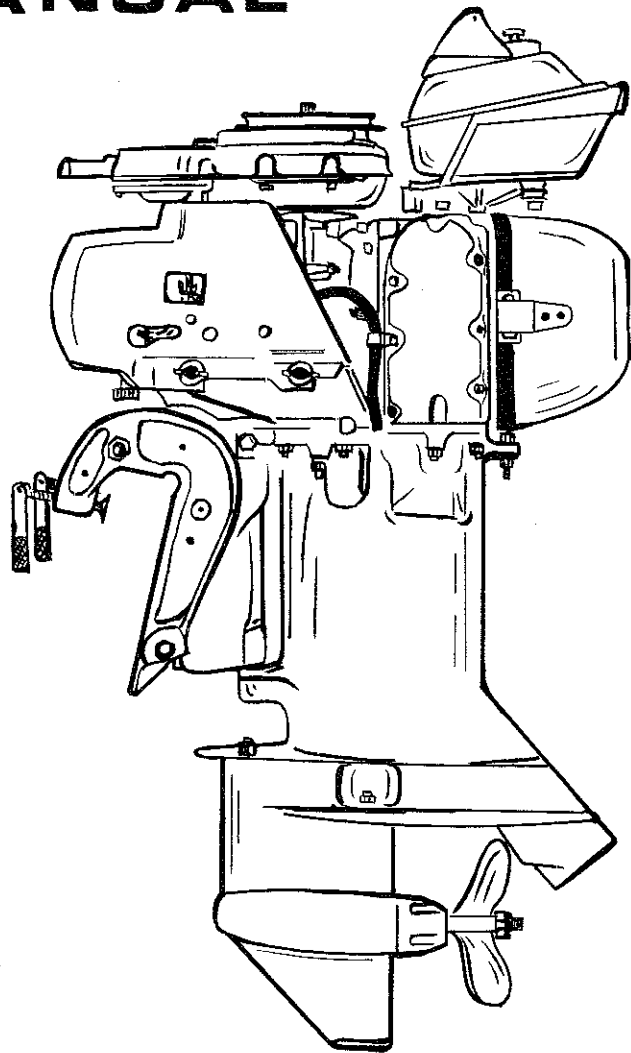


YAMATO OUTBOARD RACING
15226 S. CRENSHAW BLVD.
GARDENA, CA. 90249
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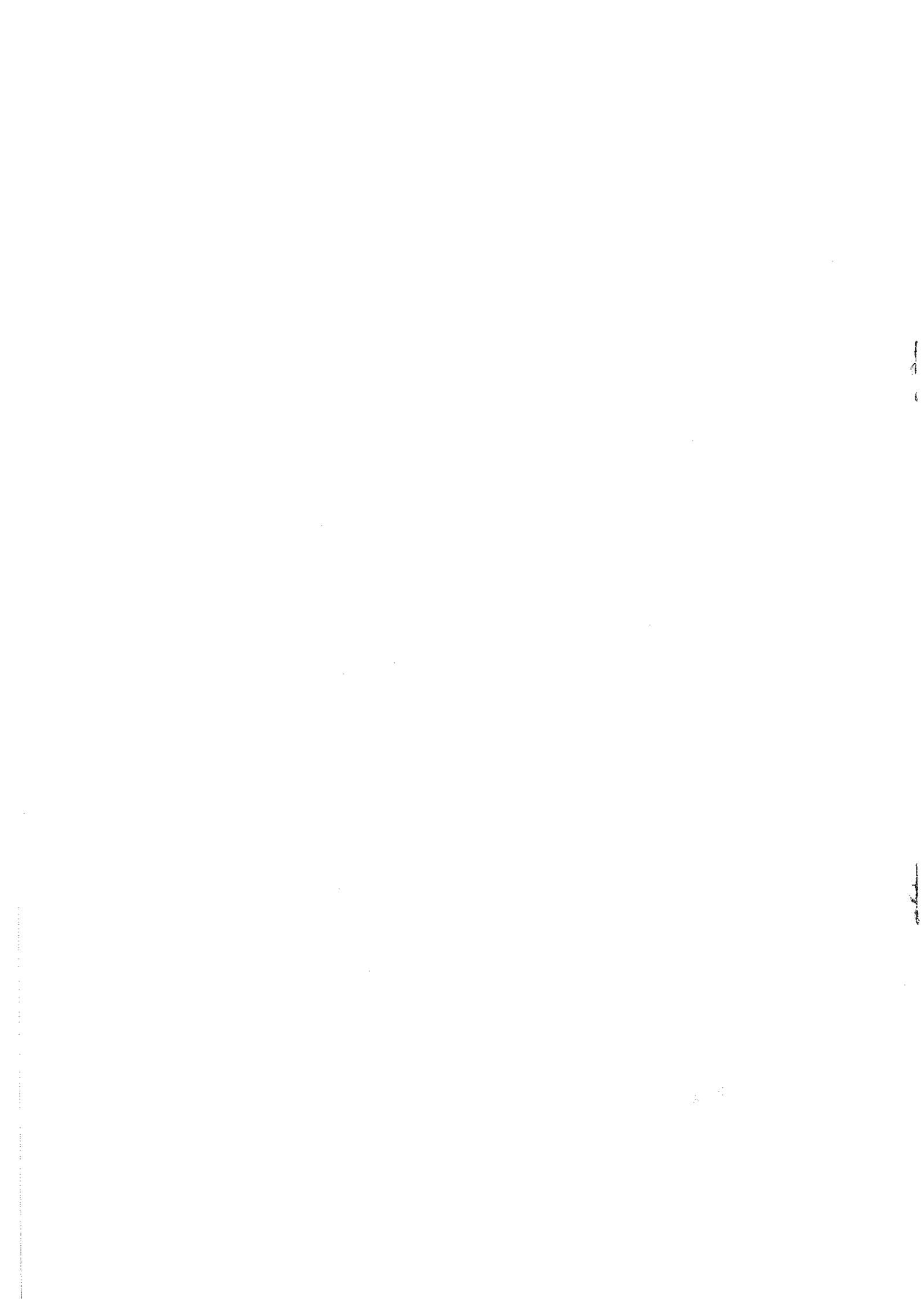
Yamato **80**

