



OPERATOR'S MANUAL

for

Chris-Craft®

**MARINE ENGINES
4 & 6 CYLINDER
A-B, K, KL, KFL, M, MCL, WB**

PART # 169908806 - 22

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.

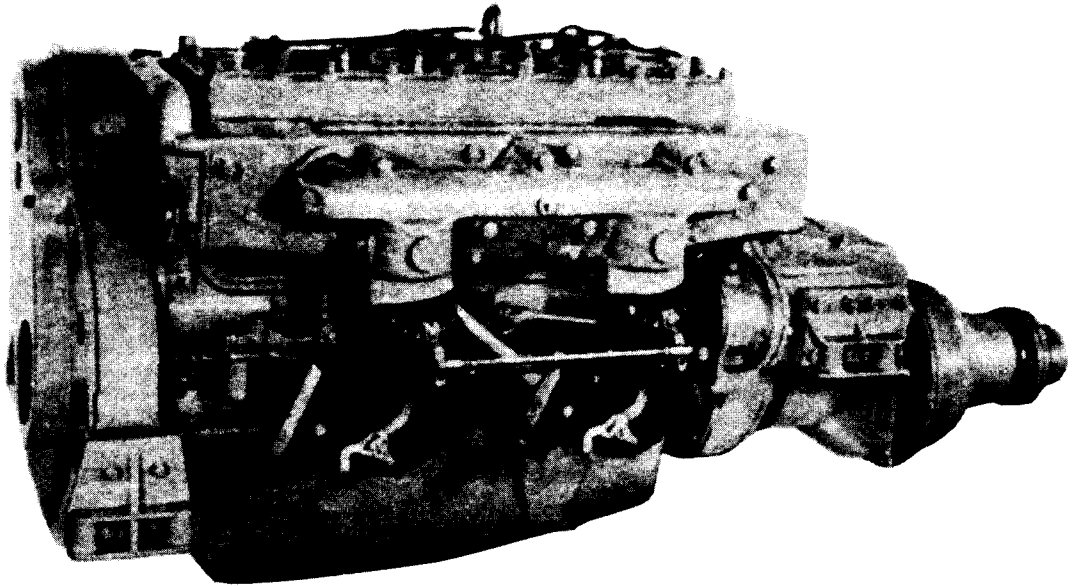


ILLUSTRATION OF ENGINE PLATE

<i>Chris-Craft</i> ® MARINE ENGINE		
WHEN ORDERING PARTS SPECIFY MODEL AND ENGINE NUMBER	MODEL * * * *	FIRING ORDER - - - - -
	ENGINE NO. * * * * *	USE ONLY HIGH GRADE HEAVY DUTY MARINE ENGINE OIL SAE 30
CHRIS - CRAFT CORPORATION POMPANO BEACH, FLORIDA U.S.A.		

Order parts from your nearest Chris-Craft dealer or direct from Chris-Craft Corporation, Parts Department.

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

PRINTED IN U.S.A.

OPERATOR'S MANUAL FOR CHRIS-CRAFT MARINE ENGINES

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CHRIS-CRAFT MARINE ENGINES GENERAL SPECIFICATIONS

Engine Model	No. Cyl.	Bore & Stroke	Cu. In. Disp.	Comp. Ratio	Lbs. Wght.	Maximum H.P. @RPM
A-B	4	3 1/4 x 4	132.7	6.78:1	465	60 @3200
K	6	3 7/16 x 4 1/8	229.7	7.21:1	660	95 @3200
KL	6	3 7/16 x 4 1/4	236.6	7.40:1	695	105 @3200
KFL	6	3 7/16 x 4 1/4	236.6	7.40:1	715	131 @3800
M	6	3 7/17 x 4 1/4	320.4	6.95:1	880	130 @3000
MCL	6	4 x 4 1/2	339.2	7.22:1	940	175 @3400
WB	6	4 1/4 x 4 3/4	404.3	6.92:1	1260	200 @3200

*

"O" Suffix indicates Opposite Rotation - ie "KO"

"S" Suffix indicates 1 1/2:1 Red. Gear - ie "KS"

"R" Suffix indicates 2:1 Red. Gear - ie "KR"

except "WB" series where "R" Suffix indicates 2 1/2:1 Red. Gear and "R2" Suffix indicates 2:1 Red. Gear.

**Weights shown are for Direct Drive engines without oil or water. If equipped with Reduction Gear, add 30 to 115 lbs depending on engine size.

Oil Pressure:

All Engines: 5 lbs. Minimum at Idle -
20 to 35 lbs. at Maximum Speed -

Firing Order:

All 4 Cyl.- 1-2-4-3
All 6 Cyl.- Std. Rot. 1-5-3-6-2-4
Opp. Rot. 1-4-2-6-3-5

Generator:

All 4 Cyl.- 6 volt - 19 Amps Max. - Circuit Breaker Control
All 6 Cyl.- 12 volt - 10 Amps Max. - Regulator Control (6 volt - 19 Amps Max also available on order).
Generator cuts in at approx. 800 RPM

Ignition Timing: Adjust to mark on flywheel.

Breaker Contracts: All engines - .022" Gap.

Spark Plugs: All Engines - Champion uJ6 .028" Gap.

YOUR NEW CHRIS-CRAFT MARINE ENGINE

Your Chris-Craft Marine Engine has been delivered to you only after a great deal of skillful engineering, careful manufacture 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 longlife.

IDENTIFICATION

On every engine there is a plate on the top of the manifold giving the model and serial number. This information is important and should be included in all parts orders and correspondence relating to the engine. A typical name plate is shown on the inside front cover.

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 of your engine, we strongly recommend that only factory replacement parts be used.

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 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.

New engines should be run at or near the following speeds. After the first ten hours operation the engine is ready for normal running except that sustained running at high speeds should be avoided until the engine is thoroughly limber.

Engine Model & H. P.	Maximum RPM's First 5 hours	Second 5 hours
A & B 60	2400	2600
K 95	2400	2600
KL 105	2400	2600
KFL 131	3000	3200
M 130	2200	2500
MCL 175	2600	3000
WB 200	2400	2600

Use regular gasoline containing lead during the break-in period. Refer to Page 5 for full details regarding gasoline recommendation.

To tell how the break-in of the engine is progressing, let the engine run at approximately 1000 RPM, turn off the ignition key and note how quickly the engine comes to a stop. The new engine will stop at once but as the breaking in process progresses and the engine becomes more limber it does not stop as suddenly. An abnormal rise in engine temperature will indicate that the engine is being run a little to fast.

During the entire life of the engine, always run the engine at medium speeds for a few minutes 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 and coming in slow or letting the engine idle after you have come into the dock. This is to allow the valves to cool down while the water is still circulating in the engine. This will help prevent warped valves.

TO START ENGINE

Before starting the new engine, check the oil level the crankcase, check fuel in tank and ventilate engine compartment thoroughly. Check also to see that the bowl on the fuel pump is full. The fuel pump and carburetor can be filled by using the hand primer saving the battery considerably. Shift the reverse gear to neutral position.

Turn the engine over a few times with the key off to start lubricating oil flowing. Open the throttle slightly (approximately 1/8 open). Pull the choke out. Turn on the key and depress the starter button or turn key all the way to the right to 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 and push the choke part way in. It is sometimes necessary to run the engine partially choked until it warms up. Avoid excessive choking because it will result in high fuel consumption and could dilute the lubricating oil. Check to make sure oil pressure is present and that cooling water is circulating.

When taking the boat out always run the engine at moderate speed until the oil warms up. When returning always allow the engine to run slowly for several minutes before shutting it off which will greatly extend the life of the valves. To accomplish this many owners plan to idle their engines for the last several hundred yards travelled.

Before engaging or disengaging clutch it is advisable to slow engine down to 1000 RPM's or less. Shifting at higher RPM's will shorten the life of the reverse gear and may cause damage.

