Chris-Craft®

Mode:
350–F

HI-PERFORMANCE

THERMOCON MARINE ENGINES

AND

OUTBOARD DRIVE

(EFFECTIVE SERIAL NO. 620001)

OWNER'S MANUAL

PART NO. 16.99-08778

ENGINE OPER
TABLE OF C(

CHRIS-CRAFT CORPORATION March, 1976 Printed in U. S. A.

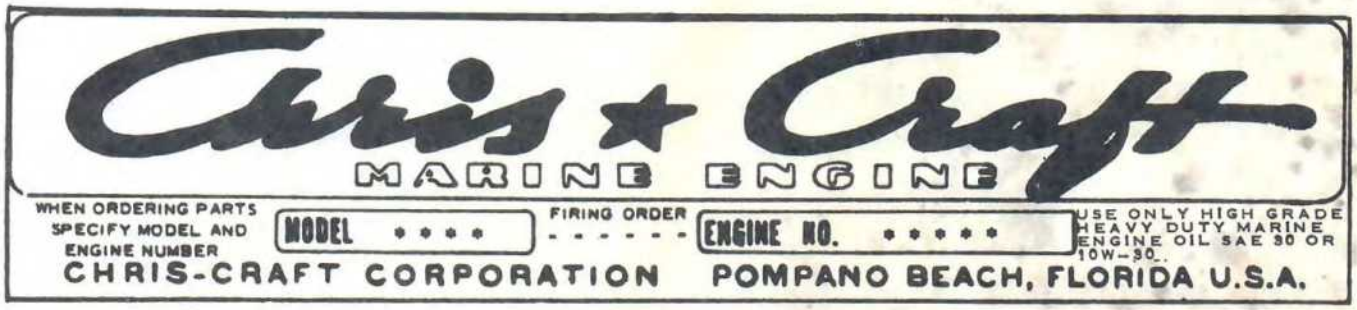
TO ORDER PARTS

ENGINE MODEL and ENGINE SERIAL NUMBER must be furnished when replacement parts are required.

The model designation (*) and serial number (*) will be found stamped into a plate fastened on top of the exhaust manifold.

NOTICE: EARLIER MODELS WILL HAVE THE SERIAL NUMBER STAMPED ON THE SIDE OF EXHAUST MANIFOLD.

ILLUSTRATION OF ENGINE PLATE



Order parts from your nearest Chris-Craft dealer or direct from Chris-Craft Corporation, Service Parts Department, Algonac, Michigan being sure to furnish numbers mentioned above.

For the best performance from your engine —
INSIST ON GENUINE CHRIS-CRAFT PARTS.

Instructions, specifications and illustrations shown are in accordance with experience and product information as developed at time of publication. The right is reserved to make changes at any time without notice.

HI-PERFORMANCE MARINE ENGINE

SPECIFICATIONS

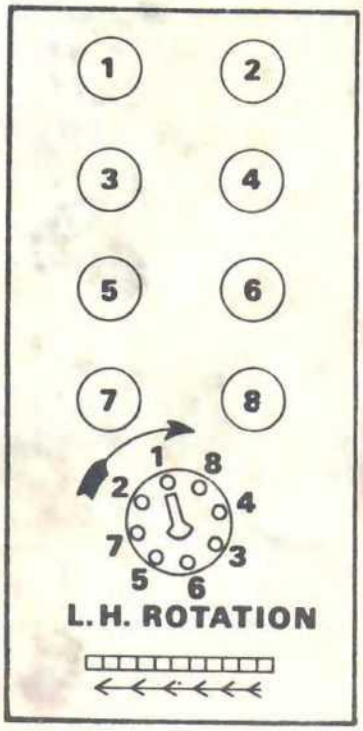
MODEL 350 FLV — (Serial No. 620001)

Horsepower	300 @ 5200 RPM
Bore	4 inches
Stroke	3½ inches
Piston Displacement	350 Cubic inches
Type	4 cycle, valve-in-head, V-8
Nominal Compression Ratio	9.0 to 1
Minimum Recommended Idle Speed	650 RPM
Engine Compression Gauge Readings	150 P.S.I.
Oil Pressure	10 lbs. at idle (approx.) 35 to 45 lbs. max. speed (hot)
Oil Pan Capacity	5 qts. & 1 qt. for filter
Carburetion	Single four-barrel (Roch. Q-Jet)
Electrical System	12 Volt
Spark Plugs	AC-MR 43T or Champion RBL-8
Revolutions	A maximum cruising speed not in excess of 85% of full throttle RPM is recommended.

FIRING ORDER

Rotation from
Outboard Drive End: Counter Clockwise

Firing Order: 1-8-4-3-6-5-7-2



TORQUE SPECIFICATIONS

(Oiled threads)

Cylinder Head	65 ft. lbs.
Connecting Rod	45 ft. lbs.
Main Bearings	Inner 75 ft. lbs.
	Outer 65 ft. lbs.
Flywheel	60 ft. lbs.
Intake Manifold	30 ft. lbs.
Exhaust Manifold	30 ft. lbs.
Spark Plug	15 ft. lbs.

YOUR NEW CHRIS-CRAFT MARINE ENGINE

Your Chris-Craft Marine Engine with power-plus performance is the product of long-term, skillful engineering combined with careful manufacturing and exhaustive testing. Chris-Craft's years of practical experience in the marine field are packed into every engine leaving our plant. With reasonable care during operation and a minimum amount of maintenance this engine will deliver a maximum amount of dependable, economical performance and long life.

IDENTIFICATION

On every engine there is a plate on top of the exhaust manifold giving the model and serial number. This information is important and must be included in all parts orders and correspondence relating to the engine.

USE GENUINE FACTORY REPLACEMENT PARTS

All Chris-Craft Marine Engines have special parts designed to give the best performance under conditions found only in marine use. To insure long life and dependable performance we strongly recommend that only factory replacement parts be used. These may be obtained from your Chris-Craft Dealer.

TO START ENGINE

Before starting the new engine check the oil level in the crankcase. Check fuel in tank and ventilate engine compartment thoroughly. Shift the drive unit to neutral position. Open the throttle to full open, then close to approximately 1/3 open.

With ignition key, turn on switch and engage the starter. Do not engage the starter for prolonged periods. If the engine does not start immediately, investigate the cause of trouble. As soon as the engine starts release the starter. Check to make sure that oil pressure is present and that cooling water is circulating.

The engine is equipped with an automatic choke. If the engine does not start due to flooding the throttle should be opened fully which will reduce the choking action. The starter should be engaged with throttle opened fully. As soon as engine starts close the throttle.

The engine should be idling below 1000 RPM before shifting into forward or reverse.

BREAK-IN

It is very important that the engine be broken in properly. All moving parts in the engine are new and have only been run for a few hours while the engine had its final test. Engines must be run carefully in the beginning until all parts are worn in and the engine becomes limber. Only then will it be safe to run the engine fast for sustained periods of time.

Running new engines or engines after a major overhaul at excessively low RPM for long periods should be avoided because it will tend to prolong the break-in period and delay proper seating of piston rings.

During the first twenty hours of operation, the engine should be run at moderate R.P.M. and at varied speeds. Avoid prolonged idle or trolling speed during this period. These procedures will contribute to a longer engine life.

During the entire life of the engine always run the engine at medium speeds to allow the oil to warm up before running at sustained high speeds. **When coming to the dock after a run always allow the engine to run at moderate speed for three to five minutes before turning off the ignition. This can be done by slowing down several hundred yards before you get to the dock or letting the engine idle after you have docked. This allows the valves to cool down while the water is still circulating thru the engine and will help prevent warped valves.**

LUBRICATION SYSTEM

OIL PRESSURE

Form the habit of watching the oil pressure gauge or light. Advance notice of serious trouble is nearly always indicated by oil pressure reading.

Oil pressure should be approximately 10 lbs. at idle speed and 35 to 45 lbs. at maximum speed with the engine hot.

ENGINE OIL RECOMMENDATION

Chris-Craft Marine Engines should be serviced with oil of good quality to insure smooth operation, freedom from trouble and best engine performance obtainable. A Marine Engine works at maximum capacity 90% of the time while an automobile engine rarely works at its maximum even 10-15% of the time. Therefore, the requirements for a good lubricating oil are far greater in a Marine Engine.

We recommend the use of S.A.E. No. 30 or 10W-40 lubricating oil containing detergents and additives conforming to API service classification SE. It is not recommended that different brands of oil be mixed. Always replenish with the same make and type of oil that is in the crankcase. If it is necessary to change the make of oil, drain the crankcase completely before refilling.

TO CHANGE ENGINE OIL

The new engine, when shipped, is filled with S.A.E. 10W-40 break-in oil. After fifteen to twenty hours of running, replace with S.A.E. 30 or 10W-40 motor oil and also replace the oil filter. Subsequent oil and filter changes should be made every fifty to one hundred hours, depending on the type of service to which the engine is subjected. An engine used for short runs only will require an oil change more often than an engine used for long runs. During the longer run, the oil attains the proper operating temperature thereby reducing the possibility of contamination.

The best method for removing crankcase oil is with a suction pump. Insert the suction hose over the oil removal tube. Most marine service stations are equipped with special pumps for removing oil, or a suitable oil sump pump (48.28-12948) may be purchased from your Chris-Craft Dealer.

The engine holds approximately five to six quarts of oil with filter. The amount of oil will vary since engines are installed at different angles in different boat models.

ENGINE OIL FILTER

The full flow oil filter should be replaced in the new engine when the break-in oil is removed after fifteen to twenty hours running. Thereafter, replace the oil filter every 50 to 100 hours depending upon type of service.

Approved oil filter replacements are as follows: Chris-Craft—16.81-08130, AC-(PF-24), WIX (PC55P.

If the normal oil pressure decreases at high engine speeds it may be due to a clogged oil filter. Run at reduced engine speed and change the oil filter promptly.

ELECTRICAL SYSTEM

The engine has a 12 volt electrical system. The starter, alternator, regulator, distributor and coil all have identification affixed denoting the respective manufacturer. These units are warranted and serviced by these manufacturers. Apply directly to the manufacturer's distributor or dealer for warranty or service on these units.

It is important that all electrical connections be periodically inspected. Make certain that the condition of the insulation on all wires is good and all mechanical connections are tight and free from corrosion. In boats operated in salt water it is especially important that all connections be inspected two or three times each year. If necessary each connection should be taken apart, cleaned with fine sandpaper, given a light coating of CRC or petroleum jelly to retard corrosion and tightly reconnected. Battery terminals should be cleaned often with water and baking soda, coated with petroleum jelly and reconnected. High tension leads must be in good condition. Even a small crack in the insulation might permit oil or moisture to cause a partial ground requiring replacement of the lead. Spraying all of the electrical units, terminals and high tension wires with CRC, or equivalent, at each engine oil change helps to reduce corrosion and damage from dampness.

IGNITION CIRCUIT

The explosion proof distributor should be inspected every 100 operating hours or not less than every six months. After removing the distributor cap inspect the breaker contacts. If the contacts are grayish in color and are not more than slightly pitted they need not be replaced. We recommend that new breaker contacts be installed when required rather than attempting to reface the old contacts.

Breaker contacts should be set. The ignition timing should always be reset using a timing light each time the breaker contacts are adjusted and each 100 hours o foperation. Inspect all wires and connections and clean up any corrosion at connections if present.

Spark plugs should be cleaned and regapped periodically. Make certain there are no cracks in the porcelain and that the terminals are clean and tight. Any spark plug which is found to have burned or badly worn electrodes should be replaced.

BATTERY

The battery should be kept near full charge. To check the condition of the battery, specific gravity readings should be taken. For further detail concerning batteries consult your Boat Owner's Manual.

Also keep the battery filled with pure water to the proper level (distilled water is best). Never let the level go below the top of the plates in the battery.

ALTERNATOR AND VOLTAGE REGULATOR

The engine is equipped with a Yacht Safety Bureau Approved Hi-Output Alternator. The alternator produces alternating current which is changed to direct current by a self contained rectifier. Alternators have the advantage of charging at low engine RPM which makes them ideal for marine use.

The following precautions should be observed to prevent damage to the alternator:

1. Engine is wired with a negative ground system. Do not reverse polarity.
2. Do not attempt to polarize alternator It is unnecessary and could destroy alternator.
3. When using a dockside battery charger disconnect battery terminals. Never use a "fast charger" to supply starting voltage.
4. Be careful not to accidentally ground the field circuit or output terminal on the alternator.
5. Never disconnect battery leads when the engine is running since this will damage the alternator diodes.
6. Be sure all electrical connections are tight. A loose connection can destroy the voltage regulator.

ADJUSTMENT INFORMATION

Model 350FLV—(Ser. No. 620001 thru 620184)

Spark Plug, Champion	Gap—.028"
Spark Plug, AC MR43T	Gap—.035"
Distributor Points (Delco 1112148 DIST.)	Gap—.019" Dwell—29-31°
Ignition Timing	~~12° BTDC~~ 8° BTDC TRANSISTOR ENG INSTALLED

Model 350FLV—(Ser. No. 620185 thru 620606)

Spark Plug, Champion	Gap—.028"
Spark Plug, AC	Gap—.035"
Distributor Points (Mallory YL-585-AV DIST.)	Gap—.018" Dwell—28-30°
Ignition Timing	4° BTDC

Model 350FLV—(Ser. No. 620607)

Spark Plug, Champion	Gap—.028"
Spark Plug, AC	Gap—.035"
Distributor Points (Mallory YL-585-CV-2 Dual Point DIST.)	Gap—.020" Dwell—one set 26° Total 31-35°
Ignition Timing	8° BTDC

IGNITION TIMING

To set the ignition timing, use a timing light. The torsional damper at the front of the engine is provided with a saw mark, indicating T.D.C. This mark should be aligned with the B.T.D.C. mark on the timing indicator, which is attached to the timing chain cover. The ignition timing should be rechecked after tightening the distributor hold down to be sure it is properly set. CAUTION: WHEN SETTING THE IGNITION TIMING, DO NOT LET THE ENGINE IDLE SPEED EXCEED 650 R.P.M.

ALTERNATOR MAINTENANCE

Make sure the alternator is mounted securely in place. Check the drive belt tension and alignment carefully, particularly after installation of new belts. Retightening new belts is necessary after a few hours operation or after storage.

NOTE: If the alternator fan can be rotated by pulling on a fan blade with one finger, the belt is too loose and must be tightened.

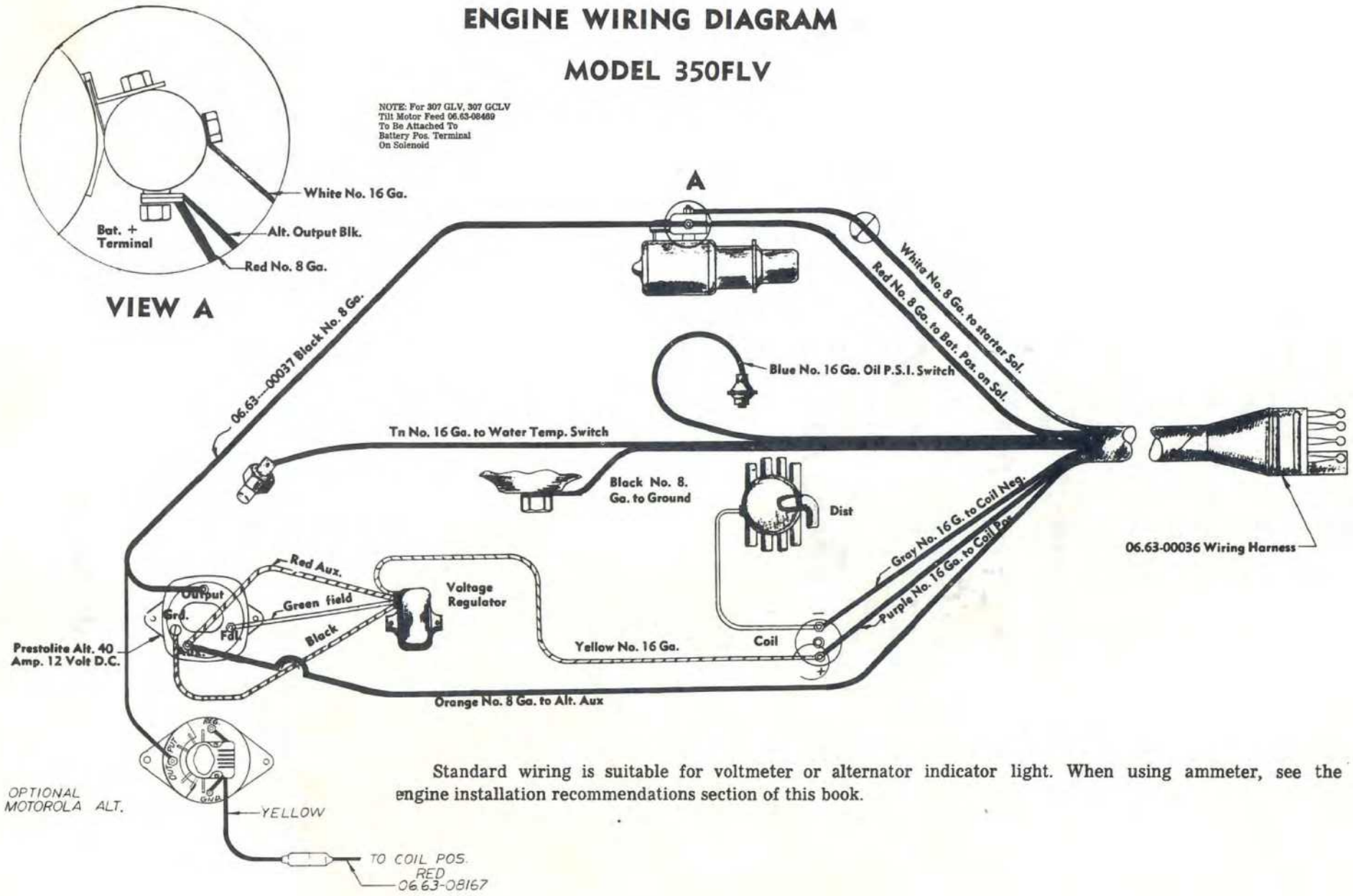
The alternator should only be adjusted by authorized service stations which have instruments and information necessary to correctly repair this unit. The voltage regulator is a sealed unit and does not require servicing.

STARTING MOTOR

No periodic lubrication of the starting motor or solenoid is required. Since the starting motor and brushes cannot be inspected without disassembling the unit, no service is required on these units between overhaul periods.

ENGINE WIRING DIAGRAM

MODEL 350FLV



Standard wiring is suitable for voltmeter or alternator indicator light. When using ammeter, see the engine installation recommendations section of this book.

FUEL SYSTEM

It is very important that the gasoline used meets the requirements for your engine. Use of gasoline which does not meet these requirements can result in burned valves and pistons, poor engine performance and shorter engine life.

FUEL RECOMMENDATION

Gasoline used for this engine should be regular marine leaded or low lead gasoline of at least 92 research octane number. (87 antiknock index or number designation 2 as defined by the Cost of Living Council.)

CAUTION: When purchasing gasoline, be very careful not to get research octane confused with antiknock index (or octane number).

The use of marine white or unleaded gasoline should be avoided.

CARBURETOR & FUEL LINES

The carburetor is warranted and serviced by the manufacturer and his distributors.

It is important that all fuel connections be kept tight and that dirt be kept out of the carburetor. Clean the carburetor flame arrestor regularly.

The carburetor is equipped with non-adjustable high speed jets which require no attention. The idle adjusting needles should be turned to the position where the engine idles smoothest. (650 RPM IN GEAR)

FUEL PUMP

The mechanical fuel pump furnished with the engine is warranted and serviced by the manufacturer and his distributors and should be inspected, repaired or replaced periodically as operating conditions warrant.

FUEL FILTER

The fuel filter is attached to the front of the engine on the right exhaust manifold header. It has an extra large sediment bowl and is equipped with a pleated paper element. The paper element (16.81-00017) (Purolator 64195) should be replaced at least seasonally or as operating conditions warrant.

Before removing the sediment bowl for cleaning be sure to turn off the fuel line valve to prevent gasoline from spilling in the boat. It is a good suggestion in removing the bowl to loosen it, then slip a plastic bag over the bowl and remove the bag and bowl as a unit thereby preventing gasoline from being spilled into the bilge.

COOLING SYSTEM

The Thermocon-Develvo marine engine cooling system is a patented arrangement which THERMOstatically CONtrols temperature at a pre-DEtermined VELocity and VOlume of water. Two water pumps (sea water and circulating), a thermostat and pressure relief valves are the primary units involved.

The sea water is taken in through the strainer on the outboard drive gear housing by a positive displacement pump that is mounted on the left hand side of the engine. This is referred to as the sea water pump. The seawater pump circulates water to the thermostat housing and into two pressure relief valves, one on each exhaust riser. Each valve has a two-pound relief spring. Until such time that the engine is completely filled with water and has built up a two-pound back pressure, all the water from the sea water pump is forced into the thermostat housing leading to the circulating pump inlet, with the exception of a very small quantity that is allowed to pass through small vent holes in the pressure relief valves. This small quantity will go into the exhaust risers and overboard through the exhaust pipe. The reason for these vent holes is to eliminate any air from being trapped in this part of the system.

After the sea water pump has built up a pressure in the engine to two-pounds then the pressure relief valves are forced open by pressure from the positive displacement pump allowing the water to flow out through the exhaust wye collector overboard.

The function of the sea water pump is as follows:

1. to maintain a constant supply of water to the engine circulating system at all times.
2. to help cool and muffle the exhaust pipe.

The circulating system consists of a centrifugal pump mounted on the front of the engine which circulates water through the engine. The pump has one inlet and two outlets. Water from the two outlets is forced through the cylinder block, cylinder heads, and intake manifold to the thermostat housing. The water then makes two passes through the exhaust manifolds and returns to the thermostat housing.

Located at the front end of the intake manifold is a thermostat and thermostat housing. This is a 143° to 165° thermostat. The function of this thermostat is to maintain a constant water temperature from the exhaust manifold water outlet. If the water in passing through the engine has not reached a high enough temperature to open the thermostat, it will return to the inlet of the centrifugal water pump and recirculate through the engine. If, however, the water has reached opening temperature the thermostat will allow a regulated amount of water to flow into the exhaust risers and through the exhaust wye collector overboard. The water which passes through the thermostat is replaced by cool water from the sea water pump thus maintaining controlled engine temperature.

MAINTENANCE

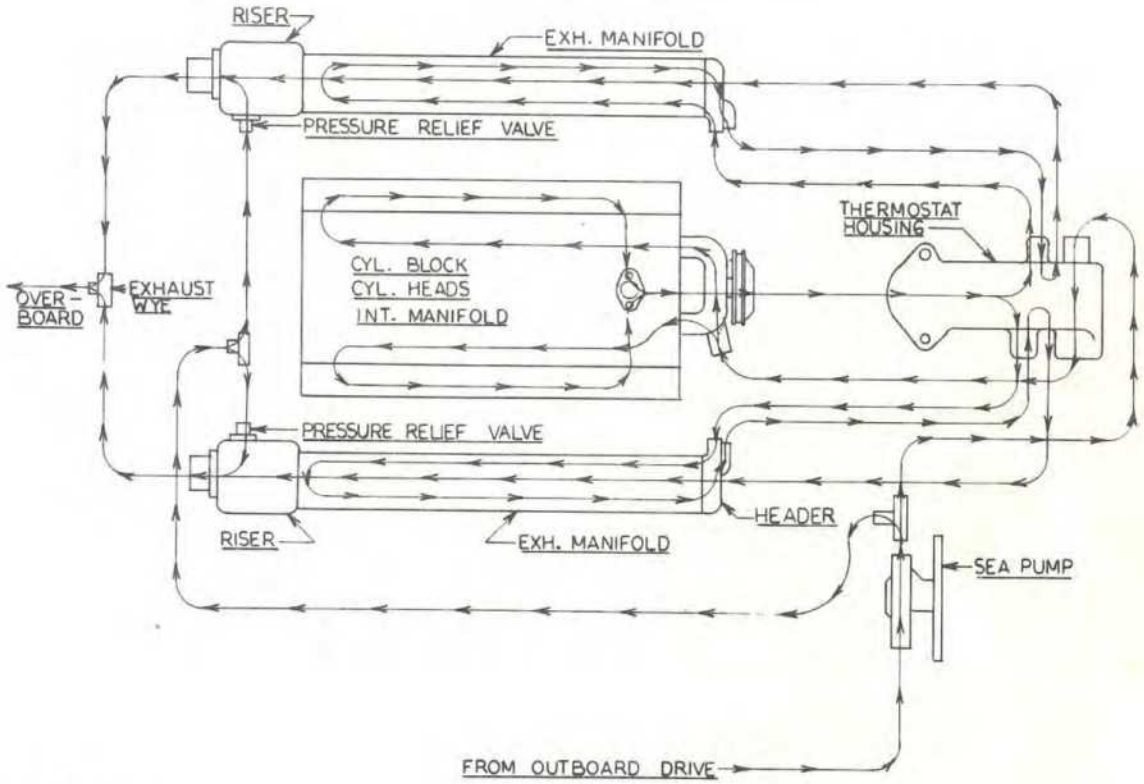
Normal maintenance for the pumps includes attention to drive belts and hoses, keeping them properly tightened and making replacement when inspection shows signs of deterioration.

WATER TEMPERATURE

The operating temperature of the thermostatically controlled water cooling system is from 143°to 165°. The temperature sending element should be of such physical dimension as to extend into the water flow to insure a true temperature reading. Any radical change from this normal temperature would indicate a malfunction in the system.

WATER COOLING SYSTEM

Model 350FLV



VALVES

Good valve action is very important to the efficiency and smoothness of the engine. Engines operated with proper care will require a minimum amount of valve maintenance.

The need for valve service will first be indicated by loss of engine speed, increased fuel consumption and rough idling. A check of the compression in each cylinder is a reliable check of valve condition. The test should be made with all spark plugs removed at cranking speed with wide open throttle and engine hot. The reading will be approximately 150 P.S.I. A uniform reading on all cylinders is more important than the individual reading of each cylinder. If a low reading is shown in one or more cylinders a little oil on top of the piston will help to determine if the valves are at fault.

This engine is equipped with hydraulic valve lifters for quiet operation. It is important that the oil be kept clean to assure quiet and efficient operation. Hydraulic valve lifters very seldom require adjustment.

VALVE ADJUSTMENT

With no. 1 piston on top dead center compression stroke, the following valves can be adjusted: intake on cyl. no. 1 - 2 - 5 - 7.

exhaust on cyl. no. 1 - 3 - 4 - 8

Valve adjustment can be made by backing out the adjusting nut until lash is felt at the push rod, then turn in adjusting nut until all lash is removed. This can be determined by checking push rod side play while turning adjusting nut. When play has been removed, turn adjusting nut in 1 additional turn to place the hydraulic lifter plunger in the center of it's travel. No other adjustment is required.

Rotate engine until no. 6 piston is on top dead center compression stroke and adjust the following valves: intake on cyl. no. 3 - 4 - 6 - 8

exhaust on cyl. no. 2 - 5 - 6 - 7

ANNUAL LAY-UP

In areas where freezing is a problem, preparing the engine becomes a major consideration because of the potential damage from freezing. This does not infer that lay-ups in more temperate climates are less important or less exacting. A thorough lay-up operation will include the following steps.

BEFORE LIFTING BOAT FROM WATER

1. Change Oil Filter, drain the engine oil and refill the crankcase. Add Chris-Craft Crankcase Oil Supplement, part number 56.00-20630, in the proportion of 16 ozs. for every four to six quarts of oil.
2. EITHER OF THE FOLLOWING TWO METHODS FOR FOGGING THE ENGINE IS RECOMMENDED

a. Add Chris-Craft Fuel Conditioner and Valve Lubricant, part number 56.00-20629, to the gasoline supply in the proportion of 6 oz. to each 7 gallons of gasoline. We suggest running the fuel supply low at the end of the season, thereby, reducing the required amount of Fuel Conditioner. If preferred, the treated fuel may be fed from an auxiliary tank. An outboard motor gasoline tank would serve very well for this purpose. Run the engine for at least fifteen minutes to disperse the Conditioner throughout the engine. The conditioning properties lie in the residue resulting from the combustion of the Fuel Conditioner, therefore, it is very important to run the engine as directed. After approximately 15 minutes, close the fuel valves at the tank and run the engine until it stalls.

b. Chris-Craft Fogging Oil in a handy 16 oz. spray can may be ordered from your Chris-Craft Dealer under part number 56.00-00204. The contents of this can is enough for two engines and the directions on the label must be followed.

3. Remove and clean the fuel filter sediment bowl and replace the pleated paper element 16.81-00017 (Purolator 64195)
4. Pull the boat from the water, bow first, to insure complete drainage of the exhaust system. If the boat is lifted vertically, the same result can be accomplished by keeping the bow higher than the stern.

AFTER LIFTING BOAT FROM WATER

1. Drain the entire cooling system, and flush with fresh water. This is especially important for boats operated in salt water. Drain plugs and valves (painted red) are located as follows:
   (a) Open drain valves under right and left exhaust risers. (total of four drain valves).
   (b) Remove drain valves in port and starboard side of cylinder block.
   NOTE: These openings are sometimes blocked with sediment and may require probing with a wire to dislodge the obstruction.
   When all trapped water has been dispelled inject a quantity of glycerine into the pump intake. Again rotate the engine to completely coat the impeller. The glycerine will prevent freeze-up and also aid in priming when the engine is reactivated.
   (c) Drain the hose running from the outboard drive water intake to the sea water pump inlet.
2. Remove the battery or batteries and arrange to have them charged periodically throughout the inactive period. Wash the exterior of each battery with a soda solution to remove all traces of corrosion and acid.
3. Seal the flame arrestor against dirt and moisture. This can be done by using an air-tight plastic bag in which to enclose the entire carburetor.
4. Cover the fuel-tank-thru-hull vents, making them airtight.
5. Repaint blemished area with Chris-Craft blue engine enamel which is available in handy "spray-on" cans from your Chris-Craft Dealer.
6. Apply a film of Chris-Craft Oil Supplement on all exposed and unpainted metal surfaces.
7. Remove the distributor cap and oil the advance mechanism. Apply a light coating of Chris-Craft Oil Supplement on the distributor cam. Replace the distributor cap.
8. Spray all electrical connections with CRC or its equivalent.

MAINTENANCE SCHEDULE

The following maintenance schedule is offered as a suggestion only. Maintenance requirements will vary according to engine usage.

Each time the engine is run:

1. Check oil level in engine and reverse gear. Maintain oil level at mark on dipsticks.
2. Check fuel level, fuel system and exhaust system, by visual inspection.
3. Make sure cooling water is circulating after starting engine by checking flow of water out exhaust pipe and observing temperature gage or indicator light.
4. Battery water should be brought up to level, if necessary.

EVERY 50 RUNNING HOURS:

1. Change oil and filter every 50 to 100 hours depending on type of service.
2. Clean carburetor flame arrestor.
3. Remove fuel filter bowl and replace pleated paper element 16.83-90006) (Carter 30-135S)
4. Clean ventilating valve located in the valve cover each time oil is changed.
5. Correct any fuel, oil or water leaks.

EVERY 100 RUNNING HOURS (OR NOT LESS THAN EVERY 6 MONTHS):

1. Clean and tightly reconnect all dirty electrical connections.
2. Replace deteriorated rubber hoses.
3. Remove distributor cap and distributor rotor. Put 5 drops medium engine oil on felt at top of center shaft under rotor. Put 1 drop of light engine oil on breaker arm pivot pin. Wipe off excess. Put light film of grease on breaker cam. Wipe off excess. Examine condition of ignition breaker contacts and set gap to proper dimensions.
4. Examine spark plugs. Clean or replace plugs which are dirty or show evidence of burning.
5. Set ignition timing with timing light. 4° B.T.D.C.
6. Examine condition of engine paint. "Aerosol Spray Paint" is available for touchup from your Chris-Craft Dealer.

INSTRUMENTS

An oil pressure gauge, tachometer, water temperature gauge and voltmeter (or ammeter) should be installed. An electric tachometer is recommended since there is no mechanical tachometer drive on the engine. If an ammeter is desired, the 06.63-08719 wire from the alternator output to the starter solenoid should be removed and discarded. Also the orange wire should be moved from the alternator auxiliary terminal to the output terminal.

ANNUAL FITTING OUT

1. Replace all drain plugs and close all drain valves.
2. Crank engine and observe to see if the sea pump is primed.
3. Reconnect all hoses loosened during lay-up.
4. Replace and reconnect the battery or batteries, making certain they are adequately charged and filled with water.
5. Inspect and replace all exhaust fittings and hoses if necessary.
6. Remove covering from carburetor or flame arrestor.
7. Uncover fuel tank vents and open fuel valves.
8. Remove excess oil from internal distributor parts.
9. Start the engine. Refer to starting section.

ENGINE PARTS

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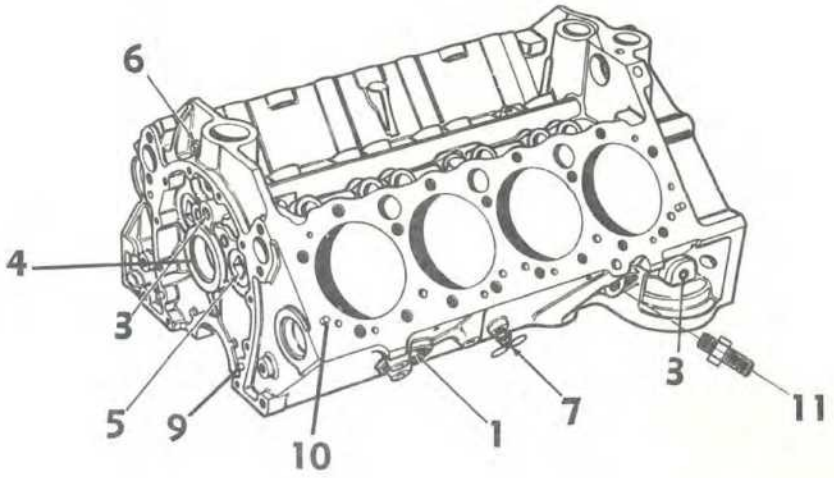
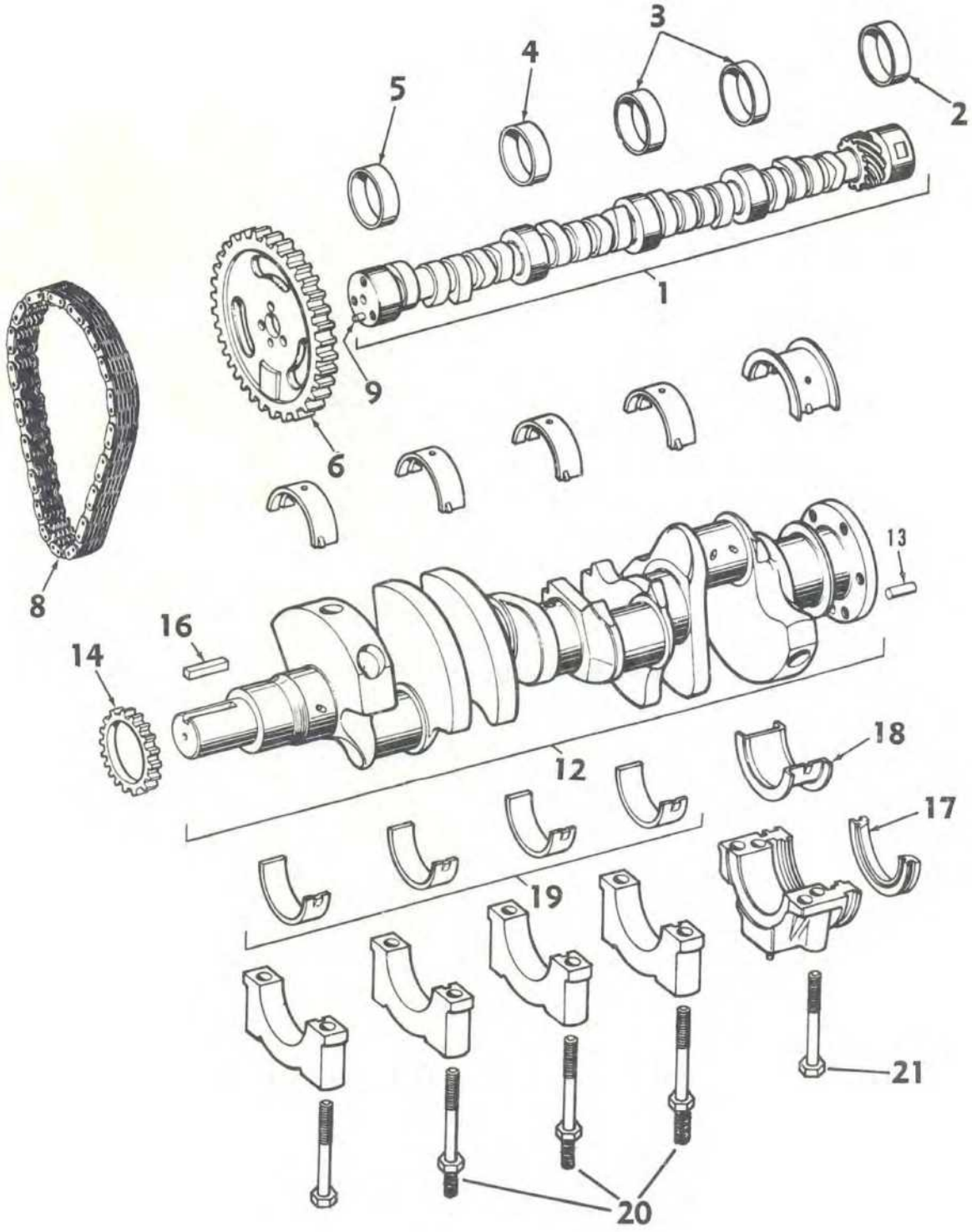


Code No.	Part No.	No. Req'd	Name
			PARTIAL ENGINE
	16.11-30061	1	Engine Assembly—Partial 350 L.H. Rot. NOTE: Partial Engine Consists of Complete Short Block—Inlet Manifold—Cyl. Heads, Water Pump, Oil Pump and Oil Pan.
			CYLINDER BLOCK
	16.11-20050	1	Cylinder Block Assembly—350 **NOTE:** Cylinder Block Assembly includes fitted pistons, ring assemblies and bearings.
1	16.74-10000	8	Cup plugs 1⅝" Brass
2	16.74-10001	1	Cup plugs ⅜" Brass (rear of block below LH water inlet)
3	16.11-00090	6	Cup plugs ½" (oil galleries)
4	16.11-00089	1	Cup plugs 2⅛" (camshaft front bearing hole)
5	16.11-00088	2	Plug 1¼" Sq. Socket
6	16.58-10153	1	Pipe Plug ⅛" Slotted Head (oil pressure hole)
	16.11-00318	3	Pipe Plug ¼" Sq. Head (oil galleries)
7	16.58-17982	2	Valve Drain ¼" Brass (water drain—each side)
9	16.47-00007	2	Dowel Pin ¼"x⅞" (align timing chain cover to block)
	16.11-00086	2	Dowel Pin ¼"x⅝" (at oil pump flange)
	16.11-00093	2	Dowel Pin ⅝" diameter (align front cover)
10	16.11-00092	4	Dowel Pin 5/16"x9/16" (at cylinder deck)
	16.11-00086	1	Dowel Pin ¼"x⅝" (cylinder block to front bearing cap)
			ELECTRICAL GROUND
11	16.44-47486	1	Grounding Stud
	16.41-10005	1	Washer 25/64"x11/16"x1/16"
	16.36-10009	2	Nut ⅜"—24 Brass
			GASKET SET
	16.50-00220	1	Complete Gasket Overhaul Set
	16.96-08631	1	Complete Valve Grind Gasket Set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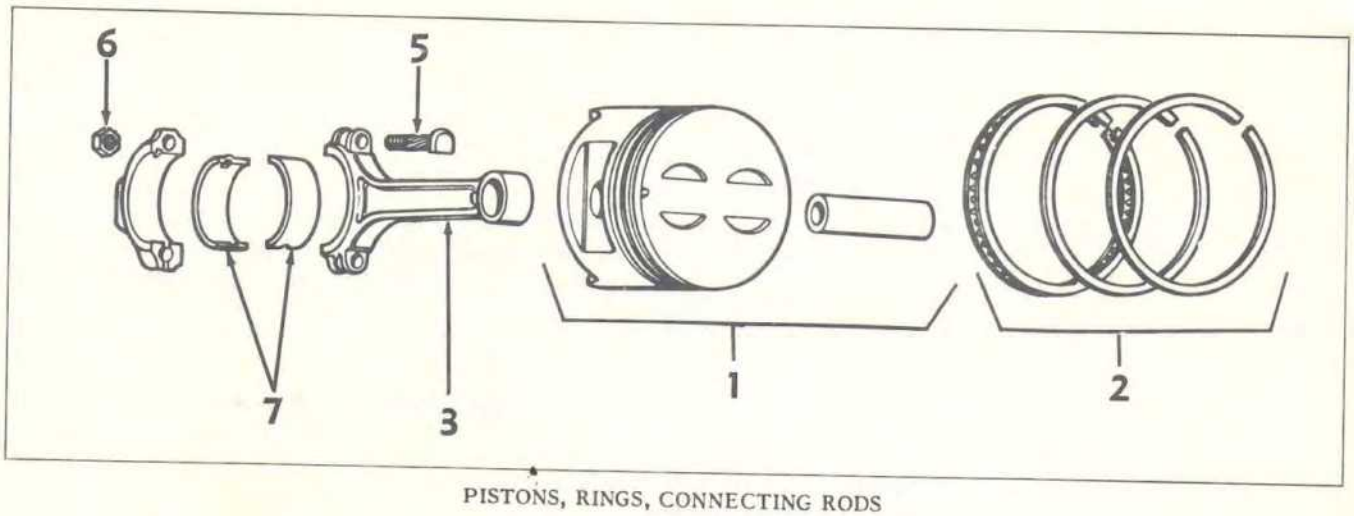
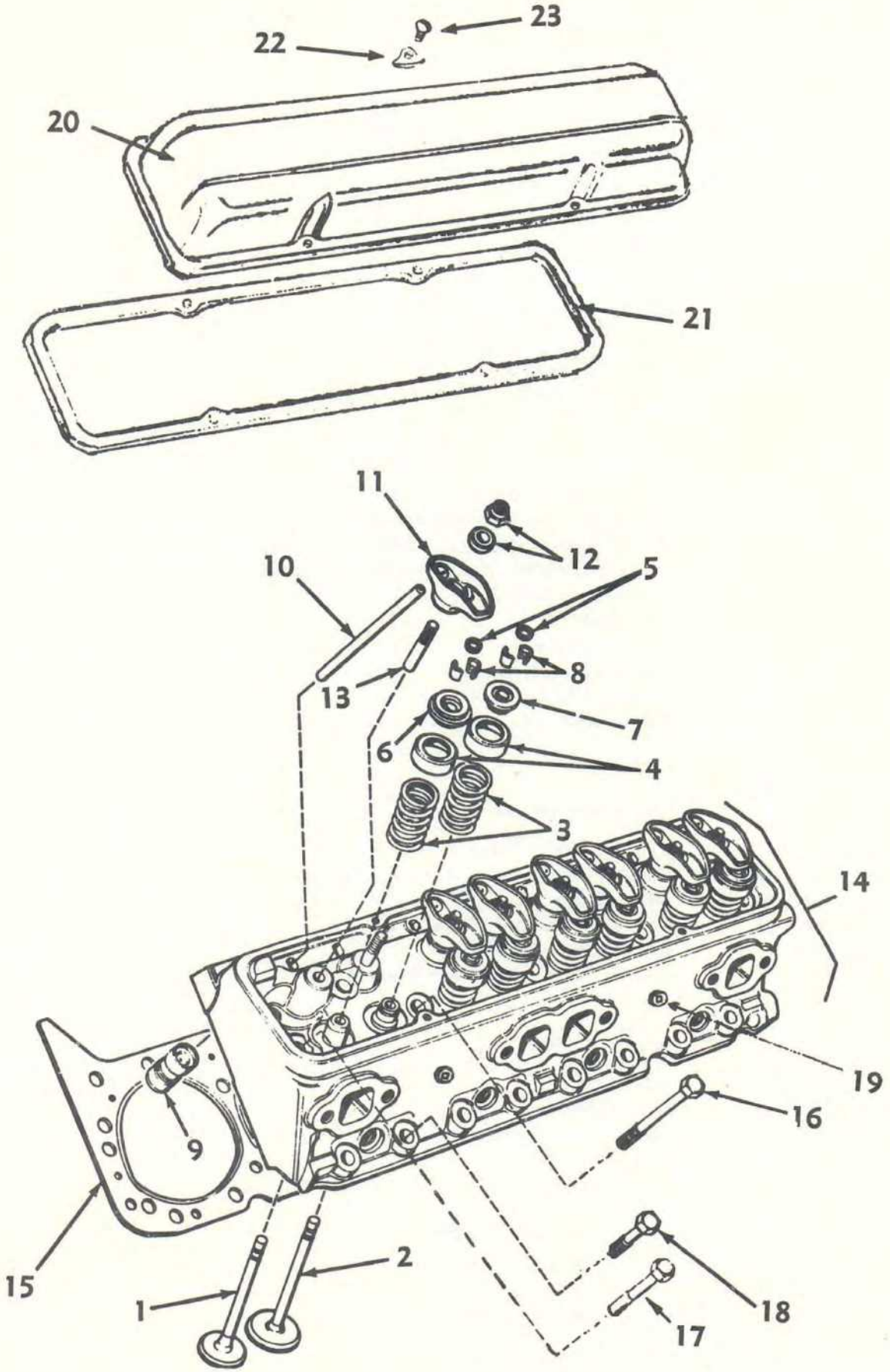
Code No.	Part No.	No. Req'd	Name
			CAMSHAFT
1	16.11-00807	1	Camshaft Assembly—LH Rot.
			NOTE: It is very important that special camshaft lubricant be applied liberally to prevent damaging camshaft lobes when new camshaft or valve lifters are installed. This lubricant can be ordered from Chris-Craft using part number 56.00-20630
2	16.11-00753	1	Bearing, Camshaft Rear — Sold As A Set Under Part No. 16.96-08642
3	16.11-00754	2	Bearing, Camshaft No. 3 and 4 — Sold As A Set Under Part No. 16.96-08642
4	16.11-00753	1	Bearing, Camshaft No. 2 — Sold As A Set Under Part No. 16.96-08642
5	16.11-00752	1	Bearing, Camshaft No. 1 — Sold As A Set Under Part No. 16.96-08642
6	16.11-00046	1	Sprocket, Camshaft (L.H. Rot.)
8	16.11-00045	1	Chain, Camshaft (L.H. Rot.)
9	16.11-00086	1	Pin, Camshaft Dowel (Included in Camshaft Assy.)
9A	16.11-00144	3	Bolt, Camshaft 5/16-18x¾"
			CRANKSHAFT
12	16.11-01029	1	Crankshaft (350 Left Hand Rotation)
13	16.11-00096	1	Pin, Flywheel Dowel
14	16.11-00334	1	Crankshaft Sprocket (Left Hand Rotation)
16	16.11-00098	2	Key, Crankshaft
17	16.51-10027	2	Seal, Crankshaft (Left Hand Rotation)
			MAIN BEARINGS
18	16.11-00389	1	Main Bearing Set—Rear (Incl. Upper & Lower)
19	16.11-00327	4	Main Bearing Set—All except (Upper & Lower)
18	16.11-00390	1	Main Bearing Set—Rear (Inc. Upper & Lower .001 US)
18	16.11-00391	1	Main Bearing Set—Rear (Incl. Upper & Lower .002 US)
18	16.11-00392	1	Main Bearing Set—Rear (Incl. Upper & Lower .010 US)
18	16.11-00393	1	Main Bearing Set—Rear (Incl. Upper & Lower .020 US)
19	16.11-00395	4	Main Bearing Set—All except Rear (Upper & Lower .001 US)
19	16.11-00396	4	Main Bearing Set—All except Rear (Upper & Lower .002 US)
19	16.11-00397	4	Main Bearing Set—All except Rear (Upper & Lower .010 US)
19	16.11-00398	4	Main Bearing Set—All except Rear (Upper & Lower .020 US)
21	16.11-00375	5	Main Bearing Cap Bolt (2 in ea. main bearing cap)
20	16.11-00376	5	Main Bearing Cap Stud (front, inter, Center & Rear)
	16.11-00407	6	Main Bearing Cap Bolt (Short-Outer)



