



POWERHEAD

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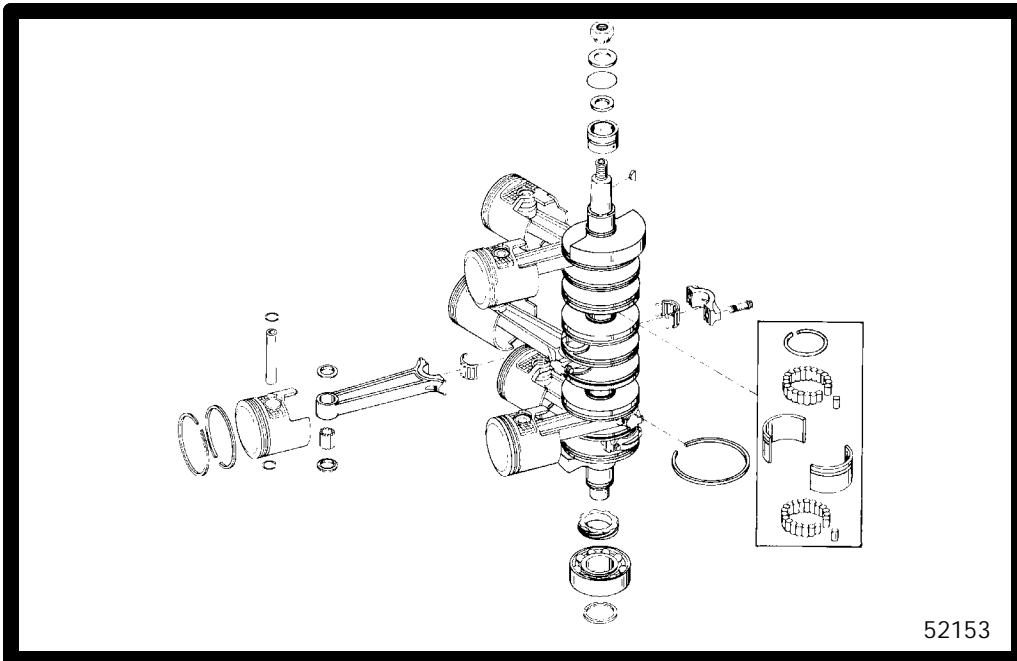




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Powerhead Specifications

Block

Type 60° V, 2 Cycle
Displacement 185.9 cu. in. (3047cc)

Reed Valve Opening

Opening (Max.) 0.020 in. (0.50mm)

Stroke

Length 3.00 in. (76.2mm)

Cylinder Bore

Dia. Standard 3.625 in. (92.1mm)
0.015 Oversize 3.640 in. (92.5mm)
0.030 Oversize 3.655 in. (92.8mm)

Taper/Out of Round Max. 0.003 in. (0.076mm)

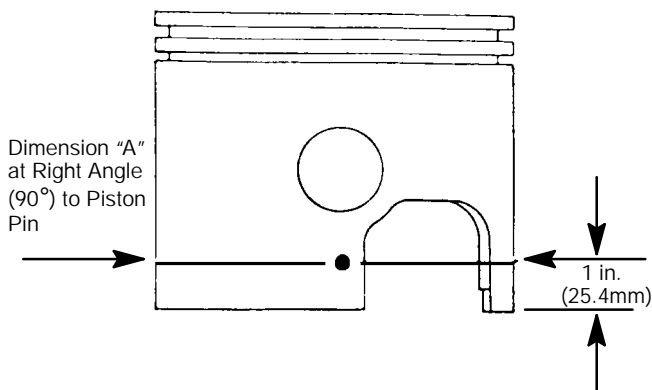
Piston

Dia. Standard 3.6210 in. ±.0005 in.
(91.97mm ±.013mm)
0.015 Oversize 3.636 in. ±.0005 in.
(92.35mm ±.013mm)
0.030 Oversize 3.666 in. ±.0005 in.
(93.1mm ±.013mm)

Compression

All Models - Using a fully charged battery, throttle shutters wide open and cylinder block warm - 90 - 110 psi (616.3 - 753.3 kPa)
Variance between cylinders should not exceed 15 psi (102.7 kPa)

IMPORTANT: Using a micrometer, measure dimension "A" at location shown. Dimension "A" should be 3.6210 in. ±.0005 for a STANDARD size piston.

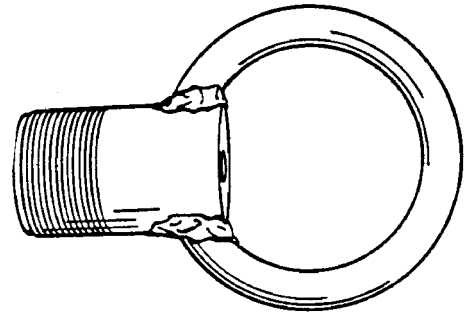


Piston Ring

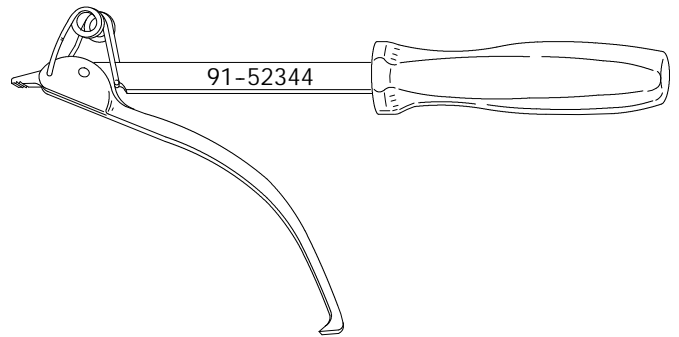
End Gap 0.010 in. to 0.018 in.
(0.25mm to 0.46mm)

Special Tools

Lifting Eye 91-90455



Flywheel Holder 91-52344

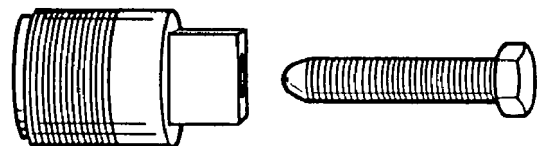


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Protector Cap 91-24161

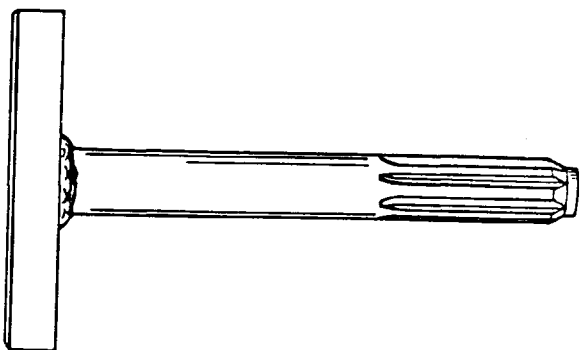


Flywheel Puller 91-73687A1

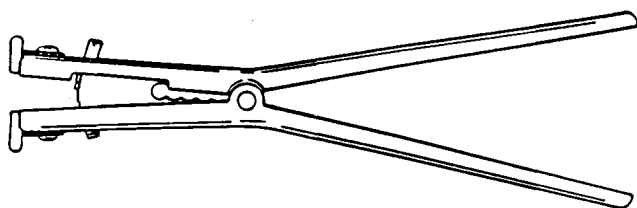




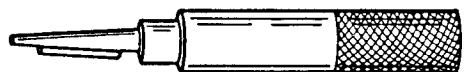
Powerhead Stand 91-30591A1



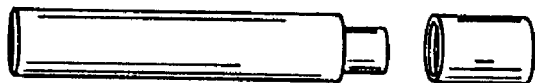
Piston Ring Expander 91-24697



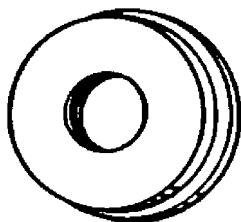
Lockring Removal Tool 91-52952A1



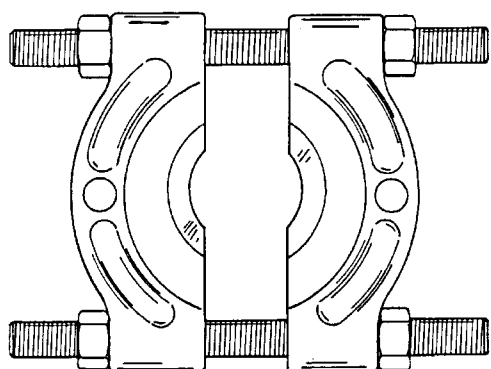
Piston Pin Tool 91-92973A1



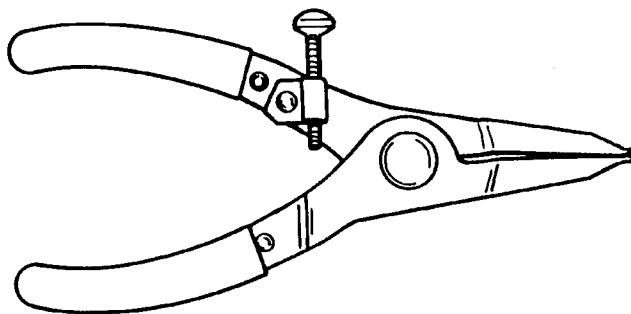
Driver Head 91-55919



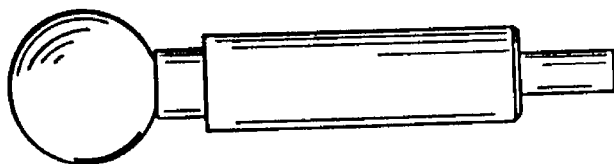
Universal Puller Plate 91-37241



Snap Ring Pliers 91-24283

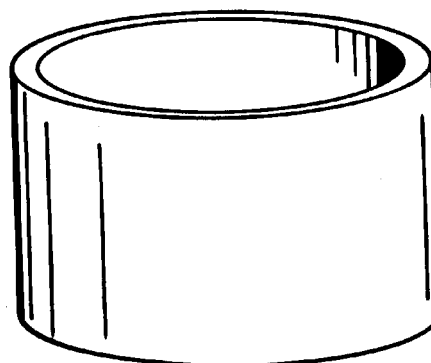


Lockring Installation Tool 91-91-93004A2

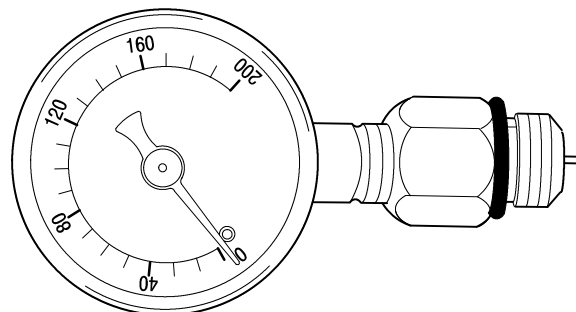


**Note: If 3.4 Liter Piston Lock Ring Installer (91-93004A1) is available, then only Guide (91-93005-1) is required to install 3 Litre piston lock rings.*

Piston Ring Compressor 91-823237



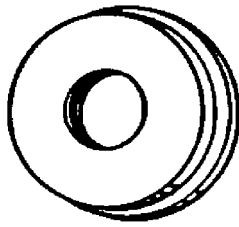
Compression Tester 91-29287



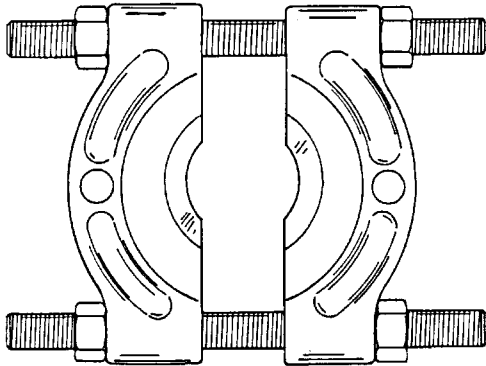
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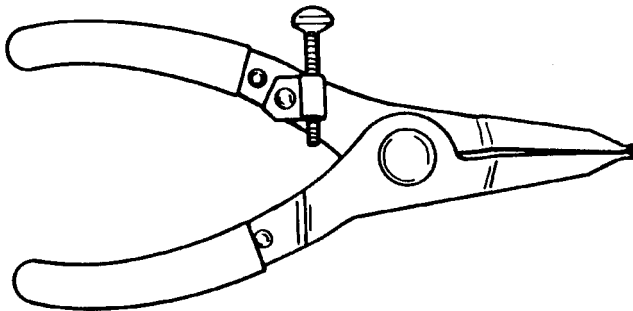
Driver Head 91-55919



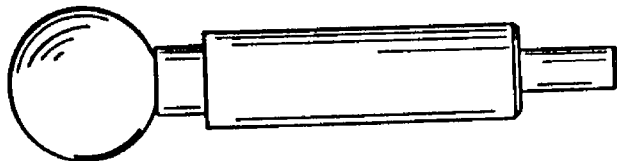
Universal Puller Plate 91-37241



Snap Ring Pliers 91-24283



Lockring Installation Tool 91-91-77109A1



Powerhead Repair Stand

A powerhead repair stand may be purchased from:

Bob Kerr's Marine Tool Co.

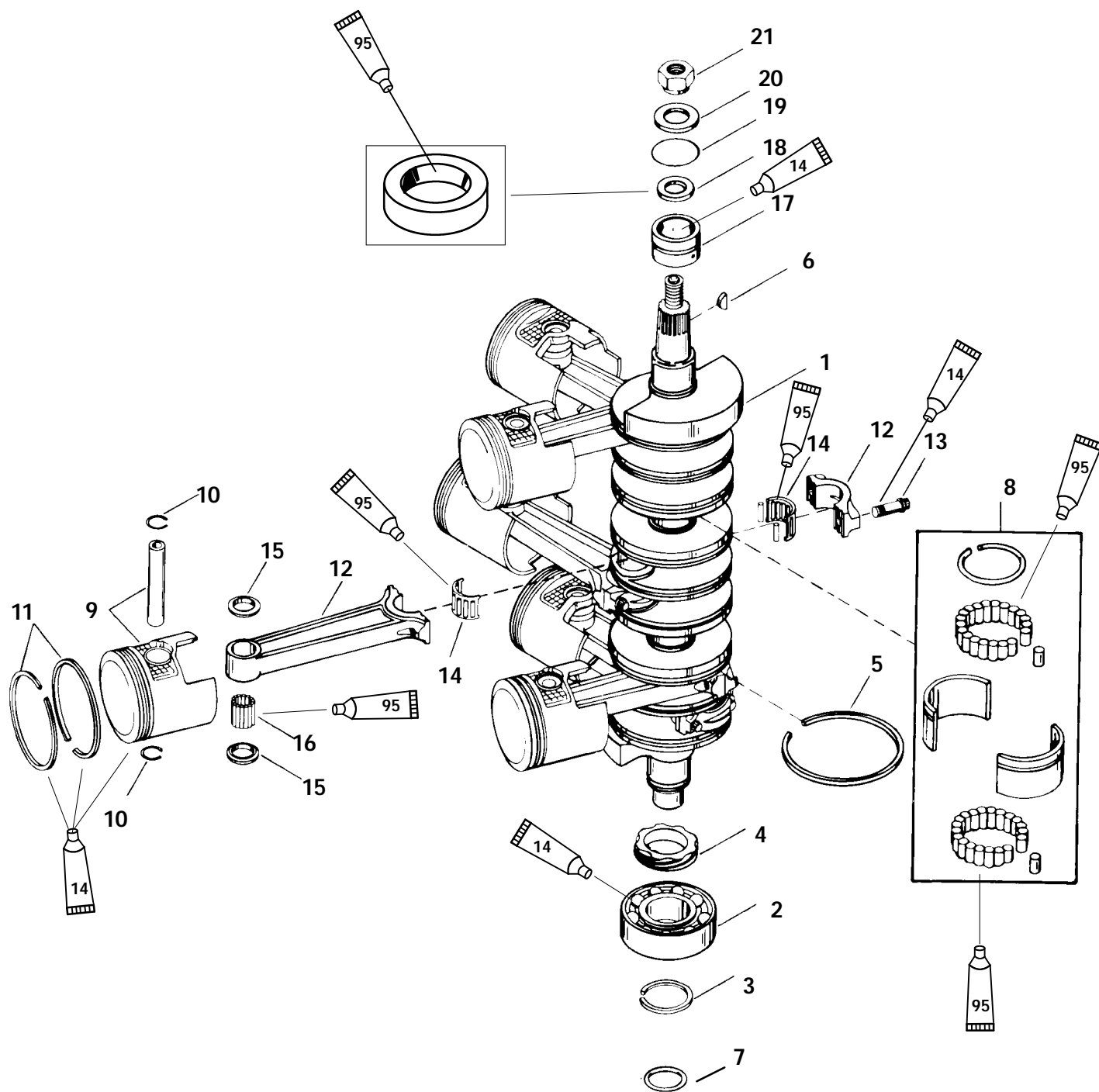
P.O. Box 1135

Winter Garden, FL 32787

Telephone: (305) 656-2089



Crankshaft - Pistons - and Connecting Rods



 14 2 Cycle Outboard Oil (92-826666A24)

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



Crankshaft - Pistons - and Connecting Rods

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	CRANKSHAFT (8 TOOTH SPLINES)			
1	1	CRANKSHAFT (13 TOOTH SPLINES)			
1	1	CRANKSHAFT			
2	1	BALL BEARING (LOWER)			
3	1	RETAINING RING			
4	1	DRIVER GEAR			
5	7	SEAL RING			
6	2	WOODRUFF KEY			
7	1	O RING			
8	2	BEARING RACE			
9	3	PISTON (STBD-STANDARD)			
9	3	PISTON (PORT-STANDARD)			
9	AR	PISTON (STBD-.015 O/S)			
9	AR	PISTON (PORT-.015 O/S)			
9	AR	PISTON (STBD-.030 O/S)			
9	AR	PISTON (PORT-.030 O/S)			
10	12	LOCK RING			
11	1	PISTON RING (STANDARD)			
11	AR	PISTON RING (.015 O/S)			
11	AR	PISTON RING (.030 O/S)			
12	6	CONNECTING ROD ASSEMBLY			
13	12	SCREW (1-1/4 ²) Important: It is recommended that connecting rod bolts be discarded after removal and new bolts be installed.			
					Apply Light Oil to Threads and Bolt Face: 1st Torque - 15 lb. in. (1.7 N·m) 2nd Torque - 30 lb. ft. (41.0 N·m) Turn Bolt an Additional 90° after 2nd Torque is Attained.
14	6	BEARING CAGE			
15	12	THRUST WASHER			
16	204	ROLLER BEARING			
17	1	MAIN BEARING (UPPER)			
18	1	OIL SEAL			
19	1	O RING			
20	1	WASHER			
21	1	NUT (M16 x 1.5)		125	170.0

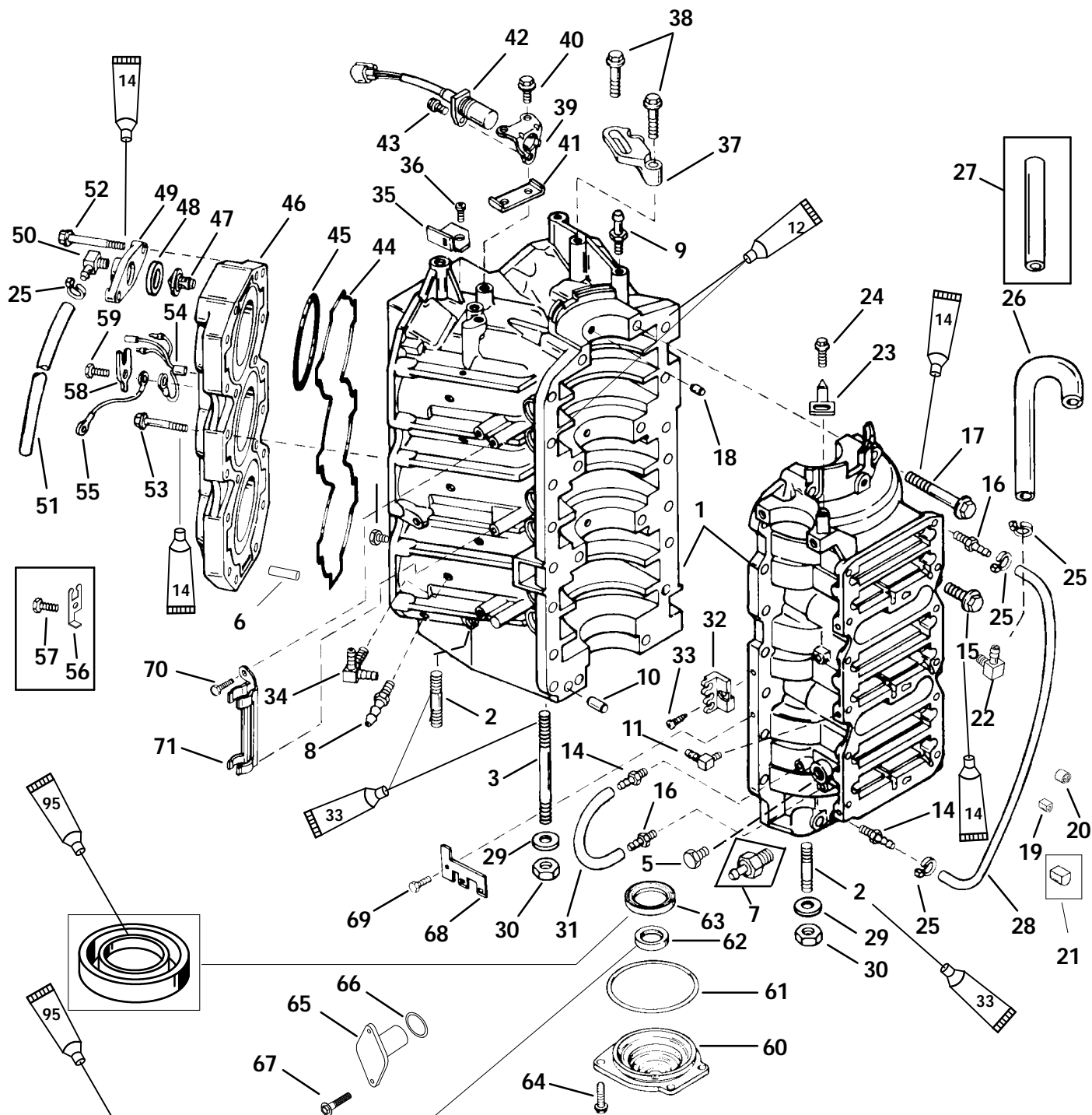
S/N-0G129221 & BELOW (8 TOOTH SPLINES)

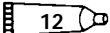
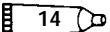
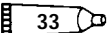
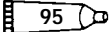
S/N-0G129222 THRU 0G303045 (13 TOOTH SPLINES)

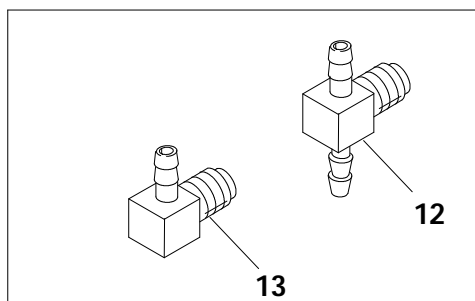
NOTE: WHEN ORDERING REPLACEMENT POWERHEAD FOR ENGINES WITH S/N-0G178947 & BELOW, REFER TO SERVICE BULLETIN #94-11 AND ORDER EXHAUST PLATE KIT 818450A1, IF NECESSARY.



Cylinder Block and End Cap



-  12 Loctite Master Gasket (92-12564-1)
-  14 2 Cycle Outboard Oil (92-826666A24)
-  33 Loctite 680 (92-809833)
-  95 2-4-C With Teflon (92-825407A12)





Cylinder Block and End Cap

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	CYLINDER BLOCK (S/N-0G129221 & BELOW)			
	1	CYLINDER BLOCK (S/N-0G129222 thru 0G437999)			
	1	CYLINDER BLOCK (S/N-0G438000 & UP)			
2	4	STUD (M10 x 1.5 x 64)			
3	6	STUD (M10 x 1.5 x 155)			
4	1	PIPE PLUG (1/8 IN.)			
5	1	PIPE PLUG (1/4 IN.-18)(SEAPRO/MARATHON)			
6	4	WATER DEFLECTOR (S/N-0G438000 & UP)			
7	1	CHECK VALVE			
8	6	FITTING			
9	2	PIN			
10	1	DOWEL PIN			
11	6	FITTING (S/N-0G437999 & BELOW)			
	12	FITTING (S/N-0G438000 thru 0G485988)			
12	6	CHECK VALVE T-FITTING S/N-0G485989 & UP			
13	6	CHECK VALVE			
14	2	CHECK VALVE			
15	14	SCREW (M8 x 35)		21	29.0
16	2	CHECK VALVE			
17	8	SCREW (M10 x 1.5)	Note		
18	3	CENTER MAIN PIN			
19	1	CARRIER ASSEMBLY (Includes 6 Carriers)			
20	6	CHECK VALVE			
21	6	STOP PLUG (S/N-0G438000 & UP)			
22	1	ELBOW (W/Ref.#24)(S/N-0G129222 & UP)			
	1	ELBOW (45 degrees)(S/N-0G129221 & BELOW)			
23	1	TIMING POINTER			
24	1	SCREW (M6 x 1)	100		11.3
25	AR	STA-STRAP			
26	1	TUBING-MOLDED(S/N-0G129222 & UP)			
27	1	TUBING (9-1/4 IN.)(S/N-0G129221 & BELOW)			
28	1	TUBING (22-1/2 IN.)			
29	10	WASHER			
30	10	NUT		50	68.0
31	1	TUBING (4 IN.)(S/N-0G437999 & BELOW)			
	1	TUBING (3-3/4 IN.)(S/N-0G438000 & UP)			
32	2	RETAINER- check valve			

☞ = S/N-0G129222 & UP (13 TOOTH SPLINES)

☜ = S/N-0G129221 & BELOW (8 TOOTH SPLINES)

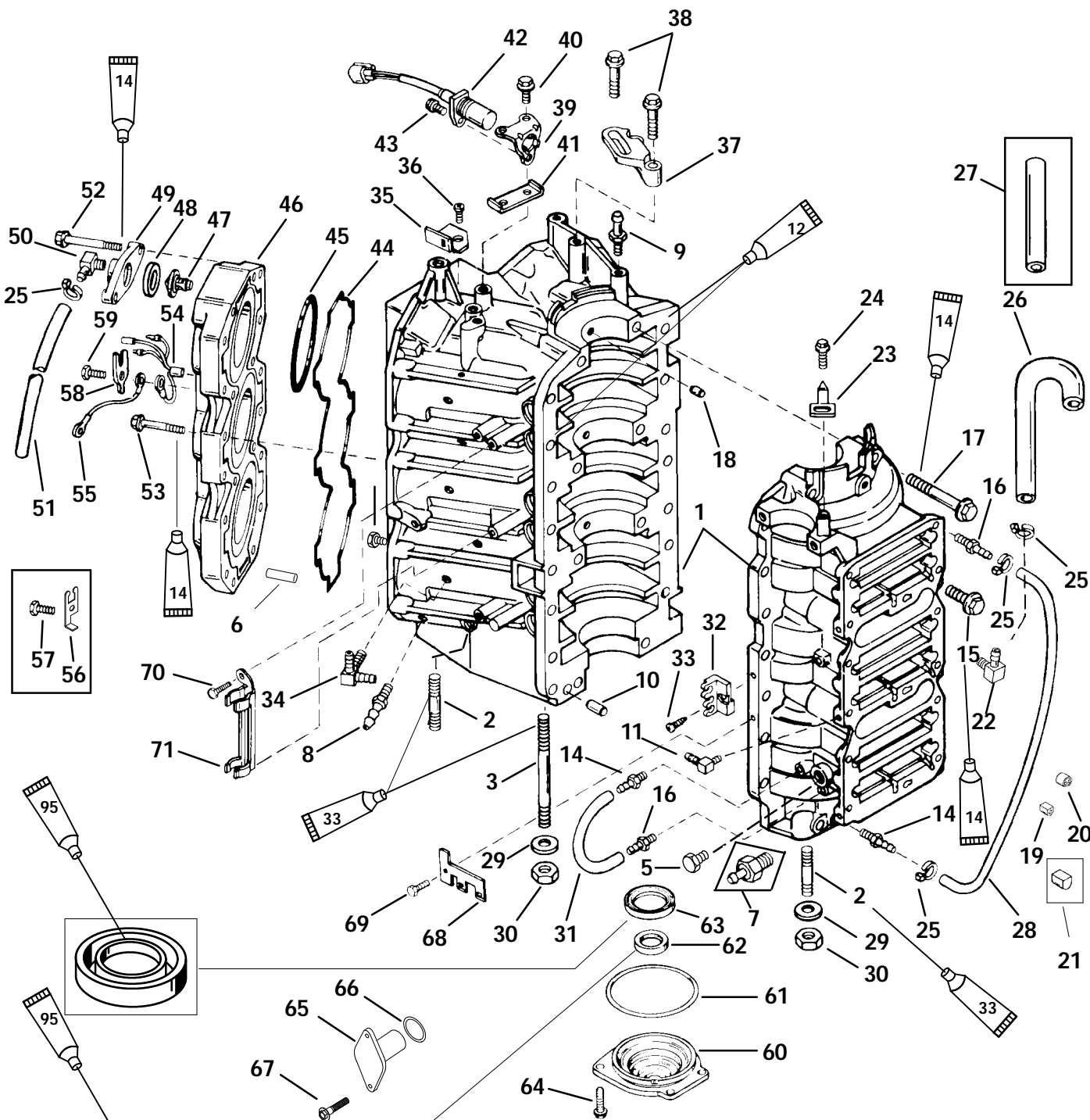
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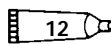
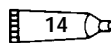
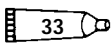
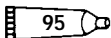
* = NOTE: WHEN ORDERING REPLACEMENT POWERHEAD FOR ENGINES WITH S/N-0G178947 & BELOW, REFER TO SERVICE BULLETIN #94-11, AND ORDER EXHAUST PLATE KIT 818450A1 IF NECESSARY.

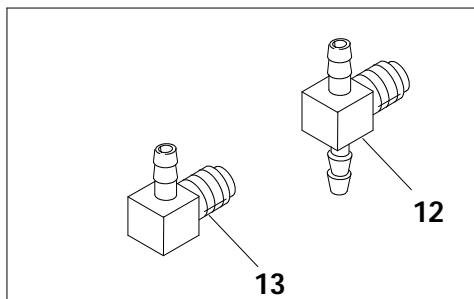
Note: Torque bolt to 30 lb. ft. (41.0 N·m) and rotate 90 degrees



Cylinder Block and End Cap



-  12 Loctite Master Gasket (92-12564-1)
-  14 2 Cycle Outboard Oil (92-826666A24)
-  33 Loctite 680 (92-809833)
-  95 2-4-C With Teflon (92-825407A12)





Cylinder Block and End Cap

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
33	2	SCREW (#10-16 x 1/2 IN.)	Drive Tight		
34	6	FITTING			
35	1	BRACKET (S/N-0G129222 & UP)(SEAPRO/MARATHON)			
	1	BRACKET (S/N-0G129221 & BELOW)			
36	1	SCREW (M6 x 1)	100		11.3
37	1	BRACKET- alternator			
38	2	SCREW (M8 x 50)		23	31.0
39	1	BRACKET			
40	2	SCREW (M6 x 1)	100		11.3
41	1	GUIDE BRACKET			
42	1	SENSOR			
43	1	SCREW (M5 x 10)	50		5.6
44	2	SEAL- cylinder head			
45	6	O RING			
46	2	CYLINDER HEAD (SEAPRO/MARATHON)			
	2	CYLINDER HEAD (S/N-0G303045 & BELOW)			
	2	CYLINDER HEAD (S/N-0G303046 & UP)			
47	2	THERMOSTAT (143 degrees)(S/#-0G438000 & UP)			
	2	THERMOSTAT (143 degrees)(S/#-0G437999 & BELOW)			
48	2	GASKET- thermostat			
49	2	COVER- thermostat			
50	2	ELBOW (45 Degrees) USE WITH 45 DEGREE ELBOW			
51	2	TUBING (19 IN.)(20-1/2 IN.)			
47	2	COVER- thermostat			
48	2	ELBOW (90 Degrees) USE WITH 90 DEGREE ELBOW			
49	2	TUBING (20 IN.)(21-1/2 IN.)			
52	4	SCREW (M8 x 90)	30 lb. ft. (41.0 N·m) and Rotate 90 deg.		
53	36	SCREW (M8 x 50)	20 lb. ft. (27.0 N·m) and Rotate 90 deg.		

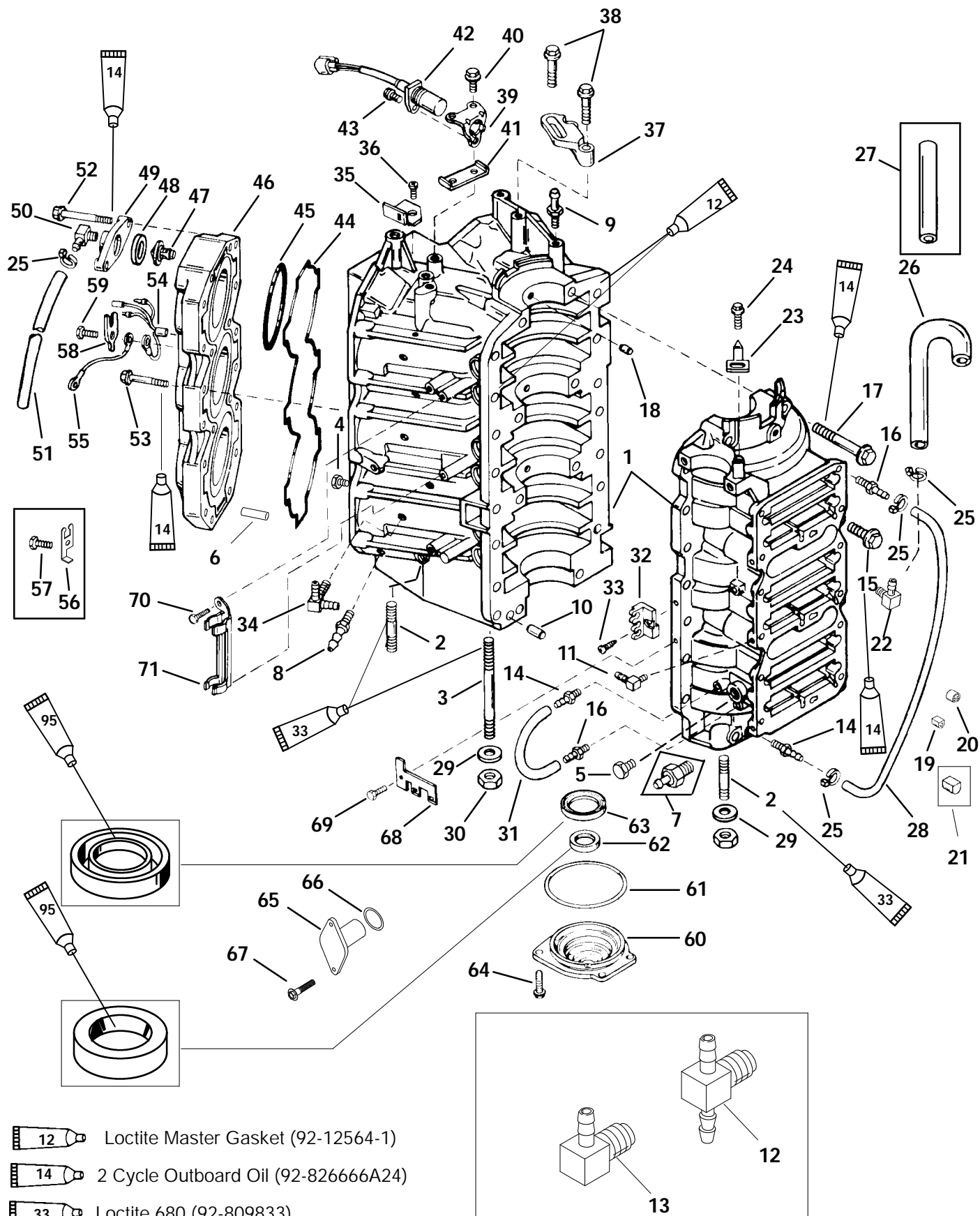
☞ = S/N-0G129222 & UP (13 TOOTH SPLINES)

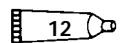
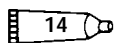
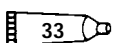
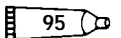
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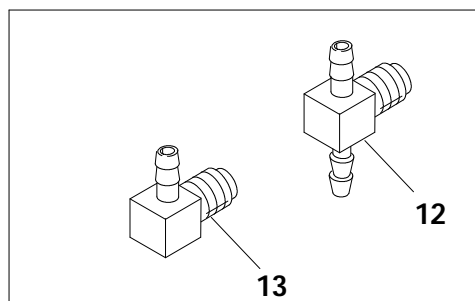
* = NOTE: WHEN ORDERING REPLACEMENT POWERHEAD FOR ENGINES WITH S/N-0G178947 & BELOW, REFER TO SERVICE BULLETIN #94-11, AND ORDER EXHAUST PLATE KIT 818450A1 IF NECESSARY.



Cylinder Block and End Cap



-  12 Loctite Master Gasket (92-12564-1)
-  14 2 Cycle Outboard Oil (92-826666A24)
-  33 Loctite 680 (92-809833)
-  95 2-4-C With Teflon (92-825407A12)





Cylinder Block and End Cap

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
54	1	TEMPERATURE SENSOR S/N-0G217420 & UP &			
55	1	CABLE (Use where applicable) SEAPRO/MARATHON			
52	1	TEMPERATURE SENSOR S/N-0G217419 & BELOW			
53	1	CABLE			
56	1	SENSOR RETAINER DESIGN I			
57	1	SCREW (.375-16 x 1/2)			
58	1	SENSOR RETAINER DESIGN II			
59	1	SCREW (M8 x 12)	200	17.0	23.0
60	1	LOWER END CAP			
61	1	O RING (S/N-0G303045 & BELOW)			
62	2	OIL SEAL See Service Bulletin 95-4			
63	1	OIL SEAL			
58	1	LOWER END CAP			
59	1	O RING S/N-0G303046 & UP			
61	2	OIL SEAL			
64	4	SCREW (M6 x 1)	85		9.6
65	1	PLUG			
66	1	O RING SEAPRO/MARATHON			
67	2	SCREW (M5 x 20)			
68	1	BRACKET			
69	1	SCREW			
70	2	SCREW (M6 x 1)	100		11.3
71	1	CLAMP			

☐ = S/N-0G129222 & UP (13 TOOTH SPLINES)

☐ = S/N-0G129221 & BELOW (8 TOOTH SPLINES)

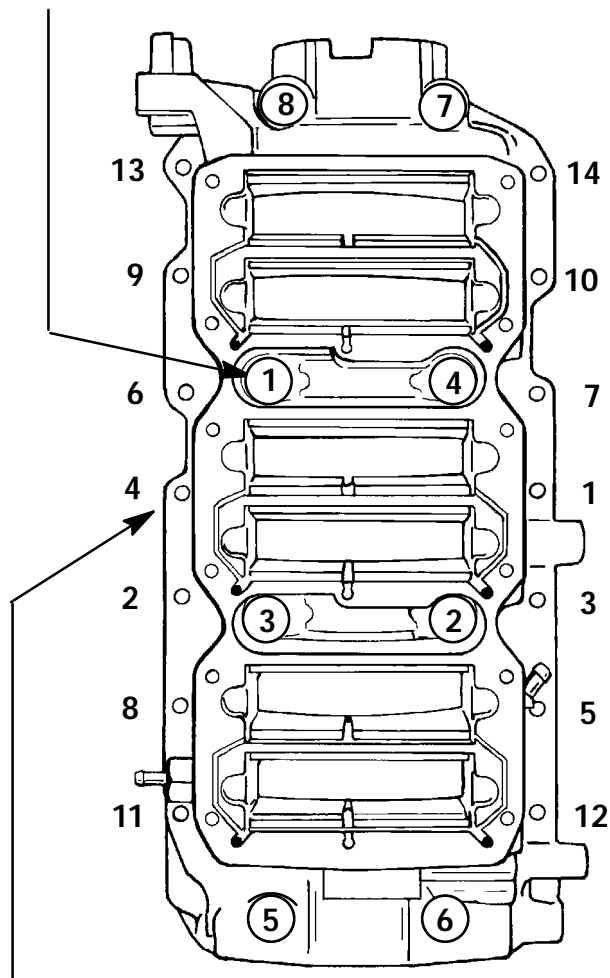
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Powerhead Torque Sequence and Torque Specifications

CRANKCASE COVER BOLTS (AND TORQUE SEQUENCE)

Add light oil to threads and bolt face:
8 Bolts (M10 x 1.5 x 80)
30 lb. ft. (40.5 N·m) and rotate 90°



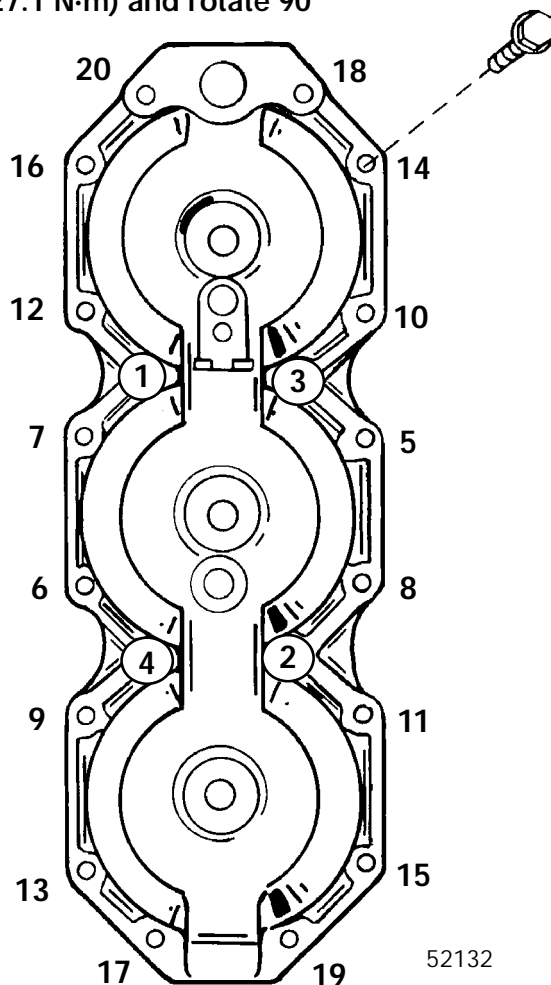
14 Bolts (M8 x 1.25 x 35)
21.0 lb. ft. (28.5 N·m)

52132

CYLINDER HEAD BOLTS (AND TORQUE SEQUENCE)

IMPORTANT

Add light oil to threads and bolt face:
Bolts 18 and 20 - Torque to 30 lb. ft. (40.5 N·m) and rotate 90°
All other bolts - Torque to 20 lb. ft. (27.1 N·m) and rotate 90°

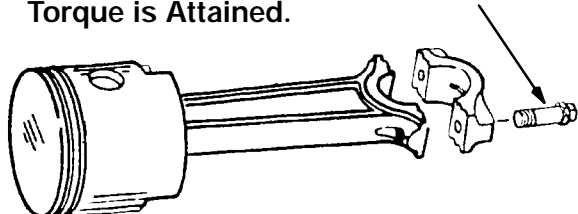


52132

PISTON ROD BOLTS

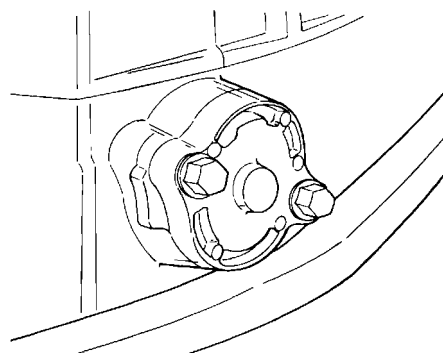
IMPORTANT: IT IS RECOMMENDED THAT ROD BOLTS BE DISCARDED AFTER REMOVAL AND REPLACED WITH NEW BOLTS.