OIL PRESSURE

Form the habit of watching the oil pressure gauge. Advance notice of serious trouble is nearly always indicated by the oil gauge. Oil pressure should be 5 lbs. minimum at idle speed and 20 to 35 lbs. at maximum speed with the engine hot.

ENGINE CARE

The following Maintenance Schedule is offered as a suggestion only. Maintenance requirements will vary depending upon the engine usage.

MAINTENANCE SCHEDULE

Each Time the Engine is Run:

- Check oil level.
- Check fuel level.
- Check cooling water flow after starting engine.
- Check battery water every one to two weeks.

Every 50 Hours Running:

- Change Oil (Every 50 to 100 hours depending on type of service).
- Clean carburetor flame arrester.
- Clean any dirt out of fuel pump bowl.
- Distributor - 3 to 5 drops medium engine oil in oiler at side of base.
- Generator - fill oil hole pocket at commutator end with medium engine oil.
- 3 to 5 drops medium engine oil in other oilers.

Starting Motor - 2 to 4 drops light engine oil in oiler at each end.

Check engine generally for any fuel or water leaks.

Each Season:

Clean all electrical connections and reconnect tightly. (Must be done more often when operating in salt water).

Check condition of all rubber hoses.

Distributor - 5 drops medium engine oil on felt on top of inside shaft.

- 1 drop of light engine oil on breaker arm pivot pin. Wipe off excess.

- light film of grease on breaker cam. Wipe off excess.

Check ignition breaker contacts, spark plugs and ignition timing. (More often if engine is in regular service).

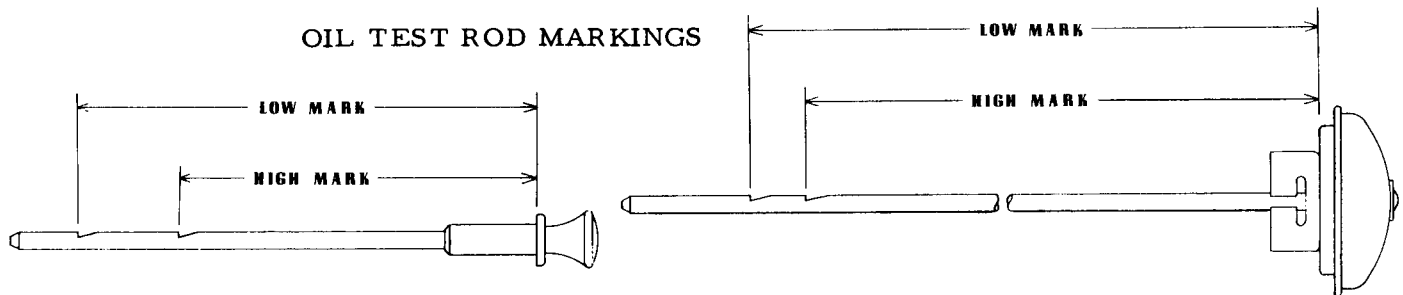
Check propeller shaft alignment.

Check tappet clearance. (Every 100 hours running if engine is in regular service).

Check reverse gear adjustments.

Check tightness of cylinder head nuts with torque wrench.

Check condition of engine paint. "Spray-On" cans of blue engine enamel are available for touchup.



For engines installed in Chris-Craft boats at the factory, the capacity of the engine lubricating system should be governed by the markings on the oil test rod.

To determine the proper test rod markings on other installations refer to the test rod illustrations and use the following dimensions to determine proper position of low and full marks. Engine angle shown is the angle of the engine in the boat while the boat is running at a speed giving greatest angle (usually around 2000 RPM).

A & B Series Engines
5° to 20° Running Angle
Run Mark 13-3/4"
Low Mark 14-1/4"

21° to 30° Running Angle
Full Mark 14"
Low Mark 14-1/2"

K & KL Series Engines
5° to 24° Running Angle
Full Mark 9-13/16"
Low Mark 10-21/32"

Note: Applies only to shallow pan engines. (After early 1956)

M & ML Series Engines
5° to 20° Running Angle
Full Mark 5-3/8"
Low Mark 6-1/2"

Note: Applies only to shallow pan engines. (After 1955)

W Series Engines
5° to 15° Running Angle
Full Mark 9-13/16"
Low Mark 10-21/32"

Note: Applies only to shallow pan engines. (After early 1956)

OIL RECOMMENDATION

Chris-Craft Marine Engines should be serviced with oil of good character and 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% to 15% of the time. Therefore the requirements for good lubricating oil are far greater in a marine engine.

We recommend the use of S.A.E. #30 lubricating oil containing detergents and additives conforming to A.P.I. designation "MS" or "DG", U.S. Military spec. MIL-L-2104-A (or Supplement #1) or I.C.E.I. designation "A" or "B". We caution that different types of oils should never be mixed because it might cause the formation of sludge. 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, always drain the crankcase as completely as possible before refilling.

FUEL RECOMMENDATION

The gasoline recommended for Chris-Craft Marine Engines is a marine leaded fuel but must have a minimum octane rating of at least 92 research method. When marine white gasoline is used, the same above octane rating is recommended and it is also recommended to occasionally use marine leaded fuel, particularly in new engines or after overhaul.

It may be found that different fuels in various localities will show the most desirable performance characteristics.

TO CHANGE OIL

The new engine when shipped is filled with S.A.E. #20 Havoline motor oil. After ten to fifteen hours running this oil should be replaced with S.A.E. #30 motor oil. Thereafter it should be changed every fifty to one hundred hours depending upon the type of service to which the engine is subjected. An engine that is used for short runs needs an oil change more often than an engine run longer periods of time. Long runs permit the oil to attain proper operating temperature at which there is less possibility of contamination and the oil will remain clean longer.

To remove the old oil from the crankcase the best method is to pump the oil out with a suction pump through the oil fill pipe opening. Most marine service stations are equipped with special pumps for this purpose.

When a hand suction pump is used, the copper tube end should be inserted through the oil filler hole and the oil is pumped out of the crankcase. An additional quantity of oil can be removed from the reverse gear by removing the reverse gear cover and pumping oil

out of this unit. On engines with reduction gears there will remain from 1 to 1-1/2 quarts in that unit which cannot be removed. A suitable hand suction pump may be purchased from the Chris-Craft Parts Department.

ELECTRICAL SYSTEM

The electrical equipment on the engine is of Auto-Lite manufacture and is guaranteed and serviced by the Electric Auto-Lite Company of Toledo, Ohio thru its official service stations located in important cities throughout the world. A directory of these service stations may be obtained by writing directly to the Parts and Service Division, Electric Auto-Lite Company, Toledo, Ohio.

It is important that all electrical connections be periodically inspected to make certain that the condition of the insulation on wires is good, all mechanical connections are tight and all connections are free from corrosion. In boats operated in salt water it is especially important that all connections be thoroughly cleaned and checked two or three times each year. Each connection should be taken apart, cleaned with fine sandpaper, given a light coating of vaseline to retard corrosion and tightly reconnected. Battery terminals should be cleaned often with water and baking soda, coated with vaseline 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.

BATTERY

The battery should be kept near full charge. To check the condition of the battery, specific gravity readings should be taken.

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

GENERATOR AND VOLTAGE REGULATOR

Make sure generator is mounted securely and the generator belt is tight.

The generator and voltage regulator should only be adjusted and repaired by Auto-Lite service stations which have instruments and information necessary to correctly repair these units.

STARTING MOTOR

Make certain the starting motor is mounted securely and the Bendix drive is free from dirt. The starting solenoid should be clean, connected securely and operating properly.