PISTONS, RINGS, CONNECTING RODS

Code No.	Part No.	No. Req'd	Name
			PISTON AND RINGS
1	16.11-01030	8	Piston w/Pin Std. (350)
1	16.11-01031	8	Piston w/Pin .030 O.S. (350)
2	16.11-00692	8	Ring Unit Std. (350)
2	16.11-00693	8	Ring Unit .010 O.S. (350)
2	16.11-00694	8	Ring Unit .030 O.S. (350)
1	16.11-00845	8	Piston w/Pin .030 O.S. (350)
			CONNECTING RODS
3	16.11-00300	8	Connecting Rod Assembly (includes rod, bolts, cap & nuts)
5	16.11-00303	16	Connecting Rod Bolt
6	16.11-00418	16	Connecting Rod Nut
7	16.11-00305	8	Connecting Rod Bearing Std. (includes upper & lower halves)
7	16.11-00306	8	Connecting Rod Bearing—.001 U.S. (includes upper & lower halves)
7	16.11-00380	8	Connecting Rod Bearing—.002 U.S. (includes upper & lower halves)
7	16.11-00381	8	Connecting Rod Bearing—.010 U.S.
7	16.11-00382	8	Connecting Rod Bearing—.020 U.S.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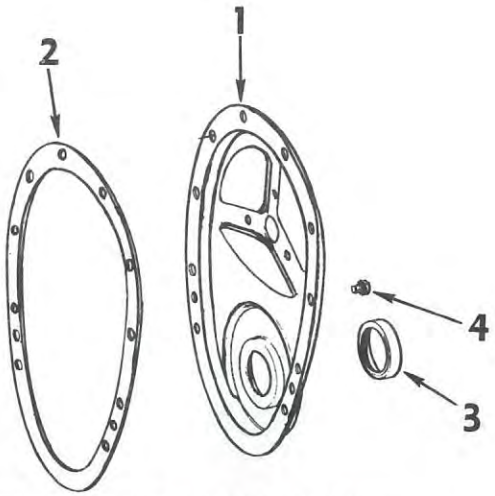
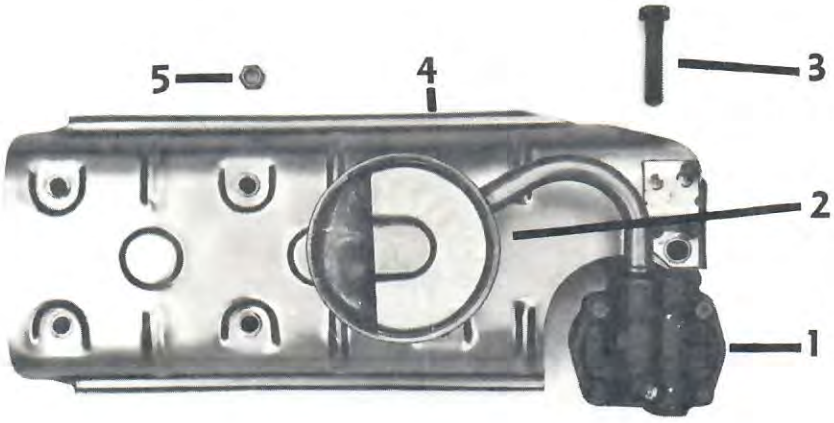
Code No.	Part No.	No. Req'd	Name
			VALVES (350)
1	16.11-00535	8	Valve, Exhaust
2	16.11-00530	8	Valve, Inlet
3	16.11-00322	8	Spring, Inlet Valve
3	16.11-00703	8	Spring, Exhaust Valve
4	16.11-00153	16	Shield, Valve Stem Oil
5	16.11-00152	16	Seal, Valve Stem Oil
6	16.11-00041	8	Rotator, Exhaust Valve
7	16.11-00273	16	Cap, Valve Spring
8	16.11-00433	32	Key, Valve Stem
			VALVE LIFTERS & ROCKER ARMS
9	16.11-00399	16	Valve Lifter Assembly—Hydraulic **NOTE:** It is very important that special camshaft lubricant be applied liberally to prevent damaging camshaft lobes, when new camshaft or valve lifters are installed. This lubricant can be ordered from Chris-Craft using part number 56.00-20630.
10	16.11-00038	16	Push Rod
11	16.11-00495	16	Arm, Valve Rocker
12	16.11-00043	16	Ball and Nut, Rocker Arm
	16.11-00151	16	Stud, Rocker Arm—.003 O.S.
	16.11-00228	16	Stud, Rocker Arm—.013 O.S.
			CYLINDER HEAD
14	16.11-00887	2	Cylinder Head—Only
15	16.50-00147	2	Gasket, Cylinder Head (Stainless Steel)
16	16.11-00010	14	Bolt, Cylinder Head—Long
17	16.11-00022	4	Bolt, Cylinder Head—Medium
18	16.11-00003	16	Bolt, Cylinder Head—Short
19	16.58-10164	2	Plug, ½" Pipe Countersunk Head—Brass
			VALVE COVER
20	16.11-01032	2	Valve Cover
	16.11-00336	2	Cap, Oil Filter
21	16.50-00184	2	Gasket, Valve Cover
23	16.11-00500	8	Bolt, Valve Cover
	16.92-07761	1	Decal, Fuel
	16.92-08719	2	Decal, Model (350)
	16.92-07601	1	Decal, Rotation—Left Hand

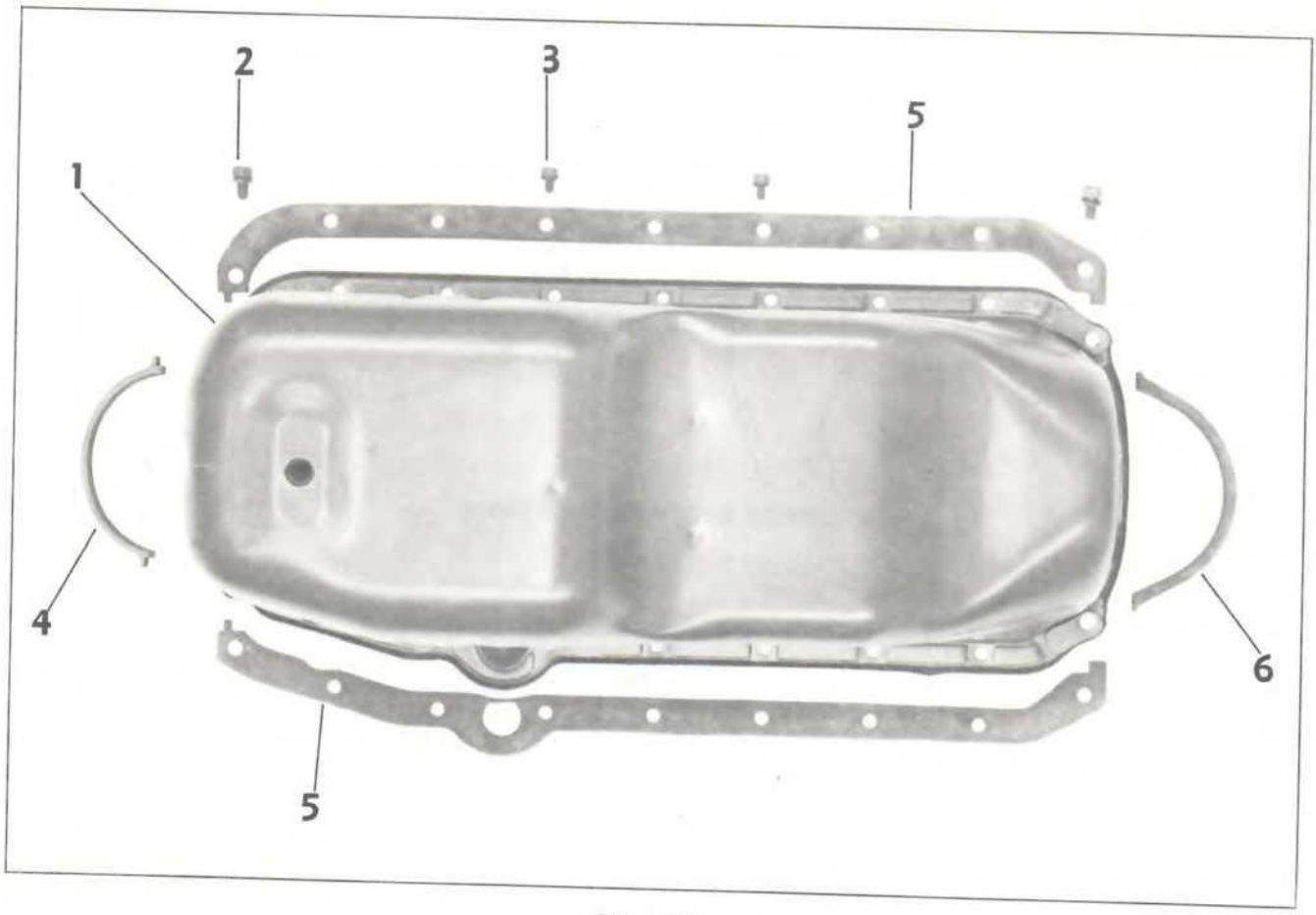


CYLINDER BLOCK FRONT COVER

Code No.	Part No.	No. Req'd	Name
			CYLINDER BLOCK FRONT COVER
1	16.11-00540	1	Cover, Crankcase Front End
2	16.50-00175	1	Gasket
3	16.11-00806	1	Seal, Front Cover
4	16.11-00167	10	Screw and Lockwasher
	16.11-00546	as req'd	Pointer, Timing (350 Left Hand Only)

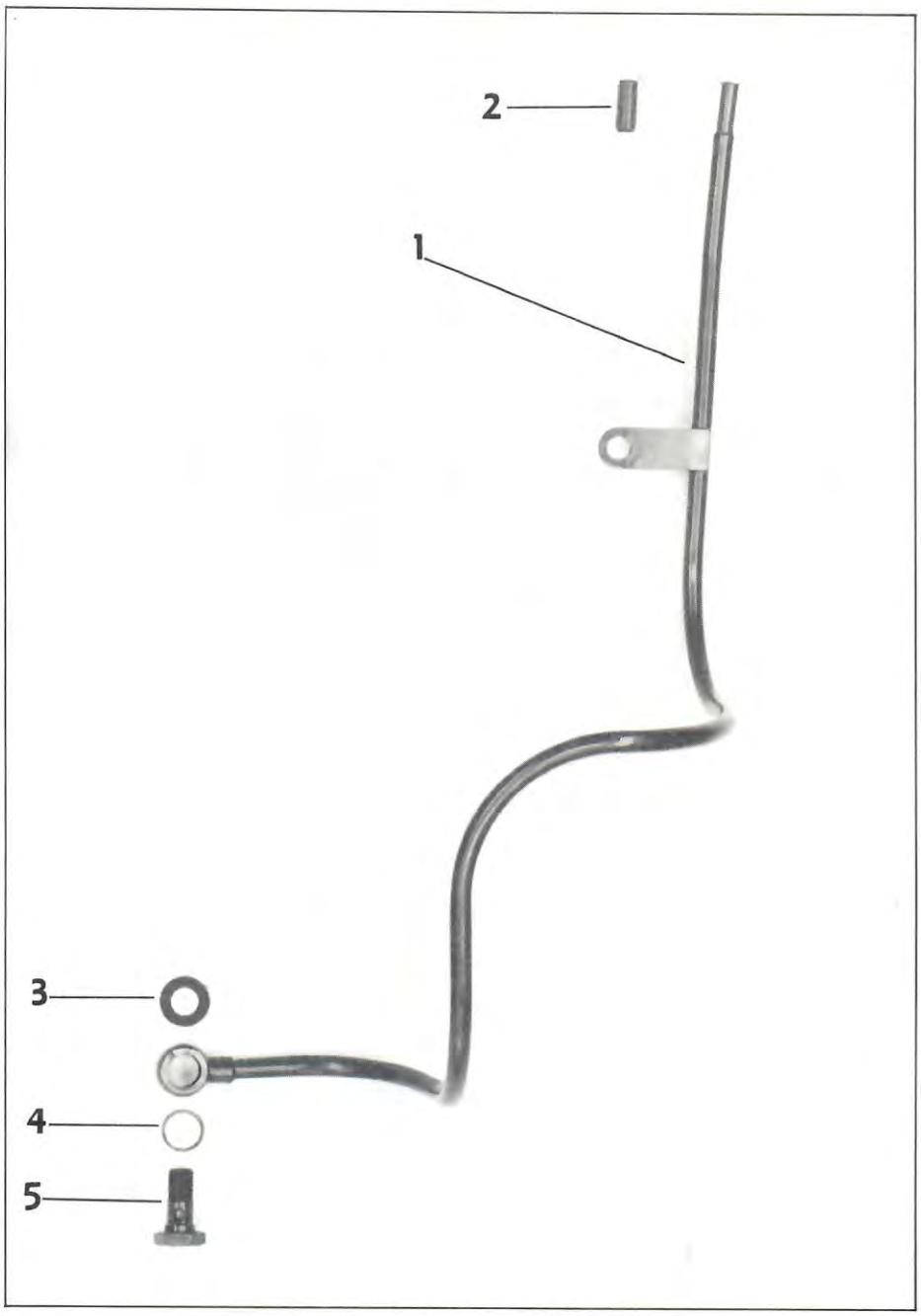


Code No.	Part No.	No. Req'd	Name
			OIL PUMP AND BAFFLE
1	16.11-00156	1	Pump, Oil
2	16.11-00238	1	Screen, Oil Pump
	16.11-00445	1	Shaft, Oil Pump To Distributor
	16.11-00446	1	Retainer, Oil Pump Shaft
3	16.11-00274	1	Bolt, Oil Pump
4	16.11-00802	1	Baffle, Oil Pan
5	16.11-00297	5	Nut, Oil Baffle
		5	Washer, Spacer—Under Baffle



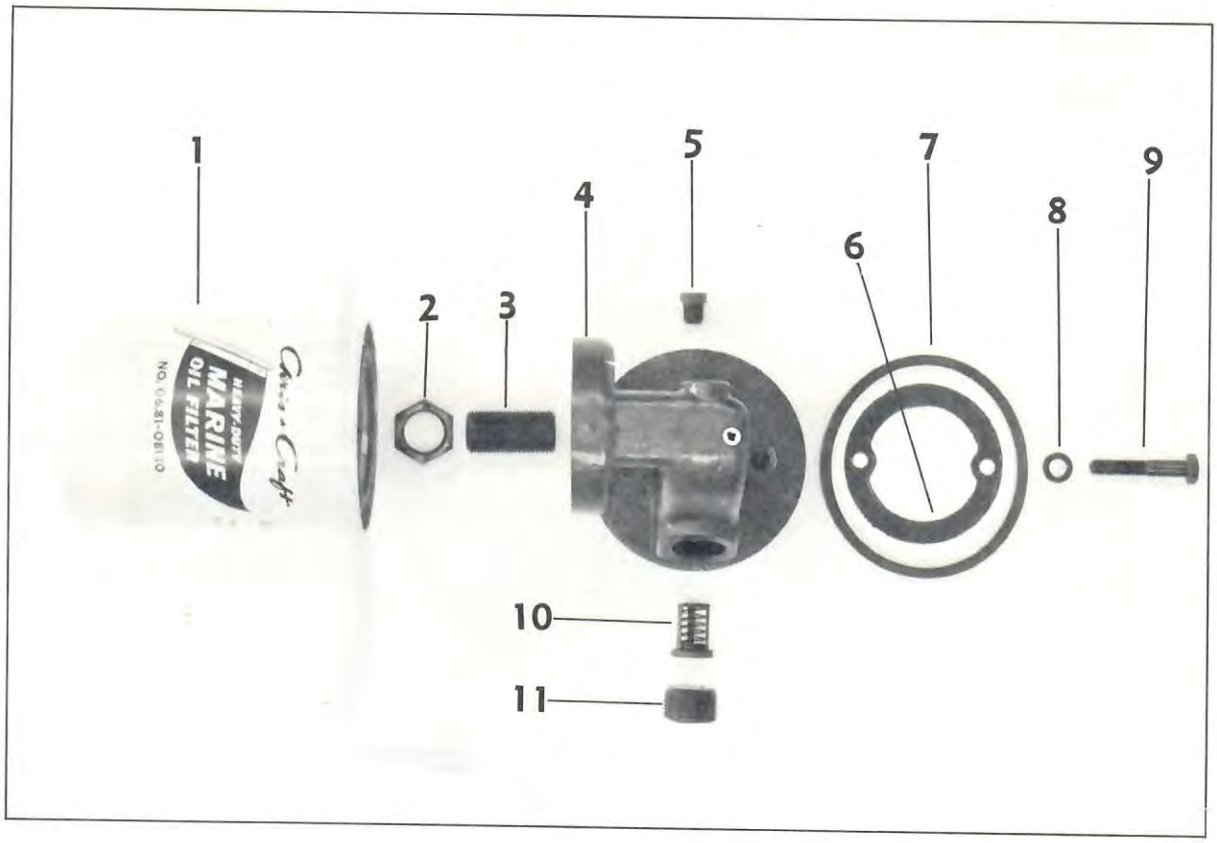
OIL PAN

Code No.	Part No.	No. Req'd	Name
			OIL PAN
1	16.11-01034	1	Oil Pan
2	16.11-00945	4	Screw and Lockwasher Ass'y.
3	16.11-00167	14	Screw and Lockwasher Ass'y.
4	16.51-10032	1	Seal, Oil Pan—Rear
5	16.50-00183	1	Gaskets—Oil Pan—Side
6	16.51-10031	1	Seal, Oil Pan—Front (Early Engines)
6	16.51-10037	1	Seal, Oil Pan—Front (Later Engines)



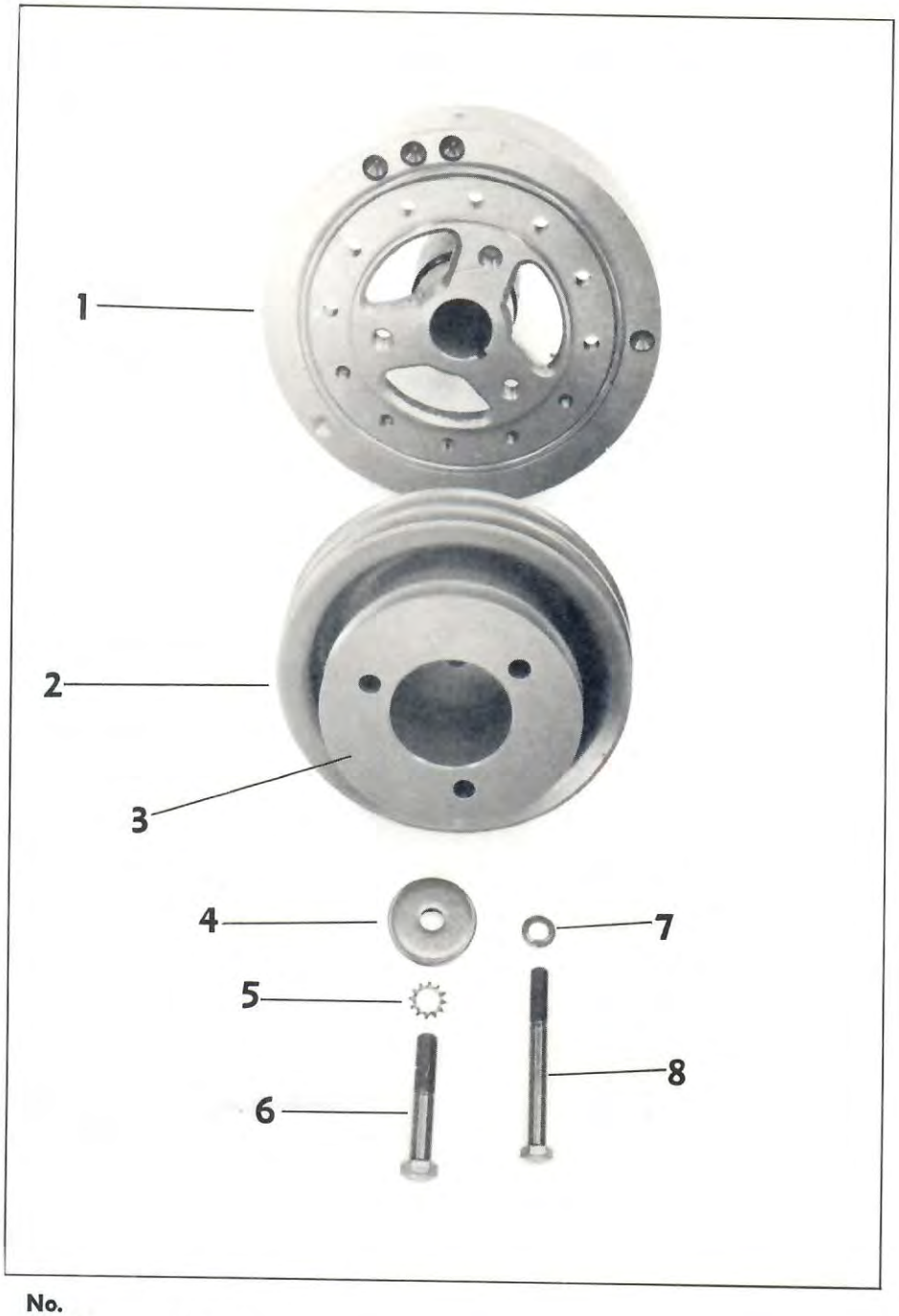
OIL REMOVAL TUBE

Code No.	Part No.	No. Req'd	Name
			OIL REMOVAL TUBE
1	16.95-00205	1	Oil Removal Tube Ass'y.
2	16.99-00267	1	Tube End
3	16.11-00765	1	Gasket
4	16.14-00622	1	Gasket
5	16.14-00621	1	Hollow Screw



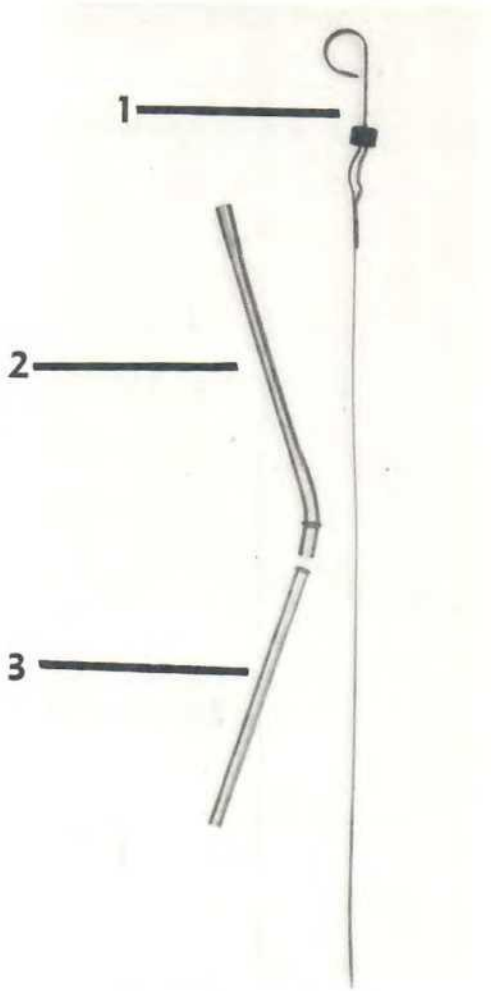
OIL FILTER AND ADAPTER

Code No.	Part No.	No. Req'd	Name
			OIL FILTER AND ADAPTER
1	16.81-08130	1	Oil Filter
2	16.72-08128	1	Nut, Lock
3	16.72-08127	1	Nipple
4	16.20-08259	1	Adapter
5	16.58-10151	2	Plug, Pipe 1/8-27
6	16.50-08155	1	Gasket, Oil Adapter
7	16.50-08352	1	Gasket, Oil Adapter Ring
8	16.41-10001	2	Washer, Flat
9	16.30-00078	2	Screw, Cap 5/16-18x1¾
10	16.99-08126	1	Valve, By-Pass
11	16.58-10168	1	Plug, Pipe ¾-14

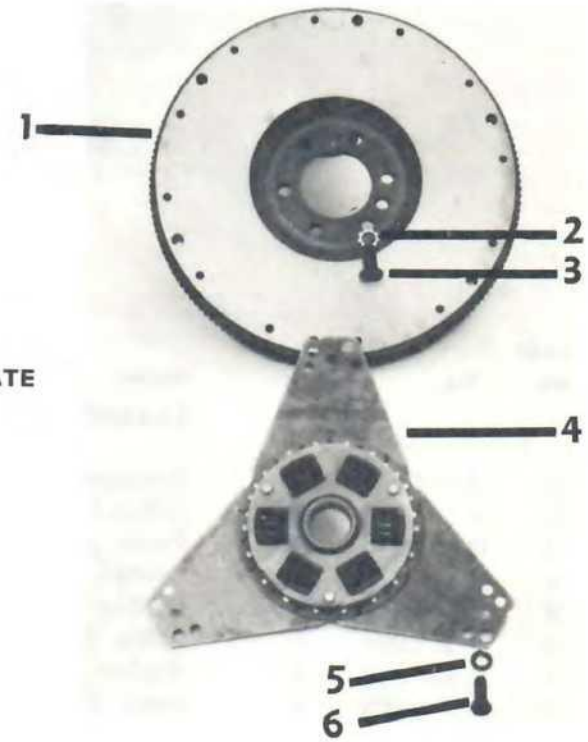


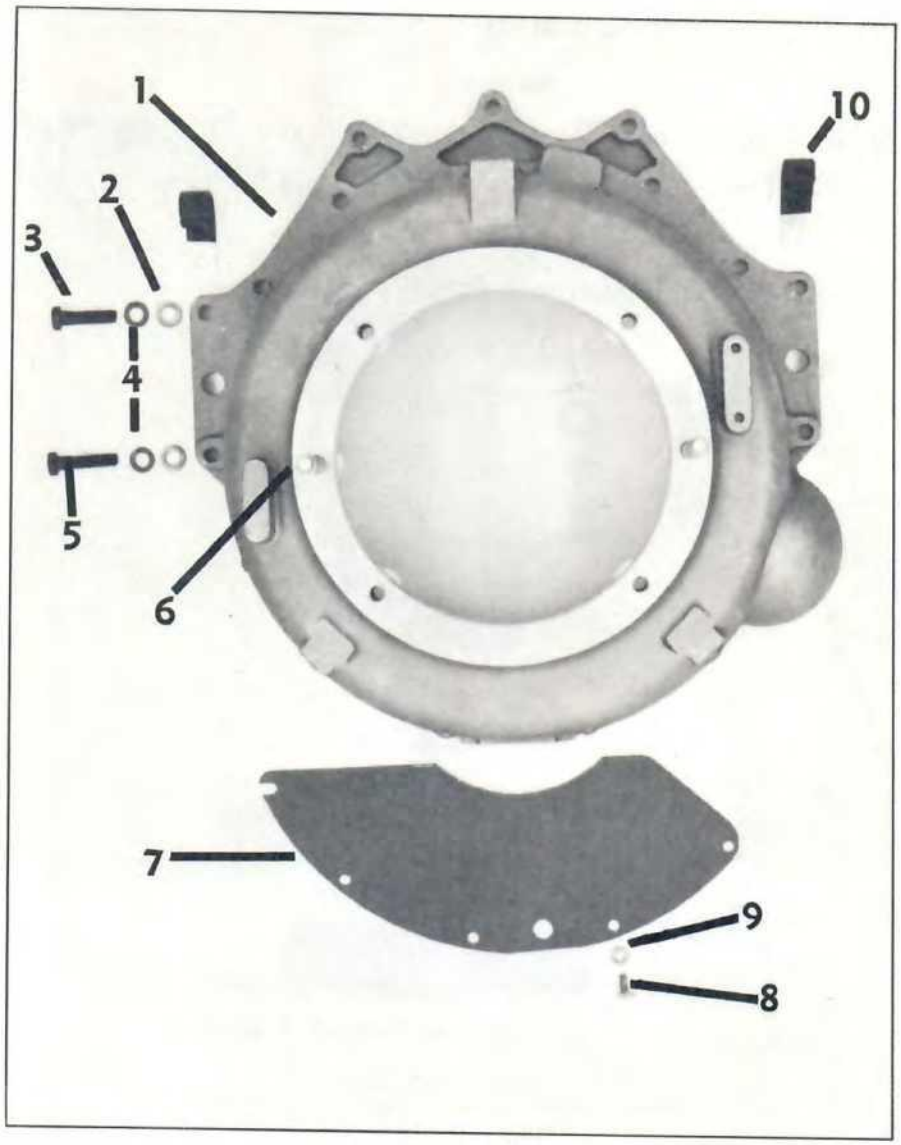
Code No.	Part No.	No. Req'd	Name
			CRANKSHAFT PULLEYS
1	16.11-00717	1	Torsional Damper
2	16.11-00103	1	Pulley, Crankshaft
3	16.20-00171	1	Pulley, Sea Pump Drive
4	16.11-00101	1	Washer, Flat
5	16.11-00206	1	Washer, Lock
6	16.30-01403	1	Screw, Cap 7/16-20x2½
7	16.42-00004	3	Washer, Lock
8	16.30-00038	3	Screw, Cap ⅜-24x3½

Code No.	Part No.	No. Req'd	Name
			OIL DIPSTICK AND TUBES
1	16.11-00718	1	Gage Ass'y.—Oil Level
2	16.57-07524	1	Tube, Oil Gage—Upper
3	16.57-00038	1	Tube, Oil Gage—Lower



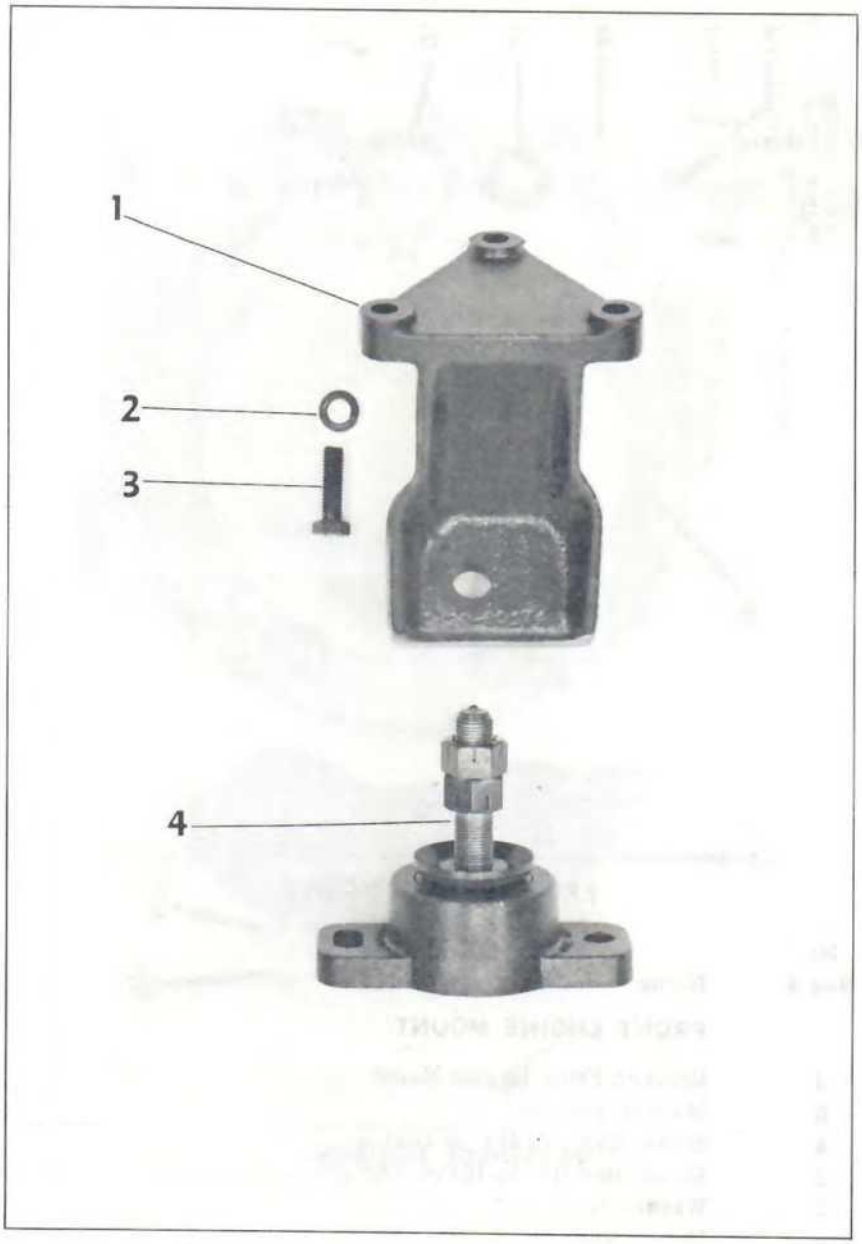
Code No.	Part No.	No. Req'd	Name
			FLYWHEEL AND DRIVE PLATE
1	16.11-00526	1	Flywheel Assembly
2	16.11-00158	6	Washer 7/16 Toothlock
3	16.11-00157	6	Bolt, Flywheel
4	16.99-08575	1	Plate, Drive
5	16.42-00004	3	Washer, Lock 3/8
6	16.11-00169	3	Bolt, Drive Plate





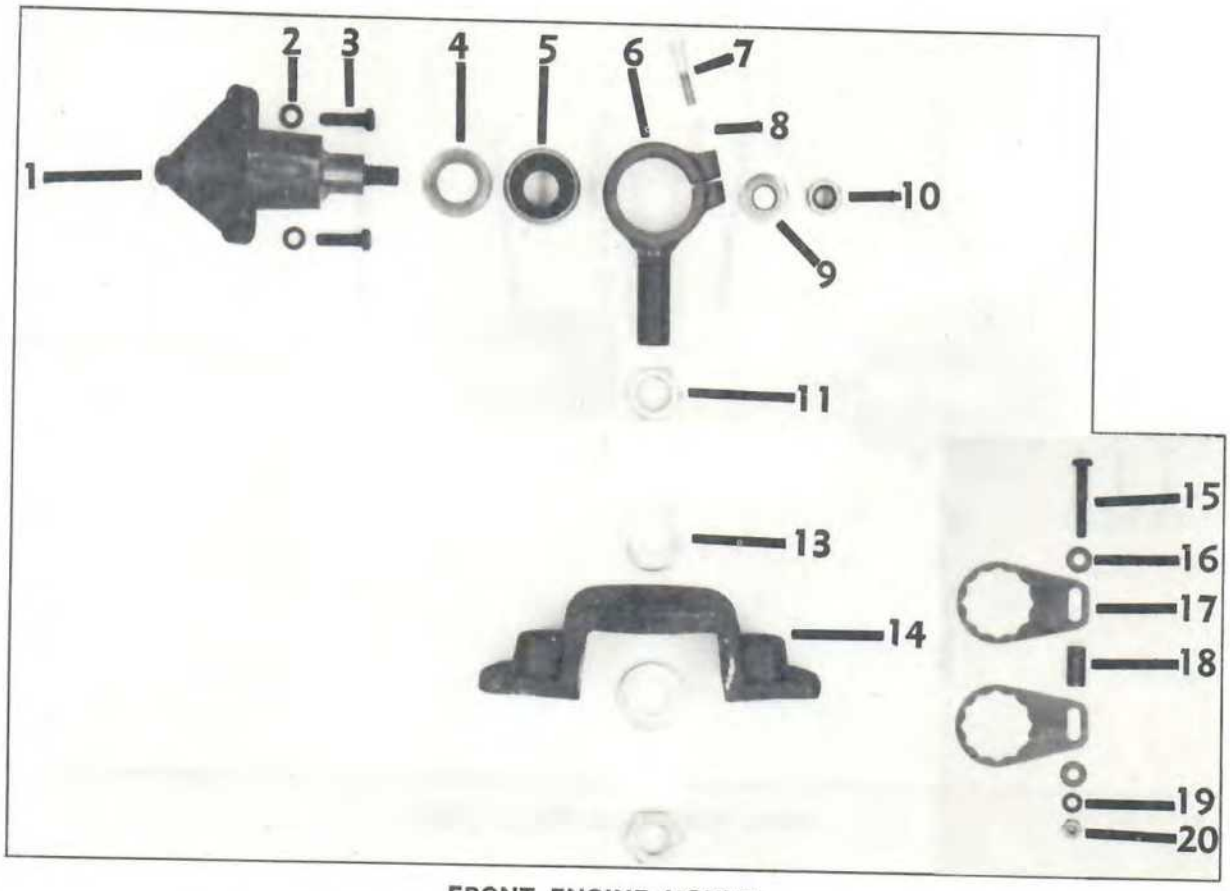
FLYWHEEL HOUSING

Code No.	Part No.	No. Req'd	Name
			FLYWHEEL HOUSING
1	16.21-08624	1	Housing, Flywheel
2	16.41-00006	7	Washer, Flat
3	16.30-00130	5	Screw, Cap Hex Hd. 3/8-16x1 3/8
4	16.42-00004	7	Washer, Lock 3/8
5	16.30-00132	2	Screw, Cap Hex Hd. 3/8-16x1 1/2
6	16.44-08154	6	Stud—Attach Outdrive Adapter
6	16.41-00008	6	Washer, Flat
6	16.42-00007	6	Washer, Lock
6	16.36-00080	6	Nut, 7/16-14
7	16.70-08502	1	Plate, Flywheel Cover
8	16.30-00544	5	Screw, Cap Hex Hd. 1/4-20x1/2 Cad. Pl.
9	16.42-00011	5	Washer, Lock 1/4
10	16.99-00188	2	Clamp, Wire—Attach Wire Harness



