harness
d - Overheat Sensor Lead

1994 and Newer 4 Cylinder Harness Routing (without Oil Reservoir Installed)



a - Stator Harness
b - Trigger Harness
c - Fuel Enrichment Harness
d - Voltage Regulator Harness
e - NEGATIVE (–) Battery Cable
f - Power Trim Harness

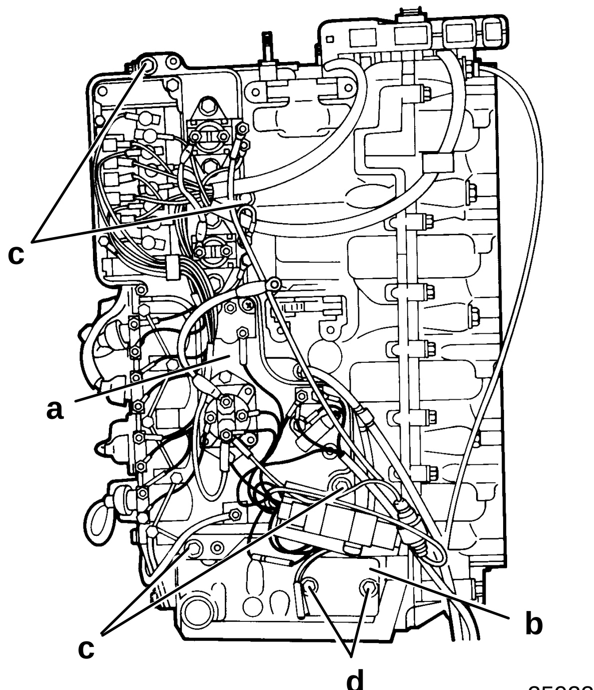
1994 and Newer 4 Cylinder Harness Routing (with Oil Reservoir Installed)



a - Stator Harness
b - Trigger Harness
c - Fuel Enrichment Harness
d - NEGATIVE (–) Battery Cable
e - Voltage Regulator Harness
f - POSITIVE (+) Battery Cable
g - Power Trim Harness
h - Low Oil Warning Harness

Ignition Plate Installation

- Install ignition plate. Apply Loctite 271 to bolt threads. Torque ignition plate bolts to 13.5 lb. ft. (18.5 N·m).

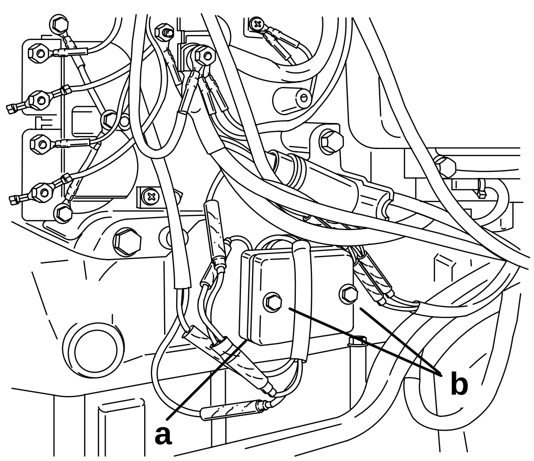


4 Cylinder Models

7 Loctite 271 (92-809820)

a - Ignition Plate
b - RPM Limiter (outer) and Oil Warning Module (inner)
c - Ignition Plate Bolts (4 Each)
d - RPM Limiter/Oil Warning Module Bolts (2 Each)

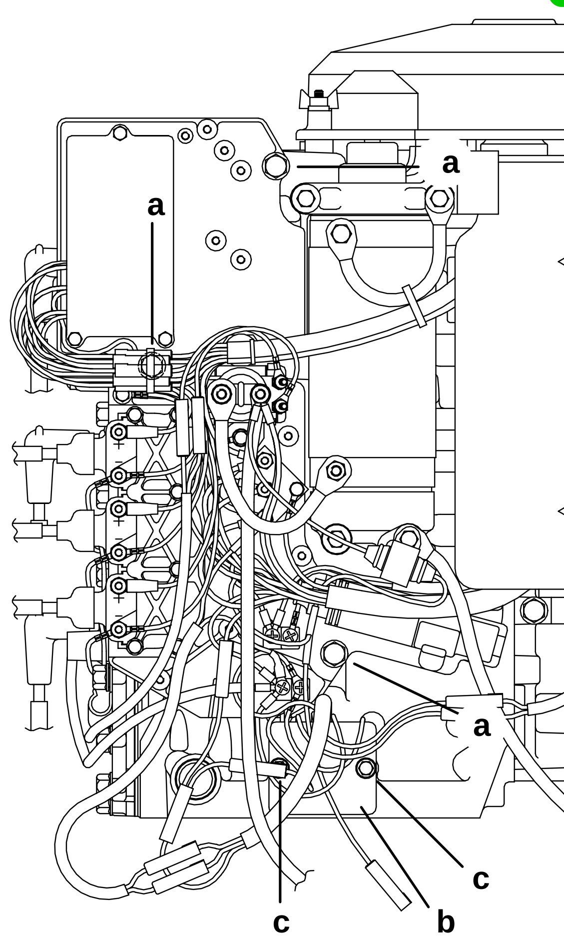
- Install Oil Warning module (Inner) and RPM Limiter module (Outer) back-to-back. Apply Loctite 271 to module bolt threads Torque bolts to 80 lb. in. (9.0 N·m).



4 Cylinder Models Only

7 Loctite 271 (92-809820)

a - Oil Warning Module (Inner); RPM Limiter Module (Outer)
b - Bolts [Torque to 80 lb. in. (9.0 N·m)]



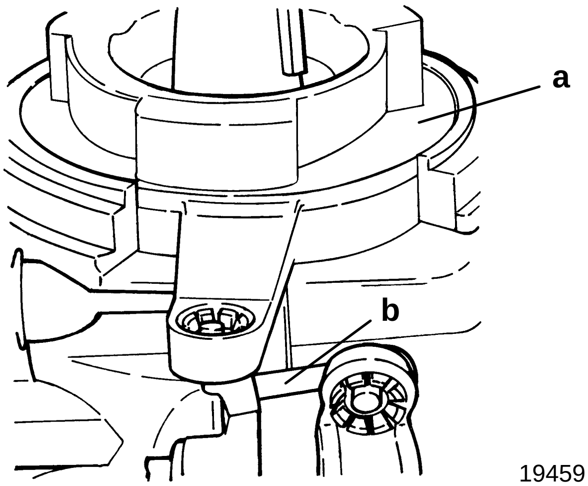
3 Cylinder Models

7 Loctite 271 (92-809820)

a - Bolts
b - Oil Warning Module
c - Oil Warning Module Bolts

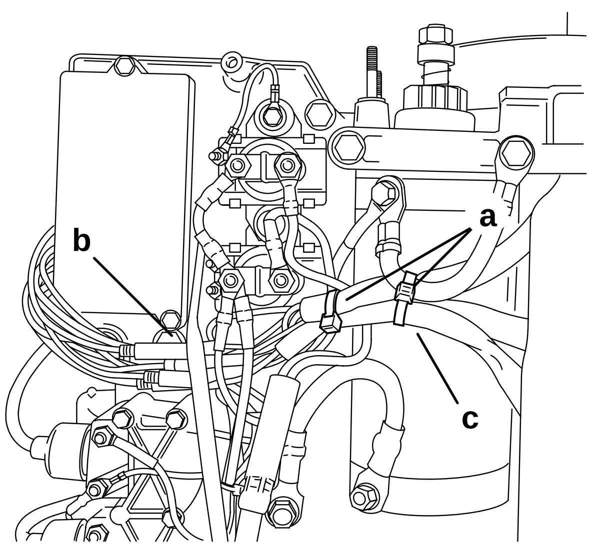
Trigger and Stator Installation

- Install trigger and connect link arm.



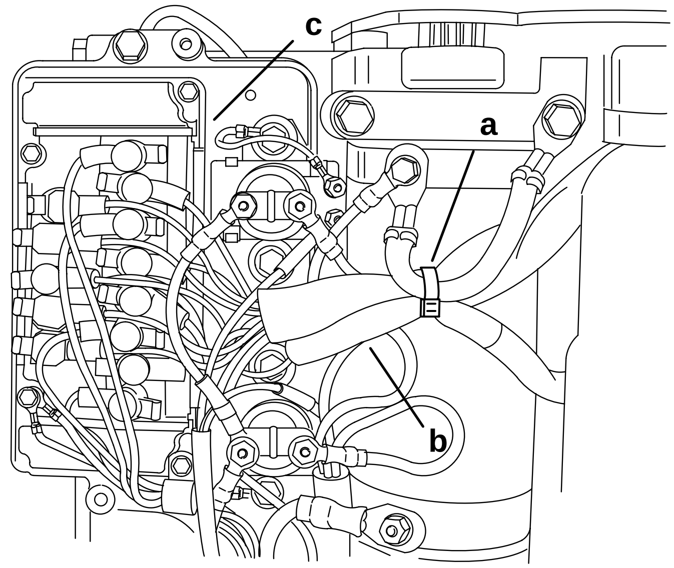
a - Trigger
b - Link Arm

- Connect trigger leads to switch box; refer to wiring diagrams in Section 2D.
- Install sta-strap.
- Install starter motor; refer to Section 2B.



3 Cylinder Models

a - Sta-Straps
b - Bullet Connectors; Connect Trigger Leads
c - Trigger Harness



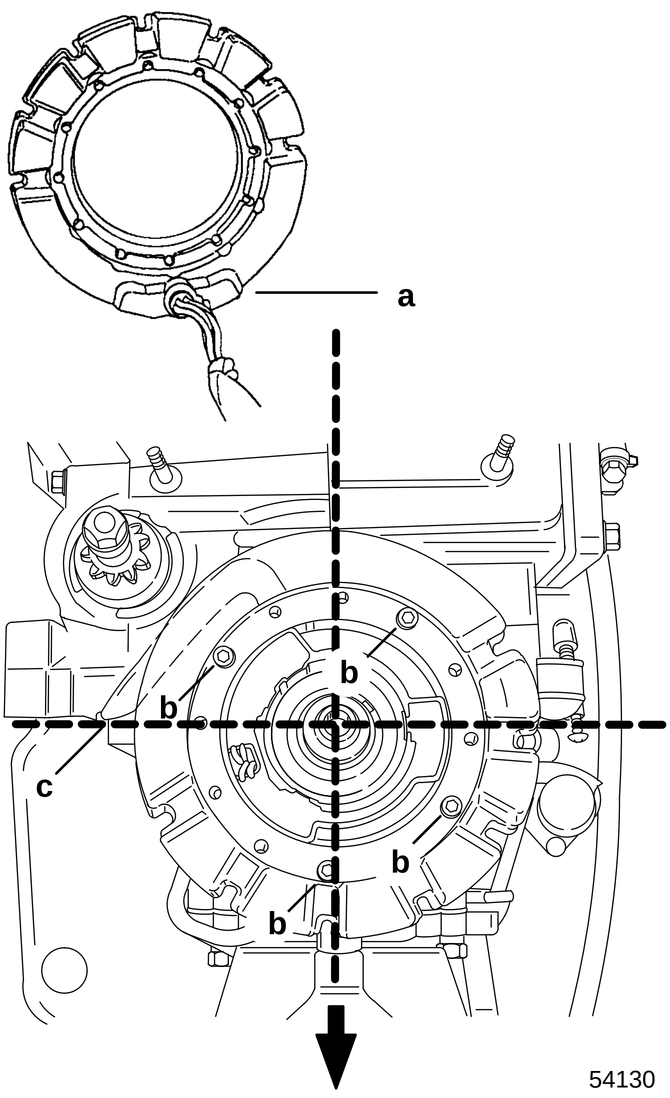
4 Cylinder Models

a - Sta-Strap
b - Trigger Harness
c - Switch Box

Stator Installation

Two styles of stators are used on 1994 through 1996 model 75/90 outboards. These stators can be identified by a large rim or small rim on the underside of the stator where the stator harness exits the stator. These stators MUST BE INSTALLED AS SHOWN RESPECTIVELY OR PREMATURE STATOR FAILURE MAY OCCUR AS A RESULT OF STATOR INTERFERANCE WITH THE ENGINE BLOCK.

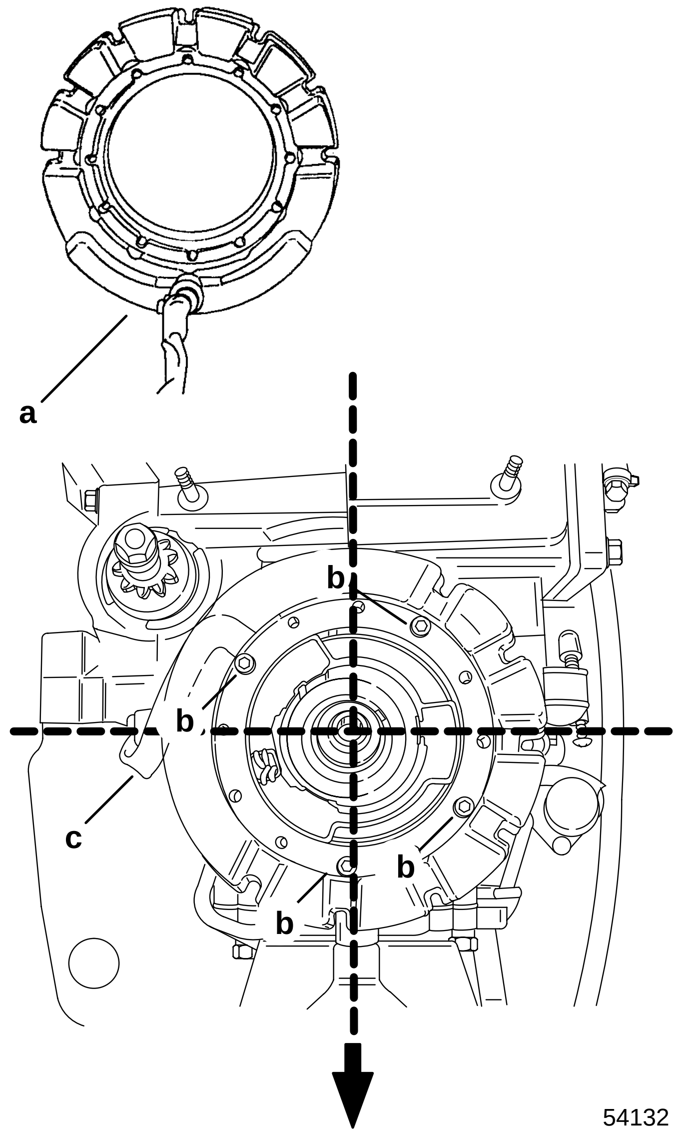
Small Rim Stator



Front of Engine

a - Small Rim
b - Stator Screws [Apply Loctite 271 to threads] [Torque screws to 60 lb. in. (6.8 N·m)]
c - Stator Harness

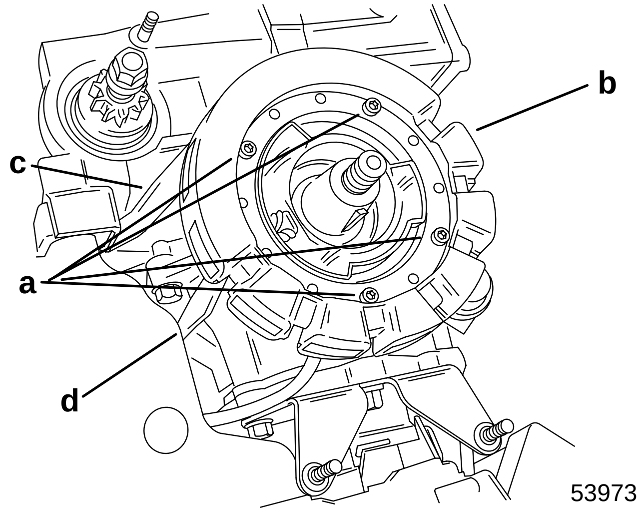
Large Rim Stator



Front of Engine

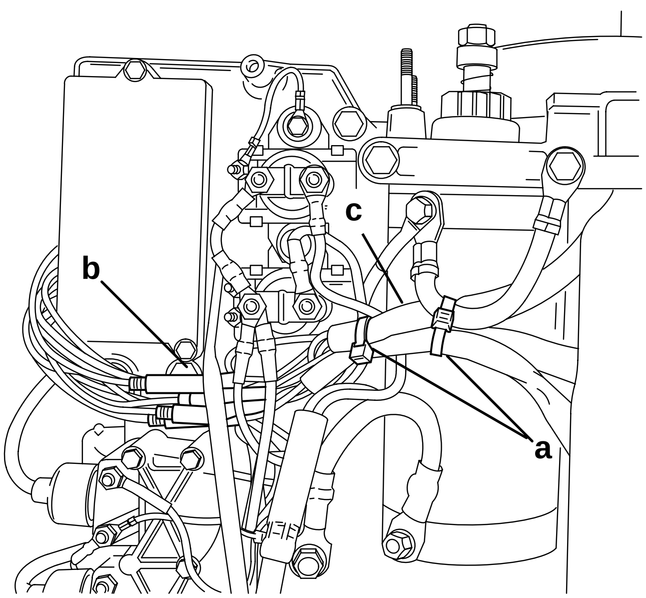
a - Large Rim Stator
b - Stator Screws [Apply Loctite 271 to threads] [Torque screws to 60 lb. in. (6.8 N·m)]
c - Stator Harness

- Install stator as shown.



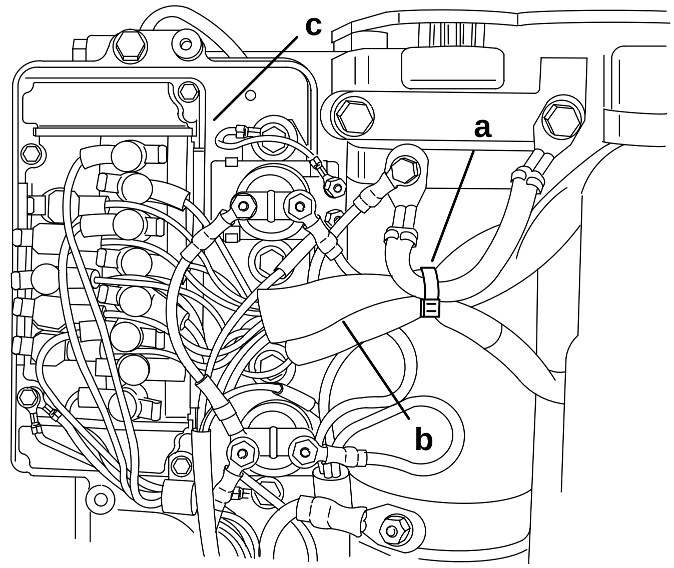
a - Screws; apply Loctite 271 on threads (unless Patch Screw is used) and torque to 60 lb. in. (6.8 N·m)
b - Stator
c - Stator Harness
d - Trigger Harness

- Connect stator leads; refer to wiring diagrams in Section 2D.
- Install sta-strap.
- Install starter motor; refer to Section 2B.



3 Cylinder Models 53792

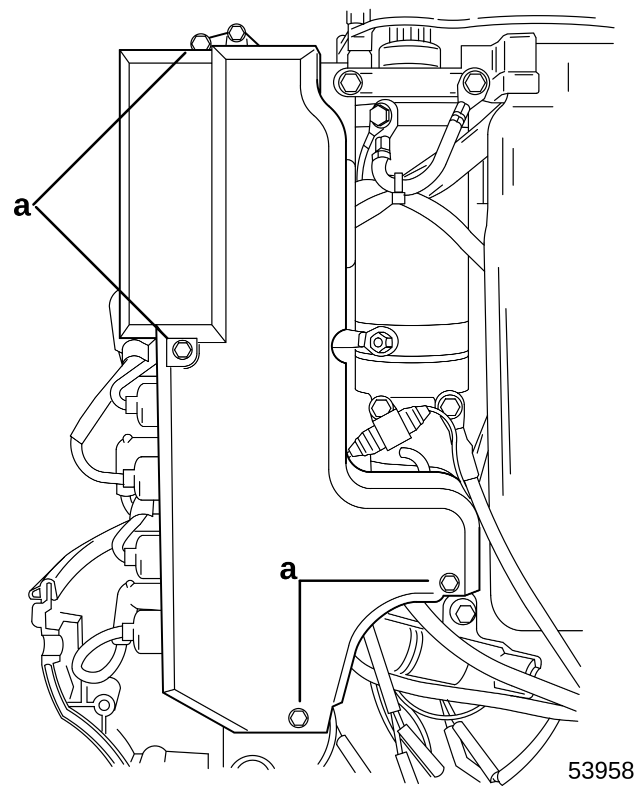
a - Sta-Straps
b - Switch Box Bullet Connectors
c - Stator Harness



4 Cylinder Models 53790

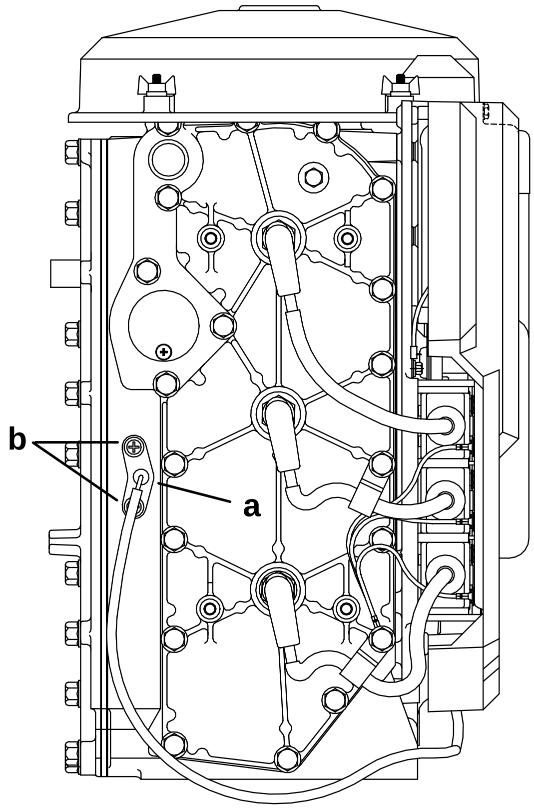
a - Sta-Strap
b - Stator Harness
c - Switch Box

- Reinstall electrical plate cover. Secure cover with 4 bolts (4 cyl. models) or 3 bolts (3 cyl. models). Torque bolts to 30 lb. in. (3.4 N·m).



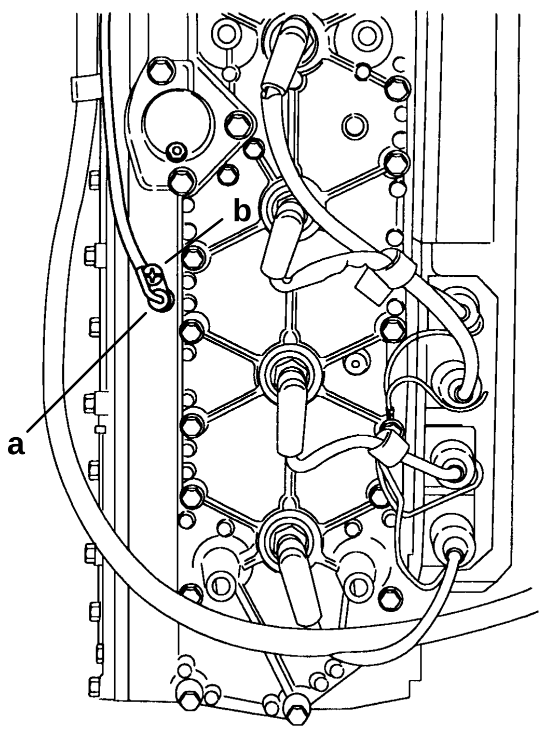
a - Bolts [Torque to 30 lb. in. (3.4 N·m)]

Temperature Sensor Installation



3 Cylinder Models

a - Temperature Sensor
b - Retainer Screws

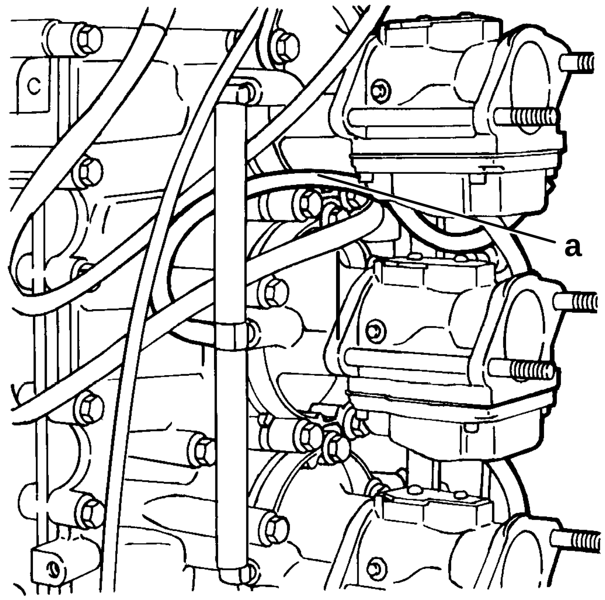


4 Cylinder Models 53993

a - Temperature Sensor
b - Retainer Screws

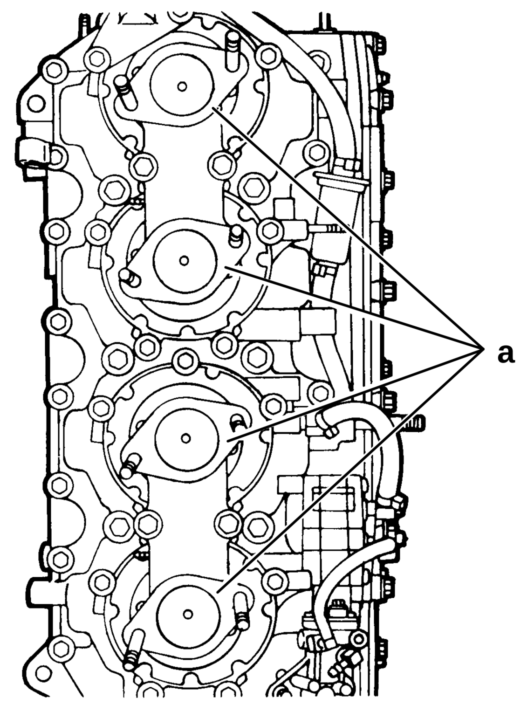
Carburetor Installation

- Install carburetor gaskets.
- Reinstall carburetors as a single unit assembly. Note manifold hose position and connection.



3 Cylinder Models 19094

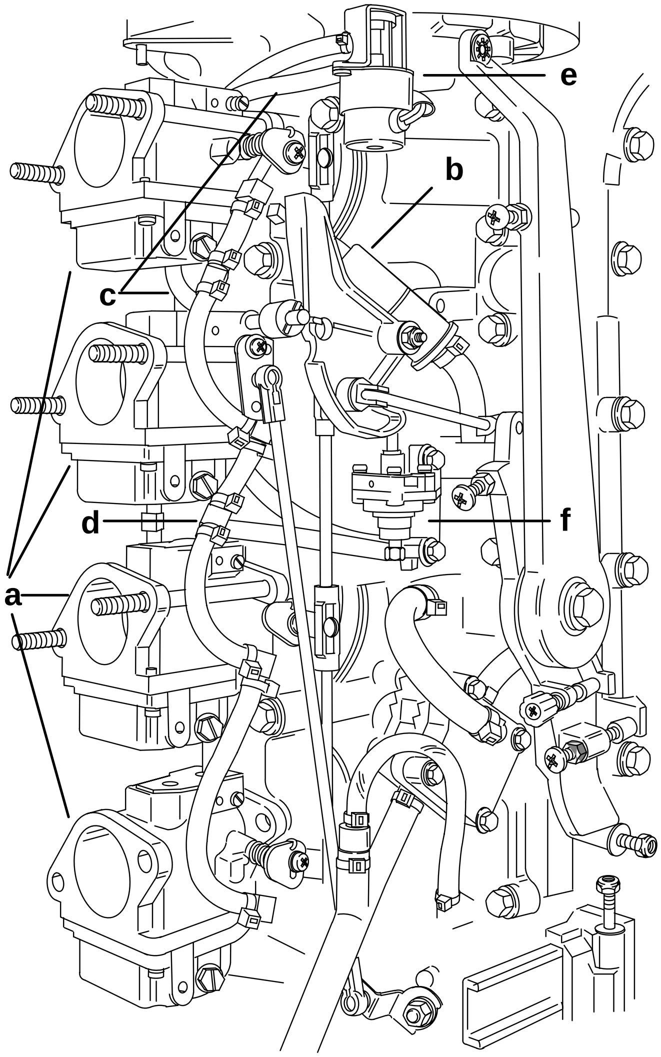
a - Manifold Hose



4 Cylinder Models 25914

a - Base Gaskets

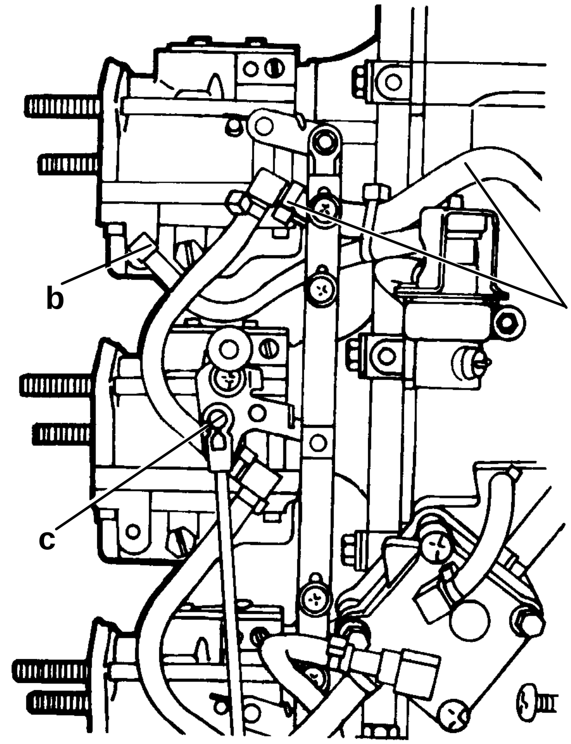
- Install carburetors as an assembly. Connect input fuel hose to top carburetor, input hose to fuel enrichment valve, and input hose to accelerator pump. Secure hoses with sta-straps.



4 Cylinder Models 54131

a - Carburetors
b - Top Carb Input Fuel Hose
c - Input Hose to Fuel Enrichment Valve
d - Input Hose to Accelerator Pump
e - Fuel Enrichment Valve
f - Accelerator Pump

- Reconnect main fuel line hose, and fuel enrichment hose. Secure fuel line “a” with sta-strap.
- Reconnect throttle linkage.



3 Cylinder Models 19093

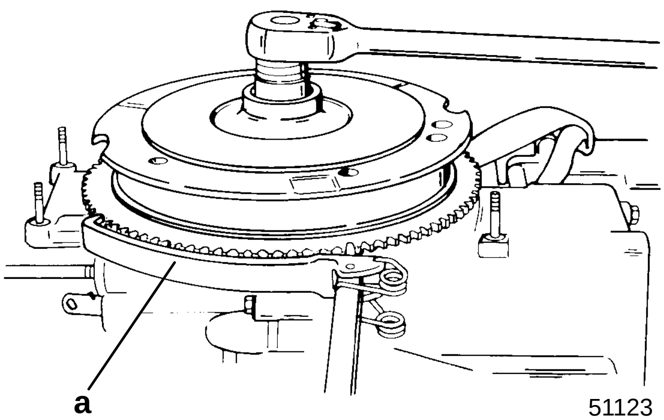
a - Main Fuel Hose
b - Fuel Enrichment Hose (1996 Models will Connect Enrichment Hose to Fitting in Fuel Line between Top and Middle Carburetors)
c - Throttle Linkage

Flywheel Installation

IMPORTANT: Inspect flywheel magnets for clinging debris prior to installing flywheel over stator. Failure to remove debris from magnets will result in damage to flywheel and stator when engine is initially started.

IMPORTANT: Do not apply oil to crankshaft taper or flywheel taper as flywheel will not seat properly against crankshaft when torqued.

- Reinstall flywheel on crankshaft. Secure flywheel with flat washer and locknut. While holding flywheel with Flywheel Holder (91-52344), torque flywheel nut to 120 lb. ft. (162.7 N·m).

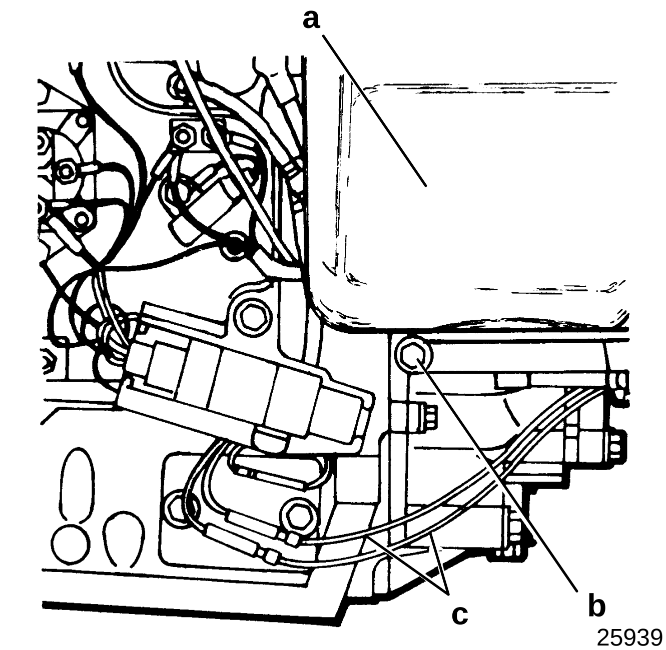


a - Flywheel Holder (91-52344)

- Install flywheel cover.

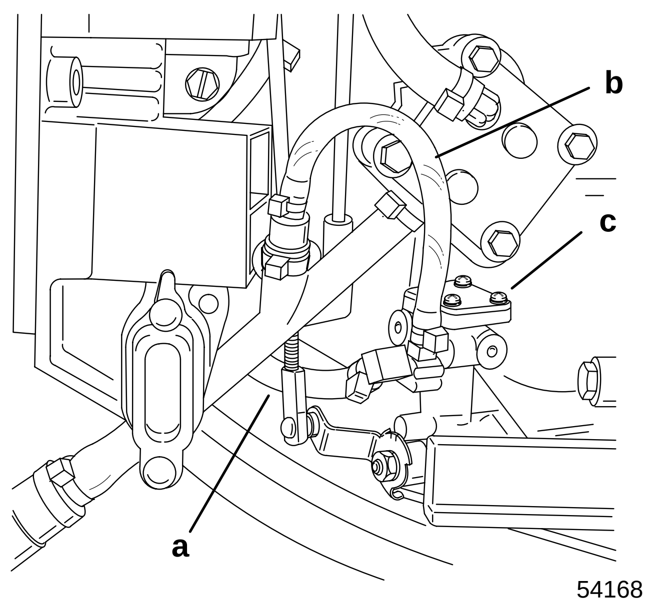
Oil Reservoir Installation

- Install oil tank assembly on powerhead. Torque aft bottom oil tank bracket bolt to 15 lb. ft. (20.3 N·m). Connect 2 LIGHT BLUE leads from oil tank to oil warning module.

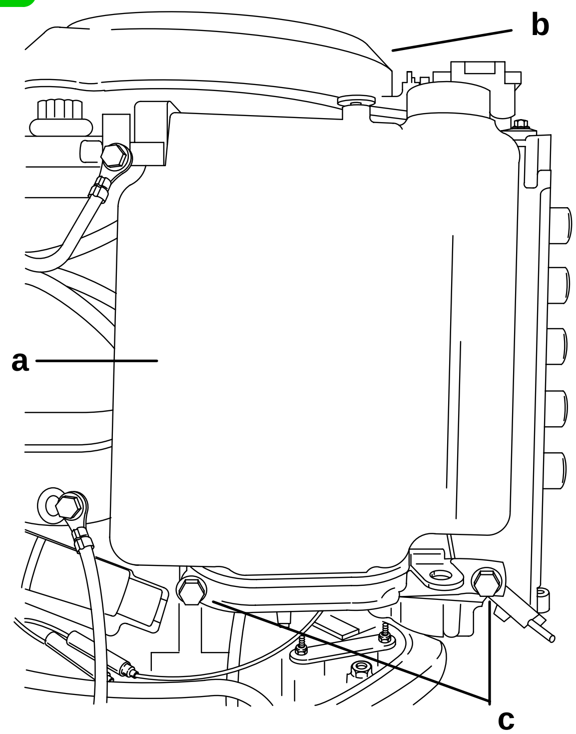


a - Oil Tank
b - Bolt
c - LIGHT BLUE Leads

- Connect oil hose (clear) from oil tank to oil pump. Secure hose with sta-straps.

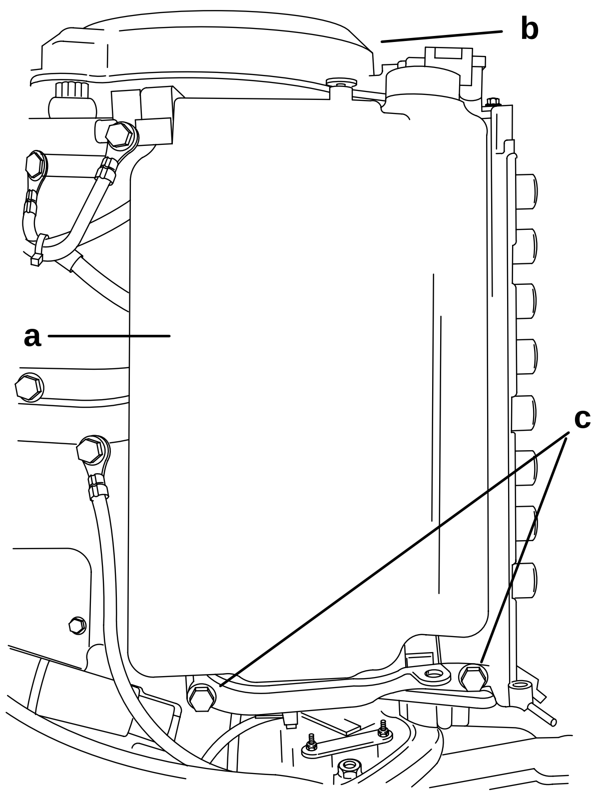


a - Oil Hose (Clear) (Inlet Hose From Oil Tank to Oil Pump)
b - Oil Hose (Clear) (Outlet Hose from Oil Pump to Fuel Line)
c - Oil Pump



3 Cylinder Models 53982

a - Oil Reservoir
b - Flywheel Cover
c - Bolt [Torque to 15 lb. ft. (20.3 N·m)]



4 Cylinder Models 53981

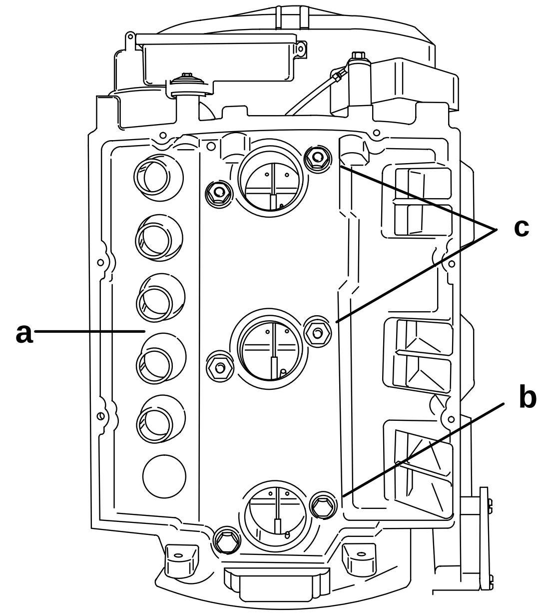
a - Oil Reservoir
b - Flywheel Cover
c - Bolt [Torque to 15 lb. ft. (20.3 N·m)]

Air Box Installation

Install Gaskets - Air Box Plate to carburetor.

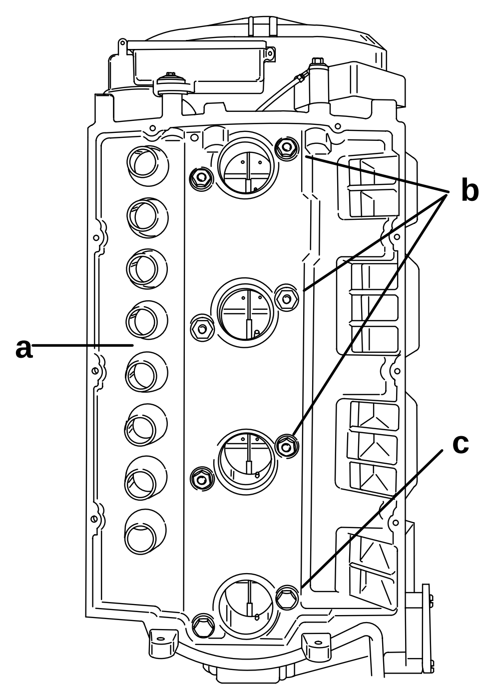
Reinstall Air Box Plate.

Torque bolts and nuts to 100 lb. in. (11.3 N·m).



3 Cylinder Models 53978

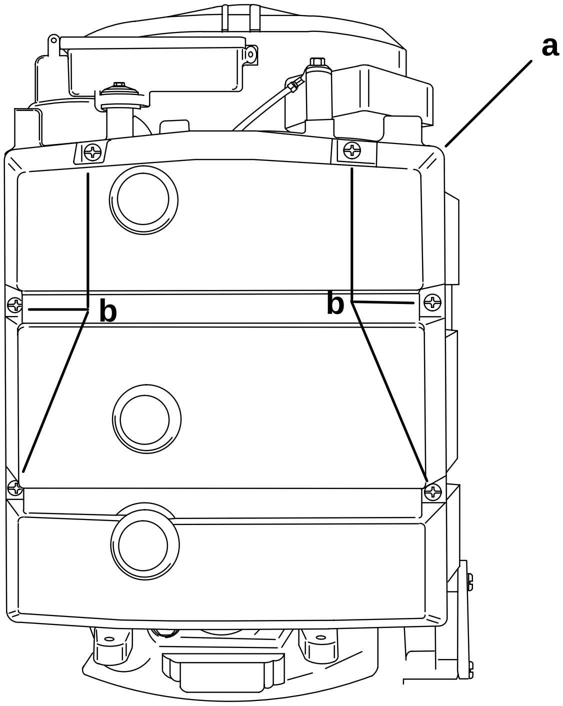
a - Air Box Plate
b - Bolts [Torque to 100 lb. in. (11.3 N·m)]
c - Nuts [Torque to 100 lb. in. (11.3 N·m)]



4 Cylinder Models 53979

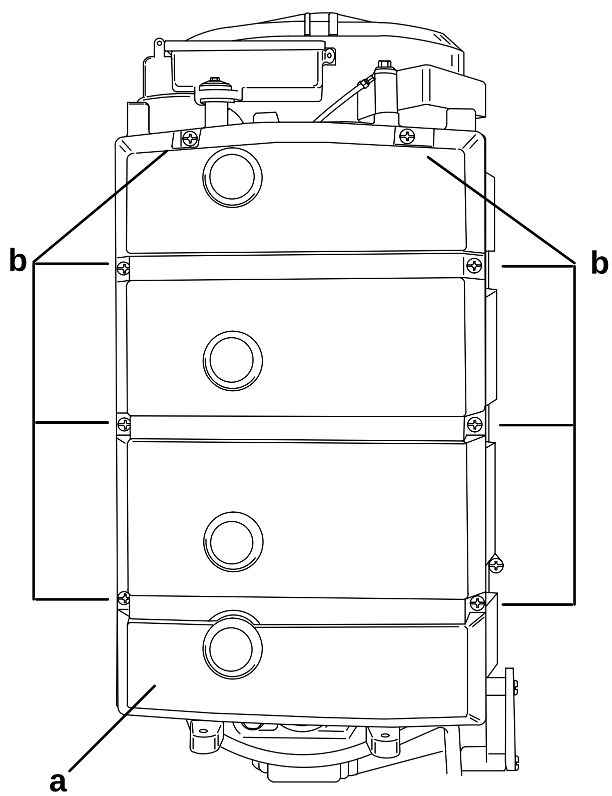
a - Air Box Plate
b - Bolts [Torque to 100 lb. in. (11.3 N·m)]
c - Nuts [Torque to 100 lb. in. (11.3 N·m)]

Reinstall Air Box Cover; tighten screws securely.



3 Cylinder Models 53977

a - Air Box Cover
b - Screws

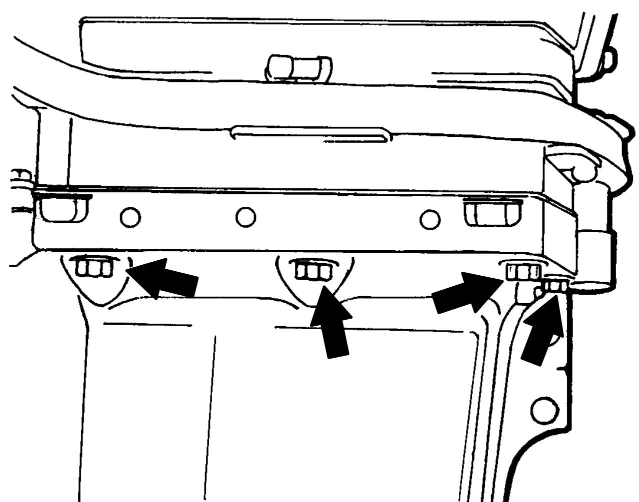


4 Cylinder Models 53976

a - Air Box Cover
b - Screws

Powerhead to Driveshaft Housing

- Install lifting eye (91-90455) onto flywheel. Thread on at least 5 full turns.
- After checking mating surfaces between powerhead and driveshaft housing for condition and cleanliness, use hoist to lift powerhead, being careful not to damage powerhead to driveshaft housing gasket surface.
- Place new gasket over locating pins on driveshaft housing-to-powerhead mating surface.
- Apply a small amount of Quicksilver 2-4-C w/Teflon to driveshaft splines.
- Recheck for correct installation of tip-seal in crankshaft seal carrier.
- Use hoist to lower powerhead into driveshaft housing, turning flywheel, if necessary, to align crankshaft splines with driveshaft splines. Lower so that powerhead is fully installed and aligned on locating pins.
- Clean holes (threads) and bolts thoroughly, with Loctite 7649 Primer. Dry, apply Loctite 271 to bolts, and install. There are 8 bolts (3 each side, 2 backside). Torque in 3 steps to 45 lb. ft. (61.0 N·m).



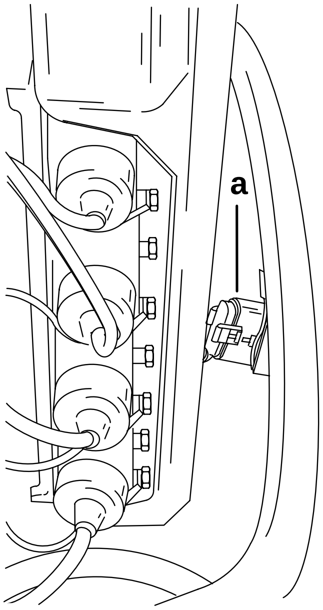
19070

7 Loctite 271 (92-809820)

92 Loctite 7649 Primer (92-809824)

Reinstall Bottom Cowl

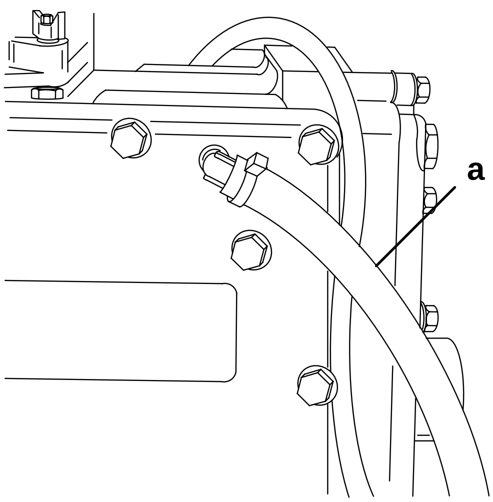
- Reconnect bullet connectors to cowl mounted trim switch.



53952

a - Cowl Mounted Trim Switch

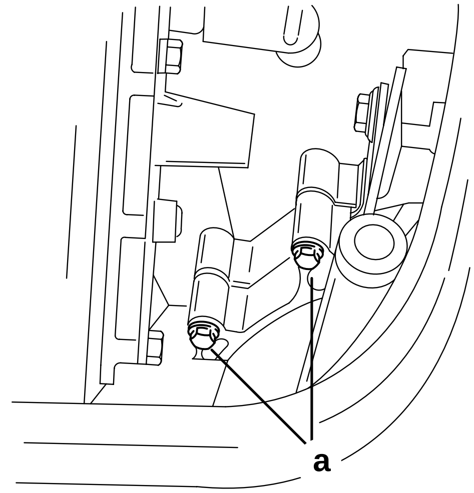
- Reinstall tell-tale hose to exhaust cover.



53956

a - Hose

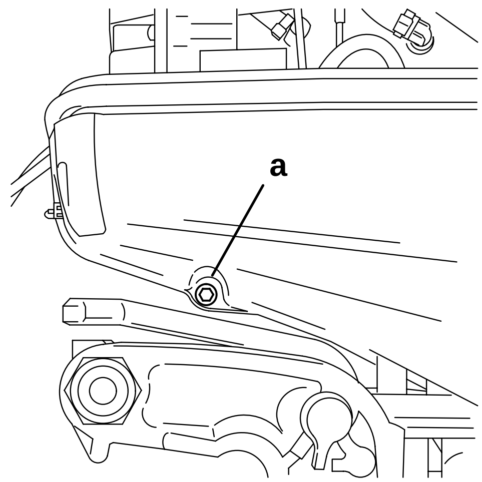
- Install 2 bolts securing aft end of lower cowling. Torque bolts to 65 lb. in. (7.3 N·m).



53953

a - Bolts

- Install bolt securing forward portion of lower cowl. Torque bolt to 65 lb. in. (7.3 N·m).

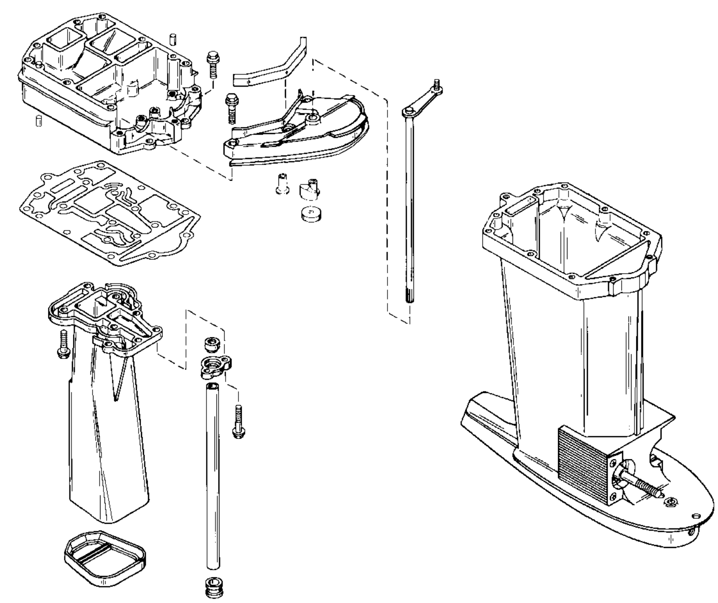


53954

a - Bolt

- Tighten PORT nut securing front latch to bottom cowl.

MID-SECTION



5

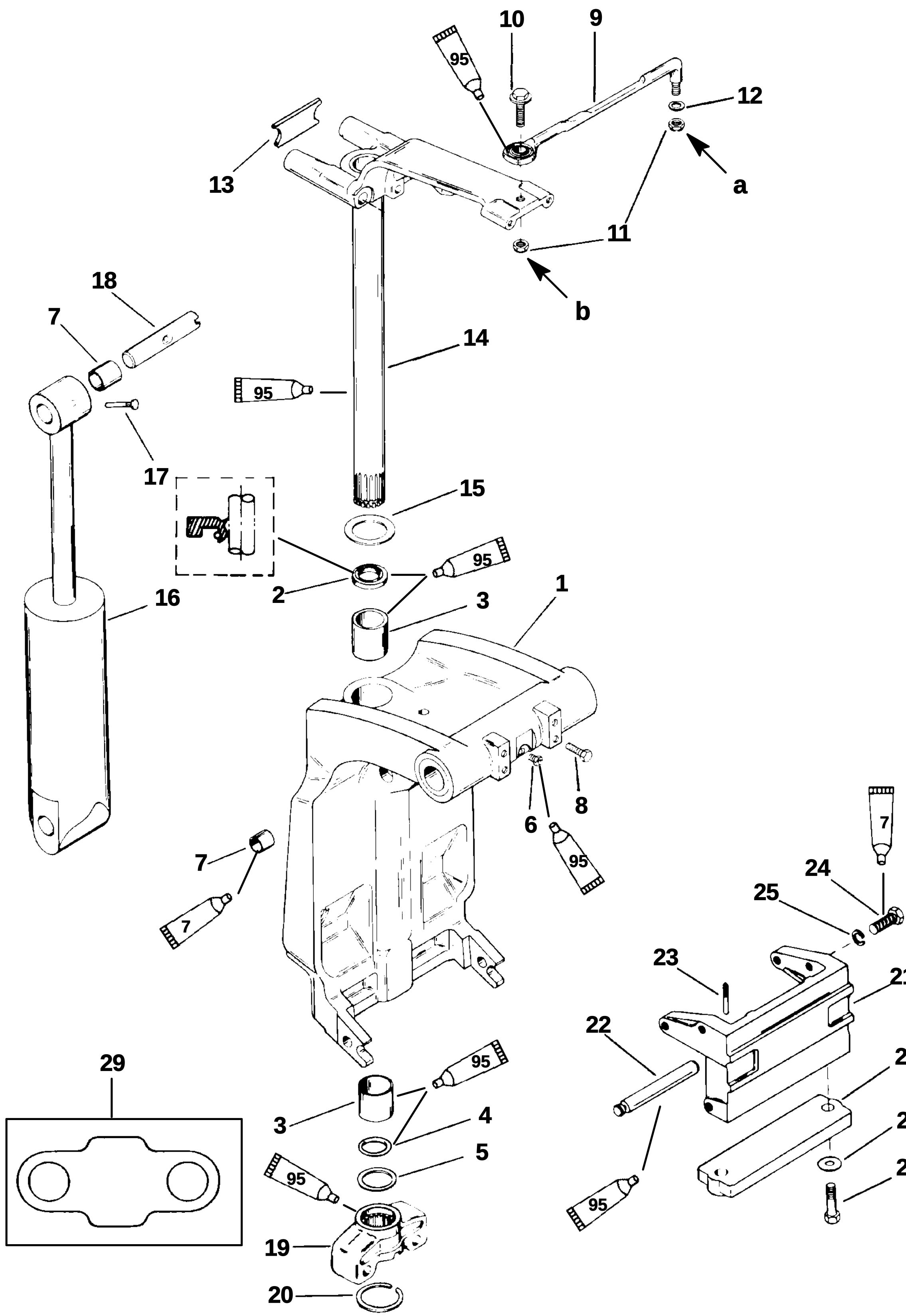
A

CLAMP/SWIVEL BRACKETS & DRIVE SHAFT HOUSING

Table of Contents

Notes:

Swivel Bracket and Steering Arm (65 Jet/75/90)



7 Loctite 271 (92-809820)

95 2-4-C With Teflon(92-825407A12)

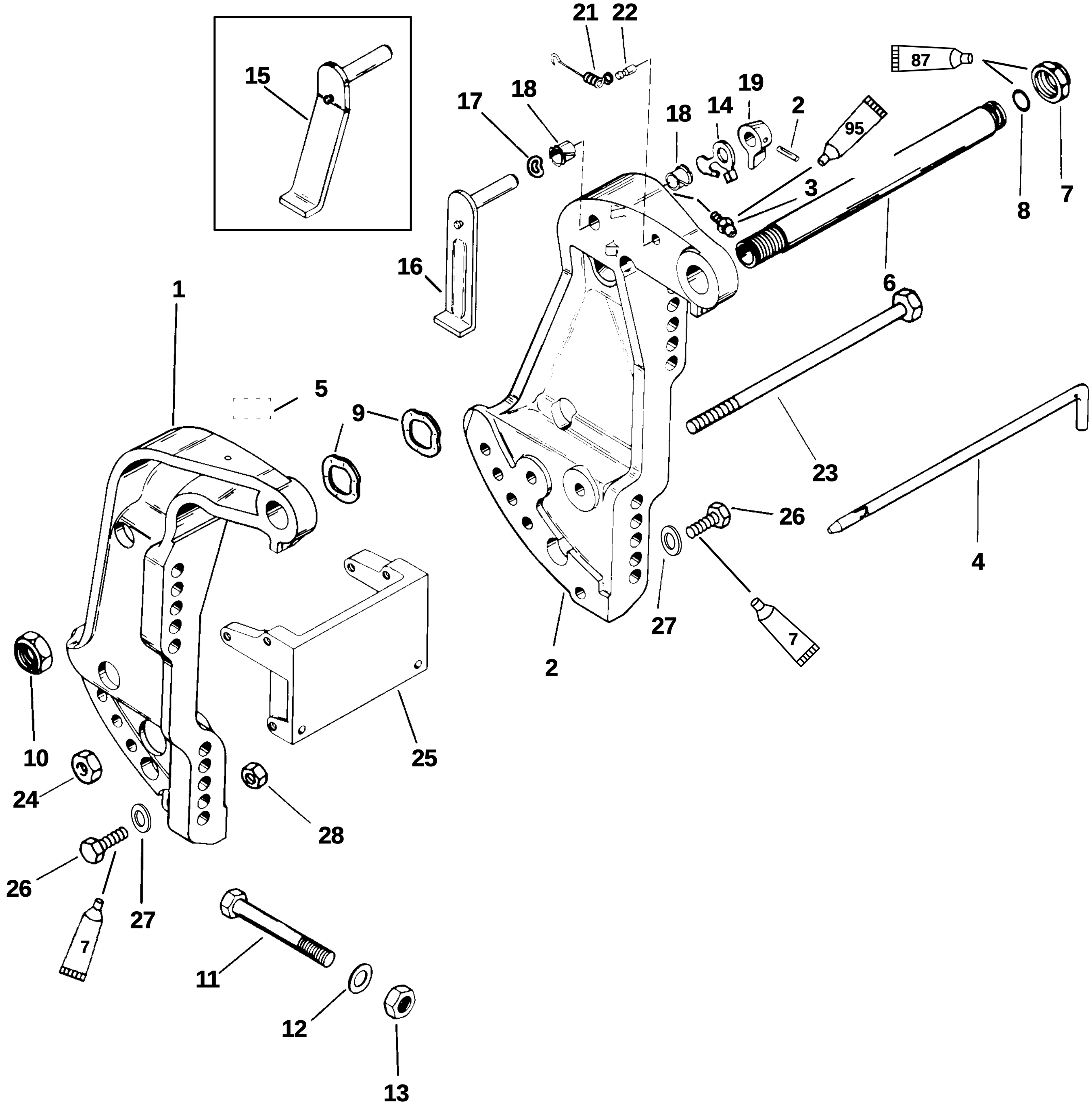
a - Torque nut to 120 lb. in. (13.6 N·m); then back off 1/4 turn.

b - Torque nut to 20 lb. ft. (27.0 N·m).

Swivel Bracket and Steering Arm (65 Jet/75/90)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	SWIVEL BRACKET **(BLACK)** **NON-POWER TRIM**			
	1	SWIVEL BRACKET **(GRAY)**			
	1	SWIVEL BRACKET **(BLACK)**			
	1	SWIVEL BRACKET **(GRAY)** **MANUAL TILT ASSIST/POWER TRIM**			
	1	SWIVEL BRACKET **(TRACKER-GRAPHITE GRAY)**			
2	1	OIL SEAL(LOWER)			
3	2	BUSHING			
4	1	O-RING			
5	1	SPACER			
6	2	GREASE FITTING	40		4.5
7	2	BUSHING			
8	2	SCREW(1/4-28 x 1/2)	100		11.3
9	1	STEERING LINK ASSEMBLY			
10	1	SCREW(3/8 x 24 x 1-1/8)		20	27.0
11	2	NUT	See Exploded View		
12	2	WASHER			
13	1	BUMPER-top yoke **(X-LONG/LL)**			
14	1	SWIVEL PIN/STEERING ARM **(BLACK)**			
	1	SWIVEL PIN/STEERING ARM **(GRAY)**			
	1	SWIVEL PIN/STEERING ARM **(TRACKER-GRAPHITE GRAY)**			
15	1	THRUST WASHER			
16	1	SHOCK **(BLACK)** **NO**			
	1	SHOCK **(GRAY)** **STAMPING**			
	1	SHOCK **(BLACK)** **STAMPED**			
	1	SHOCK **(GRAY)** **A12 or A17**			
17	1	GROOVE PIN			
18	1	SHAFT(UPPER)			
19	1	BOTTOM YOKE**(BLACK)**			
	1	BOTTOM YOKE **(GRAY)**			
	1	BOTTOM YOKE **(TRACKER-GRAPHITE GRAY)**			
20	1	RETAINING RING			
21	1	BRACKET			
22	1	SHAFT(LOWER)			
23	1	GROOVE PIN **NON POWER TRIM**			
24	6	SCREW(M10 x 1.5 x 30)		30	40.7
25	6	WASHER			
	6	LOCKWASHER **(JET)**			
26	1	ANODE ASSEMBLY			
27	2	SCREW(M6 x 1 x 25)	60		6.8
28	2	WASHER			
29	1	BUMPER-bottom yoke **(X-LONG/LL)**			

Transom Bracket(Non Power Trim & Power Trim) (65 Jet/75/90)



7 Loctite 271 (92-809820)

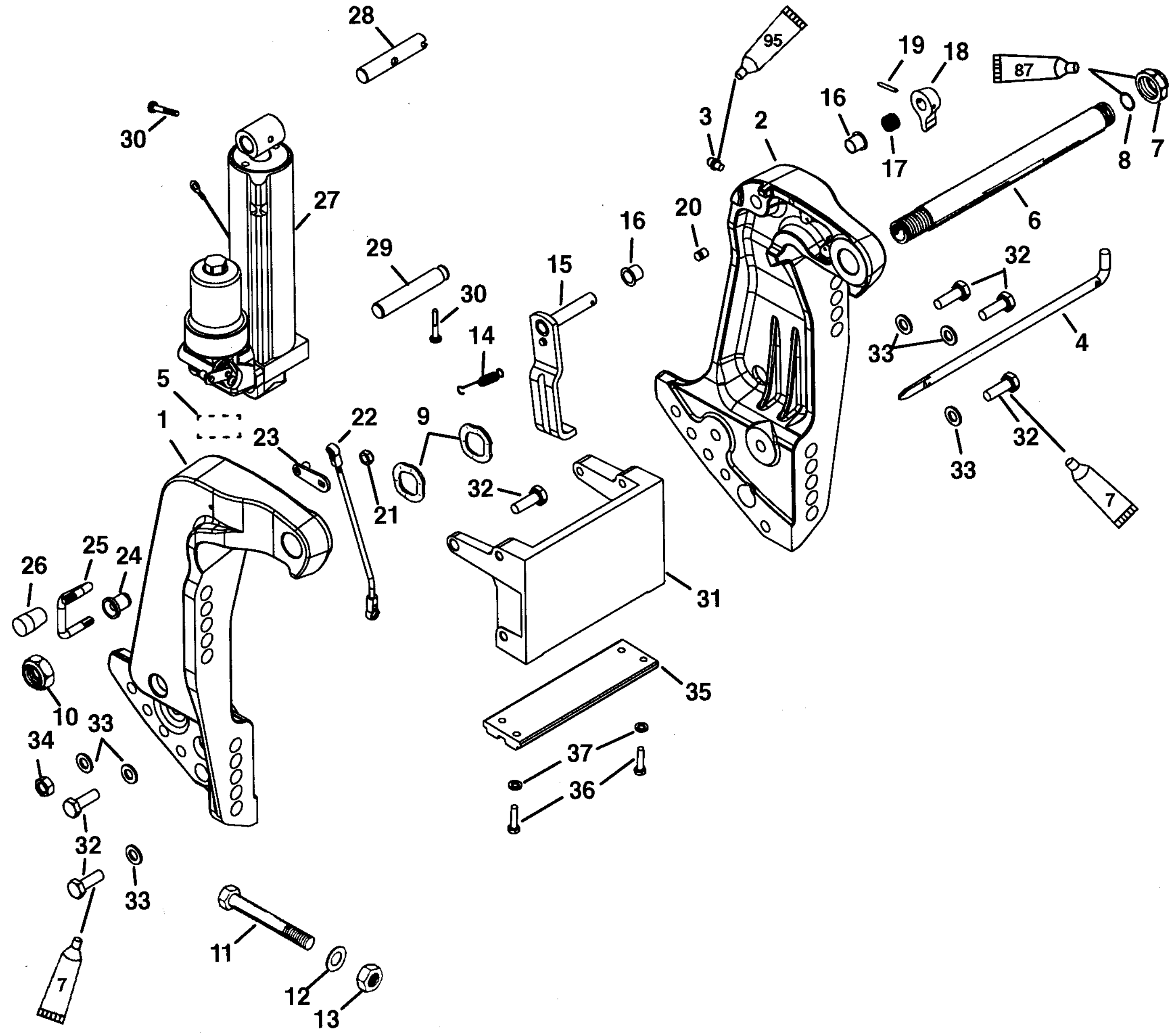
87 Quicksilver Gear Lubricant (92-13783A24)

95 2-4-C With Teflon (92-825407A12)

Transom Bracket (Non Power Trim & Power Trim) (65 Jet/75/90)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	TRANSOM BRACKET (STARBOARD)			
2	1	TRANSOM BRACKET (PORT)			
3	1	GREASE FITTING (PORT)	40		4.5
4	1	TILT PIN ASSEMBLY NON POWER TRIM			
5	1	DECAL-tilt/lock			
6	1	TILT TUBE			
7	1	NUT	Tighten Nut until Bottomed on Shoulder of Tilt Tube		
8	1	O-RING			
9	2	WAVE WASHER			
10	1	NUT	Drive Nut until Assembly is drawn together; but must be free to pivot		
11	4	BOLT (4-1/2 IN.)			
12	4	WASHER			
13	4	NUT			
14	1	STOP			
15	1	TILT LOCK LEVER (NON POWER TRIM)			
16	1	TILT LOCK LEVER (POWER TRIM)			
17	1	WAVE WASHER			
18	2	BUSHING			
19	1	KNOB			
20	1	GROOVE PIN			
21	1	SPRING			
22	1	GROOVE PIN			
23	1	BOLT ASSEMBLY			
24	1	NUT		30	40.7
25	1	ANCHOR BRACKET			
26	6	SCREW		45	61.0
27	6	WASHER POWER TRIM			
28	1	NUT		45	61.0

Transom Bracket (Manual Tilt Assist) (65 Jet/75/90)



7 Loctite 271 (92-809820)

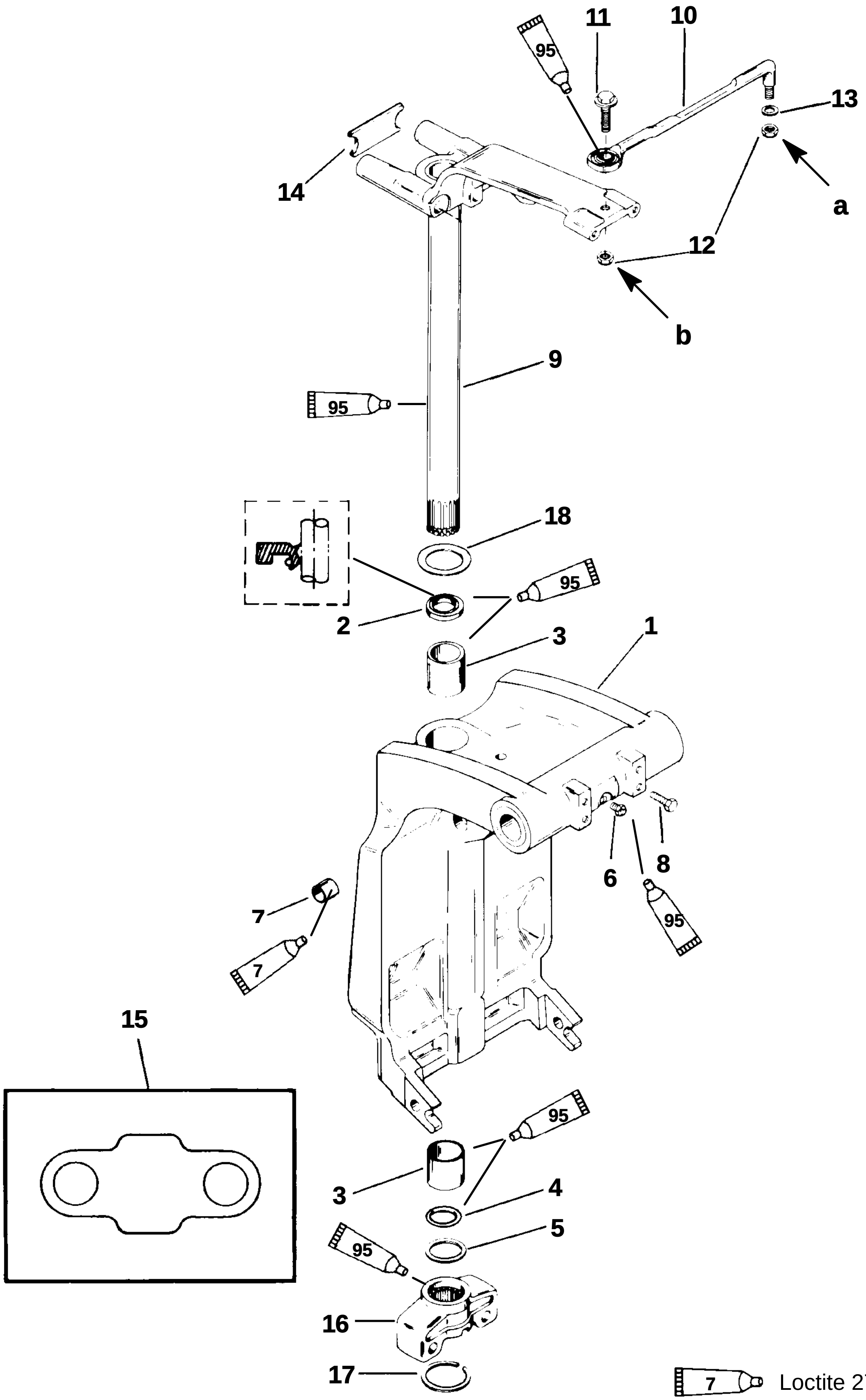
87 Quicksilver Gear Lubricant (92-13783A24)

95 2-4-C With Teflon (92-825407A12)

Transom Bracket (Manual Tilt Assist) (65 Jet/75/90)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	TRANSOM BRACKET (STARBOARD)			
2	1	TRANSOM BRACKET (PORT)			
3	1	GREASE FITTING (PORT)	40		4.5
4	1	TILT PIN ASSEMBLY			
5	1	DECAL-tilt/lock			
6	1	TILT TUBE			
7	1	NUT	Tighten Nut until Bottomed on Shoulder of Tilt Tube		
8	1	O-RING			
9	2	WAVE WASHER			
10	1	NUT	Drive Nut until Assembly is drawn together; but must be free to pivot		
11	4	BOLT (4-1/2 IN.)			
12	4	WASHER			
13	4	NUT			
14	1	SPRING			
15	1	TILT LOCK LEVER			
16	2	BUSHING			
17	1	SPRING			
18	1	KNOB			
19	1	GROOVE PIN			
20	1	PIN			
21	1	NUT			
22	1	LINK ROD			
23	1	ARM			
24	1	BUSHING			
25	1	TILT LEVER		30	40.7
26	1	KNOB			
27	1	MANUAL TILT ASSEMBLY			
28	1	TILT SHAFT (UPPER)			
29	1	ANCHOR PIN			
30	2	PIN			
31	1	ANCHOR BRACKET			
32	6	SCREW		30	40.7
33	6	WASHER			
34	1	NUT		30	40.7
35	1	ANODE ASSEMBLY			
36	2	SCREW (M6 x 25)	60		6.8
37	2	WASHER			

Swivel Bracket and Steering Arm (80 Jet/100/115/125)



7 Loctite 271 (92-809820)

95 2-4-C With Teflon (92-825407A12)

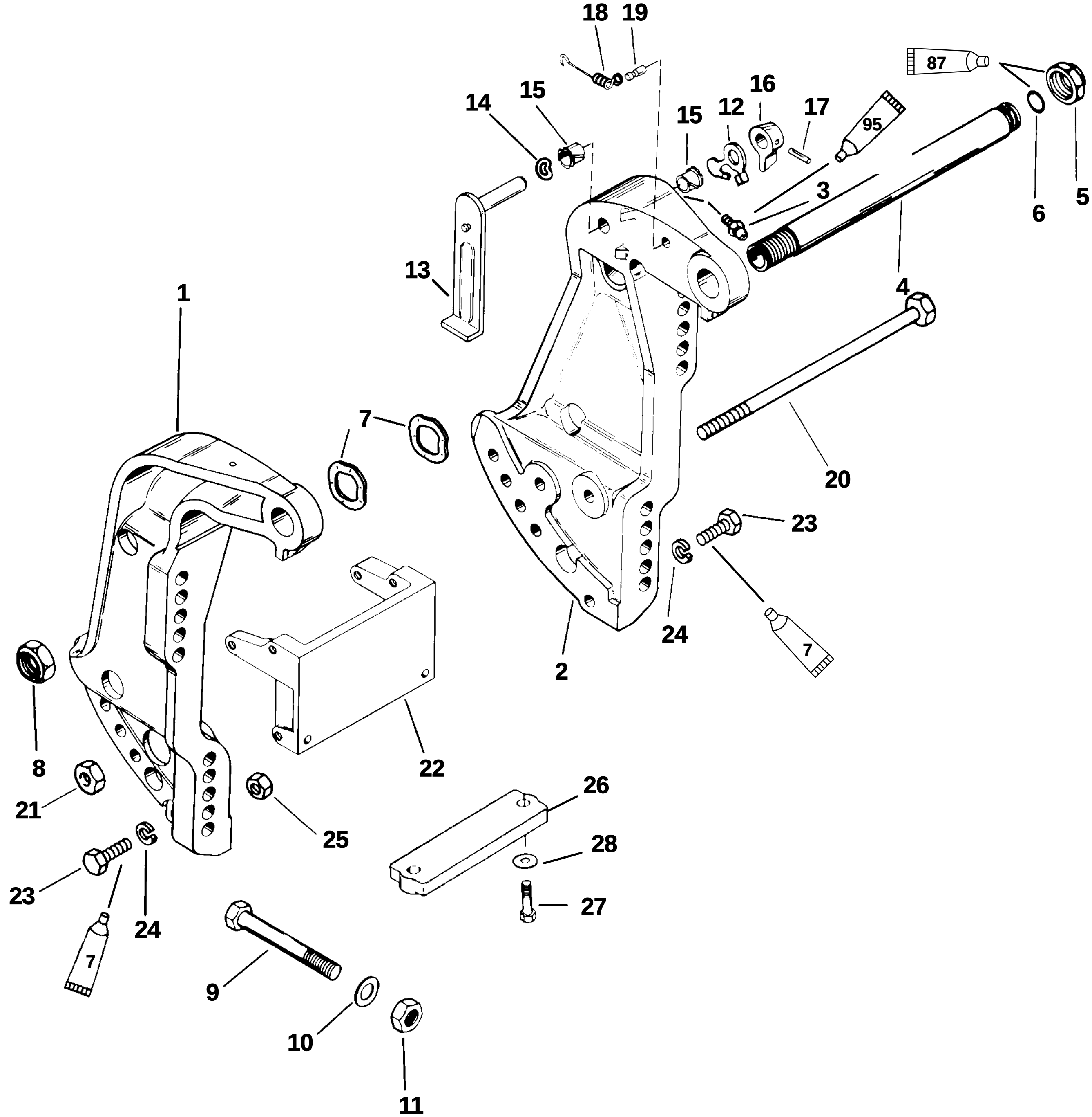
a - Torque nut to 120 lb. in (13.6 N·m)., then back off 1/4 turn.

b - Torque nut to 20 lb. ft. (27.0 N·m).

Swivel Bracket and Steering Arm (80 Jet/100/115/125)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	SWIVEL BRACKET **(BLACK)**			
	1	SWIVEL BRACKET **(GRAY)**			
	1	SWIVEL BRACKET **(TRACKER-GRAPHITE GRAY)**			
2	1	OIL SEAL **(LOWER)**			
3	2	BUSHING			
4	1	O-RING			
5	1	SPACER			
6	2	GREASE FITTING	40		4.5
7	2	BUSHING			
8	2	SCREW	100		11.3
9	1	SWIVEL PIN/STEERING ARM **(BLACK)**			
	1	SWIVEL PIN/STEERING ARM **(GRAY)**			
	1	SWIVEL PIN/STEERING ARM **(TRACKER-GRAPHITE GRAY)**			
10	1	STEERING LINK ASSEMBLY			
11	1	SCREW		20	27.0
12	2	NUT	See Exploded View		
13	2	WASHER			
14	1	BUMPER (X-LONG)			
15	1	BUMPER (X-LONG)			
16	1	BOTTOM YOKE **(BLACK)**			
	1	BOTTOM YOKE **(GRAY)**			
	1	BOTTOM YOKE **(TRACKER-GRAPHITE GRAY)**			
17	1	RETAINING RING			
18	1	THRUST WASHER			

Transom Bracket
(S/N-USA-0G589999/BEL-9973099 & BELOW)



7 Loctite 271 (92-809820)

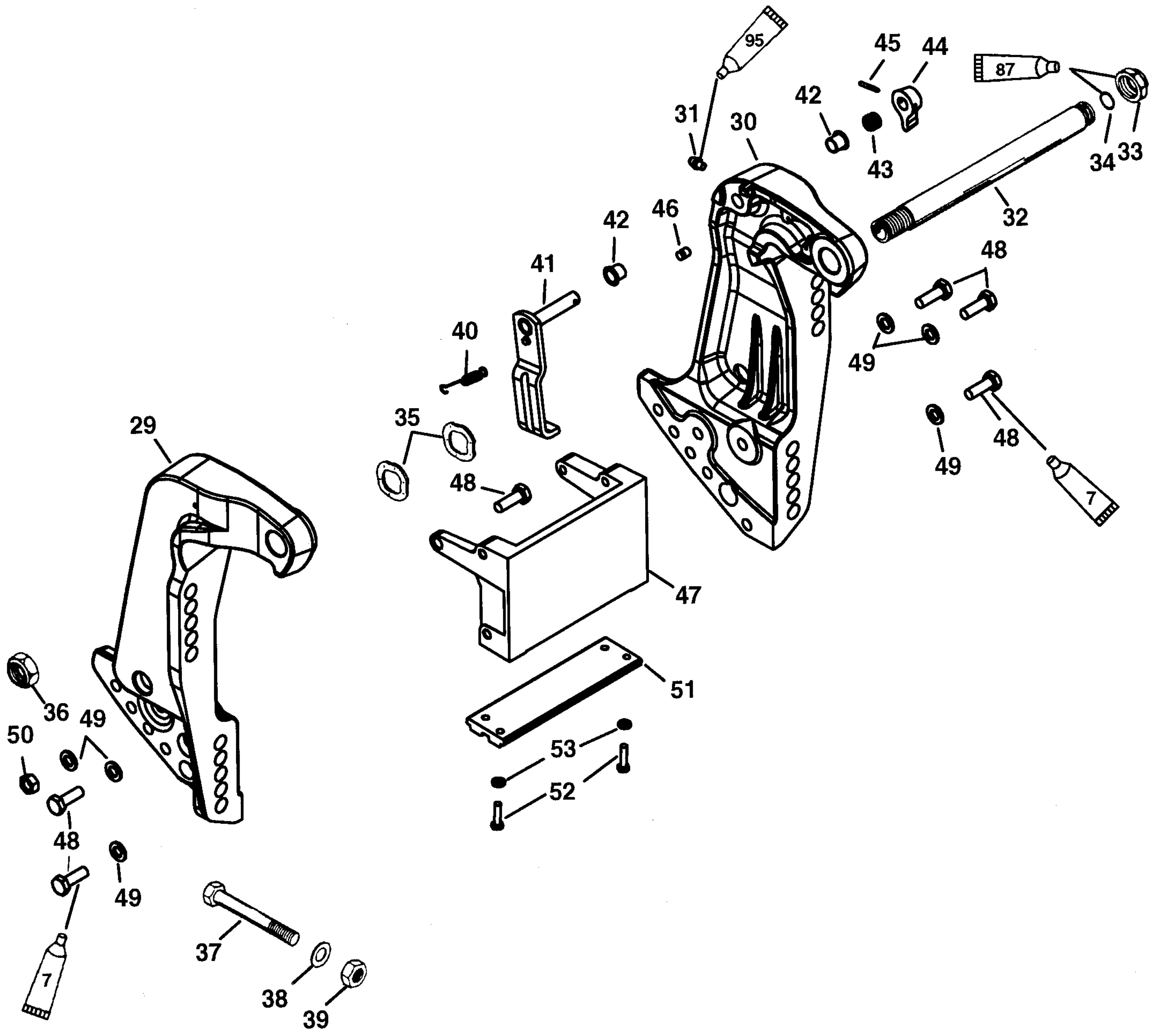
87 Quicksilver Gear Lubricant (92-13783A24)

95 2-4-C With Teflon (92-825407A12)

Transom Bracket (S/N-USA-0G589999/BEL-9973099 & BELOW)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	TRANSOM BRACKET (STARBOARD)			
2	1	TRANSOM BRACKET (PORT)			
3	1	GREASE FITTING **(PORT)**			
4	1	TILT TUBE			
5	1	NUT	Tighten Nut until Bottom on Shoulder of Tilt Tube		
6	1	O-RING			
7	2	WAVE WASHER			
8	1	NUT	Drive Nut Until Assembly is Drawn together; But must free to pivot		
9	4	BOLT (4-1/2 IN.)			
10	4	WASHER			
11	4	NUT			
12	1	STOP			
13	1	TILT LOCK LEVER			
14	1	WAVE WASHER			
15	2	BUSHING			
16	1	KNOB			
17	1	GROOVE PIN			
18	1	SPRING			
19	1	GROOVE PIN			
20	1	BOLT ASSEMBLY			
21	1	NUT		30	40.7
22	1	ANCHOR BRACKET			
23	6	SCREW		30	40.7
24	6	WASHER			
25	1	NUT		30	40.7
26	1	ANODE			
27	2	SCREW (M6 x 1 x 25)			
28	2	WASHER			

Transom Bracket
(S/N-USA-0G590000/BEL-9973100 & UP)



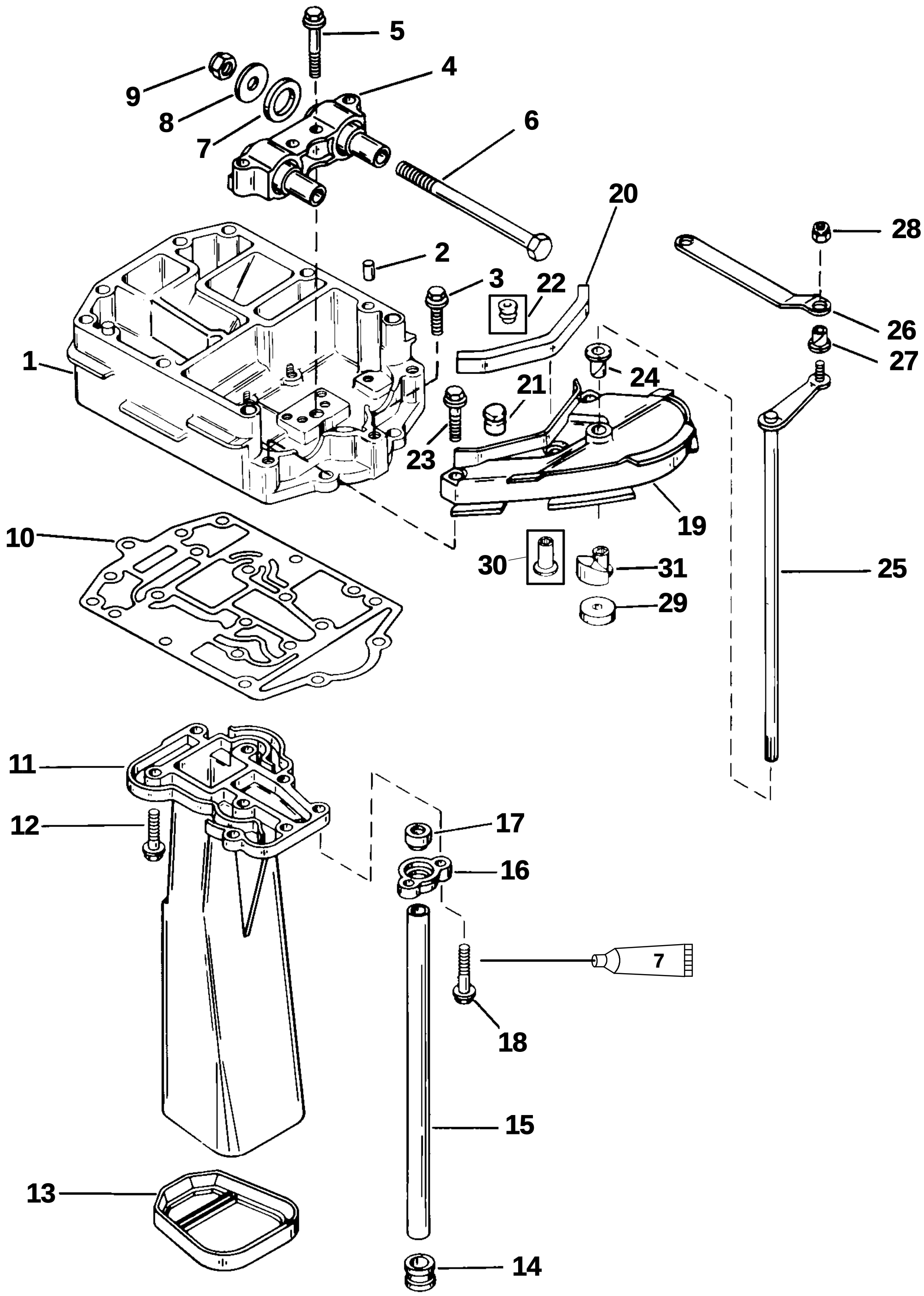
7 Loctite 271 (92-809820)

87 Quicksilver Gear Lubricant (92-13783A24)

95 2-4-C With Teflon (92-825407A12)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
29	1	TRANSOM BRACKET (STARBOARD) **BLACK**			
30	1	TRANSOM BRACKET (PORT)			
	1	TRANSOM BRACKET (STARBOARD) **GRAY**			
	1	TRANSOM BRACKET (PORT)			
31	1	GREASE FITTING (PORT)	40		4.5
32	1	TILT TUBE			
33	1	NUT	Tighten Nut until Bottomed on Shoulder of Tilt Tube		
34	1	O-RING			
35	2	WAVE WASHER			
36	1	NUT	Drive Nut until Assembly is drawn together; but must be free to pivot		
37	4	BOLT (4-1/2 IN.)			
38	4	WASHER			
39	4	NUT			
40	1	SPRING			
41	1	TILT LOCK LEVER			
42	2	BUSHING			
43	1	SPRING			
44	1	KNOB			
45	1	GROOVE PIN			
46	1	PIN			
47	1	ANCHOR BRACKET **(BLACK)**			
	1	ANCHOR BRACKET **(GRAY)**			
48	6	SCREW		30	40.7
49	6	WASHER			
	6	LOCKWASHER **(JET)**			
50	1	NUT		30	40.7
51	1	ANODE ASSEMBLY			
52	2	SCREW (M6 x 25)	60		6.8
53	2	WASHER			

Exhaust Plate (65 Jet/75/90)

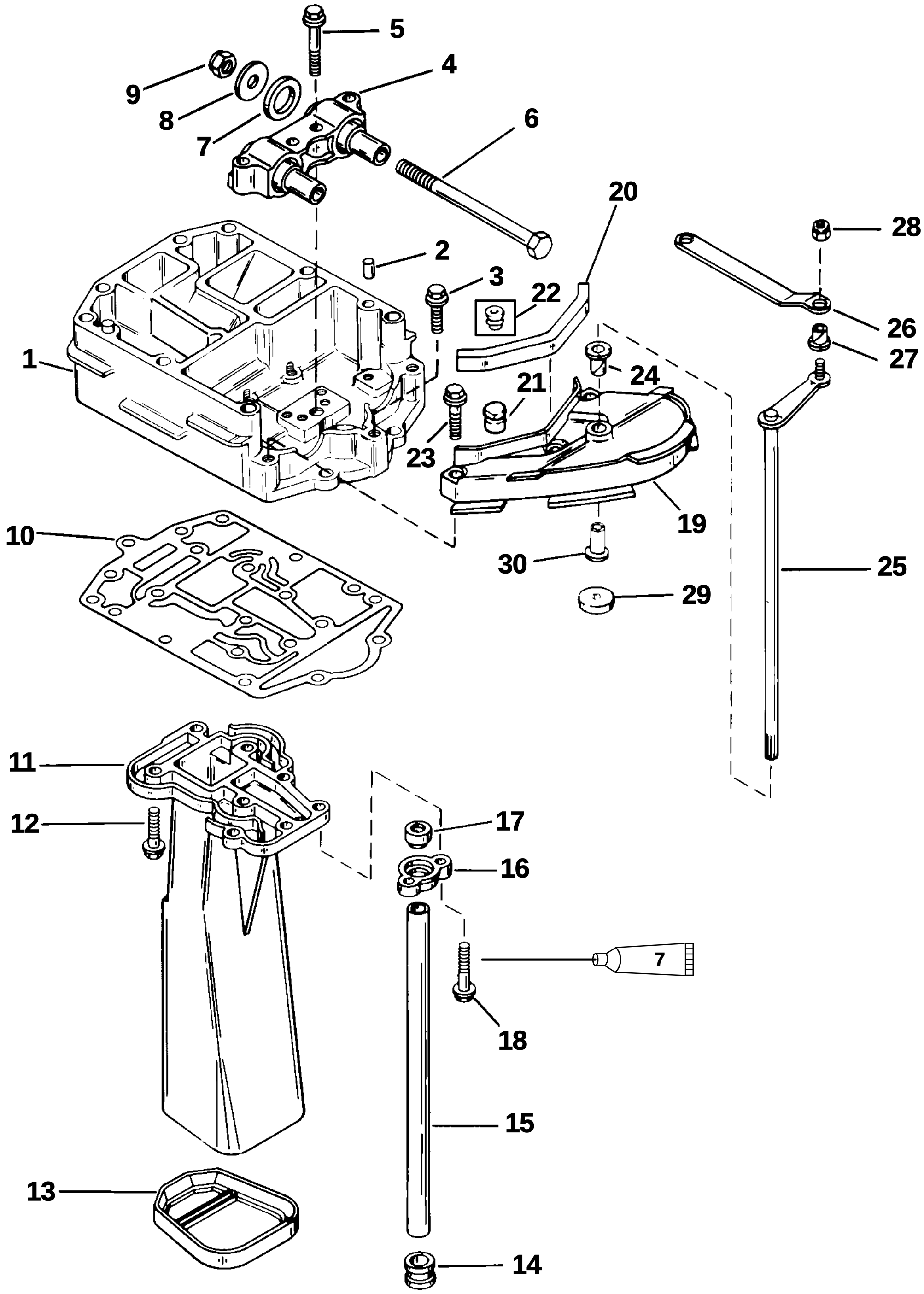


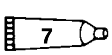
7 Loctite 271 (92-809820)

Exhaust Plate (65 Jet/75/90)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	EXHAUST PLATE ASSEMBLY			
2	5	DOWEL PIN			
3	2	SCREW (M8 x 35)		15	20.3
	1	SCREW (M8 x 70)		15	20.3
4	1	MOUNT (NON OIL INJECTION)(LL)			
	1	MOUNT (OIL INJECTION)(JET 65)			
5	4	SCREW (M8 x 50)		25	33.9
6	2	SCREW (M12 x 175)			
7	2	WASHER			
8	2	WASHER			
9	2	NUT		55	74.6
10	1	GASKET			
11	1	EXHAUST TUBE			
	1	EXHAUST TUBE (BELGIUM)(INCLUDES RESTRICTOR PLATE)			
12	6	SCREW (M8 x 35)		25	33.9
13	1	SEAL–exhaust tube			
14	1	GROMMET			
15	1	WATER TUBE **(13-1/4 IN.)**			
	1	WATER TUBE **(15-3/4 IN.)**			
	1	WATER TUBE **(18-1/4 IN.)**			
16	1	CLAMP			
17	1	SEAL (UPPER)			
18	2	SCREW (M8 x 50)		15	20.3
19	1	BRACKET ASSEMBLY **(LOWER)**			
20	1	SEAL			
21	1	GROMMET (POWER TRIM - S/N-0G360002 & BELOW)			
	1	GROMMET (NON POWER TRIM/MANUAL TILT ASSIST)			
22	1	GROMMET (POWER TRIM – S/N-0G360003 & UP)			
23	3	SCREW (M8 x 50)		25	33.9
24	1	BUSHING			
25	1	SHIFT SHAFT ASSEMBLY (UPPER – ELECTRIC)			
	1	SHIFT SHAFT ASSEMBLY (UPPER – MANUAL)			
26	1	SHIFT LINK			
27	2	BUSHING			
28	1	NUT	Drive Tight; but Joint must be free to Pivot		
29	1	SPACER (LONG)			
	1	SPACER (X-LONG)(LL)			
30	1	COUPLING (POWER TRIM/MANUAL TILT ASSIST)			
31	1	COUPLING (NON POWER TRIM)			

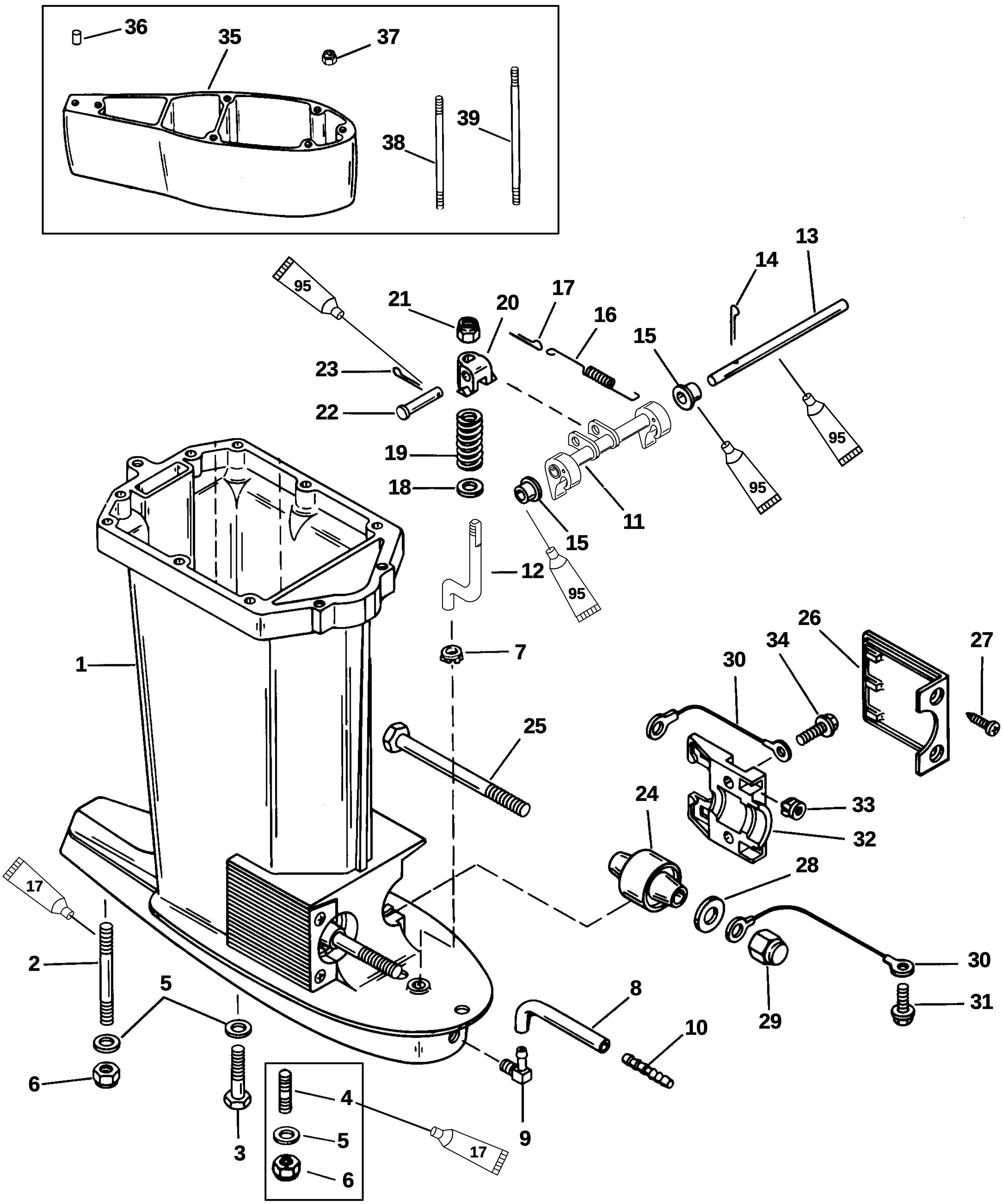
Exhaust Plate (80 Jet/100/115/125)



 Loctite 271 (92-809820)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	EXHAUST PLATE ASSEMBLY			
2	3	DOWEL PIN			
3	2	SCREW (M8 x 35)		15	20.3
3	1	SCREW (M8 x 70)		15	20.3
4	1	MOUNT			
5	4	SCREW		25	33.9
6	2	SCREW			
7	2	WASHER			
8	2	WASHER			
9	2	NUT		55	74.6
10	1	GASKET			
11	1	EXHAUST TUBE			
12	6	SCREW		25	33.9
13	1	SEAL–exhaust tube			
14	1	GROMMET			
15	1	WATER TUBE (LONG)			
	1	WATER TUBE (X-LONG)			
16	1	CLAMP			
17	1	SEAL (UPPER)			
18	2	SCREW (M8 x 50)		15	20.3
19	1	BRACKET ASSEMBLY **(LOWER)** (BLACK)			
20	1	SEAL			
21	1	GROMMET (S/#-0G359967 & BELOW)			
22	1	GROMMET (S/#–0G359968 & UP)			
23	3	SCREW (M8 x 50)		25	33.9
24	1	BUSHING			
25	1	SHIFT SHAFT ASSEMBLY **(UPPER)**			
26	1	SHIFT LINK			
27	2	BUSHING			
28	1	NUT	Drive Tight; but Joint must be free to Pivot		
29	1	SPACER (LONG)			
	1	SPACER (X-LONG)			
30	1	COUPLING			

Drive Shaft Housing (65 Jet/75/90)



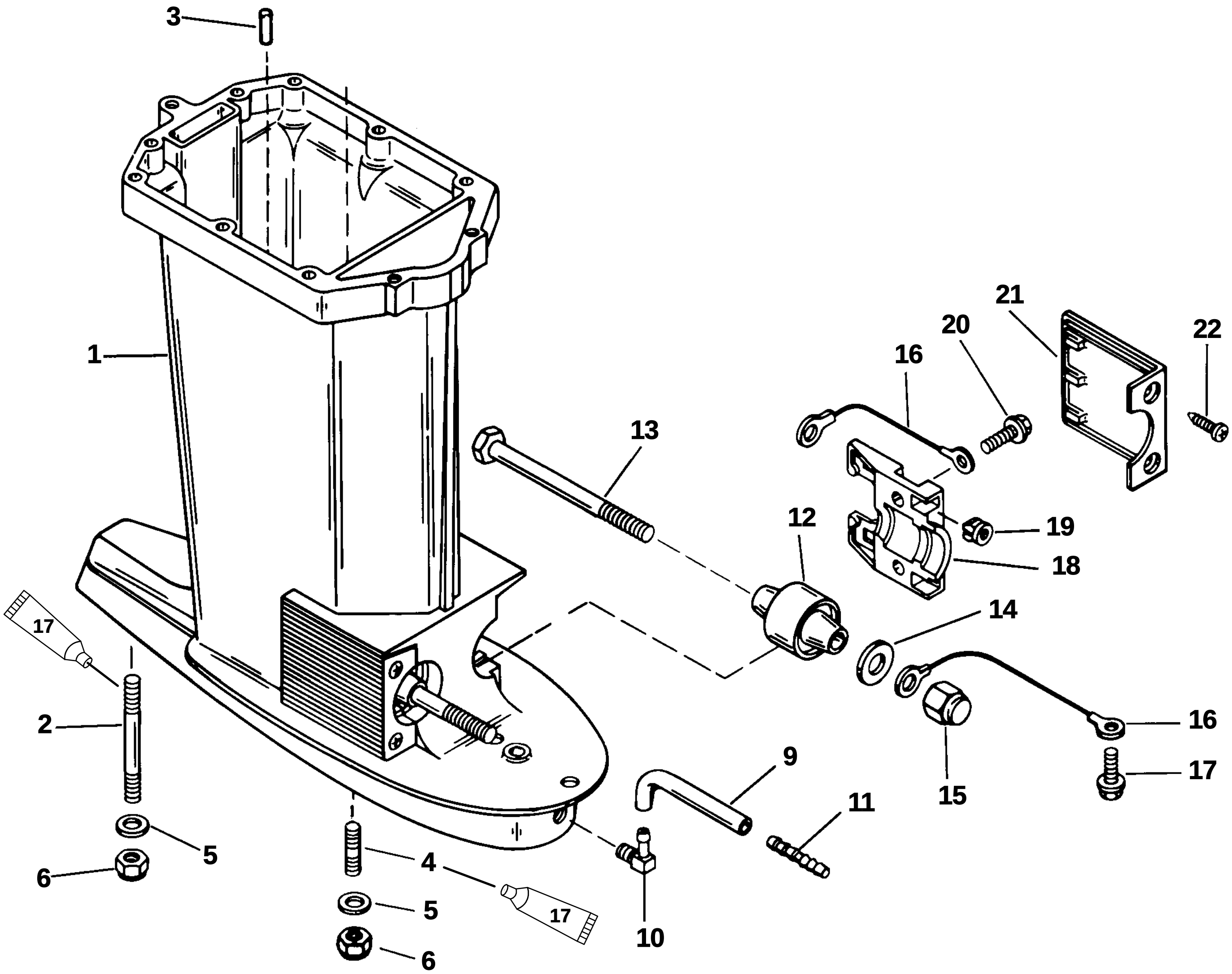
17 Loctite 35 (92-59328-1)

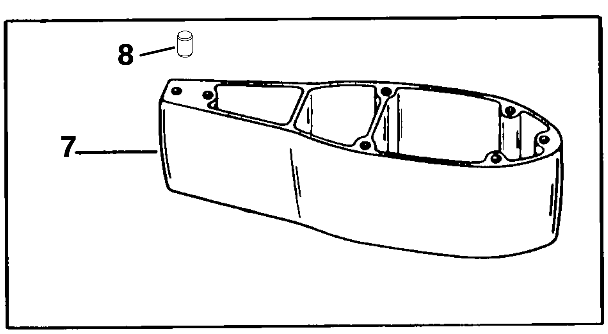
95 2-4-C With Teflon (92-825407A12)

Drive Shaft Housing (65 Jet/75/90)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	DRIVE SHAFT HOUSING ASSEMBLY			
2	1	STUD (100MM)**(LONG)**			
2	1	STUD (166MM)**(LL)**			
3	4	SCREW (M10 x 1.5 x 45)(**LONG)(DESIGN I)**		40	54.2
4	4	STUD (63MM)**(LONG)(DESIGN II)**			
4	4	STUD (124M)**(LL)**			
5	5	WASHER			
6	AR	NUT		40	54.2
7	1	GUIDE **(NON POWER TRIM)**			
8	1	SPEEDOMETER PICK-UP ASSEMBLY			
9	1	CONNECTOR (90°)			
10	1	CONNECTOR (STRAIGHT)			
11	1	REVERSE HOOK ASSEMBLY			
12	1	PUSH ROD			
13	1	SHAFT			
14	1	COTTER PIN			
15	2	BUSHING			
16	1	SPRING			
17	1	COTTER PIN **NON**			
18	1	WASHER **POWER TRIM**			
19	1	SPRING			
20	1	YOKE			
21	1	JAM NUT			
22	1	CLEVIS PIN			
23	1	COTTER PIN			
24	2	MOUNT **(ELO/ELHPTO/SCATTO/TYPHOON)**			
24	2	MOUNT **(ALL OTHER MODELS)**			
25	2	BOLT (M12 x 1.75 x 154)			
26	2	COVER **(BLACK)**			
27	4	SCREW (12-24 x 5/8^2)		Drive Tight	
28	2	WASHER			
29	2	NUT		50	67.8
30	2	GROUND WIRE ASSEMBLY			
31	1	SCREW (1/4-20 x 1/2)		Drive Tight	
32	2	CLAMP			
33	4	NUT			
34	4	SCREW (M8 x 1.25 x 25)		13.5	18.3
35	1	SPACER **(2-1/2^2)**			
35	1	SPACER **(5^2)**			
36	1	DOWEL PIN **X-LONG**			
36	1	DOWEL PIN (W/HOLE)			
37	4	NUT		40	54.2
38	4	STUD (124MM)**(2-1/2^2 SPACER)**			
38	4	STUD (190MM)**(5^2 SPACER)**			
39	1	STUD (166MM)**(2-1/2^2 SPACER)**			
39	1	STUD (227MM)**(5^2 SPACER)**			

Drive Shaft Housing (80 Jet/100/115/125)



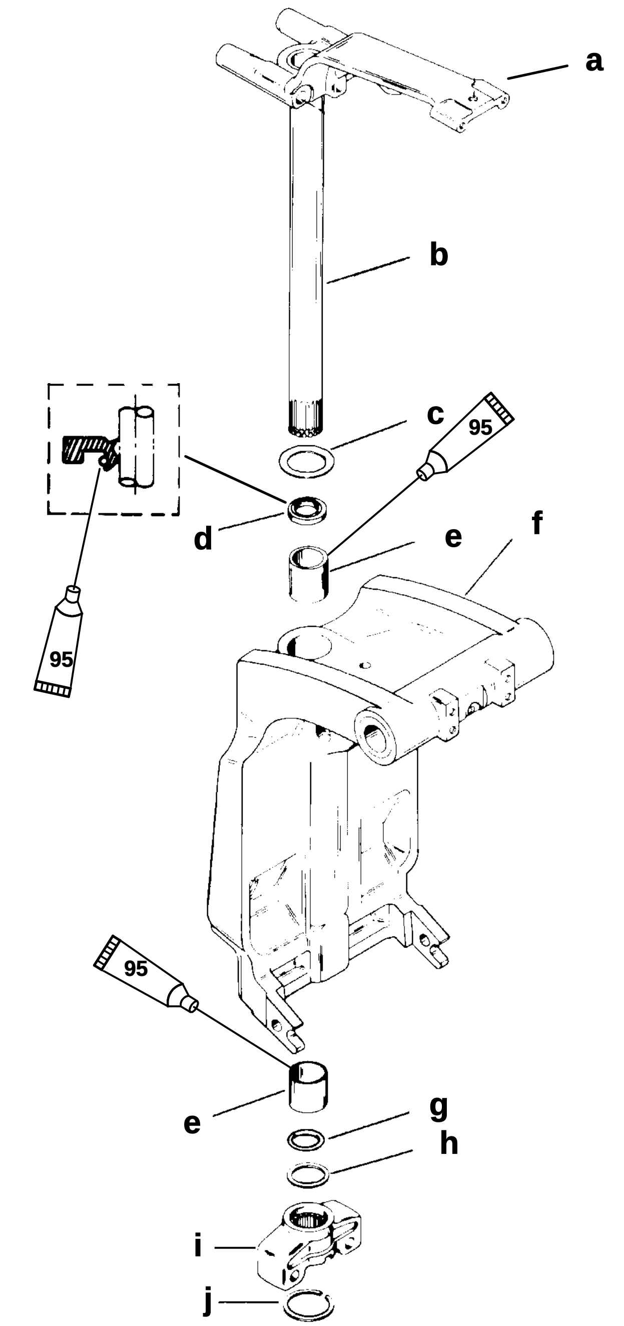


17 Loctite 35 (92-59328-1)

Drive Shaft Housing (80 Jet/100/115/125)

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	DRIVE SHAFT HOUSING ASSEMBLY			
	1	DRIVE SHAFT HOUSING ASSEMBLY (JET)			
2	1	STUD (LONG)			
	1	STUD (X-LONG)			
3	2	DOWEL PIN			
4	4	STUD (LONG)			
	4	STUD (X-LONG)			
5	5	WASHER			
6	5	NUT		40	54.2
7	1	SPACER–drive shaft housing X-LONG			
	1	SPACER–drive shaft housing			
8	1	DOWEL PIN **(W/HOLE)**			
		DOWEL PIN			
9	1	SPEEDOMETER PICK-UP ASSEMBLY			
10	1	CONNECTOR **(90 Degrees)**			
11	1	CONNECTOR **(STRAIGHT)**			
12	2	MOUNT			
13	2	BOLT			
14	2	WASHER			
15	2	NUT		50	67.8
16	2	GROUND WIRE ASSEMBLY			
17	1	SCREW		Drive Tight	
18	2	CLAMP			
19	4	NUT			
20	4	SCREW (M8 x 25)		13.5	18.3
21	2	COVER			
22	4	SCREW		Drive Tight	

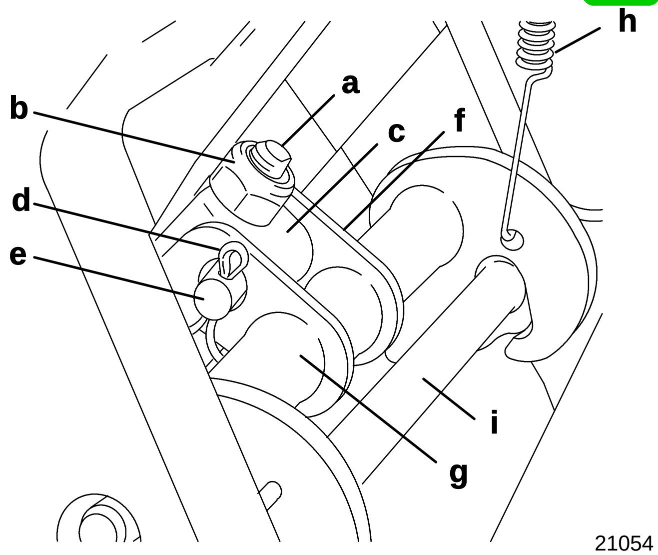
Reference Views



95 2-4-C With Teflon (92-825407A12)

Steering Arm/Swivel Pin/Lower Mount Point

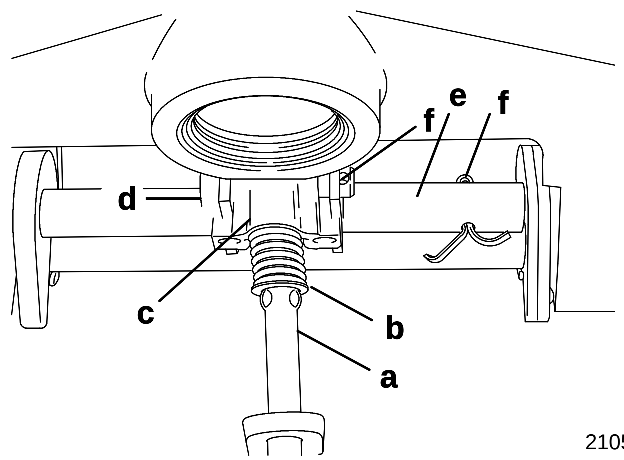
a - Steering Arm
b - Swivel Pin
c - Thrust Washer (Aluminum side towards swivel bracket)
d - Seal (Lips Face Down)
e - Bushing
f - Swivel Bracket
g - O-ring
h - Spacer
i - Yoke
j - Retaining Ring



21054

Non Power Trim Reverse Lock Hook (Shown From Above)

a - Push Rod End
b - Nut
c - Push Rod Yoke
d - Cotter Pin
e - Clevis Pin
f - Reverse Lock Hook Shaft Arm
g - Reverse Lock Hook Shaft
h - Return Spring
i - Tilt Pin

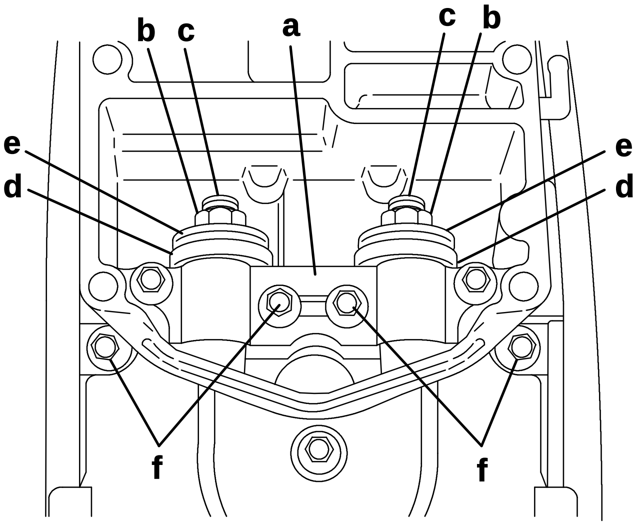


21053

Non Power Trim Reverse Lock Hook (Shown From Below)

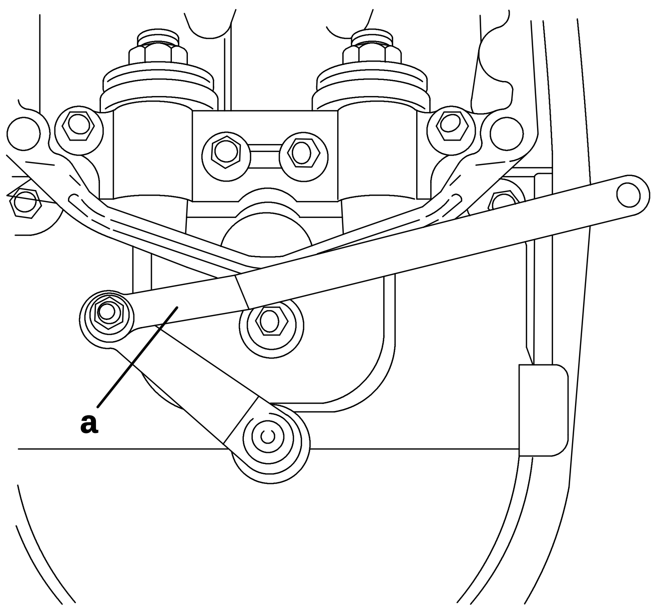
a - Push Rod Shaft
b - Spring
c - Push Rod Yoke
d - Clevis Pin
e - Reverse Lock Hook Shaft
f - Cotter Pin (2)

Upper Mount



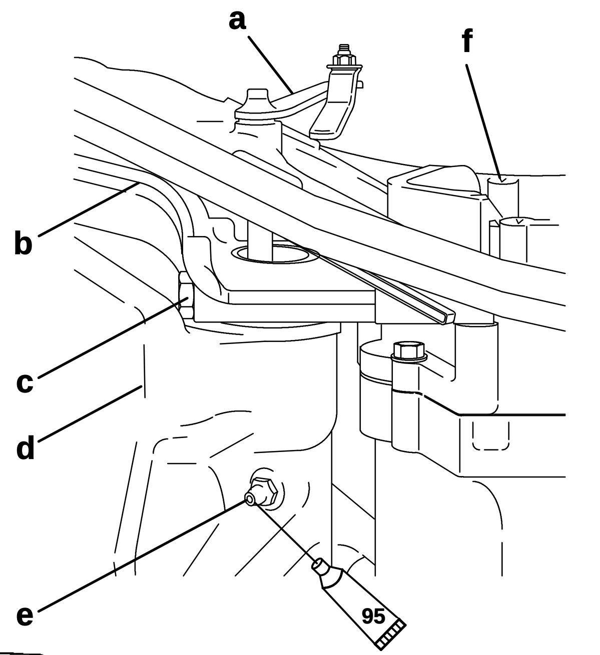
21048

a - Upper Mount
b - Nut (2) [Torque to 80 lb. ft. (108.5 N·m)]
c - Bolt (2)
d - Rubber Washer (2)
e - Washer (2)
f - Bolt (4) [Torque to 23.5 lb. in. (31.9 N·m)]



21049

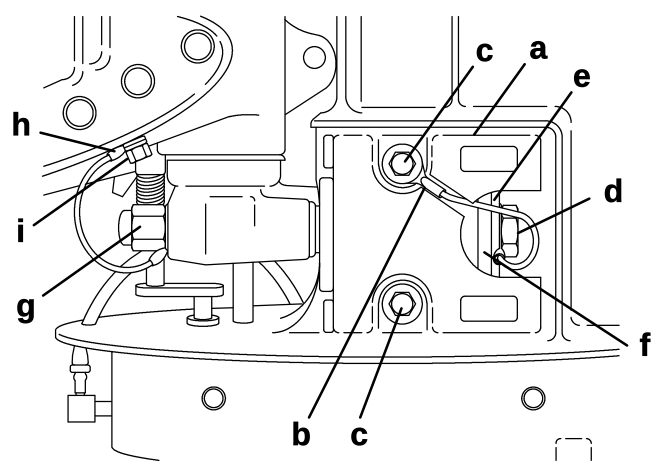
a - Upper Shift Linkage



95 2-4-C With Teflon (92-825407A12) 21050

a - Upper Shift Linkage
b - Steering Arm/Swivel Pin
c - Upper Mount Bolt
d - Swivel Bracket
e - Grease Fitting
f - Mid-Section Drive Shaft Housing

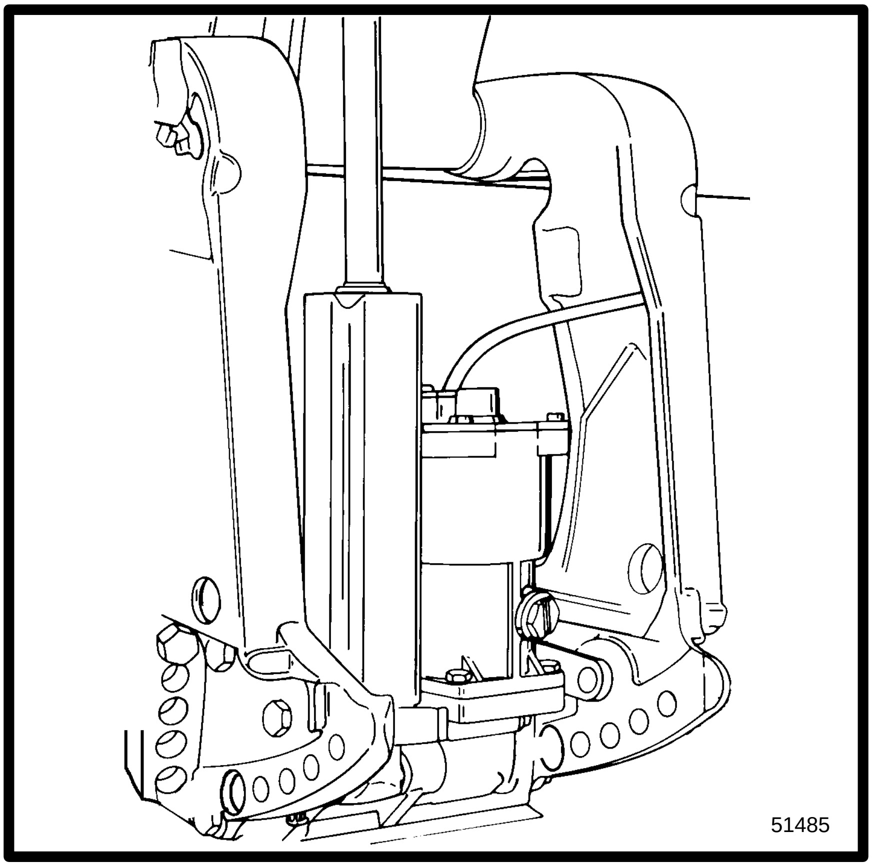
Lower Mount (Port Side Shown)



21051

a - Lower Mount Clamp
b - Ground Strap
c - Bolt (2) [Torque to 15 lb. ft. (20.3 N·m)]
d - Lower Mount Bolt
e - Washer
f - Washer
g - Nut [Torque to 50 lb. ft. (67.8 N·m)]
h - Ground Strap
i - Bolt

MID-SECTION


51485

POWER TRIM (S/N-USA 0G360002/BEL-9934136 & BELOW)

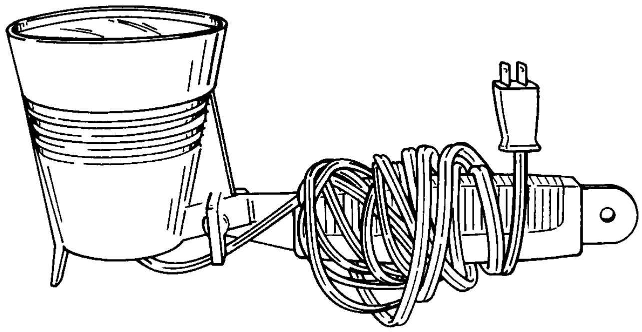
5

B

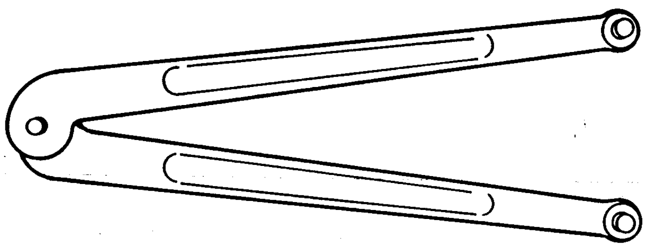
Table of Contents

Special Tools

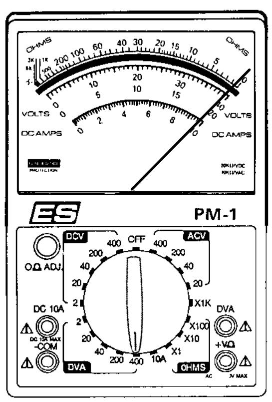
1. Torch Lamp 91-63209



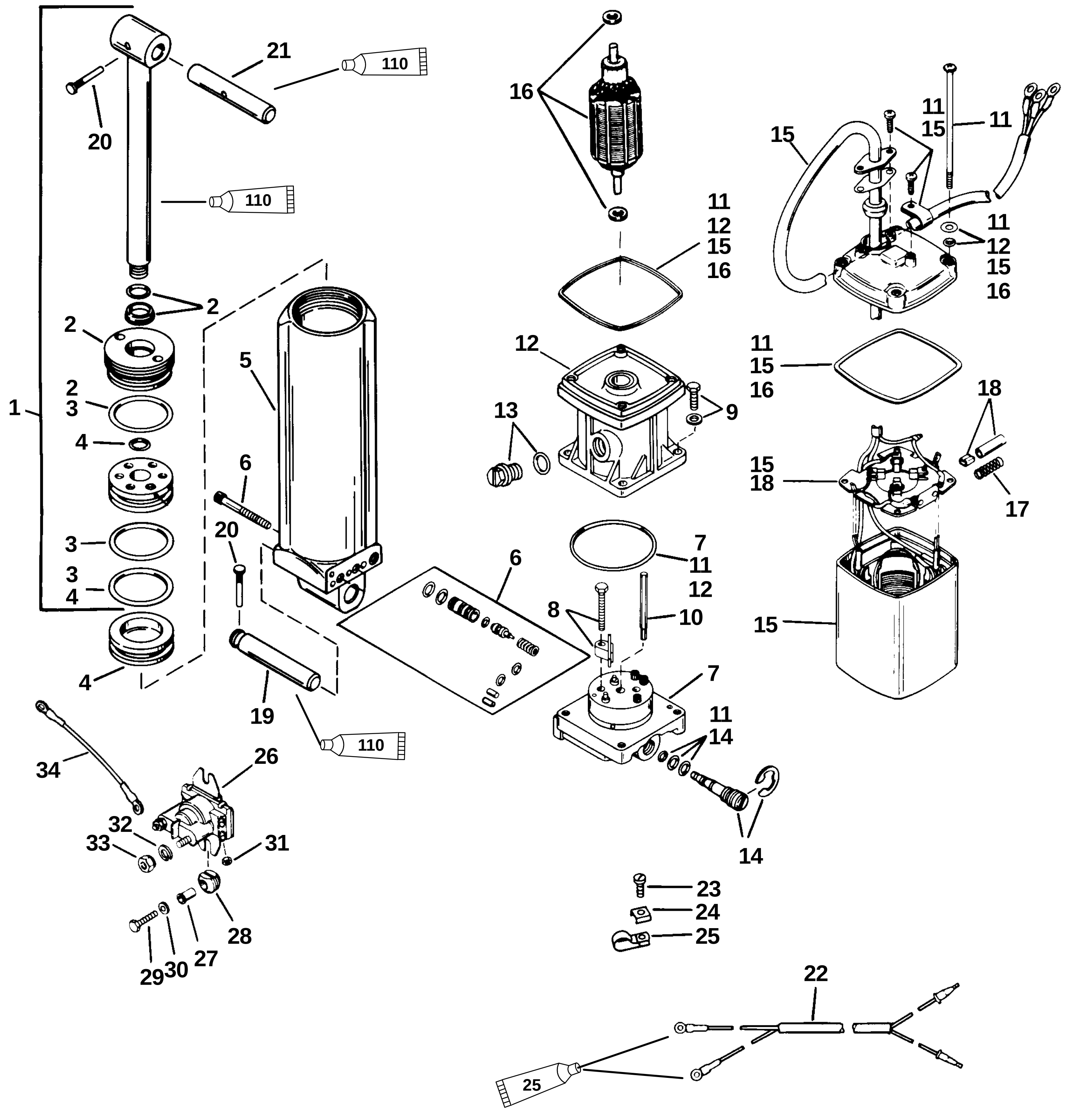
2. Spanner Wrench 91-74951



3. Multi-Meter DVA Tester 91-99750



Power Trim Components (Black Fill Plug) (S/N-USA-0G360002/BEL-9934136 & BELOW)



25 Liquid Neoprene (92-25711--2)

110 Power Trim and Steering Fluid (92-90100A12)

NOTE: *Lubricate all O-rings and seals with Power Trim and Steering Fluid.*

Power Trim Components (Black Fill Plug) (S/N-USA-0G360002/BEL-9934136 & BELOW)

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
–	1	POWER TRIM PUMP			
1	1	SHOCK ROD ASSEMBLY			
2	1	CYLINDER END CAP			
3	1	CYLINDER SEAL KIT			
4	1	MEMORY PISTON KIT			
5	1	CYLINDER			
6	1	SCREW AND SEAL KIT	100		11.3
7	1	PUMP/MANIFOLD			
8	1	ROCKER ARM	130		14.7
9	1	SCREW KIT	70		7.9
10	1	DRIVE SHAFT			
11	1	SEAL KIT(W/CASE BOLTS)	13		1.5
12	1	RESERVOIR			
13	1	PLUG KIT	Drive Tight		
14	1	RELIEF VALVE KIT			
15	1	FRAME AND FIELD KIT	13		1.5
16	1	ARMATURE KIT			
17	1	BRUSH SPRING KIT			
18	1	BRUSH CARD KIT			
19	1	ANCHOR PIN			
20	2	GROOVE PIN			
21	1	SHAFT			
22	1	TRIM HARNESS ASSEMBLY			
23	2	SCREW	Drive Tight		
24	2	C-WASHER			
25	2	CLAMP			
26	2	SOLENOID			
27	4	BUSHING			
28	4	GROMMET			
29	4	SCREW	35		4.0
30	4	WASHER			
31	4	NUT(8-32 Brass)	20		2.3
32	4	LOCKWASHER			
33	4	NUT(1/4 - 20)	50		5.6
34	2	CABLE **(RED – 2-3/4 IN.)(USE WHERE APPLICABLE)**			
	AR	CABLE **(BLACK – 3-1/2 IN.)**			

Power Trim - General Information

Description

The Power Trim system consists of an electric motor, pressurized fluid reservoir, pump and trim cylinder.