Apply light oil to threads and bolt face:
1st Torque - 15 lb. in. (1.7 N·m.)
2nd Torque - 30 lb. ft. (40.5 N·m.)
Turn bolt an additional 90° after 2nd Torque is Attained.



RELIEF VALVE COVER BOLTS

20.0 lb. ft. (27.1 N·m)



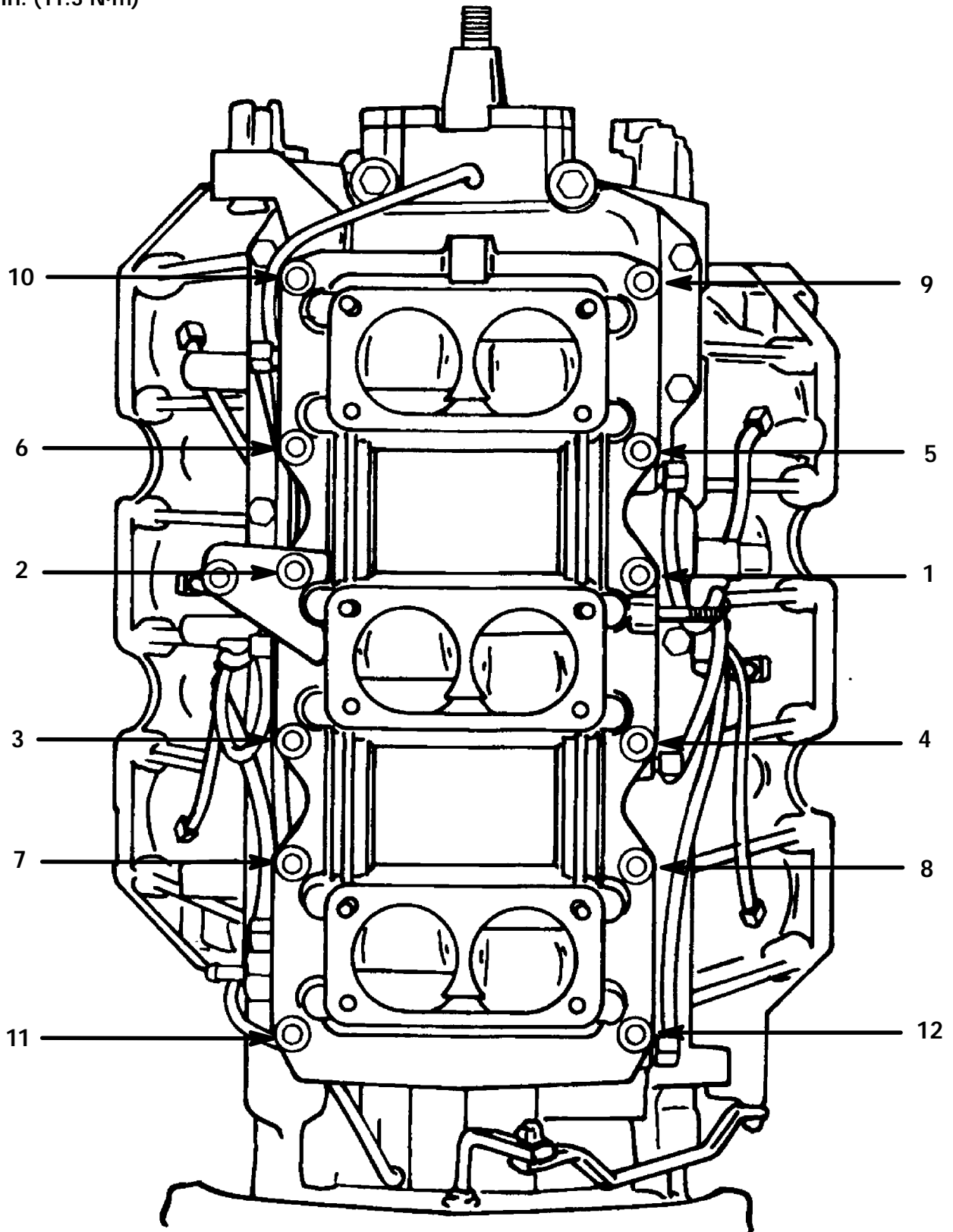
51707



Powerhead Torque Sequence

Intake Manifold

100 lb. in. (11.3 N·m)



52330



Notes:





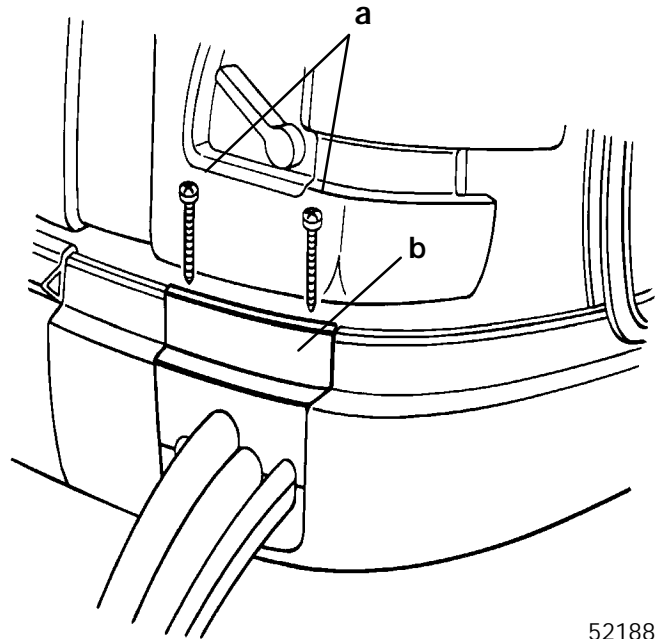
General Information

Powerhead "Disassembly" and "Reassembly" instructions are printed in a sequence that should be followed to assure best results when removing or replacing powerhead components. If complete disassembly is not necessary, start reassembly at point disassembly was stopped. (Refer to "Table of Contents," preceding.)

If major powerhead repairs are to be performed, remove powerhead from drive shaft housing. Removal of powerhead is not required for 1) inspection of cylinder walls and 2) minor repairs on components such as ignition system, carburetors, reed blocks, cylinder heads and checking operation of thermostats.

Powerhead Removal from Driveshaft Housing

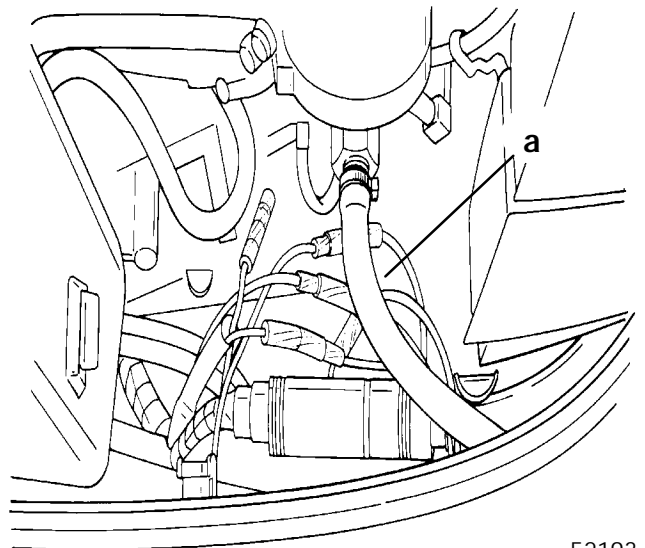
1. Disconnect battery cables from battery terminals.
2. Disconnect fuel tank hose from outboard.
3. Remove top cowling.
4. Remove two screws which secure remote control harness retainer and remove retainer.



52188

- a - Screws
- b - Retainer

5. Disconnect remote oil tank hose from pulse fitting.

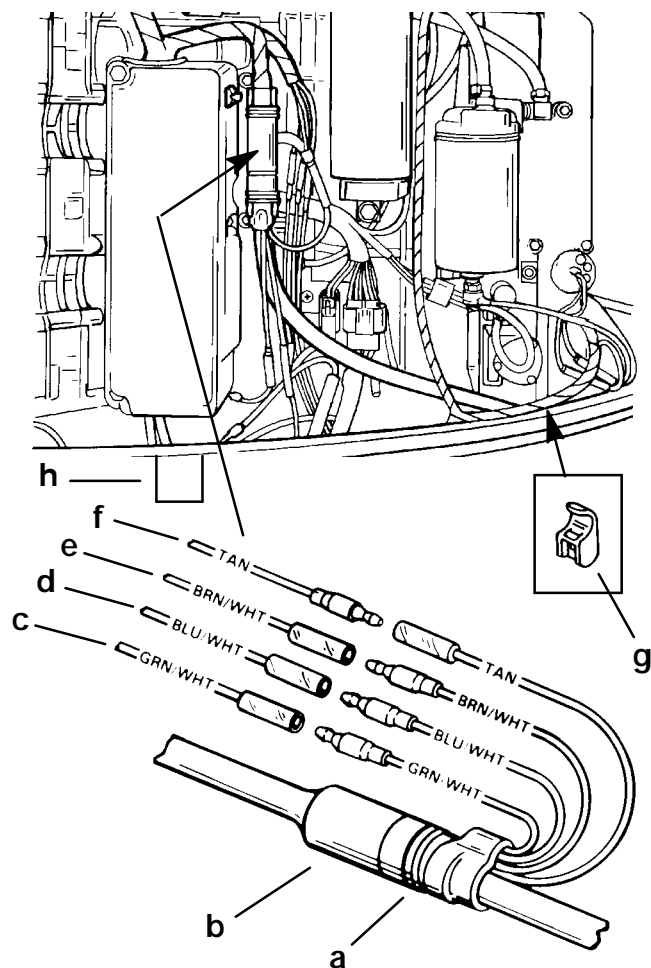


52193

- a - Oil Hose

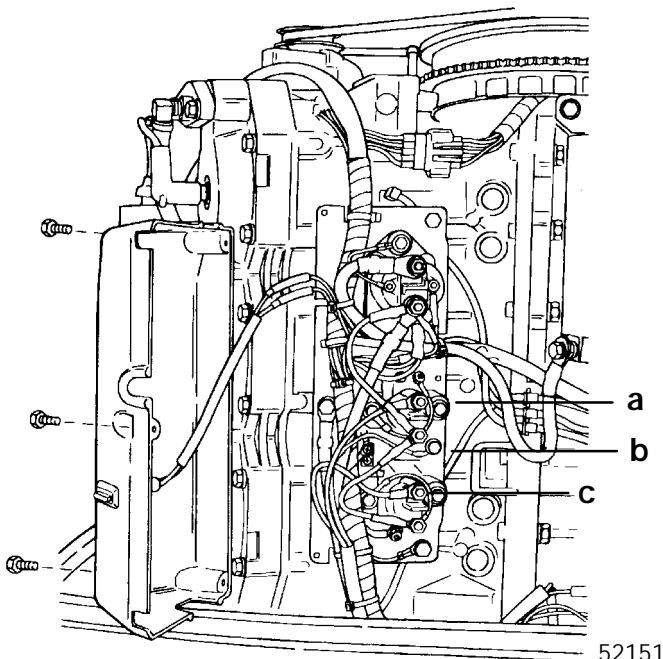


6. Disconnect remote control harness from powerhead harness connector and wires as shown.
7. Disconnect cowl mounted tilt switch harness.



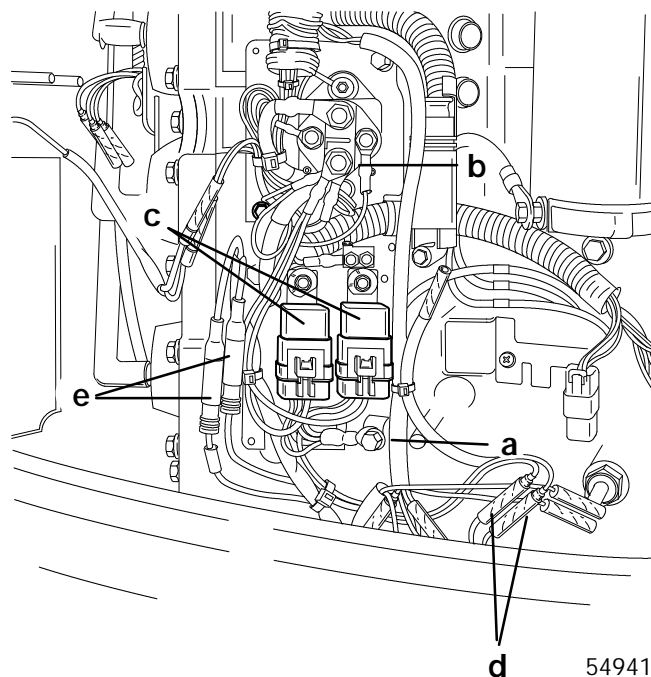
- a - Remote Wiring Harness
- b - Engine Wiring Harness Connector
- c - Lead From Trim Solenoid (Down Solenoid)
- d - Lead From Trim Solenoid (Up Solenoid)
- e - Lead From Trim Sender
- f - Lead From Temperature Sender
- g - Harness Holder (Located in Cowl)
- h - Tilt Switch

8. **MODELS WITH TRIM SOLENOIDS** - Remove BLUE, GREEN and BLACK trim harness leads from trim solenoids.



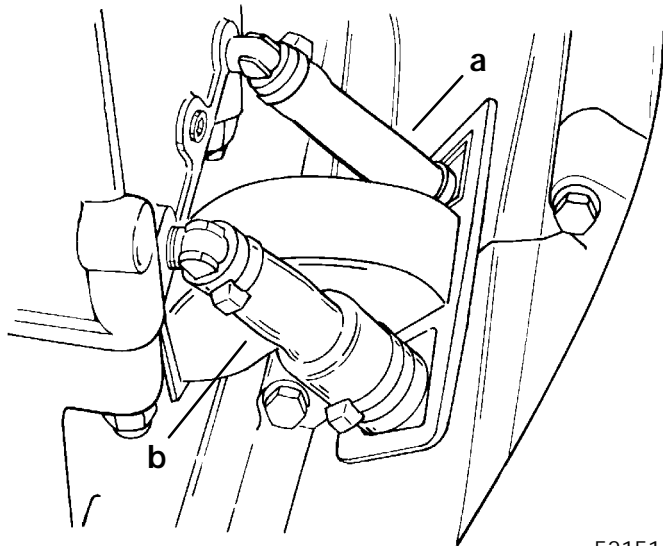
- a - BLUE Trim Lead
- b - BLACK Trim Lead
- c - GREEN Trim Lead

- MODELS WITH TRIM RELAYS** - Remove relay ground harness from lower electrical plate mounting bolt (a). Remove relay positive leads (b) (RED) from BATTERY SIDE of starter solenoid. Disconnect trim relay harness from each relay (c). Disconnect BLUE/WHITE and GREEN/WHITE trim leads from lower cowl trim switch harness (d). Disconnect BLUE (sleeve) and GREEN power trim leads from trim motor harness (e).





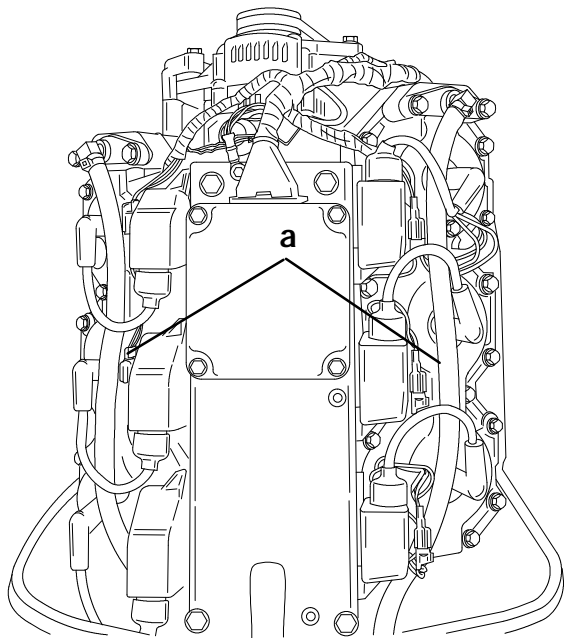
9. Remove sta-straps securing tell-tale hose and flush hose to powerhead.



a - Tell-Tale Hose
b - Flush Hose

52151

10. Disconnect bypass hoses between thermostats and exhaust adaptor plate.



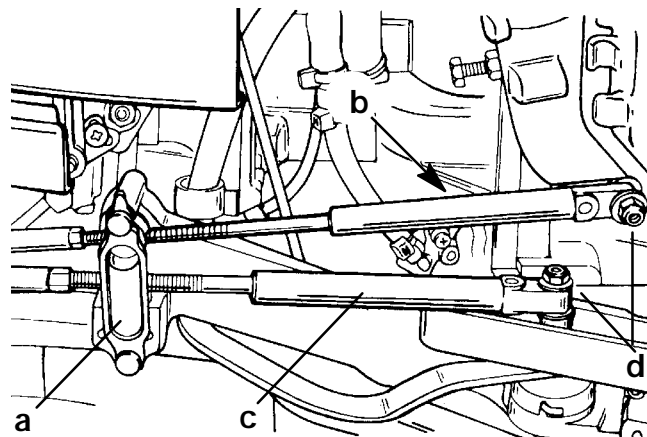
a - Bypass Hose

53459

11. Shift outboard into NEUTRAL position.

12. Unlatch throttle and shift cable retainer.

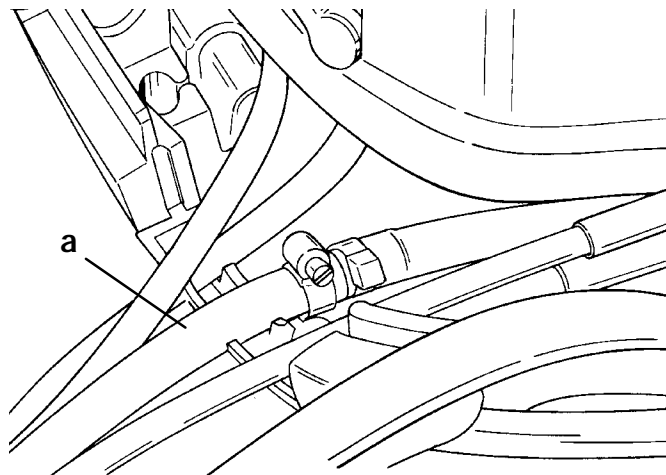
13. Remove locknut and flat washer securing throttle shift cables and remove cables.



a - Cable Retainer
b - Throttle Cable
c - Shift Cable
d - Locknut and Flat Washer

52195

14. Disconnect inlet fuel line.

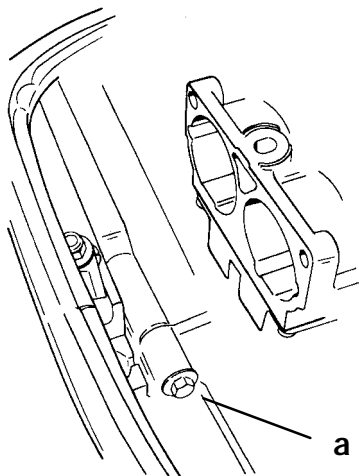


a - Inlet Fuel Line

52191

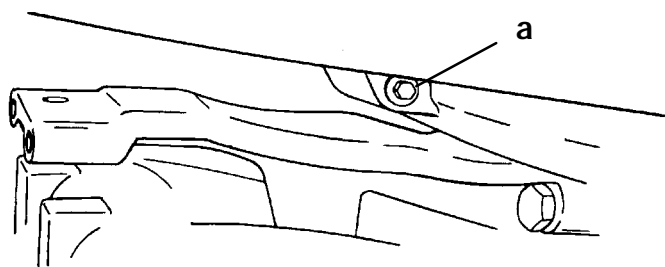


15. Remove 4 bolts securing bottom cowl halves and remove bottom cowling.



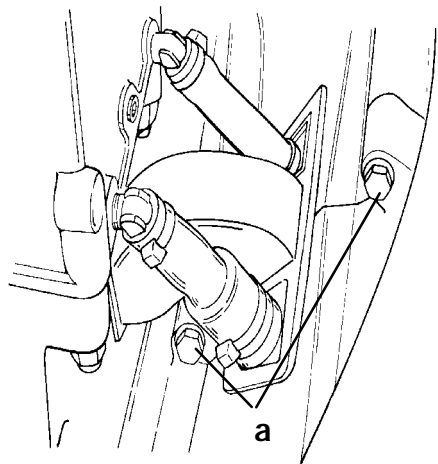
52354

a - Bolt



52352

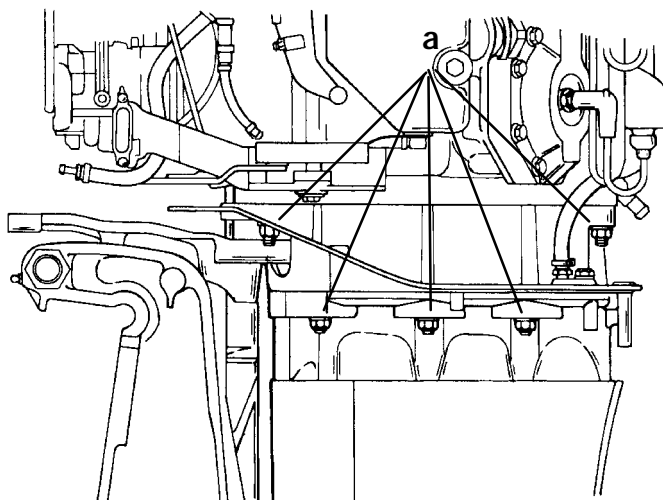
a - Bolt



52151

a - Bolt

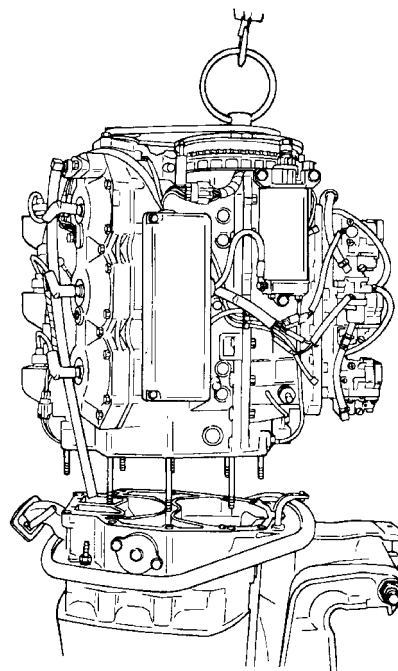
16. Remove 10 nuts and washers (5 each side) from powerhead base.



52373

a - Nuts and Washers (5 each side)

17. Remove plastic cap from center of flywheel and install Lifting Eye (91-90455) into flywheel at least 5 full turns. Using a hoist, lift powerhead assembly from drive shaft housing.



52351



REMOVING ENGINE COMPONENTS

Remove the following engine components:

Section 2

Starter Motor
Alternator
Stator
Ignition Modules
Electronic Control Unit
Solenoids
Crank Position Sensor
Throttle Position Sensor
Temperature Sensor

Section 3

Air Silencer
Carburetors and Linkage
Fuel Pump
Fuel Enrichment

Section 8

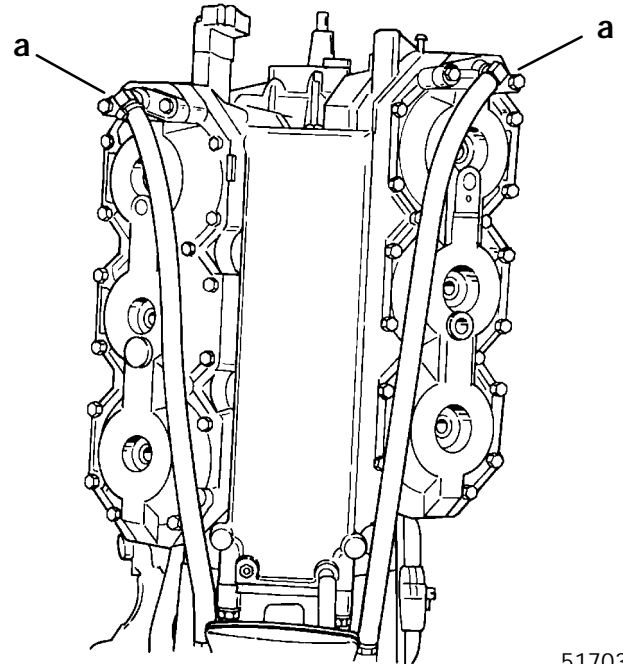
On-Board Oil Tank
Oil Pump

Section 9

EFI Removal

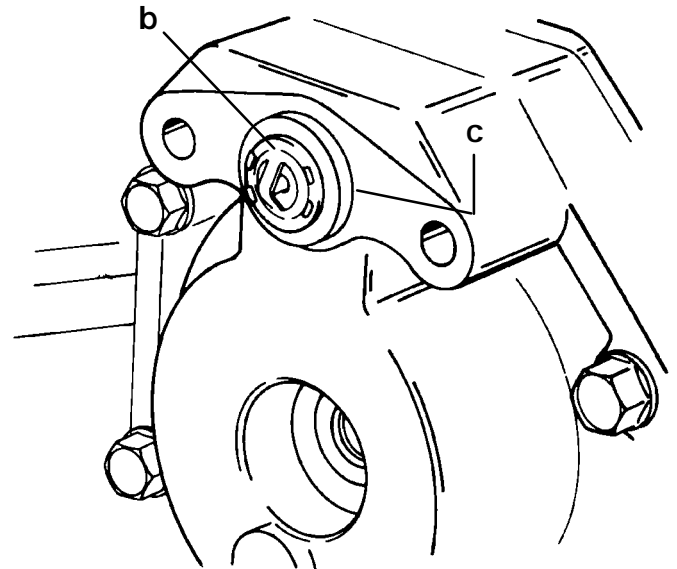
Powerhead Disassembly

1. Place powerhead in repair stand or on a bench.
2. Remove thermostat covers, thermostats and gaskets.



a - Thermostat Cover

51703

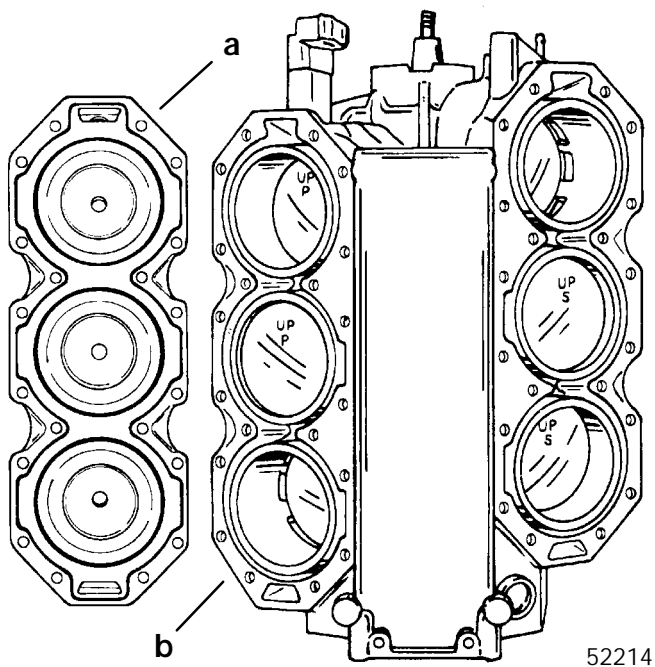


b - Thermostat
c - Gasket

51712



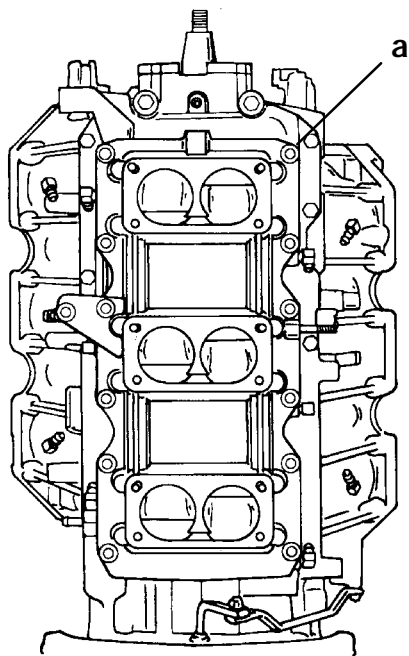
3. Remove cylinder heads from engine block.



52214

a - Cylinder Head
b - Engine Block

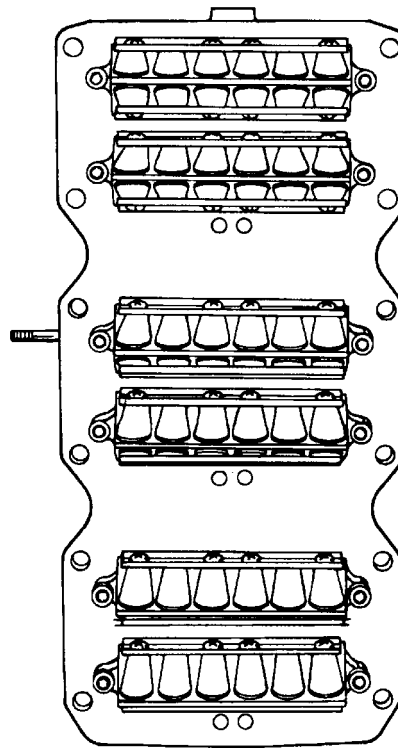
4. Remove reed block housing from cylinder block.



52215

a - Reed Block Housing

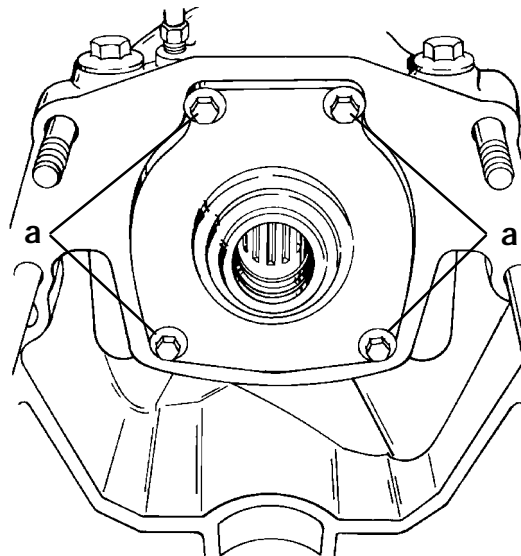
5. Inspect reeds as outlined in "Cleaning and Inspection".



52212

6. Remove bolts from end cap.

LOWER END CAP

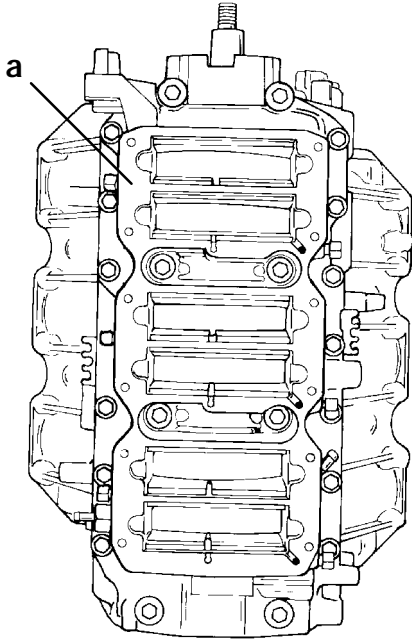


52325

a - Crankcase Attaching End Cap Bolts



7. Remove bolts which secure crankcase cover to cylinder block.

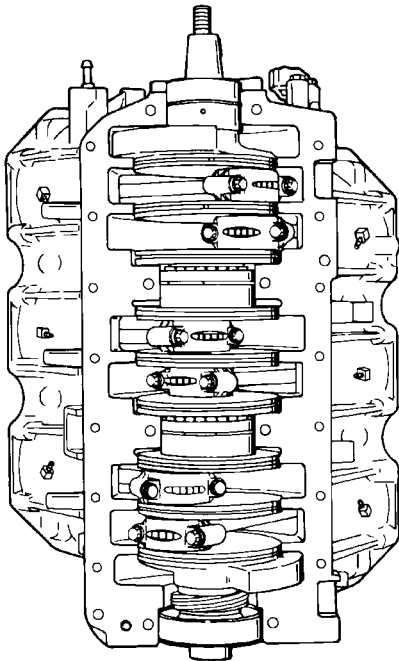


52330

a - Crankcase Cover

8. Remove crankcase end cap.

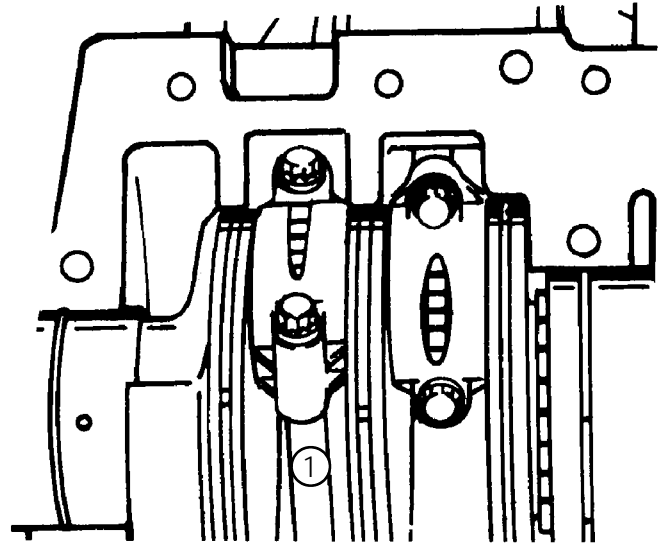
CRANKCASE COVER REMOVED



52216

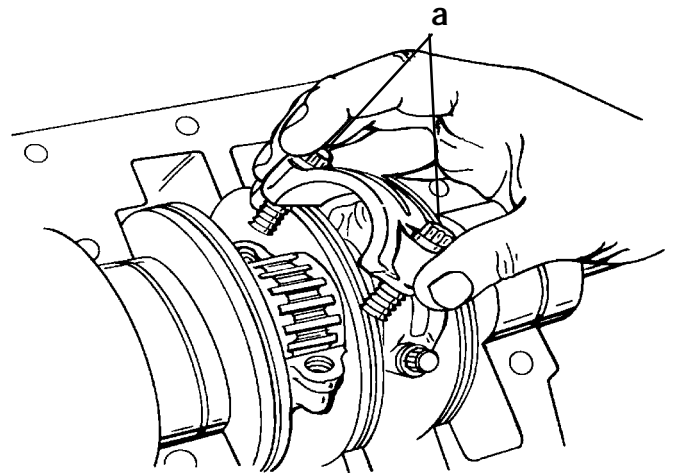
9. Use Powerhead Stand (91-812549) for rotating crankshaft to desired position for removal of connecting rods.

10. Using an awl or electric pencil, scribe the cylinder identification number on each connecting rod as shown. Reassemble connecting rods in same cylinder.



52347

11. Use a 3/8 in. 12 point socket to remove connecting rod bolts, then remove rod cap, roller bearings and bearing cage from connecting rod.



52316

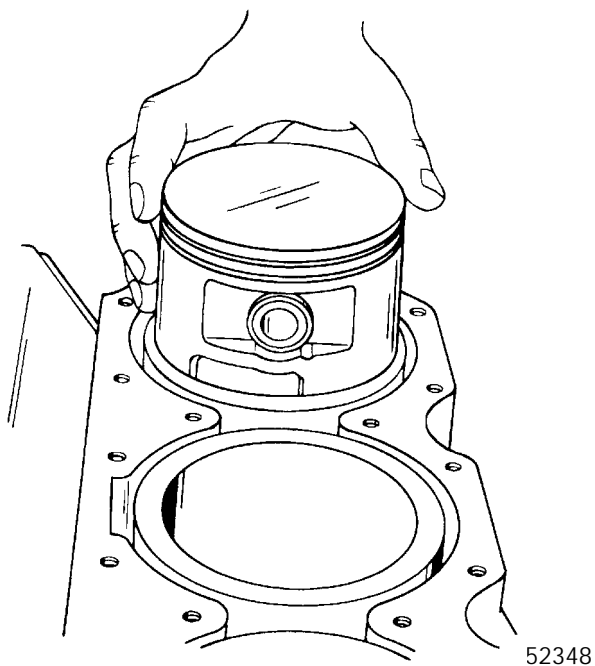
a - Connecting Rod Bolts

12. Push piston out of cylinder block.
13. After removal, reassemble each piston and connecting rod assembly.



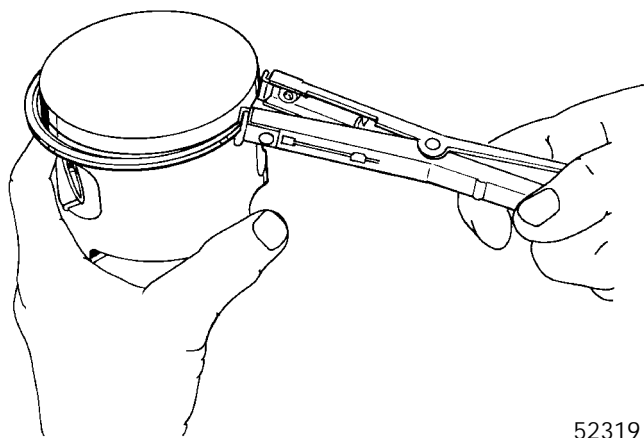
CAUTION

Each connecting rod and end cap are a matched machined set and must never be mismatched.

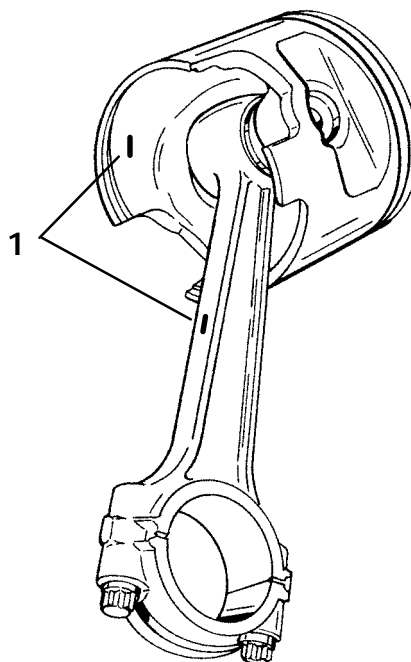


14. Inspect pistons as outlined in "Cleaning and Inspection," following.

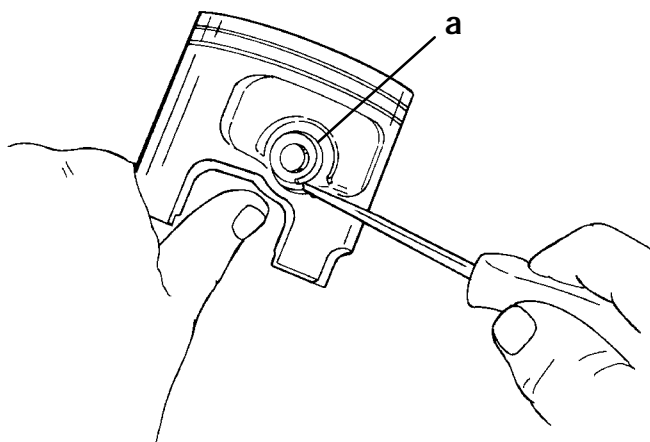
15. Use Piston Ring Expander (91-24697) to remove piston rings. Always install new piston rings.



16. Using an awl, scribe identification number of connecting rod on inside of piston (1). Reassemble piston on same connecting rod.



17. Using tool (91-52952A1), remove piston pin lockrings from both ends of piston pin. Never re-use piston pin lockrings.

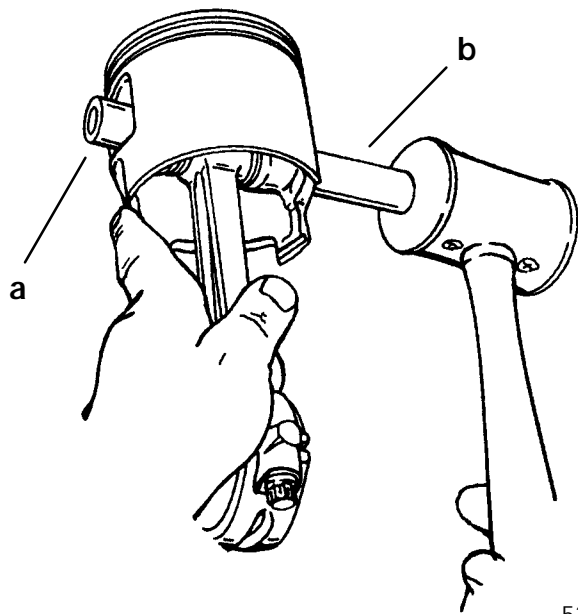


a - Lockring



IMPORTANT: Warming the piston dome using a torch lamp will ease removal and installation of piston pin.