MANUAL



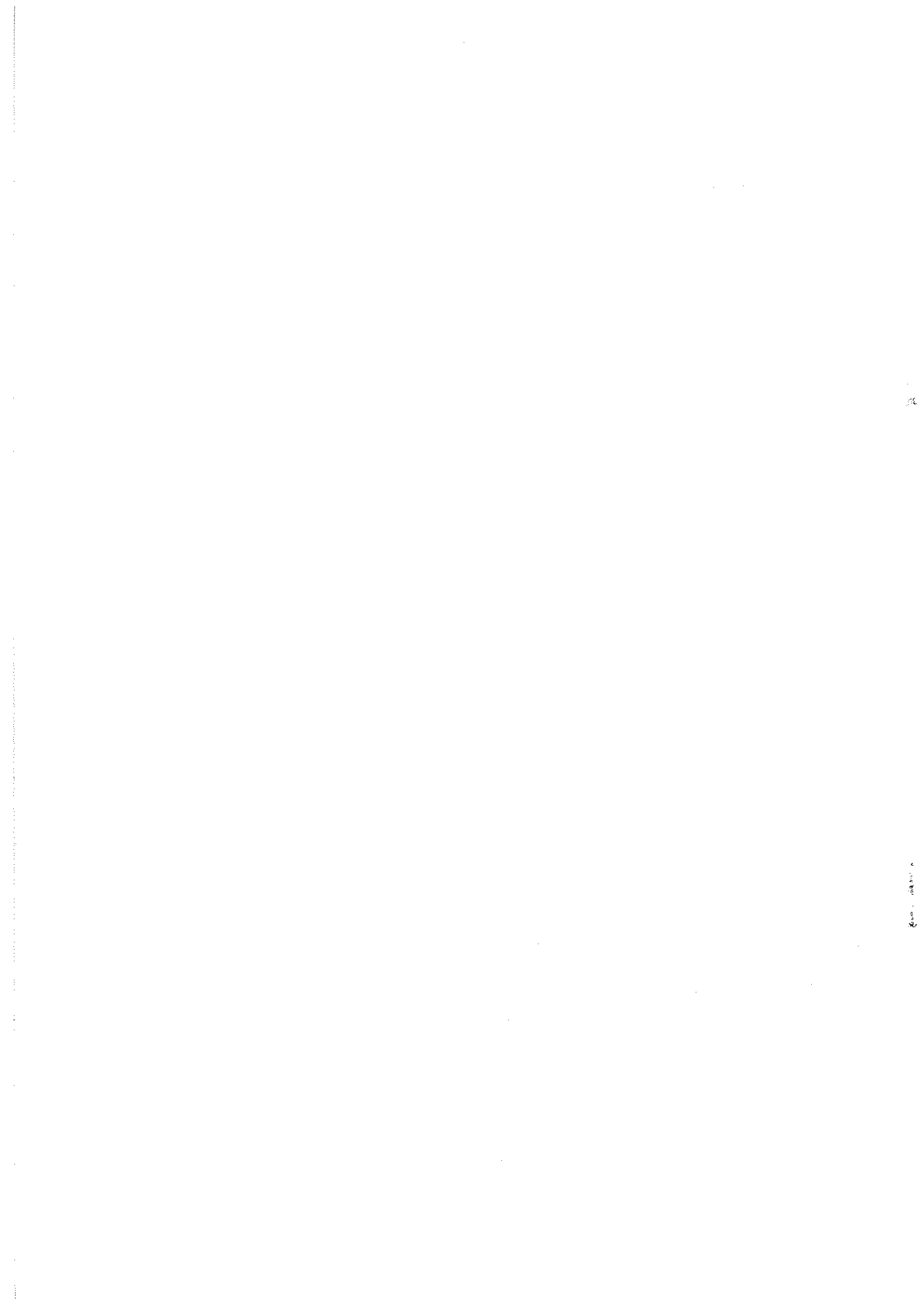
WORLD MOTOR BOAT CO., LTD.

1st January, 1978



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FORWARD

Congratulations; You have purchased one of the finest outboard motor that man has been able to design and build. The long established skill and technical knowledge of the Japanese, combined with the finest of material were assembled into this engine to give you maximum performance, reliability and durability.

Before you start your new Yamato Model 80, we recommend that you read this instruction book very carefully. It contains most of the instructions you need to run and service your engine in the best possible way. The reliability and lifetime of your engine depends to a great extent on how you use and service each component part of the engine. While servicing and/or repairing your Yamato Model 80, please refer to the parts book for reference numbers. Should advice, spare parts and service be necessary, always contact your nearest Yamato dealer.

I GENERAL

The Yamato model 80 is a water cooled, two cylinder, 327.7cc gasoline motor. Incorporated within are, Schnurle loop scavenging system (flat head piston), pyramid reed valves, one piece connecting rod, precision ground full circle built up crank, ball and roller bearing throughout, high capacity magneto, intergrated fuel tank, and an internally tuned muffler. Coolant is supplied by the propeller using the force ram system. Propeller shaft turns counter clockwise for maximum efficiency and safety on regulated close course racing. All exposed parts are made of corrosion-resistance material. All bolts and nuts are made of stainless steel with the exception of parts which require additional strength.

II OPERATION OF MOTOR

II-1 Precaution Prior to Starting Motor

- A. Check thumb screw handles(clamp screw) to be sure it is tight
- B. Check gear case oil.
- C. Check condition of spark plug and high tension wire. Be sure it is tight.
- D. Be sure safety stop switch is working properly if in use.
- E. Check fuel in tank to be sure sufficient quantity remains for the anticipated run.
- F. Check for proper engine height and angle.
- G. Check steering system for proper installation and thghtness.
- H. Check throttle system for tightness.

II-2 How to start Motor

- A. Check to see if fuel cock is vertical air vent(fuel cap) in open position, main needle(Cab.#13) opened 1 1/2 turn, and pilot screw(Cab.#33) opened one complete turn counter-clockwise after being fully seated.
- B. Check float pin(Cab.#8). Approximately 1/4 should be protruding above carburetor float cover.
- C. Open stop switch circuit.
- D. Set timing handle about midway of travel(one or two clicks can be heard).
- E. Set (push) choke lever(power #45) (on cold motor only). See figure 1. Do not open throttle.
- F. (On hot motors, do not use choke, Open throttle 1/8 to 1/4)
- G. Wrap starter rope 1 1/2 to 2 turns on starter pulley.
- H. Pull starter rope vigorously, repeat as necessary.
- I. As soon as motor starts, release(push) choke stopper(power#54) See figure 2.