The remote control (or trim panel) is equipped with a switch that is used for trimming the outboard “up” and “down”, and for tilting the outboard for shallow water operation (at slow speed) or for “trailering”. The outboard can be trimmed “up” or “down” while engine is under power or when engine is not running.

Trimming Characteristics

When trimming outboard from a mid-trim position (trim tab in neutral, straight fore-and-aft position), you can expect the following results:

TRIMMING OUTBOARD “UP” (“OUT”)

⚠ WARNING

Excessive trim “out” may reduce the stability of some high speed hulls. To correct instability at high speed, reduce the power gradually and trim the motor “In” slightly before resuming high speed operation. (Rapid reduction in power will cause a sudden change of steering torque and may cause additional momentary boat instability.)

Will lift bow of boat, usually increasing top speed.

Transfers steering torque harder to port (left) on installations below 23 in. transom height.

Increases clearance over submerged objects.

In excess, can cause “porpoising” and/or ventilation.

In excess, can cause insufficient water supply to water pump resulting in serious water pump and/or powerhead overheating damage.

⚠ WARNING

Excessive engine trim angle will result in insufficient water supply to water pump causing water pump and/or powerhead overheating damage. Make sure that water level is above gear housing water intake holes whenever engine is running.

Operating “Up” circuit will actuate the “up” relay (located under engine cowl) and close the electric motor circuit. The electric motor drives the pump, forcing fluid thru internal passageways into the “up” side of the trim cylinder.

The trim cylinder/trim ram will position the engine at the desired trim angle within the 20° maximum trim range. The Power Trim system is designed so the engine cannot be trimmed beyond the 20° maximum trim angle as long as engine RPM is above approximately 2000 RPM.

The engine can be raised beyond the 20° maximum trim angle for shallow water operation, etc., by keeping the engine RPM below 2000 RPM. If engine RPM increases above 2000 RPM, the thrust created by the propeller (if deep enough in the water) will cause the trim system to automatically lower the engine back to the 20° maximum trim angle.

TRIMMING OUTBOARD “DOWN” (“IN”)

⚠ WARNING

Excessive speed at minimum trim “In” may cause undesirable and/or unsafe steering conditions. Each boat should be tested for handling characteristics after any adjustment is made to the tilt angle (tilt bolt relocation).

Will help planing off, particularly with a heavy load.

Usually improves ride in choppy water.

In excess, can cause boat to veer to the left or right (bow steer).

Transfers steering torque harder to right (or less to the left).

Improves planing speed acceleration (by moving tilt bolt one hole closer to transom).

Operating “Down” circuit will actuate the “down” relay (located under engine cowl) and close the electric motor circuit (motor will run in opposite direction of the “Up” circuit). The electric motor will drive the pump, forcing fluid thru internal passageways into the “down” side of the tilt ram. The tilt ram will move the engine down to the desired angle.

Trailering Outboard

⚠ WARNING

Excessive engine trim angle will result in insufficient water supply to water pump causing water pump and/or powerhead overheating damage.

Make sure that water level is above gear housing water intake holes whenever engine is running.

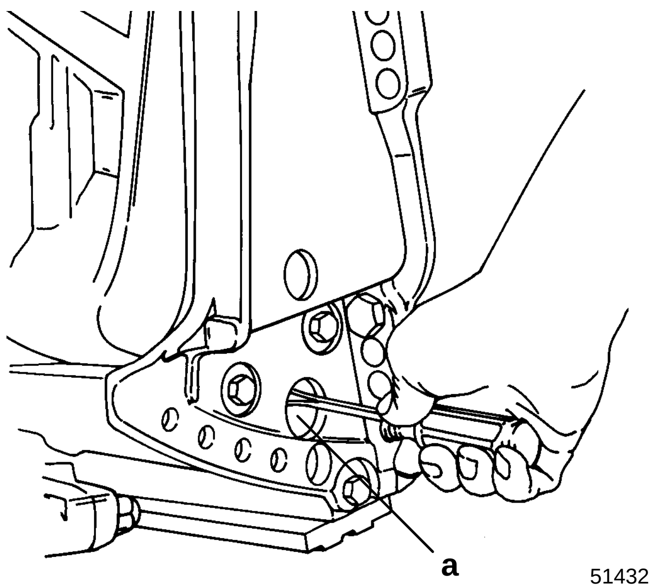
While operating "up" circuit, the ram will continue to tilt outboard to full up position for trailering.

Tilting Outboard Up and Down Manually

WARNING

Before opening the manual release valve, make sure all persons are clear of engine as engine will drop to full "down" position when valve is opened.

With power trim installed, the outboard can be raised or lowered manually by opening the manual release valve 3 turns **maximum** (counterclockwise).



a - Manual Release Valve

Trim "In" Angle Adjustment

WARNING

Operating some boats with engine trimmed to the full "in" trim angle (not using trim adjustment bolt at planing speed) will cause undesirable and/or unsafe steering conditions. Each boat must be water tested for handling characteristics after engine installation and after any trim adjustments.

IMPORTANT: Some boat/motor combinations, that do not use the trim adjustment bolt and are trimmed to the full "in" trim angle, will not experience any undesirable and/or unsafe steering conditions during planing speed. Thus, not using trim adjustment bolt may be desired. However, some boats with engine trimmed to the full "in" trim angle at planing speed will cause undesirable and/or unsafe steering conditions. If these steering conditions are experienced, under no circumstances should the engine be operated without the trim adjustment bolt and without the bolt adjusted in the proper holes to prevent unsafe handling characteristics.

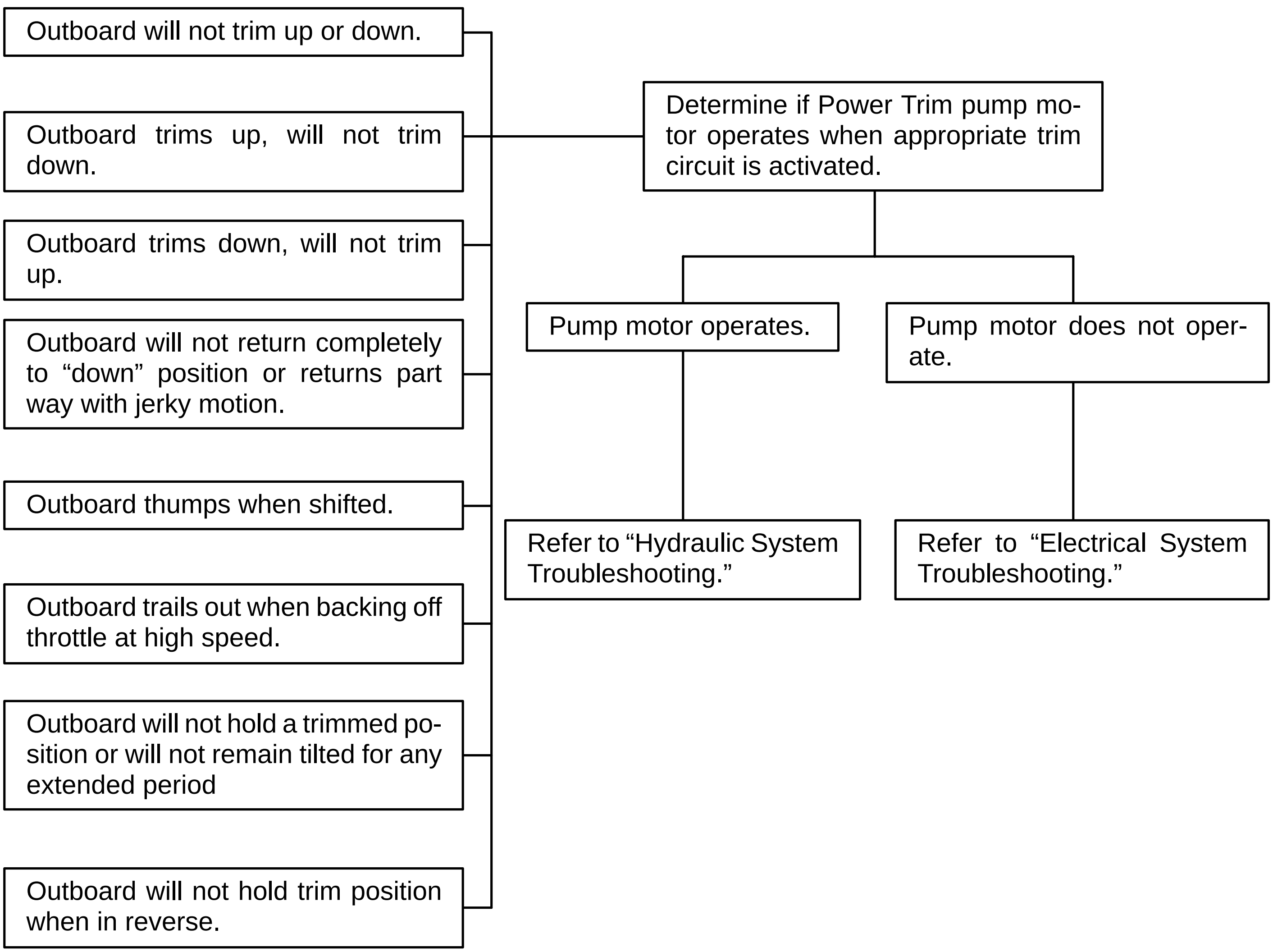
Water test the boat not using the trim adjustment bolt. If undesirable and/or unsafe steering conditions are experienced (boat runs with nose down), install trim adjustment bolt in proper hole to prevent unsafe handling characteristics.

Troubleshooting

Determining if Problem is Electrical or Hydraulic

When a problem is encountered with the Power Trim system, the first step is to determine whether the malfunction is in the "electrical system" or the "hydraulic system." Refer to the following chart to determine which system is at fault.

Problem Chart



Hydraulic System Troubleshooting

Support outboard with tilt lock lever when servicing power trim system.

After debris or failed components have been found (during troubleshooting procedures) disassemble unit completely and replace all O-rings. Check ball valve components and castings must be cleaned using engine cleaner and compressed air or replaced prior to reassembly.

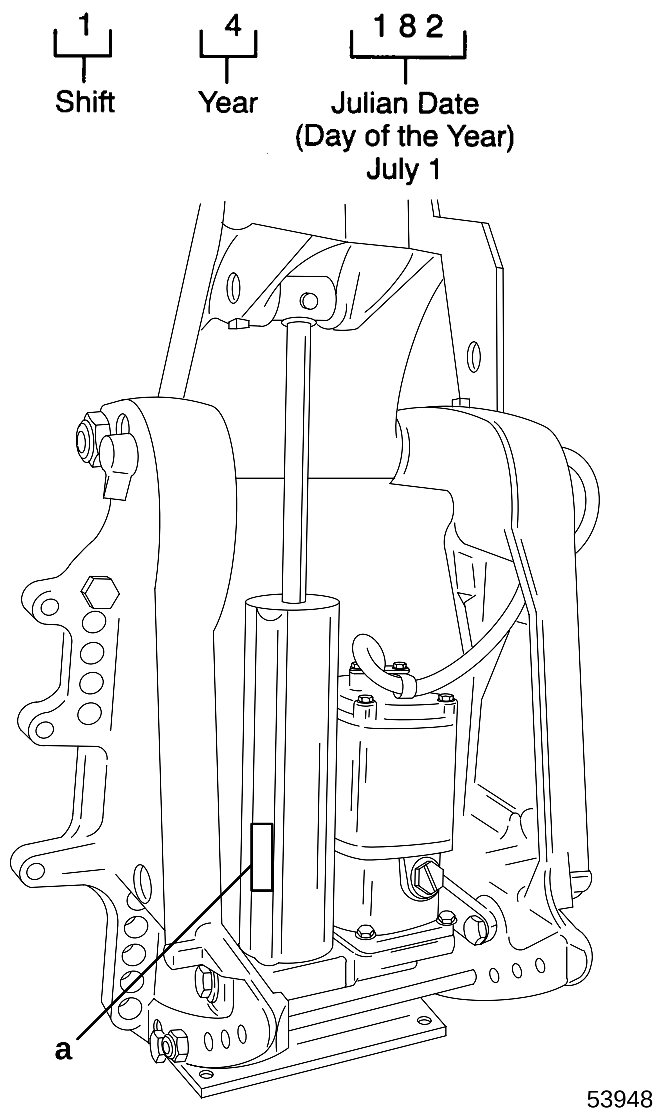
Power trim system is pressurized. Outboard must be in the full "UP" position (cylinder fully extended) prior to fill screw or manual release valve removal.

Refer to instructions following if disassembly is required.

Follow preliminary checks before proceeding to troubleshooting flow diagrams (following).

Date Code Location

Date codes are placed on power trim assemblies at date of manufacture. These date codes are designed to quickly identify assemblies which may be affected by service bulletins pertaining to specific problems. Note date code on trim assembly and compare to date code listed on service bulletins before making repairs.



a - Embossed into the CAUTION Decal on Trim/Tilt Cylinder

Preliminary Checks

Operate Power Trim System after each check to see if problem is corrected. If not, proceed with the next check.

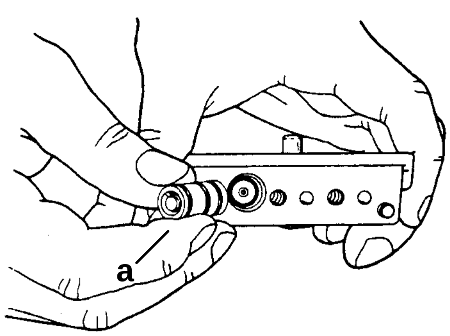
1. Check that manual release valve is tightened to full right (clockwise) position.
2. Check trim pump fluid level with outboard in full "UP" position and fill if necessary. Refer to "Fill and Purge the Power Trim System."
3. Check for external leaks in Power Trim system. Replace defective part(s) if leak is found.
4. Outboard not holding tilted position (falls to trim in position) indicates debris or defective components in trim valve assembly. Clean or replace components as required.
5. Check manual release valve for broken stem and one O-ring remaining in the release valve passage. (Separate the manifold assembly from the cylinder to dislodge broken stem.) Install new release valve and test system.
6. Check for nicked, deteriorated, or misplaced O-rings throughout trim system.

Leak Down Check - Pump and Manifold Assembly

The 1993 and 1994 models listed with power trim date codes 13011 through 23288 ONLY may experience a very slow trim rate (one minute or more) with the outboard drifting back down as soon as the UP trim button is released. This failure usually occurs when the unit is new or after 3 or 4 weeks of non use. The cause may be a stuck spool inside the sleeve due to an oversize or a hard O-ring on the spool (SERVICE BULLETIN No. 93-22A).

NOTE: *Scribe pump housing and manifold before disassembly.*

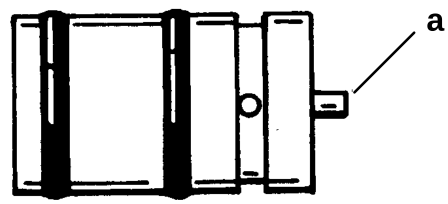
1. Remove tilt cylinder from the manifold and replace pilot valve assembly.



50999

a - Sleeve with Spool Inside

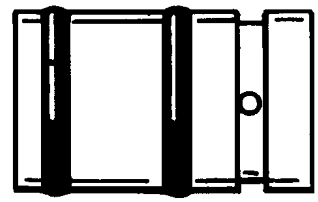
2. The spool is considered stuck when the pin end is protruding out past the end of the sleeve.



SPOOL STUCK

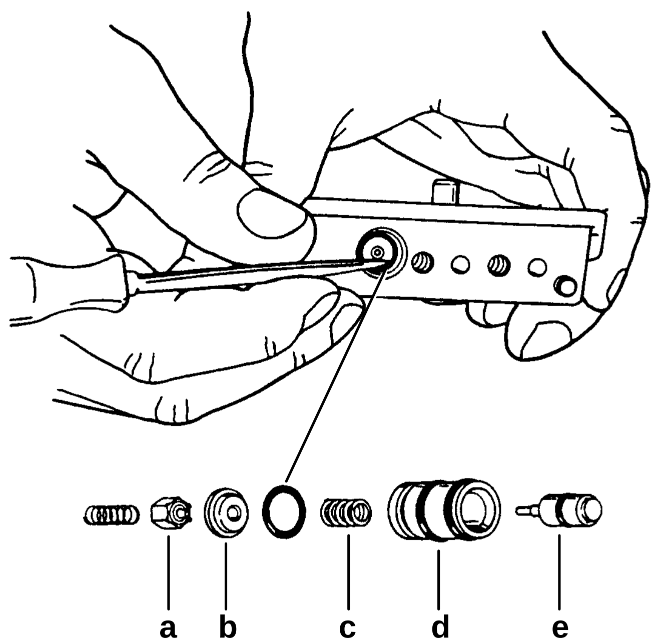
52790

a - Spool Pin



SPOOL NOT STUCK

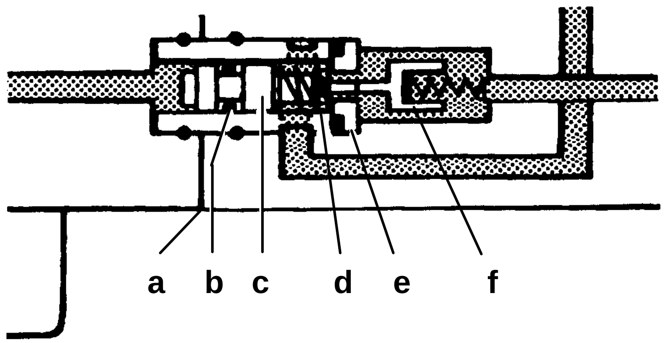
52791



Pilot Valve and Seat Removal

a - Pilot Valve
b - Valve Seat
c - Return Spring
d - Sleeve
e - Spool

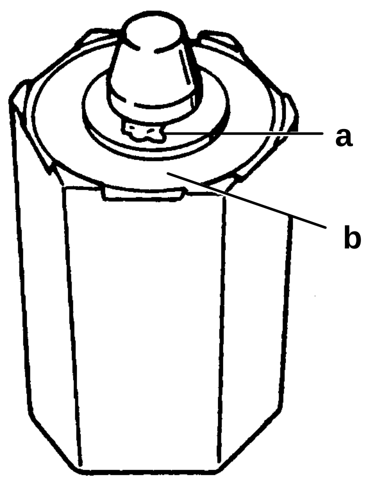
3. A leak path is created between the UP side of the cylinder and the reservoir when the spool sticks holding the pilot valve open.



a - Cylinder/Manifold Mating Surface
b - O-ring
c - Spool
d - Return Spring
e - Valve Seat
f - Pilot Valve Held Open (away from valve seat)

4. Power trim units with date code 23289 and higher have improved O-rings and improved surface finish on the inside of the sleeve to correct the problem.

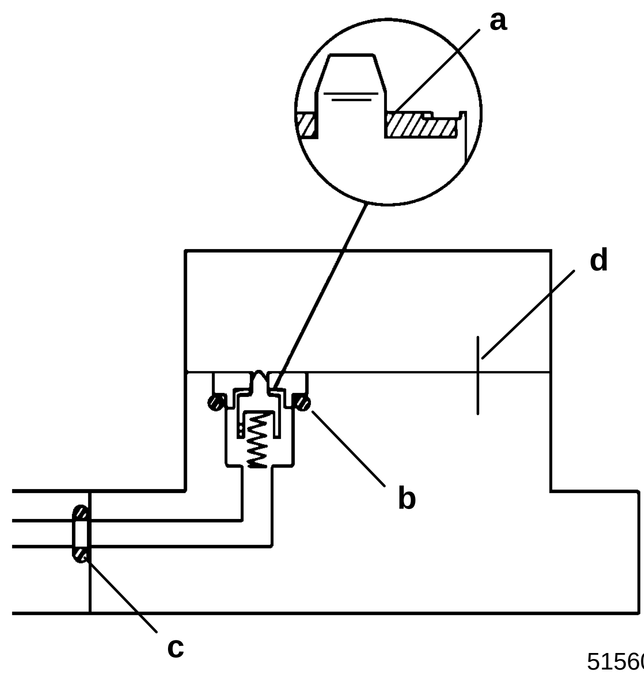
5. To correct a slow leak down, check for debris between the valve seat and valve.



52792

a - Chip under Valve Tip
b - Rubber Seat

6. Inspect for nicked, deteriorated, or misplaced O-ring.



51560

a - Valve and Seat
b - O-ring
c - O-ring
d - Scribe Mark

Reassembly

1. Install the spool into sleeve from the chamfered end (end opposite the cross hole).

2. Insert spool into sleeve until end is flush with the chamfered end of the sleeve. Inserting the spool too far into the sleeve may allow the spool O-ring to contact the sharp edges of the sleeve cross hole and damage the O-ring.

3. After reassembly, insert driveshaft and check pump rotor resistance to turning - housing halves can shift/turn during reassembly. Align scribe marks carefully.

Power Trim Partial Leak Down at Maximum Trim

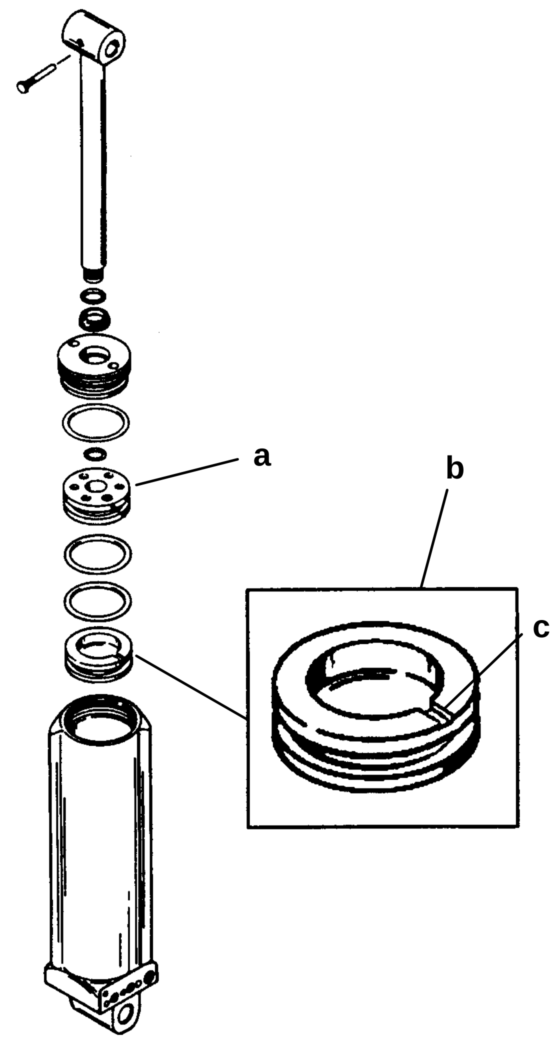
Power Trim Date Code 14182 and Below – Service Bulletin No. 94-13.

Some units, when trimmed to the maximum 20 degree limit, will leak down approximately 5 degrees and then hold. The leak will ONLY occur while the boat is under power. The cause for the 5 degree leak down is the lack of a fluid passage between the shock piston and the memory piston.

1. Disassemble the tilt ram assembly and remove the memory piston.
2. Cut a small groove 0.020 - 0.040 in. (0.5 - 1.0mm) deep across the top face of the memory piston. The groove will allow oil passage when the shock piston and memory piston are in contact. The groove can be made with a hacksaw or triangular file.

NOTE: *Power trim assemblies with Date Code 14183 and ABOVE have a groove in the shock piston to allow fluid passage. The memory piston remains the same and does not have a groove across the face.*

3. Remove all burrs and filings from the memory piston.
4. Reassemble the trim/tilt ram assembly using new O-rings and seals.

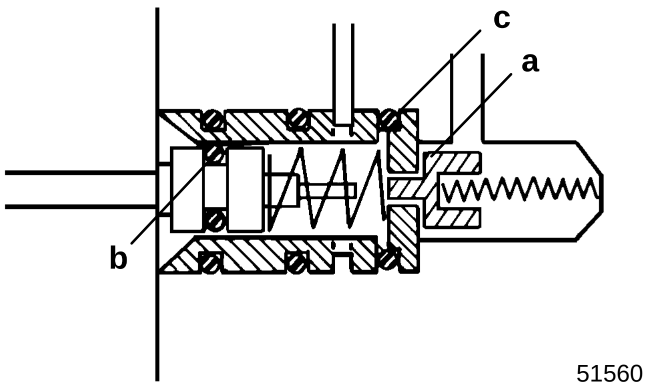


a - Shock Piston
b - Memory Piston
c - 0.020 – 0.040 in. (0.5 – 1.0mm) Groove

Leak Down Check - Pilot Valve Assembly

1. Debris or chips between valve and seat (a), usually imbedded in rubber valve seat.
2. Pilot valve installed from non-chamfered end of spool, results in nicked or damaged O-ring (b).
3. Nicked or deteriorated O-ring (c).

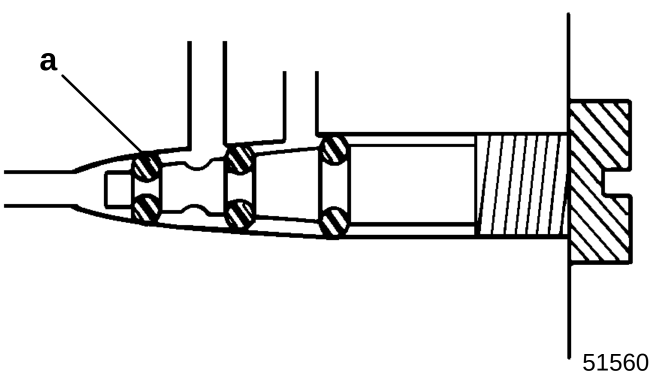
A leak path is created between the UP side of the cylinder and the reservoir. The trim system will leak down until the trim port in cylinder is covered.



a - Valve and Seat
b - Pilot Valve O-ring
c - O-ring

Leak Down Check - Manual Release Valve

1. Debris or chips under O-ring (a).
2. Flash from valve molding causing O-ring (a) to not seal.
3. Nicked O-ring (a).



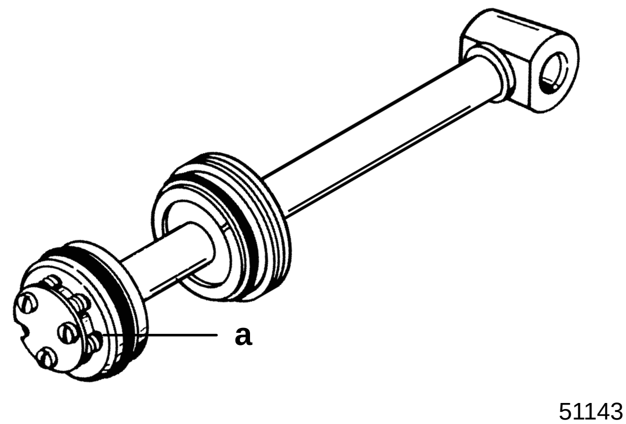
a - O-ring

Leaks Past Ball and Seat - Piston Assembly

Unit will trim to full or near full down position and then will begin to trim up while trim switch is held in "DOWN" mode.

If trim switch is released, outboard can be pushed (by hand) down to the point where trim UP started.

1. Inspect balls and seats in piston assembly for debris or damage. Repair or replace balls/seats.



a - Ball and Seat. Check all for debris or damage.

Power Trim Rocker Arm

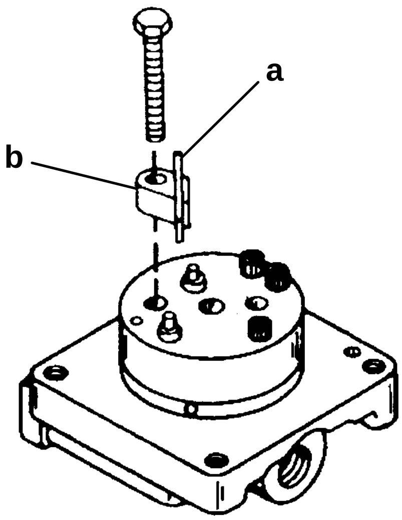
Power Trim Date Code 14182 and Below. Refer to Service Bulletin No. 92-12.

Outboard in the trim position will not trim up or down OR pump motor will lock up (not turn) in either direction.

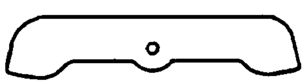
Outboard in the tilt position will not tilt up or down OR pump motor will run slow in either direction.

Single ram power trim that will not trim or tilt up or down may have a pump/manifold assembly with a broken rocker arm.

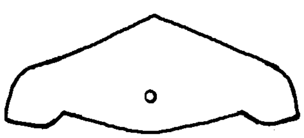
1. Replace broken rocker with improved rocker arm assembly 823180.



a - Rocker Arm
b - Rocker Arm Assembly

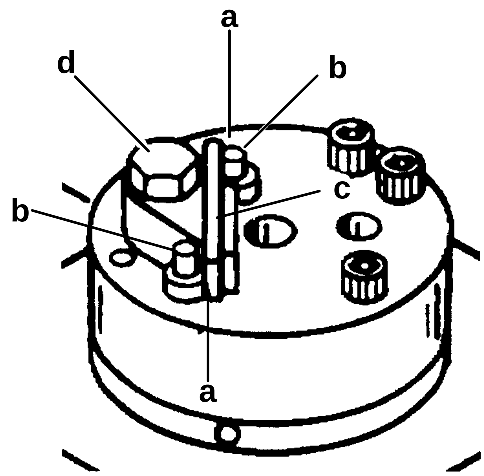


Previous Rocker Arm Design 51742



Improved Rocker Design 51742

2. Clearance between the side of the rocker arm and each pin is 0.001 to 0.010 in. (0.025 – 0.25mm).
3. Torque bolt to 125 – 140 lb. in. (14.1 – 15.8 N·m).



a - Clearance Between Each Pin and Rocker Arm – 0.001 to 0.010 in. (0.025 – 0.25mm)
b - Pump Pins
c - Rocker Arm
d - Bolt [Torque to 125 – 140 lb. in. (14.1 – 15.8 N·m)]

Troubleshooting Flow Diagram

Outboard falls to full down position with manual release valve closed.

Example a: Outboard lowers more than one tilt bolt hole in eight hours.

Example b: Outboard lowers during acceleration.

Inspect Manual Release Valve.

Result

Manual release valve and/or O-ring damage.

Replace defective valve and O-rings.

Result

Manual release valve and O-rings appear to be OK. Replace O-rings.

Result

O-rings appear to be OK. Cylinder bore and memory piston are OK. Replace O-rings and proceed.

Inspect O-rings on Pilot Relief Valve (located in manifold assembly).

Result

O-ring failure.

Replace O-rings.

Result

O-rings appear to be OK. Replace O-rings.

Inspect Memory Piston O-ring.

Result

All components appear to be OK.

Replace Manifold and Pump Assembly.

Result

O-ring or Cylinder Bore Defective.

Replace O-ring or Components.

Troubleshooting Flow Diagram

Outboard will not hold tilted position in reverse and/or trails out during high speed deceleration.

Inspect Manual Release Valve.

Result

Manual release valve and/or O-ring damage.

Replace defective valve and O-rings.

Result

Manual release valve and O-rings appear to be OK. Replace O-rings and proceed.

Inspect Trim Rod Piston Check Valve.

Result

No debris or defective components found.

Inspect Manifold Reverse Thrust Valve.

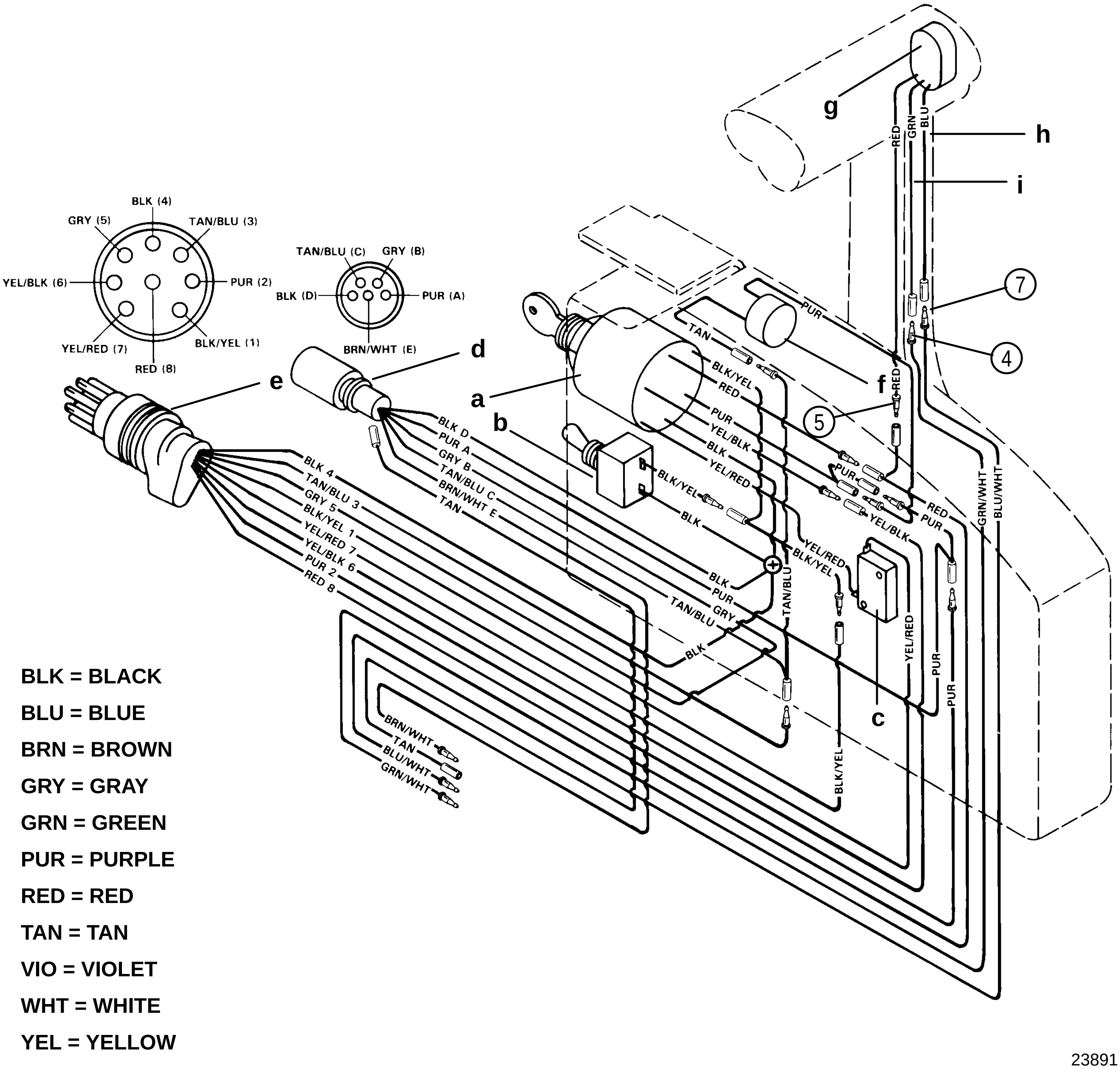
Replace Pump and Manifold Assembly.

Result

Debris found in check valve components.

Clean check valve components using engine cleaner and compressed air or replace.

COMMANDER 2000 Side Mount Remote Control (Power Trim/Tilt Electric Start with Warning Horn) Wiring Diagram



BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW

a - Ignition/Choke Switch
b - Emergency Stop Switch
c - Neutral Start Switch
d - Tachometer/Accessories Harness Connector
e - Wiring Harness Connector
f - Warning Horn
g - Trim/Tilt Switch
h - Up
i - Down

Power Trim System Wiring Diagram

BLK = BLACK

BLU = BLUE

BRN = BROWN

GRY = GRAY

GRN = GREEN

PUR = PURPLE

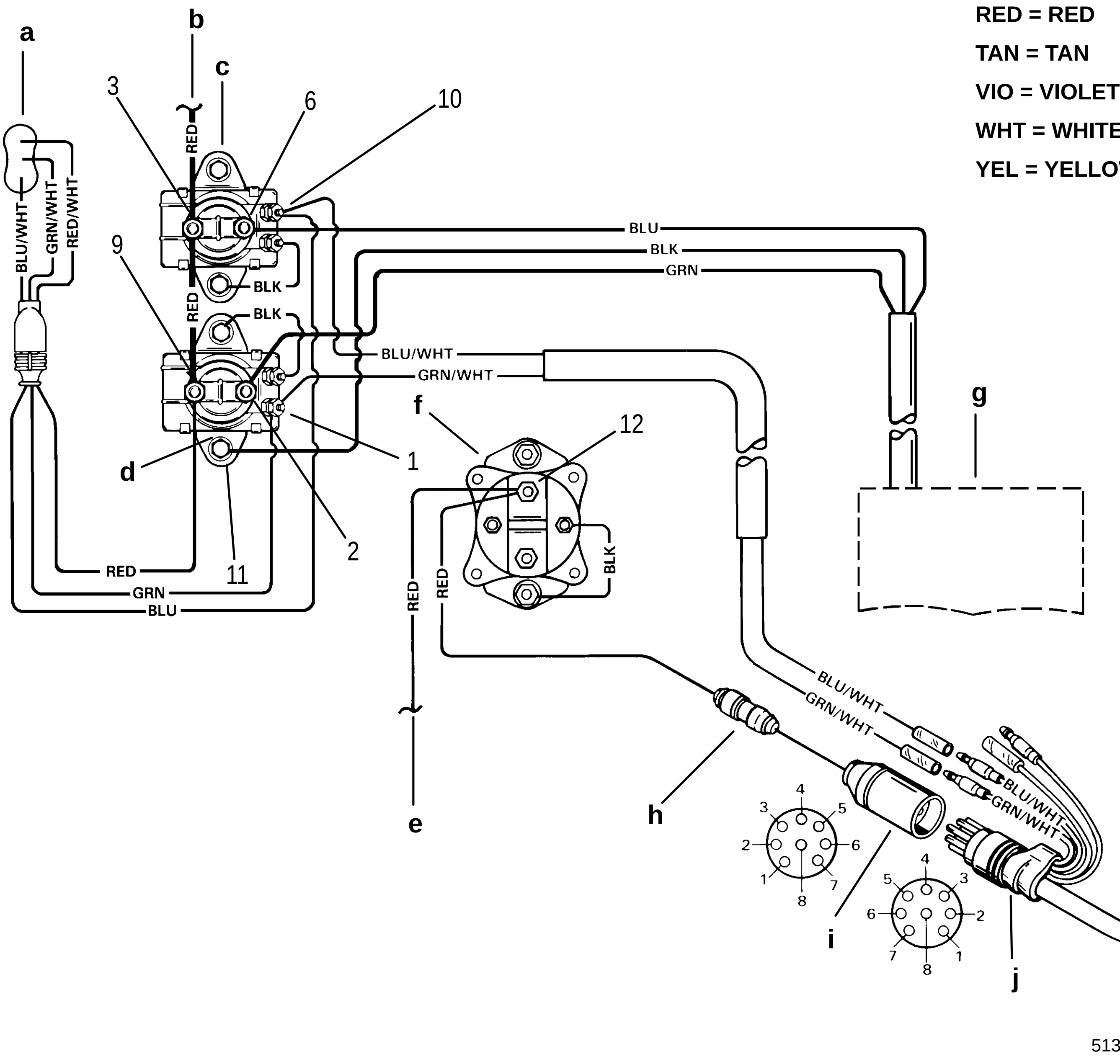
RED = RED

TAN = TAN

VIO = VIOLET

WHT = WHITE

YEL = YELLOW



a - Cowl Trim Switch
b - To Ignition Switch
c - UP Solenoid
d - DOWN Solenoid
e - To Battery
f - Starter Solenoid
g - Power Trim Motor
h - 20 Ampere Fuse
i - Engine Harness
j - Remote Control Harness

BLK ● **BLACK =** Negative (–)
BLU ● **BLUE =** Trim Motor (UP)
GRN ● **GREEN =** Trim Motor (DOWN)
RED ● **RED =** Positive (+)
BLU/WHT ● **BLUE/WHITE =** Trim Switch to UP Relay
GRN/WHT ● **GREEN/WHITE =** Trim Switch to DOWN Relay

Troubleshooting the “Down” Circuit* (When “Up” Circuit is OK)

***Remote Control Not Equipped with Trailer Button**

Connect Voltmeter red lead to Point 1 and black lead to ground.

Depress the “Down” trim button.

Battery Voltage Indicated:

Down solenoid is Defective. Replace and retest.

No Voltage Indicated:

Connect Voltmeter red lead to Point 4 and black lead to ground. Depress “Down” trim button. If battery voltage is indicated, wire is open between Points 4 and 1.

No Voltage Indicated:

Connect Voltmeter red lead to Point 5. If battery voltage is indicated, trim switch is faulty. If no battery voltage, check for loose or corroded connection at Point 5 or open circuit in wire supplying current to Point 5.

Troubleshooting the “Up” Circuit* (When “Down” Circuit Is OK)

***Remote Control NOT Equipped with Trailer Button**

Connect Voltmeter red lead to Point 8 and black lead to ground.

Depress the “Up” trim button.

Battery Voltage Indicated:

UP Solenoid is defective. Replace and retest.

No Voltage Indicated:

Connect Voltmeter red lead to Point 7 and black lead to ground. Depress “Down” trim button. If battery voltage is indicated, wire is open between Points 7 and 8.

No Voltage Indicated:

Connect Voltmeter red lead to Point 5. If battery voltage is indicated, trim switch is faulty. If no battery voltage, check for loose or corroded connection at Point 5 or open circuit in wire supplying current to Point 5.

Troubleshooting the “Down” and “Up” Circuits* (All Circuits Inoperative)

***Remote Control NOT Equipped with Trailer Button**

Check in-line fuse (under cowl) to see if fuse is blown

Blown Fuse:

- Correct problem that caused fuse to blow.
- Replace fuse.

Fuse Not Blown:

Connect Voltmeter red lead to Point 3 and black lead to ground, Battery voltage should be indicated.

No Voltage Indicated:

- Check battery leads for poor connections or open circuits.
- Check battery charge.

Battery Voltage Indicated:

- Connect Voltmeter red lead to Point 8 and black lead to ground.
- Depress “Up” trim button and check for battery voltage.

No Voltage Indicated:

Connect red Voltmeter lead to Point 5, and black lead to ground.

Battery Voltage Indicated:

- Check black ground wires for poor connection or poor ground.
- Pump motor is faulty. Refer to “Motor and Electrical Tests/Repair,” following.

No Voltage Indicated:

Check that voltage is being supplied to control by performing the following checks:

- DO NOT start engine.
- Turn ignition switch to “Run” position.
- Check for voltage at any instrument, using a Voltmeter.

Battery Voltage Indicated:

Trim switch is faulty or there is an open circuit in wires (green-white, blue-white) between trim buttons and trim pump.

- Check trim switch.
- Check all trim harness connectors for loose or corroded connections.
- Check for pinched or severed wires.

No Voltage Indicated:

Red wire is open between Point 3 and red terminal on back of the ignition switch.

- Check for loose or corroded connections.
- Check for open circuit in wire.

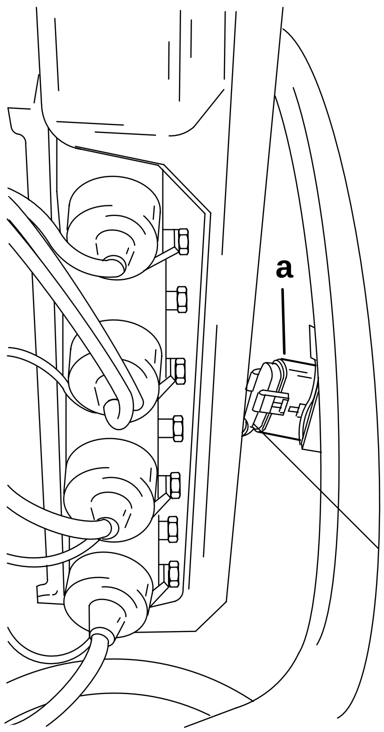
Battery Voltage Indicated:

There is an open circuit in wire between Point 5 and Red terminal on the back of the ignition switch.

Power Trim System Removal

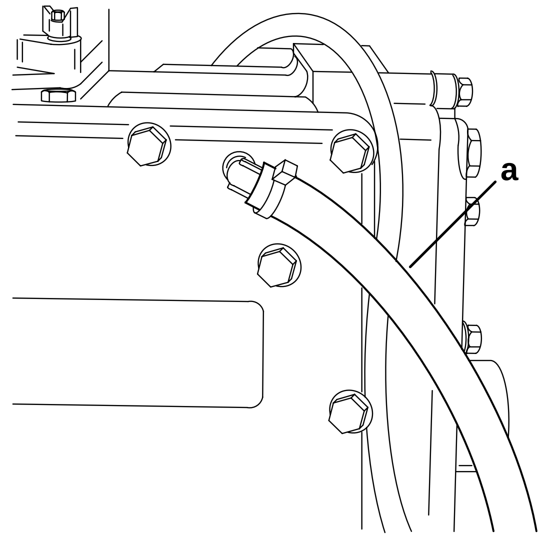
IMPORTANT: With outboard in the full tilt UP position, support outboard with tilt lock lever when servicing trim system.

1. Remove top cowl.
2. Disconnect bullet connectors in cowl mounted trim switch harness.



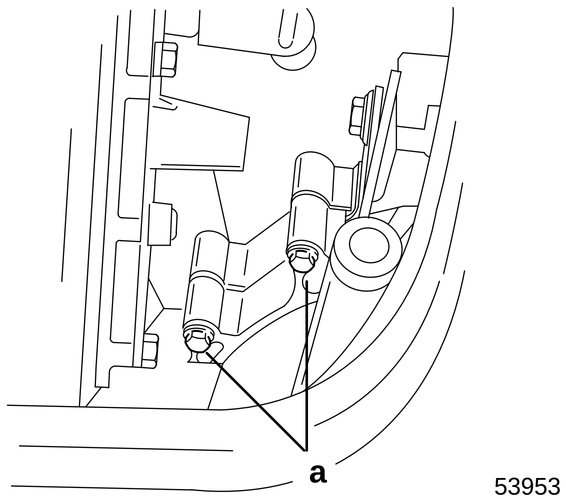
a - Cowl Mounted Trim Switch

3. Remove tell-tale hose from exhaust cover.



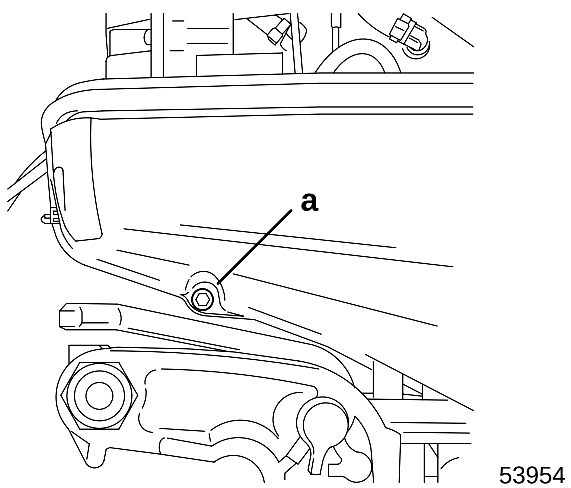
a - Hose

4. Remove 2 bolts securing aft end of lower cowling.



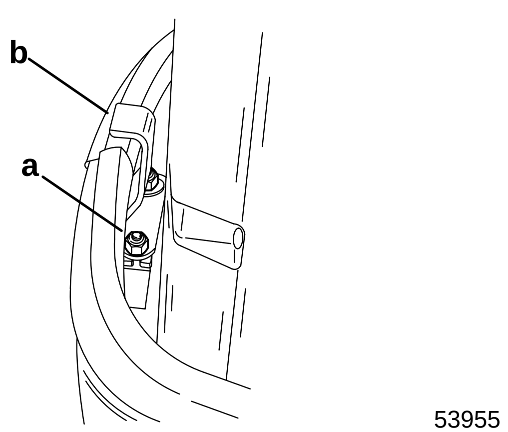
a - Bolts

5. Remove bolt securing forward portion of lower cowling.



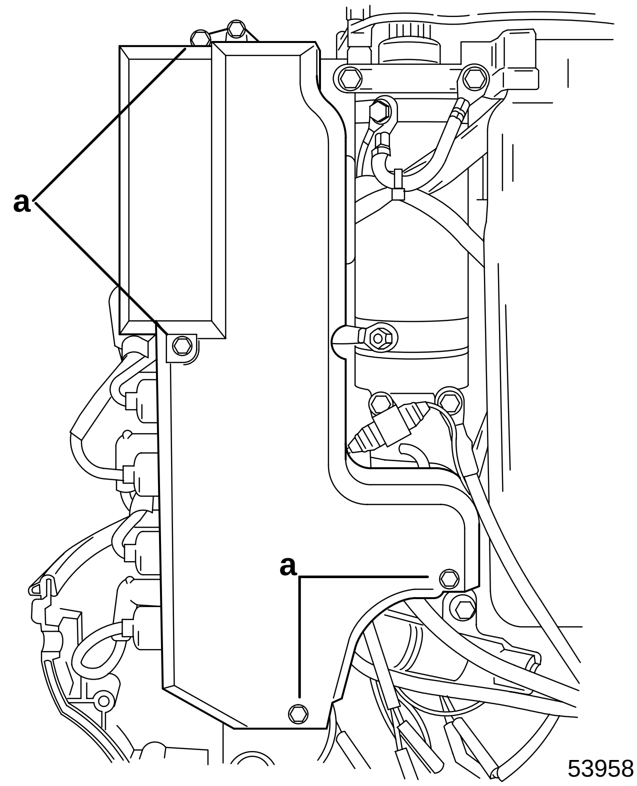
a - Bolt

6. Loosen PORT nut securing front latch to bottom cowl and remove STARBOARD bottom cowl.



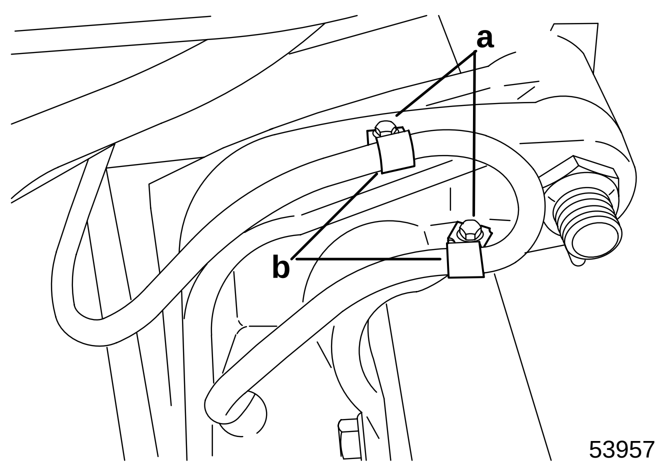
a - Nut
b - Latch

7. Remove 4 bolts securing electrical plate cover and remove cover.



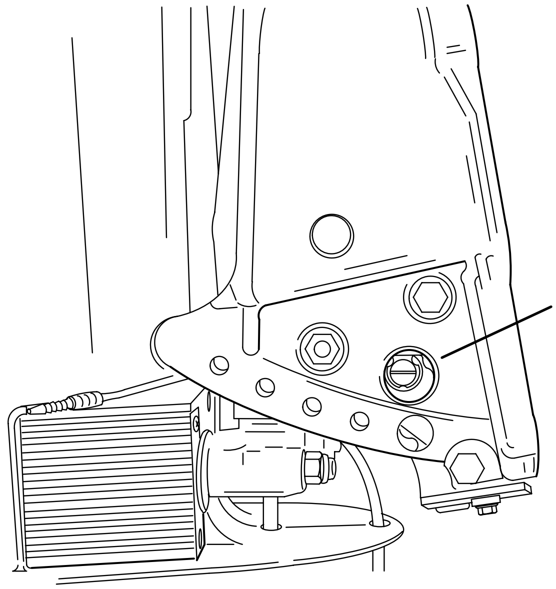
a - Bolts

8. Remove 2 bolts and J-clips securing trim motor harness to starboard clamp bracket.



a - Bolts
b - J-clips

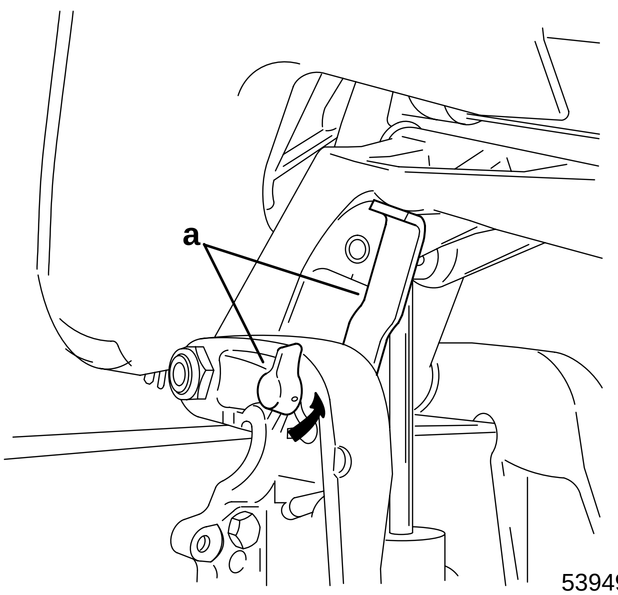
9. Turn manual release valve 3 turns COUNTERCLOCKWISE.



53969

a - Manual Release Valve

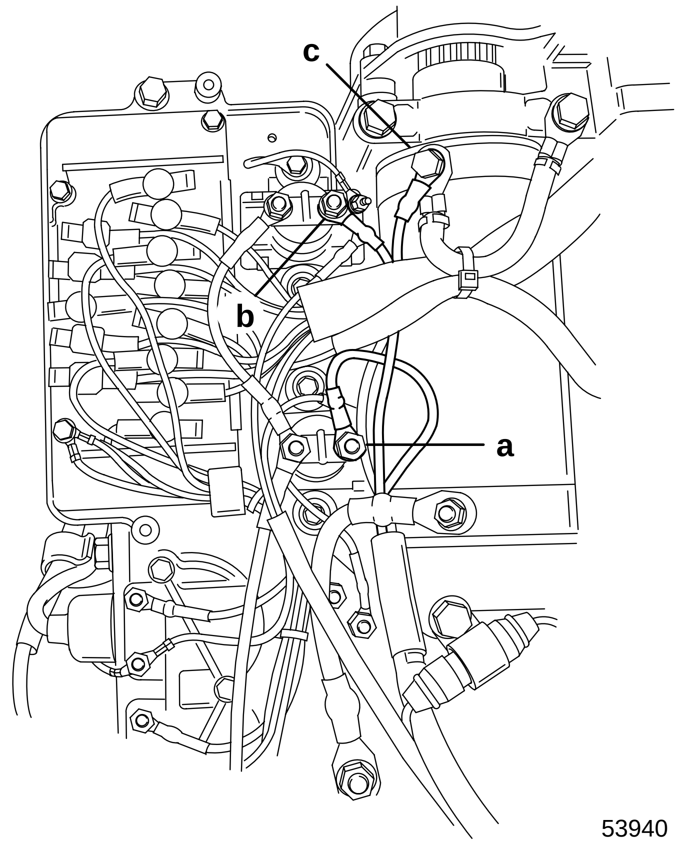
10. Manually raise outboard to the full UP position and engage tilt lock lever to support outboard while servicing power trim system.



53949

a - Tilt Lock Lever

11. Remove 2 nuts securing GREEN and BLUE trim harness leads to solenoids. Remove bolt securing BLACK trim harness lead.

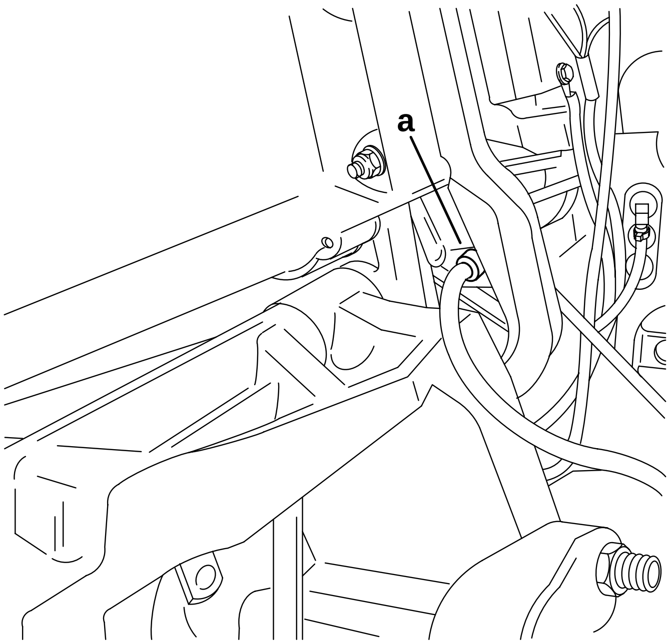


53940

a - GREEN Trim Lead
b - BLUE Trim Lead
c - BLACK Trim Lead

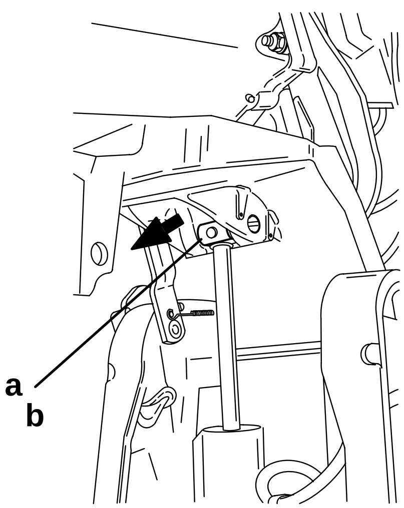
12. Remove trim gauge sender (if equipped).

13. Push grommet up through engine tray and remove grommet from harness. Pull harness down through engine tray.



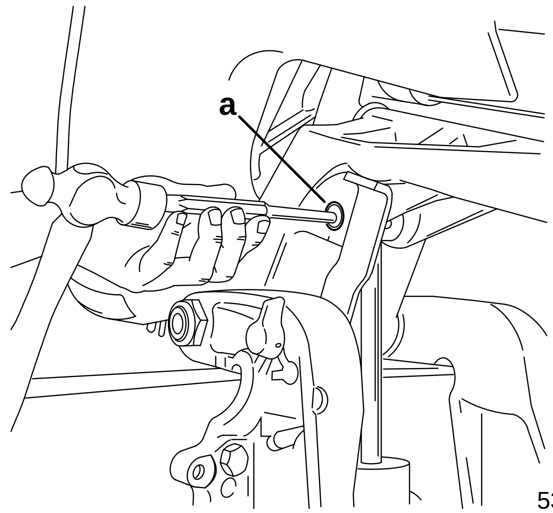
a - Grommet

14. Use suitable tool to remove upper headed cross pin. Retain pin. Straight pin is hard to remove (see item 15).



a - Cross Pin (Design 1 - Straight)
b - Cross Pin (Design 2 - Headed)

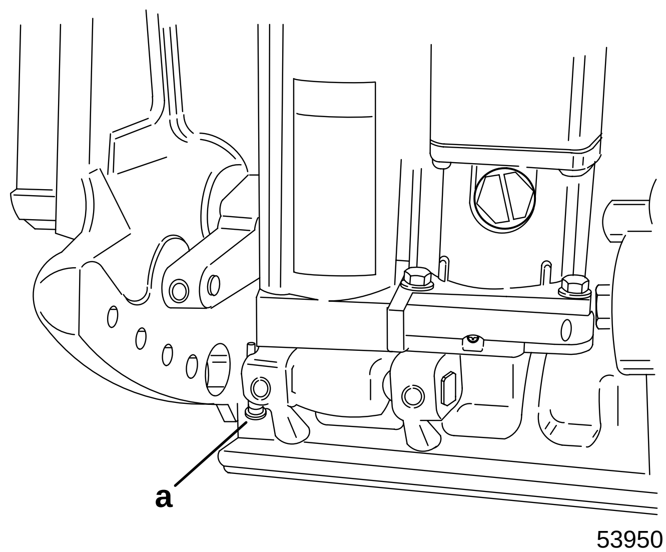
15. If necessary, drive out upper pivot pin. This will shear cross pin.



a - Upper Pivot Pin

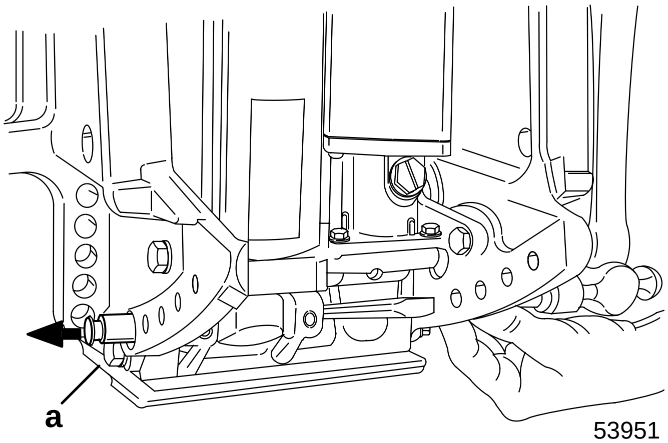
Inspect cross pin hole and pivot pin hole for damage.

16. Use suitable punch to remove lower cross pin. Retain cross pin.



a - Cross Pin

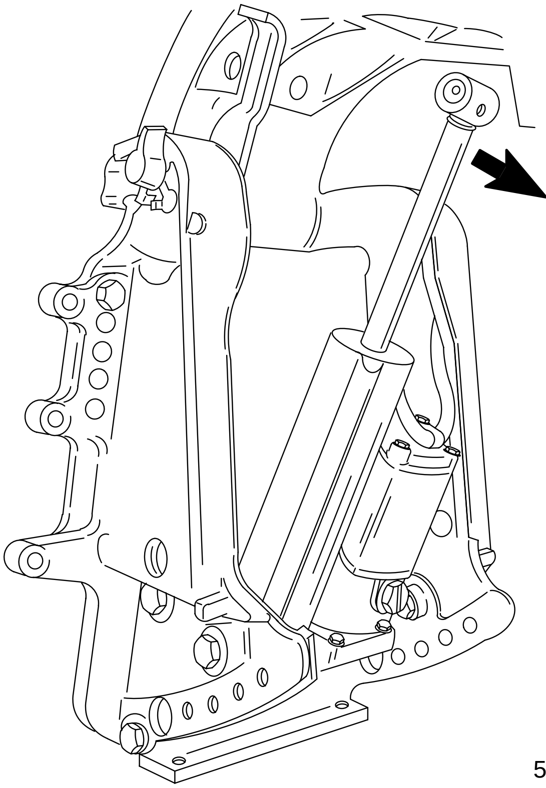
17. Use suitable punch to drive out lower pivot pin.



53951

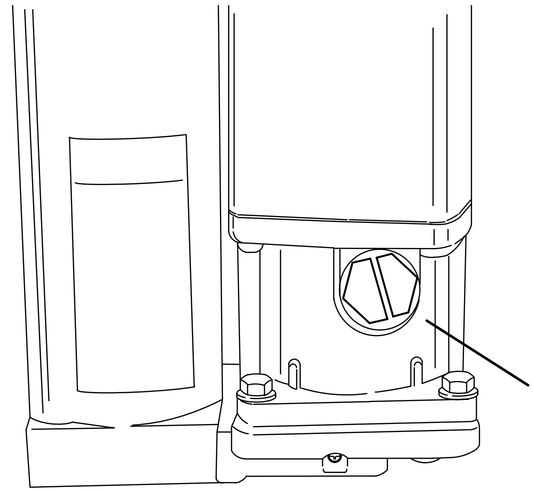
a - Pivot Pin

18. Tilt power trim assembly (top first) out from clamp bracket and remove assembly.



53944

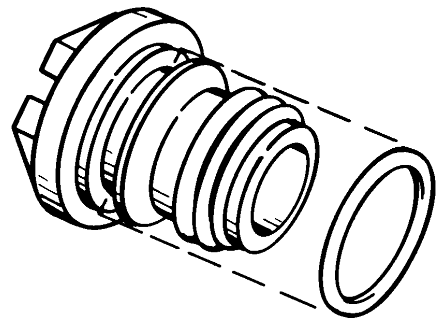
19. Remove fill screw and drain unit.



53945

a - Fill Screw

20. Remove O-ring from fill cap.

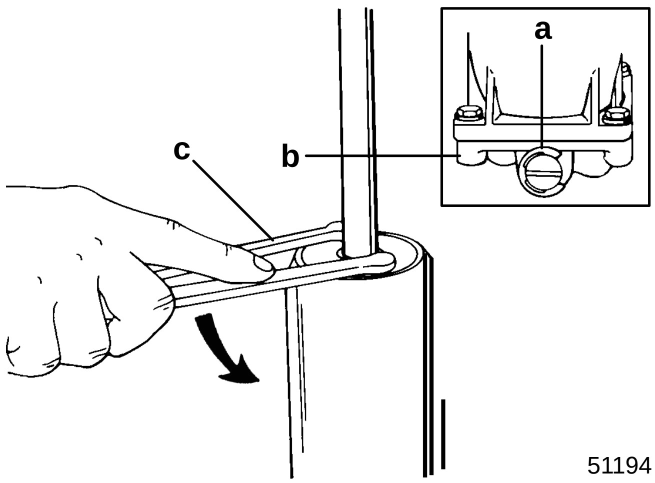


51194

Power Trim System Disassembly

Trim Rod Removal

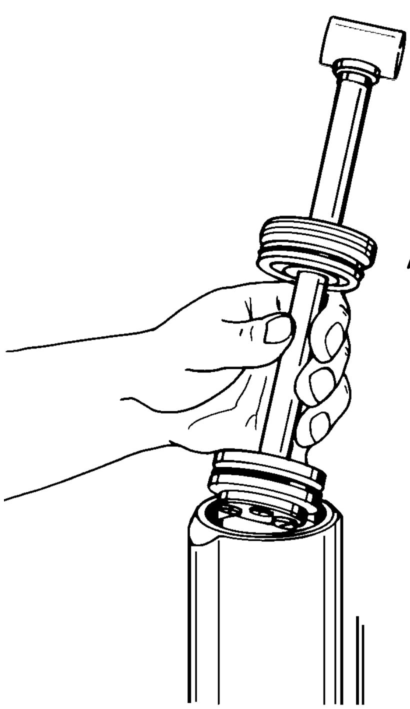
1. Secure power trim assembly in soft jawed vise.
2. Open manual release valve three turns **maximum** (counterclockwise) and position trim rod to full up position.
3. Remove cylinder end cap assembly from cylinder using spanner wrench (1/4 in. x 5/16 in. long pegs).



51194

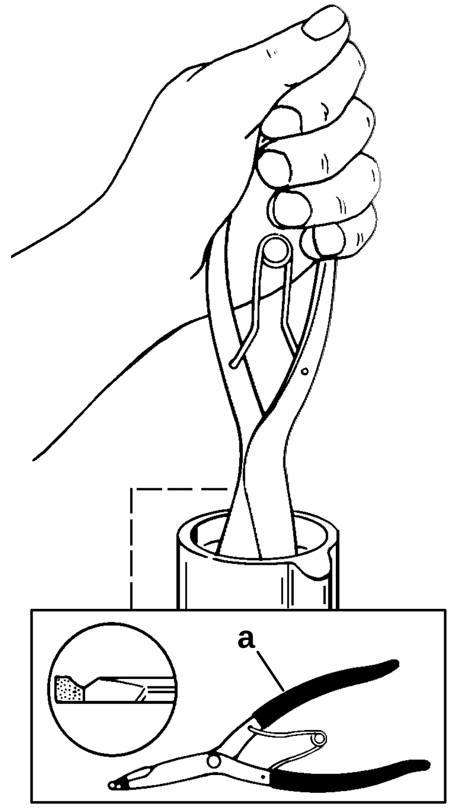
a - Manual Release Valve
b - Manifold
c - Spanner Wrench (P/N 91-74951)

4. Remove trim rod assembly from cylinder.



51196

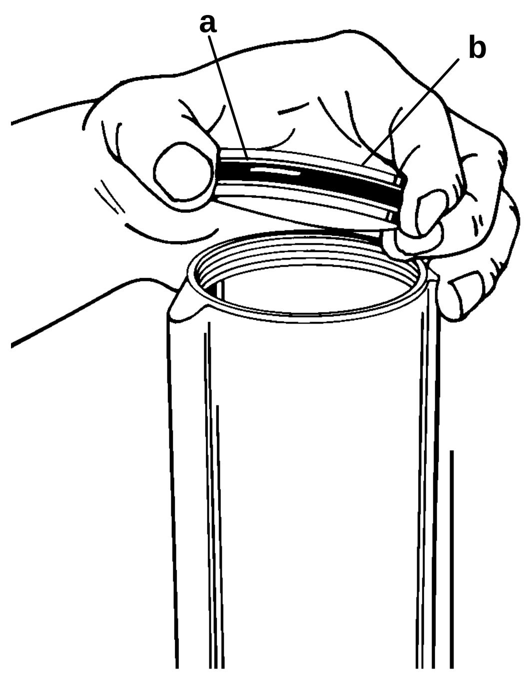
5. Remove memory piston from cylinder using lock-ring pliers (Craftsman P/N 4735) or suitable tool.



51193

a - Lock–ring pliers

6. Remove O-ring from memory piston.



51196

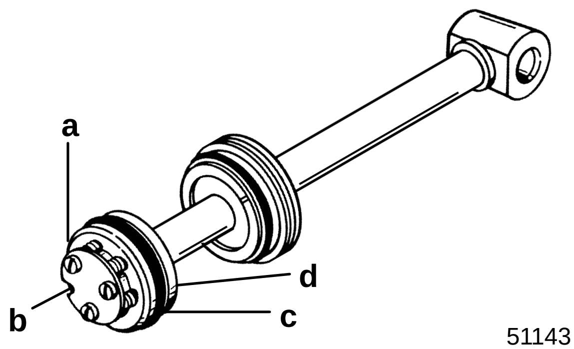
a - O-ring
b - Memory Piston

7. Place trim rod assembly on clean work surface.

8. Remove trim system from vise and empty fluid into appropriate container.

Trim Rod Disassembly

1. Place trim rod assembly on clean work surface.
2. Remove screws securing plate to trim rod piston and O-ring.
3. Remove check ball components from trim rod piston.

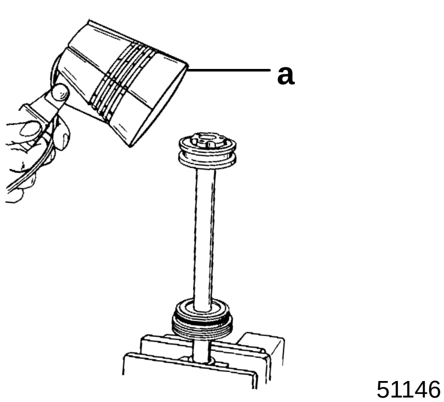


a - Screw (3)
b - Plate
c - O-ring
d - Piston

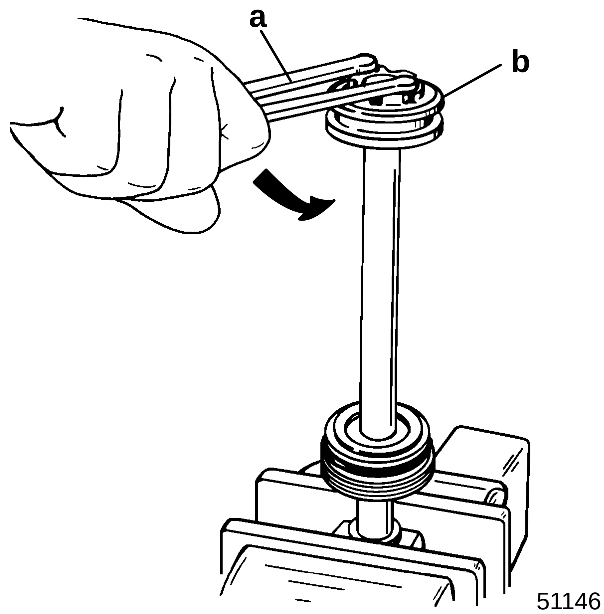
⚠ CAUTION

When removing Trim Rod piston, spanner wrench must have 1/4 in. x 5/16 in. long pegs to avoid damage to trim piston.

4. Place trim rod into soft jawed vise and apply heat to shock piston using torch lamp (91-63209).
5. Loosen trim rod piston using spanner wrench (1/4 in. x 5/16 in. long pegs).
6. Allow trim rod piston to cool. Remove from trim rod.



a - Torch Lamp

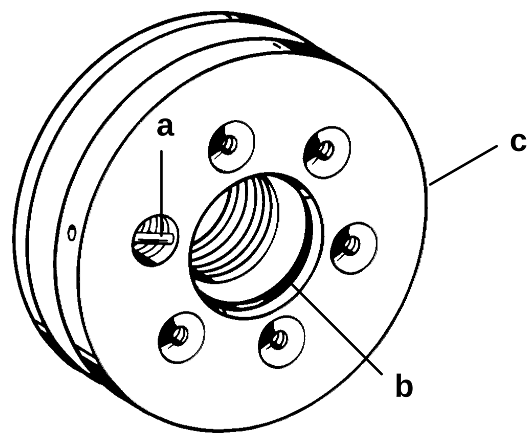


a - Spanner Wrench
b - Trim Rod Piston

⚠ CAUTION

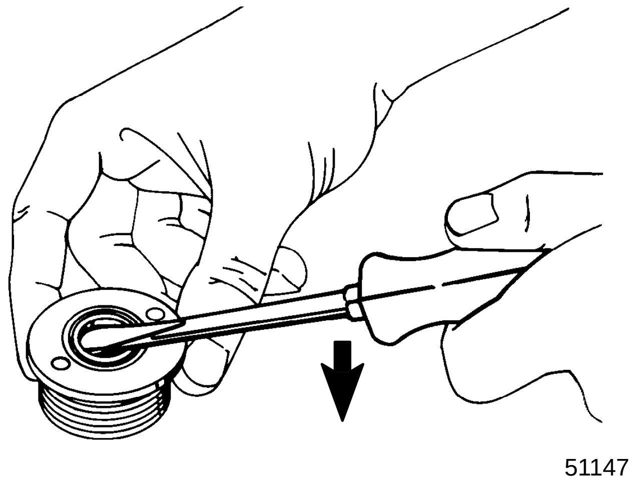
Do not remove check ball components from trim rod piston. Removal and re-installation of check valve could result in improper operating pressure and possible power trim system damage. If check valve is defective, replace trim rod piston.

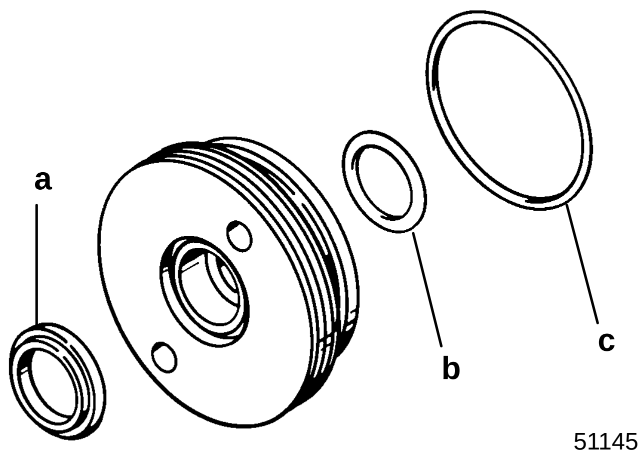
7. Remove inner O-ring from piston.



a - Check Ball Components
b - O-ring
c - Piston

8. Remove rod wiper, inner O-ring and outer O-ring.

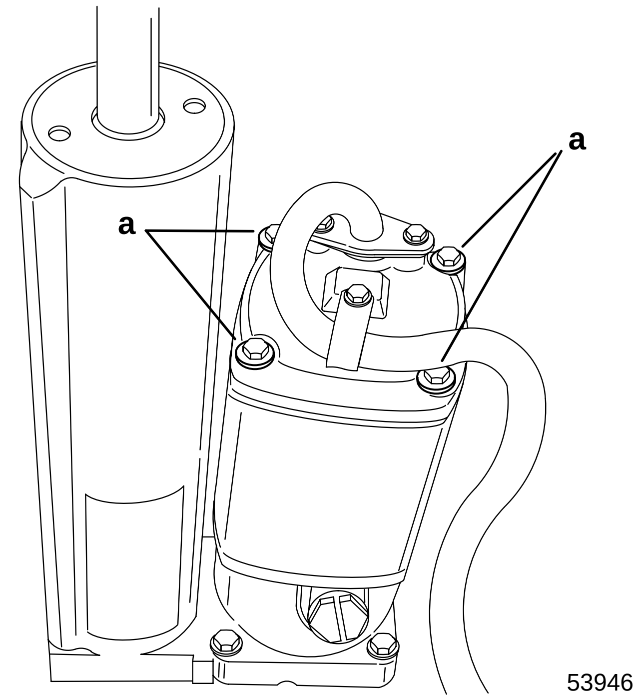




a - Rod Wiper
b - Inner O-ring
c - Outer O-ring

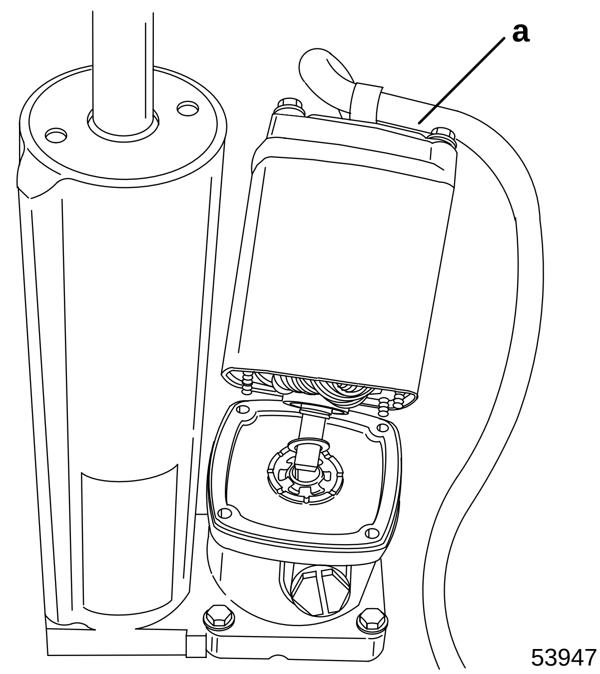
Trim Motor Removal

1. Secure power trim assembly in soft jawed vise.
2. Remove screws securing motor to reservoir and remove motor.



a - Screws (4)

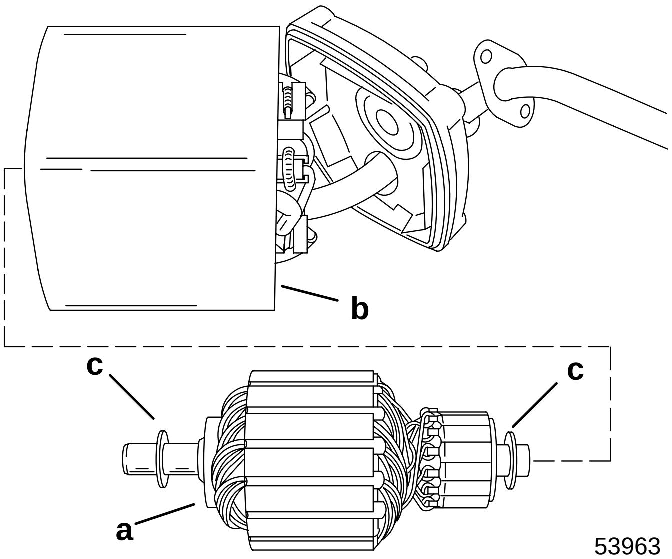
3. Remove motor from reservoir.



a - Motor

Trim Motor Disassembly

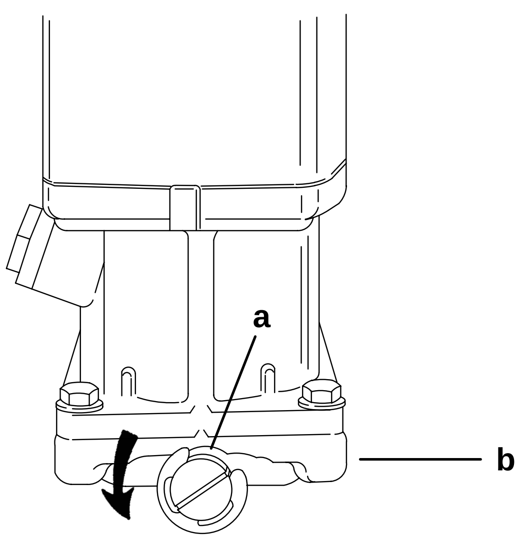
1. Remove armature from motor frame. Note position of washers on armature.



a - Armature
b - Motor Frame
c - Washer (1 each end of armature)

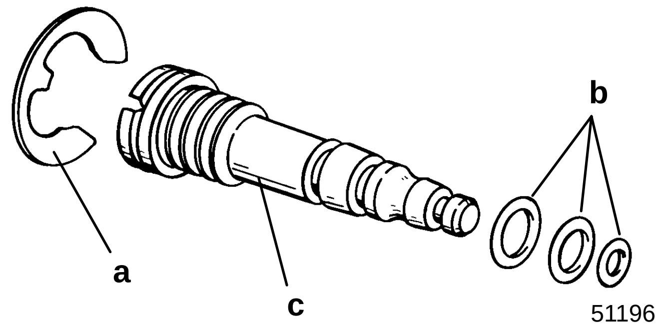
Reservoir Assembly Removal

1. Remove manual release valve from manifold.



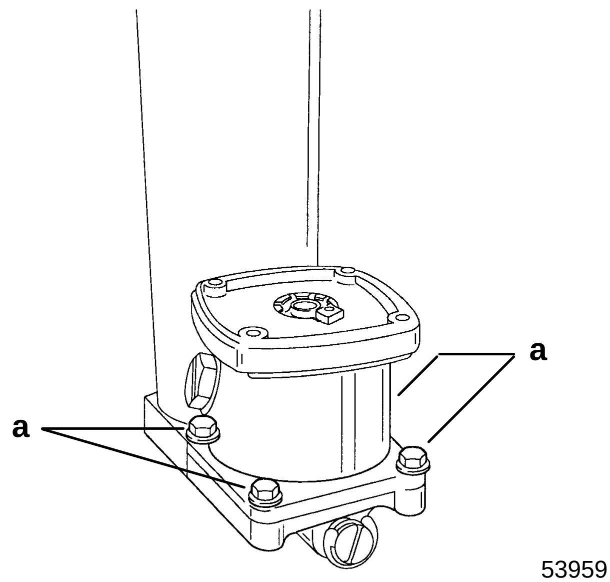
a - Manual Release Valve
b - Manifold

2. Remove "E" clip and O-rings from manual release valve.



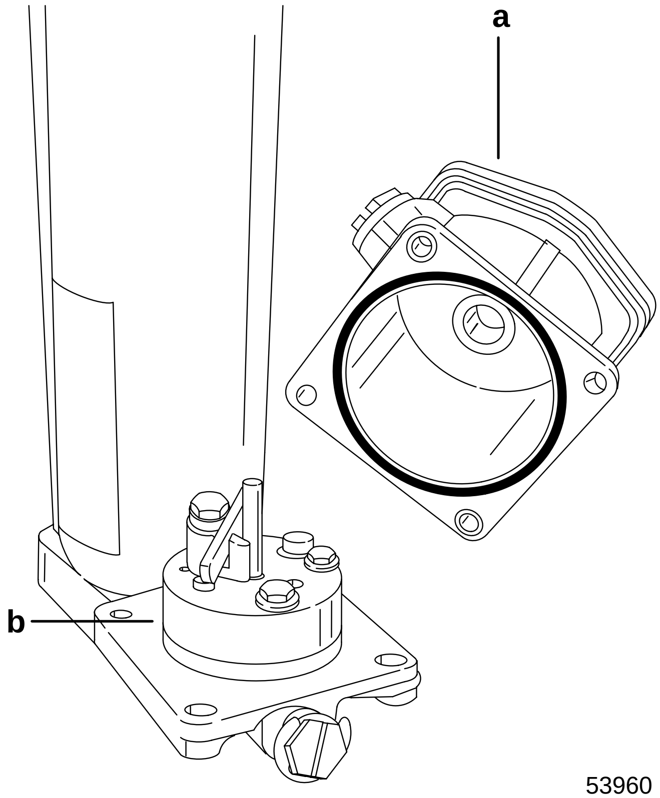
a - "E" Clip
b - O-rings
c - Manual Release Valve

3. Remove 4 screws securing reservoir to manifold.



a - Screws (4)

4. Remove reservoir from manifold.

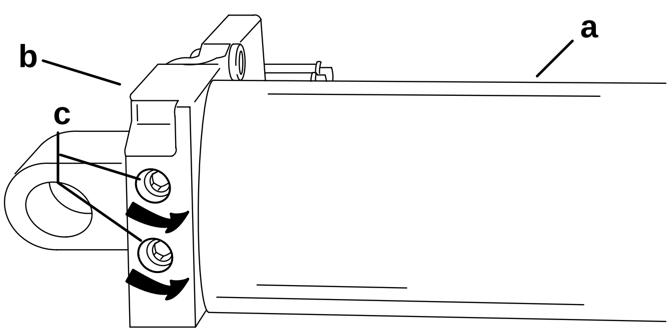


53960

a - Reservoir
b - Oil Pump

Manifold Removal

1. Remove screws and manifold from cylinder.

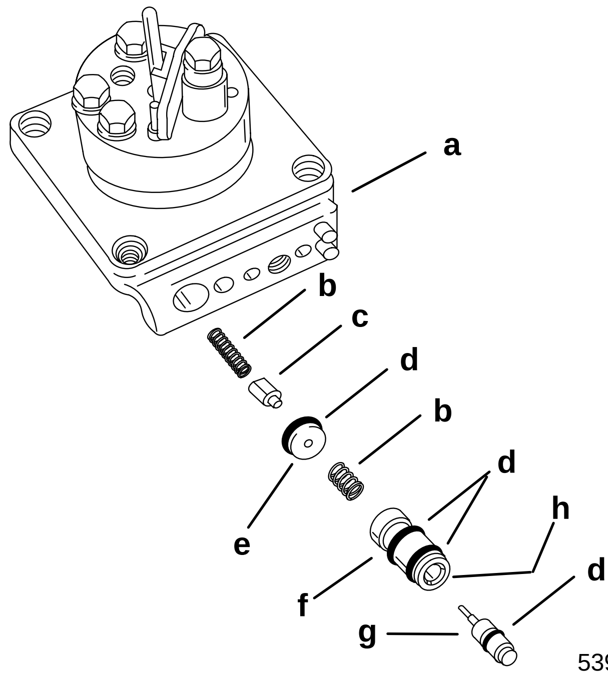


53962

a - Trim Cylinder
b - Manifold
c - Screw (2)

2. Remove check valve components from manifold.

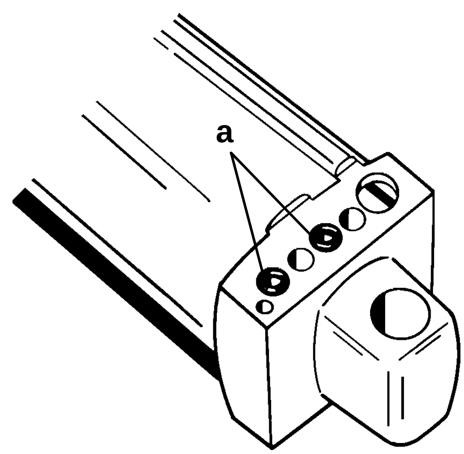
IMPORTANT: Sleeve (f) is chamfered on I.D. on end opposite drilled cross hole. Install spool (g) (with O-ring installed) from chamfered end of sleeve to avoid possibility of damaging O-ring on spool.



53961

a - Manifold and Pump
b - Spring (2)
c - Check Valve
d - O-ring (4)
e - Seat
f - Sleeve
g - Spool
h - Chamfered End

3. Remove O-rings from cylinder.



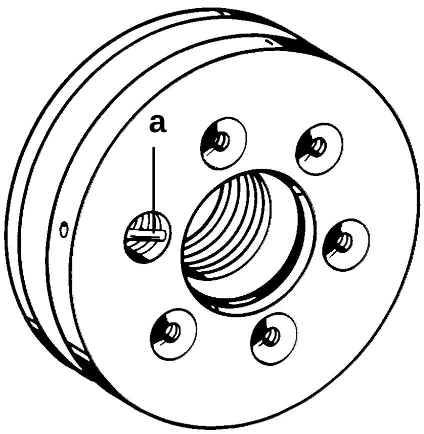
51008

a - O-rings

Cleaning and Inspection of Trim Rod Components

⚠ CAUTION

Do not remove check ball components from trim rod piston. Removal and re-installation of check valve could result in improper operating pressure and possible power trim system damage.



51199

a - Check Ball Components

Inspect check valve for debris; clean debris form check valve if found. If debris cannot be cleaned from check valve, replace trim rod piston as an assembly.

Clean trim rod and components with parts cleaner and dry with compressed air.

It is recommended that all O-rings in trim system be replaced.

Inspect trim rod. If scraper (located in cap) has failed to keep rod clean, replace scraper.

Lubricate all O-rings using Quicksilver Power Trim and Steering Fluid or; (ATF) Type F, FA or Dexron III.

Motor and Electrical Tests/Repair

Trim Pump Motor Test

⚠ WARNING

Do not perform this test near flammables (or explosives), as a spark may occur when making connections.

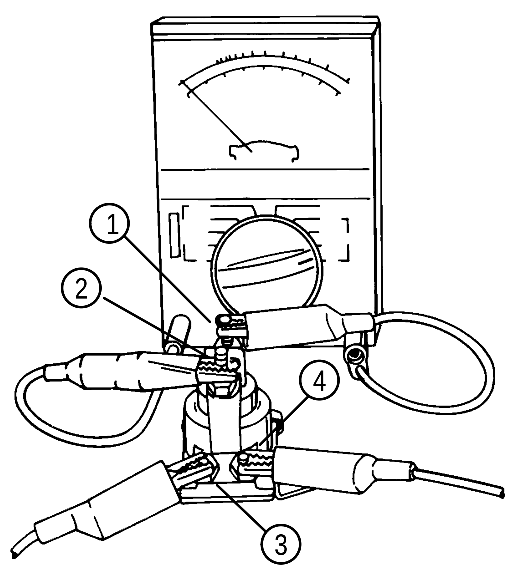
1. Disconnect GREEN (motor) wire and BLUE (motor) wire from trim system wiring harness.
2. Connect a 12 volt power supply to motor wires (POSITIVE to BLUE; NEGATIVE to GREEN results in motor up direction. POSITIVE to GREEN; NEGATIVE to BLUE results in motor down direction). Motor should run.
3. If motor does not run, disassemble motor and check components.

Solenoid Test

⚠ WARNING

Do not perform this test near flammables (or explosives), as a spark may occur when making connections.

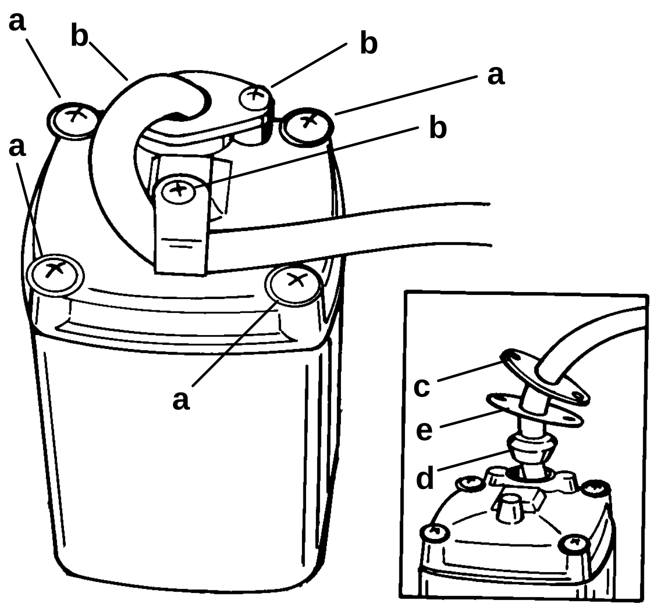
1. Disconnect all wires from solenoid terminals.
2. Set ohmmeter to Rx1 scale and connect meter to solenoid terminals 1 and 2.
3. Connect a 12 volt power supply to terminals 3 and 4. Solenoid should click and meter should read zero (0) ohms (full continuity).



51338

Motor Disassembly

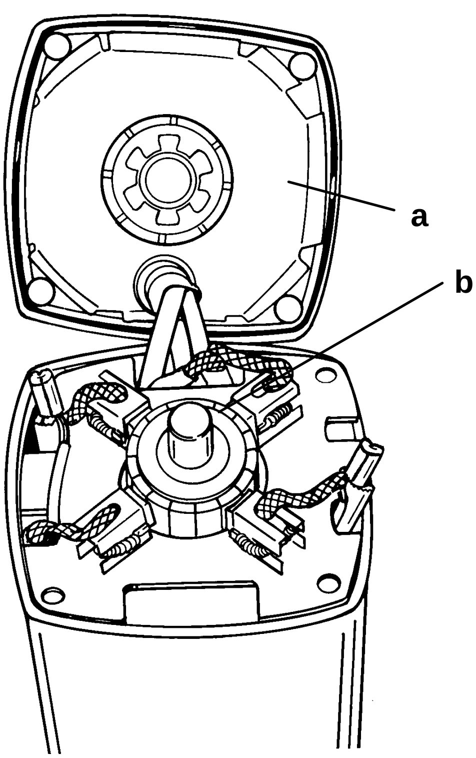
1. Remove screws and clamp.



51345

a - Screws (4)
b - Screws (3)
c - Clamp
d - Grommet
e - Gasket

2. Lift end cap from motor. Do not drop armature.



51349

a - End Cap
b - Armature

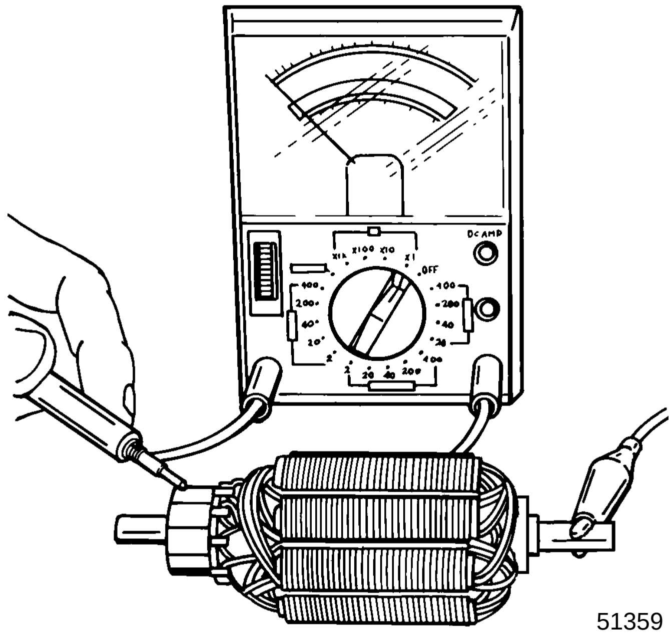
Armature Tests

TEST FOR SHORTS

Check armature on a Growler (follow Growler manufacturer's test instructions). Indication of a short requires replacement of armature.

TEST FOR GROUND

Use an Ohmmeter (R x 1 scale). Place one lead on Ohmmeter on armature shaft and other lead on commutator, as shown. If continuity is indicated, armature is grounded and must be replaced.

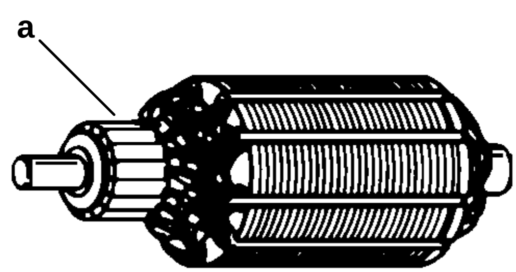


51359

CHECKING AND CLEANING COMMUTATOR

If commutator is worn it can be turned down on an armature conditioner tool or on a lathe.

Clean commutator with “00” sandpaper.



a - Commutator

FIELD TESTS

IMPORTANT: Commutator end of armature must be installed in brushes when performing the following tests.

Ohmmeter Leads Between	Resistance (Ohms)	Scale Reading* (x______)
Green and Blue Motors Wires	0	(Rx1)
Green and Black Motor Wires	0	(Rx1)
Blue and Black Motor Wires	0	(Rx1)
Black Motor Wire, and Frame (Motor Housing)	No Continuity	(Rx1)
Green Motor Wire and Frame	No Continuity	(Rx1)
Blue Motor Wire and Frame	No Continuity	(Rx1)

*If specific readings are not obtained, check for:

– Defective Armature
– Dirty or Worn Brushes
– Dirty or Worn Commutator

If defective components are found, repair or replace component(s) and retest.

Motor Repair

REMOVAL

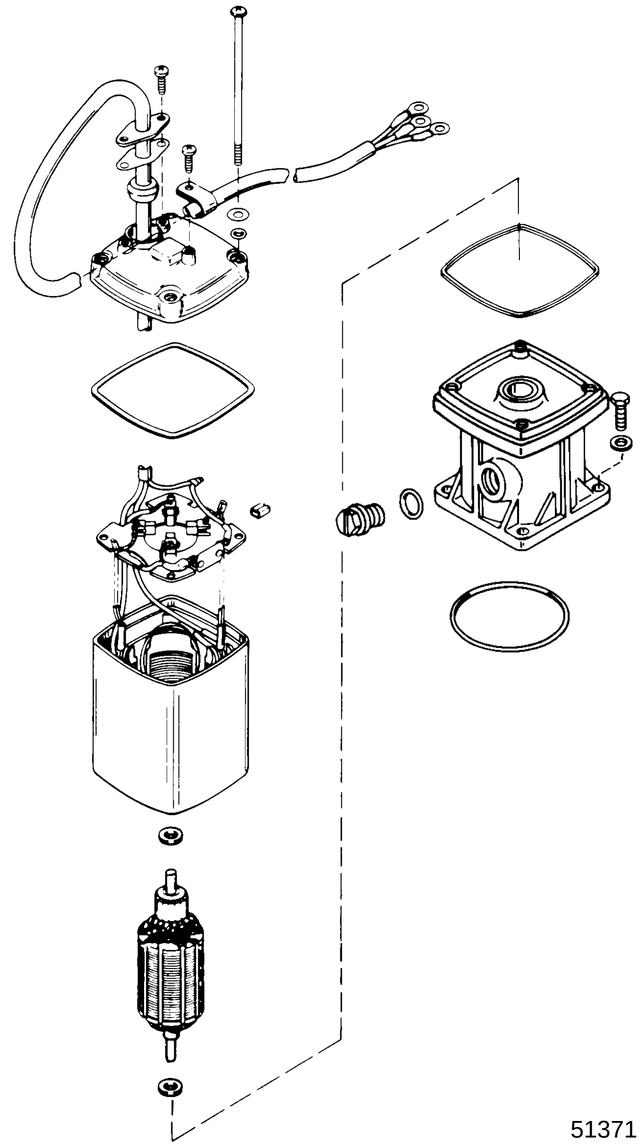
NOTE: *Power trim system does not have to be removed from outboard to repair/replace motor.*

DISASSEMBLY

Refer to **"Motor Disassembly"** on page 5B-28 to disassemble motor from pump.

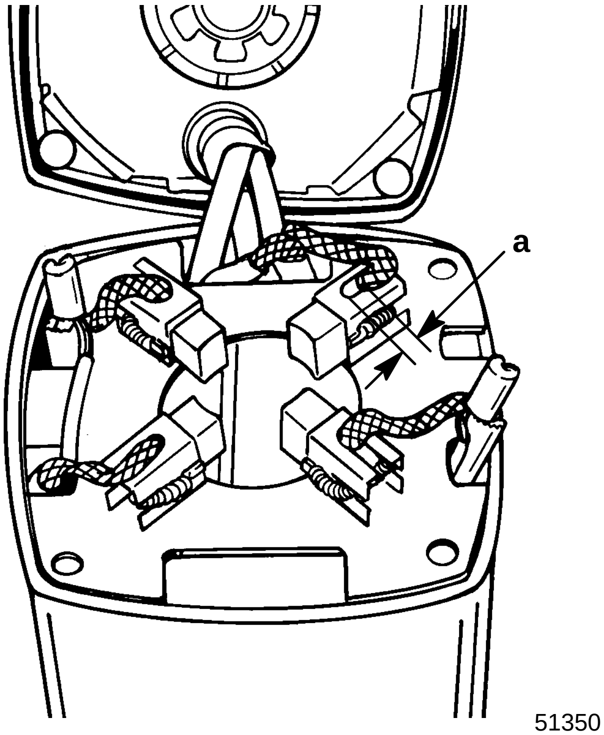
CLEANING AND INSPECTION

Inspect O-rings and replace as necessary. Carefully inspect harness for cuts or tears which will allow water to enter motor. Replace harness if cut or torn. Clean, inspect and test motor components. Refer to **"Brush Replacement"**, **"Armature Test"** and **"Field Tests"** for inspection and test procedures.



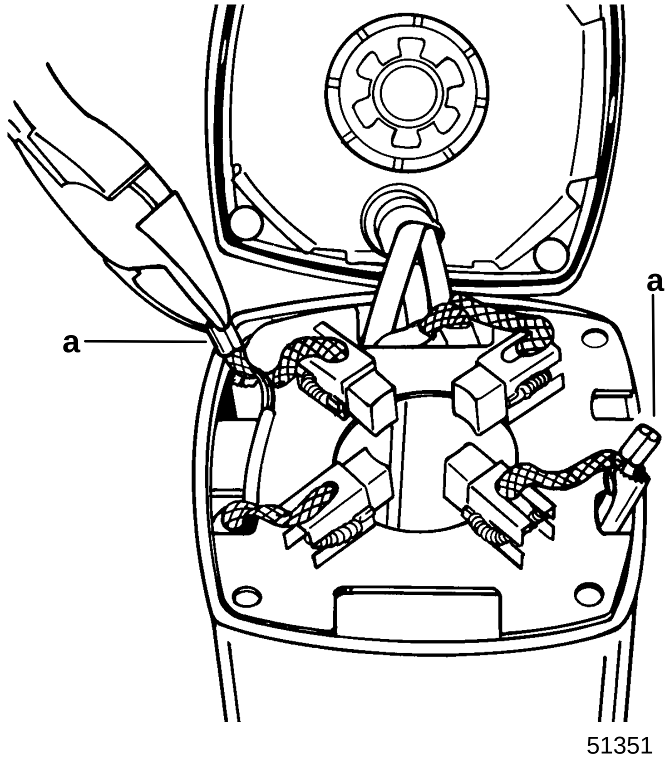
BRUSH REPLACEMENT

1. Brush replacement is required if brushes are pitted, chipped or if distance between the brush pigtail and end of brush holder slot is 1/16 in. (1.6mm) or less. Check distance with armature.



a - 1/16 in. (1.6mm)

2. To replace brush card, remove metal connectors.



a - Metal Connectors

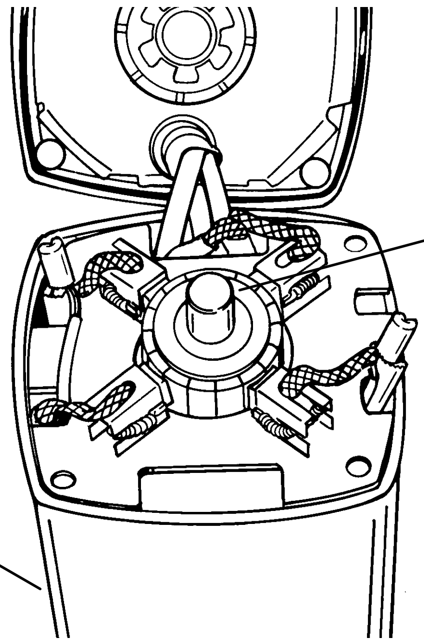
3. Install new brush card.
4. Crimp new metal connectors onto wires.

IMPORTANT: If metal connectors are not insulated with shrink tube, bend metal connectors away from motor housing to prevent shorts.

Reassembly

IMPORTANT: Components must be clean. Any debris in power trim system can cause system to malfunction.

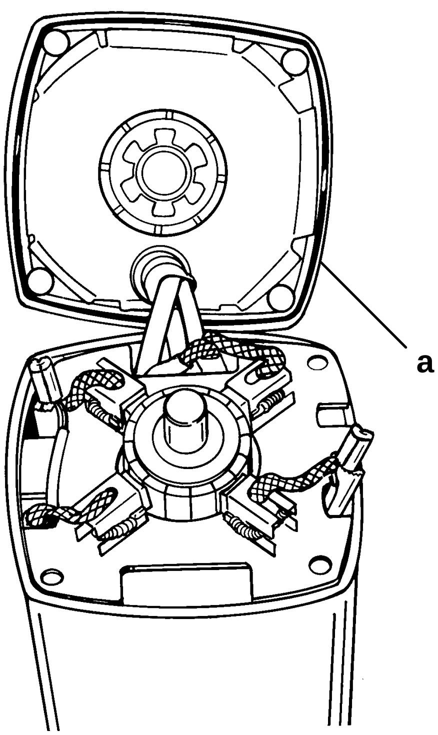
1. Install armature in motor housing.



51349

a - Motor Housing
b - Armature (Spread brushes to insert commutator)

2. Install O-ring in end cap.



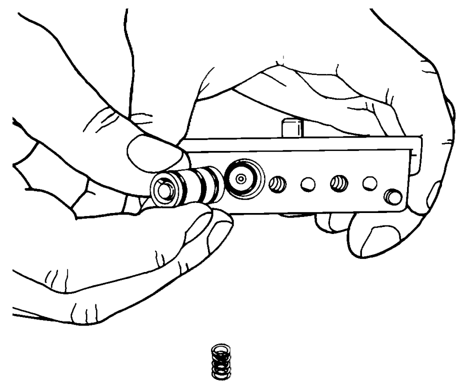
51349

a - O-ring

Power Trim System Reassembly

Manifold Installation

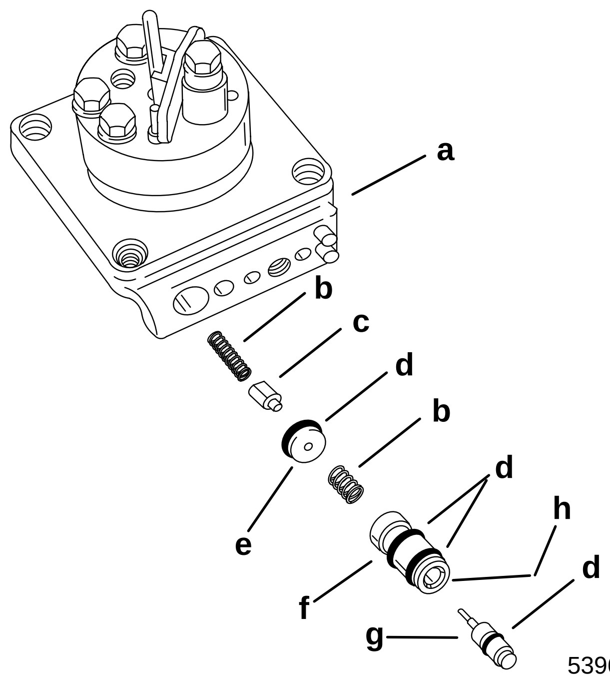
IMPORTANT: Install spring, check valve and O-ring into manifold. Position components in place using sleeve to seat in place.



50999

1. Install check valve components into pump manifold.

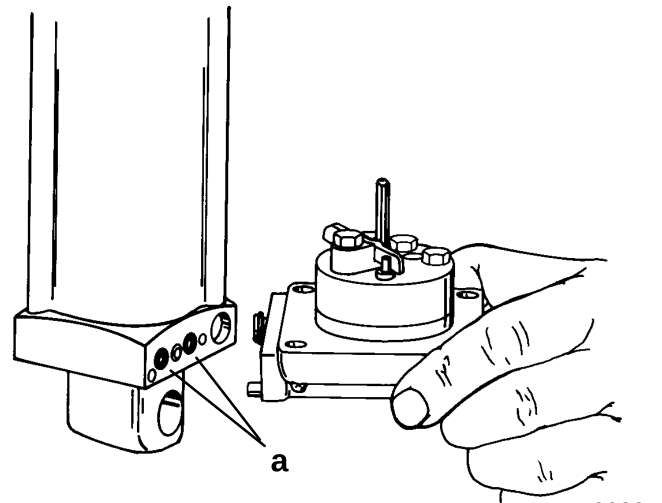
IMPORTANT: Sleeve (f) is chamfered on I.D. on end opposite drilled cross hole. Install spool (g) (with O-ring installed) from chamfered end of sleeve to avoid possibility of damaging O-ring on spool.



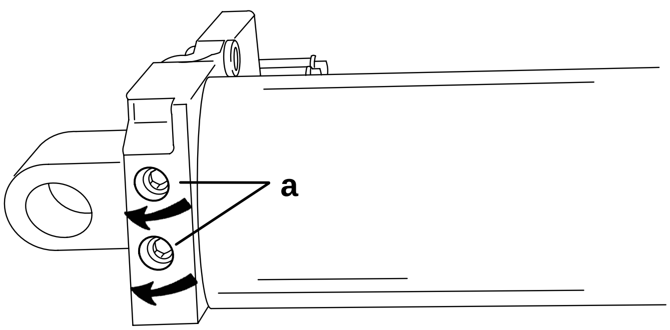
53961

a - Manifold and Pump
b - Spring (2)
c - Check Valve
d - O-ring (4)
e - Seat
f - Sleeve
g - Spool
h - Chamfered End

2. Install O-rings on cylinder and secure manifold assembly to cylinder using screws. Torque screws to 100 lb. in. (11.3 N·m).



a - O-ring (2)

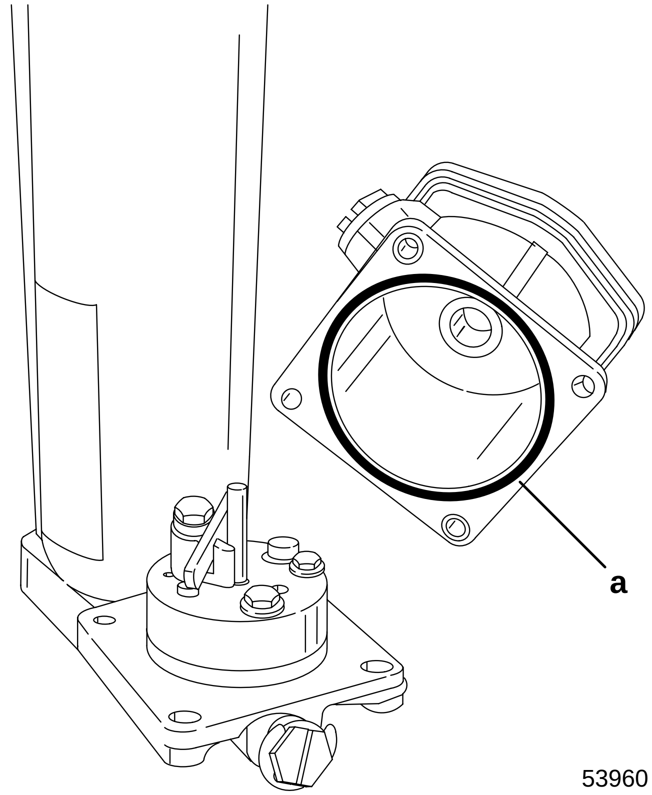


a - Screws [100 lb. in. (11.5 N·m)]

3. Secure power trim unit in soft jawed vise.

Reservoir Installation

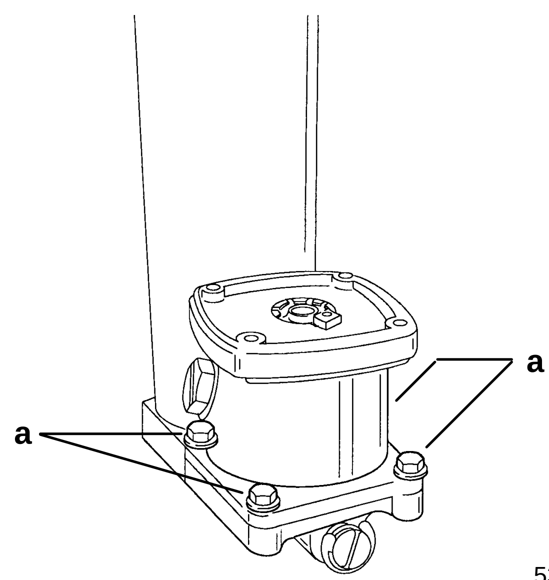
1. Inspect O-ring on bottom of reservoir for cuts or abrasions. Replace as required.



a - O-ring

2. With O-ring aligned in groove in bottom of reservoir, install reservoir on manifold.

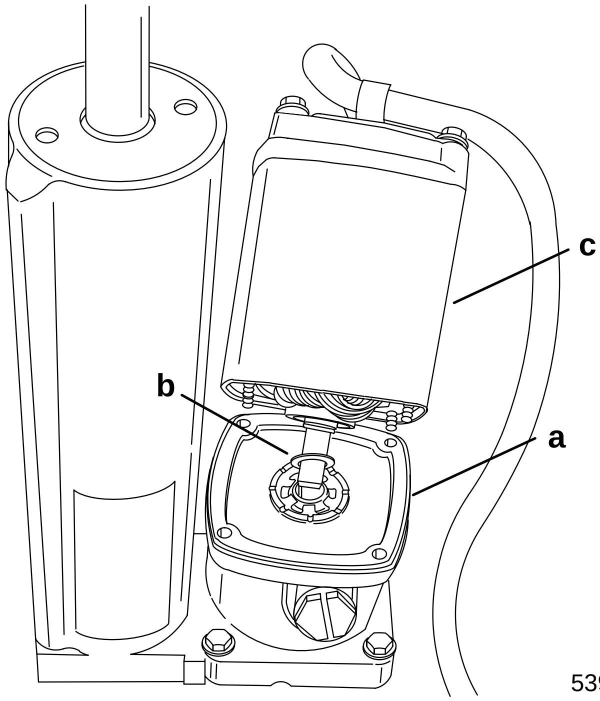
3. Secure reservoir to manifold with 4 bolts and washers. Torque bolts to 70 lb. in. (8.0 N·m).



a - Bolts and Washers [Torque to 70 lb. in. (7.9 N·m)]

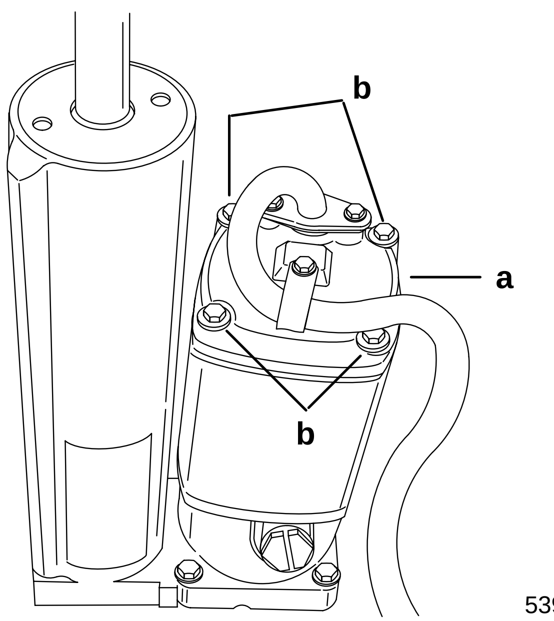
Motor Installation

1. Inspect O-ring on top of reservoir for cuts or abrasions. Replace as required. Guide armature and motor frame into reservoir housing as shown.



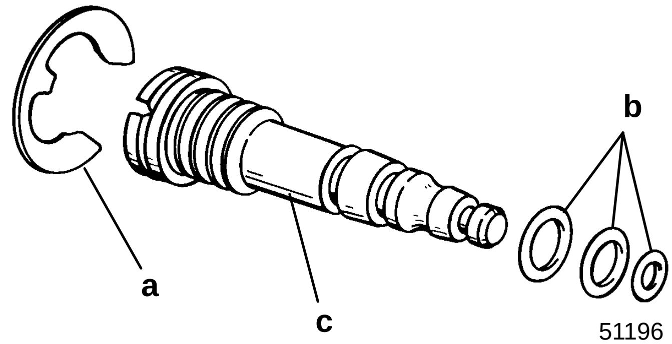
a - O-ring
b - Washer
c - Armature/Motor Frame

2. Torque end cap screws to 13 lb in. (1.5 N·m).



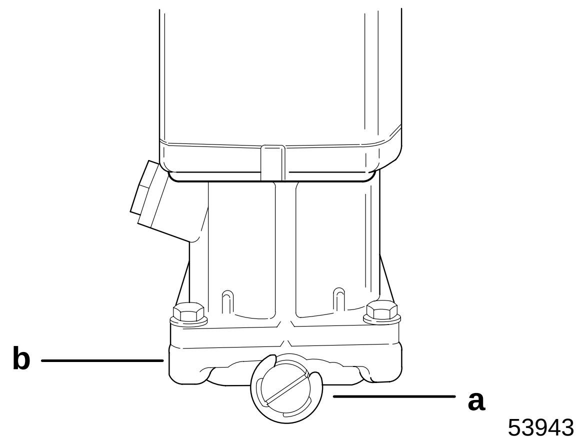
a - End Cap
b - Screws (4) [Torque to 13 lb. in. (1.5 N·m)]

3. Place drive shaft into oil pump.
4. Install lubricated O-ring to base of reservoir.
5. Install lubricated O-rings and "E" clip to manual release valve.



a - "E" Clip
b - O-ring
c - Manual Release Valve

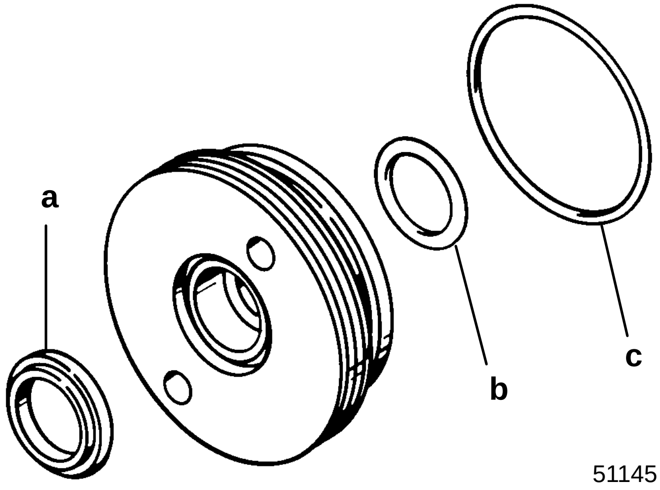
6. Insert manual release valve into manifold and tighten snuggly. Back release valve out 3 turns **maximum** allowing trim rod installation.



a - Manual Release Valve
b - Manifold

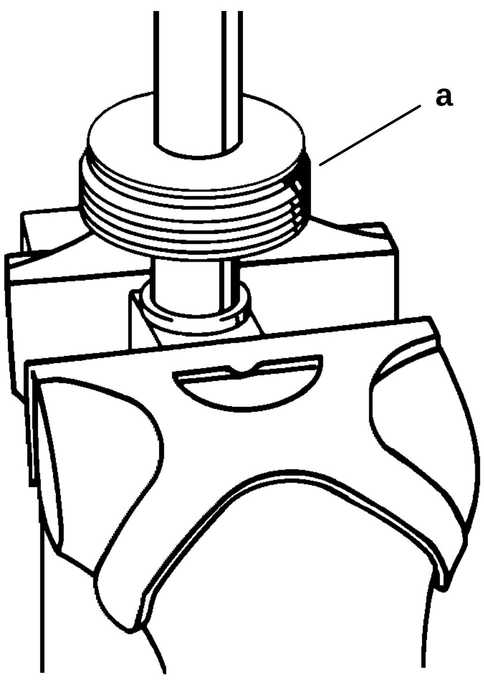
Trim Rod Reassembly

1. Install lubricated O-rings and rod wiper to end cap.



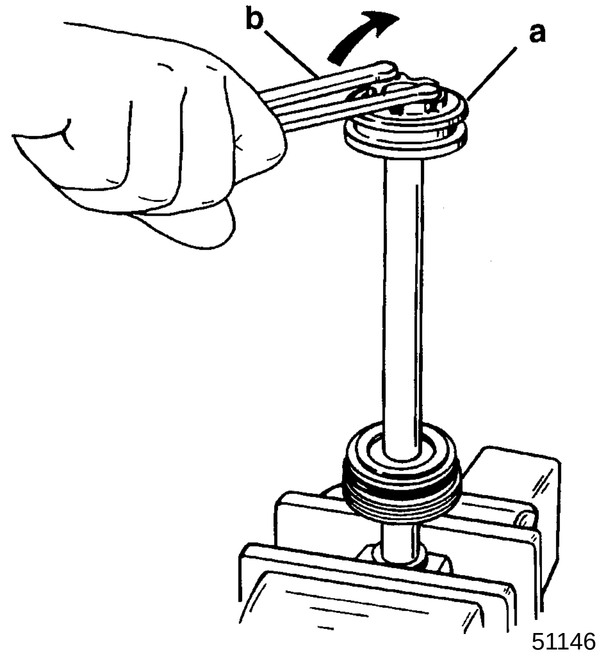
a - Rod Wiper
b - Inner O-ring
c - Outer O-ring

2. Secure trim rod in soft jawed vise as shown.
3. Slide end cap onto trim rod.



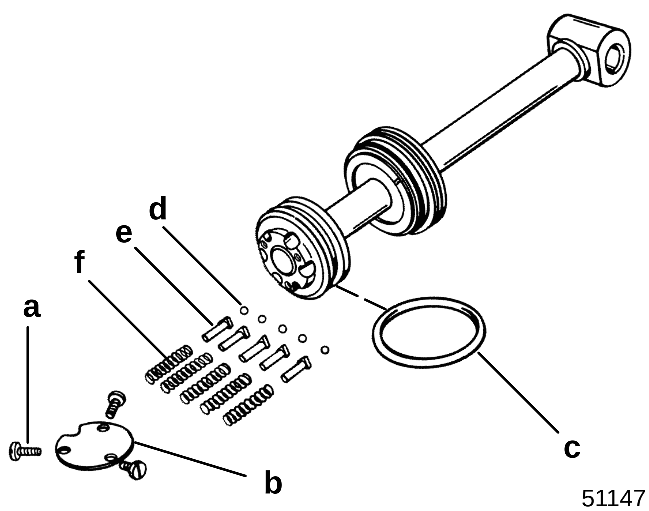
a - End Cap

4. Apply Loctite 271 (92-809820) to threads of trim rod and install rod piston. Tighten piston securely using spanner wrench (1/4 in. x 5/16 in. long peg).



a - Trim Rod Piston
b - Spanner Wrench

5. Install lubricated O-ring to trim rod piston.
6. Install check ball components into its respective bore.



a - Screw (3)
b - Plate
c - O-ring
d - Ball (5)
e - Seat, Spring (5)
f - Spring (5)

Trim Rod Installation

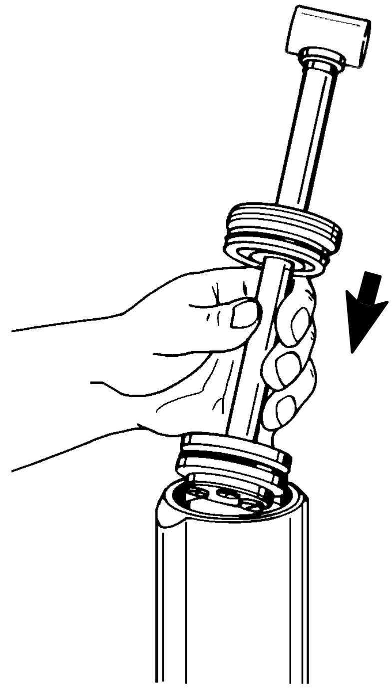
1. Place trim cylinder in soft jawed vise.
2. Fill trim cylinder three inches (76.2mm) from top of cylinder using Quicksilver Power Trim and Steering Fluid or; (ATF) Type F, FA or Dexron II.
3. Install lubricated O-ring to memory piston and place into cylinder. Push piston down to level of oil.