18. Support piston and tap out piston pin using service tool (91-92973A1) as shown.

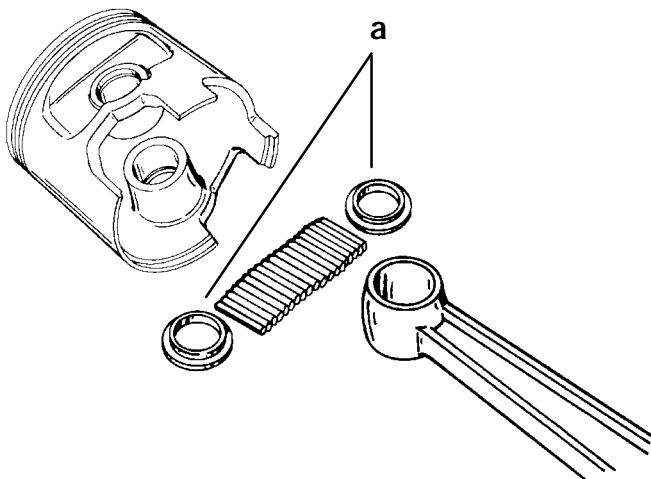


52317

a - Piston Pin
b - Piston Pin Tool (91-76159A1)

19. Remove piston pin needle bearings (34 per piston) 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.

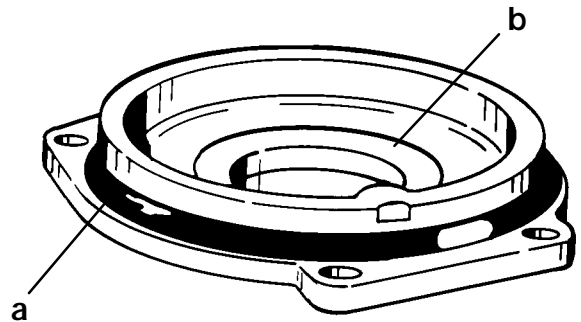


52321

a - Needle Bearing Locating Washers

20. Remove and discard O-ring seal from end cap.

21. Remove oil seals from end cap by driving seals out with a punch and hammer.

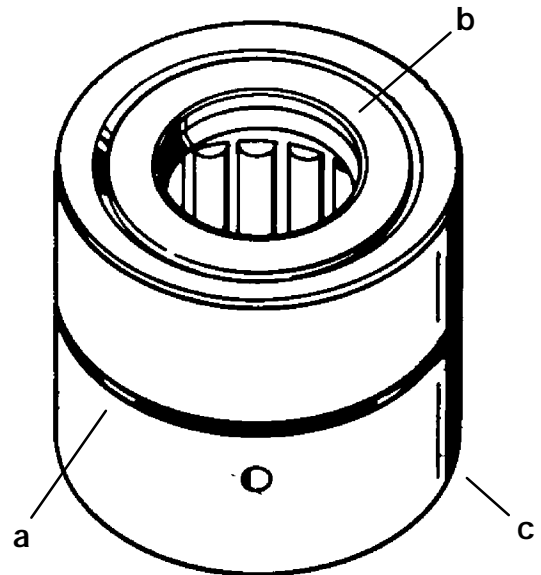


51849

a - O-ring
b - Seals (2)

22. Inspect roller bearing in upper bearing carrier as outlined in "Cleaning and Inspection".

NOTE: If roller bearing is damaged, replace bearing carrier assembly.



51473

a - O-Ring
b - Seal
c - Carrier



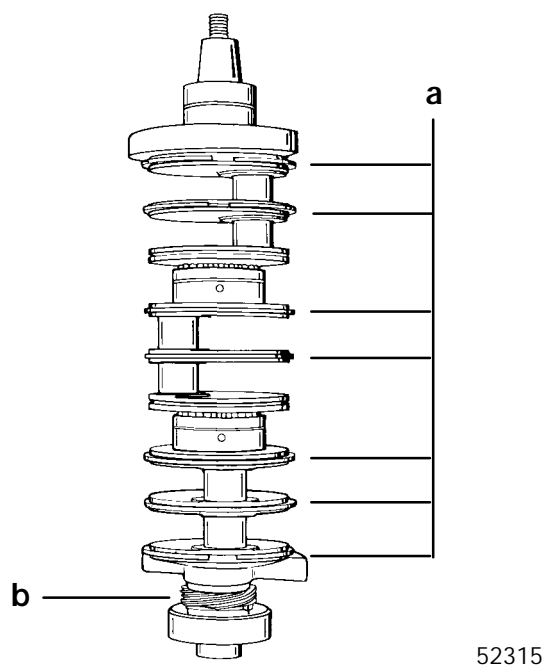
23. Remove crankshaft and place in powerhead stand as shown.

IMPORTANT: DO NOT remove crankshaft sealing rings from crankshaft, unless replacement of a sealing ring(s) is necessary. Usually, crankshaft sealing rings do not require replacement, unless broken.

CAUTION

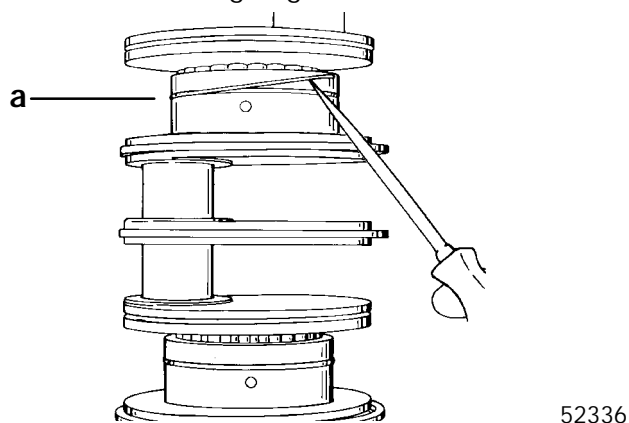
Safety glasses should be worn when removing or installing crankshaft sealing rings.

IMPORTANT: DO NOT remove oil pump drive gear on crankshaft unless gear is damaged; i.e. cracked, gear teeth chipped or fretting, or excessive looseness. Refer to "Section 8" for proper oil pump drive gear installation procedures.



a - Sealing Rings (7)
b - Oil Pump Drive Gear

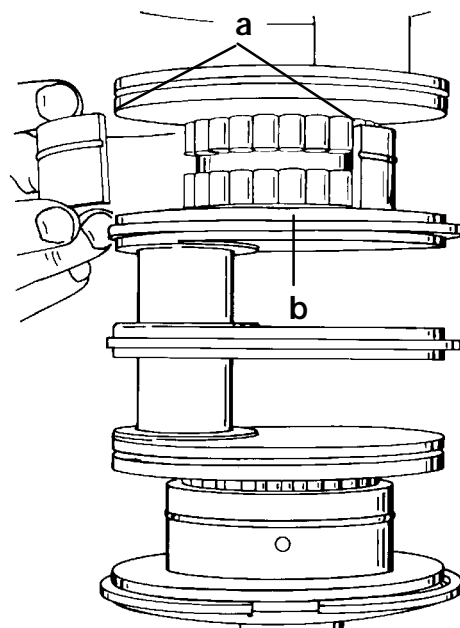
24. Remove retaining ring as shown.



a - Retaining Ring

25. Remove bearing race halves and roller bearings from crankshaft.

IMPORTANT: Keep same bearing races and roller bearings together.



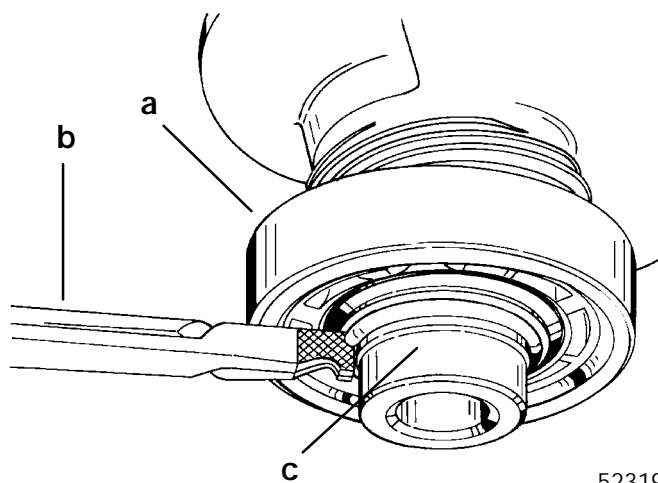
a - Bearing Race Halves
b - Roller Bearings

Inspect crankshaft ball bearing as outlined in "Cleaning and Inspection," following.

IMPORTANT: DO NOT remove crankshaft ball bearing, unless replacement is required.

26. Remove lower ball bearing from crankshaft as follows:

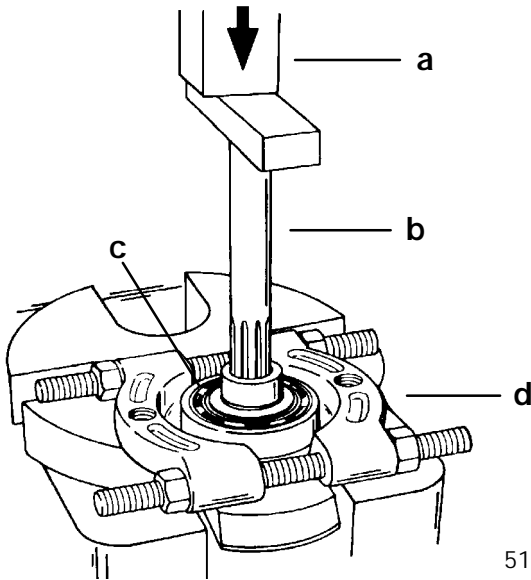
a. Remove retaining ring using a pair of snap ring pliers.



a - Crankshaft Ball Bearing
b - Pliers
c - Retaining Ring



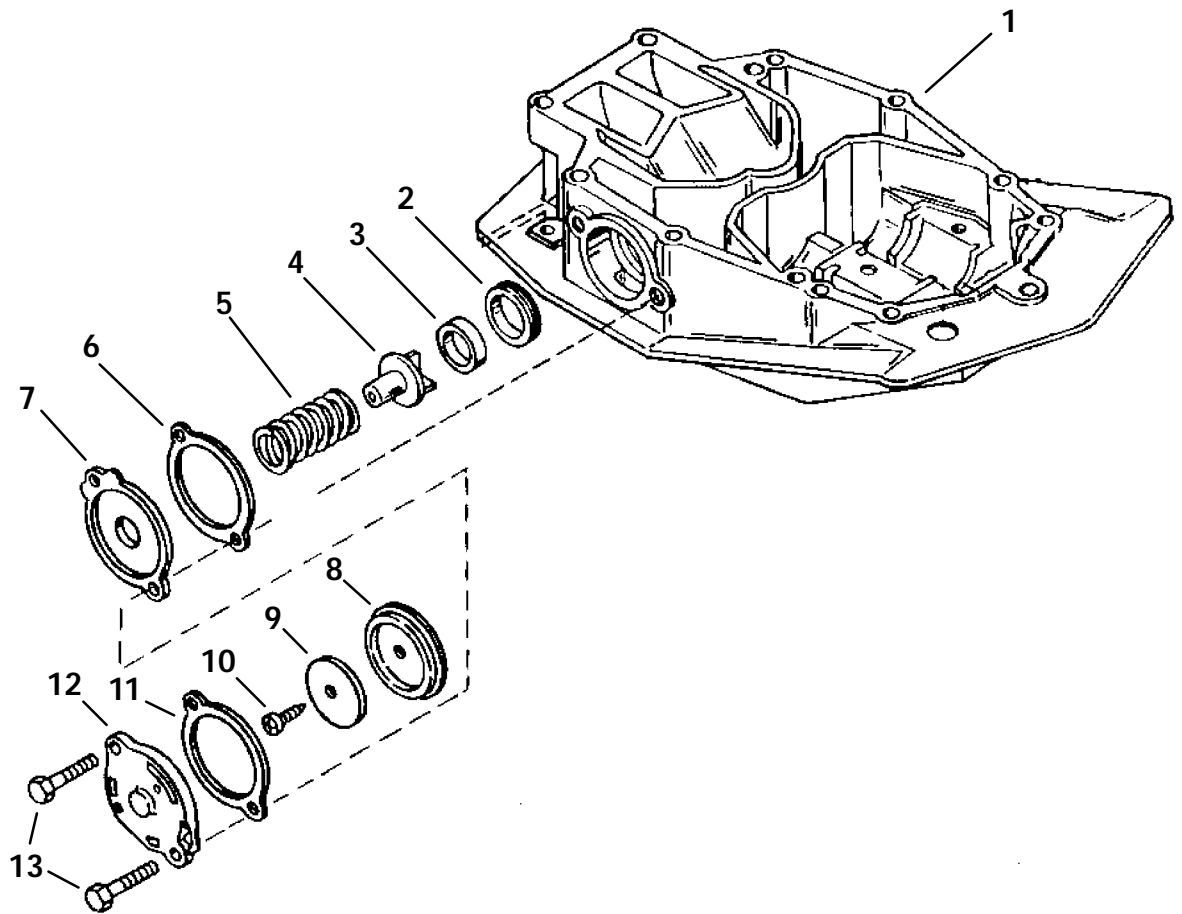
b. Press crankshaft out of lower ball bearing as shown.



51081

- a - Press
- b - Powerhead Stand (91-812549)
- c - Crankshaft Ball Bearing
- d - Universal Puller Plate (91-37241)

27. Remove and inspect water pressure relief valve components for debris or damage. Replace components as required.



- 1 - Exhaust Plate
- 2 - Carrier
- 3 - Grommet
- 4 - Poppet/Relief Valve
- 5 - Spring
- 6 - Gasket
- 7 - Inner Plate

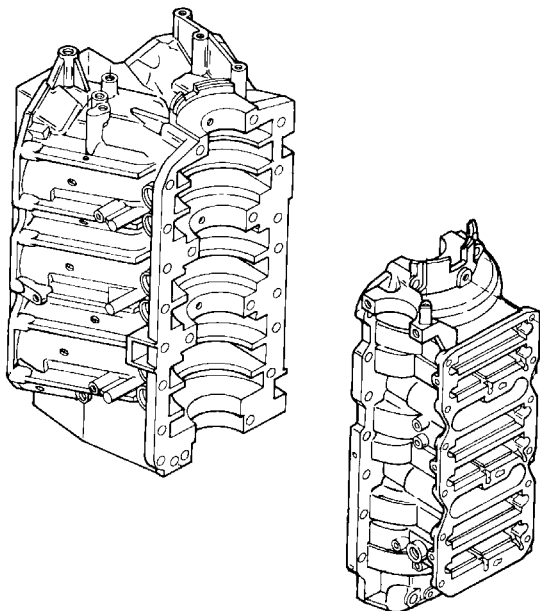
- 8 - Diaphragm
- 9 - Washer
- 10 - Screw
- 11 - Gasket
- 12 - Outer Cover
- 13 - Bolts [Torque bolts to 20 lb. ft. (27.1 N-m)]



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.



⚠ CAUTION

It crankcase cover or 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 crankcase cover/cylinder block to prevent damage to hoses and check valves.

1. Thoroughly clean cylinder block and crankcase cover. Be sure that all sealant and old gaskets are removed from matching surfaces. Be sure that carbon deposits are removed from exhaust ports.
2. Inspect cylinder block and crankcase cover for cracks or fractures.
3. Check gasket surfaces for nicks, deep grooves, cracks and distortion that could cause compression leakages.
4. Check all water and oil passages in cylinder block and crankcase cover to be sure that they are not obstructed and that plugs are in place and tight.

Special Service Information

Grooves in Cylinder Block Caused By Crankshaft Sealing Rings

Grooves in cylinder block caused by crankshaft sealing rings are not a problem, except if installing a new crankshaft and the new sealing rings on crankshaft do not line up with existing grooves in cylinder block. If installing a new crankshaft, refer to crankshaft installation, Powerhead Reassembly section to determine if powerhead can be used.

Cylinder Bores

1. Inspect cylinder bores for scoring, scuffing or a transfer of aluminum from piston to cylinder wall. Scoring or scuffing, if NOT TOO SEVERE, can normally be removed by honing. If a transfer of aluminum has occurred, an acidic solution such as "TIDY BOWL CLEANER" should be applied to the areas of the cylinder bore where transfer of aluminum has occurred. After the acidic solution has removed the transferred aluminum, thoroughly flush the cylinder bore(s) to remove any remaining acid. Cylinder walls may now be honed to remove any glaze and to aid in the seating of new piston rings.

HONING PROCEDURE

- a. When cylinders are to be honed, follow the hone manufacturer's recommendations for use of the hone and cleaning and lubrication during honing.
- b. For best results, a continuous flow of honing oil should be pumped into the work area. If pumping oil is not practical, use an oil can. Apply oil generously and frequently on both stones and work area.

⚠ CAUTION

When honing 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.

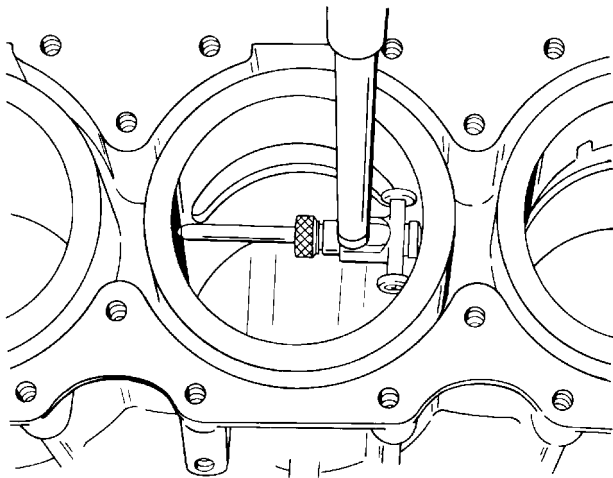
- c. Start stroking at smallest diameter. Maintain firm stone pressure against cylinder wall to assure fast stock removal and accurate results.
- d. Localize stroking in the smallest diameter until drill speed is constant throughout length of bore. Expand stones, as necessary, to compensate for stock removal and stone wear.



Stroke at a rate of 30 complete cycles per minute to produce best cross-hatch pattern. Use honing oil generously.

- e. Thoroughly clean cylinder bores with hot water and detergent. Scrub well with a stiff bristle brush and rinse thoroughly with hot water. A good cleaning is essential. If any of the abrasive material is allowed to remain in the cylinder bore, it will cause rapid wear of new piston rings and cylinder bore in addition to bearings. After cleaning, bores should be swabbed several times with engine oil and a clean cloth, then wiped with a clean, dry cloth. Cylinders **should not** be cleaned with kerosene or gasoline. Clean remainder of cylinder block to remove excess material spread during honing operation.

2. Hone all cylinder walls **just enough** to de-glaze walls.
3. Measure cylinder bore diameter (with a snap gauge micrometer) of each cylinder, as shown below. Check for tapered, out-of-round (egg-shaped) and oversize bore.



52324

3 Litre Work/225 Carb/225 EFI/250 EFI Models

Model	Cylinder Block Finish Hone
3 Litre Work/225 Carb 225 EFI/250 EFI	3.6265 (92.1131mm)
0.015 in. Oversize	3.6415 (92.4941mm)
0.030 in. Oversize	3.6565 (92.8751mm)

4. 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, preceding), it will be necessary to re-bore that cylinder(s) to 0.015 in. (0.38mm) oversize or 0.030 in. (0.76mm) oversize 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 re-bore all cylinders in a block just because one cylinder requires re-boring.

5. After honing and thoroughly cleaning cylinder bores, apply light oil to cylinder walls to prevent rusting.



Pistons and Piston Rings

IMPORTANT: If engine was submerged while engine was running, piston pin and/or 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," following, for checking straightness).

1. Inspect pistons for scoring and excessive piston skirt wear.
2. Check tightness of piston ring locating pins. Locating pins must be tight.
3. Thoroughly clean pistons. Carefully remove carbon deposits from pistons, with a soft wire brush or carbon remove solution. Do not burr or round off machined edges.

Inspect piston ring 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 following for cleaning piston ring grooves.

CLEANING PISTON RING GROOVES

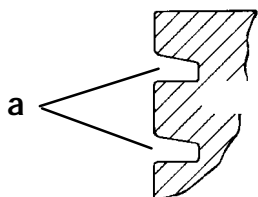
Keystone (tapered) ring grooves

CAUTION

Care must be taken not to scratch the side surfaces of the ring groove. Scratching the side surface of the ring groove will damage the ring groove.

1. Use a bristle brush and carbon remover solution to remove carbon from side surfaces.
2. 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 the inside edge of the ring to reach the inner diameter of the groove. Carefully scrape carbon from inner diameter of ring grooves. Care must be taken not to damage the grooves by scratching the side surfaces of the grooves.

Piston with two half keystone (half tapered) rings



a - Ring Grooves

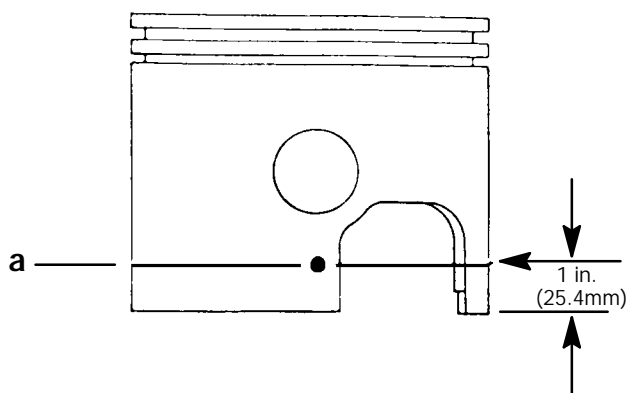
MEASURING PISTON ROUNDNESS

Piston has a barrel profile shape and is not a true diameter.

1. Using a micrometer, measure dimension "A" at location shown. Dimension "A" should be as indicated in chart following.

Piston	Dimension "A"
Standard Piston	3.6210 in. \pm .0005 in.
.015 in. Oversize Piston	3.636 in. \pm .0005 in.
.030 in. Oversize Piston	4.383 in. \pm .0005 in.

2. Using a micrometer, measure dimension "A" at location shown. Dimension "A" should be 3.6210 in. \pm 0.0005 in. for a STANDARD size piston.



a - Dimension "A" at Right Angle (90°) to Piston Pin

Cylinder Heads

1. Inspect internal surface of cylinder heads for possible damage (as a result of piston or foreign material striking cylinder heads).

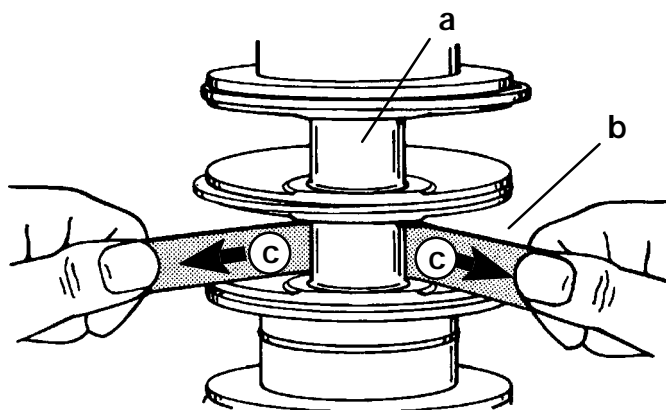
IMPORTANT: Cylinder head warpage should not exceed 0.005 in. (0.13mm) over the ENTIRE length of the cylinder head. If measured warpage, as determined on a surface block, exceeds 0.005 in. (0.13mm) or a discontinuity of up to 0.001 in. (0.03mm) exists in a 1.0 in. (25.4mm) length of the cylinder head's surface, then the cylinder head must be replaced.

2. Replace cylinder head(s) as necessary.



Crankshaft

1. Inspect crankshaft to drive shaft splines for wear. (Replace crankshaft, if necessary).
2. Check crankshaft for straightness. Maximum runout - 0.002 in. (0.0508mm) Check runout at center main bearing surfaces with ends of crankshaft supported in v-blocks. (Replace as necessary).
3. Inspect crankshaft oil seal surfaces. Sealing surfaces must not be grooved, pitted or scratched. (Replace as necessary).
4. Check all crankshaft bearing surfaces for rust, water marks, chatter marks, uneven wear and/or overheating. (Refer to "Connecting Rods").
5. If necessary, clean crankshaft surfaces with crocus cloth.



52323

- a - Crankshaft Journals
 b - Crocus Cloth
 c - Work Cloth "Back-and-Forth"

WARNING

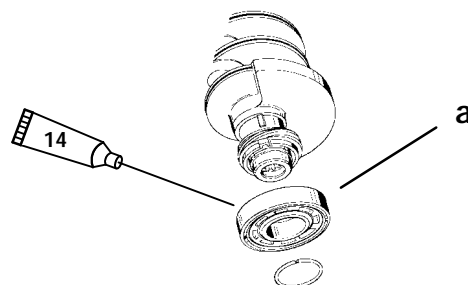
DO NOT spin-dry crankshaft ball bearing with compressed air.

6. Thoroughly clean (with solvent) and dry crankshaft and crankshaft ball bearing. Recheck surfaces of crankshaft. Replace crankshaft, if surfaces cannot be properly "cleaned up." If crankshaft will be re-used, lubricate surfaces of crankshaft with light oil to prevent rust. **DO NOT** lubricate crankshaft ball bearing at this time.

Crankshaft (and End Cap) Bearings

IMPORTANT: When overhauling powerhead assembly, it is recommended that all crankshaft bearings - upper/lower, center main, connecting rod and wrist pin bearings - be replaced to ensure optimum powerhead performance and longevity.

1. After cleaning crankshaft, grasp outer race of crankshaft ball bearing (installed on lower end of crankshaft) and attempt to work race back-and-forth. There should not be excessive play.
2. Lubricate ball bearing with light oil. Rotate outer bearing race. Bearing should have smooth action and no rust stains. If ball bearing sounds or feels "rough" or has "catches," remove and discard bearing. (Refer to "Powerhead Removal and Disassembly - Crankshaft Removal and Disassembly").



52326

2 Cycle Outboard Oil (92-826666A24)

a - Lower Ball Bearing

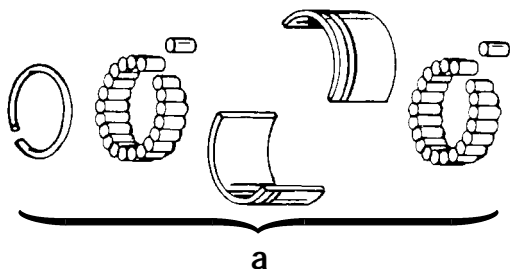
3. Thoroughly clean (with solvent) and dry crankshaft center main roller bearings. Lubricate bearings with 2-Cycle Outboard Oil.



CAUTION

DO NOT intermix halves of upper and lower crankshaft center main roller bearings. Replace bearings in pairs only.

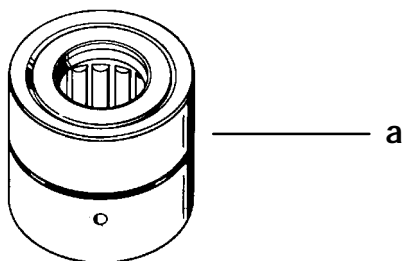
4. Thoroughly inspect center main roller bearings. Replace bearings if they are rusted, fractured, worn, galled or badly discolored.



52153

a - Center Main Roller Bearing

5. Clean (with solvent) and dry crankshaft roller bearing that is installed in upper end cap. Lubricate bearing with light oil.
6. Thoroughly inspect upper crank shaft roller bearing. If roller bearing is rusted, fractured, worn, galled or badly discolored, replace roller bearing.



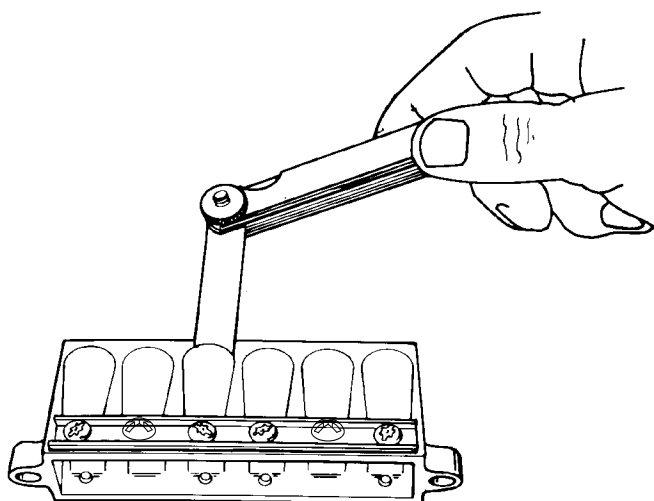
51473

a - Upper Roller Bearing

Reed Block Assembly

IMPORTANT: DO NOT remove reeds from reed blocks, unless replacement is necessary. **DO NOT** turn used reeds over for re-use. Replace reeds in sets only.

1. Thoroughly clean gasket surfaces of reed blocks and reed block housing. Check for grooves, cracks and distortion that could cause leakage. Replace parts as necessary.
2. Check for wear (indentations) on face of each reed block. Replace block(s), if reeds have made indentations.
3. Check for chipped and broken reeds.



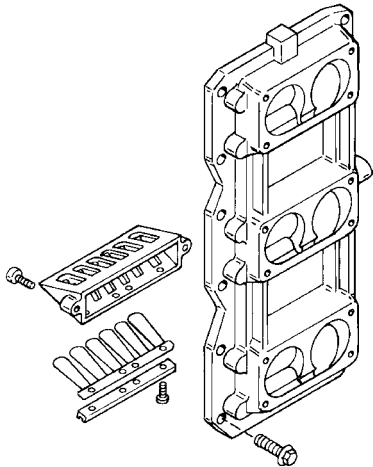
51706

Allowable reed opening is 0.020 in. (0.51mm) or less. Replace reeds if either reed is standing open more than 0.020 in. (0.51mm).



Reed Block

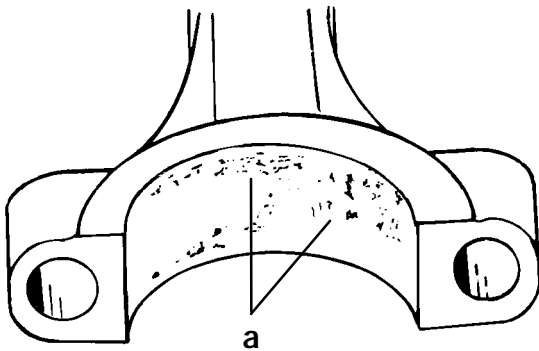
Inspect passages in reed block to be sure that they are not obstructed.



52156

Connecting Rods

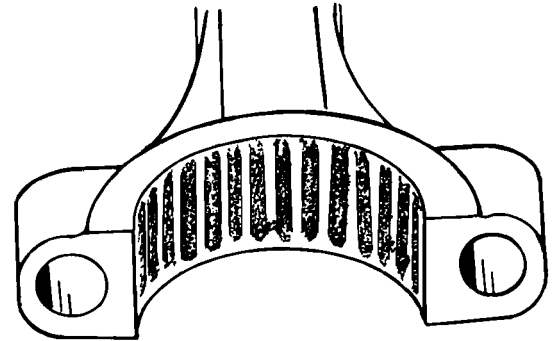
1. Check connecting rods for alignment by placing rods on a surface plate. If light can be seen under any portion of machined surfaces, if rod has a slight wobble on plate, or if a 0.002 in. (0.05mm) feeler gauge can be inserted between any machined surface and surface plate, rod is bent and must be discarded.
2. **Overheating:** Overheating is visible as a bluish bearing surface color that is caused by inadequate lubrication or excessive RPM.
3. **Rust:** Rust formation on bearing surfaces causes uneven pitting of surface(s).



a - Pitting

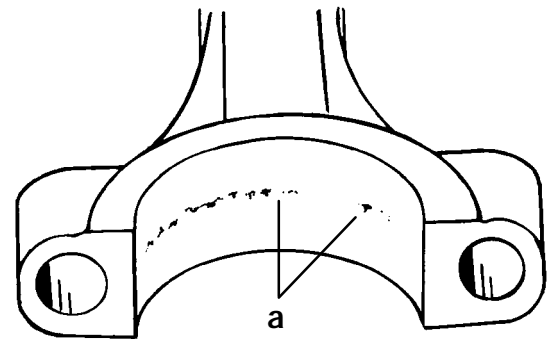
51853

4. **Water Marks:** When bearing surfaces are subjected to water contamination, a bearing surface "etching" occurs. This etching resembles the size of the bearing.



51853

5. **Spalling:** Spalling is the loss of bearing surface, and it resembles flaking or chipping. Spalling will be most evident on the thrust portion of the connecting rod in line with the "I" beam. General bearing surface deterioration could be caused by or accelerated by improper lubrication.



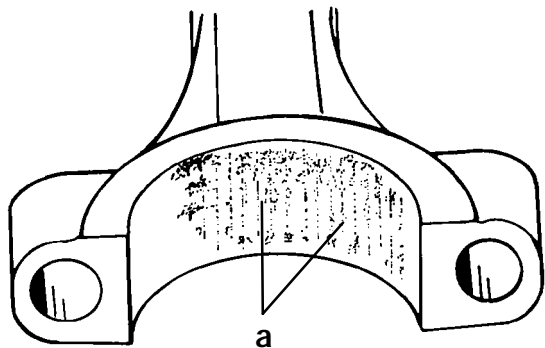
51853

a - Spalling

6. **Chatter Marks:** Chatter marks are the result of a combination of low speed - low load - cold water temperature operation, aggravated by inadequate lubrication and/or improper fuel. Under these conditions, the crankshaft journal is hammered by the connecting rod. As ignition occurs in the cylinder, the piston pushes the connecting rod with tremendous force, and this force is transferred to the connecting rod journal. Since there is little or no load on the crankshaft, it bounces away from the connecting rod. The crankshaft then remains immobile for a split second until the piston travel causes the connecting rod to catch up to the waiting crankshaft journal, then hammers it. The repetition of this action causes a rough bearing surface(s) which resembles a tiny



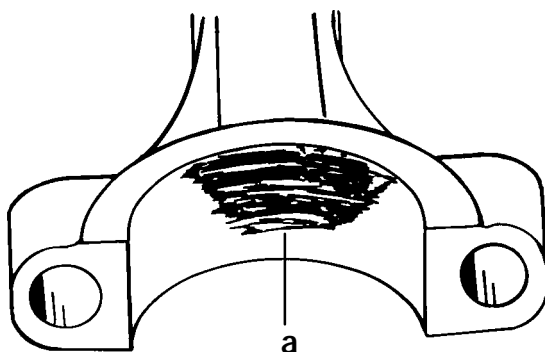
washboard. In some instances, the connecting rod crank pin bore becomes highly polished. During operation, the engine will emit a "whirr" and/or "chirp" sound when it is accelerated rapidly from idle speed to approximately 1500 RPM, then quickly returned to idle. If the preceding conditions are found, replace both the crankshaft and connecting rod(s).



51853

a - Chatter Marks Between Arrows

7. **Uneven Wear:** Uneven wear could be caused by a bent connecting rod.



51853

a - Uneven Wear Between Arrows

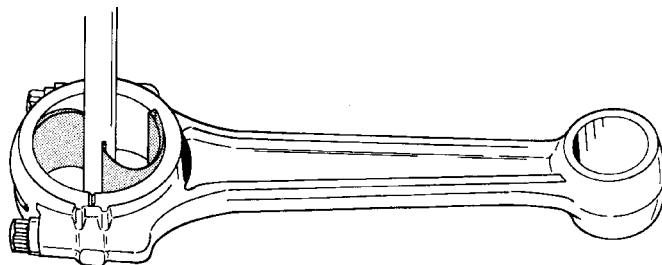
8. If necessary, clean connecting rod bearing surfaces, as follows:
- Be sure that "etched" marks on connecting rod (crankshaft end) are perfectly aligned with "etched" marks on connecting rod cap. Tighten connecting rod cap attaching bolts securely.

⚠ CAUTION

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. Chuck shaft in a drill press and operation press at high speed while keeping connecting rod at a 90° angle to slotted shaft.

IMPORTANT: Clean connecting rod just enough to clean up bearing surfaces. DO NOT continue to clean after marks are removed from bearing surfaces.



52323

- Clean PISTON PIN END of connecting rod**, using same method as in Step "b", preceding, but using 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(s) that cannot be properly "cleaned up." Lubricate bearing surfaces of connecting rods (which will be re-used) with light oil to prevent rust.

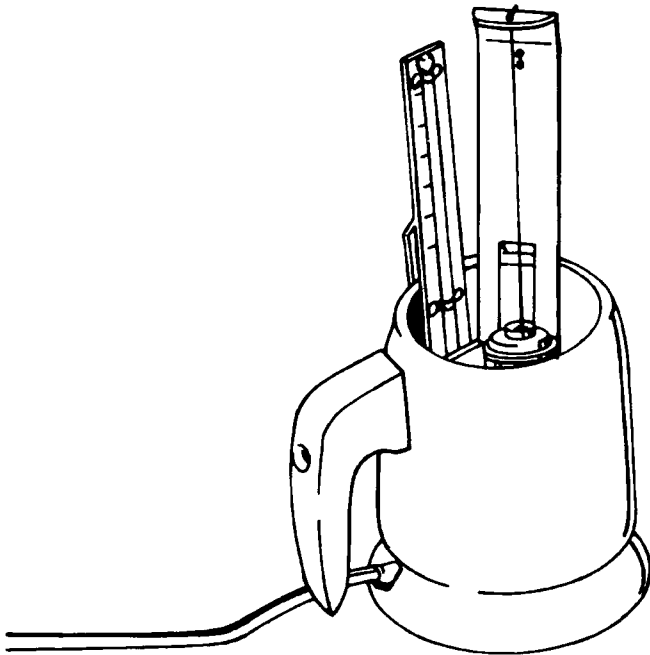
Thermostats

- Inspect thermostat covers and cylinder head covers (thermostat opening) for cracks and corrosion damage that could cause leakage. Replace parts as necessary.
- Remove and discard gasket from each thermostat.
- Wash thermostats with clean water.
- Using a thermostat tester, similar to the one shown, test each 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 temperature of thermostat opening.
 - Fill thermostat tester with water to cover thermostat.



- d. Plug tester into electrical outlet.
- e. Observe temperature at which thermostat begins to open. (Thermostat will drop off thread, that was installed in Step "a", when it starts to open.) Thermostat must begin to open when temperature reaches 140°-145° F (60°-63° C).
- f. Continue to heat water until thermostat is completely open.
- g. Unplug thermostat tester.
- h. Replace thermostat, if it fails to open at the specified temperature, or if it does not fully open.

NOTE: BE SURE that water in thermostat tester is allowed to cool sufficiently [below 130° F (56° C)] before testing the other thermostat.



51087

IMPORTANT: DO NOT operate engine without thermostats installed.

Powerhead Reassembly and Installation

General

Before proceeding with powerhead reassembly, be sure that all parts to be re-used have been carefully cleaned and thoroughly inspected, as outlined in "Cleaning and Inspection," preceding. Parts, which have not been properly cleaned (or which are questionable), can severely damage an otherwise perfectly good powerhead within the first few minutes of operation. All new powerhead gaskets **MUST BE** installed during reassembly.

During reassembly, lubricate parts with Quicksilver 2-Cycle Outboard Lubricant whenever "light oil" is specified. Quicksilver part numbers of lubricants, sealers and locking compounds and tools are listed in "Powerhead General Information," preceding.

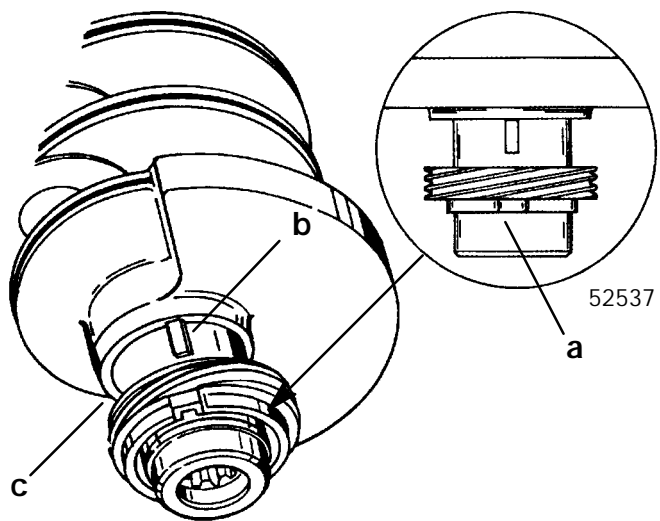
A torque wrench is **essential** for correct reassembly of powerhead. **DO NOT** attempt to reassemble powerhead without using a torque wrench. Attaching bolts for covers, housings and cylinder heads **MUST BE** torqued by tightening bolts in 3 progressive steps (following specified torque sequence) until specified torque is reached (see "Example," following).

EXAMPLE: If cylinder head attaching bolts require a torque of 20 lb. ft. (27.0 N·m), a) tighten all bolts to **5 lb. ft. (7.0 N·m)**, following specified torque sequence, b) tighten all bolts to **10 lb. ft. (13.6 N·m)**, following torque sequence, then finally c) tighten all bolts to **20 lb. ft. (27.0 N·m)**, following torque sequence.

IMPORTANT: If oil pump drive gear has been removed from crankshaft, **GEAR MUST BE REINSTALLED WITH GEAR FLANGE FACING DOWN TOWARDS BALL BEARING.**



1. Slide oil pump drive gear (flange facing down) onto crankshaft. Align slot in gear with keyway on crankshaft. Seat gear against counter weight shoulder.



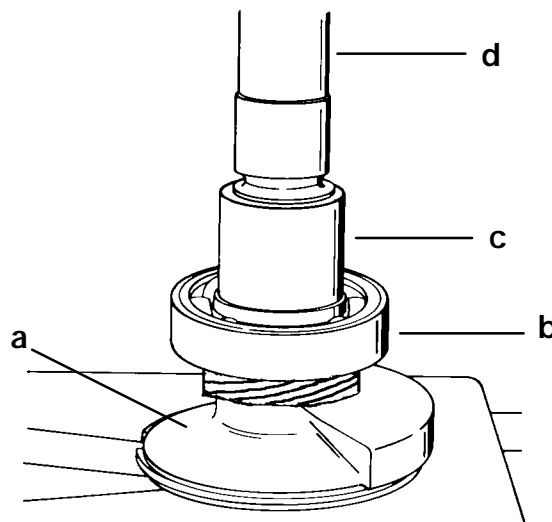
52537

52326

- a - Flange (Faces Down Towards Ball Bearing)
- b - Keyway
- c - Shoulder

IMPORTANT: If lower drive shaft ball bearing has been removed, it is recommended that a new bearing be installed as the removal process will damage the bearing.