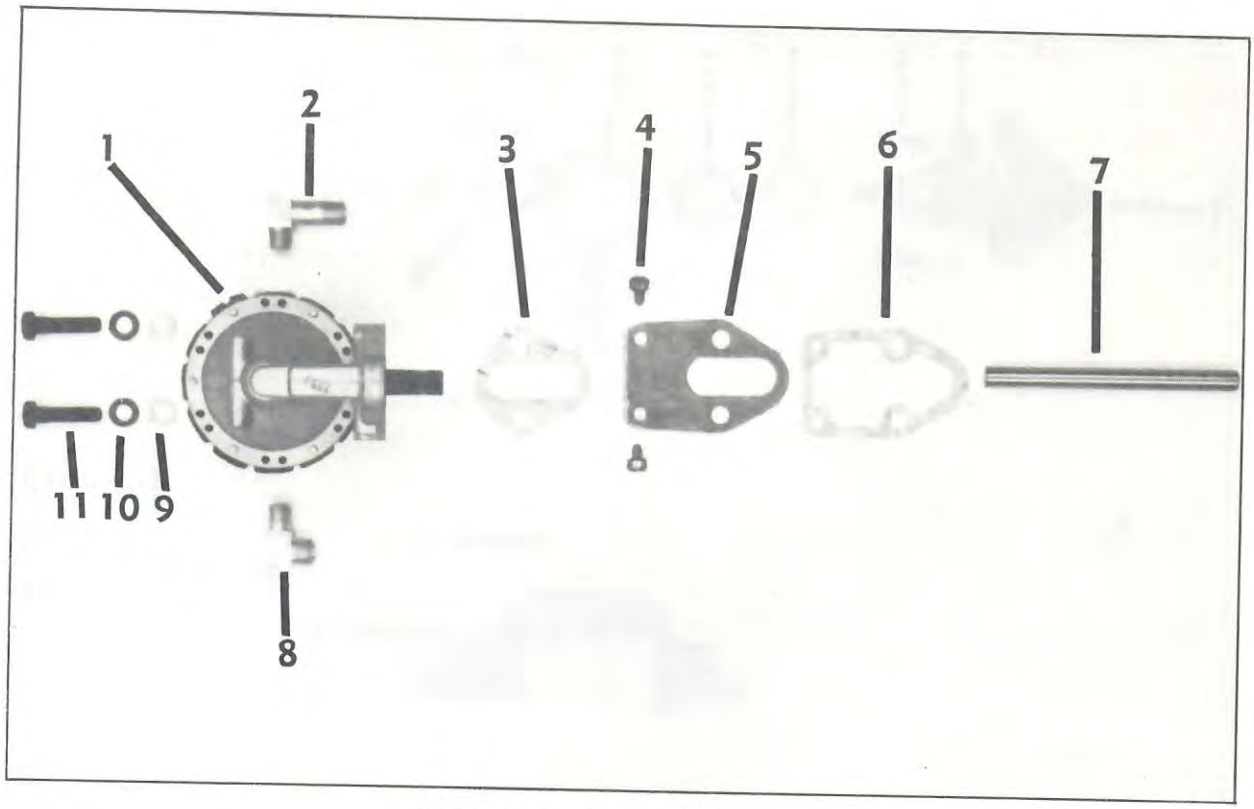
FRONT MOUNTS (AFTER SER. NO. 620874)

No. Code	No. Part	Req'd No.	Name
			FRONT MOUNTS (AFTER SER. NO. 620874)
1	16.20-00174	1	Mount Bracket—Right Side
1	16.20-00175	1	Mount Bracket—Left Side
2	16.42-00004	6	Washer, 3/8 Lock
3	16.30-00128	6	Screw, Cap 3/8-16x1 1/4
4	16.93-08042	2	Mount



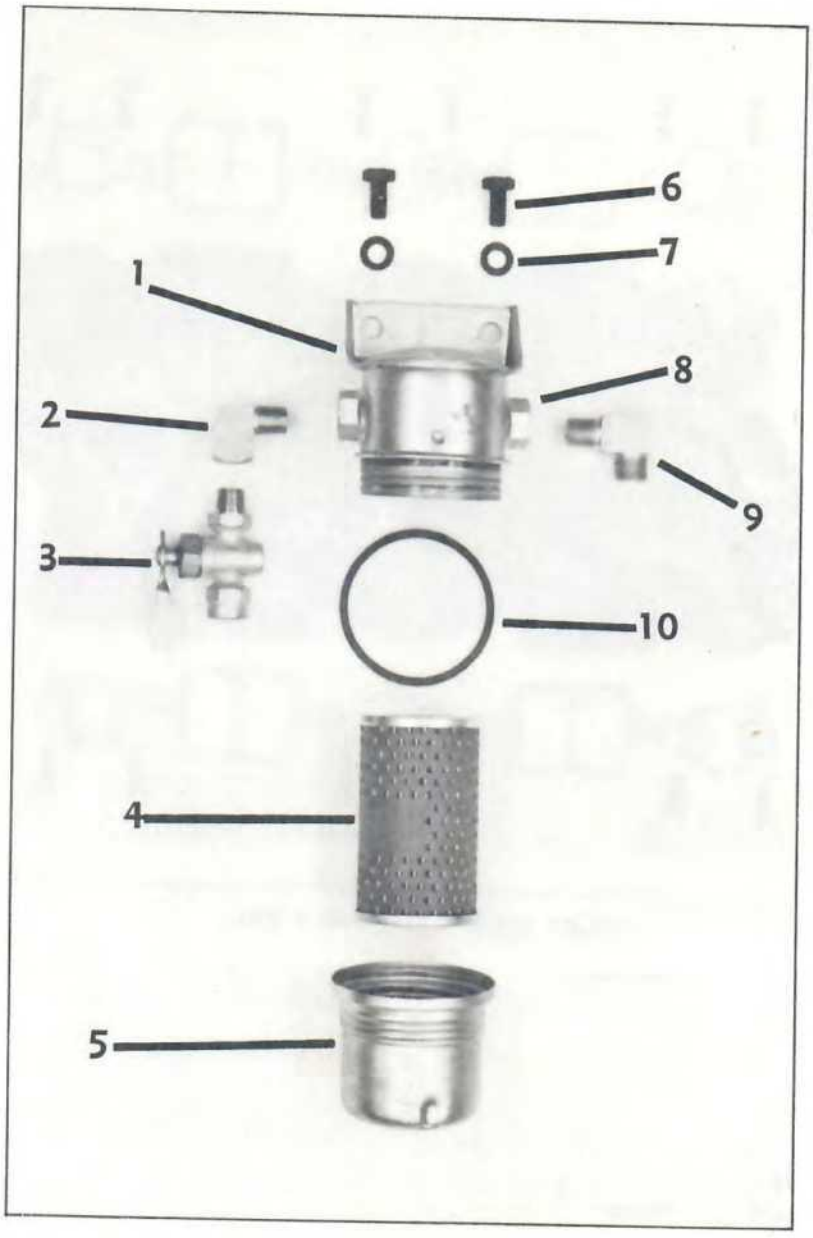
FRONT ENGINE MOUNT

Code No.	Part No.	No. Req'd.	Name
			FRONT ENGINE MOUNT
1	16.20-07652	2	Bracket, Front Engine Mount
2	16.42-00004	6	Washer, Lock 3/8
3	16.30-00130	4	Screw, Cap Hex Hd. 3/8-16x1 3/8
	16.30-00132	2	Screw, Hex Hd. 3/8-16x1½ (Attach Regulator Brk.)
4	16.72-07657	2	Washer, Shoulder
5	16.93-05808	2	Mount, Rubber
6	16.20-07692	2	Housing, Front Engine Mount
7	16.30-00545	2	Screw, Cap Hex Hd. 5/16-18x1¾ Cad. Pl.
8	16.42-00003	2	Washer, Lock 5/16 Cadium Plate
9	16.41-05840	2	Washer, Mount Retaining
10	16.39-00006	2	Nut, Lock 5/8-11 Elastic Stop
11	16.36-07694	4	Nut, Hex 1-16
13	16.41-07695	4	Washer, Flat
14	16.20-00099	2	Adapter, Engine Mount
15	16.30-00020	2	Screw, Cap Hex Hd. ¼-20x1¾
16	16.41-00002	4	Washer, Flat
17	16.70-08749	4	Lug, Keeper
18	16.57-08758	2	Spacer, Steel
19	16.42-00001	2	Washer, Lock ¼
20	16.36-00000	2	Nut, Lock ¼-20



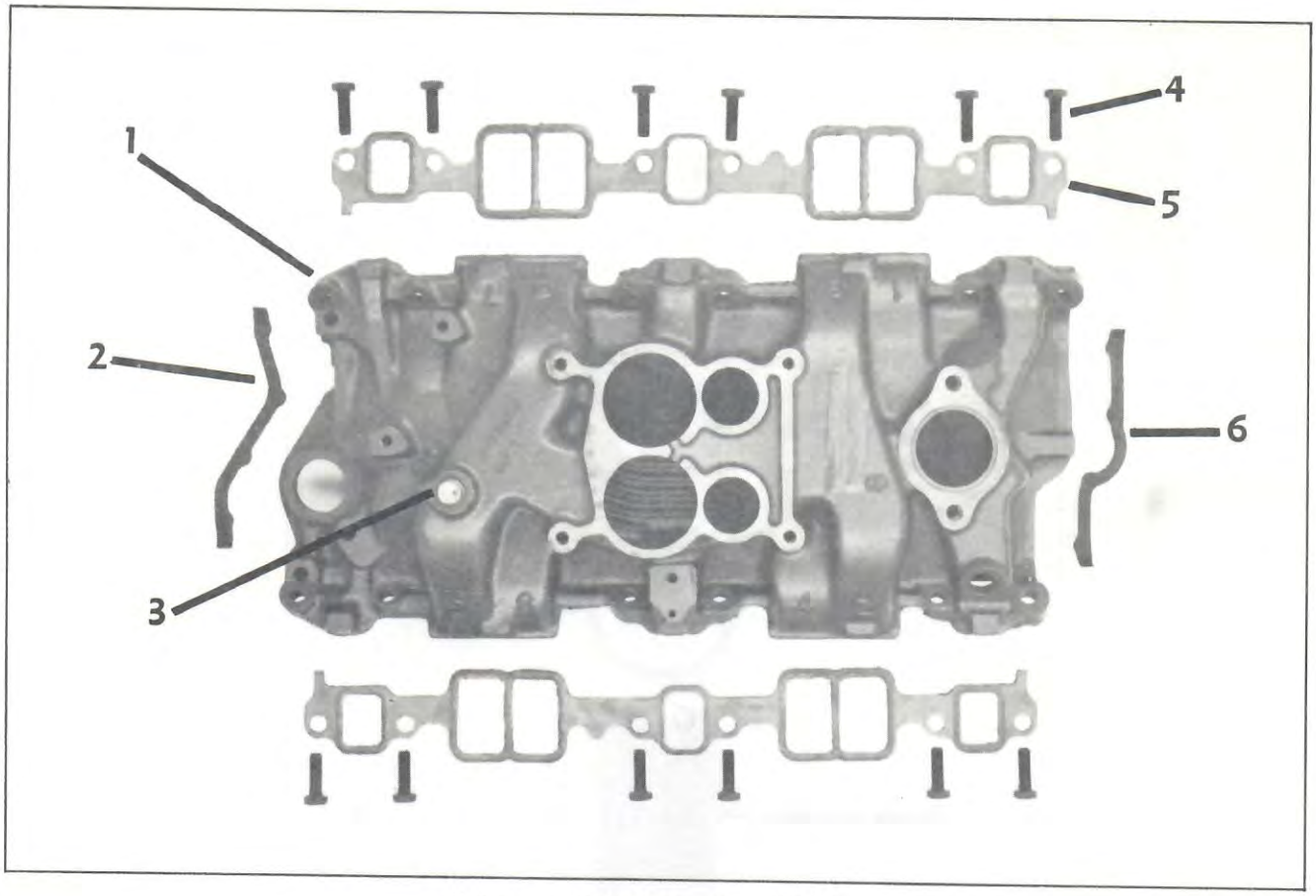
FUEL PUMP AND FUEL LINES

Code No.	Part No.	No. Req'd	Name
			FUEL PUMP AND FUEL LINES
1	16.83-00012	1	Pump, Fuel
2	16.59-00068	1	Elbow—Pump Outlet 3/8" Fuel Line
3	16.50-00074	1	Gasket, Fuel Pump
4	16.11-00167	2	Screw & Lockwasher
5	16.11-00025	1	Plate, Fuel Pump
6	16.50-05756	1	Gasket, Pump Plate
7	16.11-00024	1	Rod, Pump Push
8	16.59-00068	1	Elbow—Pump Inlet
9	16.41-00006	2	Washer Flat
10	16.42-00004	2	Washer, Lock 3/8
11	16.30-00132	2	Screw, Hex Hd. 3/8-16x1½
	16.57-58771	1	Fuel Line—Pump To Filter 3/8x9
	16.95-00203	1	Fuel Line Assy—Pump To Carb



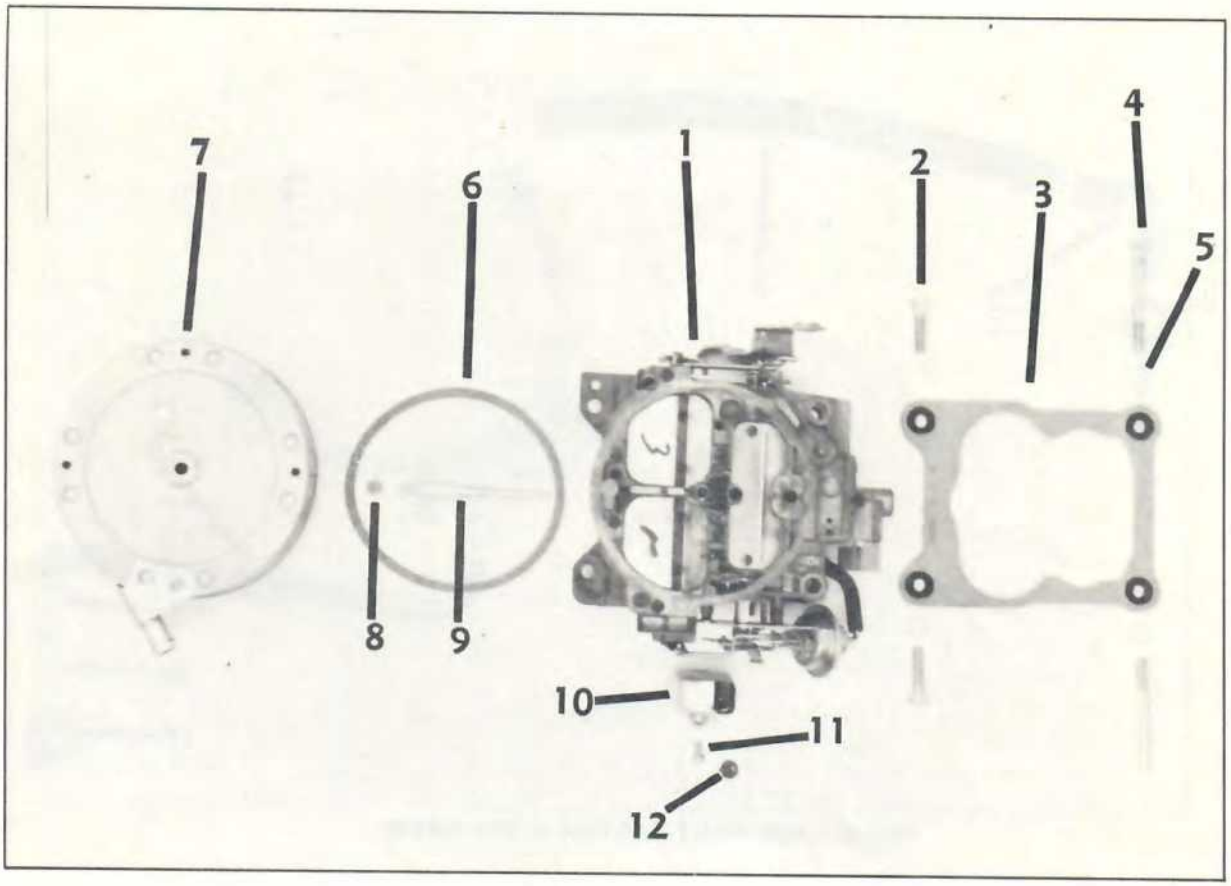
FUEL FILTER

Code No.	Part No.	No. Req'd	Name
			FUEL FILTER
1	16.81-00014	1	Filter Assy., Fuel
2	16.58-10056	1	Elbow, Street ¼ (Optional)
3	16.99-00033	1	Valve, Fuel Shut-Off ¼ Npt
4	16.81-00013	1	Element, Filter
5	16.81-00018	1	Case, Filter
6	16.30-00060	2	Screw, Cap Hex Hd. 5/16-18x⅝
7	16.42-00002	2	Washer, Lock 5/16
8	16.81-00015	1	Cover, Filter
9	16.59-00068	1	Elbow, Fuel ⅜Tx¼ Mpt
10	16.81-00016	1	Gasket, Filter



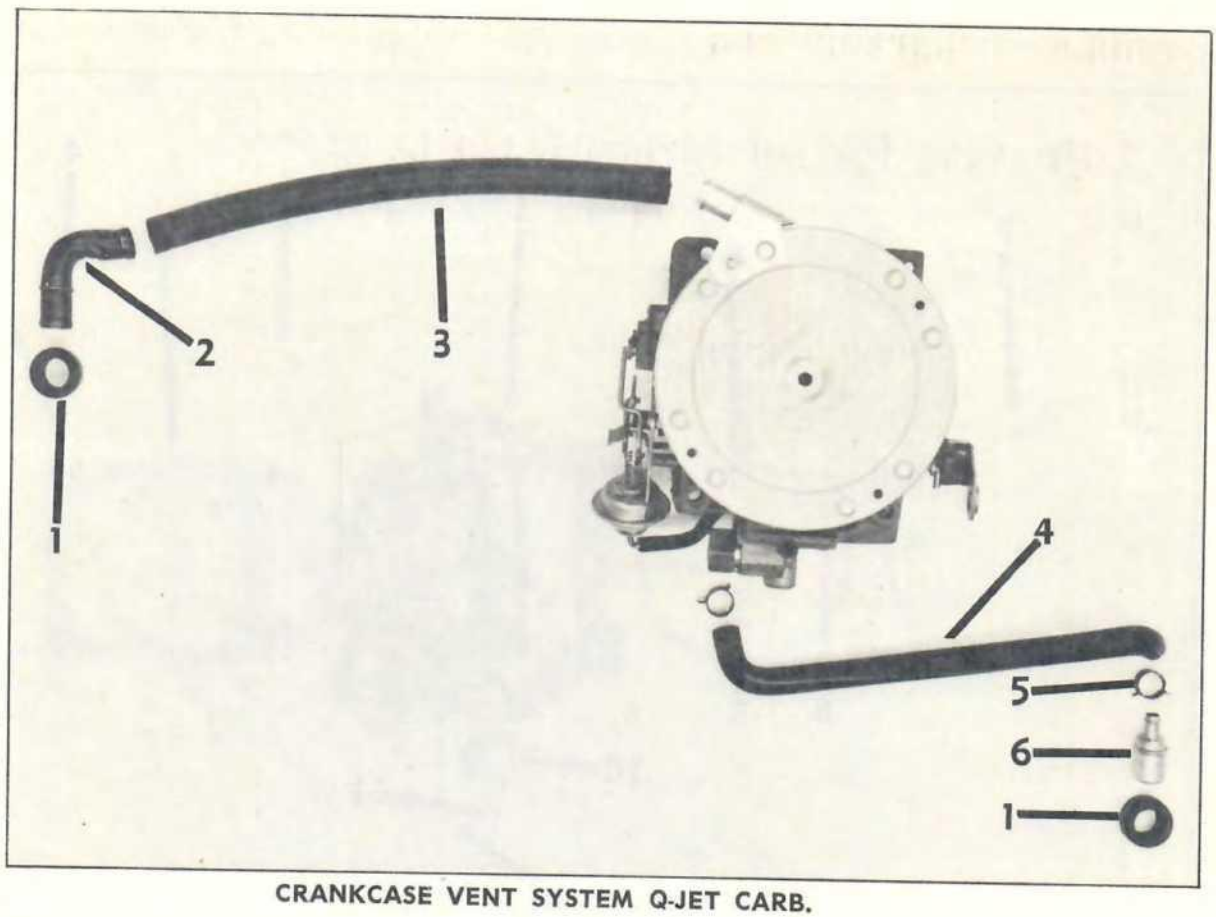
INLET MANIFOLD—350 4 BBL.

Code No.	Part No.	No. Req'd	Name
			INLET MANIFOLD 350 4 BBL.
1	16.11-01017	1	Manifold, Inlet
2	16.50-00165	1	Gasket, Manifold—Rear
3	16.58-10160	1	Plug, Brass 3/8-18
4	16.30-00126	12	Screw, Cap Hex Hd. 3/8-16x1 1/8
5	16.50-00213	2 (opt.)	Gasket, Manifold—Side—"Optional"
5	16.50-00158	2 (opt.)	Gasket, Manifold—Side—"Optional"
6	16.50-00168	1	Gasket, Manifold—Front
	16.70-08531	2	Lifting Bracket
			NOTE: Items 2, 5, and 6 may be purchased as a kit; 16.50-00232



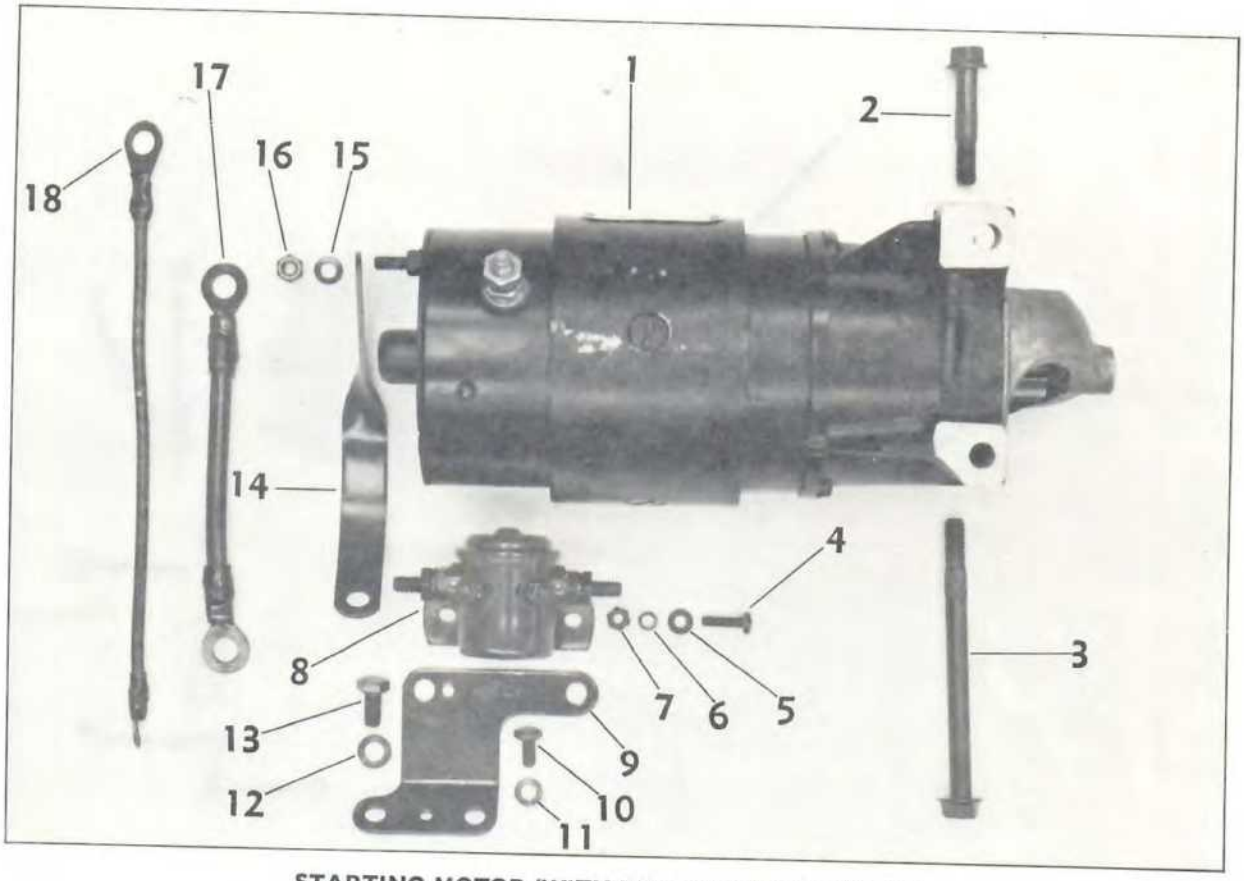
CARBURETOR 4 BARREL Q-JET

Code No.	Part No.	No. Req'd	Name
			CARBURETOR 4 BARREL Q-JET
1	16.82-40014	1	Carburetor
	16.96-08654	AR	Repair Kit, Carb
2	16.30-00601	2	Screw, Cap Hex Hd. 5/16-18x1¼ Cad. Pl.
3	16.11-01033	1	Insulator Gasket—Carb
4	16.30-00037	2	Screw, Cap Hex Hd. 5/16-18x3¾ Cad. Pl.
5	16.41-00005	4	Washer, Flat Cad. Pl.
6	16.50-08361	opt.	Gasket, Flame Arrestor
7	16.82-00034	1	Arrestor Assy., Flame
8	16.39-00010	1	Nut, Lock
9	16.44-00010	1	Stud, Flame Arrestor
10	16.11-00788	1	Choke, Thermostat & Rod
11	16.11-00702	1	Screw, Choke
12	16.11-00790	1	Clip, Choke Rod
11	16.11-00702	1	Screw, Choke
12	16.11-00790	1	Clip, Choke Rod



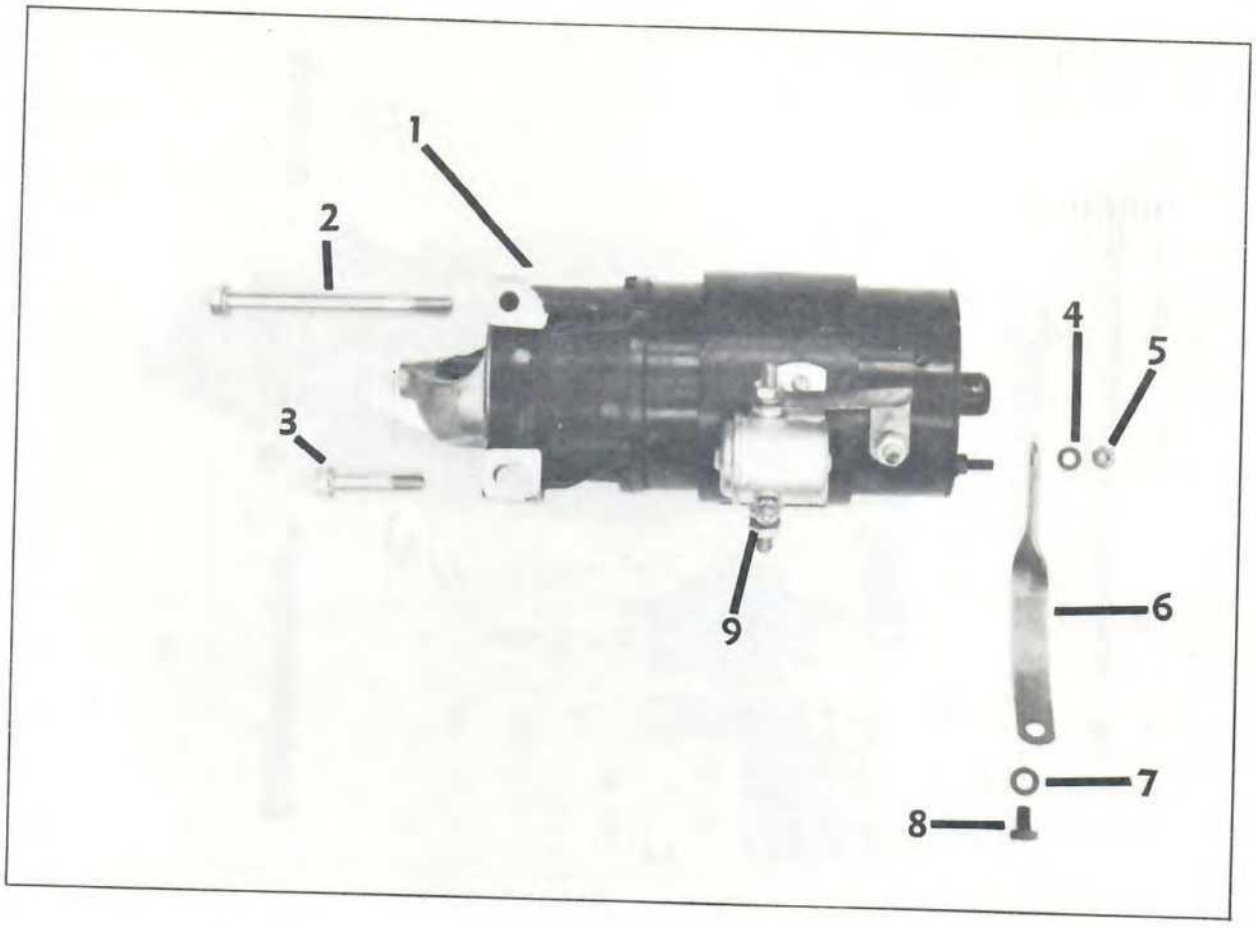
CRANKCASE VENT SYSTEM Q-JET CARB.

Code No.	Part No.	No. Req'd	Name
			CRANKCASE VENT SYSTEM Q-JET CARB.
1	16.11-00552	2	Grommet, Vent System
2	16.11-00401	1	Connector, Vent Hose
3	16.54-10087	1	Hose 5/8x12½
4	16.54-08362	1	Hose, Molded
5	16.11-00786	2	Clamp, Vent Hose
	16.55-38391	opt.	Clamp, Vent Hose
6	16.99-00072	1	Valve, Vent



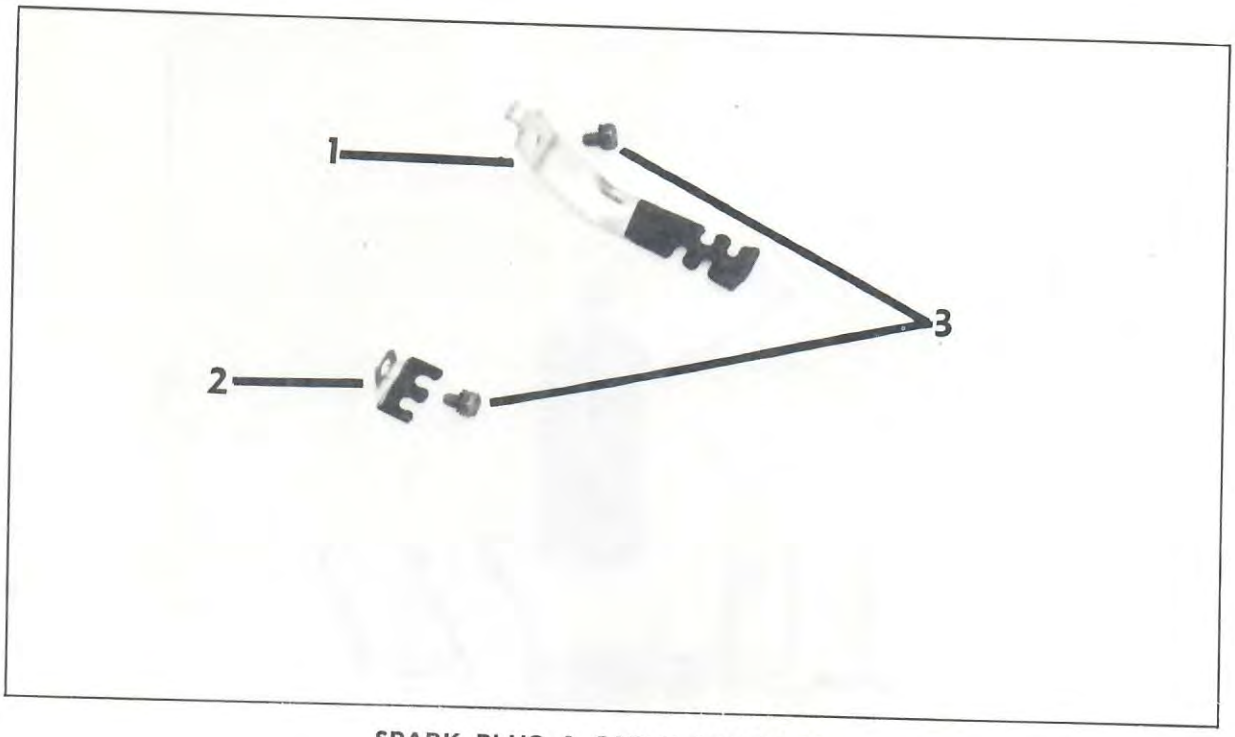
STARTING MOTOR (WITH RELOCATED SOLENOID)

Code No.	Part No.	No. Req'd	Name
			STARTING MOTOR (WITH RELOCATED SOLENOID)
1	16.61-00048	1	Starting Motor
2	16.11-00662	1	Bolt, Starter—Outboard
3	16.11-00661	1	Bolt, Starter—Inboard
4	16.32-00134	2	Screw
5	16.41-00001	2	Washer, Flat
6	16.42-00000	2	Washer, Lock
7	16.36-00015	2	Nut
8	16.61-00053	1	Solenoid, Starter
9	16.70-00159	1	Bracket, Solenoid
10	16.30-00002	1	Screw, Cap ¼-20x⅝
11	16.42-00011	1	Washer ¼ Lock
12	16.42-00002	1	Washer 5/16 Lock
13	16.30-00060	1	Screw, Cap 5/16-18x⅝
14	16.70-08429	1	Bracket, Starter Support
15	16.42-00001	1	Washer, ¼ Lock
16	16.36-00000	1	Nut, Hex ¼-20
17	16.63-08399	1	Wire, Solenoid To Starter
18	16.63-08146	1	Wire, Solenoid To Ground



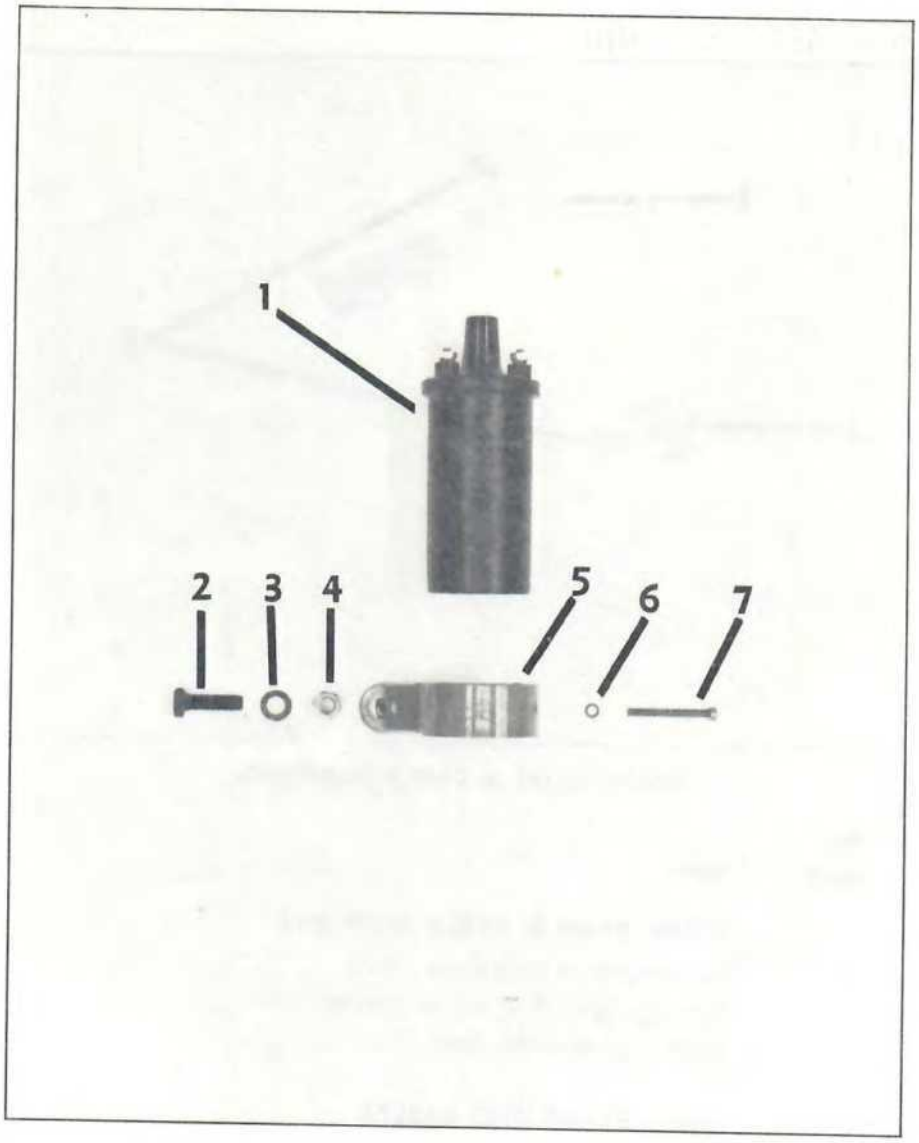
STARTING MOTOR

Code No.	Part No.	No. Req'd	Name
			STARTING MOTOR
1	16.61-00042	1	Motor, Starting—L.H. Rotation
2	16.11-00661	1	Bolt, Starter—Inboard
3	16.11-00662	1	Bolt, Starter—Outboard
4	16.42-00001	1	Washer, Lock ¼
5	16.36-00000	1	Nut, Hex ¼-20
6	16.70-08429	1	Bracket, Starter Support
7	16.42-00004	1	Washer, Lock 5/16
8	16.30-00058	1	Screw, Hex Hd. 5/16-18x½
9	16.61-00047	AR	Solenoid



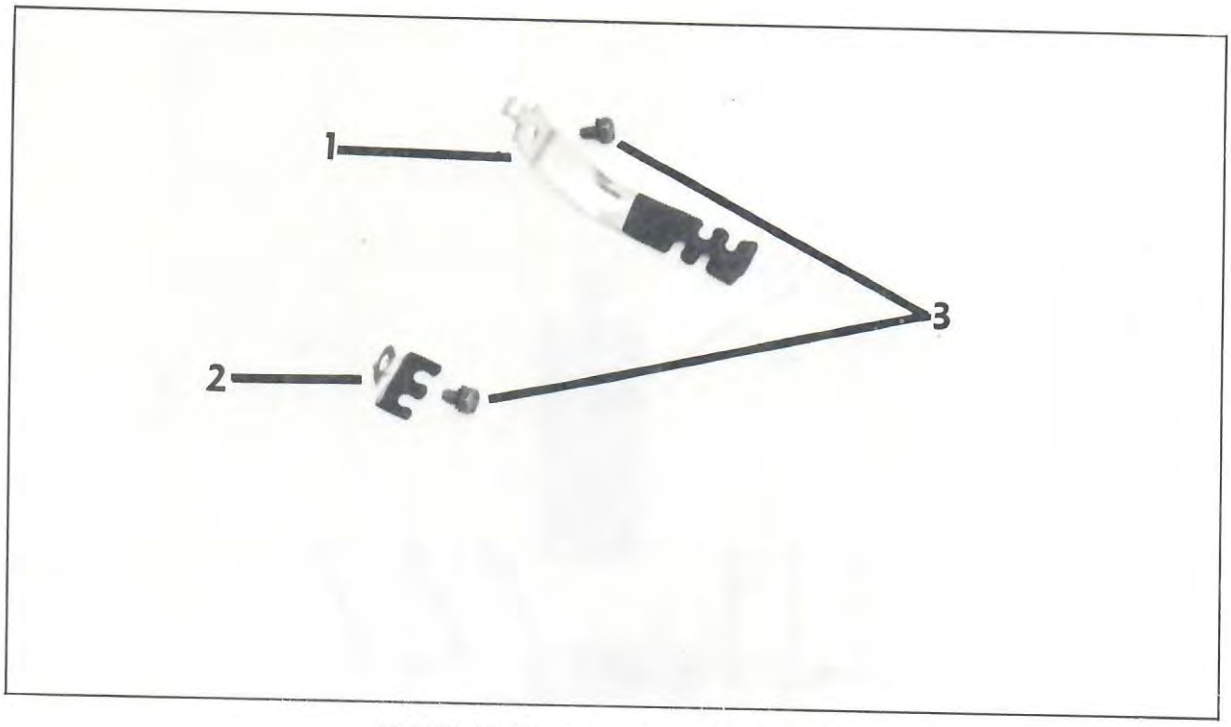
SPARK PLUG & CABLE SUPPORTS

Code No.	Part No.	No. Req'd	Name
			SPARK PLUG & CABLE SUPPORTS
1	16.11-00172	2	Support, Spark Plug Cable—Side
2	16.11-00171	2	Support, Spark Plug Cable—Lower
3	16.11-00167	4	Screw & Lockwasher Assy.
			SPARK PLUGS AND CABLES
	16.62-08737	8	Spark Plug —Gap .035"
	16.63-08743	1	Ignition Cable Set
	16.63-08744	AR	Ignition Cable Set (With Tach Drive Distributor)



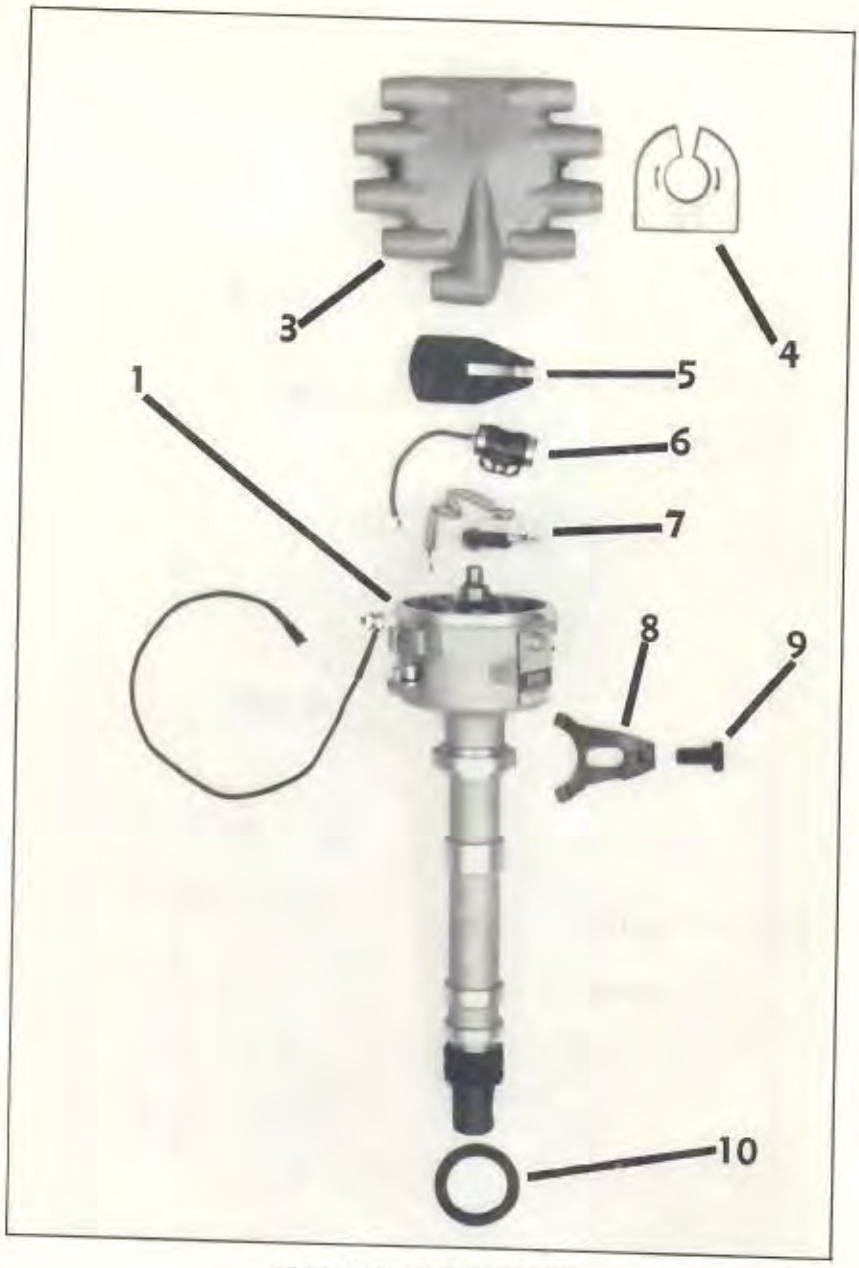
IGNITION COIL

Code No.	Part No.	No. Req'd	Name
			IGNITION COIL
1	16.64-00034	1	Coil, Ignition
2	16.30-00128	1	Screw, Hex Hd. 3/8-16x1 1/4 Coil To Rear Cover
3	16.42-00004	1	Washer, Lock 3/8
4	16.36-00004	1	Nut 3/8-16
5	16.70-08521	1	Bracket, Ignition Coil
6	16.42-00000	1	Washer, Lock No. 10
7	16.32-00129	1	Screw, Mach. Fil. Hd. No. 10-32x1 3/4