51144

Memory piston must not contact end cap during trim rod/end cap installation.

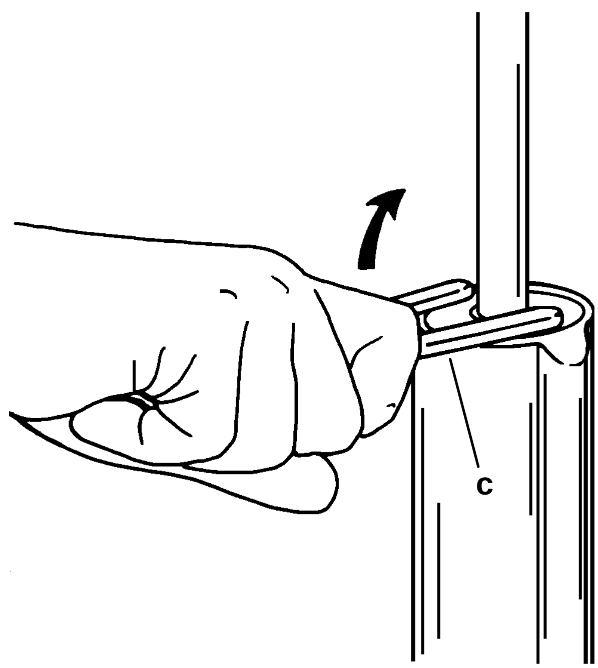
a - O-ring
b - Memory Piston

4. Install trim rod into cylinder.



51196

5. Tighten end cap assembly to cylinder securely using spanner wrench (1/4 in. x 5/16 in. long pegs).



51145

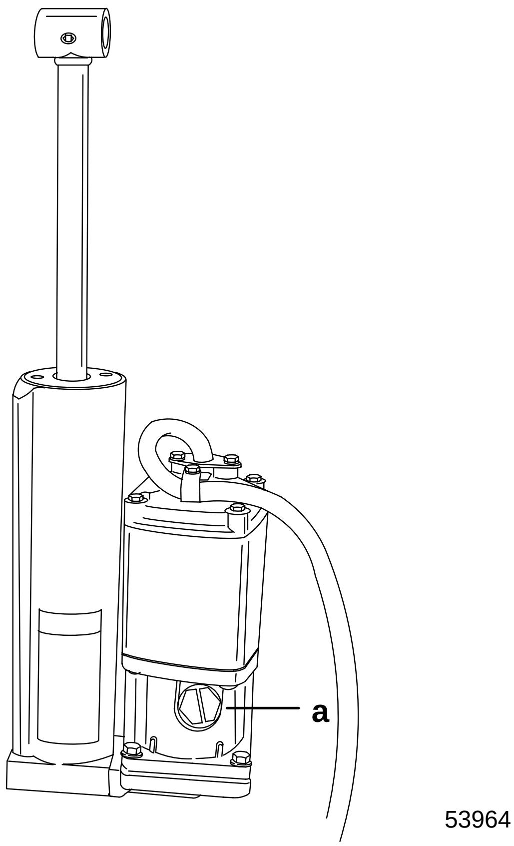
c - Spanner Wrench (91-74951)

6. Tighten manual release valve following end cap installation.

Purging Power Trim Unit

Manual release valve must be in full closed position during power trim purging and operation.

1. Secure power trim unit in soft jawed vise.
2. Remove fill cap. Add Quicksilver Power Trim and Steering Fluid (92-90100A12) or Automatic Transmission Fluid (ATF) Type F, FA or Dexron III up to threads of reservoir. Install cap.

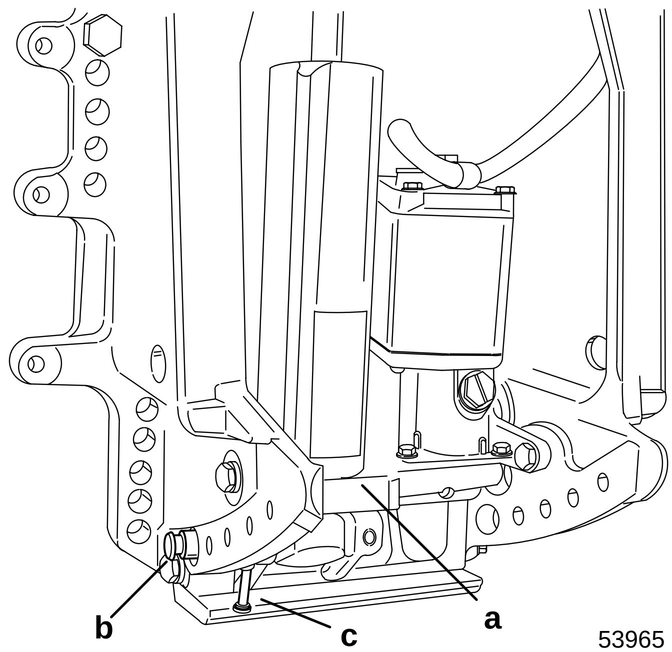


a - Fill Cap

3. Using a 12 volt power supply connect POSITIVE lead to GREEN wire, NEGATIVE lead to BLUE wire and drive trim rod to the DOWN position. Connect POSITIVE lead to BLUE wire and NEGATIVE lead to GREEN wire and drive trim rod to the UP position. Recheck fluid level, add fluid as required and repeat cycle until fluid level remains at lower portion of threads.

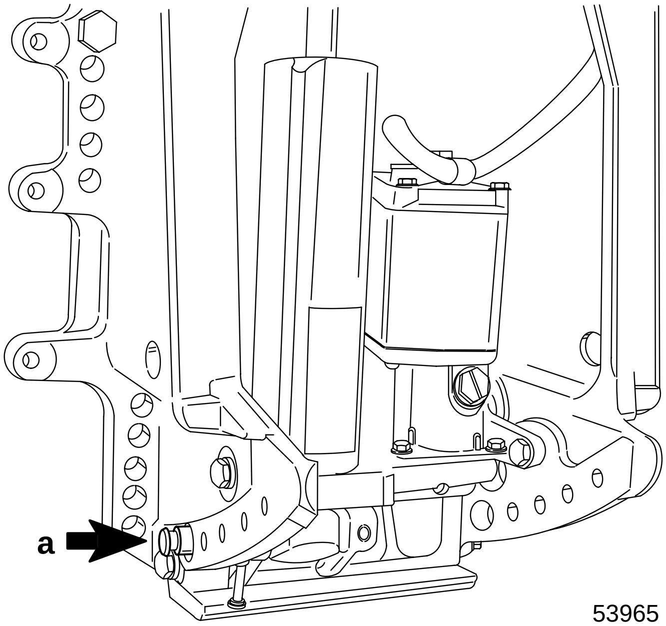
Power Trim Unit Installation

1. Apply 2-4-C w/Teflon (92-825407A12) to lower pivot pin bore and pivot pin surface.
2. Position trim cylinder assembly (BOTTOM FIRST) between clamp brackets and route trim pump electrical harness through access hole in starboard clamp bracket.
3. Start lower pivot pin into pivot pin bore and position lower cross pin (RETAINED) in its respective hole.



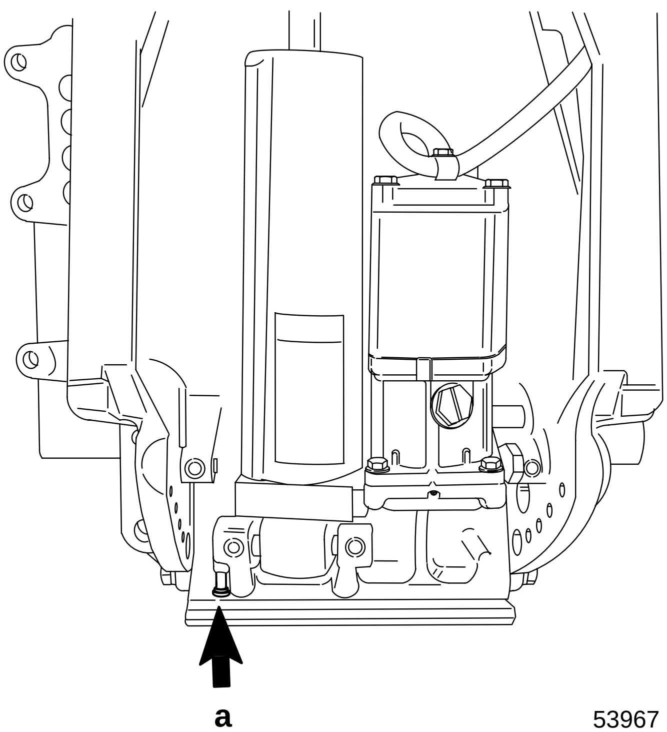
a - Trim Cylinder Assembly
b - Lower Pivot Pin
c - Lower Cross Pin

4. Using a suitable punch, drive lower pivot pin into clamp bracket and trim cylinder assembly until pivot pin is flush with outside surface.



a - Lower Pivot Pin

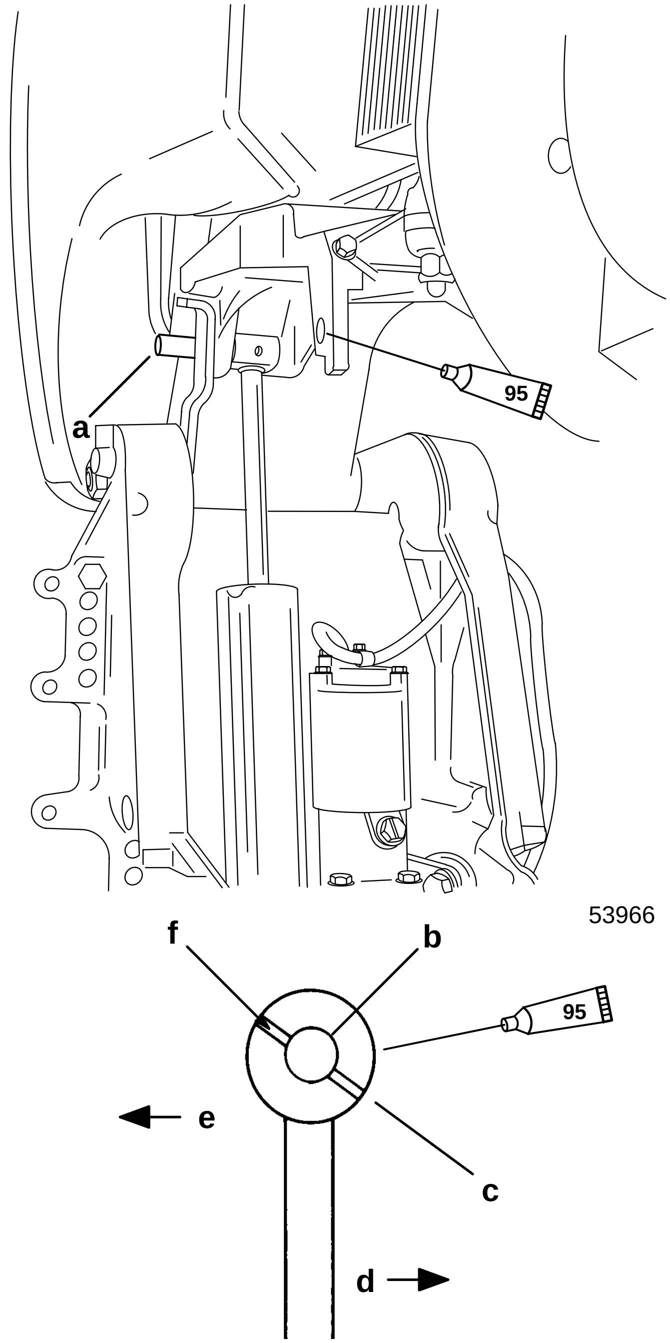
5. Using a suitable punch, drive lower cross pin into its respective bore until seated.



a - Lower Cross Pin

6. Apply 2-4-C w/Teflon (92-825407A12) to surface of upper pivot pin, pivot pin bore and trim ram bore.

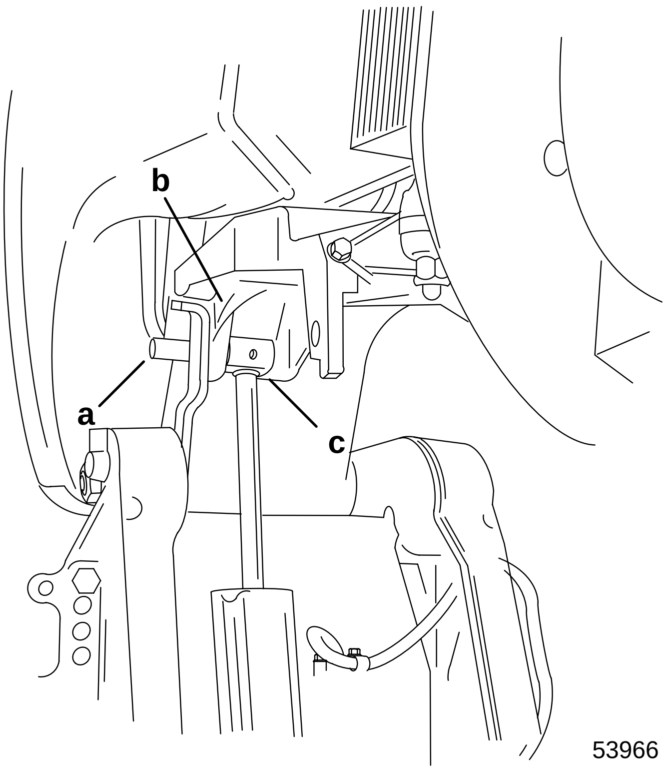
NOTE: *Install trim ram with cross hole located as shown .If trim ram is installed reversed, the trim sender (if installed) will not operate.*



95 2-4-C With Teflon (92-825407A12)

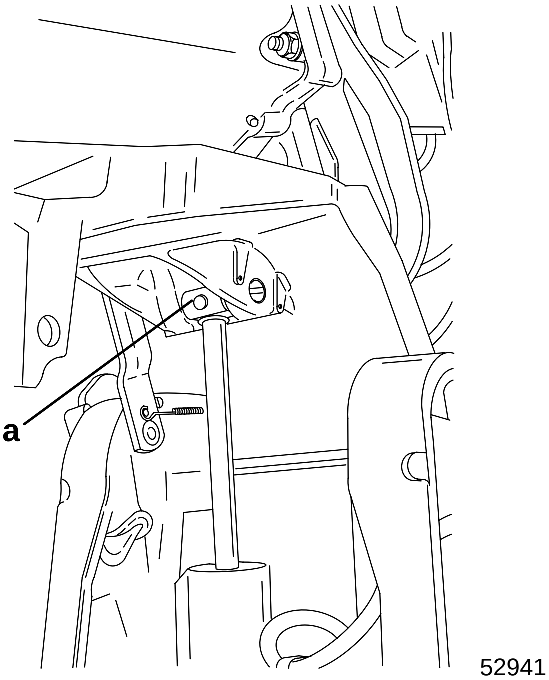
a - Pivot Pin
b - Trim Ram Bore
c - Install Trim Ram As Shown
d - Engine Side
e - Transom Side
f - Cross Hole

7. Using a suitable mallet, drive upper pivot pin into swivel bracket and through trim ram until pivot pin is flush with swivel bracket.



a - Pivot Pin
b - Swivel Bracket
c - Trim Ram

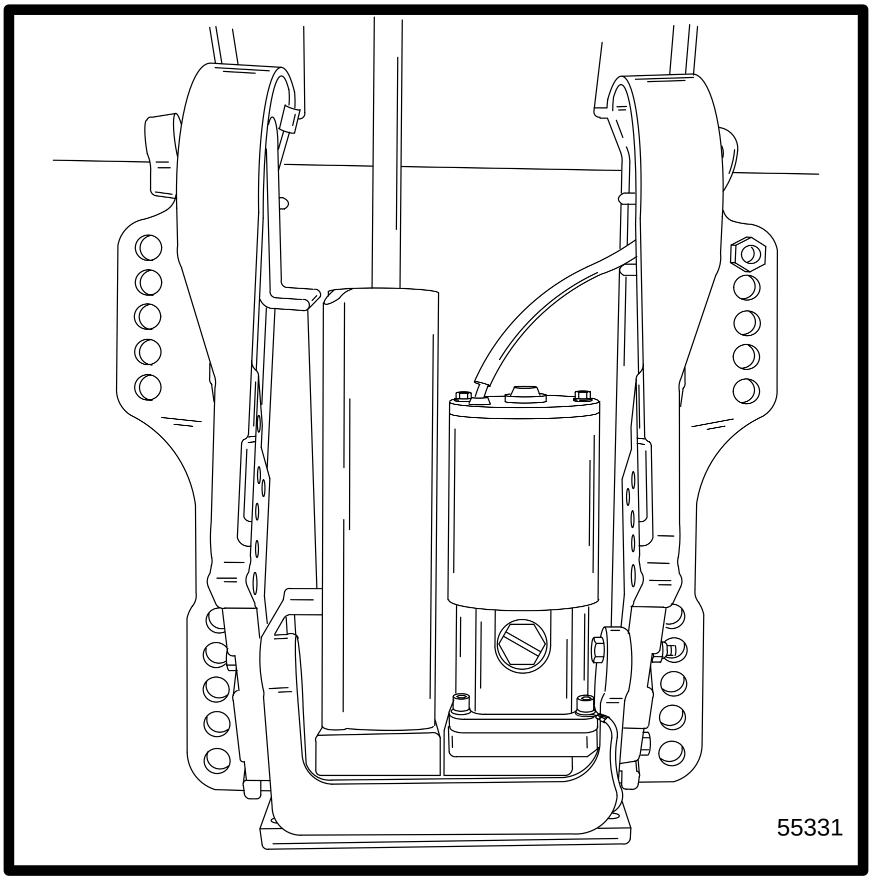
8. Drive upper retaining pin in until seated.



a - Retaining Pin

9. Recheck fluid level.
10. Power trim may now be operated to lower outboard to desired position. Trim system is self purging.
11. Reconnect power trim leads to relays under ignition cover.
12. Reinstall spark plug leads to spark plugs.
13. Reinstall cowls.
14. Connect battery leads to battery terminals.

MID-SECTION



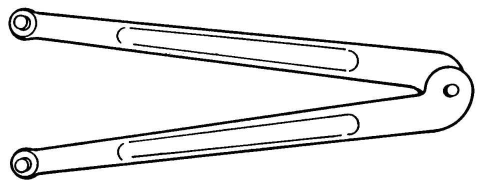
POWER TRIM
(S/N USA-0G360003/BEL-9934137 & UP)

5
C

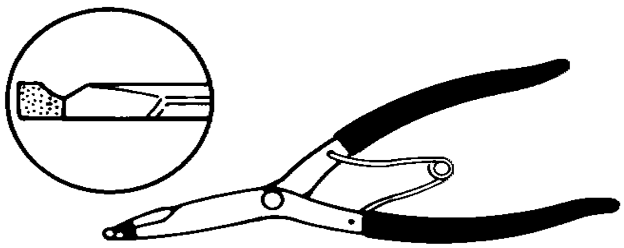
Table of Contents

Special Tools

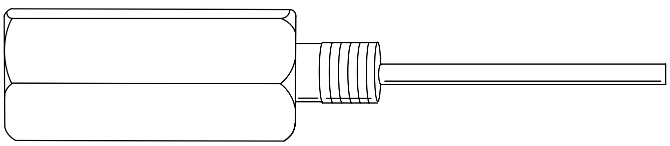
1. Spanner Wrench P/N 91-74951



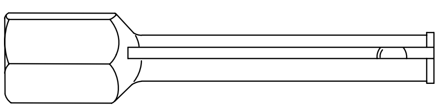
2. Lock-Ring Pliers P/N 91-822778A3



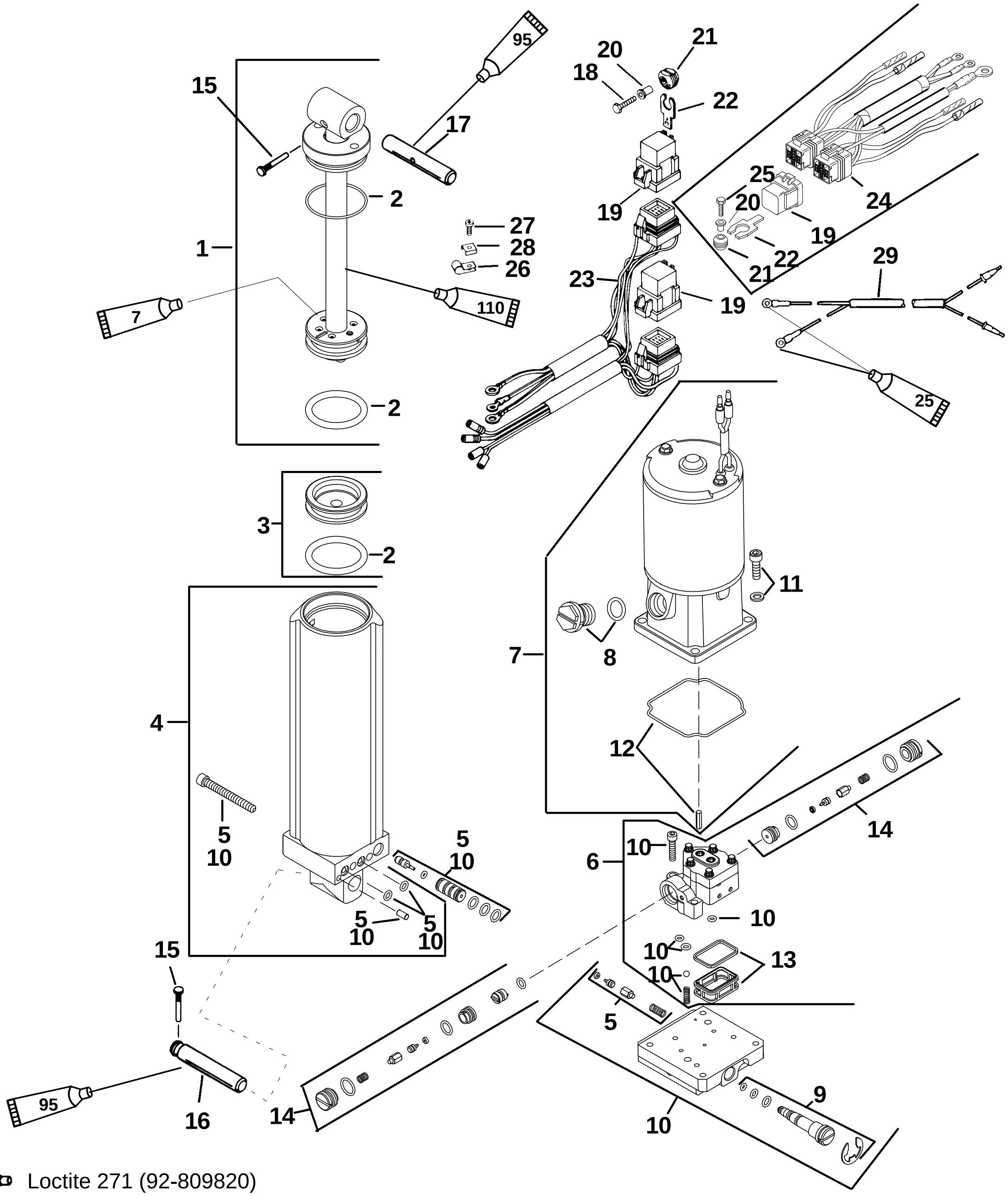
3. Expanding Rod P/N CG 41-11

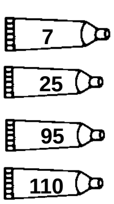


4. Collet P/N CG 41-14



Power Trim Components (Yellow Fill Plug) (S/N-USA-0G360003/BEL.-9934137 & UP)





Loctite 271 (92-809820)

Liquid Neoprene (92-25711--2)

2-4-C With Teflon (92-825407A12)

Power Trim and Steering Fluid (92-90100A12)

NOTE: *Lubricate all o-rings and seals with Power Trim and Steering Fluid.*

Power Trim Components (Yellow Fill Plug) (S/N-USA-0G360003/BEL.-9934137 & UP)

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
–	1	POWER TRIM PUMP			
1	1	SHOCK ROD KIT			
2	1	O RING REBUILD KIT			
3	1	MEMORY PISTON ASSEMBLY			
4	1	CYLINDER ASSEMBLY			
5	1	TRIM LIMIT VALVE KIT			
6	1	PUMP ASSEMBLY			
7	1	MOTOR KIT			
8	1	RESERVOIR PLUG			
9	1	MANUAL RELEASE ASSEMBLY			
10	1	MANIFOLD KIT	100		11.3
11	1	SCREW KIT(MOTOR)	80		9.0
12	1	DRIVE SHAFT			
13	1	FILTER KIT			
14	1	P.O. CHECK ASSEMBLY KIT			
–	1	O RING KIT(COMPLETE TRIM)			
15	2	GROOVE PIN			
16	1	ANCHOR PIN			
17	1	SHAFT			
18	2	SCREW(M6 x 25)**(USA-0G437999/BEL-9926999 & BELOW)**	35		4.0
19	2	RELAY			
20	2	BUSHING			
21	2	GROMMET			
22	2	BRACKET			
23	1	HARNESS ASSEMBLY **(USA-0G437999/BEL-9926999 & BELOW)**			
24	1	HARNESS ASSEMBLY **USA-0G438000/BEL-9927000 & UP**			
25	2	SCREW(M6 x 25)	35		4.0
26	2	CLAMP			
27	2	SCREW(10-16 x 3/8)	Drive Tight		
28	2	C WASHER			
29	1	TRIM HARNESS ASSEMBLY **(Use where applicable)**			

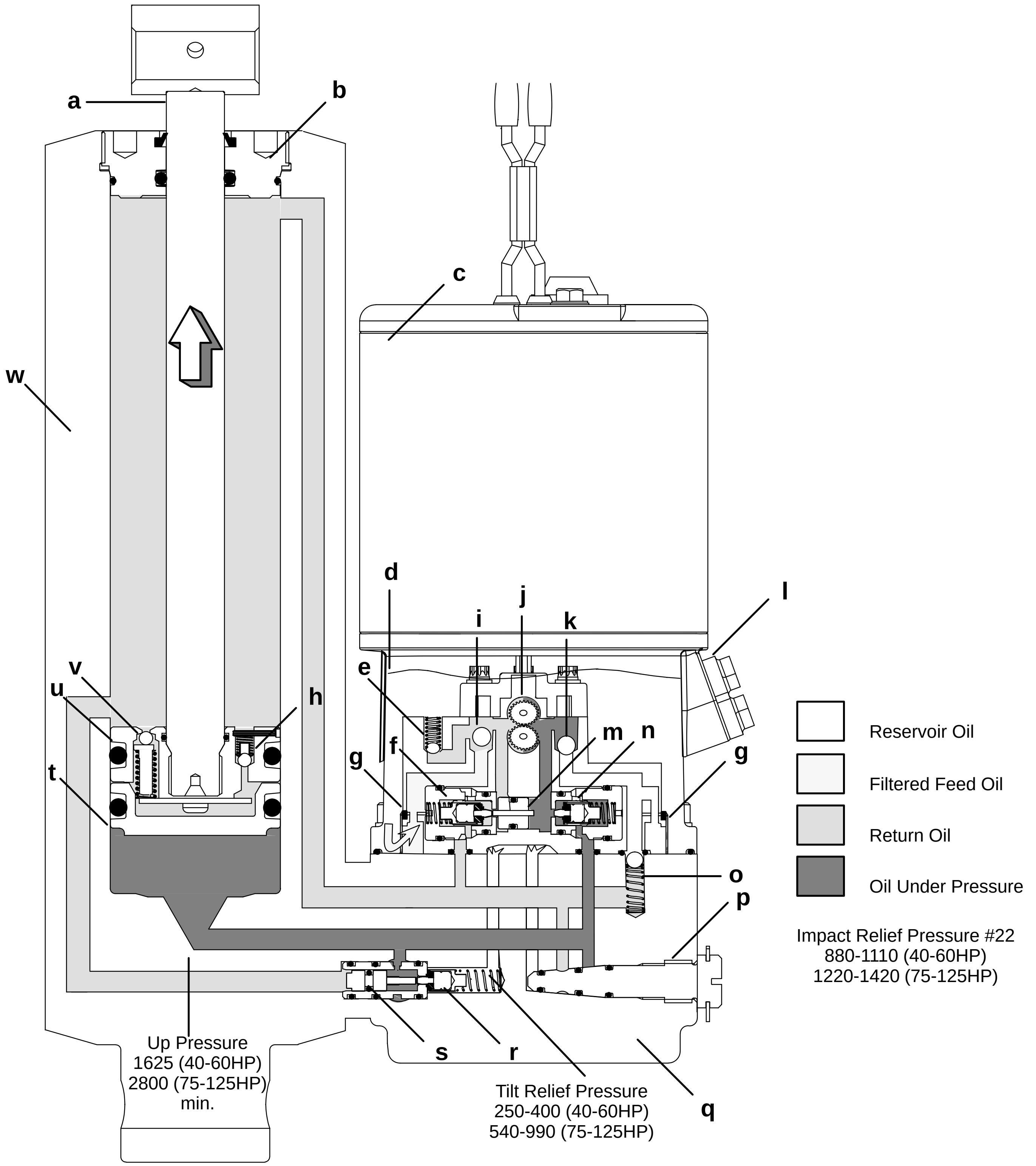
Notes:

Description

The Power Trim system consists of an electric motor, pressurized fluid reservoir, pump and trim cylinder.

The remote control (or trim panel) is equipped with a switch that is used for trimming the outboard “up” and “down”, and for tilting the outboard for shallow water operation (at slow speed) or for “trailering”. The outboard can be trimmed “up” or “down” while engine is under power or when engine is not running.

Power Trim Flow Diagrams – Trim Up Circuit



a - Piston Rod
b - End Cap
c - Electric Motor
d - Reservoir Oil
e - Down Pressure Regulating Valve
f - Down Pressure Operated Valve
g - Filter (2 shown for clarity)
h - Shock Return Valve

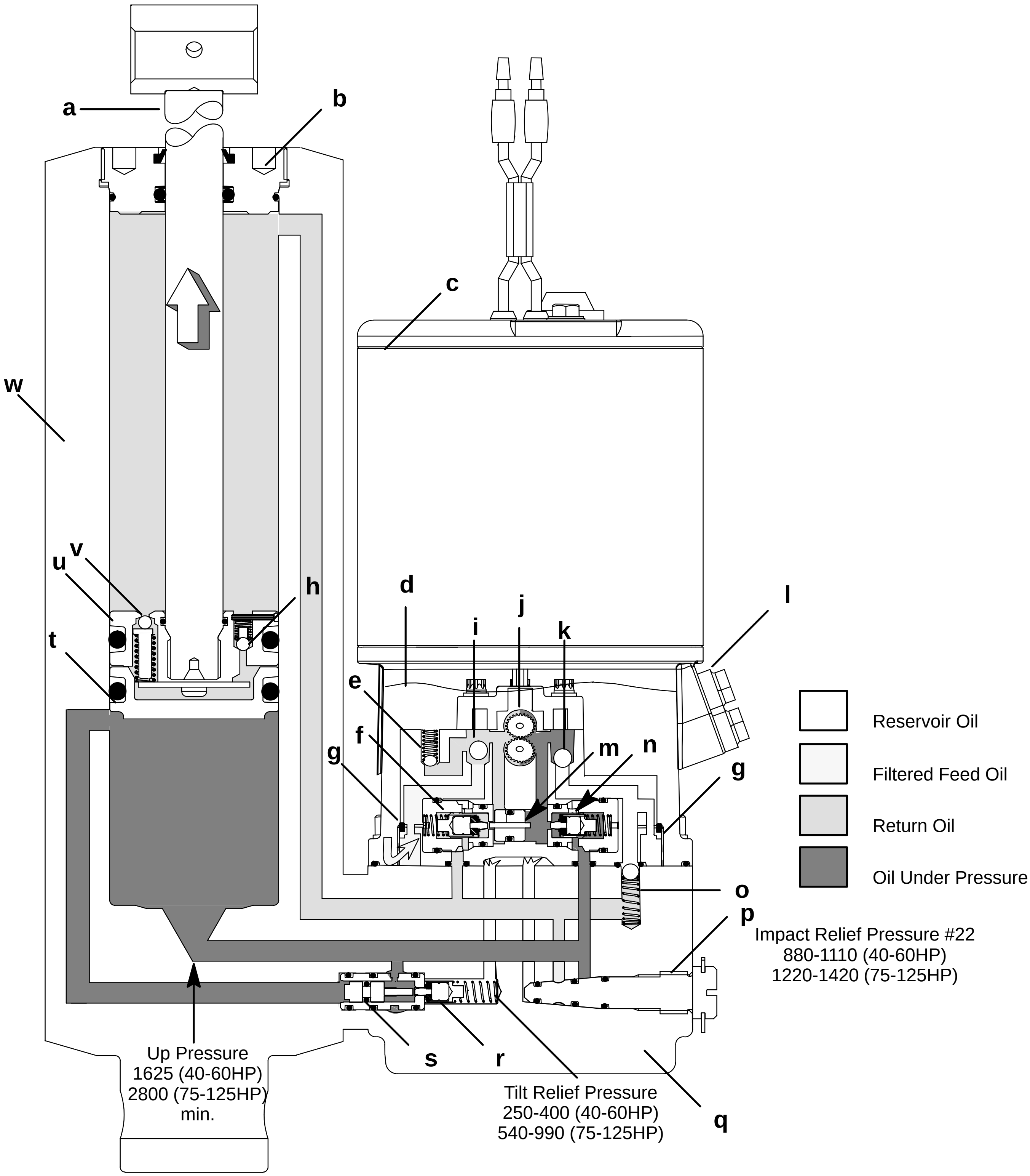
i - Up Circuit Suction Port
j - Oil Pump
k - Down Circuit Suction Port
l - Oil Fill Cap
m - Shuttle Valve
n - Up Pressure Operated Valve
o - Manifold Reverse Suction Valve
p - Manual Release Valve

q - Manifold
r - Tilt Relief Valve
s - Tilt Relief Piston
t - Memory Piston
u - Shock Piston
v - Impact Relief Valve
w - Cylinder

Trim Up

When the trim switch is activated in the up position, the electric motor (c) begins to rotate the pump gears (j), the oil pump draws a small amount of oil through the filter (g) and through the up circuit suction port (i). The oil pump gear (j) rotation forces oil into the passages for the up circuit. Oil, under pressure, will slide the shuttle valve (m) against the down circuit pressure operated valve (f). The shuttle valve will mechanically open the down pressure operated valve, allowing oil from the down cavity of the trim cylinder, to flow into the oil pump. This returning oil, from the down cavity, will supply most of the oil required for the up circuit. Oil in the up circuit is blocked from returning into the reservoir by the ball inside the down circuit suction port (k). The pressure of the oil will force the up circuit pressure operated valve (n) to open, allowing the oil to enter the passages inside the manifold (q) leading to the trim cylinder (w) up cavity. Oil is blocked from all other passages by the closed manual tilt valve (p). Oil under pressure will enter the trim cylinder below the memory piston (t). With an increasing amount of oil entering the cylinder, the memory piston contacts the shock piston (u) and forces the piston rod (a) up and out, raising the outboard motor. Oil on the top of the shock piston exits through a passage running down along the side of the cylinder and enters the manifold passages. The oil is drawn back into the pump (j) through the open down pressure operated valve (f) and enters the pump as supply for the up circuit.

Tilt Circuit



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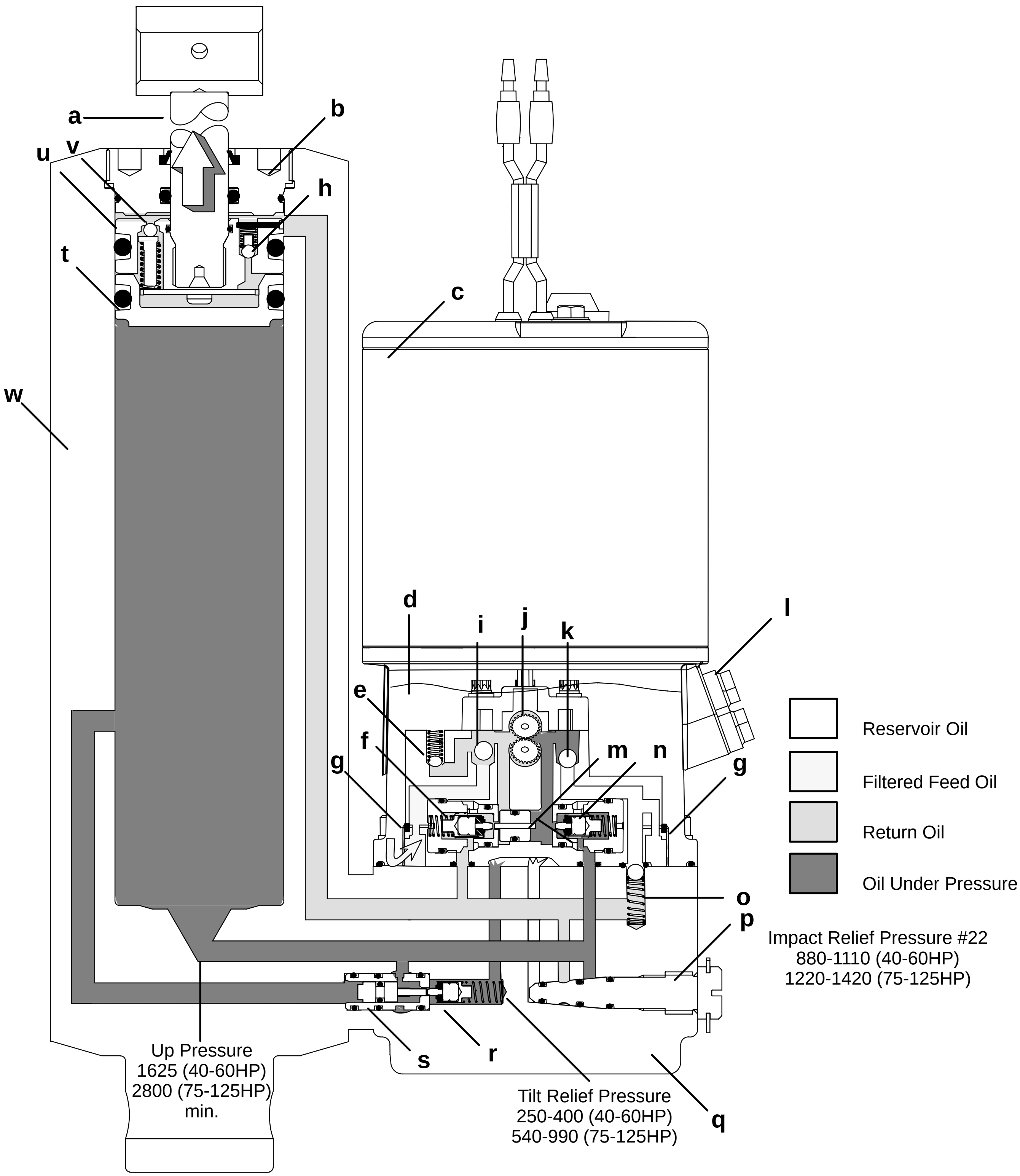
Tilt Up

In the up mode, as the piston rod (a) extends from the cylinder (w), the memory piston (t) clears or uncovers the pressure relief passage. Oil from the up cavity will enter this passage and, if required, causes the tilt relief piston (s) to open the tilt pressure relief valve (r). This valve lowers the amount of pressure available to lift the outboard motor. With the engine in forward gear, and at high engine rpm, the oil pressure available will not be able to overcome the propeller thrust, limiting the trim range to below the pressure relief orifice. When the engine rpm's fall or if engine is not in forward gear, the oil pressure is available to extend the piston rod (a) up into the tilt range.

Maximum Tilt



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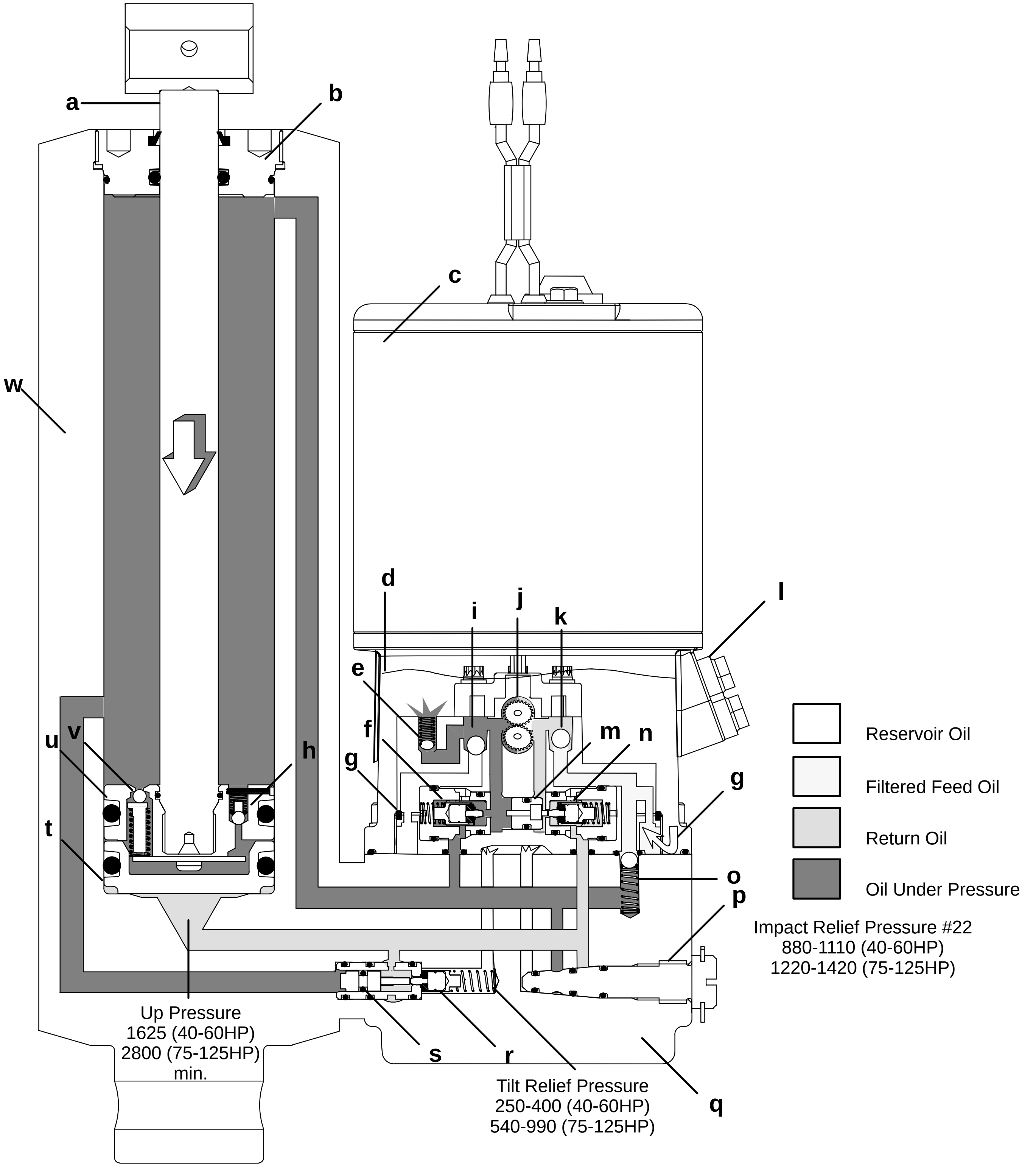
Maximum Tilt

With the piston rod at maximum travel, and due to no rod movement, the pressure inside of the trim cylinder (w) will increase to the pressure required to move the tilt relief piston (s). The tilt relief piston’s “pin” opens the tilt relief valve (r). Up pressure flows into the trim relief passage, and returns back into the reservoir.

Down Circuit



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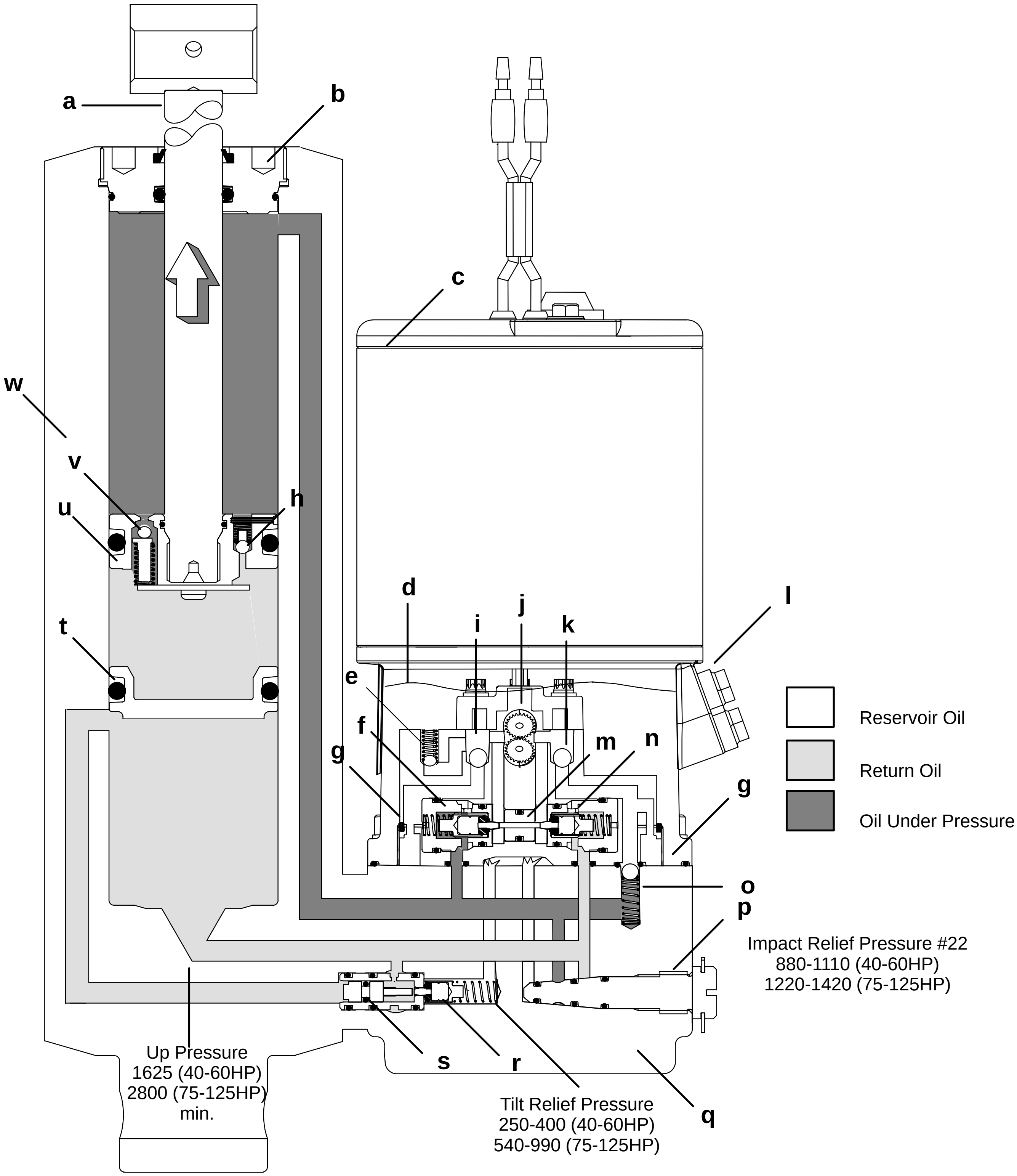
Down Mode

When the trim switch is activated in the down position, the electric motor (c) will rotate the pump (j) in the opposite direction. With the pump gears rotating backwards, the flow of oil is reversed. Oil is drawn through the filter (g), through the down circuit suction port (k) and into the oil pump (j). The pump forces pressurized oil into the down passages, oil will slide the shuttle valve (m) into the up circuit pressure operated valve (n). The shuttle valve will mechanically open the up circuit pressure operated valve and allow oil, from the up cavity of the trim cylinder (w), to return into the oil pump. This returning oil, from the up cavity, will supply the oil required for the down circuit. The oil is blocked from returning into the reservoir by the ball (i) inside the up circuit suction port. Oil, under pressure, opens the down pressure operated valve (f) and enters the down passages inside of the manifold (q). The manifold passage connects into the trim cylinder passage leading to the top of the cylinder. The cavity, inside the cylinder, above the shock piston (u) is the down cavity. As the down cavity fills with oil, the piston rod (a) retracts into the cylinder, lowering the outboard motor. Oil from the up cavity exits the cylinder and is drawn back into the pump through the open up pressure operated valve (n). When the piston rod reached full travel, the oil pressure inside the down circuit will rise until the down pressure relief valve (e) opens, bypassing oil back into the reservoir. When the trim button is released, and the oil pump stops supplying pressure, both of the pressure operated valves (f & n) will close and; if open, the down pressure regulating valve (e) will close. The closed valves will lock the fluid on either side of the shock piston (u) & memory piston (t), holding the outboard motor in position.

Shock Function Up



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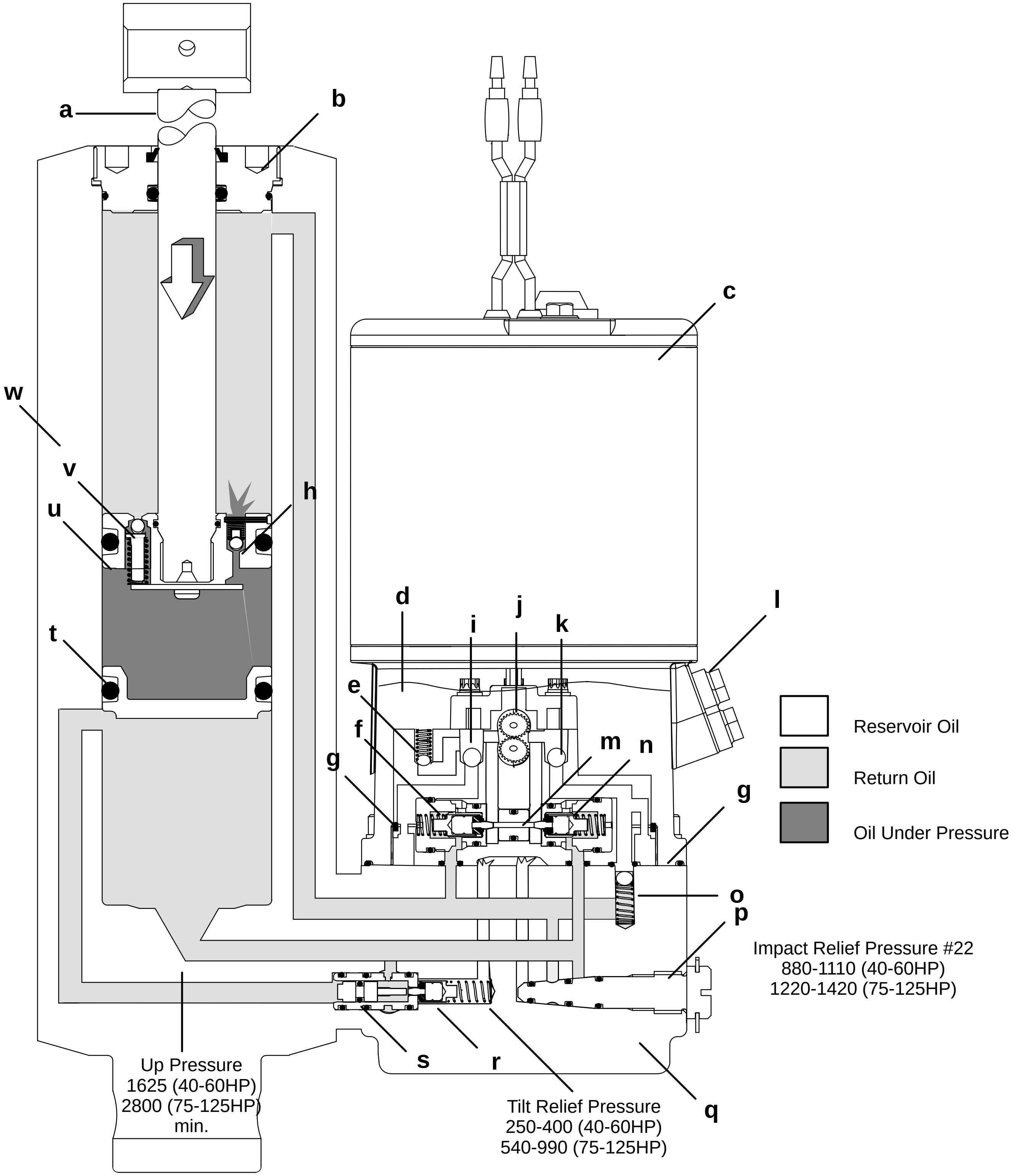
Shock Function Up

Oil inside the down cavity is locked in a static position by the closed pressure operated valve (f), the manual release valve (p) and the manifold reverse suction valve (o). If the outboard strikes an underwater object while in forward gear the piston rod (a) will try to rapidly extend from the cylinder (w), the pressure increases inside the trim cylinder down cavity and connecting passages. When the pressure increases to the level required, the impact relief valves (v), located inside the shock piston (u), will open and allow the fluid to pass through the shock piston. As the fluid passes through the piston, the piston rod (a) will extend from the trim cylinder. The memory piston (t) is held in position by vacuum, created by the oil in the up cavity being locked in a static position. Therefore; oil passing through the shock piston is trapped between the memory piston (t) and shock piston (u).

Shock Function Return



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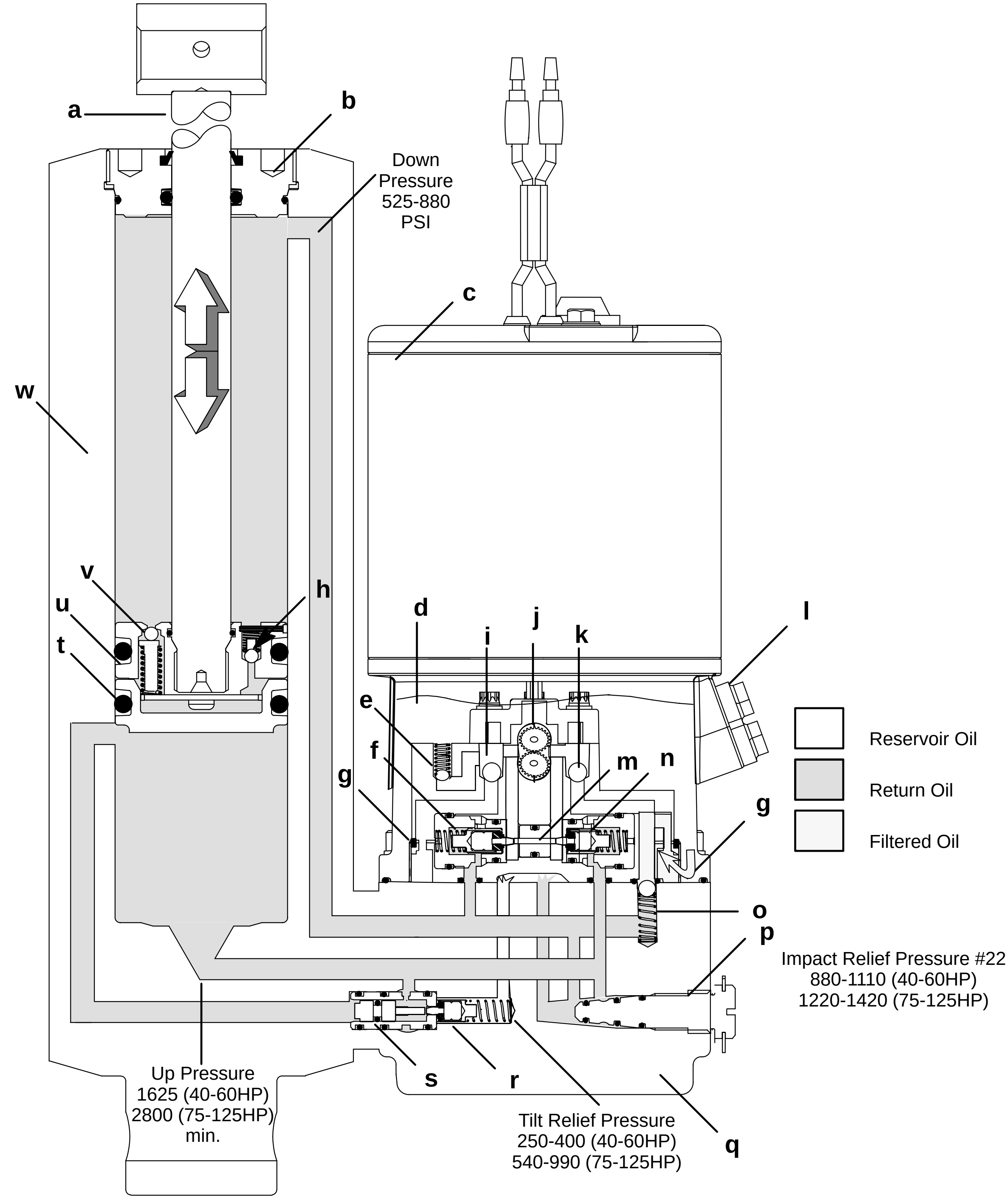
Shock Function Return

After the engine clears the under water object, the weight of the engine will increase the oil pressure between the memory piston (t) and shock piston (u) to the level required to open the shock return valve (h), inside the shock piston, allowing the oil to bleed back through the shock piston into the down cavity. If required, additional oil will enter the down cavity through the manifold reverse suction valve (o). This will return the engine back against the memory piston (t) and into the original running position.

Manual Release



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w - Cylinder

Manual Tilt

To manually tilt the outboard engine, the owner will need to back out the manual release valve (p) 3-4 turns. With the valve backed out, the internal passages inside the manifold are connected together. These passages connect both the cylinder down and up cavities together, along with the reservoir, allowing the engine to be raised or lowered. Piston rod (a) movement will continue until the manual release valve (p) is closed, locking the fluid inside of the cylinder and manifold.

Adjustments

Trimming Characteristics

NOTE: *Because varying hull designs react differently in various degrees of rough water, it is recommended to experiment with trim positions to determine whether trimming "up" or "down" will improve the ride in rough water.*

When trimming outboard from a mid-trim position (trim tab in neutral, straight fore-and-aft position), you can expect the following results:

TRIMMING OUTBOARD "UP" ("OUT")

⚠ WARNING

Excessive trim "out" may reduce the stability of some high speed hulls. To correct instability at high speed, reduce the power gradually and trim the motor "In" slightly before resuming high speed operation. (Rapid reduction in power will cause a sudden change of steering torque and may cause additional momentary boat instability.)

- Will lift bow of boat, general increasing top speed.
- Transfers steering torque harder to left on installations below 23 in. transom height.
- Increases clearance over submerged objects.
- In excess, can cause "porpoising" and/or ventilation.
- In excess, can cause insufficient water supply to water pump resulting in serious water pump and/or powerhead overheating damage.

⚠ WARNING

Excessive engine trim angle will result in insufficient water supply to water pump causing water pump and/or powerhead overheating damage. Make sure that water level is above gear housing water intake holes whenever engine is running.

Operating "Up" circuit will actuate the "up" relay (located under engine cowl) and close the electric motor circuit. The electric motor will drive the pump, thus forcing automatic transmission fluid through internal passageways into the "up" side of the trim cylinder.

The trim cylinder/trim rod will position the engine at the desired trim angle within the 20° maximum trim range. The Power Trim system is designed so the engine cannot be trimmed beyond the 20° maximum trim angle as long as engine RPM is above approximately 2000 RPM.

The engine can be raised beyond the 20° maximum trim angle for shallow water operation, etc., by keeping the engine RPM below 2000 RPM. If engine RPM increases above 2000 RPM, the thrust created by the propeller (if deep enough in the water) will cause the trim system to automatically lower the engine back to the 20° maximum trim angle.

TRIMMING OUTBOARD "DOWN" ("IN")

⚠ WARNING

Excessive speed at minimum trim "In" may cause undesirable and/or unsafe steering conditions. Each boat should be tested for handling characteristics after any adjustment is made to the tilt angle (tilt bolt relocation).

- Will help planing off, particularly with a heavy load.
- Usually improves ride in choppy water.
- In excess, can cause boat to veer to the left or right (bow steer).
- Transfers steering torque harder to right (or less to the left).
- Improves planing speed acceleration (by moving tilt bolt one hole closer to transom).

Operating "Down" circuit will actuate the "down" relay (located under engine cowl) and close the electric motor circuit (motor will run in opposite direction of the "Up" circuit). The electric motor will drive the pump, thus forcing automatic transmission fluid through internal passageways into the "down" side of the trim cylinder. The trim rod will move the engine downward to the desired angle.

Trailering Outboard

WARNING

Excessive engine trim angle will result in insufficient water supply to water pump causing water pump and/or powerhead overheating damage. Make sure that water level is above gear housing water intake holes whenever engine is running.

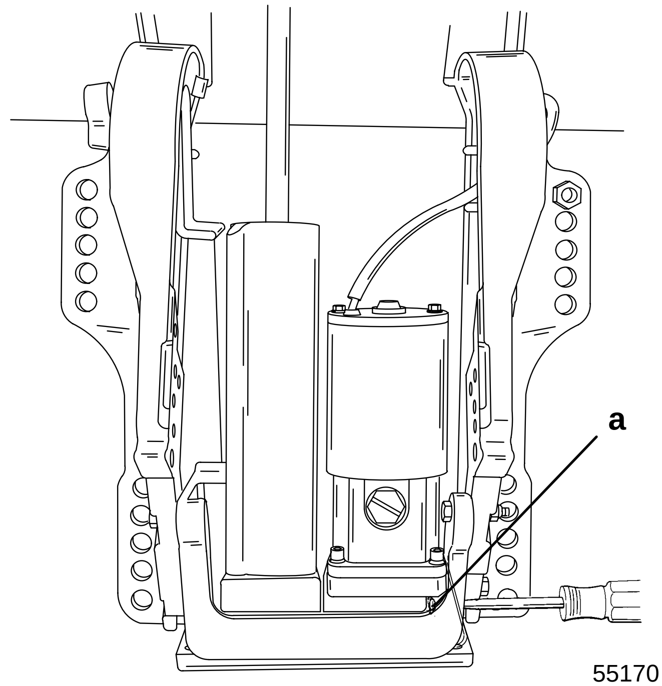
While operating “up” circuit, the cylinder rod will continue to tilt the outboard to a full up position for trailering.

Tilting Outboard Up and Down Manually

WARNING

Before loosening the manual release valve, make sure all persons are clear of engine as engine will drop to full “down” position when valve is loosened.

With power trim installed, the outboard can be raised or lowered manually by opening the manual release valve 3 to 4 turns (counterclockwise).



a - Manual Release Valve

Troubleshooting

Support outboard with tilt lock pin when servicing power trim system.

IMPORTANT: After debris or failed components have been found (during troubleshooting procedure) it is recommended that unit be disassembled completely and ALL O-rings be replaced. Check ball valve components and castings must be cleaned using engine cleaner and compressed air or replaced prior to re-assembly.

IMPORTANT: Power trim system is pressurized. Outboard must be in the full “UP” position (trim rod fully extended) prior to fill/drain plug, or manual release valve removal.

Refer to instructions following if disassembly is required when servicing.

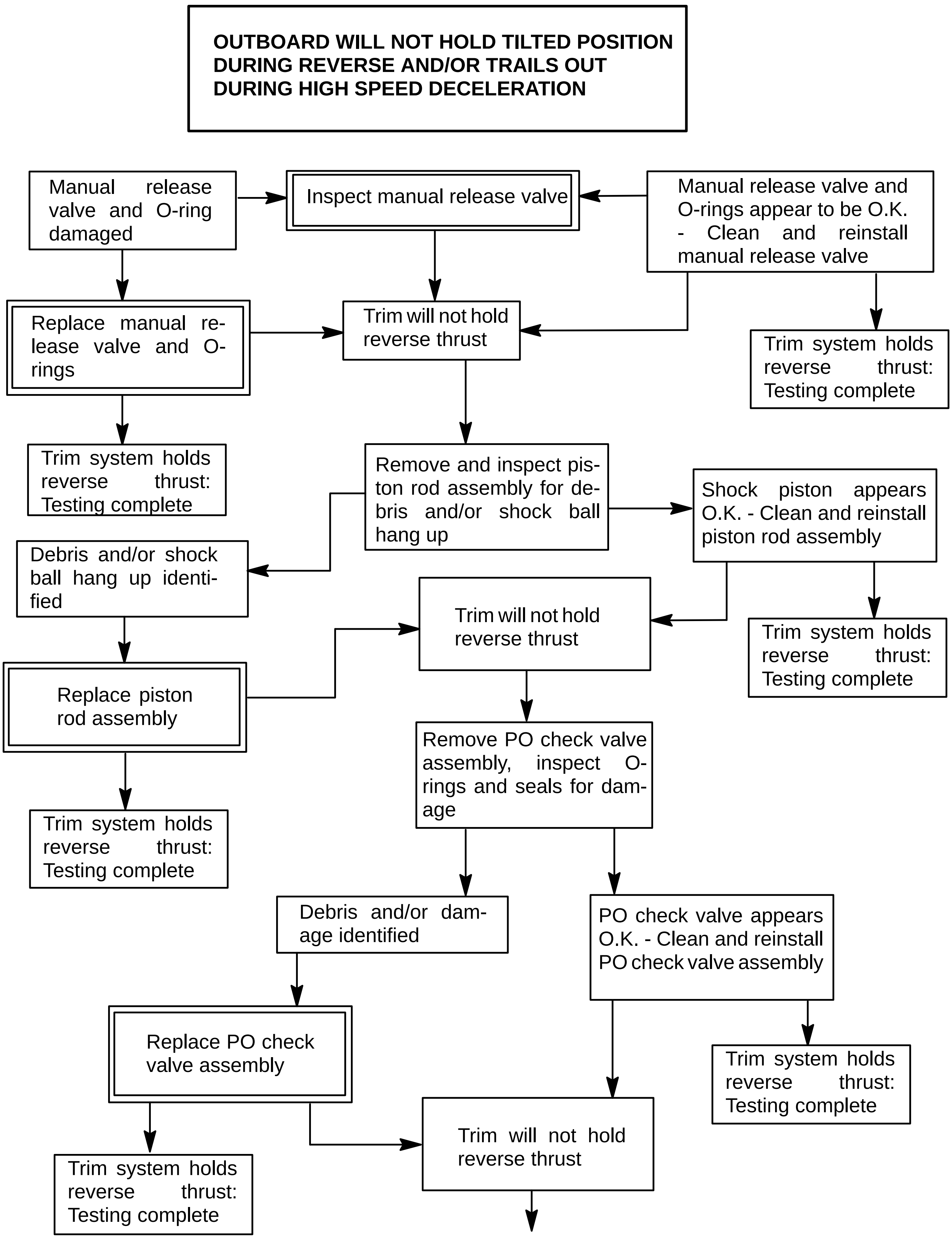
Follow preliminary checks before proceeding to troubleshooting flow diagrams (following).

Preliminary Checks

IMPORTANT: Operate Power Trim system after each check to see if problem has been corrected. If problem has not been corrected proceed to next check.

1. Check that manual release valve is tightened to full right (clockwise) position.
2. Check trim pump fluid level with outboard in full “UP” position and fill if necessary. Refer to “Bleeding Power Trim Unit”.
3. Check for external leaks in Power Trim system. Replace defective part(s) if leak is found.
4. Outboard not holding tilted position (falls down to trim position) indicates debris or defective components in trim assembly. Clean or replace components as required.

Hydraulic System Troubleshooting Flow Chart



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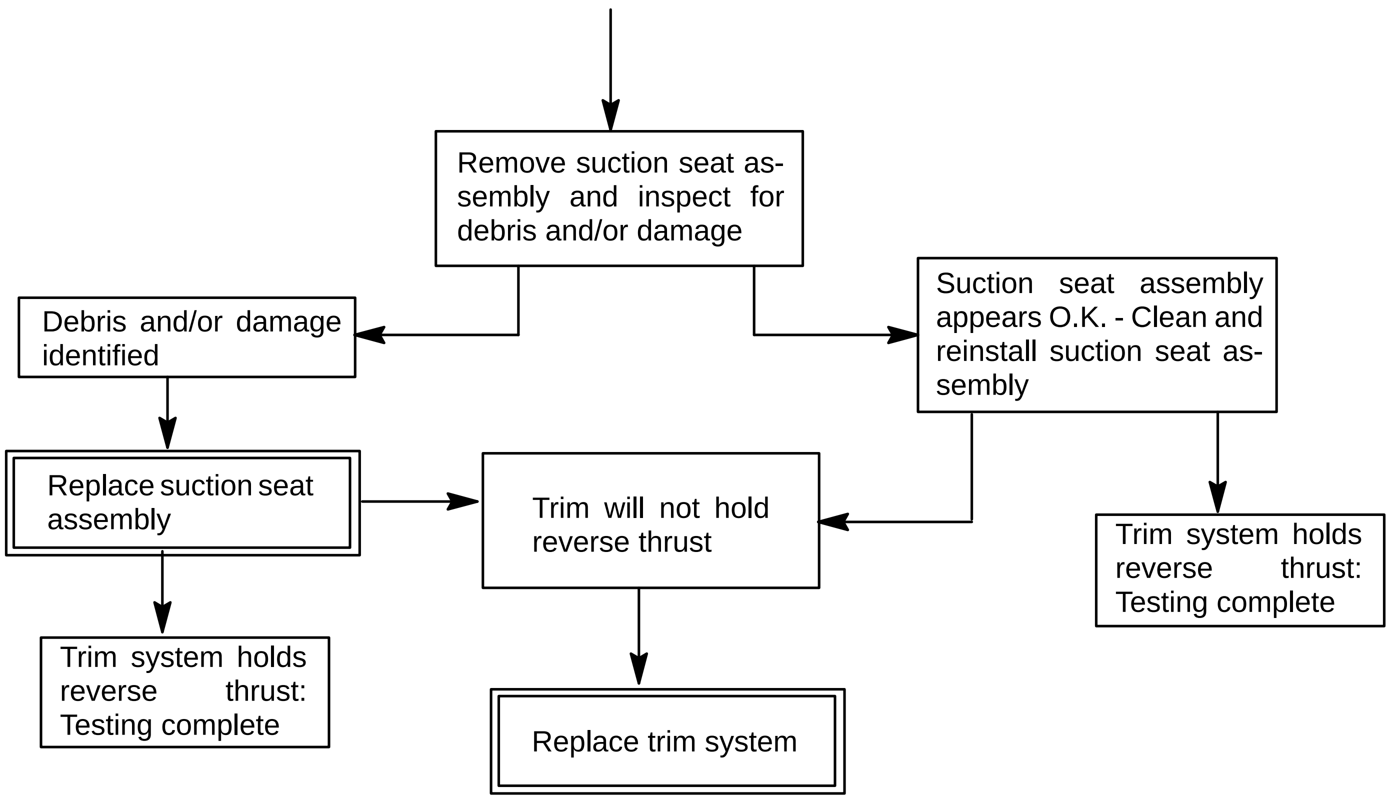
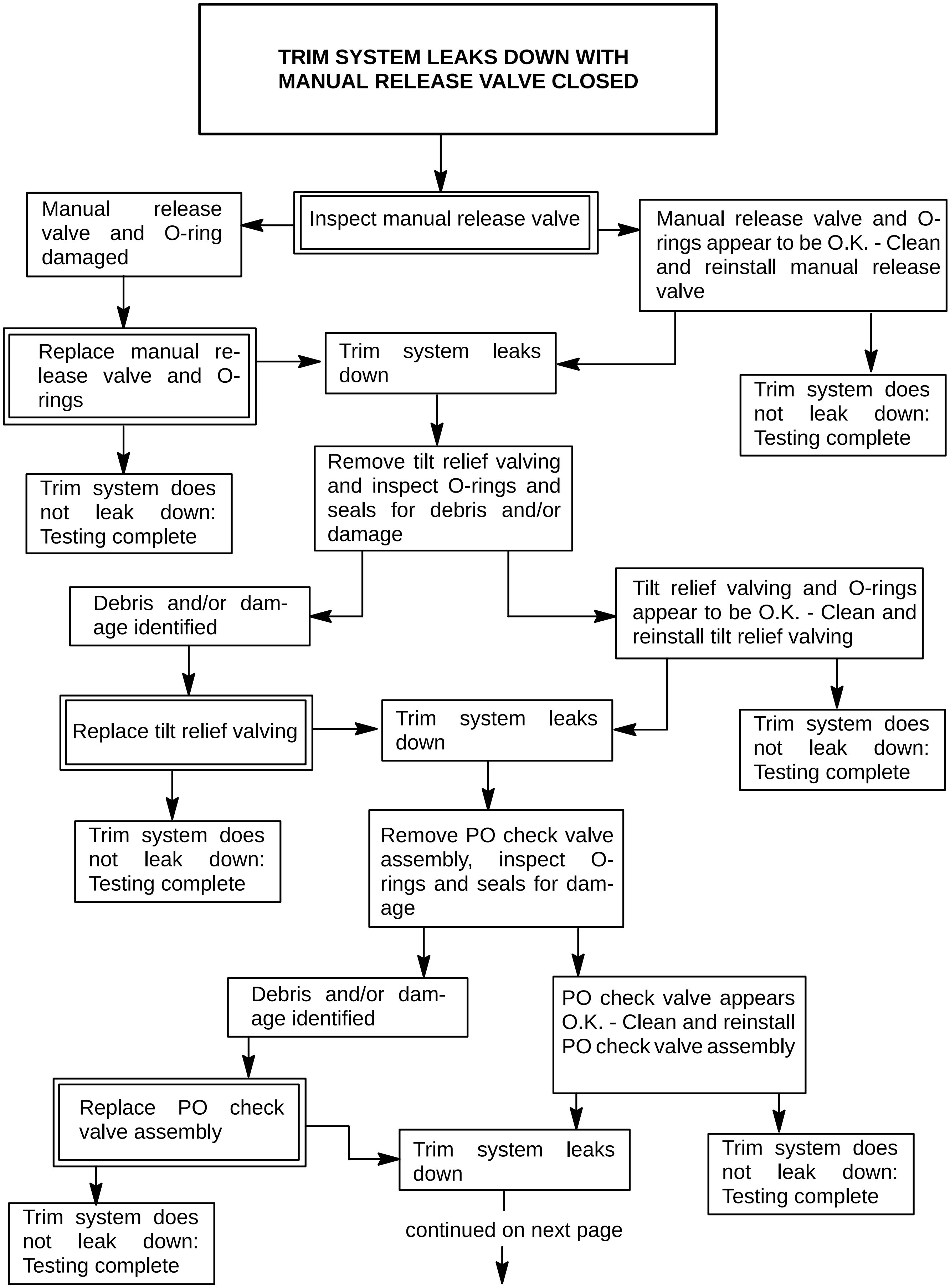
Hydraulic System Troubleshooting Flow Chart

continued



Hydraulic System Troubleshooting Flow Chart



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Hydraulic System Troubleshooting Flow Chart

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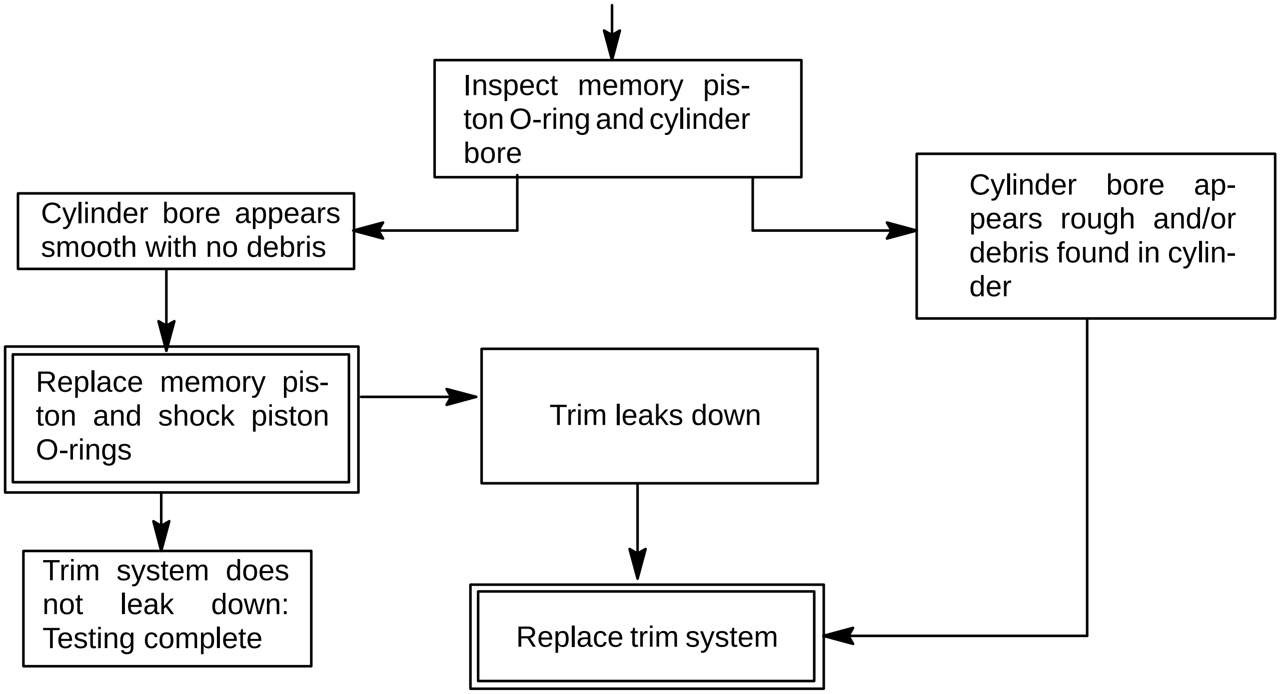
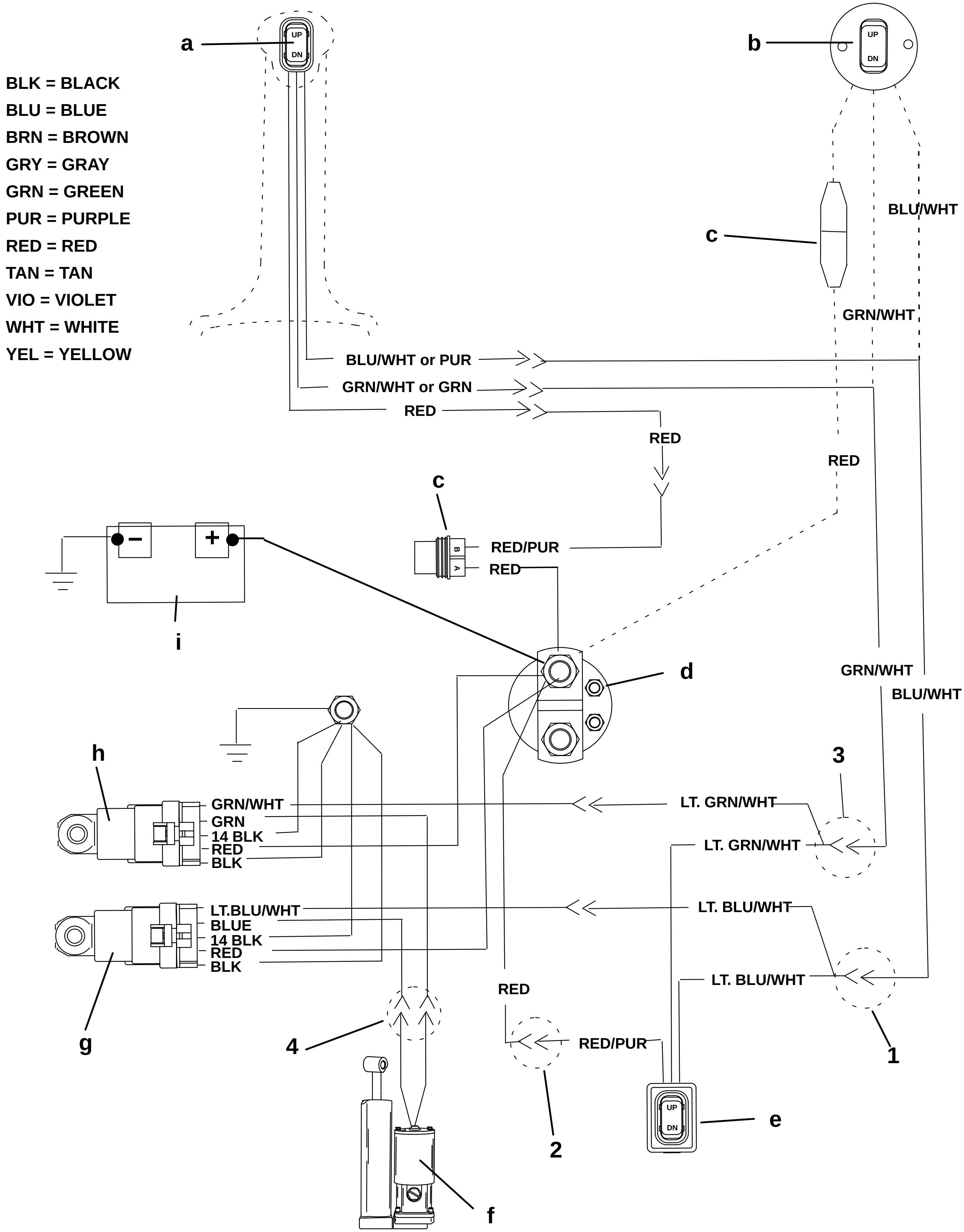


Troubleshooting the Power Trim Electrical System



a - Trim Switch (Remote Control Mounted)
b - Trim Switch (Panel Mounted)
c - Fuse Holder
d - Solenoid
e - Cowl Switch
f - Trim Pump Motor
g - Up Relay
h - Down Relay
i - Battery

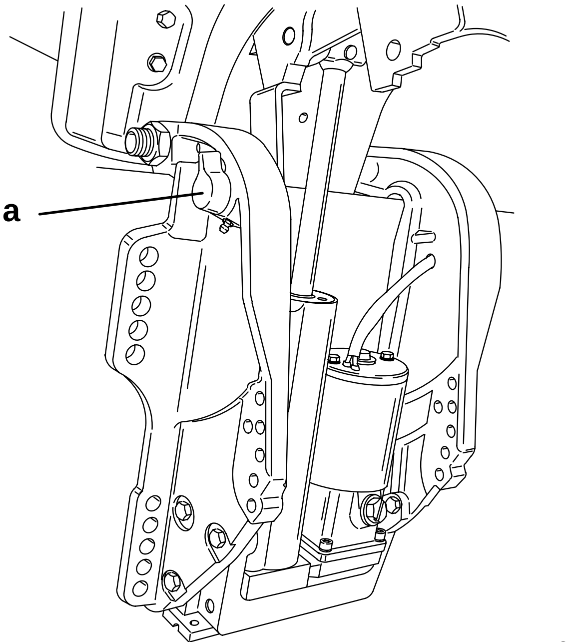
Troubleshooting the Power Trim Electrical System

Refer to wiring diagram on preceding page for location of wire connections.

Problem	Possible Cause	Remedy
Trim Switch “UP” is inoperative, but the Cowl Switch “UP” does operate.	1. Open wire between Wire Connection (1) and Trim Switch. 2. Faulty Trim Switch.	1. Check for a open connection or cut wire. 2. Replace
Cowl Switch “UP” is inoperative, but the Trim Switch “UP” does operate.	1. Open wire between Wire Connection (2) and Solenoid. 2. Faulty Cowl Switch.	1. Check for a open connection or cut wire. 2. Replace
Trim Switch “UP” and Cowl Switch “UP” are both inoperative.	1. Open wire between Wire Connection (1) and the Up Relay. 2. Open BLK wire between ground and UP Relay. 3. Open RED wire between Solenoid and Up Relay. 4. Faulty Up Relay .	1. Check for an open connection. 2. Check for an open connection. 3. Check for an open connection. 4. Replace
Trim Switch “DOWN” is inoperative, but the Cowl Switch “DOWN” does operate.	1. Open wire between Wire Connection (3) and Trim Switch. 2. Faulty Trim Switch.	1. Check for a open connection or cut wire. 2. Replace
Cowl Switch “DOWN” is inoperative, but the Trim Switch “DOWN” does operate.	1. Open wire between Wire Connection (2) and Solenoid. 2. Faulty Cowl Switch.	1. Check for a open connection or cut wire. 2. Replace
Trim Switch “DOWN” and Cowl Switch “DOWN” are both inoperative.	1. Open wire between Wire Connection (3) and the Up Relay. 2. Open BLK wire between ground and Down Relay. 3. Open RED wire between Solenoid and Down Relay. 4. Faulty Down Relay	1. Check for an open connection. 2. Check for an open connection. 3. Check for an open connection. 4. Replace
Trim Switch “UP” and “DOWN” are both inoperative, but the Cowl Switch does operate.	1. 20 AMP Fuse blown. 2. Faulty trim switch. 3. Wire is open between fuse holder and solenoid. 4. Wire is open between fuse holder and trim switch.	1. Replace fuse. Locate the cause of the blown fuse. Check electrical wiring for a shorted circuit. 2. Replace 3. Check for a open connection or cut wire. 4. Check for a loose or corroded connection.
Trim Switch and Cowl Switch are both inoperative.	1. One of the Trim Pump Motor wires is open between the motor and the Relays. 2. Faulty trim pump motor.	1. Check wire connections (4) for loose or corroded condition. 2. If voltage is present at connections (4) when the appropriate trim button is pressed, than motor is faulty. Replace motor.
Trim system operates (motor runs) without pressing the switches.	1. The Trim or Cowl switch is shorted.	1. Replace

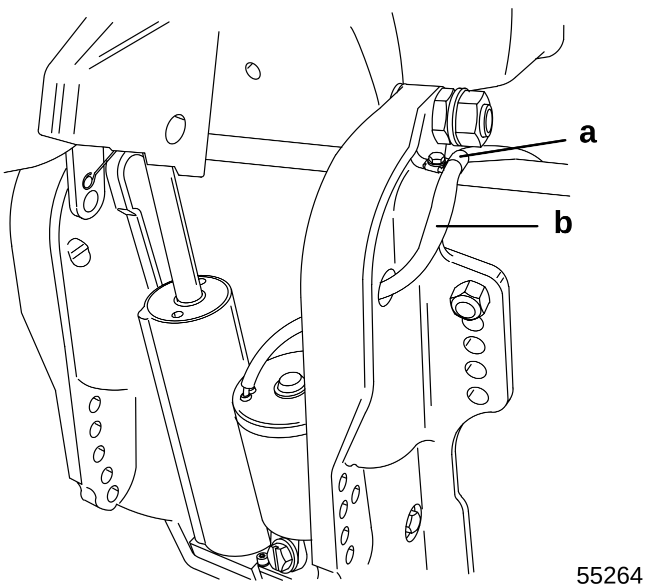
Power Trim System Removal

1. Tilt outboard to the full up position and support with tilt lock pin.



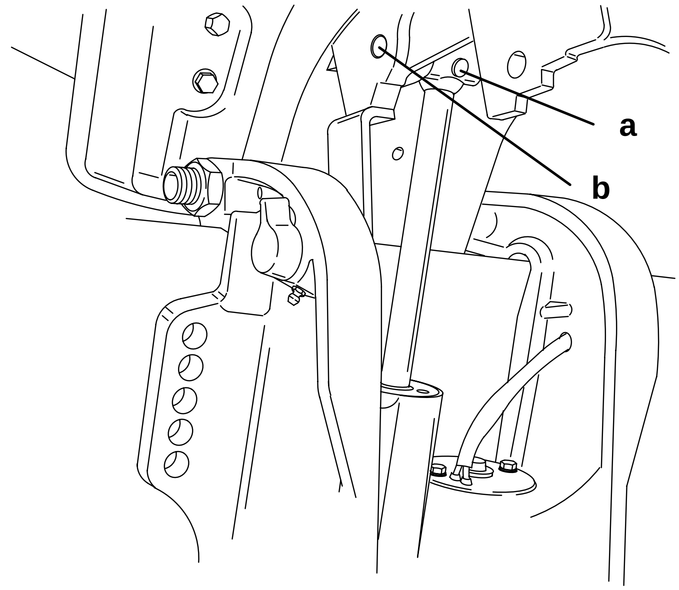
a - Tilt Lock Pin

2. Disconnect the power trim wire harness and remove clamp.



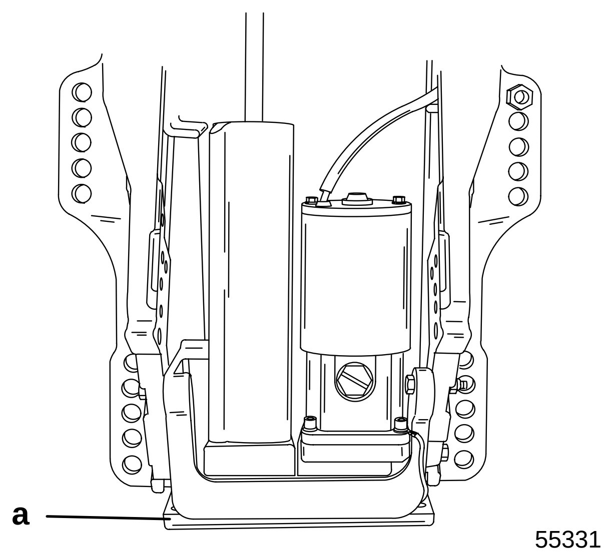
a - Power Trim Wire Harness Clamp
b - Harness

3. Remove the trilobe pin.
4. Drive out the upper pivot pin.



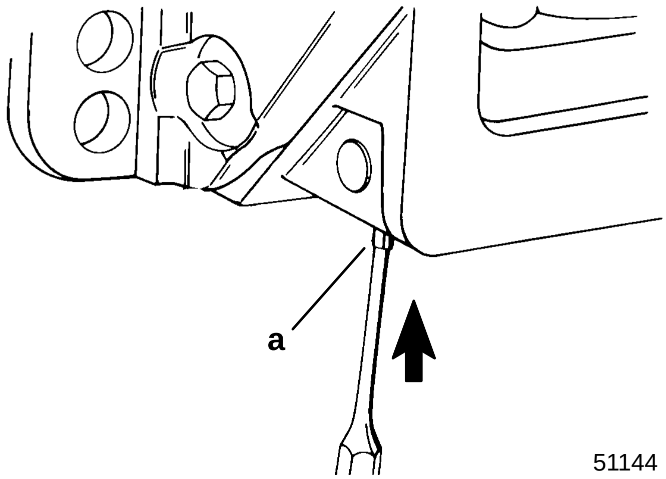
a - Trilobe Pin
b - Upper Pivot Pin

5. Remove the sacrificial anode.



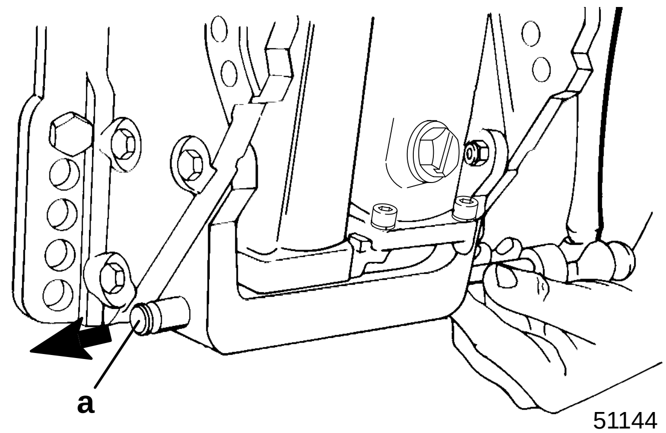
a - Sacrificial Anode

6. Use suitable punch to remove (Drive Up) lower pin. Retain dowel pin.



a - Dowel Pin

7. Use suitable punch to drive out lower pivot pin.

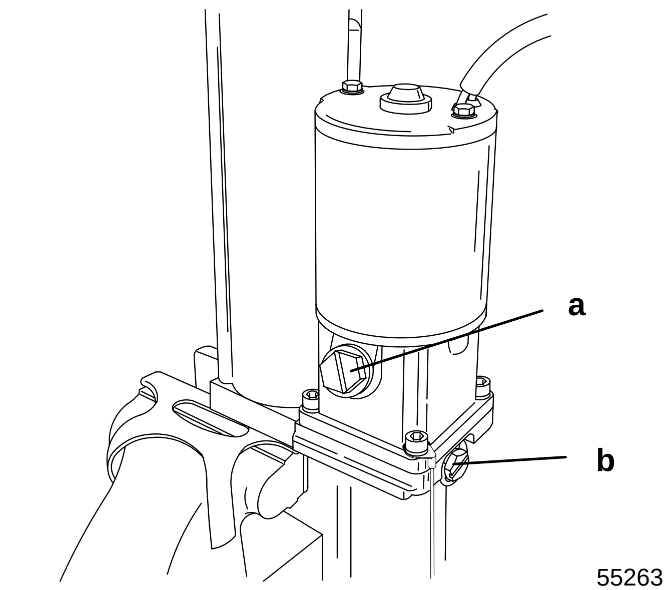


a - Lower Pivot Pin

Power Trim Disassembly

IMPORTANT: Power trim system is pressurized. Trim rod must be in the full “UP” position (fully extended) prior to fill/drain plug, or manual release valve removal.

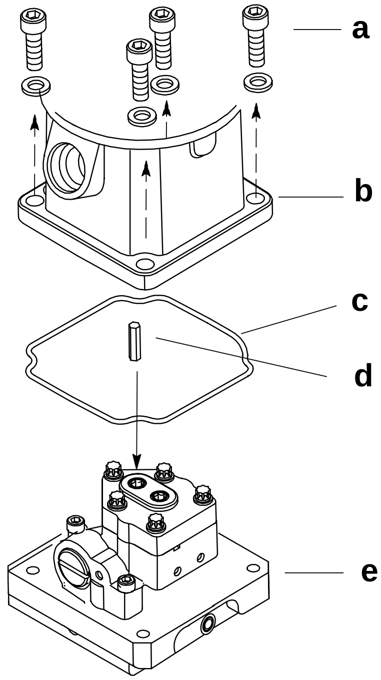
1. Remove reservoir cap.
2. Remove manual release valve assembly to drain oil.



a - Reservoir Cap
b - Manual Release Valve

Trim Motor Removal

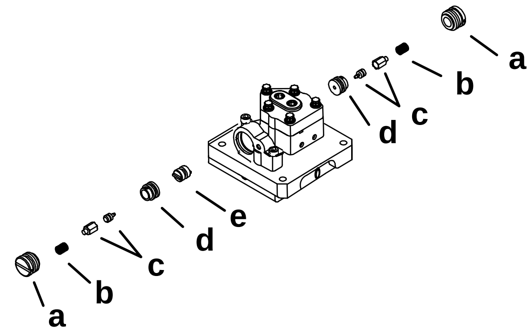
1. Secure power trim assembly in a soft jaw vise.
2. Remove four (4) screws to remove motor/reservoir. Remove reservoir seal and coupler.



a - Screw (4)
b - Reservoir
c - Reservoir Seal
d - Coupler
e - Manifold Assembly

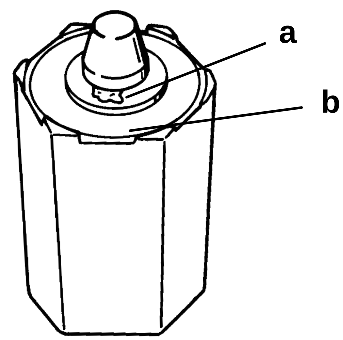
Pump and Components Removal

1. Remove pressure operated plugs on pump. Remove spring and check valve/poppet (both sides). Use special tool CG 41-11 and special tool CG 41-14 with 5/16″ end to remove spool.



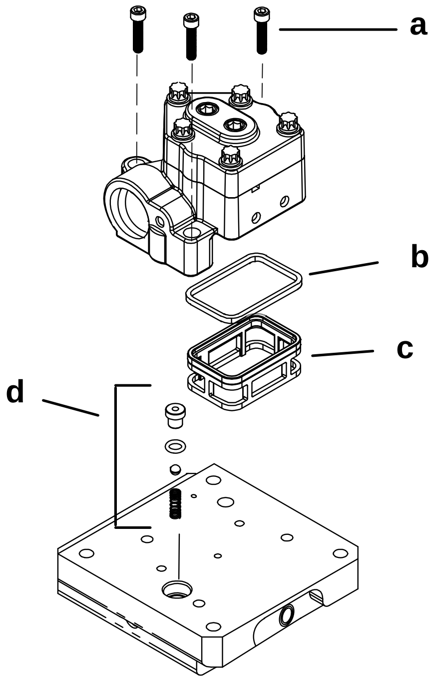
a - Plug (2)
b - Spring (2)
c - Check Valve/Poppet (2)
d - Seat (2)
e - Spool

IMPORTANT: Inspect poppet assembly for debris in the area shown. If debris is found on poppet replace poppet.



a - Debris Under Valve Tip
b - Rubber Seat

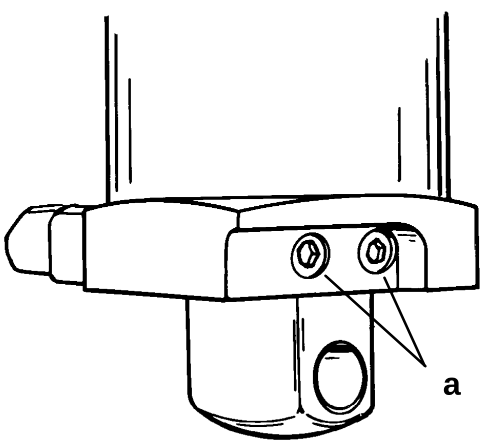
2. Remove three (3) screws to remove pump. Remove filter and filter seal under pump. Remove suction seat assembly.



a - Screws (3)
b - Filter Seal
c - Filter
d - Suction Seat Assembly

Manifold Removal

1. Remove two (2) screws to remove manifold from cylinder.



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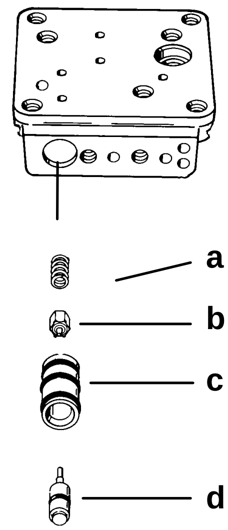
a - Screw (2)

2. Remove tilt relief components.



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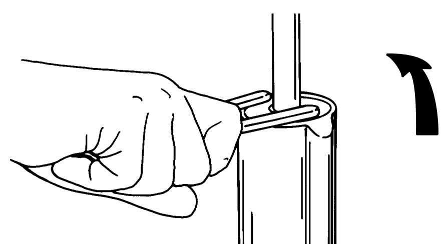
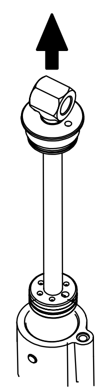
a - Spring
b - Poppet
c - Spool Housing
d - Trim Limit Spool

Shock Rod Removal

1. Unscrew end cap assembly from cylinder using spanner wrench [1/4 in. x 5/16 in. (6.4mm x 8mm) long pegs].

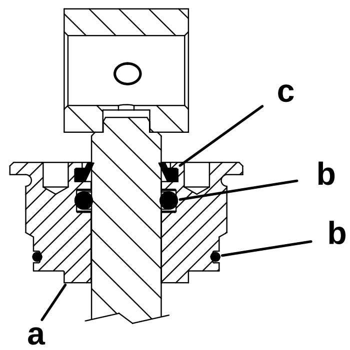


2. Remove shock rod assembly from cylinder.



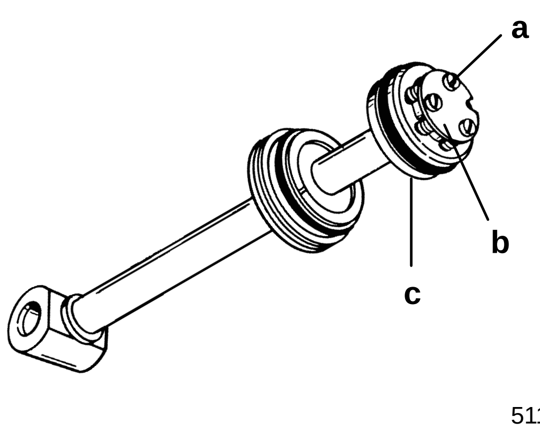
Shock Rod Disassembly

NOTE: *The only serviceable items on the shock rod assembly are the O-rings and wiper ring. If shock rod requires any other repair, replace shock rod assembly.*



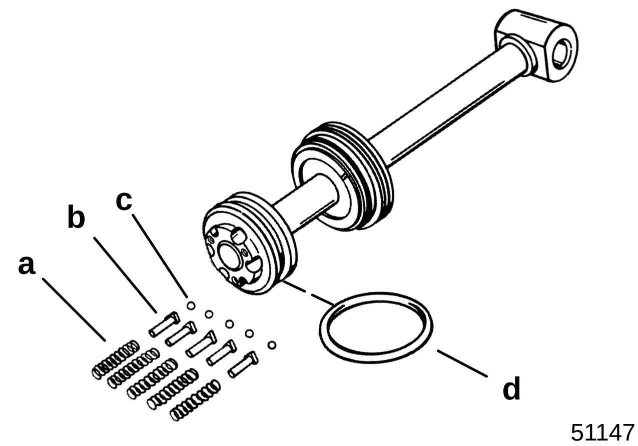
a - End Cap
b - O-ring
c - Wiper Ring

1. Place shock rod assembly on clean work surface.
2. Remove three (3) screws and remove plate from shock rod piston.



a - Screw (3)
b - Plate
c - Shock Rod Piston

3. Remove check ball components from shock rod piston.
4. Remove O-ring from shock rod piston.

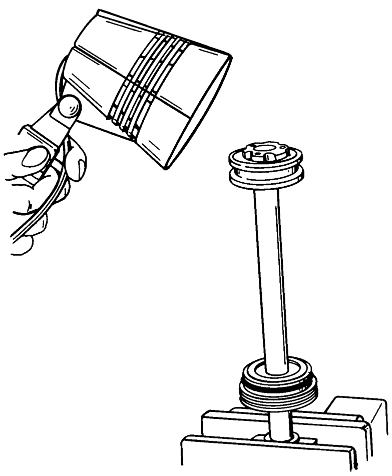


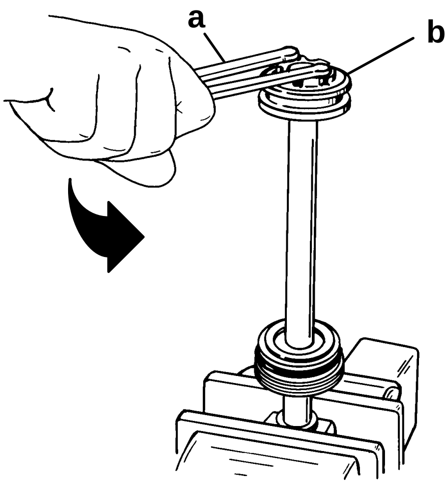
a - Spring (5)
b - Seat (5)
c - Ball (5)
d - O-ring

CAUTION

When removing shock piston, spanner wrench must have 1/4 in. x 5/16 in. long pegs to avoid damage to shock piston.

5. Place shock rod into soft jawed vise and apply heat to loosen piston using torch lamp (P/N 91-63209).
6. Loosen shock rod piston using spanner wrench [1/4 in. x 5/16 in. (6.4mm x 8mm) long pegs].
7. Allow shock rod piston to cool. Remove from shock rod.

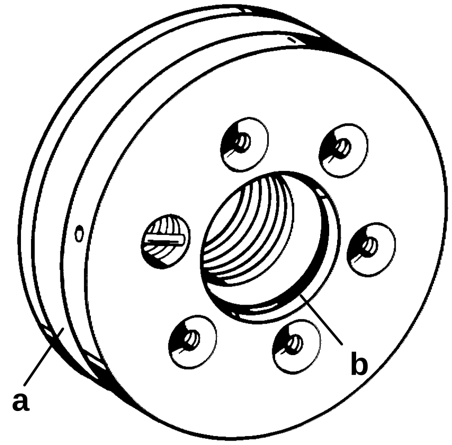




a - Spanner Wrench
b - Shock Rod Piston

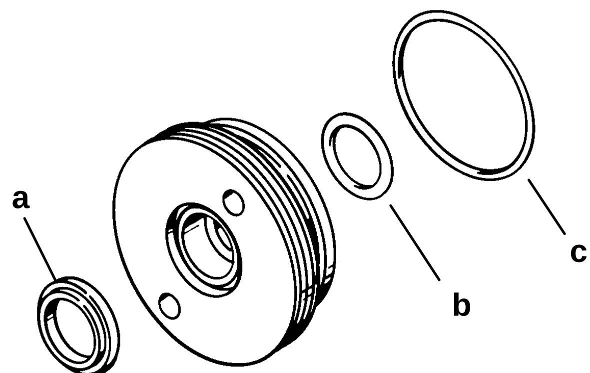
8. Inspect check valve for debris; clean debris from check valve if found. If debris cannot be cleaned from check valve, replace shock piston as an assembly.
9. Clean shock and components with compressed air.

10. Remove inner O-ring from shock rod piston.



a - Shock Piston
b - O-ring

11. Remove cylinder end cap assembly from shock rod.
12. Inspect shock. If wiper (located in cap) has failed to keep rod clean, replace wiper.
13. Place end cap on clean work surface.
14. Remove rod wiper, inner O-ring, and outer O-ring.

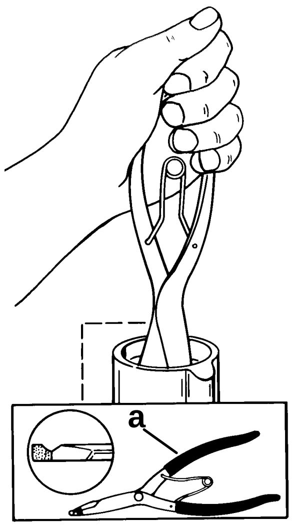


a - Rod Wiper
b - Inner O-ring
c - Outer O-ring

Memory Piston Removal

1. Remove memory piston from cylinder using one of two methods:

   a. Using lock ring pliers (Craftsman P/N 4735) or suitable tool.



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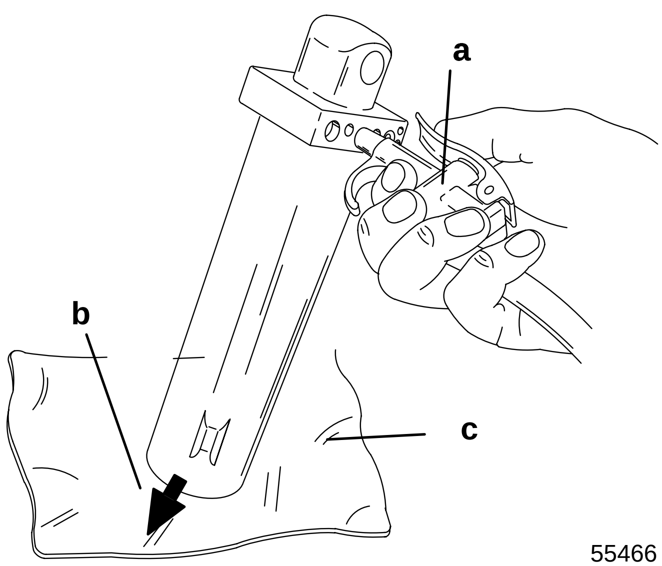
   b. Blowing compressed air into manual release valve hole using adaptor (P/N 91-822778A3).

⚠ WARNING

Memory piston cup may be expelled at a high velocity when air pressure is applied. Failure to place cylinder as shown below could result in personal injury.

NOTE: *Point cylinder opening down and away. Use a shop rag or towel to avoid damage to the memory piston.*



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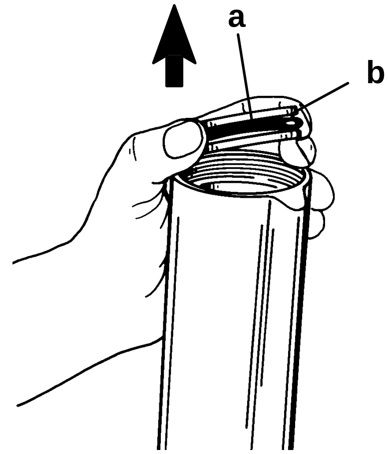
a - Adaptor/Air Hose
b - Memory Piston Exit
c - Shop Rag

2. Remove O-ring from memory piston.



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a - O-ring
b - Memory Piston

Cleaning/Inspection/Repair

IMPORTANT: Components must be dirt and lint free. Slightest amount of debris in Power Trim system could cause system to malfunction.

Clean shock rod and components with parts cleaner and dry with compressed air.

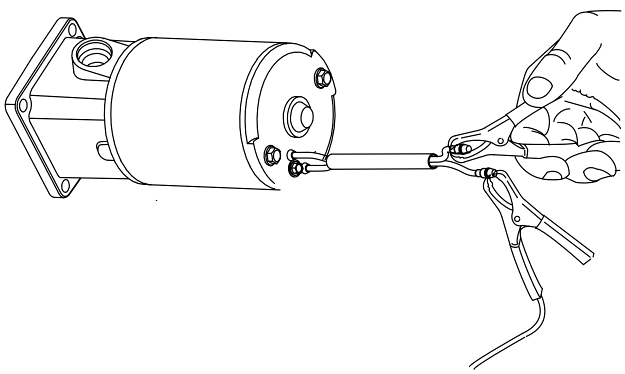
It is recommended that all O-rings in trim system be replaced. Use O-ring Kit 25-827668A1.

Lubricate all O-rings with Quicksilver Power Trim Fluid (92-90100A12). If not available, use automotive (ATF) automatic transmission fluid.

Trim Motor Electrical Tests

1. Connect a 12 volt supply to motor leads. If motor fails to run, replace pump motor.

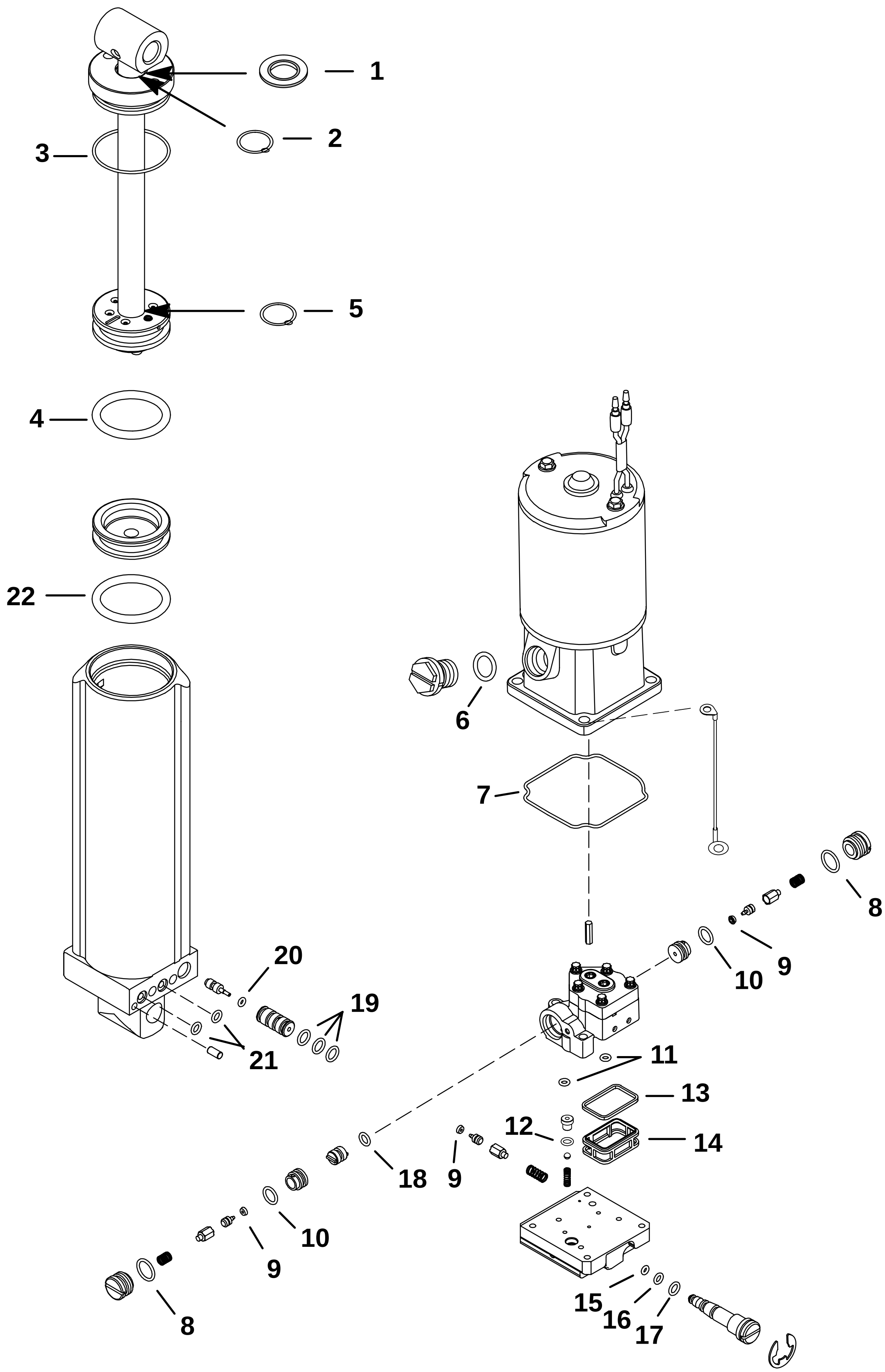
IMPORTANT: Trim Motor is not serviceable. If motor fails to run, replace motor assembly.



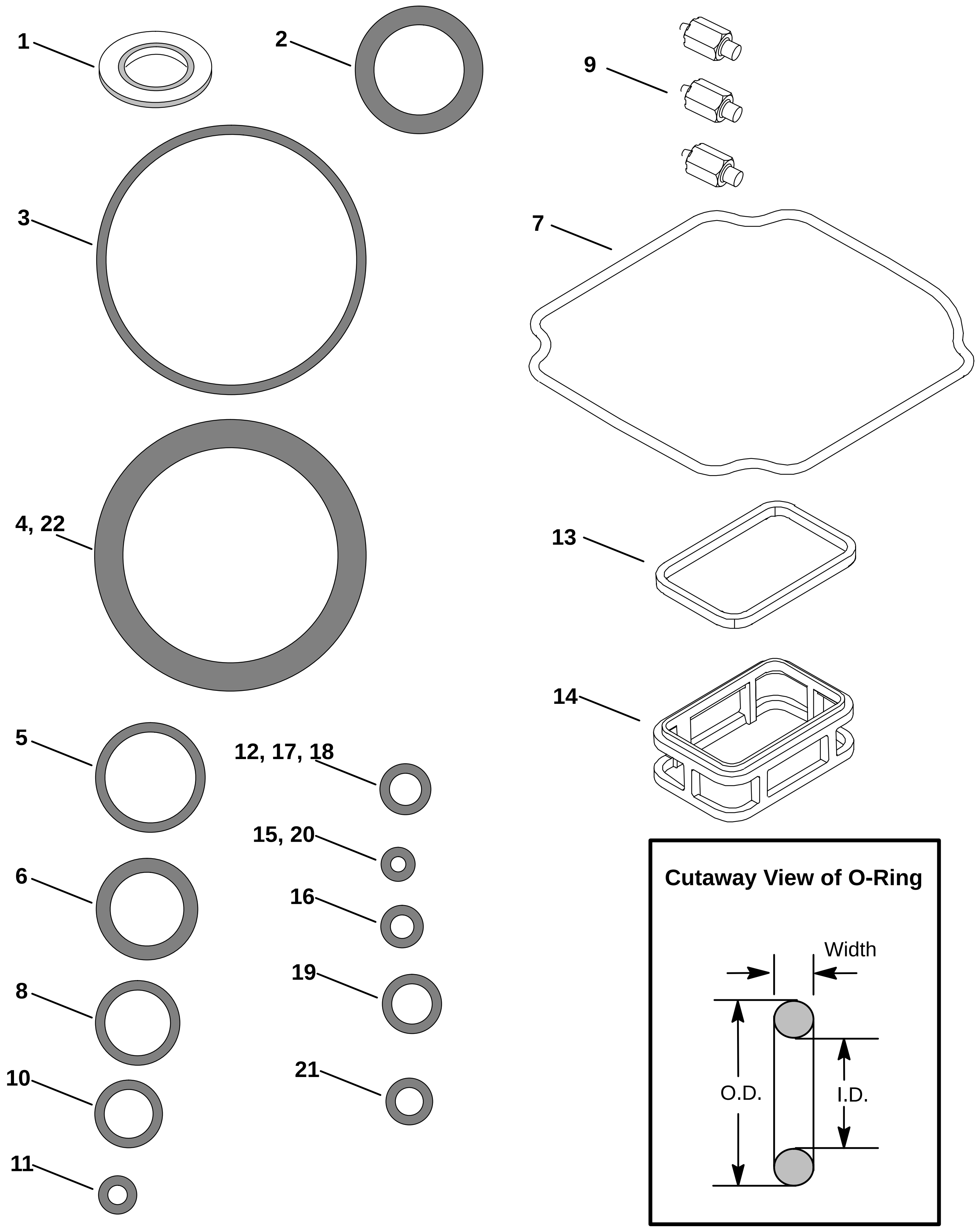
Reassembly

O-Ring and Seal Placement

O-Rings and Seals are part of O-Ring Kit 25-809880A1.



O-Ring Sizes



O-RINGS SHOWN ARE ACTUAL SIZE

O-Ring Description and Sizes

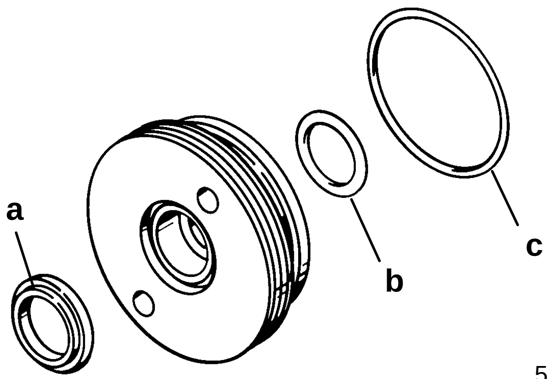
O-Ring	Description	O-Ring I.D.	O-Ring O.D.	O-Ring Width
1	Wiper Ring			
2	Cyl. Cap, Inner	0.671 in. (17.04 mm)	0.949 in. (24.10 mm)	0.139 in. (3.53 mm)
3	Cyl. Cap	1.864 in. (47.34 mm)	2.004 in. (50.90 mm)	0.07 in. (1.78 mm)
4	Shock Piston	1.6 in. (40.64 mm)	2.02 in. (53.086 mm)	0.21 in. (5.334 mm)
5	Piston Bolt	0.676 in. (17.17 mm)	.816 in. (20.726 mm)	0.07 in. (1.78 mm)
6	Reservoir Plug	0.549 in. (13.94 mm)	0.755 in. (19.17 mm)	0.103 in. (2.616 mm)
7	Motor Seal			
8 (2)	P.O. Check Plug	0.489 in. (12.42 mm)	0.629 in. (15.97 mm)	0.07 in. (1.78 mm)
9 (3)	Poppet Assy.			
10 (2)	P.O. Check Seat	0.364 in. (9.25 mm)	0.504 in. (12.80 mm)	0.07 in. (1.78 mm)
11 (2)	Pump Port	0.145 in. (3.683 mm)	0.285 in. (7.239 mm)	0.07 in. (1.78 mm)
12	Suction Seat	0.239 in. (6.07 mm)	0.379 in. (9.626 mm)	0.07 in. (1.78 mm)
13	Filter Seal			
14	Filter			
15	Manual Release	0.114 in. (2.90 mm)	0.254 in. (6.451 mm)	0.07 in. (1.78 mm)
16	Manual Release	0.176 in. (4.47 mm)	0.316 in. (8.026 mm)	0.07 in. (1.78 mm)
17	Manual Release	0.239 in. (6.07 mm)	0.379 in. (9.626 mm)	0.07 in. (1.78 mm)
18	Spool	0.239 in. (6.07 mm)	0.379 in. (9.626 mm)	0.07 in. (1.78 mm)
19 (3)	Spool Housing	0.301 in. (7.645 mm)	0.441 in. (11.20 mm)	0.07 in. (1.78 mm)
20	Trim Limit Spool	0.114 in. (2.895 mm)	0.254 in. (6.451 mm)	0.07 in. (1.78 mm)
21 (2)	Manifold	0.208 in. (5.283 mm)	0.348 in. (8.839 mm)	0.07 in. (1.78 mm)
22	Memory Piston	1.6 in. (40.64 mm)	2.02 in. (53.086 mm)	0.21 in. (5.334 mm)

Power Trim Reassembly

IMPORTANT: Lubricate all O-rings with Quicksilver Power Trim Fluid (92-90100A12). If not available, use automotive (ATF) automatic transmission fluid.