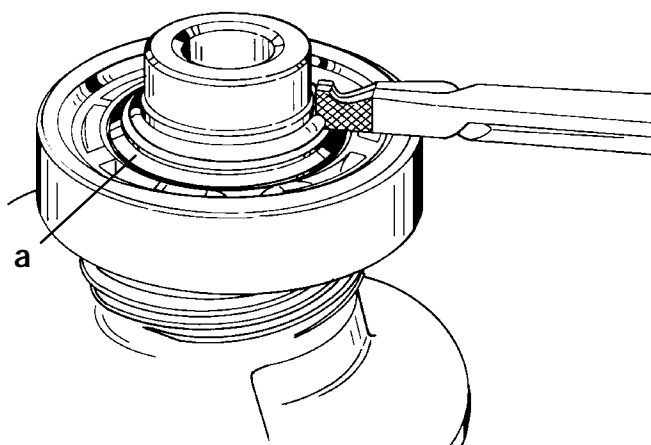
1. If removed, press new lower crankshaft ball bearing onto crankshaft as shown. Be sure bearing is pressed firmly against shoulder.



51852

- a - Crankshaft
- b - Crankshaft Ball Bearing
- c - Suitable Mandrel
- d - Press

2. Reinstall retaining ring using a suitable pair of Snap Ring Pliers.

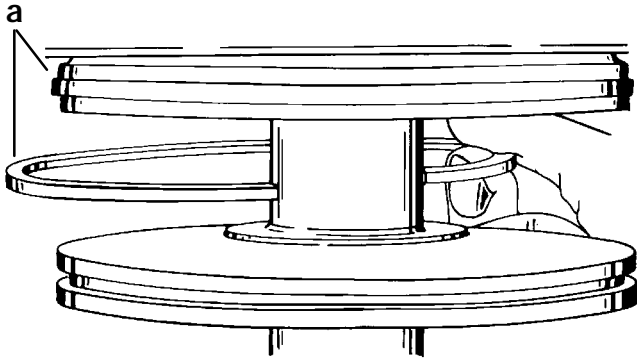


52319

- a - Retaining Ring

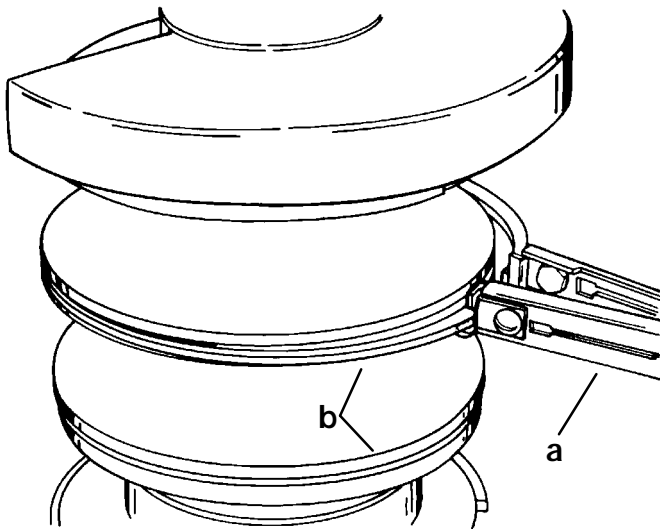


3. If removed, spread new crankshaft sealing rings just enough to slide over crankshaft journal.



a - Crankshaft Sealing Rings

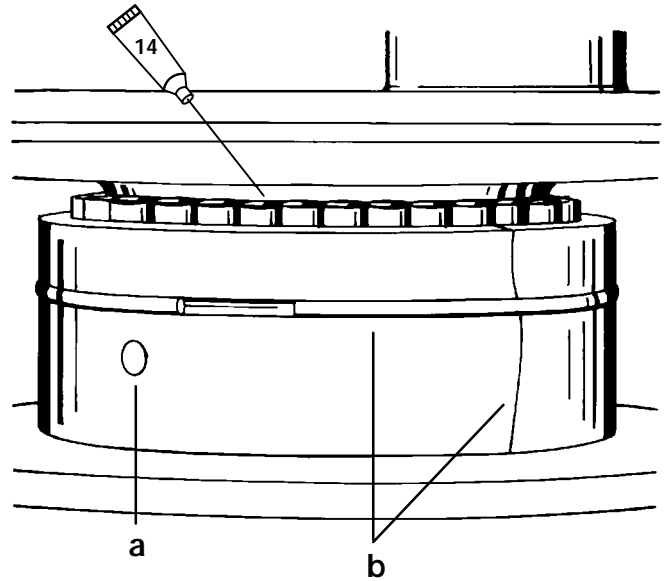
4. Use Piston Ring Expander (91-24697) and install crankshaft sealing rings into groove.



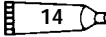
52320

a - Piston Ring Expander (91-24697)
b - Crankshaft Sealing Rings (7 Each)

5. Lubricate center main crankshaft roller bearings and races with light oil.



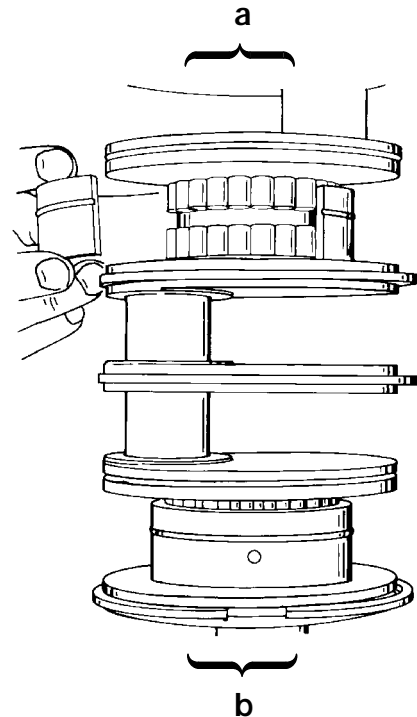
52318

 14 2 Cycle Outboard Oil (92-826666A24)

a - Install so Hole is Toward Drive Shaft End of Crankshaft
b - Verify Retaining Ring Bridges the Separating Lines of the Bearing Race

6. Place center main crankshaft roller bearings on upper and lower main bearing journals as shown.

7. Install center main bearing races as shown.

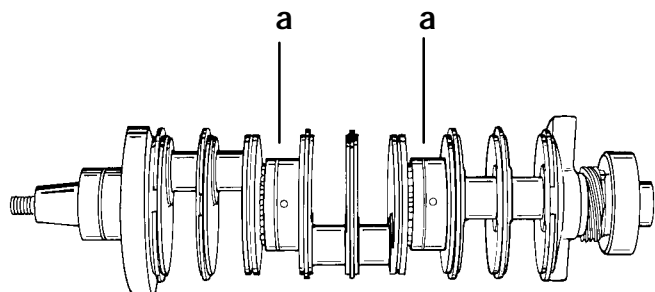


52315

a - Flywheel End
b - Drive Shaft End



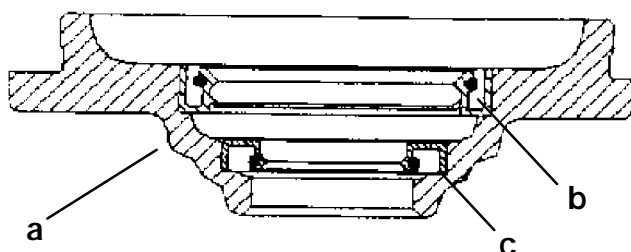
8. Secure center main bearing races together with retaining rings. Make sure retaining ring bridges the separating lines of the bearing race.



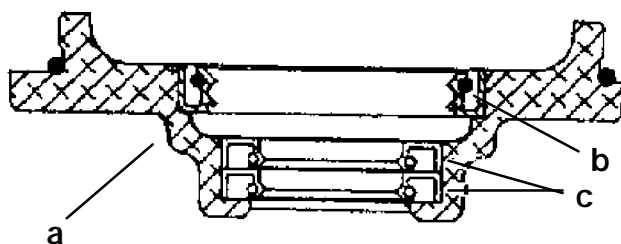
52315

a - Center main Bearing Races

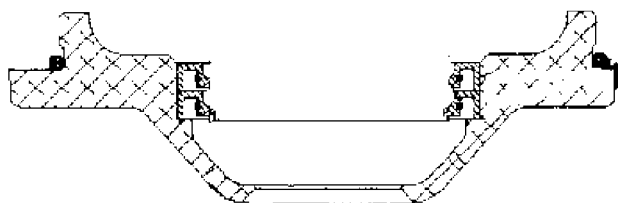
NOTE: Four styles of end caps have been used on 3 liter powerheads - 1171-9787A1; 1171-9787A3; 1171-9787A4 and 1171-9787A5. If not previously installed, it is recommended that end cap 1171-9787A5 be installed.



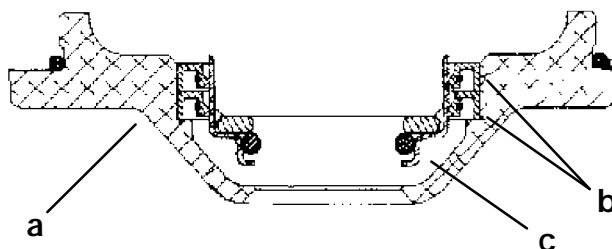
a - 1171-9787A1
b - 1 Crankshaft Seal (Faces UP)
c - 1 Drive Shaft Seal (Faces DOWN)



a - 1171-9787A3
b - 1 Crankshaft Seal (Faces UP)
c - 2 Drive Shaft Seals (Both Face DOWN)



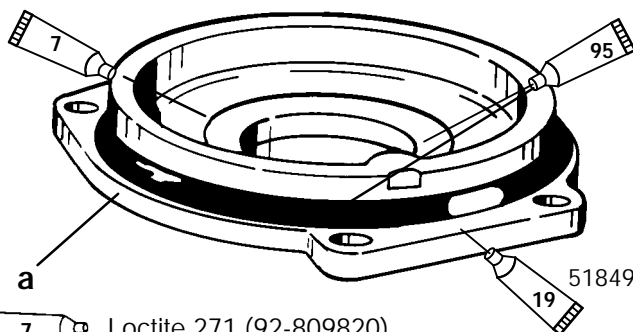
a - 1171-9787A4
b - 2 Crankshaft Seals (Both Face DOWN)



a - 1171-9787A5
b - 2 Crankshaft Seals (Both Face DOWN)
c - 1 Drive Shaft O-Ring w/Sleeve that slides over Crankshaft

9. Install oil seals into typical lower end cap as follows:

- Apply a thin bead of Loctite Type 271 (92-32609-1) to outer diameter of lower end cap oil seals.
- Using driver head (91-55919) or suitable mandrel, press one oil seal (lip facing DOWN) into lower end cap until firmly seated. Remove any excess Loctite.
- Press second oil seal (lip facing UP or DOWN, as required by specific end cap) until firmly seated on first oil seal. Remove any excess Loctite.
- Lubricate oil seal lips with 2-4-C w/Teflon (92-825407A12).
- Apply a light coat of Perfect Seal (92-34227-1) to end cap flange.
- Lubricate O-ring seal with 2-4-C w/Teflon (92-825407A12) and install over lower end cap.



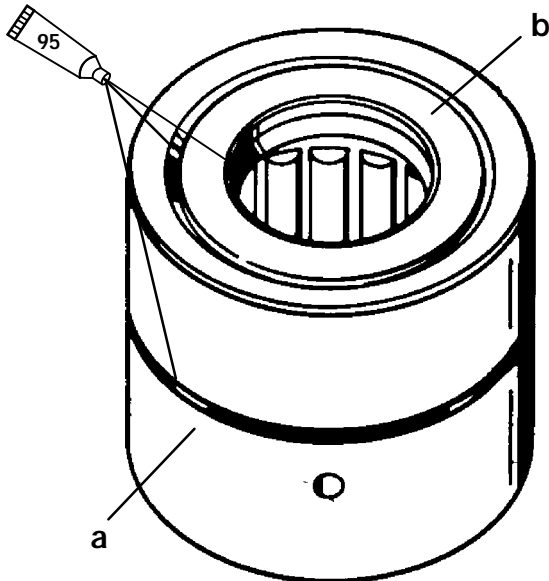
7 Loctite 271 (92-809820)
19 Perfect Seal (92-34227-1)
95 2-4-C With Teflon (92-825407A12)

a - O-ring



10. Install oil seal into upper bearing carrier assembly as follows:

- Apply a light film of 2-4-C w/Teflon (92-825407A12) to outer diameter of oil seal; this will ease seal installation into carrier.
- Lubricate oil seal lip with 2-4-C w/Teflon.
- Use a suitable mandrel, press oil seal into carrier (lip facing DOWN) until bottomed out on shoulder of carrier.
- Lubricate O-ring with 2-4-C w/Teflon and install on carrier.



51473

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

a - O-ring
b - Seal

Crankshaft Installation

SPECIAL INFORMATION

Installing A New Crankshaft Assembly Into Cylinder Block

Check the crankshaft sealing ring mating surfaces in the cylinder block and crankcase cover for wear grooves that were caused by the crankshaft sealing rings from the previous crankshaft. If wear grooves are present, the sealing rings on the new crankshaft will have to fit into the grooves without binding the crankshaft.

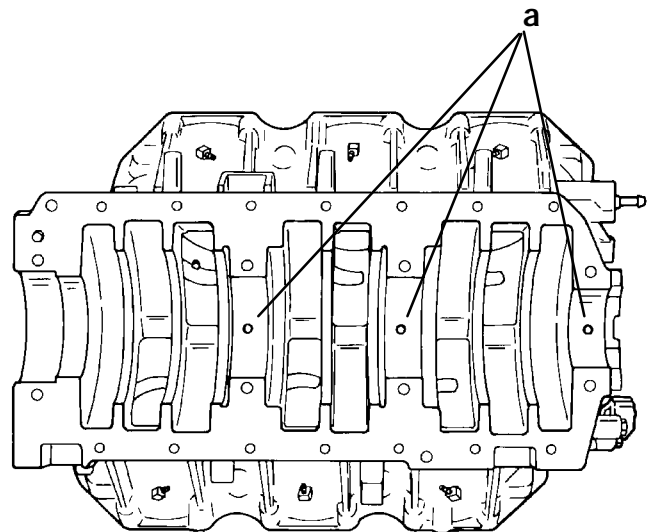
Before installing crankshaft, remove any burrs that may exist on groove edges.

Lubricate sealing rings with light oil and install new crankshaft as instructed.

Install upper and lower end caps and then inspect fit between sealing rings and grooves. Temporarily install crankcase cover and rotate crankshaft several times to check if sealing rings are binding against crankshaft. (You will feel a drag on the crankshaft.) If sealing rings are binding, recheck grooves for burrs. If this does not correct the problem, it is recommended that the cylinder block be replaced.

Install crankshaft as follows:

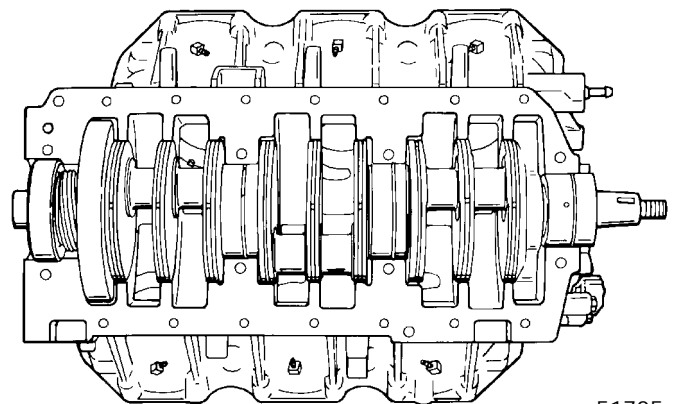
- Lubricate crankshaft sealing rings with light oil.
- Check cylinder block to be sure that dowel pins are in place.



51848

a - Dowel Pins

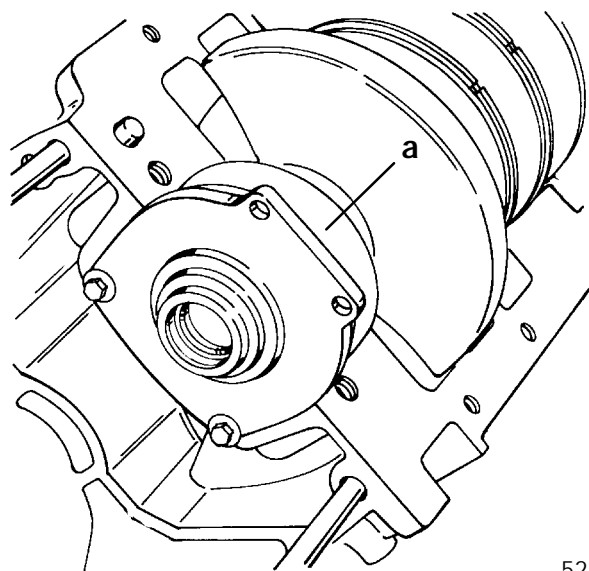
- Position all crankshaft seal ring gaps straight up.
- Align hole in each center main bearing race with dowel pin.
- Gently push crankshaft down into position making sure that the dowel pins are lined up with the holes in center main bearings and crankshaft seal rings are in place.



51705



- Lubricate lower crankshaft end (oil seal area) with light oil, then install lower end cap. Secure end cap to cylinder block with attaching bolts. DO NOT tighten end cap bolts at this time.



52328

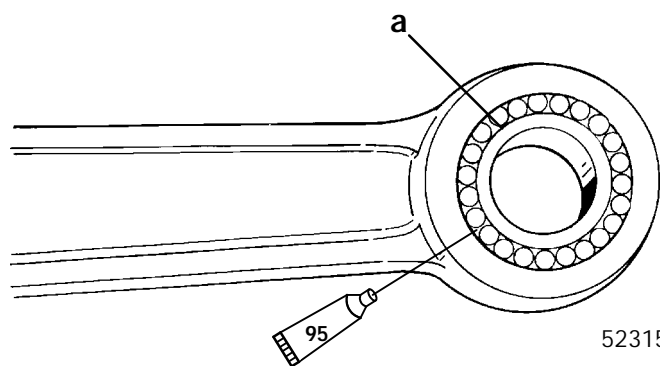
a - Lower End Cap

Piston and Connecting Rod Reassembly

- Place needle bearings on a clean piece of paper and lubricate with 2-4-C w/Teflon (92-825407A12).

NOTE: There are 34 needle bearings per piston.

- Place sleeve which is part of piston pin tool (91-92973A1) into connecting rod and install needle bearings around sleeve as shown.



52315

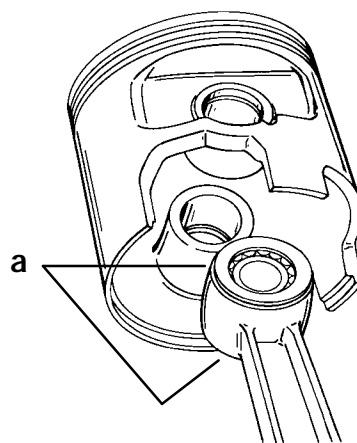
 2-4-C With Teflon (92-825407A12)

a - Sleeve (Part of Tool Assy. 91-92973A1)

- Place locating washers on connecting rod.

IMPORTANT: Position connecting rod part number facing towards flywheel.

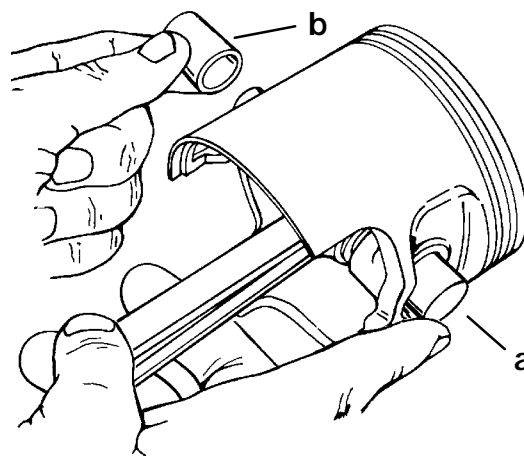
- Position piston over end of rod. Verify locating washers remain in place.



52320

a - Locating Washers

- Insert piston pin tool (91-92973A1) and push sleeve out of piston. Keep piston pin tool in piston.

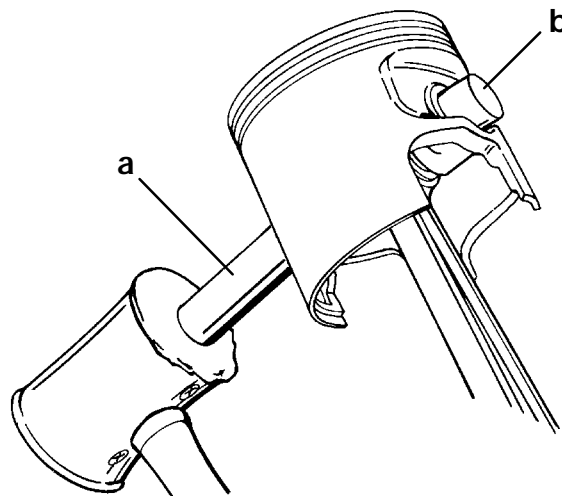


52334

a - Piston Pin Tool (91-92973A1)

b - Sleeve

- Use a mallet and tap piston pin into piston and push piston pin tool out.

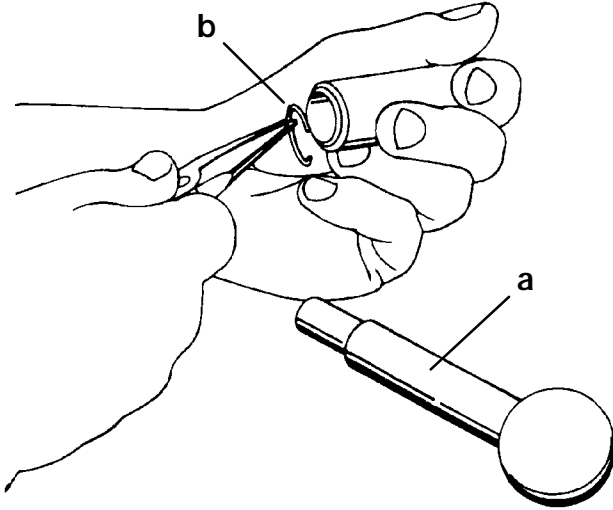


52335



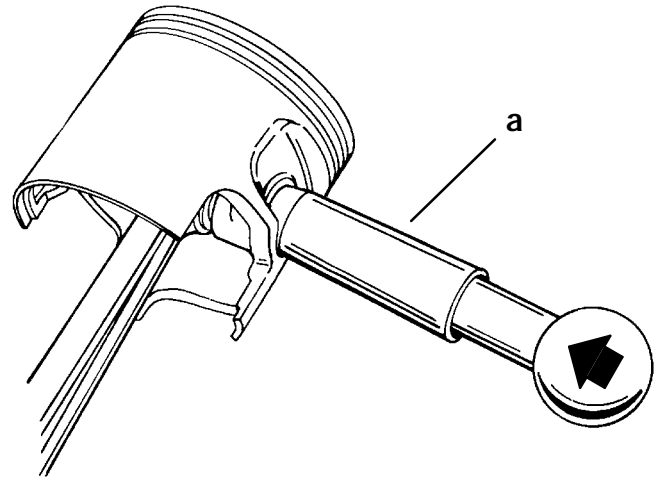
a - Piston Pin
b - Piston Pin Tool

6. Install new piston pin lockrings (one each end of piston pin) with Lockring Installation Tool (91-93004A2).
7. Make sure lockrings are properly seated in piston grooves.



51086

a - Lockring Installation Tool (91-93004A2)
b - Lockring

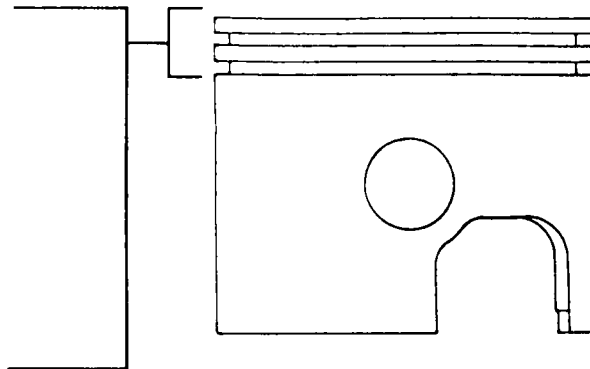
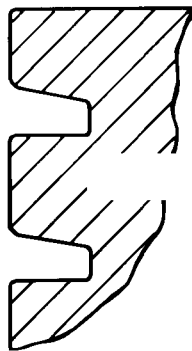
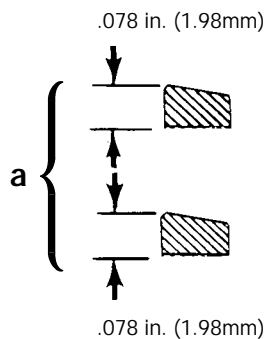


52335

a - Lockring Installation Tool



Piston and Piston Ring Combination

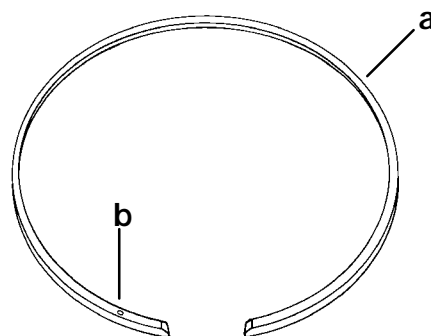


a - Half Keystone (tapered) Piston Ring

IMPORTANT: Piston ring side with dot or letter must be facing up.

Piston Installation

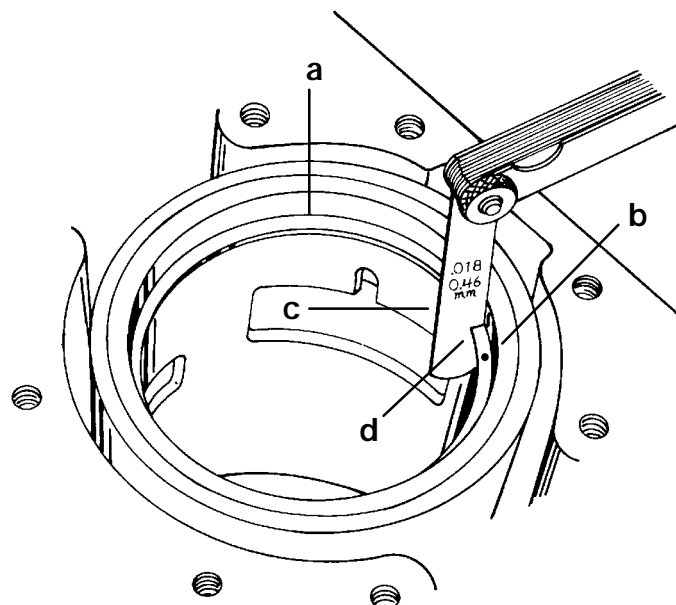
1. Before installing new piston rings, check gap between ring ends by placing each ring in its respective cylinder, then pushing ring about 1/2 in. (12.7mm) into cylinder using piston to assure proper position.
2. Check end gap of each new piston ring with a feeler gauge. End gap must be within 0.010 in. to 0.018 in. (0.25mm to 0.46mm). If end gap is greater, check other piston rings in cylinder bore, until rings (within tolerance) are found.



52317

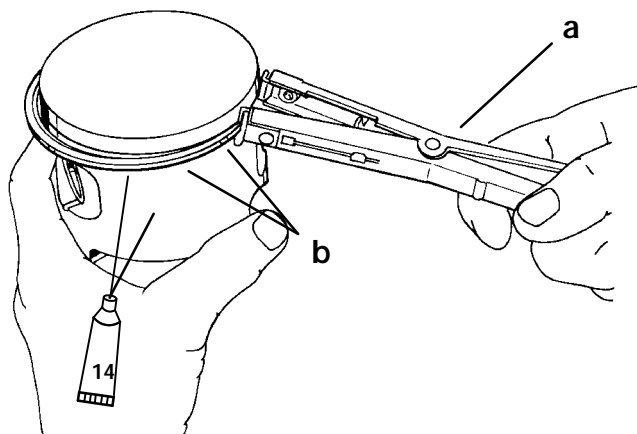
a - Piston Ring
b - Dot

3. Use Piston Ring Expander (91-24697) and install piston rings (dot side up) on each piston. Spread rings just enough to slip over piston.
4. Check piston rings to be sure that they fit freely in ring groove.
5. Lubricate piston, rings and cylinder wall with 2-Cycle Outboard Oil.



52327

a - Piston Ring
b - Dots (Faces Up)
c - Feeler Gauge
d - Ring End Gap



52319

14 2 Cycle Outboard Oil (92-826666A24)

a - Piston Ring Expander
b - Dot Side "UP" on Piston Ring



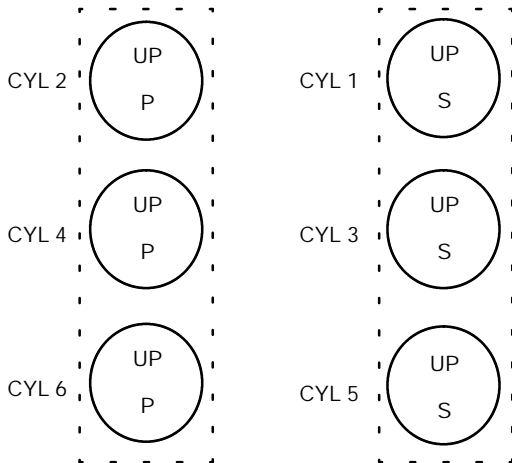
- Rotate each piston ring so end of ring is aligned with locating pin as shown.
- Install Piston Ring Compressor.
- Remove screws and connecting rod cap from piston rod assembly being installed.

IMPORTANT: Piston must be correctly installed and positioned as shown.

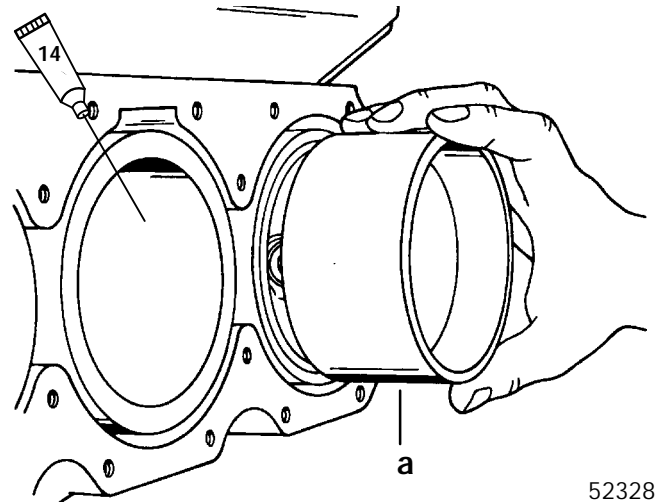
Pistons marked with the word "UP" and with the letter "P" or "S" on top of piston.

Pistons with the letter "P" must be installed in the port side of engine and the word "UP" facing toward top of engine.

Pistons with the letter "S" must be installed in the star-board side of engine and the word "UP" toward top of engine.



- Coat cylinder bore with 2-cycle oil. Match piston assembly with cylinder it was removed from, and position piston as described below. Push piston into cylinder.



52328

14 2 Cycle Outboard Oil (92-826666A24)

a - Piston Ring Compressor (91-823237)

- Apply 2-4-C w/Teflon to bearing surface of connecting rod and install bearing assembly, as shown.
- Place connecting rod cap on connecting rod. Apply light oil to threads and face of connecting rod bolts. Thread connecting rod bolts finger-tight while checking for correct alignment of the rod cap as shown.

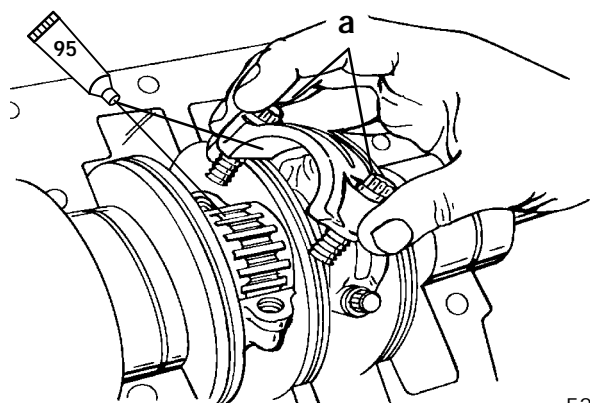
IMPORTANT: Connecting rod and connecting rod caps are matched halves. Do not torque screws before completing the following procedure.

- Run a pencil lightly over ground area.
- If pencil stops at fracture point, loosen bolts, retighten, and check again.

NOTE: If you still feel the fracture point, discard the rod.



12. Tighten connecting rod bolts (using a 5/16 in. - 12 point socket) First torque to 15 lb. in. (1.7 N·m) then 30 lb. ft. (41.0 N·m). Turn each bolt an additional 90° after 2nd torque is attained. Recheck alignment between rod cap and rod as shown.



52316

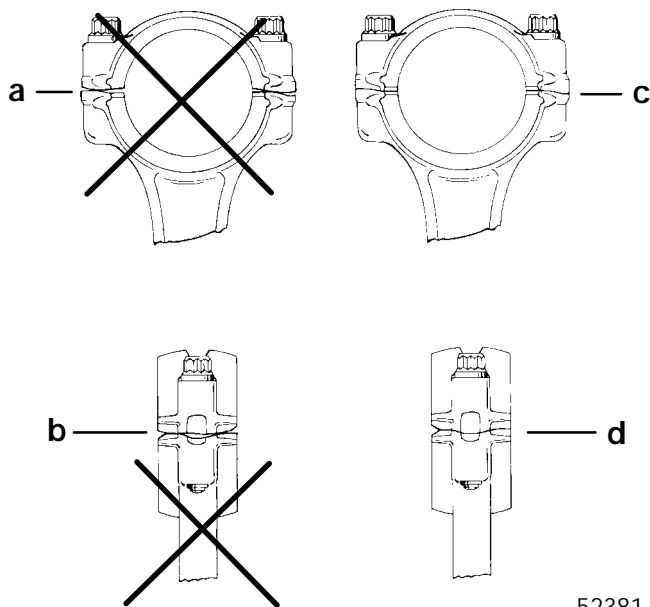
2-4-C With Teflon (92-825407A12)

a - Connecting Rod Screws

13. Rotate crankshaft several times (using powerhead stand) to assure free operation (no binds and catching).

Connecting Rod Cap Alignment

Check each connecting rod cap for correct alignment. If not aligned, a ridge can be seen or felt at the separating line as shown below. Correct any misalignment.

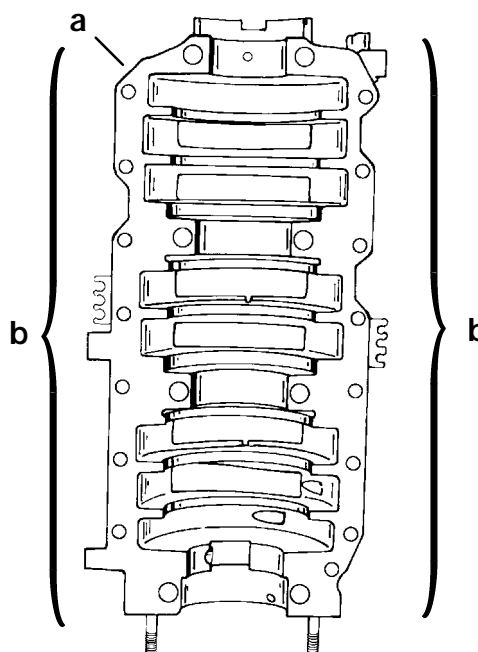


52381

- a - Side View Incorrect - Cap on Backwards
 b - End View Incorrect - Cap on Backwards
 c - Side View Correct
 d - End View Correct

Crankcase Cover Installation

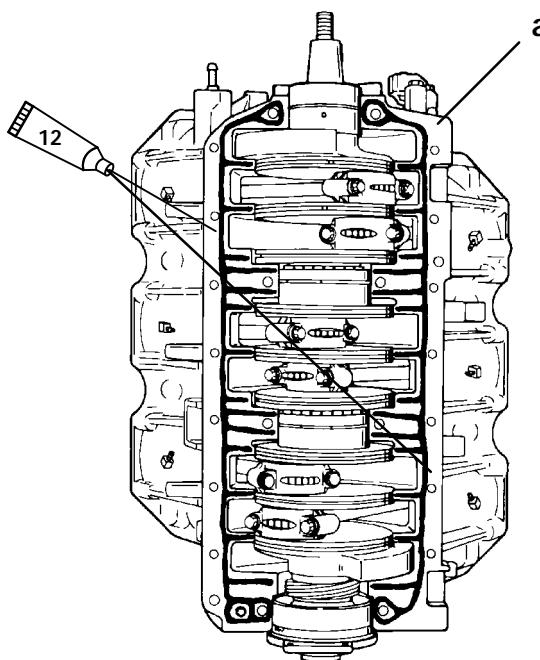
1. Thoroughly remove all oil from mating surfaces of crankcase cover and cylinder block with Loctite Primer 203 included in Master Gasket Kit (92-12564-1).



52331

- a - Crankcase Cover
 b - Remove All Oil

2. Apply a thin, even coat of Loctite Master Gasket on mating surface of cylinder block.



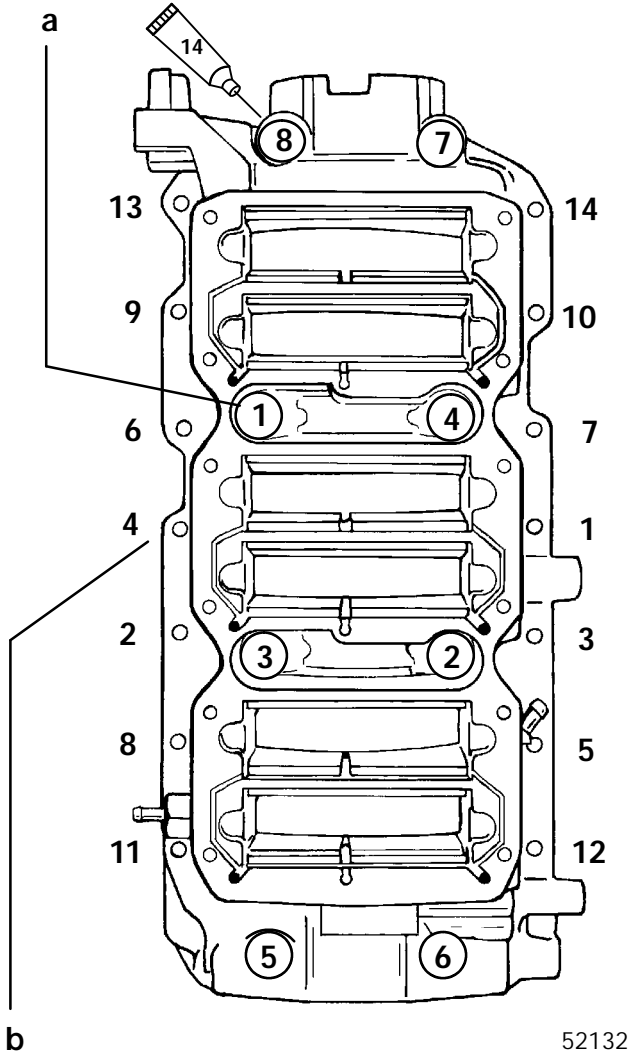
51705

Loctite Master Gasket (92-12564-2)

- a - Loctite Master Gasket (92-12564-1)



- Place crankcase cover in position on cylinder block. Turn the 8 center main bolts in a LITTLE at a time, (following torque sequence) compressing crankshaft seal rings until crankshaft cover has been drawn down to cylinder block. Tighten eight bolts (a) evenly in three progressive steps (following torque sequence).
- Install remaining crankcase cover flange bolts (following torque sequence).



52132

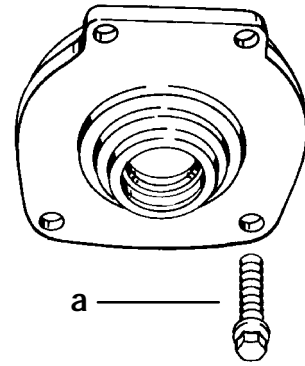
14 2 Cycle Outboard Oil (92-826666A24)

a - Add a Small Amount of Light Oil to Threads and Bolt Face;

8 Bolts (M10 x 1.5 x 80);
30 lb. ft. (40.5 N·m) and Rotate 90°

b - 14 Bolts (M8 x 1.25 x 35)
28 lb. ft. (37.9 N·m)

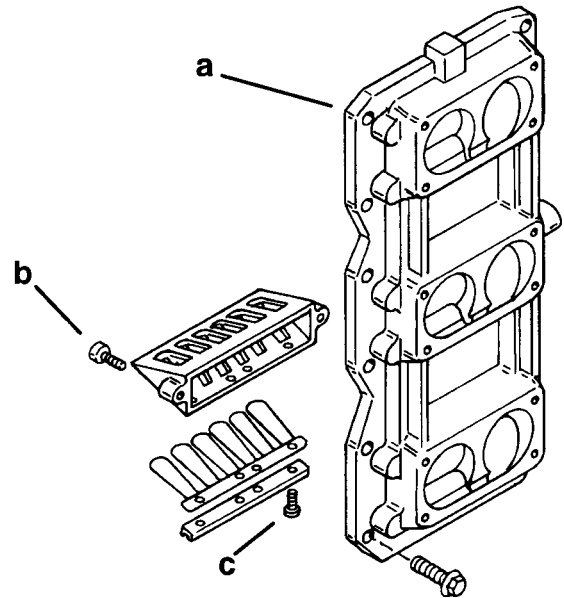
- Tighten end cap bolts to specified torque.