Figure 1

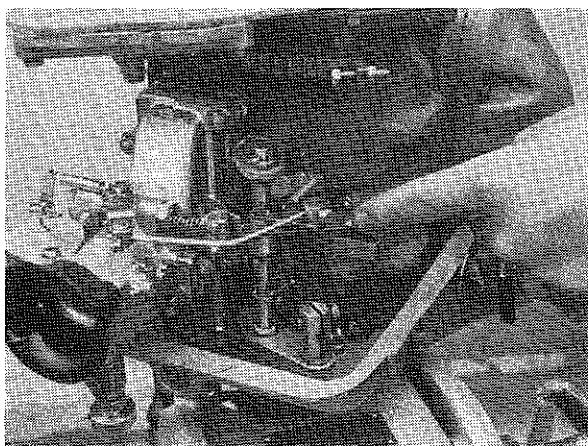
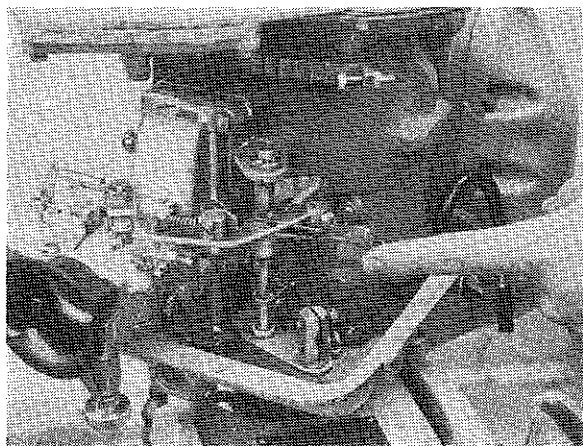


Figure 2



- J. If motor starts but stops immediately, it may or not be necessary to reset choke.
- K. Repeat step G and H.
- L. As soon as motor starts. shift timing handle all the way to the right (exhaust side).
- M. Increase motor RPM thru throttle lever.

II-3 If Hull Fails to Plane

- A. Stop motor after 20 seconds.
- B. Check transom height and angle.
- C. Check for foreign object around propeller and lower unit.
- D. Check for damaged and/or wrong propeller.
- E. Check motor. If motor lacks power (see trouble shooting chart).

II-4 Things to Observe and Adjust During Operation

- A. Be sure that timing lever(Magneto #3) is in full advanced position.
- B. Open throttle for maximum power.
- C. Adjust high speed main needle(Cab. #13) for maximum power.
- D. Check water outlet.
- E. Check RPM (if tachometer is available). Do not exceed 8,000 RPM.
- F. Listen for any unusual noise.

II-5 How to stop Motor

- A. Release throttle lever. (Motor will continue to run at idle).
- B. Activate stop switch.
- C. Alternate method of stopping motor is to shift timing lever toward the left(intake side).

II-6 Care of Motor After Use

- A. Wipe spilled gasoline with clean rag.
- B. Wipe water around power head.
- C. If motor has been used in salt water, flush motor with fresh water. Attach hose to (nipple) bolt (Lower #58).
CAUTION : Do not tip motor. Water can enter exhaust port and can cause serious damage.

II-7 Submerged Motor

- A. If motor is submerged in water for any reason, take the following action immediately.
 1. Remove propeller
 2. Remove spark plug and cylinder head. (remove cylinder head only when submerged at high speed). Cylinder head gasket is often blown due to hydraulic hammer. The gasket acts as a fuse which minimizes further internal damage.
 3. Turn motor by hand. If complete revolution is possible without any binding, complete the following.
 - a. If motor has been submerged in salt water, flush motor with fresh water thru carburetor while turning motor slowly. Clean exterior parts with fresh water.
 - b. Remove starter pulley and coil plate assembly. (See par. III-2). Flush with clean fresh water. Clean and dry all electrical parts. Reinstall starter pulley only.
 - c. Drain fuel tank, fuel line and carburetor.
 - d. Set motor with cylinder head facing down.
 - e. Crank motor several times.
 - f. Turn motor so that exhaust side is facing down.
 - g. Repeat step e.
 - h. Repeat step d.
 - i. Crank motor. Repeat step d thru h until all water is expelled.
 - j. Reassemble magneto assembly.
 - k. Attach high tension wires to spark plug. Ground spark plug.
 - l. Pull starter pulley and check spark plug. Both plugs must be firing.
 - m. Reassembly (except propeller), refuel and run motor for 30 seconds at intermediate speed.
 - n. Replace propeller. CAUTION: Close safety switch when installing or removing propeller, or remove spark plug wires.
 - o. Install on hull and run at least ten minutes.
 4. If motor binds when turned by hand, internal damage such as bent connecting rod, bent crankshaft, crankcase and/or cylinder cracked, etc. may have occurred. Remove as much water as possible by following step 3-a thru 3-i. Wash and coat internal and external parts with oil. Complete disassembly is recommended.

III DISASSEMBLY, INSPECTION AND REASSEMBLY

III-1 Power Unit

A. Disassembly

1. Remove Magneto assembly(see magneto section).
2. It is necessary to remove fuel tank for the beginner, it will be easier to work without it.
3. Remove power unit by removing seven 8 mm nuts using 12 mm box wrench.
4. Remove power unit from lower unit.
5. Remove carburetor.
6. Remove throttle link assembly(#45) by removing two nuts.
7. Remove intake manifold assembly(#44).
8. Remove reed valve assembly(#39).
9. Remove six 10 mm nuts using 14 mm box wrench to remove cylinder block. CAUTION: Do not pry between cylinder block and crank case.
10. Remove piston pin clips.
11. Remove piston pin. CAUTION: Do not mar piston.
12. Remove piston.
13. Remove four 6 mm bolts holding bearing case lower assembly(#16). It is not necessary to remove tail flange assembly except when replacing oil seal.
14. Remove four 6 mm bolts holding upper bearing case assembly(#6).
15. Remove crankcase by removing ten 8 mm nuts using 12 mm socket wrench.
16. Split crankcase assembly by tapping with soft hammer. CAUTION: Do not pry with screw driver or other sharp tool.
17. Remove crankshaft.
18. Upper bearing case assembly(#6) can be removed by hand.
19. Inspect lower bearing assembly without removing from crankshaft. If bearing is defective, use special tool, puller-bearing case(lower),parts #15-9040, CAUTION: Remove clip(#86) prior to removing lower bearing assembly.
20. Remove clip(#14) which holds split sleeve, center bearing (#12). CAUTION: Slight discoloration of center bearing is not detrimental to the life of this bearing.
21. Clean all parts in solvent. Scrape off carbon and gasket residue.