IGNITION CIRCUIT

Each season check the distributor mounting for tightness. The distributor cap may be removed to check the condition of wires and connections. Clean up any corrosion which might be present. Make sure the vent hole in the bottom of the distributor housing is kept open. Inspect 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 needed rather than attempting to reface old breaker contacts. Breaker contacts should be set with a gap of .022 inch.

Spark plugs should be cleaned and gapped periodically and replaced when necessary. Make certain there are no cracks in the porcelain and terminals are clean and tight. When replacing plugs use only the correct heat range. For all current Chris-Craft engines we recommend Champion UJ-6 spark plugs and the correct gap is .028 inch.

The ignition coil is sealed against moisture and requires no attention except to see periodically that the connections are clean and tight.

IGNITION TIMING

To set the ignition timing use a timing light. The flywheel is provided with a timing mark on its rim and an ignition timing indicator is positioned over the flywheel ring gear. With the timing light connected to the battery and No. 1 spark plug (flywheel end) and the engine run at idle (see Idling RPM Table) set the distributor so that the timing light shows the flywheel timing mark directly in line with the ignition timing indicator.

Recheck ignition timing after tightening the distributor to be sure that it is properly set.

RECOMMENDED IDLING SPEED

All Engines - 500 RPM		
Except the following		
KLC	- 120 HP	- 650 RPM
KBL	- 131 HP	- 750 RPM
KFL	- 131 HP	- 600 RPM
MBL	- 158 HP	- 700 RPM

FUEL SYSTEM CARBURETOR

The carburetor is guaranteed and serviced by the Zenith Carburetor Division, 696 Hart Avenue, Detroit, Michigan and their distributors.

It is important that all fuel connections be kept tight and that dirt be kept out of the carburetor. Periodically clean the carburetor flame arrester and empty any deposit out of the fuel pump sediment bowl.

The carburetors are 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.

On engines equipped with multiple carburetion the carburetors must be synchronized to produce a smooth idle. The idle adjusting needles should have nearly the same setting and the throttle butterflies must be open exactly the same amount at idle. If one carburetor is open only a fraction of an inch more than the other, the cylinders at that end of the engine will receive more fuel mixture resulting in an uneven idle.

The chokes must be set to fully close to insure easy starting.

FUEL PUMP

The fuel pump is guaranteed and serviced by authorized AC Service Stations and United Motors Service branches. Keep all fuel pump connections tight.

COOLING SYSTEM

Cooling water is pumped by the water pump thru an oil cooler (if engine is so equipped) and into the exhaust manifold. From the exhaust manifold the water is distributed in proper proportions to various parts of the block. The water flows up around the cylinder bores and valve areas entering the cylinder head. The overflow is then carried back into the exhaust tube from the front of the cylinder head through a copper tube or through a passage in the manifold. As the water leaves the boat with the exhaust gases it further cools the exhaust tube and helps to muffle the engine noise.

Note that with this system cold water is not pumped directly into the warm block. It is first preheated in the manifold thereby reducing rapid temperature change and formation of condensation in the engine.

THERMOSTAT- OPTIONAL

A cooling water outlet temperature of around 140° is considered ideal but it will be found that on engines operated in cold water the temperature may not go above 100° under normal conditions.

A temperature control kit is available as an accessory. The temperature control will raise the outlet temperature to approximately 140° rapidly and will help maintain a constant temperature.

WATER PUMP

The water pump is equipped with a water seal that is automatic in its action. When leaks occur, this seal should be replaced.

The water pump requires very little lubrication. On water pumps provided with grease cups the cup may be turned once every time the engine oil is changed.

A worn pump can be primed in an emergency by turning the grease cup all the way down forcing grease around the pump gears. This will usually get the pump to function temporarily but the pump should be overhauled or replaced immediately.

A worn pump can often be repaired with the replacement of new parts as needed but we wish to caution that if the housing is worn a complete new pump should be obtained.

Cooling water hoses should always be kept tight and if seasonal inspection shows them to be excessively soft or deteriorated they should be replaced.

VALVES AND VALVE TAPPETS

Good valve action is very important to the efficiency and smoothness of the engine.

The first sign indicating need for grinding valves will be loss of engine speed, increased fuel consumption and rough idling. A check of the compression in each cylinder will give a good indication of valve condition.

Engines that are operated with proper care will require a minimum amount of valve maintenance.

Valve tappet clearance should be checked in the new engine after 10 to 20 hours operation. Thereafter a check every 200 running hours will usually be sufficient.

VALVE TAPPET CLEARANCE

For Current Engines - Engine Cold

Engine Model	Clearance	
A & B	Intake .010	Exhaust .010
K - 95	Intake .010	Exhaust .012
K - 100	Intake .010	Exhaust .014
KL	Intake .010	Exhaust .014
KFL	Intake .010	Exhaust .016
M	Intake .010	Exhaust .018
MCL	Intake .010	Exhaust .018
WB	Intake .012	Exhaust .018

CYLINDER COMPRESSION

Taken at cranking speed (approximately 100 RPM) with throttle wide open and ignition off.

All Engines 90 Lbs per Sq. Inch. FAIR 105 Lbs. per Sq. Inch GOOD 120 Lbs. per Sq. Inch VERY GOOD

REVERSE GEAR OPERATION

The reverse gear is very simple to operate. With the control lever ahead, forward drive will be engaged, with the lever back, reverse drive will be engaged and with the lever in the middle the gear will be in neutral. Under ordinary conditions the engine revolutions should be kept below 1000 when engaging or disengaging clutch. Engaging gears at higher revolutions will wear parts in the reverse gear resulting in more frequent adjustments and shorter gear life.

It is not recommended that the boat be run at the dock with the reverse gear in neutral position for long periods of time (except on engines equipped with Chris-Craft Chris-O-Matic clutch controls). The gear will not always hold a positive neutral and excessive wear could result.

When the engine is not running it is best to leave the clutch in neutral position eliminating any strain.

In some reverse gears there will be present a backlash noise especially at low RPM's. This is normal and should not cause concern.

HOW THE REVERSE GEAR WORKS

The forward drive is obtained by means of a multiple disc clutch. The locking or clamping of these discs (10, 37, 1108 in illustration) is brought about by the pressure produced by the outward movement of the fingers (21 in illustration) when the operating lever is thrown into the forward position. On the forward drive the whole reverse gear is locked together as a solid coupling.

The reverse drive is obtained by clamping the brake band (19 in illustration) around the outside drum or case which carries the pinion gears. The reverse motion is then obtained by driving through the pinion gears (5 in illustration) with the forward drive discs running free.

In the neutral position, both the discs and brake band are free and the pinion gears run idle.

ADJUSTMENT FOR THE FORWARD DRIVE

If the gear slips in the forward drive more pressure is needed on the discs and this is obtained as follows:

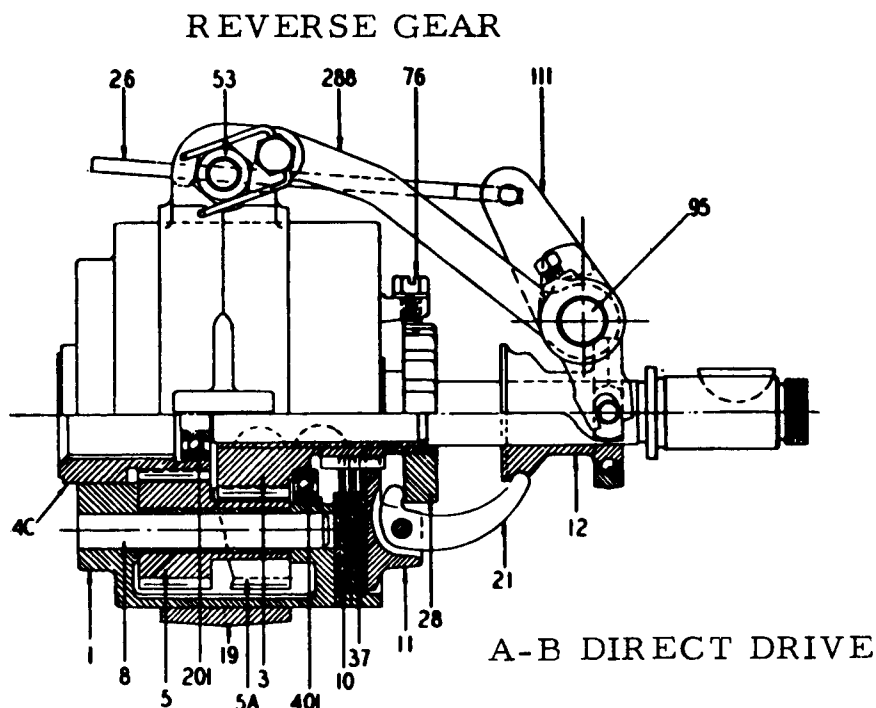
With the gear in neutral and the engine off:

(For all A Series engines and B Series direct drive)

Back out the lock screw No. 76 until the end of it is clear of the notch in the adjusting collar No. 28. Then turn the adjusting collar No. 28 to the right until the lock screw No. 76 is opposite one of the notches in the adjusting collar No. 28. Then tighten up the lock screw No. 76 and be sure that the end of the screw enters the notch in the adjusting collar No. 28. Repeat this procedure until the reverse gear holds on the forward drive. An adjustment of one or two holes is usually sufficient.

(For all K Series, M Series, W Series and B Series reduction drive engines)

Back out the lock screw No. 76 until the end of it is clear of the hole in the pressure disc No. 11. Then turn the adjusting finger plate No. 28 to the right until the lock screw No. 76 is opposite one of the holes in the pressure disc No. 11. Then tighten up the lock screw No. 76 and be sure that the end of the screw enters the hole in the pressure disc No. 11. Repeat this procedure until the reverse gear holds on the forward drive. An adjustment of one or two holes is usually sufficient.



ADJUSTMENT FOR THE REVERSE DRIVE

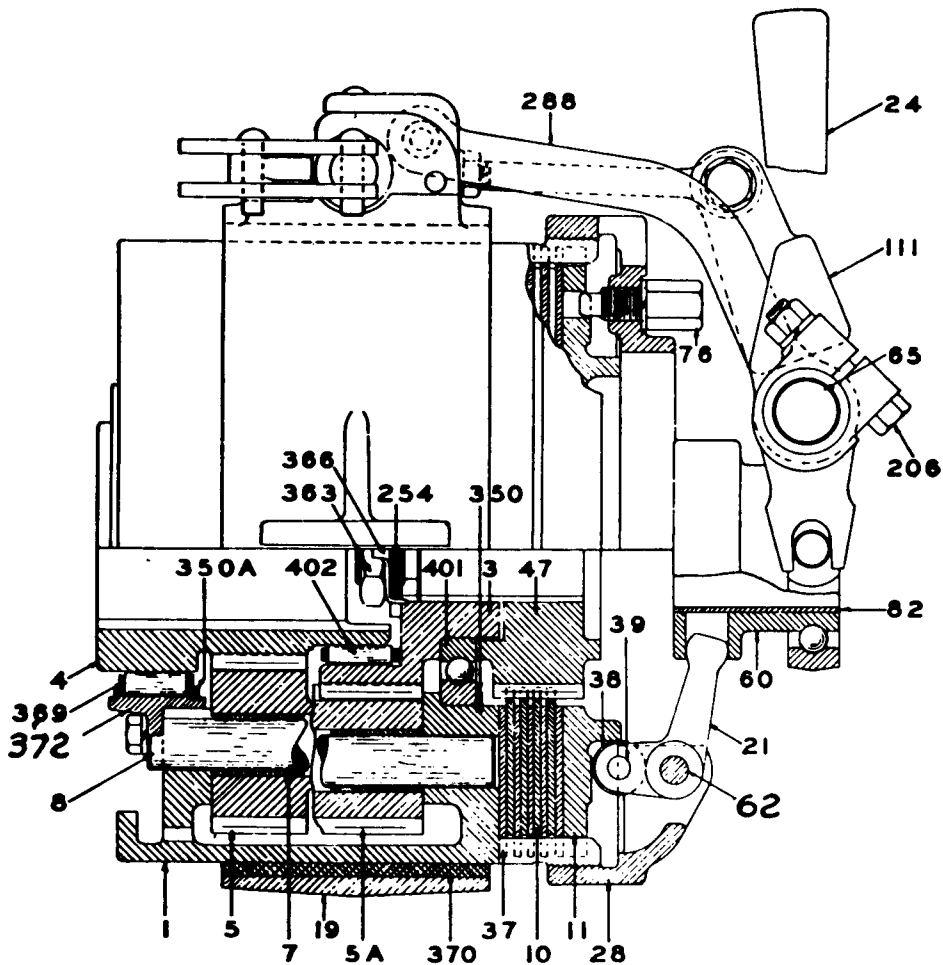
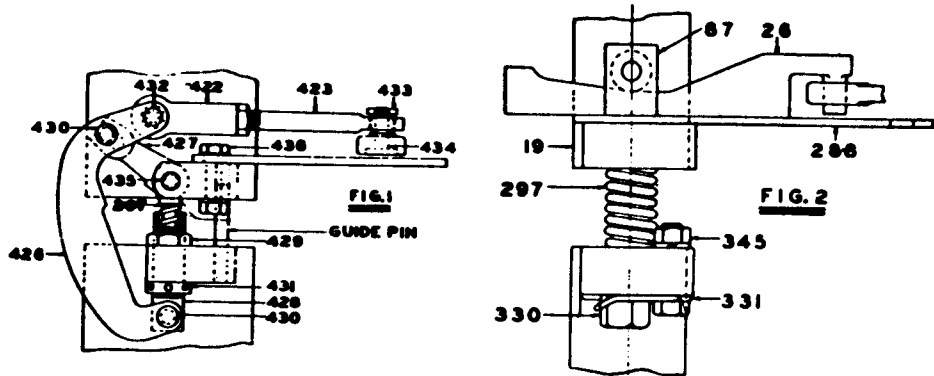
In the reverse position the brake band grips and holds the gear cage or drum from turning. If the drum slips, it is necessary to tighten the adjustment of the brake band, which adjustment is made as follows:

(with toggle clamping mechanism - Figure 1)

Loosen the locknut No. 429 on the inside of the upright lug at the top of the brake band to the amount you think the brake band needs adjusting. Then tighten the adjusting nut No. 431 on the outside of this lug until it is again tight against this lug. Repeat until the brake band grips the gear cage and keeps it from revolving. The adjustment should be tight enough so that a decided snap is felt when the lever is thrown into the reverse position.

(with cam clamping mechanism - Figure 2)

Throw the lever into the reverse position with the engine turning over slowly. Then tighten up the adjusting bolt No. 330 until the brake band clamps or grips the case or gear Cage No. 1 and holds it from revolving. It is well to screw up this adjusting bolt No. 330 a little tighter than necessary. This will compensate for any wear on the brake band. The lock spring No. 331 holds the adjusting bolt nut and keeps it from loosening.



REVERSE GEAR

K-M-W-B REDUCTION DRIVE

ANNUAL LAY-UP

Drain all water. On new motors water drain plugs are painted red and can be easily located. Sometimes the drain cock in the block will be clogged and it will be necessary to probe with a piece of wire to dislodge sediment. Leave drain cock open and drain plugs out during storage.

On engines used in salt water thoroughly flush all water passages with fresh water and if necessary clean out any deposit or corrosion which might restrict the water flow.

Drain locations are as follows:

A & B Engines

1. Drain cock on side of block behind water pump.
2. Plug in bottom of water pump.
3. Plug in water line under aft end of exhaust manifold.