52132

a - Torque Bolts to 85 lb. in. (9.6 N·m)

Assembly of Reed Blocks to Intake Manifold



52156

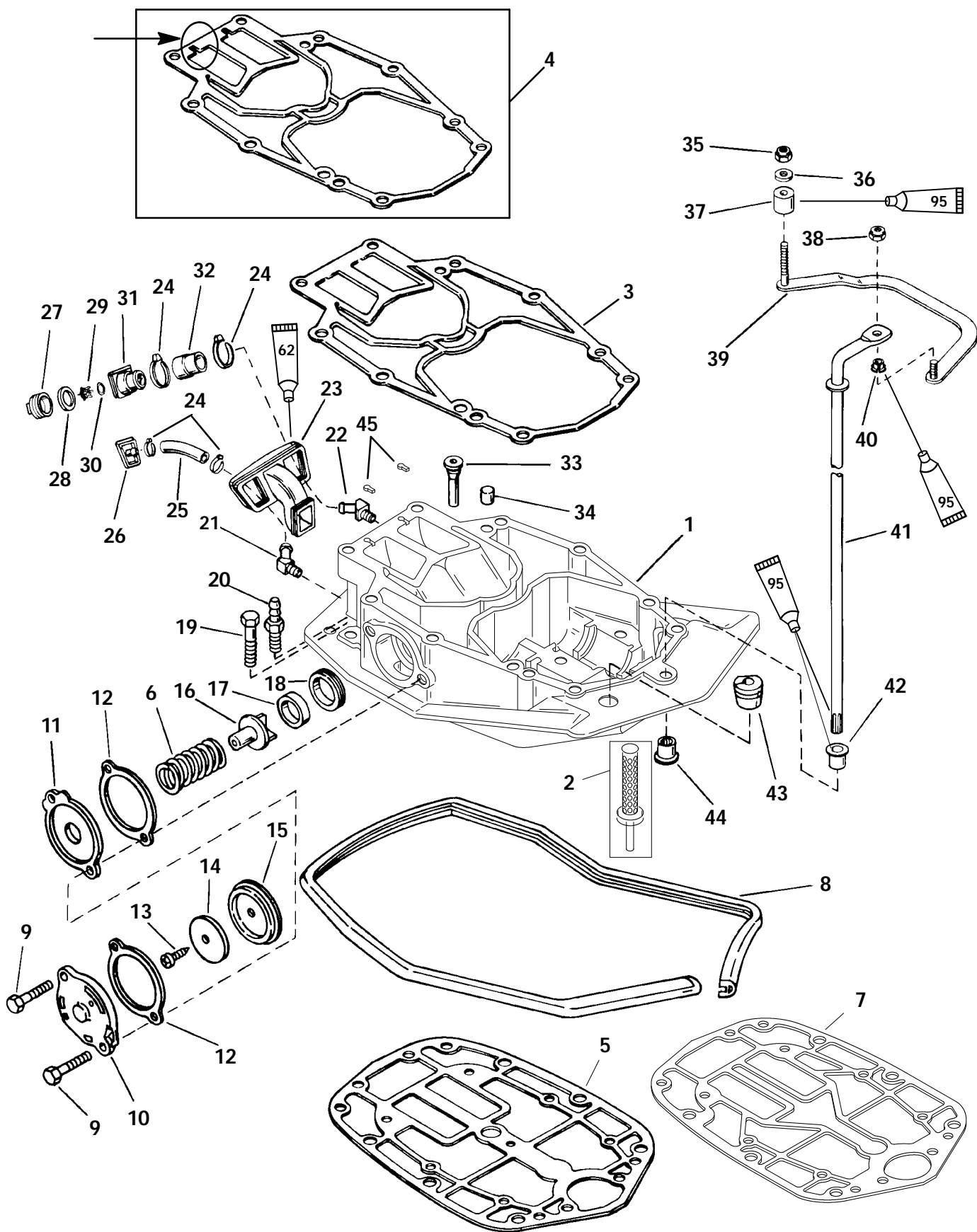
a - Intake Manifold Bolts [Torque to 100 lb. in. (11.3 N·m)]

b - Reed Block Mounting Bolts [Torque to 90 lb. in. (10.2 N·m)]

c - Reed Attaching Screws [Torque to 25 lb. in. (2.8 N·m)]



Exhaust Plate w/Water Pressure Relief Valve Components



62 3M PermaBond #3MO8155 (Obtain Locally)

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



Exhaust Plate w/Water Pressure Relief Valve Components

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	EXHAUST PLATE (W/O REF #2)			
	1	EXHAUST PLATE (WITH REF #2)			
2	2	STRAINER S/N-0G437999 & BELOW			
3	1	GASKET			
4	1	GASKET (Refer to Service Bulletin #94-11)			
5	1	GASKET (LOWER)			
6	1	SPRING			
	1	SPRING			
1	1	EXHAUST PLATE S/N-0G438000 & UP			
3	1	GASKET			
7	1	GASKET (LOWER)			
8	1	SEAL			
9	2	SCREW (M8 x 35)	240	20	27.1
10	1	COVER			
11	1	RELIEF VALVE PLATE ASSEMBLY			
12	2	GASKET			
13	1	SCREW	Drive Tight		
14	1	WASHER			
15	1	DIAPHRAGM			
16	1	POPPET			
17	1	GROMMET			
18	1	CARRIER			
19	4	SCREW (M8 x 35)	300	25	33.9
20	2	CONNECTOR			
21	1	ELBOW (45 degrees)			
22	1	ELBOW (45 degrees)			

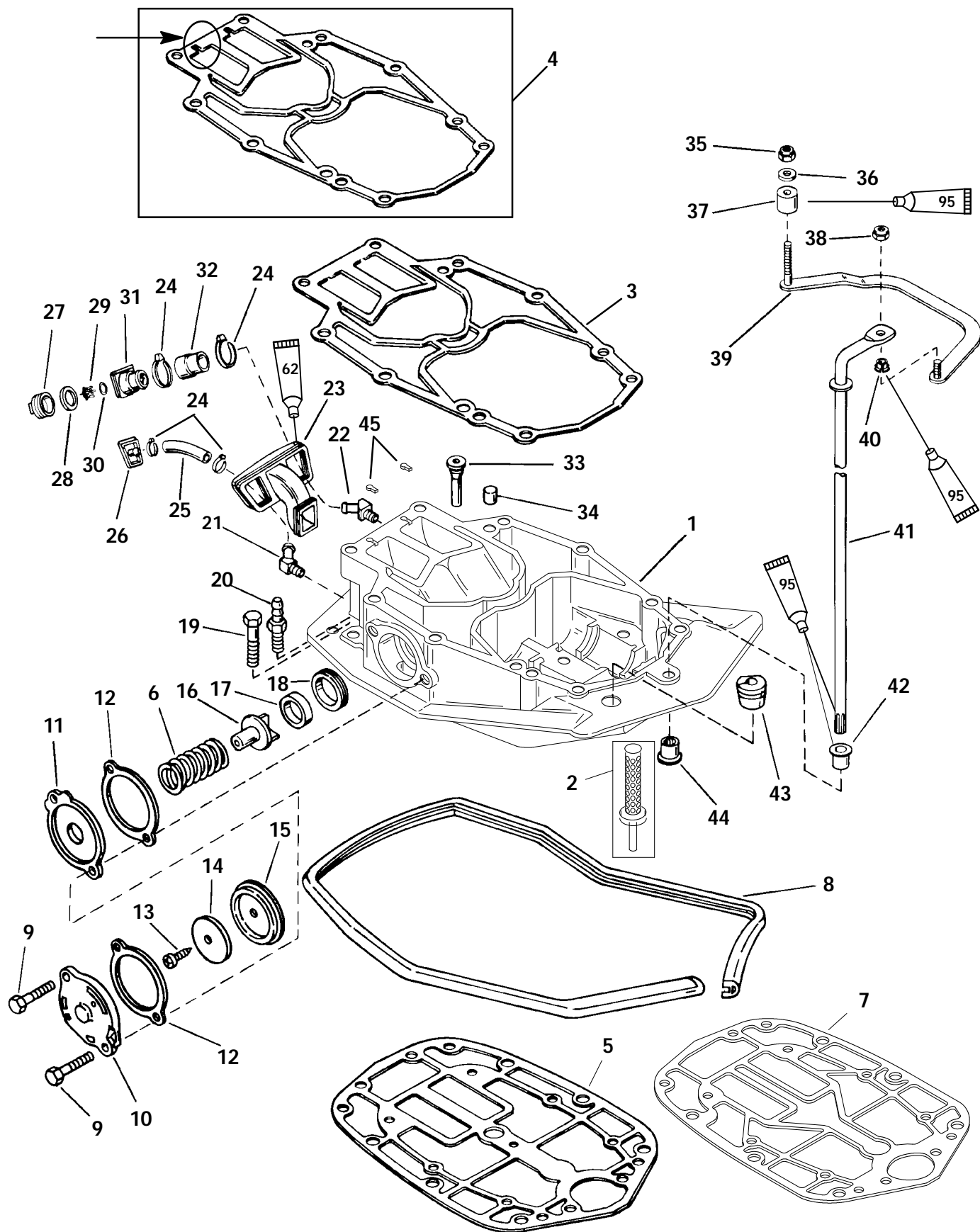
☞ = S/N-0G129222 & UP (13 TOOTH SPLINES)

☞ = S/N-0G129221 & BELOW (8 TOOTH SPLINES)

* = NOTE: WHEN ORDERING REPLACEMENT POWERHEAD FOR ENGINES WITH S/N-0G178947 & BELOW, REFER TO SERVICE BULLETIN #94-11, AND ORDER EXHAUST PLATE KIT 818450A1 IF NECESSARY.



Exhaust Plate w/Water Pressure Relief Valve Components



 62 3M Permabond #3MO8155 (Obtain Locally)

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



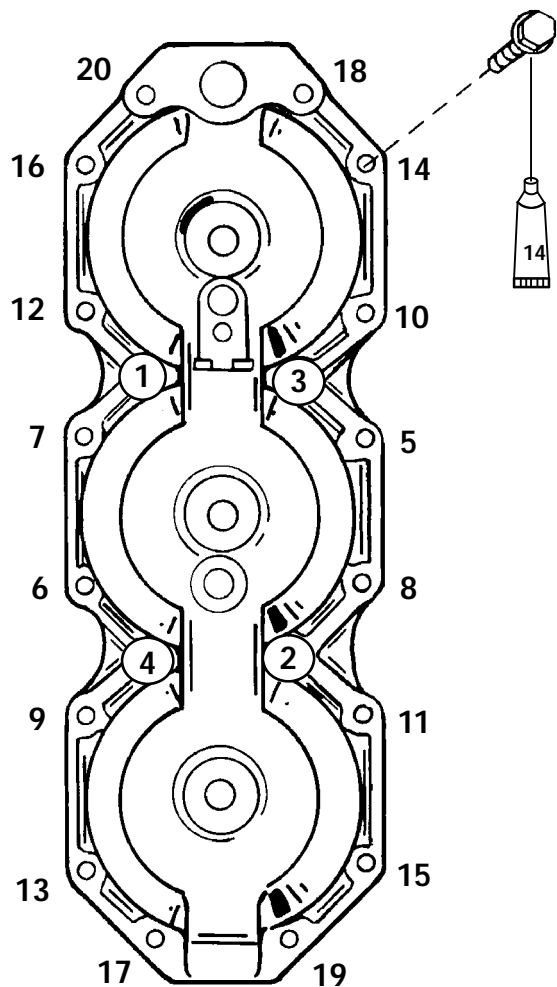
Exhaust Plate w/Water Pressure Relief Valve Components

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
23	1	IDLE EXHAUST BOOT			
24	AR	STA STRAP			
25	1	HOSE- telltale (2-1/2 IN.)			
26	1	FITTING- telltale			
27	1	PLUG			
28	1	WASHER			
29	1	CHECK VALVE			
30	1	O RING			
31	1	FITTING			
32	1	HOSE			
33	2	DRAIN CHECK VALVE			
34	4	DOWEL PIN			
35	1	NUT			
36	1	WASHER			
37	1	ROLLER			
38	1	NUT			
39	1	SHIFT LINK			
40	1	BUSHING			
41	1	UPPER SHIFT SHAFT (LONG)			
	1	UPPER SHIFT SHAFT (X-LONG)			
	1	UPPER SHIFT SHAFT (XX-LONG)			
42	1	BUSHING			
43	1	GROMMET			
44	1	COUPLING			
45	2	PLUG (S/N-0G178947 & BELOW)			



Cylinder Head Installation

1. Install each cylinder head to engine block with thermostat pocket "UP". Apply light oil to cylinder head bolt threads and bolt face. Torque bolts 18 and 20 to 30 lb. ft. (40.5 N·m) and rotate 90°. Torque all other bolts to 20 lb. ft. (27.1 N·m) and rotate 90°.



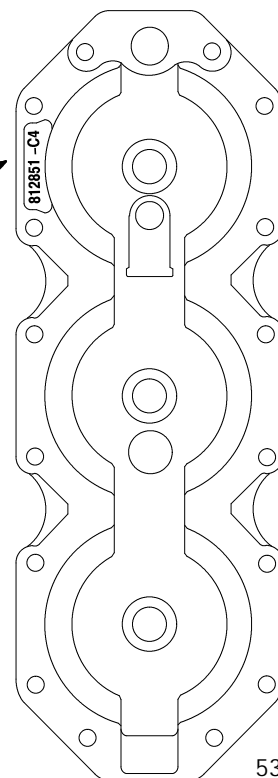
 2 Cycle Outboard Oil (92-826666A24)

52132

NOTE: The 3 Litre Work has low compression cylinder heads which can be identified from other 225 CARB/ 225 EFI/ 250 EFI cylinder heads by the casting #.

812851 - C4

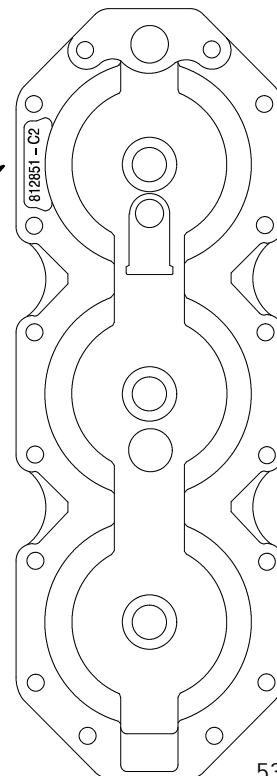
3 Litre WORK



53640

812851 - C2

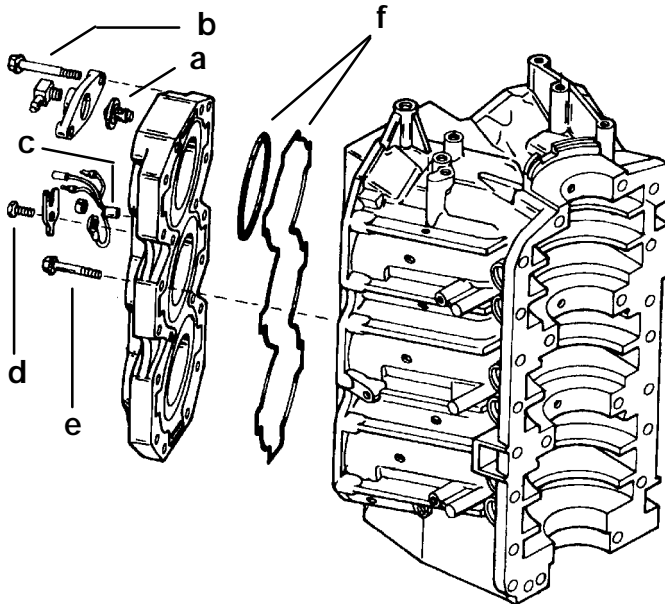
225 CARB/225 EFI
& 250 EFI



53639



2. Install thermostat assembly into each cylinder head.
3. Install overheat temperature sensor into STARBOARD cylinder head below #1 spark plug.

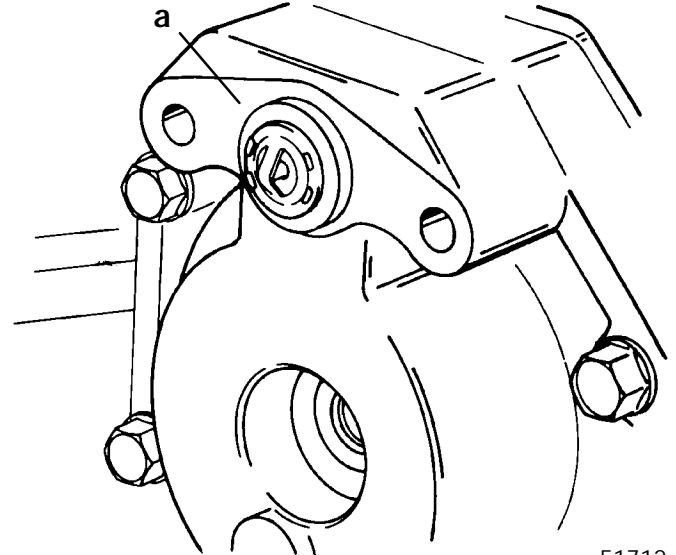


52158

- a - Thermostat (143° F - 61.7° C)
- b - Bolt - Torque to 30 lb. ft. (40.5 N·m) and rotate 90°
- c - Temperature Sensor
- d - Bolt - Torque to 200 lb. in. (22.6 N·m)
- e - Bolt - Torque to 20 lb. ft. (27.1 N·m) and rotate 90°
- f - O-ring

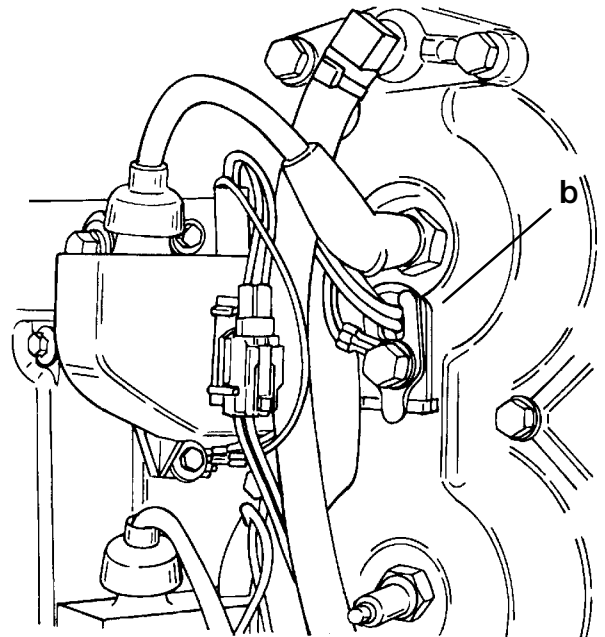
NOTE: During normal engine operating temperature, the sender electrical circuit is open and will close if temperature reaches 200° F ± 8° F (93.3° C ± 13.3° C) thus activating the overheat alarm.

4. Thermostat and temperature sensor installed.



51712

a - Thermostat [143° F (61.7° C)]



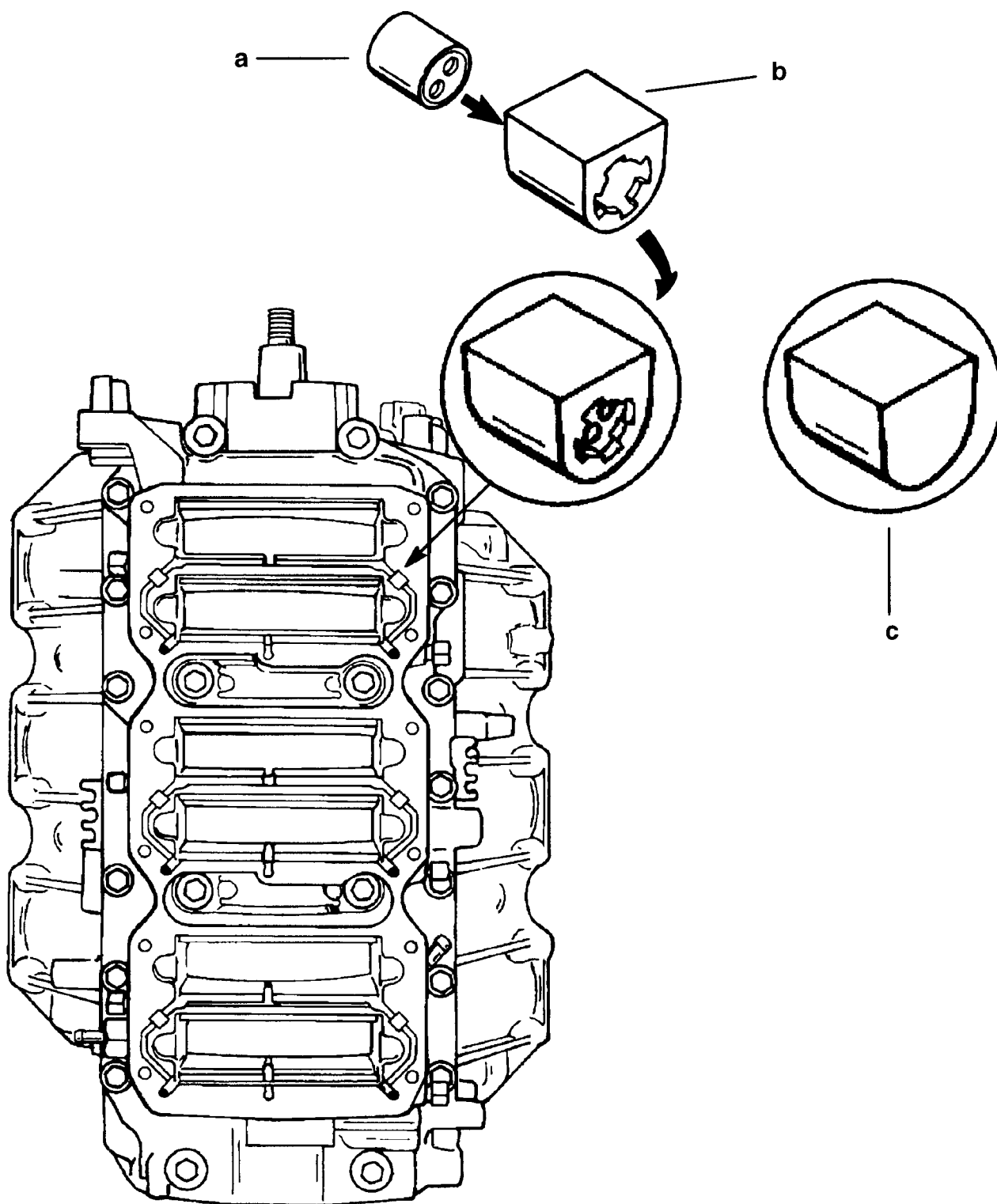
52349

b - Overheat Temperature Sensor



3 Liter Work/225 Carb/225 EFI/250 EFI Bleed Routing 1994/1995/1996 Models (1997 Models DO NOT have Front Mounted Bleed Check Valves)

Front View

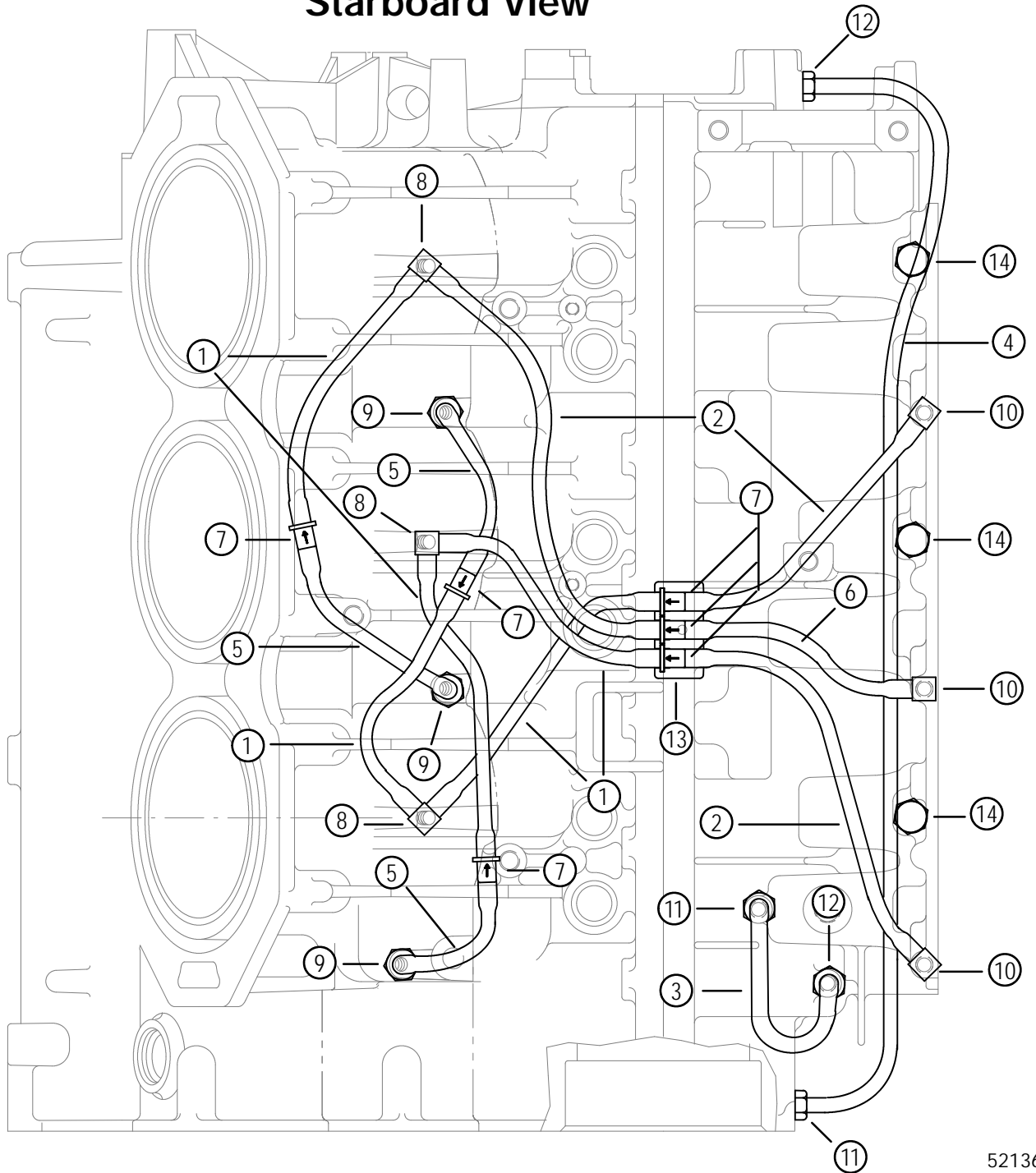


- a - Check Valve (6 Each) (1994/1995/1996 Models)
- b - Carrier (6 Each)
- c - Carrier (No Check Valve - 1997 Models)



3 Liter Work/225 Carburetor Bleed Routing for 1995/1996 Models (SN 0G129222 to 0G437999)

Starboard View



- 1 - 6 in. (15.2cm) (5 ea.)
- 2 - 8.5 in. (21.6cm) (3 ea.)
- 3 - 4 in. (10.2cm)
- 4 - 22.5 in. (57.2cm)
- 5 - 3 in. (7.6cm)
- 6 - 4.5 in. (11.4cm)
- 7 - Check Valve (21-14912--2) (12 ea.)
- 8 - Fitting (22-824356-1) (3 ea.)
- 9 - Fitting (Straight) (22-824502-1)

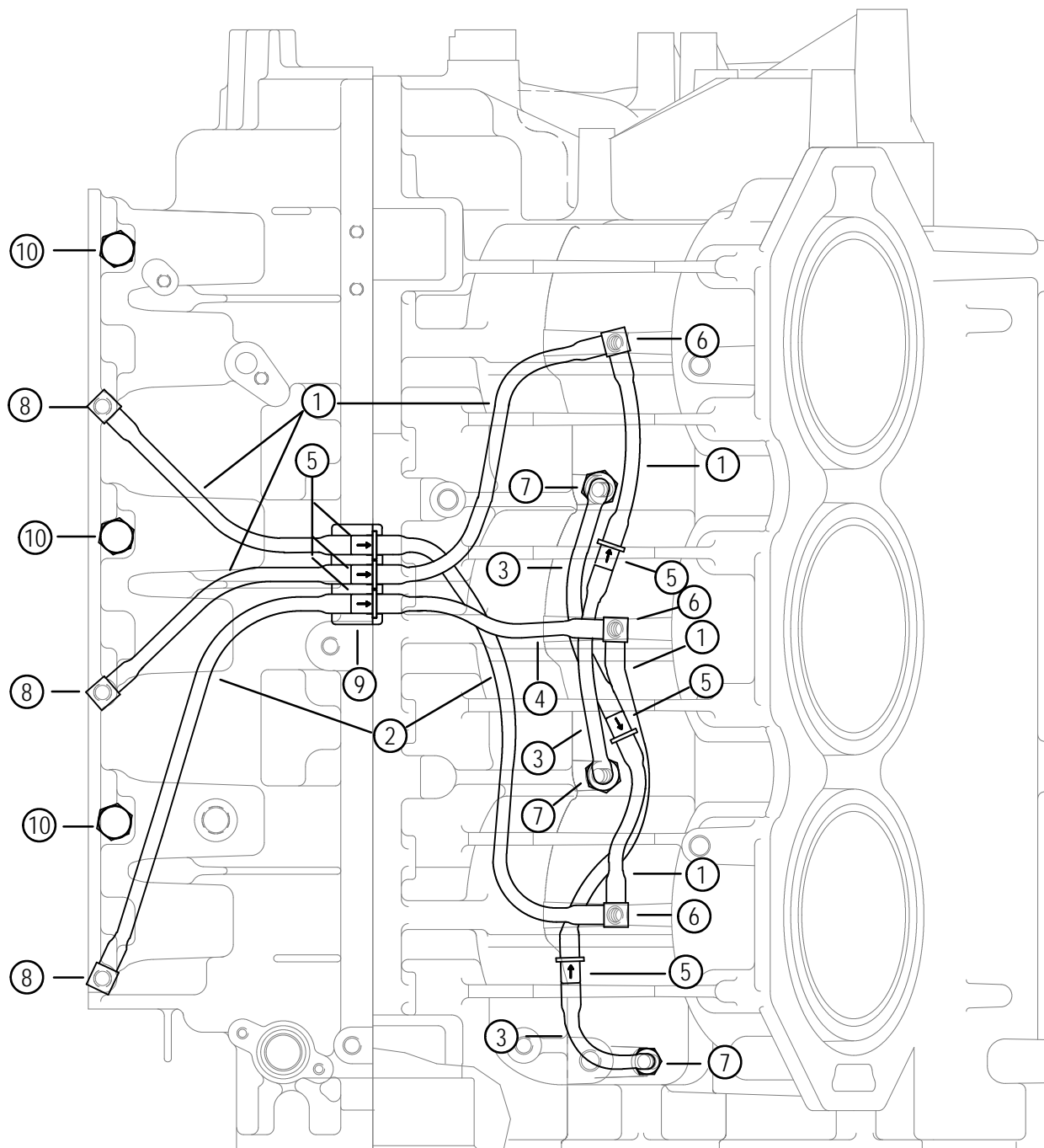
- 10- Fitting (90°) (22-76843) (3 ea.)
- 11- Check Valve (21-42658-5) (2 ea.)
- 12- Check Valve (21-815923-4) (2 ea.)
- 13- Retainer (821556) (2 ea.)
- 14- Pipe Plug (1/16) (22-827201) (3 ea.)

52136



3 Liter Work/225 Carburetor Bleed Routing for 1995/1996 Models (SN 0G129222 to 0G437999)

Port View



52133

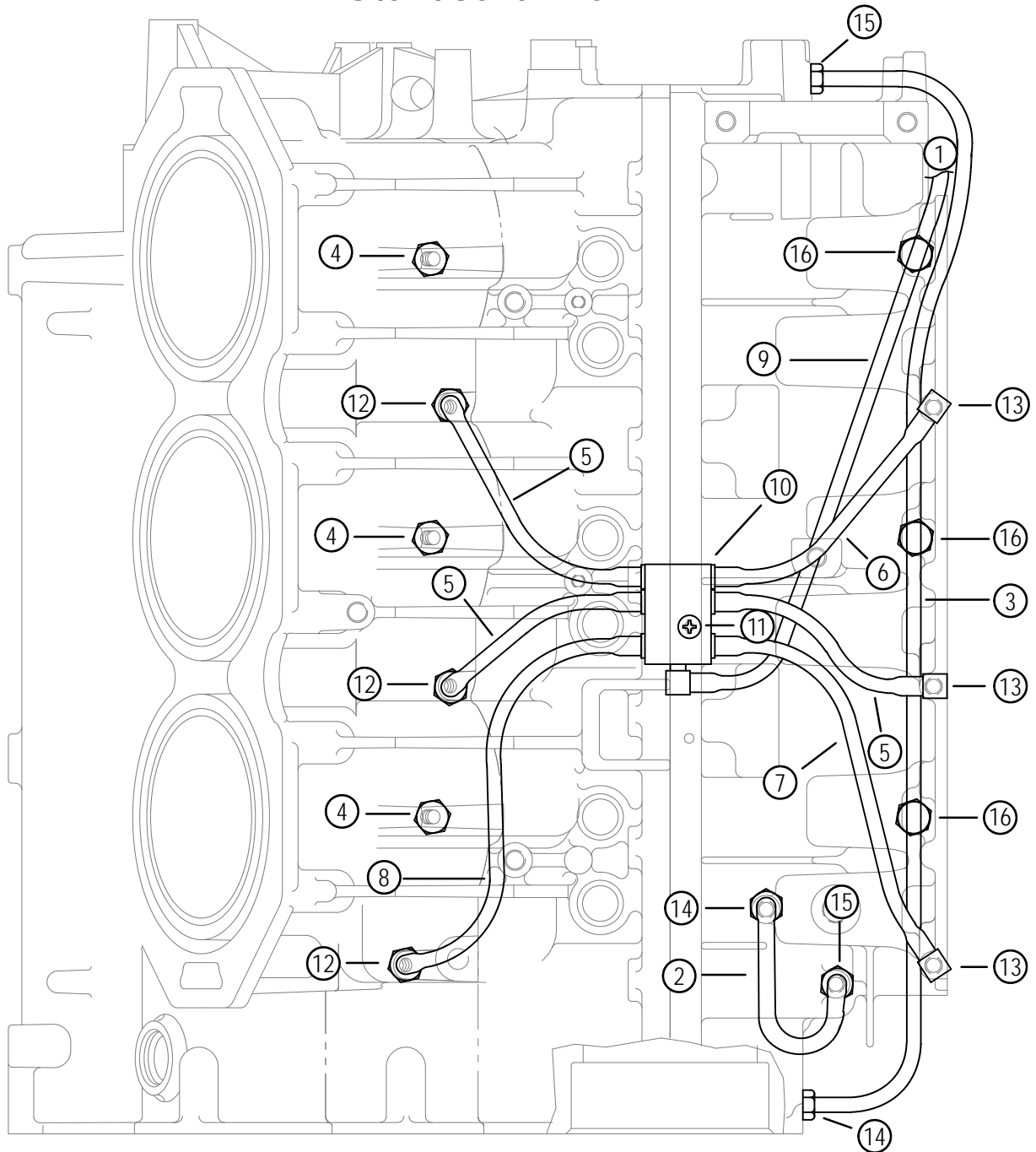
- 1 - 6 in. (15.2cm) (6 ea.)
- 2 - 8.5 in. (21.6cm) (2 ea.)
- 3 - 3 in. (7.6cm) (3 ea.)
- 4 - 4.5 in. (11.4cm)
- 5 - Check Valve (21-14912--2) (6 ea.)
- 6 - Fitting (22-76843) (3 ea.)
- 7 - Fitting (Straight) (22-824502-1) (3 ea.)
- 8 - Fitting (90°) (22-76843)

- 9 - Retainer (821556)
- 10 - Pipe Plug (1/16) (22-827201) (3 ea.)



225 EFI/250 EFI Bleed Routing for 1995/1996 Models (SN 0G129222 to 0G437999)

Starboard View



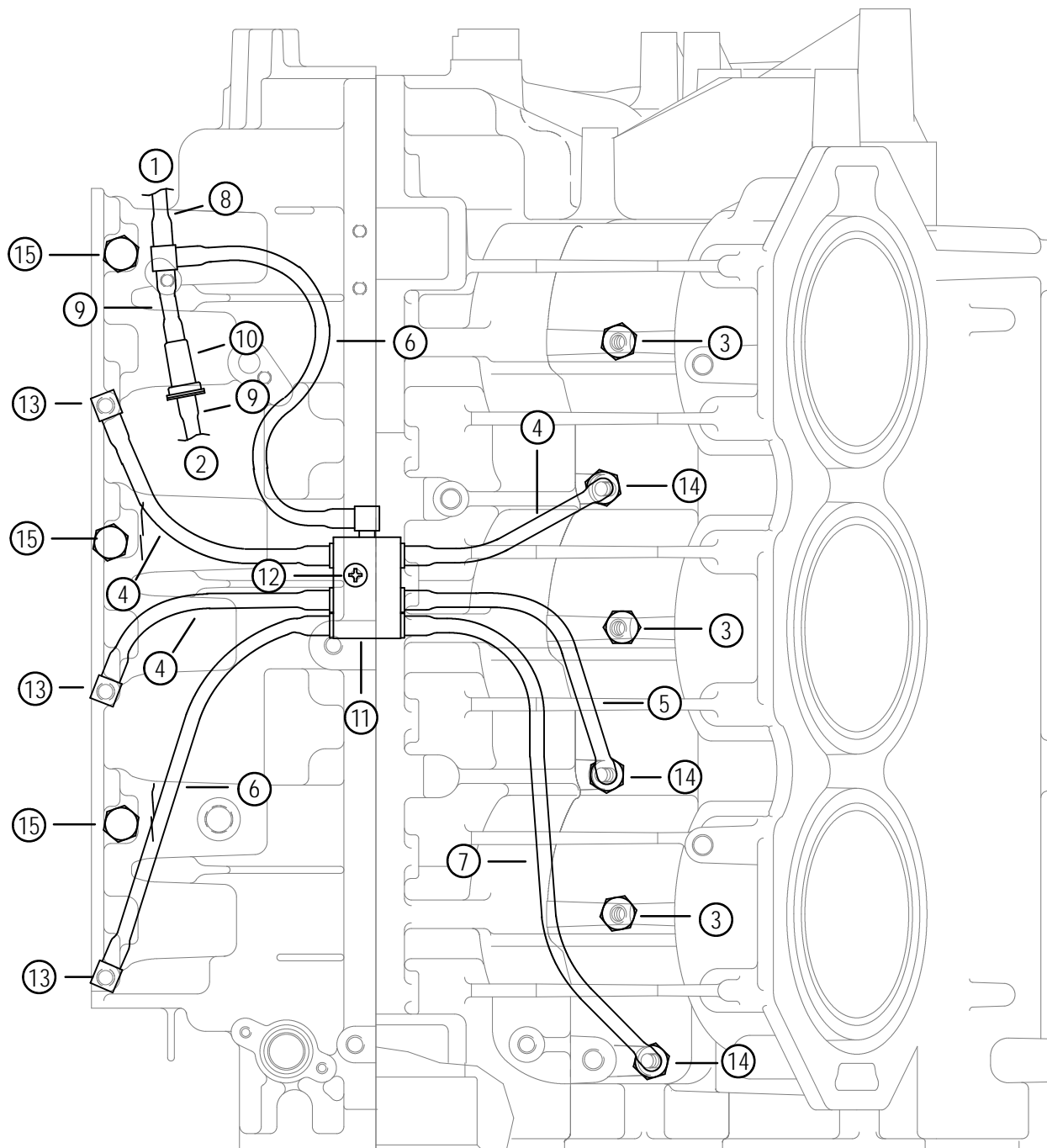
- 1 - Continuation of bleed line from PORT side
- 2 - 4 in. (10.2cm)
- 3 - 22.5 in. (57.2cm)
- 4 - Pipe Plug (1/16) (3 ea.)
- 5 - 5.25 in. (13.3cm) (3 ea.)
- 6 - 7 in. (17.8cm)
- 7 - 8-1/2 in. (21.6cm)
- 8 - 9 in. (22.9cm)
- 9 - 17 in. (43.2cm)
- 10- Manifold (827210A1)
- 11- Screw (10-16x3/4) (10-92051) (2 ea.)
- 12- Pipe Plug (1/16) (22-827201)

- 13- Fitting (90°) (22-76843)
- 14- Check Valve (21-42658-5) (2ea.)
- 15- Check Valve (21-815923--4) (2ea.)
- 16- Pipe Plug (1/16) (22-827201) (3 ea.)