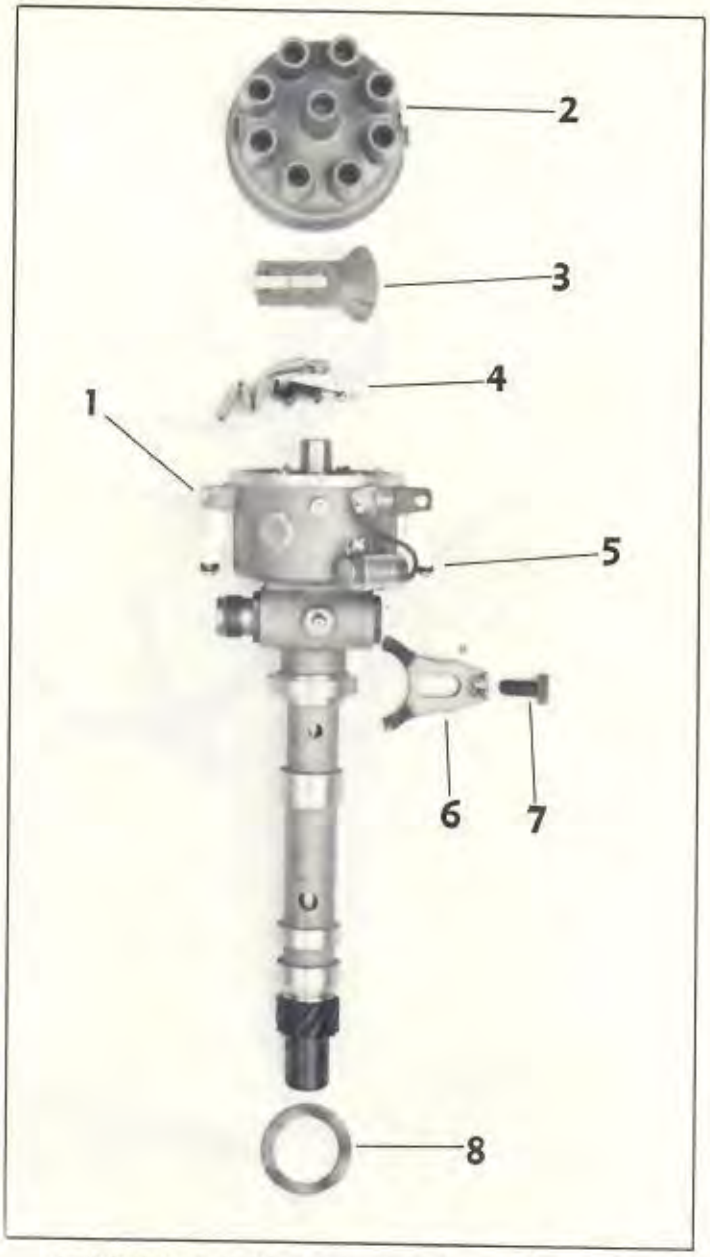
SPARK PLUG & CABLE SUPPORTS

Code No.	Part No.	No. Req'd	Name
			SPARK PLUG & CABLE SUPPORTS
1	16.11-00172	2	Support, Spark Plug Cable—Side
2	16.11-00171	2	Support, Spark Plug Cable—Lower
3	16.11-00167	4	Screw & Lockwasher Assy.
			SPARK PLUGS AND CABLES
	16.62-08737	8	Spark Plug —Gap .035"
	16.63-08743	1	Ignition Cable Set
	16.63-08744	AR	Ignition Cable Set (With Tach Drive Distributor)



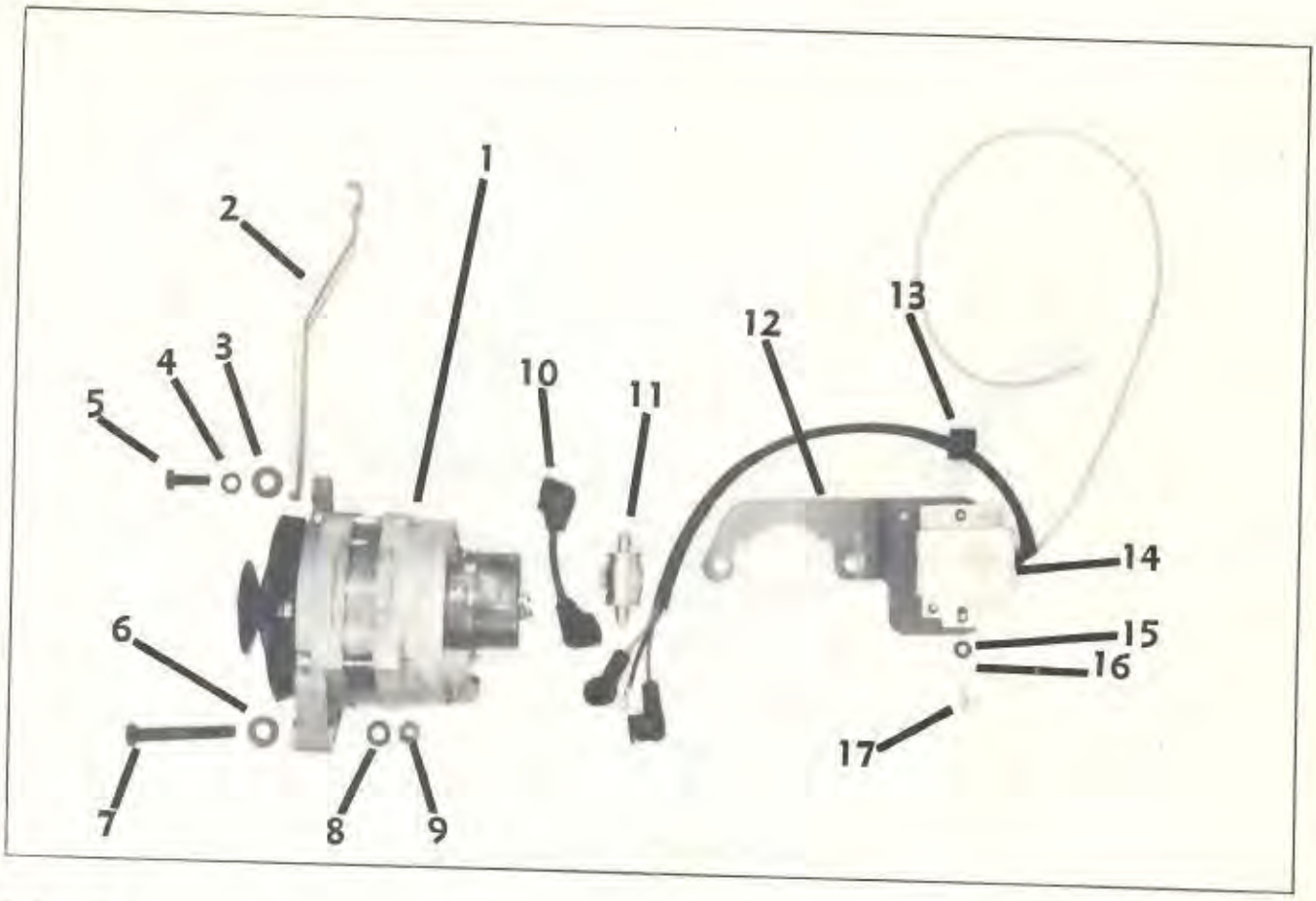
IGNITION DISTRIBUTOR

Code No.	Part No.	No. Req'd	Name
			IGNITION DISTRIBUTOR
1	16.64-00048	1	Ignition Distributor—Complete
3	16.69-00100	1	Cap, Distributor
4	16.92-00036	1	Decal, Distributor (L.H. Rot.)
5	16.69-00042	1	Rotor
6	16.69-00040	1	Condensor
7	16.69-00039	1	Ignition Points
8	16.11-00344	1	Clamp, Distributor
9	16.30-00120	1	Screw, Cap Hex Hd. 3/8-16x3/4
10	16.50-00162	1	Gasket, Distributor

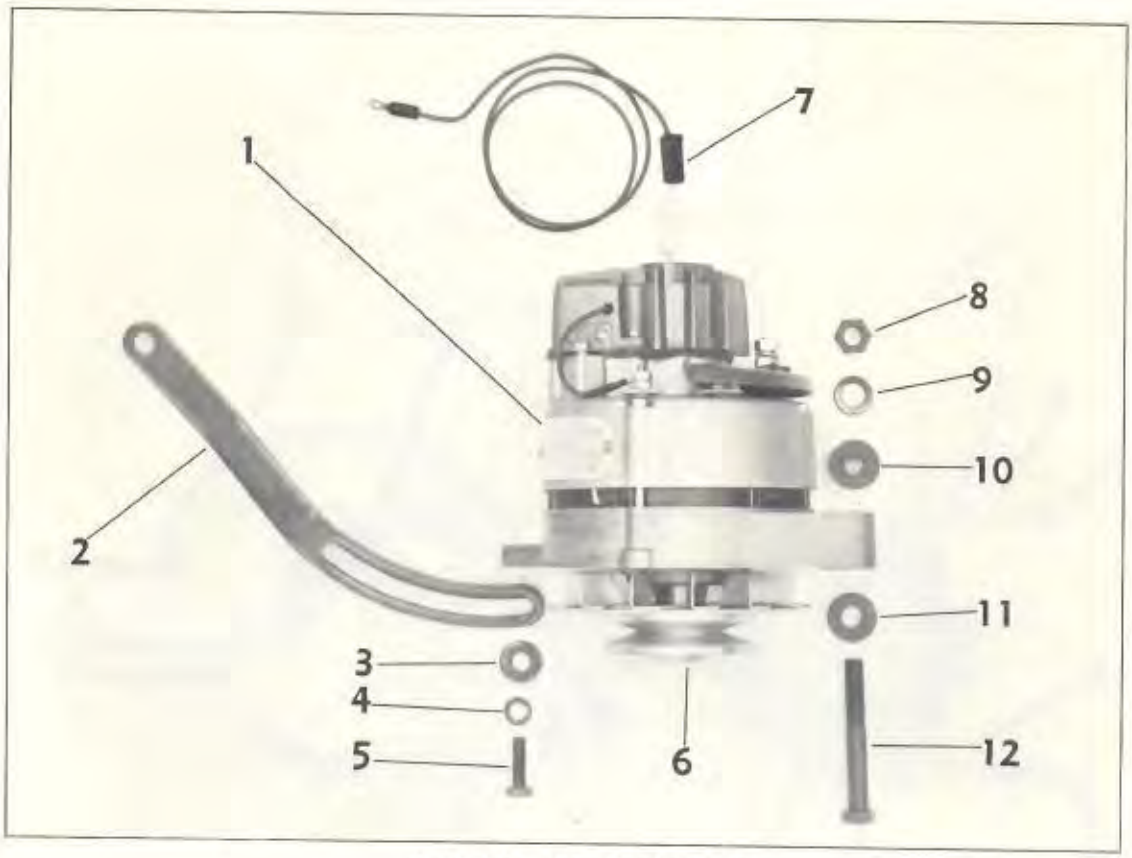


IGNITION DISTRIBUTOR (WITH TACH DRIVE)

Code No.	Part No.	No. Req'd.	Name
		Optional	IGNITION DISTRIBUTOR (WITH TACH DRIVE)
1	16.64-00049	1	Ignition Distributor, Complete
2	16.69-00148	1	Cap, Ign. Distributor
3	16.69-00149	1	Rotor, Ign. Distributor
4	16.69-00039	2	Points, Ignition
5	16.69-00040	1	Condensor
6	16.11-00344	1	Clamp, Distributor
7	16.30-00120	1	Screw, Cap 3/8-16x3/4
8	16.50-00162		Gasket, Distributor

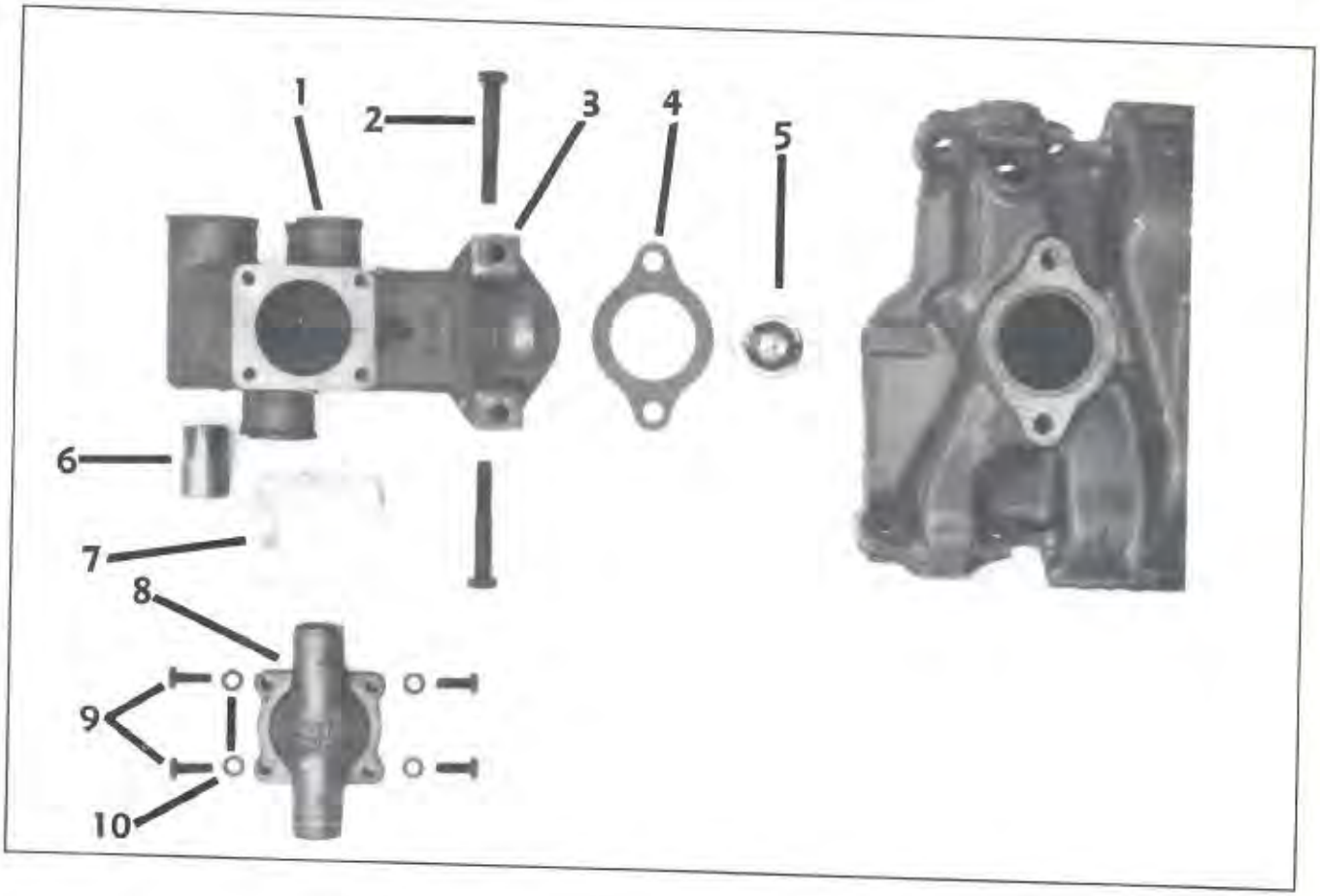


Code No.	Part No.	No. Req'd	Name
			ALTERNATOR AND VOLTAGE REGULATOR
1	16.65-00026	1	Alternator Assembly Prestolite
2	16.70-00106	1	Bracket, Alternator Adjusting
3	16.41-00024	1	Washer, Flat
4	16.42-00002	1	Washer, Lock 5/16
5	16.30-00066	1	Screw, Cap Hex Hd. 5/16-18x1
6	16.57-08778	1	Spacer, Alternator
7	16.30-00156	1	Screw, Cap Hex Hd. 3/8-16x3—Alt. To Left Header
8	16.57-08777	1	Spacer, Alternator
8	16.42-00004	1	Washer, Lock 3/8
10	16.63-08625	1	Wire, Noise Filter To Alternator
11	16.69-00102	1	Filter, Noise
12	16.70-08009	1	Bracket, Regulator
13	16.12-00285	1	Clamp, Wire
14	16.60-00031	1	Voltage Regulator Prestolite
15	16.41-00001	2	Washer, Flat
16	16.43-00009	2	Washer, Toothlock
17	16.35-00031	2	Screw No. 10
	16.97-07552	1	Belt ½" "V"—Alternator
	16.20-08540	1	Pulley, Alternator



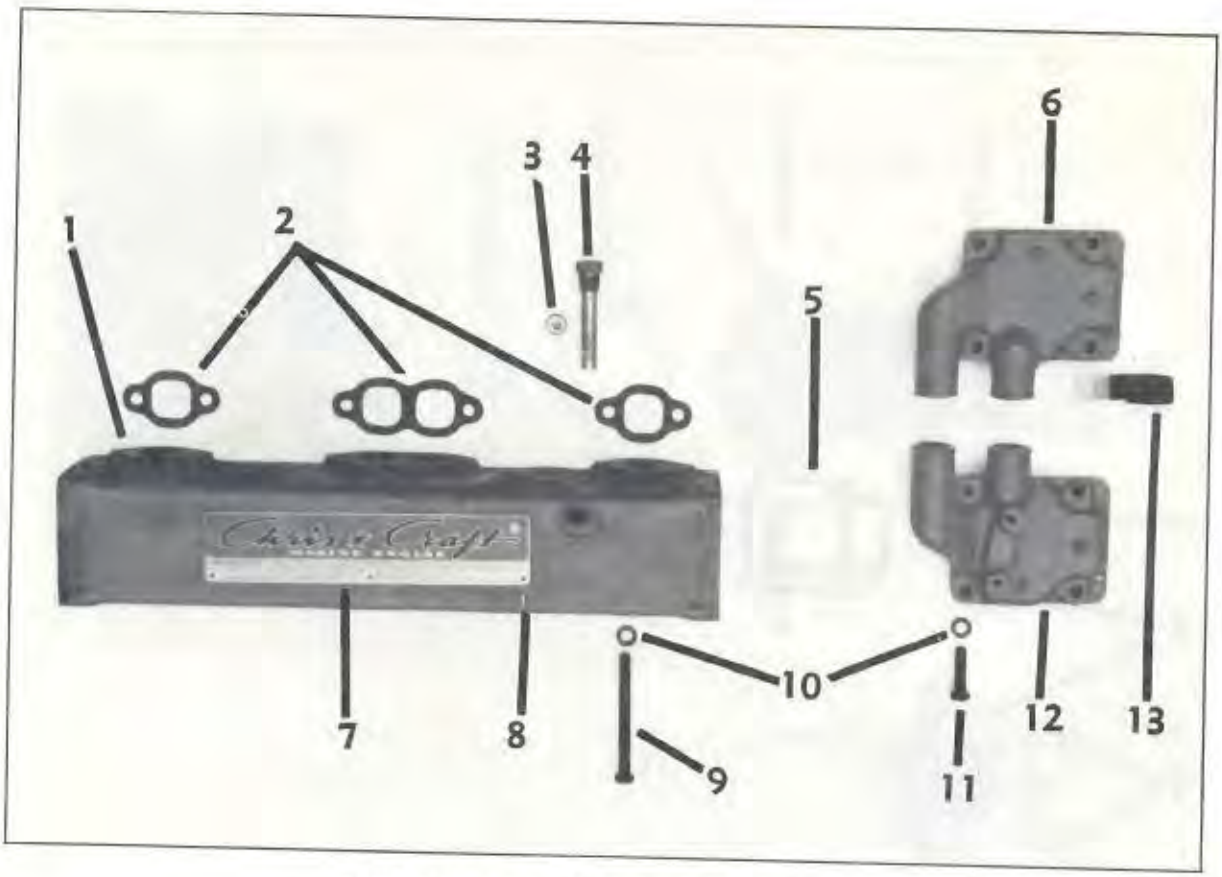
ALTERNATOR (OPTIONAL)

Code No.	Part No.	No. Req'd	Name
			ALTERNATOR (OPTIONAL)
1	16.65-00039	1	Alternator and Regulator Assy.
2	16.70-00106	1	Bracket, Adjusting
3	16.41-00024	1	Washer, Flat
4	16.42-00002	1	Washer, Lock
5	16.30-00066	1	Screw, Cap 5/16-18x1
6	16.72-20017	1	Pulley, Alternator
7	16.63-08167	1	Wire, Alternator To Coil Pos.
8	16.36-00080	1	Nut, 7/16-14
9	16.42-00007	1	Washer, Lock
10	16.57-00076	1	Spacer 29/64x5/8x1
11	16.57-00077	1	Spacer 29/64x5/16x1
12	16.30-00230	1	Screw, Cap 7/16-14x3
	16.97-07552	1	Belt



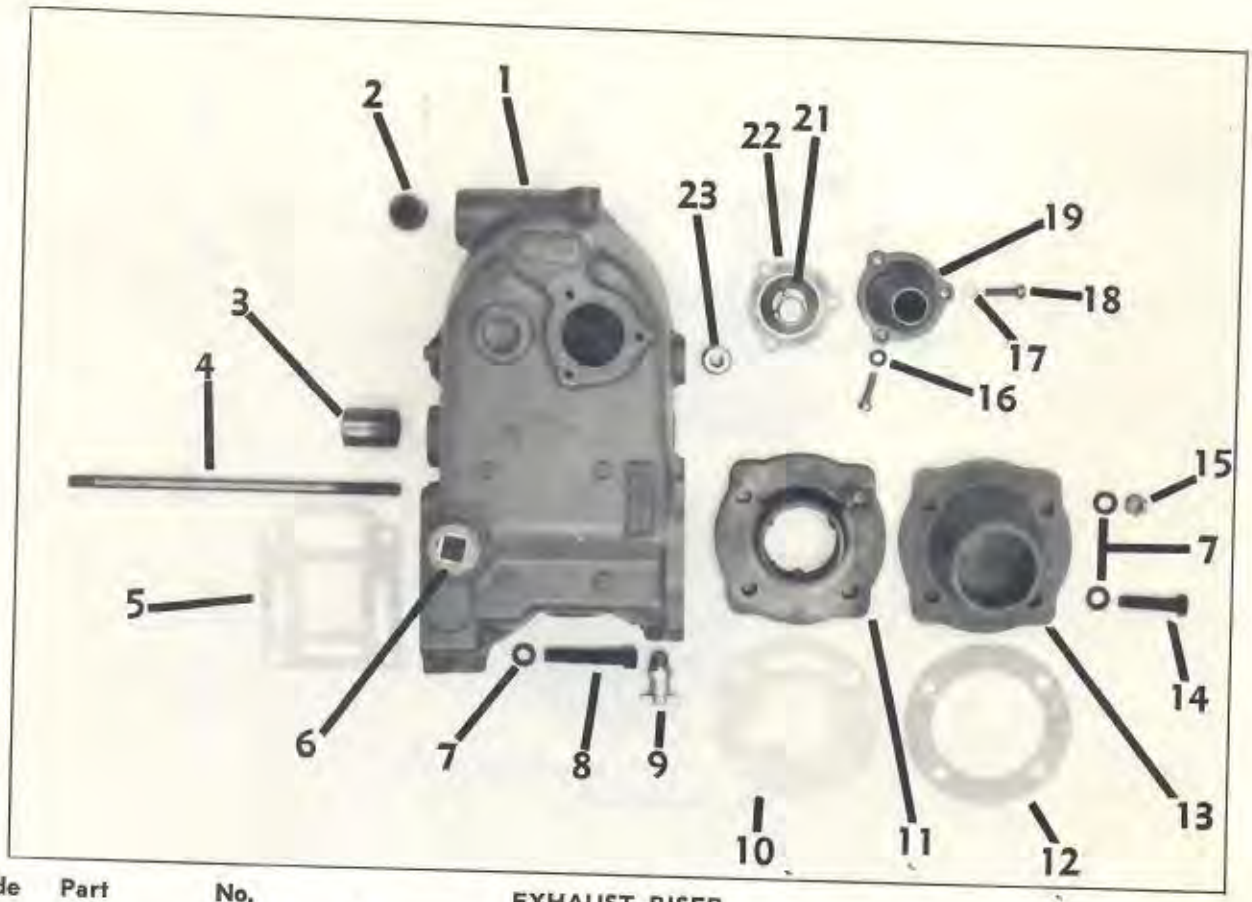
THERMOSTAT HOUSING

Code No.	Part No.	No. Req'd	Name
			THERMOSTAT HOUSING
1	16.20-00140	1	Housing, Thermostat
2	16.30-00144	2	Screw, Cap Hex Hd. ⅜-16x2¼
3	16.70-07546	AR	Bracket, Front Lifting—Optional
4	16.50-00096	1	Gasket, Thermostat Housing
5	16.99-08329	1	Thermostat
6	16.58-17120	1	Nipple, Hose ¾x1½
7	16.50-08333	1	Gasket, Thermostat Cap
8	16.20-08496	1	Cap, Thermostat Housing
9	16.30-00004	4	Screw, Hex Hd. ¼-20x¾
10	16.42-00001	4	Washer, Lock ¼



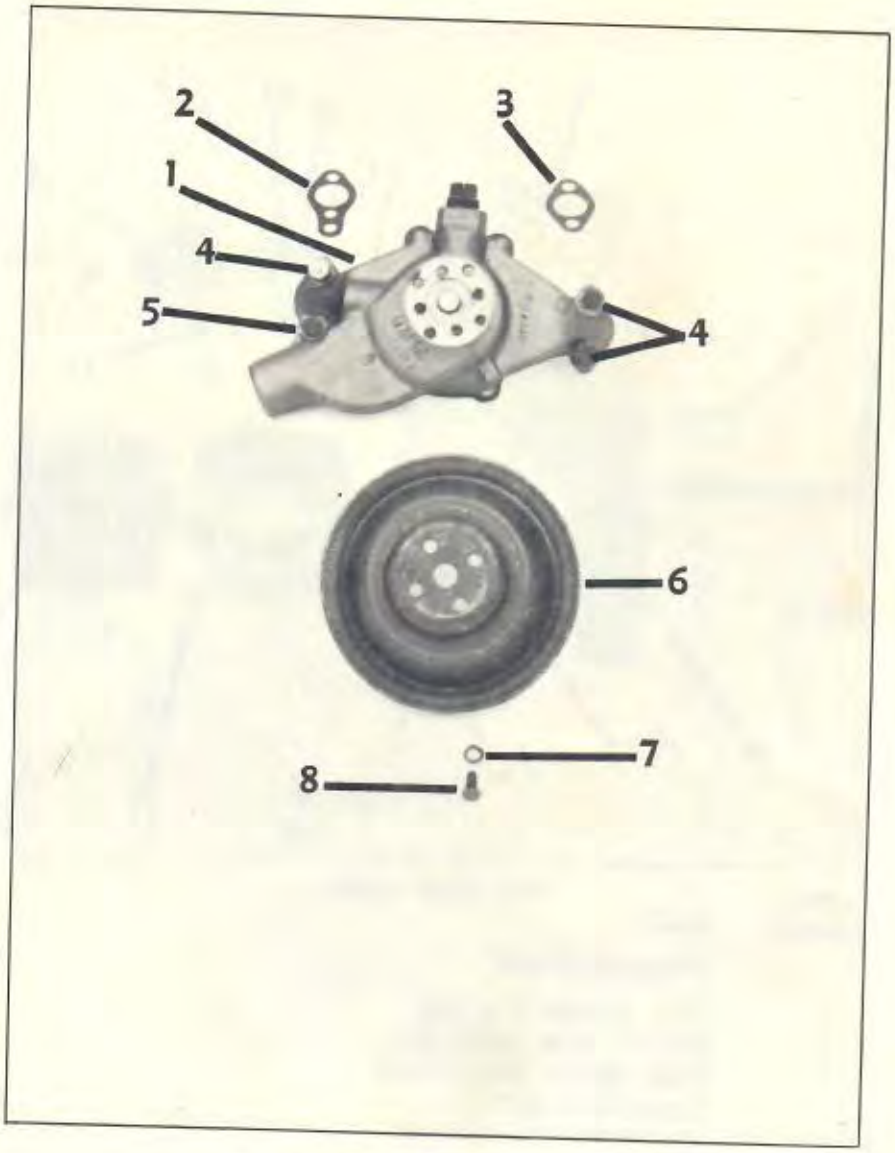
EXHAUST MANIFOLD AND HEADERS

Code No.	Part No.	No. Req'd	Name
			EXHAUST MANIFOLD AND HEADERS
1	16.20-07056	2	Manifold, Exhaust
2	16.50-05748	2	Gasket Set, Exh. Manifold To Head
3	16.58-10160	as req'd	Plug, Pipe C' Sunk Hd. 3/8-18 Brass
4	16.72-36264	as req'd	Stove, Auto Choke Heater
5	16.50-05944	2	Gasket, Header To Manifold
6	16.20-00161	1	Header, Exh. Manifold—Left
7	16.92-07588	1	Plate, Name—L.H. Rotation Only
7	16.92-07745	1	Plate, Thermocon—Develvo
8	16.33-00000	12	Screw No. 4x1/4 Nickle Plate
9	16.30-00172	12	Screw, Cap Hex Hd. 3/8-16x4
10	16.42-00004	20	Washer, Lock 3/8
11	16.30-00132	8	Screw, Cap Hex Hd. 3/8-16x1 1/2
12	16.20-00119	1	Header, Exh. Manifold—Right
13	16.55-38478	as req'd	Clip, Hose—Sea Water Hose



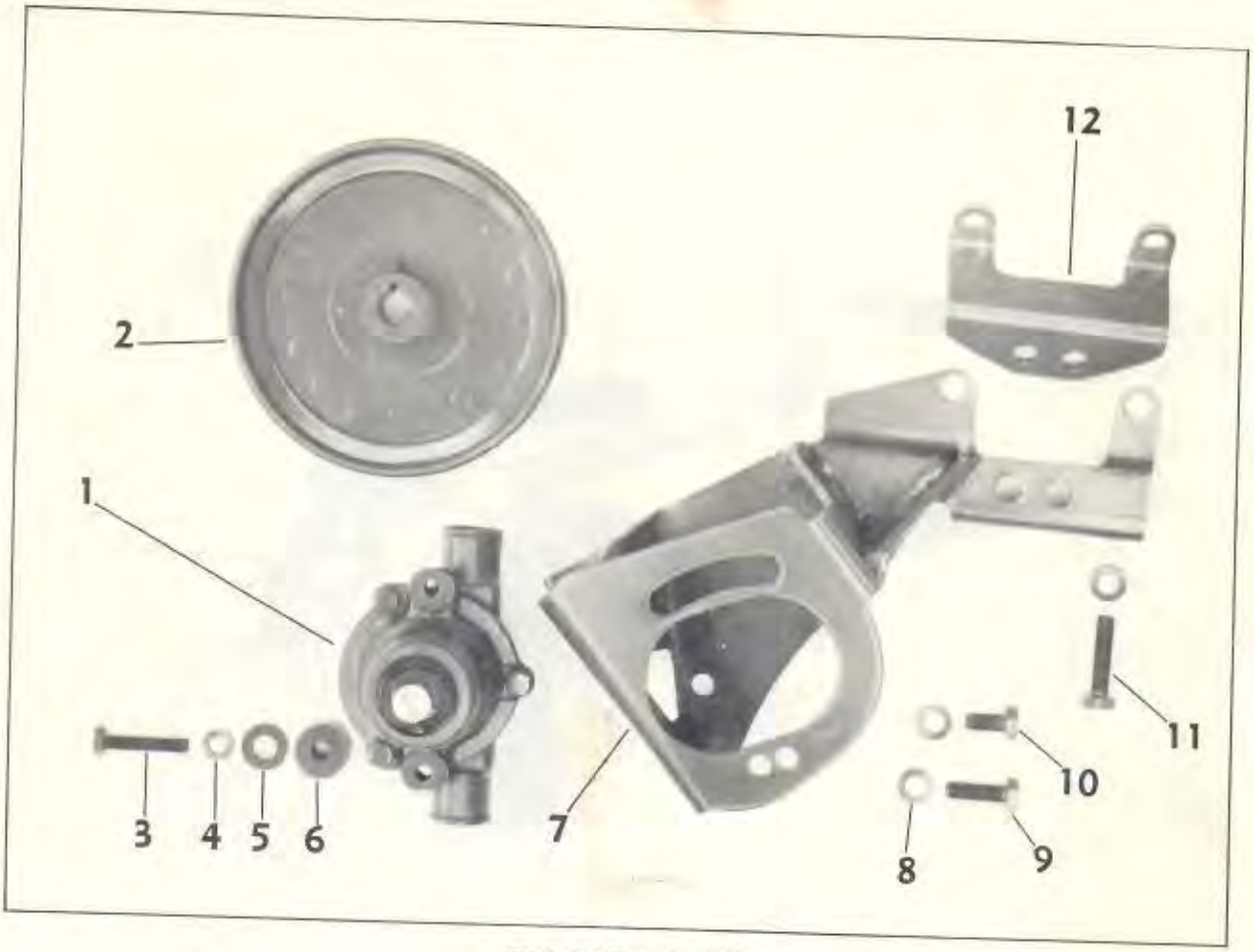
EXHAUST RISER

Code No.	Part No.	No. Req'd	Name
			EXHAUST RISER
1	16.20-08288	1	Riser, Exhaust—Left Side
1	16.20-08289	1	Riser, Exhaust—Right Side
2	16.58-10168	2	Plug, Pipe Soc. Hd. ¾ Brass
3	16.58-17120	2	Nipple, Hose ¾x1½
4	16.44-37595	4	Stud ⅜x9¼ Stainless Steel
5	16.50-05944	2	Gasket, Exh. Riser To Exh. Manifold
6	16.58-10172	2	Plug, Pipe Soc. Hd. 1" Brass
7	16.42-00004	12	Washer, Lock ⅜
8	16.30-00449	4	Screw, Cap Soc. Hd. ⅜-16x2¼
9	16.58-17982	4	Valve, Drain ¼ Npt
10	16.50-07596	2	Gasket, Riser To Deflector
11	16.20-07593	2	Deflector, Exh. Elbow
12	16.50-07597	2	Gasket, Deflector To Elbow
13	16.20-07605	2	Elbow, Exhaust
14	16.30-00546	4	Screw, Cap Hex Hd. ⅜-16x1¾ Cad. Pl.
15	16.36-30000	4	Nut, Hex ⅜-24 Stainless Steel
16	16.42-00001	4	Washer, Lock ¼
17	16.50-00073	2	Gasket, Copper Asbestos
18	16.32-40001	6	Screw, Machine Fil. Hd. ¼-20x⅞
19	16.22-07532	2	Housing, Pressure Relief Valve
21	16.99-07346	2	Valve, Pressure Relief
22	16.50-07290	2	Gasket, Relief Valve Housing
23	16.58-10164	2	Plug, Pipe Soc. Hd. ½ Brass



CIRCULATING WATER PUMP

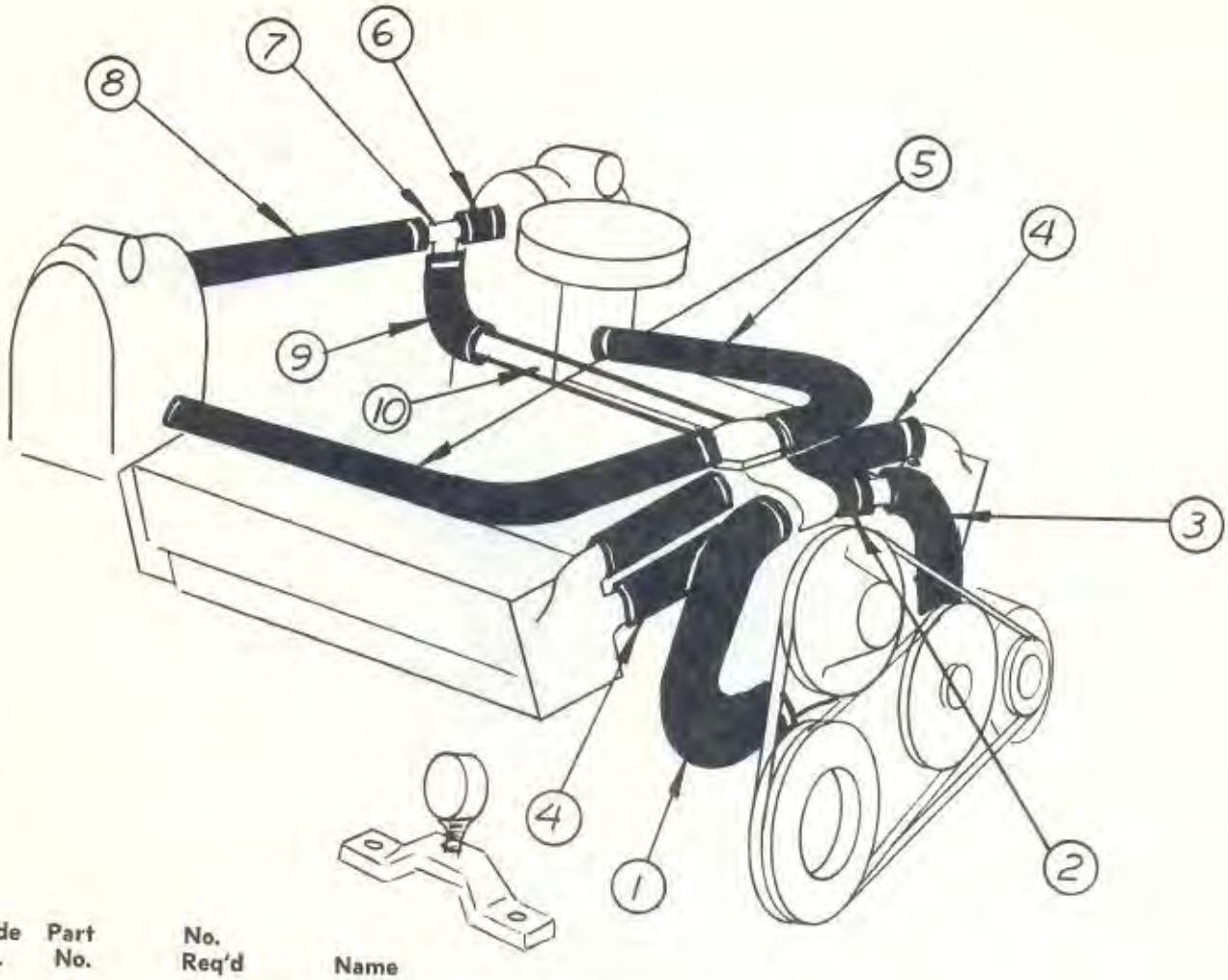
Code No.	Part No.	No. Req'd	Name
			CIRCULATING WATER PUMP
1	16.11-00742	1	Pump Assy, Cir. Water (Not Serviced)
2	16.11-00077	1	Gasket, Pump L.H.
3	16.11-00078	1	Gasket, Pump R.H.
4	16.30-00136	3	Screw, Cap Hex Hd. 3/8-16x1 3/4
5	16.30-00152	1	Screw, Cap Hex Hd. 3/8-16x2 3/4
6	16.11-00815	1	Pulley, Water Pump
7	16.42-00002	4	Washer, Lock 5/16
8	16.30-00061	4	Screw, Hex Hd. 5/16-24x5/8



SEA WATER PUMP

Code No.	Part No.	No. Req'd	Name
			SEA WATER PUMP
1	16.80-18344	1	Pump and Pulley Assy. (Early Models)
1	16.80-18346	1	Pump and Hub Assy. (Later Models)
			The Following Repair Kits are Available for Service
	16.80-90168	A.R.	Pump Body, Shaft and Hub Ass'y.
	16.80-90155	A.R.	Seal and Seat
	16.80-90049	A.R.	Impeller
2	16.80-90156	1	Pulley (Early Models)
	16.70-00152	1	Pulley (Later Models)
	16.30-00744	4	Screw, Cap 5/16-18x½ Attach Pulley
	16.42-00003	4	Washer, Lock
3	16.30-00074	2	Screw, Cap 5/16-18x1½
4	16.42-00002	2	Washer, Lock
5	16.41-00024	2	Washer, Flat
6	16.57-08776	2	Spacer, Sea Pump
7	16.95-00196	1	Bracket Ass'y.
8	16.42-00004	4	Washer, Lock
9	16.30-00126	1	Screw, Cap ⅜-16x1⅛
10	16.30-00120	1	Screw, Cap ⅜-16x¾
11	16.30-00132	2	Screw, Cap ⅜-16x1½
12	16.70-00117	1	Bracket, Alternator Mount

SHERWOOD Pump Kit #9959K



Code No.	Part No.	No. Req'd	Name
			WATER HOSE SYSTEM
1	16.54-00011	1	Hose, Molded
	16.55-38480	2	Clamp
2	16.54-10100	1	1"x3½
	16.55-37124	2	Clamp
3	16.54-00018	1	Hose, Molded
	16.55-37124	2	Clamp
4	16.54-10053	4	Hose 1¼x9
	16.55-37304	8	Clamp
5	16.54-00014	2	Hose, Molded
	16.55-37124	4	Clamp
6	16.54-10026	1	Hose 1"x2¼
	16.55-37124	2	Clamp
7	16.58-90004	1	Tee, Water
8	16.54-10098	1	Hose 1"ID.x11
	16.55-37124	2	Clamp, Hose
9	16.54-08016	1	Hose, Molded
	16.55-37124	2	Clamp, Hose
10	16.95-00201	1	Tube and Tee Ass'y.

Code No.	Part No.	No. Req'd	Name
			EXHAUST WYE COVER PLATE
			The Following Cover Plate Assembly Is Used In Conjunction With Straight Thru Exhaust
	16.95-00233	1	Cover Plate Assy.—Consists of the Following 7 Items
1	16.70-20171	1	Cover Plate
2	16.44-30016	4	Stud 3/8x1 3/4
3	16.41-00026	4	Washer, Flat
4	16.42-00005	4	Washer, Lock
5	16.36-30000	4	Nut, 3/8-24
6	16.50-08135	1	Gasket
7	16.39-08394	4	Nut 3/8-16 Lock

OUTDRIVE
OPERATION AND PARTS
AQUAMATIC 270 AND 270T

MODEL 350FLV

OUTBOARD DRIVE SECTION

This Portion Of The Engine Operators Manual Is Devoted Entirely To The Aquamatic 270 and 270T Outboard Drive and Has Been Reprinted From The Aquamatic 270 and 270T Outboard Drive Instruction Book By Permission From Volvo Penta, Goteborg, Sweden.

