

HT1B-MX

SUPPLEMENTARY

SERVICE MANUAL



YAMAHA MOTOR CO., LTD.

NOTICE

This manual has been written by Yamaha Motor Company for use by Authorized Yamaha Dealers and their qualified mechanics. In light of this purpose it has been assumed that certain basic mechanical precepts and procedures inherent to our product are already known and understood by the reader.

Without such basic knowledge, repairs or service to this model may render the machine unsafe, and for this reason we must advise that all repairs and/or service be performed by an Authorized Yamaha dealer who is in possession of the requisite basic product knowledge.

Other information is produced by the U.S. distributor, Yamaha International Corporation, and is necessary to provide total technical coverage regarding the product.

The Research, Engineering, and Service Departments of Yamaha are continually striving to further improve all models manufactured by the company. Modifications are therefore inevitable and changes in specifications or procedures will be forwarded to all Authorized Yamaha Dealers and will, where applicable, appear in future editions of this manual.

YAMAHA HT1B-MXI SERVICE MANUAL

1st Edition

MARCH 1971

SERVICE DEPARTMENT

YAMAHA MOTOR COMPANY

HAMAMATSU, JAPAN

FOREWORD

The HT1B-MX is built as a motocrosser for the many Yamaha fans who want to enjoy a new world of thrilling excitement over rough terrain.

Factory tuned, it needs no additional modification nor troublesome tuning up again for each race. The extra power of the HT1B-MX will bring you many chances to win in organized competition. In addition, this power-packed machine assures you outstanding performance for off-the-road trail riding, too.

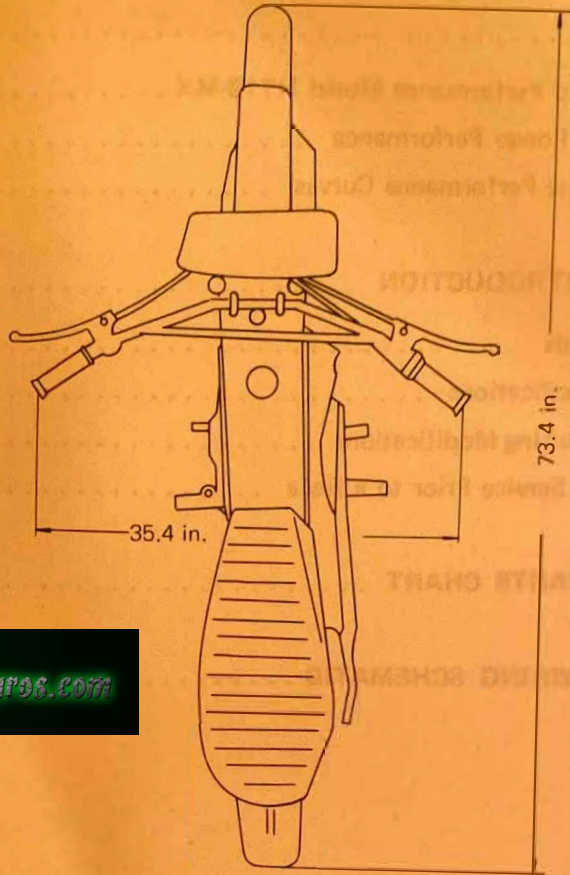
This Service Manual deals with carburetor settings, check-up procedures and detailed specifications for the HT1B-MX. For other service information, please consult the HT1-B Service Manual which is already published.