225 EFI/250 EFI Bleed Routing for 1995/1996 Models (SN 0G129222 to 0G437999)

Port View



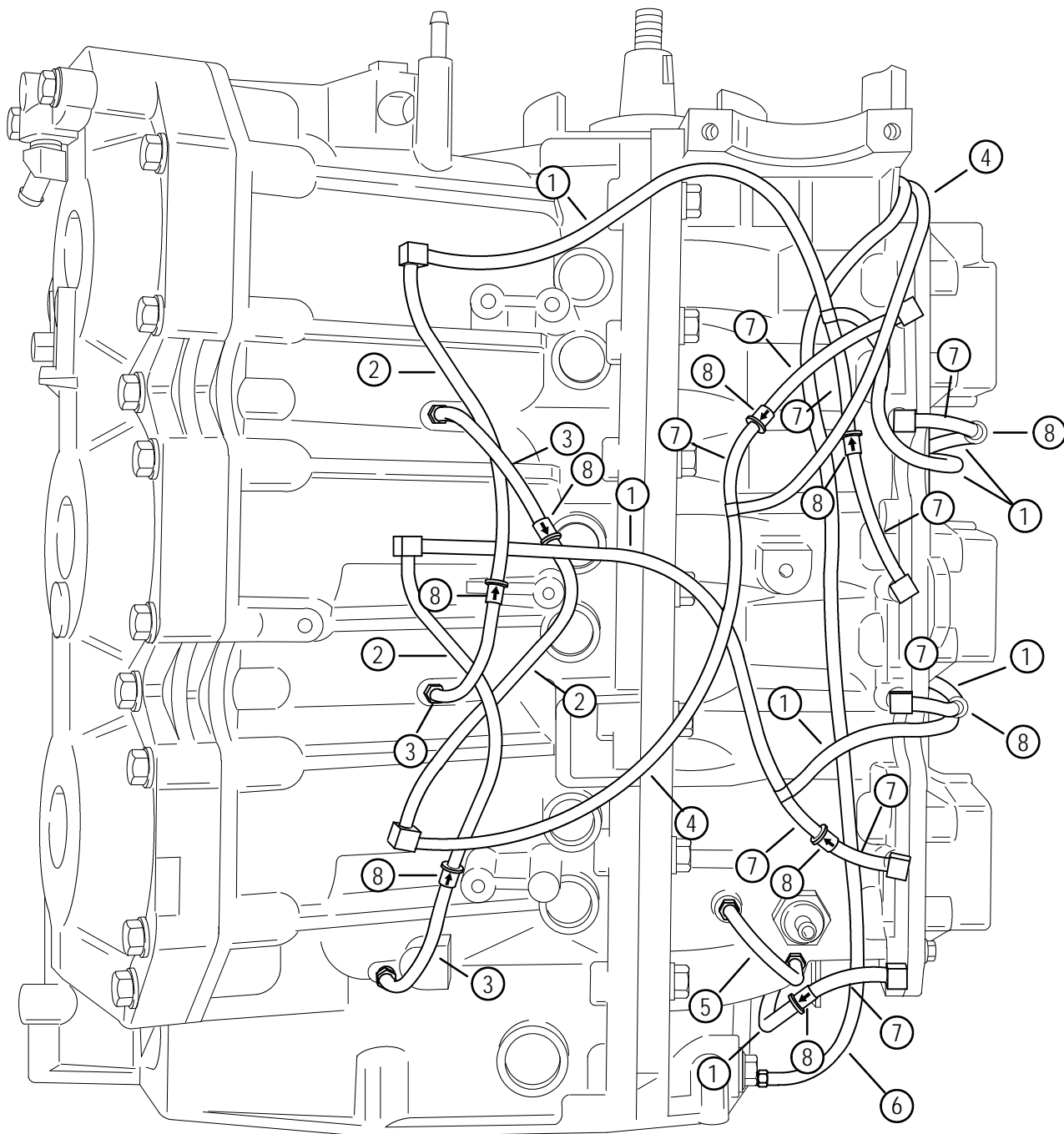
- 1 - Continuation of Bleed Line from STARBOARD side.
- 2 - To Vapor Separator
- 3 - Pipe Plug (1/16) (3 ea.)
- 4 - 5.25 in. (13.4cm) (3 ea.)
- 5 - 7 in. (17.8cm)
- 6 - 9 in. (22.8cm) (2 ea.)
- 7 - 11 in. (27.9cm)
- 8 - 17 in. (43.2cm)
- 9 - 1.75 in. (4.5cm) (2 ea.)

- 10- Filter (35-18206)
- 11- Manifold (827210A1)
- 12- Screw (10-16x3/4) (10-92051)
- 13- Fitting (90°) (22-76843) (3 ea.)
- 14- Fitting (Straight) (22-824502-1) (3 ea.)
- 15- Pipe Plug (1/16) (22-827201) (3 ea.)



1997 3 Liter Work and 225 Carburetor Models (SN 0G438000 to 0G485988)

Starboard View



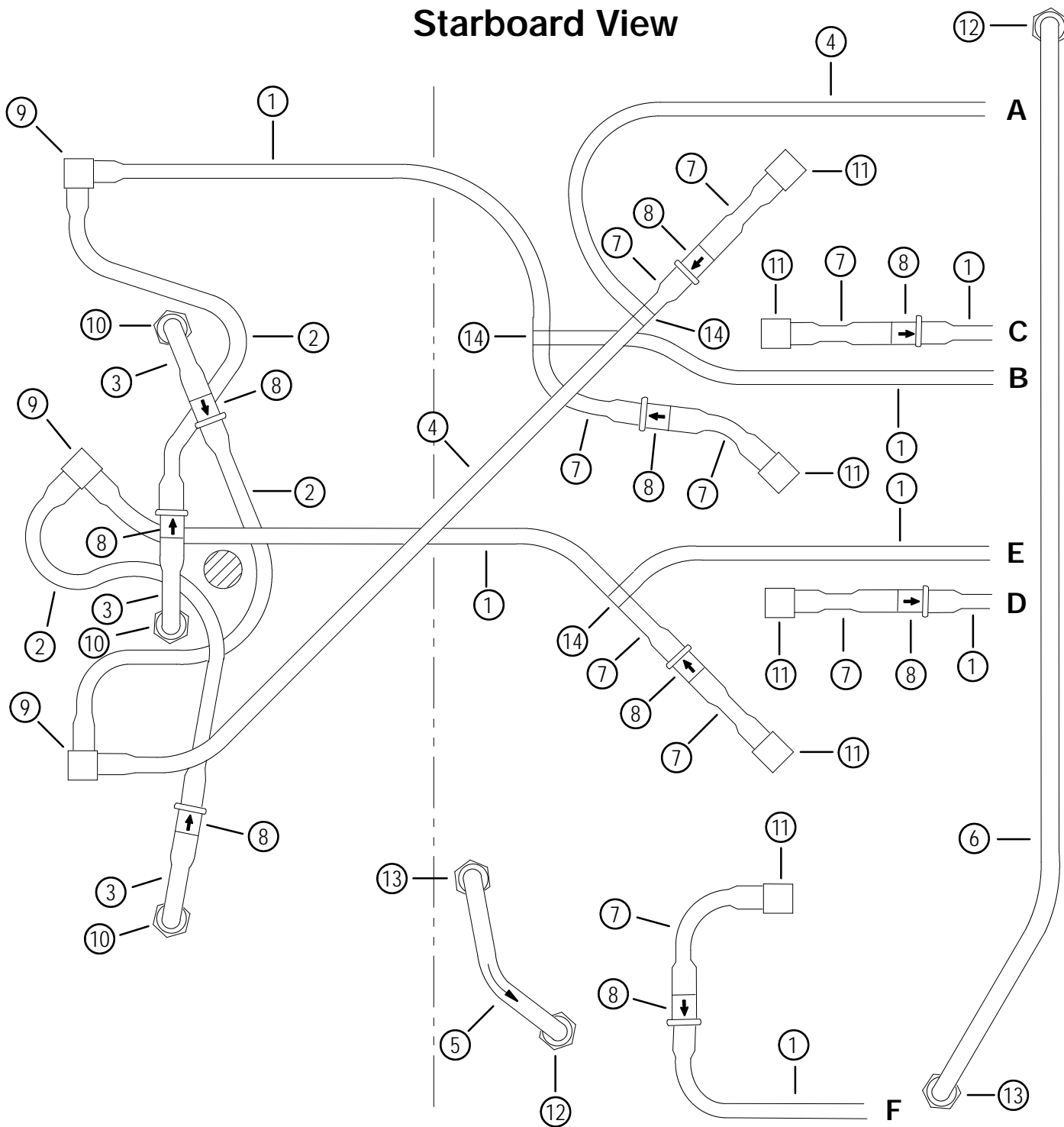
55657

- 1 - 9.5 in. (24.1cm) (7 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (3 ea.)
- 4 - 11.75 in. (29.8cm) (2 ea.)
- 5 - 3.75 in. (9.5cm) (1 ea.)
- 6 - 22.5 in. (57.1cm) (1 ea.)
- 7 - 1.5 in. (3.8cm) (9 ea.)
- 8 - Check Valves (21-14912--2) (9 ea.)



1997 3 Liter Work and 225 Carburetor Bleed Hose Flow Diagram (SN 0G438000 to 0G485988)

Starboard View



55658

1 - 9.5 in. (24.1cm) (7 ea.)

2 - 6 in. (15.2cm) (3 ea.)

3 - 3 in. (7.6cm) (3 ea.)

4 - 11.75 in. (29.8cm) (2 ea.)

5 - 3.75 in. (9.5cm) (1 ea.)

6 - 22.5 in. (57.1cm) (1 ea.)

7 - 1.5 in. (3.8cm) (9 ea.)

8 - Check Valves (21-14912--2) (9 ea.)

9 - Fitting (22-824356-1) (3 ea.)

10- Fitting (Straight) (22-824502-1) (3 ea.)

11- Fitting (90°) (22-76843) (6 ea.)

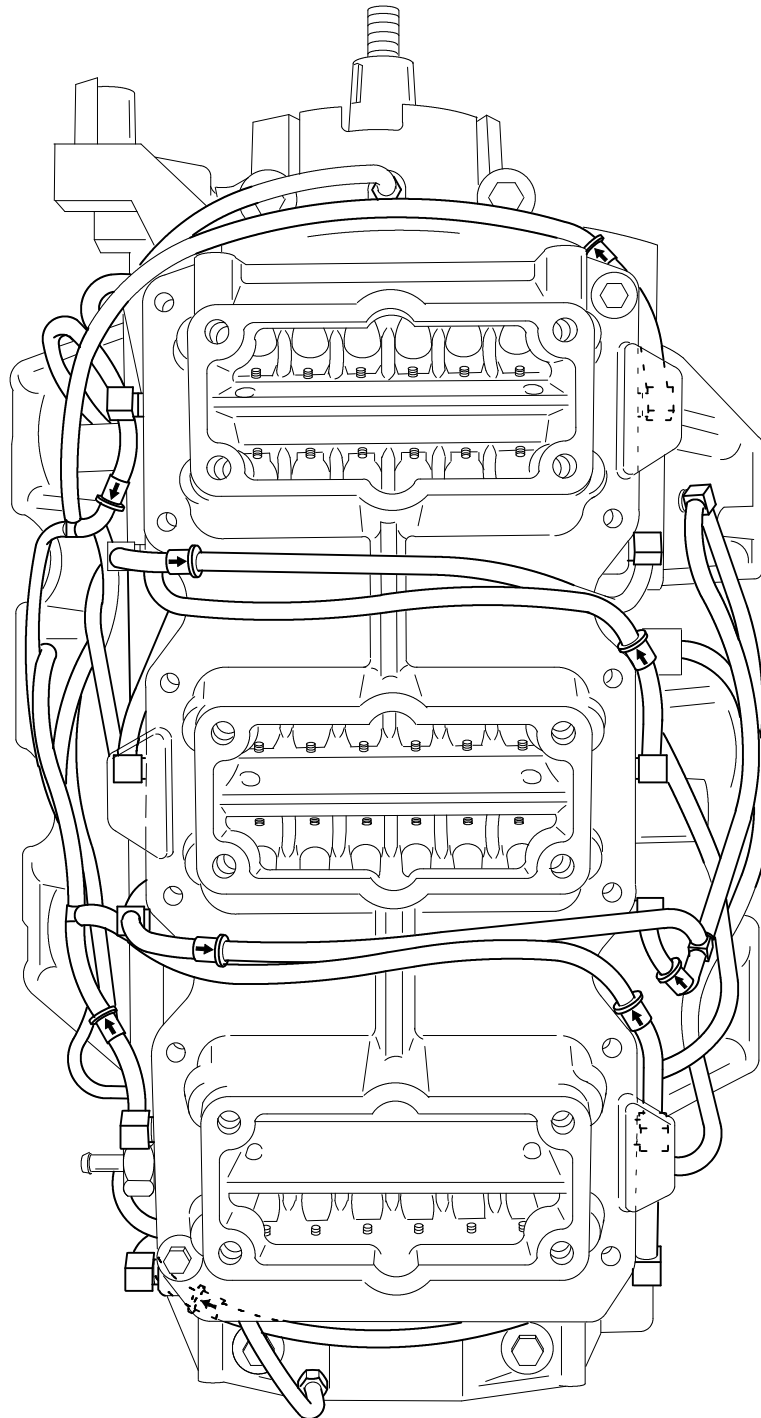
12- Check Valve (21-815923-4) (2 ea.)

13- Check Valve (21-42658-5) (2 ea.)

14- T-Fitting (22-59169) (3 ea.)



1997 3 Liter Work and 225 Carburetor Models (SN 0G438000 to 0G485988) Front View

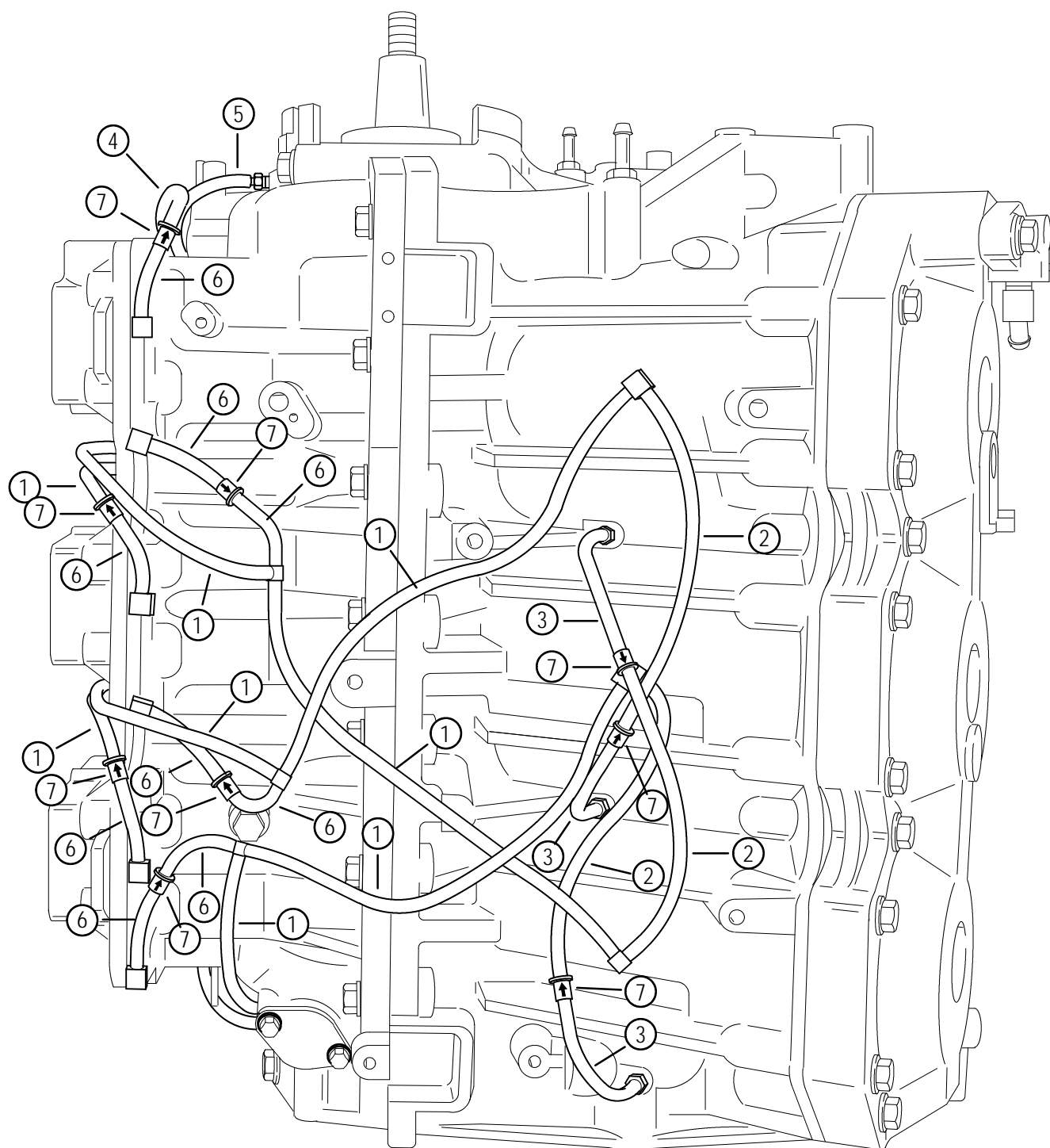


55659



1997 3 Liter Work and 225 Carburetor Models (SN 0G438000 to 0G485988)

Port View



55655

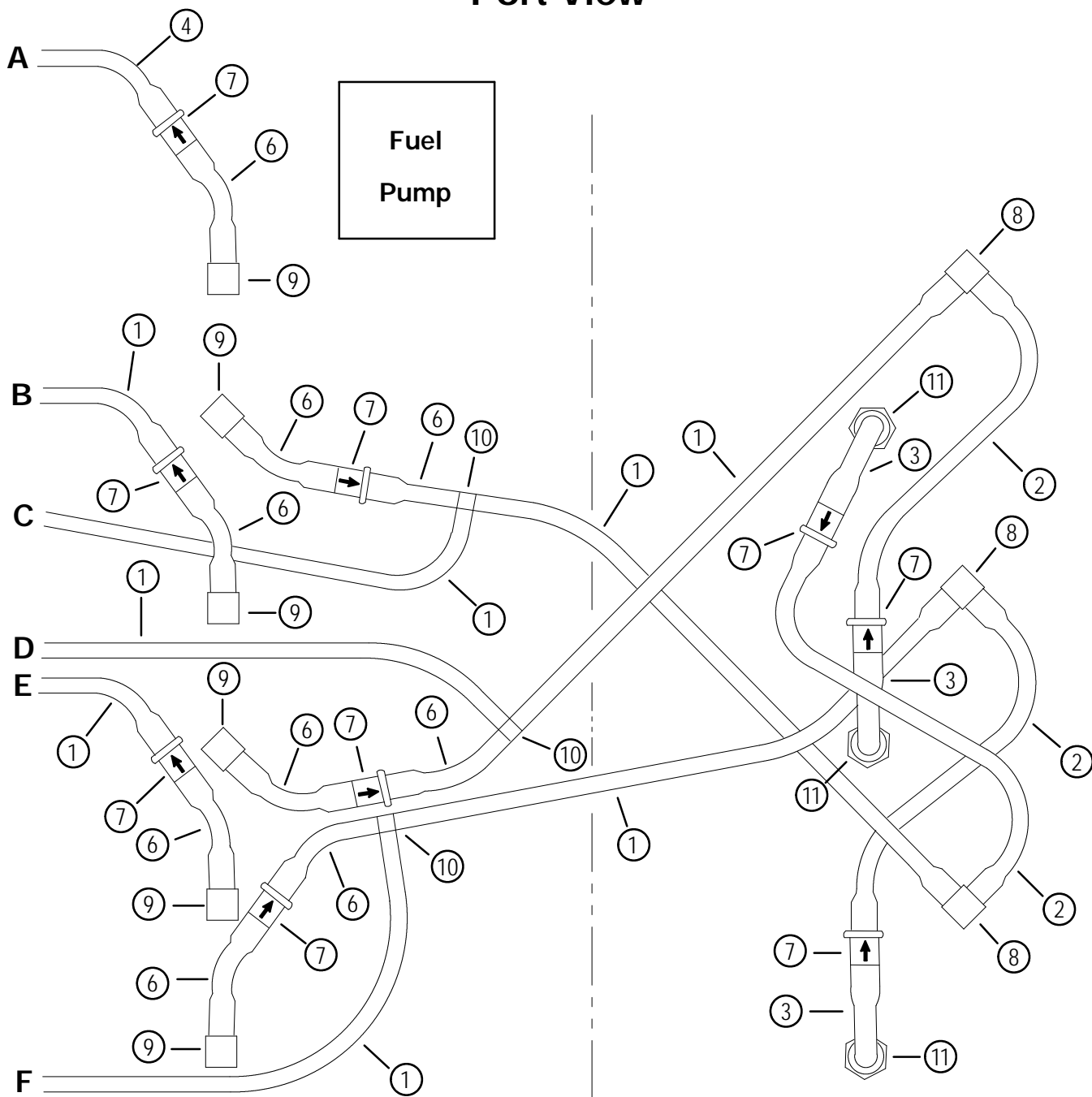
- 1 - 9.5 in. (24.1cm) (8 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (3 ea.)
- 4 - 11.75 in. (29.8cm) (1 ea.)
- 5 - 22.5 in. (57.1cm) (1 ea.)

- 6 - 1.5 in. (3.8cm) (9 ea.)
- 7 - Check Valves (21-14912--2) (9 ea.)



1997 3 Liter Work and 225 Carburetor Bleed Hose Flow Diagram (SN 0G438000 to 0G485988)

Port View



55655

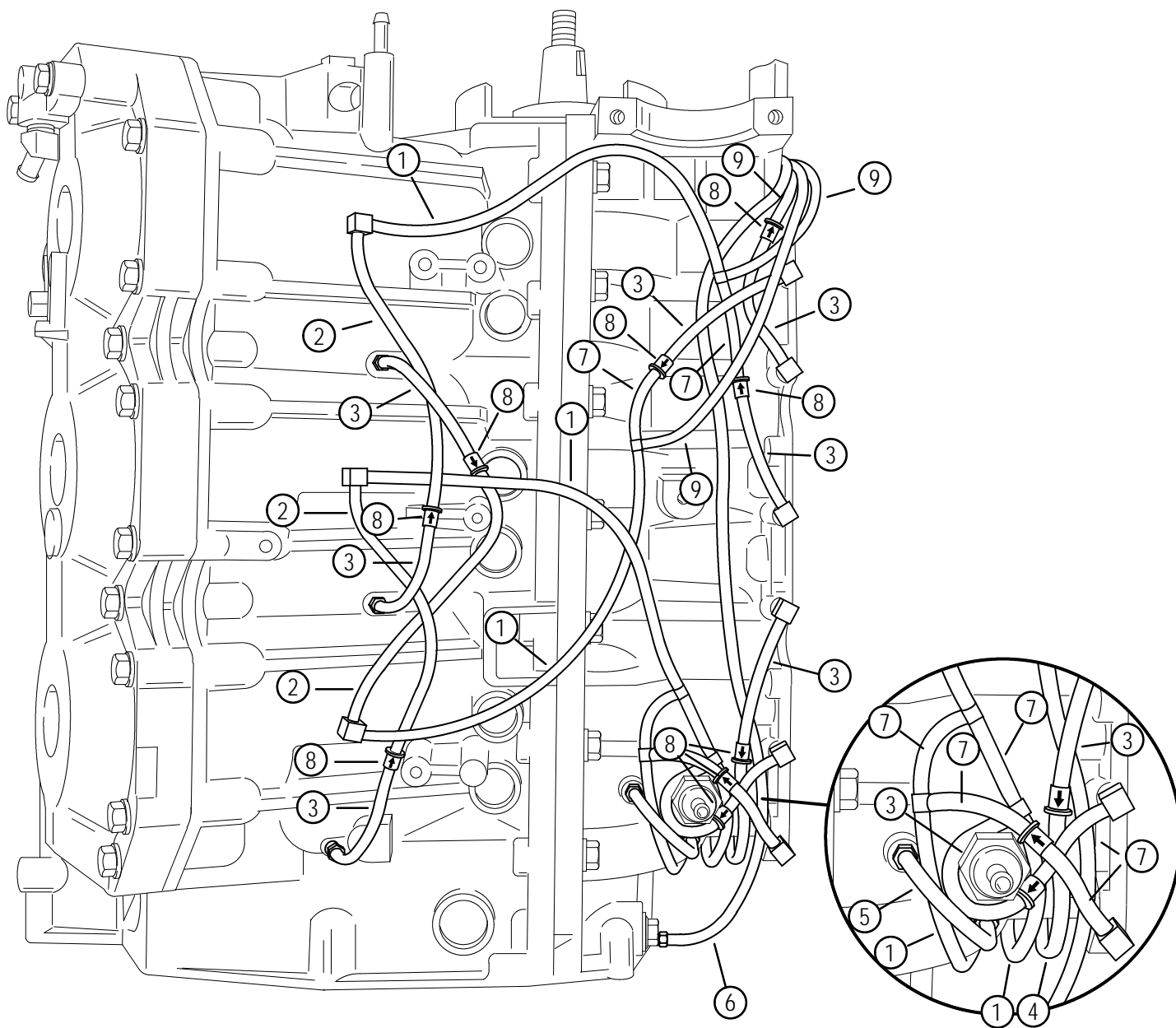
- 1 - 9.5 in. (24.1cm) (8 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (3 ea.)
- 4 - 11.75 in. (29.8cm) (1 ea.)
- 5 - 22.5 in. (57.1cm) (1 ea.)
- 6 - 1.5 in. (3.8cm) (9 ea.)
- 7 - Check Valves (21-14912--2) (9 ea.)
- 8 - Fitting (22-824356-1) (3 ea.)
- 9 - Fitting (90°) (22-76843) (6 ea.)

- 10- T-Fitting (22-59169) (2 ea.)
- 11- Fitting (Straight) (22-824502-1) (3 ea.)



1997 225/250 EFI Models (SN 0G438000 to 0G485988) (225 EFI w/FUEL ECM 830046-4 and 250 EFI w/FUEL ECM 830046-5)

Starboard View



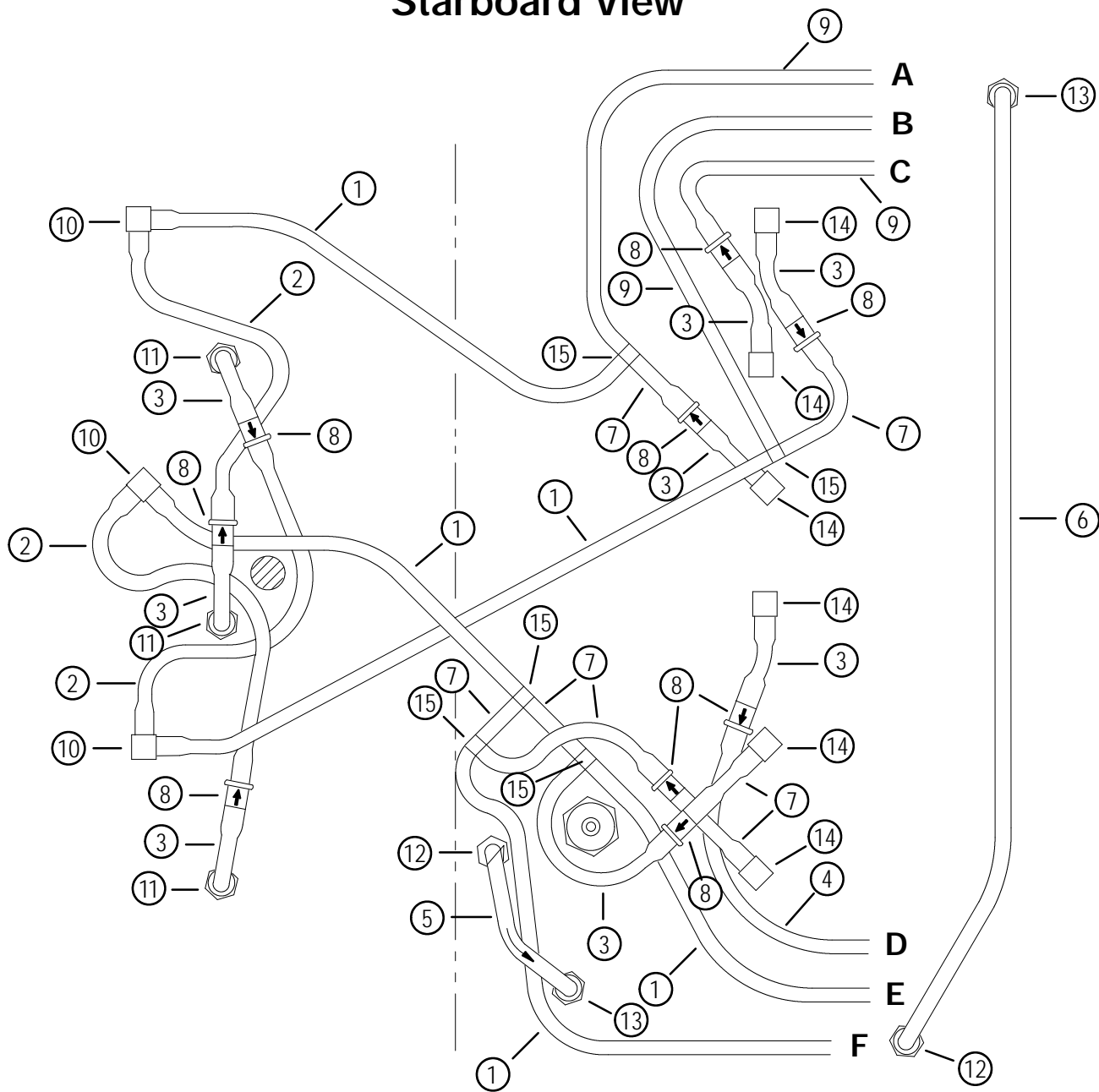
- 1 - 9.5 in. (24.1cm) (6 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (8 ea.)
- 4 - 11.75 in. (29.8cm) (1 ea.)
- 5 - 3.75 in. (9.5cm) (1 ea.)
- 6 - 22.5 in. (57.1cm) (1 ea.)
- 7 - 1.5 in. (3.8cm) (6 ea.)
- 8 - Check Valves (21-14912--2) (9 ea.)
- 9 - 14 in. (35.6cm) (3 ea.)

55132



1997 225/250 EFI Bleed Hose Flow Diagram (SN 0G438000 to 0G485988) (225 EFI w/FUEL ECM 830046-4 and 250 EFI w/FUEL ECM 830046-5)

Starboard View



55653

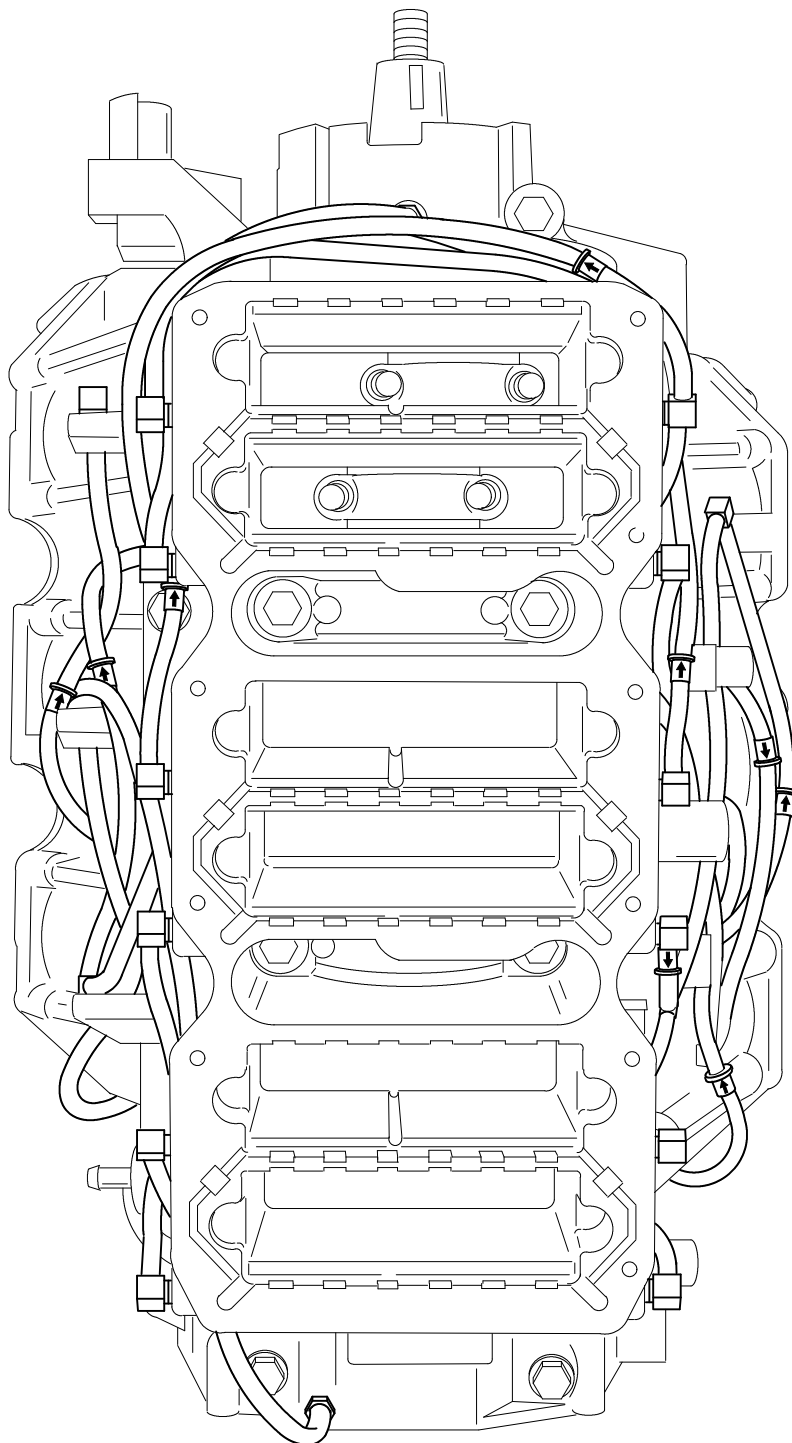
- 1 - 9.5 in. (24.1cm) (6 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (8 ea.)
- 4 - 11.75 in. (29.8cm) (1 ea.)
- 5 - 3.75 in. (9.5cm) (1 ea.)
- 6 - 22.5 in. (57.1cm) (1 ea.)
- 7 - 1.5 in. (3.8cm) (6 ea.)
- 8 - Check Valves (21-14912--2) (9 ea.)
- 9 - 14 in. (35.6cm) (3 ea.)
- 10- Fitting (22-824356-1) (3 ea.)
- 11- Fitting (Straight) (22-824502-1) (3 ea.)

- 12- Check Valve (21-42658-5) (2 ea.)
- 13- Check Valve (21-815923-4) (2 ea.)
- 14- Fitting (90°) (22-76843) (6 ea.)
- 15- T-Fitting (22-59169) (5 ea.)



1997 and Newer 225/250 EFI Models (225 EFI w/FUEL ECM 830046-4 and 250 EFI w/FUEL ECM 830046-5)

Front View

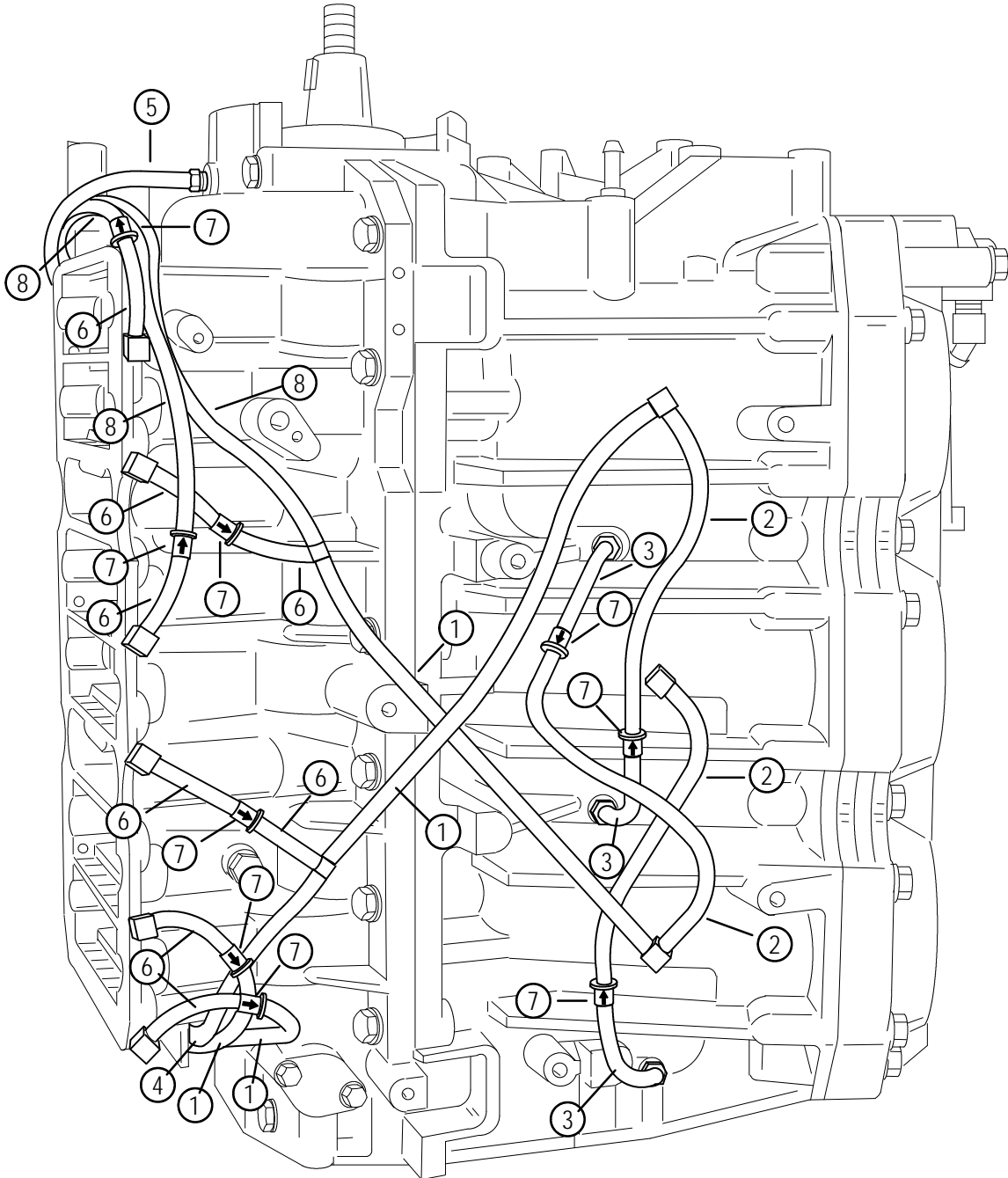


55654



1997 225/250 EFI Models (SN 0G438000 to 0G485988) (225 EFI w/FUEL ECM 830046-4 and 250 EFI w/FUEL ECM 830046-5)

Port View



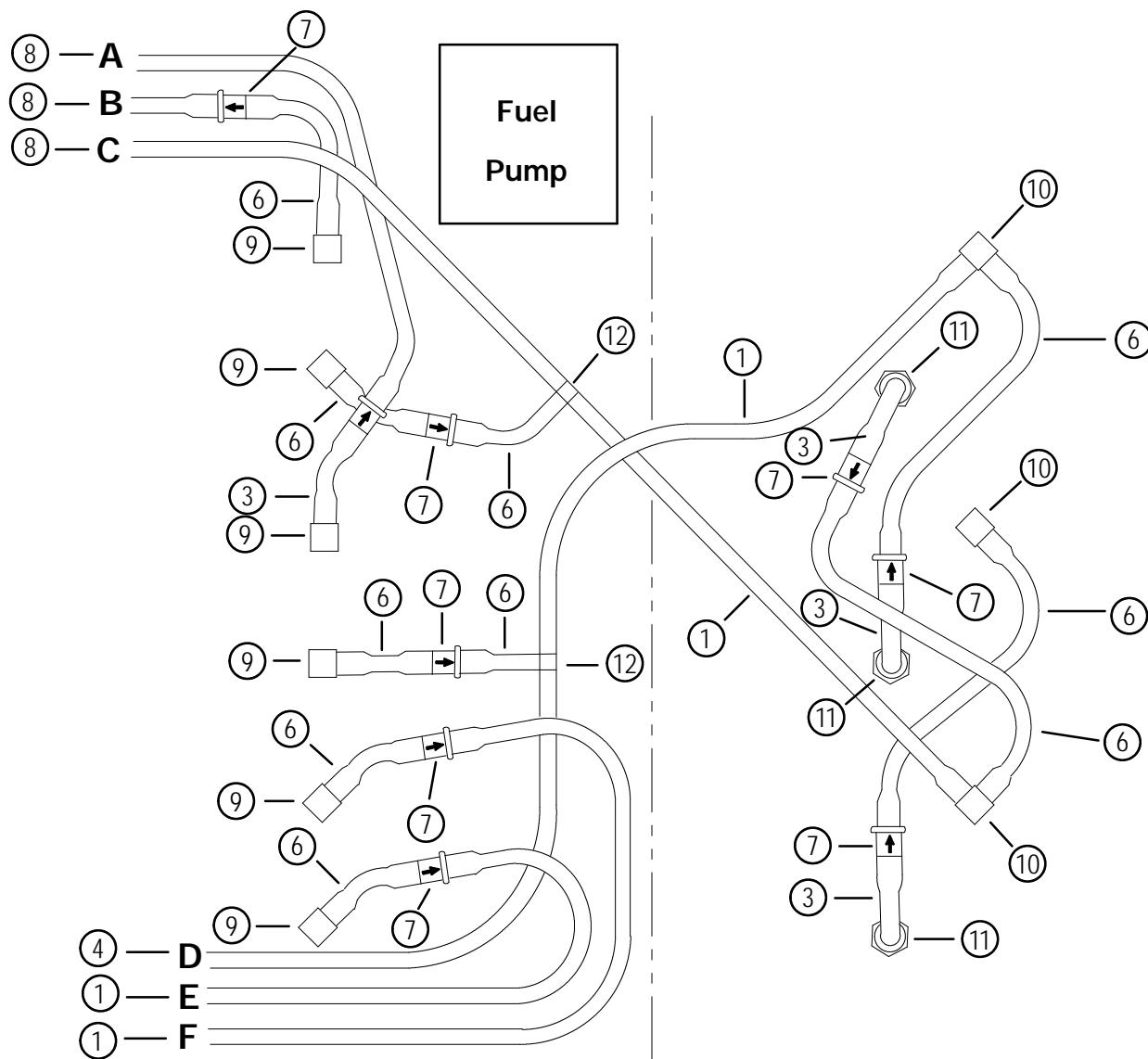
- 1 - 9.5 in. (24.1cm) (3 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (4 ea.)
- 4 - 11.75 in. (29.8cm) (1 ea.)
- 5 - 22.5 in. (57.1cm) (1 ea.)
- 6 - 1.5 in. (3.8cm) (7 ea.)
- 7 - Check Valves (21-14912--2) (9 ea.)
- 8 - 14 in. (35.6cm) (3 ea.)