K Engines

1. Drain cock on side of block behind water pump.
2. Plug at bottom of water pump.
3. Two plugs in oil cooler bracket.
4. Plug in water line under aft end of exhaust manifold.

KL & KFL Engines

1. Drain cock on side of block behind water pump.
2. Plug at bottom of water pump.
3. Two plugs in oil cooler bracket.
4. Plug in water line under aft end of exhaust manifold.
5. Plug in intake manifold just above carburetor. (Two plugs on KFL).

M & MCL Engines

1. Drain cock on side of block behind water pump.
2. Plug at bottom of water pump.
3. Plug in oil cooler bracket.
4. Plug in side of exhaust manifold at aft end.
5. Two plugs in intake manifold just above carburetors. (MCL only).
6. Plug in exhaust manifold front cover.

WB Engines

1. Plug on side of block located at lower end of oil cooler bracket.
2. Plug in upper part of oil cooler bracket.
3. Plug at bottom of water pump.
4. Plug in under side of exhaust manifold at aft end.
5. Two plugs in intake manifold just above carburetors.
6. Plug in exhaust manifold front cover.

Drain engine oil and put fresh oil in the engine before storage. This will eliminate the danger of any acids which might have formed in the oil doing damage to the bearings during storage.

Remove spark plugs and inject about 2 oz. or 60 cc of #50 engine oil into each cylinder. Turn engine over approximately six times and inject 1 oz. more oil in each cylinder. Replace spark plugs.

The battery should be removed and stored making sure that it is kept charged to prevent deterioration.

Plug the exhaust pipe to prevent moisture from entering the valve chamber during storage.

Drain the fuel system thoroughly. The carburetor is provided with a drain plug located on the underside of the fuel chamber. The fuel pump sediment bowl should be emptied and cleaned. The fuel in the tank will have to be siphoned or pumped out.

The carburetor flame arrester should be covered to prevent moisture from getting to the valves. Masking tape will make a good seal or a blind gasket can be installed between the carburetor and intake manifold.

The fuel tank vent fitting through the hull and the small vent hole in the side of the gas cap should also be covered.

Oil distributor, generator and starting motor as described in Maintenance Schedule (See Page 4).

Any blemishes in engine paint may be easily corrected by repainting with Chris-Craft blue engine enamel which is available in handy "Spray-On" cans from your nearby dealer.

Go over any unpainted exposed metal parts with an oil soaked rag to prevent rust or corrosion.

Leave the reverse gear in neutral position during storage.

ANNUAL FITTING OUT

Replace all drain plugs and close drain cock.

Remove plug from exhaust pipe.

Uncover carburetor flame arrester or remove blind gasket under carburetor if used.

Uncover fuel tank vent fitting and small vent hole in side of gas cap.

Install battery being sure battery is fully charged and filled with water to recommended level. Connect battery cables tightly using vaseline to keep connections free from corrosion.

Fill fuel tank. Operate hand primer on fuel pump until fuel lines, fuel pump and carburetor are full.

Make a final check of spark plugs and ignition distributor contacts replacing and adjusting where necessary. Check oil level.

After engine starts check oil gauge, ammeter and temperature. Make sure cooling water is flowing properly.

ENGINE INSTALLATION RECOMMENDATIONS

MOUNTING

A rigid bed should be prepared for mounting the engine. Heavy wood engine stringers running fore and aft in the boat with proper cutouts for mounting the engine supports are usually used.

ALIGNMENT

Proper alignment with the propeller shaft is important for engine efficiency and smoothness. The two coupling faces (one on engine and one on shaft) must be absolutely parallel. Use a feeler gauge or piece of shim stock not more than .003 inch in thickness. When coupling faces are brought together by hand, not bolted, the .003 feeler should be tightly gripped at all points around the edges of the couplings. Alignment must be correct when couplings are viewed from the side as well as when seen from the top. It is necessary to lift lightly on the shaft and coupling to compensate for the weight of those two items but be very careful that only the weight is lifted and the shaft is not sprung. To correct any misalignment the corners of the engine may be raised or lowered by using tapered cast iron wedges.

EXHAUST

The cooling water overflow is routed into the exhaust tube through copper tubing from the cylinder head in some engine models or directly out of the exhaust manifold in other engine models. The flow of water through the exhaust tube will cool the exhaust and in addition will help to quiet the exhaust noise.

We recommend that copper tubing or exhaust hose of proper diameter be used for the exhaust pipe. Copper tubing can be bent as needed to fit a particular installation or can be welded giving the required angles. Be sure to use correct diameter exhaust pipe and keep bends to a minimum to insure least amount of exhaust restriction possible.

RECOMMENDED COPPER EXHAUST TUBE SIZES

Engine Series	Horsepower	Diameter
A, B	60	2"
K	95	2-1/2"
KL, KFL	105, 131	2-3/4"
M	130	3-1/2"
MCL	175	4"
WB	200	4"

EXHAUST ELBOW

We strongly recommend the use of standard Chris-Craft exhaust elbows for connecting from the exhaust manifold to copper tube or exhaust hose water cooled exhaust systems. The exhaust elbows are designed to give minimum back pressure, maximum exhaust cooling, and are available with turns in several different directions in either bronze or cast iron material. Inquiry for information regarding any installation is invited.

ENGINE CONTROLS

Various controls will have to be connected to the engine. All linkages should be made strong enough to withstand any strain to which they will be subjected and direct positive action is necessary in all connections. Keep play at a minimum.

For a reverse control a hand lever may be mounted directly on the reverse gear cross shaft or a remote control can be linked through suitable bell cranks and pipe connections to the engine.

With Chris-O-Matic electric hydraulic reverse control the installation instructions supplied with the unit should be followed.

Suitable throttle and choke controls should be installed and connected to the proper carburetor arms. Make sure that the throttle and choke on the carburetor will open and close all the way.

All switches should be resistant to rust and corrosion for marine use. They should be connected as shown in the wiring diagram.

INSTRUMENTS

An oil pressure gauge, tachometer and ammeter should be installed. A fitting is provided on the right hand side of each engine for an oil pressure gauge. At the bottom of the distributor drive shaft a fitting is provided for the attachment of a tachometer drive cable. The cable is driven at one half engine speed and a suitable tachometer should be used. The ammeter should be wired into the electrical circuit as detailed on the engine wiring diagram. If desired a temperature gauge may also be installed. There is a threaded hole suitable for the insertion of a temperature gauge bulb on the right hand side of the cylinder head near the front.

CHRIS-O-MATIC CONTROL

The Chris-O-Matic clutch control is an electric hydraulic mechanism which shifts the engine reverse gear for you. Simple movement of an electrical switch is the only effort required to shift gears.

In order that you may secure the utmost pleasure and convenience from this clutch control system we would like to point out that in close work such as docking, the selector does not have to be left in forward or reverse position until the full shift is completed. With a little experience it will be found that partial shifting can be accomplished with greater rapidity than with any other method. As in manual control, shifting may be made from forward to reverse or vice-versa without hesitating in neutral.

CHRIS-O-MATIC SIGNAL LIGHT

A red signal light is usually installed on the instrument panel.

This light flashes only when the Chris-O-Matic is actually shifting. If the light signals either intermittently or continuously after the shift is completed, the unit is out of adjustment and there is danger of severe damage.

If emergency adjustment does not correct the operation, disconnect the main feed wire from the starting solenoid. The reverse gear may then be shifted manually, using a large wrench, after disconnecting the cylinder shaft yoke from the clutch arm.

CHRIS-O-MATIC FLUID LEVEL

The Chris-O-Matic should be checked occasionally and the fluid level brought up to within sight of the plug fill opening.