Shock Rod Reassembly

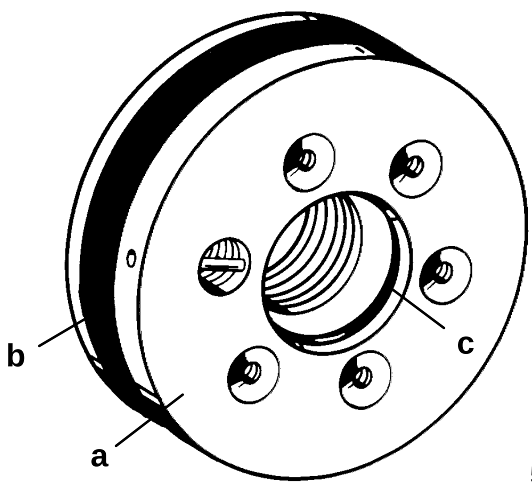
1. Install lubricated O-rings to end cap.
2. Install rod wiper.



51145

a - Rod Wiper
b - Inner O-ring
c - Outer O-ring

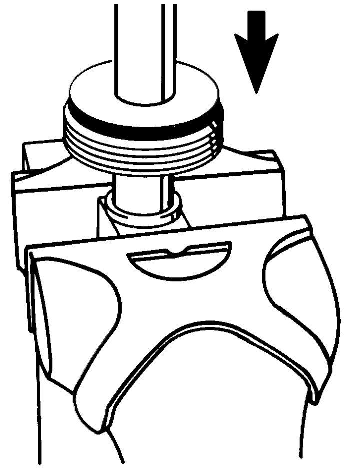
3. Install lubricated O-rings to shock piston.



51199

a - Shock Piston
b - O-ring
c - O-ring

4. Clamp shock rod in soft jawed vise.
5. Position cylinder end cap onto rod as shown.

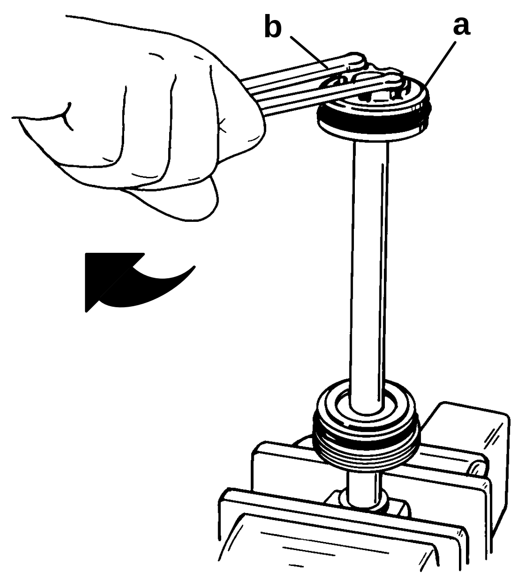


51146

⚠ CAUTION

When installing shock rod piston, spanner wrench must have 1/4 in. x 5/16 in. (6.4mm x 8mm) long pegs to avoid damage to shock rod piston.

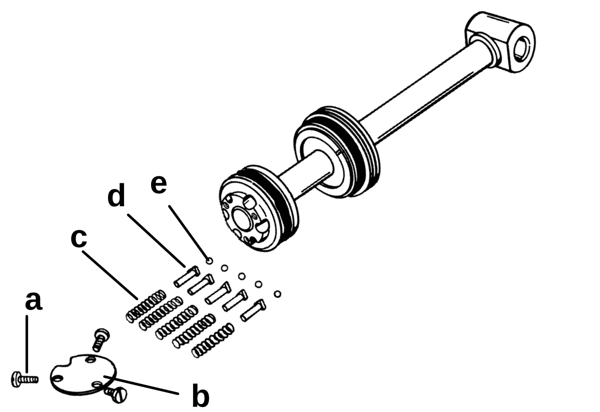
6. Apply Loctite Grade 271 to threads on shock rod.
7. Install shock rod piston.
8. Tighten shock rod piston securely using spanner wrench (1/4 in. x 5/16 in. long pegs). If a torquing type spanner tool is used to tighten shock piston, then torque to 90 lb. ft. (122 N·m).



51146

a - Shock Rod Piston - Torque to 90 lb. ft. (122 N·m)
b - Spanner Wrench

9. Remove shock rod assembly from vise.
10. Install ball, seat, and spring (five sets) to shock rod piston.
11. Secure components with plate. Torque screws to 35 lb. in. (4.0 N·m).

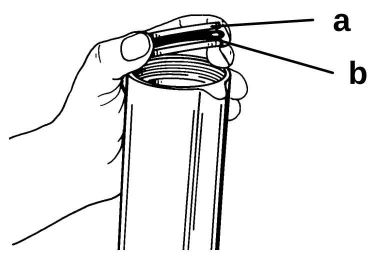


51147

a - Screw (3) Torque to 35 lb. in. (4.0 N·m)
b - Plate
c - Spring (5)
d - Seat (5)
e - Ball (5)

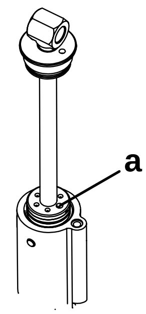
Shock Rod Installation

1. Place trim cylinder in soft jawed vice.
2. Install lubricated O-ring to memory piston and place into cylinder. Push memory piston all the way to bottom.



a - Memory Piston
b - O-ring

3. Fill cylinder three inches (76.2mm) from top of cylinder using Quicksilver Power Trim and Steering Fluid. If not available, use automotive (ATF) automatic transmission fluid.
4. Install shock rod into cylinder until power trim fluid flows through oil blow off ball passage. Fill remaining cylinder to just below the cylinder threads.

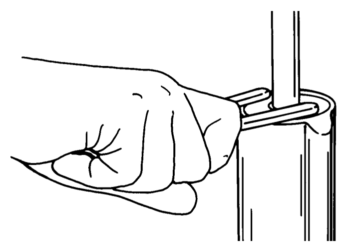


a - Oil Blow Off Ball Passage

⚠ CAUTION

End cap must not make contact with shock rod piston when tightening. Shock rod piston must be positioned in cylinder deep enough to avoid contact.

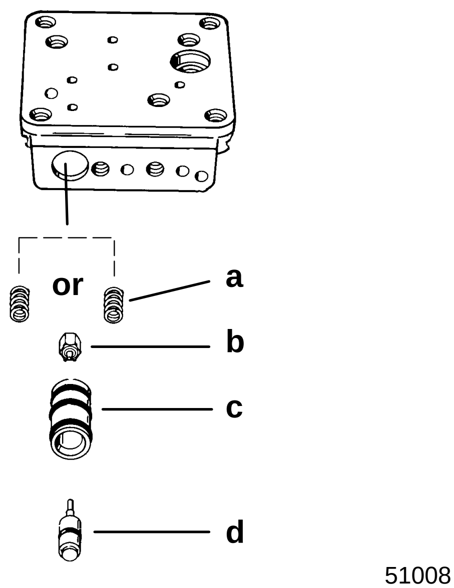
5. Tighten end cap securely using spanner wrench [1/4 in. x 5/16 in. (6.4mm x 8mm) long pegs].. If a torquing type spanner tool is used to tighten end cap, then torque to 45 lb. ft. (61.0 N·m).



Trim Limit Assembly Installation

1. Lubricate all O-rings. Install spring, poppet spool housing an trim limit spool into manifold.

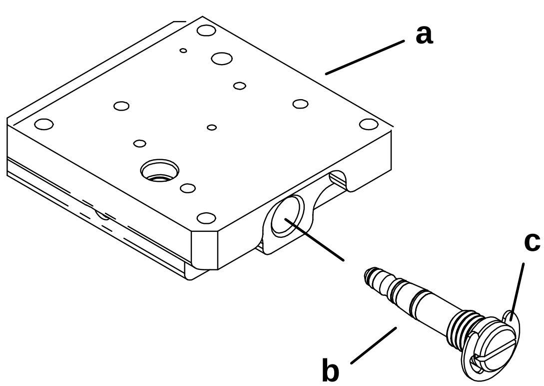
NOTE: *There are two different size springs used in this manifold. The heavy spring is used on 75 to 125 HP engines. The light spring is used on 40 to 60 HP engines.*



a - Spring
b - Poppet
c - Spool Housing
d - Trim Limit Spool

Manual Release Valve Installation

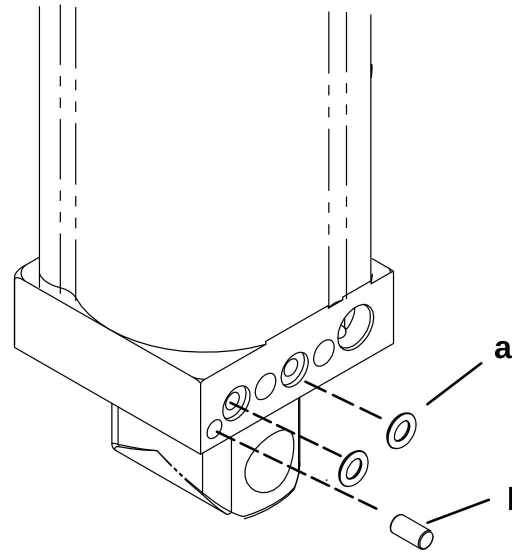
1. Install “E” clip (if removed) and lubricate O-rings to manual release valve.
2. Install manual release valve assembly into manifold.



a - Manifold
b - Manual Release Valve
c - E Clip

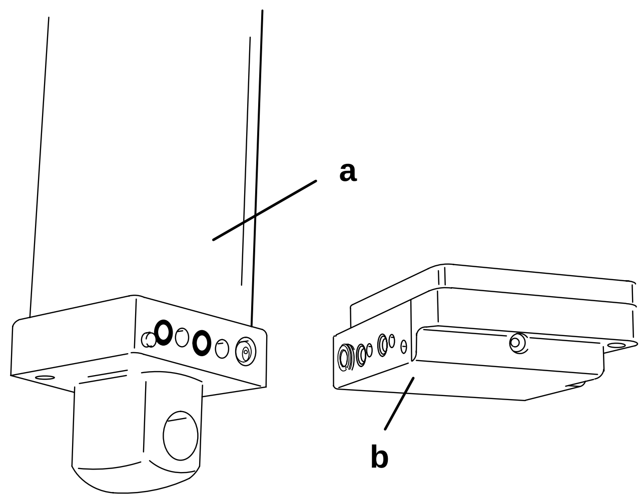
Manifold Installation

1. Install dowel pin and two (2) lubricated O-rings into trim cylinder.



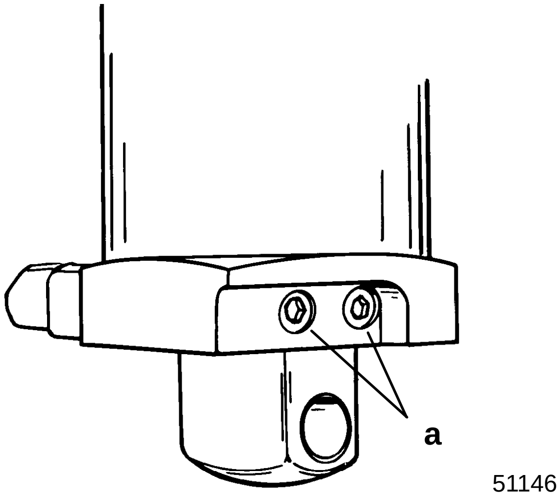
a - O-Ring (2)
b - Dowel Pin

2. Align the trim cylinder and pump/reservoir assembly together.



a - Trim Cylinder Assembly
b - Reservoir/Manifold Assembly

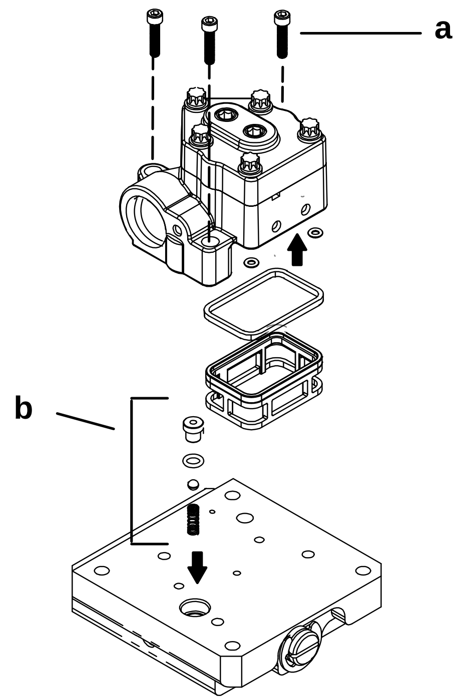
3. Install the two (2) long screws and torque to 100 lb. in. (11.3 N·m).



a - Screw (2) Torque to 100 lb. in. (11.3 N·m)

Oil Pump Installation

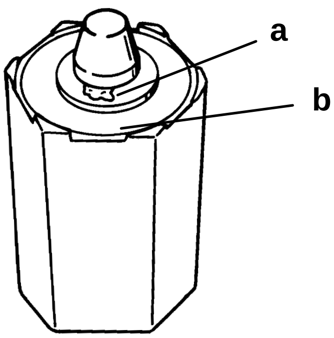
1. Install spring, ball, lubricated O-ring and plastic seat to manifold.
2. Check to see that O-rings are placed on bottom of pump.
3. Install filter and filter seal under pump. Install pump onto manifold. Torque screws to 70 lb. in. (7.9 N·m).



a - Screw (3) Torque to 70 lb. in. (7.9 N·m)
b - Suction Seat Assembly

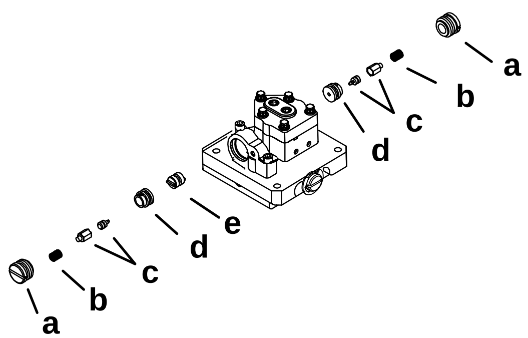
Pressure Operated Assembly Installation

IMPORTANT: Inspect poppet assembly for debris in the area shown. If debris is found on poppet replace poppet.



a - Debris Under Valve Tip
b - Rubber Seat

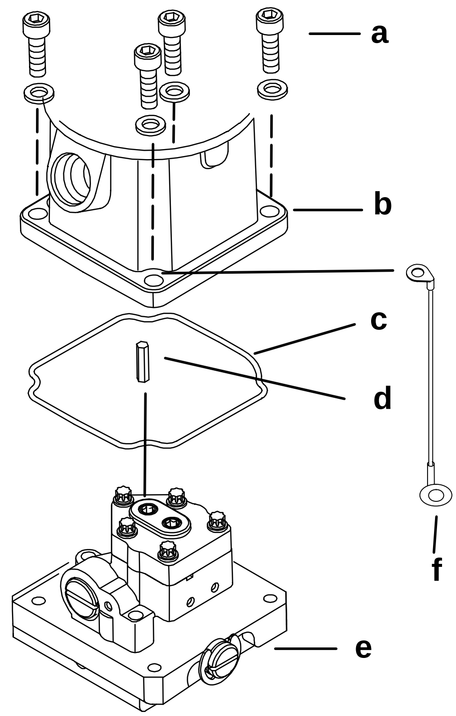
1. Lubricate O-rings.
2. Install spool, seat with O-ring, check valve/poppet, spring and plug with O-ring into pump. Repeat for other side. Torque plugs to 120 lb. in. (13.6 N·m).



a - Plug (2) Torque to 120 lb. in. (13.6 N·m)
b - Spring (2)
c - Check Valve/Poppet (2)
d - Seat (2)
e - Spool

Reservoir/Motor Installation

1. Install coupler into top of pump. Make sure reservoir seal is in the reservoir groove and place reservoir onto pump/manifold assembly. Install ground strap under screw shown. Torque screws to 80 lb. in. (9.0 N·m).

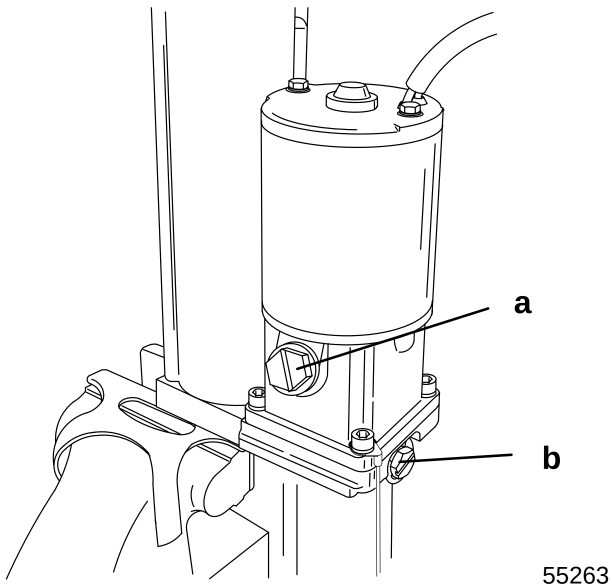


a - Screw (4) Torque to 80 lb. in. (9.0 N·m)
b - Reservoir
c - Reservoir Seal
d - Coupler
e - Manifold Assembly
f - Ground Strap

2. Fill reservoir to bottom of fill hole using Quicksilver Power Trim Fluid (92-901000A12). If not available, use automotive (ATF) automatic transmission fluid.

Bleeding Power Trim Unit

1. Secure power trim unit in soft jawed vise.
2. Add power trim fluid until its even with the bottom of the fill hole. Reinstall plug.
3. Close the manual release valve. (Turn full clockwise).

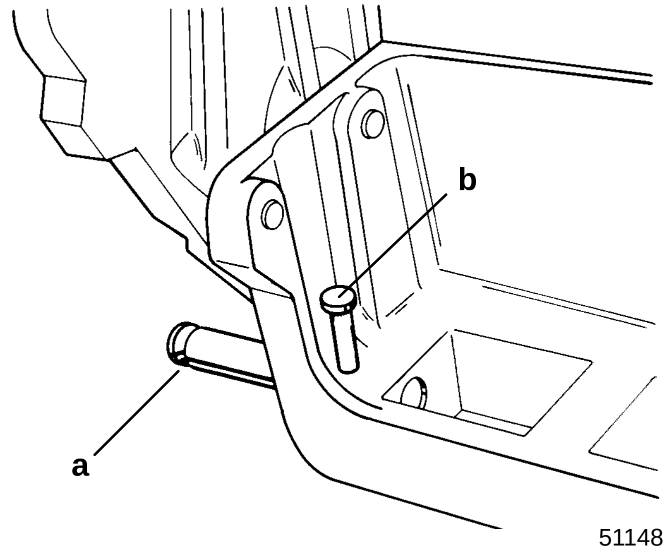


a - Reservoir Plug/Fill Hole
b - Manual Release Valve

4. Using a 12 volt power supply, connect the positive lead to (BLUE) trim motor wire and negative lead to (GREEN) trim motor wire and drive shock rod to the up position. Repeat for three times.
5. Connect the positive lead to the (GREEN) trim motor wire, and the negative lead to the (BLUE) trim motor wire and drive the shock rod to the down position.
6. Recheck fluid level, add fluid if required and repeat cycle until fluid level stays even with the bottom of the fill hole.

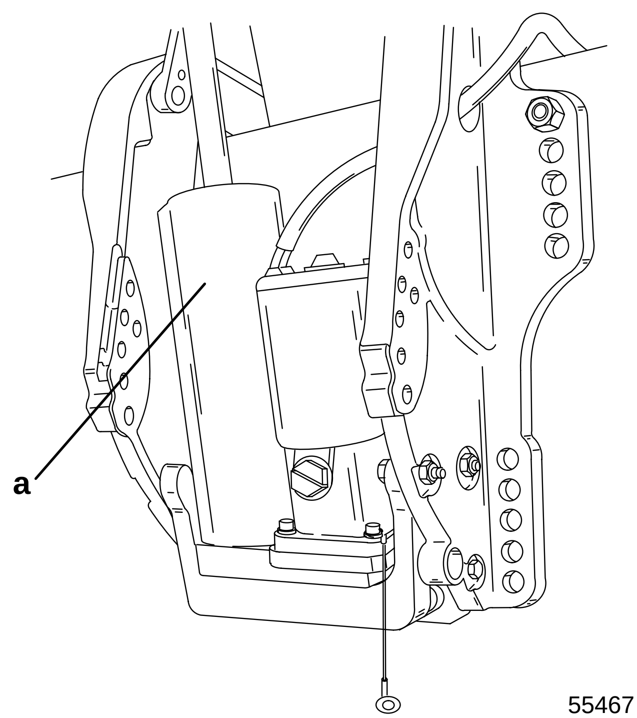
Installation of Power Trim System

1. Lubricate lower pivot pin, mounting holes with 2-4-C w/Teflon Marine Lubricant.
2. Start lower pivot pin into pivot pin bore and position lower dowel pin (Retained) in its respective hole.



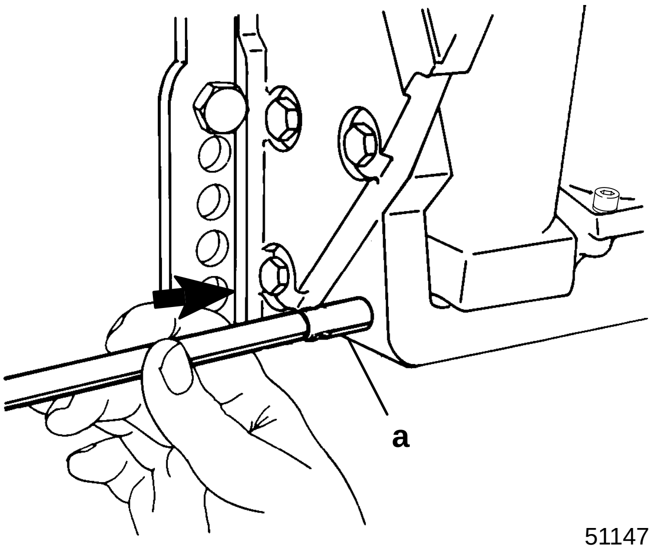
a - Lower Pivot Pin
b - Lower Dowel Pin

3. Position trim cylinder assembly (Bottom First) between clamp brackets.



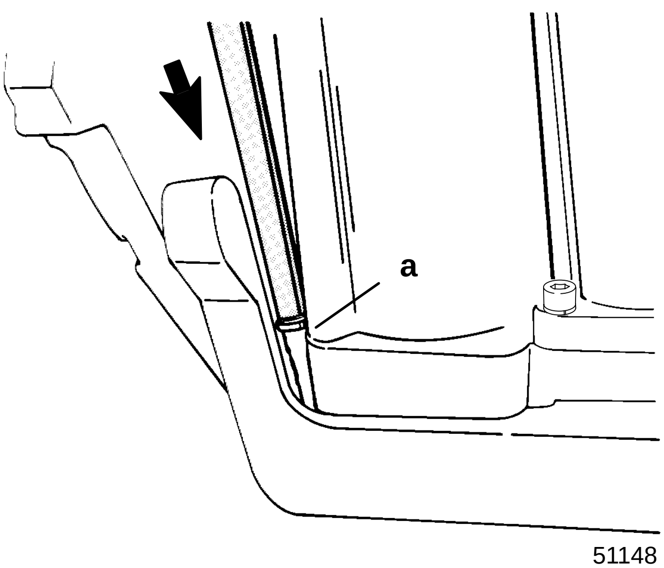
a - Trim Cylinder Assembly

4. Apply 2-4-C w/Teflon Marine Lubricant (92-90018A12) to lower pivot pin. Using a suitable punch, drive lower pivot pin into clamp bracket and trim cylinder assembly until pivot pin is flush with outside surface.



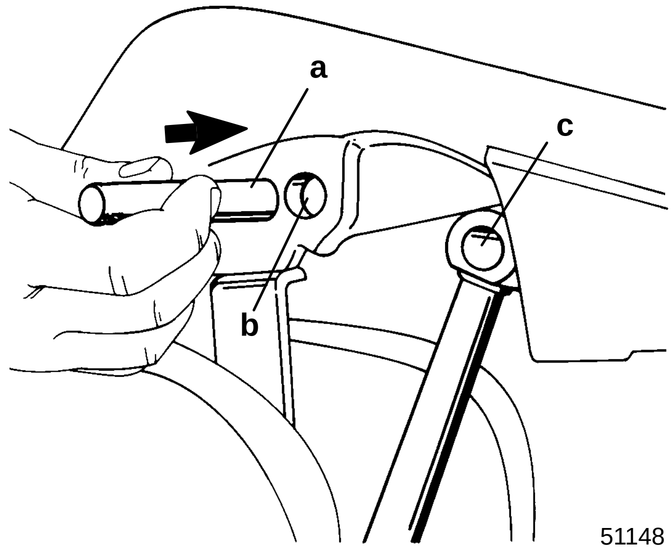
a - Lower Pivot Pin

5. Using a suitable punch, drive lower dowel pin into its hole until seated.



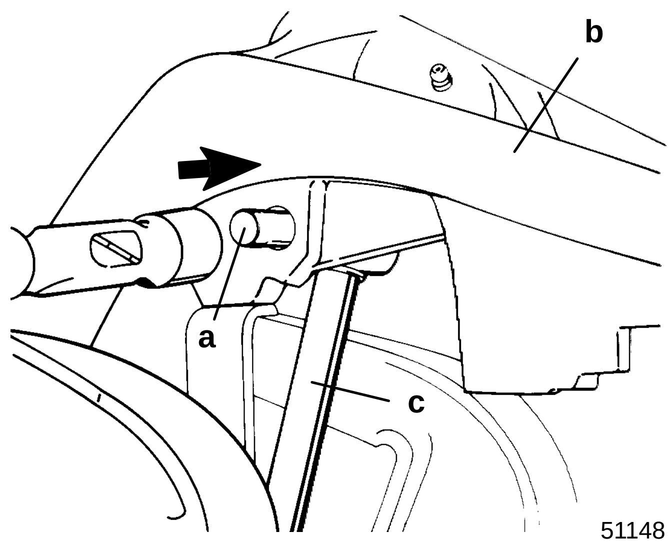
a - Lower Dowel Pin

6. Apply 2-4-C Marine Lubricant (92-90018A12) to surface of upper pivot pin, pivot pin bore and trim ram bore.



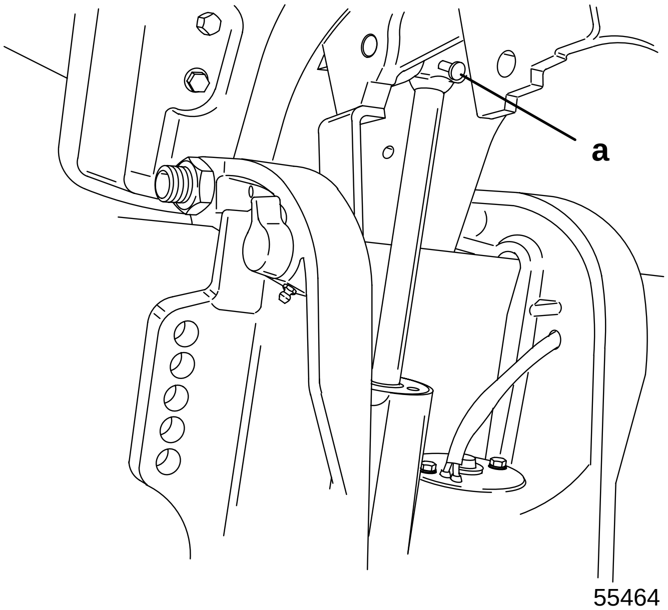
a - Pivot Pin
b - Pivot Pin Bore
c - Trim Ram Bore

7. Using a suitable mallet, drive upper pivot pin into swivel bracket and through trim ram until pivot pin is flushed with swivel bracket.



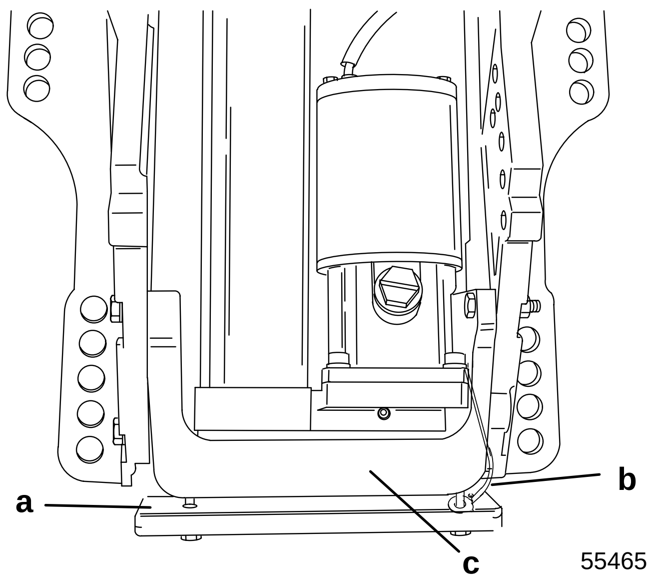
a - Pivot Pin
b - Swivel Bracket
c - Trim Ram

8. Drive trilobe pin (a) into its hole until seated.



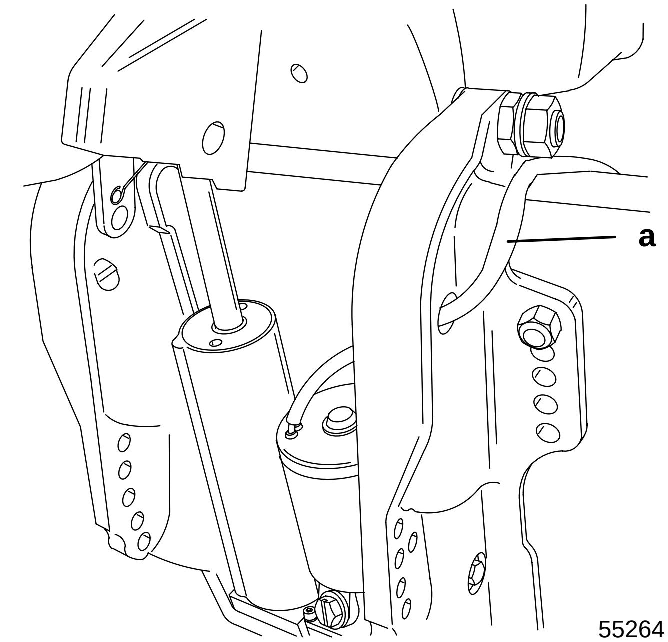
a - Trilobe Pin

9. Install sacrificial aluminum anode to reservoir bracket placing ground strap between bracket and anode as shown.



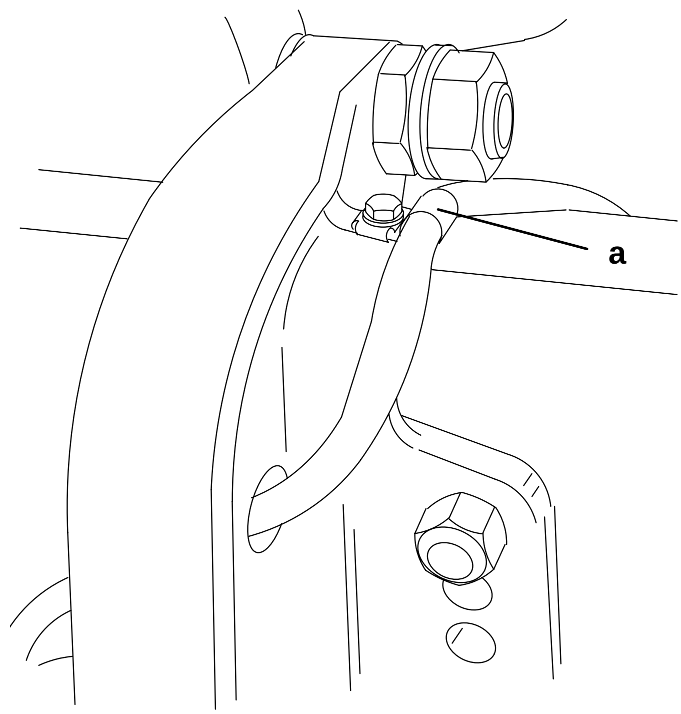
a - Sacrificial Anode
b - Ground Strap
c - Bracket

10. Route trim harness through clamp bracket and cowling.



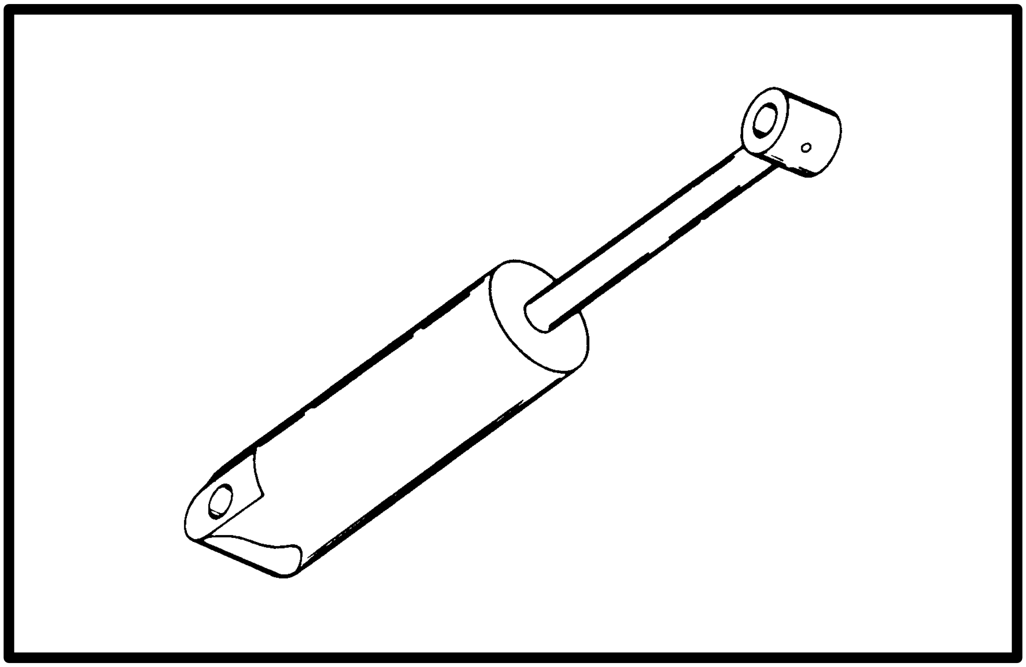
a - Trim Harness

11. Secure trim harness with clamp as shown.



a - Clamp

MID-SECTION



SHOCK ABSORBER

5

D

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Removal

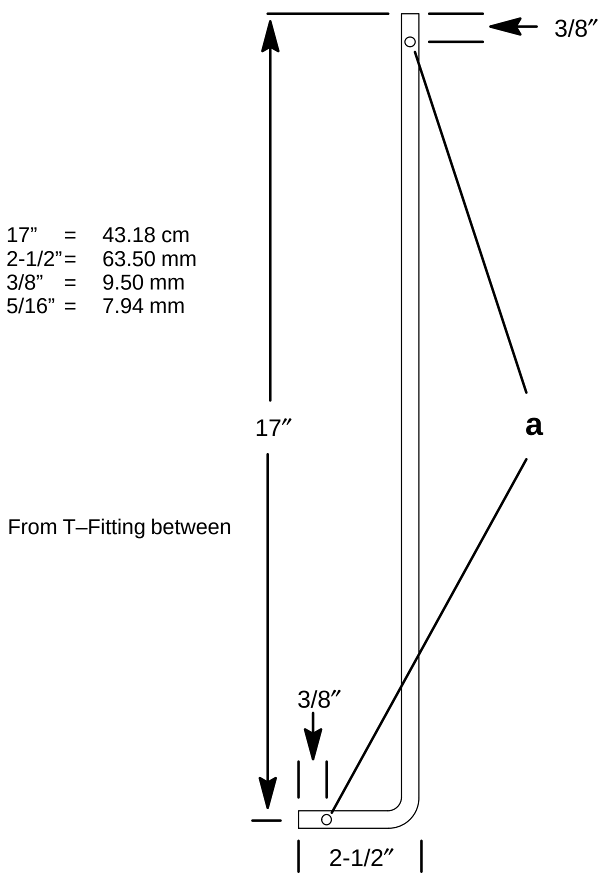
1. Tilt engine to full “UP” position and engage tilt lock lever.

⚠ WARNING

Failure to support engine as shown could result in personal injury and/or damage to engine or boat.

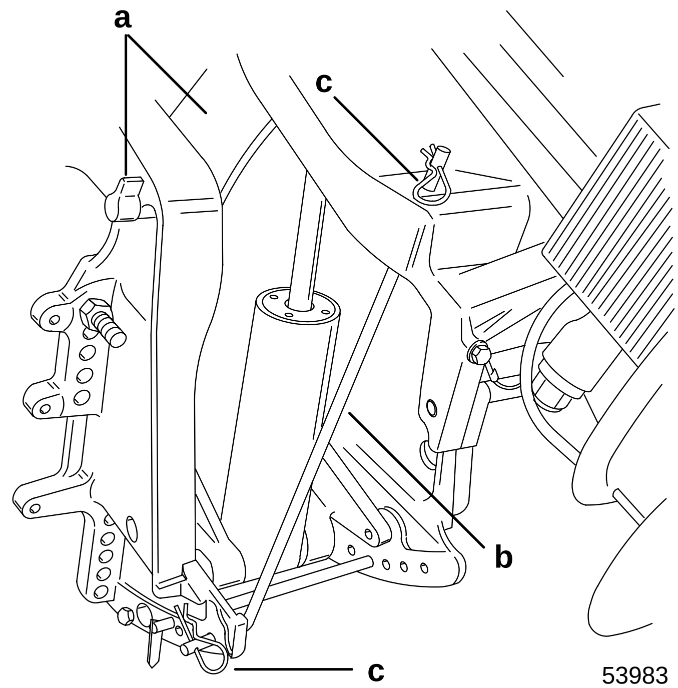
IMPORTANT: Support engine with tool as shown, to prevent engine from tipping over center into boat when retaining pin is removed.

SUPPORT TOOL



Use a metal rod (5/16” diameter) to make support tool.

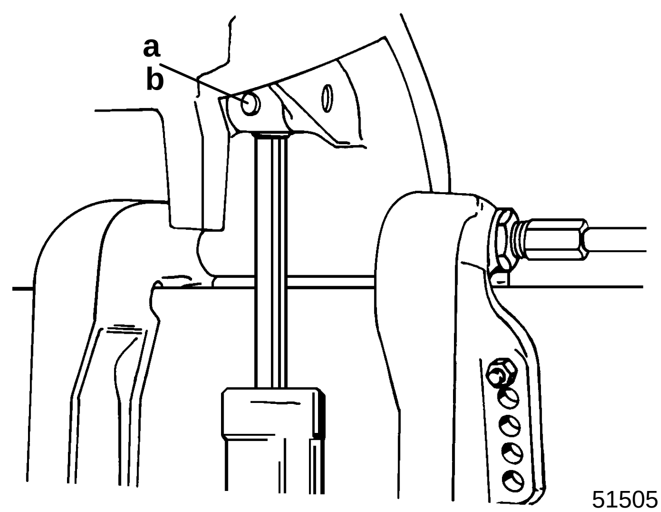
a - Drill Holes for Retaining Clips



a - Tilt Lock Lever
b - Support Tool
c - Retaining Clips

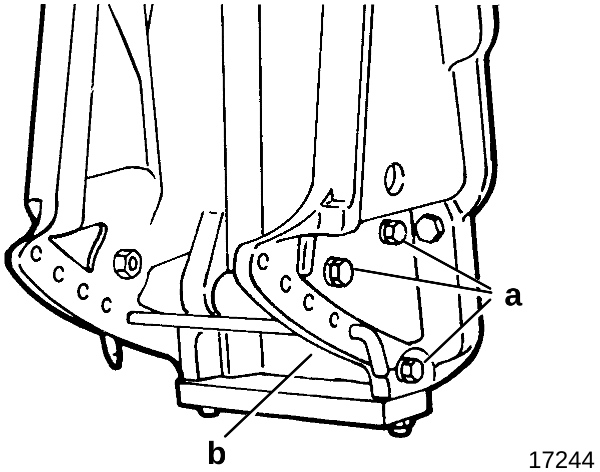
2. To remove tilt pin when straight cross pin is installed, use a punch and hammer to drive out tilt pin (shearing cross pin) and remove halves of sheared cross pin.
3. To remove tilt pin when headed cross pin is installed, use diagonal cutters to pry cross pin out of tilt pin. Push out tilt pin.

IMPORTANT: Cross pin should not be reused after removal. Replace with a new pin.



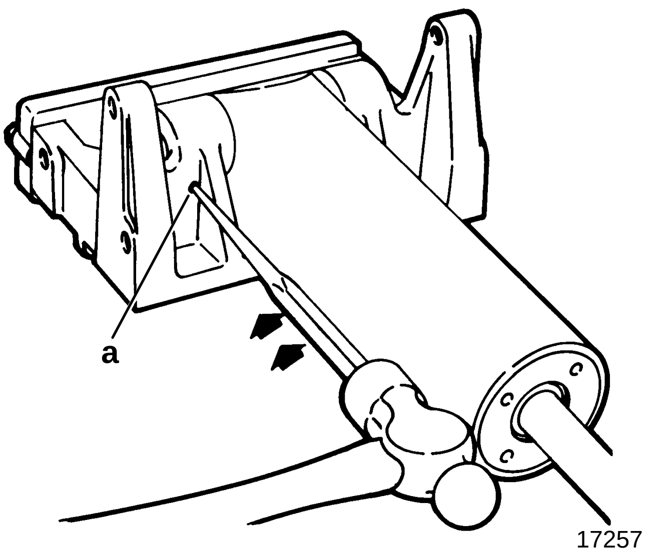
a - Cross Pin (Design 1 - Straight)
b - Cross Pin (Design 2 - Headed)

4. Support lower mount bracket and remove (6) bolts.



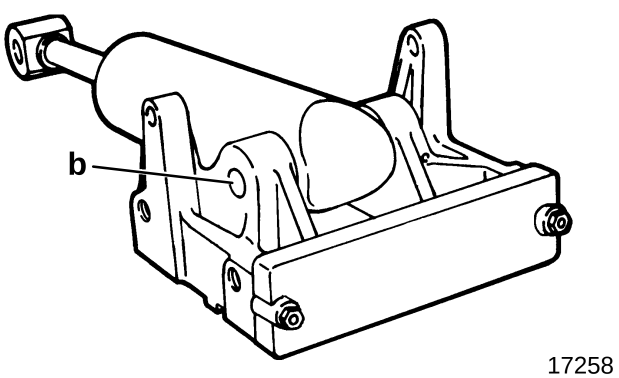
a - Bolts (3 Each Side)
b - Lower Mount Bracket

5. Remove shock absorber from lower mount bracket by driving out cross pin using a punch and hammer.



a - Cross Pin

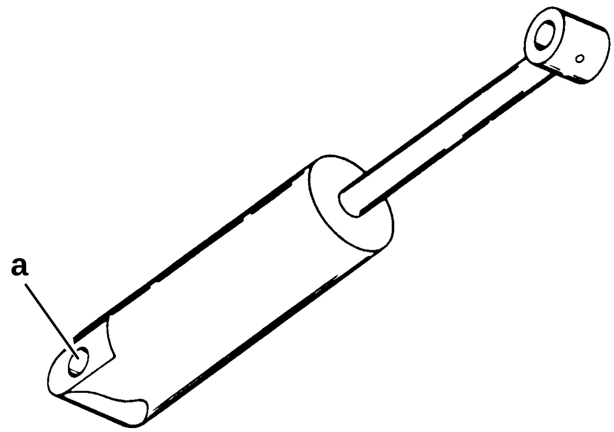
6. Push out retaining pin.



b - Retaining Pin

Inspection and Repair

1. Inspect bushings and replace if worn.



a - Bushings

⚠ CAUTION

The shock absorber is pressurized with gas. Do not disassemble unless fluid is leaking from shock absorber.

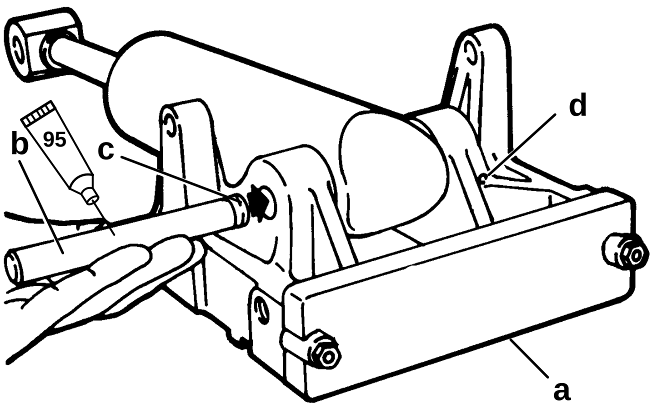
NOTE: *A pressurized shock absorber makes tilting of the engine easier than a non-pressurized shock absorber.*

If the shock absorber leaks fluid it can be rebuilt by installing “Shock Absorber Repair Kit” (P/N 41760A2), however, the shock absorber will no longer be pressurized and the force needed to tilt the engine will be increased to that of a non-pressurized shock absorber. Instructions are supplied with kit.

If the shock absorber leaks fluid and a pressurized shock absorber is desired, replace shock absorber as an assembly.

Installation

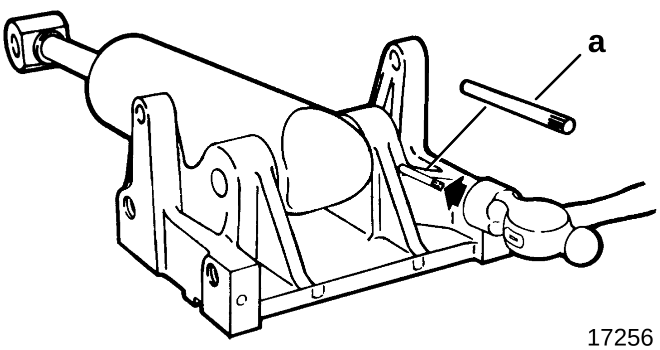
1. Remove anode plate. Lubricate retaining pin with Quicksilver 2-4-C w/Teflon. Place shock absorber into lower mount bracket, as shown, and install retaining pin so that groove aligns with hole.



95 2-4-C With Teflon (92-825407A12) 17255

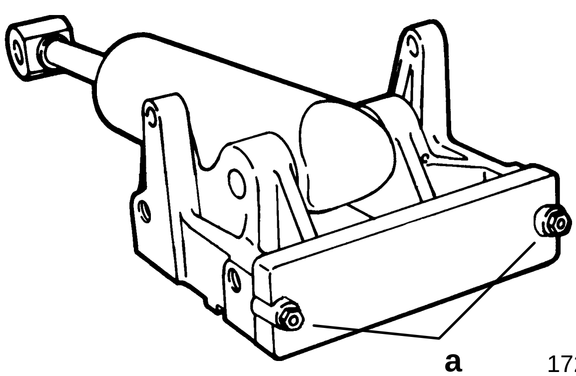
a - Anode Plate
b - Retaining Pin
c - Groove
d - Cross Pin Hole

2. Drive cross pin (flush) into lower mount bracket, as shown and reinstall anode plate. Secure anode with 2 bolts and washers. Torque bolts to 60 lb. in. (6.8 N·m).



17256

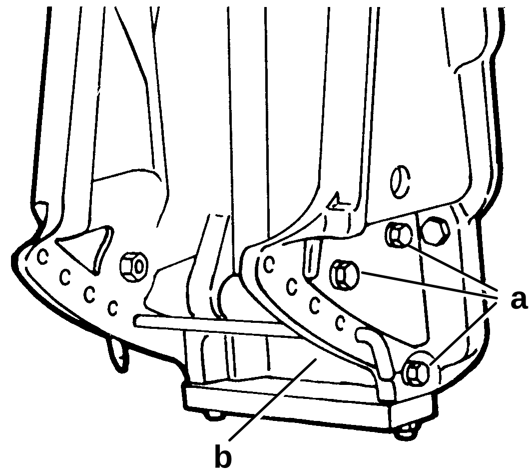
a - Cross Pin



17258

a - Bolts [Torque to 60 lb. in. (6.8 N·m)]

3. Reinstall shock absorber assembly between clamp brackets and secure shock assembly to clamp brackets with 6 bolts and lockwashers (3 each clamp bracket). Torque bolts to 30 lb. ft. (40.7 N·m).

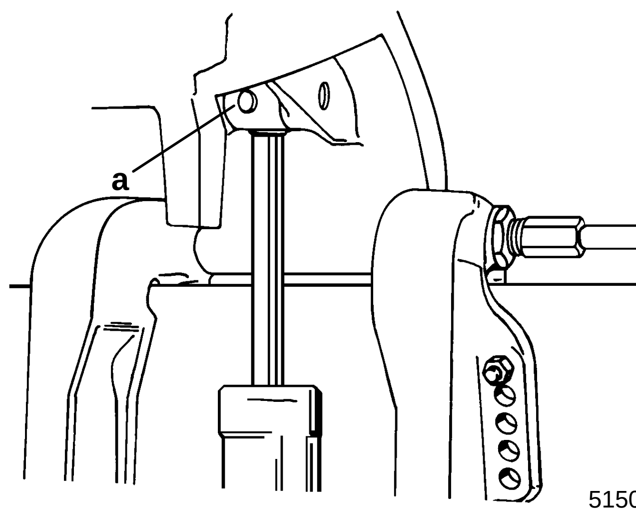


17244

a - Bolts [Torque to 30 lb. ft. (40.7 N·m)]
b - Shock Absorber Assembly

4. Reinstall tilt pin through swivel bracket and shock absorber eye.

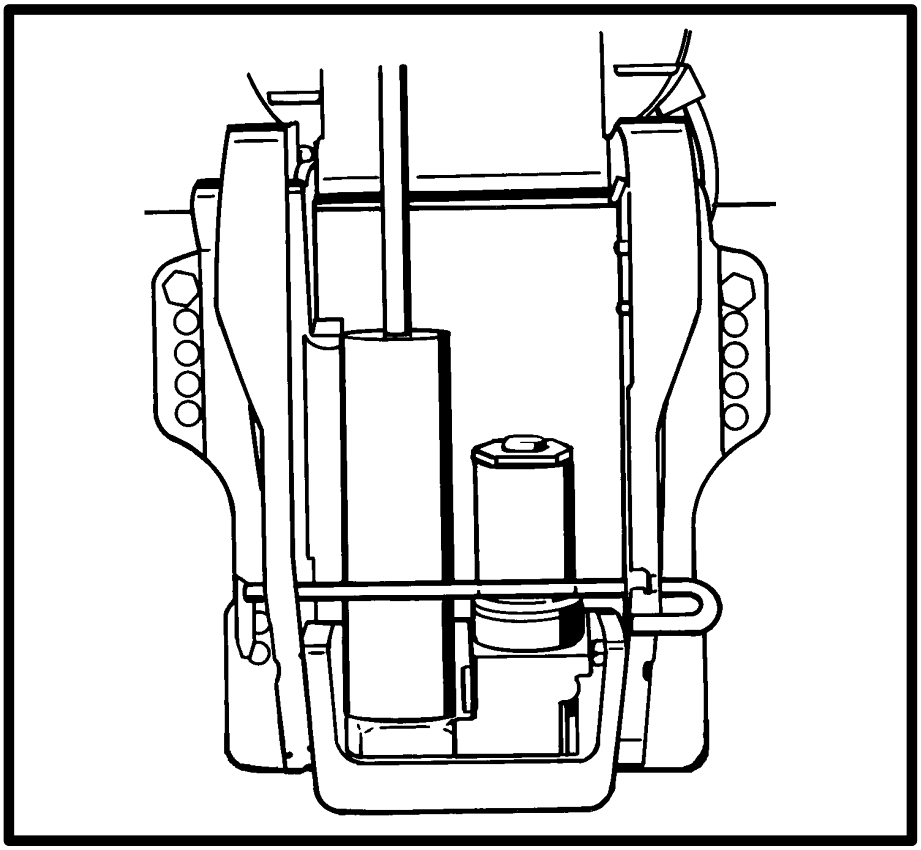
5. Install new cross pin securing shock to tilt pin.



51505

a - Cross Pin

MID-SECTION



MANUAL TILT

5
E

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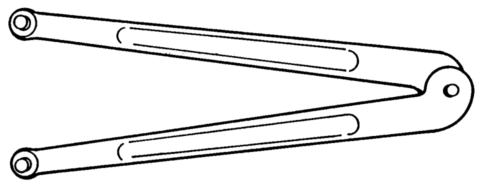
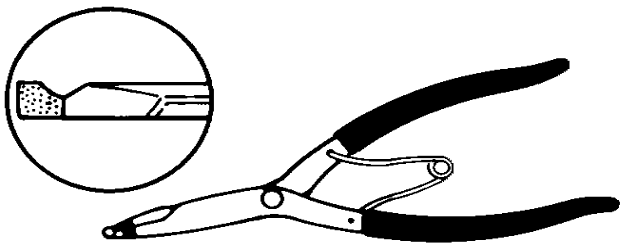
Special Tools

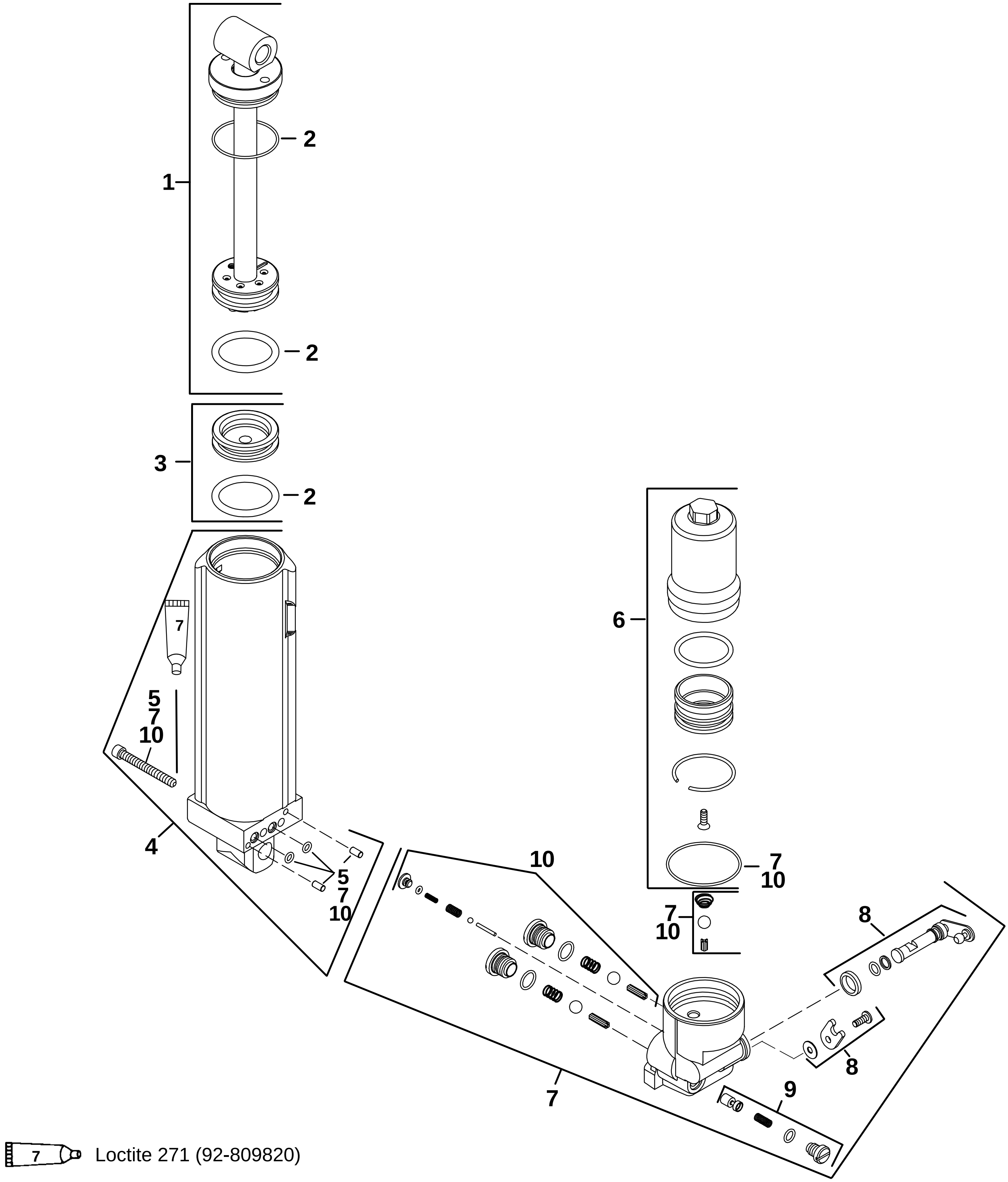
1. Spanner Wrench P/N 91-74951



2. Lock-Ring Pliers P/N 91-822778A3



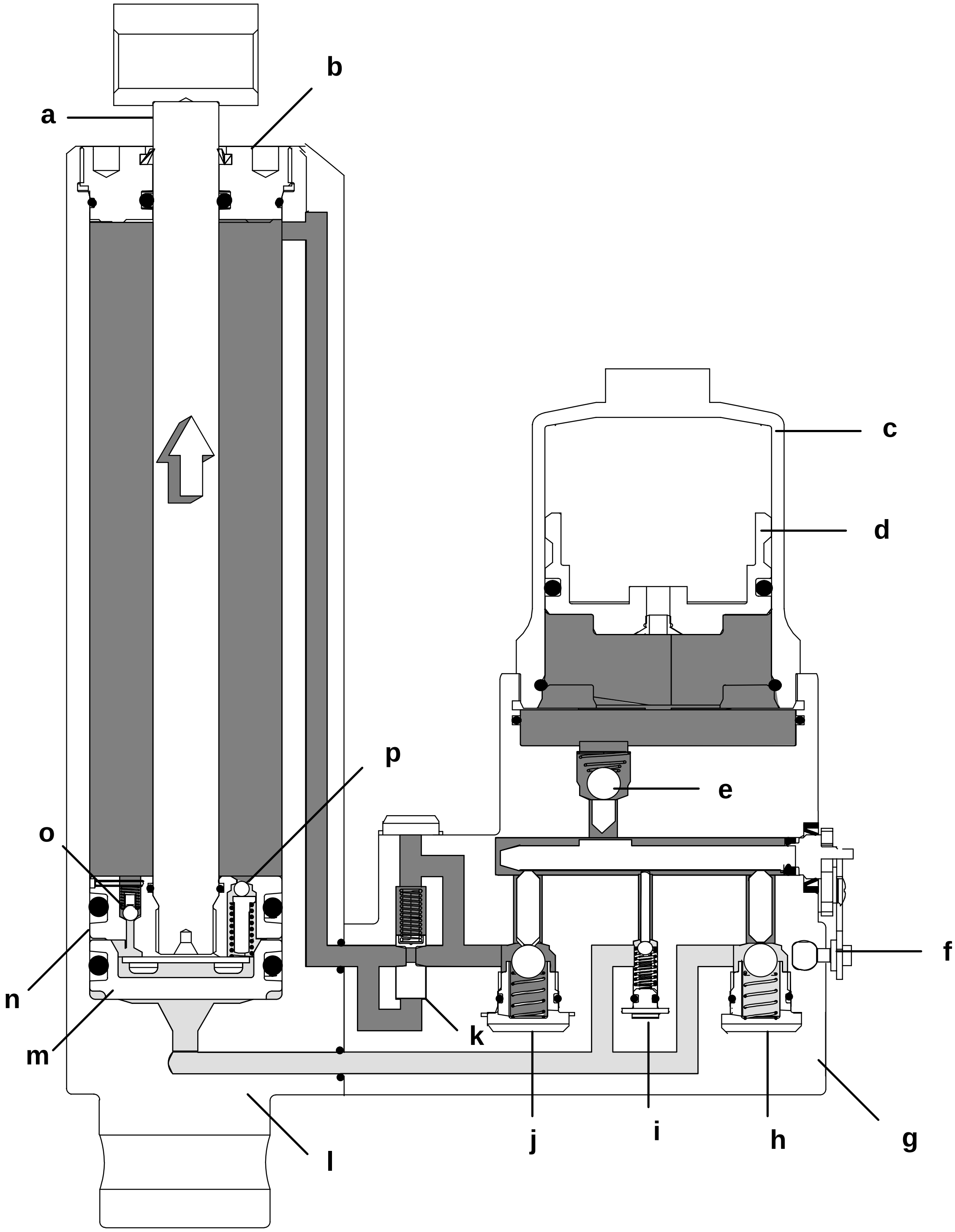
Manual Tilt Assist Components



Loctite 271 (92-809820)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	lb. ft.	N·m
–	1	TRIM PUMP ASSEMBLY			
1	1	SHOCK ROD ASSEMBLY			
2	1	O RING REBUILD KIT-Cylinder			
3	1	MEMORY PISTON ASSEMBLY			
4	1	CYLINDER ASSEMBLY			
5	1	SCREW AND SEAL KIT			
6	1	ACCUMULATOR ASSEMBLY			
7	1	VALVE BODY ASSEMBLY			
8	1	CAM KIT			
9	1	VELOCITY VALVE KIT			
10	1	CHECK SYSTEM REPAIR KIT			
–	1	O RING KIT			

Manual Trim Flow Diagrams - Up Circuit



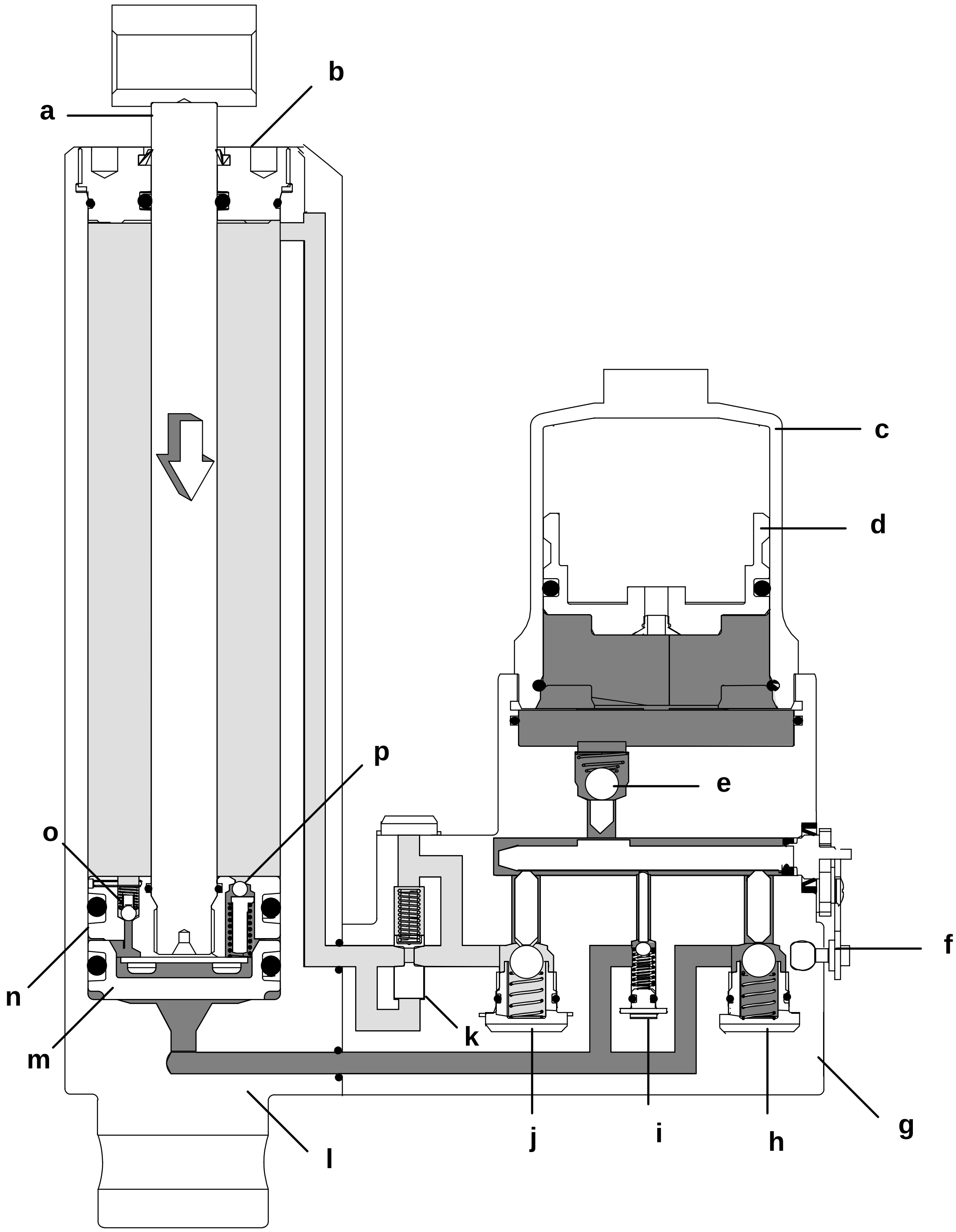
a - Shock Rod
b - End Cap
c - Accumulator
d - Accumulator Piston
e - Accumulator Check Valve
f - Camshaft Lever
g - Manifold
h - Down Fast Transfer Valve

i - Down Slow Transfer Valve
j - Up Fast Transfer Valve
k - Surge Valve
l - Cylinder
m - Memory Piston
n - Shock Piston
o - Shock Return Valve
p - Impact Relief Valve

Tilt Up

With the engine in the down position, the accumulator piston (d) will be at the top of the accumulator (c) with the gas at maximum pressure. To raise the engine, the camshaft lever (f) is rotated all the way down. The internal shaft connected to the camshaft lever will move the push rods, opening the accumulator check valve (e), both fast transfer valves (h & j) and the down slow transfer valve (i). As the operator lifts the engine; oil, under pressure inside the accumulator, will flow around both the slow transfer valve (i) and the down circuit fast transfer valve (h). Oil flows into the bottom of the tilt cylinder forcing the memory piston (m) into the shock piston (n) and then forcing the shock rod up and out. Oil above the shock piston exits the cylinder (l) through an interconnecting passage along side of the cylinder and returns into the manifold (g). Inside the manifold the oil flows past the groove in the surge valve (k), through the transfer valve (j) and mixes with the oil flowing from the accumulator into the up cavity. With the engine in the correct position, the camshaft lever (f) is rotated up and the push rods allow the check valves (e, h, i, & j) to close. The closed check valves prevent the oil from traveling between cavities and locks the engine into position.

Down Circuit



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l - Cylinder
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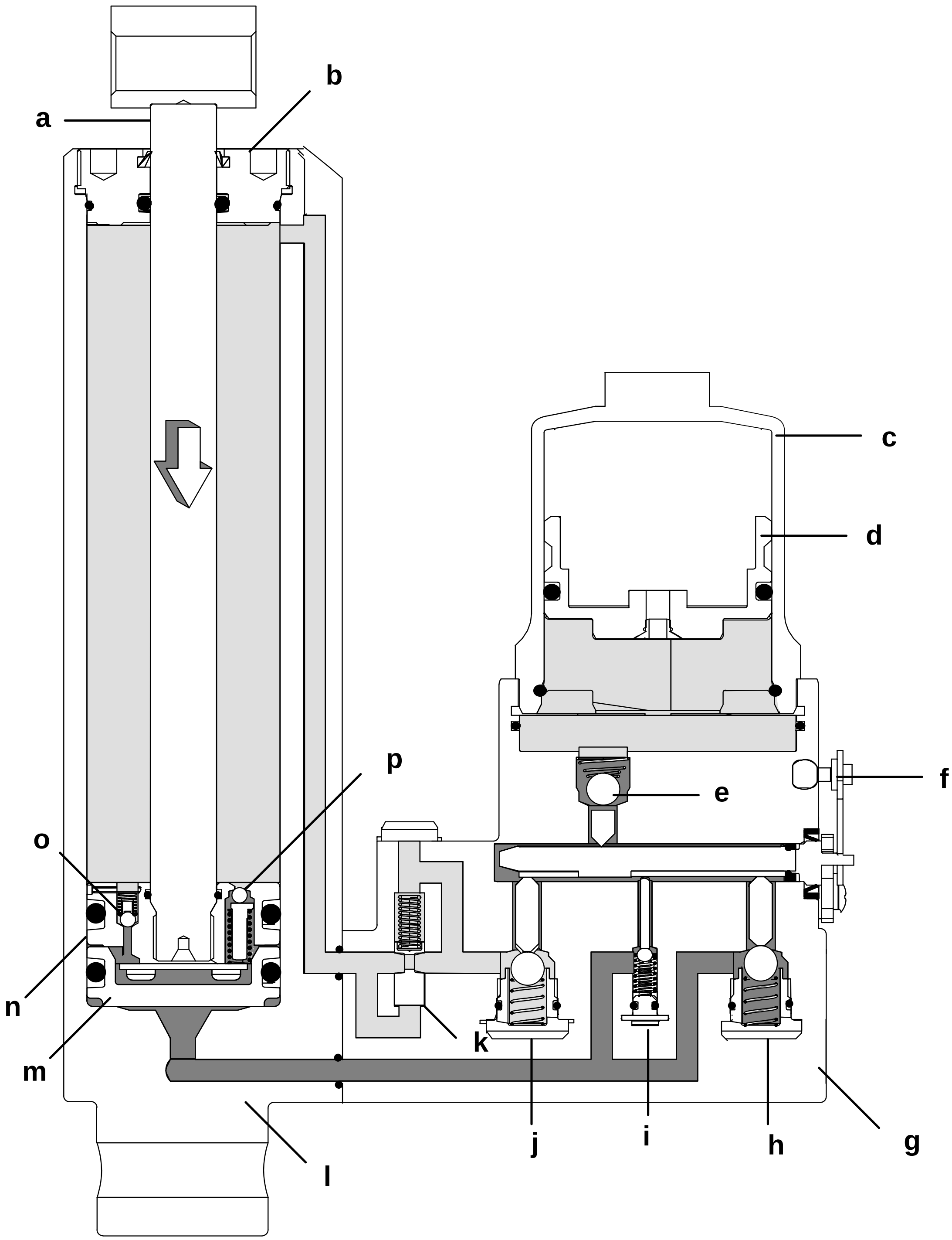
n - Shock Piston
o - Shock Return Valve
p - Impact Relief Valve

Tilt Down

With the engine tilted up, the piston inside the accumulator piston (d) will be at the bottom of the accumulator (c) and the gas pressure is low. To lower the engine, the camshaft lever (f) is rotated down, the internal cam will cause the push rods to open the accumulator check valve (e), both fast transfer valves (h & j) and the down slow transfer valve (i). The operator will have to press down on the engine cowl to overcome the pressure inside cylinder. Fluid will flow out of the bottom of the cylinder, past both the down fast transfer valve (h) and down slow transfer valve (i). Fluid will flow past the up fast transfer valve (j), surge valve (k) and through the interconnecting passage into the top of the cylinder (l). Due to the shock rod (a), the tilt cylinder cavities differ in volume, the extra fluid from the up cavity [forced into the accumulator (c)] will cause the internal accumulator piston (d) to compress the gas. With the engine in the correct position, the camshaft lever is rotated up and the push rods allow the check valves (e, h, i, & j) to close.

Slow Tilt Down Under High Thrust



a - Shock Rod
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e - Accumulator Check Valve
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k - Surge Valve
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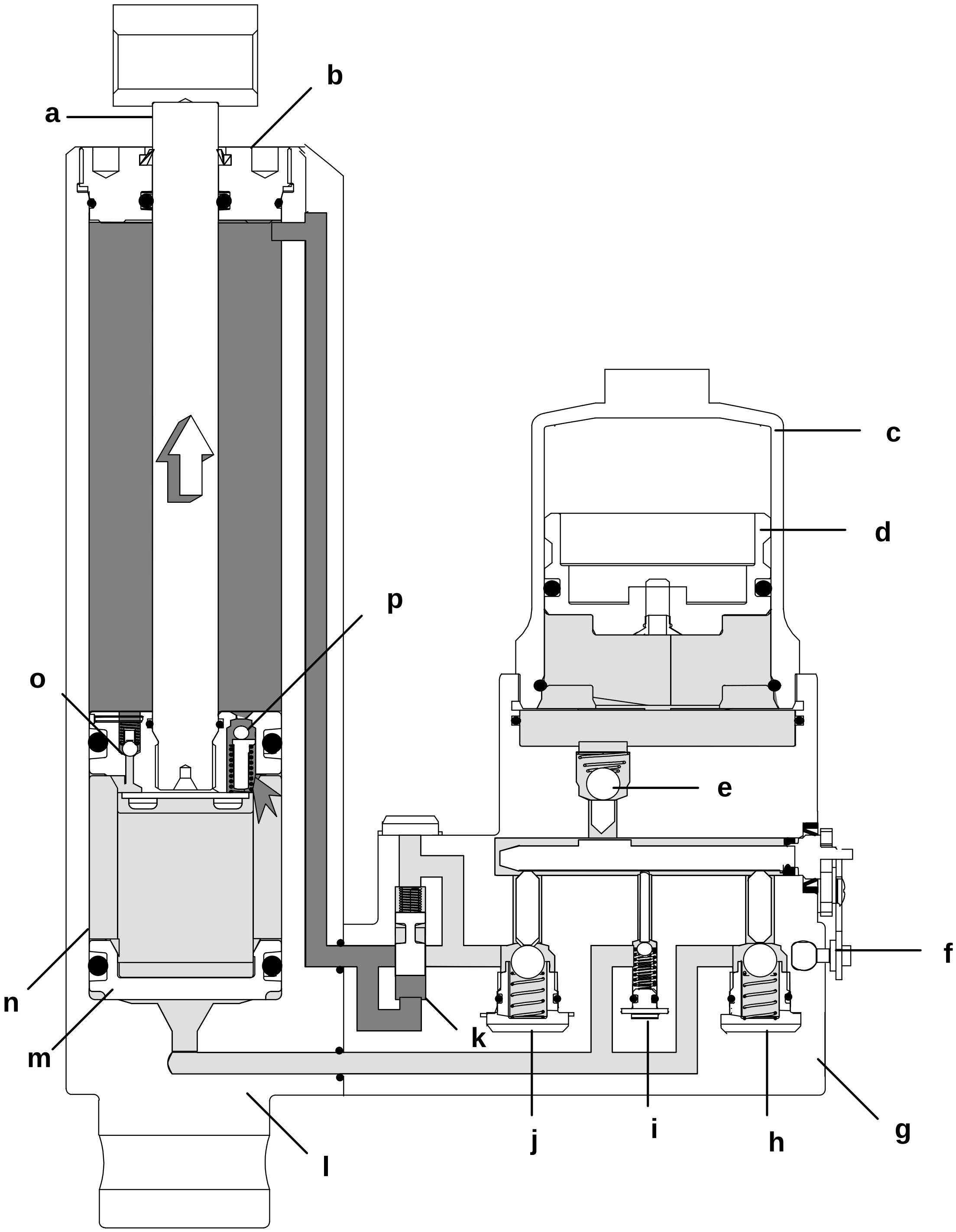
n - Shock Piston
o - Shock Return Valve
p - Impact Relief Valve

Slow Tilt Down Under High Thrust

To tilt the engine down under high thrust conditions [where the propeller thrust forces the shock rod down, creating higher pressure below the memory piston (m)] the camshaft lever (f) is rotated slightly downward. The internal shaft connected to the lever will open the down slow transfer valve (i) allowing oil under pressure into the cavity around the shaft. The higher oil pressure will open the up fast transfer valve (j) allowing oil from the bottom of the cylinder to flow above the shock piston (n) while lowering the engine. Additional oil will flow into the accumulator (c) as the internal pressure forces the accumulator check valve (e) to open. Oil flowing into the accumulator moves the accumulator piston (d) and compresses the gas.

Under Water Strike (Valves Open)



a - Shock Rod
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i - Down Slow Transfer Valve
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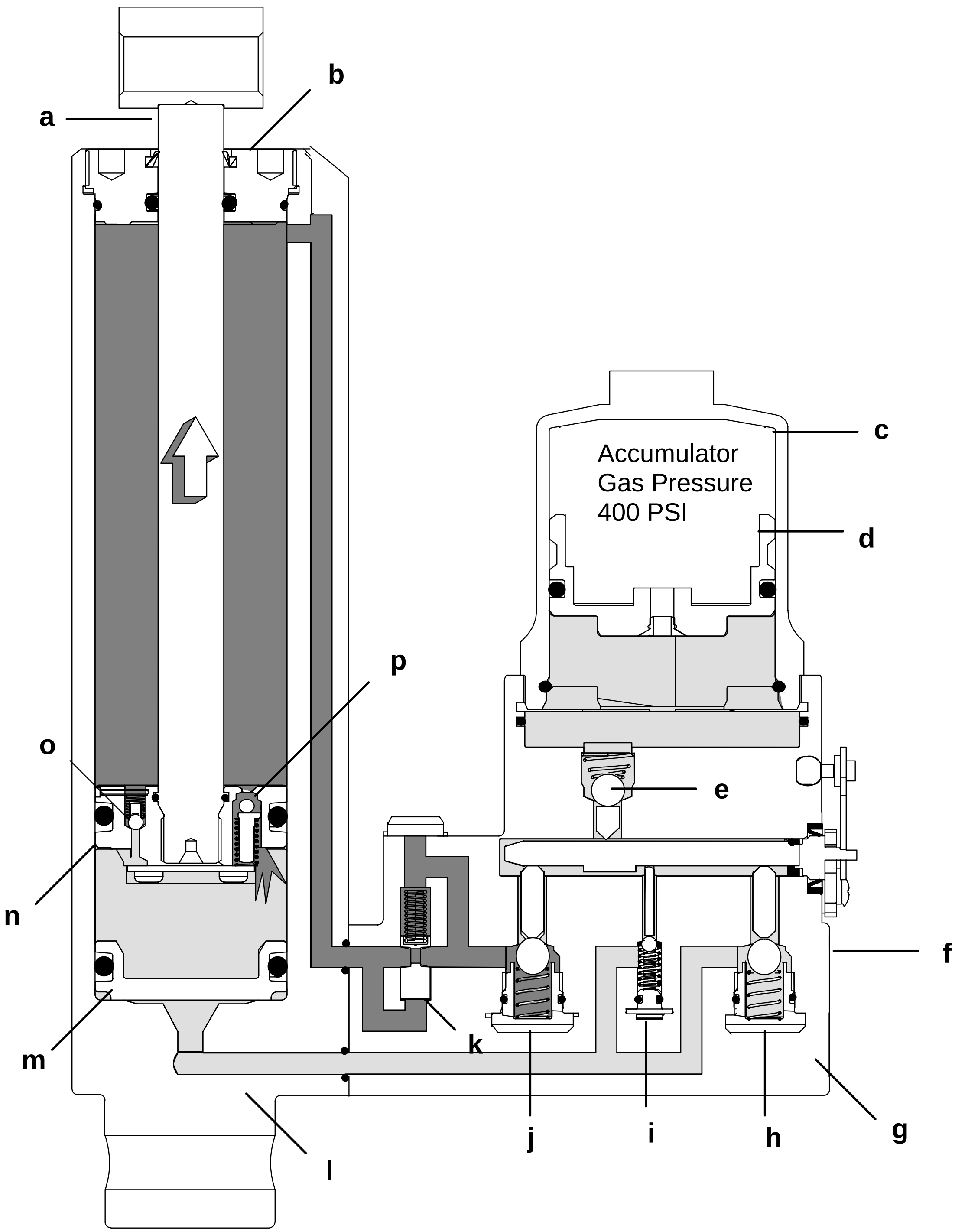
k - Surge Valve
l - Cylinder
m - Memory Piston
n - Shock Piston
o - Shock Return Valve
p - Impact Relief Valve

Under Water Strike With Valves Open

Should the drive unit strike a submerged object while in forward motion, the shock rod (a) will extend from the tilt cylinder (l). Fluid will attempt to exit the cylinder through the interconnecting passage. The rapid fluid flow will increase the pressure below the surge valve (k), causing the valve to move, closing the oil return passage back into the accumulator (c). Oil inside the up cavity is locked in a static position by the closed up fast transfer valve (j), the closed down slow transfer valve (i) and down fast transfer valve (h). As the shock rod extends outward, the pressure inside the up cavity will reach sufficient pressure to open the shock valve (p) which opens at 880-1110 psi. Oil will flow into the cavity created as the shock rod & shock piston (a & n) moves away from the memory piston (m).

Shock Function (Valve Closed)



a - Shock Rod
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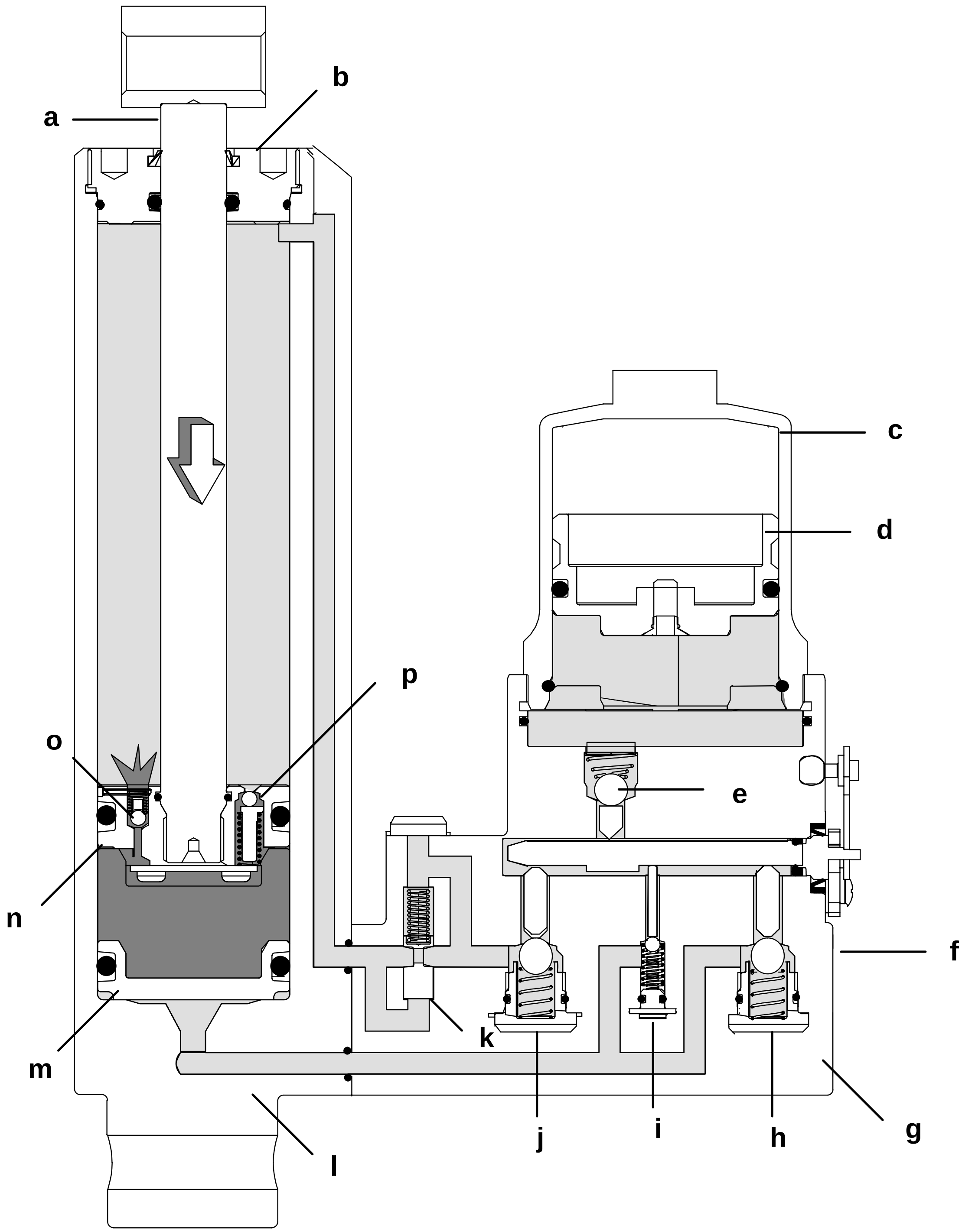
l - Cylinder
m - Memory Piston
n - Shock Piston
o - Shock Return Valve
p - Impact Relief Valve

Shock Function With Valves Closed

Should the drive unit strike a submerged object while in forward motion, the shock rod (a) will extend from the cylinder (l). Oil inside the up cavity is locked in a static position by the closed up fast transfer valve (j), the closed down slow transfer valve (i) and closed down fast transfer valve (h). Fluid will attempt to exit the cylinder through the interconnecting passage back into the accumulator (c). The closed up fast transfer valve (j) will prevent the fluid return. As the shock rod extends outward, the pressure inside the up cavity will reach sufficient pressure to open the shock valve (p) which opens at 880-1110 psi. Oil will flow into the cavity created as the shock rod & shock piston (n) moves away from the memory piston (m).

Shock Function Return



a - Shock Rod
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e - Accumulator Check Valve
f - Camshaft Lever
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i - Down Slow Transfer Valve
j - Up Fast Transfer Valve
k - Surge Valve
l - Cylinder
m- Memory Piston
n - Shock Piston
o - Shock Return Valve
p - Impact Relief Valve

Shock Function Return

After the drive clears the object, the shock return valve (o) will allow the oil to flow from between the shock piston (n) and memory piston (m) onto the down cavity as the drive returns to it's original running position.

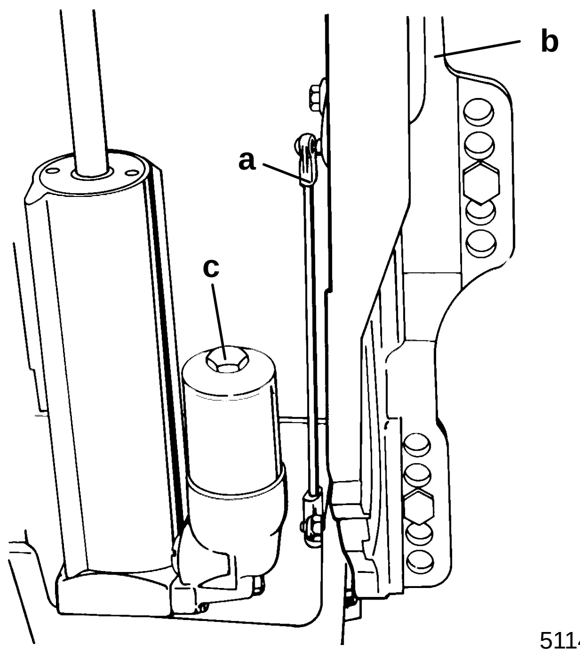
Hydraulic System Troubleshooting

Refer to disassembly/reassembly instructions (following) if disassembly is required when servicing.

IMPORTANT: After debris or failed components have been found (during troubleshooting procedure) it is recommended that unit be disassembled completely and ALL O-rings be replaced. Check ball components and castings must be cleaned using engine cleaner and compressed air or replaced prior to reassembly.

Support outboard with tilt lock lever when servicing manual tilt system.

1. Check manual release cam adjustment. Cam must open and close freely. Adjust cam link rod as necessary.



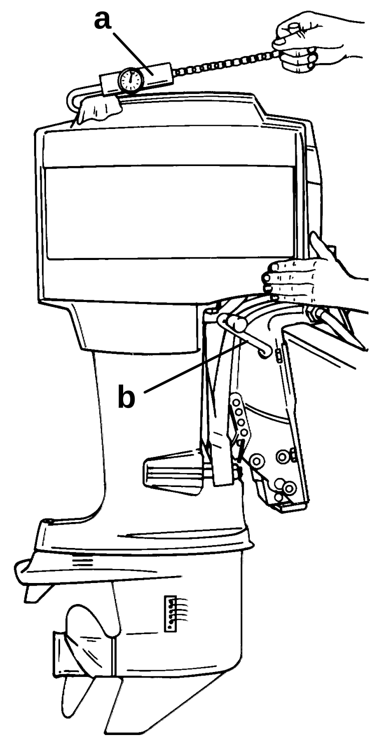
51143

a - Link Rod
b - Manual Release Lever
c - Accumulator

2. Check for external leaks in the manual tilt system. Replace defective part(s) if leak is found.

IMPORTANT: If cut or damaged O-rings are found, inspect machined surfaces for scoring, burrs or debris.

3. Check for discharged accumulator. 35 to 50 lb. ft. (47-68 N·m) of pulling force must be attained when tilting outboard from full “down” to full “up” position. If more than 50 lb. ft. (68 N·m) of force is required, replace accumulator.



50431

a - Weight Scale
b - Valve Lever (open position)

Manual Tilt System Removal

⚠ CAUTION

Remove cowling and remove all spark plug leads from spark plugs to prevent accidental starting while servicing outboard.

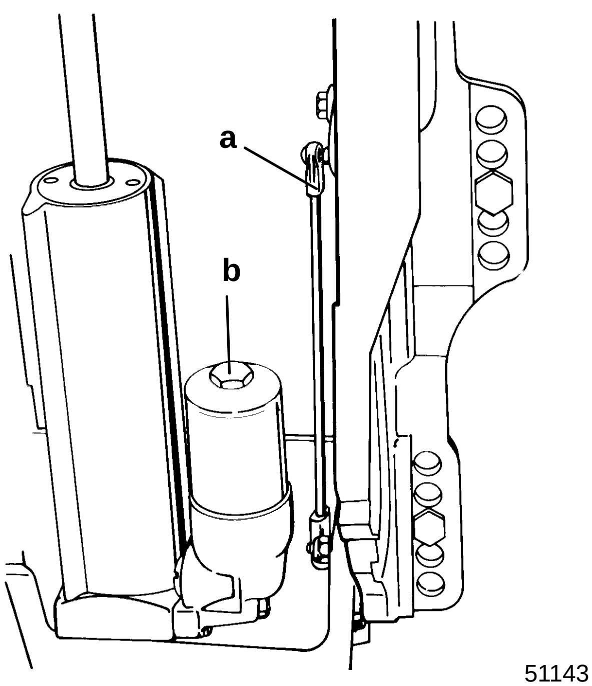
⚠ WARNING

Service or installation of the tilt system may result in loss of pressure in the shock cylinder. If the outboard is not in the full down position, such loss of pressure will cause the engine to fall to the full down position with a potential for damaging engine or causing personal injury. To avoid such injury support outboard in the up position using tilt lock lever.

⚠ WARNING

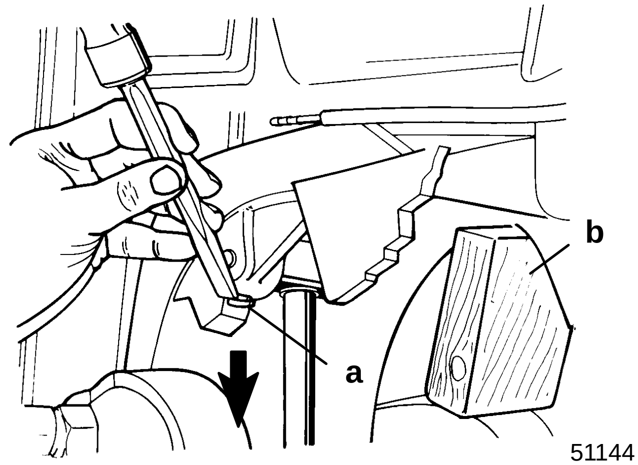
Manual tilt system is pressurized. Accumulator must be removed when shock rod is in the full up position, prior to servicing, otherwise oil spray-back may occur.

1. Support outboard in the up position using tilt lock lever.
2. Remove link rod.



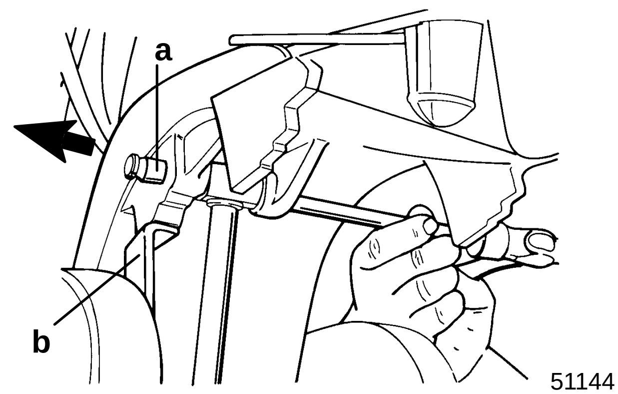
a - Link Rod
b - Accumulator

3. Position piece of wood under transom bracket instead of tilt lock for access of removing pin. Use suitable punch to remove (DRIVE DOWN) upper dowel pin. Retain dowel pin.



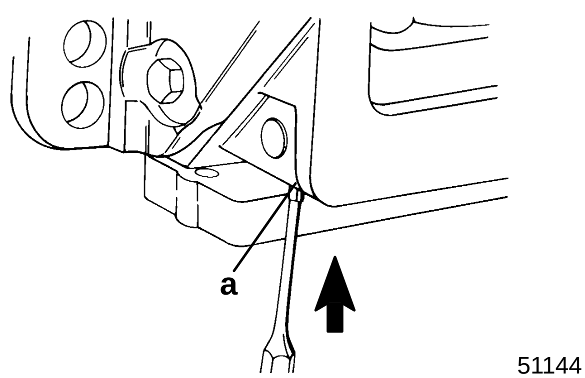
a - Dowel Pin
b - Wood

4. Position tilt lock and remove piece of wood. Use suitable punch to drive out upper pivot pin.



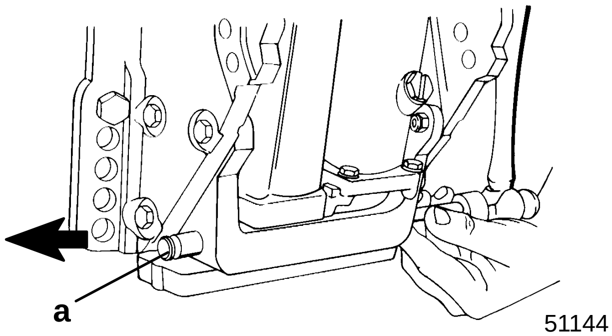
a - Pivot Pin
b - Tilt Lock

5. Use punch to remove (DRIVE UP) lower dowel pin. Retain dowel pin.



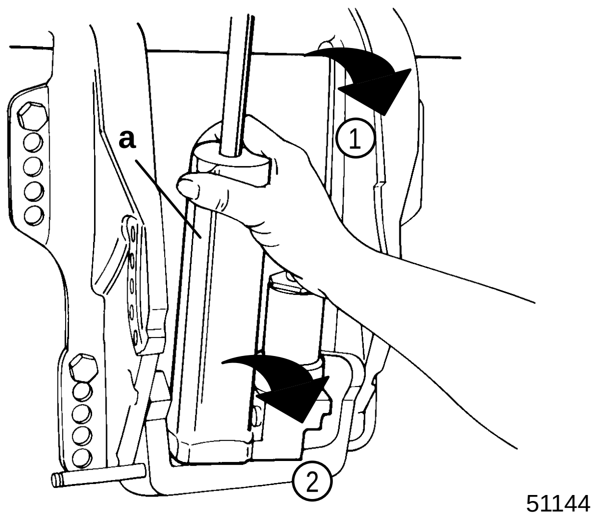
a - Dowel Pin

6. Use suitable punch to drive out lower pivot pin.



a - Pivot Pin

7. Tilt shock absorber assembly (TOP FIRST) out from clamp bracket and remove assembly.



a - Manual Tilt System

Manual Tilt System Disassembly

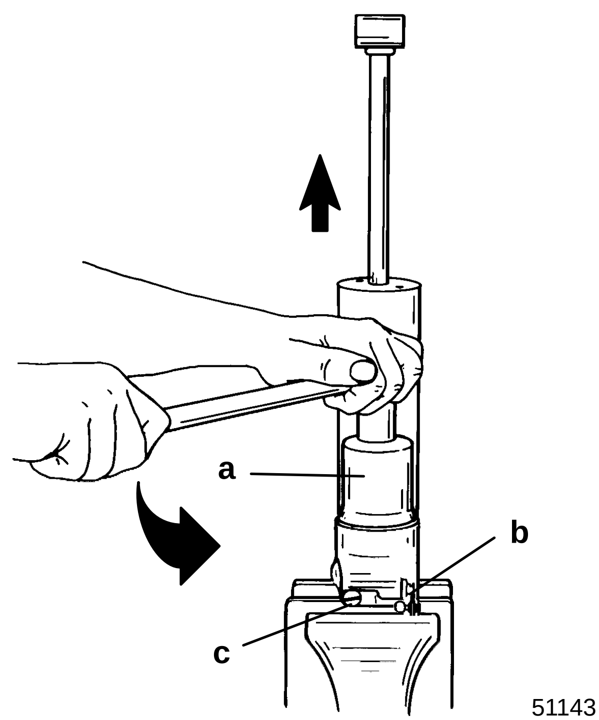
NOTE: *Accumulator contains a high pressure nitrogen charge and is NOT SERVICEABLE. Replace if necessary.*

WARNING

This tilt system is pressurized. Remove accumulator only when shock rod is in full up position.

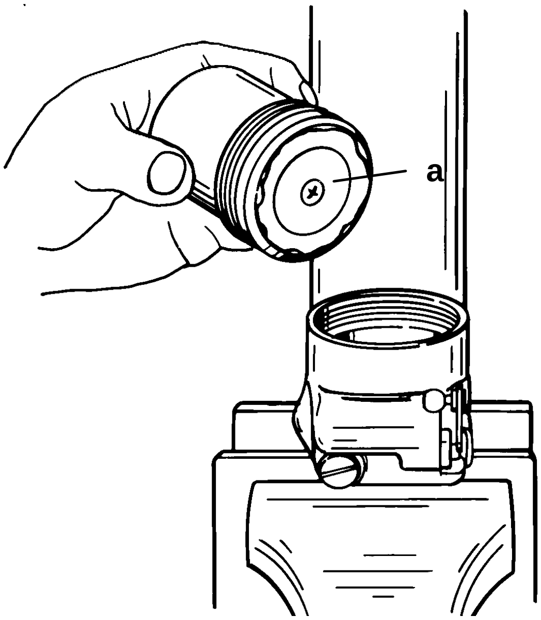
Accumulator Removal

1. Place manual tilt system in soft jawed vise.
2. Position shock rod to full up position.
3. Open cam shaft valve (Down Position).
4. Loosen surge valve enough to drip, wait until dripping stops.
5. When fluid stops dripping, loosen and remove accumulator.



a - Accumulator
b - Cam Lever
c - Velocity Plug

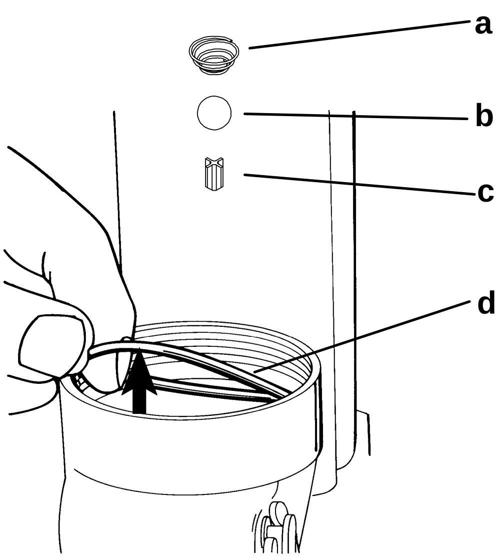
6. If plunger can be compressed into accumulator by hand, accumulator is defective. Replace accumulator.



51143

a - Plunger

7. Once accumulator is removed, remove O-ring, conical spring, steel ball and plunger.

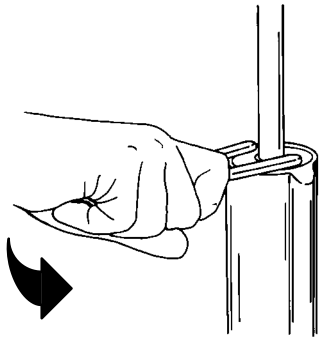


51145

a - Conical Spring
b - Steel Ball
c - Plunger
d - O-ring

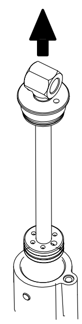
Shock Rod Removal

1. Unscrew cylinder end cap assembly using spanner wrench [1/4 in. x 5/16 in. long pegs].



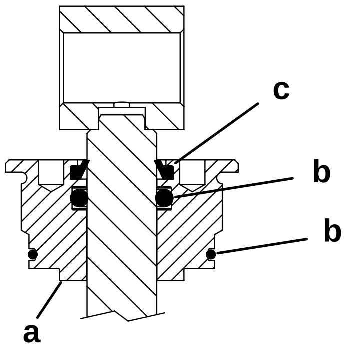
51145

2. Remove shock rod assembly from cylinder.



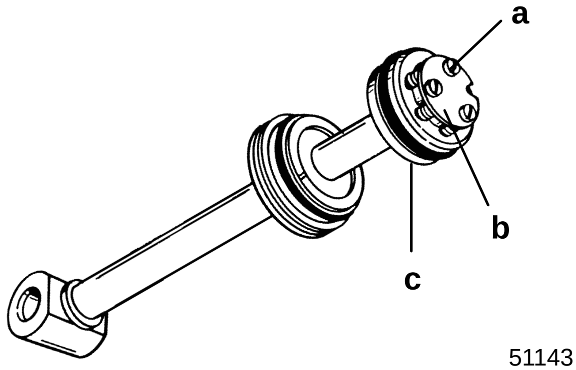
Shock Rod Disassembly

NOTE: *The only serviceable items on the shock rod assembly are the O-rings and wiper ring. If shock rod requires any other repair, replace shock rod assembly.*



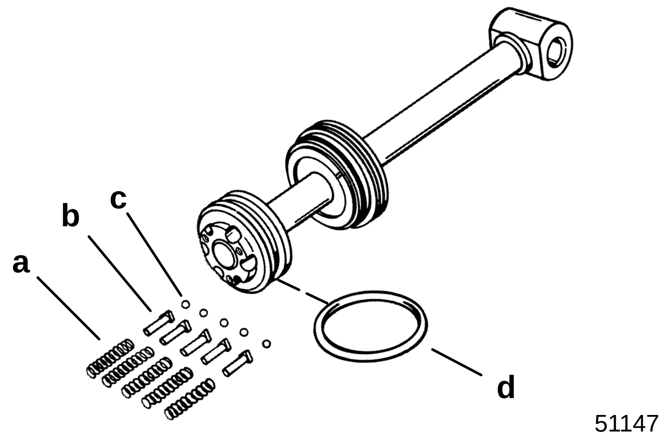
a - End Cap
b - O-ring
c - Wiper Ring

1. Place shock rod assembly on clean work surface.
2. Remove three (3) screws and remove plate from shock rod piston.



a - Screw (3)
b - Plate
c - Shock Rod Piston

3. Remove check ball components from shock rod piston.
4. Remove O-ring.

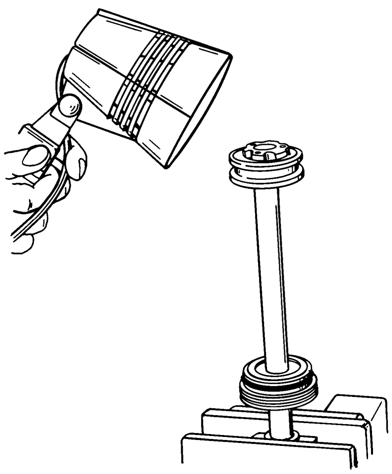


a - Spring (5)
b - Seat (5)
c - Ball (5)
d - O-ring

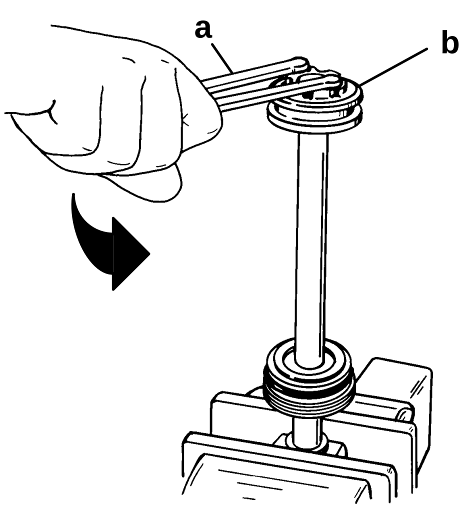
⚠ CAUTION

When removing shock piston, spanner wrench must have 1/4 in. x 5/16 in. long pegs to avoid damage to shock piston.

5. Place shock rod into soft jawed vise and apply heat to loosen piston using torch lamp (P/N 91-63209).
6. Loosen shock rod piston using spanner wrench [1/4 in. x 5/16 in. (6.4mm x 8mm) long pegs].
7. Allow shock rod piston to cool. Remove from shock rod.



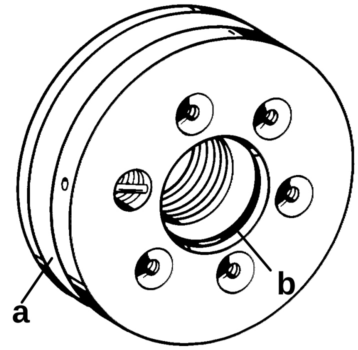
51146



51146

a - Spanner Wrench
b - Shock Rod Piston

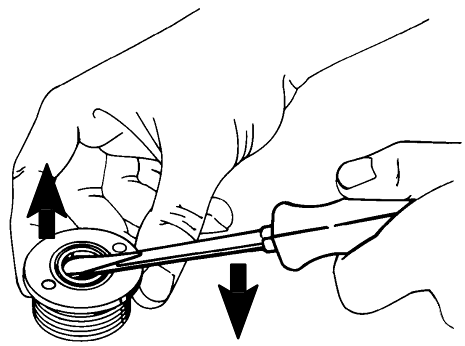
8. Inspect check valve for debris; clean debris from check valve if found. If debris cannot be cleaned from check valve, replace shock piston as an assembly.
9. Clean shock and components with compressed air.
10. Remove inner O-ring.



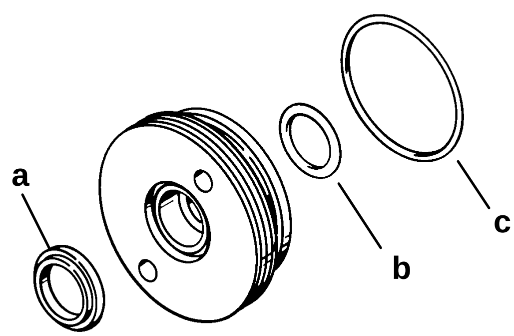
51199

a - Shock Piston
b - O-ring

11. Remove cylinder end cap assembly from shock rod.
12. Inspect shock. If wiper (located in cap) has failed to keep rod clean, replace wiper.
13. Place end cap on clean work surface.
14. Remove rod wiper, inner O-ring, and outer O-ring.



51147

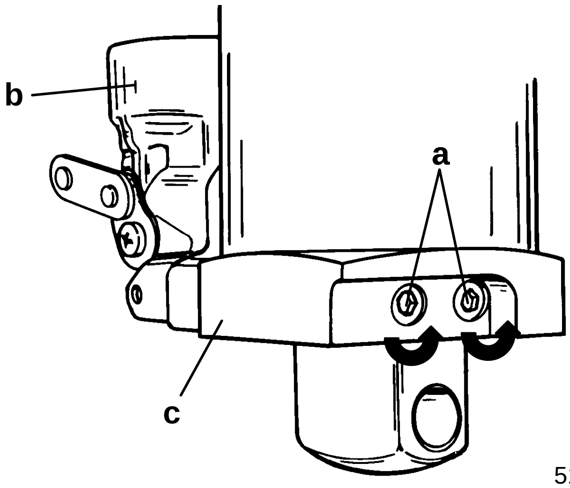


51145

a - Rod Wiper
b - Inner O-ring
c - Outer O-ring

Valve Block Removal

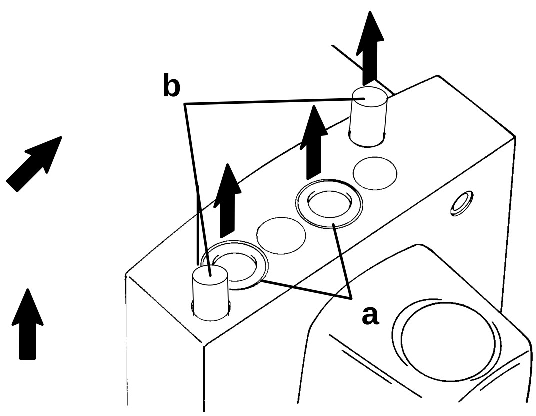
1. Remove two screws from the shock rod cylinder to separate the valve block.



51146

a - Screw
b - Valve Block
c - Shock Rod Cylinder

2. Remove O-rings and dowel pins.



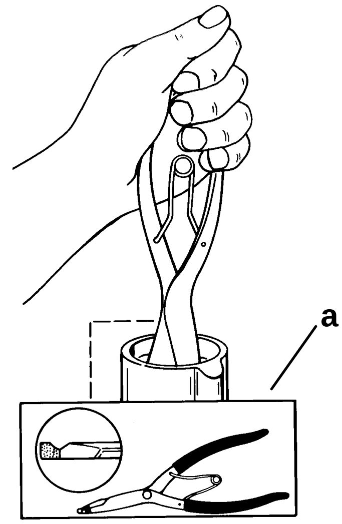
51148

a - O-ring (2)
b - Dowel Pin (2)

Memory Piston Removal

1. Remove memory piston from cylinder using one of two methods:

   a. Using lock ring pliers (a) (Craftsman P/N 4735) or (Snap-on P/N SRP4).



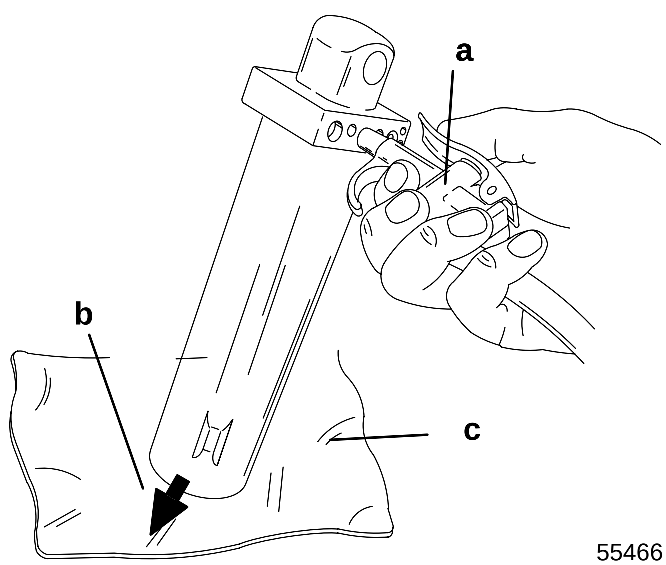
51144

   b. Blowing compressed air into center O-ring hole.

⚠ WARNING

Memory piston cup may be expelled at a high velocity when air pressure is applied. Failure to place cylinder as shown below could result in personal injury.

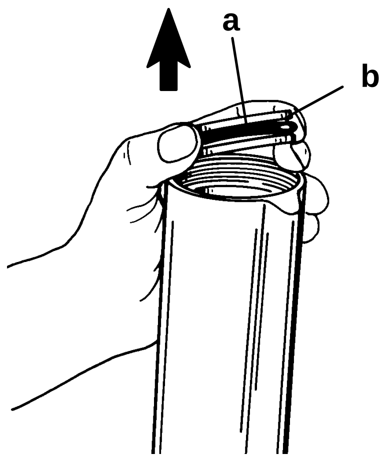
NOTE: *Point cylinder opening down and away. Use a shop rag or towel to avoid damage to the memory piston. Fluid will blow out also.*



55466

a - Adaptor/Air Hose
b - Memory Piston Exit
c - Shop Rag

2. Remove O-ring from memory piston.

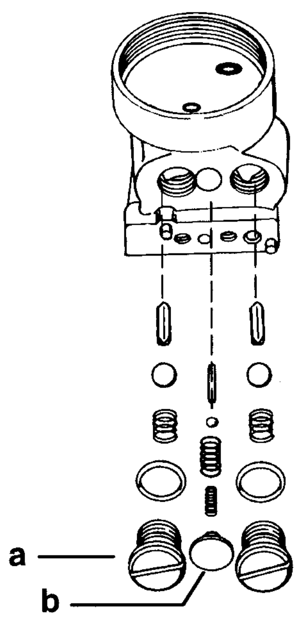


51144

a - O-Ring
b - Memory Piston

Valve Block Disassembly

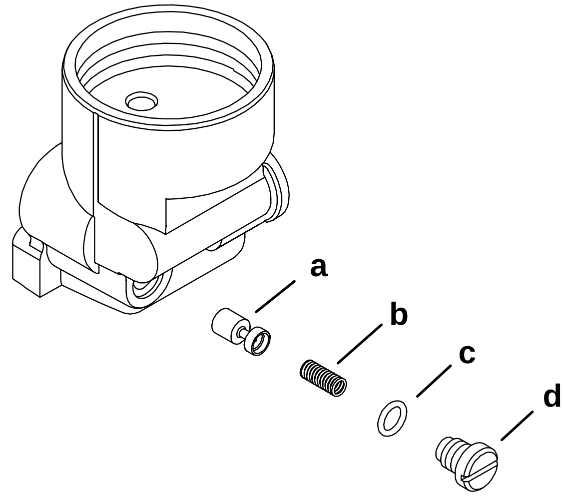
1. Remove check retainer plug and components.
2. Remove hydraulic oil transfer valve plugs and components.



51142

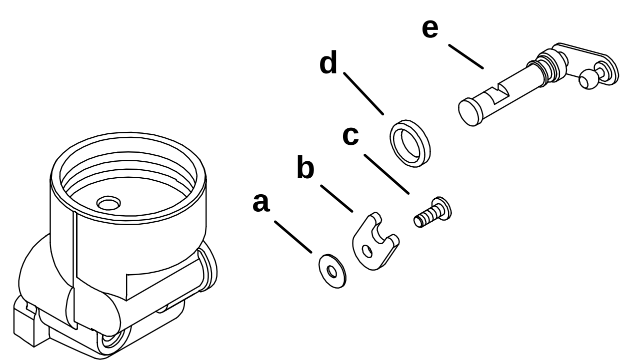
a - Transfer Valve Plug Assembly (2)
b - Check Retainer Plug or Screw Assembly

3. Remove surge valve assembly.



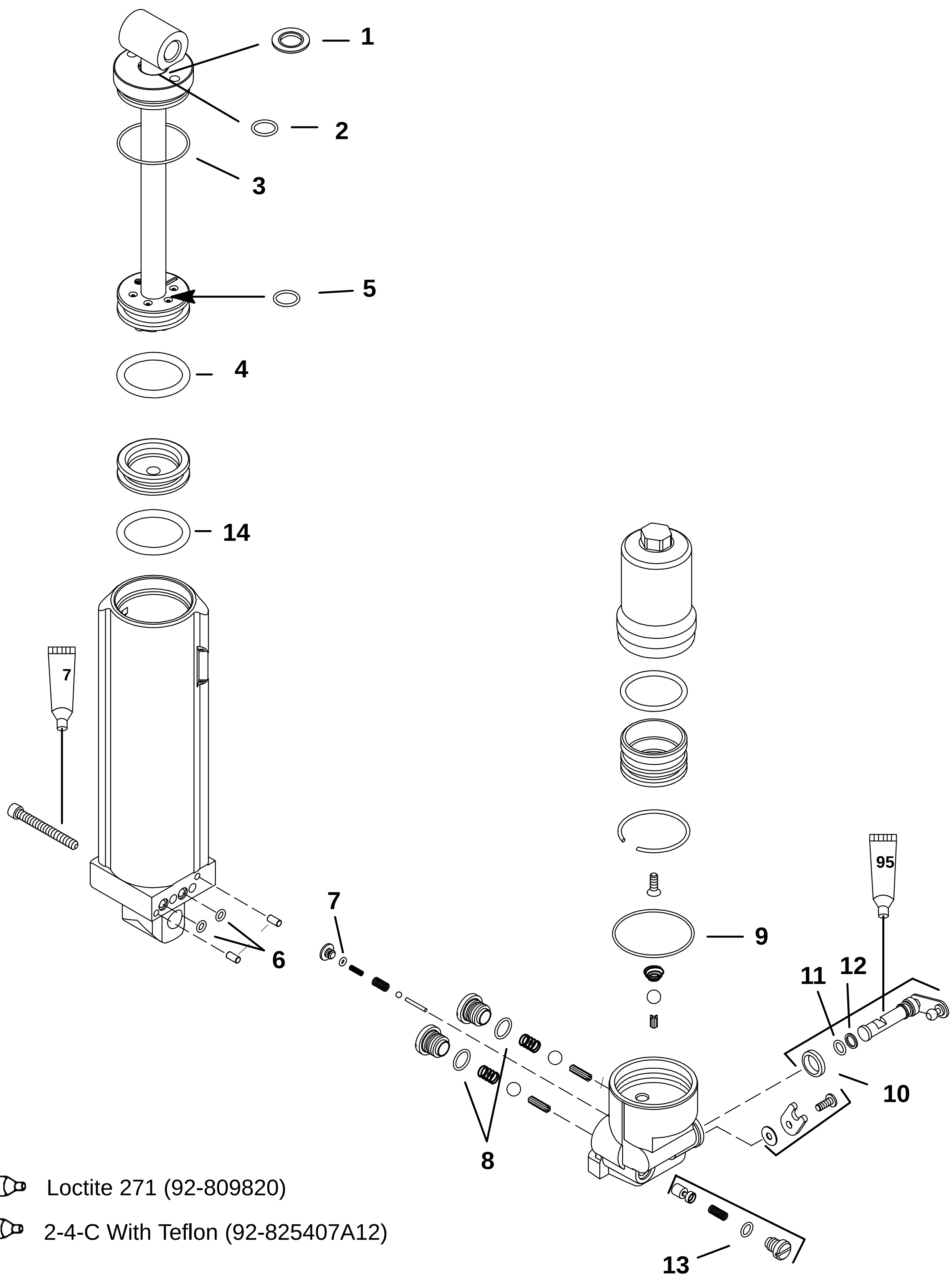
a - Spool
b - Spring
c - O-ring
d - Screw Plug

4. Remove screw and remove cam assembly.



a - Spacer Retainer Clip
b - Retainer Clip
c - Screw
d - Shaft Seal
e - Cam

Reassembly - O-Ring and Seal Placement



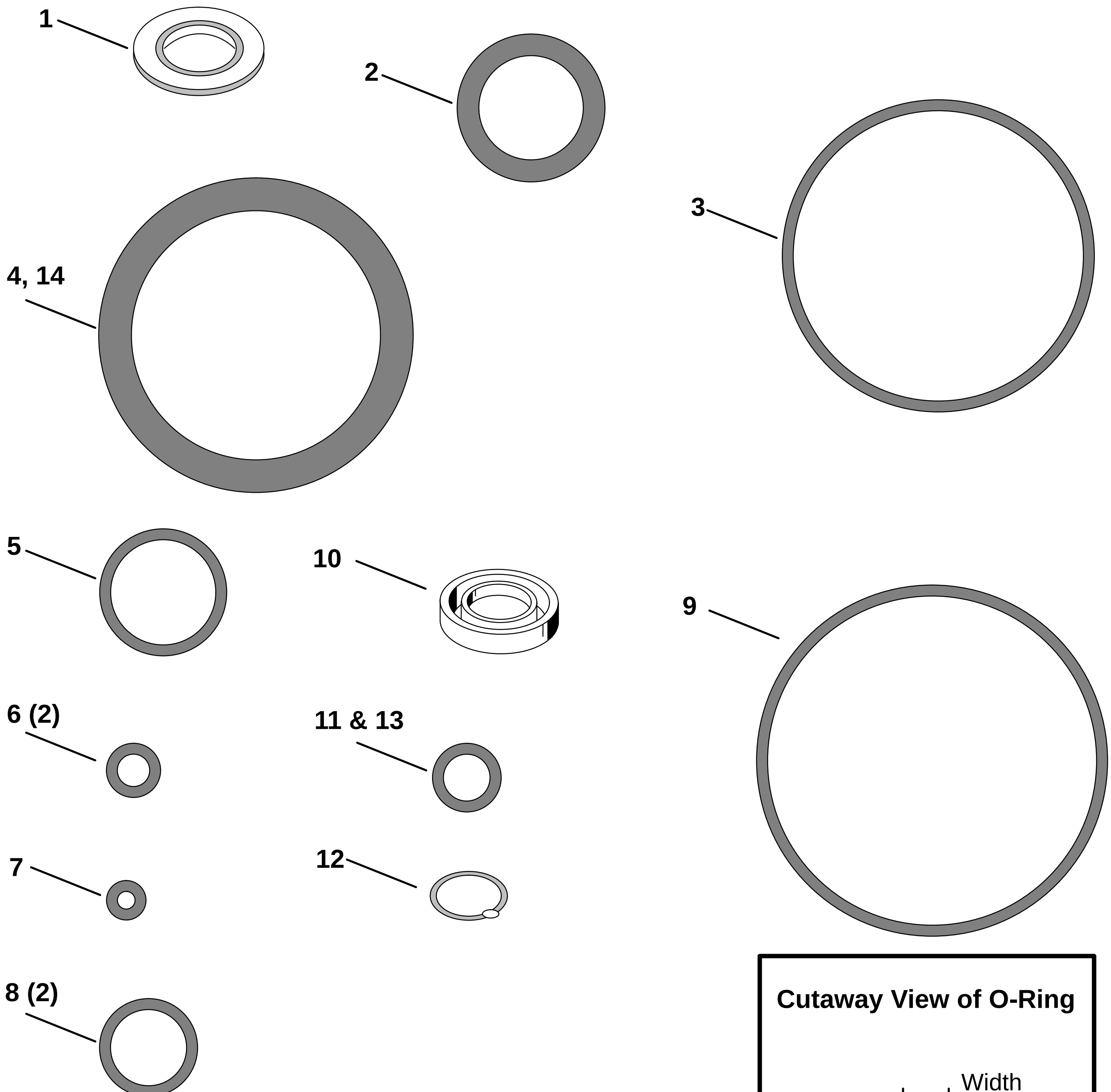
7 Loctite 271 (92-809820)

95 2-4-C With Teflon (92-825407A12)

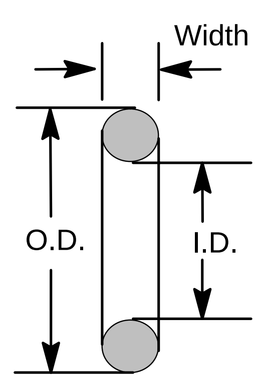
NOTE: *Lubricate all O-rings using Quicksilver Power Trim and Steering Fluid. If not available, use automotive (ATF) automatic transmission fluid.*

NOTE: *It is recommended that all O-rings be replaced when servicing tilt system.*

Actual O-Ring Sizes



Cutaway View of O-Ring



O-RINGS SHOWN ARE ACTUAL SIZE

O-Ring Description and Sizes

O-Ring	Description	O-Ring I.D.	O-Ring O.D.	O-Ring Width
1	Wiper Ring			
2	Cyl. Cap, Inner	0.671 in. (17.04 mm)	0.949 in. (24.10 mm)	0.139 in. (3.53 mm)
3	Cyl. Cap	1.864 in. (47.34 mm)	2.004 in. (50.90 mm)	0.07 in. (1.78 mm)
4	Shock Piston	1.6 in. (40.64 mm)	2.02 in. (53.086 mm)	0.21 in. (5.334 mm)
5	Piston Bolt	0.676 in. (17.17 mm)	.816 in. (20.726 mm)	0.07 in. (1.78 mm)
6 (2)	Manifold Split Line	0.208 in. (5.283 mm)	0.348 in. (8.839 mm)	0.07 in. (1.78 mm)
7	Slow Valve	0.114 in. (2.90 mm)	0.254 in. (6.451 mm)	0.07 in. (1.78 mm)
8 (2)	Plug	0.489 in. (12.42 mm)	0.629 in. (15.97 mm)	0.07 in. (1.78 mm)
9	Accumulator	2.114 in. (53.69 mm)	2.254 in. (57.25 mm)	0.07 in. (1.78 mm)
10	Lip Seal			
11	Cam Shaft	0.301 in. (7.645 mm)	0.441 in. (11.20 mm)	0.07 in. (1.78 mm)
12	Back Up Ring			
13	Surge Valve	0.301 in. (7.645 mm)	0.441 in. (11.20 mm)	0.07 in. (1.78 mm)
14	Memory Piston	1.6 in. (40.64 mm)	2.02 in. (53.086 mm)	0.21 in. (5.334 mm)

Manual Tilt System Cleaning and Inspection

1. It is recommended that all O-rings exposed during disassembly be replaced.
2. Clean components, filter, and check valve seats using engine cleaner and compressed air. Do not use cloth rags.
3. Inspect all machined surfaces for burrs or scoring to assure O-ring longevity.
4. Inspect shock rod. If scraper (located in cap) has failed to keep rod clean, replace scraper.