B. Inspection

1. Slight scratches on cylinder wall is permissible. Hone if necessary.
2. Replace piston rings if gap exceeds 0.032"(0.8mm).

3. To check crankshaft, remove all bearings. Place "V" blocks on surface plate. Support crankshaft ends on "V" blocks. Check by placing dial indicator on center bearing surface while turning crankshaft. Maximum crankshaft deflection permissible---0.0032" (0.08mm)
 4. Check upper and lower bearing for excessive play and wear.
- C. Reassemble in reverse order with the following precaution.
1. Lubricate all bearings.
 2. When placing crankshaft in crankcase, be sure knock pin(#66) fits into split sleeve of center bearing(#12).
 3. After placing crankshaft in crankcase, install two 6 mm bolts on upper bearing case assembly and two 6 mm bolts on lower bearing case assembly on to crankcase. See figure 3 and 4.

Figure 3

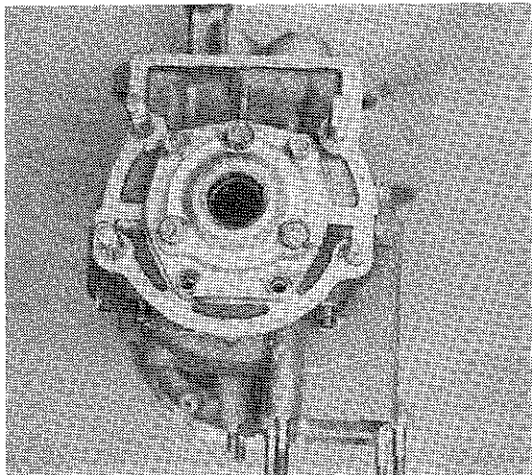
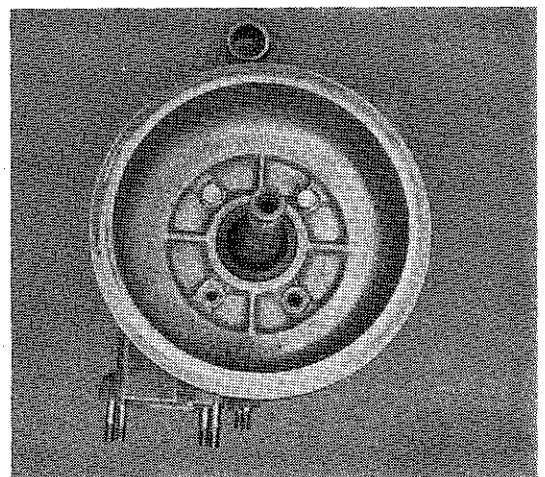


Figure 4



4. Use gasket sealer to seal crankcase splits.
5. Tighten two (crankcase) center 8 mm nuts using 12 mm socket. See figure 5. Torque nuts 14-18 ft/lbs (200-250 Kg/cm). Re loosen these two center nuts.
6. Install four remaining bolts to top and lower bearing case. Torque all bolts 5-7 ft/lbs(70-100 Kg/cm).
7. Install remaining 8 mm nuts on to crankcase. Torque all nuts 14-18 ft/lbs(200-250 Kg/cm). See figure 6.

Figure 5

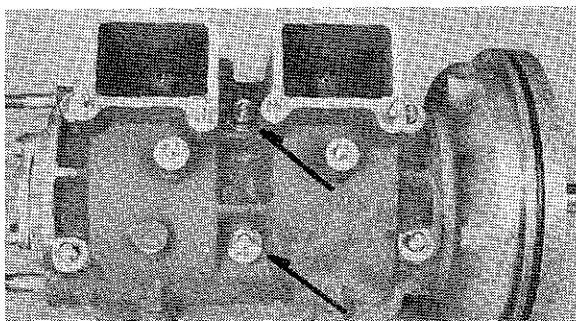
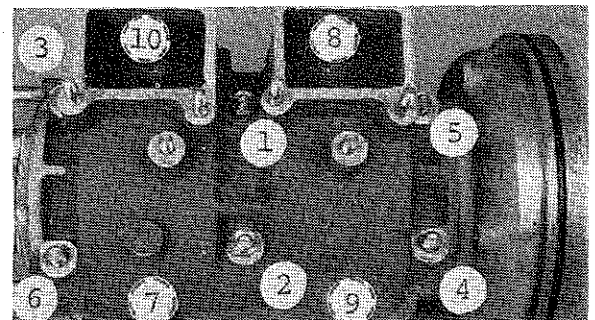


Figure 6



8. Install piston. Piston has an arrow stamped on head. This arrow must be pointed up. Install piston clips.
9. Install piston rings. Rings are marked NPR. This side faces cylinder head.

10. Insure that cylinder block and crankcase is flush at bottom. Torque cylinder to crankcase nut 22-25 ft/lbs (300-350 Kg/cm). See figure 7 and 8.