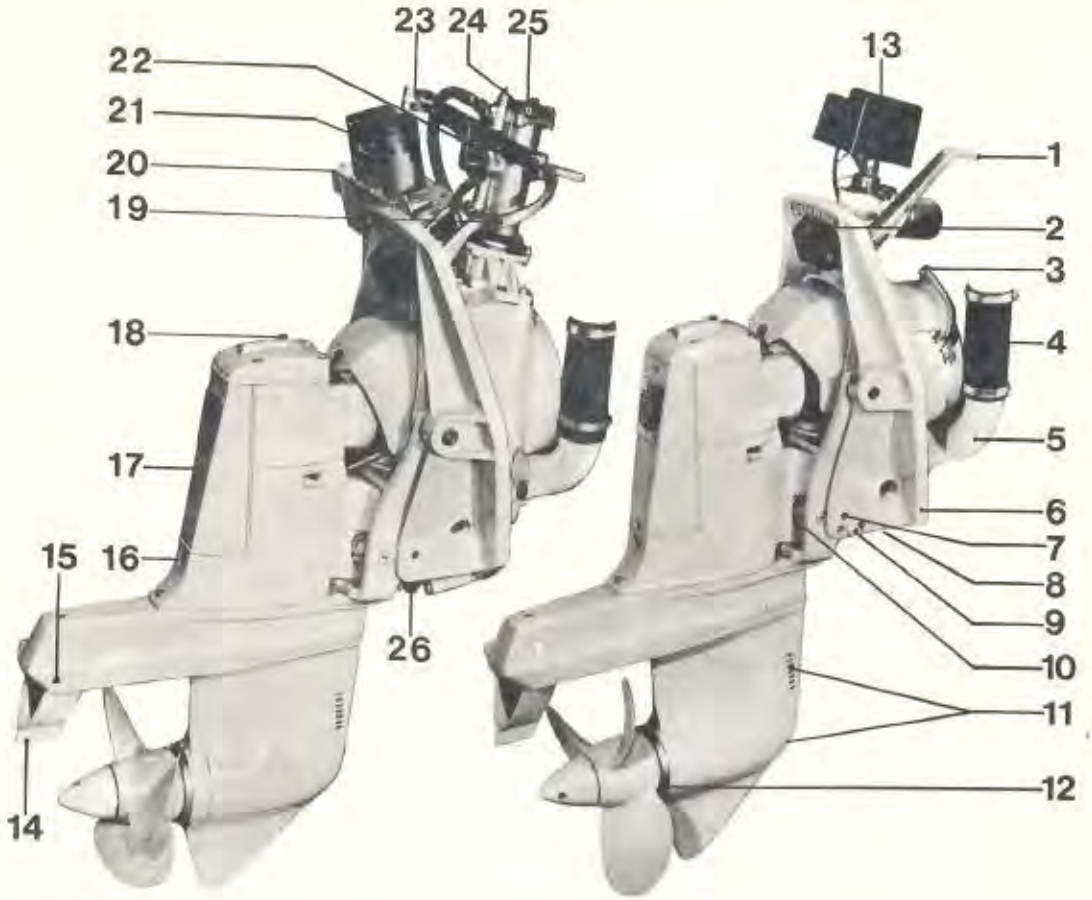


Fig. 1 Outboard drive models 270 and 270T

1. Steering rod
2. Rubber block
3. Cooling-water pipe
4. Exhaust hose
5. Exhaust pipe on mounting collar
6. Mounting collar
7. Hole for transport bracket
8. Zinc plate
9. Locating pin
10. Retaining pawl
11. Water intakes
12. Zinc ring
13. Electromechanical lift
14. Exhaust outlet with trim tab
15. Anti-cavitation plate
16. Oil filler hole
17. Gear casing
18. Oil dipstick
19. Steering rod
20. Hydraulic tank
21. Motor for hydraulic pump
22. Lever for control valve
23. Attachment for control cable
24. Air nipple
25. Lift cylinder
26. Trim cylinder

CONTENTS

DESCRIPTION

Outboard drive models 270 and 270T

The Aquamatic outboard drive models 270 and 270T are second to none when it comes to performance, dependability and toughness.

The outboard drive is flexibly mounted on a collar bolted to the outside of the boat transom. Drive 270T is equipped with Internal Power Trim, which means that the drive can be hydraulically trimmed in and out from the boat operator's seat for optimum performance, and can also be tilted up. Drive 270 has electromechanical lift for tilting up the drive.

All exposed parts are made of corrosion-resistant material. Zinc electrodes protect the drive unit from damage by corrosion caused by galvanic currents. Exhaust gases and cooling water are taken through the collar and drive whose channels are treated with special protection paint. The engine is flexibly suspended in the mounting collar through the flywheel casing.

Power is transmitted from the engine via a double universal joint to the bevel gears for "Forward", "Reverse" and "Neutral". The cone clutch in the shift mechanism ensures smooth and quiet engagement. The cone clutch, which is patented and of the type "Silent Shift", has power-assisted disengagement so that very small transmission forces are required for shifting. The friction cones, which are included in the cone clutch, are self-adjusting.

The propeller gear is of a special bevel type which provides the drive with very quiet operation and makes continuous running in either direction of rotation possible. This means that either a left-hand or right-hand propeller can be used.

A feature of the drive 270T is the Internal Power Trim which enables the boat operator to trim and tilt the unit for optimum boat performance irrespective of load. When running in shallow water, the drive can be partly tilted to "Beach". This means that the boat can be manoeuvered both "Forward" as well as "Reverse" with the drive partly tilted up. The hydraulic system is so designed that the drive can be fully relied upon to tilt up should it unexpectedly strike some obstacle under the water when the boat is running forward. Safety valves in the hydraulic system open with overloading, and this prevents the drive from damage. The hydraulic system is self-venting.

The patented design of the retaining pawl on drive 270 is fully to be relied upon to tilt up should it unexpectedly strike some obstacle under the water when the boat is running forward.

Rapid manoeuvering in "Reverse" in an emergency can be carried out on both the 270 and 270T drives at speed up to about 15 knots without the possibility of the drive "floating up".

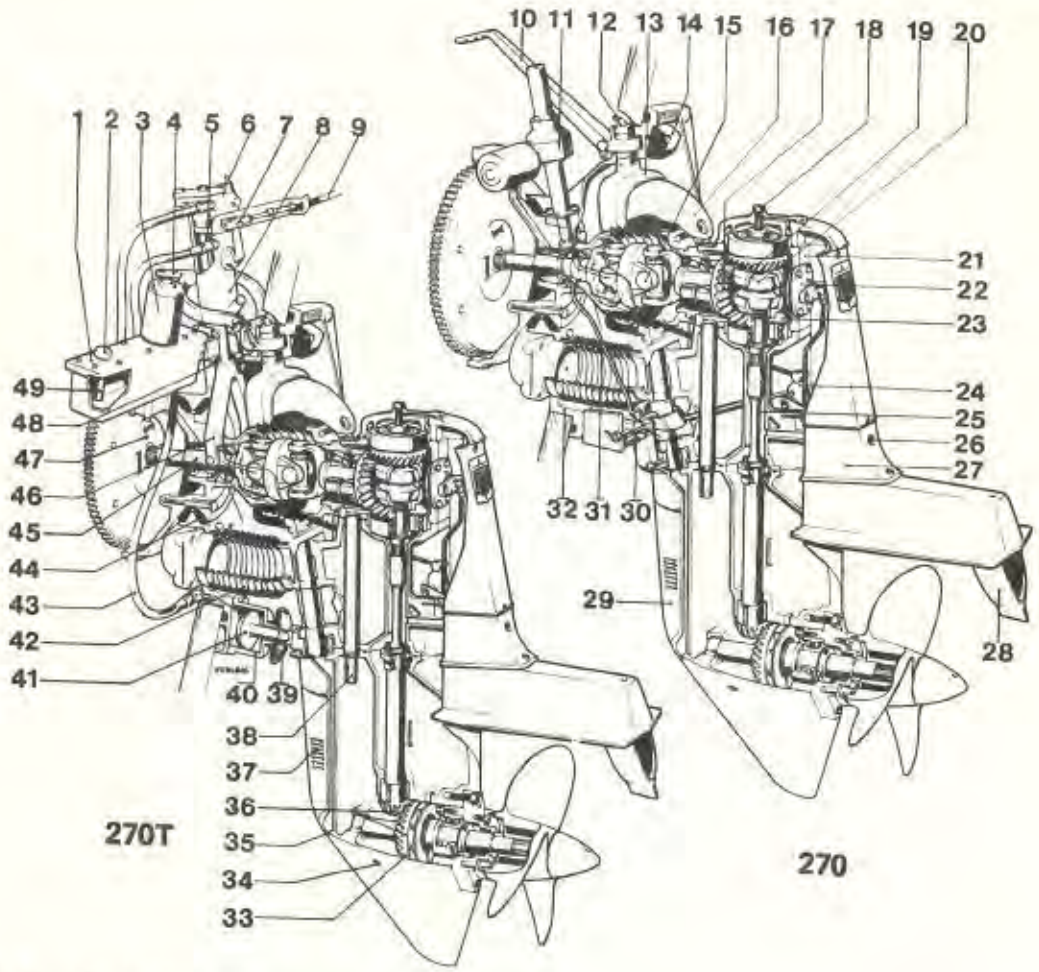


Fig. 2. Cross-section through outboard drives

1. Hydraulic tank
2. Oil filler hole
3. Motor for pump
4. Steering rod
5. Piston, lift cylinder
6. Air nipple
7. Control lever
8. Lift cylinder
9. Control cable
10. Steering rod
11. Lift
12. Lubricating nipple
13. Steering yoke
14. Rubber block
15. Universal joint
16. Steering casing
17. Input gear
18. Oil dipstick
19. Gear
20. Cone clutch
21. Upper gear housing
22. Shift mechanism
23. Gear
24. Shift fork
25. Vertical drive shaft
26. Oil filler hole
27. Intermediate housing
28. Trim tab
29. Lower gear housing
30. Retaining pawl
31. Release rod, retaining pawl
32. Mounting collar
33. Circulation pump
34. Oil drain
35. Water intake
36. Propeller gear
37. Water intake
38. Oil strainer
39. Rubber bellow
40. Trim cylinder
41. Piston, trim cylinder
42. Exhaust bellow
43. Hose
44. Supporting rubber pad
45. Drive shaft
46. Lift yoke
47. Vibration damper
48. Rubber bellow
49. Oil strainer

RUNNING INSTRUCTIONS

CONTROLS

Described below are the MV single type or MT twin lever control systems with synchronized throttle and shift systems.

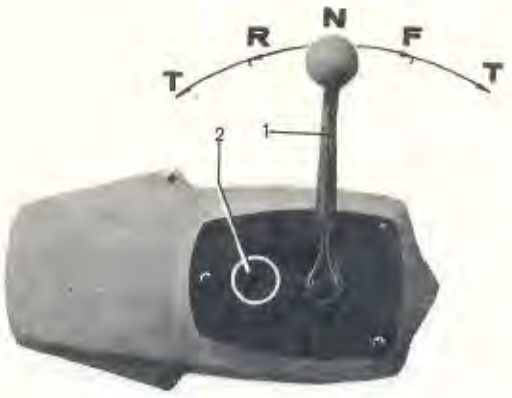


Fig. 3. MV with casing for single engine installation. Side mounting.

1. Control lever
2. Neutral throttle knob (pulled out axially)

Fig. 4. Type MT Twin for twin engine installation. Top mounting.

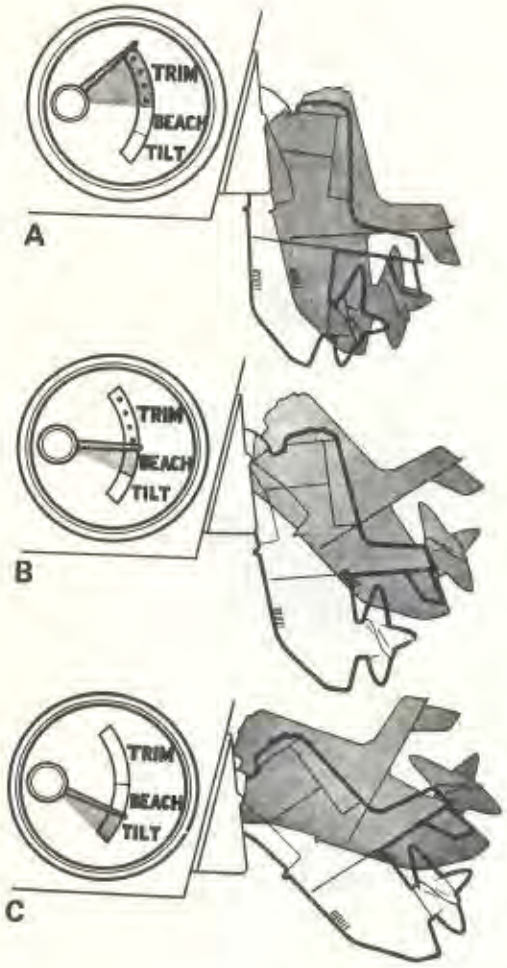
N = Neutral positon
F = Forward position
R = Reverse position
T = Throttle

Note. The engine must never be started while the outboard drive is tilted up. For drive 270 there is a warning lamp for the electromechanical lift which lights red as soon as the drive is wholly or partly tilted up. Outboard drive 270T has a trim indicator which shows the exact angle of the drive unit at all times. **When the trim indicator indicates "Tilt", the engine must not be started** until the drive is tilted down to "Trim" or "Beach".

MANOEUVERING THE INTERNAL POWER TRIM, 270T

Drive model 270T can be manoeuvered to "Trim" and "Beach" while underway by manoeuvering the toggle control switch. The trim indicator shows the exact angle of the drive, see Fig. 5. The drive must not be tilted to "Tilt" while the engine is running, nor must the engine be started with the drive at "Tilt".

NOTE. **The drive may not be manoeuvered while "Reverse" gear is engaged.**



A. Trim
The drive is manoeuverable while underway for optimum performace.

B. Beach
The drive is manoeuverable within "Beach" while underway at low speed and idling, in order to be able to run in shallow water. Once the drive has been adjusted to this position, "Forward" and "Reverse" can be engaged and the speed increased.

C. Tilt
The engine must not be started or driven while the drive is within the tilt area. "Tilt" is intended to be used when the boat is moored in shallow water or when being transported on a trailer.

Fig. 5. Trim, Beach, Tilt, drive 270T

RUNNING IN SHALLOW WATER[1)]

OUTBOARD DRIVE MODEL 270

When running in shallow water at low speed with great risk of contacting the bottom, it is recommended as an extra safety measure that the retaining pawl for the outboard drive is released with the drive lift. NOTE. Running "Reverse" cannot be carried out with the retaining pawl released. Release the retaining pawl as follows:

Move the control switch to the "Up" position until the warning lamp lights up and then keep the switch in this position for another 2–4 seconds. This reduces the risk of damage to the propeller and outboard drive if they come into contact with the bottom.

1) Normally the outboard drive kicks up automatically if it strikes an object in the water.

RUNNING INSTRUCTIONS

OUTBOARD DRIVE MODEL 270T

If the boat is to be run in shallow water and there is risk of contacting the bottom, the engine speed should be cut back to idling and the drive lifted to "Beach" in order to eliminate possible damage to the propeller. Then the engine speed can be stepped up. "Trim" is marked in green on the trim indicator. "Beach" is white and "Tilt" red on the indicator.

If the drive has been lifted to the borderline between the white and red fields on the trim indicator, the boat speed should be low. **If the drive has been lifted so that the pointer on the trim indicator points to the red field, the engine must not be driven.**

RUNNING IN REVERSE

OUTBOARD DRIVE MODEL 270

Running "Reverse" can only be carried out when this drive is fully down and the retaining pawl has locked the drive in this position. The warning lamp indicating lifted outboard drive must always be off before running in reverse.

OUTBOARD DRIVE MODEL 270T

Running "Reverse" can be carried out without hindrance with this drive at "Trim" or "Beach". The drive can be operated fully, and thus the boat can be manoeuvered in "Reverse", with the drive adjusted to "Trim" or "Beach".

THE TRIM OF THE BOAT

In order to ensure top performance for the boat, the normal position of the anti-cavitation plate on the outboard drive should be parallel with the bottom of the boat.

The normal angle for the transom is 78° and the angle between the outboard drive and the transom is adjustable on drive 270 by moving the adjustning pin to one of the three alternative holes (see Fig. 6). Normally the best position for the outboard drive is with the adjusting pin in hole 2.

The angle between the 270T outboard drive and transom is infinitely adjustable from the boat operator's seat while underway. The trim indicator shows the trim position on the indicator green field. In order to reach maximum speed more

quickly or to counteract "stern-heavy" tendencies, the drive should be trimmed in all the way. This means that the trim indicator pointer should point to the bottom of the green field on the indicator. If the maximum speed hull position is such that the boat has a tendency to be "nose-heavy", the drive should be trimmed out so that the pointer moves to "Beach".

In order to attain the maximum speed hull position more rapidly and also to improve the boat's running in the case of certain boat types, it may be advisable to fit Volvo Penta trimming flaps.

Fig. 6. Range of use for adjusting pin. Drive 270.

1. Position to counteract "nose-heavy" tendency
2. Neutral position
3. Position to counteract "stern-heavy" tendency

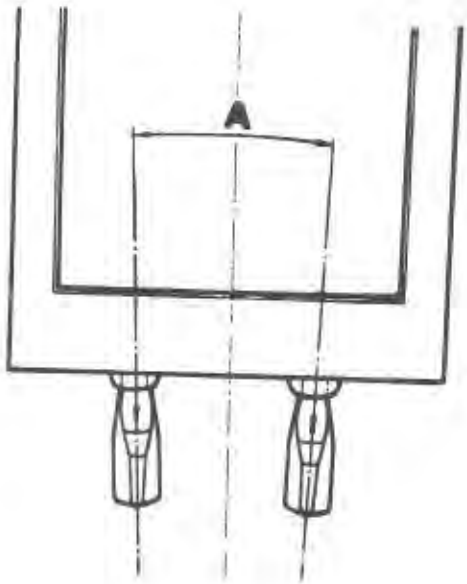


Fig. 7. Angle between drives in case of twin installation

ADJUSTMENT OF STEERING RODS IN CASE OF TWIN ENGINE INSTALLATION

For optimum propeller efficiency, it is important to adjust the angle of the outboard drives so that the meeting point between the wash from the two propellers is well behind the boat. The angle between the outboard drives increases with deeper V-bottom. See "A", Fig. 7. If the angle is too small, this will often result in propeller caviation.

Fine adjustment of this angle can be carried out by means of the link between the two drive steering rods.

ADJUSTING FOR DEVIATION FROM COURSE

The outboard drive is fitted with a combined exhaust outlet and trim tab, see Fig. 8. This trim tab can be turned to counteract any tendency towards deviation from course in the steering while underway. Check course deviation with the steering wheel in its neutral position and at cruising speed.

The trim tab is adjusted when necessary by loosening the lock screw (2, Fig. 8) and turning the **trailing edge** of the trim tab **towards** the course deviation. Tighten the lock screw and then test-run the boat. Repeat adjustment if necessary until the best courseholding is obtained with the steering wheel in the neutral position.

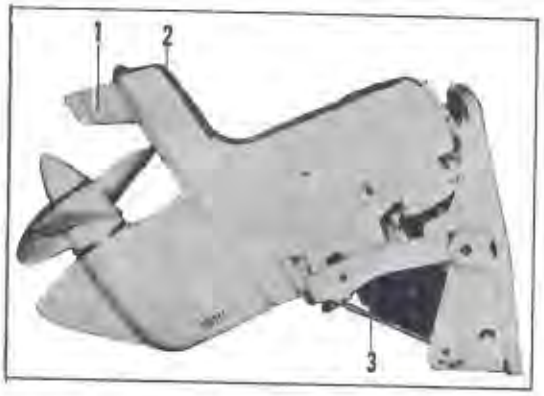


Fig. 8.

1. Trim tab
2. Lock screw
3. Transport bracket

TRAILING

When the boat is being towed on a trailer, the outboard drive should be raised as far as it will go. In order to prevent the drive from shaking down from its tipped-up position, the drive is supplied with a transport bracket (3, Fig. 8). The transport bracket is fitted as follows:

Place the bracket handle in the yoke recess for the locating pin, press together the lower part of the bracket so that both the pins can be located in the mounting collar holes just above the locating pin as shown in Fig. 8.

MAINTENANCE SCHEME

The servicing procedures in the maintenance scheme below are numbered and these numbers refer to the description on the following pages.

Point	Operation	To be carried out:		
		Every 14 days	After 50[1] hours running	After 100[1] hours running
	PERIODICAL SERVICING			
1	Checking the oil level in outboard drive	•		
2	Checking the oil level in hydraulic pump (270T)	•		
3	Changing the oil in outboard drive			•
4	Greasing the drive shaft bearing and steering bearings		•	
5	Checking the anti-corrosion devices	•		
	GENERAL SERVICING INSTRUCTIONS	To be carried out according to the intervals given under the respective points or when necessary		
6	Removing and fitting the propeller			
7	Adjusting the retaining pawl and connecting up the gear control cable, drive 270			
8	Connecting up gear control cable, drive 270T			
9	Carry out general inspections			
10	Preparing the unit for laying up			

1) Or once each season, whichever occurs first.

1.
Checking the oil level in outboard drive

Check the oil every 14 days by using the dipstick (1, Fig. 10) in the cover over the upper gear housing. This check must be carried out while the outboard drive is in its lowered position. The oil dipstick should not be screwed in when the oil level is checked.

The oil level should be within the field on the lower flat part of the dipstick. The correct oil grade viscosity is shown in the table on page 11. Fill up through the dipstick hole.

2.
Checking the oil level in hydraulic pump, drive 270T

Check the oil level in the hydraulic pump every 14 days by using the distick (1, Fig. 9) on top of the tank. Observe great care when carrying out this check that no foreign particles drop down into the tank.

The oil level should be within the field on the flat part of the dipstick.

When necessary top up through the oil filler hole (2, Fig. 9) to the correct level with oil which meets the requirements for "Automatic Transmission Fluid Type F". The designation for the oil is ATF Type F, or in cases of exception, Type A or Dexron, if Type F is not available. NOTE. **Ordinary engine oil must not be used.**

Fig. 9. Hydraulic tank
1. Oil dipstick
2. Oil filler hole

3.
Changing the oil in outboard drive

Change the lubricating oil after every 100 hours running or at least once each season. Drain off the old oil by removing the plug (2, Fig. 10). The dipstick (1) should be unscrewed so that the oils runs out more easily.

Fill up with oil through the oil filler hole (4). Use the oil scavenging pump and hose nozzle supplied with the tool kit (extra accessories). The drive should be in its tilted-up position when oil is being filled.

After filling up, screw the oil filler plug (4) into position again and lower the drive completely.

Check the oil level by following the instructions in point 1 and fill up if required. Make sure that the washers under the plugs and dipstick are in good condition.

NOTE. Never allow the oil level to be above the MAX mark on the dipstick.

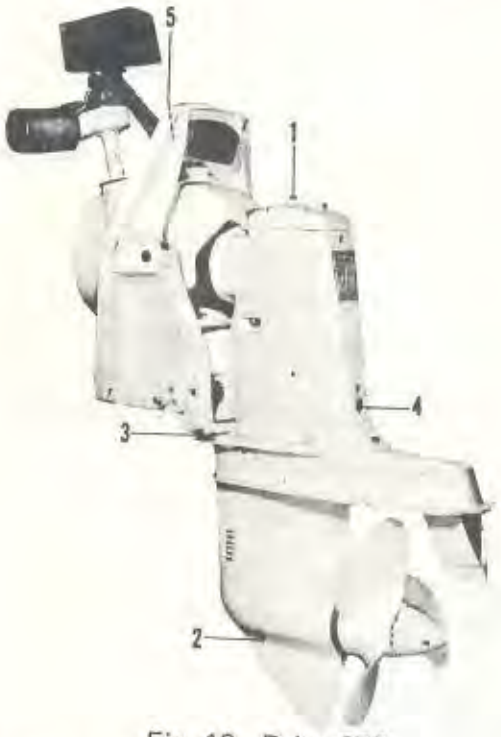


Fig. 10. Drive 270

1. Oil dipstick
2. Drain hole
3. Grease nipple, steering shaft
4. Oil filler hole
5. Lubricator, steering rod bearing (inside mounting collar)

Quality	Viscosity	Oil capacity
Engine oil Multigrade Service MS	SAE 10W/30 or 20W/40	2 1/4 US qts. (2.2 litres)1)

1) Capacity is approx. 2 1/2 US qts. (2.5 litres) with 4" extension.

4.
Greasing the drive shaft bearing and steering bearings

After every 50 hours running the lubricating points mentioned below must be greased with multipurpose grease:

The drive shaft bearing in the flywheel housing is greased by filling the grease nipple with grease and screwing it in all the way.

The steering shaft bearing is greased through the grease nipple (3, Fig. 10) by using a grease gun. Force in so much that it seeps out at the wear washer.

The stearing rod bearing is greased through the lubricator (5, Fig. 10) on the inside of the mounting collar. Force in so much grease that it seeps out at the bearing.

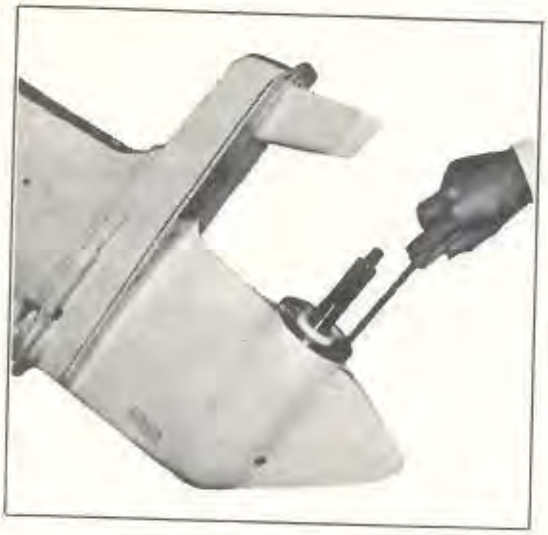


Fig. 11. Zinc ring

Fig. 12. Zinc plate, drive 270

5.
Checking the anti-corrosion devices

Check how much the zinc electrodes have been corroded at least every 14 days. When about 50% of the original size has been corroded away, replace the electrodes as follows:

ZINC RING

Remove the propeller and spacer ring with deflector ring (see point 6 "Removing and fitting the propeller") and remove the Philips screws retaining the zinc ring (Fig. 11).

Scrape the contact surface against the bearing housing clean and fit a new zinc ring. Make sure that there is good metallic contact between the zinc ring and the propeller housing.

ZINC PLATE

Unscrew the zinc plate which is fitted under the mounting collar (see Fig. 12). Clean the contact surfaces and fit a new zinc plate. NOTE. The drive 270T has two zinc plates, one on each side of the trim cylinder.

NOTE. Do not paint the zinc ring or zinc plate.

6.
Removing and fitting the propeller

1. Knock up the tabs on the lock washer (2, Fig. 13) for the propeller cone.
2. Unscrew the propeller cone (1) with the help of a screwdriver which is pushed in through the hole in the propeller cone. Then pull off the propeller. Note the spacer ring inside the propeller.
3. Clean the propeller shaft and apply graphite grease, or equivalent, to the shaft.

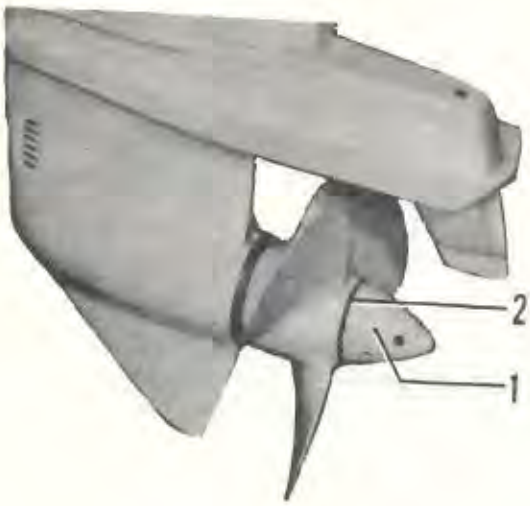


Fig. 13. Changing propeller

4. **Check that the new propeller has the same size and markings as the earlier unit.**
5. Fit the propeller. NOTE. The spacer ring and deflector ring should be fitted between the propeller and the gear housing.

   NOTE. Lock the propeller cone by staking all the teeth on the lock washer.

   If the teeth of the lock washer do not fit in the middle of the cone recess, unscrew the cone and move the lock washer one spline position on the propeller shaft.

7.
Adjusting the retaining pawl and connecting up the gear control cable, drive 270

Check once each season, and adjust when necessary, the position of the locking rod against the retaining pawl (A, Fig. 14) and also the position of the push rod B) for lift disengagement of the retaining pawl. Adjust as follows:

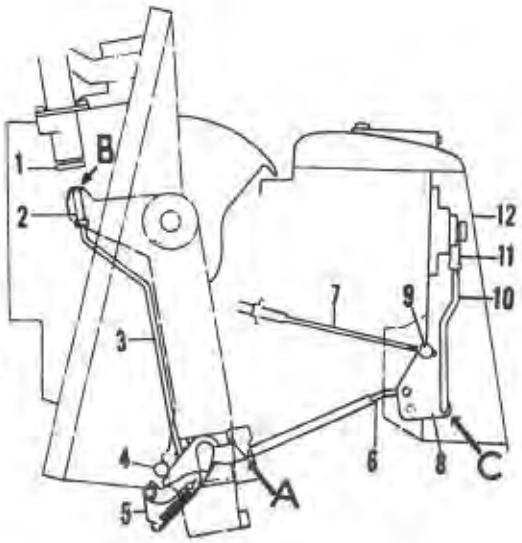


Fig. 14. Adjusting retaining pawl, drive 270

1. Remove the protective cover (12, Fig. 14) on the upper gear housing so that the shift mechanism is accessible. Move the control lever to the neutral position.
2. Disconnect the gear control cable "dice" (9) from the lever (8) and the yoke (11) from the gear lever.
3. Loosen the locknut for the yoke (11) and turn the yoke on the gear rod (10) thread so that at the connection with the gear lever the push rod (6) goes into such a position that it just contacts (without pressure) the pawl at "A". Secure the yoke (11) in this position with the locknut.
4. Adjust the gear cable "dice" (9) so that it can easily be moved into the hole on the lever (8) and secure it in this position. Move the control lever to the "Forward" position and check that the corner "C" does not contact the intermediate housing. Fit the cover over the gear shift mechanism.
5. **Press the drive forward, against the adjusting pin,** and check the position of the push rod (3). The upper part (2) of the rod should be level with the yoke at "B". This is to enable the lift (1) to disengage the retaining pawl (5) when tilting up. Adjust the length of the push rod if necessary by loosening the locknut and turning the upper part of the rod (2).

8.
Connecting up gear control cable, drives 270 and 270T

In those cases where the drive has been removed from the boat and is to be re-fitted, the gear control cable must be connected to the drive shift mechanism as follows:

1. Move the control lever at the boat operator's seat to neutral position.
2. Remove the protective cover (12, Fig. 14) over the shift mechanism. Move the shift mechanism lever to neutral position.
3. Push the gear control cable in as far as it can go and then pull it out fully in order to check for play. Then push in the cable to half the length of the measured play. Screw on the "dice" so far that its pin fits in the lever on the shift yoke. Lock the "dice" with the locknut on the gear control cable.
4. Check that the "dice" and the gear rod (10, Fig. 14) are properly adjusted by moving the control lever to "Forward", "Neutral" and "Reverse" while checking at the same time that the "dice" and gear rod do not jam in their bearings. Adjust if necessary.
   Check to make sure that the corner "C" (Fig. 14) does not contact the intermediate housing.
5. Lock the "dice" to the lever with washer and split pin.

9.
Carry out general inspection

General inspection of the outboard drive must be carried out after every 100 hours running or at least once each season. Clean the outside of the drive and touch up any damaged paintwork. Paint the underwater parts of the drive and also the cooling water intake channels with anti-fouling paint (must not include copper or mercury).

NOTE. Do not paint the zinc ring or zinc plate.

At the same time check for oil leakage and ensure that the rubber bellows are in good condition and that there is no abnormal wear on the links for the control mechanism.

For drive 270T, the Internal Power Trim should also be checked to make sure that there is no leakage at connections or joints.

10.
Preparing the unit for laying up

Even insignificant corrosion on precision-machined parts can result in a serious deterioration in the condition of these parts.

If the outboard drive is to remain idle for a longer period than one month, we recommend that it should be given protective treatment as described below.

PROTECTIVE TREATMENT

Drain off the oil from the drive and fill upp with preservative oil (for example, Shell Ensis Oil 20 or similar). NOTE. The hydraulic system on drive 270T does not require protective treatment. First clean the drive externally with fresh water and then with kerosene or similar solvent. Remove all marine growth and deposits. Then touch up any of the paintwork that may be damaged. **NOTE. Do not paint the zinc ring and zinc plate.** Protect the outboard drive externally by applying anti-rust oil.

If the outboard drive is dismounted from the boat, a cover has to be mounted in the rubber bellows and on the stub shaft in the flywheel housing.

PREPARING FOR USE AGAIN

Drain off the preservative oil from the outboard drive. Fill up with oil (see "Servicing", point 3).

Clean the outboard drive externally from rust-proofing oil and replace the zinc ring and zinc plate on the outboard drive, see "Servicing", point 5.

Carefully check the bellows for damage and re-tighten all hose clips. If the drive has been removed, make sure when re-fitting that the bellows and hoses are correctly fitted. Adjust the control cable and retaining pawl, see "Servicing", point 7 for drive 270 and point 8 for drives 270 and 270T.

Paint the underwater parts of the outboard drive and the cooling water intake channels with anti-fouling paint (must not include copper or mercury).

Electrical wiring diagrams for drives 270 and 270T

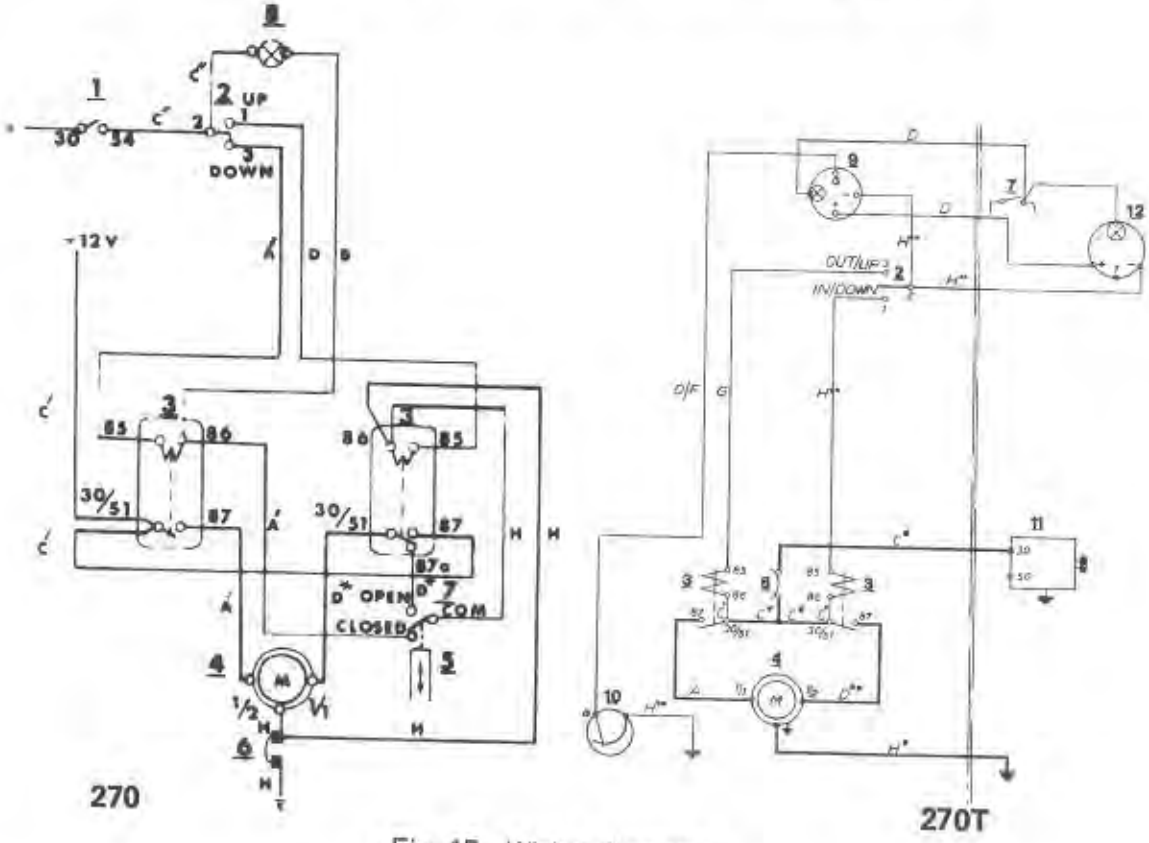


Fig. 15. Wiring diagrams

COMPONENTS

1. Key switch
2. Switch
3. Relay
4. Electric motor
5. Push rod, lift unit
6. Motor protector
7. Switch
8. Warning lamp
9. Trim indicator
10. Trim indicator sender
11. Starter motor
12. Revolution counter

CABLE MARKINGS

Mark	Color	sq.mm	AWG
A	Ivory	6.0	9
A'	Ivory	2.5	13
A''	Ivory	1.5	15
B	Black	1.5	15
C'	Red (+)	2.5	13
C''	Red (+)	1.5	15
C*	Red	6.0	9
D	Green	1.5	15
D*	Green	2.5	13
D**	Green	6.0	9
F	Yellow	1.5	15
G	Brown	1.5	15
H	Blue	2.5	13
H*	Blue	6.0	9
H**	Blue	1.5	15

Internal Power Trim, 270T

Hydraulic function layout

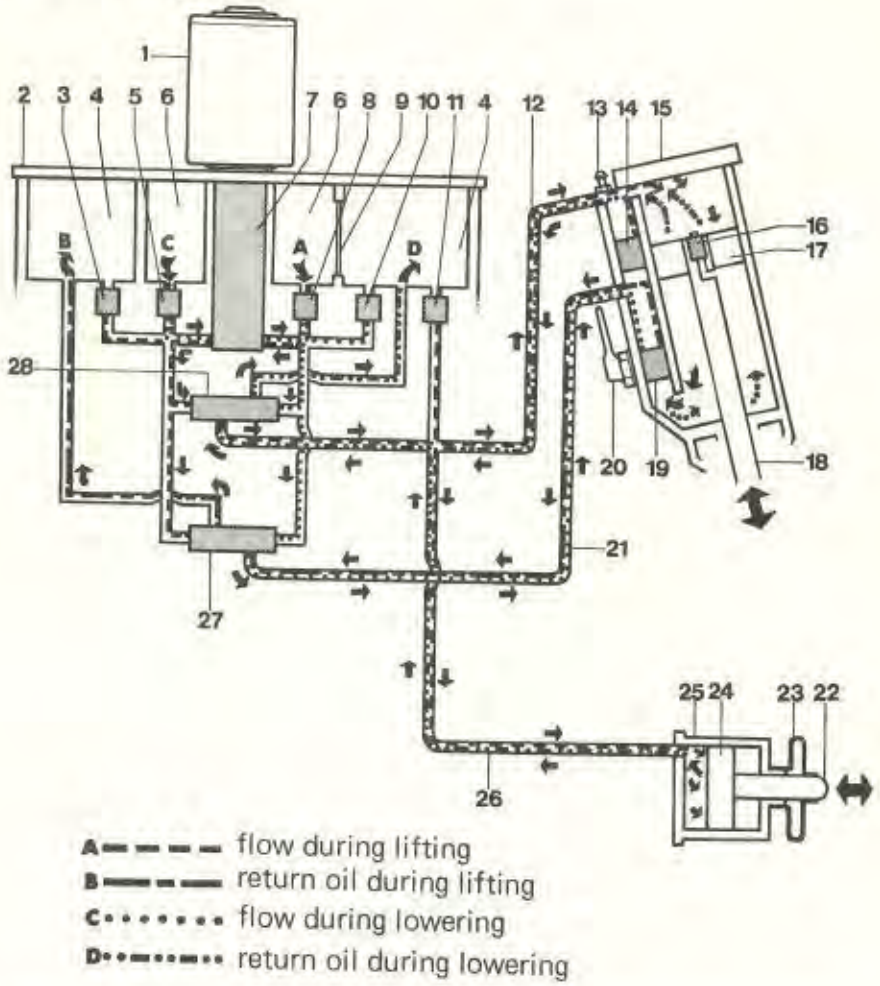


Fig. 16. Hydraulic function for Internal Power Trim, outboard drive 270T

1. Motor
2. Tank
3. Relief valve, lifting
4. Return tank
5. Check valve for lifting
6. Drain tank, filtered oil
7. Pump
8. Check valve for lowering
9. Strainer
10. Relief valve, lowering
11. "Beach" valve
12. Hose
13. Venting nipple
14. Safety release valve
15. Lift cylinder
16. Safety valve
17. Piston, lift cylinder
18. Lift yoke
19. Control valve, closes when reversing
20. Control lever
21. Hose
22. Contact face, trim cylinder – drive
23. Rubber bellow
24. Piston, trim cylinder
25. Trim cylinder
26. Hose
27. Ball valve
28. Ball valve

TECHNICAL DATA

Type designation	Aquamatic 270
Reduction ratios, total, "Forward" and "Reverse"	1.61:1/270 B 1.89:1/270 C 2.15:1/270 D
Type designation	Aquamatic 270T
Reduction ratios, total, "Forward" and "Reverse"	1.61:1/270 TB 1.89:1/270 TC 2.15:1/270 TD
Shift mechanism	"Silent Shift" self-adjusting cone
Maximum propeller diameter	16"
Tip-up angle, drive 270	0°–60°
Tip-up angle, drive 270T	
Trim position	–4° to +5°
Beach position	5°–30°
Tilt position	–30° –60°
Lift unit, type	
drive 270	Electromechanical
drive 270T	Hydraulic
Lubricating system	Circulation pump for oil supply to all lubricating points
Oil capacity, outboard drive, approx.	2 1/4 US qts. (2.2 litres)
Oil capacity between max. and min. marks, approx.	1/4 pint (0.15 litre)
Oil quality	Multigrade Service MS
Oil viscosity	SAE 10W/30 or 20W/40
Oil capacity, hydraulic system drive 270T, approx.	1 1/2 US qts. (1.5 litres)
Oil quality, hydraulic system drive 270T	Automatic Transmission Type F, A[1] or Dexron[1]

[1] Only if type F is not available.

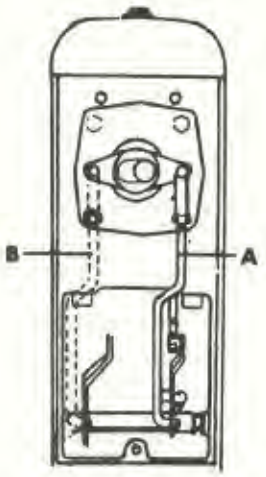
Adjustment for change from L.H. to R.H. propeller

The gears in the outboard drive are designed to operate under load in either direction of rotation, for use with either left-hand or right-hand propeller, although the standard unit is assembled to use left-hand propeller.

In the standard unit, for use with left-hand propeller, the lower clutch-and-gear functions as the forward drive gear. If it is desired to use a right-hand propeller, as required for the starboard unit of a pair, the linkage of the shifting mechanism may be reversed by a simple change in the assembly, whereupon the upper gear will become the forward drive gear. The procedure then is as follows:

1. Remove the cover from the gear mechanism.
2. Move the gear control rod from locating "A" as shown in Fig. 17 to locating "B".