Manual Tilt System Reassembly

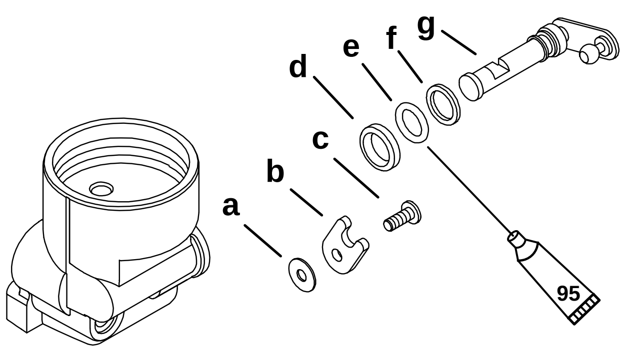
IMPORTANT: Components must be dirt and lint free. Slightest amount of debris in tilt system could cause system to malfunction.

Apply Quicksilver Power Trim and Steering Fluid to all O-rings during reassembly. If not available, use automotive (ATF) automatic transmission fluid.

CAM SHAFT REASSEMBLY

IMPORTANT: Cam shaft O-ring must be lubricated using 2-4-C with Teflon (92-825407A12).

1. Install lubricated O-ring and back up seal to cam.
2. Install shaft seal in valve block with lips facing out.
3. Install cam shaft assembly in valve block.
4. Secure cam shaft in place using insulator, retainer plate, and screw. Tighten screw securely.

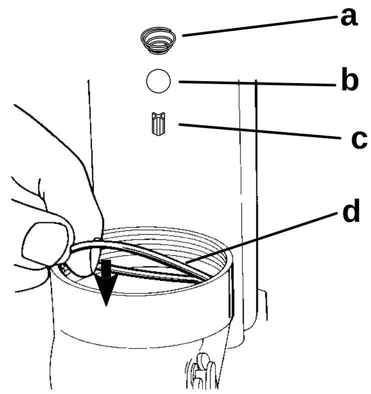


95 2-4-C With Teflon (92-825407A12)

a - Spacer Retainer Clip
b - Retainer Clip
c - Screw
d - Shaft Seal
e - O-ring
f - Back up Seal
g - Cam

VALVE BODY CHECK REASSEMBLY

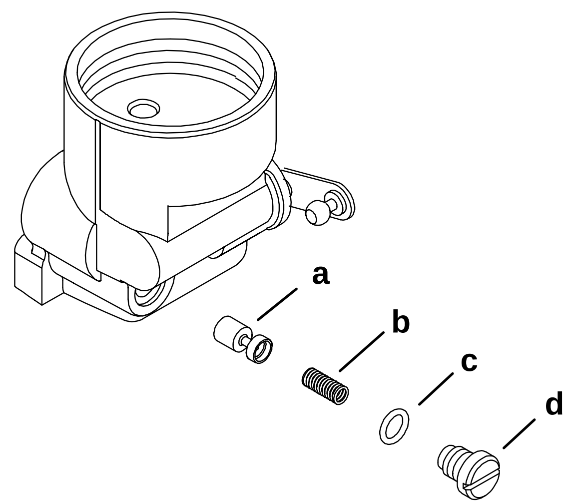
1. Install lubricated O-ring, plunger, steel ball and conical spring to valve block.



a - Conical Spring
b - Steel Ball
c - Plunger
d - O-ring

VELOCITY VALVE REASSEMBLY

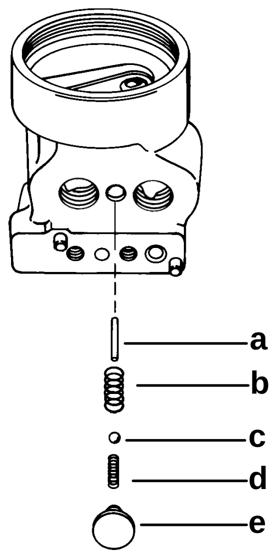
1. Install spool, spring, lubricated O-ring and screw plug (surge valve assembly) into valve block.
2. Torque screw plug to 75 lb. in. (8.5 N·m).



a - Spool
b - Spring
c - O-ring
d - Screw Plug - Torque to 75 lb. in. (8.5 N·m)

CHECK RETAINER REASSEMBLY

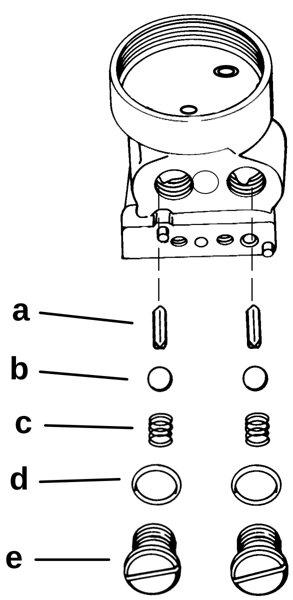
1. Install plunger, spring (large), ball, spring (small), and plug into valve block.



a - Plunger
b - Spring (Large)
c - Ball
d - Spring (Small)
e - Plug

VALVE PLUG REASSEMBLY

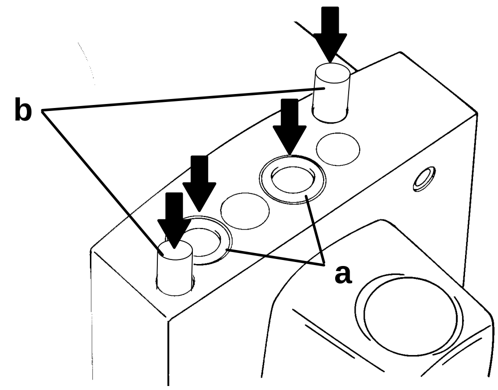
1. Install plunger, steel ball, spring, lubricated O-ring and screw plug. Torque screw plugs to 75 lb. in. (8.5 N·m).



a - Plunger (2)
b - Steel Ball (2)
c - Spring (2)
d - O-ring (2)
e - Screw Plug (2) Torque to 75 lb. in. (8.5 N·m)

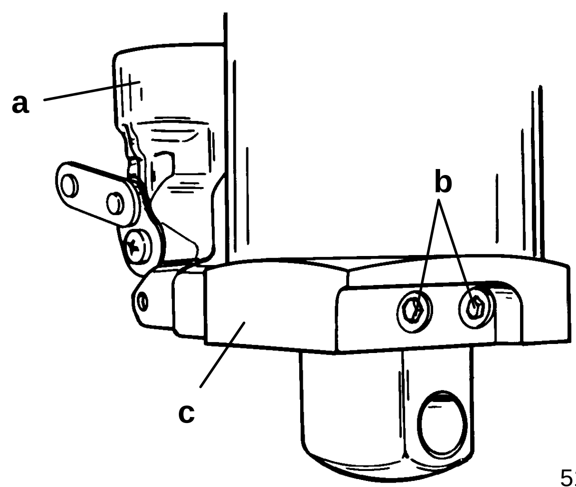
Valve Block Installation

1. Install lubricated O-rings and dowel pins.



a - O-ring (2)
b - Dowel Pin (2)

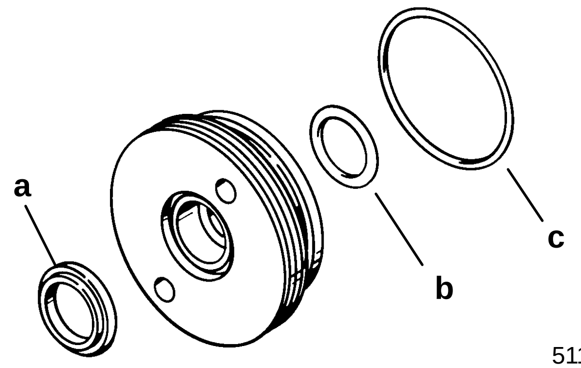
2. Install valve block to shock rod cylinder. Insert screws to shock rod cylinder and torque to 100 lb. in. (11.3 N·m).



a - Valve Block
b - Screw (2) Torque to 100 lb. in. (11.3 N·m)
c - Shock Rod Cylinder

Shock Rod Reassembly

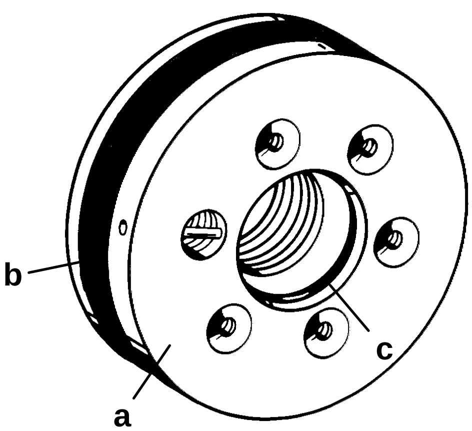
1. Install lubricated O-rings to end cap.
2. Install rod wiper.



51145

a - Rod Wiper
b - Inner O-ring
c - Outer O-ring

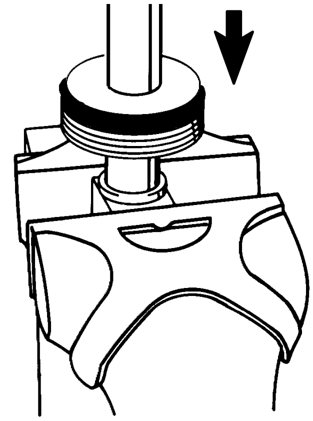
3. Install lubricated O-rings to shock piston.



51199

a - Shock Piston
b - O-ring
c - O-ring

4. Clamp shock rod in soft jawed vise.
5. Position cylinder end cap onto rod as shown.

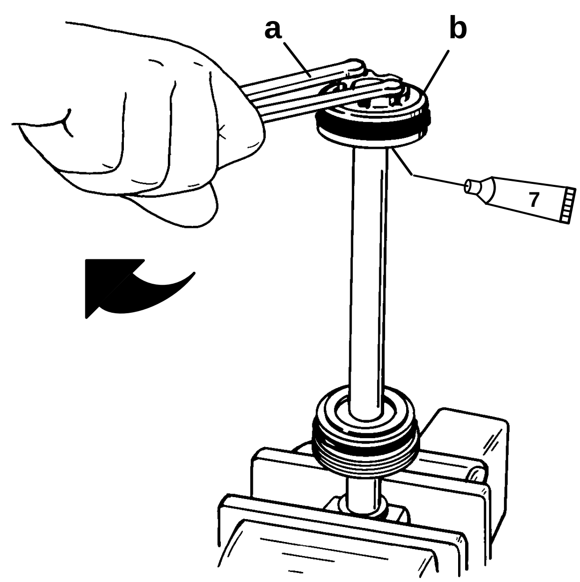


51146

⚠ CAUTION

When installing shock rod piston, spanner wrench must have 1/4 in. x 5/16 in. (6.4mm x 8mm) long pegs to avoid damage to shock rod piston.

6. Apply Loctite Grade 271 to threads on shock rod.
7. Install shock rod piston.
8. Tighten shock rod piston securely using spanner wrench [1/4 in. x 5/16 in. (6.4mm x 8mm) long pegs]. If a torquing type spanner tool is used to tighten shock piston, then torque to 90 lb. ft. (122.0 N·m).

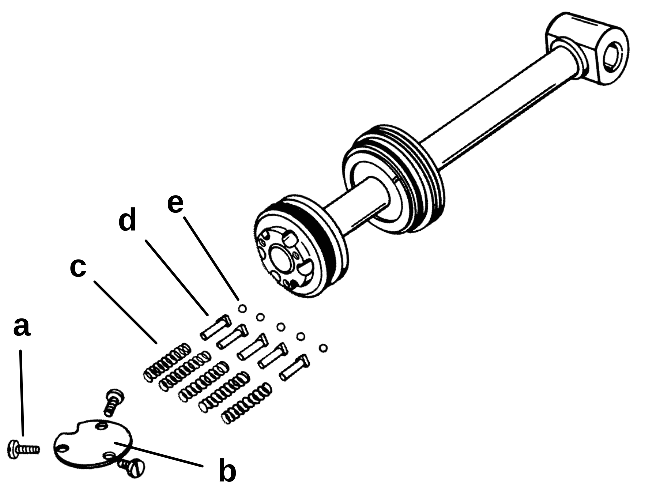


7 Loctite 271 (92-809820)

51146

a - Spanner Wrench
b - Shock Rod Piston - Torque to 90 lb. ft. (122.0 N·m)

9. Install ball, seat, and spring (five sets) to shock rod piston.
10. Secure components with plate. Torque screws to 35 lb. in. (4.0 N·m).
11. Remove shock rod assembly from vise.



51147

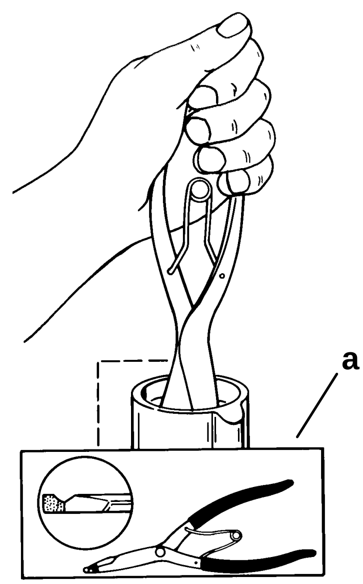
a - Screw (3) Torque to 35 lb. in. (4.0 N·m)
b - Plate
c - Spring (5)
d - Seat (5)
e - Ball (5)

Shock Rod Installation and Fluid Filling Procedure

NOTE: *There are two ways for the filling procedure. The first is the easiest and less time consuming.*

Filling Procedure Option One

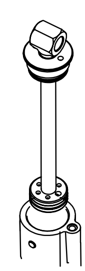
1. Place trim cylinder in soft jawed vice.
2. With manifold cam lever closed (Up Position), fill cylinder and manifold to top with Quicksilver Power trim and steering fluid, or (ATF) automatic transmission fluid. Let bubbles disperse.
3. Install lubricated O-ring to memory piston.
4. Using lock ring pliers (Craftsman P/N 4735) or (Snap-on P/N SRP4) set memory piston in top of cylinder then open cam lever (Down Position) and push memory piston down just below cylinder treads. Close cam lever (Up Position).



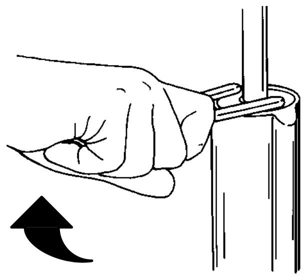
51144

a - Lock Ring Pliers

5. Fill top of cylinder again with fluid to top and install shock rod assembly on top memory piston. Open cam lever (Down Position) and push shock rod assembly down to 1/8″ (3.2mm) below cylinder threads. Close cam lever (Up Position).

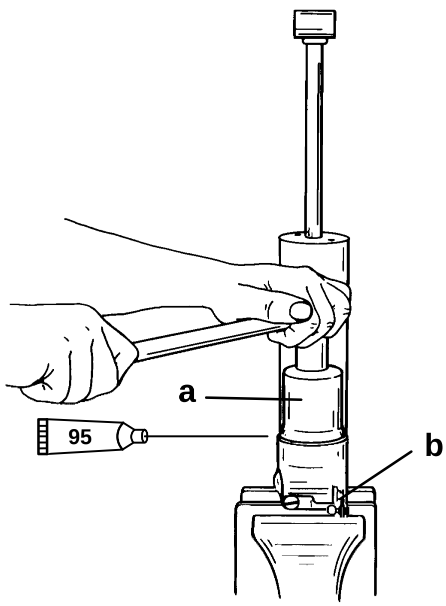


6. Fill top of shock rod assembly with fluid to top of cylinder. Open cam lever (Down Position) and screw cylinder cap down.
7. Tighten end cap securely using spanner wrench [1/4 in. x 5/16 in. (6.4mm x 8mm) long pegs]. If a torquing type spanner tool is used to tighten end cap, then torque the end cap to 45 lb. ft. (61.0 N·m). Close cam lever (up Position).



51145

8. Open and close cam lever watching for bubbles coming from accumulator check ball hole. When bubbles stop, fill accumulator opening to top with fluid. Grease threads on accumulator and opening with 2-4-C with Teflon. Start accumulator in threads and open cam lever (Down Position). Torque accumulator to 35 lb. ft. (47.5 N·m).

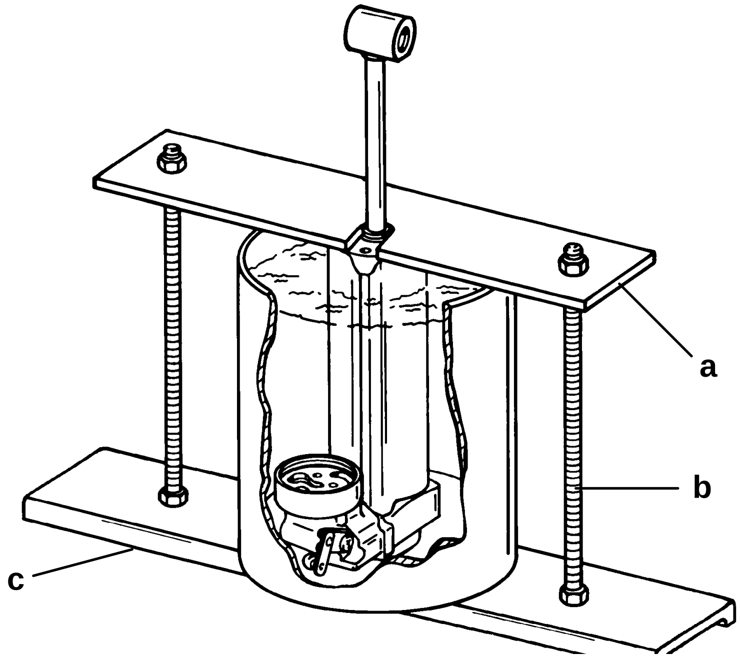


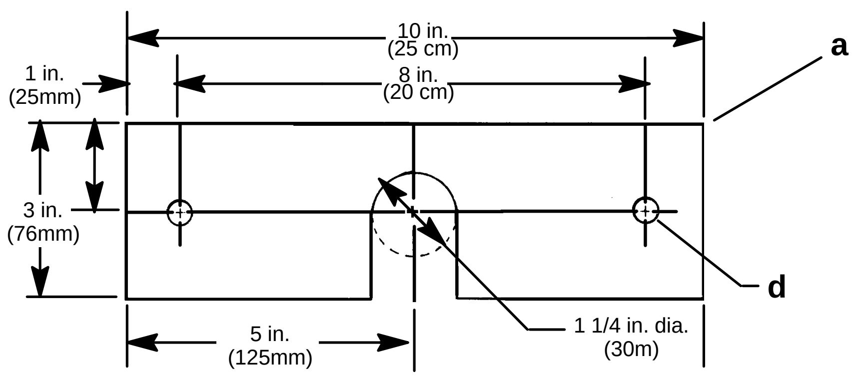
95 2-4-C With Teflon (92-825407A12) 51143

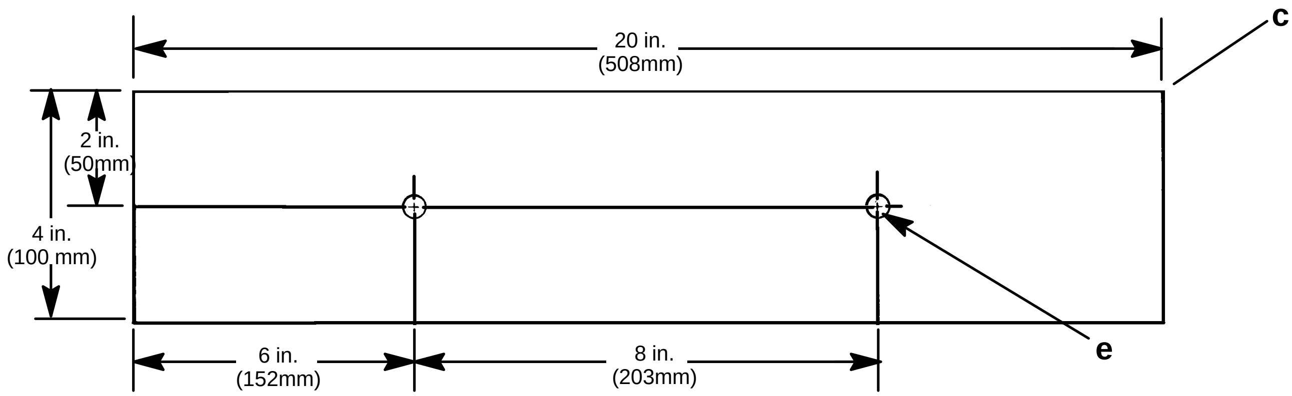
a - Accumulator
b - Cam Lever (Down Position)

NOTE: *If filling procedure is done correctly, it should be hard to turn cylinder rod assembly by hand.*

Filling Procedure Option Two
Instructions for Making Retaining Tool







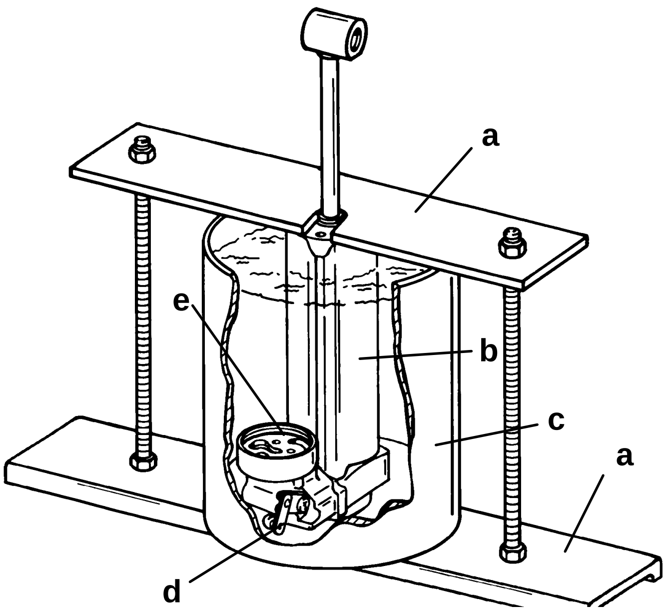
a - Plate (Obtain Locally)
b - Threaded Rod 3/8in x 13in (9.5mm x 330.2mm)
c - Plate (Obtain Locally)
d - Hole [3/8in (9.5mm) Diameter]
e - Hole [3/8in (9.5mm) Diameter]

Bleeding Manual Tilt System

IMPORTANT: While bleeding tilt system, time must be allowed between each stroke to allow air bubbles to dissipate.

1. With shock rod in the full up position and manifold cam lever open (facing down), secure tilt system to retaining tool and container. (A No. 10 can or 3 lb. coffee can could be used).
2. Fill container to near full level using Quicksilver Power Trim and Steering Fluid. If not available, use automotive (ATF) automatic transmission fluid.

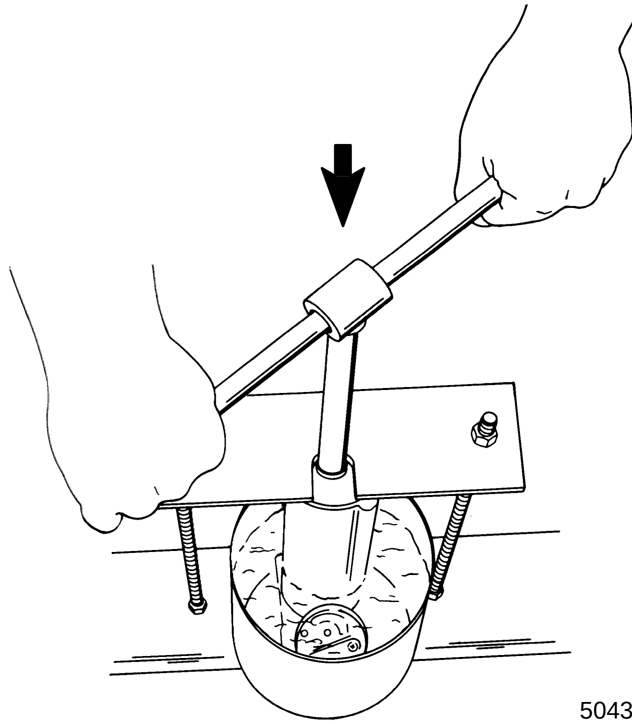
IMPORTANT: Fluid level must remain above accumulator opening during bleeding process.



50447

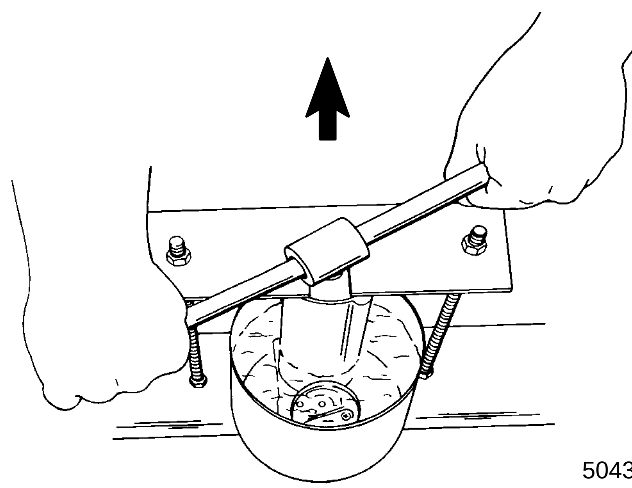
a - Retaining Tool
b - Tilt System
c - Container
d - Cam Lever
e - Accumulator Opening

3. Bleed unit by pushing rod down slowly (18-20 seconds per stroke) until stopped at base. Wait until all air bubbles exit accumulator base.



50432

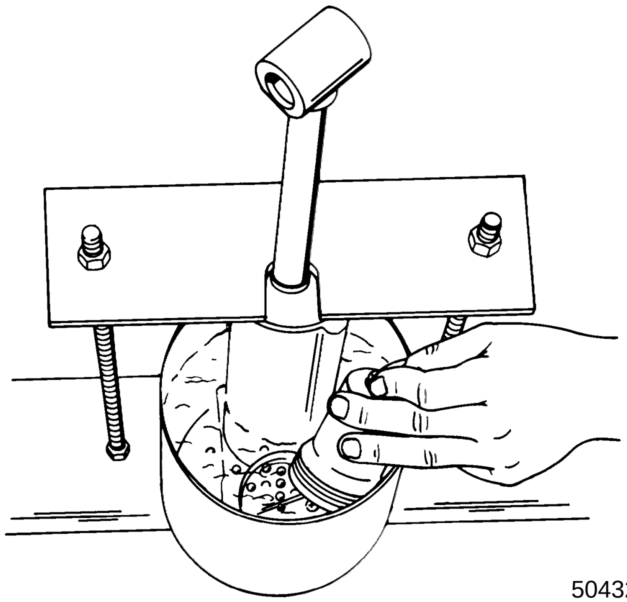
4. During up stroke, pull up on rod slowly 3 in. (76mm) from base.
5. Wait until all air bubbles to exit accumulator base.



50433

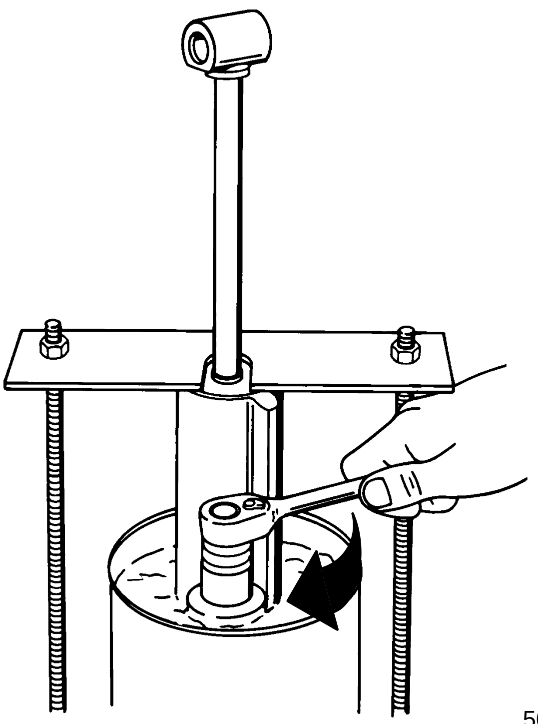
6. Slowly cycle unit 5-8 times (round trip per cycle) using short strokes 3 in. (76mm) from base allowing bubbles to disappear during each stroke.

7. Allow unit to stand five minutes then proceed to cycle unit 2-3 more times using short strokes. No air bubbles should appear from accumulator port at this time.
8. With oil level well above accumulator port, slowly pull rod to full up position.
9. Install accumulator making sure air bubbles do not enter system.



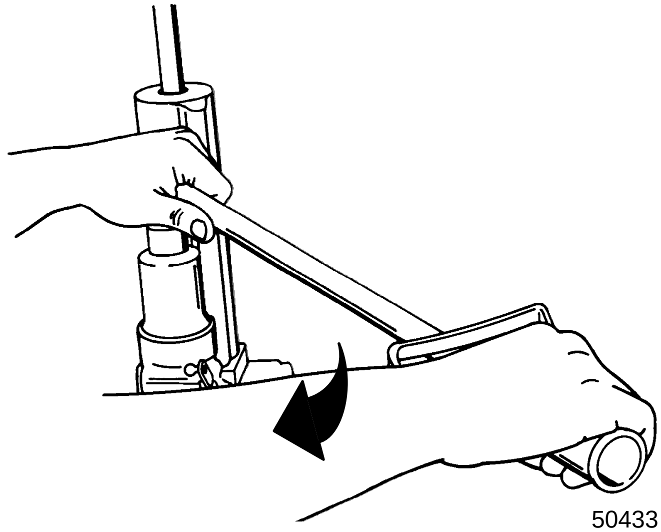
50432

10. Tighten accumulator snugly at this time.



50432

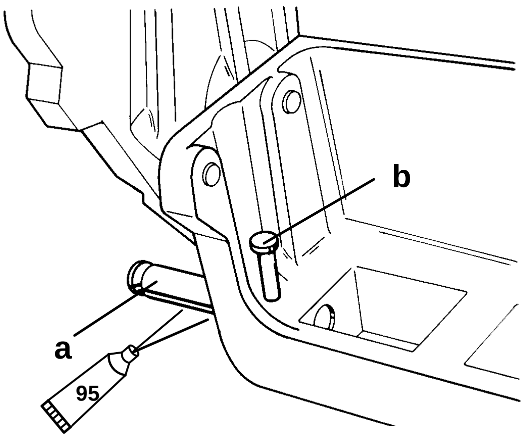
11. With cam lever remaining open (facing down), remove tilt assembly from oil and secure in soft jawed vise. Torque accumulator to 35 lb. ft. (47.5 N·m).



50433

Manual Tilt System Installation

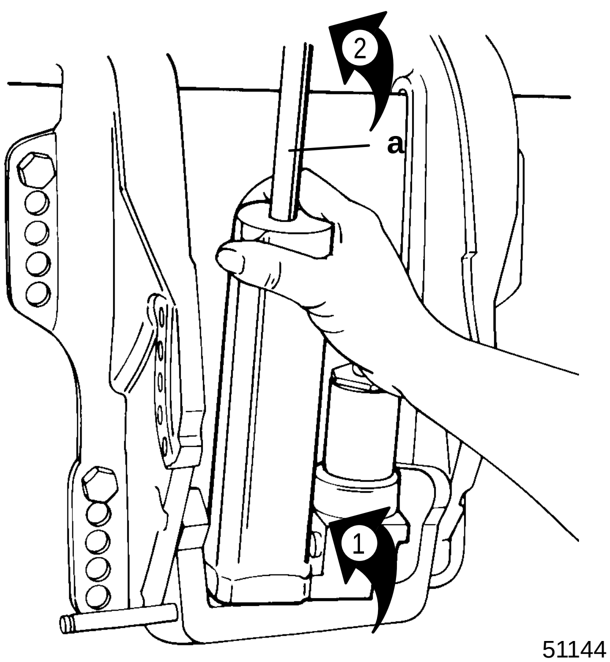
1. Apply 2-4-C w/Teflon Marine Lubricant to lower pivot pin hole and pivot pin surface.
2. Start lower pivot pin into pivot pin hole and position lower dowel pin (retained) in its hole.



95 2-4-C With Teflon (92-825407A12)

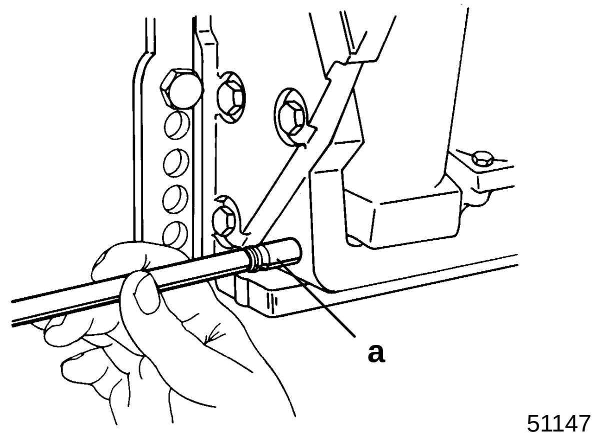
a - Lower Pivot Pin
b - Lower Dowel Pin

3. Reinstall manual tilt system, bottom first. Reconnect release valve link rod.



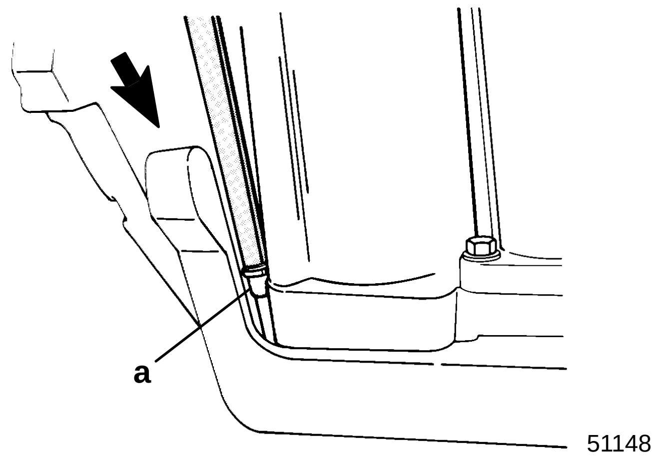
a - Manual Tilt System

4. Using a suitable punch, drive lower pivot pin into clamp bracket and trim cylinder assembly until pivot pin is flush with outside surface.



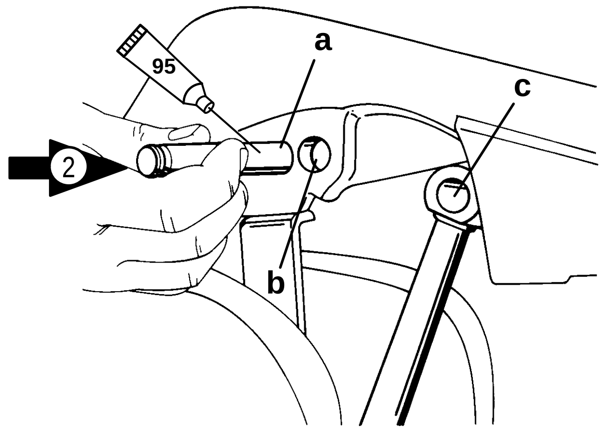
a - Lower Pivot Pin

5. Using a punch, drive lower dowel pin in until seated.



a - Lower Dowel Pin

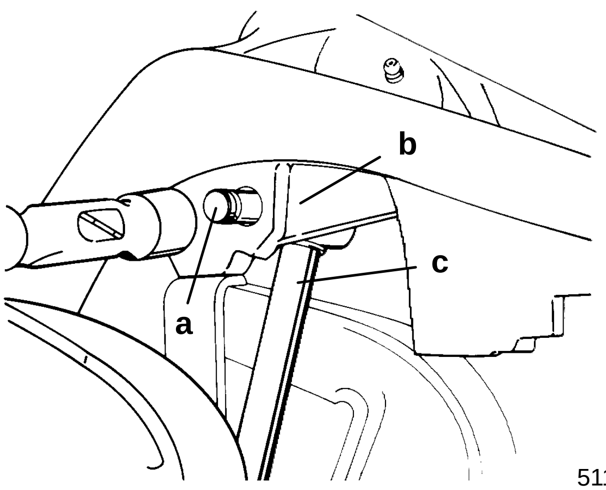
6. Apply 2-4-C w/Teflon Marine Lubricant (92-90018A12) to surface of upper pivot pin, pivot pin hole and shock rod hole.



95 2-4-C With Teflon (92-825407A12) 51148

a - Pivot Pin
b - Pivot Pin Bore
c - Shock Rod Bore

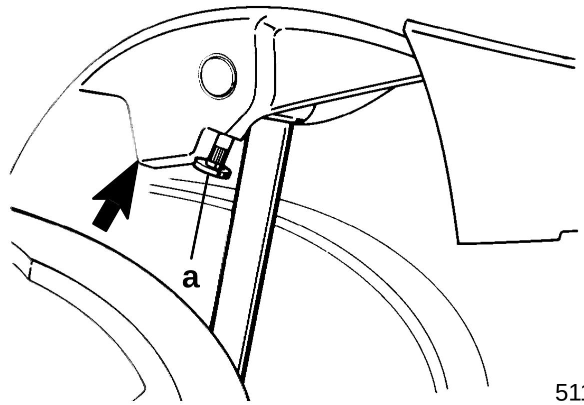
7. Using a mallet, drive upper pivot pin into swivel bracket and through shock rod until pivot pin is flush with swivel bracket.



51148

a - Pivot Pin
b - Swivel Bracket
c - Shock Rod

8. Drive upper dowel pin (a) into its hole until seated.



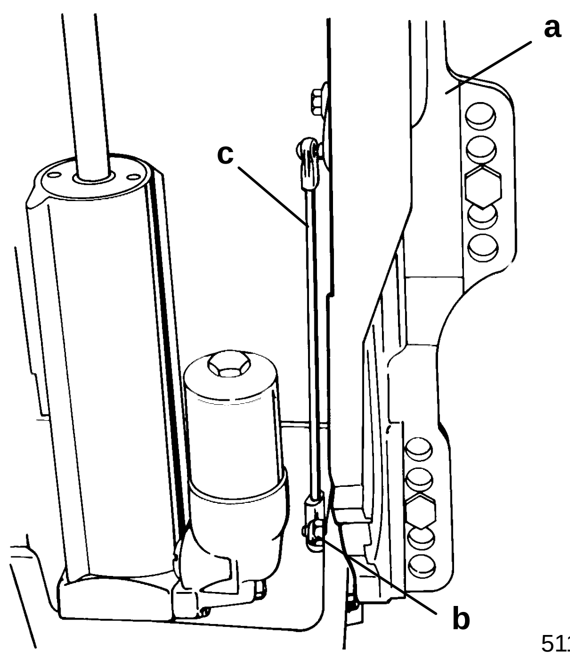
51147

a - Dowel Pin

9. Check manual release cam adjustment. Cam must open and close freely. Adjust link rod as necessary.

Manual Release Valve Adjustment

1. With outboard in full up position, place tilt lock lever forward.
2. Lift cam lever (with link rod) to full up position.

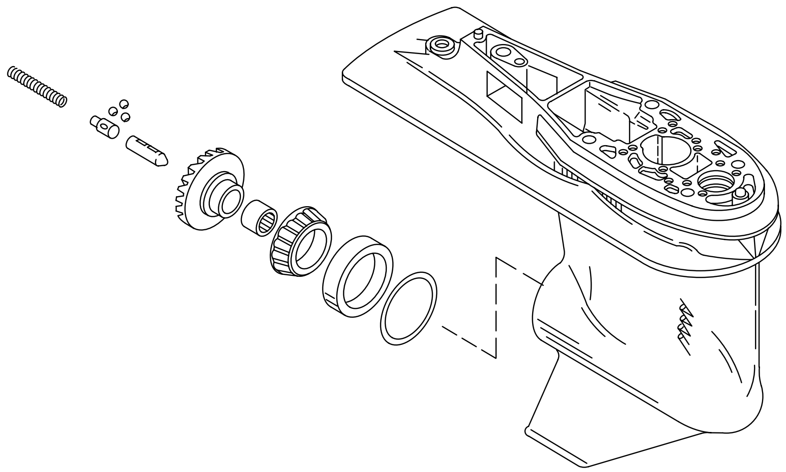


51143

a - Tilt Lock Lever
b - Cam Lever
c - Link Rod

3. Link rod end must snap onto ball of tilt lock lever without moving tilt lock lever or cam lever.

LOWER UNIT



791-H

6

A

GEAR HOUSING

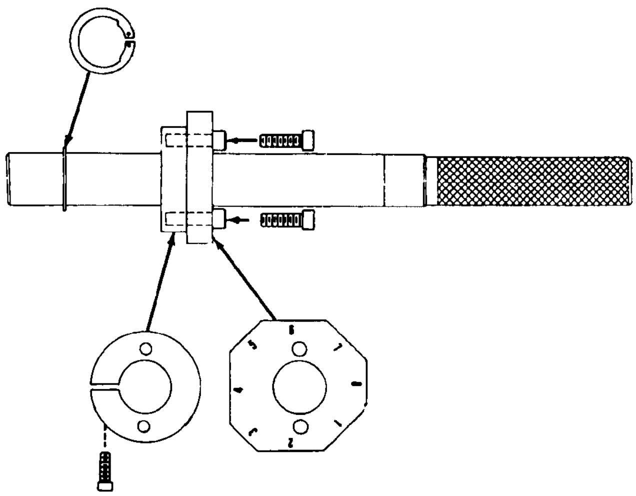
Table of Contents

Specifications

MODEL 75/90	**Gear Ratio**	2.3:1
	Gearcase Capacity	22.5 fl. oz. (655ml)
	Lubricant Type	Quicksilver Gear Lube-Premium Blend
	Forward Gear	
	Number of Teeth	30 Spiral/Bevel
	Pinion Gear	
	Number of Teeth	13 Spiral/Bevel
	Pinion Height	0.025 in. (0.64mm) Pinion Gear Locating Tool (91-12349A2) Flat #8 Disc #3
	Forward Gear Backlash	0.012-0.019 in. (0.30-0.48mm) Backlash Indicator Tool (91-78473) Mark #4
	Water Pressure	
	@ 750 RPM (Idle)	2.0-4.0 psi (14-28 kPa)
	@ 6000 RPM (WOT)	10.0-15.0 psi (69-103 kPa)
MODEL 100/115/125	**Gear Ratio**	2.07:1
	Gearcase Capacity	22.5 fl. oz. (655ml)
	Lubricant Type	Quicksilver Gear Lube-Premium Blend
	Forward Gear	
	Number of Teeth	29 Spiral/Bevel
	Pinion Gear	
	Number of Teeth	14 Spiral/Bevel
	Pinion Height	0.025 in. (0.64mm) Pinion Gear Locating Tool (91-12349A2) Flat #8 Disc #3
	Forward Gear Backlash	0.015-0.022 in. (0.38-0.55mm) Backlash Indicator Tool (91-19660--1) Mark #1
	Water Pressure	
	@ 750 RPM (Idle)	2.0-4.0 psi (14-28 kPa)
	@ 6000 RPM (WOT)	10.0-15.0 psi (69-103 kPa)
75/90/100/115/125	**Prop Shaft Runout (Maximum)**	0.009 in. (0.23mm)

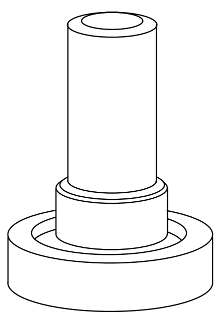
Special Tools

1. Pinion Gear Locating Tool (91-12349A2)

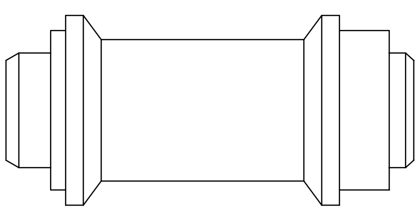


55079

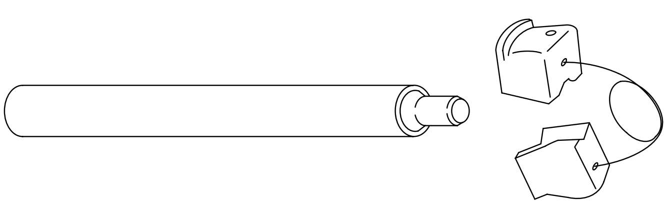
2. Bearing Installation Tool (91-13945)



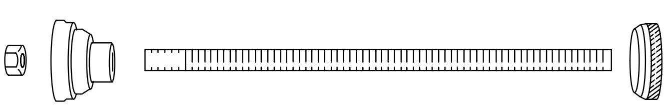
3. Oil Seal Driver (91-13949)



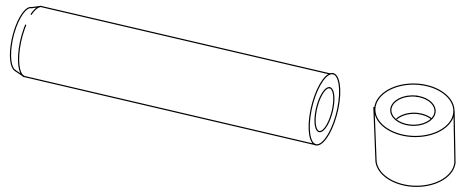
4. Bearing Race Tool (91-14308A1)



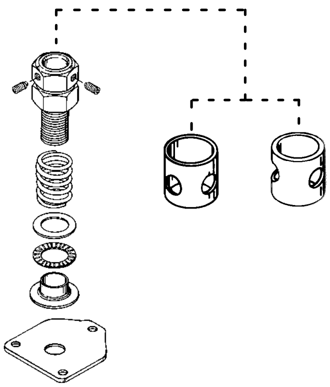
5. Bearing Installation (91-14309A1)



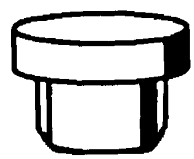
6. Wear Sleeve Installation Tool (91-14310A1)



7. Bearing Preload Tool (91-14311A2)

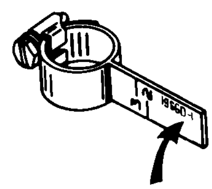


8. Mandrel (91-15755)*



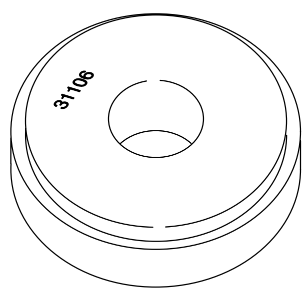
73815

9. Backlash Indicator Tool (91-19660--1) (4 cyl.)

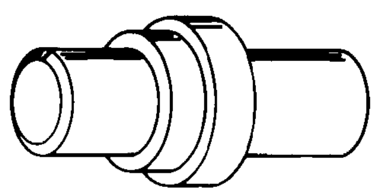


19660-1

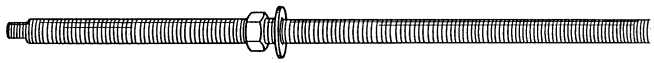
10. Mandrel (91-31106)



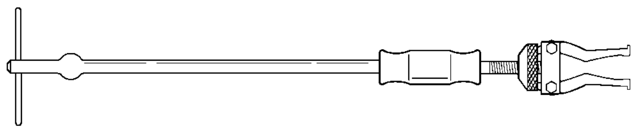
11. Oil Seal Driver (91-31108)



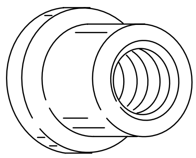
12. Treaded Rod (91-31229) and Nut (91-24156)*



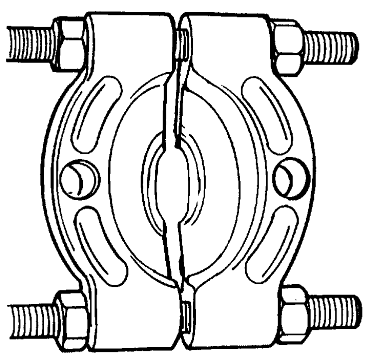
13. Slide Hammer (91-34569A1)



14. Mandrel (91-36569)*



15. Universal Puller Plate (91-37241)

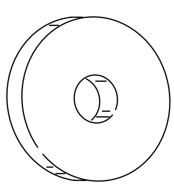


73652

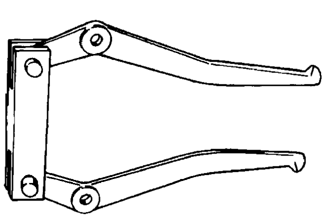
16. Driver Rod (91-37323)*

74184

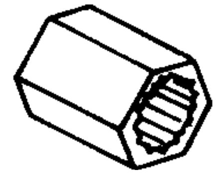
17. Mandrel (91-37350)



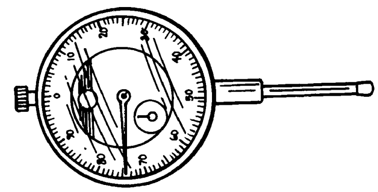
18. Puller Jaws (91-46086A1)



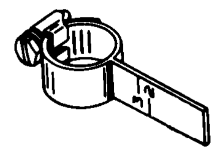
19. Driver Shaft Holding Tool (91-56775)



20. Dial Indicator (91-58222A1)

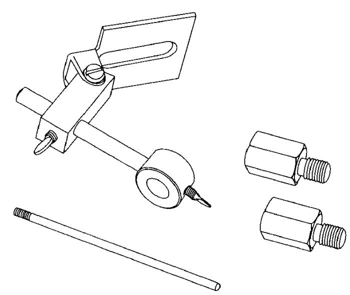


21. Backlash Indicator Tool (91-78473) (3 cyl.)

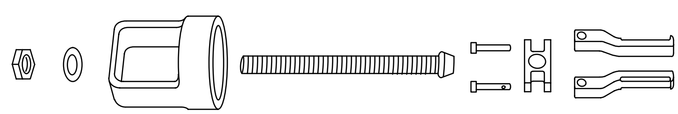


22. Puller Bolt (91-85716)

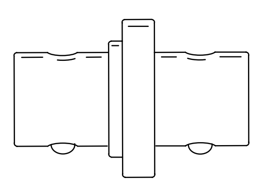
23. Dial Indicator Adaptor Kit (91-83155)



24. Bearing Puller Assembly (91-83165M)



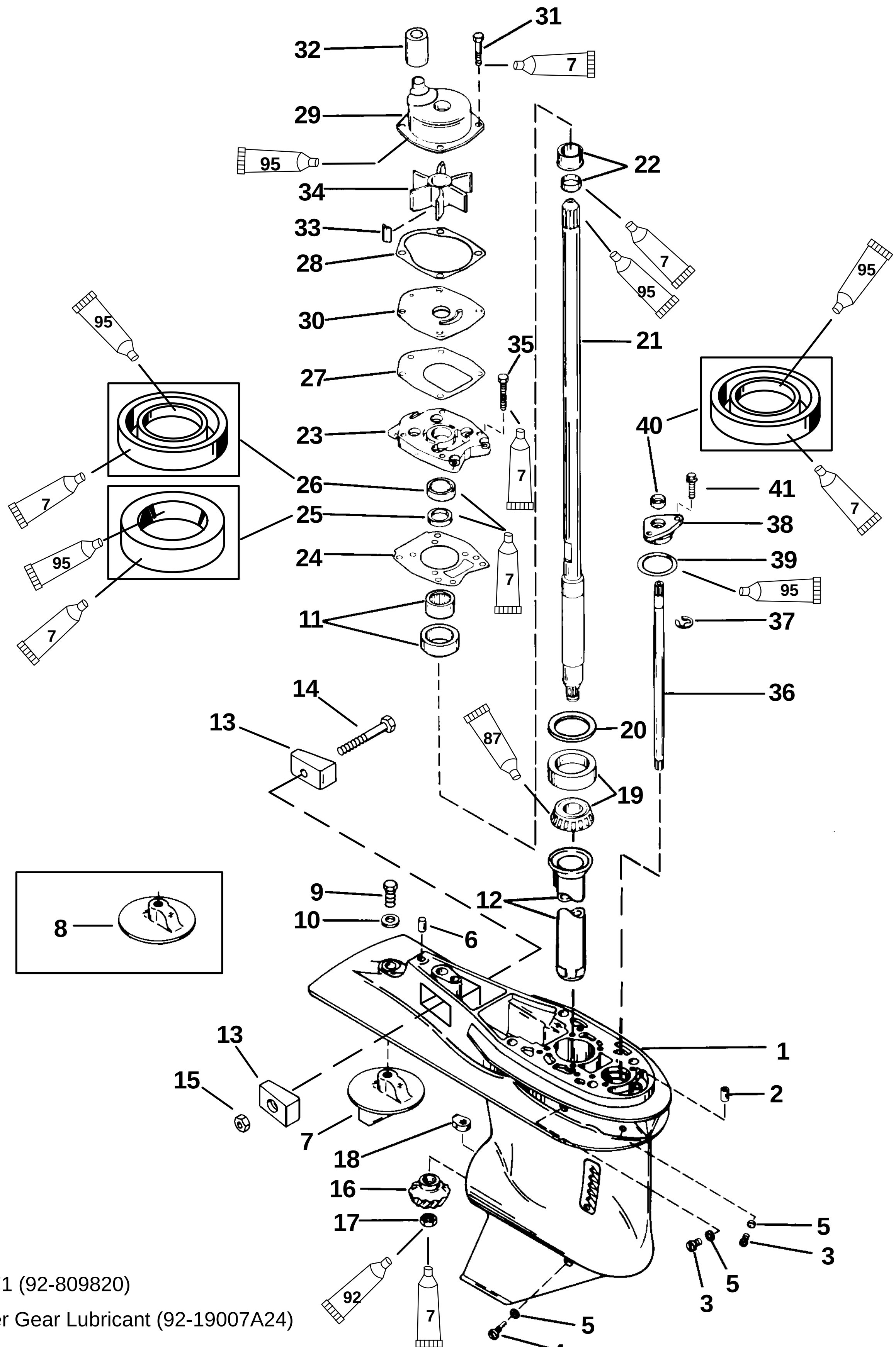
25. Bearing Installation Tool (91-855875)



56783

* From Bearing Removal and Installation Kit (91-31229A7)

Gear Housing (Drive Shaft)



7 Loctite 271 (92-809820)

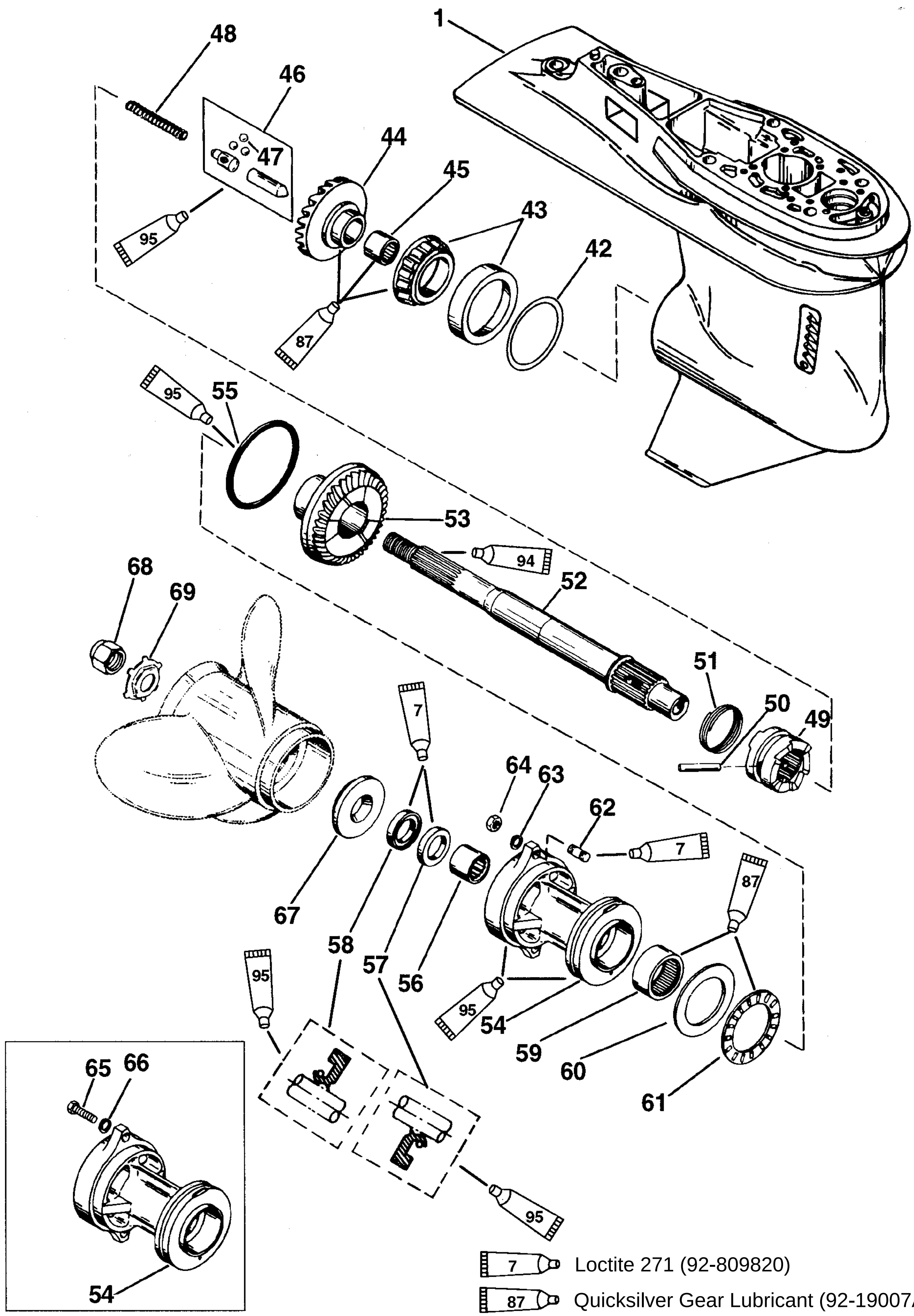
87 Quicksilver Gear Lubricant (92-19007A24)

92 Loctite 7649 Primer (92-809824)

95 2-4-C With Teflon (92-825407A12)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	GEAR HOUSING			
2	1	DOWEL PIN **(FRONT)**			
3	2	DRAIN SCREW	60		6.8
4	1	SCREW (MAGNETIC)	60		6.8
5	3	WASHER–Sealing			
6	1	DOWEL PIN **(REAR)**			
7	1	TRIM TAB (USE W/GH W/O ANODES)			
8	1	TRIM TAB (USE W/GH WITH ANODES)			
9	1	SCREW (7/16-14 x 1-1/4)		22	29.8
10	1	WASHER			
11	1	CARRIER			
12	1	OILER TUBE			
13	2	ANODE (DESIGN II)			
14	1	SCREW (DESIGN II)			
15	1	NUT (DESIGN II)	60		6.8
16	1	PINION GEAR			
17	1	NUT		70	95.0
18	1	SHIFT CAM			
19	1	TAPERED ROLLER BEARING			
20	1	SHIM ASSEMBLY			
21	1	DRIVE SHAFT ASSEMBLY (LONG–32 IN.)			
	1	DRIVE SHAFT ASSEMBLY (LL–34-1/2 IN.)			
	1	DRIVE SHAFT ASSEMBLY (X-LONG–37 IN.)			
22	1	WEAR SLEEVE ASSEMBLY			
23	1	COVER ASSEMBLY			
24	1	GASKET			
25	1	OIL SEAL **(LOWER)**			
26	1	OIL SEAL **(UPPER)**			
27	1	GASKET			
28	1	GASKET			
29	1	WATER PUMP ASSEMBLY			
30	1	FACE PLATE			
31	4	SCREW (M6 x 30)	60		6.8
32	1	SEAL			
33	1	KEY			
34	1	IMPELLER			
35	6	SCREW (M6 x 25)	60		6.8
36	1	SHIFT SHAFT ASSEMBLY (LONG–12 IN.)			
	1	SHIFT SHAFT ASSEMBLY (LL–14-1/2 IN.)			
	1	SHIFT SHAFT ASSEMBLY (X-LONG–17 IN.)			
37	1	E-RING			
38	1	BUSHING ASSEMBLY			
39	1	O-RING			
40	1	OIL SEAL			
41	2	SCREW (M6 x 25)	35		4.0

Gear Housing (Propeller Shaft)



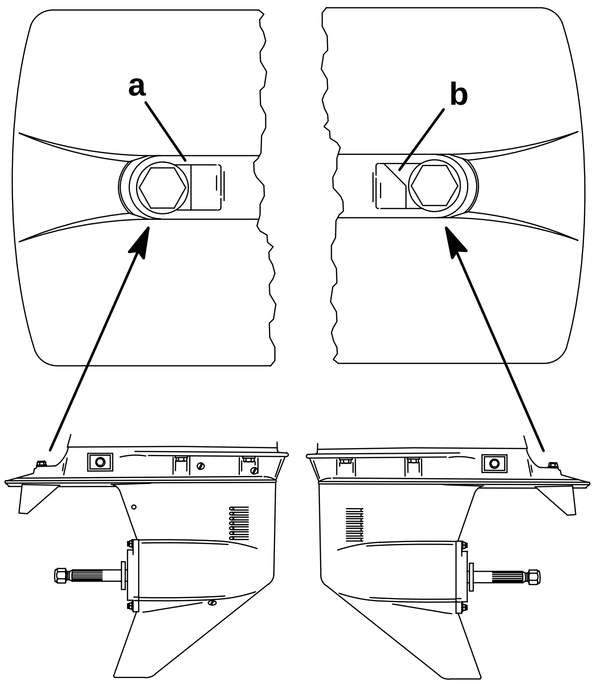
7	Loctite 271 (92-809820)
87	Quicksilver Gear Lubricant (92-19007A24)
94	Anti-Corrosion Grease (92-78376A6)
95	2-4-C With Teflon (92-825407A12)

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	GEAR HOUSING			
42	1	SHIM ASSEMBLY			
43	1	TAPERED ROLLER BEARING ASSEMBLY			
44	1	FORWARD GEAR			
45	1	ROLLER BEARING			
46	1	CAM FOLLOWER ASSEMBLY			
47	3	BALL			
48	1	SPRING			
49	1	CLUTCH			
50	1	CROSS PIN			
51	1	SPRING			
52	1	PROPELLER SHAFT			
53	1	REVERSE GEAR			
54	1	BEARING CARRIER ASSEMBLY			
55	1	O-RING			
56	1	ROLLER BEARING			
57	1	OIL SEAL **(INNER)**			
58	1	OIL SEAL **(OUTER)**			
59	1	ROLLER BEARING			
60	1	THRUST WASHER			
61	1	THRUST BEARING			
62	2	STUD (M8 x 48)		100	135
63	2	WASHER DESIGN II			
64	2	NUT		25	34.0
65	2	SCREW DESIGN I		25	34.0
66	2	WASHER			
67	1	THRUST HUB ASSEMBLY THESE PARTS ARE NOT			
68	1	PROPELLER NUT ASSEMBLY INCLUDED WITH REPLACEMENT		55	74.6
69	1	TAB WASHER **GEAR HOUSING**			

Gear Case Identification

⚠ CAUTION

Identify gear case design to ensure correct components are being installed. Design I - "3 Jaw Reverse Clutch" (a) gear case identified with straight machined edge for trim tab screw mounting surface. Design II - "6 Jaw Reverse Clutch" (b) gear case identified with angled machined edge for trim tab screw mounting surface.



1987 – 1997 "3 Jaw Reverse Clutch"　**1998 and Newer "6 Jaw Reverse Clutch"**

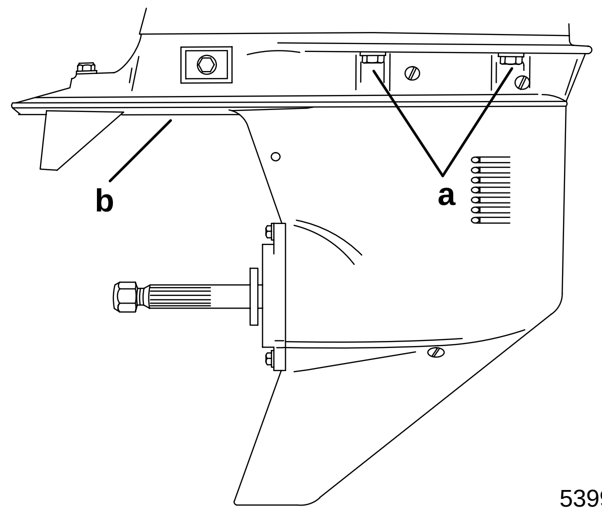
a - Design I - "3 Jaw Reverse Clutch" Gear Case Identifier
b - Design II - "6 Jaw Reverse Clutch" Gear Case Identifier

Removal

⚠ WARNING

To prevent accidental engine starting, remove (and isolate) spark plug leads from spark plugs before removing gear housing.

1. Remove (and isolate) spark plug leads from spark plugs.
2. Shift engine into forward gear.
3. Tilt engine to full "Up" position.
4. Remove fasteners.
5. Remove locknut and washer.
6. Remove gear housing.



a - Fasteners (2 each side)
b - Locknut and Washer

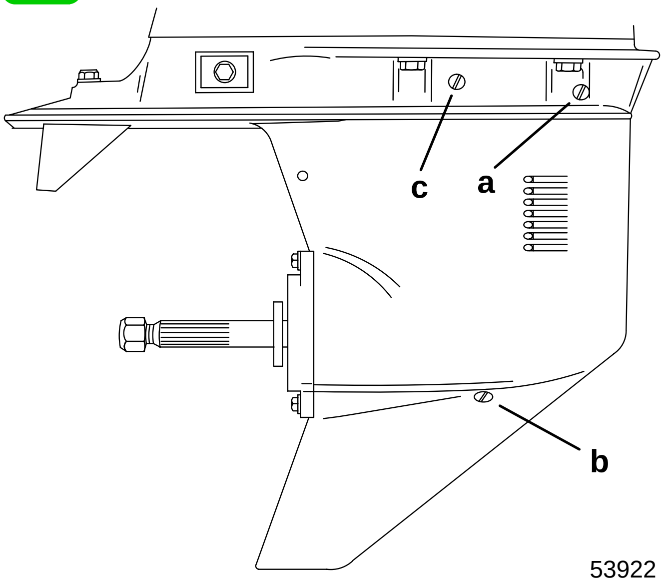
Disassembly

Draining and Inspecting Gear Housing Lubricant

⚠ WARNING

If gear housing is installed on engine, to avoid accidental starting, disconnect (and isolate) spark plug leads from spark plugs before working near the propeller.

1. With gear housing in normal running position, place a clean pan under housing and remove the two vent screws and one fill/drain screw (with gaskets).



a - Oil Level Screw
b - Fill/Drain Screw
c - Vent Screw

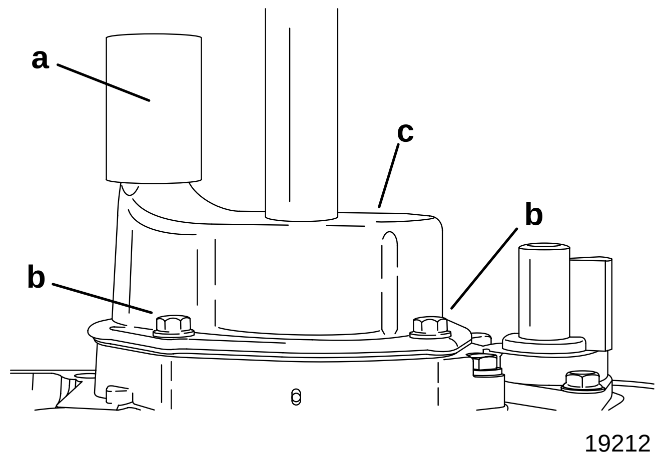
2. Inspect gear lubricant for metal particles (lubricant will have a “metal flake” appearance). Presence of fine metal particles (resembling powder) on the drain plug bar magnet indicates normal wear. The presence of metal chips on the drain plug bar magnet indicates the need for gear housing disassembly and component inspection.

3. Note color of gear lubricant. White or cream color MAY indicate presence of water in lubricant. Gear lubricant which has been drained from a gear case recently in operation will have a yellowish color due to lubricant agitation/aeration. Gear lube which is mixed with assembly lubricant (Special Lube 101 or 2-4-C w/Teflon will also be creamy white in color. This is normal and should not be confused with the presence of water. If water is suspected to be present in gearcase, a pressure check of gearcase should be made (with no lubricant in gearcase). Gearcase should hold 10 to 12 psi (68 – 82 kPa) of pressure for 5 minutes without leaking down. Pouring a portion of the gear lubricant into a glass jar and allowing the lubricant to settle will allow any water in the lube to separate and settle to the bottom of the jar.

4. Presence of water in gear lubricant indicates the need for disassembly and inspection of oil seals, seal surfaces, O-rings, water pump gaskets as well as gear housing components for damage. If gearcase is rebuilt, gearcase should be pressure checked before filling with lubricant.

Water Pump

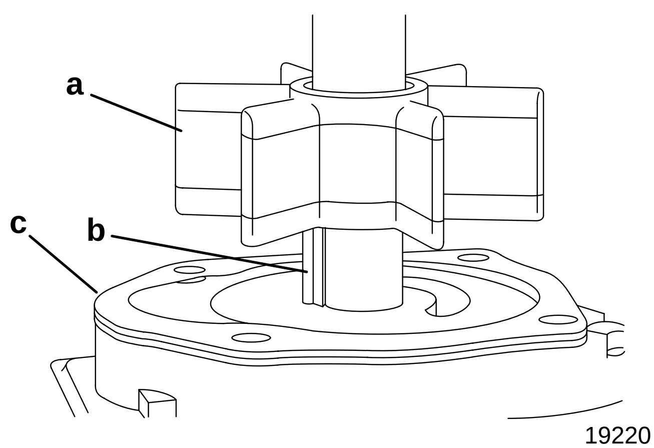
1. If water tube seal stayed on water tube (inside of drive shaft housing) when gear housing was removed, pull water tube seal from water tube.
2. Replace water tube seal, if damaged.
3. Remove 4 bolts, washers, and isolators.
4. Remove cover.



a - Water Tube Seal
b - Bolts (4 each)
c - Cover

IMPORTANT: The circular groove formed by the impeller sealing bead should be disregarded when inspecting cover (Step 5) and plate (Step 9), as the depth of the groove will not affect water pump output.

5. Replace cover if thickness of steel at the discharge slots is 0.060 in. (1.52mm) or less, or if groove(s) (other than impeller sealing bead groove) in cover roof are more than 0.030 in. (0.76mm) deep.
6. Lift impeller, drive key, and gasket from drive shaft.

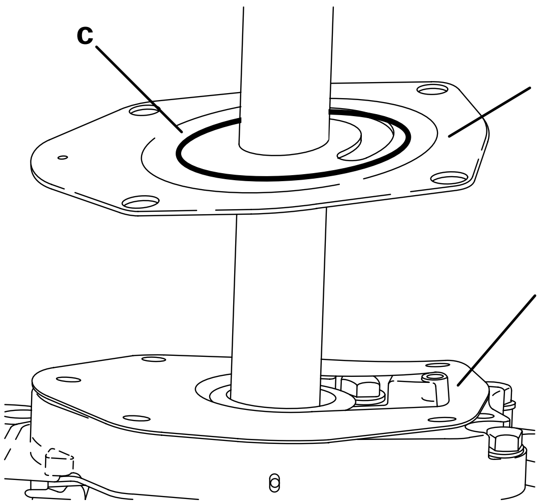


a - Impeller
b - Drive Key
c - Gasket

7. Inspect impeller. Replace impeller if any of the following conditions exist:

- Impeller blade(s) are cracked, torn, or worn.
- Impeller is glazed or melted (caused by operation without sufficient water supply).
- Rubber portion of impeller is not bonded to impeller hub.

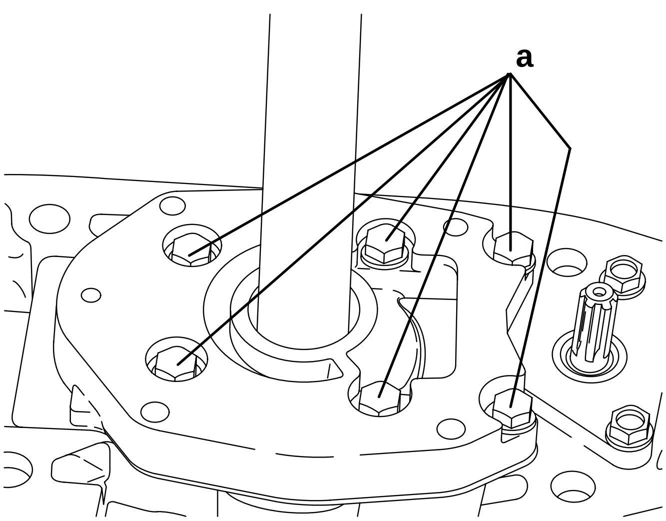
8. Remove plate and gasket.
9. Replace plate if groove(s) (other than impeller sealing bead groove) in plate are more than 0.030 in. (0.76mm) deep.



19219

a - Plate
b - Gasket
c - Impeller Sealing Groove

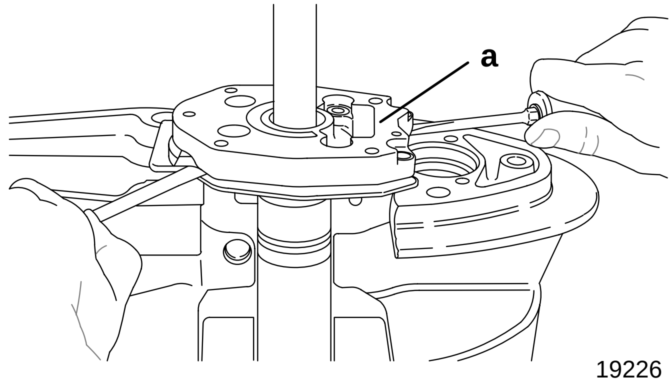
10. Remove bolts and washers.



19217

a - Bolts and Washers (6 each)

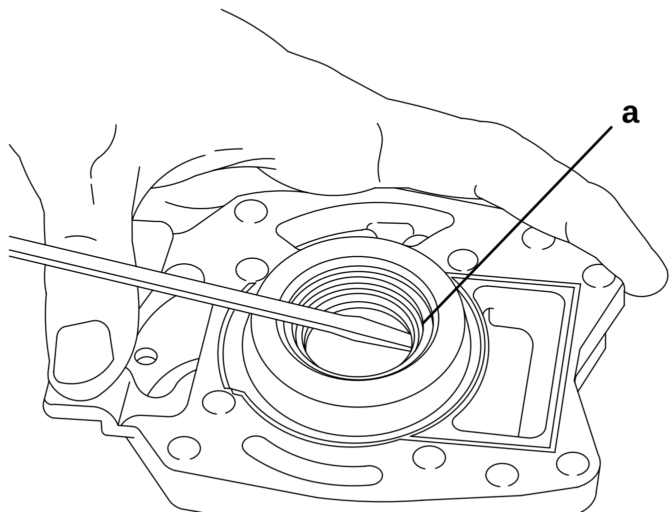
11. Remove water pump base.



19226

a - Water Pump Base

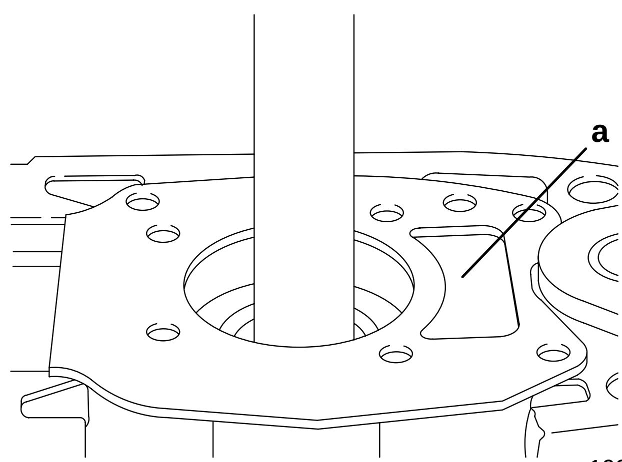
12. Remove (and discard) seals.



19195

a - Seals

13. Remove gasket.

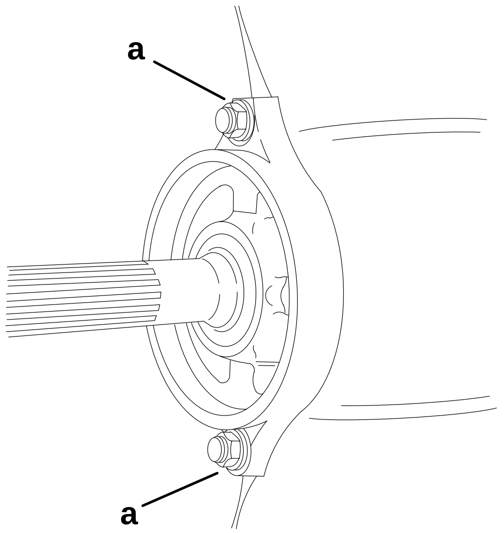


19218

a - Gasket

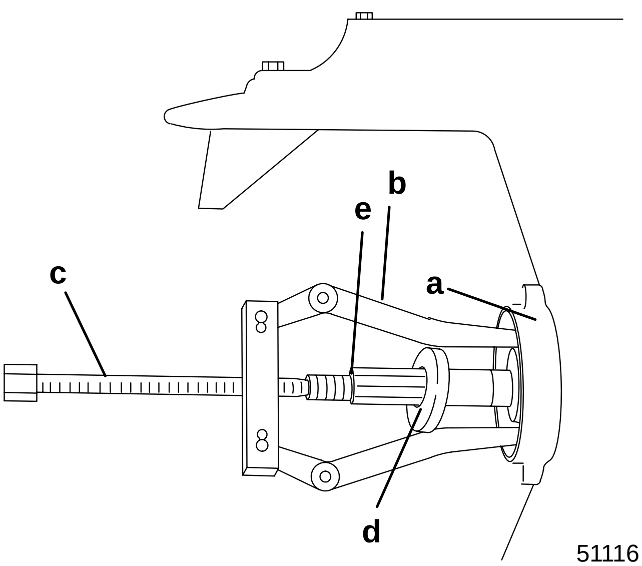
Bearing Carrier and Propeller Shaft

1. Remove fasteners.



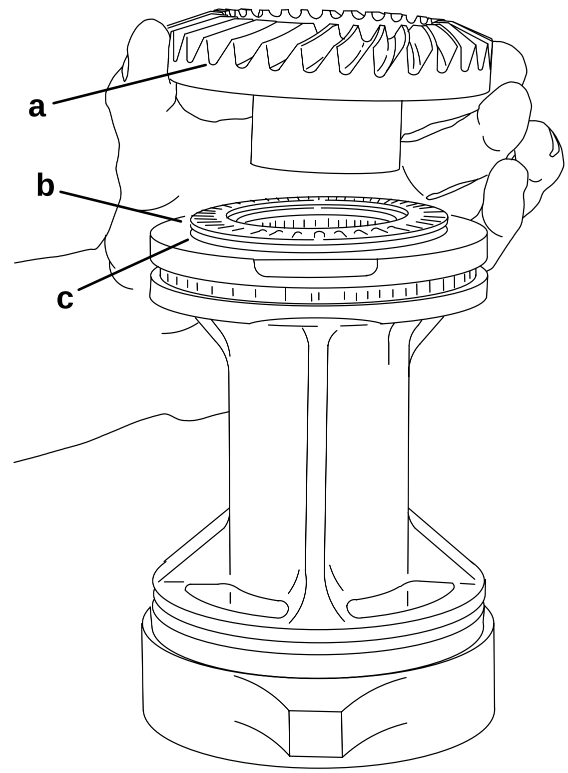
a - Fasteners

2. With propeller shaft horizontal, pull carrier to break seal with gear housing. Remove bearing carrier/propeller shaft components as an assembly, taking care not to lose cam follower or 3 metal balls in end of propeller shaft.
3. Remove propeller shaft from bearing carrier.



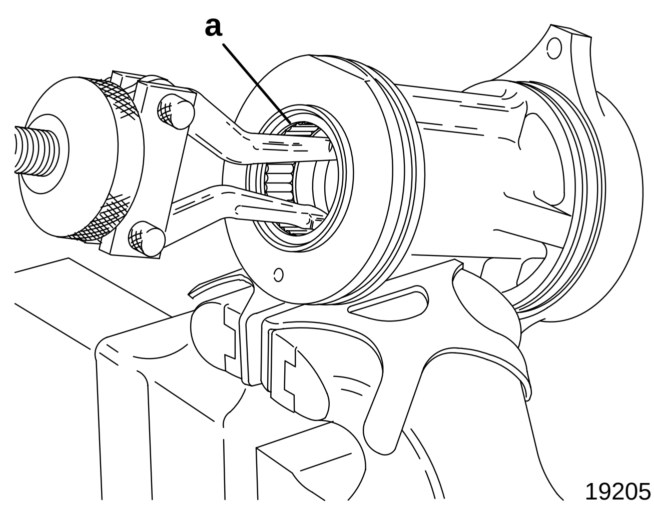
a - Bearing Carrier
b - Puller Jaws (91-46086A1)
c - Puller Bolt (91-85716)
d - Thrust Hub
e - Propeller Shaft

4. Lift reverse gear, thrust bearing and thrust washer from bearing carrier.
5. Replace reverse gear if gear teeth or clutch teeth on reverse gear are chipped or worn. If reverse gear must be replaced, pinion gear and sliding clutch should be inspected for damage.
6. Replace thrust bearing and thrust washer if rusted or damaged.



a - Reverse Gear
b - Thrust Bearing
c - Thrust Washer

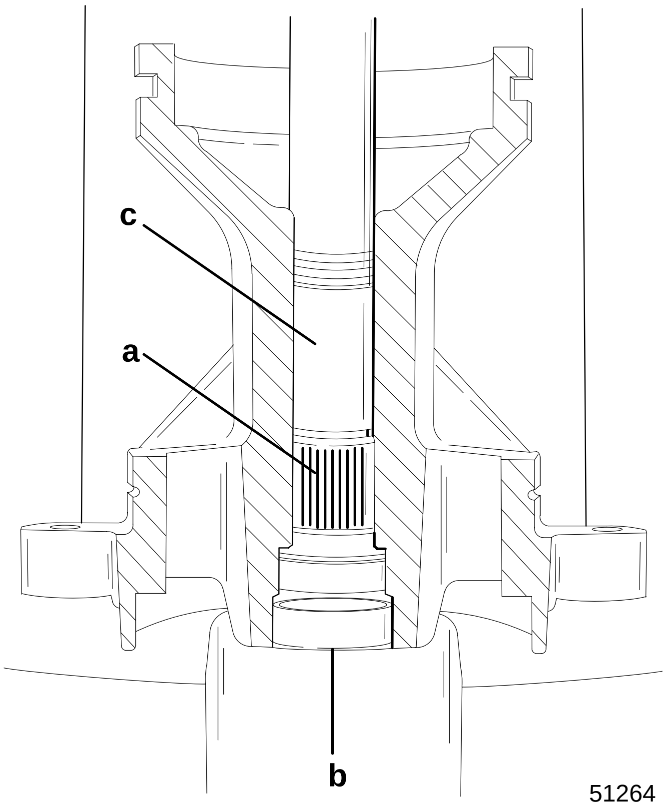
7. If bearing is rusted or does not roll freely, replace bearing. Remove bearing using Slide Hammer (91-34569A1).



a - Bearing

8. If bearing is rusted or does not roll freely, replace bearing. Remove bearing and oil seals using Mandrel* (91-36569) and Driver Rod* (91-37323). Discard oil seals.

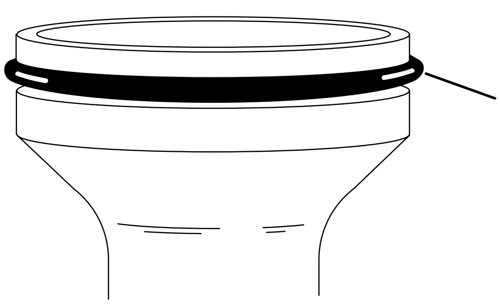
* From Bearing Removal and Installation Kit (91-31229A7)



51264

a - Bearing
b - Mandrel (91-26569)
c - Driver Rod (91-37323)

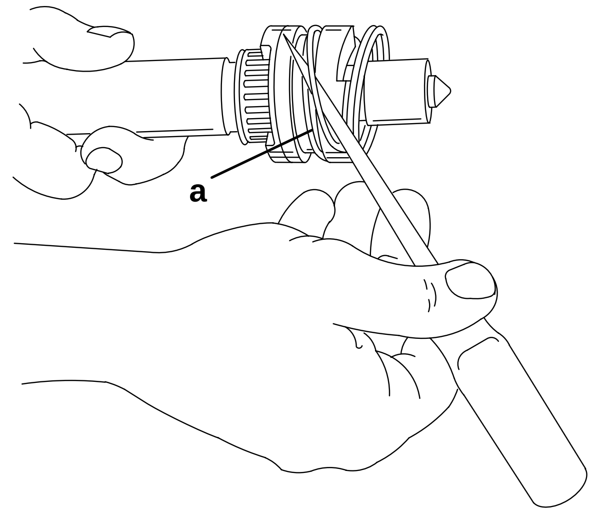
9. Remove (if not removed with bearing in Step 8) propeller shaft seals and bearing carrier O-ring.



51263

a - O-ring

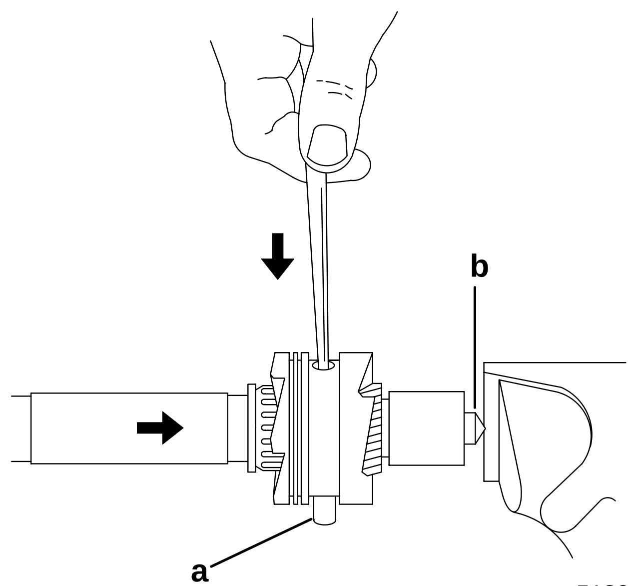
10. Remove spring.



51876

a - Spring

11. Apply constant pressure to cam follower to prevent cam follower assembly from ejecting from propeller shaft while pushing cross pin out of clutch dog.



51800

a - Cross Pin
b - Cam Follower

12. Remove components from propeller shaft.

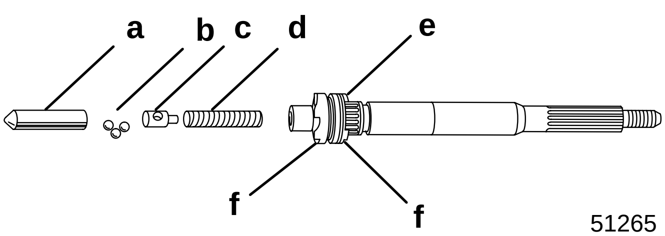
13. Replace cam follower if worn or pitted.

14. Replace sliding clutch if jaws are rounded or chipped. Rounded jaws indicate one or more of the following:

    a. Improper shift cable adjustment.

    b. Engine idle speed too high while shifting.

    c. Shifting from neutral to reverse (or forward) too slowly.



a - Cam Follower
b - 3 Metal Balls
c - Guide Block
d - Spring
e - Sliding Clutch
f - Jaws

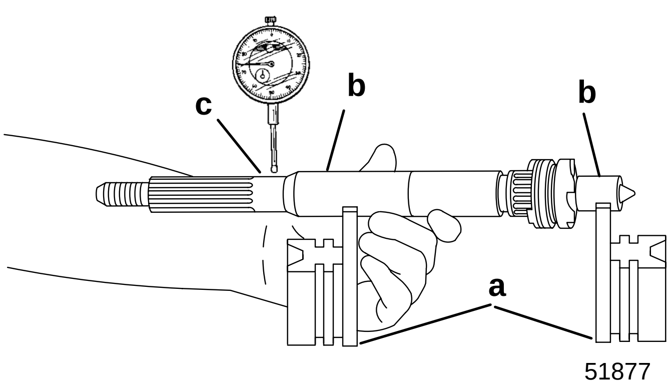
15. Check bearing surfaces of propeller shaft for pitting or wear. If shaft is worn or pitted, replace shaft and corresponding bearing.

16. Replace propeller shaft if any of the following exist:

    a. Splines are twisted or worn.

    b. Oil seal surface is grooved.

    c. Shaft has a noticeable "wobble" or is bent more than 0.009 in. (0.23mm). Prop shaft trueness should be measured with a dial indicator with prop shaft on V-blocks.

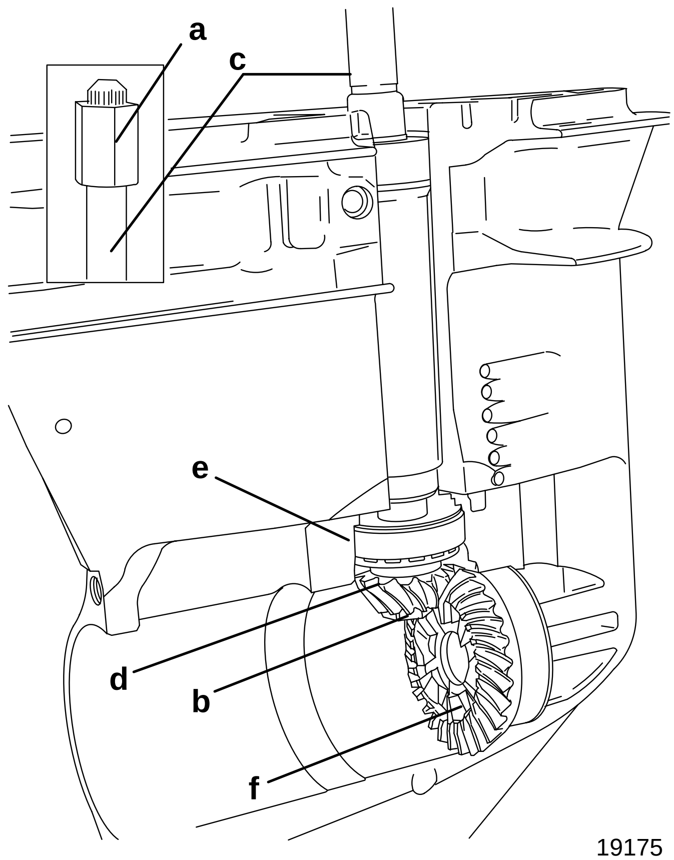


a - V-Blocks
b - Bearing Surfaces
c - Measure with Dial Indicator at This Point

Pinion Gear, Drive Shaft, and Forward Gear

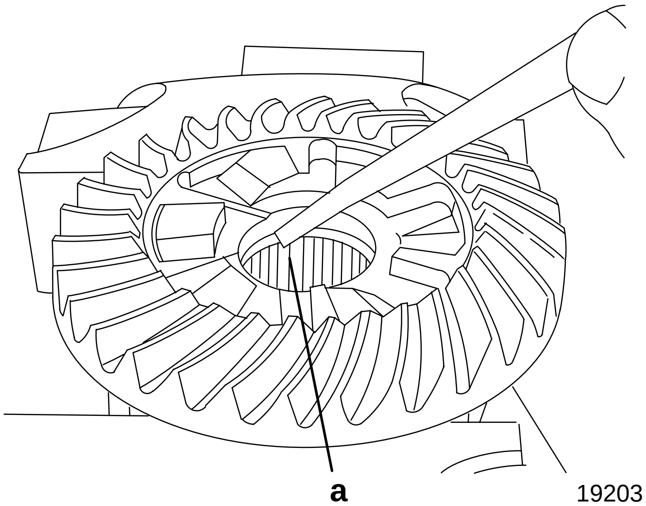
Model	Drive Shaft Holding Tool
50 Bigfoot (4-Stroke)	91-56775
60 Bigfoot	91-817070
75/90/100/115/125	91-56775

1. Hold drive shaft using Drive Shaft Holding Tool (91-56775); remove (and discard) pinion nut.
2. Remove drive shaft, pinion gear, bearing and forward gear.
3. Replace pinion gear if it is chipped or worn.
4. Replace bearing and race if either are rusted or damaged; or if bearing does not roll freely. To remove race, refer to "Lower Drive Shaft Bearing Race," following.
5. Replace forward gear if gear teeth or clutch teeth are chipped or worn.



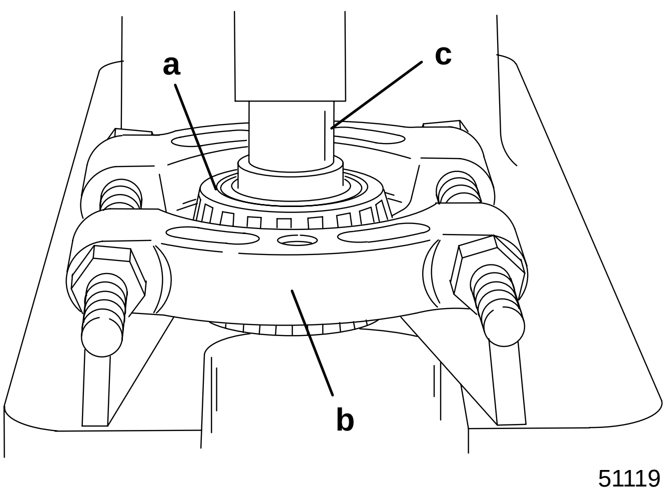
a - Drive Shaft Holding Tool (91-56775)
b - Pinion Nut
c - Drive Shaft
d - Pinion Gear
e - Bearing
f - Forward Gear

6. Replace bearing if it is rusted or does not roll freely; use a punch and hammer to remove bearing.



a - Bearing

7. Replace forward gear bearing and race if either are rusted or damaged; or if bearing does not roll freely. Remove bearing from gear using Universal Puller Plate (91-37241) and mandrel. To remove race, refer to "Forward Gear Bearing Race," following.



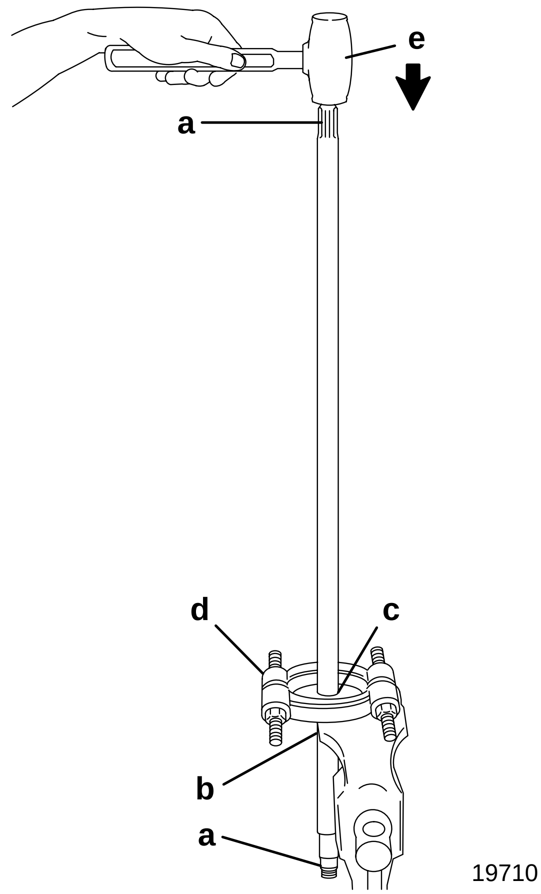
a - Forward Gear Bearing
b - Universal Puller Plate (91-37241)
c - Mandrel

8. Replace drive shaft if splines are worn or twisted.

9. If bearing surface is damaged, replace drive shaft and corresponding bearing.

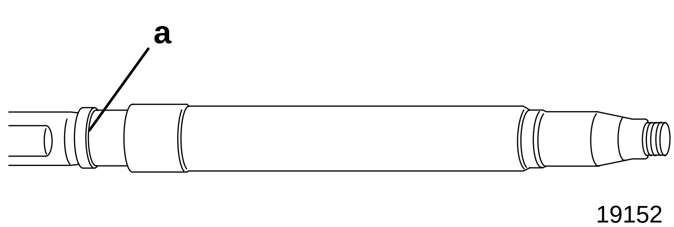
IMPORTANT: Do not tighten vise against drive shaft.

10. If wear sleeve is deeply grooved; allowing water to enter gear case, remove (and discard) sleeve using Universal Puller Plate (91-37241) and mallet.



a - Splines
b - Bearing Surface
c - Wear Sleeve
d - Universal Puller Plate (91-37241)
e - Mallet

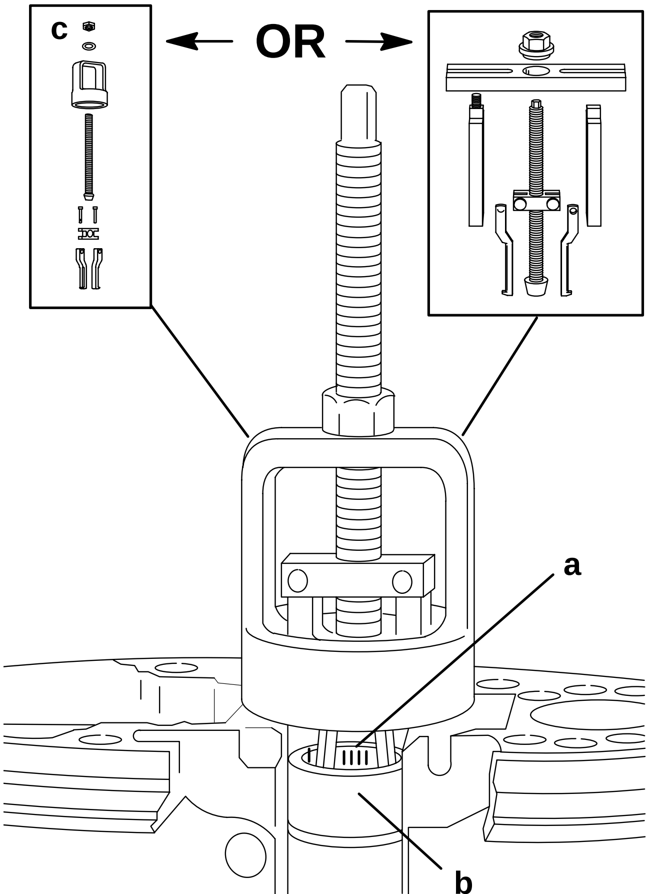
11. Remove (and discard) rubber ring.



a - Rubber Ring

Upper Drive Shaft Bearing

1. Replace upper drive shaft bearing and sleeve if either are rust stained, or if bearing will not roll freely. Remove bearing and then sleeve using Puller Assembly (91-83165M) with suitable jaws.

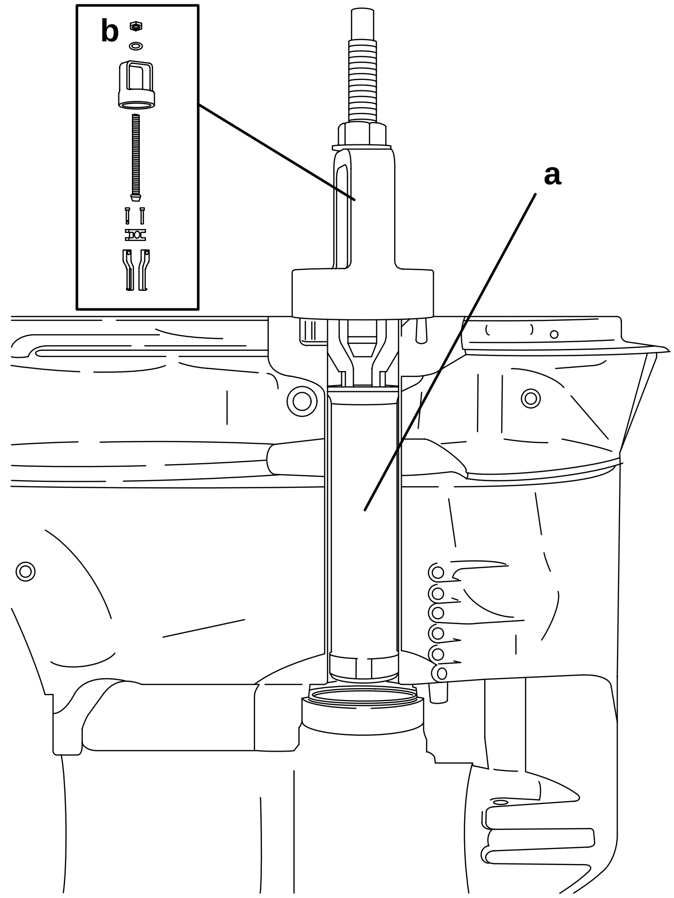


a - Upper Drive Shaft Bearing
b - Sleeve
c - Puller Assembly (91-83165M)

IMPORTANT: Upper drive shaft bearing/sleeve must be removed prior to oil sleeve removal. Refer to “Upper Drive Shaft Bearing,” preceding.

Oil Sleeve

1. Remove oil sleeve (if necessary) using Puller Assembly (91-83165M) with suitable jaws.



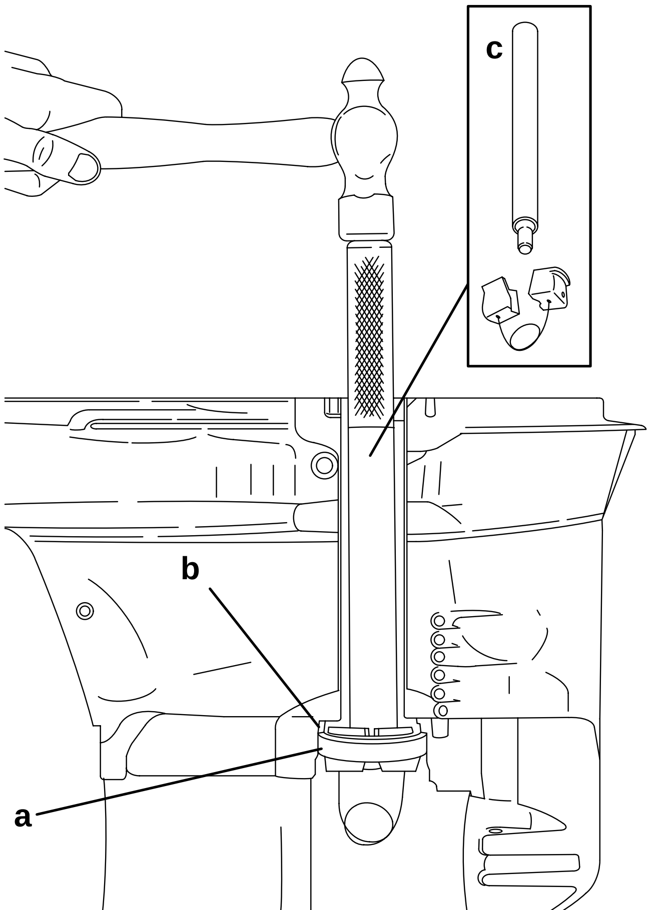
a - Oil Sleeve
b - Puller Assembly (91-83165M)

IMPORTANT: Upper drive shaft bearing/sleeve and oil sleeve do not have to be removed for lower drive shaft bearing race removal.

Lower Drive Shaft Bearing Race

IMPORTANT: Retain shim(s) for reassembly.

1. Remove race and shim(s) using bearing race tool (91-14308A1).

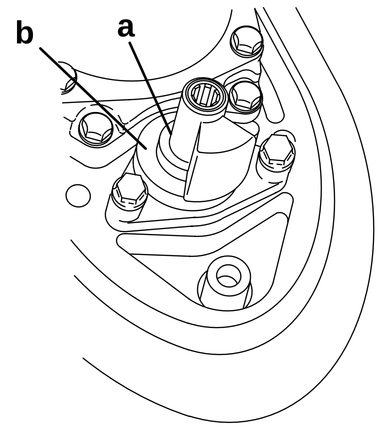


19171

a - Race
b - Shim(s)
c - Bearing Race Tool (91-14308A1)

Shift Shaft

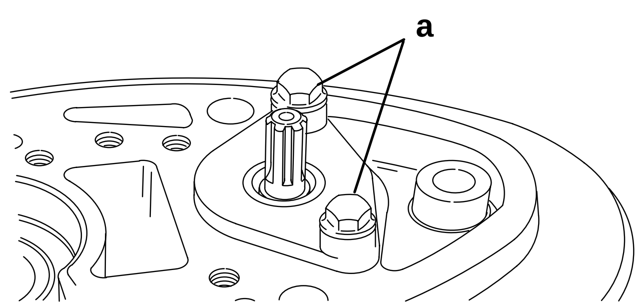
1. Remove shift shaft coupler and nylon spacer.



53925

a - Shift Shaft Coupler
b - Spacer

2. Remove bolts.

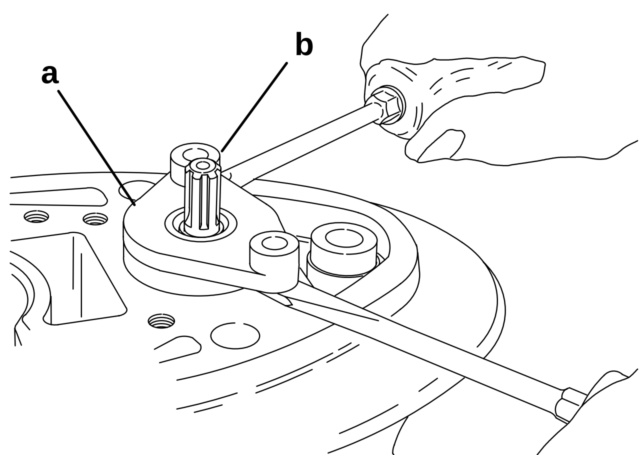


53926

a - Bolts

***NOTE:** Gearcase should be in FORWARD for easiest removal of shift shaft.*

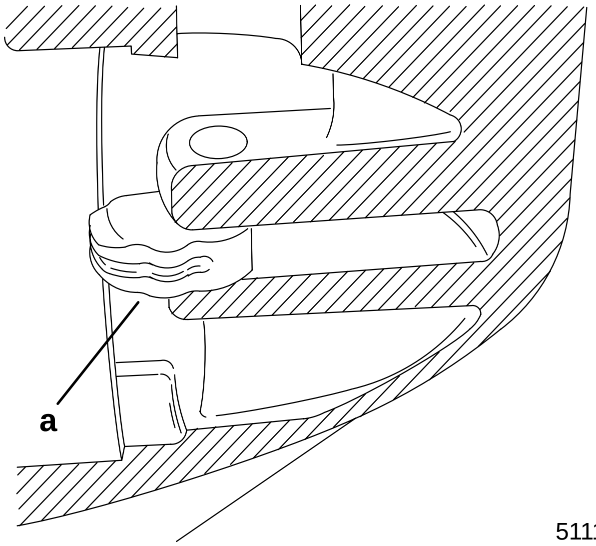
3. Remove shift shaft bushing and shift shaft.



53927

a - Bushing
b - Shift Shaft

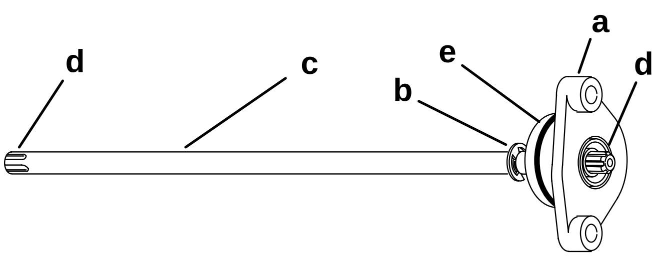
4. Remove shift cam from housing.
5. Replace shift cam if worn.



a - Shift Cam

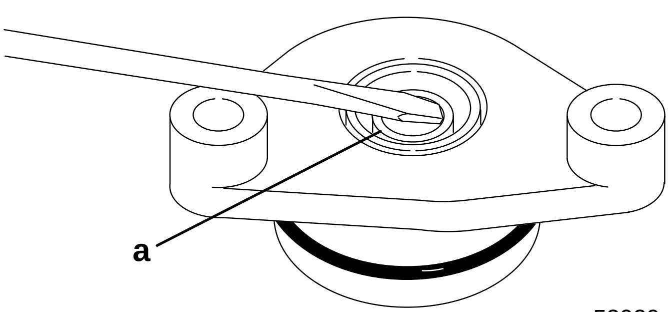
***NOTE:** If shift shaft splines are rough, shift shaft seal lips will be cut during removal/installation.*

6. Remove shift shaft bushing and clip from shift shaft.
7. Replace shift shaft if splines are worn or shaft is twisted.
8. Remove (and discard) O-ring.



a - Bushing
b - Clip
c - Shift Shaft
d - Splines
e - O-ring

9. Remove (and discard) seal.

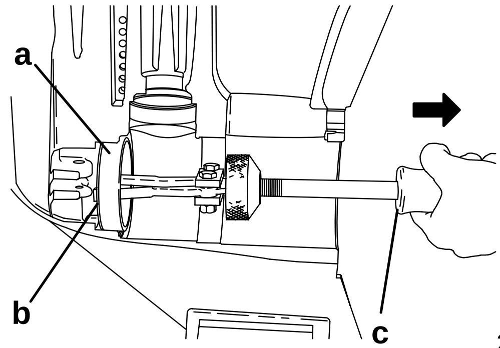


a - Seal

Forward Gear Bearing Race

IMPORTANT: Retain shim(s) for reassembly. If shims are damaged, replace with new shims of equal thickness.

1. Remove race and shim(s) using Slide Hammer (91-34569A1).

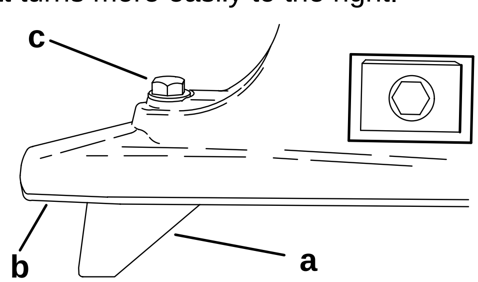


a - Race
b - Shim(s)
c - Slide Hammer (91-34569A1)

Trim Tab Adjustment and Replacement

IMPORTANT: The trim tab is now painted and does NOT aid in protecting the drive shaft housing and gear housing from galvanic corrosion (corrosion and pitting of metal surfaces). Side anodes now provide protection. Do not paint or place protective coating on the side anodes, or corrosion protection function will be lost.

1. Replace trim tab if damaged. Mark location of old trim tab on anti-ventilation plate before removal; install new trim tab in same location.
2. The trim tab provides a means to offset (balance) some of the steering load that is caused by propeller torque at higher operating speeds. If at higher speeds the boat turns more easily to the left, loosen bolt, move the trim tab (trailing edge) to the left (when viewed from behind); retighten bolt. Turn trim tab (trailing edge) to the right if the boat turns more easily to the right.

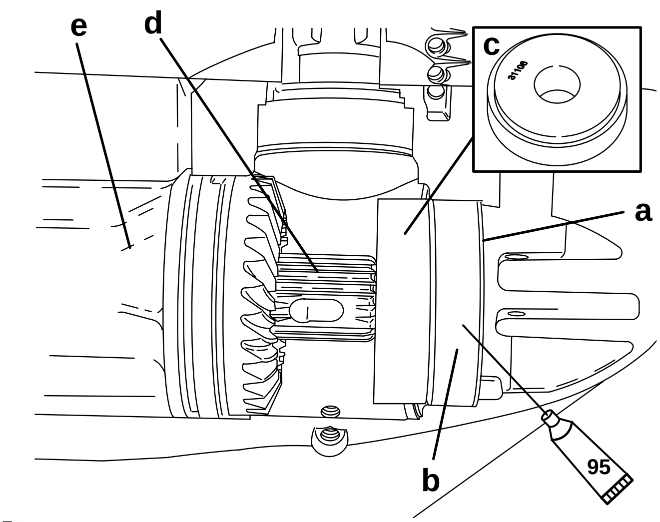


a - Trim Tab
b - Anti-Ventilation Plate
c - Retaining Bolt and Washer; Torque Bolt to 22 lbs. ft. (29.8 N·m)

Reassembly

Forward Gear Bearing Race

1. Place shim(s) (retained from disassembly) into housing. If shim(s) were lost, or a new gear housing is being assembled, start with 0.010 in. (0.254mm) shim(s).
2. Assemble components as shown; drive race into housing by striking propeller shaft end with lead hammer.



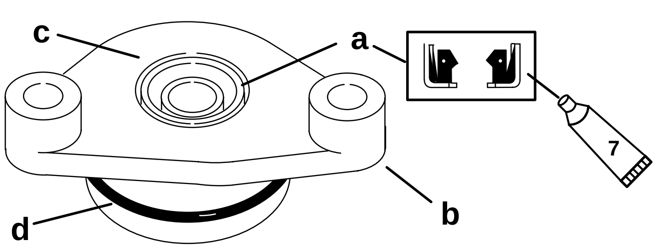
95 2-4-C With Teflon (92-825407A12)

19179

a - Shim(s)
b - Race, Apply 2-4-C w/Teflon Lubricant on O.D.
c - Mandrel (91-31106)
d - Disassembled Propeller Shaft
e - Assembled Bearing Carrier

Shift Shaft

1. Apply Loctite 271 on O.D. of new seal.
2. Press seal into shift shaft bushing until seal is seated against shoulder.
3. Install new O-ring.
4. Apply 2-4-C with Teflon on O-ring and I.D. of seal.

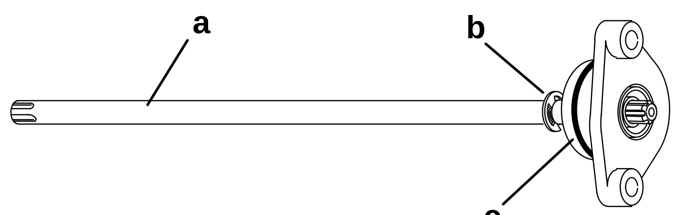


7 Loctite 271 (92-809820)

53930

a - Seal (Lip faces UP)
b - Bushing
c - Surface
d - O-ring

5. Assemble components as shown.

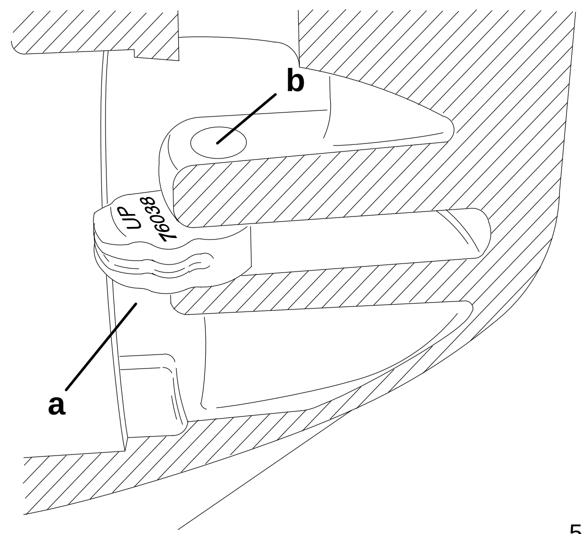


53928

a - Shift Shaft
b - “E” Clip
c - Shift Shaft Bushing

6. Install shift cam (numbers toward top of gear housing); align hole in shift cam with hole.

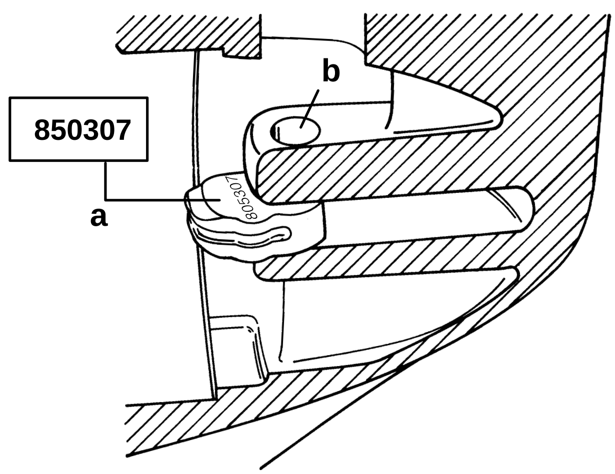
60 Bigfoot 75/90/100/115/125



51117

a - Shift Cam (marked with “UP” and part number)
b - Gear Housing Hole

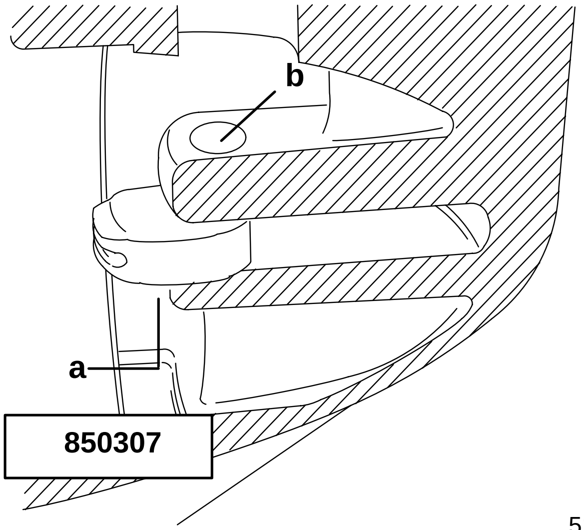
60 Bigfoot 75/90/100/115/125



56791

a - Shift Cam (marked with part number **only**)
b - Gear Housing Hole

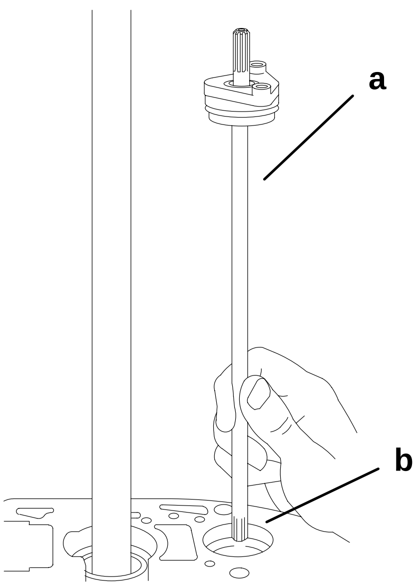
50 Bigfoot (4-Stroke)



51117

a - Shift Cam (**Numbers Down**)
b - Hole

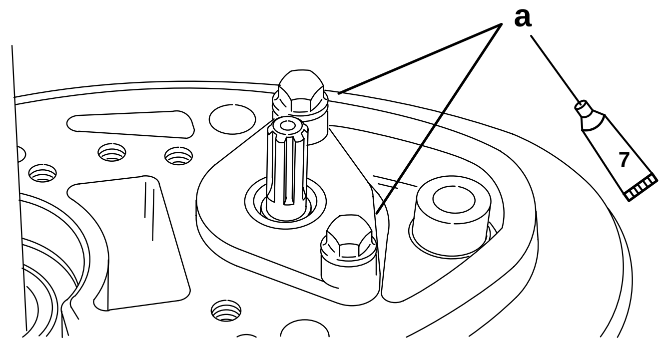
7. Install shift shaft assembly; insert splines into shift cam.



53932

a - Shift Shaft Assembly
b - Splines

8. Apply Loctite 271 on bottom half of threads of bolts; install bolts and torque to 35 lb. in. (4.0 N·m).

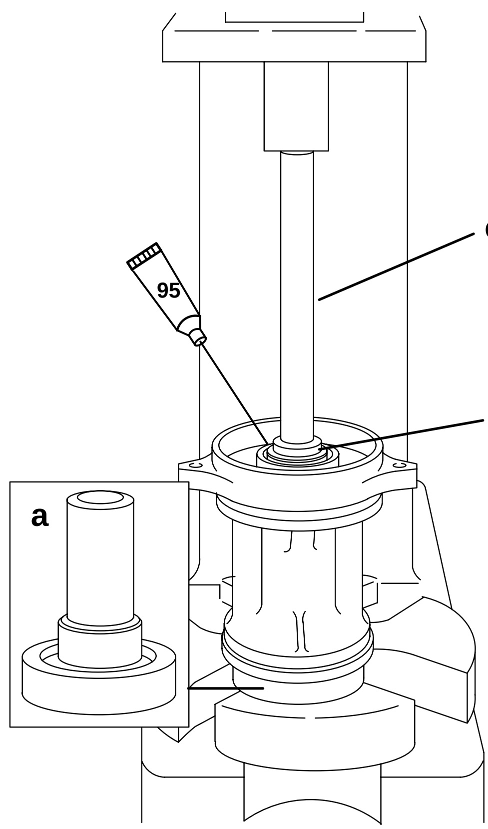


7 Loctite 271 (92-809820) 53926

a - Bolts [Torque to 35 lb. in. (4.0 N·m)]

Bearing Carrier Reassembly

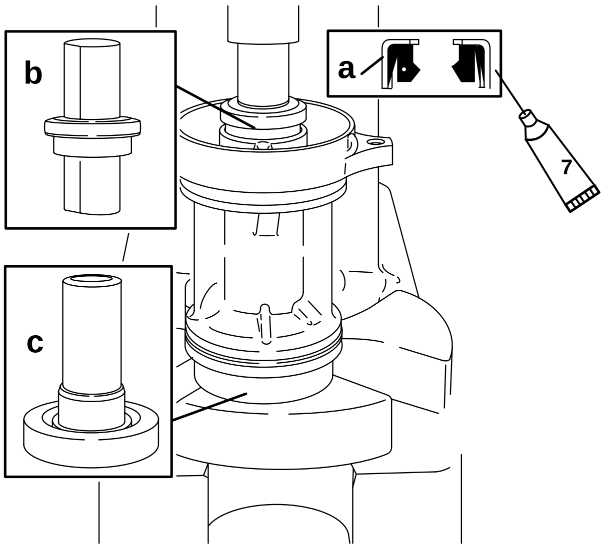
1. Lubricate O.D. of bearing and bearing carrier bore with Quicksilver 2-4-C w/Teflon.
2. Protect lip on forward side of bearing carrier, using Bearing Installation Tool (91-13945).
3. Press propeller shaft needle bearing (number side toward mandrel) into carrier, until bearing bottoms out.



95 2-4-C With Teflon (92-825407A12) 21042

a - Bearing Installation Tool (91-13945)
b - Mandrel (91-15755)
c - Suitable Driver Rod

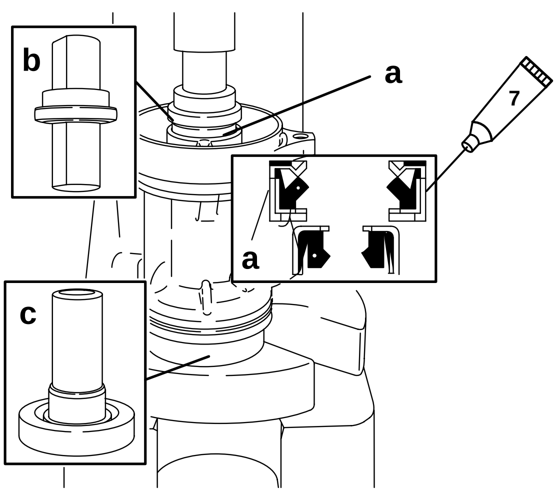
4. Place smaller diameter seal on longer shoulder of Oil Seal Driver (91-31108) with seal lip away from shoulder.
5. Protect lip on front side of bearing carrier using Bearing Installation Tool (91-13945). Apply Loctite 271 on O.D. of seal. Press seal into carrier until tool bottoms.



7 Loctite 271 (92-809820) 21040

a - Seal
b - Oil Seal Driver (91-31108)
c - Bearing Installation Tool (91-13945)

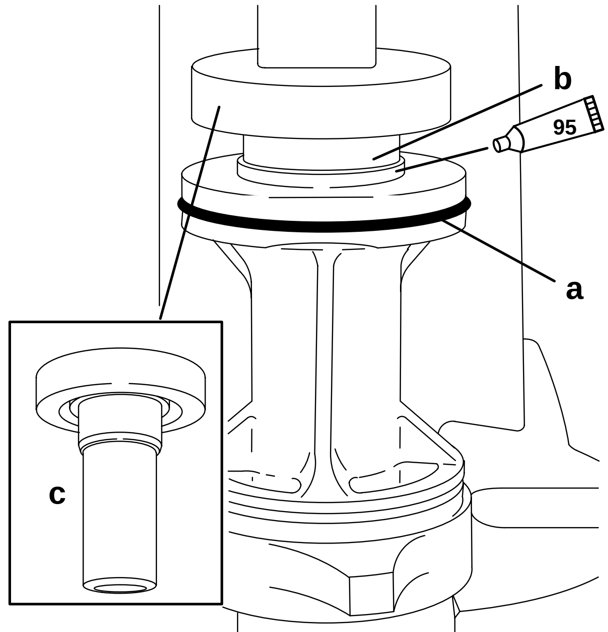
6. Place larger diameter seal on shorter shoulder of Oil Seal Driver (91-31108) with seal lip toward shoulder.
7. Protect lip on front side of bearing carrier using Bearing Installation Tool (91-13945). Apply Loctite 271 on O.D. of new seal. Press seal into carrier until tool bottoms.