Figure 7

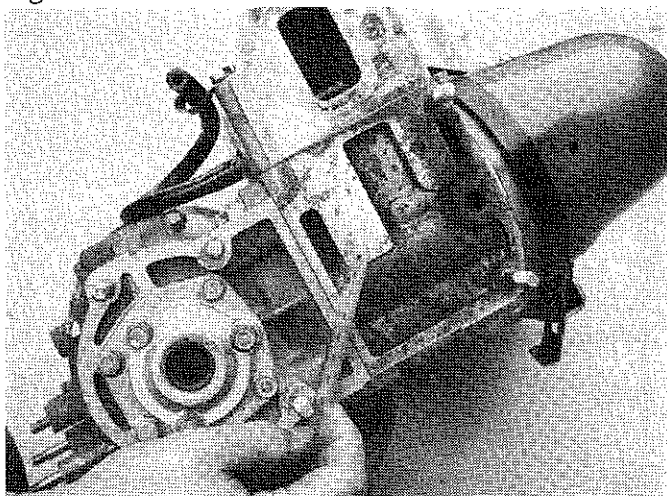
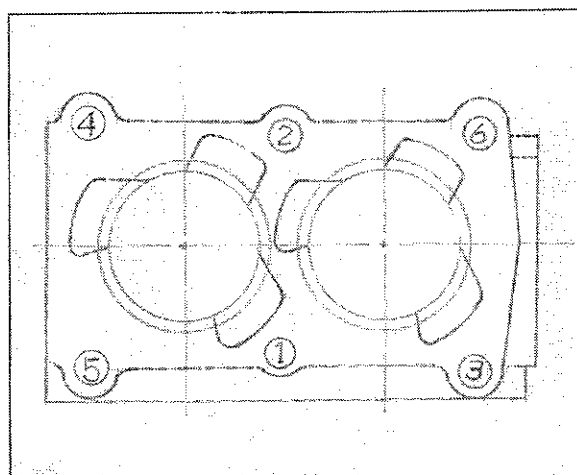


Figure 8



11. Insure that exhaust flange is flush with cylinder. See figure 9.
12. Insure that exhaust flange is flush at lower unit. See figure 10.

Figure 9

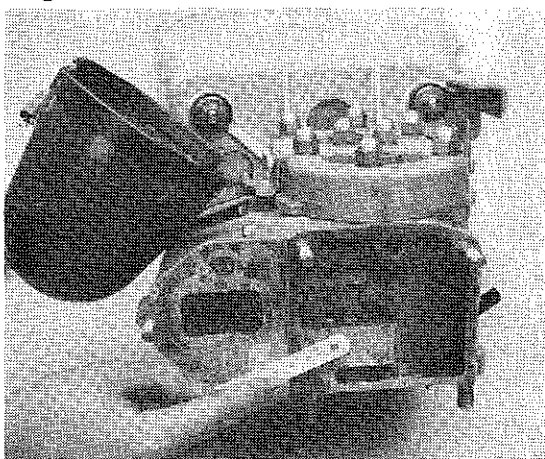
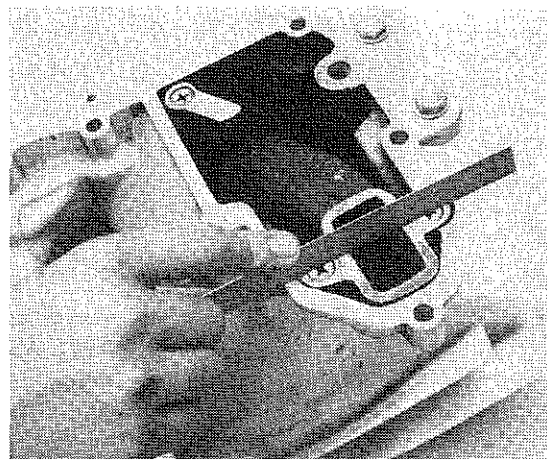
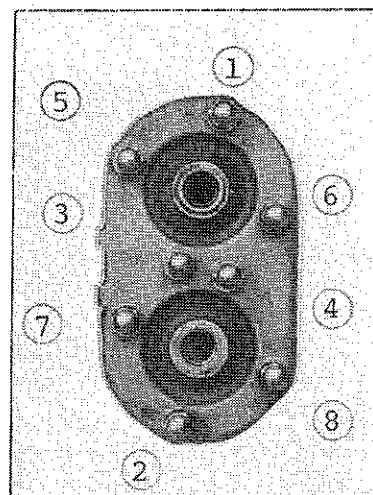


Figure 10



13. Torque cylinder head 14-18 ft/lbs (200-250 Kg/cm). See figure 11 for proper sequence. CAUTION: It is of utmost importance that all bolts and nuts be torqued as specified. Over tightening can cause distortion with a noticeable loss in power. Often overlooked is seemingly unimportant torque such as the seven 8 mm nuts that hold the power head and the lower unit. These as well as other bolts and nuts can reduce power if improperly torqued.

Figure 11



III-2 Magneto

A. Disassembly

1. Remove starter pulley bolt(#39).
2. Remove starter Pulley(#25).
3. Remove coil plate cover(#4).
4. Remove four clamp plate bolts(#36).
5. Remove coil plate assembly(#3). Tap with soft hammer. See figure 12.
6. Remove cam(#24) using special tool 15-9110 of screw driver.
7. Remove key, pulley(#26).
8. Remove flywheel nut(#22). Use special tool clamp flywheel, 15-9020. See figure 13.
9. Remove flywheel(#2) using special tool 15-9030. See figure 14.
10. Clean all parts in solvent. Wipe dry or blow with air.
11. Clean breaker point(#8) using appropriate file of stone.