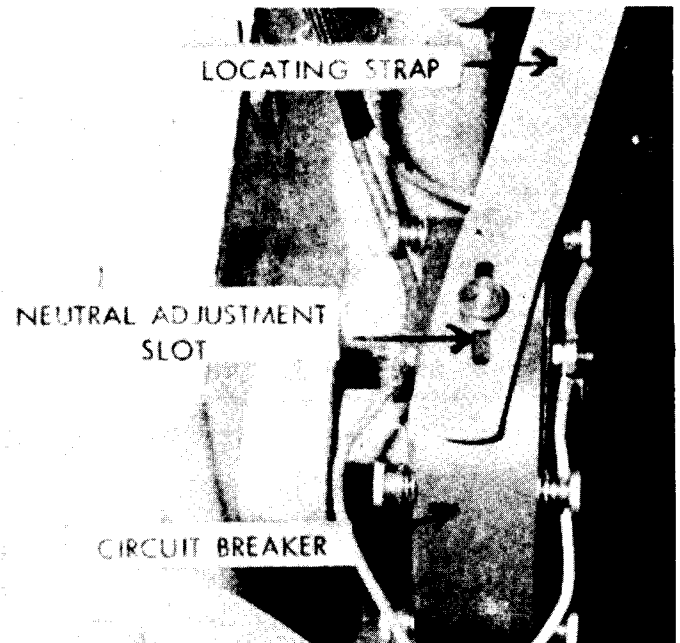
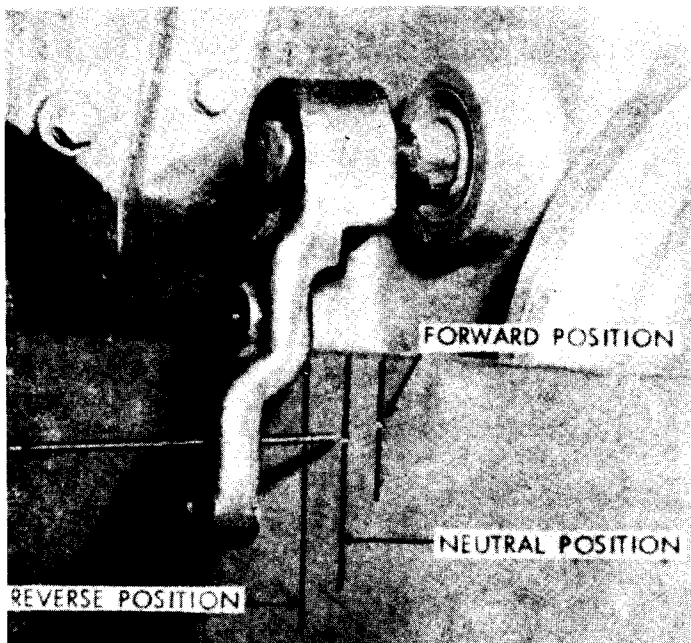
We recommend for refilling the reservoir the use of Delco #9 or #11 hydraulic fluid.

Note: Chris-O-Matics are shipped with a solid fill plug in the reservoir. This plug must be removed and the vented plug also furnished with the unit **INSTALLED IN ITS PLACE**. Failure to use a vented plug may force oil into the motor unit, resulting in failure.



CHRIS-O-MATIC ADJUSTMENT

The reverse gear must first be properly adjusted and operating correctly in order to correctly adjust the Chris-O-Matic unit because the Chris-O-Matic simply moves the reverse gear to the proper position by power. Before attempting adjustment of the Chris-O-Matic unit, make marks on the engine stringer to indicate accurately the position of the shift lever in forward, neutral and reverse when shifted manually. The shift lever has a hole through which a piece of small rod may be put to be used as an indicator. The Chris-O-Matic unit is then adjusted so that the shift lever will be pushed to these three correct positions.



Neutral Adjustment: Loosen knurled nut so that the selector can be rotated within the slot in the locating strap. The selector should be rotated so that the unit stops with the shift lever as close as possible to the neutral mark when the Chris-O-Matic is operated from forward to neutral and from reverse to neutral. Tighten the knurled nut to hold selector in position.

Forward Adjustment: The green "Forward" plate on one side of the selector should be rotated to the right or left as required to give the correct amount of travel. It is necessary to slightly loosen the four knurled nuts holding this plate in order to rotate it. The adjustment should be checked by working the Chris-O-Matic from neutral to forward checking to make sure that it stops with the shift lever at the proper position.