7 Loctite 271 (92-809820) 21041

a - Seal
b - Oil Seal Driver (91-31108)
c - Bearing Installation Tool (91-13945)

8. Install O-ring.
9. Lubricate O-ring with 2-4-C w/Teflon. Lubricate seal lips with 2-4-C w/Teflon. Lubricate outside diameter of bearing and bearing carrier bore with a light coating of 2-4-C w/Teflon.
10. Press bearing into carrier until tool bottoms.

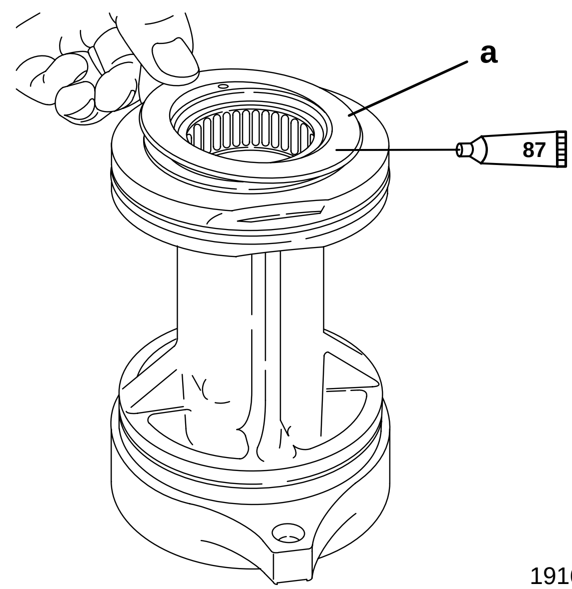


19163

95 2-4-C With Teflon (92-825407A12)

a - O-ring
b - Bearing, Numbered Side Toward Tool
c - Bearing Installation Tool (91-13945)

11. Install thrust washer. Coat thrust washer with Quicksilver Gear Lubricant.

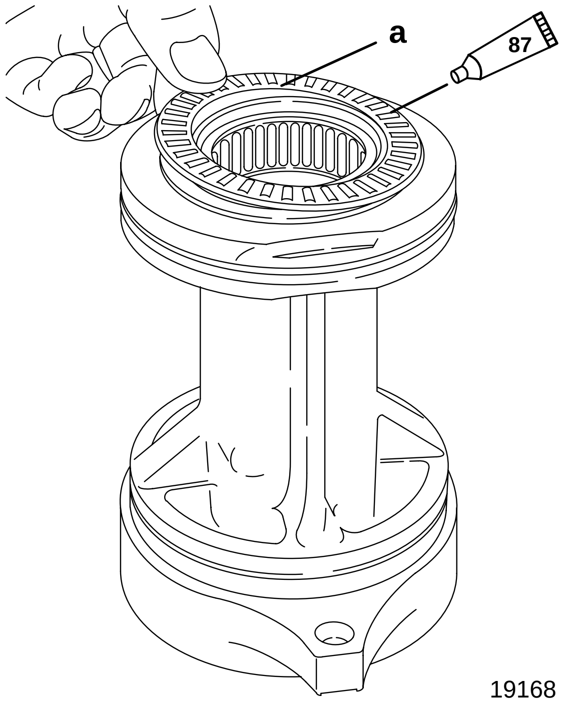


19167

87 Quicksilver Gear Lubricant (92-19007A24)

a - Thrust Washer

12. Install thrust bearing. Coat thrust bearing with Quicksilver Gear Lubricant.

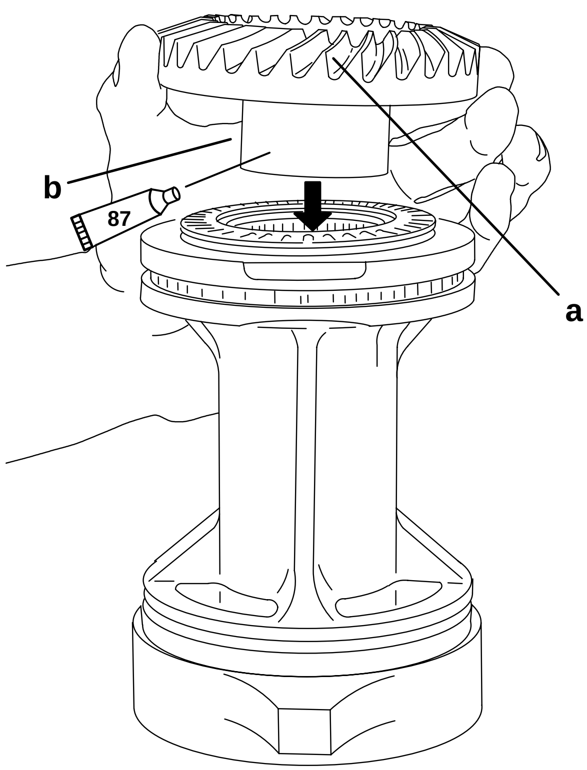


19168

87 Quicksilver Gear Lubricant (92-19007A24)

a - Thrust Bearing

13. Apply gear lubricant to bearing surface of reverse gear and install reverse gear.



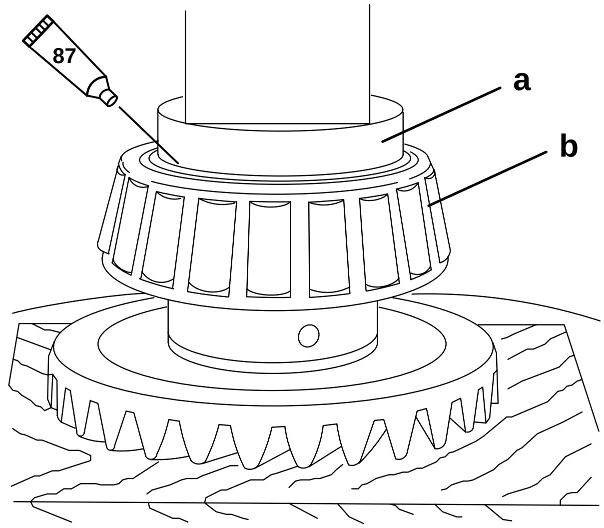
19202

87 Quicksilver Gear Lubricant (92-19007A24)

a - Reverse Gear
b - Bearing Surface

Forward Gear Reassembly

1. Press tapered bearing onto gear (press only on inner race of bearing).



87 Quicksilver Gear Lubricant (92-19007A24)

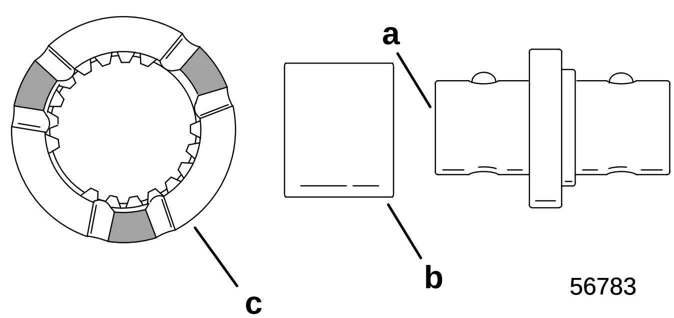
51869

a - Mandrel (91-37350)
b - Bearing; Lubricate I.D. with Quicksilver Gear Lubricant

2. Inspect reverse gear end of clutch to determine the number of jaws. Refer to chart, following, for tool end selection.

Model	Installation Tool	End Stamped	Bearing Position
3 Jaw Reverse Clutch	91-856875	3	0.155 in. (3.94mm) below surface
6 Jaw Reverse Clutch	91-856875	6	Flush with surface

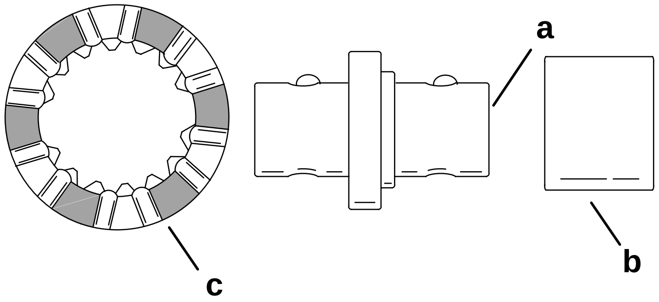
3 Jaw Reverse Clutch



56783

a - Stamped “3”
b - Numbered end of Needle Bearing
c - 3 Jaw Reverse Clutch

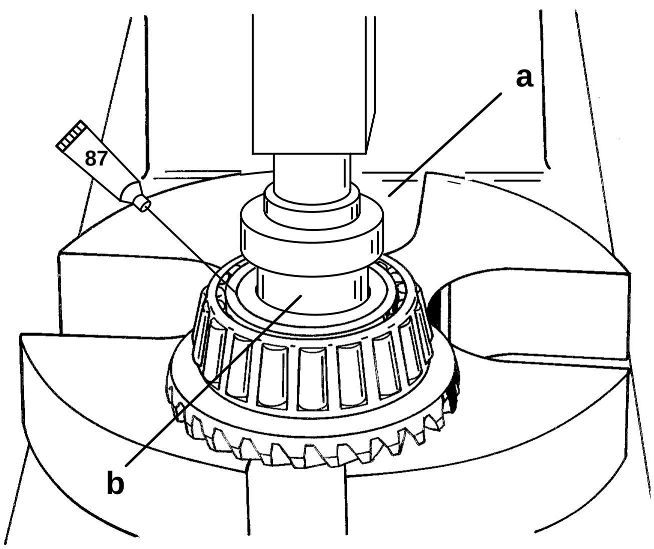
6 Jaw Reverse Clutch



56784

a - Stamped “6”
b - Numbered end of Needle Bearing
c - 6 Jaw Reverse Clutch

3. Apply Quicksilver gear lubricant to I.D. of forward gear. Press bearing into forward gear until tool contacts gear.



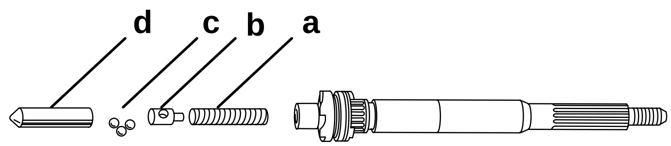
56785

87 Quicksilver Gear Lubricant (92-19007A24)

a - Forward Gear Bearing Installer (91-856875)
b - Needle Bearing, Numbered Side Toward Installer Tool

Propeller Shaft Reassembly

1. Install components into propeller shaft in sequence shown.

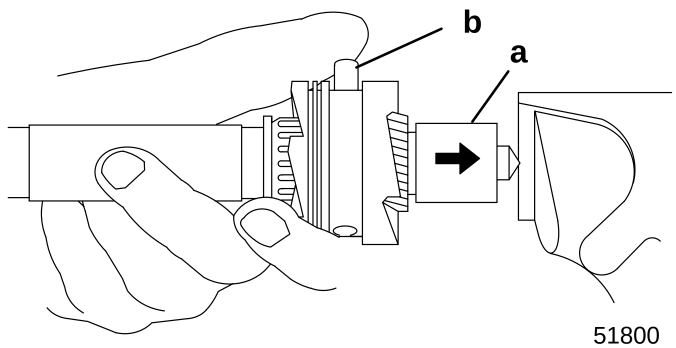


19154

a - Spring
b - Guide Block
c - 3 Metal Balls*
d - Cam Follower*

* Hold in Place With Quicksilver 2-4-C w/Teflon

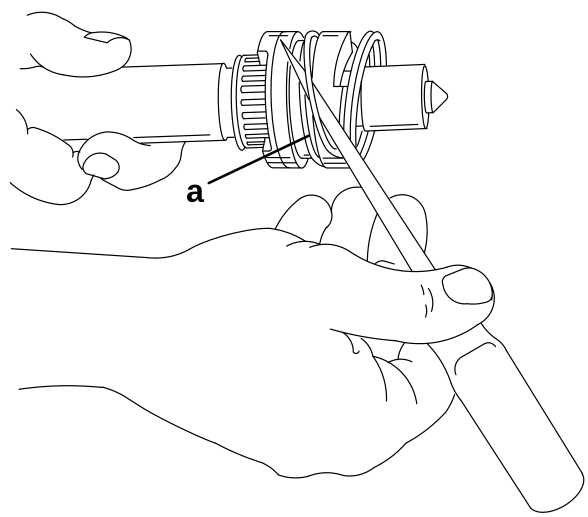
2. Install cross pin.



51800

a - Apply Pressure in This Direction
b - Cross Pin

3. Install spring. DO NOT overlap springs.

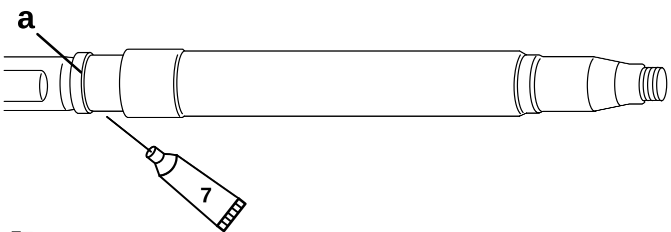


51876

a - Spring

Drive Shaft Wear Sleeve Installation

1. Install new rubber ring.
2. Apply a light coat of Loctite 271 on outside diameter of rubber ring.



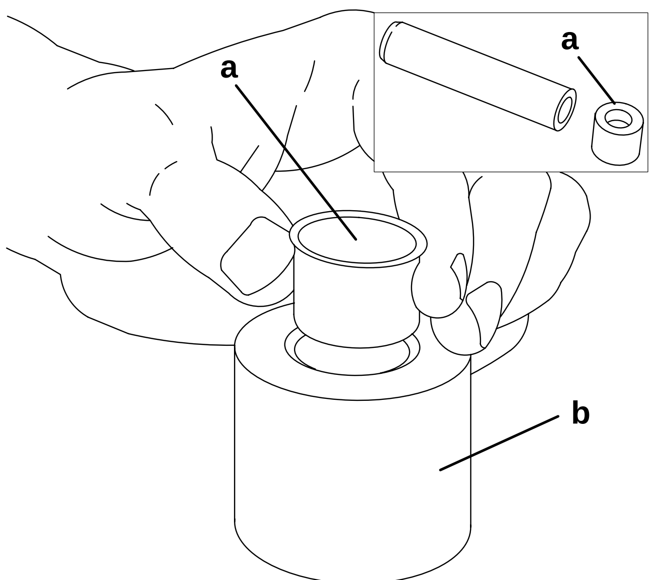
7 Loctite 271 (92-809820)

19152

a - Ring

3. Insert sleeve into holder*.

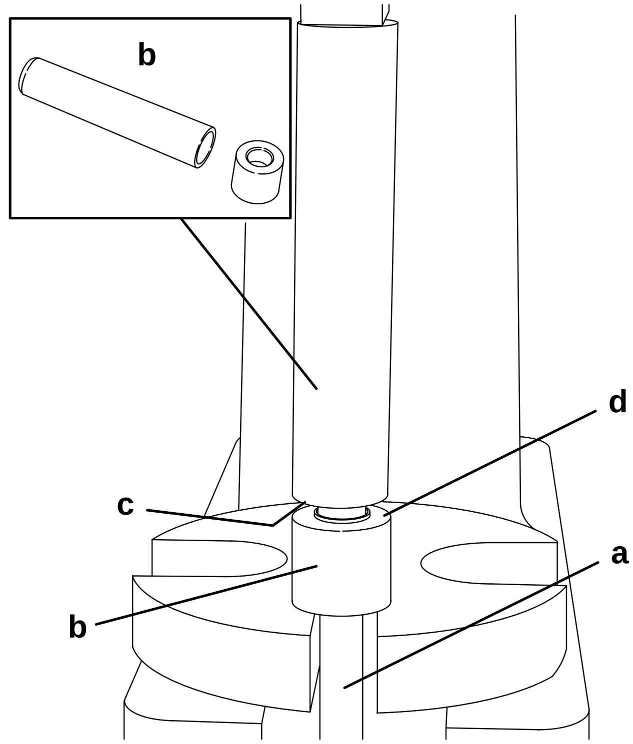
* Component of Wear Sleeve Installation Tool (91-14310A1).



19169

a - Sleeve
b - Holder

4. Press sleeve onto drive shaft using Wear Sleeve Installation Tool (91-14310A1); continue pressing until surface contacts surface.



19166

a - Drive Shaft
b - Wear Sleeve Installation Tool
c - Surface
d - Surface

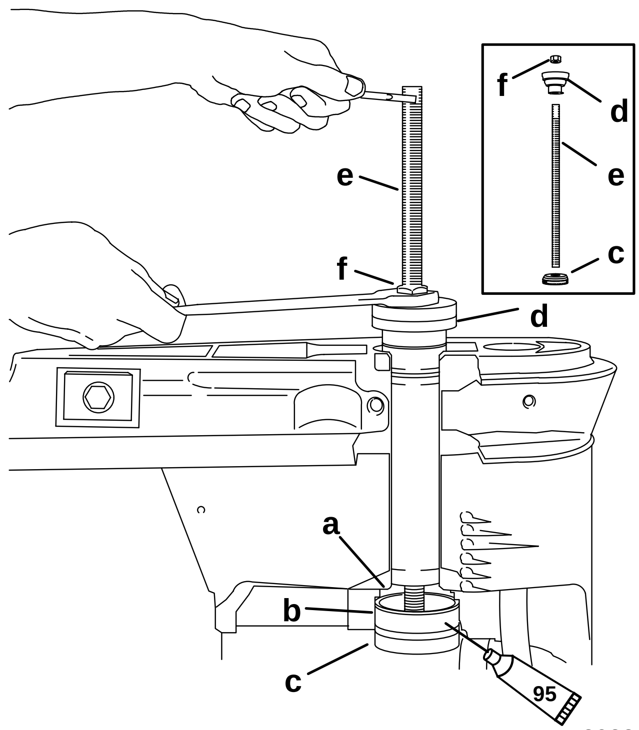
5. Remove excess Loctite from assembled shaft.

Lower Drive Shaft Bearing Race Installation

IMPORTANT: Lower drive shaft bearing cup can be installed with or without upper drive shaft bearing/sleeve and oil sleeve installed.

1. Lubricate O.D. of bearing race with Quicksilver 2-4-C w/Teflon.
2. Install shim(s) and bearing race into housing.

NOTE: *Verify shim(s) are not cocked when drawing up race.*



53933

95 2-4-C With Teflon (92-825407A12)

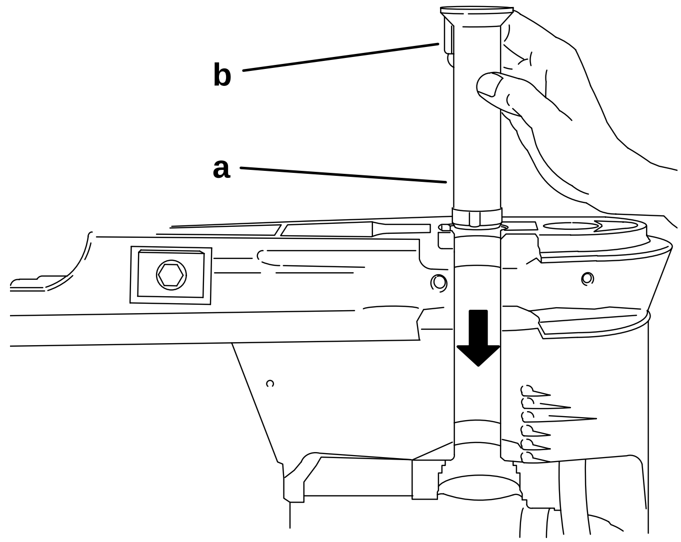
a - Shim(s); Retained From Disassembly. If Shim(s) Were Lost or a New Gear Housing is Being Assembled, Start With 0.025 in. (0.635mm) Shim(s)
b - Bearing Race
c - Mandrel* (91-13780)
d - Mandrel* (91-13781)
e - Threaded Rod** (91-31229)
f - Nut** (11-24156)

* From Bearing Installation Tool (91-14309A1)

** From Bearing Removal and Installation Kit (91-31229A7)

Oil Sleeve Installation

1. Install oil sleeve with tab positioned as shown.

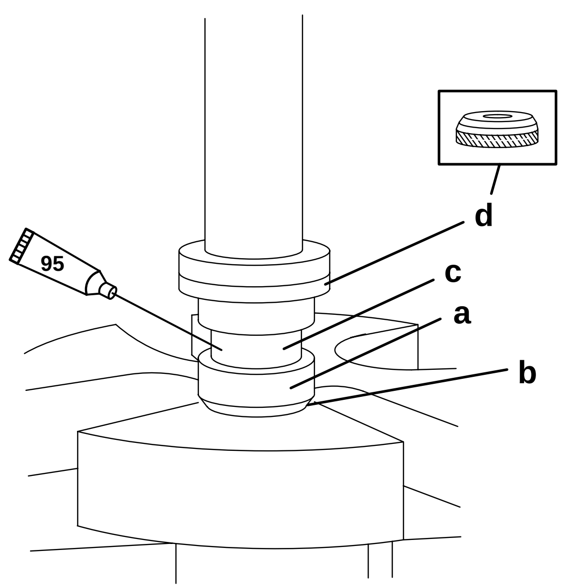


53934

a - Oil Sleeve
b - Tab

Upper Drive Shaft Bearing Installation

1. Lubricate I.D. of bearing holder and O.D. of bearing with 2-4-C w/Teflon.
2. Press bearing into sleeve.



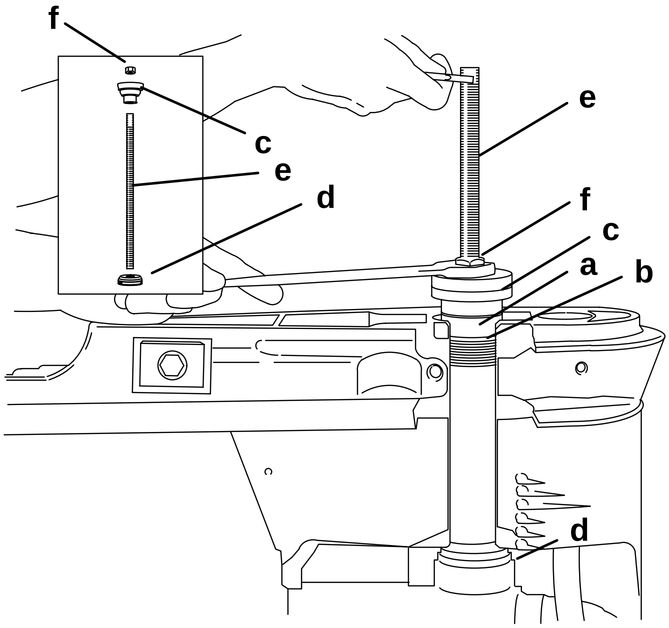
95 2-4-C With Teflon (92-825407A12) 19164

a - Bearing Sleeve
b - Tapered End
c - Bearing; Numbered Side Toward Mandrel
d - Mandrel (91-13781); From Bearing Installation Tool (91-14309A1)

IMPORTANT: Oil sleeve must be installed prior to upper drive bearing installation.

IMPORTANT: Upper drive shaft bearing/sleeve can be installed with or without lower drive shaft bearing cup installed.

3. Install bearing/sleeve into housing.



a - Bearing/Sleeve
b - Tapered End
c - Mandrel* (91-13781)
d - Mandrel* (91-13780)
e - Threaded Rod** (91-31229)
f - Nut** (11-24156)

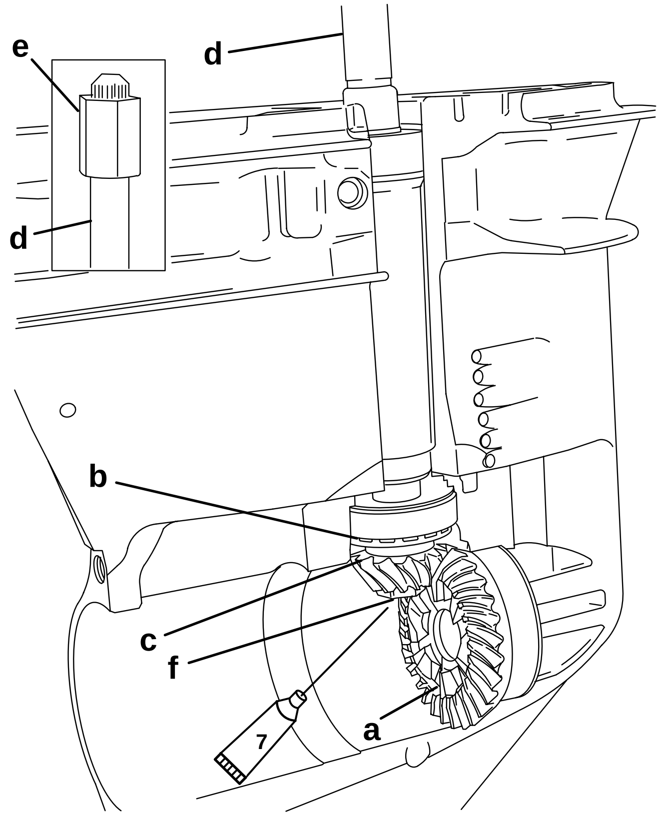
* From Bearing Installation Tool (91-14309A1)

** From Bearing Removal and Installation Kit (91-31229A7)

Forward Gear, Lower Drive Shaft Bearing, Pinion Gear, and Drive Shaft Installation

Model	Drive Shaft Holding Tool
50 Bigfoot (4-Stroke)	91-56775
60 Bigfoot	91-817070
75/90/100/115/125	91-56775

1. Install components in sequence shown.



7 Loctite 271 (92-809820) 19175

a - Forward Gear/Bearing: Work Quicksilver gear lube into bearing rollers.
b - Lower Drive Shaft Tapered Roller Bearing: Work Quicksilver gear lube into bearing rollers.
c - Pinion Gear
d - Drive Shaft
e - Drive Shaft Holding Tool
f - Pinion Nut (New): Apply Loctite 271 to threads during final assembly (after pinion gear depth and forward gear backlash have been set), torque to 70 lb. ft. (95 N·m)

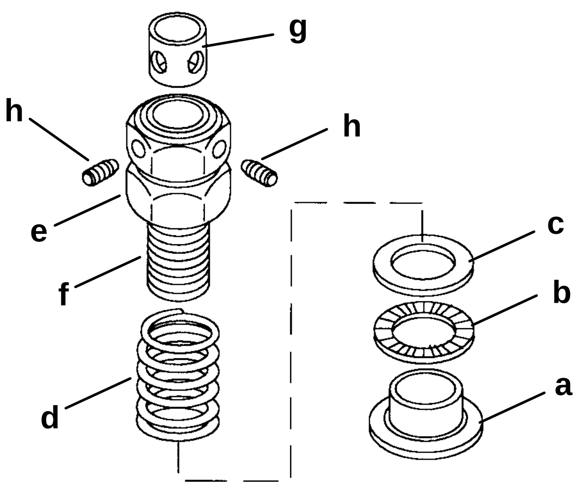
Pinion Gear Depth and Forward Gear Backlash

DETERMINING PINION GEAR DEPTH

***NOTE:** Read entire procedure before attempting any change in shim thickness.*

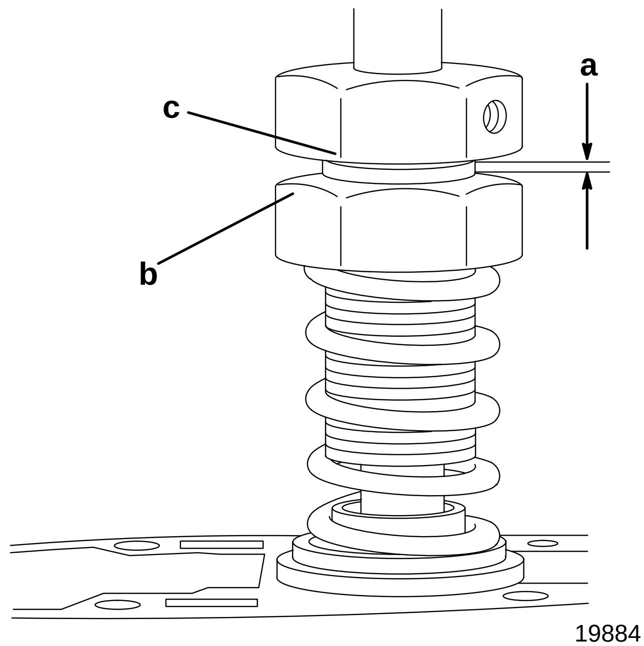
IMPORTANT: Forward gear assembly must be installed in gear housing when checking pinion gear depth or an inaccurate measurement will be obtained.

1. Clean the gear housing bearing carrier shoulder and diameter.
2. With gear housing positioned up right (drive shaft vertical), install Bearing Preload Tool (91-14311A2) over drive shaft in sequence shown.



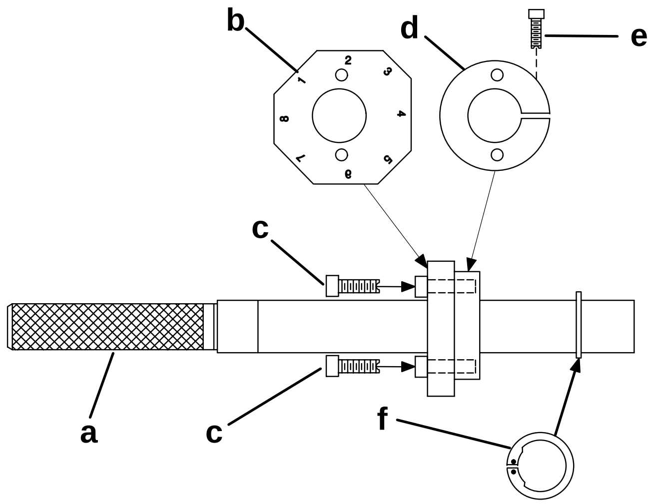
a - Adaptor: Bearing surfaces clean and free of nicks
b - Thrust Bearing: Oiled and able to move freely
c - Thrust Washer: Clean and free of nicks and bends
d - Spring
e - Nut: Threaded all the way onto bolt
f - Bolt: Held snug against spring
g - Sleeve: Holes in sleeve must align with set screws
h - Set Screw (2): Tightened against drive shaft, bolt should not slide on drive shaft.

3. Measure distance between top of nut and bottom of bolt head.
4. Increase distance by 1 in. (25.4mm).
5. Rotate drive shaft 5 to 10 revolutions. This should properly seat upper drive shaft tapered roller bearing.



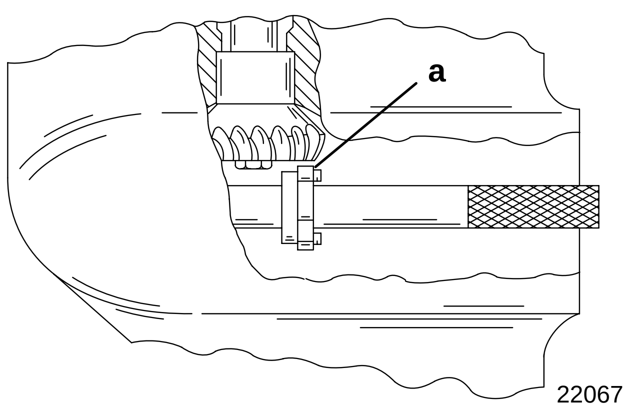
a - 1 in. (25.4mm)
b - Nut
c - Bolt Head

6. Assemble Pinion Gear Locating Tool (91-12349A2) as shown; do not tighten collar retaining bolt at this time.



a - Arbor
b - Gauging Block; Install With Numbers Away From Split Collar
c - Bolt; Gauging Block Retaining
d - Split Collar
e - Bolt; Collar Retaining
f - Snap Ring

7. Insert tool into forward gear assembly; position gauging block under pinion gear as shown.



a - Gauging Block

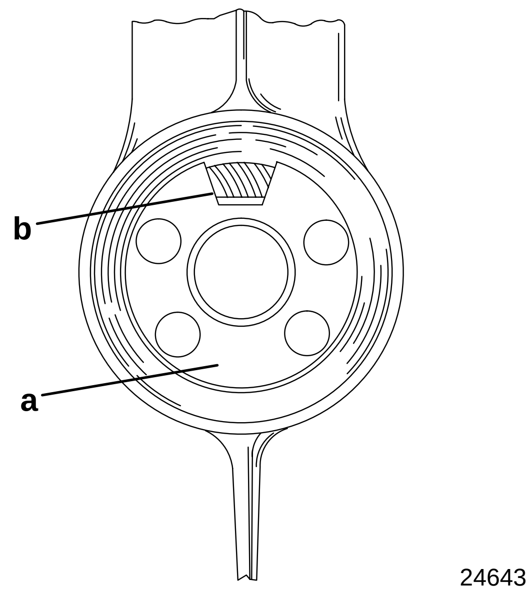
8. Remove tool, taking care not to change gauging block position, and tighten collar retaining bolt.

9. Insert tool into forward gear assembly; position proper numbered flat (from chart) of gauging block – under pinion gear.

MODEL	GEAR RATIO (PINION GEAR TEETH/ REVERSE GEAR TEETH)	USE FLAT NO.
50 Bigfoot (4-stroke)	13/30	8
60 Bigfoot/60 Sea-pro/60 Marathon	13/30	8
75-thru-90 (3 Cylinder)	13/30	8
100/115/125 (4 Cylinder)	14/29	2

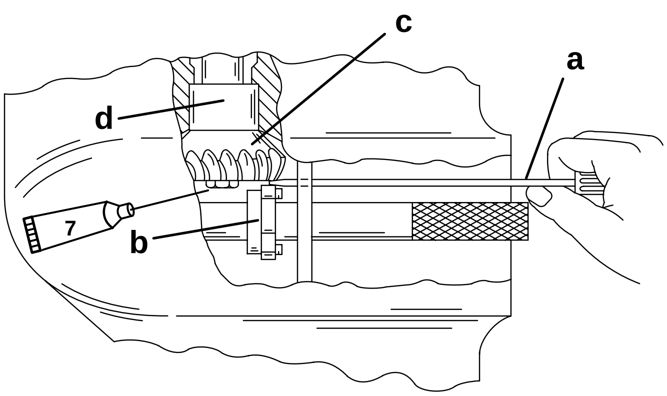
10. Install the number “3” locating disc against bearing carrier shoulder in gear housing.

11. Position access hole as shown.



a - Locating Disc
b - Access Hole

12. Determine pinion gear depth by inserting a feeler gauge thru access hole in locating disc.
13. The correct clearance between gauging block and pinion gear is 0.025 in. (0.64mm).
14. If clearance is correct, leave Bearing Preload Tool on drive shaft and proceed to “Determining Forward Gear Backlash,” following.
15. If clearance is incorrect, add (or subtract) shims from above bearing race to lower (or raise) pinion gear. When reinstalling pinion nut, apply Loctite 271 on threads of nut.



7 Loctite 271 (92-809820)

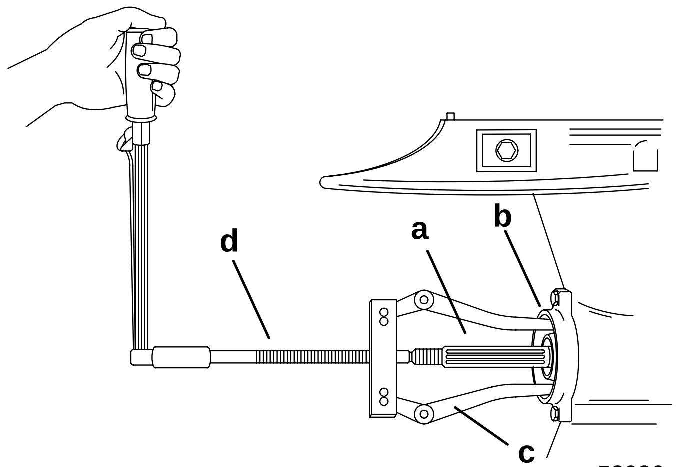
24643

a - Feeler Gauge
b - Gauging Block
c - Pinion Gear
d - Bearing Race

DETERMINING FORWARD GEAR BACKLASH

NOTE: *Read entire procedure before attempting any change in shim thickness.*

1. Obtain correct pinion gear depth; refer to “Determining Pinion Gear Depth,” preceding.
2. Install Bearing Preload Tool (91-14311A2) on drive shaft; refer to “Determining Pinion Gear Depth,” preceding.
3. Install components as shown.



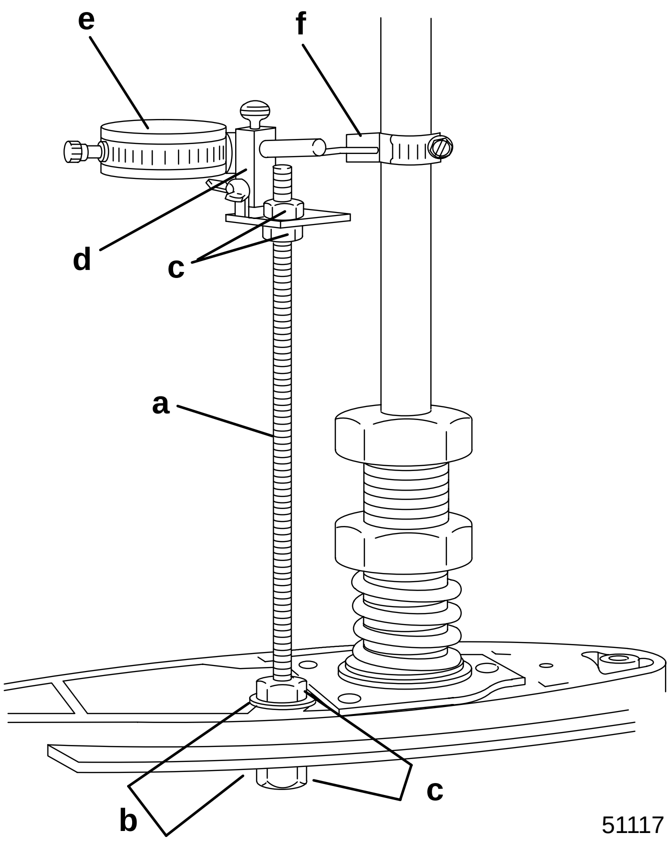
53936

a - Propeller Shaft*
b - Bearing Carrier* (Assembled)
c - Puller Jaws (91-46086A1)
d - Puller Bolt (91-85716); Torque to 45 lbs. in. (5.1 N·m)

* Refer to “Bearing Carrier and Propeller Shaft Installation,” following.

4. Rotate drive shaft 5 to 10 revolutions. This should properly seat forward gear tapered roller bearing.

5. Install components as shown.



a - Threaded Rod (Obtain Locally)
b - Washers
c - Nuts
d - Dial Indicator Adaptor Kit (91-83155)
e - Dial Indicator (91-58222A1)
f - Backlash Indicator Tool

6. Position Dial Indicator on appropriate line (from chart) marked on Backlash Indicator Tool.

MODEL	ALIGN POINTER OF DIAL INDICATOR WITH MARK
50 Bigfoot (4-stroke) Backlash Indicator Tool (91-78473)	4
60 Seapro/60 Marathon/60 Bigfoot Backlash Indicator Tool (91-78473)	4
75-thru-90 (3 Cylinder) Backlash Indicator Tool (91-78473)	4
100/115/125 (4 Cylinder) Backlash Indicator Tool (91-19660--1)	1

7. Lightly turn drive shaft back and forth (no movement should be noticed at propeller shaft).

8. Dial Indicator registers amount of backlash, which must be between specification shown in chart.

MODEL	DIAL INDICATOR MINIMUM	READING MAXIMUM
50 Bigfoot (4-Stroke)	0.012 in. (0.30mm)	0.019 in. (.48mm)
60 Bigfoot	0.012 in. (0.30mm)	0.019 in. (.48mm)
75-thru-90 (3 Cylinder)	0.012 in. (0.30mm)	0.019 in. (.48mm)
100/115/125 (4 Cylinder)	0.015 in. (0.38mm)	0.022 in. (0.55mm)

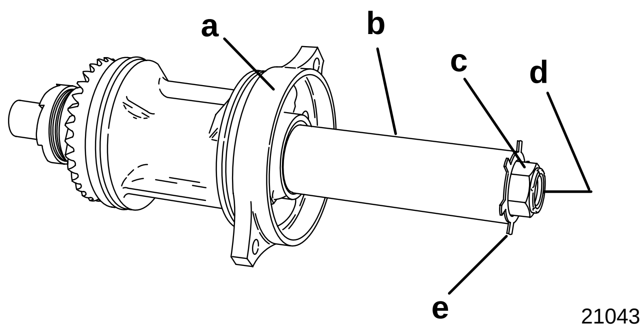
9. If backlash is less than the minimum specification, remove shim(s) from in front of forward gear bearing race to obtain correct backlash. When reinstalling pinion nut, apply Loctite 271 on threads of nut.

10. If backlash is more than the maximum specification, add shim(s)* in front of forward gear bearing race to obtain correct backlash. When reinstalling pinion nut, apply Loctite 271 on threads of nut.

NOTE: *By adding or subtracting 0.001 in. (0.03mm) shim, the backlash will change approximately 0.001 in. (.03mm).*

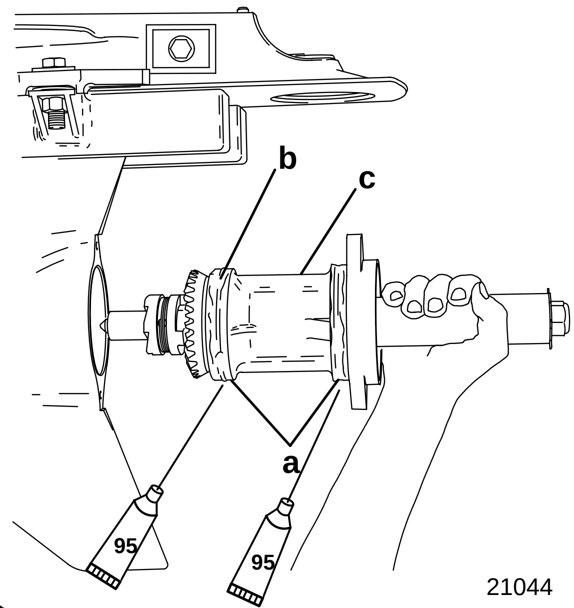
Bearing Carrier and Propeller Shaft Installation

1. Insert propeller shaft assembly into bearing carrier.
2. Before installing bearing carrier assembly into gear housing, obtain locally a 6 in. (152.4mm) long by 1-1/4 in. – 1-1/2 in. (31.7mm – 38.1mm) diameter piece of PVC pipe. Install the PVC pipe over the prop shaft and secure the pipe against the bearing carrier assembly with the propeller nut and tab washer. This will allow the reverse gear to apply pressure to the reverse gear thrust bearing to prevent the thrust bearing from being inadvertently dislodged as the bearing carrier assembly is installed in the gear housing.



a - Bearing Carrier Assembly
b - PVC Pipe
c - Tab Washer
d - Prop Shaft
e - Propeller Nut

3. Lubricate O-ring and mating surfaces with 2-4-C w/Teflon.
4. Install bearing carrier and propeller shaft into housing with the word “TOP” located on flange toward top of housing.



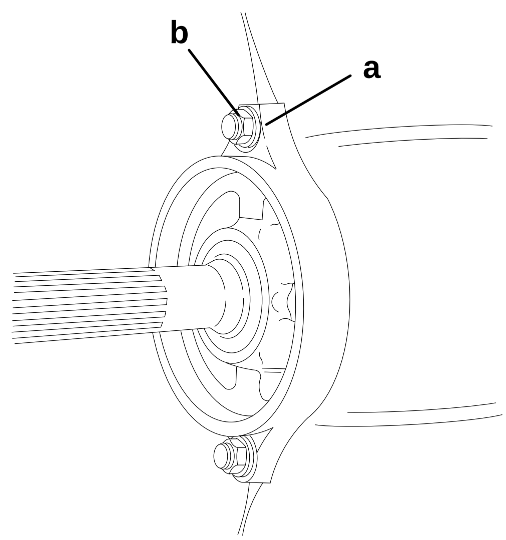
95 2-4-C With Teflon (92-825407A12)

a - Apply 2-4-C w/Teflon
b - O-ring
c - TOP

5. Install components as shown.

***NOTE:** Use thick 0.090 in. (2.29mm) washers (12-855941) under fasteners if not previously installed.*

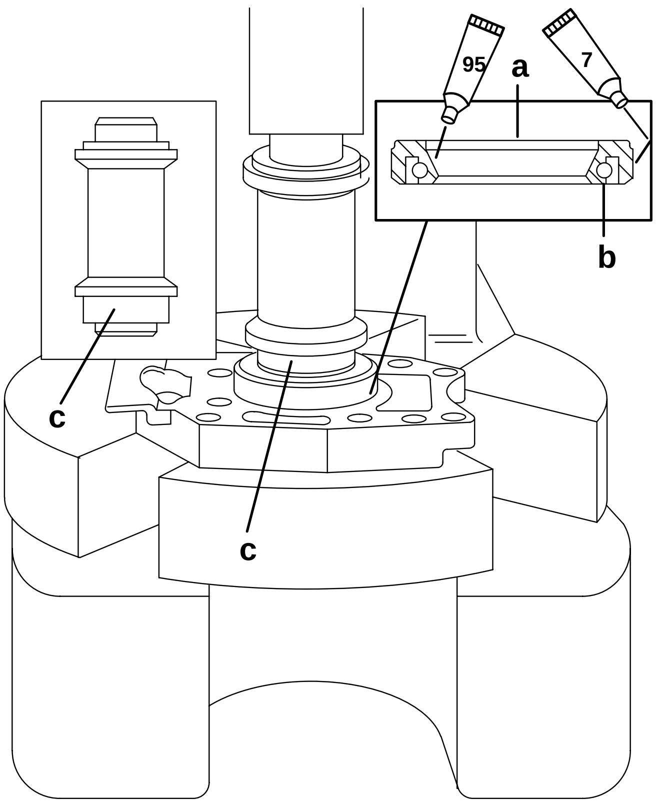
Washer Thickness	Fastener Torque
0.090 in. (2.29mm)	22 lb. ft. (29.8 N·m)
0.060 in. (1.53mm)	25 lb. ft. (33.9 N·m)



a - Washers
b - Fasteners; (If using Bolts – Apply Loctite 271 on Threads)

Water Pump Reassembly and Installation

1. Place seal on longer shoulder side of Oil Seal Driver (91-13949) with seal lip away from shoulder.
2. Apply Loctite 271 on O.D. of seal; press seal into water pump base until tool bottoms. Lubricate seal lip with Quicksilver 2-4-C w/Teflon.



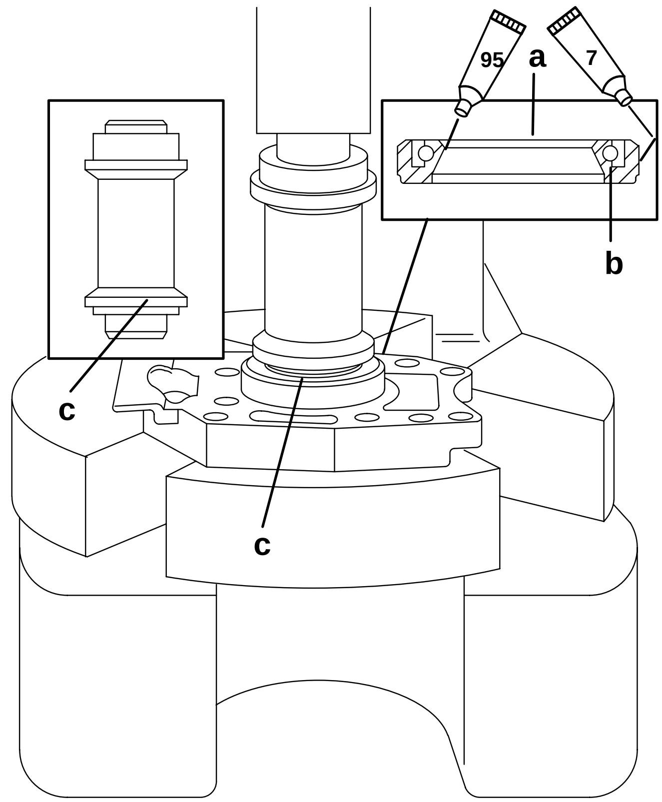
51553

7 Loctite 271 (92-809820)

95 2-4-C With Teflon (92-825407A12)

a - Seal – Teflon Coated Lip (Flat Brownish Color – Lip faces toward Power Head)
b - Spring Faces Toward Power Head
c - Oil Seal Driver (91-13949)

3. Place seal on shorter shoulder side of Oil Seal Driver (91-13949) with seal lip toward shoulder.
4. Apply Loctite 271 on O.D. of seal; press seal into water pump base until tool bottoms.
5. Lubricate lip of each seal with Quicksilver 2-4-C w/Teflon.



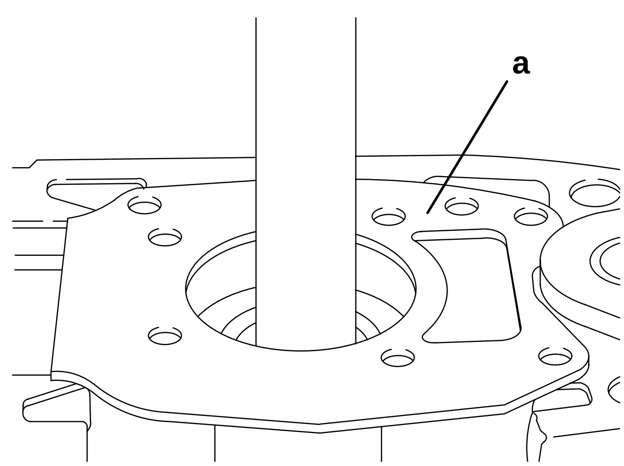
51553

7 Loctite 271 (92-809820)

95 2-4-C With Teflon (92-825407A12)

a - Seal (Gloss Black Color – Lip faces toward Gear Case)
b - Spring Faces Toward Gear Case
c - Oil Seal Driver (91-13949)

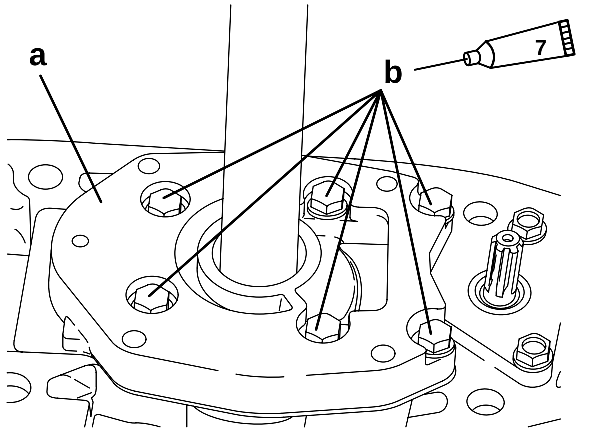
6. Install gasket.



19218

a - Gasket

7. Install components as shown.

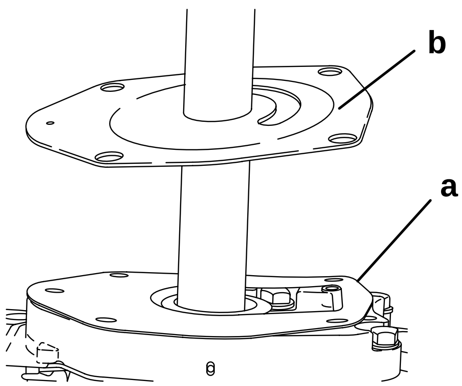


7 Loctite 271 (92-809820)

19217

a - Water Pump Base
b - Bolts and Washers; Apply Loctite 271 on bottom 1/2 of Threads and Torque to 60 lb. in. (6.8 N·m)

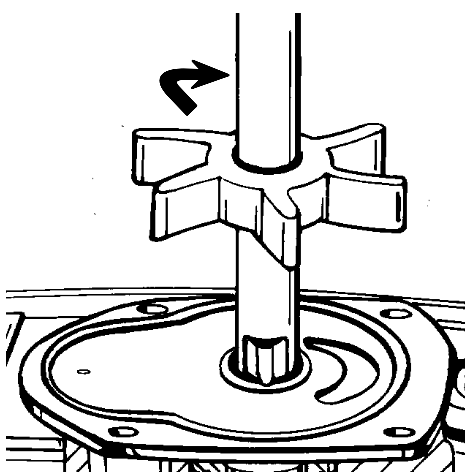
8. Install gasket and plate.



19219

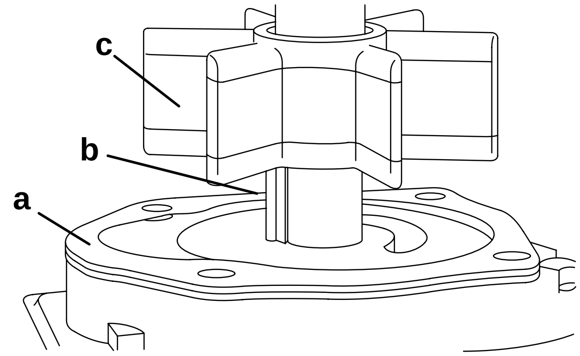
a - Gasket
b - Plate

IMPORTANT: If the old impeller will be re-used, impeller must be installed in original (clockwise) direction of rotation.



52869

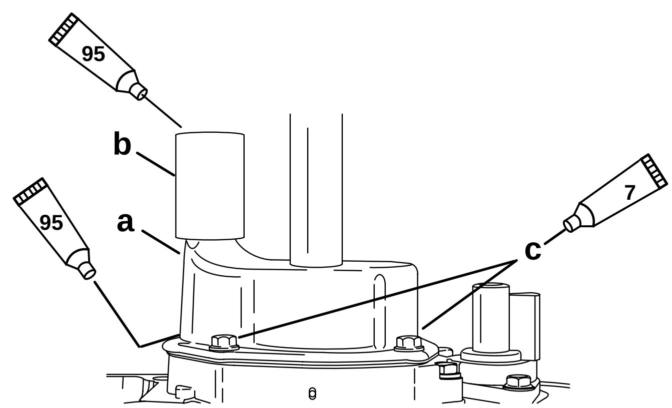
9. Install gasket, drive key and impeller.



19220

a - Gasket
b - Drive Key
c - Impeller

10. Lubricate I.D. of cover with Quicksilver 2-4-C w/ Teflon.
11. Rotate drive shaft clockwise and push cover down over impeller.
12. Install cover.
13. If water tube seal stayed on water tube (inside of drive shaft housing) when gear housing was removed, pull water tube seal from water tube.
14. Lubricate I.D. of water tube seal with Quicksilver 2-4-C w/Teflon and install as shown.



19212

7 Loctite 271 (92-809820)

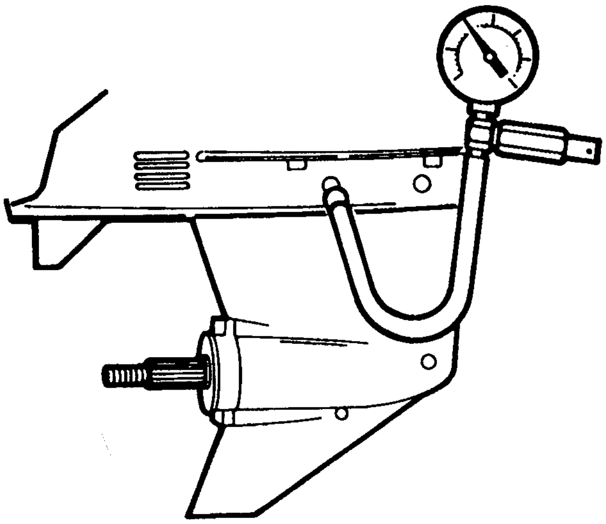
95 2-4-C With Teflon (92-825407A12)

a - Cover
b - Seal
c - Bolts (4); Apply Loctite 271 on Threads and Torque to 60 lb. in. (6.8 N·m).

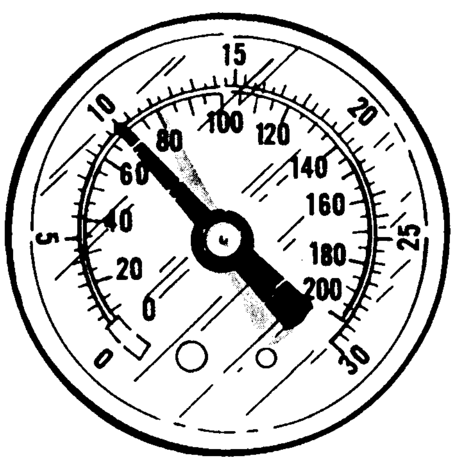
NOTE: *It is recommended that the gearcase be pressure tested for leaks after reassembly and BEFORE gear lube is added. Gearcase should hold 10 to 12 psi(68-82kPa) for 5 minutes.*

Gear Housing Pressure Test

1. Remove vent plug and install pressure test gauge.



2. Pressurized housing to 10 to 12 psi (68-82kPa) and observe gauge for 5 minutes.
3. Rotate drive shaft, prop shaft and move shift shaft while housing is pressurized to check for leaks.



4. If pressure drop is noted, immerse housing in water.
5. Re-pressurize to 10 to 12 psi (68-82kPa) and check for air bubbles.
6. Replace leaking seals as necessary. Retest housing.

NOTE: *Gearcase should hold 10 to 12 psi (68-82 kPa) for 5 minutes.*

7. Remove tester from housing and install vent plug. Torque vent screw to 60 lb. in. (6.8 N·m).

Filling Gear Housing With Lubricant

NOTE: *Gear housing lubricant capacity is 22.5 fl. oz. (665.2ml).*

⚠ WARNING

If gear housing is installed on engine, to avoid accidental starting, disconnect (and isolate) spark plug leads from spark plugs before working near the propeller.

⚠ CAUTION

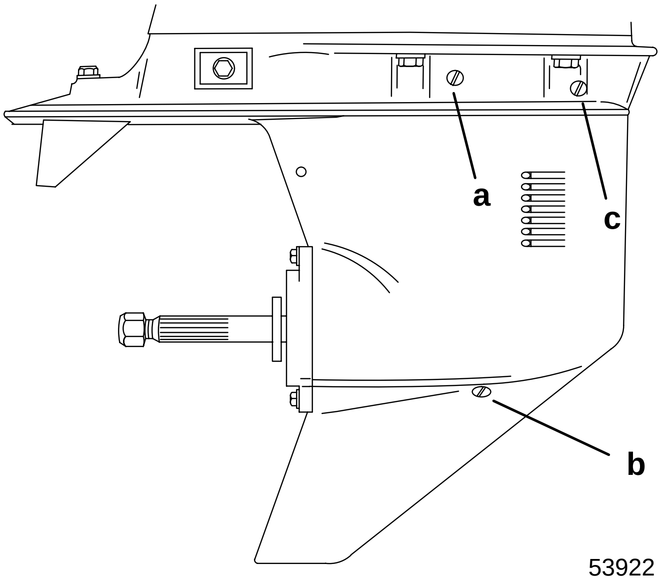
Do not use automotive grease in the gear housing. Use only Quicksilver Gear Lube or Quicksilver Super-Duty Lower Unit Lubricant.

1. Remove any gasket material from “Fill” and “Vent” screws and gear housing.
2. Install new gaskets on “Fill” and “Vent” screws.

IMPORTANT: Never apply lubricant to gear housing without first removing “Vent” screws or gear housing cannot be filled because of trapped air. Fill gear housing only when housing is in a vertical position.

3. Insert lubricant tube into “Fill” hole.
4. Fill gear housing with lubricant until excess starts to flow out of one (first) “Vent” screw hole.

5. Replace this lubricant "Vent" screw and gasket only and continue filling until excess starts to flow out of second lubricant "Vent" screw hole.



a - Vent Screw (Torque to 60 lb. in. (6.8 N·m)
b - Fill/Drain Screw (Torque to 60 lb. in. (6.8 N·m)
c - Oil Level Vent Screw (Torque to 60 lb. in. (6.8 N·m)

6. Replace second lubricant "Vent" screw and gasket.

IMPORTANT: Do not lose more than one fluid ounce (30cc) of gear lubricant while reinstalling "FILL" screw.

7. Remove lubricant tube from "Fill" hole; install "Fill" screw and gasket. Torque "Fill" screw to 60 lb. in. (6.8 N·m).

Gearcase Installation

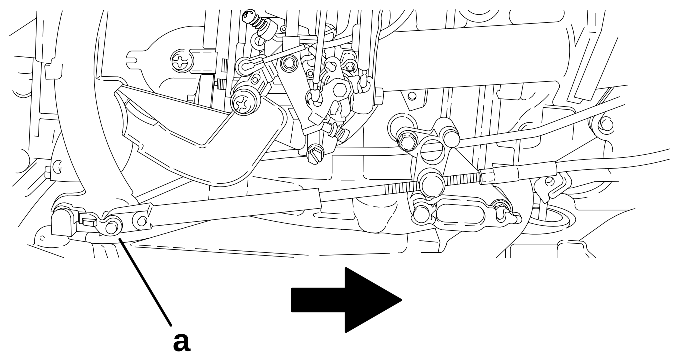
WARNING

Disconnect (and isolate) spark plug leads from spark plugs before installing gear housing onto drive shaft housing. Failure to follow this warning could result in accidental engine starting and possible injury.

1. Position outboard shift linkage into forward gear position.

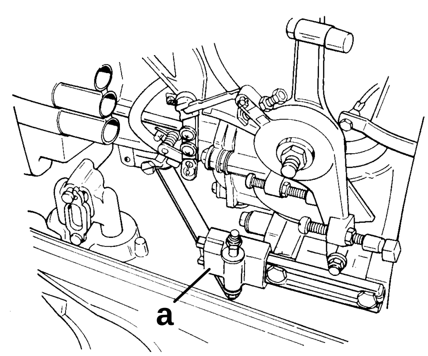
Models 40/45/50 Bigfoot (4-Stroke)

Remote Control Model Shown



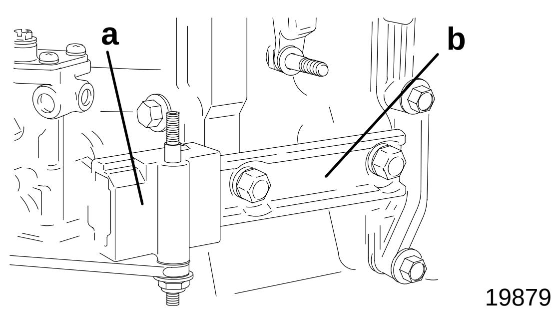
a - Shift Lever

Models 60 Bigfoot



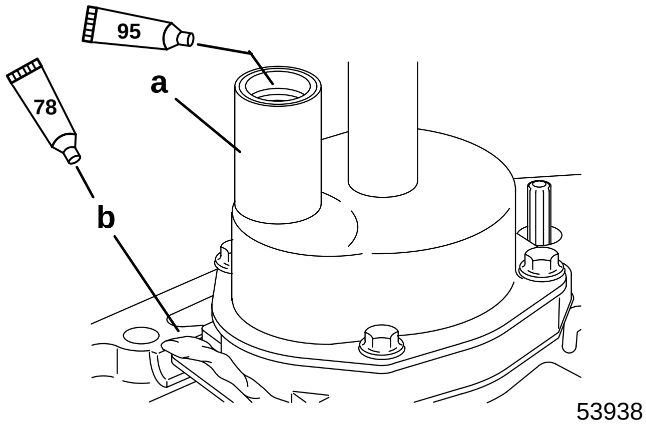
a - Shift Block

Models 75/90/100/115/125



a - Shift Block; Front of Block MUST Extend 1/8 in. (3.2mm) Past Front of Rail.
b - Rail

2. Tilt engine to full “UP” position and engage tilt lock lever.
3. Shift gear housing into neutral position. Propeller shaft will rotate freely in either direction.
4. Install water tube seal; lube I.D. of seal with Quicksilver 2-4-C w/Teflon (92-825407A12).
5. Apply a bead of RTV Sealer as shown.



53938

78 G. E. RTV Sealant (92-90113--2)

95 2-4-C With Teflon (92-825407A12)

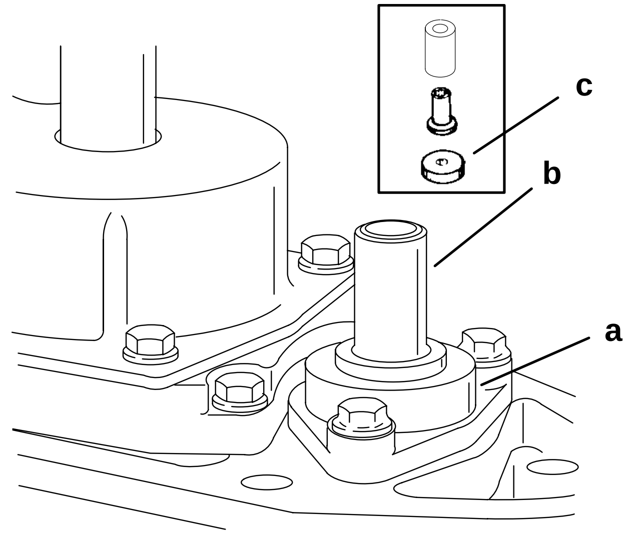
a - Water Tube Seal
b - RTV Sealer

⚠ CAUTION

Do not use lubricant on top of drive shaft. Excess lubricant, that is trapped in clearance space, will not allow drive shaft to fully engage with crankshaft. Subsequently, tightening the gear housing fasteners (while lubricant is on top of drive shaft) will load the drive shaft/crankshaft and damage either or both the power head and gear housing. Top of drive shaft is to be wiped free of lubricant.

6. Apply a light coat of Quicksilver 2-4-C w/Teflon onto drive shaft splines.
7. Apply a light coat of Quicksilver 2-4-C w/Teflon on gear case shift shaft splines and upper shift shaft splines. Do not use lubricant on ends of shift shafts.
8. Install components as shown in appropriate photo.

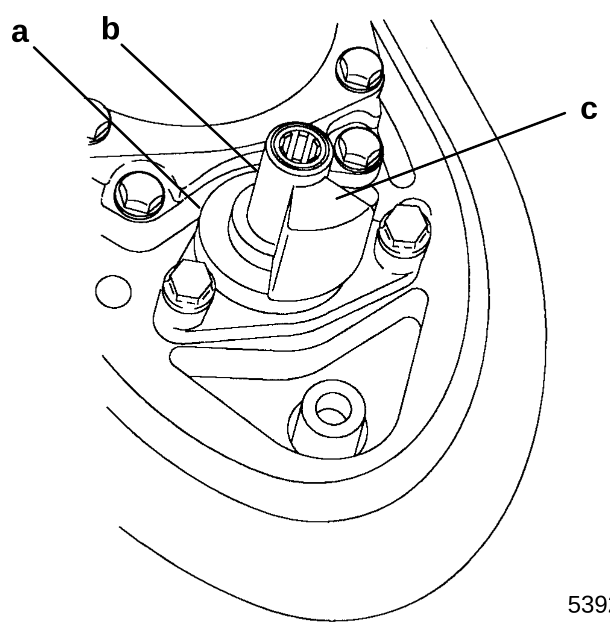
POWER TRIM MODELS



53968

a - Nylon Spacer
b - Shift Shaft Coupler; Used on Models Equipped with Power Trim
c - Bushing 40/45/50 Bigfoot (4-Stroke) Only

NON-POWER TRIM MODELS



53925

a - Nylon Spacer
b - Shift Shaft Coupler; Used on Models NOT Equipped with Power Trim
c - Flat; MUST BE Positioned Toward Front of Gear Housing

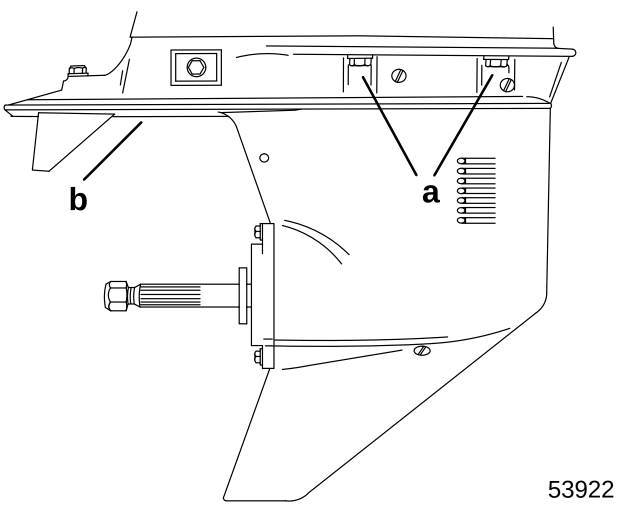
9. Shift gear housing into forward gear position. In forward gear the gear housing will ratchet when propeller shaft is turned clockwise and resistance will be felt when propeller shaft is rotated counter-clockwise.

10. Apply Loctite Grade 271 on threads of gear housing retaining bolts.

NOTE: *If, while performing Step 11, the drive shaft splines will not align with the crankshaft splines, place a propeller onto propeller shaft and turn it counterclockwise as the gear housing is being pushed toward drive shaft housing.*

NOTE: *During installation of gear housing, it may be necessary to move the shift block (located under cowl) slightly to align upper shift shaft splines with shift shaft coupler splines.*

11. Position gear housing so that the drive shaft is protruding into drive shaft housing.
12. Move gear housing up toward drive shaft housing, while aligning upper shift shaft splines with shift shaft coupler splines, water tube with water tube seal, and crank shaft splines with drive shaft splines.
13. Install 4 bolts and washers (two each side).
14. Install locknut and washer.
15. Torque bolts and locknut (or nuts only if applicable) to 40 lbs. ft. (54.0 N·m).



a - Bolts and Washers (4)
b - Locknut and Washer

16. Check shift operation as follows:
    a. Place shift lever in forward gear. Gear housing should ratchet when propeller shaft is turned clockwise and resistance should be felt when propeller shaft is turned counterclockwise.
    b. Place shift lever in neutral. Propeller shaft should rotate freely in either direction.
    c. While rotating propeller shaft, place shift lever in reverse gear. Resistance should be felt when propeller shaft is rotated in either direction.

IMPORTANT: If shift operation is not as described, preceding, the gear housing must be removed and the cause corrected.

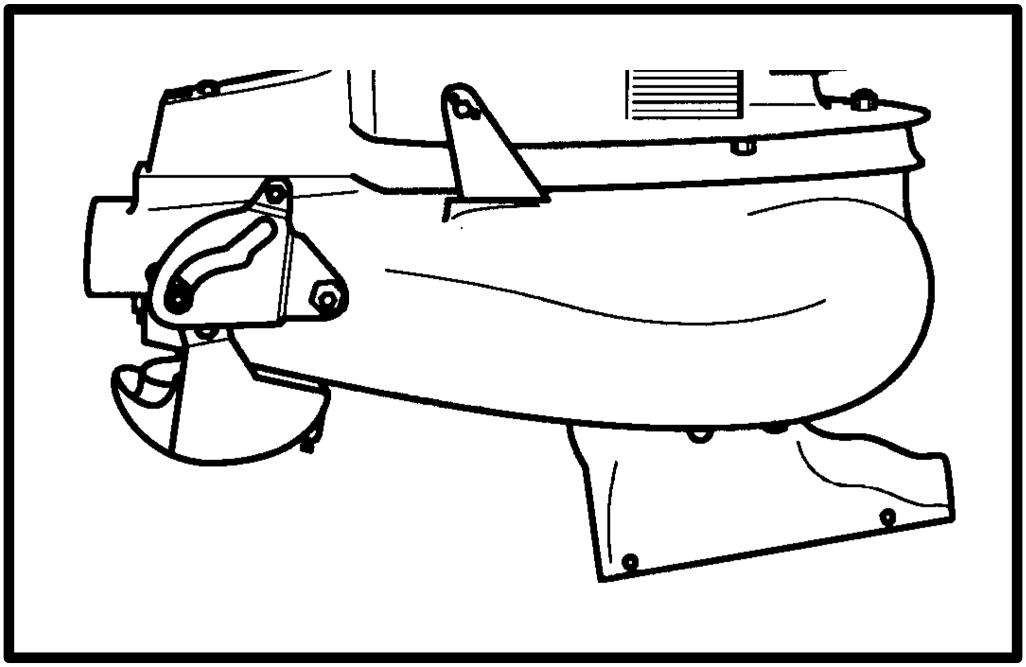
Trim Tab Adjustment

1. Check trim tab position as follows:
    a. Operate boat at the speed at which it normally would be operated.
    b. If the boat pulls to the right (STARBOARD), the trailing edge of trim tab must be moved to the right. If the boat pulls to the left (PORT), the trailing edge of trim tab must be moved to the left.
2. If necessary, adjust trim tab as follows:
    a. Shift engine control into NEUTRAL and turn ignition key to “OFF” position.

NOTE: *Loosen trim tab bolt sufficiently to allow trim tab to disengage from locking ridges in gear case before attempting to move tab. DO NOT strike trim tab with a hard object to make adjustments.*

    b. If boat pulls to the left, adjust trailing edge of trim tab to the left. If boat pulls to the right, adjust trailing edge of trim tab to the right.
3. Tighten trim tab retaining bolt and washer to 22 lb. ft. (30.0 N·m).

LOWER UNIT



JET DRIVE

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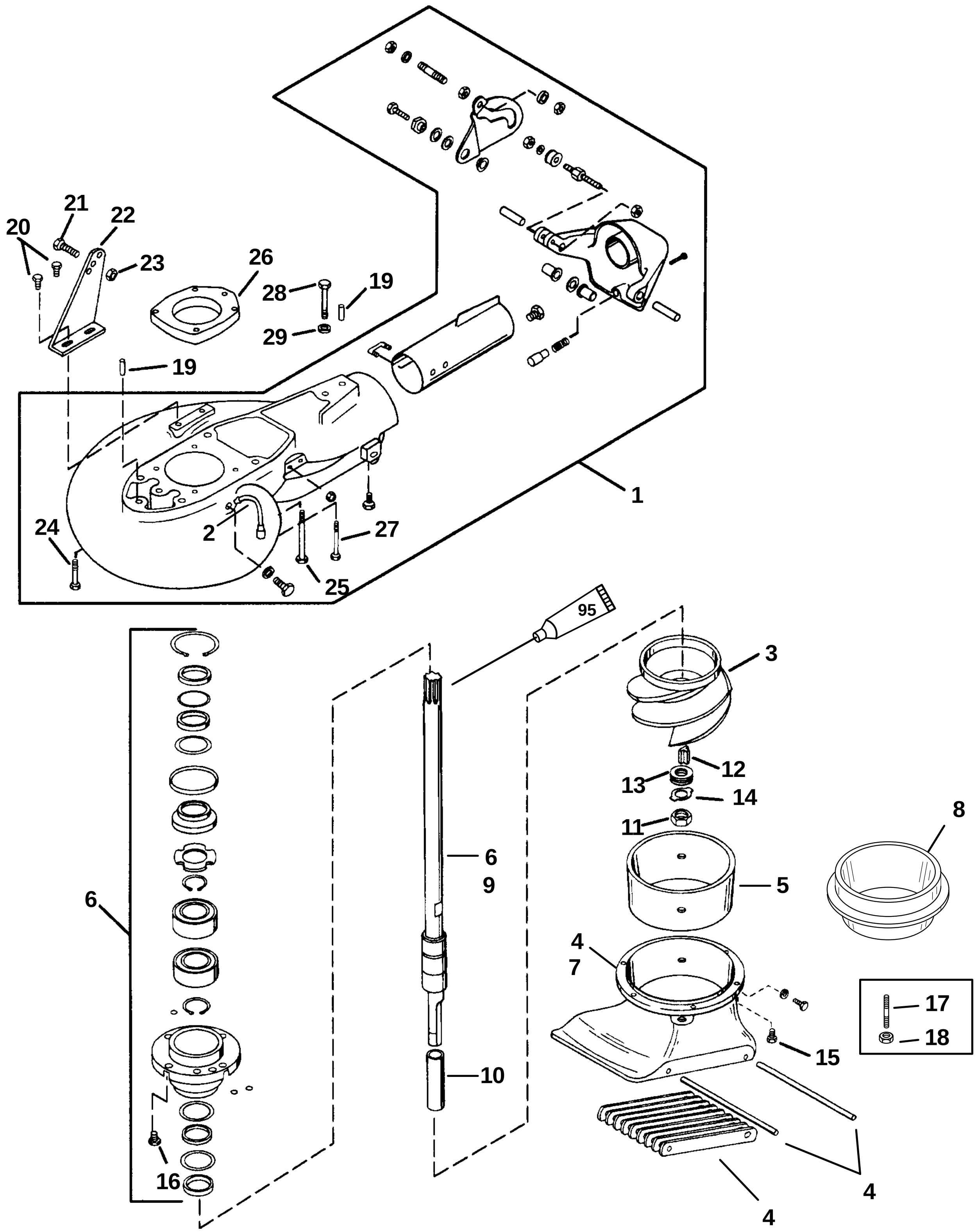
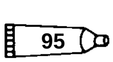
Notes:

65 Jet Drive (3 cylinder)

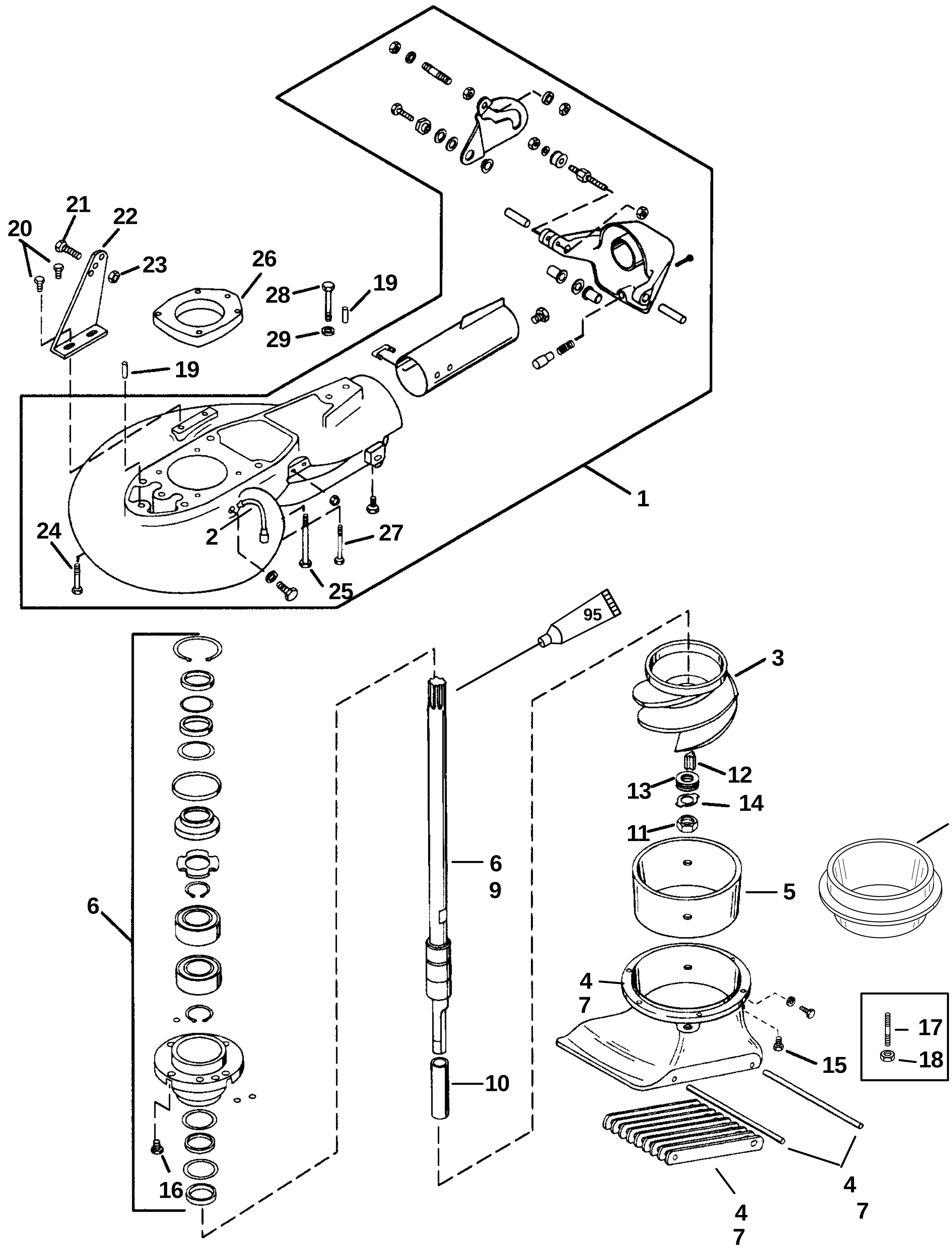


 2-4-C With Teflon (92-825407A12)

Jet Pump Assembly

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
–	1	JET PUMP ASSEMBLY (BLACK) S/N-0G582704 & BELOW			
–	1	JET PUMP ASSEMBLY (GRAY)			
–	1	JET PUMP ASSEMBLY (S/N-0G582705 & UP)			
1	1	HOUSING–pump (S/N-0G582704 & BELOW)			
	1	HOUSING-pump (S/N-0G582705 & UP)			
2	1	HOSE–lube			
3	1	IMPELLER			
4	1	HOUSING–intake			
5	1	LINER S/N-0G582704 & BELOW			
6	1	DRIVESHAFT			
7	1	HOUSING-Intake			
8	1	LINER S/N-0G582705 & UP			
9	1	DRIVESHAFT			
10	1	SLEEVE			
11	1	NUT	Drive Tight		
12	1	KEY			
13	8	SHIM–impeller			
14	1	TAB WASHER			
15	6	SCREW (.312-18 x 1)	160		18.1
16	4	SCREW (1/4-20 x .875) S/N-0G582704 & BELOW	70		7.9
	4	SCREW (1/4-20 x .875) S/N-0G582705 & UP	144	12	16.5
17	6	STUD (.312 x 18 x 1.81)	144	12	16.5
18	6	NUT S/N-0G582705 & UP	144	12	16.6
19	2	PIN–dowel			
20	2	SCREW (1/4-20 x .625)	70		7.9
21	1	SCREW (.312-18 x 1.25)	160		18.1
22	1	BRACKET–cable support			
23	1	NUT (.312-18)	160		18.1
24	2	SCREW (M10 x 60)		25	33.9
25	1	SCREW (M10 x 90)		25	33.9
26	1	ADAPTOR–pump			
27	1	SCREW (M10 x 70)		25	33.9
28	1	SCREW (.38-16 x 4)		22.5	30.5
29	1	WASHER			

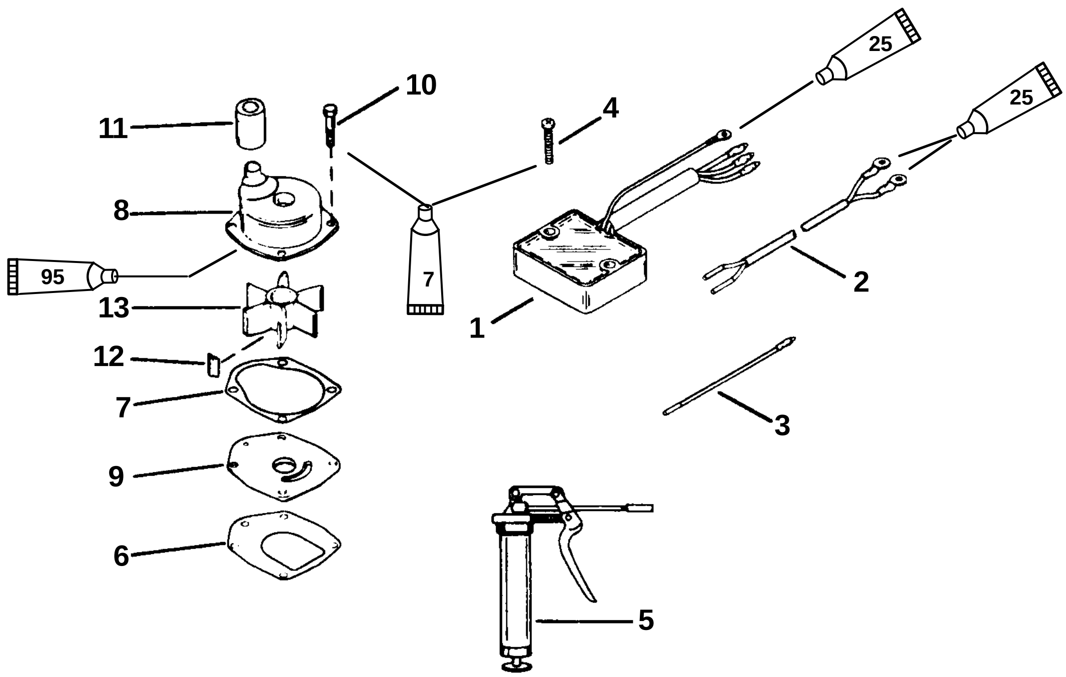
80 Jet Drive (4 cylinder)



95 2-4-C With Teflon (92-825407A12)

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	lb. ft.	N·m
–	1	JET PUMP (BLACK) S/N-0G582704 & BELOW			
–	1	JET PUMP (GRAY)			
–	1	JET PUMP (S/N-0G582705 & UP - W/ALUMINUM IMPELLER)			
–	1	JET PUMP (W/STAINLESS STEEL IMPELLER)			
1	1	HOUSING–pump (S/N-0G582705 & UP)			
	1	HOUSING–pump (S/N-0G582704 & BELOW)			
2	1	HOSE–lube			
3	1	IMPELLER (ALUMINUM)			
	1	IMPELLER (STAINLESS STEEL)			
4	1	HOUSING–intake			
5	1	LINER S/N-0G582704 & BELOW			
6	1	DRIVESHAFT			
7	1	HOUSING–intake			
8	1	LINER S/N-0G582705 &UP			
9	1	DRIVESHAFT			
10	1	SLEEVE			
11	1	NUT	Drive Tight		
12	1	KEY			
13	8	SHIM–impeller			
14	1	TAB WASHER			
15	6	SCREW (.312-18 x 1)	160		18.1
16	4	SCREW (1/4-20 x .875) S/N-0G582704 & BELOW	70		7.9
	4	SCREW (.312 x 18 x 1 IN) S/N-0G582705 &UP	144	12	16.5
17	6	STUD (.312 x 18 x 1.81)	144	12	16.6
18	6	NUT S/N-0G582705 &UP	144	12	16.5
19	2	PIN–dowel			
20	2	SCREW (1/4-20 x .625)	70		7.9
21	1	SCREW (.312-18 x 1.25)	160		18.1
22	1	BRACKET–cable support			
23	1	NUT (.312-18)	160		18.1
24	2	SCREW (M10 x 60)		25	33.9
25	1	SCREW (M10 x 90)		25	33.9
26	1	ADAPTOR–pump			
27	1	SCREW (M10 x 70)		25	33.9
28	1	SCREW (.38-16 x 4)		22.5	30.5
29	1	WASHER			

Jet Water Pump Components



7 Loctite 271 (92-809820)

25 Liquid Neoprene (92-25711--2)

95 2-4-C With Teflon (92-825407A12)

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	REV LIMITER			
2	1	HARNESS–adaptor–rev Limiter			
3	1	HARNESS–adaptor			
4	2	SCREW (M6 x 50)	70		7.9
5	1	GREASE KIT			
6	1	GASKET			
7	1	GASKET			
8	1	WATER PUMP ASSEMBLY			
9	1	FACE PLATE			
10	4	SCREW (M6 x 1 x 30)	60		6.8
11	1	SEAL			
12	1	KEY			
13	1	IMPELLER			

Selecting A Boat That Is Best Suited For Jet Power

To obtain the best performance from the jet drive, the boat should have the following features:

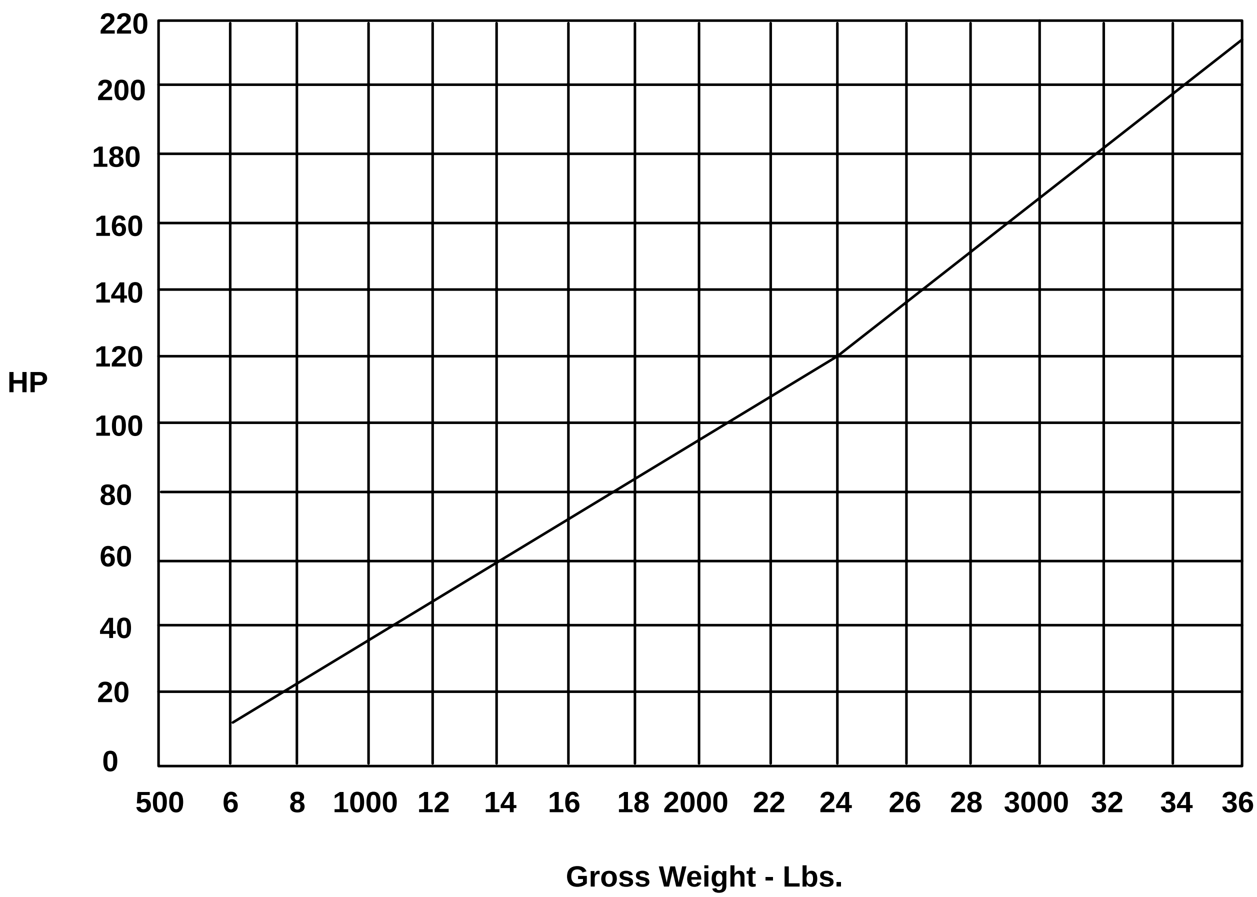
1. The boat should be as light as possible.
2. The boat should have hull and transom that is designed for use with a jet drive.
3. The boat should be at least 13 feet in length.

Engine Horsepower Selection

A boat operating at slow speed requires considerably more depth than one which is planing on the surface of the water. It is important therefore to use sufficient horsepower and not to overload your boat beyond its ability to plane. See the following table.

Engine Horsepower Selection

The following table is based on experience obtained with sled-type boats using outboard jets. The gross weights shown includes the outboard, boat, people, and all the gear carried. For a given horsepower loading beyond these weights will give less than good performance.

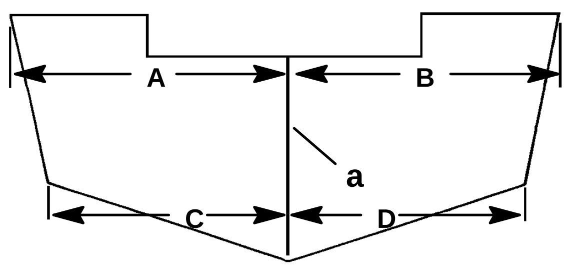


Transom Height of the Boat

Outboards with jet drives will be mounted approximately 7 inches higher on the transom than propeller driven outboards. This requires outboards that have a 15 in. shaft length to be installed on boats having a 22 in. transom height and outboards that have a 20 in. shaft length to be installed on boats having a 27 in. transom height.

If the boat transom is of insufficient height, and the outboard cannot be installed to the recommended height, contact the boat manufacturer for recommended procedure to build up the boat transom.

Locate Centerline Of The Outboard



a - Centerline of Transom

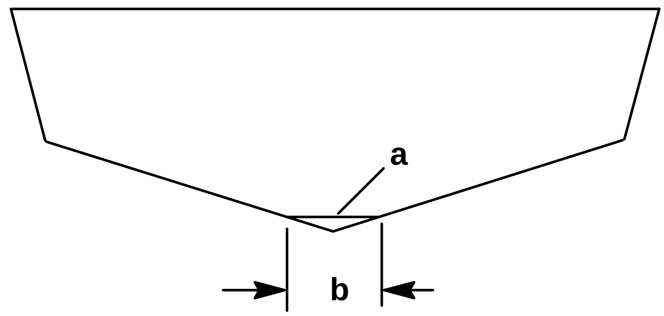
Outboard Mounting Height

The initial outboard mounting height setting will work good for most applications, however, because of different boat/hulls designs, the setting should be rechecked by test-running the boat. Refer to Water Testing.

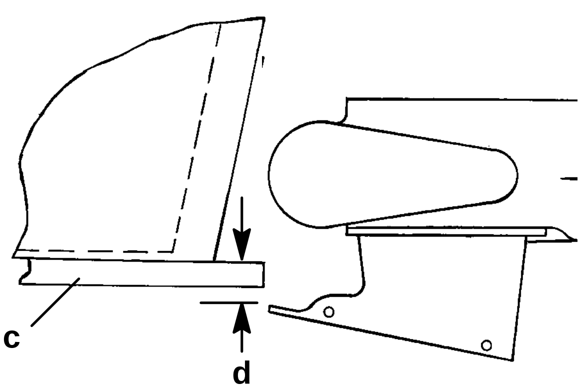
- Installing the outboard too high on the transom will allow the water intake to suck in air and cause cavitation (cavitation will cause the engine to overspeed in spurts and reduce thrust). This condition should be avoided by proper height setting.
- Installing the outboard too low on the transom will allow excessive drag.

SETTING OUTBOARD MOUNTING HEIGHT ON BOATS WITH "V" BOTTOM HULLS

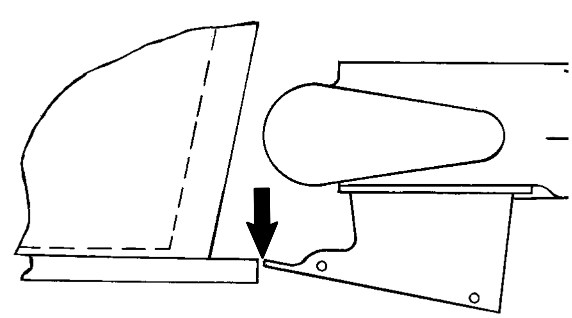
1. Measure the width of the leading edge on the water intake housing. Make a horizontal line (a) on the transom up from the "V" bottom the same length as the width of the water intake housing (b).



2. Place (center) the outboard on the boat transom so that the transom brackets are resting on top of the transom. Temporally fasten the outboard to the transom using two C-clamps.
3. Position the outboard in a vertical position.
4. Line-up a straight edge (c) along the bottom of the boat with the horizontal line made in Step 1 and measure the distance between the horizontal line and top front edge of the water intake housing (d).



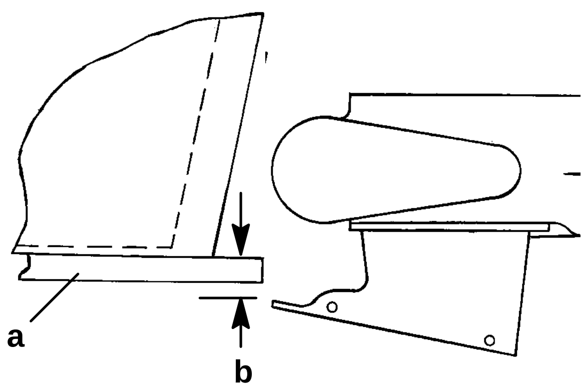
5. Raise the outboard up on the transom the distance measured in Step 4. Use a straight edge and recheck the mounting height. The top edge of the water intake housing should be lined-up with the horizontal line made in Step 1.



6. Fasten outboard to the transom at this height.

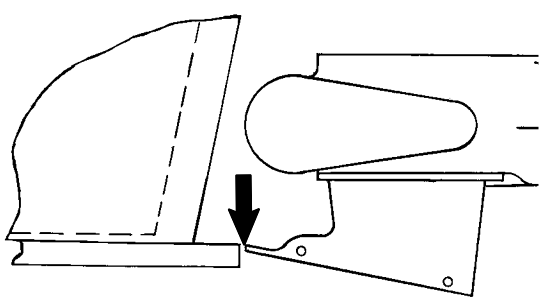
SETTING OUTBOARD MOUNTING HEIGHT ON BOATS WITH FLAT BOTTOM HULLS

1. Place (center) the outboard on the boat transom so that the transom brackets are resting on top of the transom. Temporarily fasten the outboard to the transom using two C-clamps.
2. Position the outboard in a vertical position.
3. Place a straight edge (a) along the bottom of the boat as shown and measure the distance between the bottom of the boat and top front edge of the water intake housing (b).



a - Straight Edge
b - Top Edge of Water Intake Housing

4. Raise the outboard up on the transom the distance measured in Step 3. Use a straight edge and recheck the mounting height. The top edge of the water intake housing should be in line with the bottom of the boat as shown.



5. Fasten outboard to the transom at this height.

Water Testing

Checking for Cavitation

Making the initial outboard height setting should be close to the optimum setting for the outboard. However because of the hull design of some boats, obstructions or imperfections in the hull ahead of the water intake may require this setting to change in order to prevent cavitation at running speeds.

When operating the boat, the outboard drive shaft should be vertical when planing or tilted toward the boat in order to provide a scooping angle on the water intake. Tilting the outboard out beyond a vertical position reduces the scoop angle and can cause impeller slippage and cavitation. If the angle of the boat transom does not allow the drive shaft to be positioned vertical a Wedge kit should be installed behind the transom brackets to increase the tilt-in angle.

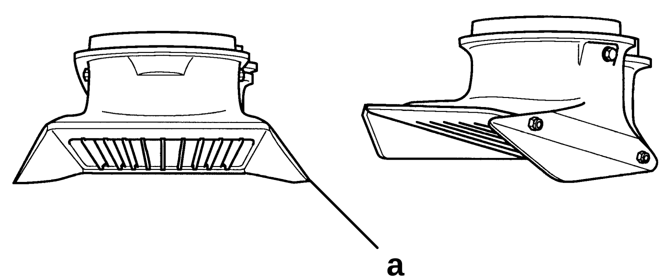
NOTE: *Slight cavitation in sharp turns and rough water is acceptable but excessive cavitation is harmful to the outboard and should be avoided.*

Test run the boat. If cavitation occurs (air enters the pump causing loss of thrust, engine over-speeds erratically). the first thing to try is lowering the outboard height 1/4 in. This can be accomplished by elongating the drilled mounting holes in the boat transom by 1/4 in.

If cavitation still exists after lowering the outboard 1/4 in., it may be helpful to seek advice from the boat manufacturer.

A number of other options are available to further reduce cavitation.

1. Water intake fin kit (a) – Available from the Specialty Mfg. Co. for jet models 30 thru 140. The purpose of these fins is to ram more water into the intake and shield the forward sides of the intake from the entrance of air. This kit will help reduce cavitation when running with the wind in a chop.



a - Intake Fin Kit

Water Intake Fin Kit Part No.1186 for jet models 45 thru 140 and Part No. 1185 for jet model 30 is available from:

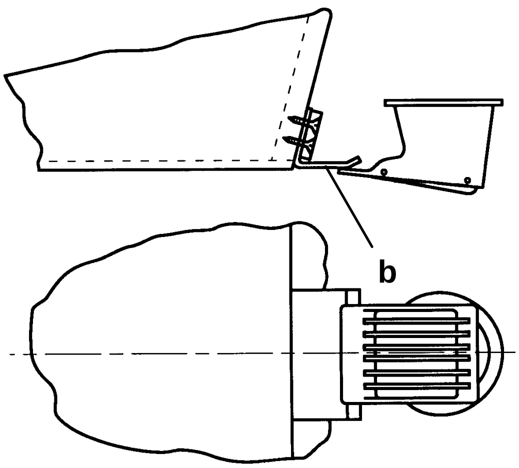
Specialty Mfg. Co.
2035 Edison Ave.
San Leandro, CA 94577

Continued on next page

Water Testing

Checking for Cavitation (Continued)

1. Rough Water Plate (b) – Using this type of plate may be helpful in reducing cavitation when running in windy rough water conditions where air is sucked-in the water intake when jumping waves. Install a 1/32 in. metal plate that extends from the hull bottom to the top of the water intake housing. This plate tends to reduce air intake as well as reduce spray.



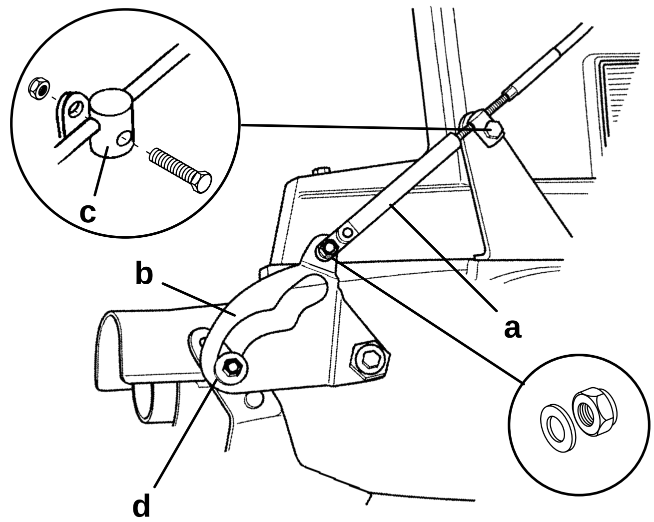
b - Rough Water Plate

Shift Cable Installation

⚠ WARNING

The shift cable must be adjusted to lock the reverse gate against unexpected engagement (caused by water pressure hitting the gate) while operating the boat in forward. Activation of the reverse gate will cause sudden unexpected stopping of the boat. Sudden stopping may cause occupants to be thrown within the boat or even out of the boat. This action may result in serious injury or death.

1. Attach shift cable (a) to the shift cam (b) with flat washer and locknut as shown. Tighten locknut against the flat washer, then back-off the locknut 1/4 turn.
2. Place remote control handle into full forward position.
3. Adjust the brass barrel (c) on the shift cable so that roller (d) is at the full end of travel (bottom) in the shift cam when the remote control is in full forward.
4. Attach the brass barrel (c) to the bracket with bolt and locknut. Tighten the bolt until it seats against the barrel, then back-off the bolt 1/4 turn. Hold bolt from turning, and tighten locknut on bolt. The barrel must be free to pivot.



a - Shift Cable
b - Shift Cam
c - Barrel
d - Roller

5. Recheck the shift cable adjustment in forward shift position. The correct shift adjustment will position the cam far enough on the roller in order to lock the the reverse gate into forward position. You should not be able to forcibly push up the reverse gate toward neutral. Pull on the reverse gate by hand to verify this.

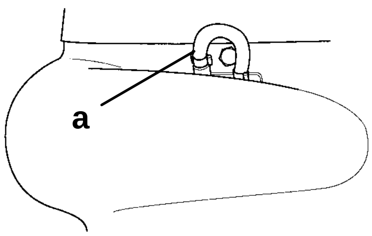
IMPORTANT: The forward locking of the reverse gate must be met. If not, readjust the shift cable.

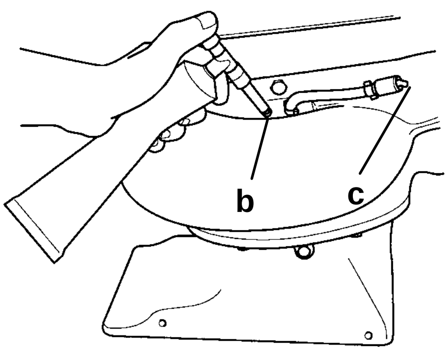
Lubricating the Drive Shaft Bearing

Recommended Lubrication - Use 2-4-C w/Teflon.

IMPORTANT: It is important that you do not use a general-all-purpose grease for this bearing. The lubricant we recommend is a water resistant grease of the proper consistency for this application. If you use a substitute grease, be sure that it is water resistant and of the same consistency.

Frequency of lubrication - We recommend lubricating the drive shaft bearing after each day's use and after every 10 hours of operation. After every 30 hours of operation, pump in extra grease to purge out any moisture.





a - Vent Hose
b - Grease Gun
c - Grease Exiting Vent Hose

Lubricating Procedure - Pull vent hose (a) off the grease fitting. Pump in grease (b) through the grease fitting (using the grease gun provided) until excess grease starts to exit the vent hose (c).

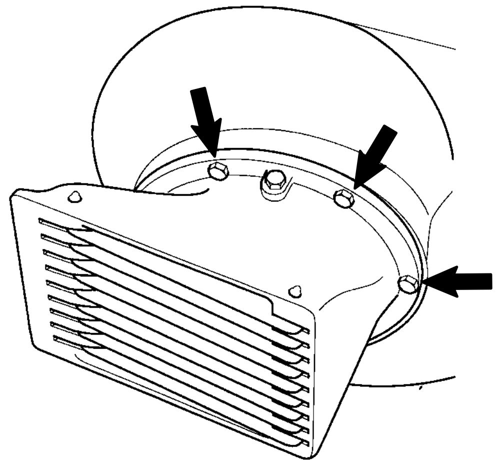
Reconnect the vent hose (a) onto the grease fitting after greasing.

After 30 hours of operation, pump in extra grease to purge out any moisture. Visually inspecting the purged grease at this time will give you an indication of conditions inside the bearing housing. A gradual increase in moisture content, indicates seal wear. If the grease begins to turn dark, dirty gray, the drive shaft bearing and seals should be inspected and replaced if necessary. Some discoloration of the grease is normal during the break-in period on a new set of seals.

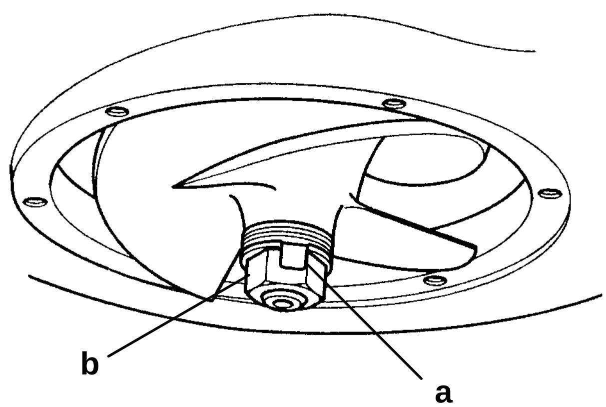
Impeller Removal and Installation

REMOVAL

1. Shift outboard to NEUTRAL (N) position.
2. Remove spark plug leads to prevent engine from starting.
3. Remove the water intake housing that is fastened with six screws.



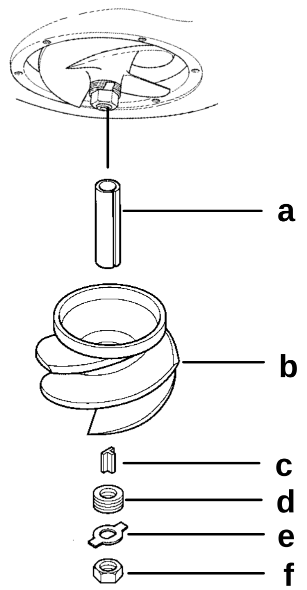
4. Straighten the bent tabs (a) on the impeller nut retainer and remove the impeller nut (b).
5. Pull impeller straight off the shaft. If the impeller is tight, use a hammer and block of wood to rotate the impeller (clockwise) on the shaft until the keyway is directly above the flat on the shaft. This will free the jammed key and allow removal.



a - Tab
b - Nut

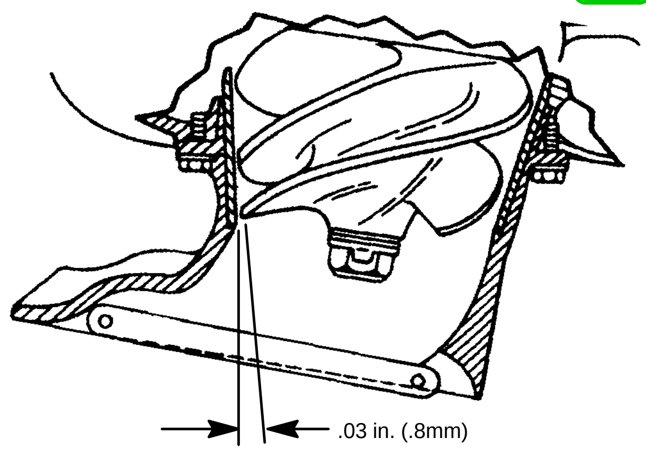
INSTALLATION

1. Grease the drive shaft, shear key, and impeller bore. Place the plastic sleeve (a) inside the impeller (b) and install impeller, shear key (c), shims (d) nut retainer (e), and impeller nut (f). Turn the nut tight on the shaft to remove any play between the impeller and shaft. If the tabs on the retainer do not line up with the flats on the nut, remove the nut and turn the retainer over and re-tighten the nut again.

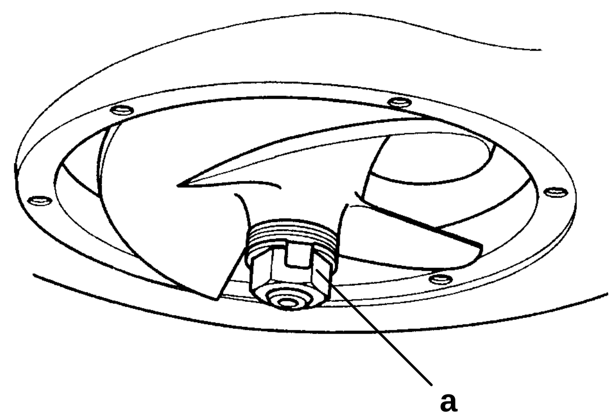


a - Plastic Sleeve
b - Impeller
c - Shear Key
d - Shims
e - Nut Retainer
f - Impeller Nut

2. Temporarily reinstall the water intake housing in order to check for impeller clearance. The clearance between the impeller and liner should be 0.030 in. (0.8 mm). Shim washers can be transferred to either side of the impeller to raise or lower the impeller to the correct clearance setting. The water intake housing can be shifted side ways a small amount in order to center the liner.



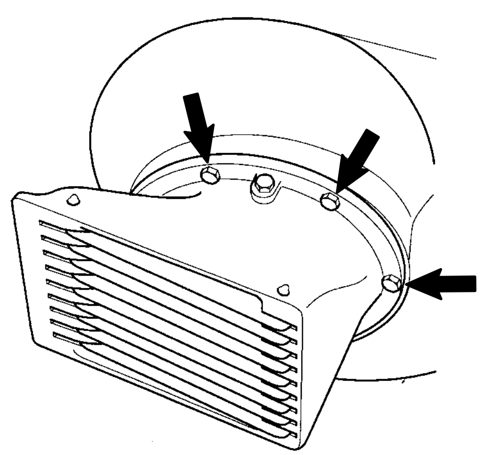
3. After setting the impeller height, tighten the impeller nut snug with a wrench. Secure impeller nut by bending tabs (a) against the flats on the impeller nut.



a - Tabs

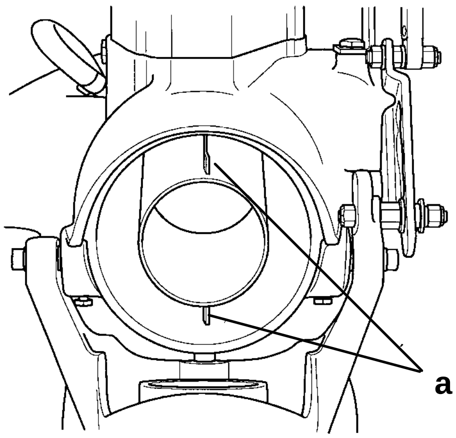
4. Reinstall the water intake housing with six bolts. Check clearance around the impeller to make sure the water intake housing is centered and not rubbing against the liner. Torque mounting bolts to 13 lb. (17.6 N·m).

NOTE: *If the outboard is used in salt water, apply Quicksilver Anti-Corrosion Grease around the entire mounting flange on the water intake housing and also to the threads on the six mounting bolts.*



Steering Pull Adjustment

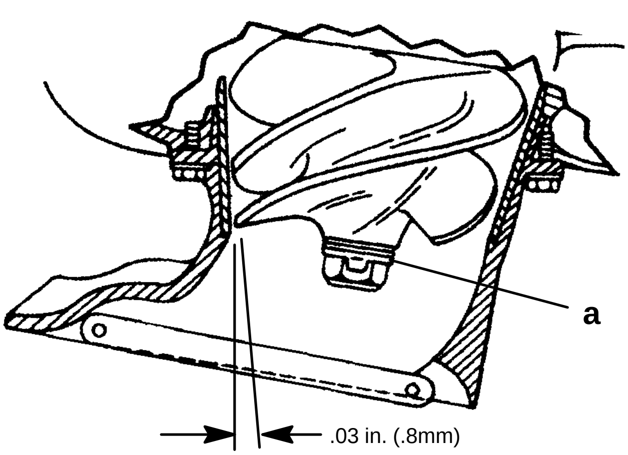
The steering on some boats will have the tendency to pull towards starboard. This pulling condition can be corrected by using a pliers and bending the ends of the exhaust fins (a) 1/16 in. (1.5mm) toward the starboard side of the outboard.



a - Exhaust Fins

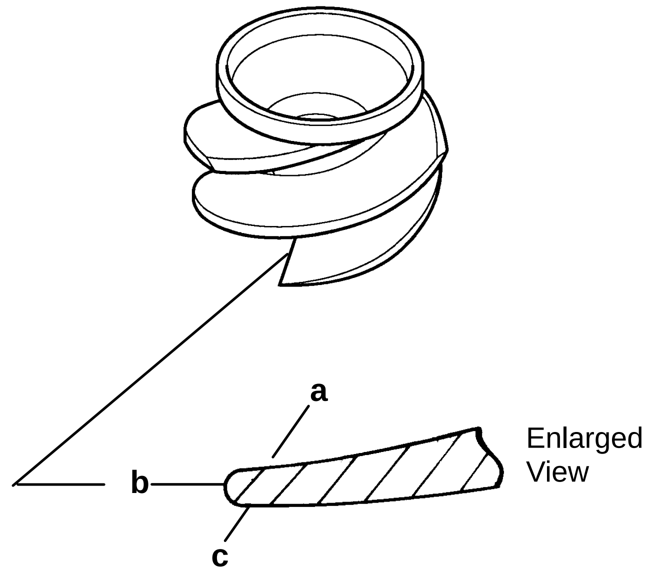
Impeller Clearance Adjustment

1. The impeller should be adjusted so there is approximately 0.03 in. (0.8mm) clearance between the impeller edge and liner. Operating the jet drive in waters that contain sand and gravel can cause wear to the impeller blades, and the clearance will start to exceed 0.03 in. (0.8mm). As the blades wear, shims (a) located in the stack outside of the impeller can be transferred behind the impeller. This will move the impeller further down into the tapered liner to reduce the clearance.
2. Check the impeller clearance by sliding a feeler gauge through the intake grate and measure the clearance between the impeller edge and liner. If adjustment is required, refer to Impeller Removal and Installation.



a - Shims

Worn (Dull) Impeller



a - Sharpen to a 1/32 in. (.8mm) radius by removing material from bottom side only
b - Leading edge
c - Do Not sharpen or alter the top side lifting angle

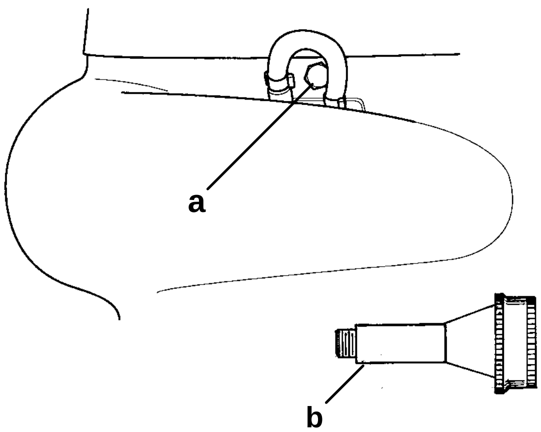
The intake of gravel through the pump can round off and wear the leading edges on the impeller. Some conditions you may experience from a worn impeller are (1) a noticeable performance loss, especially on acceleration, (2) difficulty getting the boat on plane, or (3) an increase in engine RPM at wide open throttle. Check the impeller blades occasionally for damage. Use a flat file to resharpen the leading edges as shown.

Flushing the Cooling System

Use Quicksilver accessory hose coupling Part Number 24789A1.

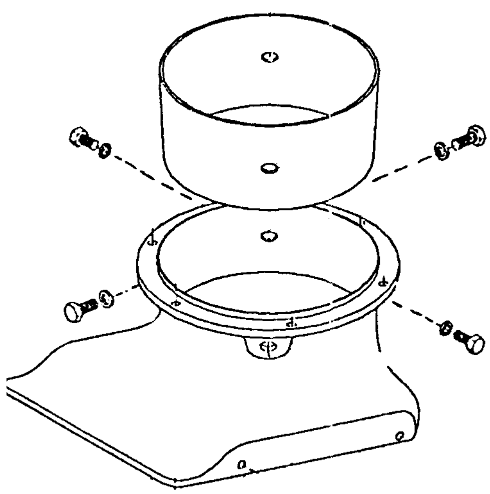
1. Remove plug and gasket (a) and thread-in hose coupling (b).
2. Attach a water hose to the hose coupling. Turn on the water gently, start the engine, and run it at idle speed only.
3. Check for a steady stream of water flowing out of the water pump indicator hole. Continue flushing the outboard for 3 to 5 minutes; adjust water pressure if needed.

4. Stop the engine, turn off the water, and remove the hose coupling. Reinstall the plug and gasket.



a - Plug and Gasket
b - Hose Coupling

Liner Replacement



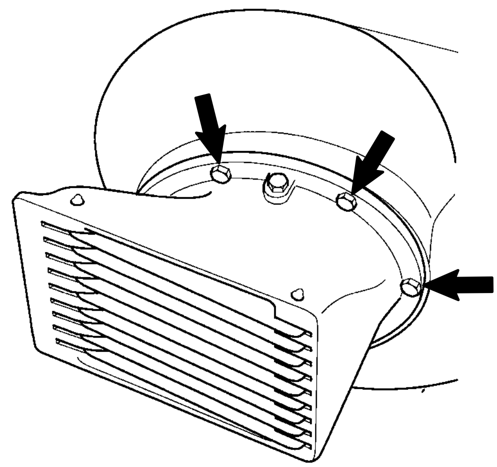
1. Mark the liner mounting bolts for reassembly into the same holes. Remove the bolts.
2. Remove the liner. If the liner is tight, tap on the inner edge of the liner with a long drift punch through the intake grate.

NOTE: *Apply grease to the liner mounting bolt threads before assembly.*

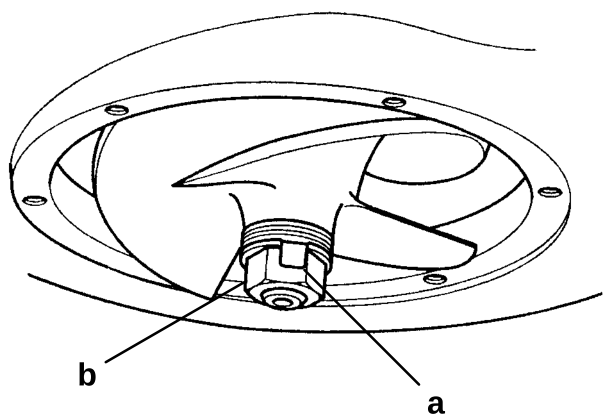
3. Position the liner into the water intake housing. Line up one of the liner bolts and lightly thread it in. It may be necessary to tap or press the liner into the water intake housing to locate the liner for installation of the remaining bolts. Torque bolts to 120 lbs. in. (13.6 N·m).
4. Grind off the ends of any bolts that may extend beyond the inner liner surface.

Jet Drive Removal

1. Shift outboard to NEUTRAL (N) position and disconnect the shift linkage.
2. Remove spark plug leads to prevent engine from starting.
3. Remove the water intake housing that is fastened with six screws.

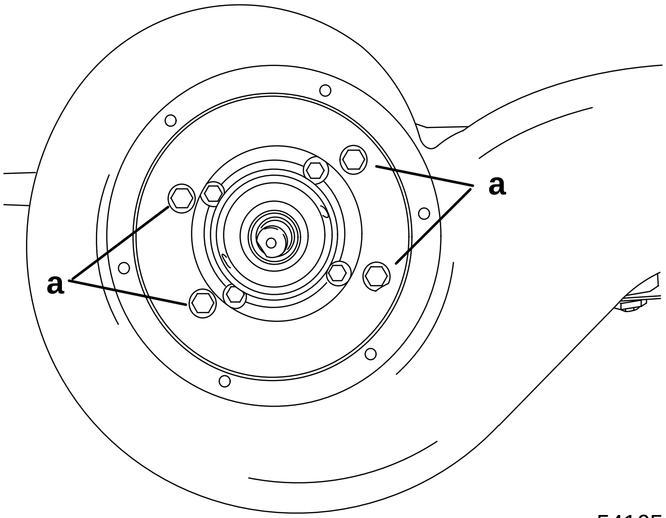


4. Straighten the bent tabs (a) on the impeller nut retainer and remove the impeller nut (b).
5. Pull impeller straight off the shaft. If the impeller is tight, use a hammer and block of wood to rotate the impeller (clockwise) on the shaft until the keyway is directly above the flat on the shaft. This will free the jammed key and allow removal.



a - Tabs
b - Nut

6. Remove 5 bolts securing pump drive to drive shaft housing and remove pump.



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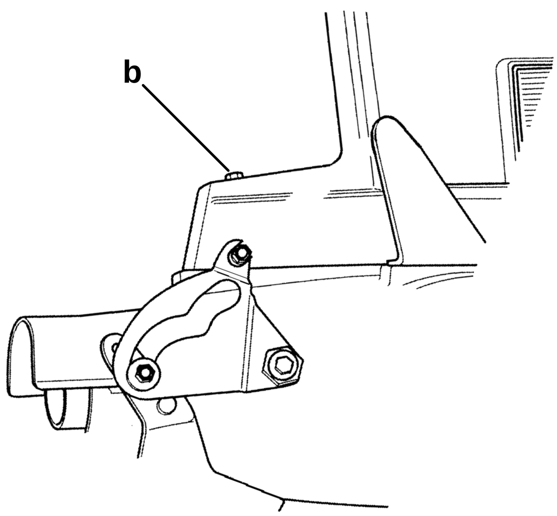
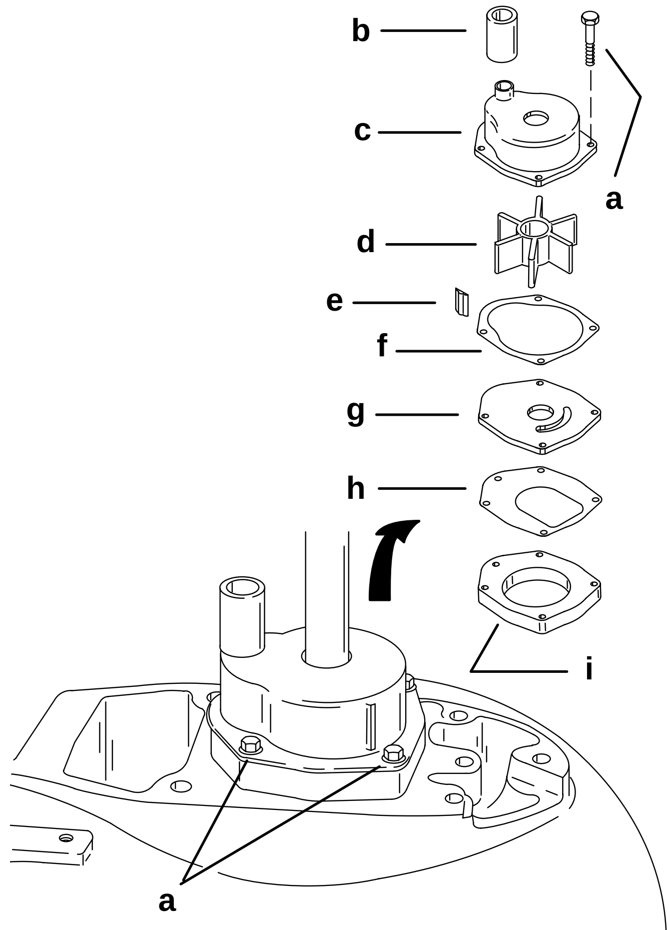


a - Bolts (4)
b - Bolt (1)

Bearing Carrier Removal

NOTE: *Water pump assembly must be removed before bearing carrier can be removed.*

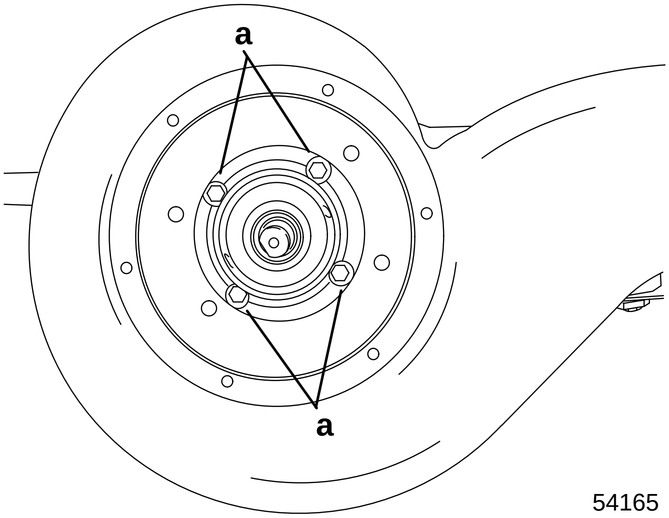
1. Remove 4 bolts (2 each side) securing water pump assembly and remove water pump.