Location of gear rod for use with right-hand propeller



Standard location of gear rod for use with left-hand propeller

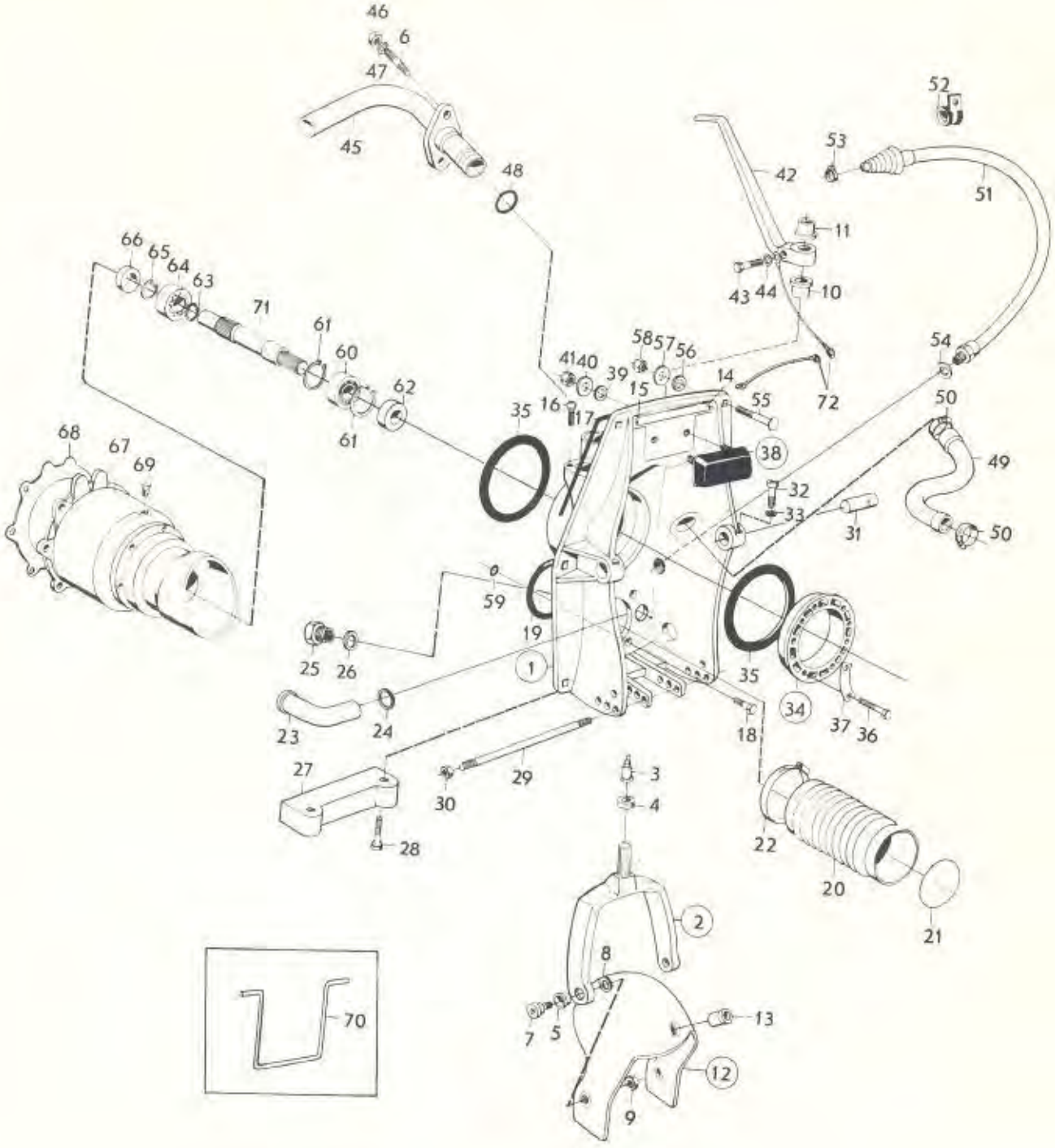
Fig. 17

By reference to Fig. 17, it will be observed that in both positions of the gear rod (A and B), the cable from the shift control lever has a "push" motion for engaging the forward gear. Check and adjust the shift linkage according to "Servicing", point 7, page 14.

AQ–DRIVE UNIT 270
CONNECTING PARTS

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	16.14-00485	Shild	1
2	16.14-00429	Steering yoke	1
3	16.14-00321	Grease nipple	1
4	16.14-00315	V-ring	1
5	16.14-00026	Bushing	2
6	16.14-00001	Stud	2
7	16.14-00023	Bearing bolt	2
8	16.14-00024	Washer	2
9	16.14-00322	Nut	2
10	16.14-00022	Bushing, lower	1
11	16.14-00427	Bushing, upper	1
12	16.14-00319	Protecting cap	1
13	16.14-00055	Bushing	1
14		Emblem	1
15		Drive Screw	2
16	16.14-00241	Allen screw	2
17	16.14-00002	Rubber seal	1
18		Bolt	4
19	16.14-00006	O-ring	1
20	16.14-00028	Exhaust bellow	1
21	16.14-00494	Ring	9
22	24.00-00064	Hose clamp	2
23	16.14-00356	Rubber bend	1
24	16.14-00363	Washer	1
25	16.14-00255	Plug	1
26	16.14-00034	Packing	1
27	16.14-00370	Zincelectrode	1
28	16.14-00371	Allen Screw	2
29	16.14-00008	Setting pin	1
30	16.14-00009	Nut	2
31	16.14-00010	Bearing pin	2
32	16.14-00011	Allen screw	2
33	16.14-00012	Washer	2
34	16.14-00013	Clamping ring kit	1
35	16.14-00014	Rubber ring	2
36	16.14-00015	Screw	6
37	16.14-00016	Lockwasher	3
38	16.14-00017	Rubber cushion	1
39	16.14-00459	Gasket	2
40	16.14-00460	Washer	2
41	16.14-00461	Nut	2
42	16.14-00430	Steering lever	1
43	16.14-00374	Bolt	1
44	16.14-00375	Washer	1
45	16.14-00379	Water pipe grommet	1
46	16.14-00020	Nut	2
47	16.14-00462	Washer	2
48	16.14-00019	O-ring	1
49	16.14-00151	Rubber hose	1
50	16.14-00152	Hose clamp	2
51	16.14-00030	Hose with rubberbellows	1
52	16.14-00512	Clamp	1
53	16.14-00033	Hose clamp	1
54	16.14-00034	Packing	1
55	16.14-00252	Screw	6
56	16.14-00035	Packing	6
57	16.14-00253	Washer	6
58	16.14-00254	Nut	6
59	16.14-00529	O-ring	4
60	16.90-00035	Ball bearing	1
61	16.99-00066	Circlip	2
62	16.14-00041	Seal ring	1
63	16.99-00065	Circlip	1
64	16.90-00034	Ball bearing	1
65	16.99-00067	Circlip	1
66	16.51-10018	Seal ring	1
67	16.21-08153	Primary shaft housing	1
68		Gasket	1
69	16.30-00570	Plug	1
70	16.14-00380	Catch	1
71	16.72-08105	Primary shaft	1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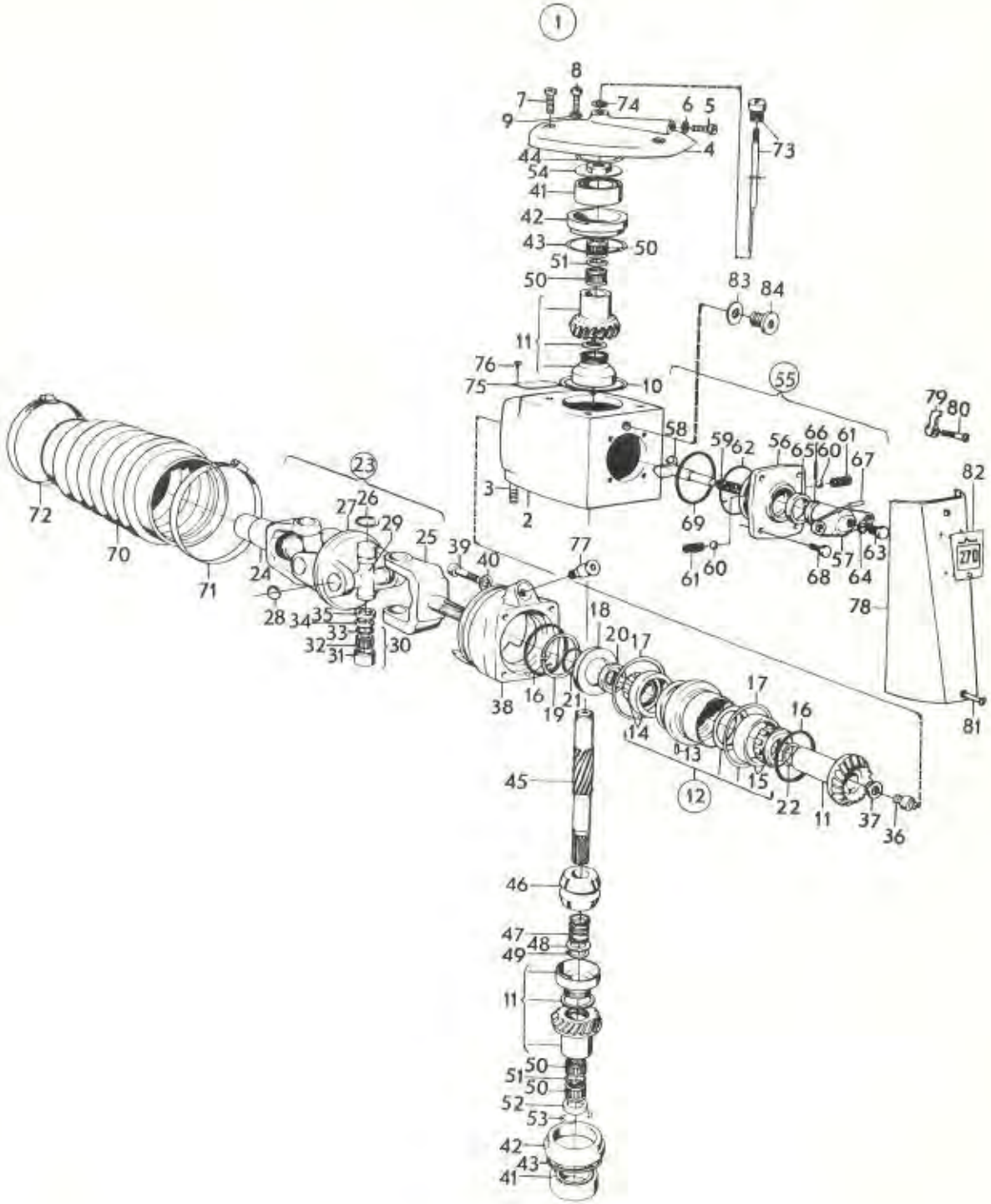
AQ–DRIVE UNIT 270
UPPER GEAR UNIT

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	16.14-00390	Upper gear unit	1
2	16.14-00391	Housing	1
3	16.14-00464	Stud	2
4	16.14-00392	Cover	1
5	16.14-00051	Screw	1
6	16.14-00052	Gasket	1
7	16.14-00086	Bolt	3
8	16.14-00431	Hollow screw	1
9	16.14-00393	O-ring	1
10	16.14-00394	Gasket	1
11	16.14-00432	Gear set	1
12	16.14-00328	Double bearing unit	1
13	16.14-00465	Peg	1
14	16.14-00502	Roller bearing	1
15	16.14-00503	Roller bearing	1
16	16.14-00195	O-ring	2
17	16.14-00063	Shim	A.R.
	16.14-00064	Shim	A.R.
18	16.14-00389	Seal ring	1
19	16.14-00433	Lock ring	1
20	16.14-00396	Head washer	1
21	16.14-00066	O-ring	1
22	16.14-00397	Shim	A.R.
	16.14-00398	Shim	A.R.
	16.14-00399	Shim	A.R.
23	16.14-00434	Universal joint	1
24	16.14-00110	Fork	1
25	16.14-00400	Fork	1
26	16.14-00112	Lock ring	4
27	16.14-00113	Interm. piece	4
28	16.14-00112	Lock ring	4
29	16.14-00114	Cross piece	2
30	16.14-00115	Needle bearing	8
31		Ring, outer	8
32		Needle	232
33		Seal washer	8
34	16.14-00268	Protector ring	8
35	16.14-00116	Cork ring	8
36	16.14-00401	Screw	1
37	16.14-00402	Washer	1
38	16.14-00334	Clamp ring	1
39	16.14-00091	Bolt	4
40	16.14-00090	Washer	4
41	16.14-00403	Roller bearing	2
42	16.14-00404	Bearing sleeve	2
43	16.14-00405	Shim	A.R.
	16.14-00406	Shim	A.R.
44	16.14-00407	Shim	A.R.
	16.14-00408	Shim	A.R.
	16.14-00409	Shim	A.R.
45	16.14-00078	Shaft	1
46	16.14-00325	Sliding sleeve	1
47	16.14-00081	Spring	1
48	16.14-00082	Washer	1
49	16.14-00080	Lock ring	1
50	16.14-00077	Needle bearing	4
51	16.14-00262	Spacer ring	2
52	16.14-00263	Spacer ring	1
53	16.14-00083	Lock ring half	2
54	16.14-00084	Nut	1
55	16.14-00326	Gear mechanism	1
56	16.14-00093	Bearing housing	1
57	16.14-00094	Eccentric piston	1
58	16.14-00327	Sliding shoe	1
59	16.14-00097	Spring	1
60	16.14-00102	Steel ball	1
61	16.14-00098	Spring	1
	16.14-00436	Spring	2
62	16.14-00095	Lock wire	1
63	16.14-00096	Bolt	1
64	16.14-00099	Shim	1
65	16.14-00103	Seal ring	1
66	16.14-00101	Lock pin	1
67	16.14-00264	Pin	1
68	16.14-00104	Bolt	4
69	16.14-00105	O-ring	1
70	16.14-00106	Rubber guard	1
71	16.14-00107	Clamp	1
72	24.00-00064	Clamp	1
73	16.14-00538	Oil dipstick	1
74	16.14-00089	Packing	1
	16.14-00539	O-ring	1
75		PZ serial number plate	1
76	16.14-00466	Rivet	2
77	16.14-00435	Bearing bolt	1
78	16.14-00117	Protector cap	1
79	16.14-00467	Catch	1
80	16.14-00468	Screw	1
81	16.14-00119	Screw	1
82	16.14-00428	Emblem	1
83	16.14-00147	Packing	1
84	16.14-00146	Plug	1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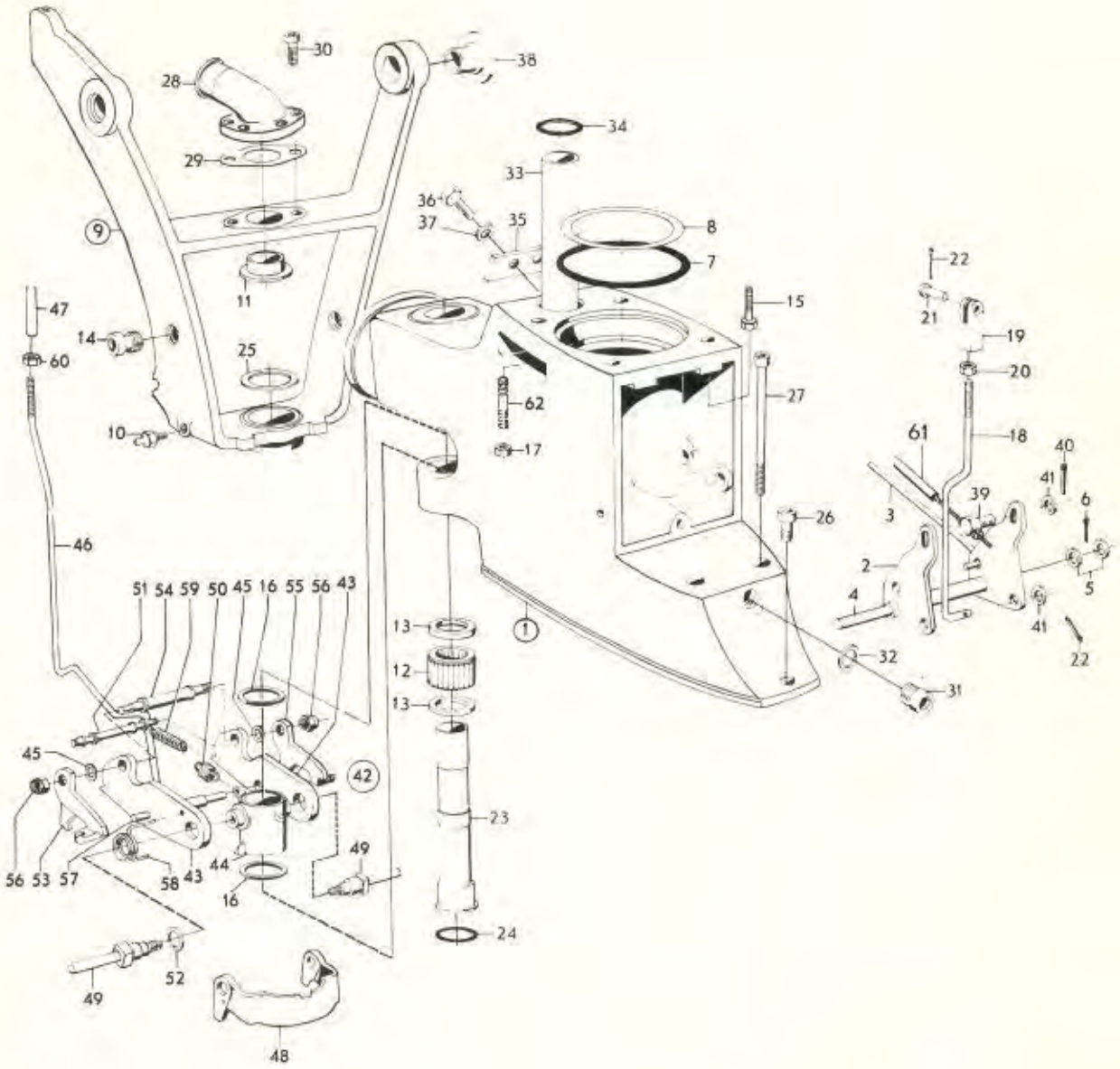
AQ–DRIVE UNIT 270
INTERMEDIATE HOUSING AREA

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	16.14-00410	Intermediate Housing	1
2	16.14-00129	Gear Yoke	1
3	16.14-00338	Astern Lock Rod	1
4	16.14-00130	Shaft	1
5	16.14-00136	Washer	2
6	16.14-00135	Cotter Pin	2
7	16.14-00121	"O" Ring	1
8	16.14-00407	Shim	1
	16.14-00408	Shim	1
	16.14-00409	Shim	1
9	16.14-00342	Fork Complete	1
10	16.14-00274	Lubricating Nipple	1
11	16.14-00336	Bushing	1
12	16.14-00139	Needle Bearing	1
13	16.14-00140	Seal Ring	2
14	16.14-00340	Steering Plug	2
15	16.14-00123	Bolt Disc. Selling 16.14-00086	2
16	16.14-00337	Nylon Washer	2
17	16.14-00125	Nut Disc. Selling 16.14-00009	2
18	16.14-00131	Control Rod	1
19	16.14-00132	Fork	1
20	16.14-00133	Nut	1
21	16.14-00134	Cotter Pin Bolt	1
22	16.14-00284	Cotter Pin Disc. Selling 16.14-00135	1
23	16.14-00385	Guide Sleeve	1
24	16.14-00141	"O" Ring	1
25	16.14-00283	Washer	1
26	16.14-00143	Screw	1
27	16.14-00142	Screw	2
28	16.14-00285	Connection Hose Disc. Selling 16.14-00411	1
29	16.14-00388	Gasket	1
30	16.14-00145	Bolt	2
31	16.14-00146	Oil Filler Plug	1
32	16.14-00147	Gasket	1
33	16.14-00286	Oil Tube	1
34	16.14-00122	"O" Ring	2
35	16.14-00287	Control Cable Connection	1
36	16.14-00288	Bolt	2
37	16.14-00291	Washer	2
38	16.14-00148	Nylon Bearing	2
39	16.14-00150	Cube	1
40	16.14-00290	Cotter Pin	1
41	16.14-00291	Washer	2
42	16.14-00339	Astern Complete Lever	1
43	16.14-00437	Astern Lever	1
44	16.14-00438	Bearing Sleeve	1
45	16.14-00439	Washer, Spacer	1
46	16.14-00440	Rod, Push	1
47	16.14-00144	Thrust Sleeve	1
48	16.14-00441	Bail, Lock	1
49	16.14-00442	Pin, Shaft	1
50	16.14-00443	Spring	1
51	16.14-00444	Shaft, Spring	1
52	16.14-00445	Washer	1
53	16.14-00446	Catch, Spring	1
54	16.14-00447	Shaft	1
55	16.14-00448	Catch, Spring	1
56	16.14-00449	Nut	1
57	16.14-00450	Shaft, Stop	1
58	16.14-00451	Spring	1
59	16.14-00452	Spring	1
60	16.14-00453	Nut	1
61		Control Cable	1
62	16.14-00124	Bolt Stud	2
	16.14-00341	Astern Lever Repair Kit	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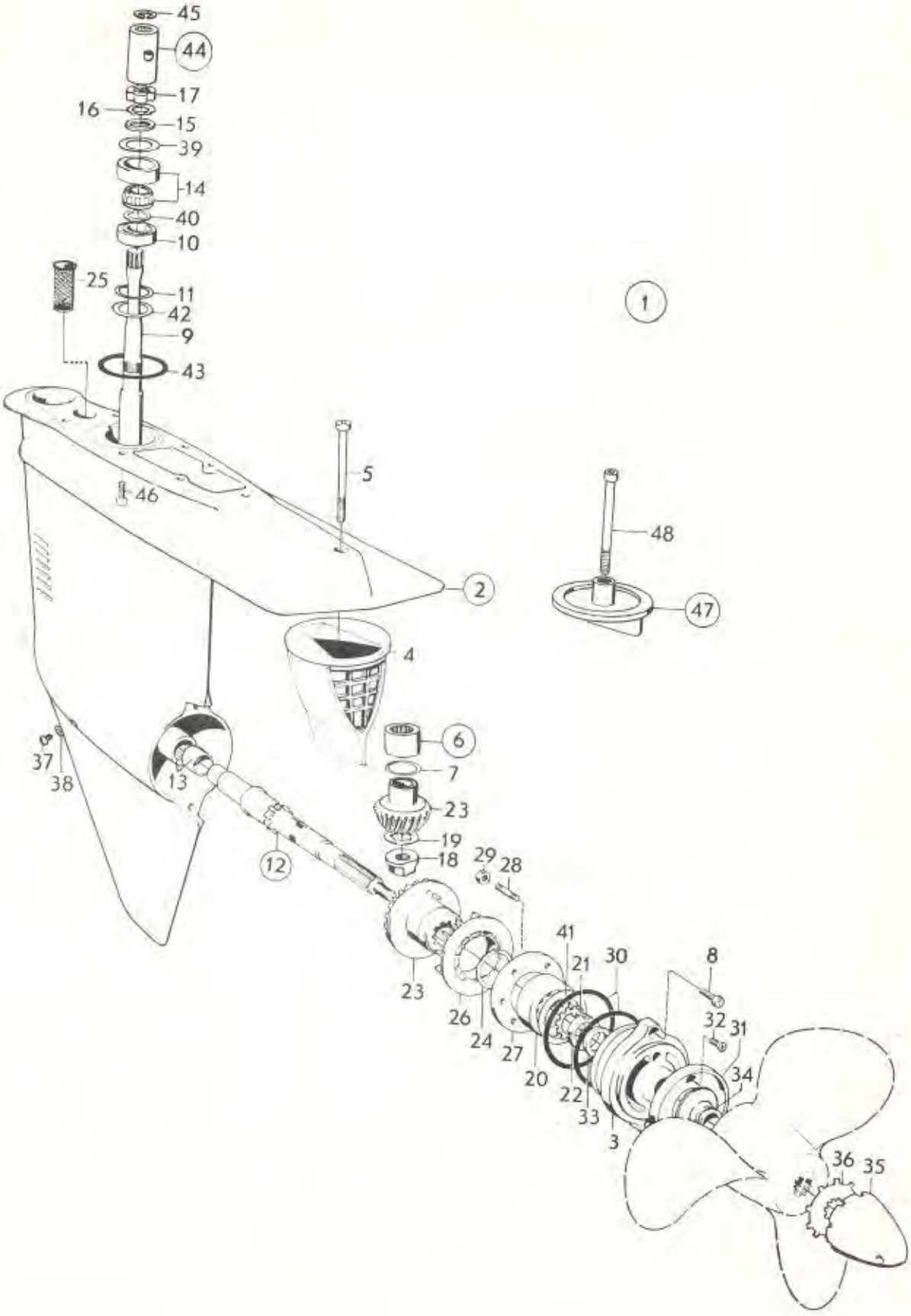
AQ–DRIVE UNIT 270
LOWER GEAR ASSEMBLY AREA

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	16.14-00412	Gear Housing-1.61:1	1
		Lower Gear Unit	1
		Lower Gear Unit	1
2	16.14-00413	Gear Housing, Lower	1
3	16.14-00414	Propeller Bearing Housing	1
4	16.14-00377	Exhaust Port	1
5	16.14-00155	Bolt	1
6	16.14-00421	Full Roller Brg.	1
8	16.14-00181	Screw	2
9	16.14-00368	Intermediate Drive Shaft	1
10	16.14-00416	Ball Bearing	1
11	16.14-00158	Shim	4
	16.14-00159	Shim	1
	16.14-00160	Shim	1
12	16.14-00454	Shaft, Propellor	1
13	16.14-00162	Needle Bearing	1
14	16.14-00163	Roller Bearing	1
15	16.14-00360	Clamp Ring	1
16	16.14-00164	Lock Washer	1
17	16.14-00165	Ring Nut	1
18	16.14-00358	Nut	1
19	16.14-00455	Lock Washer	1
20	16.14-00422	Ball Bearing	1
21	16.14-00169	Lock Washer	1
22	16.14-00170	Ring Nut	1
23	16.14-00415	Gear Kit-1.61:1	1
		Gears Kit	1
		Gears Kit	1
24	16.14-00173	Lock Ring	1
25	16.14-00376	Strainer	1
26	16.14-00351	Centrifugal Pump	1
27	16.14-00456	Washer, Thrust	1
28	16.14-00176	Stud Bolt	6
29	16.14-00177	Nut	6
30	16.14-00353	"O" Ring	2
31	16.14-00347	Zinc Ring	1
32	16.14-00180	Screw	2
33	16.14-00182	Seal Ring	2
34	16.14-00183	Thrust Ring	1
35	16.14-00184	Propeller Cone	1
36	16.14-00185	Lock Washer	1
37	16.14-00186	Plug	1
38	16.14-00539	Washer Disc.	1
39	16.14-00420	Shim	3
	16.14-00419	Shim	AR
	16.14-00418	Shim	AR
40	16.14-00420	Shim	3
	16.14-00419	Shim	3
	16.14-00418	Shim	3
41	16.14-00423	Shim	1
42	16.14-00457	Gasket	1
43	16.14-00195	"O" Ring	1
44	16.14-00196	Spline Sleeve	1
45	16.14-00188	Lock Ring	1
46	16.14-00197	Bolt	4
47	04.59-77253	Trimfin Kit	1
48		Allen Screw	1
49	04.59-77243	Cover Plate, Exh. Wye	1

NOTE: Item 47 and 49 Are Used With Straight Out Exhaust Only.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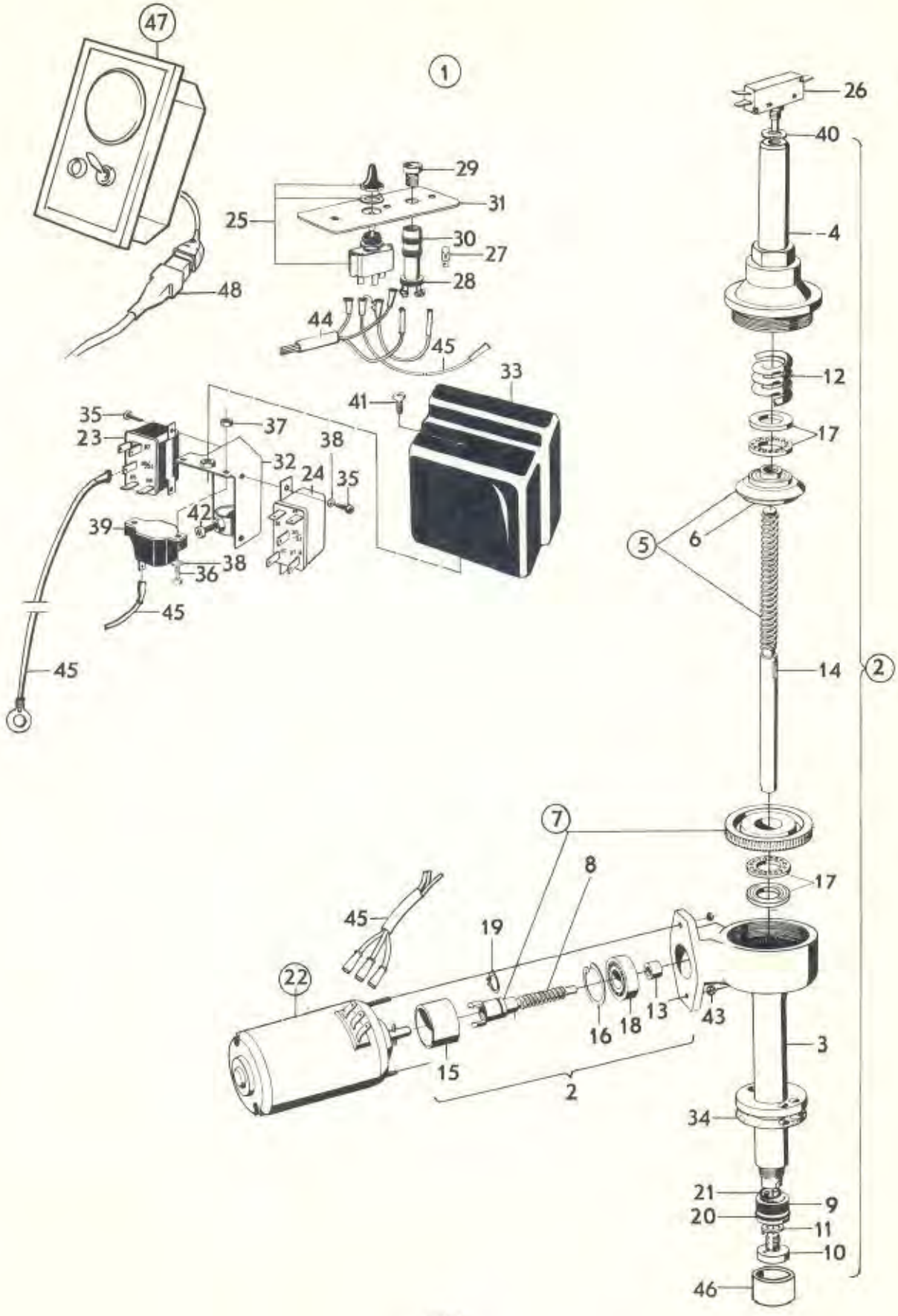
AQ–DRIVE UNIT 270
MECHANICAL LIFT

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	16.14-00198	Mechanical Electric Lift	1
2		Lift Device	1
3	16.14-00199	Lower Part	1
4	16.14-00386	Upper Part	1
5	16.14-00382	Screw Spindle	1
6		Break Nut	1
7	16.14-00383	Worm Gear Complete	1
8		Worm Screw	1
9	16.14-00201	Seal Nut	1
10	16.14-00202	End Screw	1
11	16.14-00369	Lock Washer	1
12	16.14-00293	Spring	1
13	16.14-00469	Bushing	1
14	16.14-00294	Key	1
15	16.14-00470	Guide	
16	16.14-00295	Lock Ring	1
17	16.14-00296	Ball Bearing	2
18	16.14-00297	Ball Bearing	1
19	16.14-00298	Lock Ring	1
20	16.14-00203	"O" Ring	1
21	16.14-00204	"O" Ring	1
22	16.14-00205	Electrical Motor	1
23	16.14-00206	Relay	1
24	16.14-00200	Relay	1
25	16.14-00208	Switch Sell:-16.14-00301	1
26	16.14-00209	Switch	1
27	16.14-00355	Bulb	1
28	16.14-00306	Bulb Holder	1
29	16.14-00232	Glass	1
30	16.14-00307	Socket for Warning Lamp	1
31	16.14-00308	Instrument Plate	1
32	16.14-00236	Bracket	1
33	16.14-00237	Protecting Cover	1
34	16.14-00384	Gasket	1
35	16.14-00471	Screw	4
36	16.14-00472	Screw	2
37	16.14-00473	Nut	2
38	16.14-00474	Lock Washer	6
39	16.14-00210	Circuit Breaker	1
40	16.14-00475	Resilient Washer	1
41	16.14-00476	Screw	1
42	16.14-00477	Screw	1
43	16.14-00478	Lock Nut	2
44	16.14-00479	Cable Unit	1
45		Cable and Cable Terminals	
46	16.14-00480	Bushing	1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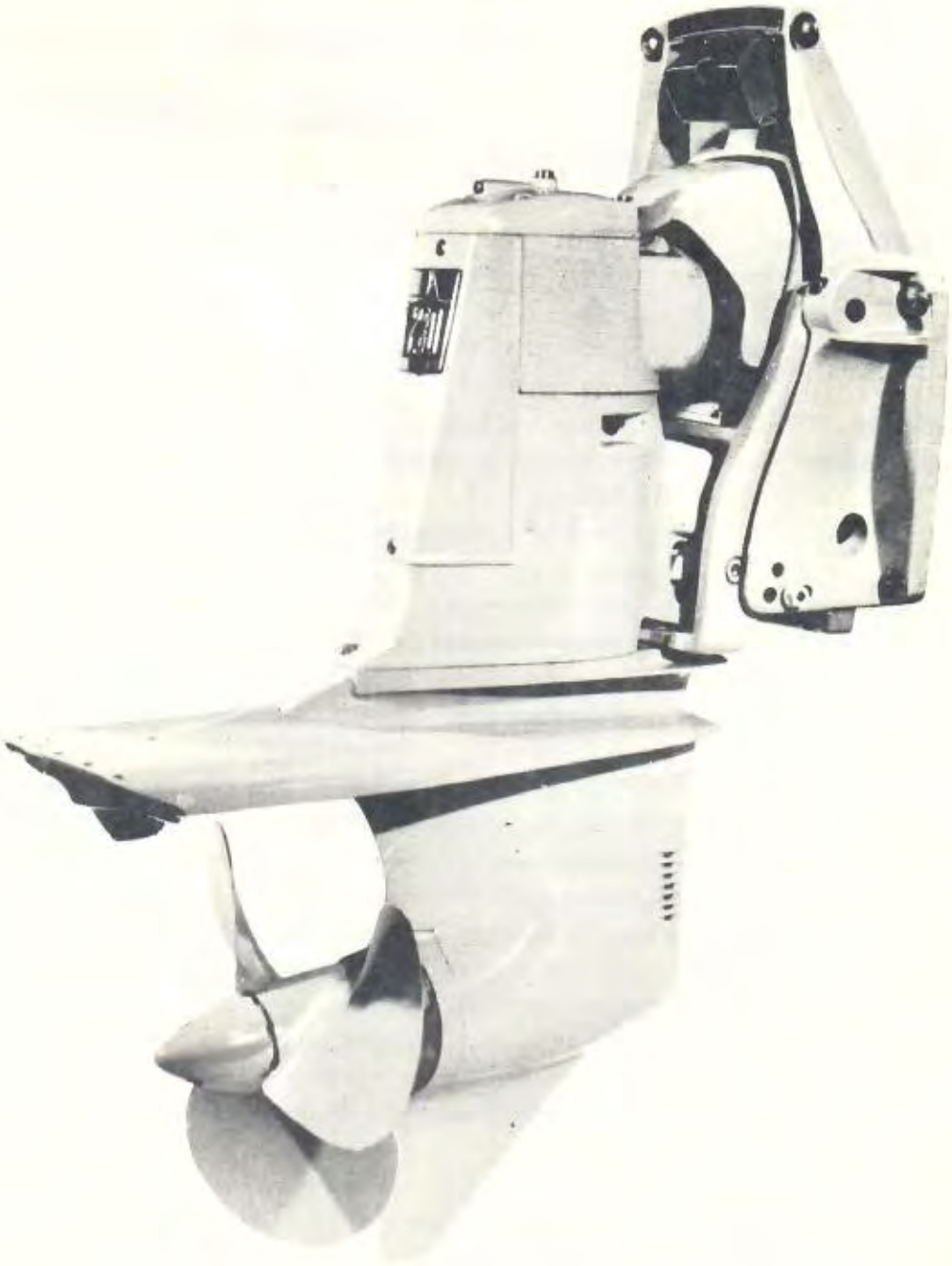
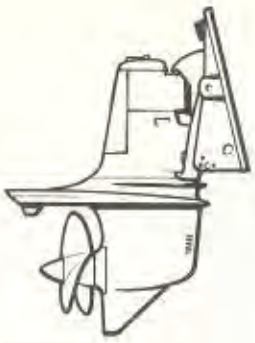


Outboard drive models 280 and 280T



INSTRUCTION BOOK
AQUAMATIC
OUTBOARD DRIVE
280 • 280T

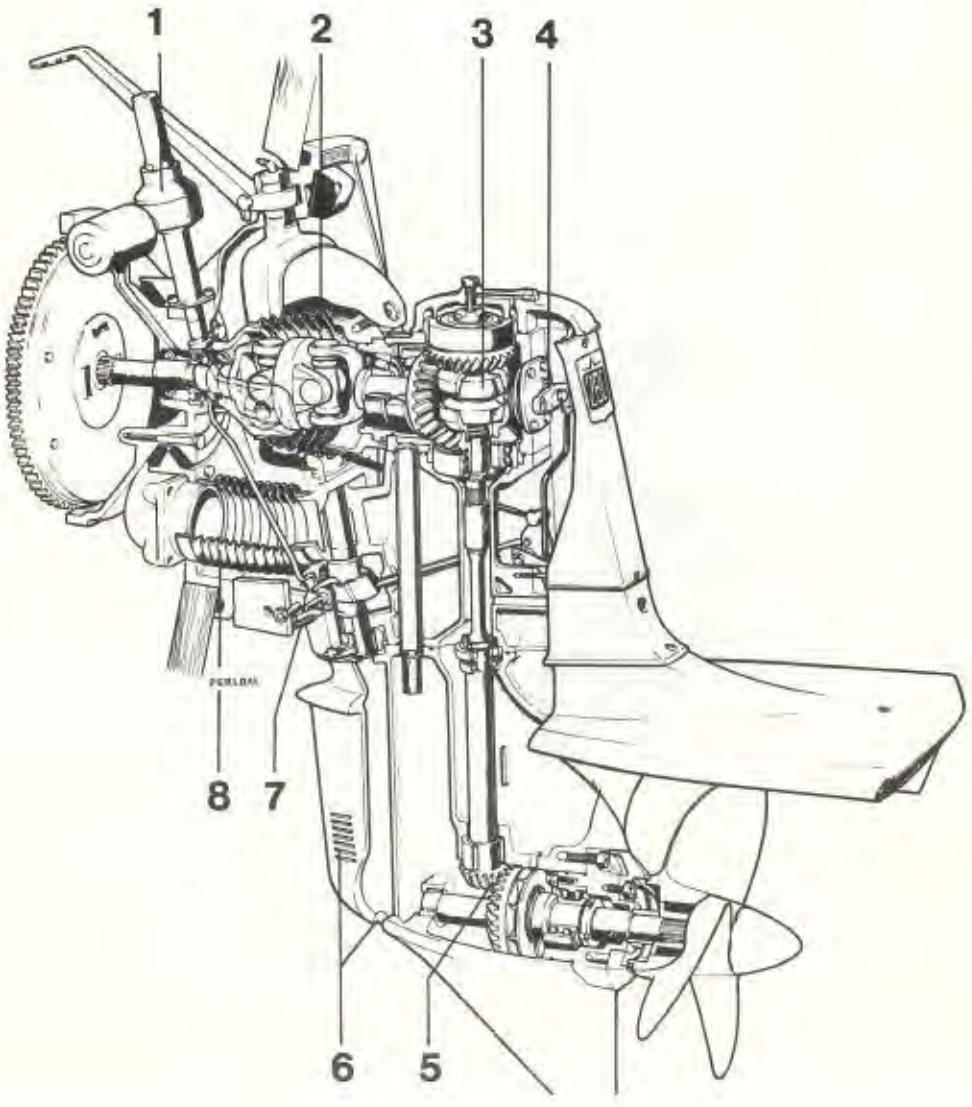
Contents

Drive 280

The Aquamatic outboard drive 280 is a development of the earlier well-known 270 drive. It is flexibly mounted on a collar bolted to the outside of the boat transom and can be tilted up with the help of an electromechanical lifting device.

The lower gear housing on the drive 280 is designed to provide very low current resistance at high speeds.

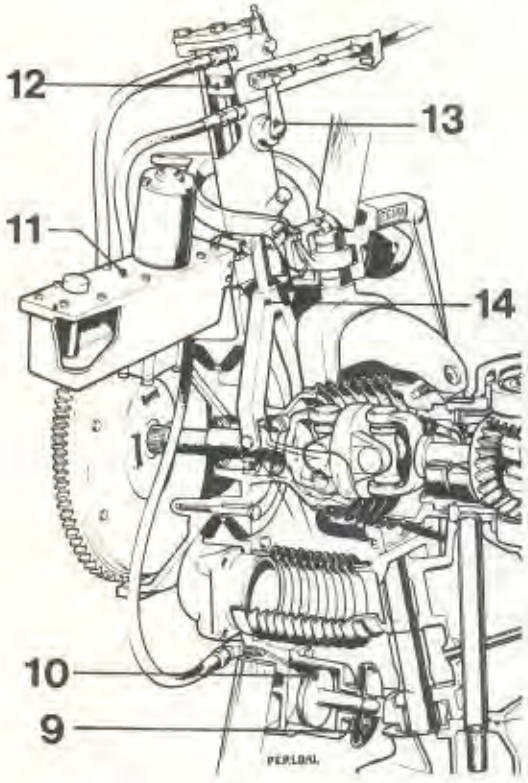
All exposed parts are made of corrosion-resistant material.



Drive 280T

Aquamatic outboard drive 280T is equipped with Internal Power Trim, which means that the drive can be hydraulically trimmed in and out from the boat operator's seat for optimum performance, and can also be tilted up.

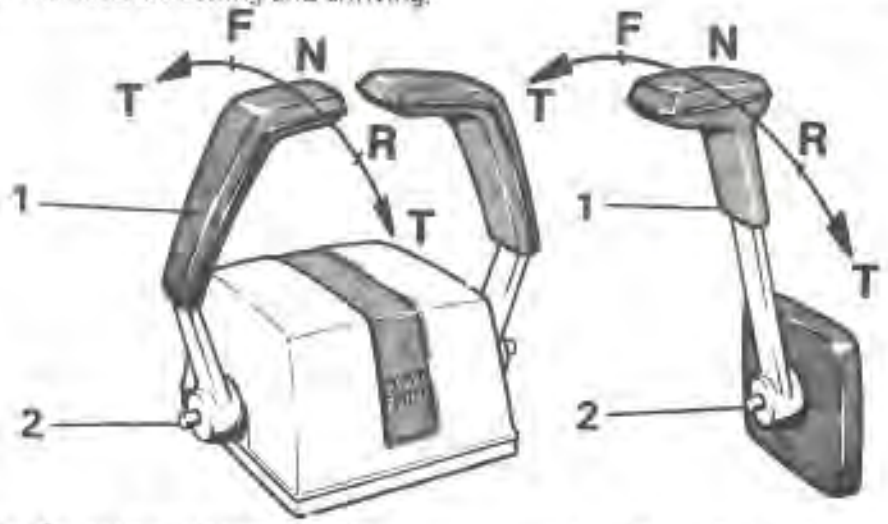
Drive 280T is otherwise identical with drive 280.