Figure 12

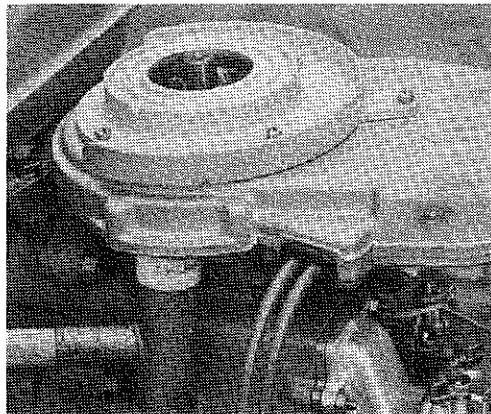


Figure 13

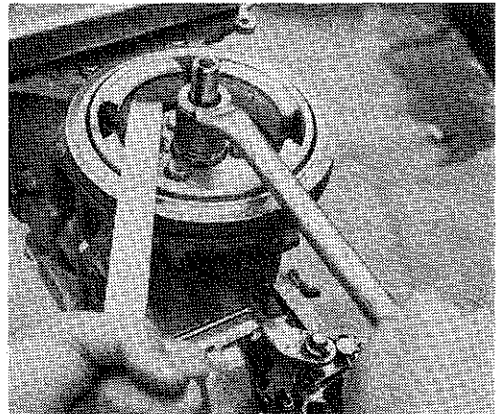
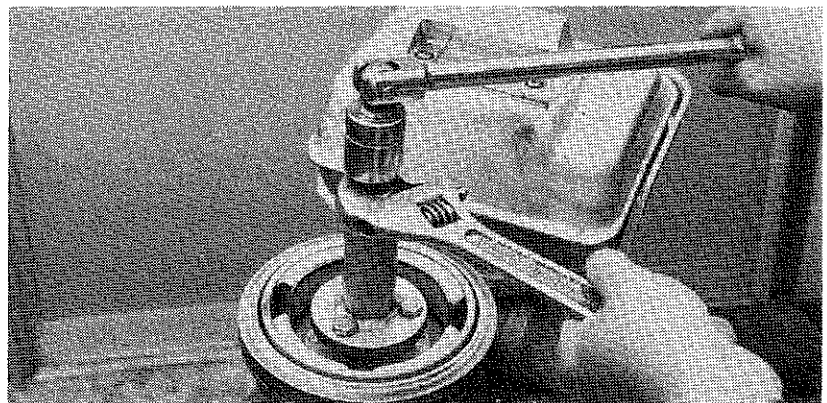


Figure 14

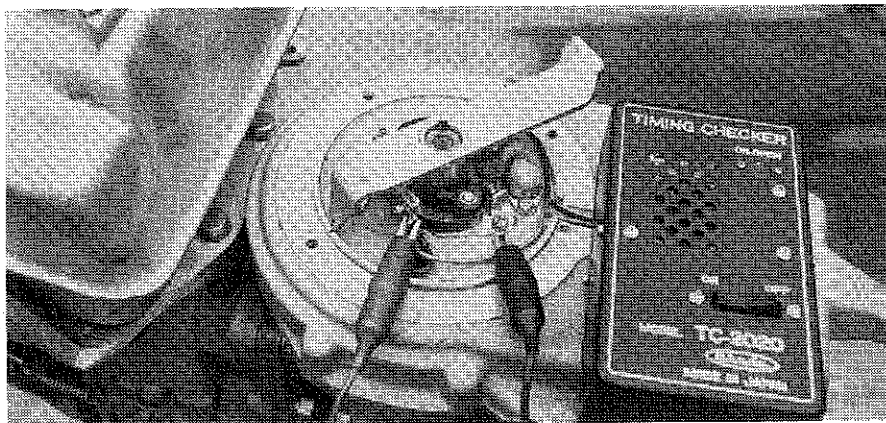


B. Inspection

1. Check breaker point arm pivot for excessive wear.
2. Check breaker points for chips and full contact.
3. Check breaker point springs for cracks.
4. Check capacity of condenser.
5. Check magnet strength.
6. Check leads for breaks and frayed insulation.

- C. Reassemble in reverse order with the following precaution.
1. Lubricate inside of coil plate assembly(#3) with grease.
 2. Cam can be placed upside down. Be sure that groove is at bottom.
 3. Lubricate cam sparingly with cam grease.
 4. Insure that flywheel key(#23) is seated properly.
 5. Use clamp flywheel, special tool 15-9020 when tightening flywheel. Tighten 58-65 ft/lbs(800-900 kg/cm).
 6. When installing timing lever, shift lever to the intake side.
 7. Coil plate assembly(#3) can be tightened by bending clamp plate(#20).
 8. When setting breaker points, use dial indicator thru spark plug or use special tool 15-9090. If special tool 15-9090 is used, place special tool on crankshaft. Rotate pointer to mark on coil plate assembly(#3). Breaker points should begin to break. See figure 15.

Figure 15



9. Maximum spark advance can be adjusted by moving bolt (#38). Adjust to 0.18-0.20"(4.6-5.0 mm).

D. Specification

1. Breaker point gap: 0.012-0.016"(0.3-0.4 mm).
2. Condenser capacity: 0.25 MFD.
3. Coil resistance: a. Primary(exciter) coil(#6) 2-4 ohm.
b. Ignition coil
Primary -----2.33 ohm.
Secondary ---5.40 ohm.
4. Magnet: 18,000 maxwell (minimum).
5. Breaker point timing when using dial gauge in spark plug hole. 0.18-0.20"(4.6-5.0 mm).
6. Pulley bolt torque: 13-15 ft/lbs(180-200 kg/cm).

III-3 Carburetor

A. Disassembly

1. Remove 2 screw(#45) from float cover.
2. Remove nut(#10).
3. Remove banjo(#9).
4. Float assembly can be removed from top. CAUTION: Do not bend needle.
5. Remove spring plate(#34).
6. Loosen holder(#11).
7. Remove main needle(#13) assembly.
8. Remove all plugs(#31, 35, 33, 37).
9. Remove pilot jet(#51).
10. Clean body and all parts in clean solvent.
11. Blow all parts with compressed air.

B. Inspection

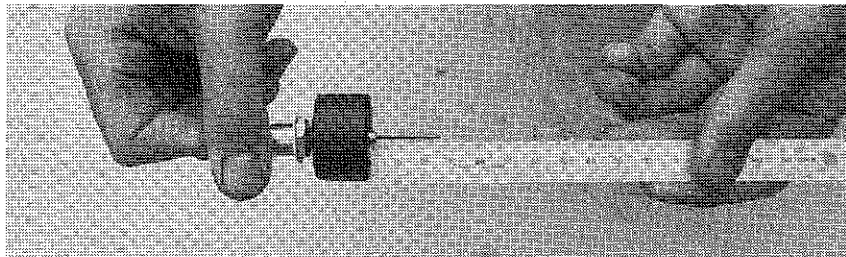
1. Inspect float needle for straightness.
2. Inspect float needle contact.

C. Reassemble in Reverse Order

CAUTION:

1. Check throttle butterfly for smooth movement and proper return.
2. Set float level to 1"(25.4 mm). Measured from tip of float pin to top of float. See figure 16.

Figure 16



3. Do not misplace air jet, pilot jet(#51) and air jet(#30). Air jet main has an I.D. of 0.076"(1.9 mm) and is placed toward the front of carburetor. Air jet(#30) has an I.D. of 0.036"(0.9 mm) and is located behind the above jet.
4. Adjust link bar(power #55) only at closed throttle. Be sure throttle butterfly closes fully and smoothly.