54166

a - Bolts (2 each side)
b - Seal
c - Housing
d - Impeller
e - Key
f - Gasket
g - Plate
h - Gasket
i - Spacer

2. Remove 4 bolts securing bearing carrier to jet drive.

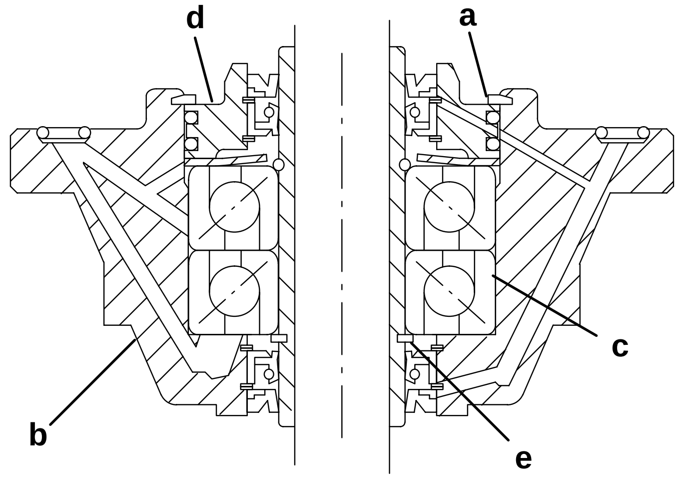


54165

a - Bolts

Bearing Carrier Disassembly

1. Remove the large beveled snap ring (a) from the bearing carrier.
2. Heat the bearing carrier (b) with a torch only until you can barely touch it.
3. Hold the drive shaft vertical and bump the impeller end of the drive shaft against a wooden block causing the bearing carrier to slide down off the bearings.
4. Press the ball bearings (c) off the drive shaft. Leave the bearing thrust ring (e) (located in the drive shaft groove above the upper ball bearing) unless damaged.
5. Remove the seals and spiral retaining rings from the bearing carrier and the upper seal housing (d).
6. Clean all parts thoroughly and remove any burrs.



a - Snap Ring
b - Bearing Carrier
c - Ball Bearing
d - Upper Seal Housing
e - Thrust Ring

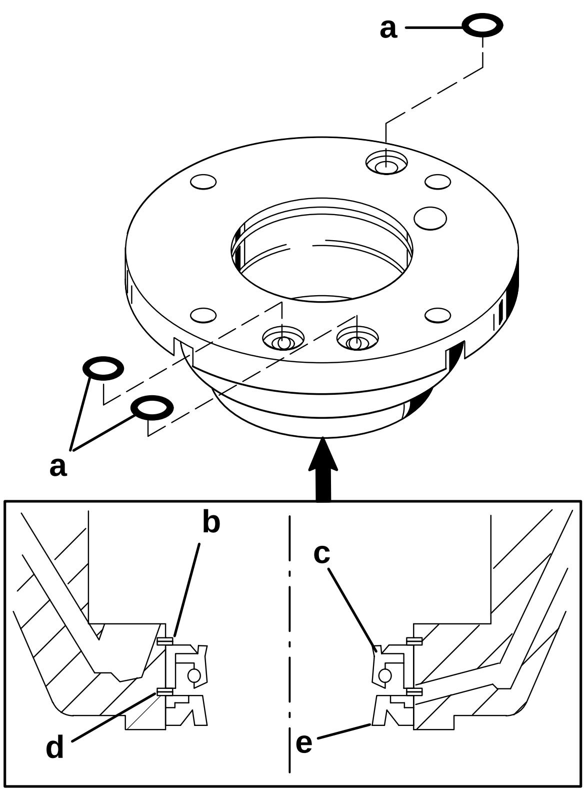
Bearing Carrier Reassembly

Installing Lower Seals

Install seals into bearing carrier as follows:

1. Install O-ring seals (a) into the top seats of the three passage holes.
2. Install spiral retaining ring (b) into the inner ring groove.
3. Spread a film of grease around the inside bore of the seal surface before pressing in the seals.
4. Press in the garter spring seal (c) against the inner retaining ring as shown. Fill the garter spring cavity in the seal with grease.
5. Install spiral retaining ring (d) into the outer ring groove. <u>Align the notched ends of the retaining ring to straddle the small vent hole drilled in the ring groove.</u>
6. Press in the outer seal (e) against the retaining ring as shown.
7. Grease all the seal lips.

IMPORTANT: The notched ends of the retaining ring must straddle this vent hole.

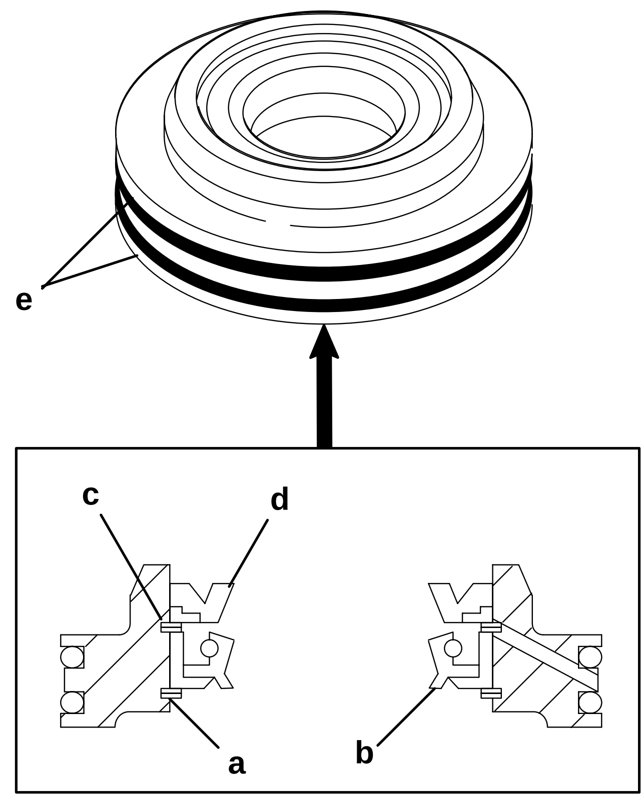


a - O-rings
b - Retaining Ring
c - Spring Seal
d - Retaining Ring
e - Outer Seal

Installing Upper Seals

1. Install spiral retaining ring (a) into the inner ring groove of the upper seal housing.
2. Spread a film of grease around the inside bore of the seal surface before pressing in the seals.
3. Press in the garter spring seal (b) against the inner retaining ring as shown. Fill the garter spring cavity in the seal with grease.
4. Install spiral retaining ring (c)into the outer ring groove. <u>Align the notched ends of the retaining ring to straddle the small vent hole drilled in the ring groove.</u>
5. Press in the outer seal against the retaining ring as shown.
6. Grease all the seal lips.
7. Grease the two O-ring seals (e) and install then into the outer ring grooves.

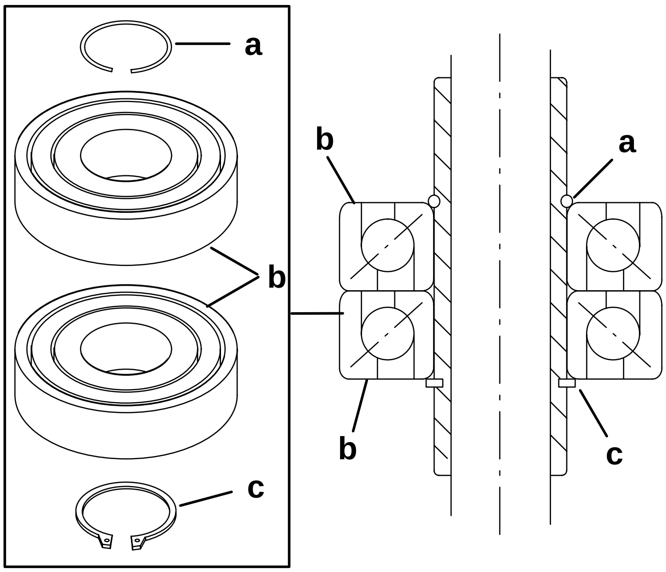
IMPORTANT: The notched ends of the retaining ring must straddle this vent hole.



a - Retaining Ring
b - Spring Seal
c - Retaining Ring
d - Outer Seal
e - O-rings

Installing Drive Shaft Ball Bearings

1. If removed, install the bearing thrust ring (a) into the groove on the drive shaft.
2. Press new ball bearings (b) onto the drive shaft, **pressing against the inner races only**. Press bearings against the thrust ring, locking it in its groove. Install snap ring (c) into drive shaft below the lower bearing.

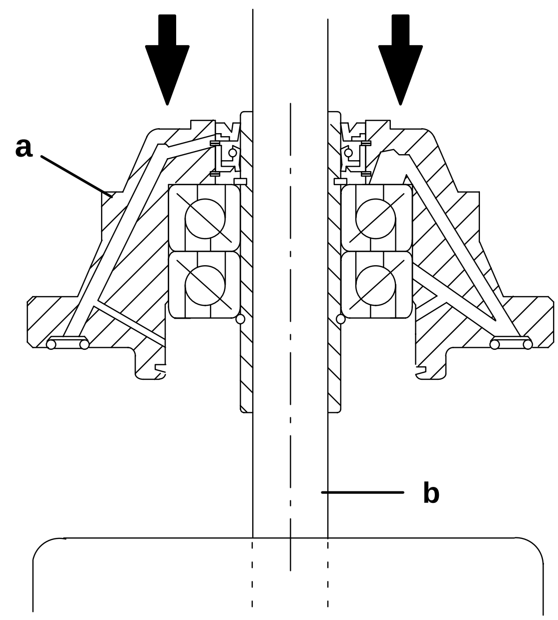


a - Thrust Ring
b - Ball Bearings
c - Snap Ring

Installing Drive Shaft

1. Lubricate the seals and inside bore of the bearing carrier (a).
2. Place the drive shaft (“b” impeller end facing up) into a vise.
3. Heat the bearing carrier (a) until it feels warm to the touch.
4. Place the bearing carrier (a) onto the drive shaft. Square up the inner bore with the ball bearings and push the bearing carrier down until it bottoms-out against the bearing. It may be necessary to lightly tap bearing carrier onto the bearings using a rubber hammer.

NOTE: *Only a light pressing force is needed to press on the bearing carrier. It may be necessary to lightly tap the bearing carrier onto the bearing using a rubber hammer.*



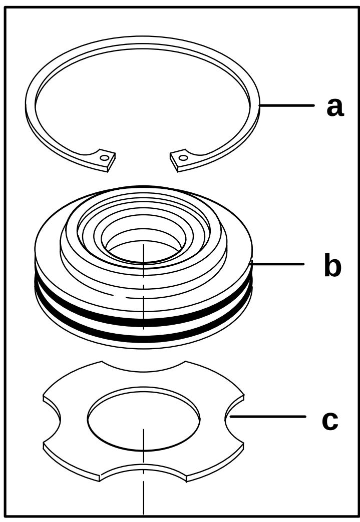
a - Bearing Carrier
b - Drive Shaft

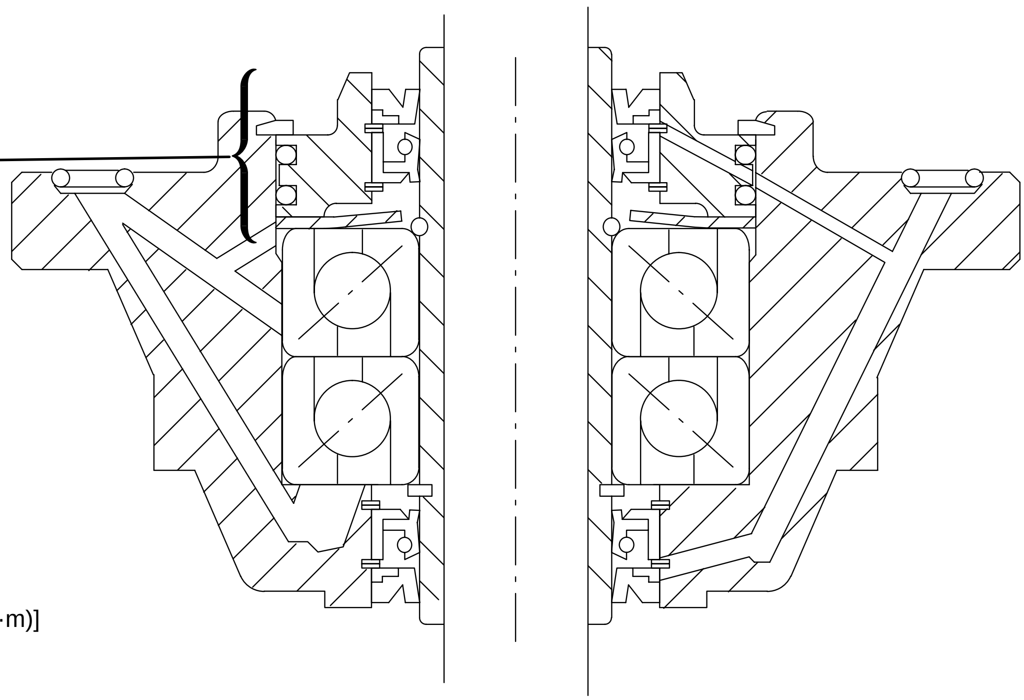
Installing Upper Seal Housing

1. Grease the upper seals and inside bore of the bearing carrier to ease entry of the seal housing.
2. Install the thrust washer (c) against the upper ball bearing, <u>with the dished center section facing up.</u>
3. Install the upper seal housing (b) being careful not to damage the O-ring seals as they pass the snap ring groove. Only finger pressure should be necessary to push in the housing.
4. Install the beveled snap ring (a), <u>beveled side facing up</u> into the ring groove. <u>Make sure the snap ring is fully seated into groove.</u>

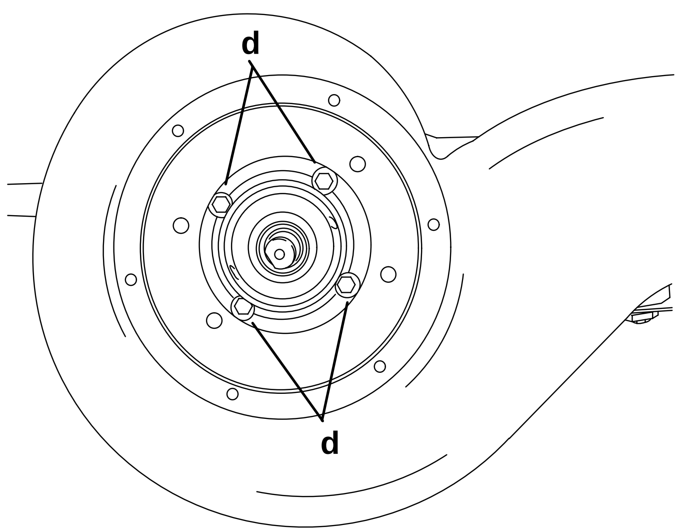
Bearing Carrier Installation

1. Install the bearing carrier into the jet drive. Secure carrier in drive with 4 bolts. Torque bolts to 70 lb. in. (7.9 N·m). Fill carrier with grease, using the grease gun supplied with the jet drive. If using a hand lever gun, pump very slowly so as to not build up internal grease pressure and damage the seals or housing.





a - Snap Ring
b - Upper Seal Housing
c - Thrust Washer
d - Bolts [Torque to 70 lb. in. (7.9 N·m)]



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Jet Drive Installation

Reassembling Water Pump to Jet Drive

NOTE: *Replace cover if thickness of steel at discharge slots is 0.060 in. (1.524mm) or less, or if groove(s) (other than impeller sealing groove) in cover roof are more than 0.030 in. (0.762mm) deep.*

NOTE: *Replace impeller if:*

a. *Impeller blades are cracked, torn or worn.*

b. *Impeller is glazed or melted (caused by insufficient water supply).*

c. *Rubber portion of impeller is not bonded to impeller hub.*

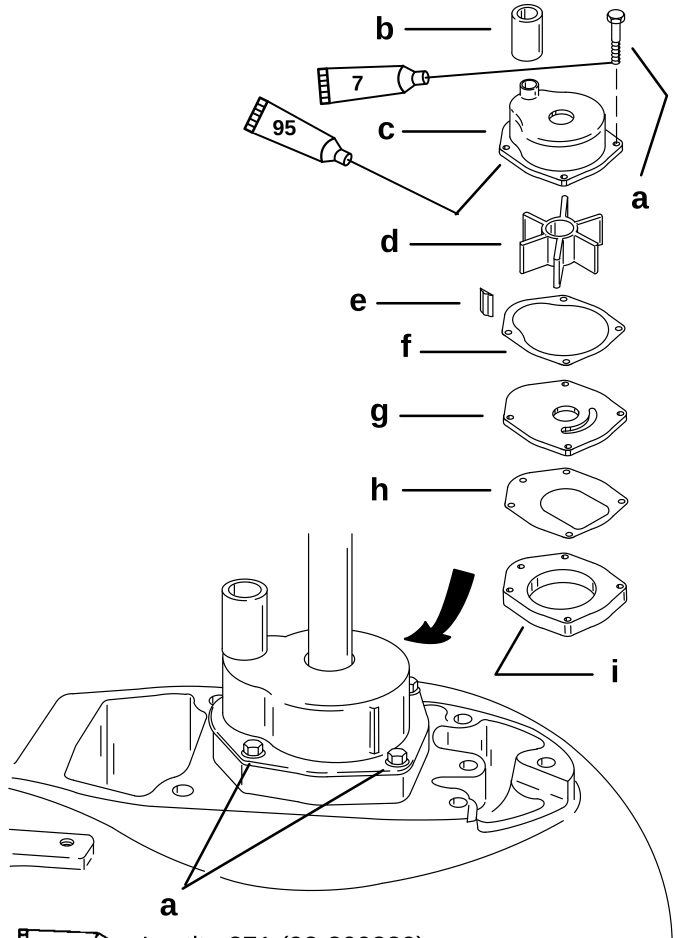
1. Install spacer.
2. Install base gasket, base plate, pump cover gasket (NEOPRENE STRIP FACES UP) and impeller key.

IMPORTANT: If impeller being installed has been previously used and vanes have taken a "set," DO NOT INSTALL THE IMPELLER WITH THE VANES REVERSED FROM THEIR PREVIOUS "SET" AS VANE BREAKAGE WILL OCCUR SHORTLY AFTER UNIT IS RETURNED TO SERVICE.

3. Install impeller.

NOTE: *Apply a light coat of 2-4-C w/Teflon to inside of pump cover to ease installation of cover over impeller.*

4. Install pump cover. Rotate drive shaft CLOCKWISE while pressing cover down over impeller.
5. Apply Loctite 271 to retaining bolts and torque bolts to 60 lb. in. (6.8 N·m).



7 Loctite 271 (92-809820)

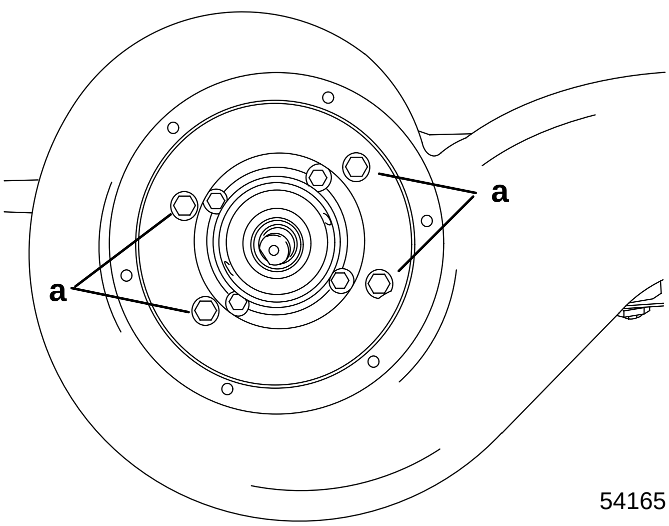
95 2-4-C With Teflon (92-825407A12)

54166

a - Bolts (2 each side) [Apply Loctite 271. Torque to 60 lb. in. (6.8 N·m)]
b - Seal
c - Cover
d - Impeller
e - Key
f - Gasket
g - Plate
h - Gasket
i - Spacer

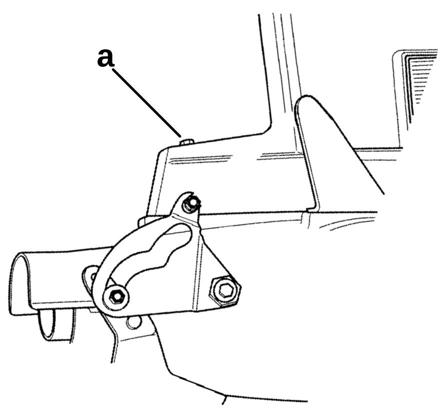
Installing Jet Drive to Drive Shaft Housing

1. Apply a light coat of 2-4-C w/Teflon to the drive shaft splines. DO NOT APPLY GREASE TO THE TOP OF THE DRIVE SHAFT AS THE GREASE WILL PREVENT THE DRIVE SHAFT FROM FULLY ENGAGING THE CRANKSHAFT AND DAMAGE TO THE POWERHEAD AND/OR GEAR CASE WILL RESULT.
2. Carefully slide jet drive into drive shaft housing while aligning drive shaft splines with crankshaft and the water tube with the water pump cover seal.
3. Secure jet drive to drive shaft housing with 4 bolts. Torque bolts to 25 lb. ft. (33.9 N·m)].



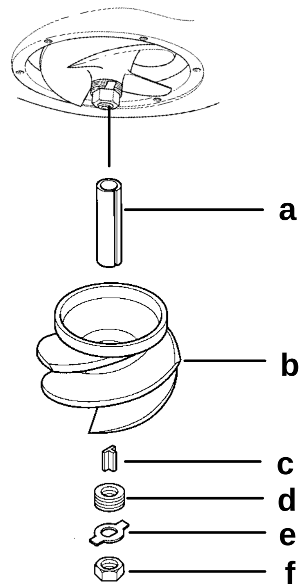
a - Bolts [Torque to 25 lb. ft. (33.9 N·m)]

4. Secure aft end of jet drive to drive shaft housing with bolt and washer. Torque bolt to 22.5 lb. ft. (30.5 N·m).



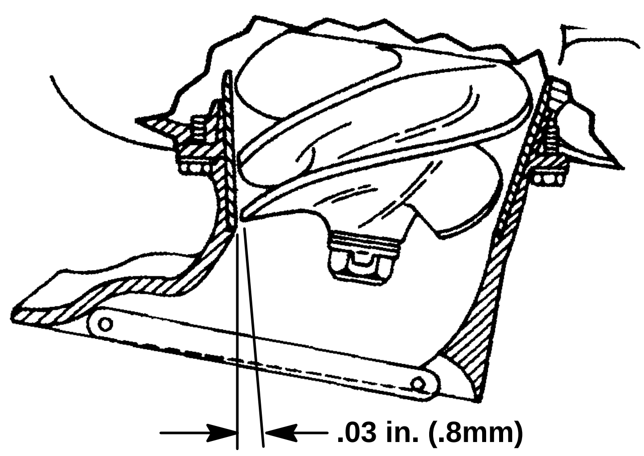
a - Bolt and Washer [Torque to 22.5 lb. ft. (30.5 N·m)]

5. Grease the drive shaft, shear key, and impeller bore. Place the plastic sleeve (a) inside the impeller (b) and install impeller, shear key (c), shims (d) nut retainer (e), and impeller nut (f). Turn the nut tight on the shaft to remove any play between the impeller and shaft. If the tabs on the retainer do not line up with the flats on the nut, remove the nut and turn the retainer over and re-tighten the nut again.

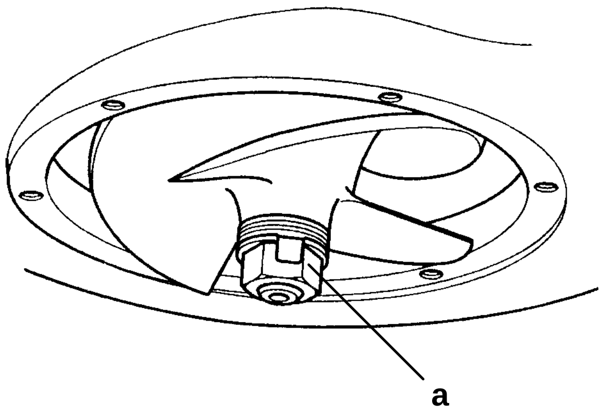


a - Plastic Sleeve
b - Impeller
c - Shear Key
d - Shims
e - Nut Retainer
f - Impeller Nut

6. Temporarily reinstall the water intake housing in order to check for impeller clearance. The clearance between the impeller and liner should be 0.030 in. (0.8 mm). Shim washers can be transferred to either side of the impeller to raise or lower the impeller to the correct clearance setting. The water intake housing can be shifted side ways a small amount in order to center the liner.



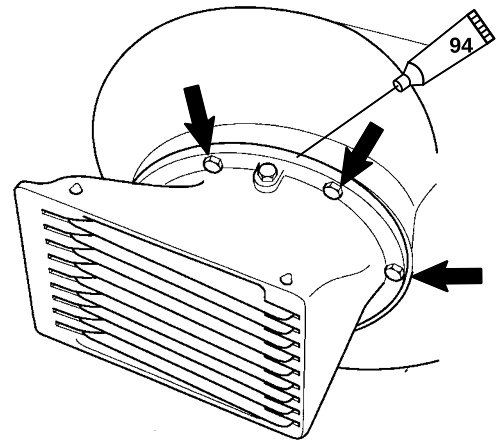
7. After setting the impeller height, tighten the impeller nut snug with a wrench. Secure impeller nut by bending tabs (a) against the flats on the impeller nut.



a - Tabs

8. Reinstall the water intake housing with six bolts. Check clearance around the impeller to make sure the water intake housing is centered and not rubbing against the liner. Torque mounting bolts to 120 lbs. in. (13.5 N·m).

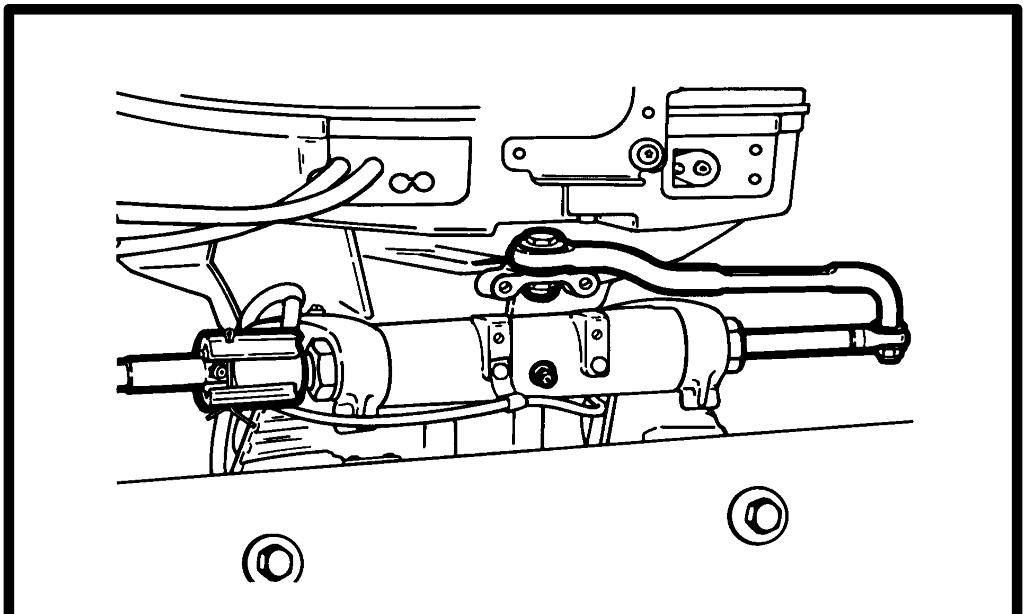
NOTE: *If the outboard is used in salt water, apply Quicksilver Anti-Corrosion Grease around the entire mounting flange on the water intake housing and also to the threads on the six mounting bolts.*



94 Anti-Corrosion Grease (92-78376A6)

9. Refer to “SHIFT CABLE INSTALLATION” page 10 and reinstall shift cable to jet drive.

ATTACHMENTS/ CONTROL LINKAGE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THROTTLE/SHIFT LINKAGE

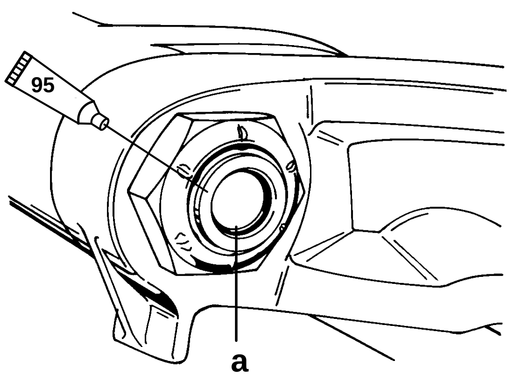
Table of Contents

Steering Cable and Steering Link Rod Installation

⚠ CAUTION

Control cables must be the correct length when installed. Cables that are too long may bind or kink putting extra stress on cables.

1. Install steering mount and steering wheel in accordance with installation instructions that accompany each.
2. Lubricate seal inside of engine tilt tube and entire steering cable end with Quicksilver 2-4-C w/Teflon.

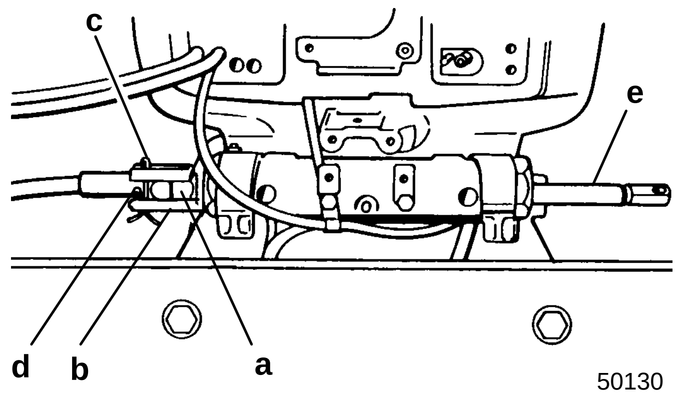


95 2-4-C With Teflon (92-825407A12) 51890

a - Seal

IMPORTANT: Before installing steering cable into tilt tube, lubricate seal and entire cable end with Quicksilver 2-4-C w/Teflon.

3. Insert steering cable end thru engine tilt tube and secure steering cable to tilt tube with steering cable attaching nut as shown. Torque nut to 35 lb. ft. (47.5 N·m).
4. Install rubber bumper on inside of locking sleeve, then install locking sleeve over steering cable (attaching nut) and secure with cotter pin. Spread ends of cotter pin. Be sure to install cotter pin so that it is located in-between attaching nut and grease fitting, as shown.



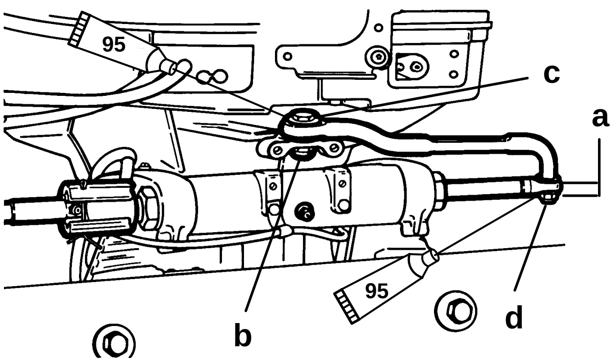
50130

a - Cable Nut
b - Locking Sleeve
c - Cotter Key
d - Grease Fitting
e - Steering Cable

⚠ CAUTION

Steering link must be installed in rear hole in engine steering arm. Failure to install in rear hole may cause damage to steering system.

5. Lubricate hole in end of steering cable with Quicksilver 2-4-C w/Teflon and assemble steering link rod to steering cable with 2 flat washers and locknut as shown. Torque locknut to 120 lbs. in. (13.5 N·m) maximum and back off 1/4-turn.
6. Lubricate ball joint in steering link rod with 2-4-C w/Teflon and assemble to rear hole in engine steering arm with pivot bolt and locknut. Torque pivot bolt, then locknut to 20 lbs. ft. (27.0 N·m).



95 2-4-C With Teflon (92-825407A12) 50099

a - Flat Washers (2)
b - Locknut
c - Pivot Bolt
d - Locknut

Ride-Guide Attachment – Dual Front Installation (92876A2)

⚠ WARNING

Quicksilver Super Ride-Guide Steering (Dual Cables) must be used with this attaching kit. Failure to adhere to this requirement could result in steering system failure.

Installation and Maintenance

IMPORTANT: The distance from each engine's centerline to the side of transom opening must be a minimum of 16″ (40.6cm).

This kit contains all necessary parts to connect both engines to Ride-Guide Steering cables for 22-1/2″ (57.2cm) thru 24-1/2″(62.2cm), refer to Figure 14, page 7A-14 for additional extension couplers.

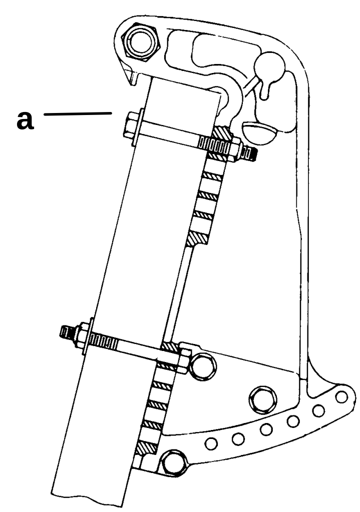
Cable Routing Types

Use "1" or "2", following, to route steering cables:

1. Parallel cable routing: Cables routed together down starboard side of boat. Refer to "Parallel Routed Steering Cables and Attaching Kit Installation," immediately following.
2. Opposite side cable routing: One cable routed down starboard side of boat and one cable routed down port side of boat. Refer to "Opposite Side Routed Steering Cables and Attaching Kit Installation," page 7A-8.

⚠ CAUTION

With this kit installed, the upper (engine) mounting bolts must be installed so that hex head end of bolts is on the inside of boat transom, as illustrated below. Failure to install upper mounting bolts, as shown in illustration, could result in interference between outer steering cable locking sleeve and ends of mounting bolts when engine is tilted up.



a - Install Upper Bolts so that Hex Head End of Bolts Are on the Inside of Boat Transom

Parallel Routed Steering Cables and Attaching Kit Installation

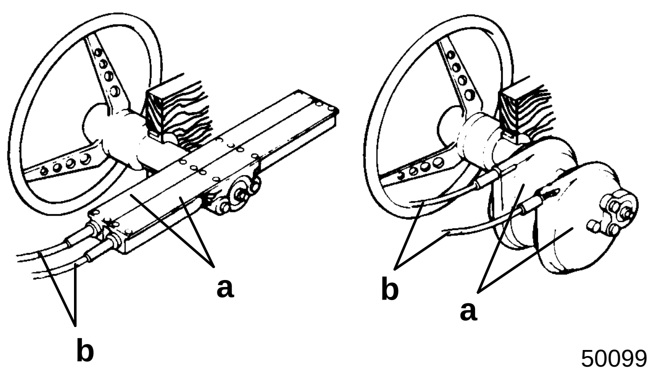
(Both Steering Cables Routed Together Down Starboard Side of Boat)

Super Ride-Guide Steering Kit Installation

IMPORTANT: It may be necessary to install steering cable into tilt tube of starboard engine before mounting engine.

Both gear racks or rotary steering heads must be installed so that both steering cables will be routed together on the same side of the boat and will push-and-pull together.

1. Install Super Ride-Guide Steering Kit in accordance with instructions included with Super Ride-Guide Kit.
2. Make sure that both gear racks or rotary steering heads are installed so that both steering cables are routed together and will push-and-pull together (Figure 1).



a - Straight Rack (Left); Rotary Steering (Right)
b - Steering Cables (Install so that Both Cables Will Push-and-pull Together.)

Figure 1. Super Ride-Guide Steering Kits Installed

⚠ WARNING

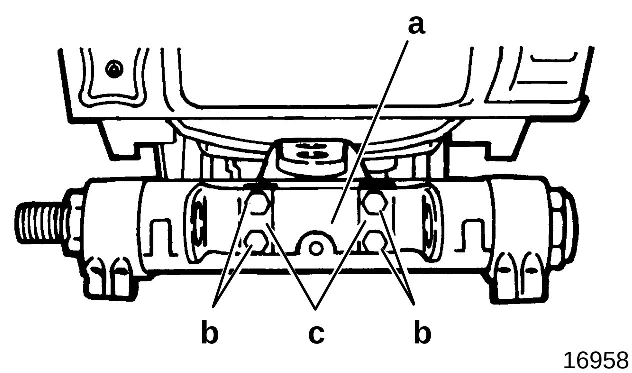
Before using engine after installation of cables, check to see that boat will turn right when steering wheel is turned right and that boat will turn left when wheel is turned left. Do this check at all tilt angles and thru full range of turn angles.

Installing Steering Cables and Steering Link Rods to Engines

1. Install tube mounting bracket (Figure 2) to starboard mounted engine with 2 locking retainers and 4 bolts. Torque bolts to 100 lbs. in. (11.3 N·m) and bend end of locking retainers up and against flat on each bolt, as shown in Figure 2.

⚠ WARNING

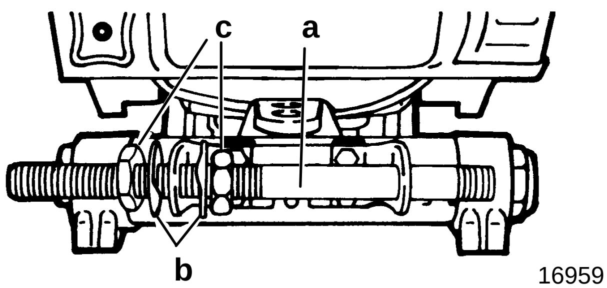
Locking retainer ends must be bent up and against flat on each bolt, that secures mounting bracket to engine, to prevent bolts from turning out.



a - Tube Mounting Bracket
b - Bolts [Torque to 100 lb. in. (11.3 N·m)]
c - Locking Retainers (Bend Ends Up and Against Flat on Bolts.)

Figure 2. Tube Mounting Bracket Installed

2. Install steering cable mounting tube into mounting bracket with 2 adjustment nuts and tab lock washers, as shown in Figure 3. Be sure that longer threaded end of tube is toward steering cable attaching nut side of engine.
3. Temporarily adjust tube so that longer threaded end of tube is extended out the same distance as engine tilt tube. Do not tighten adjustment nuts at this time.



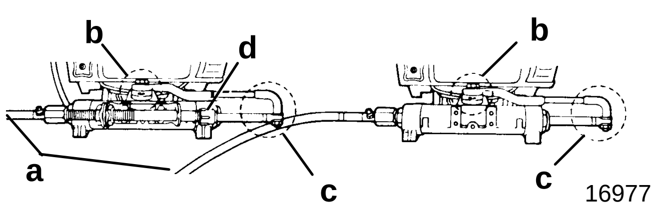
a - Steering Cable Mounting Tube
b - Tab Lock Washers
c - Adjustment Nuts (Rounded Edge Facing Out)

Figure 3. Steering Cable Mounting Tube Installed

4. Install steering cables, as follows:

IMPORTANT: Before installing steering cables, lubricate inside of port mounted engine tilt tube and inside of steering cable mounting tube with Quicksilver 2-4-C w/Teflon. Verify that rubber O-ring seal (located in engine tilt tube) also is lubricated.

   a. Lubricate inside of (port) engine tilt tube with Quicksilver 2-4-C w/Teflon. Make sure that rubber O-ring seal (located in engine tilt tube) also is lubricated.
   b. Lubricate inside of steering cable mounting tube with Quicksilver 2-4-C w/Teflon.
   c. Insert ends of steering cables thru engine tilt tube and cable mounting tube (Figure 4). Thread steering cable attaching nuts onto tubes hand-tight.

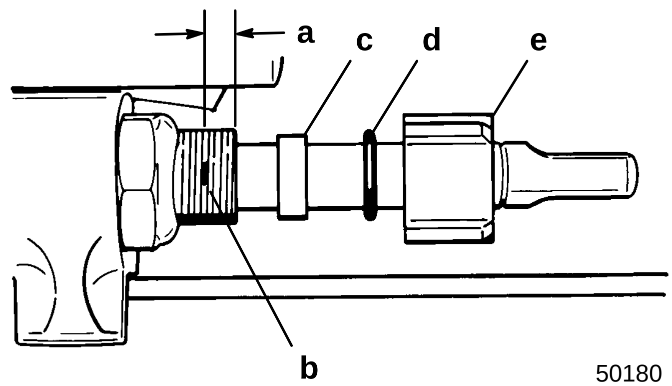


a - Steering Cables Routed Down Starboard Side
b - See Figure 7 for Correct Parts Sequence
c - See Figure 8 for Correct Parts Sequence
d - Seal

Figure 4. Steering Cables and Steering Link Rods Installed

***NOTE:** Torque steering cables attaching nuts and install locking sleeve after final tension adjustment.*

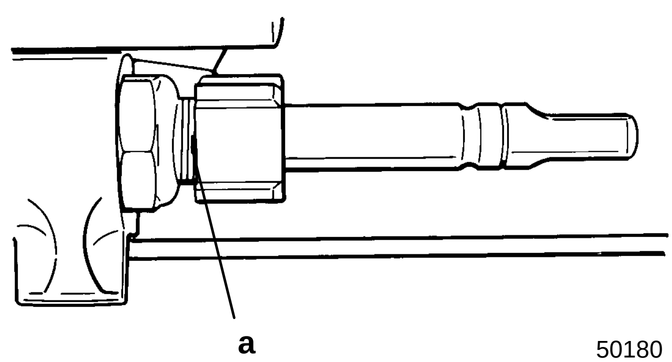
5. Install steering cable seal to steering cable mounting tube, as follows:
   a. Place a mark on steering cable mounting tube 5/8″ (15.8mm) from end of tube (Figure 5).



a - 5/8″ from End of Tube
b - Place Mark on Tube Here.
c - Nylon Spacer
d - O-ring
e - Cap

Figure 5. Seal Installation Sequence

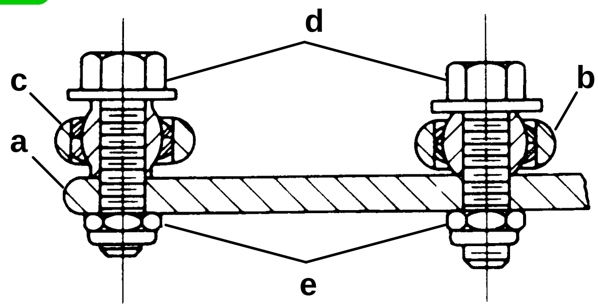
   b. Slide nylon spacer, O-ring and cap (from kit) over steering cable (Figure 5).
   c. Thread cap onto steering cable mounting tube up to mark [made on tube in Step “a” (Figure 6)].



a - Mark Made in Step 5a

Figure 6. Steering Cable Seal Installed

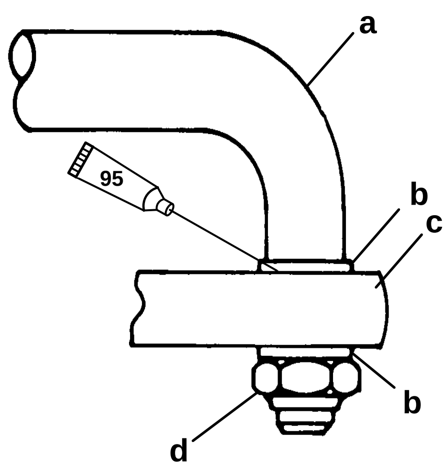
6. Install link rods (Figure 4) to engine steering arms. Fasten each link rod to steering arm onto top side rear hole with pivot bolt and locknut, as shown in Figure 7. Torque each pivot bolt to 20 lbs. ft. (27.0 N·m), then thread locknut onto pivot bolt and torque nut to 20 lbs. ft. (27.0 N·m).



a - Engine Steering Arm
b - Steering Link Rod
c - Steering Eye and Coupler
d - Pivot Bolts - Torque to 20 lbs. ft. (27.0 N·m)
e - Locknuts - Torque to 20 lbs. ft. (27.0 N·m)

Figure 7. Steering Link Rod and Steering Eye with Coupler Installed on Engine Steering Arm

7. Lubricate hole(s) in end of steering cable(s) with Quicksilver 2-4-C w/Teflon and assemble steering link rod(s) to steering cable end, as shown in Figure 8. Tighten self-locking nut until it seats [DO NOT exceed 120 lbs. in. (13.5 N·m)], **then back nut off 1/4-turn.**



95 2-4-C With Teflon (92-825407A12)

a - Steering Link Rod
b - Flat Washer (5/8" O.D.)
c - Steering Cable End
d - Locknut; Tighten Until it Seats [DO NOT Exceed 120 lbs. in. (13.6 N·m)], then Back Nut Off 1/4-Turn.

Figure 8. Steering Link Rod Assembled on Steering Cable

Steering Eyes and Coupler Installation

1. Position engines so that they are facing straight forward. (Distance between centers of threaded pivot bolt holes in engine steering arms must be equal to distance between propeller shaft centers.)
2. Lubricate inside of rubber sleeves (Figure 9) and slide on to coupler.
3. Slide rubber bushings (Figure 9) onto steering eyes.
4. Thread steering eyes (Figures 9 and 10) into coupler and adjust steering eyes so that distance between centers of pivot bolt holes in steering eyes is the same distance as between centers of threaded pivot holes in engine steering arms. Exposed steering eye threads should be equal at both ends of coupler and must not extend out of coupler more than 2-3/4″ (70mm).

⚠ WARNING

Both steering eyes must be threaded into coupler 3/4″ (19mm) minimum. Thread length of steering eye is 3-1/2″ (89mm), so exposed thread must not extend out of coupler more than 2-3/4″. Failure to adhere to this requirement could result in steering system failure.

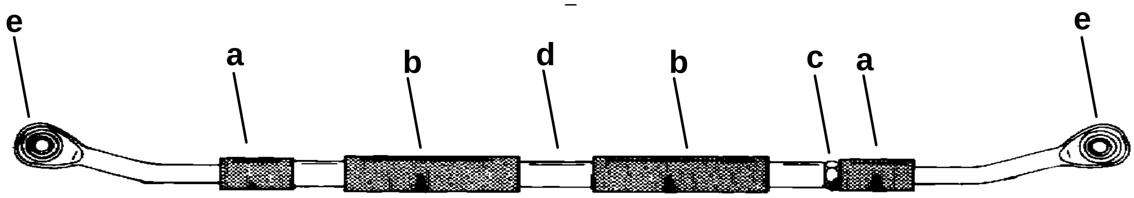
5. Lubricate steering eye threads, pivot bolts, and ball joints with Quicksilver 2-4-C w/Teflon (92-825407A12) before assembling.
6. Assemble steering eyes and coupler to top side, front holes of steering arm with pivot bolts and locknuts, as shown in Figures 7 and 10.

IMPORTANT: With steering eyes and coupler installed and before tightening pivot bolts, check engine alignment. Distance between pivot bolts centers and distance between propeller shaft centers must be equal for proper steering. If adjustment is necessary, remove pivot bolt from one steering eye and turn eye in or out to correct alignment. Both steering eyes MUST BE threaded into coupler 3/4″ (19mm) minimum.

7. Torque pivot bolts to 20 lbs. ft. (27.0 N·m), then thread self-locking nut (Figure 7) onto bolts and torque nuts to 20 lbs. ft. (27.0 N·m).

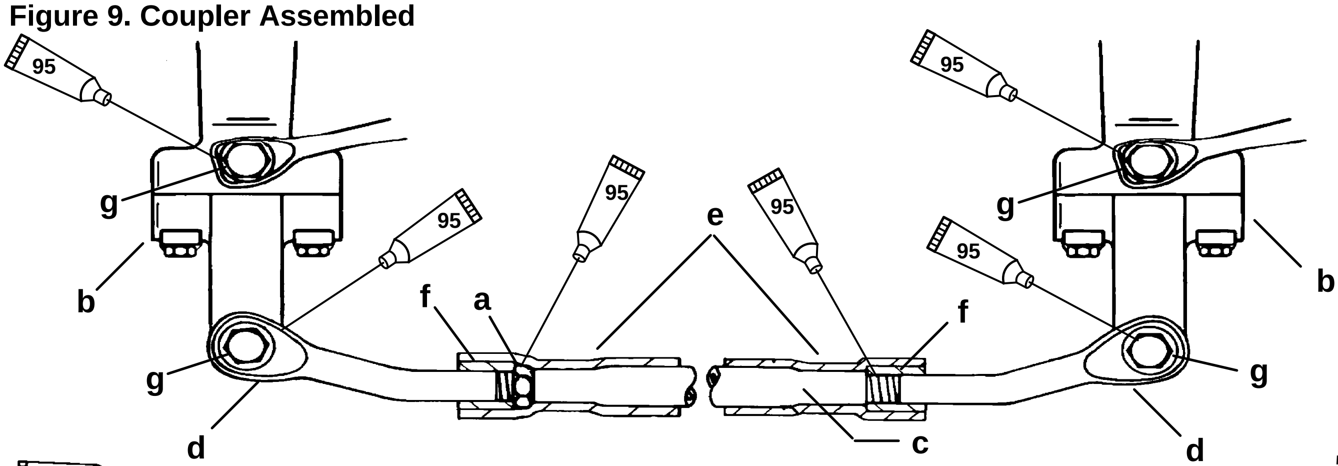
⚠ WARNING

Both steering eyes MUST BE threaded into coupler 3/4″ (19mm) minimum, and jam nut (Figure 9) must be secured against coupler to prevent coupler from turning. Torque jam nut to 20 lbs. ft. (27.0 N·m).



a - Rubber Bushing
b - Rubber Sleeve
c - Jam Nut; Torque to 20 lbs. ft. (27.0 N·m)
d - Coupler
e - Steering Eye

Figure 9. Coupler Assembled



95 2-4-C With Teflon (92-825407A12)

a - Jam Nut; Torque to 20 lbs. ft. (27.0 N·m)
b - Engine Steering Arm
c - Coupler
d - Steering Eye
e - Rubber Sleeves
f - Rubber Bushings
g - Pivot Bolt and Locknut

Figure 10. Coupler Parts Sequence

8. Secure coupler with jam nut, as shown in Figures 9 and 10, and torque to 20 lbs. ft. (27.0 N·m).
9. Position rubber bushings as shown above.
10. Slide both rubber sleeves over exposed threads on each steering eye (Figure 10).

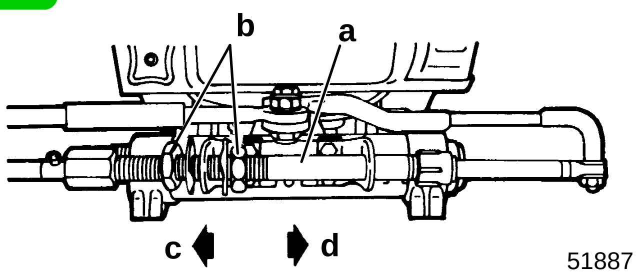
⚠ WARNING

Tension adjustment – steering cable mounting tube must be adjusted away from end of steering cable when adding tension to steering system (to remove slack). Failure to adjust tube this way may result in hard steering, if one engine is tilted up while operating boat.

Steering System Tension Adjustment (Parallel Routed Steering Cables)

IMPORTANT: After this Ride-Guide Attachment Kit is installed, there must be proper tension in the steering system. Not enough tension will cause slack (play) in steering system. Too much tension will cause steering cables to bind. Perform Step 1, following, to adjust for correct tension.

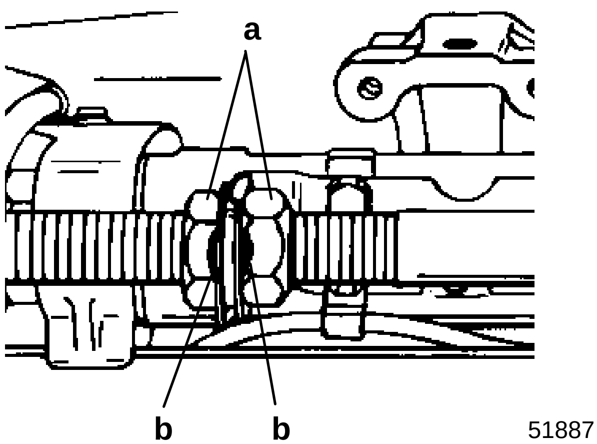
1. Loosen adjustment nuts and push steering cable mounting tube (by-hand) toward end of steering cable (to remove slack in steering system). Tighten adjustment nuts and check system for slack (play) or too much tightness. If steering system is too tight, readjust tube away from end of steering cable (Figure 11) or, if too much slack (play) exists in system, readjust tube toward end of steering cable (Figure 11). Tighten nuts and readjust, if necessary.



a - Steering Cable Mounting Tube
b - Adjustment Nuts
c - Adjust Tube in This Direction to Remove Slack from Steering System
d - Adjust Tube in This Direction to Reduce Tightness from Steering System

Figure 11. Steering System Tension Adjustment (Parallel Routed Steering Cables)

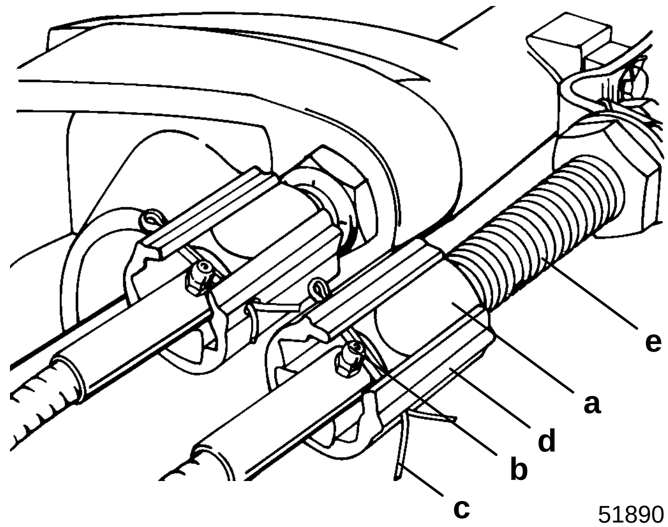
2. After steering system tension is adjusted correctly, torque adjustment nuts (Figure 12) to 35 lbs. ft. (47.5 N·m) and bend a tab lockwasher against a flat on each nut.



a - Adjustment Nuts - Torque to 35 lbs. ft. (47.5 N·m)
b - Tab Lockwasher (Bend Against Flat on Each Nut.)

Figure 12. Adjustment Nuts Secured with Locktabs

3. Secure each steering cable attaching nut to tubes by torquing steering cable attaching nuts (Figure 13) to 35 lbs. ft. (47.5 N·m).
4. Install rubber bumpers on inside of locking sleeves, then install a locking sleeve over each steering cable attaching nut and secure with cotter pin. Spread ends of cotter pin. Be sure to install cotter pin so that it is located in-between attaching nut and grease fitting (Figure 13).



a - Steering Cable Attaching Nut -Torque to 35 lbs. ft. (47.5 N·m)
b - Grease Fitting
c - Cotter Pin
d - Locking Sleeve
e - Cable Mounting Tube

Figure 13. Steering Cables Fastened to Tubes

5. Install new trim tabs as outlined in “Trim Tab Installation,” following.

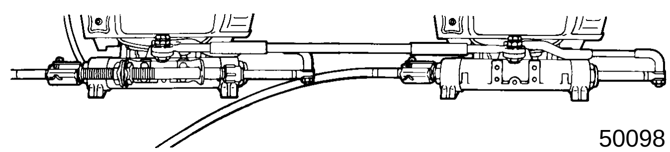


Figure 14. Attachment Kit Installation Complete

⚠ WARNING

After installation is complete (and before operating engine), check that boat will turn right when steering wheel is turned right and that boat will turn left when steering wheel is turned left. Check steering thru full range (left and right) at all tilt angles to assure interference-free movement.

Opposite Side Routed Steering Cables and Attaching Kit Installation

(ONE CABLE ROUTED DOWN STARBOARD SIDE OF BOAT AND ONE CABLE ROUTED DOWN PORT SIDE OF BOAT)

IMPORTANT: Steering cable must be installed into tilt tube of “port” engine before engine is mounted.

Super Ride-Guide Steering Kit Installation

Install Super Ride-Guide Steering Kit in accordance with instructions included with Super Ride-Guide Kit.

Installing Steering Cables and Steering Link Rods to Engines

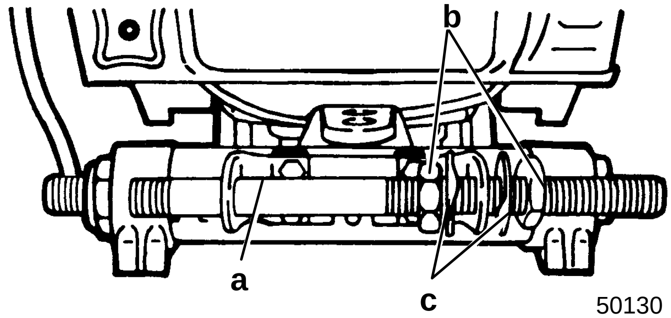
1. Install tube mounting bracket to (starboard) mounted engine with 2 locking retainers and 4 bolts. Torque bolts to 100 lbs. in. (11.3 N·m) and bend end of locking retainers up against flat on each bolt, as shown in Figure 1.

⚠ WARNING

Locking retainer ends must be bent up and against flat on each bolt, that secures tube mounting bracket to engine, to prevent bolts from turning out.

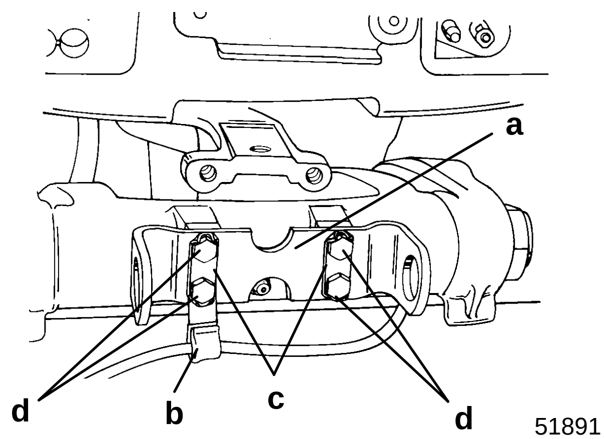
2. Install steering cable mounting tube into mounting bracket with 2 adjustment nuts and tab lockwashers, as shown in Figure 2. Be sure that longer threaded end of tube is toward steering cable attaching nut side of engine.

3. Temporarily adjust tube so that longer, threaded end of tube is aligned with outward edge of transom bracket. DO NOT tighten adjustment nuts at this time.



a - Tube Mounting Bracket
b - Nuts
c - Locking Retainers (Bend Ends Up and Against Flat on Bolts.)

Figure 1. Tube Mounting Bracket Installed



a - Mounting Bracket for Steering Cable Mounting Tube
b - “J” Clip - Supplied with Outboard
c - Locking Retainers (2)
d - Bolts (4) - 5/8 in. (16mm) Long - Torque to 100 lb. in. (11.3 N·m), then Bend Corner Tabs of Locking Retainers Up and Against Flats on Each Bolt

Figure 2. Steering Cable Mounting Tube Installed

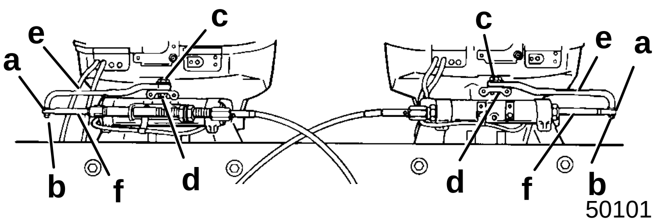
4. Install steering cables, as follows:

IMPORTANT: Lubricate inside of (port mounted) engine tilt tube and inside of steering cable mounting tube with Quicksilver 2-4-C w/Teflon. Make sure that rubber O-ring seal (located in engine tilt tube) is lubricated.

   a. Lubricate inside of (port) engine tilt tube with Quicksilver 2-4-C w/Teflon. Make sure that rubber O-ring seal (located in engine tilt tube) is lubricated.

   b. Lubricate inside of steering cable mounting tube with Quicksilver 2-4-C w/Teflon.

c. Insert ends of steering cables thru engine tilt tube and cable mounting tube (Figure 3). Thread steering cable attaching nuts hand-tight onto tubes.



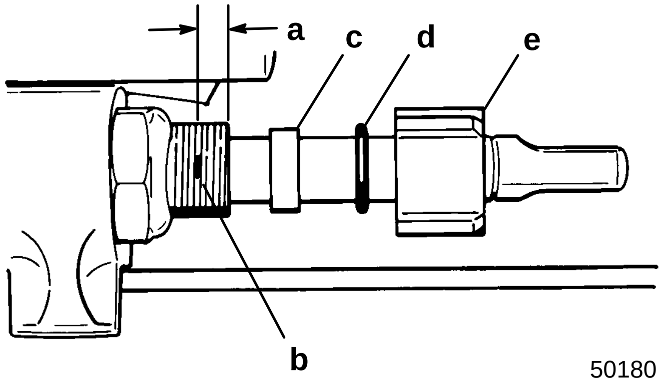
a - Flat Washer (2 Each Link Rod)
b - Nylon Insert Locknut - Torque Until it Seats [DO NOT Exceed 120 lb. in. (13.6 N·m) of Torque], then Back Off 1/4-Turn
c - Special Washer Head Bolt (10-14000) - Torque to 20 lb. ft. (27.0 N·m)
d - Nylon Insert Locknut - Torque to 20 lb. ft. (27.0 N·m)
e - Steering Link Rod
f - Steering Cable End

Figure 3. Steering Cables and Link Rod Installed

NOTE: *Torque steering cables' attaching nuts and install locking sleeves after final tension adjustment.*

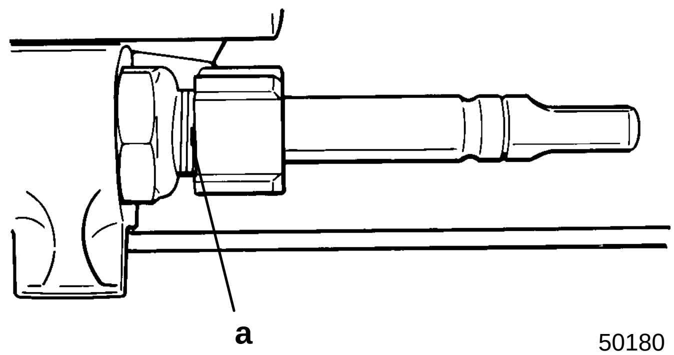
5. Install steering cable seal to steering cable mounting tube, as follows:

   a. Place a mark on steering cable mounting tube 5/8″ (16mm) from end of tube (Figure 4).



a - 5/8″ from End of Tube
b - Place Mark on Tube Here.
c - Nylon Spacer
d - O-ring
e - Cap

Figure 4. Seal Installation Sequence



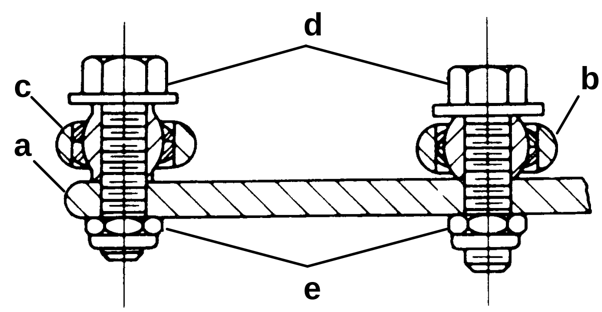
a - Mark Made in Step 5a

Figure 5. Steering Cable Seal Installed

   b. Slide plastic spacer, O-ring and cap (from kit) over steering cable (Figure 4).

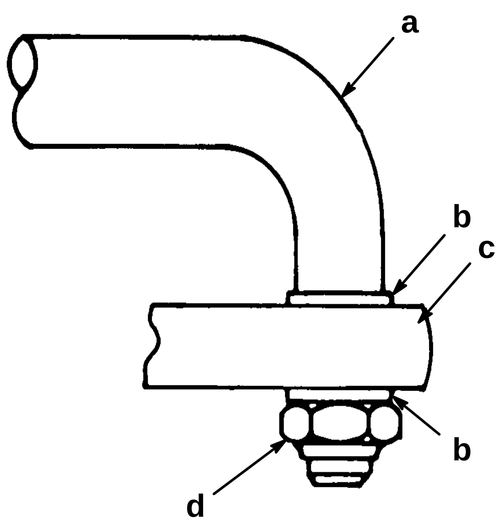
   c. Thread cap onto steering cable mounting tube up to mark [made on tube in Step "a" (Figure 5)].

6. Install link rods (supplied with engines) to engine steering arms (Figure 3). Fasten each link rod to steering arm onto topside rear hole with pivot bolt and locknut, as shown in Figure 6. Torque each pivot bolt to 20 lbs. ft. (27.0 N·m), then thread locknut onto pivot bolt and torque nut to 20 lbs. ft. (27.0 N·m).



a - Engine Steering Arm
b - Steering Link Rod
c - Steering Eye and Coupler
d - Pivot Bolts - Torque to 20 lbs. ft. (27.0 N·m)
e - Locknuts - Torque to 20 lbs. ft. (27.0 N·m)

Figure 6. Steering Link Rod and Steering Eye with Coupler Installed on Engine Steering Arm



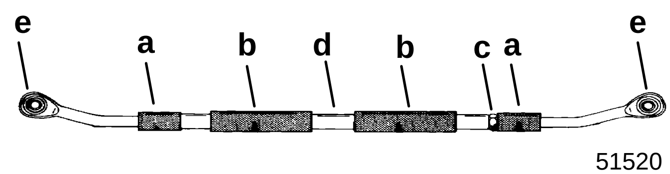
a - Steering Link Rod
b - Flat Washer (5/8″ O.D.)
c - Steering Cable End
d - Locknut; Tighten Until it Seats [DO NOT Exceed 120 lbs. in. (13.6 N·m)], then Back Nut Off 1/4-Turn.

Figure 7. Steering Link Rod Assembled on Steering Cable

7. Lubricate hole(s) in end of steering cable(s) with 2-4-C w/Teflon and assemble steering link rod(s) to steering cable end, as shown in Figure 7. Tighten self-locking nut until it seats [DO NOT exceed 120 lbs. in. (13.6 N·m)], **then back nut off 1/4-turn.**

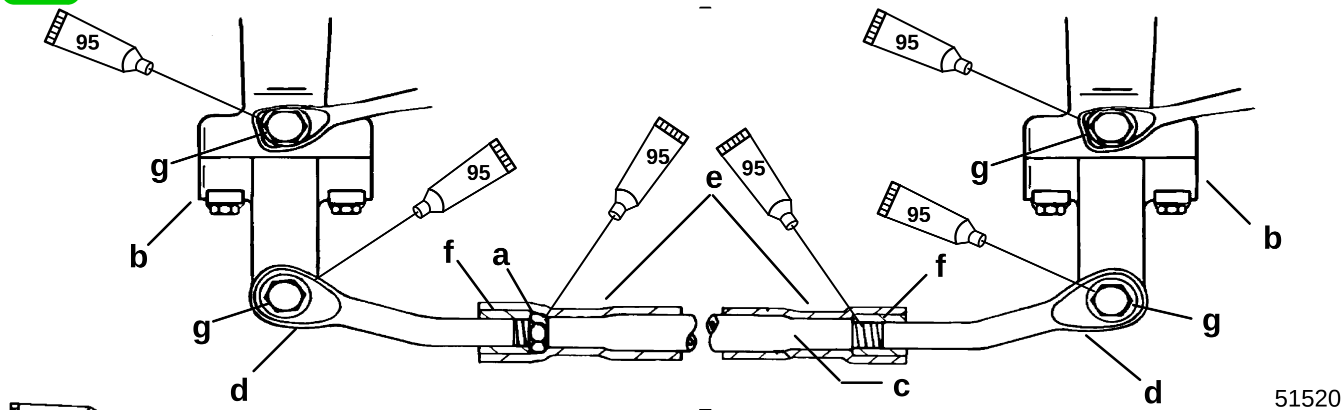
Steering Eyes and Coupler Installation

1. Position engines so that they are facing straight forward. (Distance between centers of threaded pivot bolt holes in engine steering arms must be equal to distance between propeller shaft centers.)
2. Lubricate inside of rubber sleeves (Figure 8) and slide onto coupler.
3. Slide rubber bushings (Figure 8) onto steering eyes.



a - Rubber Bushing
b - Rubber Sleeve
c - Jam Nut; Torque to 20 lbs. ft. (13.6 N·m)
d - Coupler
e - Steering Eye

Figure 8. Coupler Assembled



95 2-4-C With Teflon (92-825407A12)

a - Jam Nut; Torque to 20 lbs. ft. (27.0 N·m)
b - Engine Steering Arm
c - Coupler
d - Steering Eye
e - Rubber Sleeves
f - Rubber Bushing
g - Pivot Bolt and Locknut; Torque to 20 lbs. ft. (27.0 N·m)

Figure 9. Coupler Parts Sequence

4. Thread steering eyes (Figures 8 and 9) into coupler and adjust steering eyes so that distance between centers of pivot holes in steering eyes is the same distance as between centers of threaded pivot holes in engine steering arms. Exposed steering eye threads should be equal at both ends of coupler and must not extend out of coupler more than 2-3/4″ (70mm).

⚠ WARNING

Both steering eyes must be threaded into coupler 3/4″ (19mm) minimum. Thread length of steering eye is 3-1/2″ (89mm), so exposed thread must not extend out of coupler more than 2-3/4″ (70mm). Failure to adhere to this requirement could result in steering system failure.

5. Lubricate steering eye threads, pivot bolts and ball joints with 2-4-C w/Teflon before assembling.
6. Assemble steering eyes and coupler to top side, front holes of steering arm with pivot bolts and locknuts, as shown in Figures 6 and 9.

IMPORTANT: With steering eyes and coupler installed and before tightening pivot bolts, check engine alignment. Distance between pivot bolts centers and distance between propeller shaft centers must be equal for proper steering. If adjustment is necessary, remove pivot bolt from one steering eye and turn eye in or out to correct alignment. Both steering eyes MUST BE threaded into coupler 3/4″ (19mm) minimum.

7. Torque pivot bolts to 20 lbs. ft. (27.0 N·m), then thread self-locking nut onto bolts and torque nuts to 20 lbs. ft. (27.0 N·m).

⚠ WARNING

Both steering eyes MUST BE threaded into coupler 3/4″ (19mm) minimum, and jam nut (Figures 8 and 9) must be secured against coupler to prevent coupler from turning. Torque jam nut to 20 lbs. ft. (27.0 N·m).

8. Secure coupler with jam nut, as shown in Figure 9. Torque to 20 lbs. ft. (27.0 N·m).
9. Position rubber bushings as shown above.
10. Slide both rubber sleeves over exposed threads on each steering eye (Figure 9).

⚠ WARNING

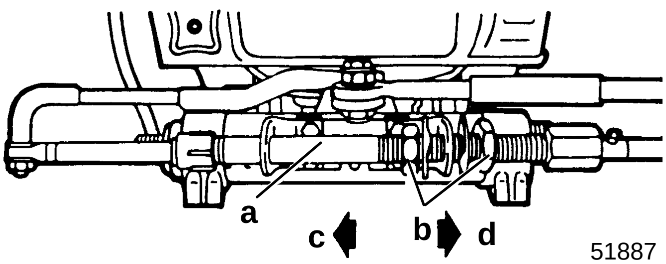
Tension adjustment – steering cable mounting tube must be adjusted away from end of steering cable when adding tension to steering system (to remove slack). Failure to adjust tube this way may result in hard steering, if one engine is tilted up while operating boat.

Steering System Tension Adjustment

OPPOSITE SIDE ROUTED STEERING CABLES

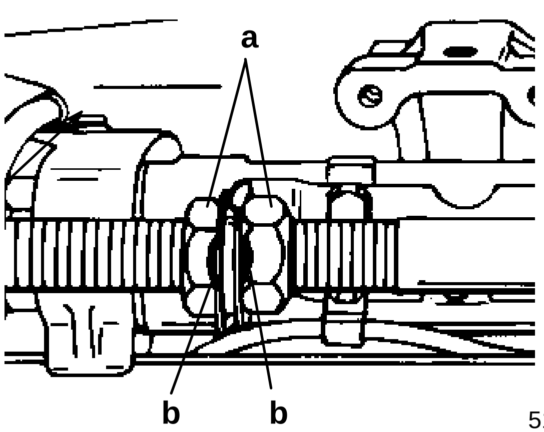
IMPORTANT: After this Ride-Guide Attachment Kit is installed, there must be proper tension in the steering system. Not enough tension will cause slack (play) in steering system. Too much tension will cause steering cables to bind. Perform Step 1, following, to adjust for correct tension.

1. Loosen adjustment nuts and pull steering cable mounting tube (by hand) away from end of steering cable (to remove slack in steering system). Tighten adjustment nuts and check system for slack (play) or too much tightness. If steering system is too tight, readjust tube toward end of steering cable (Figure 10) or, if too much slack (play) exists in system, readjust tube away from end of steering cable (Figure 10). Tighten nuts and readjust, if necessary.



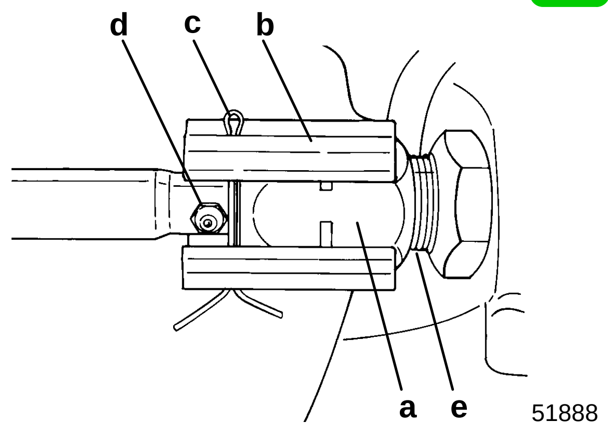
a - Steering Cable Mounting Tube
b - Adjustment Nuts
c - Adjust Tube in This Direction to Remove Slack from Steering System
d - Adjust Tube in This Direction to Reduce Tightness from Steering System

Figure 10. Steering System Tension Adjustment (Opposite Side Routed Steering Cables)



a - Adjust Nuts; Torque to 35 lbs. ft. (47.5 N·m)
b - Tab Lockwashers (Bend Against Flat on Each Nut.)

Figure 11. Adjustment Nuts Secured with Locktabs



a - Steering Cable Attaching Nut;Torque to 35 lbs. in. (47.5 N·m)
b - Locking Sleeve (Provided with Ride-Guide Steering Cables)
c - Cotter Pin
d - Grease Fitting
e - Cable Guide Tube

Figure 12. Steering Cables Fastened to Tubes

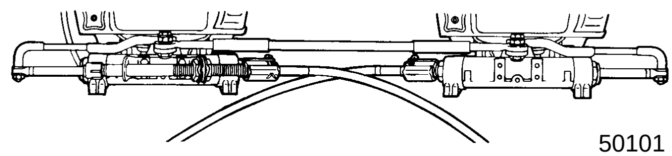


Figure 13. Attachment Kit Installation Complete

2. After steering system tension is adjusted correctly, torque adjustment nuts (Figure 11) to 35 lbs. ft. (47.5 N·m) and bend a tab lockwasher against a flat on each nut.
3. Secure each steering cable attaching nut to tubes by torquing steering cable attaching nuts (Figure 12) to 35 lbs. ft. (47.5 N·m).
4. Install rubber bumpers on inside of locking sleeves, then install a locking sleeve over each steering cable attaching nut and secure with cotter pin. Spread ends of cotter pin. Be sure to install cotter pin so that it is located in-between attaching nut and grease fitting (Figure 12).
5. Install new trim tabs as outlined in “Trim Tab Installation,” following.

⚠ WARNING

After installation is complete (and before operating engine), check that boat will turn right when steering wheel is turned right and that boat will turn left when steering wheel is turned left. Check steering thru full range (left and right) at all tilt angles to assure interference-free movement.

Trim Tab Installation

IMPORTANT: With dual engine installation, existing trim tabs MUST BE replaced with new trim tabs (supplied with kit).

1. Install new trim tabs as follows:
   a. Shift engine controls into neutral and turn ignition keys to "Off" position.
   b. Remove plastic cap from rear of both drive shaft housings, loosen bolt, that secures trim tab to gear housing, and remove both trim tabs from gear housing.
   c. Install special trim tabs (supplied with kit) to both gear housings, using existing bolts. Tighten bolts securely. Initial trim tab setting should be straight to rear of engine. Replace plastic caps on drive shaft housing.
2. Check trim tab position as follows:
   a. Operate boat at normal cruise throttle setting and adjust trim to optimum setting. Turn steering wheel to left and right, noting in which direction wheel turns more easily.
   b. If wheel turns more easily to left, then the trailing edge of trim tab must be turned to left (when viewing motor from behind). Reverse procedure if boat turns more easily to right.

Trim Tab Adjustment

1. Shift engine controls into neutral and turn ignition keys to "Off" position.

IMPORTANT: Trim tabs MUST BE set in the same position on both engines.

2. Remove plastic cap from rear of drive shaft housing and loosen bolt and trim tab.
3. Position trailing edge of trim tab to left (viewing motor from behind), if steering wheel turns more easily to left. Position trailing edge of trim tab to right (viewing motor from behind), if steering wheel turns more easily to right.
4. Tighten both trim tab bolts securely and replace plastic caps.
5. Operate boat per "Check trim tab position as follows," preceding, to check trim tab setting. Readjust trim tabs, if necessary.

Maintenance Instructions

Maintenance inspection is owner's responsibility and must be performed at intervals specified, following:

Normal Service – Every 50 hrs. of operation or 60 days (whichever comes first)

***Severe Service–** Every 25 hrs. of operation or 30 days (whichever comes first)

* Operation in a salt water area is considered **"Severe Service."**

1. Carefully check steering system components for wear. Replace worn parts.
2. Check steering system fasteners to be sure that they are torqued to correct specifications.

NOTE: *Ride-Guide steering cables are lubricated at the factory and require no additional lubrication at initial installation.*

⚠ WARNING

Core of each steering cable (transom end) must be fully retracted into cable housing before lubricating cable. If cable is lubricated while extended, hydraulic lock of cable could occur.

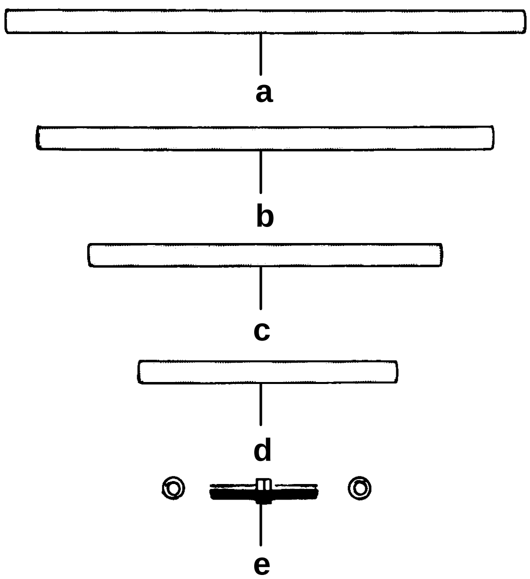
3. With core of Ride-Guide steering cables (transom end) fully retracted, lubricate transom end of steering cables thru grease fittings (Figure 12) with Quicksilver 2-4-C w/Teflon. Lubricate exposed portion of cable end with 2-4-C w/Teflon.
4. Lubricate pivot points and ball joints in link rods and coupler steering eyes with 2-4-C w/Teflon.
5. Inspection and lubrication of steering head assembly (rotary or straight rack) should be performed once each year (by your Authorized Dealer) or whenever steering mount and/or steering head are disassembled, or if steering effort has increased. Lubricate with Quicksilver 2-4-C w/Teflon.

⚠ WARNING

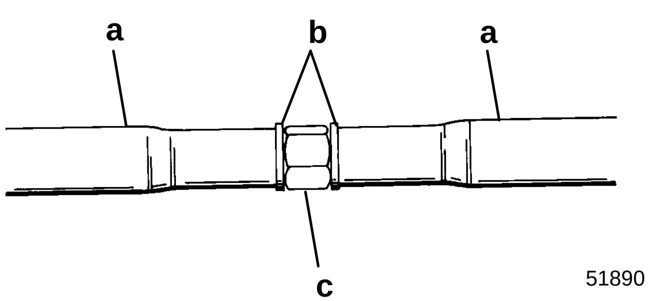
When 2 couplers are connected together with coupler link rod, a lockwasher must be used on each side of coupler link rod, and link rod must be torqued to 20 lbs. ft. (27.0 N·m) into end of each coupler.

Ride Guide Steering Attachment Extension Couplers

Outboard Center Line Distance	Required Coupler(s) Between Steering Eyes (Shown Below)
22-1/2 in. thru 24-1/2 in. (57.2cm thru 62.2cm)	12 in. (30.5cm) Coupler
23-1/2 in. thru 27-1/2 in. (59.7cm thru 69.9cm)	15 in. (38.1cm) Coupler (Supplied with this kit)
26-1/2 in. thru 30-1/2 in. (67.3cm thru 75.5cm)	18 in. (45.7cm) Coupler
30 in. thru 34 in. (76.3cm thru 86.4cm)	9 in. (22.9cm) Coupler and 12 in. (30.5cm) Coupler (Connected together with coupler link rod)
33 in. thru 37 in. (83.8cm thru 94.0cm)	12 in. (30.5cm) Coupler and 12 in. (30.5cm) Coupler (Connected together with coupler link rod)



a - 18 in. (45.7cm) Coupler (97932-3)
b - 15 in. (38.1cm) Coupler (97932-2)
c - 12 in. (30.5cm) Coupler (97932-1)
d - 9 in. (22.9cm) Coupler (97932-4)
e - Coupler Link Rod (98181A1)



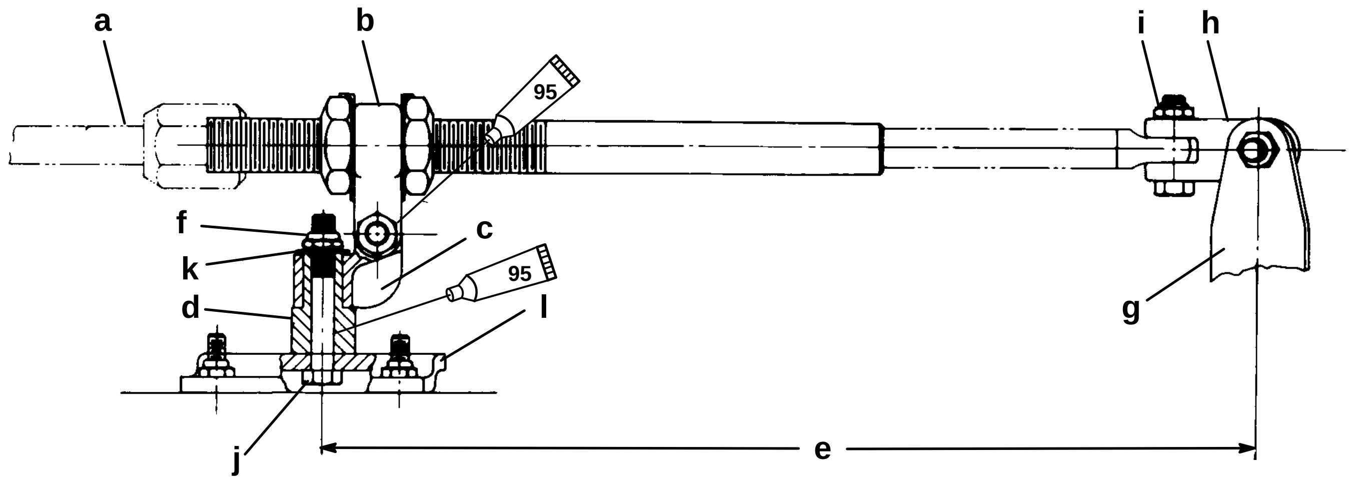
a - Couplers Connected Together
b - Lockwashers
c - Coupler Link Rod - Torque to 20 lbs. ft. (27.0 N·m) into End of Each Coupler.

Figure 14. Couplers Connected Together with Coupler Link Rod

Transom Mounted Ride-Guide Attaching Kit Installation (73770A1)

Attaching Kit Installation

1. Lubricate both holes in pivot block (Figure 1) with Quicksilver 2-4-C w/Teflon.
2. Place pivot block on pivot spacer and secure to transom bracket with 3/8 in. x 2-1/2 in. (9.5mm x 63.5mm) bolt, flat washer and locknut, as shown in Figure 1. Torque locknut to 20 lbs. ft. (27.0 N·m).

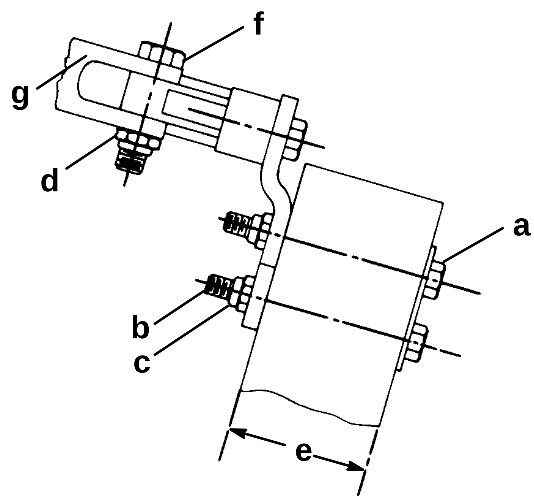


95 2-4-C With Teflon (92-825407A12)

Figure 1

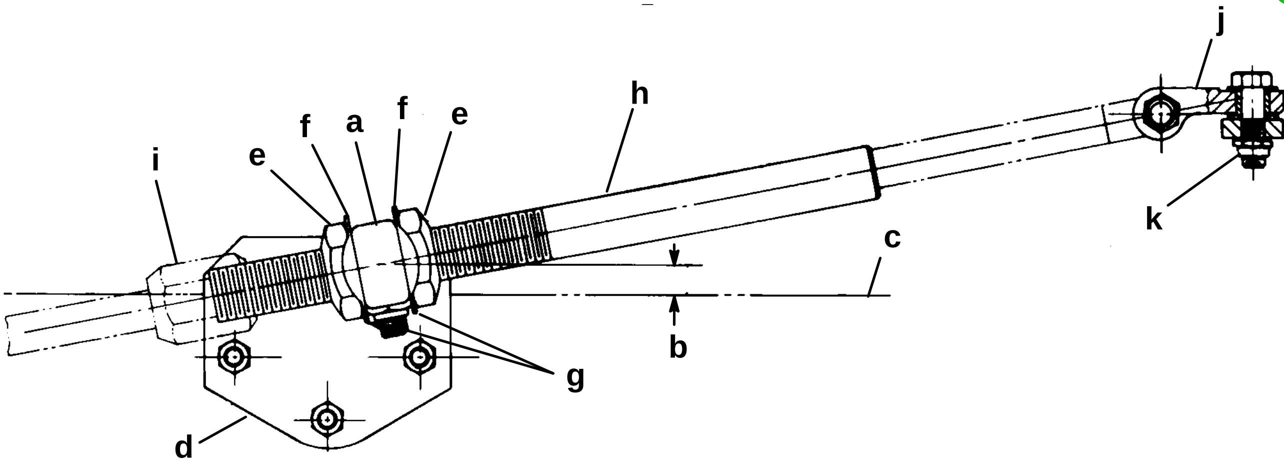
a - Ride-Guide Cable
b - Ride-Guide Yoke
c - Pivot Block
d - Pivot Spacer
e - 15 in. (38.1cm) (Centerline of Attaching Kit Pivot to Centerline of Outboard)
f - Pivot Attaching Locknut - Torque to 20 lbs. ft. (27.0 N·m)
g - Outboard Steering Arm
h - “Clevis Kit”
i - Ride-Guide Cable Attaching Locknut - Torque to 10 lbs. ft. (13.6 N·m)
j - Bolt - 3/8 in. x 2-1/2 in. (9.5mm x 63.5mm)
k - Flat Washer
l - Transom Bracket

3. Place Ride-Guide yoke on pivot block and secure with 7/16 in. x 1-3/4 in. (11.1mm x 44.5mm) bolt and locknut, as shown in Figures 1 and 2. Torque locknut to 10 lbs. ft. (13.5 N·m), **then back off 1/4-turn.**
4. Install one cable tube jam nut onto steering cable tube. Place tab washer over Ride-Guide yoke, then insert cable tube thru tab washer and yoke. Install second cable tube jam nut onto cable tube but do not tighten at this time (Figure 3).
5. Position transom attaching kit on transom as follows:
   a. Determine centerline of outboard, then measure 15 in. (38.1cm) over from this centerline and draw a vertical line on transom (Figure 1).
   b. Position attaching kit on transom so that **transom bracket is centered on the 15 in. (38.1cm)** (Figure 1) at a height where the **center of Ride-Guide yoke is even with, or not more than 1/2 in. (12.7mm)** above top edge of transom (Figure 3).



a - Transom Backing Plate
b - Bolt - 5/16 in. x 3-1/4 in. (7.9mm x 82.5mm)
c - Locknut - Torque to 10 lbs. ft. (13.5 N·m)
d - Ride-Guide Yoke Attaching Locknut - Torque to 10 lbs. ft. (13.5 N·m) **Then Back Off 1/4-Turn.**
e - 2-3/8 in. (60.3mm) Maximum Transom Thickness
f - Bolt - 7/16 in. x 1-3/4 in. (11.1mm x 44.5mm)
g - Ride-Guide Yoke

Figure 2



a - Ride-Guide Yoke
b - 0 in. to 1/2 in. (0mm to 12.8mm) (Center of Ride-Guide Yoke to Top of Transom)
c - Top of Transom
d - Transom Bracket
e - Cable Tube Jam Nuts - Torque to 35 lbs. ft. (47.5 N·m)
f - Tab Washer
g - After Jam Nuts are Torqued to Specification, Bend Locking Tabs against Nuts.
h - Cable Guide Tube
i - Ride-Guide Cable Attaching Nut - Torque to 35 lbs. ft.. (47.5 N·m)
j - "Clevis Kit"
k - Clevis Attaching Locknut - Torque to 20 lbs. ft. (27.0 N·m)

Figure 3

NOTE: *When drilling thru transom, be sure that holes are drilled perpendicular to transom.*

6. With attaching kit positioned as outlined preceding, use 3 holes in transom bracket as a guide and drill three 11/32 in. (8.7mm) holes thru transom.
7. Use a marine-type sealer on three 5/16 in. x 3-1/4 in. (7.9mm x 82.6mm) bolts. Secure attaching kit to transom, using transom backing plate, 3 bolts (with sealer) and 3 locknuts, installed as shown in Figure 2. Torque locknuts to 10 lbs. ft. (13.5 N·m).

STEERING CABLE INSTALLATION

1. Lubricate steering cable end with Quicksilver 2-4-C w/Teflon.
2. Install steering cable thru steering cable tube and secure to cable tube with cable attaching nut (Figure 3). Do not tighten cable attaching nut at this time.
3. Attach Ride-Guide cable to outboard steering arm, using the proper "Clevis Kit." Installation instructions for clevis are with "Clevis Kit."
4. Adjust 2 large jam nuts on cable tube of attaching kit, so that **steering wheel** is in normal straight-driving position with outboard in straight-running position. Torque each jam nut to 35 lbs. ft. (47.5 N·m), then bend a side of tab washer against flat of each jam nut (Figure 3).
5. Torque Ride-Guide cable attaching nut (which secures cable to guide tube) to 35 lbs. ft. (47.5 N·m) (Figure 3). Install locking sleeve over cable attaching nut and secure with cotter pin. Spread ends of cotter pin.

NOTE: *Some Ride-Guide steering cables may not be equipped with locking sleeve and cotter pin. If cable being installed does not have these parts, disregard instructions to install them.*

⚠ WARNING

After installation is completed (and before operating outboard), check that boat will turn right when steering wheel is turned right and that boat will turn left when steering wheel is turned left. Check steering thru full range (left and right) at all tilt angles to assure interference-free movement.

Maintenance Instructions

Lubrication and maintenance inspection is owner's responsibility and must be performed at intervals specified, following:

Normal Service – Every 50 hrs. of operation or 60 days (whichever comes first)

***Severe Service–** Every 25 hrs. of operation or 30 days (whichever comes first)

* Operation in a salt water area is considered **"Severe Service."**

⚠ CAUTION

Core of steering cable must be fully retracted into cable housing when lubricating cable. If cable is lubricated while extended, hydraulic lock of cable could occur.

1. Lubricate outboard end of Ride-Guide steering cable (thru grease fitting next to cable attaching nut) with Quicksilver 2-4-C w/Teflon.

NOTE: *Ride-Guide steering cable is lubricated at the factory and requires no additional lubrication at initial installation.*

2. Lubricate all steering system pivot points (and exposed portion of steering cable core) with Quicksilver 2-4-C w/Teflon. Lubricate at intervals specified preceding.
3. Carefully check steering system components for wear (at intervals specified, preceding). Replace worn parts.
4. Check steering system fasteners (at intervals specified, preceding) to be sure that they are torqued to correct specifications. (Figures 1, 2 and 3).

Ride-Guide Steering Cable/Attaching Kit Installation (92876A3)

Dual Cable - Single Outboard

⚠ WARNING

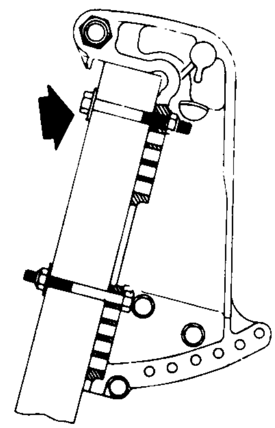
Quicksilver Super Ride-Guide Steering (dual cables) MUST BE USED with this attaching kit. Failure to adhere to this requirement could result in steering system failure.

Refer to **"Quicksilver Accessories Guide"** to determine correct length of steering cables and remote control cables.

IMPORTANT: Steering cables and remote control cables MUST BE THE CORRECT LENGTH, sharp bends on too-short cables result in "kinks"; too-long cables require unnecessary bends and/or loops. Both conditions place extra stress on the cables.

⚠ CAUTION

With this kit installed, the upper (outboard) mounting bolts MUST BE installed so that hex head end of bolts is on the inside of boat transom, as illustrated. Failure to install upper mounting bolts, as shown in illustration, could result in interference between outer steering cable locking sleeve and ends of mounting bolts when outboard is tilted up.

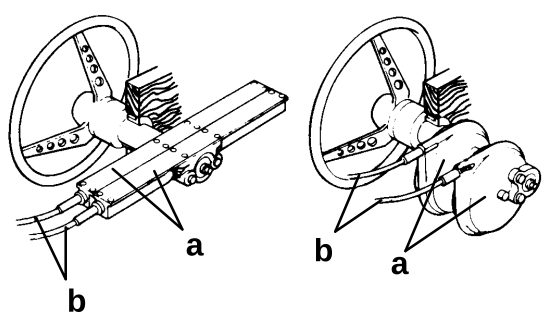


Install upper bolts so that hex head end of bolts is on the inside of boat transom.

Super Ride-Guide Steering Kit Installation

IMPORTANT: Both gear racks or rotary steering heads must be installed so that both steering cables will be routed together on the same side of the boat and will push-and-pull together.

1. Install Super Ride-Guide Steering Kit in accordance with instructions included with Super Ride-Guide Kit.
2. Make sure that both gear racks or rotary steering heads are installed so that both steering cables are routed together down starboard side of boat and will push-and-pull together.



a - Straight Rack (Left); Rotary Steering (Right)
b - Steering Cables (Install so that Both Cables Will Push-and-pull Together.)

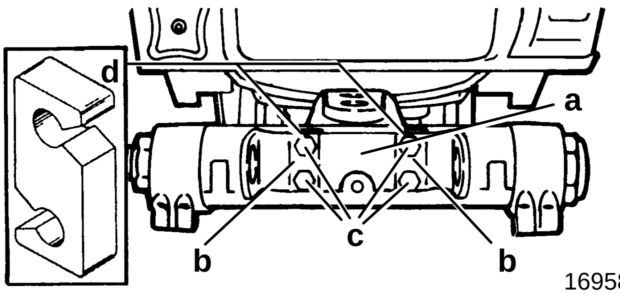
Mounting Bracket Installation

IMPORTANT: Spacers (d) must be installed between engine and mounting bracket.

1. Install mounting bracket to engine with 2 spacers, 2 locking retainers and 4 bolts. Torque bolts to 100 lbs. in. (11.3 N·m) and bend end of locking retainers up and against flat on each bolt, as shown.

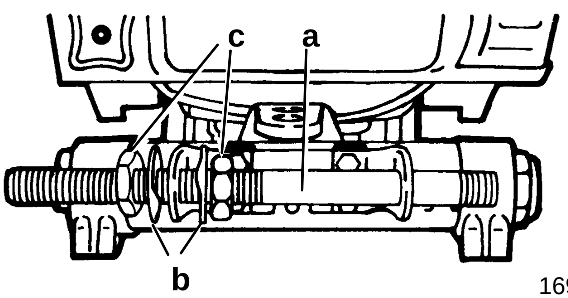
⚠ WARNING

The locking retainer ends must be bent up and against flat on each bolt, that secures mounting bracket engine, to prevent bolts from turning out.



a - Mounting Bracket
b - Retainers
c - Bolts [Torque to 100 lb. in. (11.3 N·m)]
d - Spacers

2. Install steering cable mounting tube into mounting bracket with 2 adjustment nuts and locking tab washer, as shown. Be sure that longer, threaded end of tube is toward steering cable attaching nut side of engine.
3. Temporarily adjust tube so that longer, threaded end of tube is extended out the same distance as engine tilt tube. Do not tighten adjustment nuts at this time.

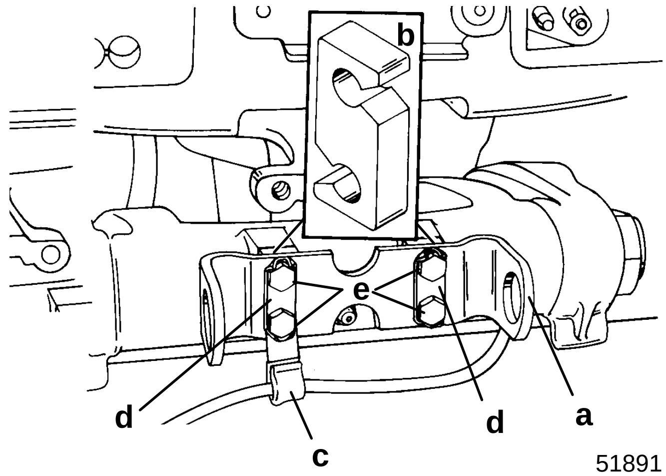


a - Cable Mounting Tube
b - Tab Washer
c - Adjustment Nut

Steering Cable Mounting Tube Installation

IMPORTANT: Spacers (b) must be installed between outboard swivel bracket and mounting bracket for steering cable mounting tube to provide proper spacing between steering cables.

Secure mounting bracket for steering cable mounting tube on to swivel bracket of outboard.



a - Mounting Bracket for Steering Cable Mounting Tube
b - Spacer (2)
c - “J” Clip (Supplied with Outboard.)
d - Locking Retainer (2)
e - Bolts (4) - 7/8 in. (22.2mm) Long - Torque to 100 lbs. in. (11.3 N·m), then Bend Corner Tabs of Locking Retainers Up and Against Flats on Each Bolt.

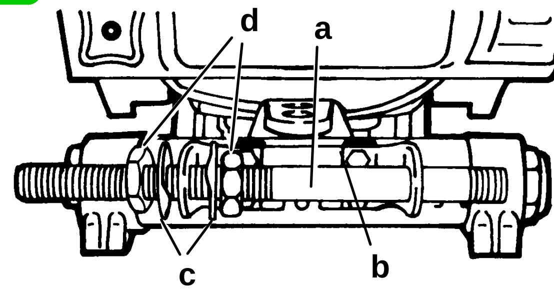
⚠ WARNING

Locking retainer corner tabs, MUST BE bent up and against flats on each bolt that secures mounting bracket for steering cable mounting tube to outboard swivel bracket, to prevent bolts from turning out.

COUPLER INSTALLATION

Install steering cable mounting tube into mounting bracket with 2 adjusting nuts and 2 locking tab washers. Verify longer threaded end of tube is toward starboard side of boat.

Temporarily adjust tube so that longer threaded end of tube extends out the same distance as the outboard tilt tube. Do not tighten adjustment nuts at this time.



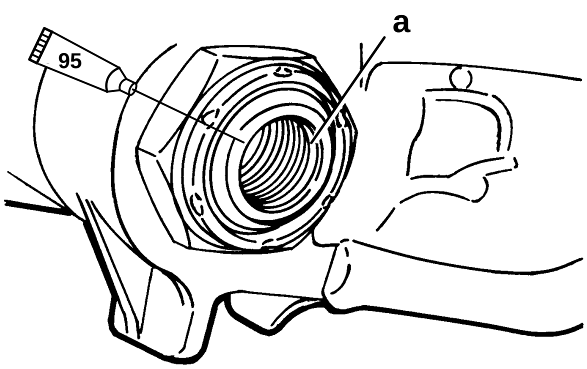
51891

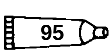
a - Steering Cable Mounting Tube (End of Tube with Longer Threads Toward Starboard Side of Boat)
b - Mounting Bracket
c - Locking Tab Washers (2)
d - Adjustment Nuts (Flats of Nuts Facing Toward Locking Tab Washer)

Installing Steering Cables

IMPORTANT: Lubricate inside of outboard tilt tube, inside of steering cable mounting tube and rubber O-ring seal (located in outboard tilt tube) with Quicksilver 2-4-C w/Teflon before installing steering cables.

Lubricate inside of outboard tilt tube and inside of steering cable mounting tube with Quicksilver 2-4-C w/Teflon. Verify rubber O-ring seal (located in outboard tilt tube) is lubricated.



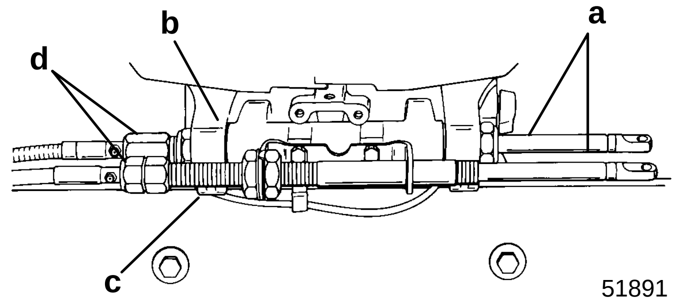


2-4-C With Teflon (92-825407A12) 51890

a - Seal

Insert steering cable ends thru outboard tilt tube and cable mounting tube. Thread steering cable attaching nuts on to tubes hand tight.

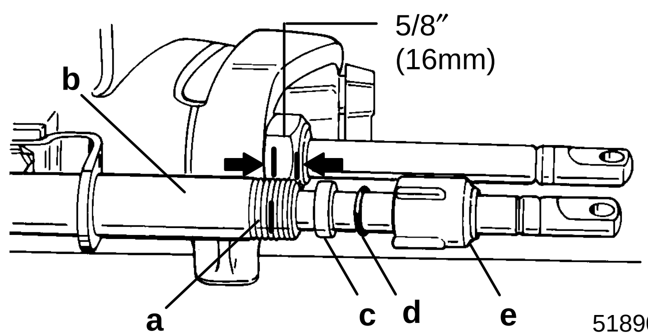
Torque steering cable attaching nuts only after final steering adjustments have been made.



51891

a - Steering Cable Ends
b - Outboard Tilt Tube
c - Cable Mounting Tube
d - Cable Attaching Nuts

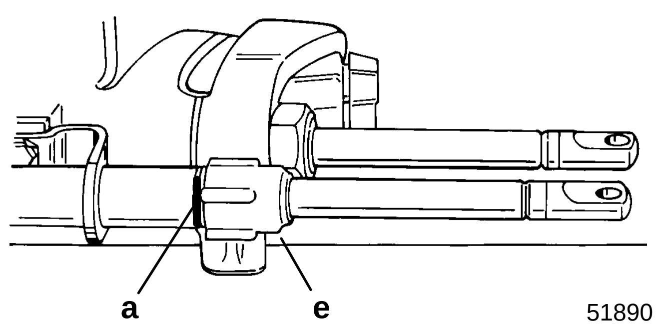
Place a mark on steering cable mounting tube 5/8 in. (16mm) from end of mounting tube. Slide plastic spacer, O-ring and cap over steering cable.



51890

a - Mark
b - Steering Cable Tube
c - Spacer
d - O-ring
e - Cap

Thread cap (e) onto steering cable mounting tube, up to mark (a).



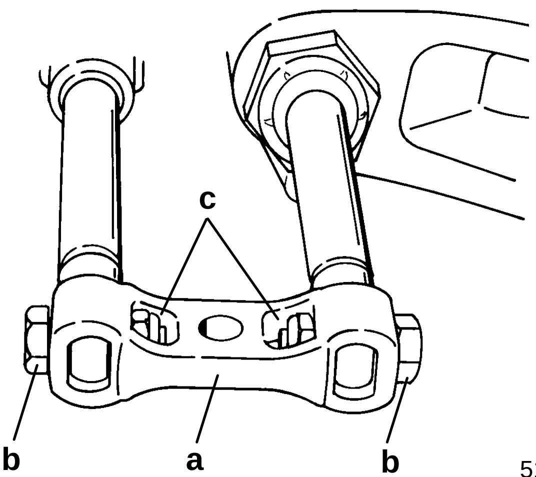
51890

Coupler Installation

⚠ WARNING

Locknuts must be used with bolts to secure steering cables to coupler. Failure to adhere to this requirement could result in steering system failure.

Slide coupler onto steering cable ends and secure each steering cable to coupler with bolt and locknut as shown. Tighten to a torque of 20 lb. ft. (27.0 N·m).



51888

a - Coupler
b - Bolt
c - Locknut

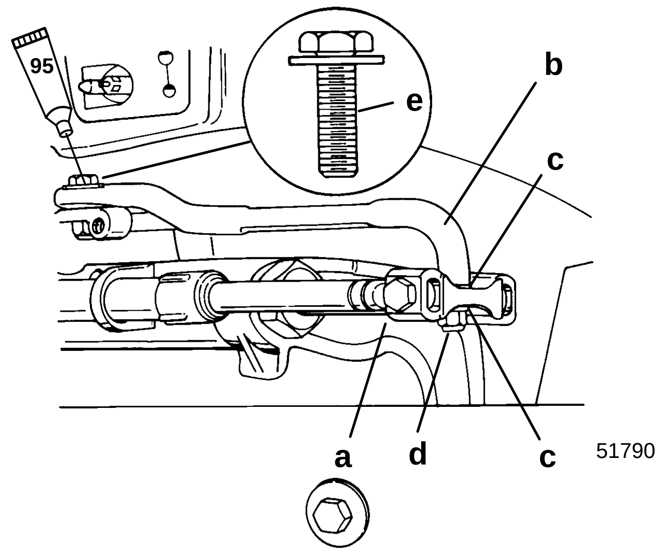
Installing Link Rod

⚠ WARNING

Steering link rod MUST BE secured between outboard steering arm and steering coupler, using special washer head bolt (10-14000) and two nylon insert locknuts (11-34863), as shown. Both special washer head bolt and nylon insert locknuts MUST BE tightened as specified.

Lubricate hole in steering coupler, with Quicksilver 2-4-C w/Teflon. Assemble steering link rod to steering coupler, using 2 flat washers (one each side of coupler) and nylon insert locknut. Tighten locknut until it seats [DO NOT exceed 120 lb. in. (13.6 N·m) of torque], then back nut off 1/4 turn.

Lubricate ball joint in steering link rod with 2-4-C w/ Teflon. Secure link rod to outboard steering arm, using special washer head bolt (10-14000) provided and nylon insert locknut as shown. Torque special bolt to 20 lb. ft. (27.0 N·m), then torque locknut to 20 lb. ft. (27.0 N·m).



51790

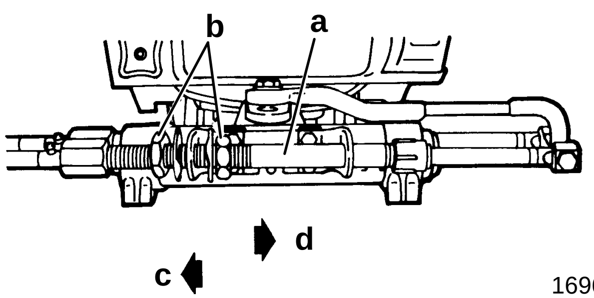
95 2-4-C With Teflon (92-825407A12)

a - Steering Coupler
b - Steering Link Rod
c - Flat Washer (2)
d - Nylon Insert Locknut - Torque until it seats [DO NOT exceed 120 lb. in. (13.6 N·m) of torque], then back nut off 1/4 turn.
e - Special Washer Head Bolt (10-14000) - Torque to 20 lb. ft. (27.0 N·m)

STEERING SYSTEM TENSION ADJUSTMENT

IMPORTANT: After this dual steering cable attachment kit is installed, there must be proper tension in forward mounted steering cable for this attachment kit to operate properly. Not enough tension will cause slack (or play) in steering system. Too much tension will cause steering cables to bind. Perform the following steps to adjust for correct tension.

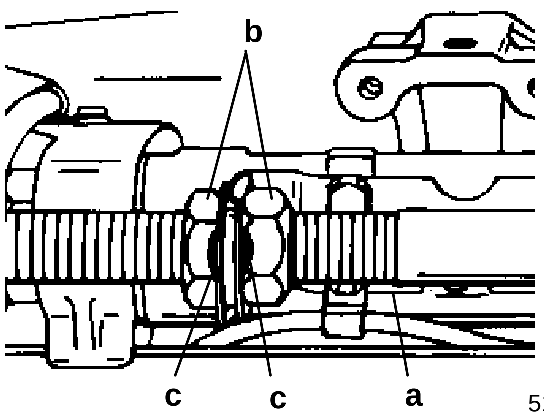
Loosen adjustment nuts and pull steering cable mounting tube (by hand) away from end of steering cable (to remove slack in steering system). Tighten adjustment nuts against mounting bracket and check system for slack (play). If steering system is too tight, readjust tube toward end of steering cable or, if too much slack (play) exists in system, readjust tube away from end of steering cable. Tighten nuts against mounting bracket and readjust, if necessary.



16961

a - Steering Cable Mounting Tube
b - Adjustment Nuts
c - Adjust Tube in This Direction to Remove Slack from Steering System
d - Adjust Tube in This Direction to Reduce Tension from Steering System

After steering system tension is adjusted correctly, tighten adjustment nuts against mounting bracket, to a torque of 35 lb. ft. (47.5 N·m) and bend a tab lock washer against a flat on each nut.

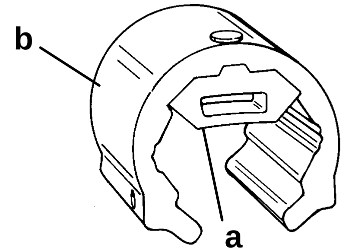


51887

a - Steering Cable Mounting Tube
b - Adjustment Nuts; Torque to 35 lb. ft. (47.5 N·m)
c - Tab Lock Washer (Bend Against Flat on Each Adjustment Nut)

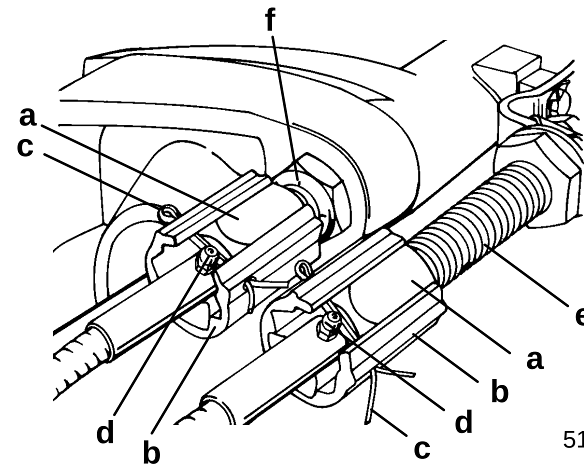
Tighten steering cable attaching nuts of each steering cable to a torque of 35 lb. ft. (47.5 N·m).

Install rubber bumpers (a) on inside of each locking sleeve (b).



51889

Install locking sleeves over steering cable attaching nuts and secure with cotter pins. Spread ends of cotter pins. Be sure to install cotter pin so that it is located in between attaching nut and grease fitting.



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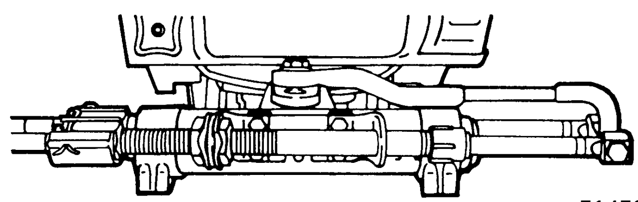


51452

a - Steering Cable Attaching Nut - Torque to 35 lb. ft. (47.5 N·m)
b - Locking Sleeve (If So Equipped)
c - Cotter Pin
d - Grease Fitting
e - Steering Cable Mounting Tube
f - Outboard Tilt Tube

⚠ WARNING

After installation is complete [and before operating outboard(s)], check that boat will turn right when steering wheel is turned right and that boat will turn left when steering wheel is turned left. Check steering thru full range (left and right) at all tilt angles to assure interference-free movement.

Maintenance Instructions

Maintenance inspection is owner's responsibility and must be performed at intervals specified, following:

Normal Service – Every 50 hrs. of operation or 60 days (whichever comes first)

***Severe Service–** Every 25 hrs. of operation or 30 days (whichever comes first)

* Operation in a salt water area is considered **"Severe Service."**

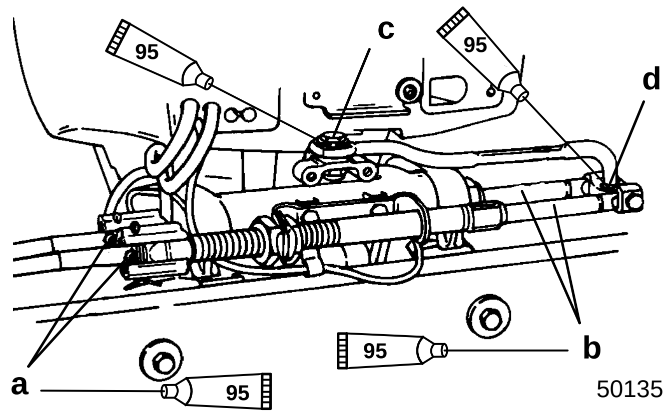
1. Carefully check steering system components for wear. Replace worn parts.
2. Check steering system fasteners to be sure that they are torqued to correct specifications.

Ride-Guide steering cables are lubricated at the factory and require no additional lubrication at initial installation.

⚠ WARNING

Core of each steering cable (transom end) must be fully retracted into cable housing before lubricating cable. If cable is lubricated while extended, hydraulic lock of cable could occur.

3. With core of Ride-Guide steering cable (transom end) fully retracted, lubricate transom end of steering cables thru grease fittings with 2-4-C w/ Teflon. Lubricate exposed portion of cable ends with 2-4-C w/Teflon.
4. Lubricate pivot point of steering link rod and ball joint of link rod/steering coupler with 2-4-C w/Teflon.
5. Inspection and lubrication of steering head assembly (rotary or straight rack) should be performed once each year (by your Authorized Dealer) or whenever steering mount and/or steering head are disassembled, or if steering effort has increased. Lubricate with 2-4-C w/Teflon.



95 2-4-C With Teflon (92-825407A12)

a - Grease Fitting
b - Cable Ends
c - Pivot Point
d - Ball Joint

Remote Control Installation

Refer to "Quicksilver Accessories Guide" to determine correct length of remote control cables.

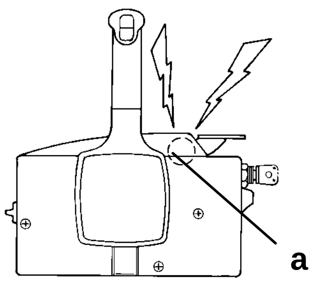
IMPORTANT: Remote control cables must be correct length. Sharp bends on too-short cables result in "kinks;" too-long cables require unnecessary bends and/or loops. Both conditions place extra stress on the cables.

IMPORTANT: Install control cables to remote control and mount remote control BEFORE attaching control cables to engine. Refer to installation instructions included with remote control.

Required Side Mount Remote Control or Ignition Key Switch Assembly

Boats Equipped with Side Mount Remote Control

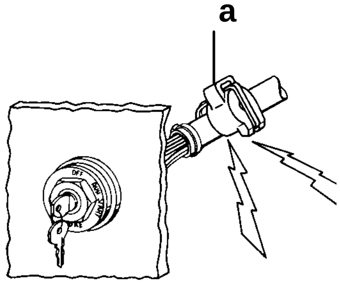
A Quicksilver Commander 2000 series Side Mount Remote Control equipped with a warning horn must be used with this outboard. This warning horn is necessary for the engine warning system.



a - Warning Horn

Boats Equipped with Panel Or Console Mount Remote Control

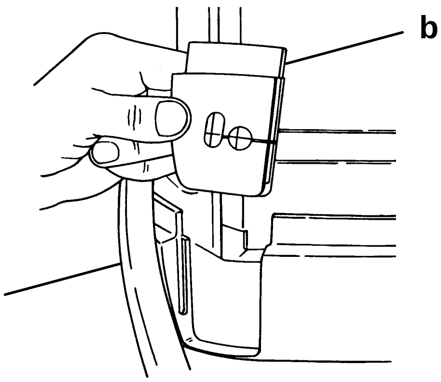
A Quicksilver Ignition Key/Choke Assembly equipped with a warning horn must be used with this engine. This warning horn is necessary for the engine warning system.



a - Warning Horn

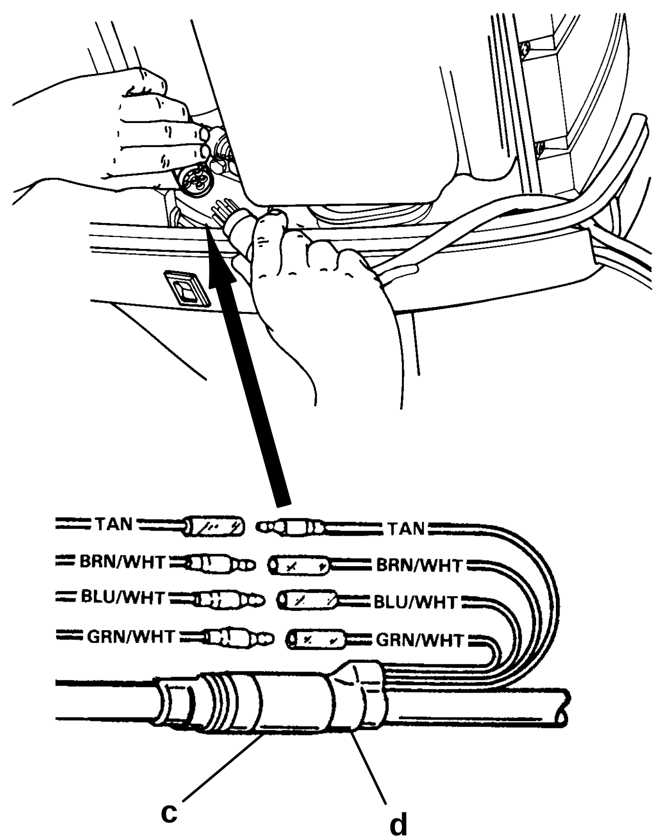
Connecting Remote Wiring Harness To The Engine

1. Pull up the cowl seal (a) and remove the starboard side rubber grommet (b).



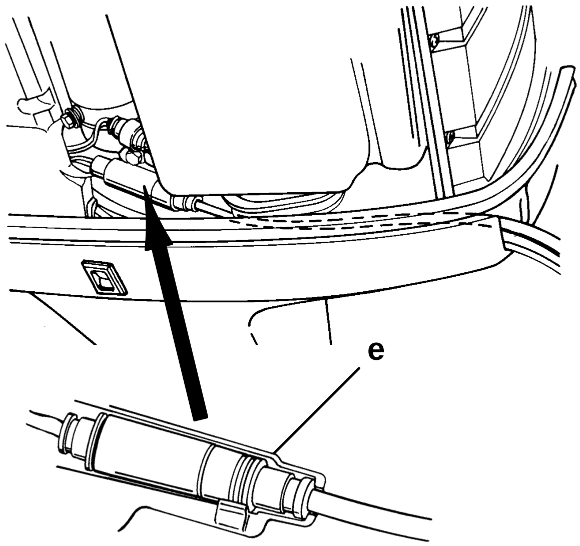
2. Take hold of the engine connector (c) and install the remote wiring harness plug (d). Connect additional wire leads (if equipped) as shown.

NOTE: *The rubber grommet can to be lubricated to ease installation.*

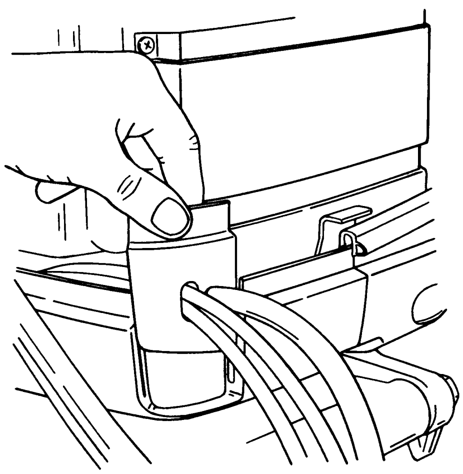


BLK = BLACK
BLU = BLUE
BRN = BROWN
GRY = GRAY
GRN = GREEN
PUR = PURPLE
RED = RED
TAN = TAN
VIO = VIOLET
WHT = WHITE
YEL = YELLOW

3. Push the connector and plug into the holder (e).



4. Insert the battery cables and remote wiring harness into the rubber grommet. Reinstall the starboard side rubber grommet into the cowl. Push the cowl seal back in place.