55118



1997 225/250 EFI Bleed Hose Flow Diagram (SN 0G438000 to 0G485988) (225 EFI w/FUEL ECM 830046-4 and 250 EFI w/FUEL ECM 830046-5)

Port View



55119

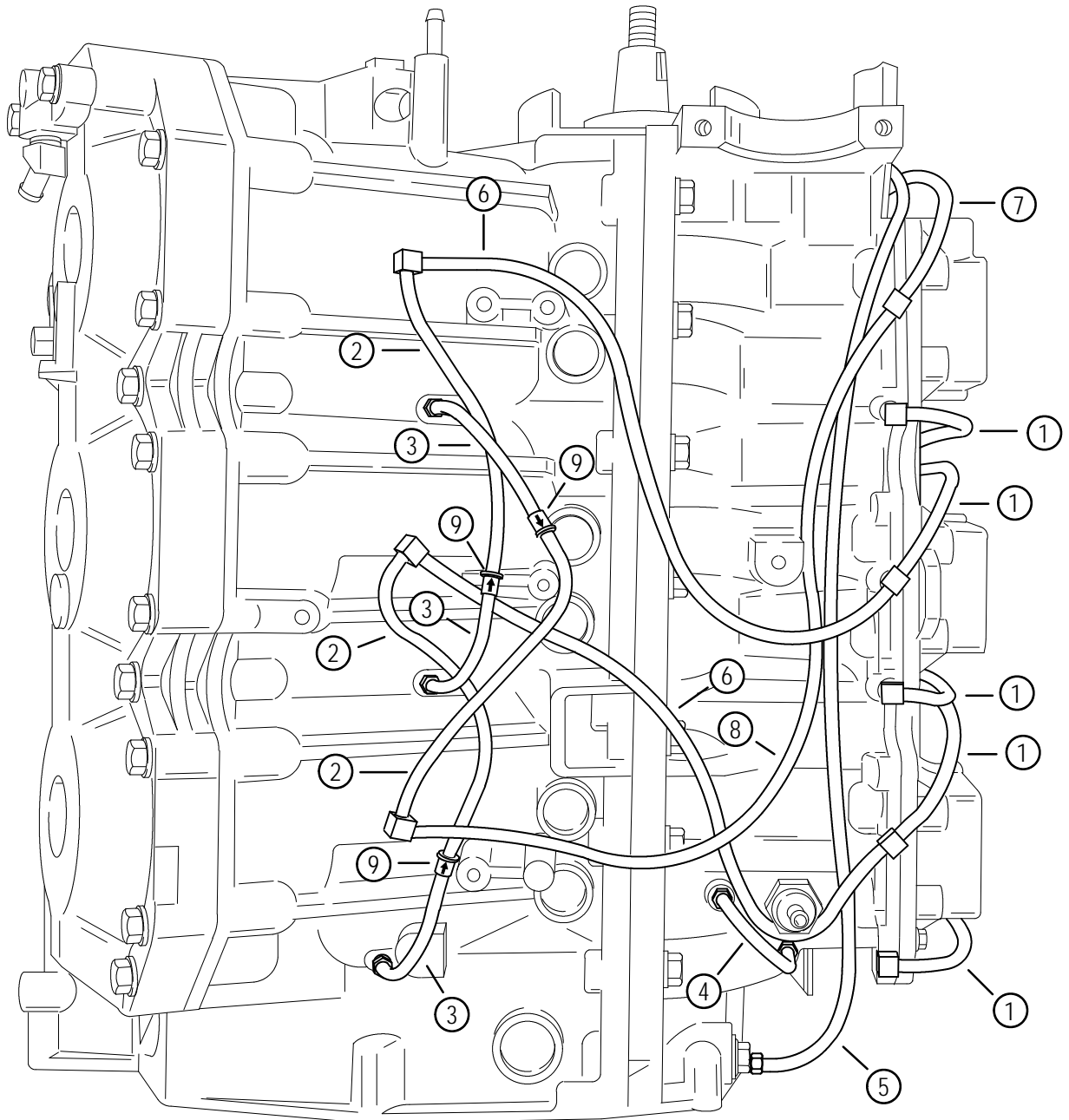
- 1 - 9.5 in. (24.1cm) (3 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (4 ea.)
- 4 - 11.75 in. (29.8cm) (1 ea.)
- 5 - 22.5 in. (57.1cm) (1 ea.)
- 6 - 1.5 in. (3.8cm) (7 ea.)
- 7 - Check Valves (21-14912--2) (9 ea.)

- 8 - 14 in. (35.6cm) (3 ea.)
- 9 - Fitting (90°) (22-76843) (6 ea.)
- 10- Fitting (22-824356-1) (3 ea.)
- 11- Fitting (Straight) (22-824502-1) (3 ea.)
- 12- T-Fitting (22-59169) (2 ea.)



1997 and Newer 3 Liter Work and 225 Carburetor Models (SN 0485989 and ABOVE)

Starboard View



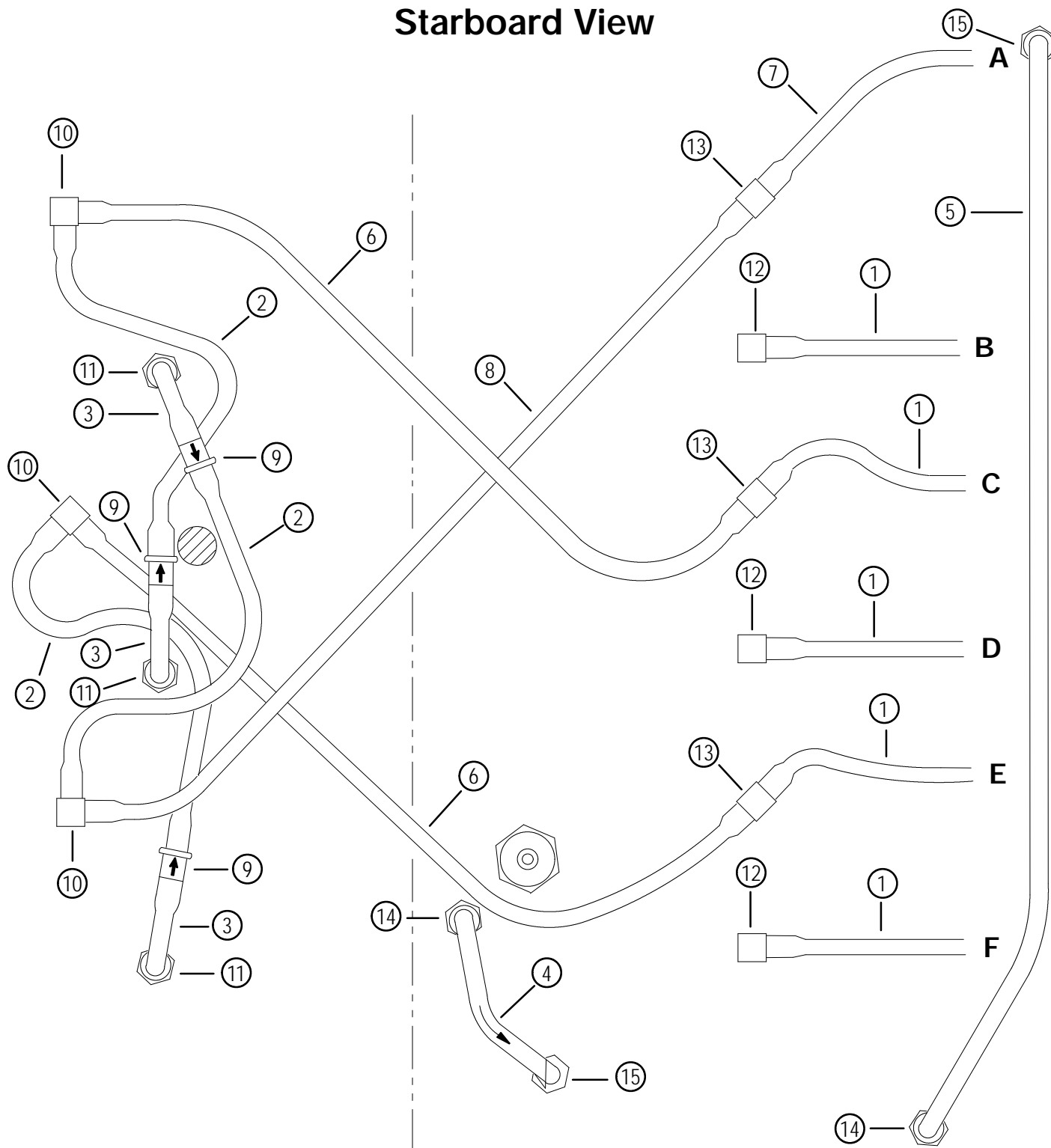
55667

- 1 - 9.5 in. (24.1cm) (5 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (3 ea.)
- 4 - 3.75 in. (9.5cm) (1 ea.)
- 5 - 22.5 in. (57.1cm) (1 ea.)
- 6 - 13.25 in. (33.6cm) (2 ea.)
- 7 - 10.25 in. (26.0cm) (1 ea.)
- 8 - 16 in. (40.6cm) (1 ea.)
- 9 - Check Valves (21-14912--2) (3 ea.)



1997 and Newer 3 Liter Work and 225 Carburetor Bleed Hose Flow Diagram (SN 0G485989 and ABOVE)

Starboard View



55668

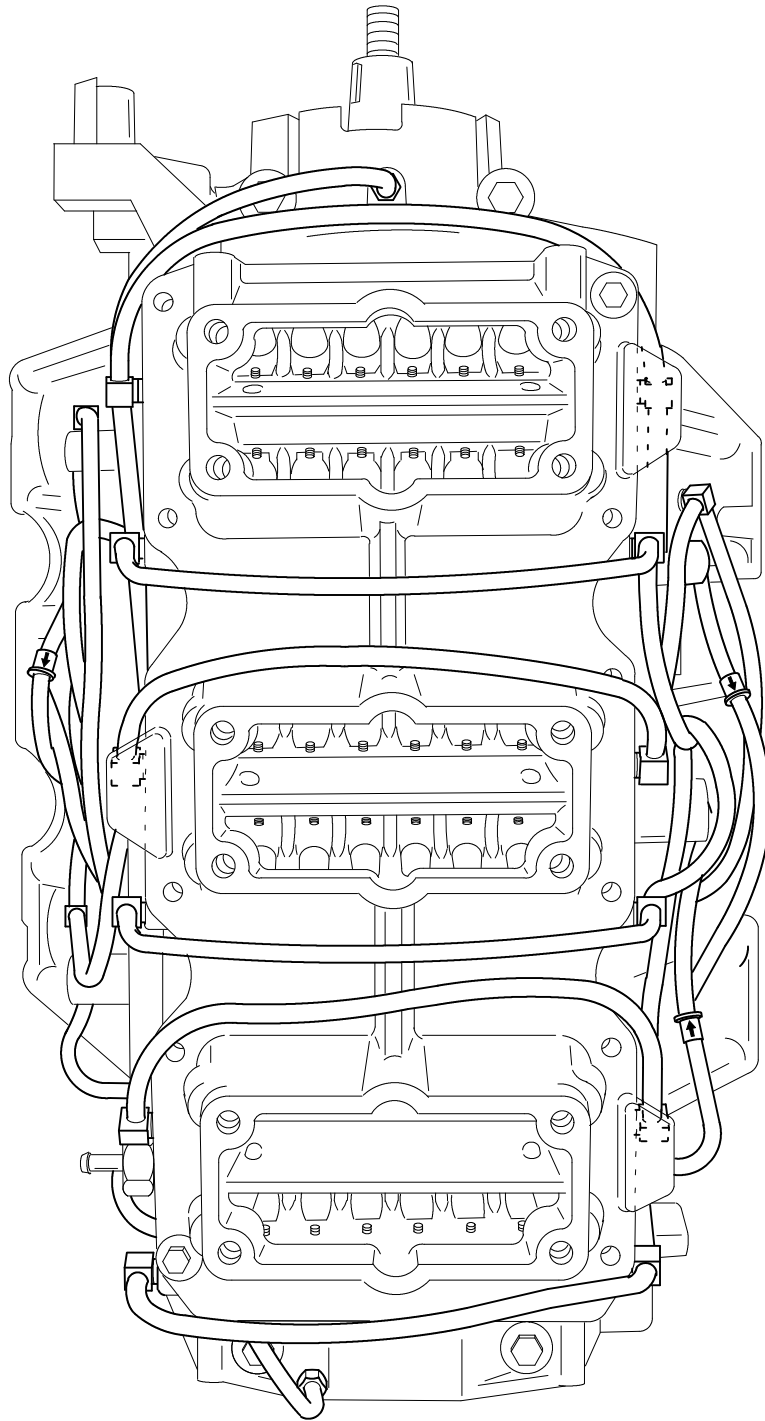
- 1 - 9.5 in. (24.1cm) (5 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (3 ea.)
- 4 - 3.75 in. (9.5cm) (1 ea.)
- 5 - 22.5 in. (57.1cm) (1 ea.)
- 6 - 13.25 in. (33.6cm) (2 ea.)
- 7 - 10.25 in. (26.0cm) (1 ea.)
- 8 - 16 in. (40.6cm) (1 ea.)

- 9 - Check Valves (21-14912--2) (3 ea.)
- 10- Fitting (22-824356-1) (3 ea.)
- 11- Fitting (Straight) (22-824502-1) (3 ea.)
- 12- Check Valve (90°) (21-828218-2) (3 ea.)
- 13- Check Valve (T-Fitting) (21-834804-1) (3 ea.)
- 14- Check Valve (Straight) (21-42658-1) (2 ea.)
- 15- Check Valve (Straight) (21-815923-1) (2 ea.)



1997 and Newer 3 Liter Work and 225 Carburetor Models (SN 0G485989 and ABOVE)

Front View

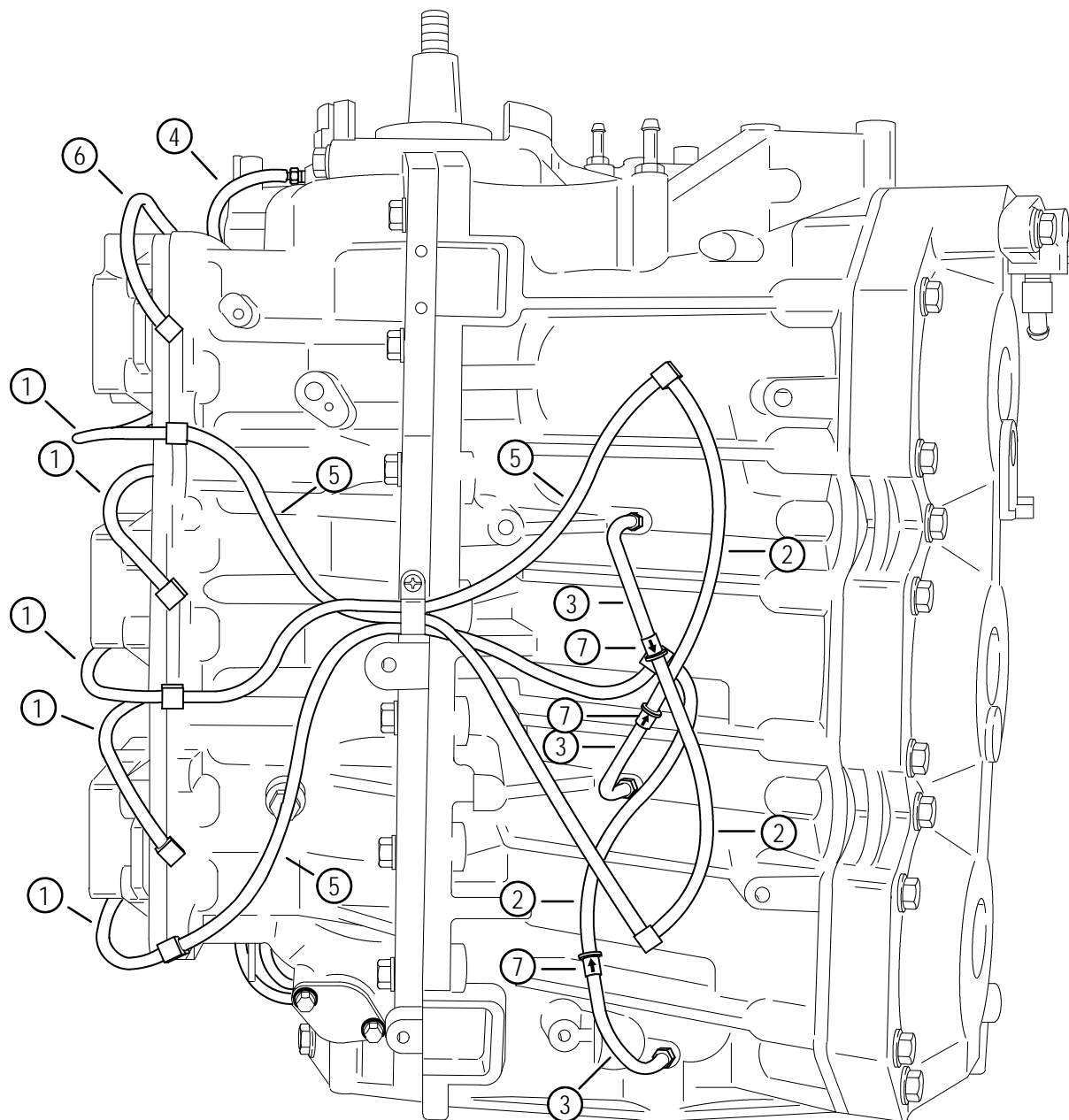


55669



1997 and Newer 3 Liter Work and 225 Carburetor Models (SN 0G485989 and ABOVE)

Port View



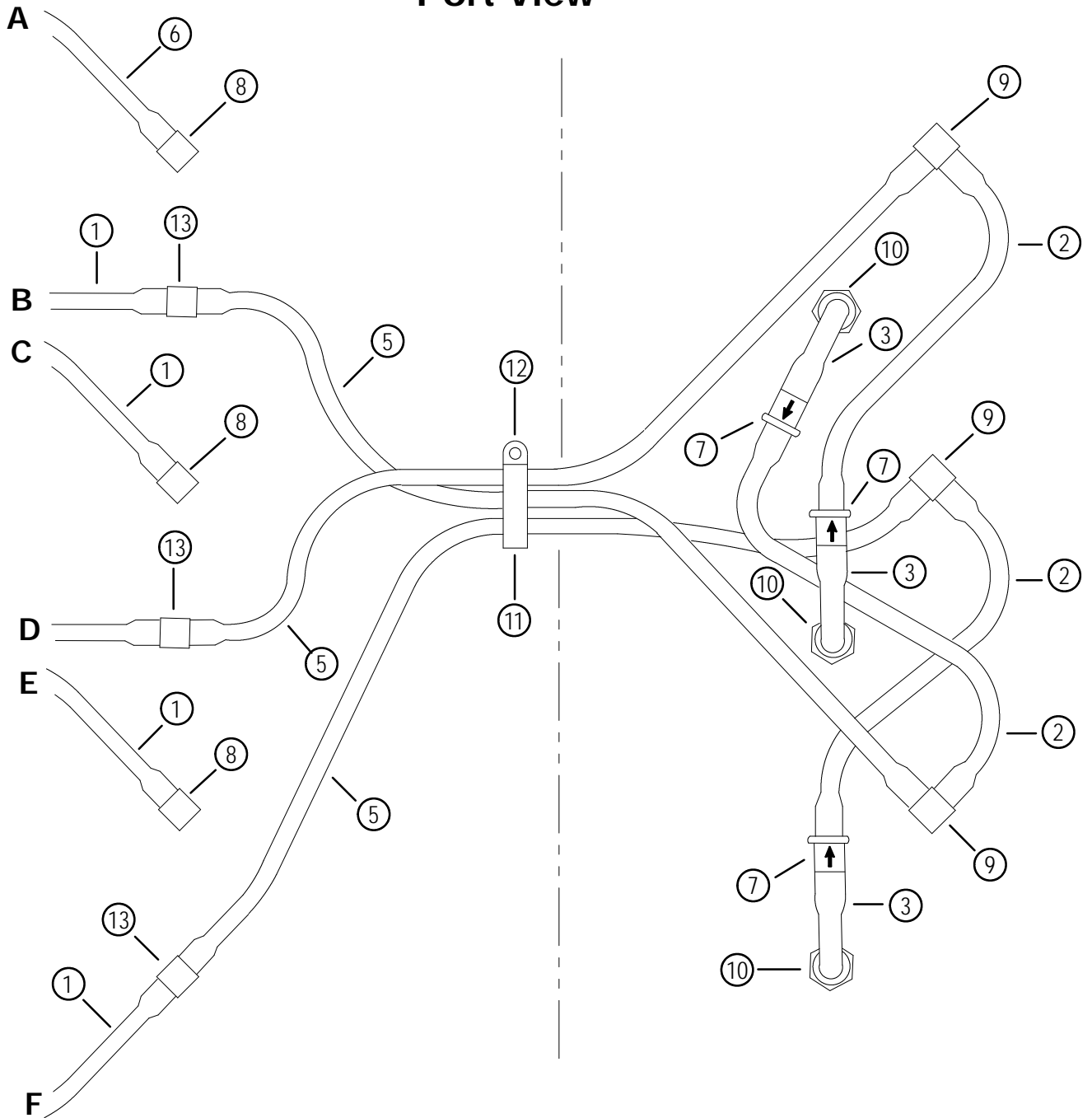
55665

- 1 - 9.5 in. (24.1cm) (5 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (3 ea.)
- 4 - 22.5 in. (57.1cm) (1 ea.)
- 5 - 13.25 in. (33.6cm) (3 ea.)
- 6 - 10.25 in. (26.0cm) (1 ea.)
- 7 - Check Valves (21-14912--2) (3 ea.)



1997 and Newer 3 Liter Work and 225 Carburetor Bleed Hose Flow Diagram (SN 0G485989 and ABOVE)

Port View



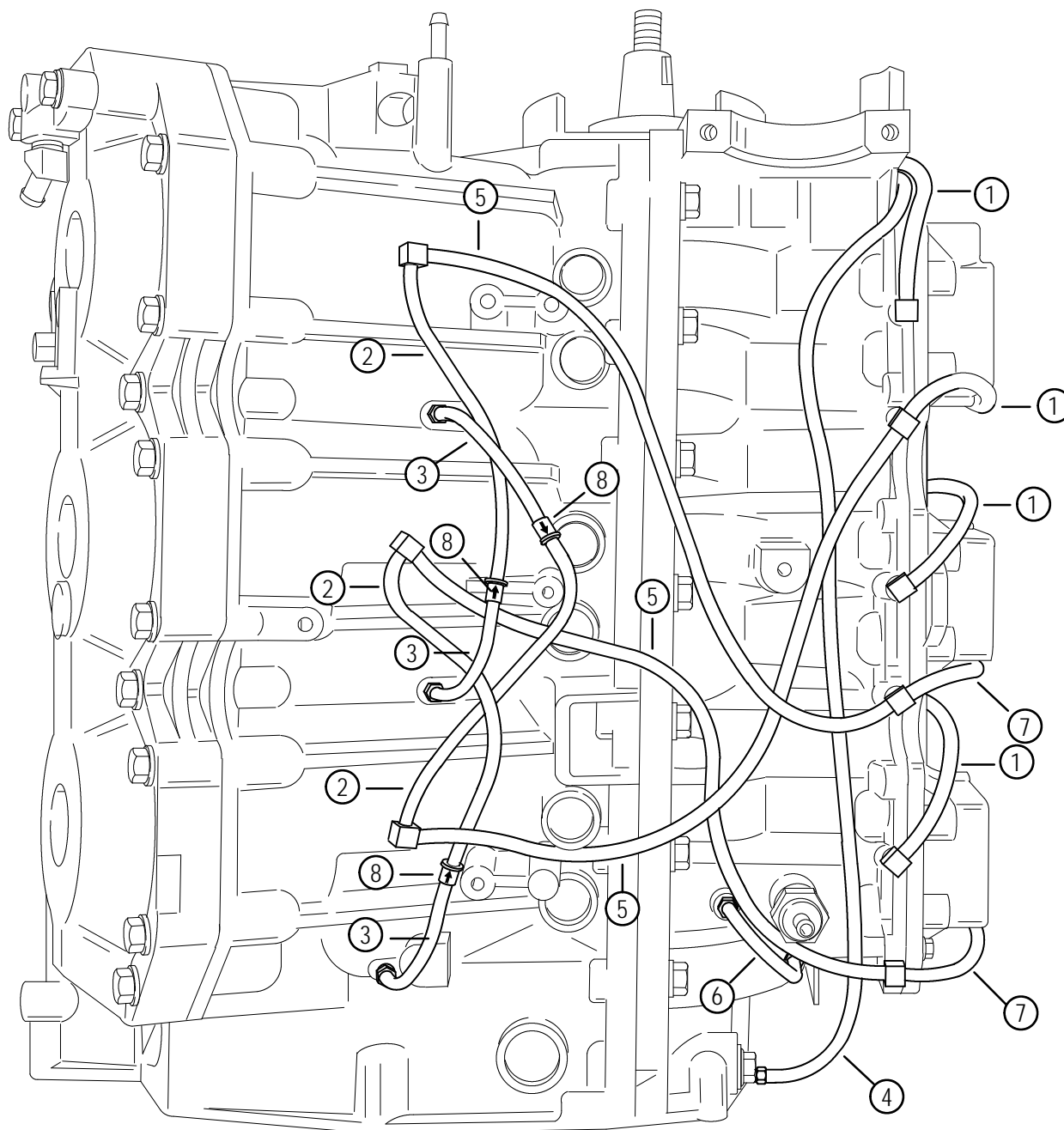
55666

- | | |
|---|---|
| 1 - 9.5 in. (24.1cm) (5 ea.) | 10- Fitting (Straight) (22-824502-1) (3 ea.) |
| 2 - 6 in. (15.2cm) (3 ea.) | 11- Clamp (54-22875) |
| 3 - 3 in. (7.6cm) (3 ea.) | 12- Screw (10-48408) |
| 4 - 22.5 in. (57.1cm) (1 ea.) | 13- Check Valve (T-Fitting) (21-834804-1) (3 ea.) |
| 5 - 13.25 in. (33.6cm) (3 ea.) | |
| 6 - 10.25 in. (26.0cm) (1 ea.) | |
| 7 - Check Valves (21-14912--2) (3 ea.) | |
| 8 - Check Valve (90°) (21-828218-2) (3 ea.) | |
| 9 - Fitting (22-824356-1) (2 ea.) | |



1997 and Newer 225/250 EFI Models (SN 0G485989 and ABOVE) (225 EFI w/FUEL ECM 830046-7 and 250 EFI w/FUEL ECM 830046-8)

Starboard View



- 1 - 9.5 in. (24.1cm) (4 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (3 ea.)
- 4 - 22.5 in. (57.1cm) (1 ea.)
- 5 - 13.25 in. (33.6cm) (3 ea.)
- 6 - 3.75 in. (9.5cm) (1 ea.)

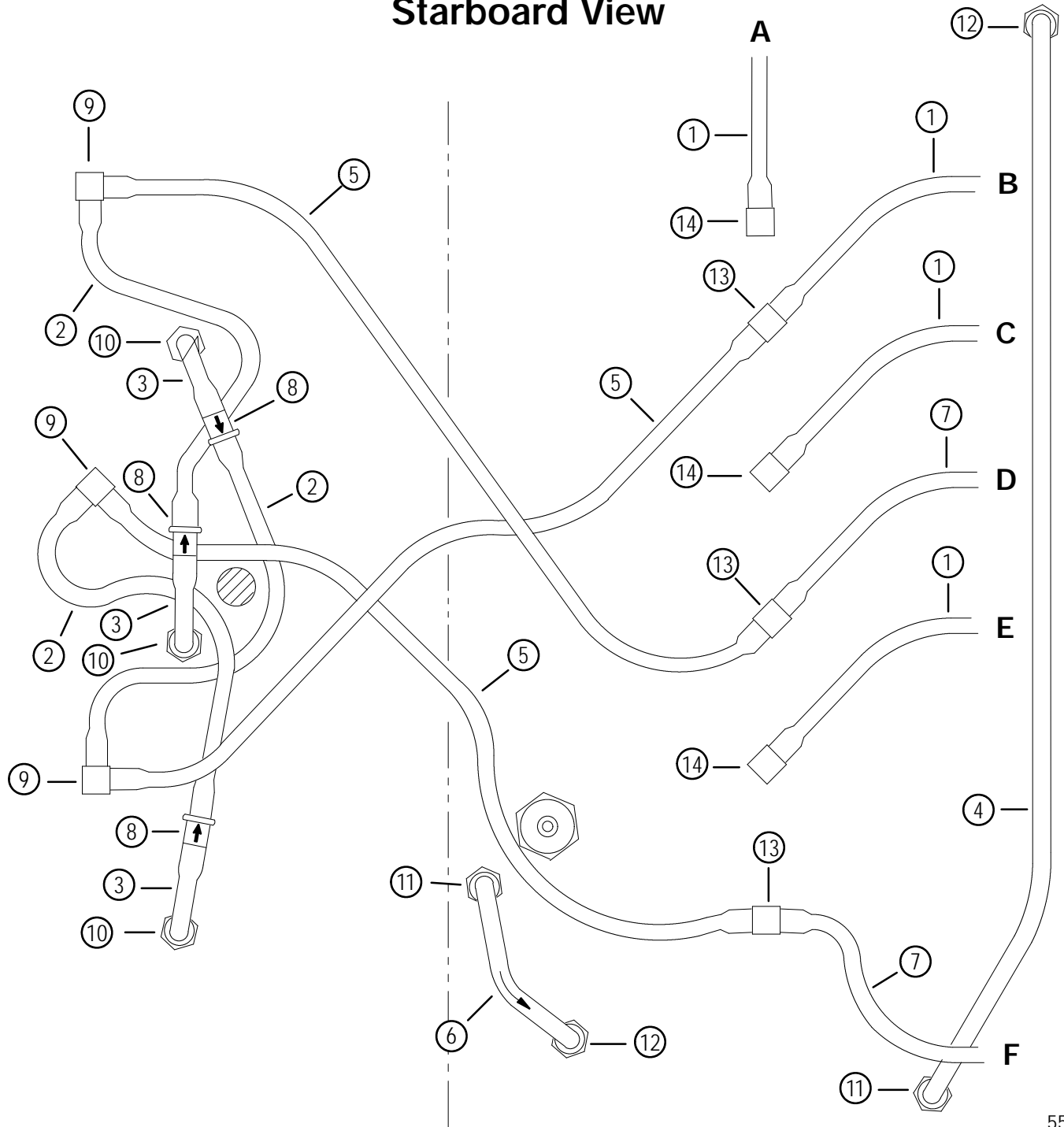
- 7 - 9.25 in. (23.5cm) (2 ea.)
- 8 - Check Valves (21-14912--2) (3 ea.)

55662



1997 225/250 EFI Bleed Hose Flow Diagram (SN 0G485989 and ABOVE) (225 EFI w/FUEL ECM 830046-7 and 250 EFI w/FUEL ECM 830046-8)

Starboard View



- 1 - 9.5 in. (24.1cm) (4 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (3 ea.)
- 4 - 22.5 in. (57.1cm) (1 ea.)
- 5 - 13.25 in. (33.6cm) (3 ea.)
- 6 - 3.75 in. (9.5cm) (1 ea.)
- 7 - 9.25 in. (23.5cm) (2 ea.)
- 8 - Check Valves (21-14912--2) (3 ea.)
- 9 - Fitting (22-824356-1) (3 ea.)
- 10- Fitting (Straight) (22-824502-1) 3 ea.)

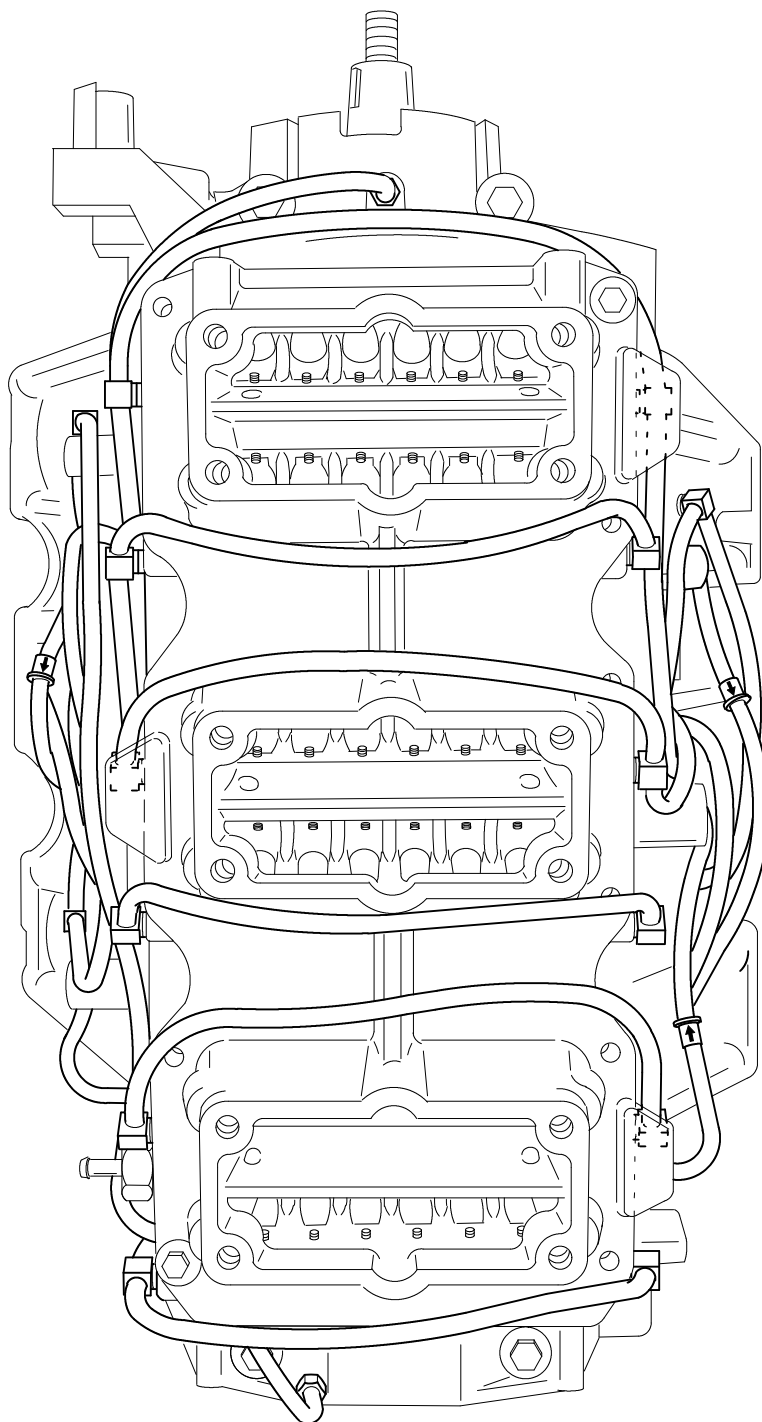
- 11- Check Valve (Straight) (21-42658-5) (2 ea.)
- 12- Check Valve (Straight) (21-815923-4) (2 ea.)
- 13- Check Valve (T-Fitting) (21-834804-1) (3 ea.)
- 14- Check Valve (90°) (21-828218-2) (3 ea.)

55663



1997 and Newer 225/250 EFI Models (SN 0G485989 and ABOVE) (225 EFI w/FUEL ECM 830046-7 and 250 EFI w/FUEL ECM 830046-8)

Front View

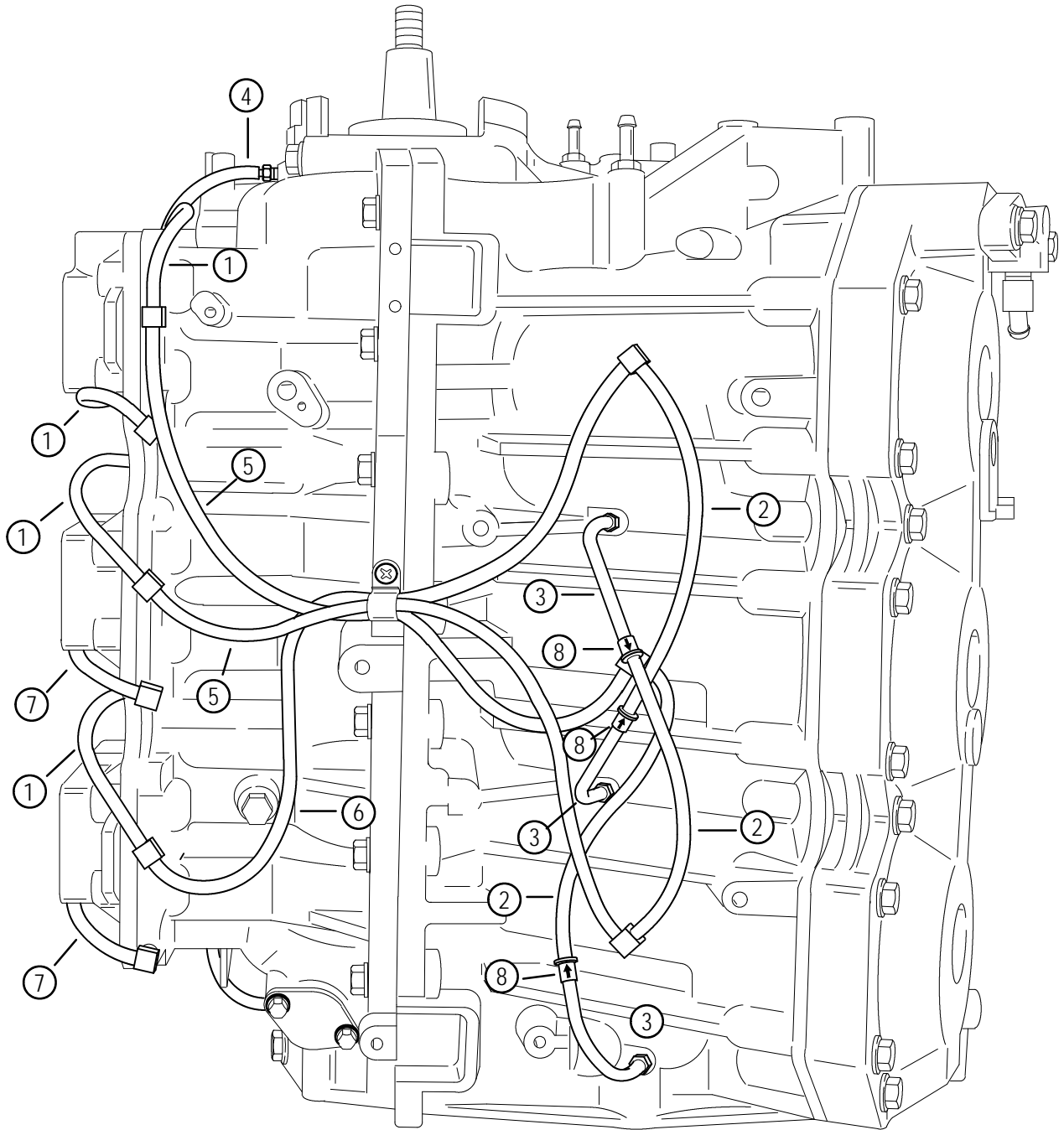


55664



1997 and Newer 225/250 EFI Models (SN 0G485989 and ABOVE) (225 EFI w/FUEL ECM 830046-7 and 250 EFI w/FUEL ECM 830046-8)

Port View



55660

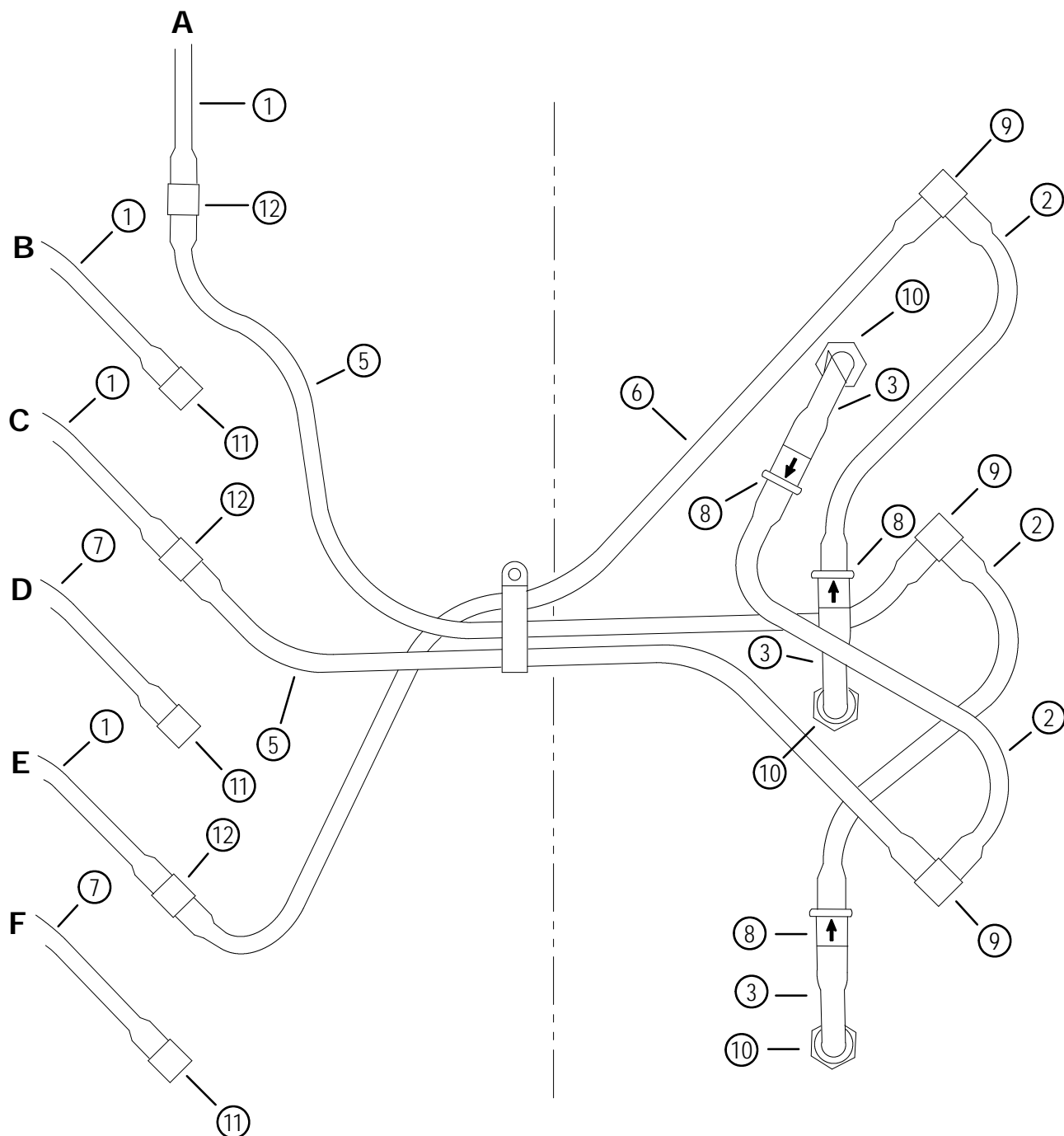
- 1 - 9.5 in. (24.1cm) (4 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (3 ea.)
- 4 - 22.5 in. (57.1cm) (1 ea.)
- 5 - 13.25 in. (33.6cm) (2 ea.)
- 6 - 16 in. (40.6cm) (1 ea.)