III-4 Gear Case

A. Disassembly

1. Using wrench, tail cap, special tool 15-9190, loosen tail cap. CAUTION: LEFT HAND THREAD.
2. Remove tail cap and propeller shaft assembly by:
 - a. Removing propeller pin prior to removing tail cap(#10).
 - b. Clamping propeller shaft in vice. Do not mar shaft.

c. Pulling gear case while tapping gear case with plastic or rubber hammer until the propeller shaft with attached parts are removed. Tail cap can then be divorced from propeller shaft by tapping propeller end with soft hammer while holding tail cap.

3. Remove pinion gear nut(#23) using 14mm box wrench.
4. Remove clip(#5).
5. Clamp pinion shaft(#3) in vice.
6. Tap gear case with plastic or rubber hammer to remove pinion shaft with attached parts.
7. Clean all parts in solvent and dry with compressed air.

B. Inspection

1. When draining gear oil, check for entry of water in gear case. If oil appears white, replace oil seals and O-ring(#13 and 15) and oil seal(lower #5).
2. Inspect gear for wear and full contact. If not making full contact, shaft may be bent or shim adjustment is incorrect.
3. Check all bearing for wear.

C. Reassembly

1. Assemble in reverse order.
2. Add or remove shim(#28,29) to adjust up down movement of pinion shaft(#3).
3. Back lash of gear should be between 0.004-0.006" (0.1-0.15 mm). Adjust by adding or removing shims(#30,31).
4. Torque pinion shaft nut 22-25 ft/lbs(300-350 kg/cm).
5. Torque propeller shaft nut 22-25 ft/lbs(300-350 kg/cm).
6. When replacing tail cap assembly(#10), coat threads and body of tail cap with graphite grease.
7. Torque tail cap 58-65 ft/lbs(800-900 kg/cm).

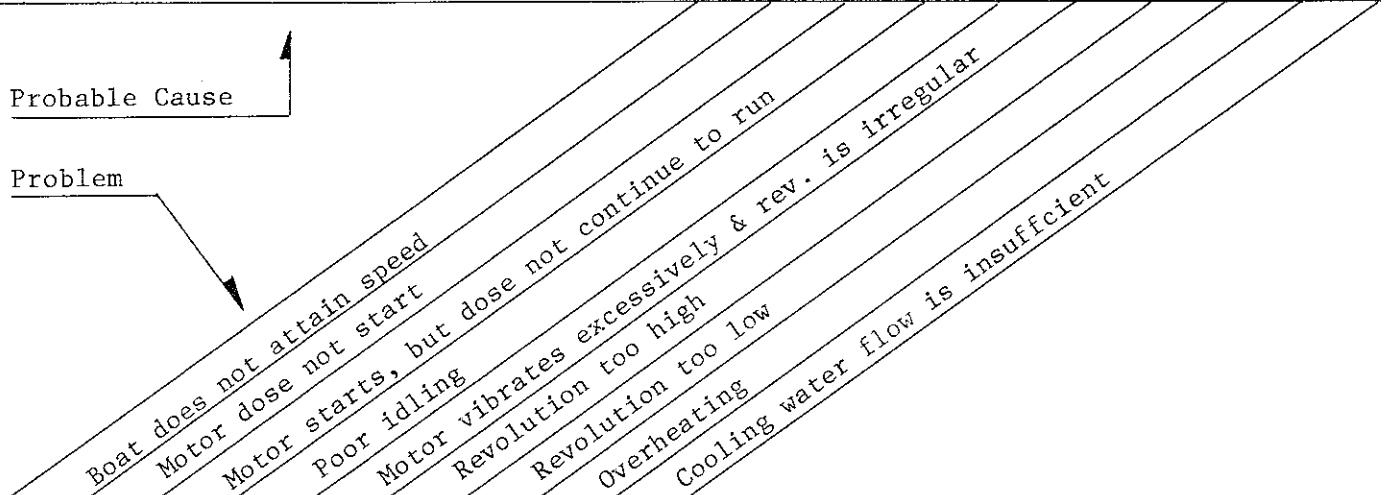
CAUTION: When installing gear case assembly on to drive shaft housing, care should be taken not to damage oil seal on drive shaft housing.

8. Fill gear case with a good quality gear oil.

Boat dose not suit motor	*						*		*
Boat overloaded. Hull bottom coated with shells and/or seaweed growth. Propeller pitch excessive	*						*		*
Tilt angle not correct	*					*	*		*
Installation of motor low							*		
Installation of motor high	*					*		*	*
Propeller slips	*					*			
Propeller pin sheared	*					*			
Propeller damaged or fouled with debris or seaweed	*				*	*			*
Cavitation	*					*			*
Cooling water circuit clogged	*						*		*
Water in fuel	*	*	*	*			*		
Contact breaker pitted, cracked, fouled or adjusted incorrectly	*	*	*	*	*		*		
Ignition of spark plug weak or missing	*	*	*	*	*		*		
Switch engaged, short-circuited or damaged	*	*		*	*				
Reverse connection of ignition cords		*							
Wrong spark plug heat range	*				*		*	*	
Spark plug fouled	*	*	*	*	*		*		
Fuel mixture too rich	*		*	*	*		*		
High speed jet clogged or improperly adj.	*		*	*	*		*	*	
Slow speed jet		*	*	*	*				
Over choking		*	*	*	*				
Choking motor is necessary		*	*						
Float chamber is not filled with fuel	*	*	*	*					
Fuel line bent or cracked	*	*	*	*			*		
Air vent of tank clogged or closed	*		*	*					
Fuel tank empty		*	*						
Fuel filter clogged	*	*	*	*			*	*	