1. Electromechanical device for lifting drive
2. Bellows cover for drive joint
3. Silent Shift cone clutch (patented) ensures reliable and smooth engagement
4. Shift mechanism with power-assisted disengagement for easy shifting
5. Propeller gear with generously dimensioned bevel gear for quiet running and long lifetime
6. Water intakes for engine cooling water
7. Mechanical retaining pawl. In the event of striking against an underwater obstacle, the pawl permits the drive to tilt up. This reduces the risk of damage to the drive. Rapid reverse manoeuver, e.g. emergency stopping up to 15 knots without drive "floating up"
8. Exhaust bellow for outgoing cooling water and exhaust gases
9. Bellows cover for trim cylinder
10. Trim cylinder for hydraulically adjusting drive to correct trim underway
11. Hydraulic tank with built-in hydraulic pump
12. Lift cylinder for hydraulically lifting drive to "Beach and Tilt" positions. If striking an underwater obstacle a safety valve in hydraulic system opens and the drive is released to tilt up. The risk of damage to drive and propeller is thus reduced. Rapid reverse manoeuver, e.g. emergency stopping can be carried out up to 15 knots without drive "floating up".
13. Control valve for Forward, Reverse and Neutral
14. Lift yoke, well sealed against impurities and underwater growth

Controls

Described below are the Volvo Penta Single and Twin Control Systems with synchronized throttling and shifting.



Volvo Penta Twin Control System

1. Control lever
2. Neutral throttle knob
   Push the button when the control lever is in neutral and move the lever forward a bit. Release the button. The gear cannot be engaged. Push in the button again and pull back the lever for synchronized throttling and shifting.

Volvo Penta Single Control System

N = Neutral position
F = Forward position
R = Reverse position
T = Throttle

LIFTING THE DRIVE

The 280 drive can be lifted and lowered with the help of the electromechanical lift. It is operated by a switch on the control panel. When the warning lamp lights red, this means that the drive is far enough up to disengage the retaining pawl.

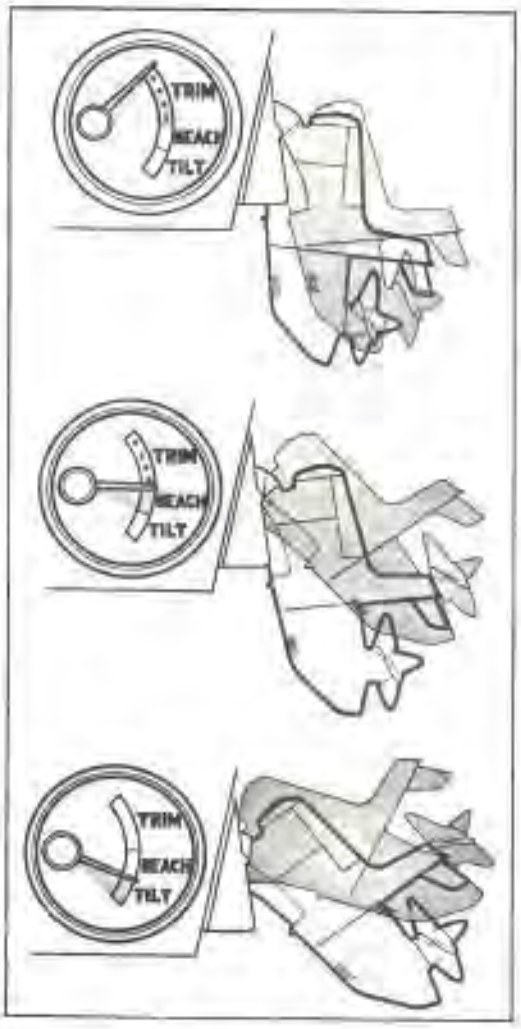
The engine must never be started while the drive is fully up.

The 280T drive is equipped with Power Trim, with which it is possible to manoeuver the drive while underway to "Trim" and "Beach". The drive can also be lifted to "Tilt", that is, it is fully up when the engine is stopped.

The engine must never be started while the drive is at "Tilt".

The drives Power Trim is manoeuvered by means of the control on the panel. The trim indicator always shows the position of the drive.

NOTE. The drive may not be manoeuvered while "Reverse" gear is engaged.



A. Trim

The drive is manoeuverable while underway for optimum performance.

B. Beach

The drive is manoeuverable within "Beach" while underway at low speed and idling, in order to be able to run in shallow water. Once the drive has been adjusted to this position, "Forward" and "Reverse" can be engaged and the speed increased.

C. Tilt

The engine must not be started or driven while the drive is within the tilt area. "Tilt" is intended to be used when the boat is moored in shallow water or when being transported on a trailer.

Running in shallow water

DRIVE 280

When running in shallow water at low speed with great risk of contacting the bottom, it is recommended as an extra safety measure that the retaining pawl for the outboard drive is released with the drive lift.[1] NOTE. **Running "Reverse" cannot be carried out with the retaining pawl released.** Release the retaining pawl as follows:
Move the control switch to the "Up" position until the warning lamp lights up and then keep the switch in this position for another 2–4 seconds. This reduces the risk of damage to the propeller and outboard drive if they come into contact with the bottom.

[1] Normally the outboard drive kicks up automatically if it strikes an object under water.

DRIVE 280T

If the boat is to be run in shallow water and there is risk of contacting the bottom, the engine speed should be cut back to idling and the drive lifted to "Beach" in order to eliminate possible damage to the propeller. Then the engine speed can be stepped up. "Trim" is marked in green on the trim indicator. "Beach" is white and "Tilt" red on the indicator.

If the drive has been lifted to the borderline between the white and red fields on the trim indicator, the boat speed should be low. **If the drive has been lifted so that the pointer on the trim indicator points to the red field, the engine must not be driven.**

Running in reverse

DRIVE 280

Running "Reverse" can only be carried out when this drive is fully down and the retaining pawl has locked the drive in this position. The warning lamp indicating lifted drive must always be off before running in reverse.

DRIVE 280T

Running "Reverse" can be carried out without hindrance with this drive at "Trim" or "Beach". The drive can be operated fully, and thus the boat can be manoeuvered in "Reverse", with the drive adjusted to "Trim" or "Beach".

The trim of the boat

Range of use for adjusting pin. Drive 280

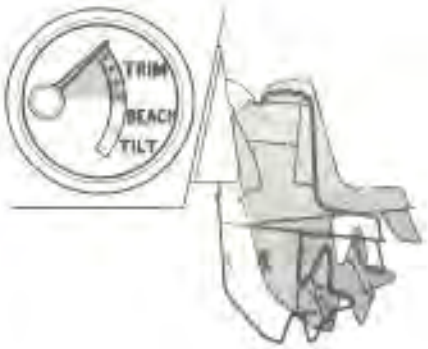
DRIVE 280

The angel between the outboard drive and the transom is adjustable on drive 280 by moving the adjusting pin to one of the three alternative holes. Normally the best position for the drive is with the adjusting pin in hole 2.

1. Position to counteract "nose-heavy" tendency
2. Normal position
3. Position to counteract "stern-heavy" tendency

DRIVE 280T

The angle between the 280T drive and transom is infinitely adjustable from the boat operator's seat while underway. The trim indicator shows the trim position on the indicator green field. In order to reach maximum speed more quickly or to counteract "stern-heavy" tendencies, the drive should be trimmed in all the way. This means that the trim indicator pointer should point to the bottom of the green field on the indicator. If the maximum speed hull position is such that the boat has a tendency to be "nose-heavy", the drive should be trimmed out so that pointer moves to "Beach".



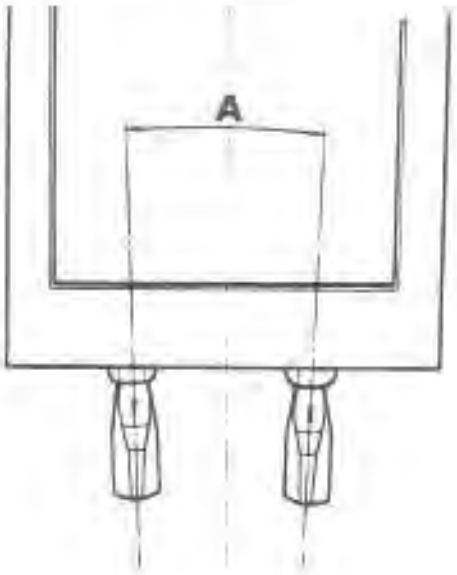
Trim range. Drive 280T

In order to reach maximum speed hull position more rapidly and also to improve the boat's running in the case of certain boat types, it may be advisable to fit Volvo Penta trim tabs.

Adjustment of steering rods in case of twin engine installation

For optimum propeller efficiency, it is important to adjust the angle of the drives so that the meeting point between the wash from the two propellers is well behind the boat. The angle between the drives increases with deeper V-bottom. See "A" in adjacent illustration. If the angle is too narrow, this will often result in propeller cavitation.

Fine adjustment of this angle can be carried out be means of the link between the two drive steering rods.

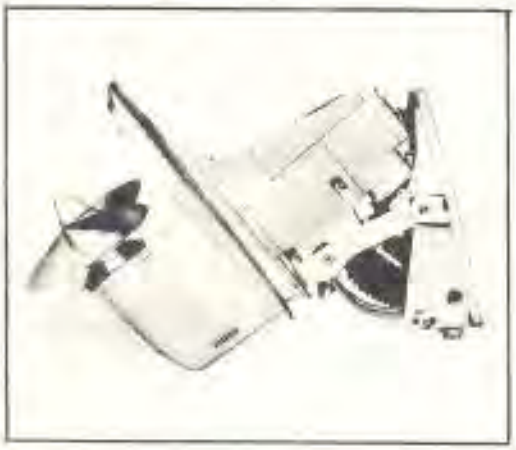


Adjusting for deviation from course

The outboard drive is fitted with a trim tab which can be turned to counteract any tendency towards deviation from course in the steering while underway. Check course deviation with the steering wheel in its neutral position and at cruising speed.

The trim tab is adjusted when necessary by loosening the lock screw and turning the **trailing edge** of the trim **towards** the course deviation. Tighten the lock screw and test-run the boat. Repeat adjustment if necessary until the best courseholding is obtained with the steering wheel in the neutral position.

Trailing



When the boat is being towed on a trailer, the outboard drive should be raised as far as it will go. In order to prevent the drive from shaking down from its tipped-up position, the drive is supplied with a transport bracket, which is fitted as follows:

Place the bracket handle in the yoke recess, press together the lower part of the bracket so that both the pins can be located in the mounting collar holes.

Maintenance scheme

The servicing procedure in the maintenance scheme below are numbered and these numbers refer to the description on the following pages.

Point	Operation	To be carried out:		
		Every 14 days	After[1] 50 hours running	After[1] 100 hours running
	PERIODICAL SERVICING			
1	Checking the oil level in outboard drive	●		
2	Checking the oil level in hydraulic tank (280T)	●		
3	Changing the oil in outboard drive			●
4	Greasing the drive shaft bearing and steering bearings		●	
5	Checking the anti-corrosion devices	●		
	GENERAL SERVICING INSTRUCTIONS	To be carried out according to the intervals given under the respective points or when necessary		
6	Removing and fitting the propeller			
7	Adjusting the retaining pawl and connecting up the gear control cable, drive 280			
8	Connecting up gear control cable, drive 280T			
9	Carry out general inspections			
10	Preparing the unit for laying up			

1) Or once each season, whichever occurs first

1 Checking the oil level in outboard drive

Check the oil level every 14 days by using the dipstick in the cover over the upper gear housing. This check must be carried out while the outboard drive is in its lowered position.

The oil dipstick should not be screwed in when the oil level is checked.

The oil level should be within the field on the lower flat part of the dipstick.

The correct oil grade and viscosity are shown in the "Technical Data". Fill up through the dipstick hole or through the oil filler hole just inside the protective cover after the drive has been tilted up.

2 Checking the oil level in hydraulic tank, drive 280T

Hydraulic tank

1. Oil dipstick
2. Oil filler hole

Check the oil level in the hydraulic tank every 14 days by using the dipstick on top of the tank. Observe great care when carrying out this check that no foreign particles drop down into the tank.

The oil level should be within the field on the flat part of the dipstick.

When necessary top up through the oil filler hole to the correct level with oil which meets the requirements given in "Technical Data". NOTE Ordinary engine oil must not be used.

3 Changing the oil in outboard drive

Changing the lubricating oil after every 100 hours running or at least once each season. Tilt up the drive and drain off the old oil by removing the plug. The oil filler plug should be unscrewed to enable the oil to run out more easily.

Fill up with oil through the oil filler hole. Concerning quality and viscosity, see "Technical Data". The drive should be in its tilted-up position when oil is being filled.

After filling up, screw the oil filler plug into position again and lower the drive completely. Check the oil level by following the instructions in point 1 and fill up if required through the dipstick hole or oil filler hole. Make sure that the O-rings under the plugs and dipstick are in good condition.

NOTE. Never allow the oil level to get above the MAX mark on the dipstick.

Oil draining

Oil filling

4 Greasing the drive shaft bearing and steering bearings

After every 50 hours running the lubricating points mentioned below must be greased with Multipurpose grease:

The drive shaft bearing in the flywheel housing is greased by filling the grease nipple with grease and screwing it in all the way.

The steering rod bearing is greased through the lubricator on the inside of the mounting collar. Force in so much grease that it seeps out at the bearing.

The steering shaft bearing is greased through the grease nipple by using a grease gun. Force in so much grease that it seeps out at the wear washer.

5 Checking the anti-corrosion devices

At least every 14 days check how much the zinc electrodes have been corroded. When about 50 % of the original size has been corroded away, replace the electrodes as follows:

ZINC RING

Remove the propeller and spacer ring with deflector ring (see point 6 "Removing and fitting the propeller") and remove the Philips screws retaining the zinc ring.

Scrape the contact surface against the bearing housing clean and fit a new zinc ring. Make sure that there is good metallic contact between the zinc ring and the propeller housing.

ZINC PLATE

Unscrew the zinc plate which is fitted under the mounting collar. Clean the contact surfaces and fit a new zinc plate. NOTE. The drive 280T has two zinc plates, one on each side of the trim cylinder.

NOTE. Do not paint the zinc ring or zinc plate.

6 Removing and fitting the propeller

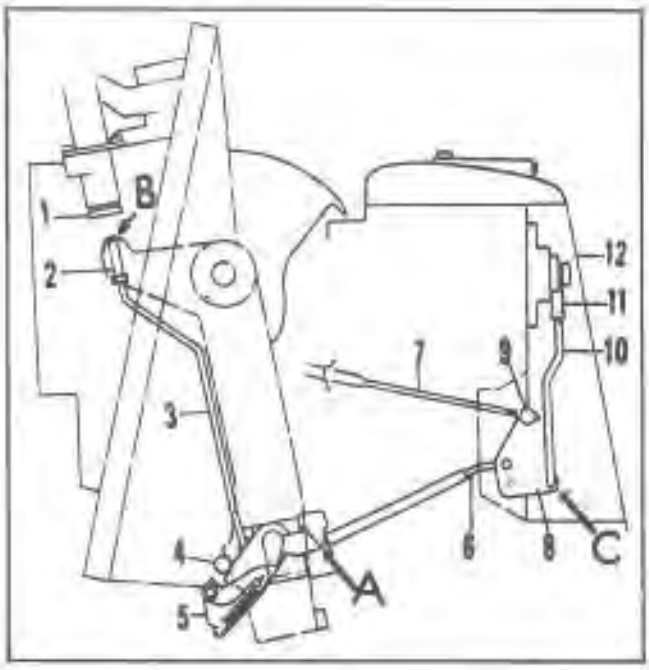
1. Knock up the tabs on the lock washer for the propeller cone.
2. Unscrew the propeller cone with the help of a screwdriver which is pushed in through the hole in the propeller cone. Then pull off the propeller. Note the spacer ring on the inside of the propeller.
3. Clean the propeller shaft and apply graphite grease, or equivalent, to the shaft.
4. **When changing the propeller, check that the new one has the same size and markings as the earlier unit.**
5. Fit the propeller. NOTE. The spacer ring and deflector ring (see Fig) should be fitted between the propeller and the gear housing.

   NOTE. Lock the propeller cone by staking all the teeth on the lock washer.

   If the teeth of the lock washer do not fit in the middle of the cone recess, unscrew the cone and move the lock washer one spline position on the propeller shaft.

7 Adjusting the retaining pawl and connecting up the gear control cable, drive 280

Check once each season, and adjust when necessary, the position of the locking rod against the retaining pawl "A" and also the position of the push rod "B" for lift disengagement of the retaining pawl. Adjust as follows:



Adjusting retaining pawl, drive 280

1. Remove the protective cover (12) on the upper gear housing in order to get at the shift mechanism. Move the control lever to the neutral position.
2. Disconnect the gear control cable "dice" (9) from the lever (8) and the yoke (11) from the gear lever.
3. Loosen the locknut for the yoke (11) and turn the yoke on the gear rod (10) thread so that at the connection with the gear lever the push rod (6) goes into such a position that it just contacts (without pressure) the pawl at "A". Secure the yoke (11) in this position with the locknut.
4. Adjust the gear cable "dice" (9) so that it can easily be moved into the hole on the lever (8) and secure it in this position. Move the control lever to the "Forward" position and check that the corner "C" does not contact the intermediate housing. Fit the cover over the gear shift mechanism.
5. **Press the drive forward, against the adjusting pin,** and check the position of the push rod (3). The upper part (2) of the rod should be level with the yoke at

8 Connecting up gear control cable, drives 280 and 280T

In those cases where the drive has been removed from the boat and is to be re-fitted, the gear control cable must be connected to the drive shift mechanism as follows:

1. Move the control lever at the boat operator's seat to neutral position.
2. Remove the protective cover over the shift mechanism. Move the shift mechanism lever to neutral position.
3. Push the gear control cable in as far as it can go and then pull it out fully in order to check for play. Then push in the cable to half the length of the measured play. Screw on the "dice" so far that its pin fits in the lever on the shift yoke. Lock the "dice" with the locknut on the gear control cable.
4. Check that the "dice" and the gear rod are properly adjusted by moving the control lever to "Forward", "Neutral" and "Reverse" while checking at the same time that the "dice" and gear rod do not jam in their bearings. Adjust if necessary.

   Check to make sure that the corner "C" (point 7) does not knock against the housing.
5. Lock the "dice" to the lever with washer and split pin.

9 Carry out general inspection

General inspection of the outboard drive must be carried out after every 100 hours running or at least once each season. Clean the outside of the drive and touch up any damaged paintwork. Paint the underwater parts of the drive and also the cooling water intake channels with anti-fouling paint (must not include copper or mercury).

NOTE. Do not paint the zinc ring or zinc plate.

At the same time check for oil leakage and ensure that the rubber bellows are in good condition and that there is no abnormal wear on the links for the control mechanism.

For drive 280T, the Internal Power Trim should also be checked to make sure that there is no leakage at connections or joints.

10 Preparing the unit for laying up

Even insignificant corrosion on precision-machined parts can result in a serious deterioration in the condition of these parts.

If the outboard drive is to remain idle for a longer period than one month, we recommend that it should be given protective treatment as described below.

PROTECTIVE TREATMENT

Drain off the oil from the drive and fill up with preservative oil (for example, Shell Ensis Oil 20 or similar). NOTE. The hydraulic system on drive 280T does not require protective treatment. First clean the drive externally with fresh water and then with kerosene or similar solvent. Remove all marine growth and deposits. Then touch up any of the paintwork that may be damaged. **NOTE. Do not paint the zinc ring and zinc plate.** Protect the outboard drive externally by applying rust-proofing oil.

If the outboard drive is dismounted from the boat, a cover has to be fitted over the stub shaft in the flywheel housing.

Painting the outboard drive

1. Drive
2. Primer
3. Surface coat
4. Anti-fouling coat

PREPARING FOR USE AGAIN

Drain off the preservative oil from the outboard drive. Fill up with oil (see "Servicing", point 3).

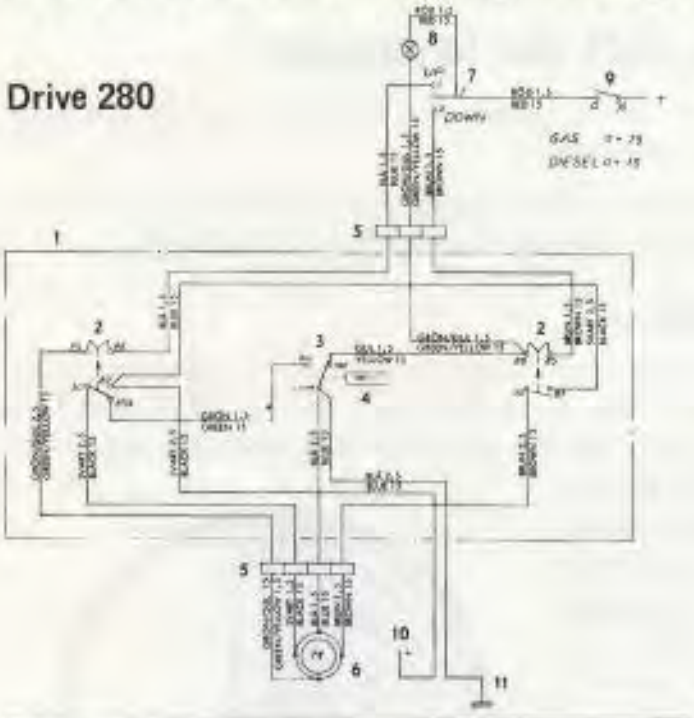
Clean the outboard drive externally from rust-proofing oil and replace the zinc ring and zinc plate on the outboard drive, see "Servicing", point 5.

Carefully check the bellows for damage and re-tighten all hose clips. If the drive has been removed, make sure when re-fitting that the bellows and hoses are correctly fitted. Adjust the control cable and retaining pawl, see "Servicing", point 7 for drive 280 and point 8 for drives 280 and 280T.

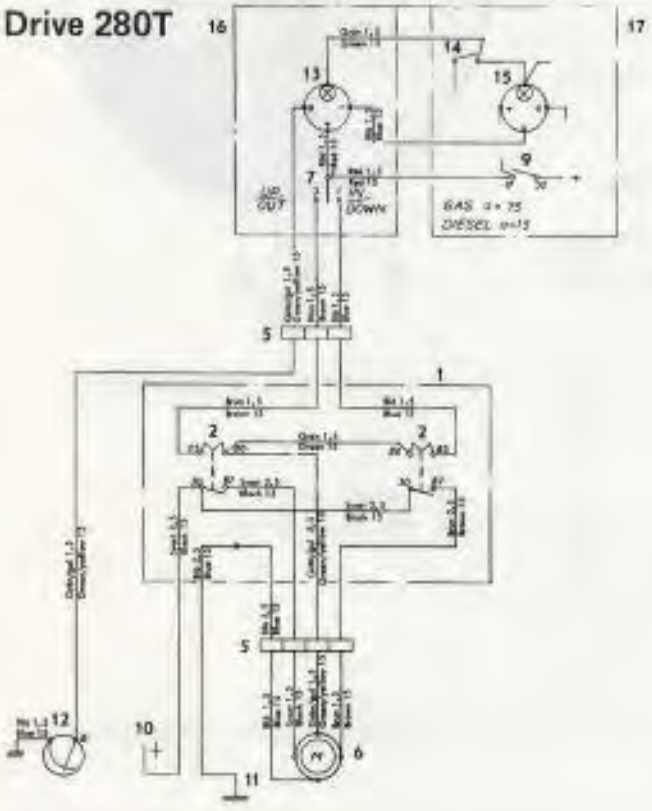
Paint the underwater parts of the outboard drive and the cooling water intake channels with anti-fouling paint (must not include copper or mercury).

Electrical wiring diagrams

Drive 280

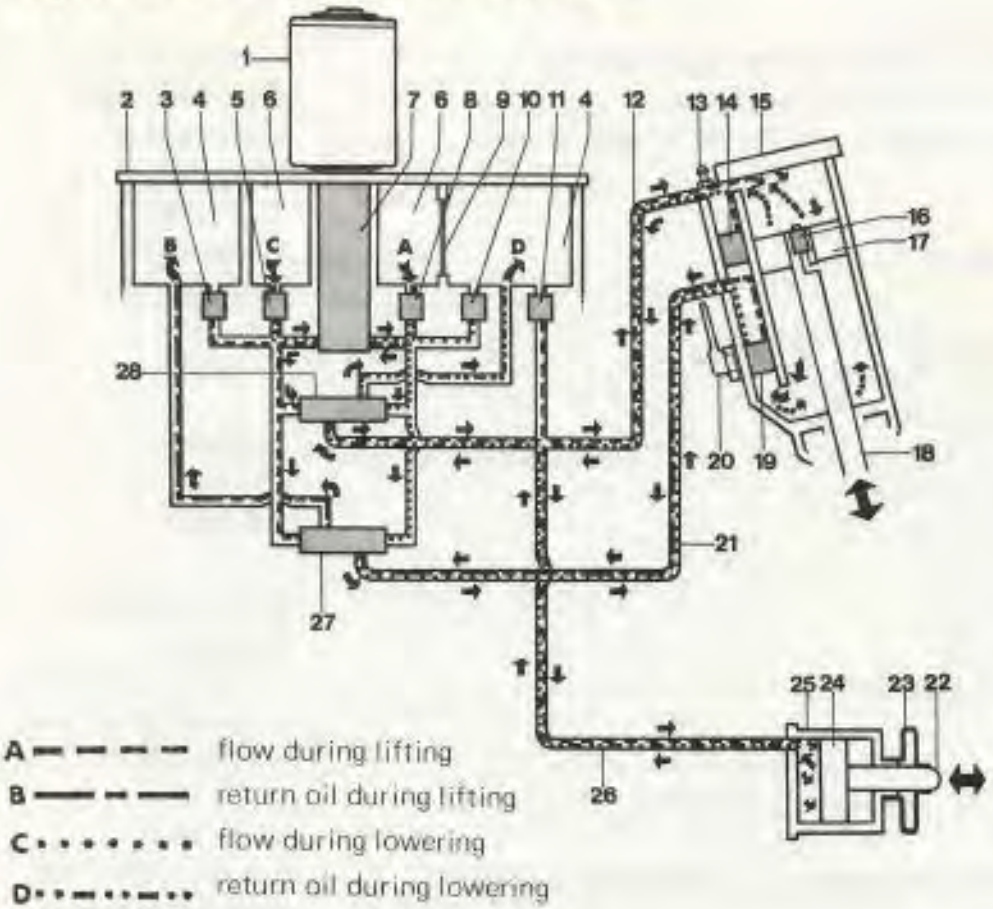


Drive 280T



1. Relay box
2. Relay
3. End position switch
4. Push rod, retaining pawl
5. Connector
6. Electric motor
7. Manoeuver switch
8. Warning lamp
9. Key switch
10. Connected to 30 (+) on starter motor
11. Connected engine body
12. Sender for trim indicator
13. Trim indicator
14. Switch, instrument panel lighting
15. Temperatur gauge
16. Instrument panel, trim
17. Main instrument panel

Internal Power Trim, 280T
Hydraulic function layout



Hydraulic function for Internal Power Trim, outboard drive 280T

1. Motor
2. Tank
3. Relief valve, lifting
4. Return tank
5. Check valve for lifting
6. Drain tank, filtered oil
7. Pump
8. Check valve for lowering
9. Strainer
10. Relief valve, lowering
11. "Beach" valve
12. Hose
13. Venting nipple
14. Safety release valve
15. Lift cylinder
16. Safety valve
17. Piston, lift cylinder
18. Lift yoke
19. Control valve, closes when reversing
20. Control lever
21. Hose
22. Contact face, trim cylinder – drive
23. Rubber bellow
24. Piston, trim cylinder
25. Trim cylinder
26. Hose
27. Ball valve
28. Ball valve

Technical Data

Type designations	
Drive with electromechanical lift device	Aquamatic 280
Drive with Internal Power Trim	Aquamatic 280T
Reduction ratios, total, "Forward" and "Reverse"	1.61:1/280 B 1.89:1/280 C 2.15:1/280 D
Shift mechanism	"Silent Shift" self-adjusting cone
Maximum propeller diameter	16"
Tip-up angle, drive 280	0^{o}–60^{o}
Tip-up angle, drive 280T	
Trim position	-4^{o}–$+5^{o}$
Beach position	5^{o}–30^{o}
Tilt position	30^{o}–60^{o}
Lift unit, type	
drive 280	Electromechanical
drive 280T	Hydraulic
Lubricating system	Circulation pump for oil supply to all lubricating points
Oil capacity, outboard drive, approx.	2 1/2 US qts. (2.6 liters)
Oil capacity between max. and min. marks, approx.	1/5 pint (0.15 liter)
Oil quality	Multigrade Service SE[1]
Oil viscosity	SAE 10W/30 or 20W/40
Oil capacity, hydraulic system, drive 280T, approx.	1 1/2 US qts. (1.5 liters)
Oil quality, hydraulic system, drive 280T	Automatic Transmission Fluid, Type F, A[2] or Dexron [2]

[1] Earlier designation, Service MS
[2] Only if type F is not available

Adjustment for change from L-H to R-H propeller

The gears in the outboard drive are designed to operate in either direction of rotation, for use with either left-hand or right-hand propeller.

In the standard unit, for use with left-hand propeller, the lower clutch-and-gear functions as the forward drive gear. If it is desired to use a right-hand propeller, as required for the starboard unit of a pair, the linkage of the shifting mechanism may be reversed by a simple change in the assembly, whereupon the upper gear will become the forward drive gear. The procedure then is as follows:

1. Remove the cover from the gear mechanism.
2. Move the gear control rod from "A" to "B", see Figure.

Location of gear rod for use with right-hand propeller

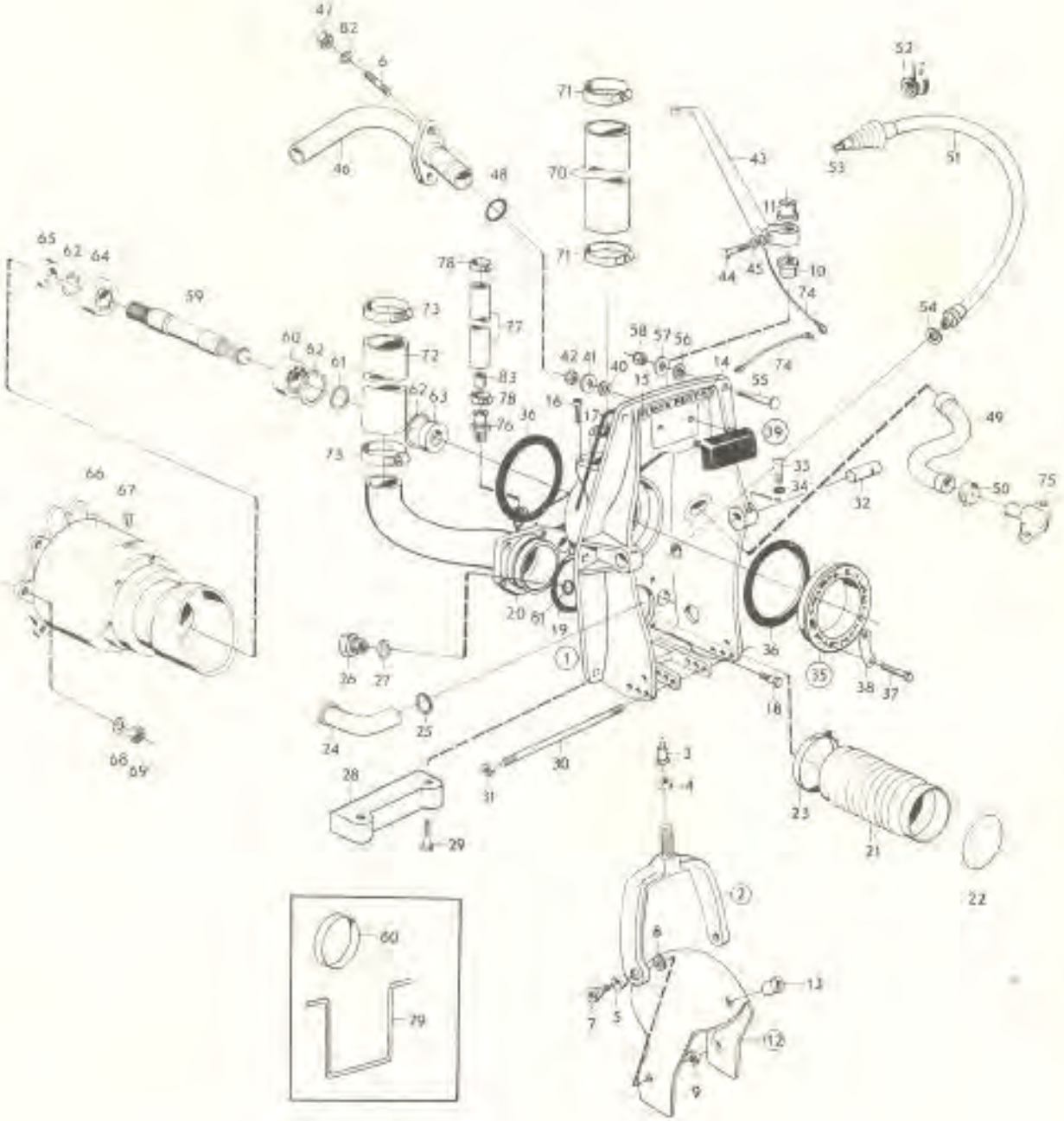
Standard location of gear rod for use with left-hand propeller

By reference to the Fig. it will be observed that in both positions of the gear rod (A and B), the cable from the shift control lever has a "push" motion for engaging the forward gear. Check and adjust the shift linkage according to "Servicing", point 7, page 14.

AQ–DRIVE UNIT 280
CONNECTING COMPONENTS

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	16.14-00485	Shield	1
2	16.14-00486	Steering yoke	1
3	16.14-00321	Grease nipple	1
4	16.14-00487	V-ring	1
5		Bushing	2
6	16.14-00001	Stud	2
7	16.14-00024	Bearing ball	2
8	16.14-00023	Washer	2
9	16.14-00322	Nut	2
10	16.14-00488	Bushing, lower	1
11	16.14-00489	Bushing, upper	1
12	16.14-00319	Protecting cap	1
13		Bushing	1
14	16.14-00490	Emblem "Volvo Penta"	1
15	16.14-00491	Drive screw	2
16	16.14-00241	Allen screw	2
17	16.14-00002	Rubber seal	1
18	16.14-00492	Screw	4
19	16.14-00006	O-ring	1
20	16.14-00493	Exhaust outlet	1
21	16.14-00028	Exhaust bellow	1
22	16.14-00494	Ring	9
23	16.14-00029	Hose clamp	3
24	16.14-00356	Rubber bend	1
25	16.14-00363	Washer	1
26	16.14-00366	Plug	1
27	16.14-00034	Packing	1
28	16.14-00370	Zink electrode	1
29	16.14-00371	Allen screw	2
30	16.14-00008	Setting pin	1
31	16.14-00009	Nut	2
32	16.14-00010	Bearing pin	2
33	16.14-00011	Allen screw	2
34	16.14-00012	Washer	2
35	16.14-00013	Clamping ring kit	1
36	16.14-00014	Rubber ring	2
37	16.14-00015	Screw	6
38	16.14-00016	Lock washer	3
39	16.14-00495	Rubber cushion	1
40	16.14-00459	Packing	2
41	16.14-00460	Washer	2
42	16.14-00461	Nut	2
43	16.14-00509	Steering lever	1
44	16.14-00589	Screw	1
45	16.14-00375	Washer	1
46	16.14-00379	Water pipe grommet	1
47	16.14-00020	Nut	2
48	16.14-00019	O-ring	1
49	16.14-00151	Rubber hose	1
50	16.14-00510	Hose clamp	2
51	16.14-00511	Hose with rubber bellows	1
52	16.14-00512	Clamp	1
53		Control cable	1
54	16.14-00034	Packing	1
55	16.14-00252	Screw	6
56	16.14-00035	Packing	6
57	16.14-00253	Washer	6
58	16.14-00254	Nut	6
59	16.14-00513	Primary shaft	1
60	16.14-00514	Ball bearing	1
61	16.14-00067	Circlip	1
62	16.14-00065	Circlip	3
63	16.14-00515	Seal-ring	1
64	16.14-00034	Ball bearing	1
65	16.14-00515	Seal ring	1
66	16.14-00517	Primary shaft housing	1
67	16.14-00186	Plug	1
68	16.14-00518	Washer	6
69	16.14-00519	Nut	6
70	16.14-00522	Rubber hose	1
71	16.14-00521	Hose clamp	2
72	16.14-00522	Rubber hose	1
73	16.14-00521	Hose clamp	2
74		Cables and cable terminals	1
75	16.14-00524	Hose union	1
76	16.14-00525	Elbow union	1
77	16.14-00526	Rubber hose	1
78	16.14-00521	Hose clamp	2
79	16.14-00380	Catch	1
80	16.14-00528	Protection cap	1
81	16.14-00529	O-ring	4
82	16.14-00530	Washer	2
83	16.14-00531	Restriction	1

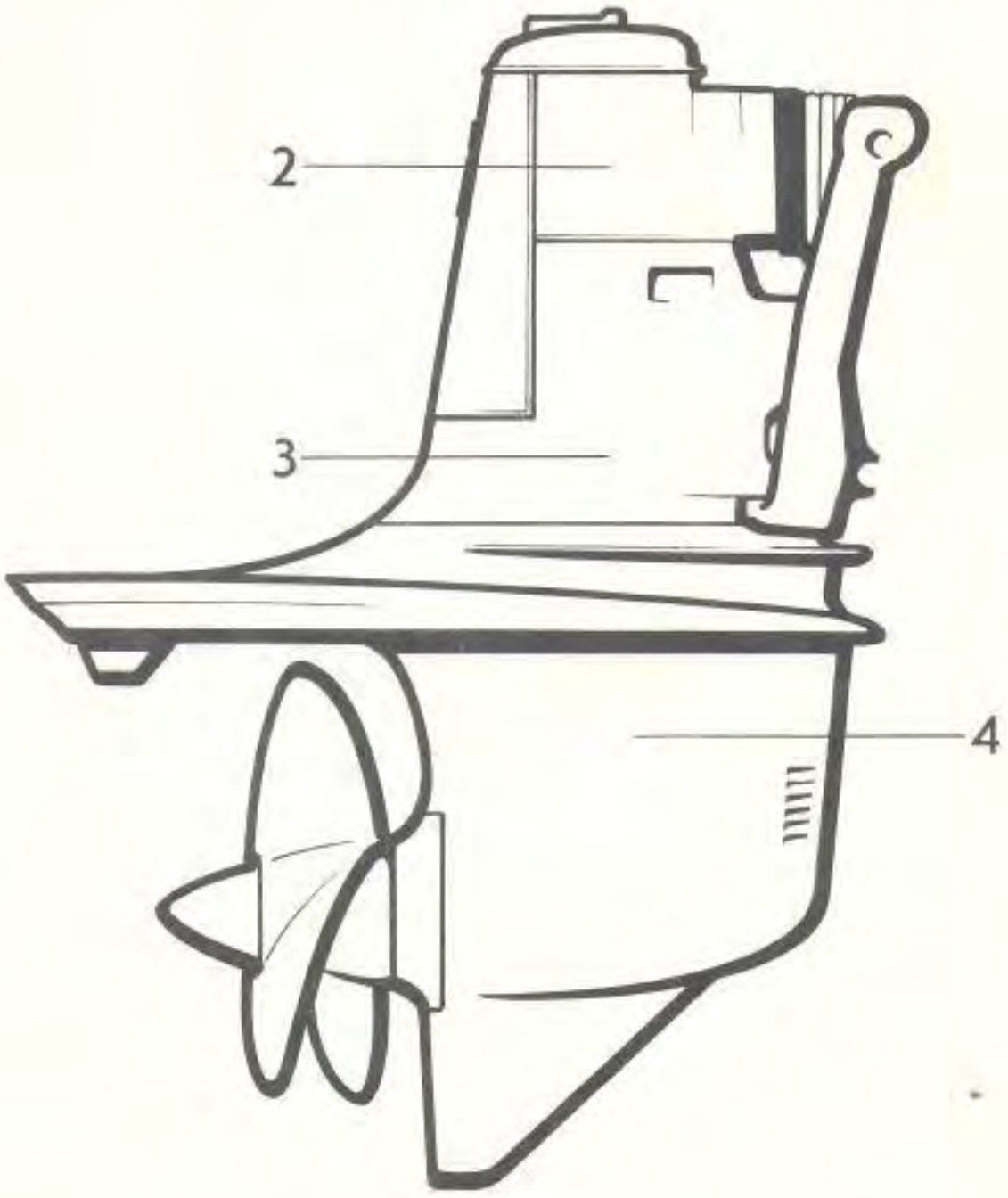


AQUAMATIC–DRIVE UNIT 280

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	48.71-00023	AQ-drive unit 280B	1
2	16.14-00500	Upper gear unit	1
3	16.14-00410	Interm. housing	
4	16.14-00545	Lower gear unit	
	16.14-00499	Gasket set	

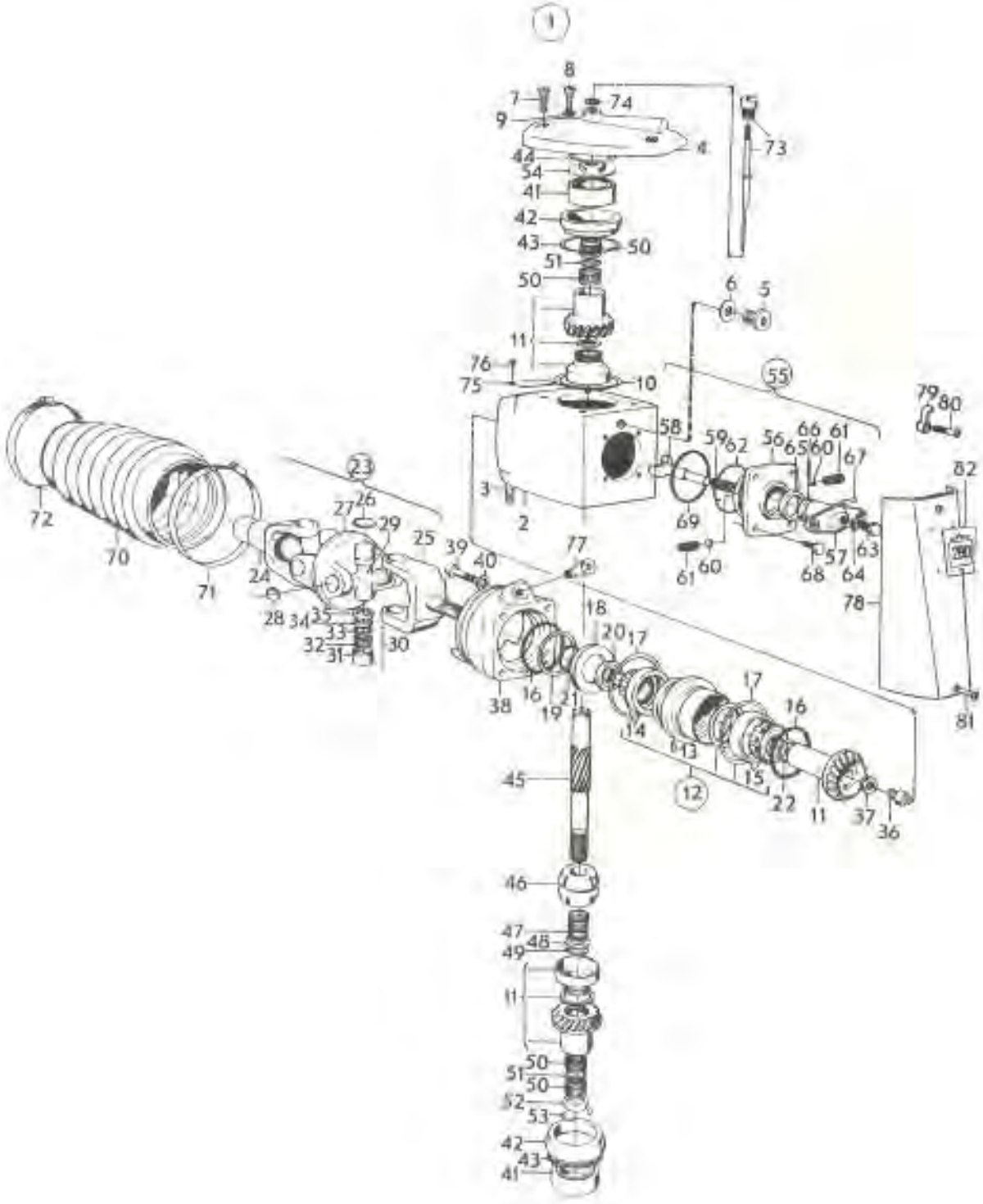
(1)