- 7 - 9.25 in. (23.5cm) (2 ea.)
- 8 - Check Valves (21-14912--2) (3 ea.)



1997 and Newer 225/250 EFI Models Bleed Hose Flow Diagram (SN 0G485989 and ABOVE) (225 EFI w/FUEL ECM 830046-7 and 250 EFI w/FUEL ECM 830046-8)

Port View



55661

- 1 - 9.5 in. (24.1cm) (4 ea.)
- 2 - 6 in. (15.2cm) (3 ea.)
- 3 - 3 in. (7.6cm) (3 ea.)
- 4 - 22.5 in. (57.1cm) (1 ea.)
- 5 - 13.25 in. (33.6cm) (2 ea.)
- 6 - 16 in. (40.6cm) (1 ea.)
- 7 - 9.25 in. (23.5cm) (2 ea.)

- 8 - Check Valves (21-14912--2) (3 ea.)
- 9 - Fitting (22-824356-1) (3 ea.)
- 10- Fitting (Straight) (824502-1) (3 ea.)
- 11- Check Valve (90°) (21-828218-2) (3 ea.)
- 12- Check Valve (T-Fitting) (21-834804-1) (3 ea.)
- 13- Clamp (54-22875)
- 14- Screw (10-48408)



Reinstalling Engine Components

Reinstall the following components:

Section 2

Starter Motor
Alternator
Stator
Ignition Modules
Electronic Control Unit
Solenoids
Crank Position Sensor
Throttle Position Sensor
Temperature Sensor

Section 3

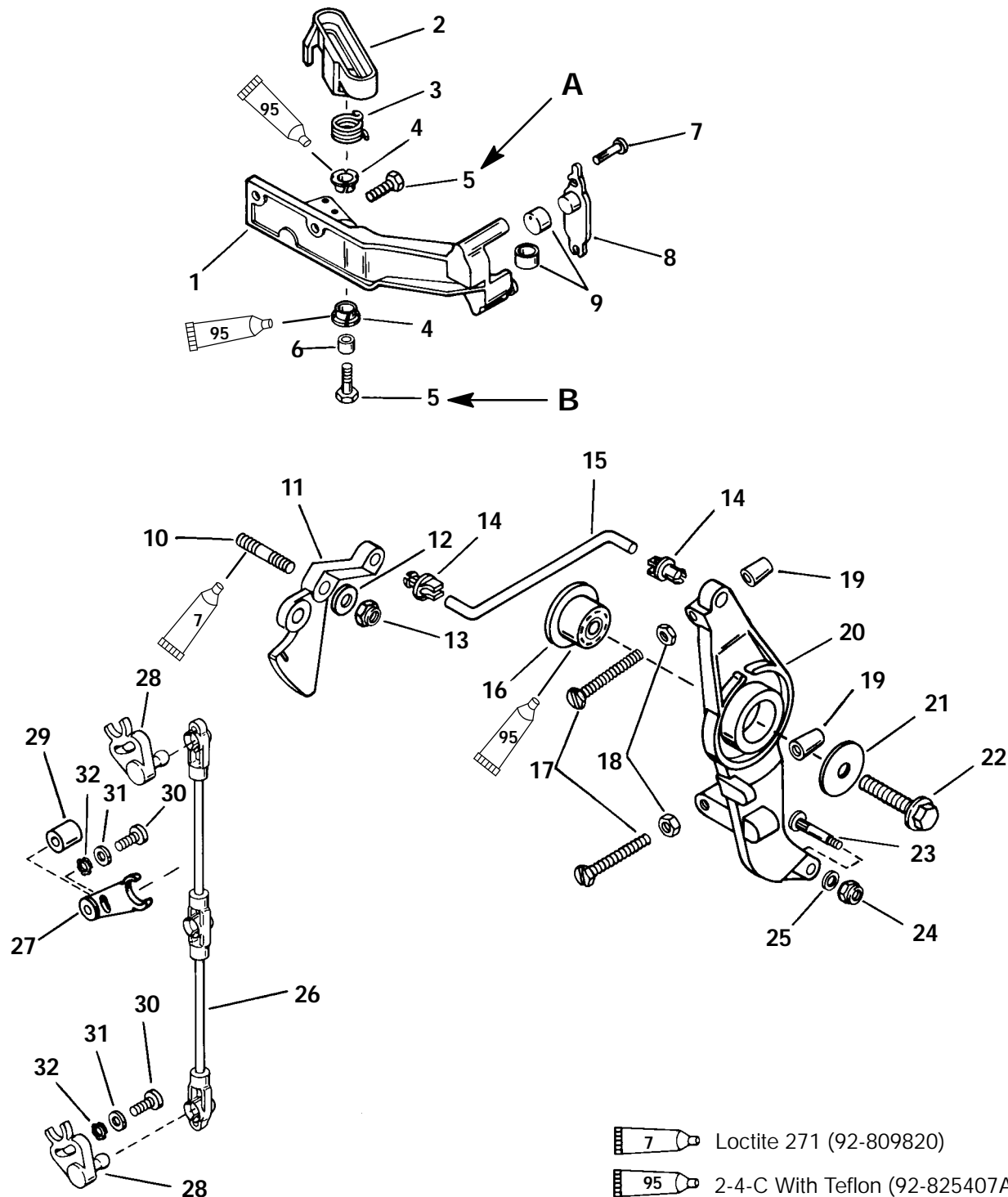
Air Silencer
Carburetors and Linkage
Fuel Pump
Fuel Enrichment

Oil Injection

On-Board Oil Tank
Oil Pump



Anchor Bracket/Throttle Linkage SEAPRO/MARATHON (S/N-0G303045 & BELOW)



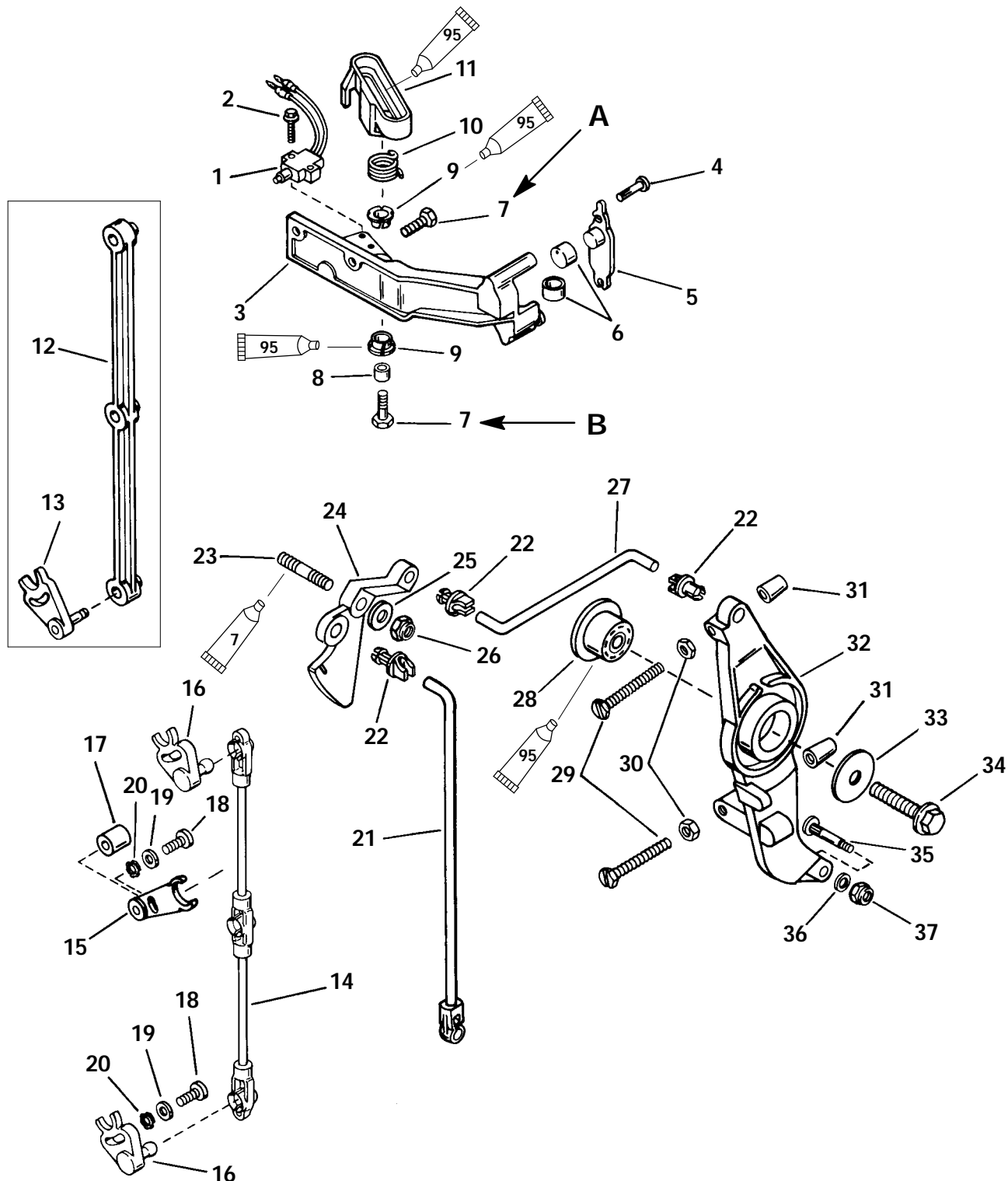


Anchor Bracket/Throttle Linkage SEAPRO/MARATHON (S/N-0G303045 & BELOW)

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	ANCHOR BRACKET			
2	1	ROLLER GUIDE			
3	1	SPRING			
4	2	BUSHING			
5	3	SCREW (M8 x 25)			
6	1	BUSHING			
7	2	DRIVE SCREW			
8	1	LATCH			
9	2	CUP			
10	1	STUD			
11	1	THROTTLE CAM			
12	1	WASHER			
13	1	NUT			
14	2	SWIVEL BUSHING			
15	1	THROTTLE LINK			
16	1	BUSHING			
17	2	SCREW (M6 x 1 x 55)			
18	2	NUT			
19	2	CAP			
20	1	THROTTLE LEVER			
21	1	WASHER			
22	1	SCREW (M8 x 35)	240	20	27.1
23	1	PIN INSERT			
24	1	NUT			
25	1	WASHER			
26	1	THROTTLE LINK KIT			
27	1	LINK (Stub Shaft)			
28	2	LINK (Ball Shaft)			
29	1	ROLLER			
30	3	SCREW (10-32 x 1/2")			
31	3	WASHER			
32	3	LOCKWASHER			



Anchor Bracket/Throttle Linkage 225 Carb (S/N-0G303045 & BELOW)



 Loctite 271 (92-809820)

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

A - 25 lb. ft. (33.9 N·m)

B - 20 lb. ft. (27.1 N·m)

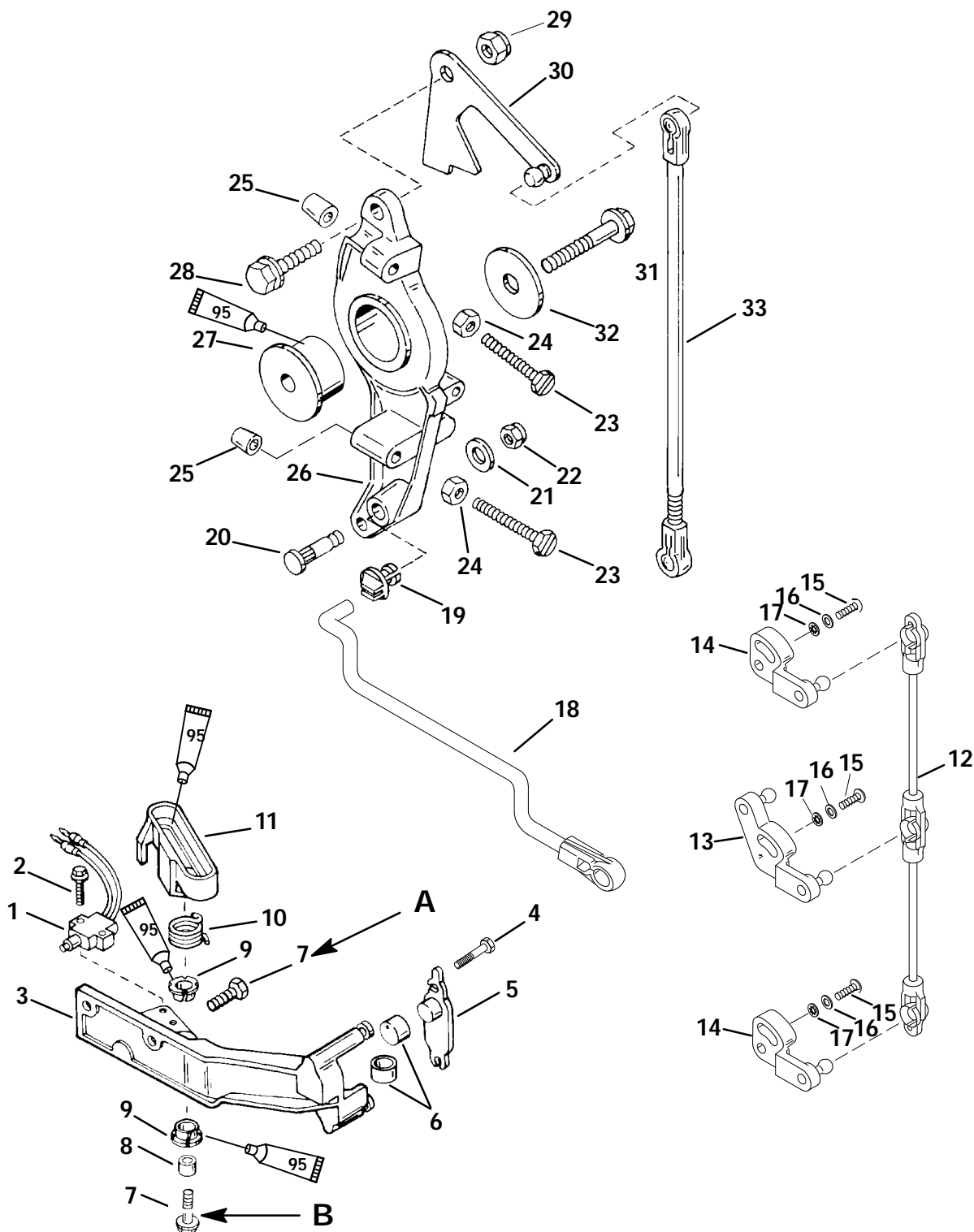


Anchor Bracket/Throttle Linkage 225 Carb (S/N-0G303045 & BELOW)

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	SWITCH			
2	2	SCREW (M3.5 x 20)	10		1.1
3	1	ANCHOR BRACKET			
4	2	DRIVE SCREW			
5	1	LATCH			
6	2	CUP			
7	3	SCREW (M8 x 25)			
8	1	BUSHING			
9	2	BUSHING			
10	1	SPRING			
11	1	ROLLER GUIDE			
12	1	THROTTLE LINK Use With WMH-19			
13	3	LINK (Stub Shaft) Series Carburetors			
14	1	THROTTLE LINK KIT Use With WMH-46/47			
15	1	LINK (Stub Shaft) Series Carburetors			
16	2	LINK (Ball Shaft)			
17	1	ROLLER			
18	3	SCREW (10-32 x 1/2 ²)			
19	3	WASHER			
20	3	LOCKWASHER			
21	1	LINK			
22	3	SWIVEL BUSHING			
23	1	STUD			
24	1	THROTTLE CAM			
25	1	WASHER			
26	1	NUT			
27	1	THROTTLE LINK			
28	1	BUSHING			
29	2	SCREW (M6 x 1 x 55)			
30	2	NUT			
31	2	CAP			
32	1	THROTTLE LEVER			
33	1	WASHER			
34	1	SCREW (M8 x 35)	240	20	27.1
35	1	PIN INSERT			
36	1	WASHER			
37	1	NUT			



Anchor Bracket/Throttle Linkage (Carb Models) (S/N-0G303046 & Up)



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

A - 25 lb. ft. (33.9 N·m)

B - 20 lb. ft. (27.1 N·m)

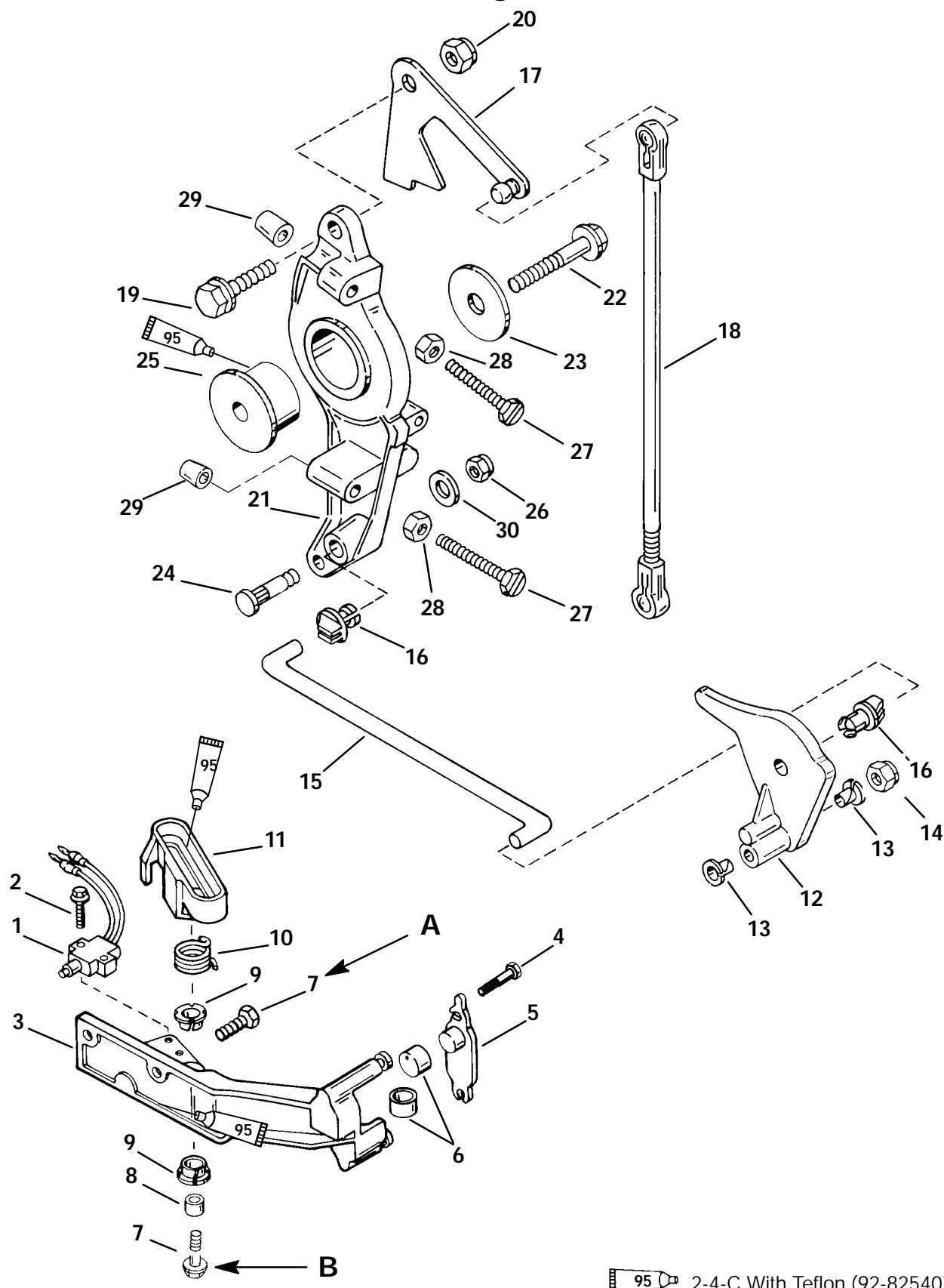


Anchor Bracket/Throttle Linkage (Carb Models) (S/N-0G303046 & Up)

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	SWITCH NON SEAPRO/MARATHON			
2	2	SCREW (M3.5 x 20)	10		1.1
3	1	ANCHOR BRACKET			
4	2	DRIVE SCREW			
5	1	LATCH			
6	2	CUP			
7	3	SCREW (M8 x 25)			
8	1	BUSHING			
9	2	BUSHING			
10	1	SPRING			
11	1	ROLLER GUIDE			
12	1	THROTTLE LINK KIT			
13	1	THROTTLE LEVER			
14	2	THROTTLE LEVER			
15	3	SCREW (10-32 x 3/4 ²)			
16	3	WASHER			
17	3	LOCKWASHER			
18	1	THROTTLE LINK			
19	1	SWIVEL BUSHING			
20	1	PIN INSERT			
21	1	WASHER			
22	1	NUT			
23	2	SCREW (M6 x 1 x 55)			
24	2	NUT			
25	2	CAP			
26	1	THROTTLE LEVER			
27	1	BUSHING			
28	1	SCREW (M8 x 25)	200	16.5	22.4
29	1	NUT			
30	1	BRACKET-Oil Link			
31	1	SCREW (M8 x 35)	240	20	27.1
32	1	WASHER			
33	1	LINK			



Anchor Bracket/Throttle Linkage (EFI Models)



A - 25 lb. ft. (33.9 N·m)

B - 20 lb. ft. (27.1 N·m)



Anchor Bracket/Throttle Linkage (EFI Models)

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	SWITCH			
2	2	SCREW (M3.5 x 20)	10		1.1
3	1	ANCHOR BRACKET			
4	2	DRIVE SCREW			
5	1	LATCH			
6	2	CUP			
7	3	SCREW (M8 x 25)			
8	1	BUSHING			
9	2	BUSHING			
10	1	SPRING			
11	1	ROLLER GUIDE			
12	1	THROTTLE CAM			
13	2	BUSHING			
14	1	NUT			
15	1	THROTTLE LINK			
16	2	SWIVEL BUSHING			
17	1	BRACKET-Oil Link			
18	1	LINK			
19	1	SCREW (M8 x 25)	200	17.0	23.0
20	1	NUT			
21	1	THROTTLE LEVER			
22	1	SCREW (M8 x 35)	240	20	27.1
23	1	WASHER			
24	1	PIN INSERT			
25	1	BUSHING			
26	1	NUT			
27	2	SCREW (M6 x 1 x 55)			
28	2	NUT			
29	2	CAP			
30	1	WASHER			



Powerhead Installation on Driveshaft Housing

1. Install Lifting Eye (91-90455) into flywheel.

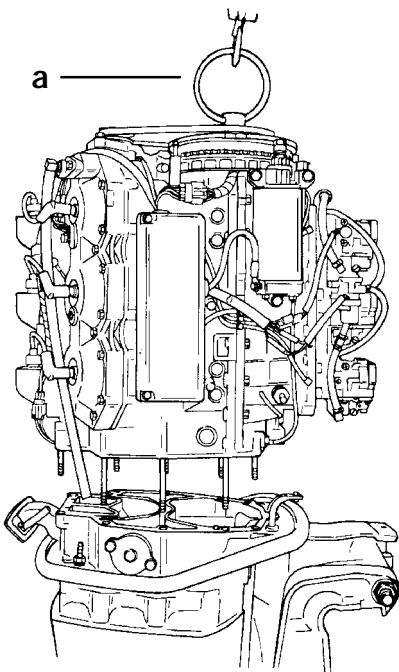
⚠ WARNING

BE SURE that Lifting Eye is threaded into flywheel as far as possible BEFORE lifting powerhead.

2. Using a hoist, lift powerhead high enough to allow removal of powerhead from repair stand. Remove powerhead from repair stand, being careful not to damage drive shaft housing gasket surface of powerhead.
3. Place a new gasket around powerhead studs and into position on base of powerhead.

IMPORTANT: DO NOT apply lubricant to top of drive- shaft as this will prevent driveshaft from fully engaging into crankshaft.

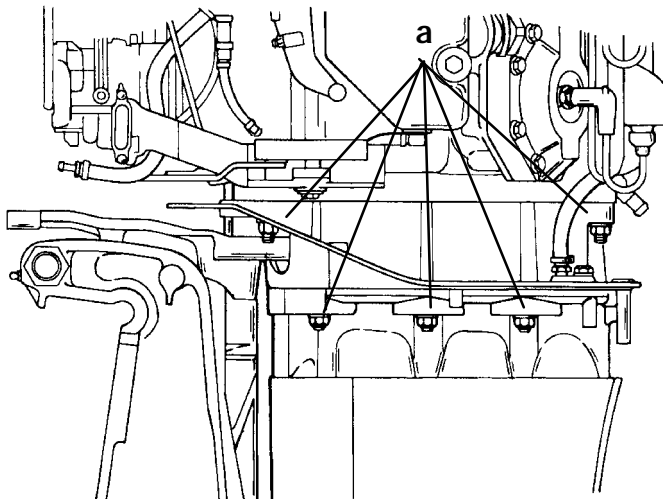
4. Apply a small amount of 2-4-C w/Teflon (92-825407A12) onto driveshaft splines.
5. Use hoist to lower powerhead onto driveshaft housing. It may be necessary to turn flywheel (aligning crankshaft splines with drive shaft splines) so that powerhead will be fully installed.



52351

a - Lifting Eye (91-90455)

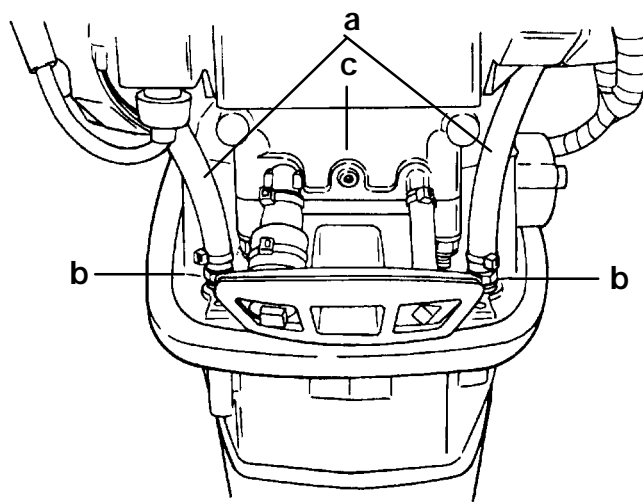
6. Install 10 flat washers and 10 locknuts which secure powerhead to exhaust extension plate/driveshaft housing. Torque locknuts in 3 progressive steps until secured.
7. Disconnect hoist from Lifting Eye and remove Lifting Eye from flywheel.
8. Reinstall plastic cap into center of flywheel cover.



52373

a - Locknuts and Flat Washers [Torque to 50 lb. ft. (68.0 N-m)]

9. Connect bypass water hoses to fittings on exhaust adaptor plate.

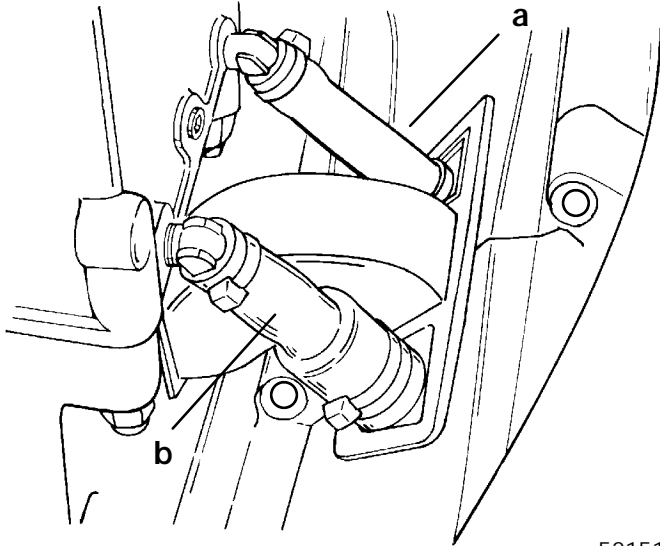


52355

a - Water Hose
b - Fitting
c - Water Pressure Gauge Fitting



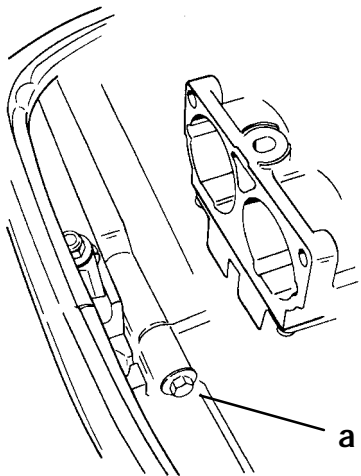
10. Connect tell-tale hose and flush hose to engine block.



52151

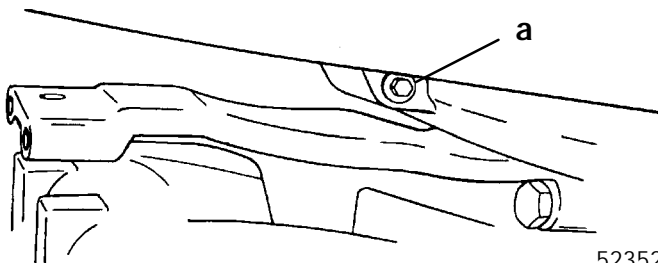
a - Tell-Tale Hose
b - Flush Hose

11. Install four bolts which secure bottom cowl halves together.



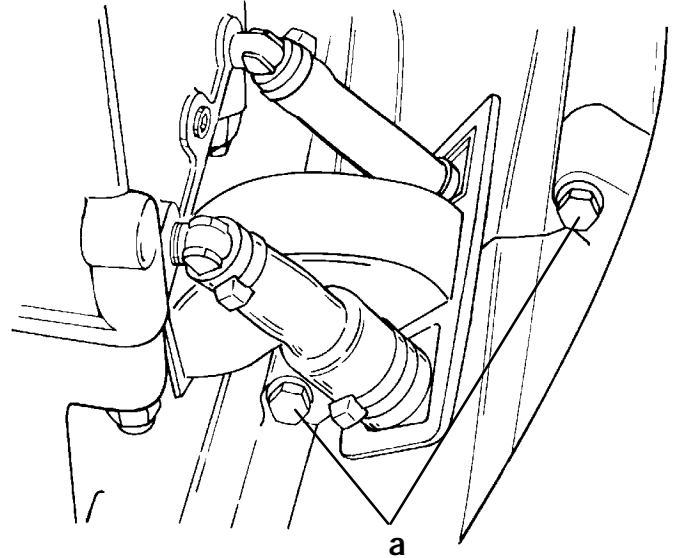
52354

a - Bolts [Torque to 65 lb. in. (7.3 N·m)]



52352

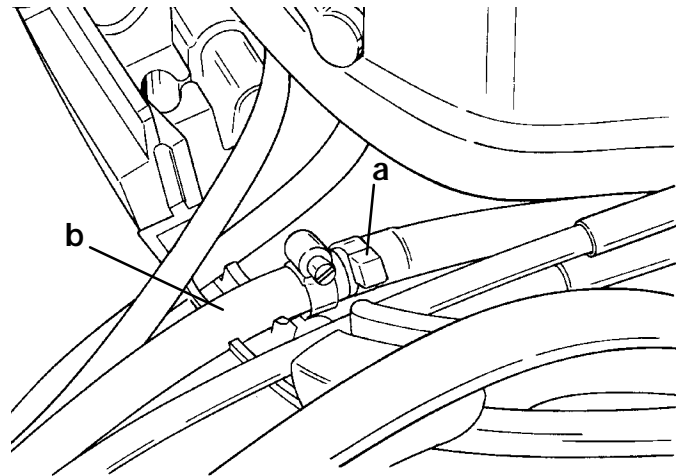
a - Bolts [Torque to 65 lb. in. (7.3 N·m)]



52151

a - Bolts [Torque to 65 lb. in. (7.3 N·m)]

12. Re-connect input fuel line.

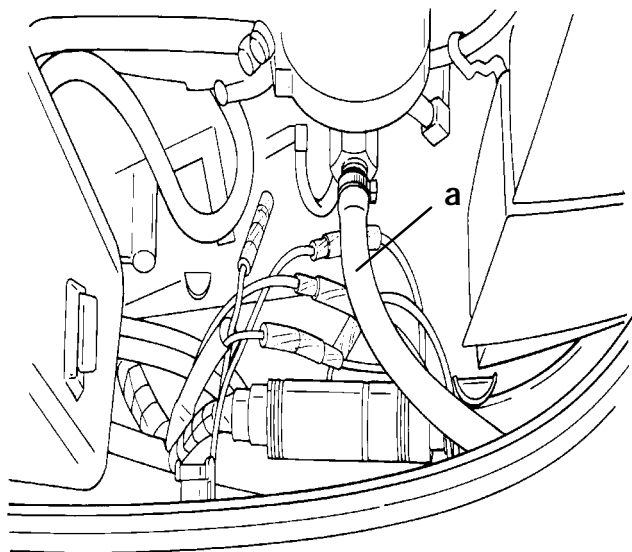


52191

a - Sta-Strap
b - Fuel Line



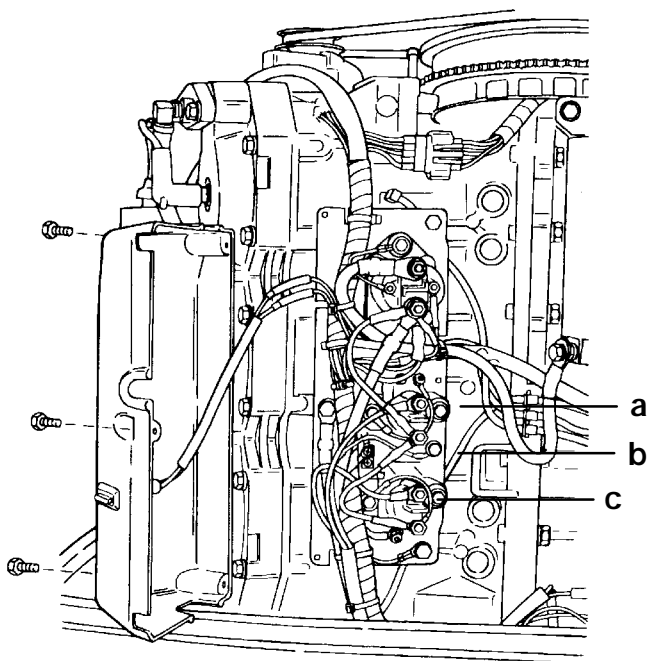
13. Connect remote oil tank pressure hose to to crankcase fitting.



52193

a - Remote Oil Tank Pressure Hose

14. **MODELS WITH TRIM SOLENOIDS** - Connect BLUE, GREEN and BLACK trim harness leads to trim solenoids. Install trim harness to J-clip on exhaust cover.

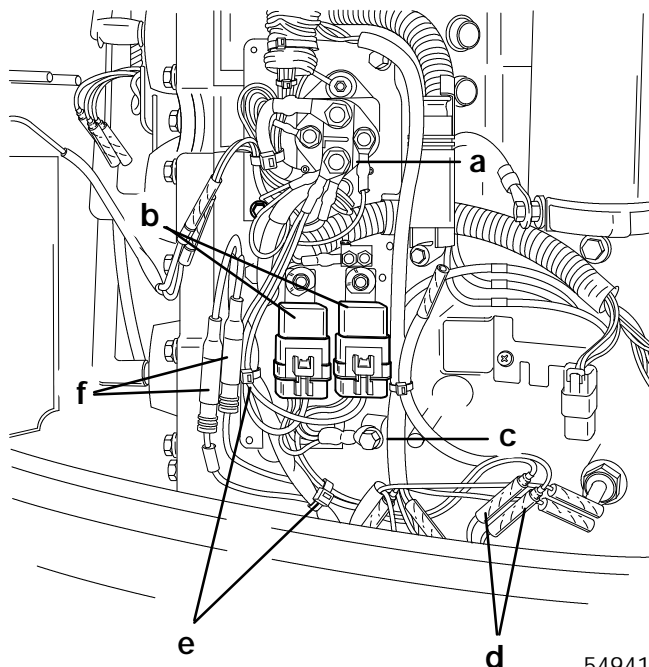


52151

a - Blue Trim Lead
b - Black Trim Lead
c - Green Trim Lead

MODELS WITH TRIM RELAYS - Attach relay ground harness to lower electrical plate mounting bolt. Torque bolt to 16.5 lb. ft. (22.4 N·m). Attach relay positive leads (RED) to BATTERY SIDE

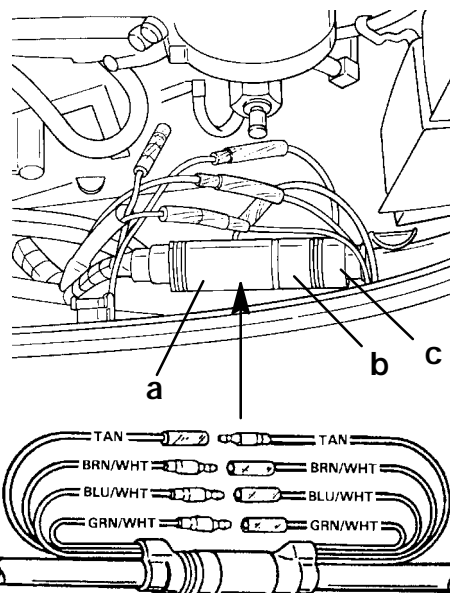
of starter solenoid with nut. Torque nut to 45 lb. in. (5.1 N·m).



54941

a - Nut - Attach RED Relay Leads - Torque Nut to 45 lb. in. (5.1 N·m)
b - Relays - Secure with Retained Bolts and Nuts
c - Bolt - Attach BLACK (ground) Relay leads - Torque Bolt to 16.5 lb. ft. (22.4 N·m).
d - Connect BLUE/WHITE and GREEN/WHITE Trim Leads to Lower Cowl Trim Switch Harness.
e - Sta-Straps
f - Connect BLUE (sleeve) and GREEN Power Trim Leads.

15. Re-connect remote control harness to powerhead harness connector and wires as shown.

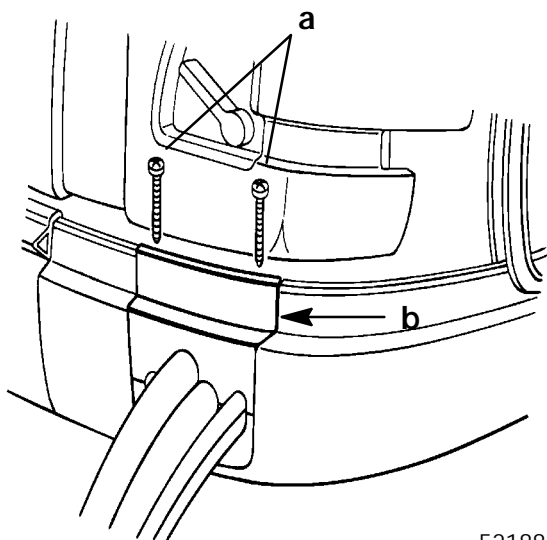


52186

a - Engine Harness Connector
b - Remote Wiring Harness
c - "J" Clamp



16. Install two screws which secure remote control harness retainer.



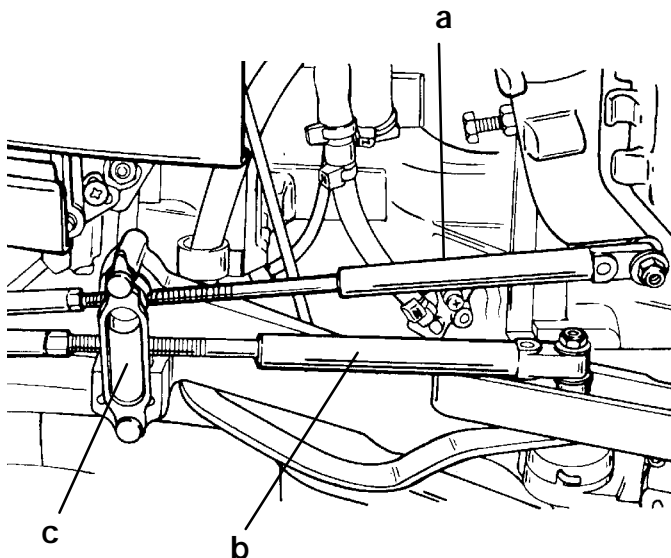
52188

a - Screws
b - Retainer

17. Slide outboard shift lever into neutral position.

18. Install throttle cable.

19. Install shift cable assembly as shown Refer to "Cable Adjustment" Section 7A.



52195

a - Throttle Cable
b - Shift Cable
c - Cable Retainer

Refer to Section 2 of this Service Manual "Timing/Synchronizing/Adjusting" for engine set-up procedures.

Break-In Procedure

MODELS WITH OIL INJECTION

Use a 50:1 (2%) gasoline/oil mixture in the first tank of fuel. Follow the table below for mixing ratios. Use of this fuel mixture combined with oil from the oil injection system will supply adequate lubrication during engine break-in.

After the break-in fuel mixture is used up, it is no longer necessary to add oil with the gasoline.

NOTE: At the end of the break-in period, visually check to see if the oil level in the oil injection tank has dropped. Oil usage indicates the oil injection system is functioning correctly.

GASOLINE/OIL MIXING RATIO CHART

GAS/OIL RATIO	1 GAL-LON GAS (3.8 LITERS)	3 GAL-LONS GAS (11.5 LITERS)	6 GAL-LONS GAS (23 LITERS)
50:1 (2%)	3 FL. OZ. (89 ML) OIL	8 FL. OZ. (237 ML) OIL	16 FL. OZ. (473 ML) OIL

MODELS WITHOUT OIL INJECTION

Use a 25:1 (4%) gasoline/oil mixture in the first tank of fuel.

After the break-in fuel mixture is used up, use a 50:1 (2%) gasoline/oil mixture. Follow the table below for mixing ratios.

GASOLINE/OIL MIXING RATIO CHART

GAS/OIL RATIO	1 GAL-LON GAS (3.8 LITERS)	3 GAL-LONS GAS (11.5 LITERS)	6 GAL-LONS GAS (23 LITERS)
25:1 (4%)	5 FL. OZ. (148 ML) OIL	16 FL. OZ. (473 ML) OIL	32 FL. OZ. (946 ML) OIL
50:1 (2%)	3 FL. OZ. (89 ML) OIL	8 FL. OZ. (237 ML) OIL	16 FL. OZ. (473 ML) OIL

ENGINE BREAK-IN PROCEDURE (ALL MODELS)

Vary the throttle setting during the first hour of operation. Avoid remaining at a constant speed for more than two minutes and avoid sustained wide open throttle.