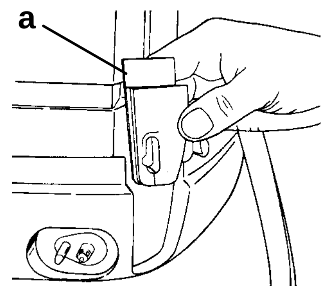
Shift and Throttle Cable Installation To The Outboard

Install the shift cable and throttle cable into the remote control and mount the remote control following instructions which are provided the remote control.

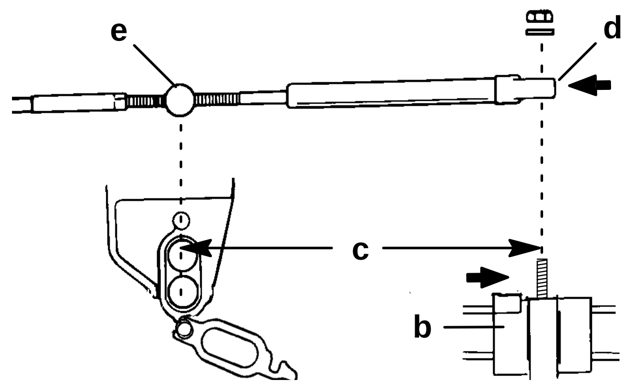
NOTE: *Install the shift cable before the throttle cable. The shift cable is the first cable to move when the remote control handle is moved into gear.*

Shift Cable Installation

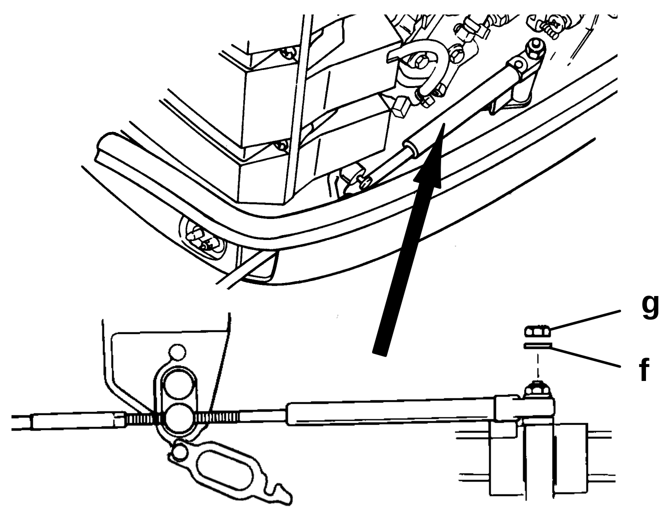
1. Pull up the cowl seal and remove the port side rubber grommet (a).



2. Position the remote control and outboard into neutral.
3. Slide shift actuator (b) toward the rear of engine (reverse gear) until resistance is felt. Measure distance (c) between mounting stud and barrel retainer.
4. Push the cable end (d) in (towards cable barrel) until resistance is felt. Adjust the cable barrel (e) to attain distance (c).



5. Place cable barrel into retainer and fasten the cable end to mounting stud with nylon washer (f) and locknut (g). Tighten locknut against the nylon washer, then back-off the locknut 1/4 turn.

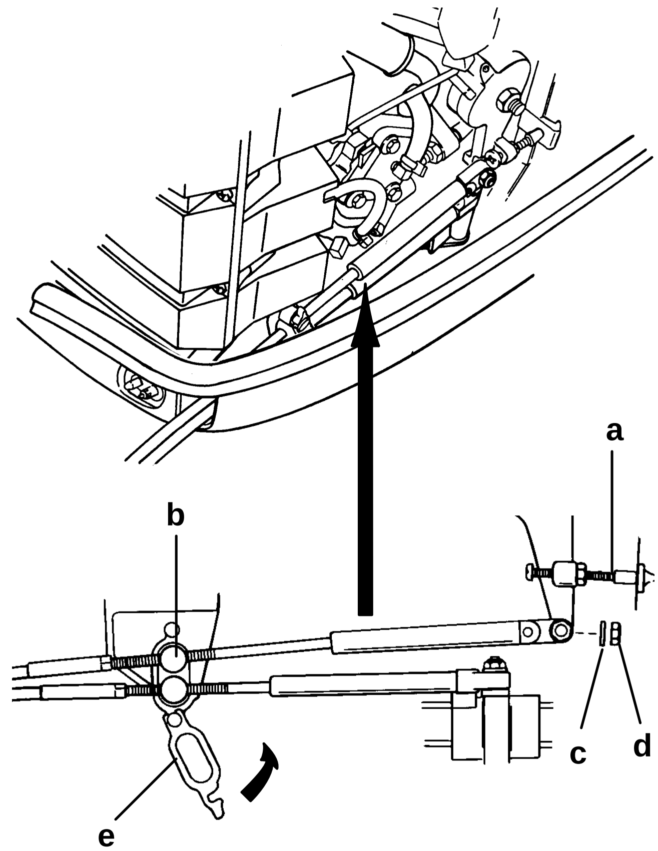


6. Check shift cable adjustments as follows:
   a. With remote control in forward the propshaft should lock solidly in gear. If it does not, adjust the cable barrel closer to the cable end guide.
   b. Shift remote control into neutral. The propshaft should turn freely without drag. If not, adjust the barrel away from the cable end guide. Repeat steps a and b.
   c. Shift remote control into reverse while turning propeller. The propshaft should lock solidly in gear. If not, adjust the barrel away from the cable end guide. Repeat steps a thru c.
   d. Return remote control handle to neutral. The propeller should turn freely without drag. If not, adjust the barrel closer to the cable end guide. Repeat steps a thru d.

Throttle Cable Installation

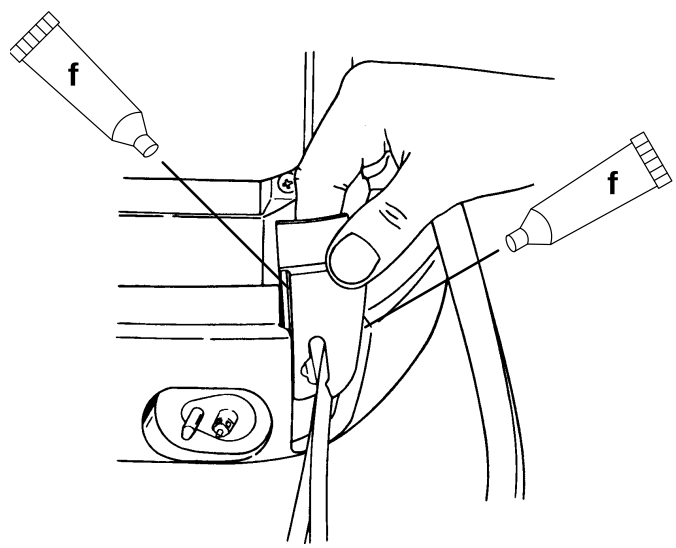
NOTE: *Attach Shift cable to engine prior to attaching throttle cable.*

1. Position the remote control handle into neutral detent.
2. Position adjustment screw (a) against the stop.
3. Adjust throttle cable barrel (b) so the barrel will be able to slip into the retainer when the cable end is on the mounting stud and there is a slight preload against the stop.
4. Check preload on throttle cable by placing a thin piece of paper between adjustment screw and stop. Preload is correct when the paper can be removed without tearing, but has some drag in it. Readjust cable barrel if necessary.
5. Place the throttle cable barrel into the top retainer hole and the cable end on the cable mounting stud. Fasten throttle cable to the mounting stud with nylon washer (c) and locknut (d). Tighten locknut against the nylon washer, then back-off the locknut 1/4 turn.
6. Lock the cable barrels in-place with cable latch (e).



7. Lubricate the port side rubber grommet and reinstall into cowl. Slip the grommet over the control cables. Push the cowl seal back into place.

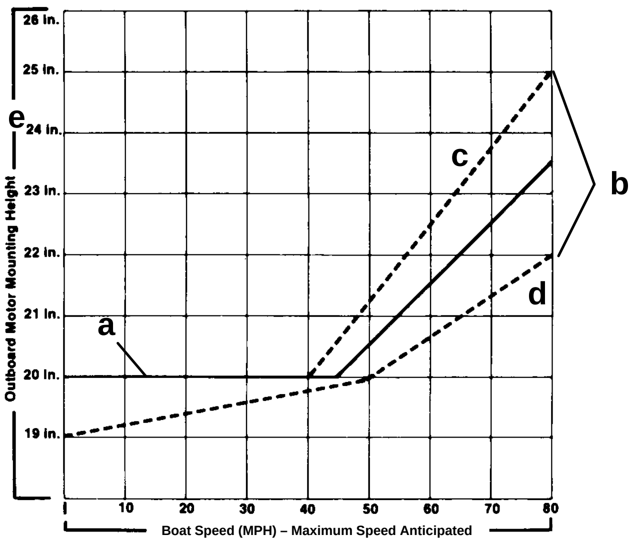
NOTE: *The rubber grommet has to be lubricated to ease installation.*



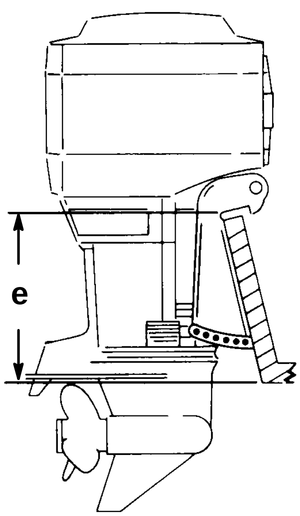
f - Lubricant

Installing Outboard Motor on Transom

Determining Recommended Outboard Mounting Height



1 in. = 25.4mm
1 MPH = 1.6 Km/h



IMPORTANT: Add 5 in. (12.7cm) to Mounting Height for "XL" Models.

a - This solid line is recommended to determine the outboard mounting height dimension. Use transom mounting bolt holes that will position outboard nearest to the recommended height. After engine break-in (if necessary), raise or lower outboard one position at a time to attain best performance. See **"Important"** immediately following.

IMPORTANT: Increasing the height of outboard generally will provide the following: 1) Less steering torque, 2) more top speed, 3) greater boat stability, but, 4) will cause more prop "break loose" which may be particularly noticeable when planing off or with load.

b - These broken lines represent the extremes of known successful outboard mounting height dimensions.

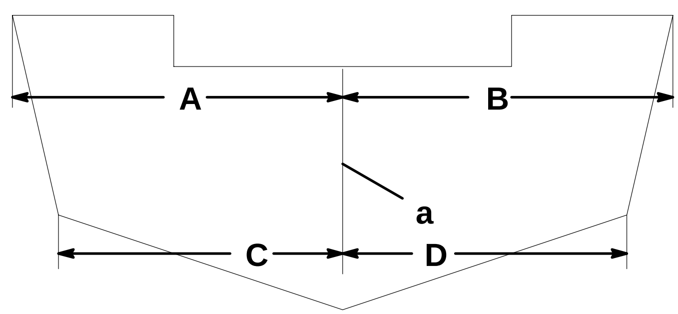
c - This line may be preferred to determine outboard mounting height dimension, if maximum speed is the only objective.

d - This line may be preferred to determine outboard mounting height dimension for dual outboard installation.

e - Outboard mounting height (height of outboard transom bracket from bottom of boat transom). For heights over 22 in. (560mm), a propeller, that is specifically designed for surfacing operation, such as the "Chopper" series, usually is preferred.

Locate Centerline of Boat Transom

Locate (and mark with pencil) vertical centerline of boat transom, as shown.



NOTE: *Dimensions "A" and "B" and "C" and "D" are equal length.*

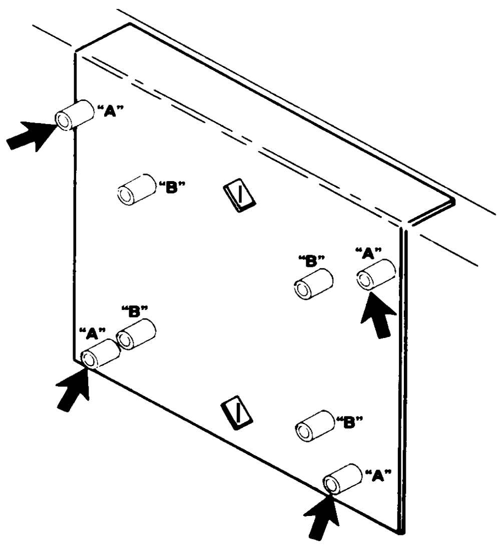
Drilling Outboard Mounting Holes

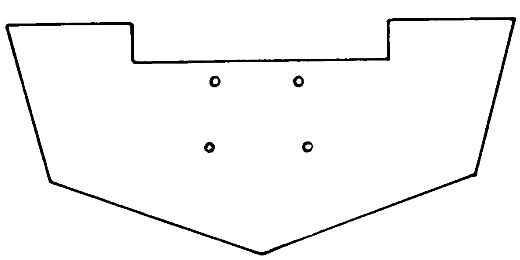
IMPORTANT: Before drilling any mounting holes, carefully read "Determining Recommended Outboard Motor Mounting Height", preceding. There is a 3/4 in. (19mm) difference between outboard mounting holes in transom bracket.

⚠ WARNING

DO NOT, under any circumstances, allow upper outboard mounting bolts to be closer than 1 in. (25.4mm) from top of boat transom. Upper mounting bolts must never be installed thru shims.

IMPORTANT: If using "Transom Drill Fixture" (91-98234A2), use drill guide holes marked "A" when drilling outboard mounting holes.



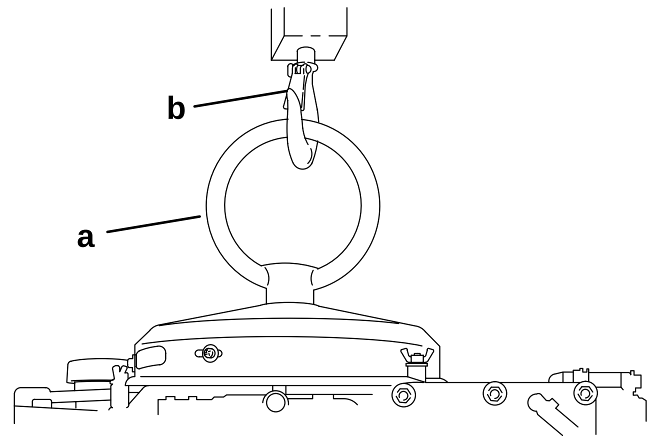


Lifting Engine

⚠ WARNING

Make sure that lifting eye is threaded into flywheel a minimum of 5 turns and that hoist has a minimum lift capacity of at least 500 lbs. (227 kg) BEFORE lifting engine.

1. Remove cowling from engine and plastic cap from center of flywheel. Thread lifting eye into flywheel hub a minimum of 5 turns. Replace plastic cap after installation.
2. Connect hoist [minimum lift capacity of 500 lbs. (227 kg)] to lifting eye. Lift engine and place on boat transom.



a - Lifting Eye (C-91-75132)
b - Hoist

Installing Engine to Transom

⚠ CAUTION

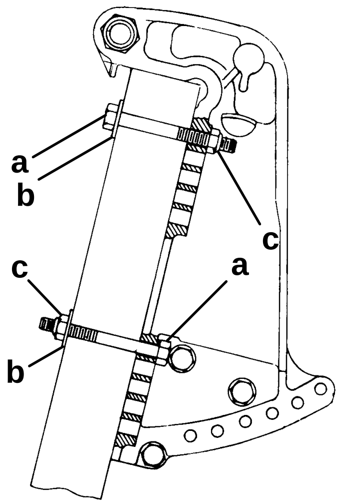
Marine sealer must be used on shanks of mounting bolts to make a water-tight installation.

NOTE: *Because of clearance on some boats it will be necessary to install steering cable on engine before installing engine to transom. Refer to page 1 of this instruction.*

IMPORTANT: DO NOT use an impact driver when tightening transom mounting bolts.

1. Determine engine mounting height dimension from graph (STEP 1) and use engine mounting holes that will position engine nearest to recommended height.

2. Apply marine sealer to shanks of mounting bolts (not threads) and secure engine to transom with 4 bolts, flat washers and locknuts, as shown. Be sure that installation is water-tight.

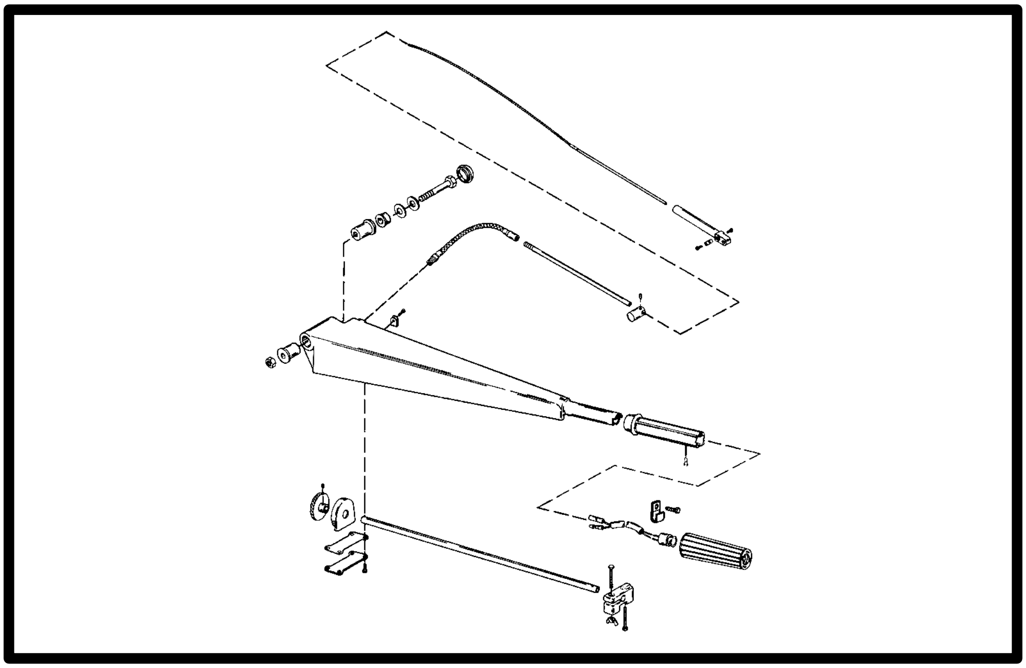


a - Mounting Bolt - 4-1/2 in. (11.4mm) long (4 Req.)
b - Flat Washer (4 Req.)
c - Locknut (4 Req.)

WARNING

Before operating, motor(s) MUST BE SECURED to boat transom with four 1/2″ diameter bolts and locknuts, as follows: 2 bolts must be installed thru upper mounting holes and 2 bolts thru lower mounting holes, as shown in step 5. Installation must be water-tight, and engine should be checked for tightness on the transom during operation. Failure to bolt engine to transom (using 4 bolts and locknuts, as shown in step 5) may result in damage to boat and/or loss of motor and possible injury to occupants of boat.

ATTACHMENTS/ CONTROL LINKAGE



TILLER HANDLE

7

B

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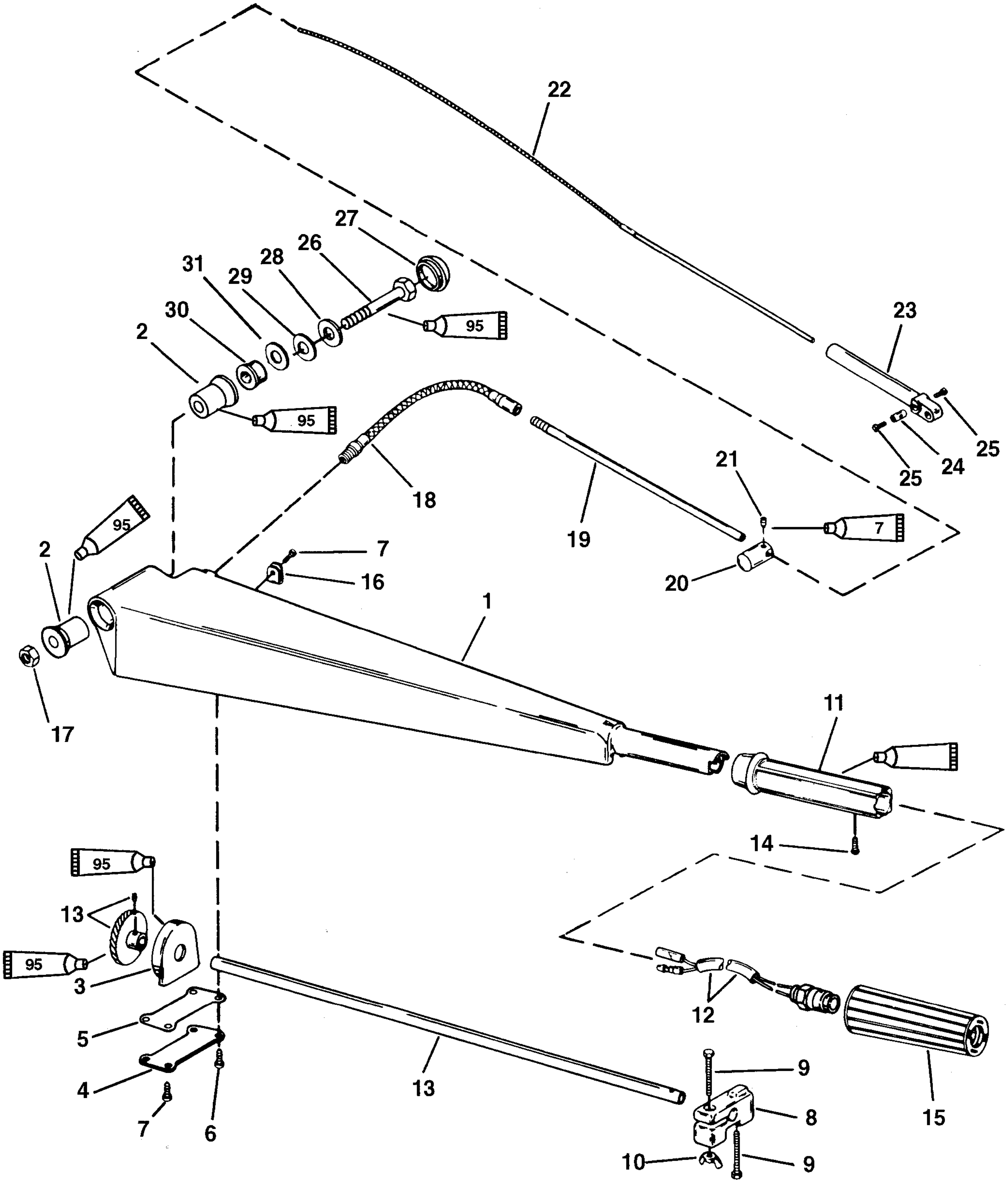
Notes:

Steering Handle Components



Soapy Water Solution (Obtain Locally)

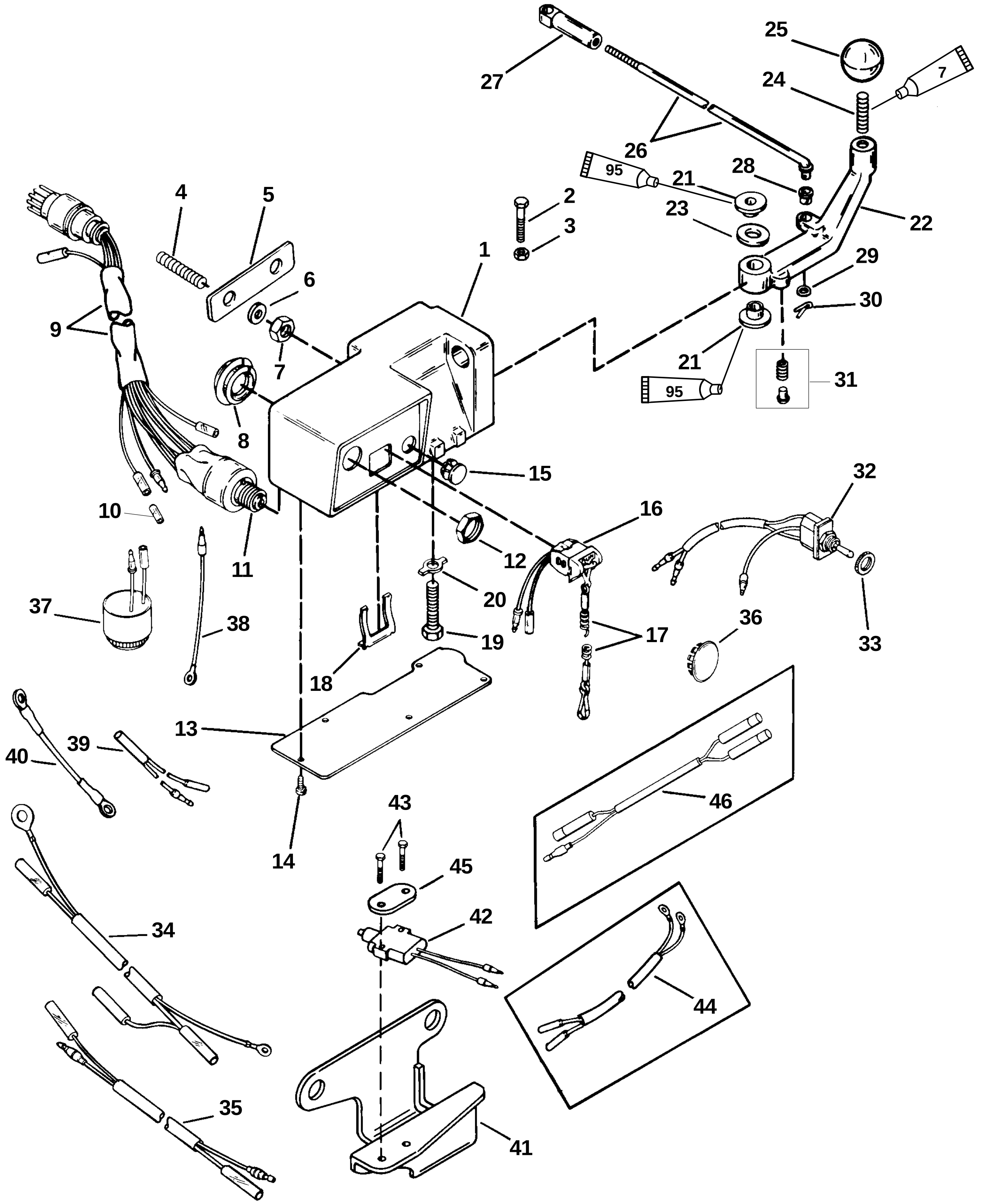
7 Loctite 271 (92-809820)

95 2-4-C With Teflon (92-825407A12)

Steering Handle Components

REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	lb. ft.	N·m
1	1	STEERING ARM **(BLACK)**			
	1	STEERING ARM **(GRAY)**			
–	1	GREASE FITTING			
2	2	BUSHING			
3	1	HOUSING			
4	1	PLATE			
5	1	GASKET			
6	1	SCREW (3/5 IN.)	Drive Tight		
7	4	SCREW (1/2 IN.)	Drive Tight		
8	1	CLAMP			
9	2	SCREW (M5 x 40)	40		4.5
10	1	NUT	Hand Tighten		
11	1	THROTTLE HANDLE/STOP SWITCH KIT			
12	1	STOP SWITCH			
13	1	THROTTLE TUBE			
14	1	SCREW (10-16 x 3/8 IN.)	Hand Tighten		
15	1	GRIP			
16	2	CLIP			
17	1	NUT		40	54.2
18	1	CONDUIT			
19	1	GUIDE TUBE			
20	1	BARREL			
21	1	SET SCREW	9		1.0
22	1	CABLE			
23	1	GUIDE			
24	1	ANCHOR			
25	2	SET SCREW	Drive Tight		
26	1	SCREW			
27	1	CAP			
28	1	WASHER			
29	1	WASHER			
30	1	SPACER			
31	1	WASHER			

Steering Handle Components



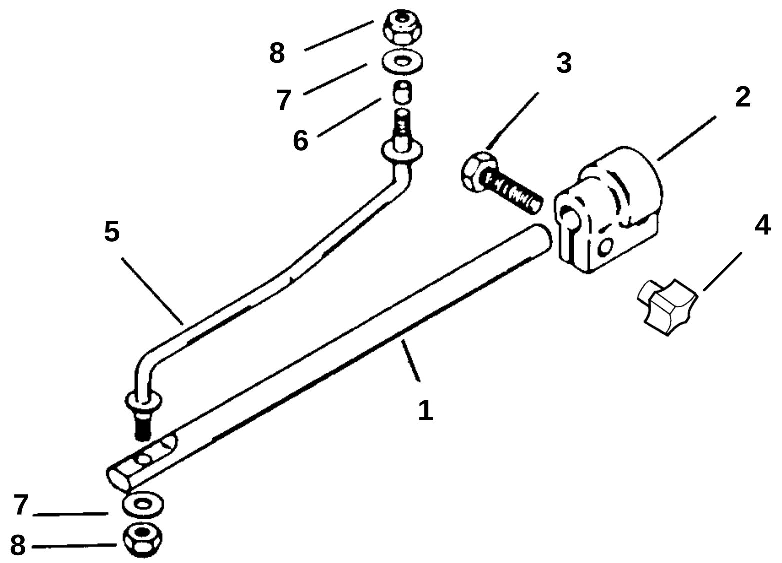
7 Loctite 271 (92-809820)

95 2-4-C With Teflon (92-825407A12)

Steering Handle Components

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	BRACKET ASSEMBLY **(BLACK)**			
	1	BRACKET ASSEMBLY **(GRAY)**			
2	1	SCREW (3/8-24 x 1-1/4 IN.)			
3	1	NUT			
4	2	STUD (5/16 x 2-1/2)			
5	1	SPACER			
6	2	WASHER			
7	2	NUT		40	54.2
8	1	GROMMET			
9	1	HARNESS ASSEMBLY **(22 IN.)**			
	1	HARNESS ASSEMBLY **(33 IN.)**			
10	1	PLUG **(ELECTRIC)**			
11	1	KEY SWITCH **(KEYS LISTED UNDER KEY CHART)**			
12	1	NUT	Drive Tight		
13	1	COVER			
14	6	SCREW (10-16 x 1/2)	Drive Tight		
15	1	PLUG **(NON POWER TRIM)**			
16	1	STOP SWITCH ASSEMBLY			
17	1	LANYARD			
18	1	RETAINER			
19	1	SCREW (M8 x 1.25 x 50)	110		12.4
20	1	TAB WASHER			
21	2	BUSHING			
22	1	SHIFT LEVER **(BLACK)**			
	1	SHIFT LEVER **(GRAY)**			
23	1	WASHER			
24	1	STUD (3/8-24 x 1-1/8)			
25	1	KNOB			
26	1	SHIFT ROD			
27	1	ROD END			
28	1	BUSHING			
29	1	WASHER			
30	1	COTTER PIN			
31	1	DETENT ASSEMBLY			
32	1	TRIM SWITCH **POWER TRIM**			
33	1	NUT	Drive Tight		
34	1	STOP HARNESS			
35	1	CABLE **MANUAL**			
36	1	PLUG			
37	1	HORN			
38	1	CABLE			
39	1	ADAPTOR HARNESS **(MANUAL) (Use where Applicable)**			
40	1	CABLE **(RED/YELLOW - 3-1/2 IN. - ELECTRIC)**			
41	1	BRACKET			
42	1	SWITCH ASSEMBLY			
43	2	SCREW (M3.5 x 0.6 x 20)	Drive Tight		
44	1	HARNESS ASSEMBLY **(Use where Applicable)**			
45	1	PLATE			
46	1	HARNESS **(USA-S/N-0G437999/BEL-9926999 & BELOW)**			
	1	HARNESS **(USA-S/N-0G4378000/BEL-9927000 & UP)**			

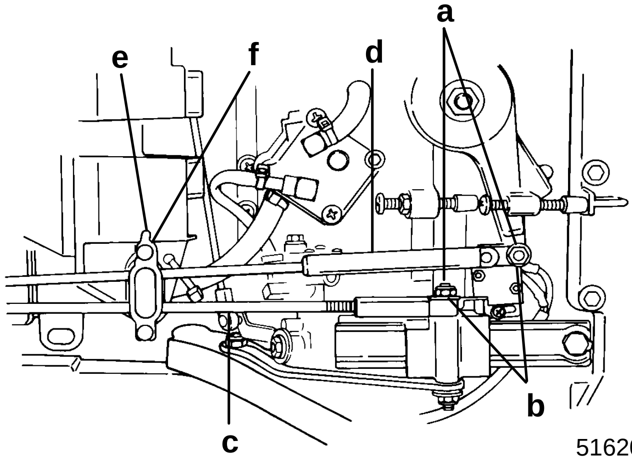
Co-Pilot



REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	lb. ft.	N·m
–	1	CO-PILOT REPLACEMENT **ROD LENGTH**			
1	1	PILOT ROD **is 12-5/8 IN.**			
–	1	CO-PILOT REPLACEMENT **ROD LENGTH**			
1	1	PILOT ROD **is 14-5/8 IN.**			
2	1	NUT ASSEMBLY			
3	1	SCREW			
4	1	KNOB–PRONG			
5	1	ROD			
6	1	BUSHING			
7	2	WASHER			
8	2	NUT	Tighten Until Nut Seats; Do Not Exceed 120 lb. in.(13.6 N·m), then back off 1/4 turn		

Tiller Arm/Shift Lever Removal

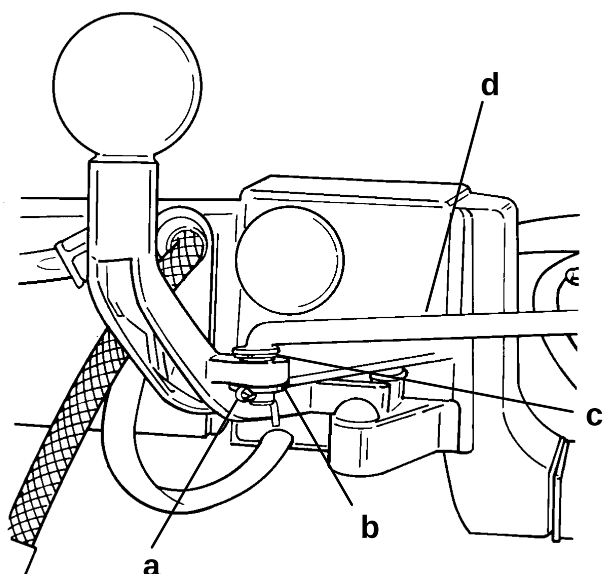
1. Remove battery cables from battery.
2. Remove outboard cowling.
3. Remove nuts securing shift link rod and throttle cable to engine. Release latch and remove shift link rod and throttle cable from anchor bracket.



51620

a - Locking Nut
b - Washer
c - Shift Cable
d - Throttle Cable
e - Latch
f - Anchor Bracket

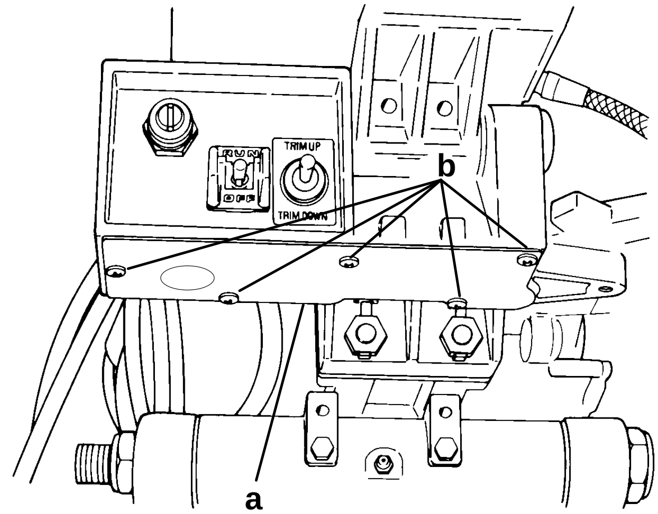
4. Remove cotter key, washer, bushing and shift link rod from shift lever.



51624

a - Cotter Key
b - Washer
c - Bushing
d - Shift Link Rod

5. Remove access cover from underneath tiller handle bracket.

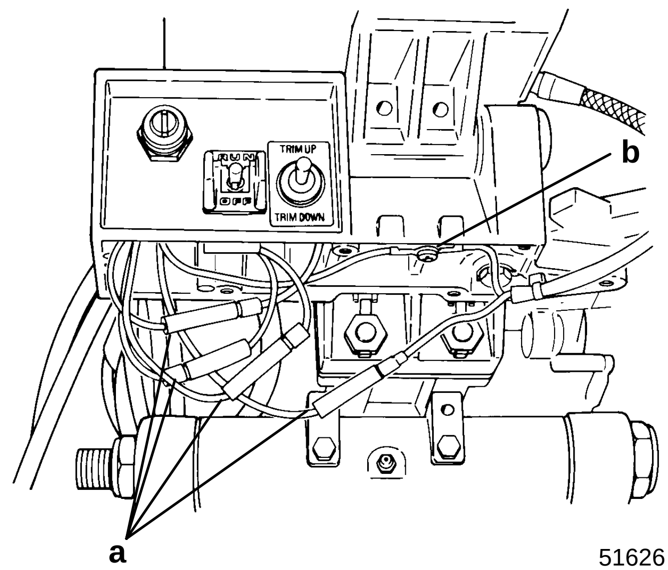


51626

a - Access Cover
b - Screws

6. Disconnect key switch, lanyard stop switch and tiller stop switch leads at bullet connectors.

Remove screw securing key switch and tiller stop switch ground leads.

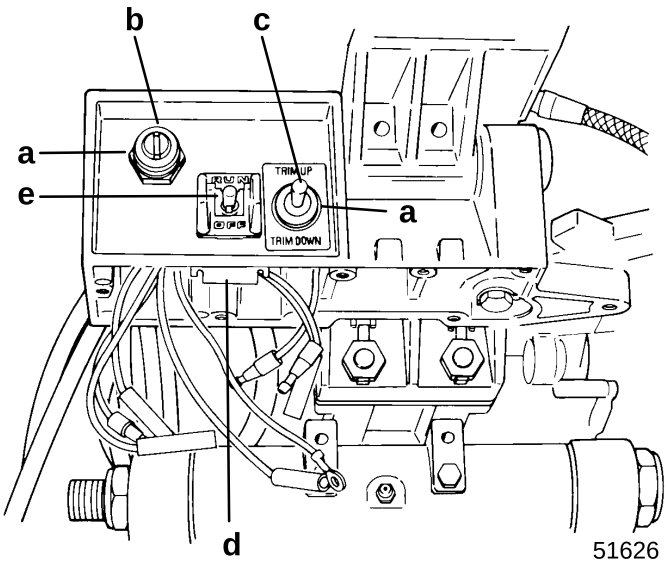


51626

a - Bullet Connectors
b - Screw

7. Remove nuts securing key switch and trim switch to tiller handle bracket.

Remove clip securing lanyard stop switch and remove switch from bracket.

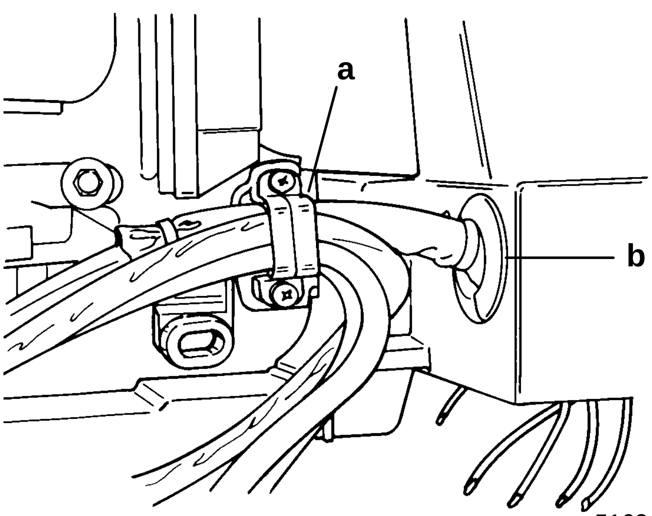


51626

a - Nuts
b - Key Switch
c - Trim Switch
d - Clip
e - Lanyard Stop Switch

8. Remove harness retainer from outboard.

Remove grommet from tiller bracket.



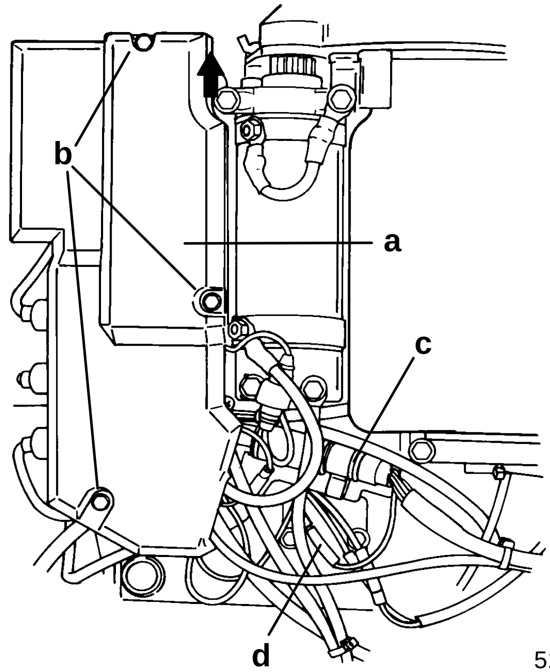
51624

a - Harness Retainer
b - Grommet

9. Remove electrical panel access cover.

Disconnect switch harness from engine harness plug.

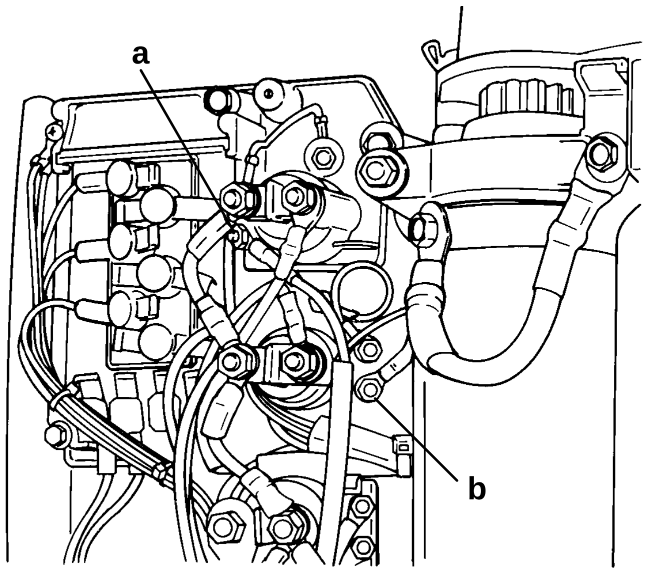
Disconnect PURPLE bullet connector.



51621

a - Access Cover
b - Bolts
c - Switch Harness
d - PURPLE Lead

10. Disconnect BLUE/WHITE and GREEN/WHITE trim leads from trim solenoids.

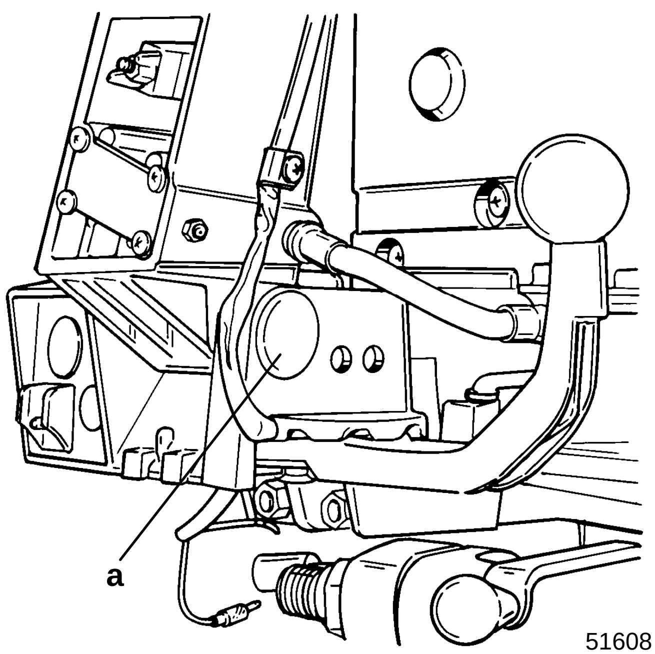


51622

a - BLUE/WHITE Lead
b - GREEN/WHITE Lead

11. Remove key switch, trim switch and their harnesses from tiller bracket.

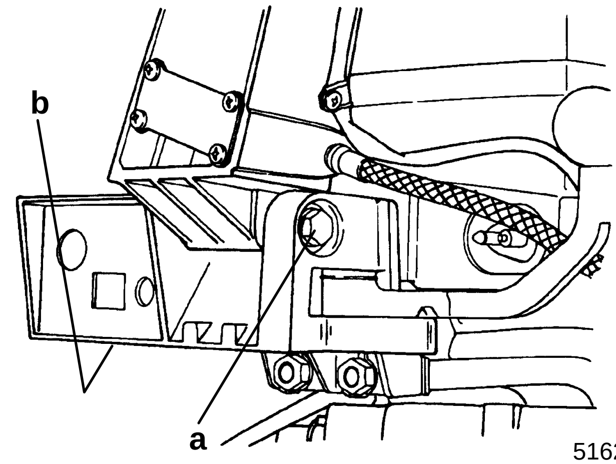
12. Remove plug from tiller handle bracket.



51608

a - Plug

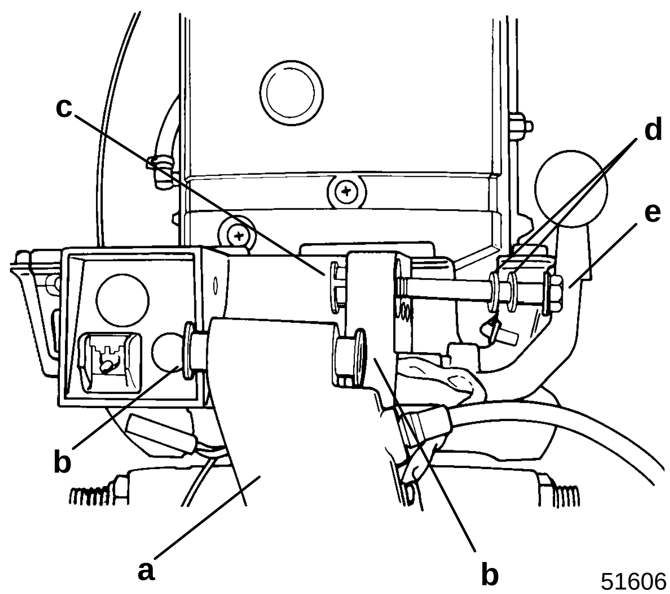
13. Remove bolt and nut (hidden) from tiller handle bracket.



51625

a - Bolt
b - Nut (Hidden)

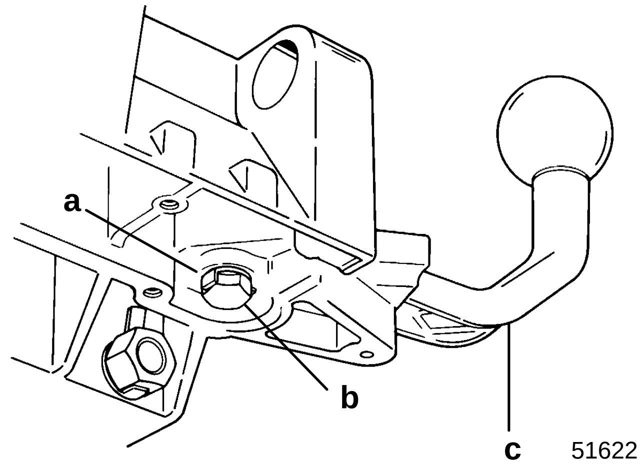
14. Remove tiller handle, 2 nylon bushings, stainless bushing and 2 flat washers from bracket.



51606

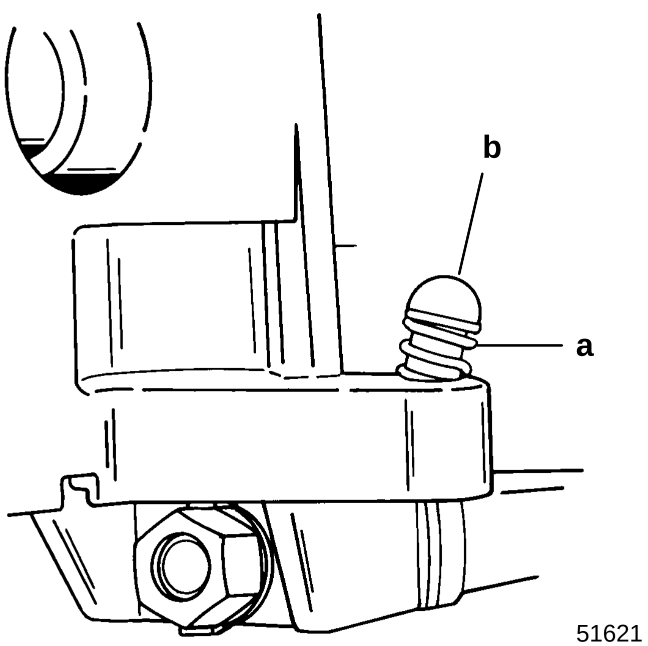
a - Tiller Handle
b - Nylon Bushings (2)
c - Stainless Steel Bushing
d - Flat Washers (2)
e - Bolt

15. Bend tab washer away from bolt securing shift lever and remove bolt and lever from bracket.



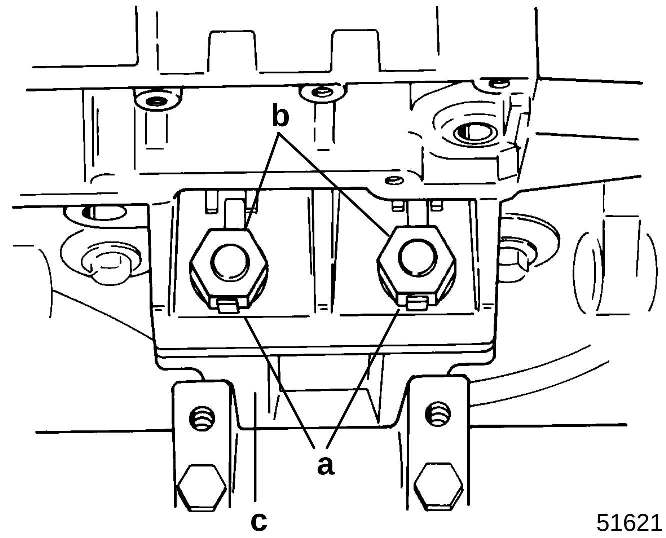
a - Tab Washer
b - Bolt
c - Shift Lever

16. Remove spring and detent pin from bracket.



a - Spring
b - Detent Pin

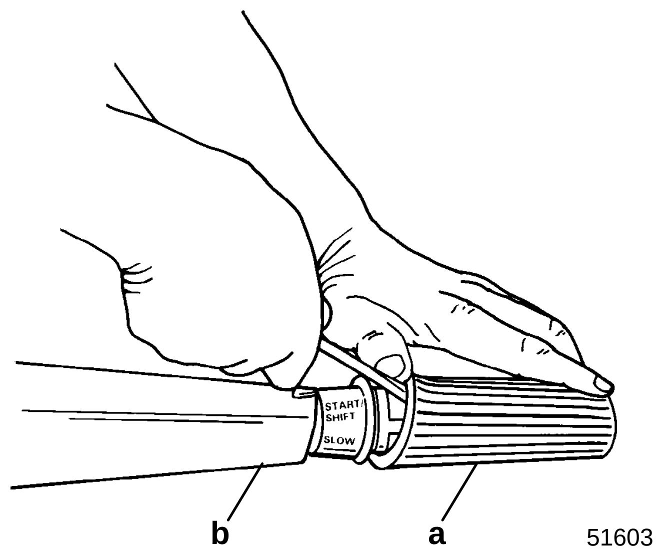
17. Bend tabs on tab washers away from nuts securing bracket to steering arm. Remove nuts, tab washers and bracket from steering arm.



a - Tab Washer
b - Nut
c - Steering Arm

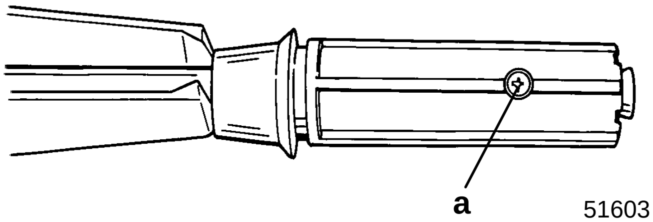
Tiller Handle Disassembly

1. Using a flat tip screwdriver, carefully pry/push rubber grip off tiller handle.



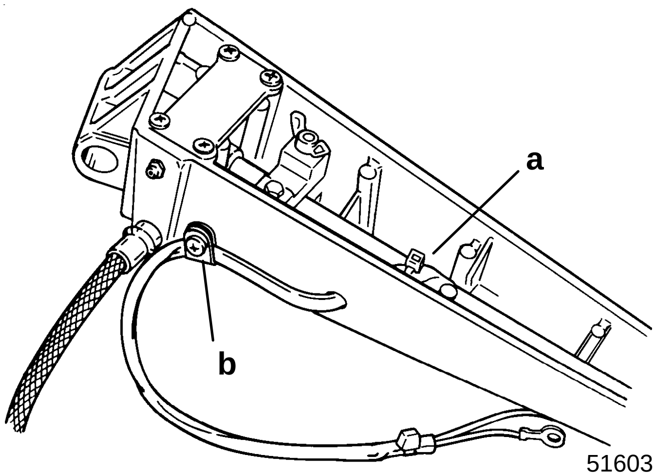
a - Grip
b - Tiller Handle

2. Remove screw from twist grip.



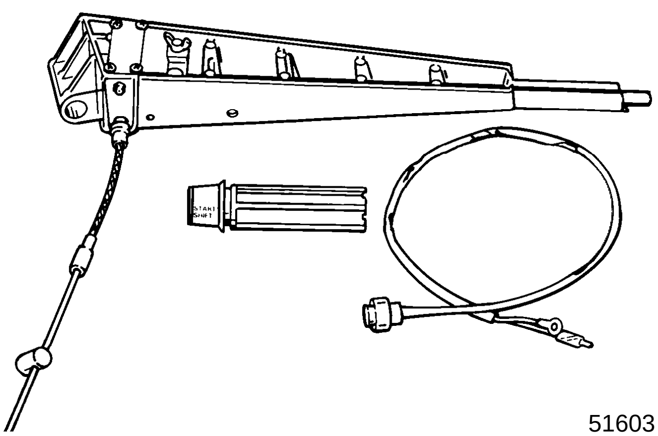
a - Screw

3. Cut sta-strap securing stop switch harness and remove screw from harness J-clip.

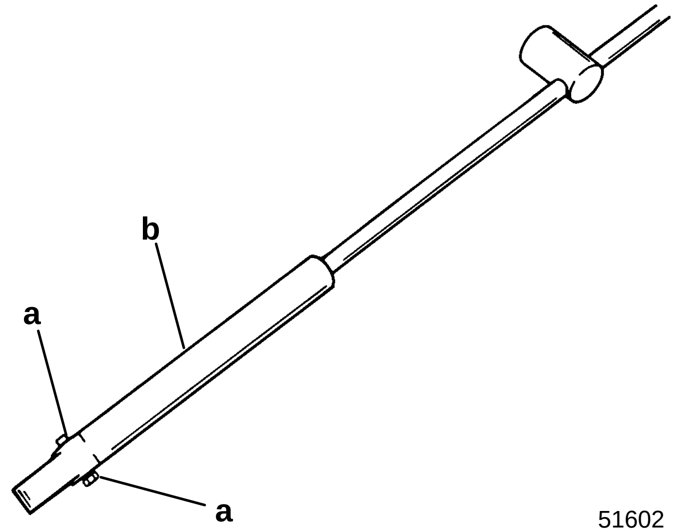


a - Ties
b - Screw

4. Remove stop switch and twist grip from tiller handle.

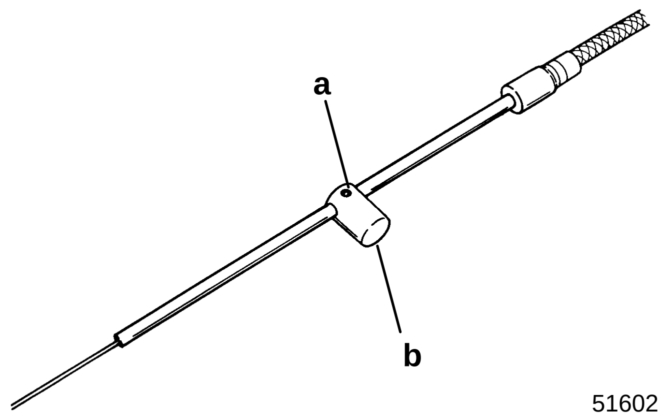


5. Remove throttle cable anchor screws and remove cable guide.



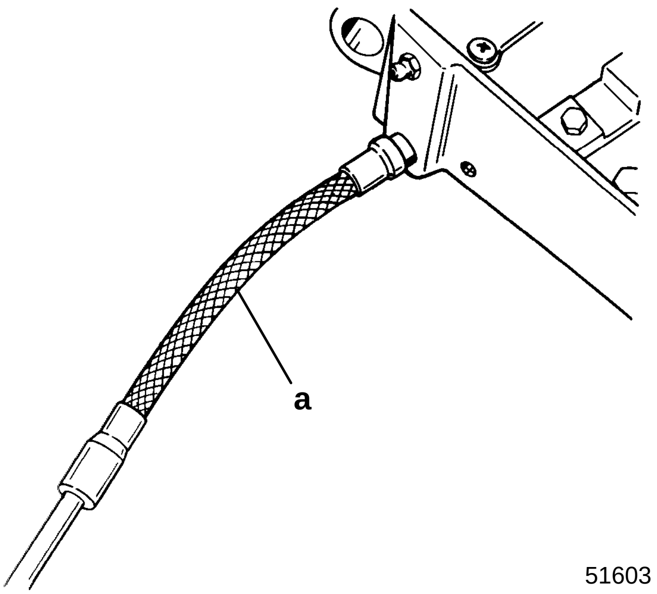
a - Anchor Screws
b - Throttle Cable Guide

6. Remove allen screw from brass barrel and remove barrel.



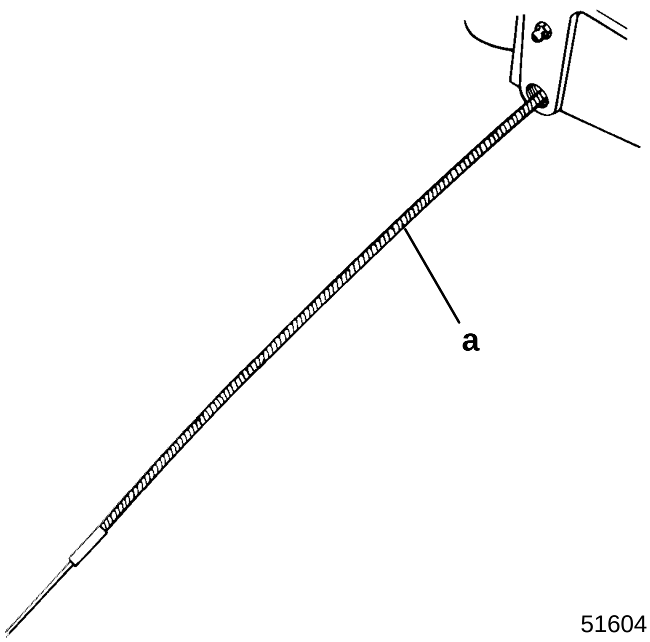
a - Allen Screw
b - Brass Barrel

7. Unscrew (counterclockwise) stainless conduit from tiller handle.



a - Conduit

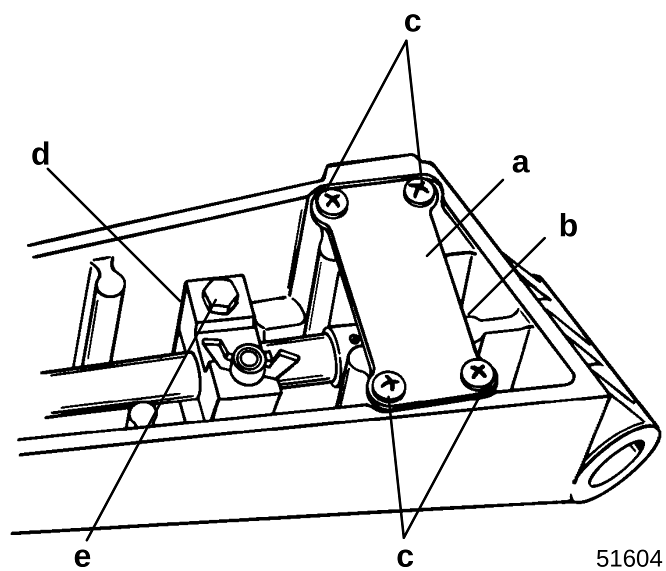
8. Pull throttle cable from tiller handle.



a - Throttle Cable

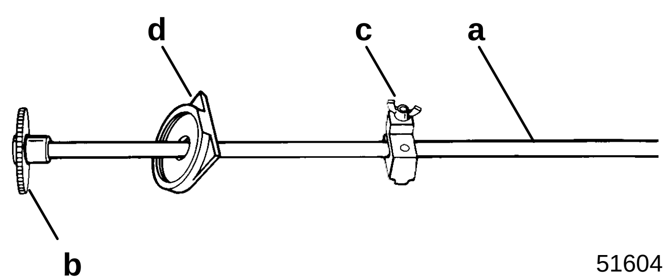
9. Remove cover plate and gasket from tiller handle.

10. Remove bolt from throttle friction assembly.



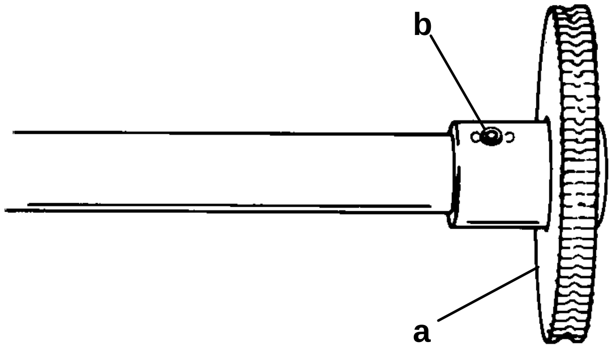
a - Cover Plate
b - Gasket (below plate)
c - Screws
d - Throttle Friction Assembly
e - Bolt

11. Remove throttle arm, gear assembly and friction device from tiller handle. Slide gear cover and friction device off of throttle arm.



a - Throttle Arm
b - Gear Assembly
c - Friction Device
d - Gear Cover

12. Drive out drift pin and remove throttle gear from throttle arm.

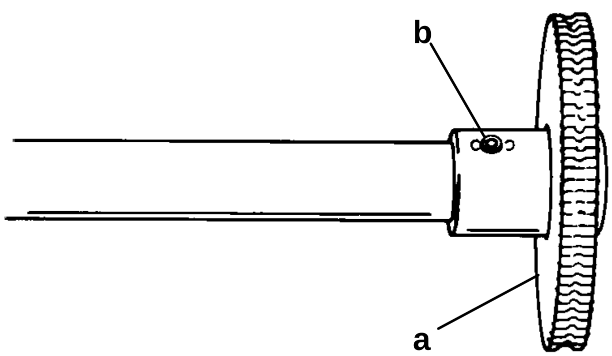


51602

a - Gear
b - Drift Pin

Tiller Arm Reassembly

1. Reinstall throttle gear on throttle arm and secure gear to arm with new drift pin.

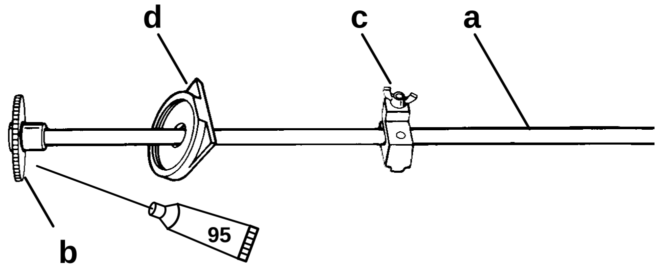


51602

a - Gear
b - Drift Pin

2. Apply a light coat of 2-4-C w/Teflon to gear teeth and inside of gear cover.

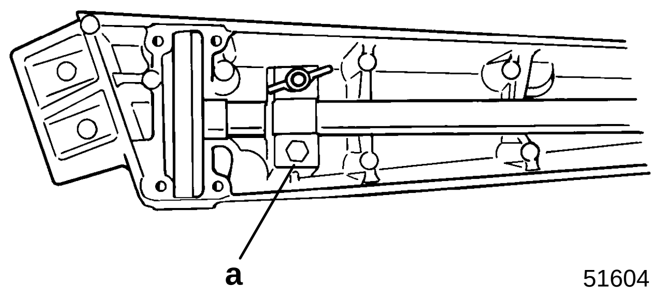
3. Slide cover and friction device onto throttle arm.



95 2-4-C With Teflon (92-825407A12) 51604

a - Throttle Arm
b - Gear
c - Throttle Friction Device
d - Cover

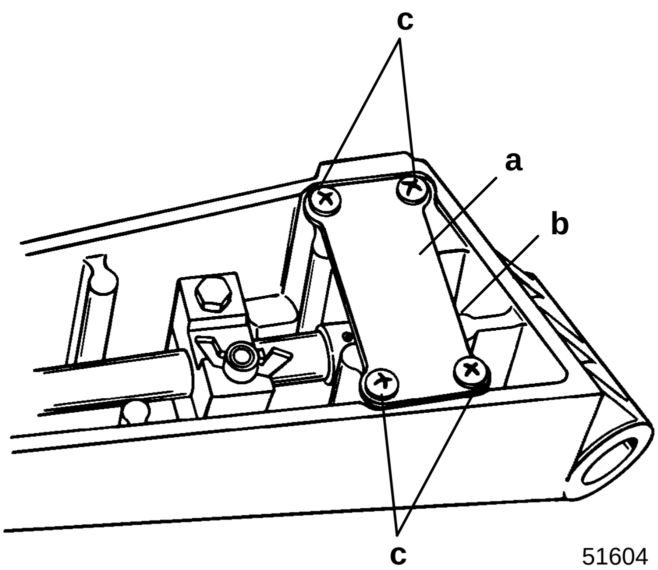
4. Install throttle arm assembly into tiller arm.
5. Torque friction device attaching bolt to 40 lb. in. (4.5 N·m).



51604

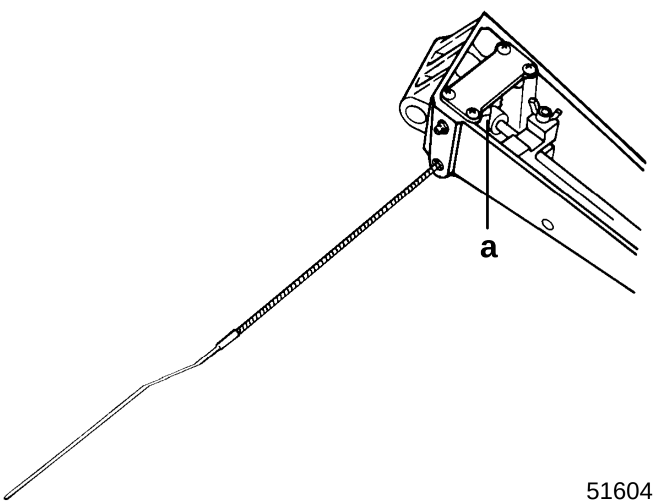
a - Bolt [Torque to 40 lb. in. (4.5 N·m)]

6. Install gasket and cover plate over gear assembly. DO NOT OVERTIGHTEN attaching screws.



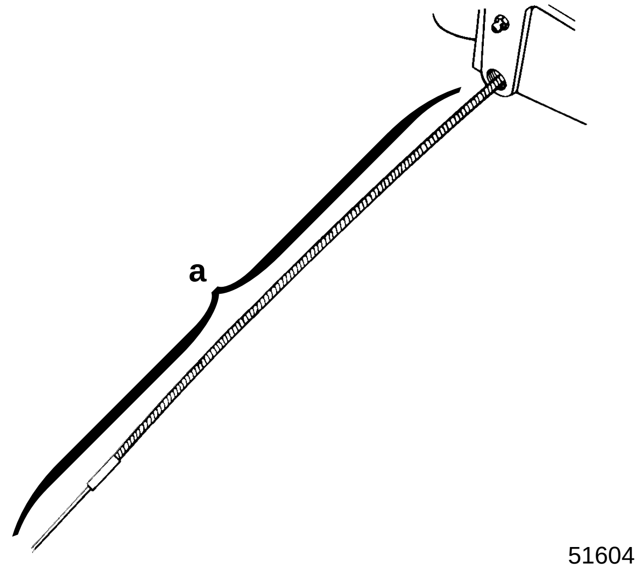
a - Cover Plate
b - Gasket (below cover)
c - Screws

7. Rotate throttle arm so that twist grip attaching screw hole faces DOWN and gear drift pin faces UP.
8. Insert throttle cable (CURVED END FACING UP) into tiller handle gear assembly while rotating tiller arm COUNTERCLOCKWISE.



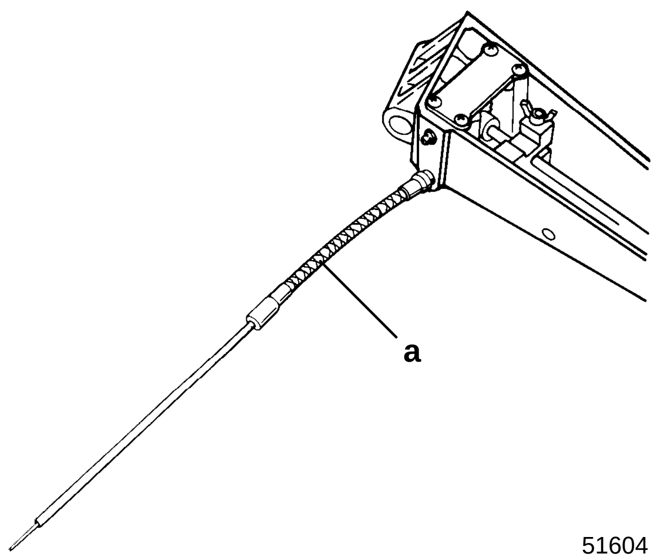
a - Gear Drift Pin (FACES UP)

9. Retract throttle cable into gear assembly until approximately 17 in. (43 cm) extends from the tiller arm.



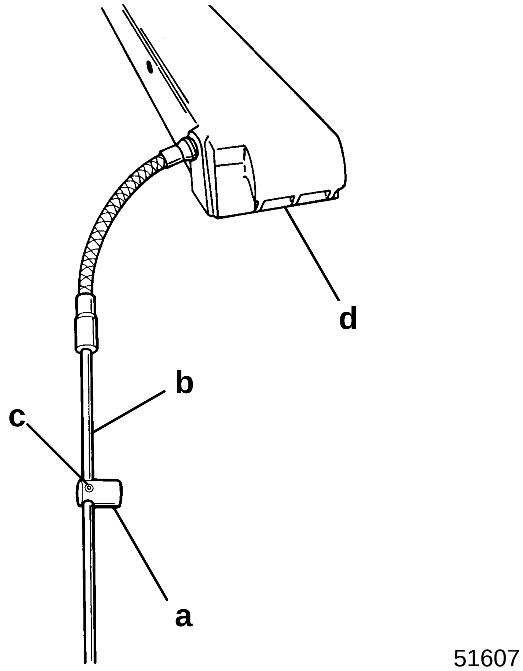
a - Cable [Extends 17 in. (43 cm)]

10. Slide stainless steel conduit over throttle cable and thread into tiller arm until lightly seated. Rotate conduit COUNTERCLOCKWISE ONE FULL TURN from a lightly seated position.



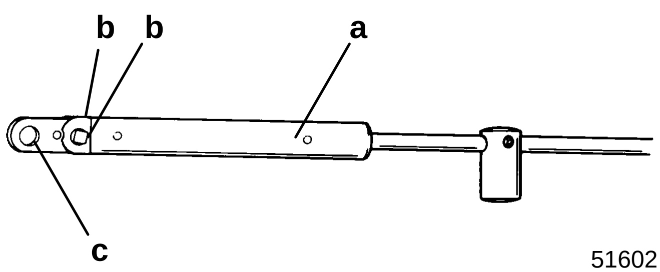
a - Stainless Steel Conduit

11. Slide brass barrel over throttle cable tube. Secure barrel to tube with allen screw approximately 3.5 in. (89mm) from stainless conduit. DO NOT OVERTIGHTEN screw as tubing may be crushed binding throttle cable. Position barrel to face towards tiller handle.



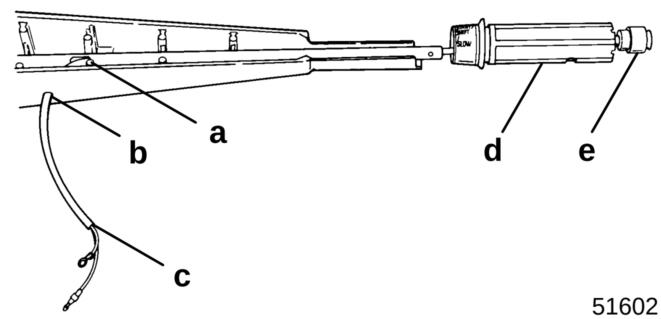
a - Brass Barrel
b - Tube
c - Allen Screw
d - Tiller Handle

12. Install throttle cable guide onto throttle cable. Secure guide to cable with anchor and two screws. Guide hole should face up.



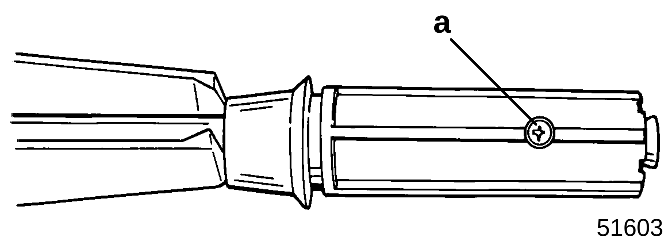
a - Cable Guide
b - Screws (2)
c - Hole (faces up)

13. Position throttle arm slot to face stop harness exit hole in tiller handle. Route stop switch harness through twist grip, into throttle arm, and out through side of tiller handle.



a - Slot
b - Exit Hole
c - Harness
d - Twist Grip
e - Stop Switch

14. Secure twist grip to throttle arm with attaching screw.



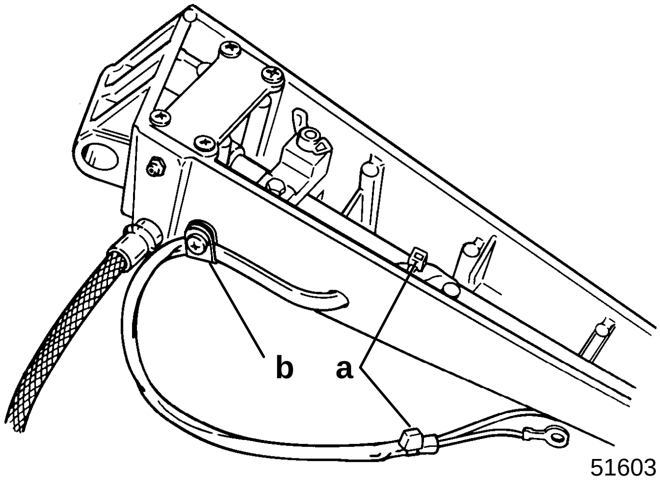
a - Screw

15. Sta-strap harness to throttle arm.

IMPORTANT: Allow enough slack in harness (rotate throttle grip in both directions) before securing harness to handle assembly with J-clip.

16. Attach harness to tiller arm with J-clip allowing enough slack in harness for full throttle rotation.

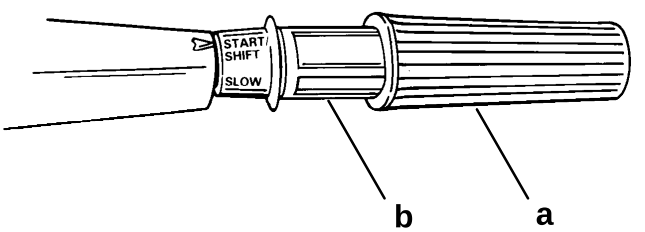
17. Attach sta-strap to end of harness sleeve.



a - Sta-strap
b - J-clip

18. Install rubber twist grip by aligning ridges on plastic twist grip with grooves inside of rubber grip.

***NOTE:** Applying a soapy water solution to rubber grip will ease installation.*



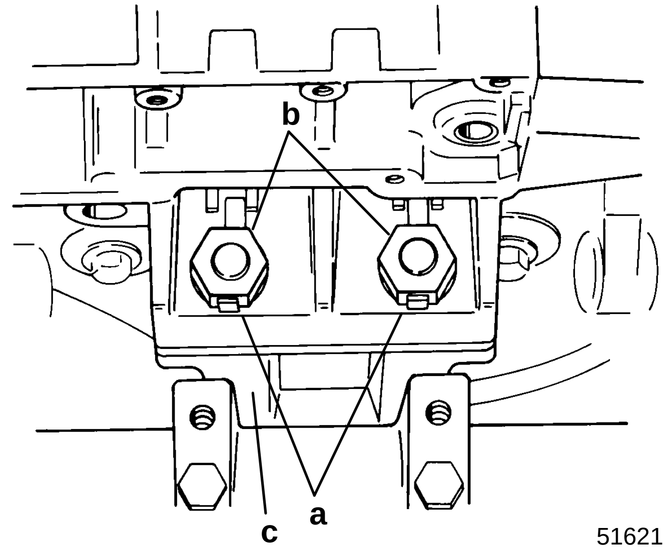
a - Ridges
b - Grooves (under handle)

Tiller Handle/Shaft Bracket Installation

1. Slide bracket over steering arm studs. Secure bracket to arm with retained nuts and NEW tab washers.

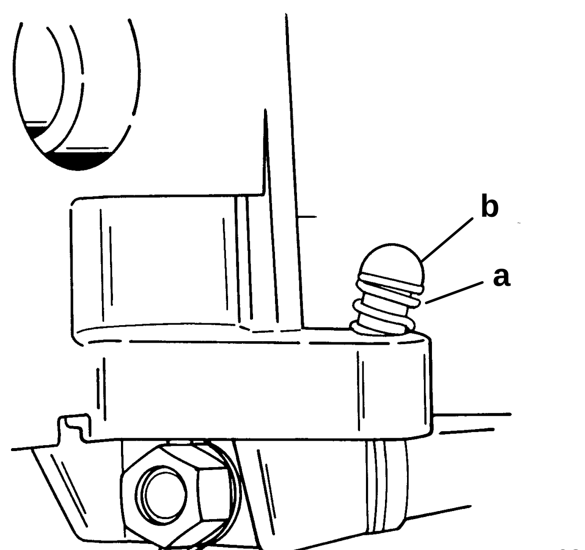
Torque nuts to 40 lb. ft. (54.0 N·m).

Bend locking tabs against flats of nuts.



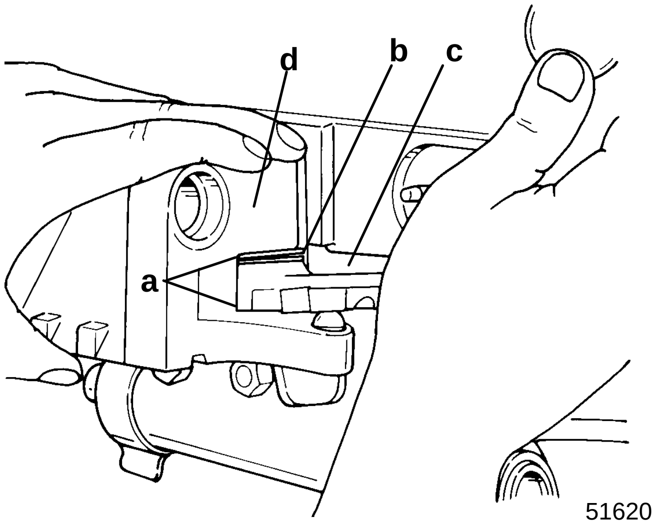
a - Tab Washer
b - Nut
c - Steering Arm

2. Install retained spring and detent pin into tiller handle bracket.



a - Spring
b - Detent Pin

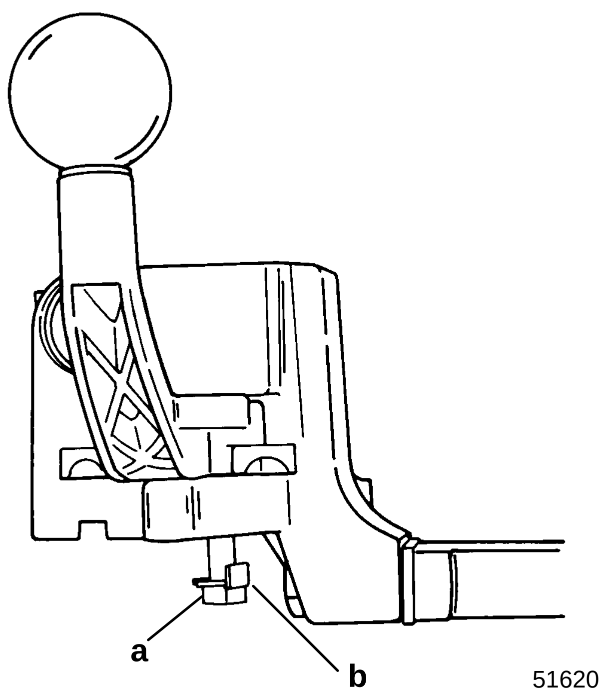
3. Insert bushings and thrust washer into shift lever. Install shift lever onto bracket.



a - Bushings
b - Thrust Washer
c - Shift Lever
d - Bracket

4. Secure shift lever to bracket with bolt and NEW tab washer. Align tab washer with slot in bracket.

Torque bolt to 110 lb. in. (12.4 N·m).

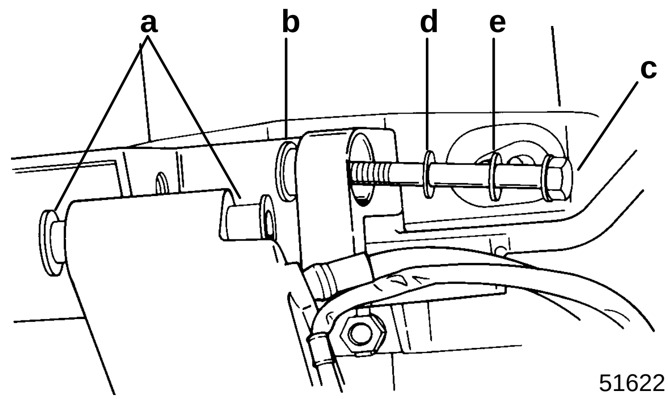


a - Bolt
b - Tab Washer

5. Install two nylon bushings into tiller handle.

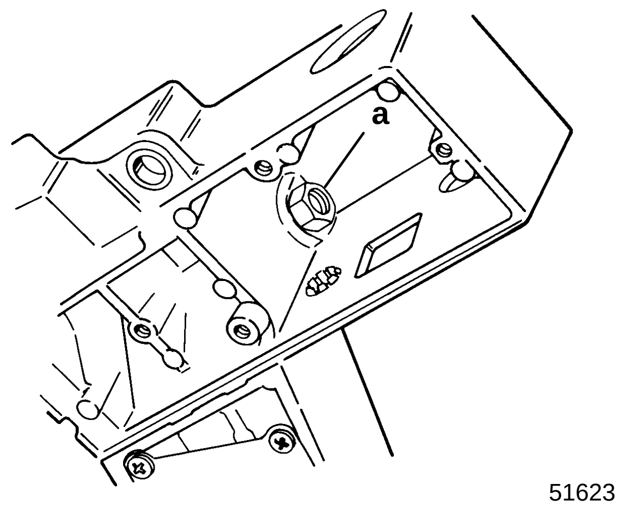
Install stainless bushing into bracket.

Install tiller handle to bracket using bolt and two washers.



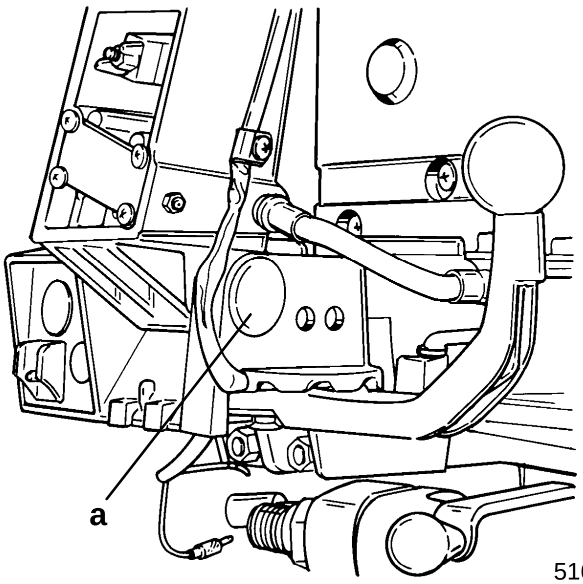
a - Nylon Bushings
b - Stainless Bushing
c - Bolt
d - Washer (Thin)
e - Washer (Thick)

6. Secure bolt in place with nut. Torque nut to 40 lb. ft. (54.2 N·m).



a - Nut

7. Reinstall plug.



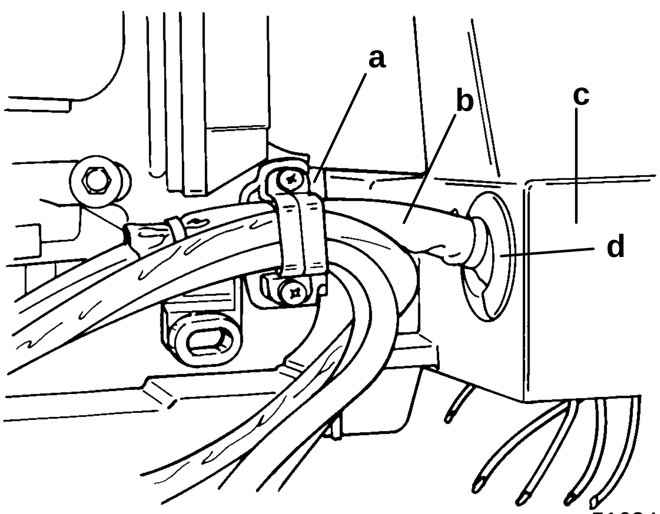
51608

a - Plug

8. Route key switch and trim switch harness through tiller bracket. Secure both switches to bracket with respective nuts.

Install grommet in harness access hole.

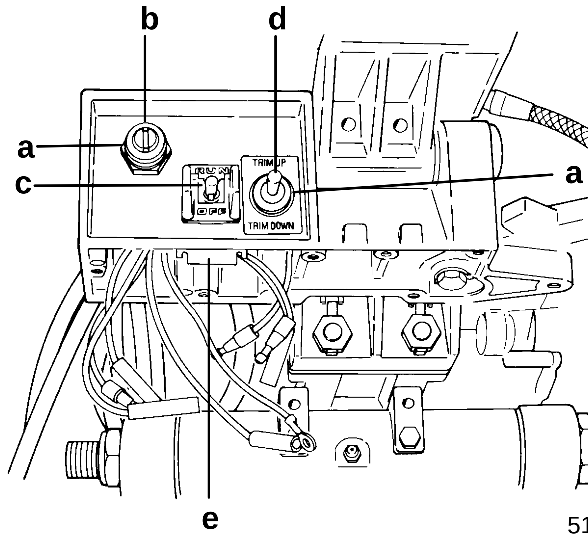
Secure harness with harness retainer.



51624

a - Harness Retainer
b - Switch Harness
c - Tiller Bracket
d - Grommet

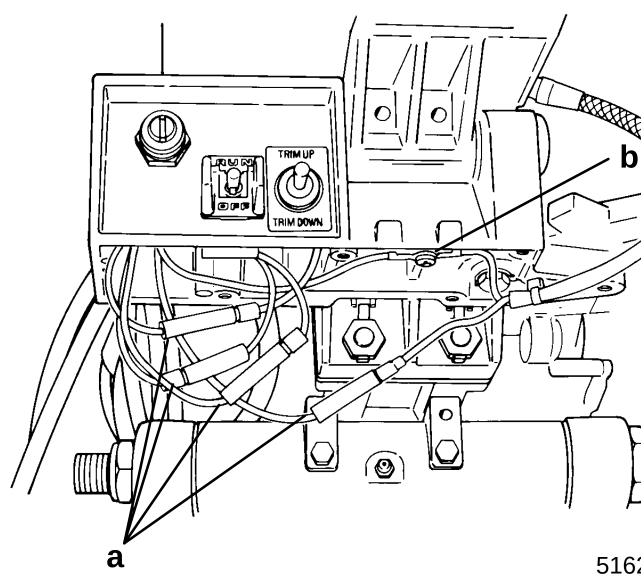
9. Reinstall lanyard stop switch in bracket and secure with clip.



51626

a - Nuts
b - Key Switch
c - Lanyard Stop Switch
d - Trim Switch
e - Clip

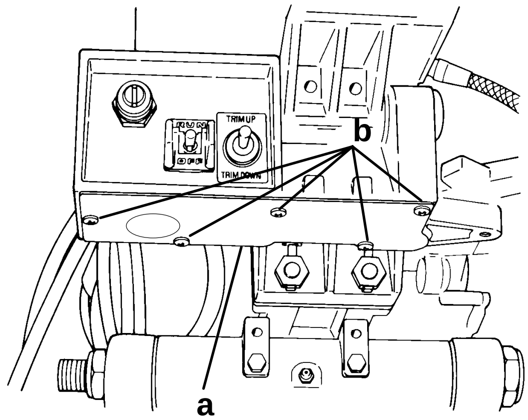
10. Reconnect key switch, trim switch and remote stop switch leads at bullet connectors. Secure harness BLACK ground lead and tiller handle remote stop switch ground lead to bracket with self-tapping screw.



51626

a - Bullet Connectors
b - Screw

11. Secure access cover to tiller bracket with five screws. DO NOT OVERTIGHTEN SCREWS.

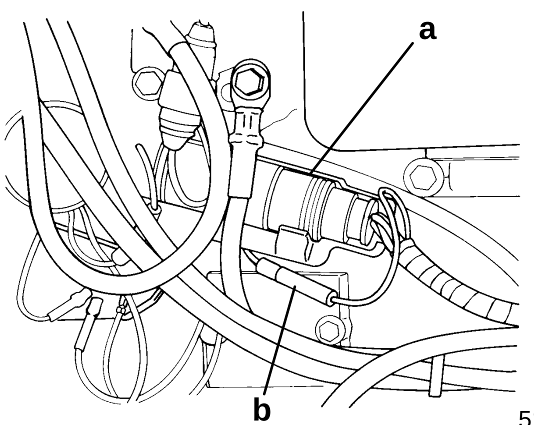


51626

a - Access Cover
b - Screws

12. Connect switch harness plug to engine harness plug.

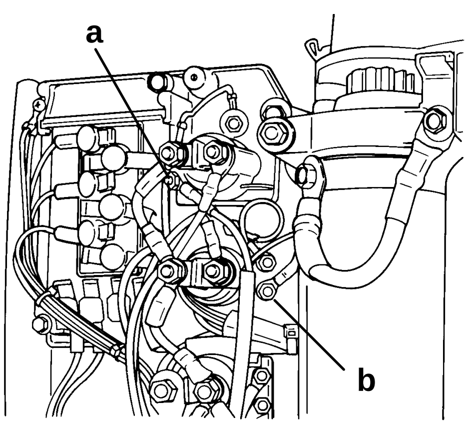
Reconnect PURPLE bullet connector.



51623

a - Switch Harness Plug
b - PURPLE Bullet Connector

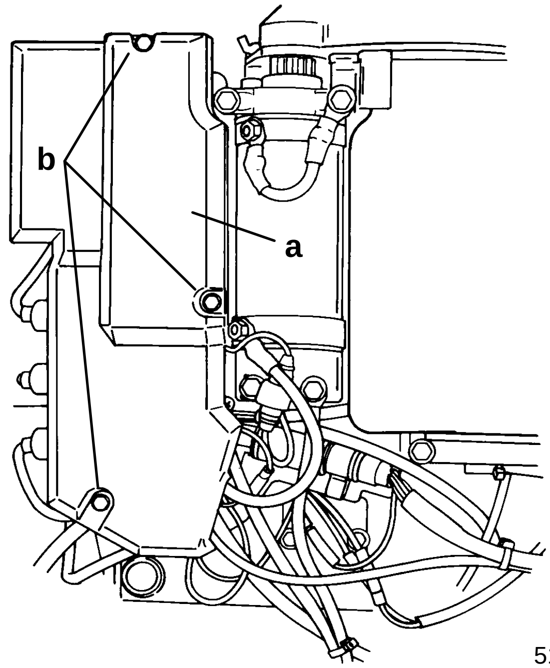
13. Reconnect trim switch leads to trim solenoids.



51622

a - BLUE/WHITE Lead
b - GREEN/WHITE Lead

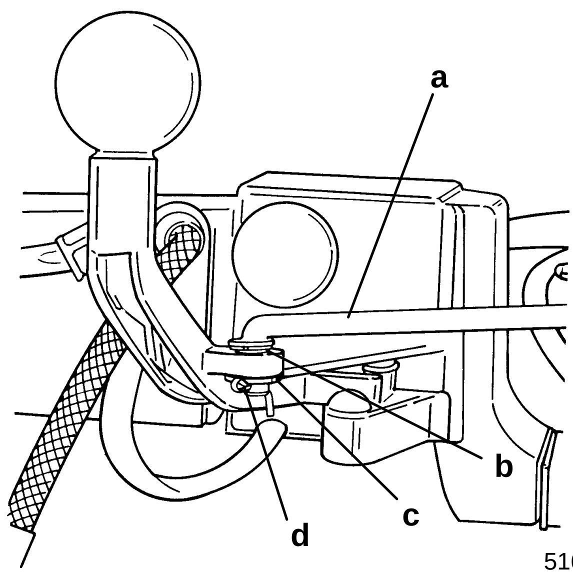
14. Reinstall electrical panel access cover and secure with screws. Torque screws to 30 lb. in. (3.4 N·m).



51621

a - Panel
b - Screws - Torque to 30 lb. in. (3.4 N·m)

15. Reconnect shift link rod to shift lever using bushing, washer and cotter key.

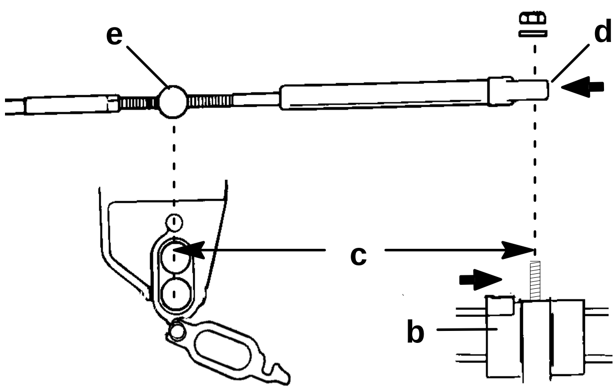


51624

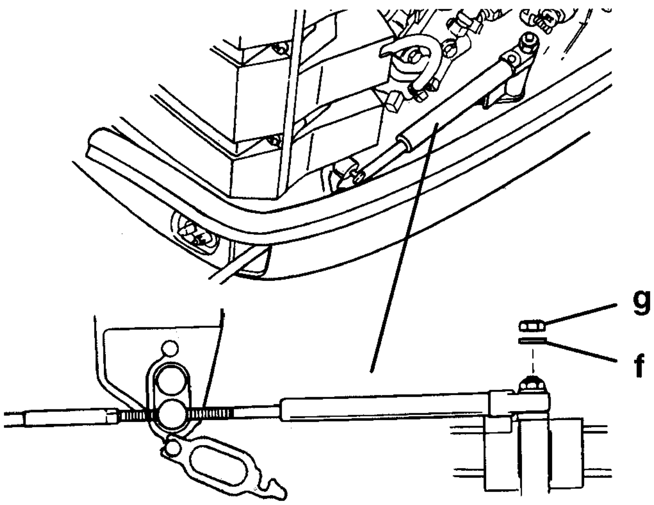
a - Shift Link Rod
b - Bushing
c - Washer
d - Cotter Key

Shift Link Rod Installation and Adjustment to Engine

1. Position shift lever handle into neutral detent.
2. Manually shift outboard into neutral (propeller will rotate freely).
3. Slide shift actuator (b) toward the rear of engine (reverse gear) until resistance is felt. Measure distance (c) between mounting stud and barrel retainer.
4. Push the cable end (d) in (towards cable barrel) until resistance is felt. Adjust the cable barrel (e) to attain distance (c).



5. Place cable barrel into retainer and fasten the cable end to mounting stud with nylon washer (f) and locknut (g). Tighten locknut against the nylon washer, then back-off the locknut 1/4 turn.

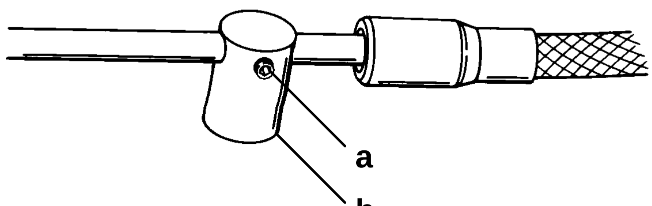


6. Check shift link rod adjustment as follows:
   a. Place engine shift lever in "F" (Forward) position. Propeller should not rotate in a COUNTERCLOCKWISE direction. If propeller does rotate COUNTERCLOCKWISE, length of shift link rod must be reduced and Step "a" repeated.
   b. Place engine shift lever in "N" (Neutral) position. Propeller should rotate freely without drag. If not, length of shift link rod must be increased and Steps "a" and "b" repeated.
   c. While rotating propeller, place engine shift lever in "R" (Reverse) position. If propeller can be rotated in either direction, length of shift link rod must be increased and Steps "a" thru "c" repeated.
   d. Place engine shift lever in "N" (Neutral) position. Propeller should turn freely without drag. If not, length of shift link rod must be decreased and Steps "a" thru "d" repeated.

Throttle Cable Installation and Adjustment to Engine

IMPORTANT: Turn throttle cable conduit clockwise until bottomed on tiller handle then back off one turn before reconnecting throttle cable to engine.

1. Rotate throttle twist grip fully clockwise to stop "IDLE" position.
2. Back out set screw from throttle cable barrel until 2 or 3 threads of set screw are exposed.

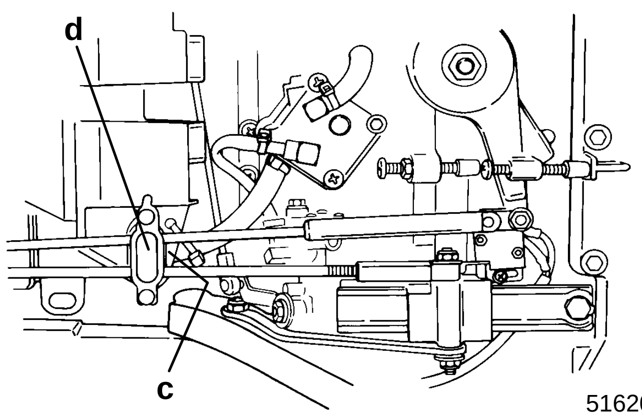


a - Set Screw
b - Throttle Cable Barrel

3. Place end of throttle cable guide over peg of throttle lever and secure with locknut and washer. Tighten until snug then back off 1/4 turn.

IMPORTANT: DO NOT exceed 1/4 turn on set screw after it has bottomed-out.

4. Holding engine throttle lever against idle stop, adjust throttle cable barrel to slip into upper hole of barrel receptacle, with a very light preload of throttle lever against idle stop. Apply small amount of Loctite 271 to threads of allen screw and tighten until snug, then an additional 1/8 turn. Lock barrel in place with barrel retainer.



c - Barrel Receptacle
d - Barrel Retainer

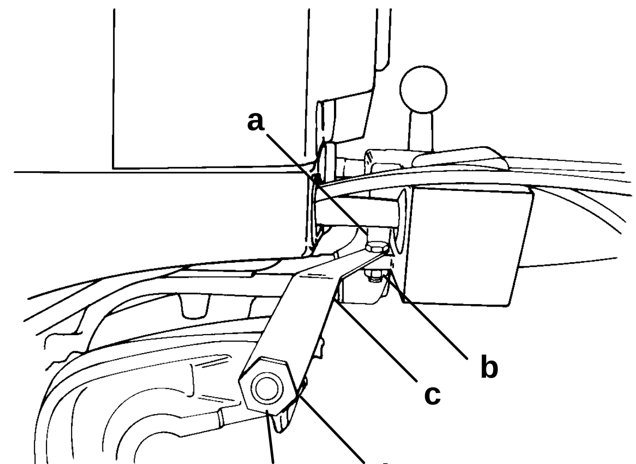
5. Check preload on throttle cable by placing a thin piece of paper between idle stop screw and idle stop. Preload is correct when paper can be removed without tearing, but has some drag on it. Readjust cable barrel, if necessary.
6. Reinstall outboard cowling.
7. Reconnect POSITIVE (+) and NEGATIVE (–) cables to battery.

Co-Pilot Installation

⚠ WARNING

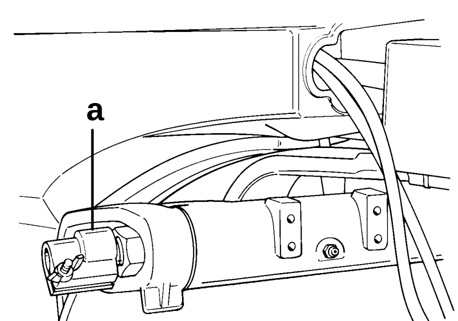
Co-Pilot Assembly (supplied) MUST BE installed on tiller handle models.

1. Remove and discard shipping bracket components, if installed.



a - Bolt
b - Nut
c - Shipping Bracket
d - Washer
e - Nut

2. Thread friction device onto starboard end of tile tube, until securely tightened and position wing nut toward front of outboard as shown.



a - Friction Device

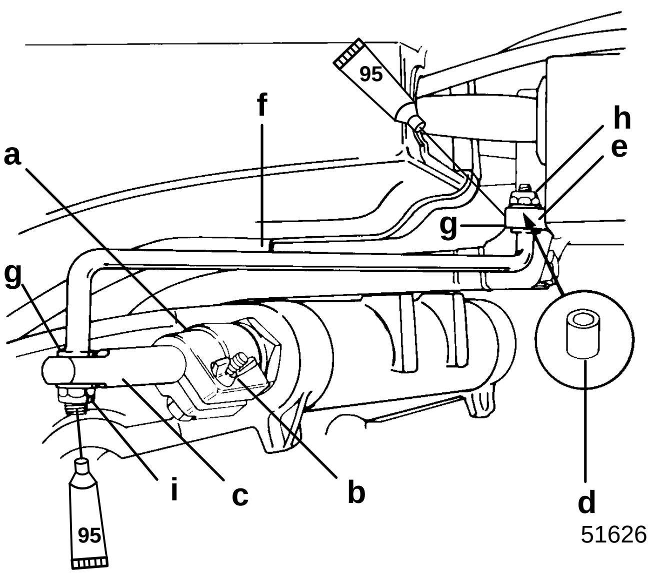
3. Loosen wing nut on friction device and insert pilot rod thru friction device and into tilt tube.

4. Lubricate both ends of link rod with Quicksilver 2-4-C w/Teflon.
5. Secure link rod between steering handle assembly and pilot rod end as shown.
6. Adjust wing nut on friction device to provide desired steering control.

IMPORTANT: Tighten wing nut to increase friction; loosen to decrease friction.

⚠ WARNING

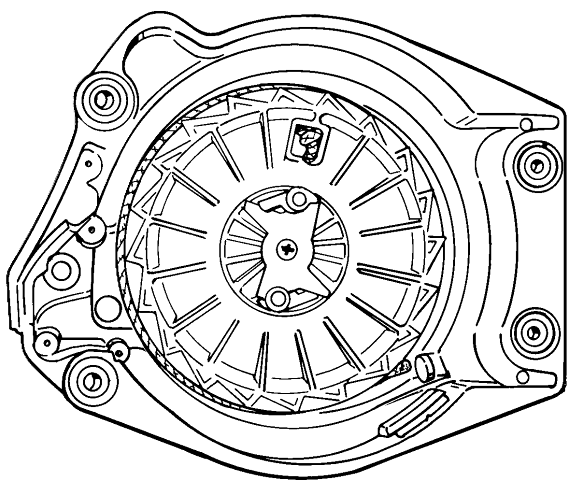
If wing nut is tightened, it may not be possible to steer the outboard in an emergency.



95 2-4-C With Teflon (92-825407A12)

a - Steering Friction Device
b - Wing Nut
c - Pilot Rod
d - Spacer (Hidden) - Place in hole of steering handle assembly.
e - Steering Handle Assembly
f - Link Rod - Short bend of link rod to steering handle
g - Flat Washer (2)
h - Locknut - Torque to 120 lb. in. (13.6 N·m)
i - Locknut - Tighten until it seats - DO NOT exceed 120 lb. in. (13.6 N·m), then back off 1/4 Turn.

MANUAL STARTER



51605

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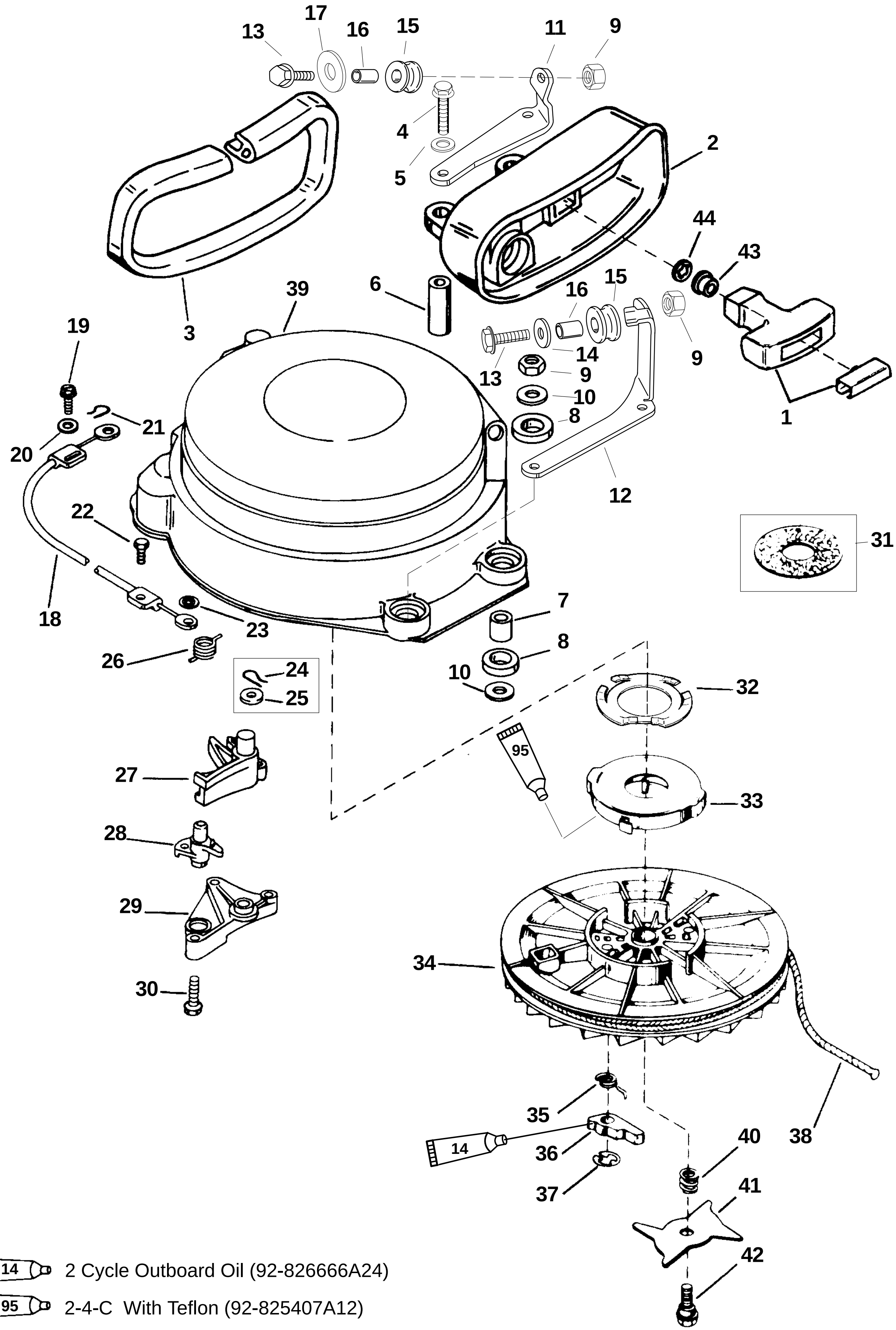
Notes:

Starter Assembly (Manual)



14 2 Cycle Outboard Oil (92-826666A24)

95 2-4-C With Teflon (92-825407A12)

Starter Assembly (Manual)

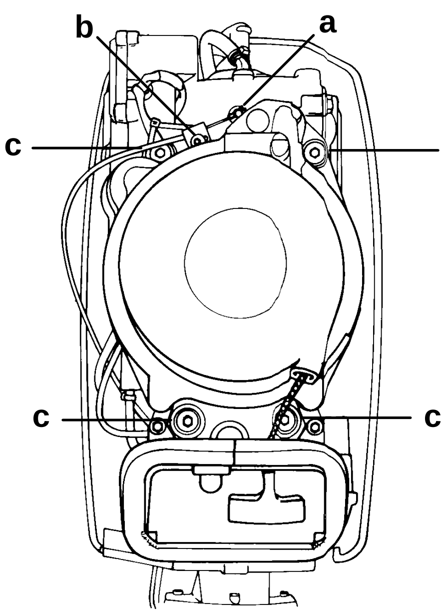
REF. NO.	QTY.	DESCRIPTION	TORQUE lb. in.	TORQUE lb. ft.	TORQUE N·m
1	1	HANDLE ASSEMBLY			
2	1	REST			
3	1	SEAL			
4	2	SCREW (M6 x 50)			
5	2	WASHER			
6	2	SPACER			
7	4	BUSHING			
8	8	GROMMET			
9	4	NUT **(S/N- & BELOW)**	90		10.2
	6	NUT **(S/N & UP)**			
10	8	WASHER **(S/N- & BELOW)**			
	6	WASHER			
11	1	BRACKET			
12	1	BRACKET			
13	2	SCREW	40		
14	1	WASHER **S/N & UP**			
15	2	PULLEY KIT			
16	2	SPACER			
17	1	WASHER			
18	1	INTERLOCK CABLE			
19	1	SCREW (10-16 x 5/8)	Drive Tight		
20	1	WASHER			
21	1	COTTER PIN			
22	1	SCREW	Drive Tight		
23	1	PUSH NUT **(DESIGN I)**			
24	1	WASHER **DESIGN II**			
25	1	COTTER PIN			
–	1	STARTER HOUSING **(S/N–0G242650 & BELOW)**			
–	1	STARTER HOUSING **(S/N–0G242651 & UP)**			
26	1	SPRING			
27	1	INTERLOCK LEVER **(S/N–0G242650 & BELOW)**			
	1	INTERLOCK LEVER **(S/N–0G242651 & UP)**			
28	1	CAM			
29	1	RETAINER			
30	3	SCREW (10-16 x 1)			
31	1	FELT PAD **(DESIGN I)**			
32	1	WASHER **(DESIGN II)**			
33	1	SPRING			
34	1	STARTER SHEAVE			
35	2	SPRING			
36	2	CAM			
37	2	RETAINING RING			
38	1	STARTER ROPE			
39	1	STARTER HOUSING			
40	1	SPRING			
41	1	CAM			
42	1	SCREW (1/4-20)	135		15.3
43	1	BUSHING			
44	1	RETAINING RING			

Rewind Starter Disassembly

⚠ WARNING

When disassembling and reassembling rewind starter, SAFETY GLASSES must be worn in case rewind spring uncoils out of the housing.

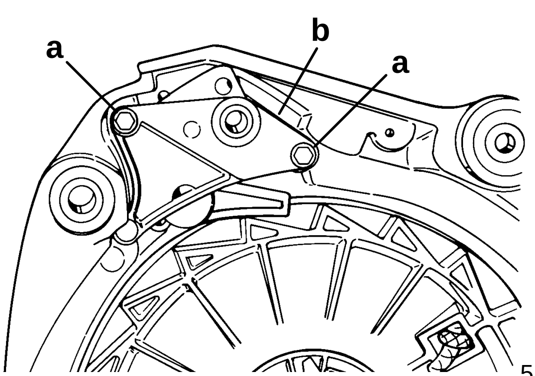
1. Untie knot in starter rope and release starter rope to allow rewind spring to unwind.
2. Remove retaining clip and attaching screw which secures shift interlock cable to starter housing.
3. Remove rewind starter from engine.



51606

a - Retaining Clip
b - Screw
c - Bolts (4)

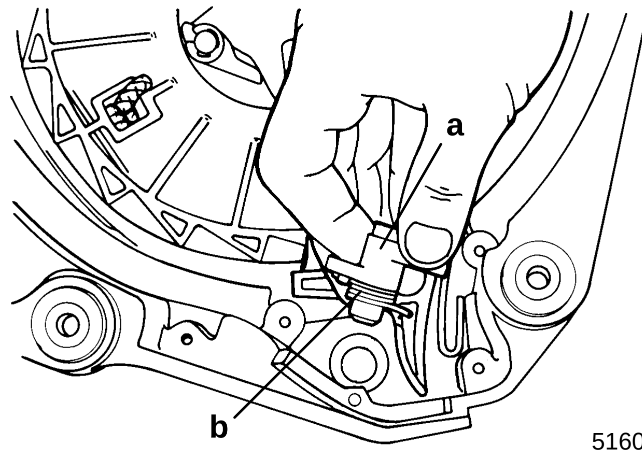
4. Remove cam retainer.



51605

a - Screws (2)
b - Retainer

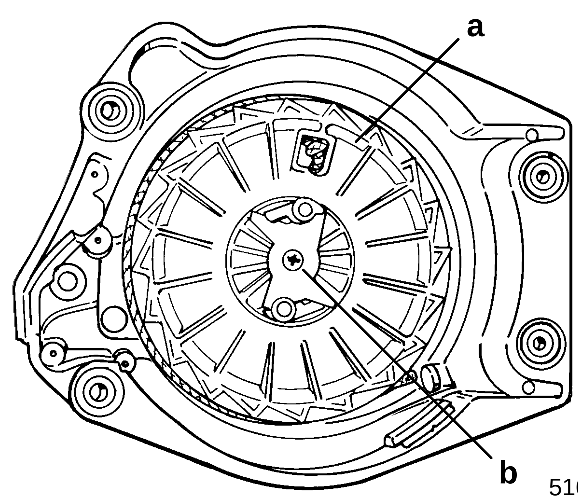
5. Remove cam and spring.



51605

a - Cam
b - Spring

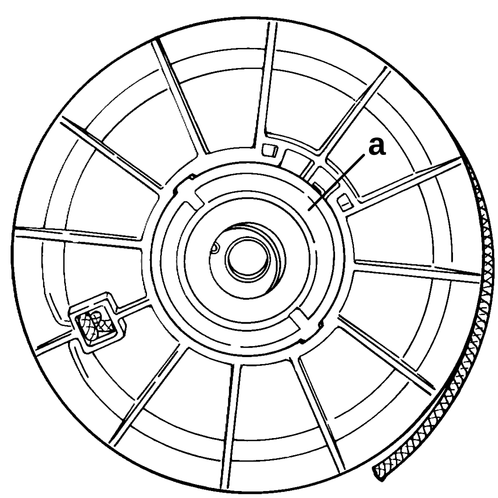
6. Remove starter sheave.



51605

a - Starter Sheave
b - Screw

7. Spring is replaced as a spring/cover assembly.



51607

a - Spring Assembly

Cleaning and Inspection

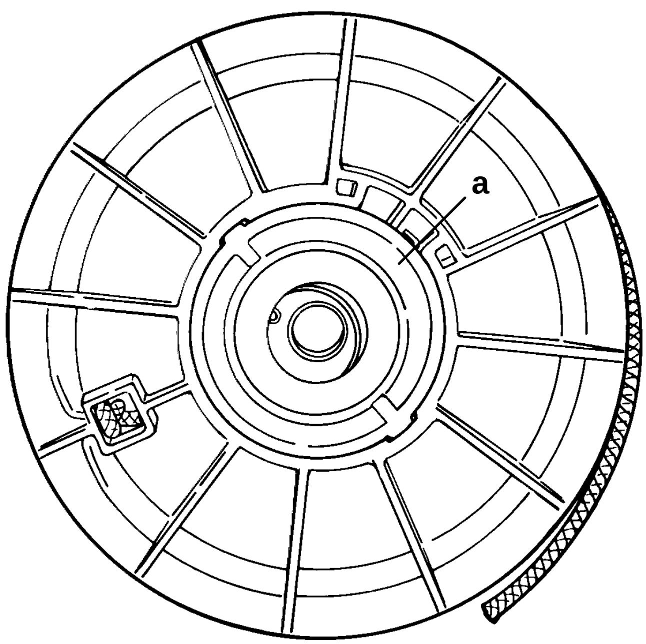
1. Clean components in solvent and dry with compressed air.
2. Inspect rewind spring for kinks, burrs, corrosion of breakage.
3. Inspect starter sheave, rope guide and starter housing for nicks, grooves, cracks, wear or distortion, especially area of rope travel.
4. Inspect bushing, starter drive pawl and spring for wear or damage.
5. Inspect starter rope for wear.
6. Replace components as necessary.

Rewind Starter Reassembly

⚠ WARNING

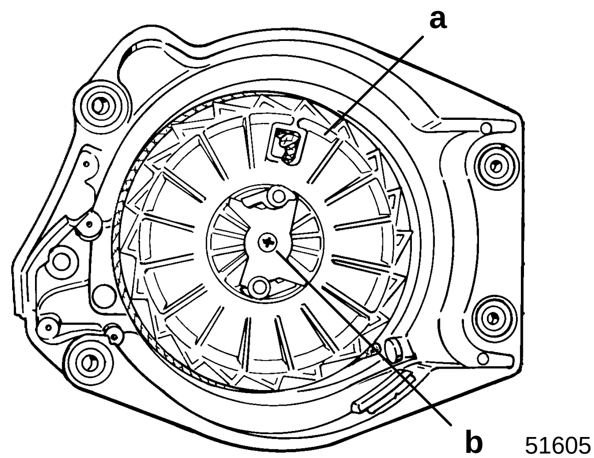
When reassembling rewind starter, SAFETY GLASSES must be worn in case rewind spring uncoils out of the housing.

1. Install spring/cover assembly into sheave.



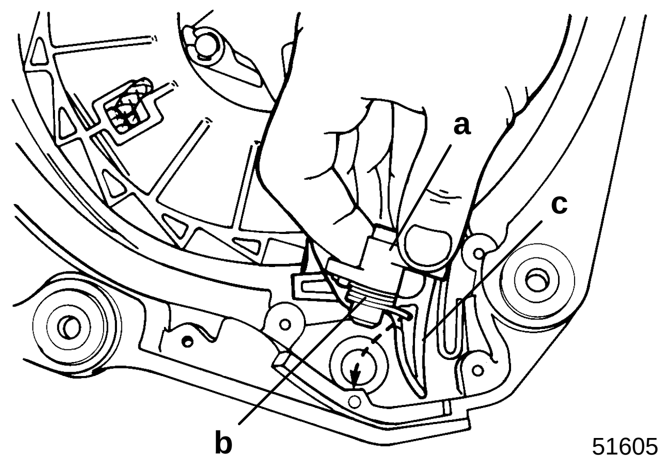
a - Spring Assembly

2. Install starter sheave to housing and secure in place with screw. Torque to 135 lb. in. (15.3 N·m).



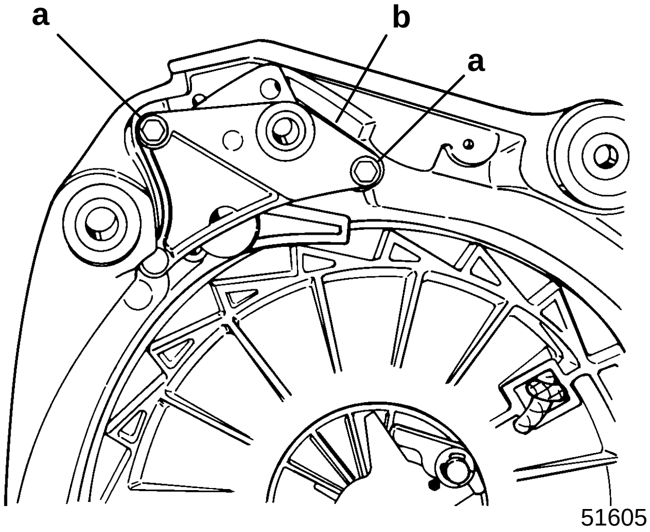
a - Starter Sheave
b - Screw

3. Install interlock lever, cam and spring into housing. Position spring on cam as shown.



a - Cam
b - Spring
c - Interlock Lever

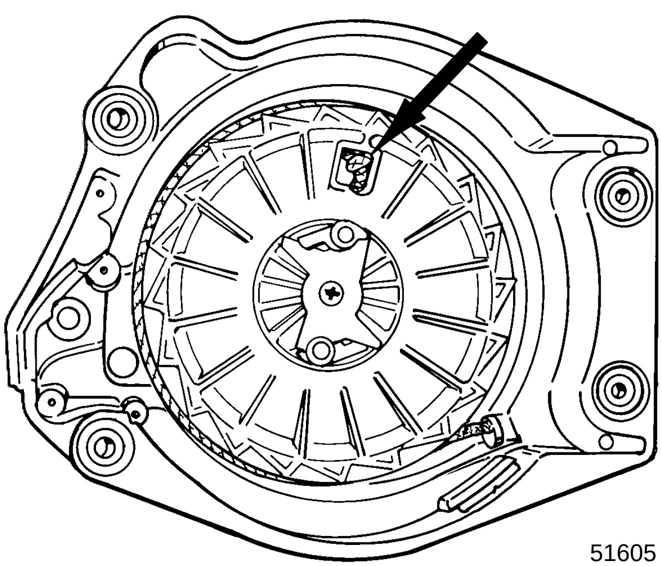
4. Install cam retainer.



a - Screws (2)
b - Cam Retainer

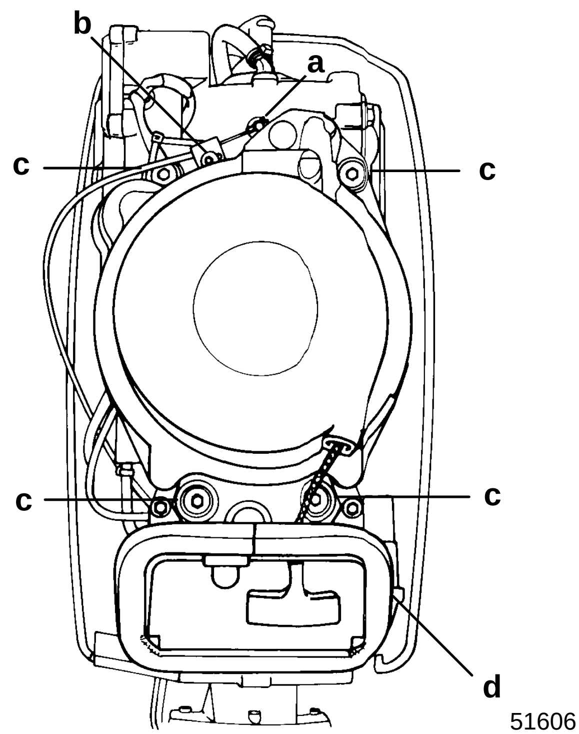
Adjusting Rewind Spring Tension

1. Rotate sheave counterclockwise until it stops (coil is bound). Then back off one full turn, plus what is needed to align rope end with hole in housing. Never back off sheave less than one full turn.
2. Route starter rope thru rope guide in housing. Tie a slip knot in rope approximately 12 in. (305 mm) from end of rope.



NOTE: *Check operation of rewind and rewind tension before outboard installation.*

3. Install rewind starter to engine.
4. Pull starter rope thru bracket, handle, and rope retainer. Secure rope retainer with knot in rope.



a - Retaining Clip
b - Screw
c - Nuts (4) Torque to 90 lb. in. (10.2 N·m)
d - Bracket