AQ–DRIVE UNIT 280
UPPER GEAR UNIT

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	16.14-00500	Upper gear unit	1
2	16.14-00391	Housing	1
3	16.14-00464	Stud	2
4	16.14-00392	Cover	1
5	16.14-00146	Plug	1
6	16.14-00147	Packing	1
7	16.14-00123	Bolt	3
8	16.14-00431	Hollow screw	1
9	16.14-00393	O-ring	1
10	16.14-00394	Gasket	1
11	16.14-00501	Gear set	1
12	16.14-00328	Double bearing unit	1
13	16.14-00465	Peg	1
14	16.14-00502	Roller bearing	1
15	16.14-00503	Roller bearing	1
16	16.14-00062	O-ring	2
17	16.14-00063	Shim	A.R.
	16.14-00064	Shim	A.R.
18	16.14-00504	Seal ring	1
19	16.14-00433	Lock ring	1
20	16.14-00396	Head washer	1
21	16.14-00066	O-ring	1
22	16.14-00397	Shim	A.R.
	16.14-00398	Shim	A.R.
	16.14-00399	Shim	A.R.
23	16.14-00482	Universal joint	1
24	16.14-00110	Fork	1
25	16.14-00506	Fork	1
26	16.14-00112	Lock ring	4
27	16.14-00113	Interm. piece	1
28	16.14-00267	Lock ring	4
29	16.14-00114	Cross piece	2
30	16.14-00115	Needle bearing	8
31		Ring outer	8
32		Needle	232
33		Seal washer	8
34	16.14-00268	Protector ring	8
35	16.14-00116	Cork ring	8
36	16.14-00507	Screw	1
37	16.14-00508	Washer	1
38	16.14-00334	Clampring	1
39	16.14-00091	Bolt	4
40	16.14-00090	Washer	4
41	16.14-00590	Roller bearing	2
42	16.14-00404	Bearing sleeve	2
43	16.14-00405	Shim	A.R.
	16.14-00532	Shim	A.R.
	16.14-00406	Shim	A.R.
44	16.14-00407	Shim	A.R.
	16.14-00408	Shim	A.R.
	16.14-00409	Shim	A.R.
45	16.14-00078	Shaft	1
46	16.14-00325	Sliding sleeve	1
47	16.14-00081	Spring	1
48	16.14-00082	Washer	1
49	16.14-00533	Lock ring	1
50	16.14-00077	Needle bearing	4
51	16.14-00262	Spacer ring	2
52	16.14-00263	Spacer ring	1
53	16.14-00083	Lock ring half	2
54		Nut	1
	16.14-00534	Nut with wear plate	
	16.14-00535	Nut with wear plate	
	16.14-00536	Nut with wear plate	
55	16.14-00326	Gear mechanism	1
56	16.14-00093	Bearing housing	1
57	16.14-00094	Eccentric piston	1
58	16.14-00327	Sliding shoe	1
59	16.14-00097	Steel ball	1
60	16.14-00102	Steel ball	2
61	16.14-00537	Spring	2
62	16.14-00095	Lock wire	A.R.
63	16.14-00096	Bolt	1
64	16.14-00099	Shim	A.R.
65	16.14-00103	Seal ring	1
66	16.14-00101	Lock pin	1
67	16.14-00264	Pin	1
68	16.14-00104	Bolt	4
69	16.14-00105	O-ring	1
70	16.14-00106	Rubber guard	1
71	16.14-00107	Clamp	1
72	24.00-00064	Clamp	1
73	16.14-00538	Oil dipstick	1
74	16.14-00539	Packing	1
75	16.14-00330	PZ-serial number plate	2
76	16.14-00540	Rivet	2
77	16.14-00435	Bearing bolt	1
78	16.14-00117	Protector cap	1
79	16.14-00541	Catch	1
80	16.14-00542	Screw	1
81	16.14-00119	Screw	1
82	16.14-00543	Emblem	1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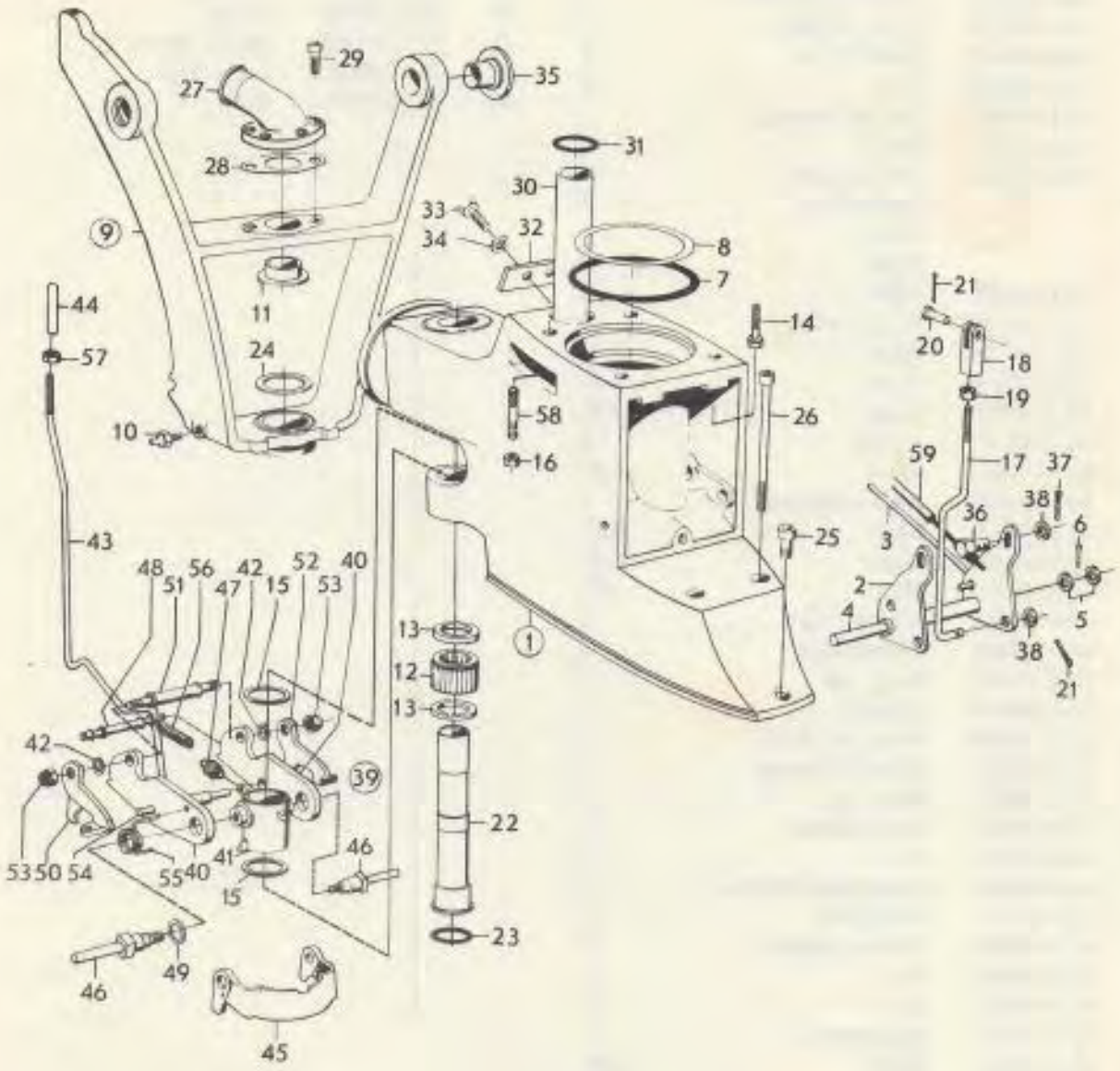
AQ–DRIVE UNIT 280
INTERMEDIATE HOUSING

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	16.14-00410	Interm. housing	1
2	16.14-00129	Gear yoke	1
3	16.14-00338	Astern lock rod	1
4	16.14-00130	Shaft	1
5	16.14-00136	Washer	2
6	16.14-00135	Cotter pin	1
7	16.14-00121	O-ring	1
8	16.14-00407	Shim	A.R.
	16.14-00408	Shim	A.R.
	16.14-00409	Shim	A.R.
9	16.14-00342	Fork	1
10	16.14-00274	Lubr. nipple	1
11	16.14-00336	Bushing	1
12	16.14-00139	Needle bearing	1
13	16.14-00140	Seal	2
14	16.14-00123	Bolt	2
15	16.14-00337	Washer	2
16	16.14-00125	Mutter	2
17	16.14-00131	Control nut	1
18	16.14-00132	Fork	1
19	16.14-00133	Nut	1
20	16.14-00134	Cotter pin bolt	1
21	16.14-00135	Cotter pin	2
22	16.14-00585	Guide sleeve	1
23	16.14-00141	O-ring	1
24	16.14-00283	Washer	1
25	16.14-00143	Bolt	1
26	16.14-00142	Bolt	2
27	16.14-00544	Hose union	1
28	16.14-00388	Gasket	1
29	16.14-00145	Bolt	2
30	16.14-00200	Oil tube	1
31	16.14-00122	O-ring	2
32	16.14-00287	Cable connection	1
33	16.14-00288	Bolt	2
34	16.14-00291	Washer	2
35	16.14-00148	Bushing	3
36	16.14-00150	Cube	1
37	16.14-00290	Cotterpin	1
38	16.14-00291	Washer	2
39	16.14-00339	Astern lever kit	1
40	16.14-00437	Asternlever	2
41	16.14-00438	Bearing sleeve	1
42	16.14-00439	Spacer washer	2
43	16.14-00440	Push rod	1
44	16.14-00144	Push sleeve	1
45	16.14-00441	Lock ball	1
46	16.14-00442	Shaft pin	2
47	16.14-00443	Spring	1
48	16.14-00444	Springshaft	1
49	16.14-00445	Washer	1
50	16.14-00446	Spring catch	1
51	16.14-00447	Shaft	1
52	16.14-00448	Spring catch	1
53	16.14-00449	Nut	2
54	16.14-00450	Stop shaft	1
55	16.14-00451	Spring	1
56	16.14-00452	Spring	2
57	16.14-00453	Nut	1
58	16.14-00124	Stud	2
59		Control cable	A.R.
60	16.14-00341	Repair kit, astern lever	1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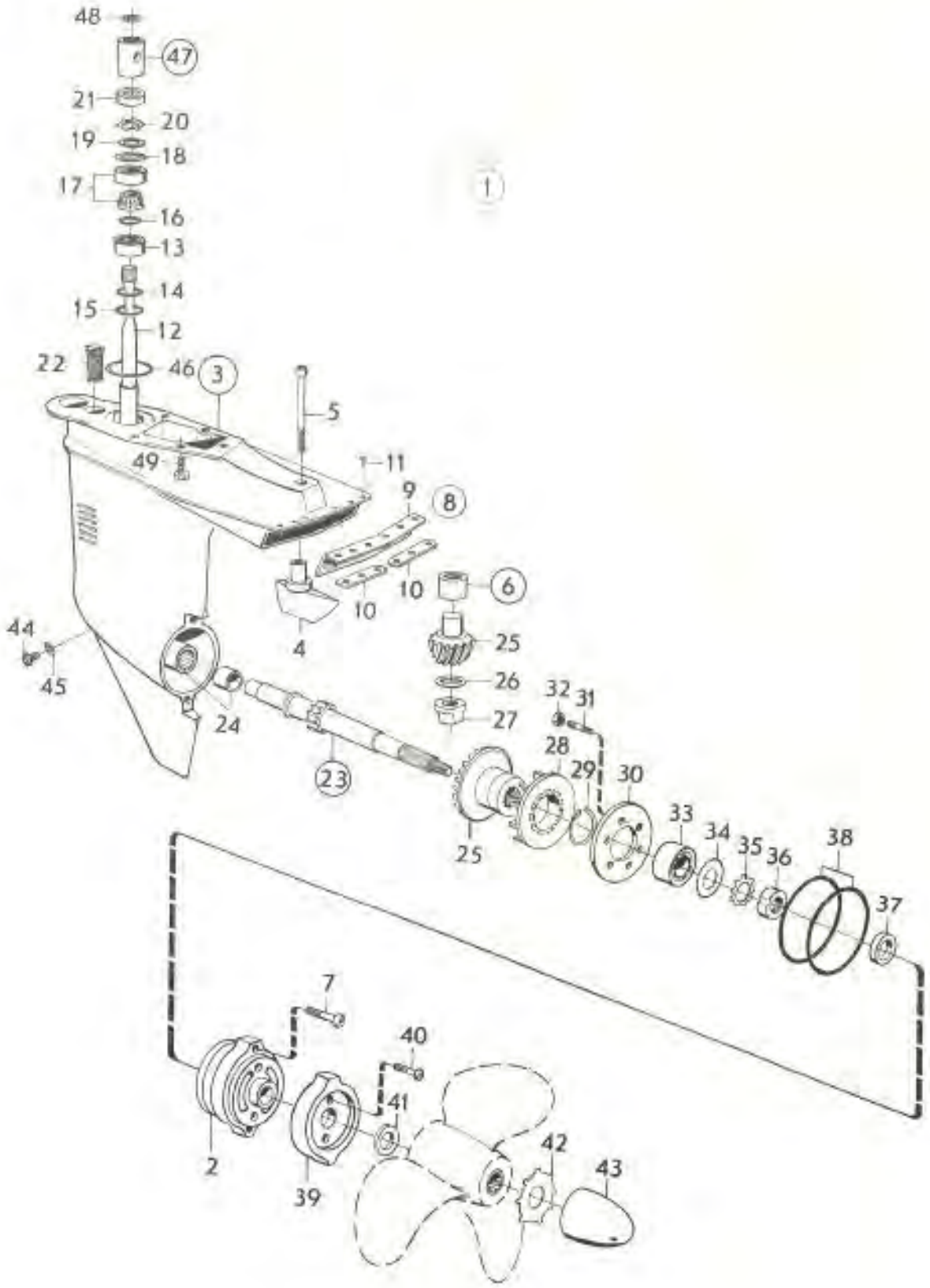
AQ–DRIVE UNIT 280
LOWER GEAR UNIT

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	16.14-00545	Lower gear unit	1
2	16.14-00547	Bearing housing	1
3	16.14-00546	Gear housing	1
4	16.14-00548	Steering fin	1
5	16.14-00549	Bolt	1
6	16.14-00421	Needle bearing	1
7	16.14-00181	Screw	2
8	16.14-00550	Exhaust port	1
9		Rubber lip	1
10		Plate	1
11		Rivet	6
12	16.14-00368	Shaft	1
13	16.14-00416	Ball bearing	1
14	16.14-00158	Shim	A.R.
	16.14-00159	Shim	A.R.
	16.14-00160	Shim	A.R.
15	16.14-00457	Gasket	1
16	16.14-00551	Shim	A.R.
17	16.14-00163	Roller bearing	1
18	16.14-00420	Shim	A.R.
	16.14-00419	Shim	A.R.
	16.14-00418	Shim	A.R.
19	16.14-00360	Clamp ring	1
20	16.14-00164	Lockwasher	1
21	16.14-00165	Ring nut	1
22	16.14-00376	Strainer	1
23	16.14-00552	Propeller shaft	1
24	16.14-00162	Needle bearing	1
25	16.14-00415	Gears kit	1
26	16.14-00455	Lock washer	1
27	16.14-00358	Nut	1
28	16.14-00351	Centrifugal pump	1
29	16.14-00173	Lock ring	1
30	16.14-00456	Thrust washer	1
31	16.14-00176	Stud	6
32	16.14-00177	Nut	6
33	16.14-00422	Ballbearing	1
34	16.14-00423	Shim	A.R.
	16.14-00424	Shim	A.R.
35	16.14-00169	Lock washer	1
36	16.14-00170	Ring nut	1
37	16.14-00182	Seal ring	2
38	16.14-00353	O-ring	2
39	16.14-00553	Zincring	1
40	16.14-00143	Screw	2
41	16.14-00554	Thrust ring	1
42	16.14-00185	Lock washer	1
43	16.14-00184	Propeller cone	1
44	16.14-00555	Plug	1
45	16.14-00556	Packing	1
46	16.14-00195	O-ring	1
47	16.14-00196	Spline sleeve	1
48	16.14-00188	Lock ring	1
49	16.14-00197	Bolt	4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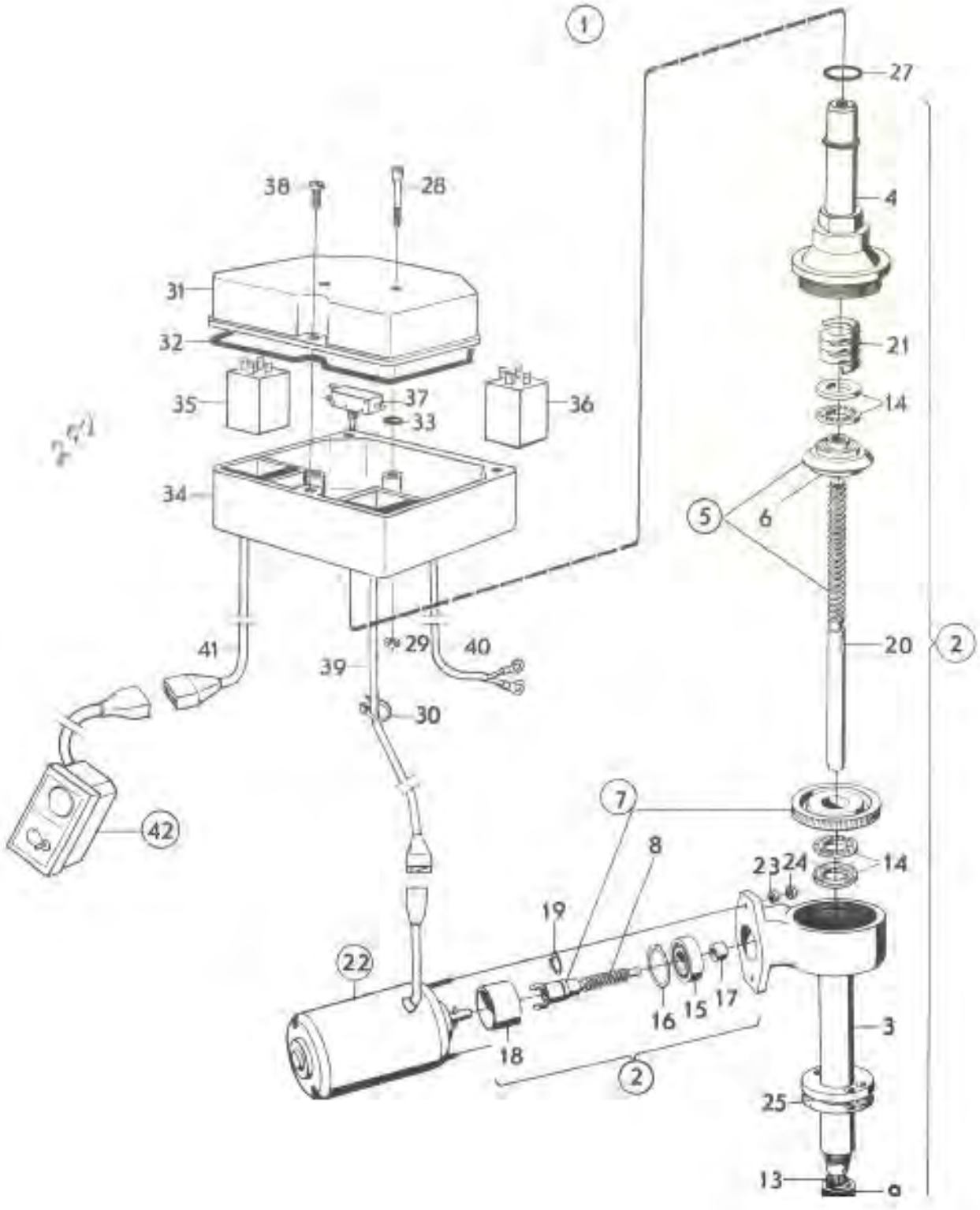
AQ–DRIVE UNIT 280
MECHANICAL LIFT DEVICE

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	16.14-00557	Mek. lift device	1
2	16.14-00558	Liftdevice	1
3	16.14-00199	Lower part	1
4	16.14-00559	Upper part	1
5	16.14-00382	Screw spindle set	1
6		Brake nut	1
7	16.14-00383	Worm screw set	1
8		Worm screw	1
9	16.14-00301	Seal nut	1
10	16.14-00202	Thrust plate	1
11	16.14-00369	Lock washer	1
12	16.14-00203	O-ring	1
13	16.14-00204	O-ring	1
14	16.14-00296	Ball bearing	2
15	16.14-00247	Ball bearing	1
16	16.14-00295	Lock ring	1
17	16.14-00469	Bushing	1
18	16.14-00470	Guide	1
19	16.14-00298	Lock ring	1
20	16.14-00294	Key	1
21	16.14-00293	Spring	1
22	16.14-00561	El. motor	1
23	16.14-00562	Nut	2
24	16.14-00478	Nut	2
25	16.14-00384	Packing	1
26	16.14-00480	Bushing	1
27	16.14-00563	O-ring	1
28	16.14-00564	Screw	2
29	16.14-00565	Nut	2
30	16.14-00566	Clamping band	1
31	16.14-00567	Cover	1
32	16.14-00568	O-ring	1
33	16.14-00569	O-ring	2
34	16.14-00570	Housing	1
35	16.14-00571	Relay	1
36	16.14-00572	Relay	1
37	16.14-00209	Switch	1
38	16.14-00573	Screw	3
39	16.14-00574	Cable unit	1
40	16.14-00575	Cable unit	
41	16.14-00576	Cable unit	
42	16.14-00577	Instrument panel	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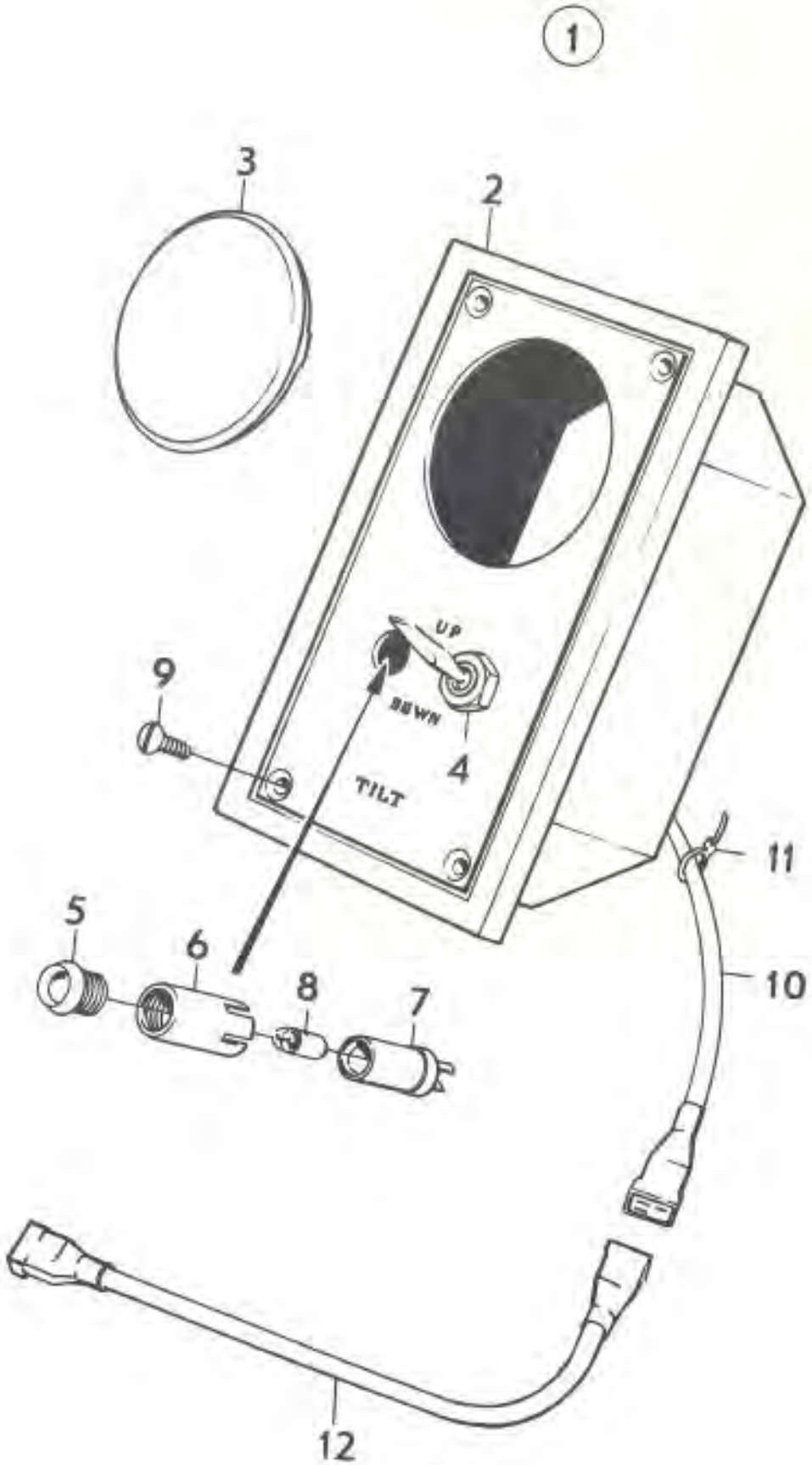
INSTRUMENT PANEL
MECHANICAL LIFT DEVICE

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	16.14-00577	Instrument panel	1
2		Panel	1
3		Plug	1
4	16.14-00301	Switch	1
5		Glass	1
6	16.14-00307	Housing	1
7	16.14-00306	Bulb housing	1
8	16.14-00355	Bulb	1
9		Screw	
10		Cable unit	1
11	16.14-00560	Clamping band	1
12		Extension cable	1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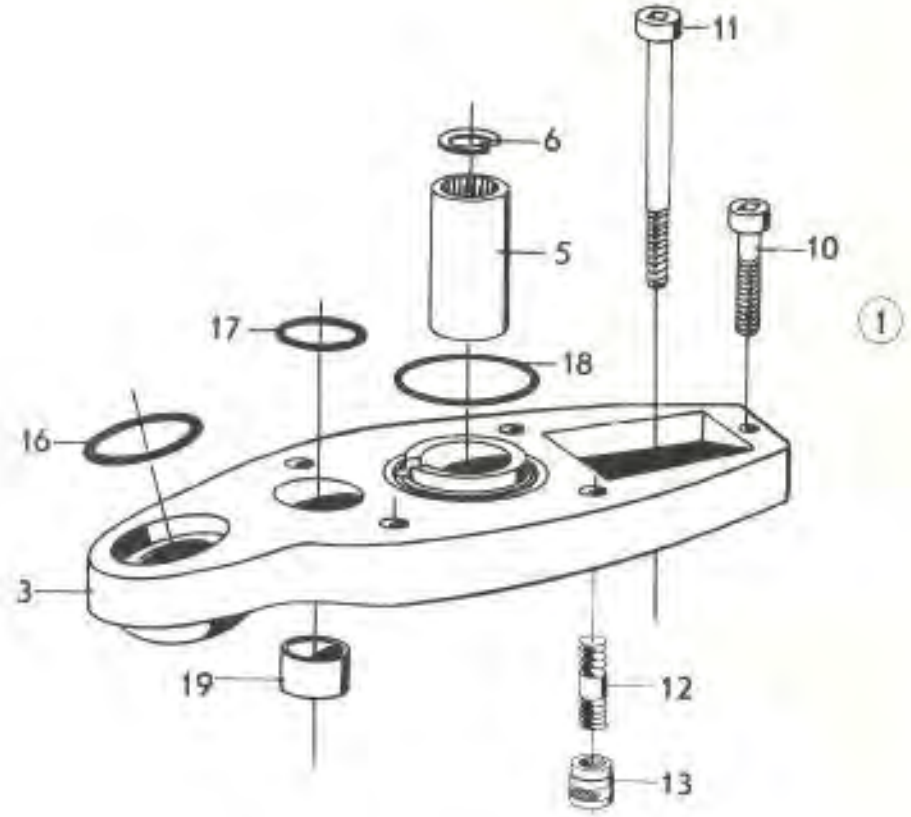
EXTENSION SET

THE PARTS LISTED BELOW ARE INTERCHANGEABLE WITH VOLVO OUTDRIVES

Code No.	Chris-Craft Part No.	Description	Qty.
1	16.14-00579	Extension set	A.R.
2	16.14-00378	Extension set	A.R.
3		Adapter	A.R.
4		Adapter	A.R.
5	16.14-00580	Splines sleeve	A.R.
6	16.14-00188	Lock ring	A.R.
7	16.14-00196	Splines sleeve	1
8	16.14-00188	Lock ring	1
9	16.14-00581	Shaft	1
10	16.14-00011	Screw	1
11	16.14-00582	Screw	2
12	16.14-00583	Stud	4
13	16.14-00584	Nut	4
14	16.14-00143	Screw	3
15	16.14-00197	Screw	4
16	16.14-00141	O-ring	1
17	16.14-00122	O-ring	1
18	16.14-00006	O-ring	1
19	16.14-00585	Oilpipe	1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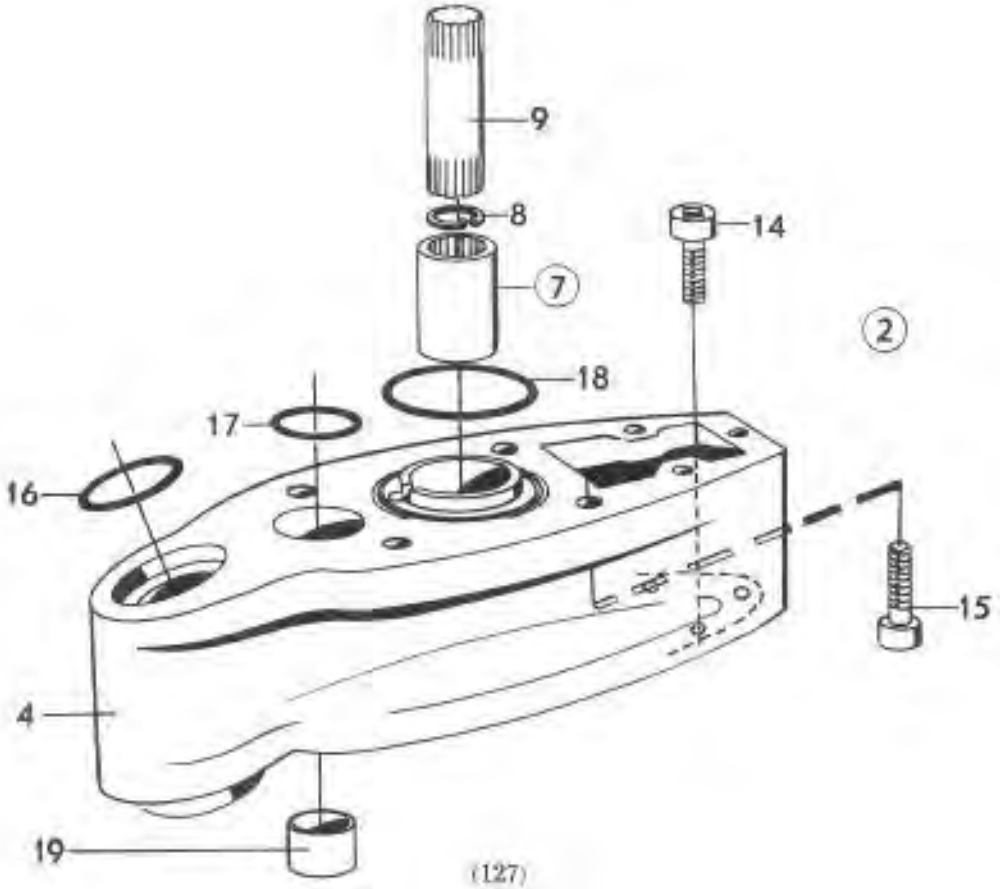
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EMERGENCY REPAIRS

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EMERGENCY REPAIRS

introduction

As a boat owner or operator, you may be in a serious situation if your engine fails, or some other emergency trouble develops while at sea and you are unsure of what to do or how to make repairs.

You need not be a mechanic to perform the repairs and do the inspections illustrated in this book. Follow the hints one at a time in order, and always reset adjustments before going on to the next item. Use your head, proceed calmly and methodically. The results of your work may save your boat or your life and will be gratifying when you get underway "ON YOUR OWN."

The illustrations in this booklet are to acquaint you with basic principles and may not be exactly the same as the equipment on your own craft, however, principles remain the same regardless of manufacturer or installation.

trouble shooting

STARTING MOTOR WILL NOT OPERATE

1. Discharged or Low Battery.—Turn OFF all electrical equipment and wait for about 30 minutes for the battery to recover. While waiting for the recovery, check the cable connections at the battery terminals. Don't just look—remove the clamps and clean the posts, then reclamp.

2. Defective Starter Switch.—First inspect the connections for tightness, broken wires or bare wire touching engine frame. To use the test lamp (recommended in tool kit) place one test lead to the ground post of battery (the one bolted to the engine frame or block) and the other test lead to the primary terminal (small wire) on the distributor. When the engine is cranked over, either by hand or starter, the light will light when the distributor points are open if the ignition switch is in the "ON" position and working properly.

STARTING MOTOR OPERATES BUT WILL NOT ENGAGE

Loosen the starting motor from the engine by removing the attaching bolts. Check the small pinion gear or so-called bendix to see if it is stuck on the shaft. If it is stuck, free it up with a hammer and oil it with a few drops of oil from the engine dip stick.

WARNING: Before attempting any electrical repairs as outlined, make sure bilges and engine compartment are free of explosive vapors.

STARTING MOTOR OPERATES BUT ENGINE WILL NOT START

1. Engine Primary Electrical Circuit (Small Wires).—Look for corroded, dirty, damaged or loose connections in the ignition primary circuits. This includes the wires from the junction box to the ignition switch, the wire to the coil and to the distributor.

2. Engine Secondary Circuit (Large Wires to Plugs).—Look for broken or damaged wires to spark plugs and from the coil to the distributor cap. There may be moisture on the wires or on the spark plugs that will cause the spark to be grounded.

3. Ignition.—Check the distributor points to see if they are opening and closing as the engine is cranked. Stop the cranking with the points in their maximum open position. The opening should be about .020 inches. NOTE: A matchbook cover may be used in an emergency to measure this point gap.

Inspect the distributor cap to see if the contact button is in place and is free to move. This contact is to carry current from the coil to the spark plug wires and must make contact with the rotor.

IMPORTANT: Don't forget to replace the rotor after you inspect the distributor.

4. Quick Spark Test.—A firing indicator (pencil type) is a fast effective way to check spark plug and ignition cable voltage. To check spark plug, touch the end of the indicator to the cable boot. To check cable, slide grooved swivel end over length of the cable. As fire passes through wire, window of firing indicator will light. A firing indicator can be purchased at most parts stores. Champion Spark Plug Division has an indicator under their part no. CT-438.

WARNING: Before attempting any electrical repairs as outlined make sure bilges and engine compartment are free of explosive vapors.

STARTING MOTOR OPERATES, SPARK IS GOOD BUT ENGINE WILL NOT START

1. Out of Fuel?—Tank empty? Always check fuel before leaving port. Good rule to follow is never cruise farther than one third of your fuel supply.

Save two thirds for the return trip.

2. Is Fuel Reaching the Fuel Pump?—See if the fuel filter or sediment bowl is filled with fuel. If it is not, and if the tank is full then the shut off cock may have vibrated closed or a fuel line may be clogged. Disconnect the inlet side of the pump and blow through the line. Look for dents in the fuel line and air leaks in the fuel pump gaskets or in the fuel line connections. Make sure the gasoline tank vent is open.

3. Is Fuel Reaching the Carburetor?—Remove the sediment bowl from the fuel pump and see if the screen in the pump body is clean. Then disconnect the outlet line from the fuel pump to the carburetor and see if fuel flows out when the engine is cranked. Make sure ignition is OFF when making this test. Pulling out the coil wire will insure that the ignition is dead.

4. Is Fuel Reaching the Cylinders?—Remove the spark plugs and see if they are moist. If there is no fuel on the plugs, the carburetor may be out of adjustment. Many marine carburetors have a main jet adjustment that can be turned to increase the fuel flow.

5. Is the Choke Closing Properly?—This is especially important on dual carburetors if the linkage permits one choke to remain open, both chokes will be out of service.

6. Engine May Be Flooded.—If the spark plugs are wet, this indicates flooding caused by using the choke too long. The correct way to dry out the cylinders is to OPEN the throttle wide. Put the choke in the open position (NON-CHOKING), and with the ignition ON crank the engine several times. This draws nothing but air through the carburetor. NOTE: Always replace the flame arrester before cranking the engine.

ENGINE OVERHEATS

1. Check to see that the surge tank cap seats in the filler neck and releases at specified pressure.
2. Check coolant level.
3. Check temperature sending unit and/or gauge.
4. Check engine thermostat.
5. Check water pump belts for excessive looseness.
6. Check for punctures in heat exchanger, ruptured or disconnected hoses, loose pressure cap or use of low boiling point antifreeze. These conditions prevent cooling system from maintaining proper pressure.
7. Clean debris from heat exchanger (sea water tubes).
8. Check engine operation to make sure tune-up is not needed. Improper timing may cause overheating.
9. Check for plugged or damaged strainer or thru hull fitting.
10. Check for collapsed or deteriorated suction hose from thru hull fitting or strainer to sea water pump.
11. Check sea water pump for excessive wear, damaged impeller, or obstruction in pump intake.
12. Check reverse gear oil cooler for foreign matter that might restrict water flow.
13. Check pressure relief valve and heat exchanger for foreign matter that might restrict water flow.
14. Check for plugged exhaust or excessive exhaust back pressure.
15. Check circulating water pump for defective impeller or impeller loose on shaft.

emergency repairs

Most emergency repairs can be made with what you have on board. With a little imagination you can make most anything needed to get underway. Let's take a look at what people have done in the past.

Broken Fan Belt.—Fan belts are made to last for a long time; however, it's a good idea to carry a spare for emergencies. A replacement can also be made from a piece of line or rope. Simply tie the line around the pullies, securing the ends with a splice or square knot. Tighten the movable pulley and you're underway again.

Broken Pipe or Hose.—Use FIRST AID. Bandage the break with rags or a piece of canvas and tie it with line or your belt.

Lost Rudder.—Make an emergency steering device by using buckets, deck covers or anything you can tie to a line and drag behind your boat. By shifting the line from side to side, as shown in the illustration, you can control your direction fairly well. This make-shift rig is called a sea-anchor, and works well if used properly.

Engine Oil Leak.—Simply catch the oil in a pan or bucket and pour it back into the engine.

Complete Electrical Failure.—To get the engine running disconnect all the electrical equipment from the battery except the large cables from the battery to the starter. Connect a length of wire from the battery post (Positive or large post) to the coil primary switch side and start the engine by grounding the small terminal on the starter solenoid with a screwdriver. To stop the engine disconnect the coil wire.

In most cases you will not be able to proceed at high speed while nursing a sick engine but the important thing is getting into port where permanent repairs can be made.

stay afloat

Let us now look at some of the causes for "TAKING ON WATER."

The sea around your boat is always looking for a way to get in.

You may find a large quantity of water in the bilges. Your first thought is that the boat is sinking and all is lost.

Don't abandon yet! Have lifesaving devices out and signaling and survival gear ready, but let's look around. Maybe there is a simple explanation for all that water in the boat.

Most boats have openings in the hull that are very necessary to the operation of the craft.

Some of these openings are:

1. Engine cooling water suction
2. Head suction and discharge
3. Galley drain
4. Bait pump supply
5. Propeller shaft, with packing

Any of the above items could be leaking. Check them all and any other hull fittings you know of.

The engine cooling water line may be broken (a common occurrence). While the engine is running it may be pumping the boat full of water.

While checking the hull fittings be looking for damage to the hull. If damage is found you can still save the day by using some good old common sense.

Stuff blankets or a pillow into a damaged area. Wedge them down with a deck cover or paddle. Tear off a railing if necessary to make repairs; a damaged boat is better than no boat at all.

Get underway if possible and head for the nearest land or other boats.

If you must abandon, stay together, keep everyone calm. Use a length of rope to connect all survivors together facing each other. This position will give the most buoyancy and will help keep the group warm and in good spirits until help arrives. Stay with the boat. Most boats will not completely sink; instead will reach equilibrium with the decks awash, with the bow or stern on the surface or may capsize with the underwater body remaining on the surface. The best procedure is usually to stay with the boat until help arrives. Not only will you have something to hang on to, but you will be more easily spotted by searchers.

DISTRESS SIGNALS

There are many means of signaling that your boat is in distress.

A recognized small boat distress signal is made by slowly and repeatedly raising and lowering both arms outstretched at sides.

Other signals are: Continuous sounding of fog signal apparatus, flying boat's ensign upside down, a controlled fire aboard boat, rockets or flares. The signal by radiotelephone is spoken word "May day" (extreme emergency only) broadcast on 2182kHz.

Additional information on distress signals are contained in the "Recreational Boating Guide" (CG-340), sold by the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Besides distress signals, this publication contains information on various subjects including life saving devices and Federal boating requirements to name a few.

recommended basic tools and parts

A few basic hand tools and spare parts are a must for every boat. This list will give you some idea of what to have, but many more tools and parts, especially tools of special nature for your engine, should be carried aboard.

The Test Lamp.—The test lamp is handy as we have seen on page two. To make it, simply purchase a socket to fit the bulbs used on your boat and attach two lengths of wire about six feet long. Clean one inch of the ends for test prods. Make sure the bulb is the same voltage as the electrical system, i.e., 6 volt, 12 volt, etc.

Hand Tools.—Common adjustable wrenches are best for the average small job. Some of them are:

1. Adjustable end wrench (crescent)
2. Slip joint pliers
3. Pipe wrench
4. Vise grip
5. Screw driver (Various sizes)
6. Box end wrench set
7. Hammer
8. Firing indicator—Champion Spark Plug No. CT-436

Spare Parts.—This is a list of basic spare parts:

1. Points for distributor

2. Condenser-Rotor-Dist. cap
3. Coil
4. Spark plugs
5. Fuel pump
6. Fuel filter and gasket
7. Drive belts
8. Sea pump impeller

EXTRA PROTECTION

We have discussed some of the things that can be done if problems come up while you are out on the water. What can be done to help prevent these problems from ever coming up? Following manufacturer's recommendations and keeping your boat and engine in good repair will help to make your boating trouble free.

To find out if your boat meets the highest standards of safety and has all the legally required equipment, ask a qualified member of the Coast Guard Auxiliary for a Courtesy Motorboat Examination.

This examination is free and there is no obligation. It covers all legally required equipment. In addition, your boat is checked for safety practices that are not required by law. If your boat passes, you will receive an official Examination decal. If it does not pass, no report is made to any law enforcement authority. The examiner will advise you of deficiencies so that you can correct them.