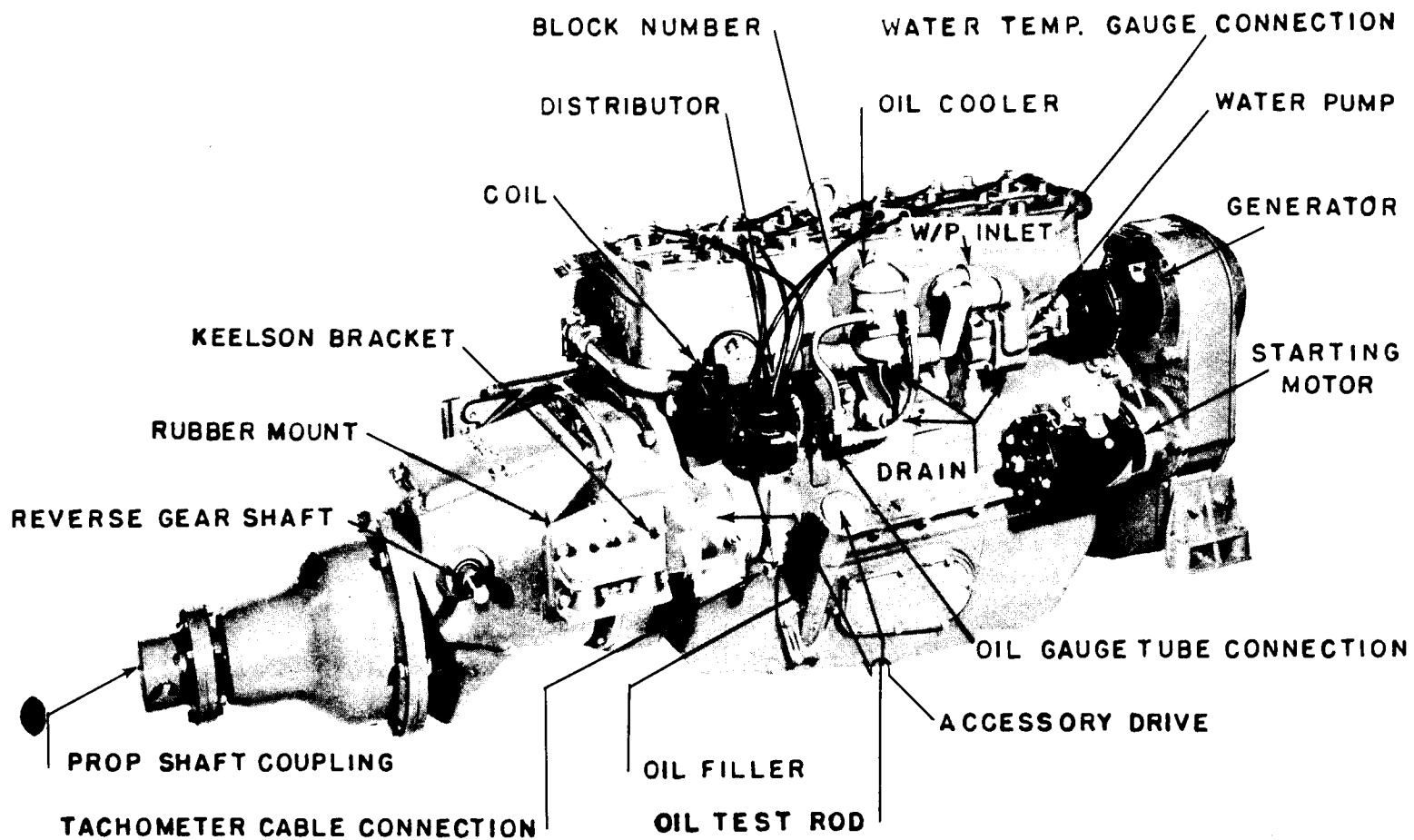
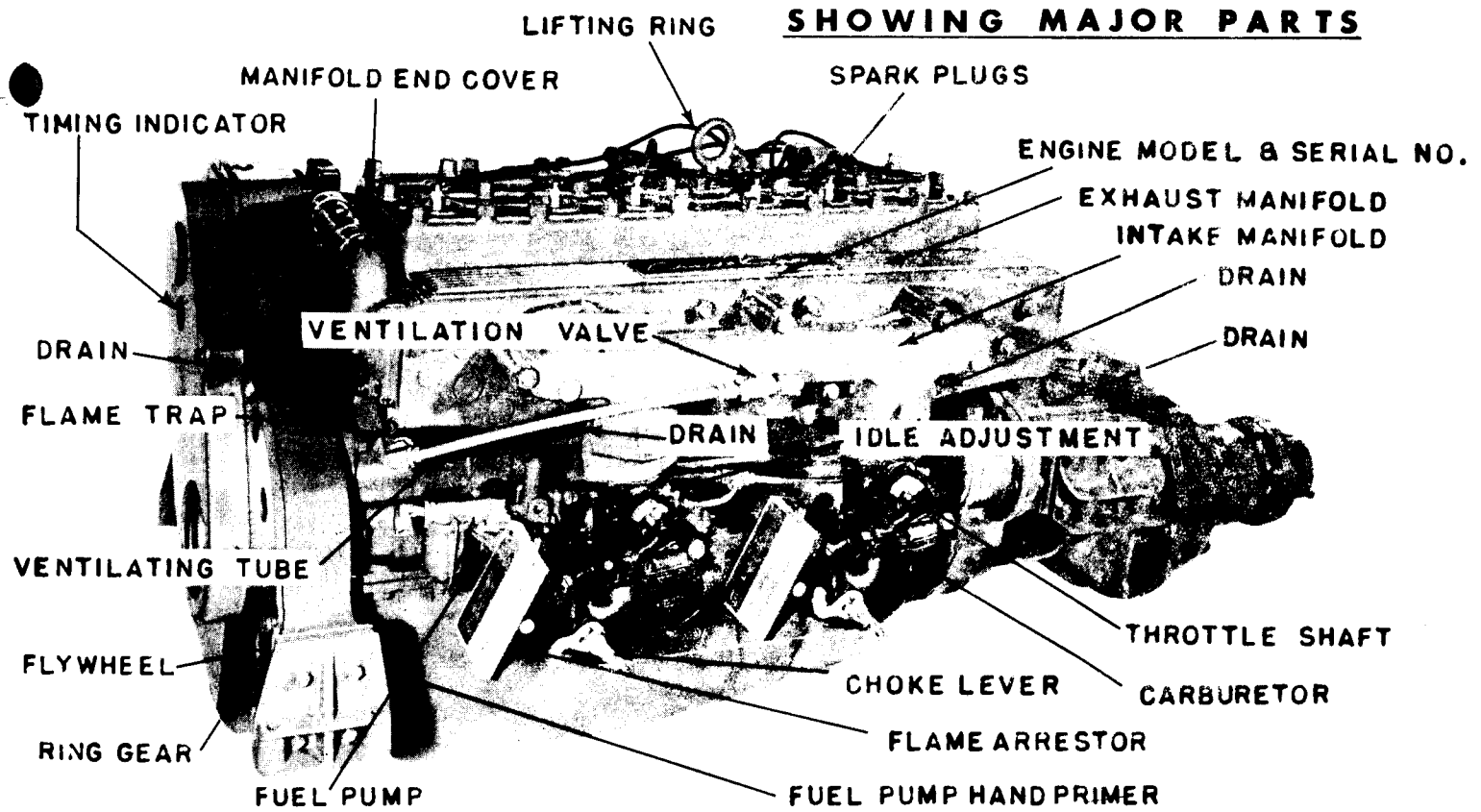
Reverse Adjustment: This adjustment is made the same as the forward adjustment except that the red "Reverse" plate is rotated until the proper amount of reverse travel is obtained.

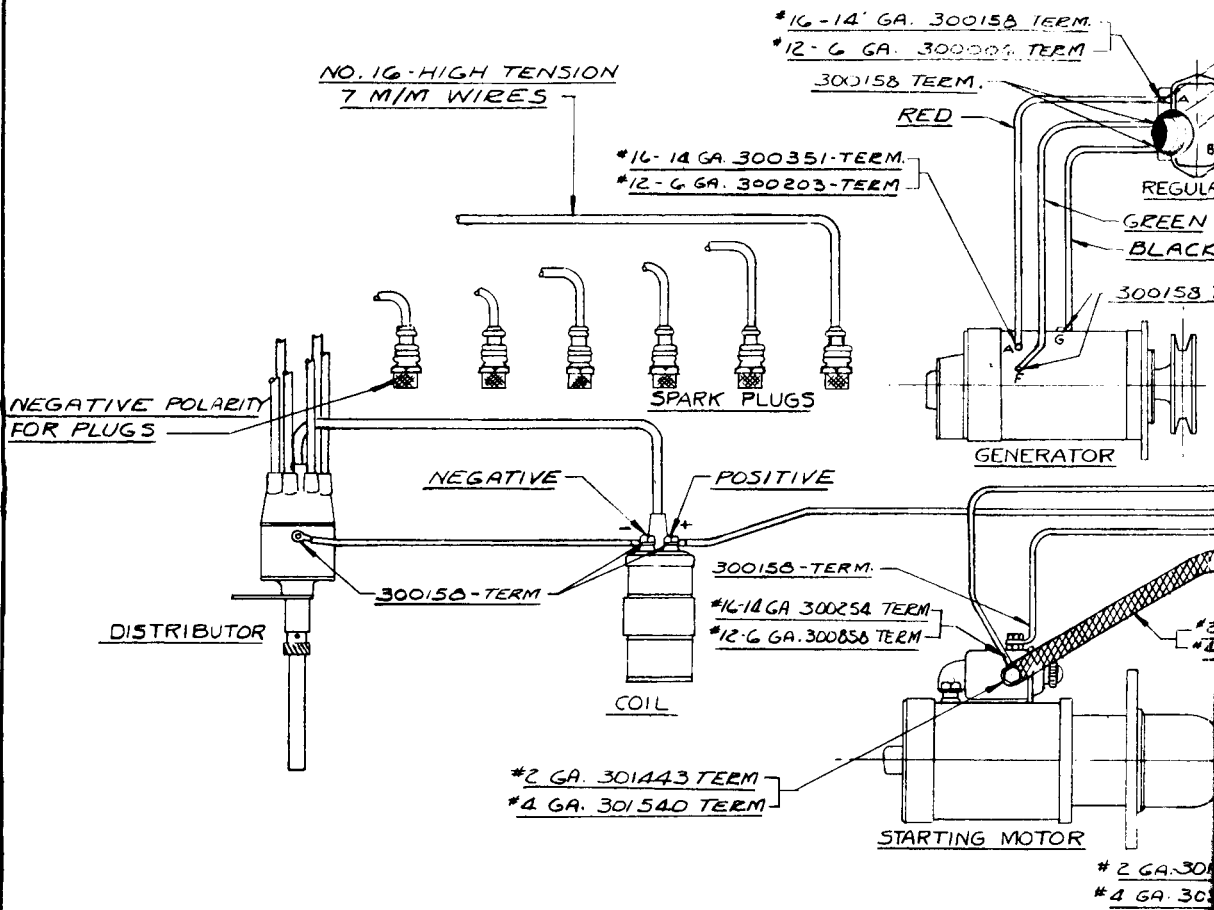
INFORMATION AVAILABLE

We are in a position to offer engineering assistance to all who are operating Chris-Craft boats or who are making Chris-Craft engine installations. If you wish general data or information concerning an individual problem send us full details. We will be happy to give a propeller size suggestion based on our experience either to improve present performance or for a new engine installation.