Probable Cause

Problem

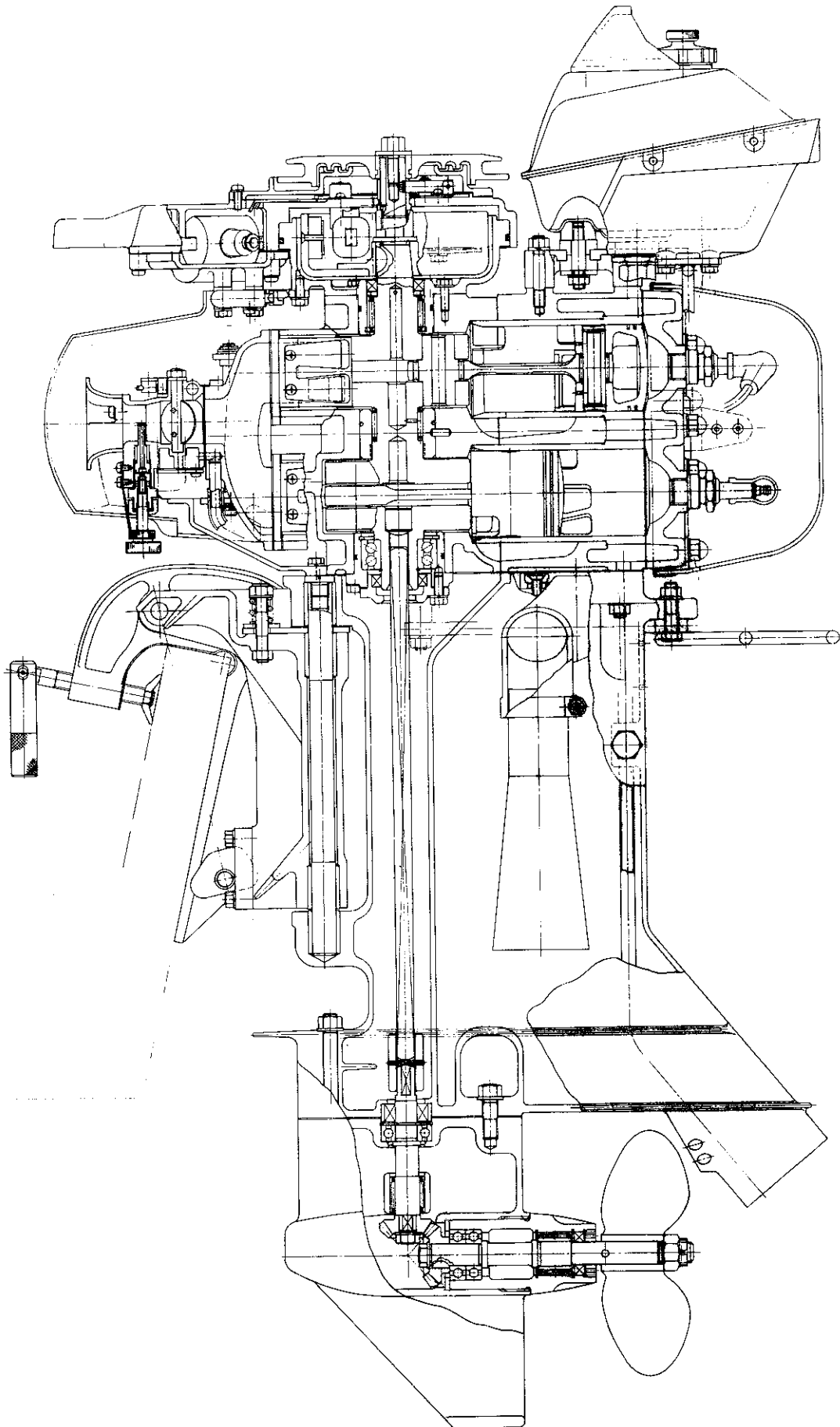


V SPECIFICATION FOR MODEL 80

1.	Horse Power	30 HP/7000 rpm
2.	Maximum Torque	24.6 ft/lbs(3.4 kg/cm)/6000 rpm
3.	Bore x Stroke	2.362" x 2.283"
4.	Piston Displacement	20 cubic inch
5.	Cylinder	2
6.	Port Timing - Intake	B.D.C. 62°
7.	Port Timing - Exhaust	B.D.C. 83°
8.	Piston Clearance Volume	1.1 cubic inch (min.)
9.	Induction System	Reed Valve, 2 sets
10.	Cooling System	Water Pressure
11.	Carburetor.....	1
12.	Ignition	Flywheel Magneto
13.	Flywheel Weight	2.86 lbs. (min.)
14.	Starting	Rope Start
15.	Gear Ratio	14 : 16 (S.T.D.) 13:15, 14:15, 14:14
16.	Fuel	Regular Gas., Min.86 Octane
17.	Fuel Tank Capacity	0.8 Gallon(3.0 liter) (15 minutes average time at full throttle)
18.	Oil	Outboard Motor Oil
19.	Fuel Mixing Ratio	25 : 1
20.	Transom Height	13-14"(330-356 mm)
21.	Weight	88 lbs(38 kg)
22.	Ignition Timing	B.I.D.C. 0.18-0.20"(4.6-5.0 mm)
23.	Spark Plug	NGK-A9N,A10N, Champion-K83R,K57R Autolight-BN603
24.	Spark Plug Gap(S.T.D.)	0.016"(0.45 mm)
25.	Compression Ratio	6.62:1(measured from top of exhaust) 9.86:1(measured from B.D.C.)
26.	Carburetor	MIKUNI BV-30, Throat 1.181"(30mm) Venturi 0.984"(25mm)
27.	Torque Specification	6mm: 5-7 ft/lbs(70-100 kg/cm) (S.T.D. bolts and studs) 8mm: 14-18 ft/lbs(200-250 kg/cm) 10mm: 22-25 ft/lbs(300-350 kg/cm)
28.	Reed Block	2 sets(4 ports x 2) Port size: 0.984"x0.669",0.551" (trapezoid)
29.	Exhaust holes	2 holes(0.788"x0.850",trapezoid)

VI CROSS SECTION MOTOR

Model : YAMATO 80



VII SPECIAL TOOLS

1. Puller - Pivot Pin Part#15-9010
2. Clamp - Flywheel Part#15-9020
3. Puller - Flywheel Part#15-9030
4. Puller - Bearing Case(Lower) ... Part#15-9040
5. Timing Handle Part#15-9090
6. Clamp - Pulley Part#15-9100
7. Puller - Cam Part#15-9110
8. Guide - Piston Pin Part#15-9130
9. Wrench - Tail Cap Part#15-9190
10. Wrench - Tail Cap(Plastic) Part#15-9200
11. Puller - Bevel Gear Part#15-9230
12. Bevel Puller Attachment Part#15-9240
13. Test Propeller Part#15-9350