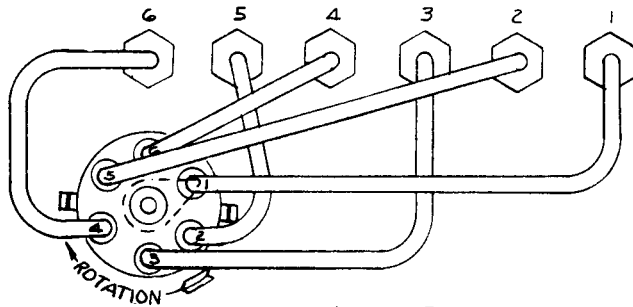
TYPICAL *Chris-Craft* ENGINE

SHOWING MAJOR PARTS



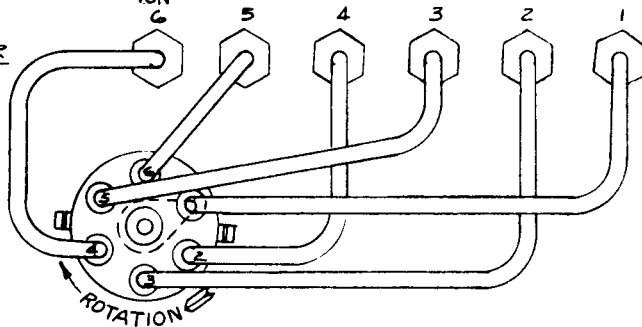


FIRING ORDER FOR
STD. ROTATION
6 CYLINDER
1-5-3-6-2-4



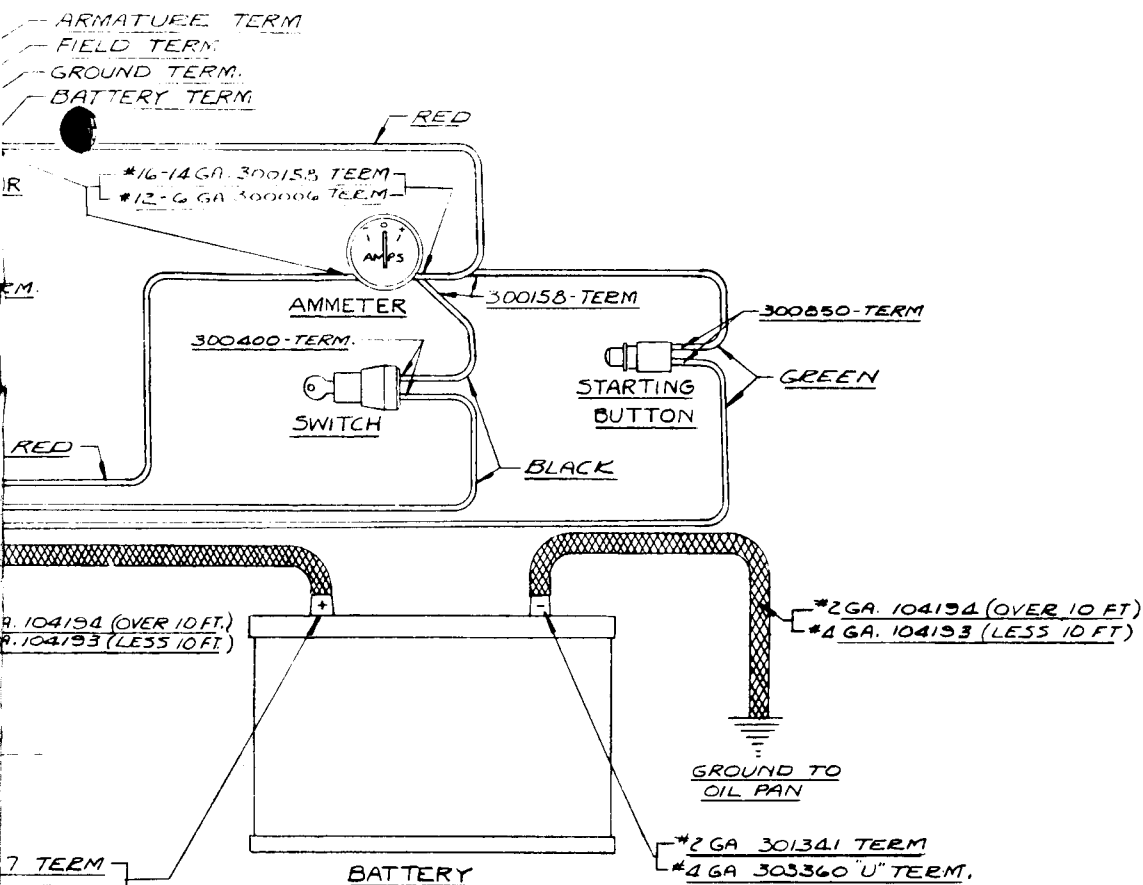
FLYWHEEL
END

FIRING ORDER FOR
OPP. ROTATION
6 CYLINDER
1-4-2-6-3-5



FLYWHEEL
END

LOCATE #1 PISTON AT TOP DEAD CENTER OF COMPRESSION
STROKE (FLYWHEEL END)
LOCATE DISTRIBUTOR AND ROTOR IN APPROX. LOCATION
AS SHOWN
CONNECT #1 HIGH TENSION TERMINAL ON DISTRIBUTOR WITH
#1 SPARK PLUG AS INDICATED THEN ROTATE CLOCKWISE
FROM #1 TERMINAL ON DISTRIBUTOR AND CONNECT EACH
HIGH TENSION WIRE TO THE RESPECTIVE SPARK PLUG
DEPENDING ON ORDER OF FIRING.



CIRCUIT IDENTIFICATION	WIRE COLOR	GAUGE	AUTO-LITE SPEC. NO.
IGNITION & REGULATOR GRD.	BLACK	16	101240
STARTING RELAY & GEN FIELD	GREEN	16	101241
GENERATOR CHARGING	RED	SEE CHART	

BATTERY SPECS:

ENGINES UP TO AND INCLUDING 236.6 CU. INCH
USE A 50 OR 60 AMPERE HOUR 12 VOLT BATTERY

ENGINES FROM 320 CU. INCHES TO 404 CU. INCHES
USE A 70 AMPERE HOUR 12 VOLT BATTERY

NOTES:

KEEP ALL WIRES AS SHORT AS POSSIBLE

ALL TERMINALS TO BE SOLDERED

USE AUTO-LITE WIRE & TERMINALS OR EQUIVALENT

AUTO-LITE SPECS. & PART NO. SHOWN

MOUNT REGULATOR SEPARATE FROM ENGINE

VOLTAGE REGULATOR FOR NEGATIVE GROUND ONLY

GENERATOR CIRCUIT		
TOTAL LENGTH OF GEN. CHARGING CIRCUIT IN FEET	WIRE GAUGE	AUTO-LITE WIRE SPEC. NO.
2 TO 6	16	100464
6 TO 8	14	102952
8 TO 14	12	102962
14 TO 20	10	104249
20 TO 30	8	101937
30 TO 50	6	100112

POLARIZING

CONNECT ALL LEADS TO THE GENERATOR & REGULATOR AND BEFORE ENGINE IS STARTED MAKE A MOMENTARY CONNECTION WITH A JUMPER WIRE BETWEEN THE "A" & "B" TERMINAL ON THE REGULATOR.

ENGINE WIRING DIAGRAM

12 VOLT SYSTEM

5464

ROTATION DIAGRAM

Standard Chris-Craft Engine Installation