**SERVICE DEPARTMENT
YAMAHA MOTOR CO., LTD.**

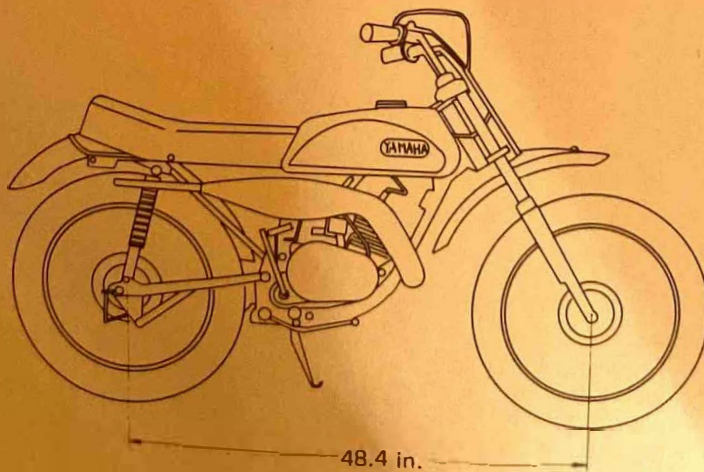
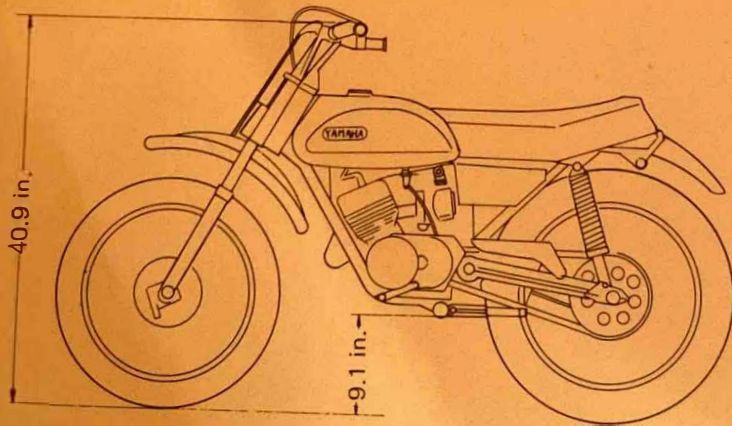
CHAPTER 2. HT1B-MX PARTS CHART

CHAPTER 3. HT1B-MX WORK PROCEDURES

NOMENCLATURE



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CHAPTER 1.

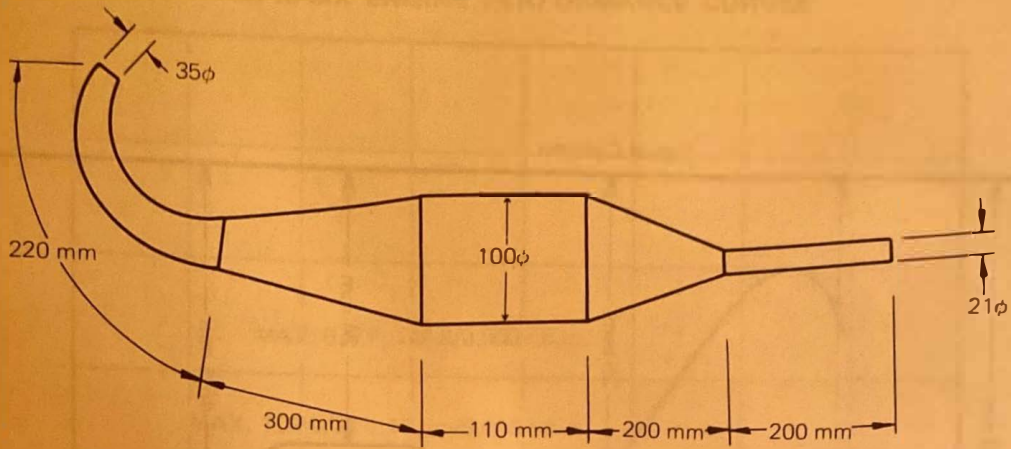
1-1 Specification & Performance Model HT1B-MX

| Model | YAMAHA HT1B-MX |
|---|---|
| Dimensions: Overall length Overall width Overall height Wheel base Min. ground clearance | 73.4 in. 35.4 in. 40.9 in. 48.4 in. 9.1 in. |
| Weight: Net Gross | 181 lbs. 192 lbs. |
| Performance: Climbing ability Min. turning radius | 32° 68.9 in. |
| Engine: Model Type Lubrication Cylinder Displacement Bore x Stroke Compression ratio Max. power Max. torque Starting system Ignition system Spark plug | HT1B-MX 2 stroke, gasoline YAMAHA Autolube & Gas/oil 5 port induction cast iron sleeve aluminum cylinder 5.43 cu. in. (89 c.c.) 1.969 in. x 1.795 in. 8.1 : 1 14 Bhp/9,500 r.p.m. 7.96 ft. lb/9,000 r.p.m. Kick starter Magneto ignition (2.5 mm B.T.D.C.) B-9EN |
| Carburetor: Type M. J. J. N. Float level | VM24SH #130 4DH7 2nd stage 25.5 mm |
| Air cleaner: | Wet foam rubber |
| Clutch: | Wet, multiple disk |
| Primary reduction system: | Helical cut gear |
| Primary reduction ratio: | 74/19 3.894 |
| Transmission: Type Reduction ratio 1st 2nd 3rd 4th 5th | Constant mesh, 5-speed forward 34/12 2.833 30/16 1.875 26/19 1.368 24/22 1.090 22/23 0.956 |

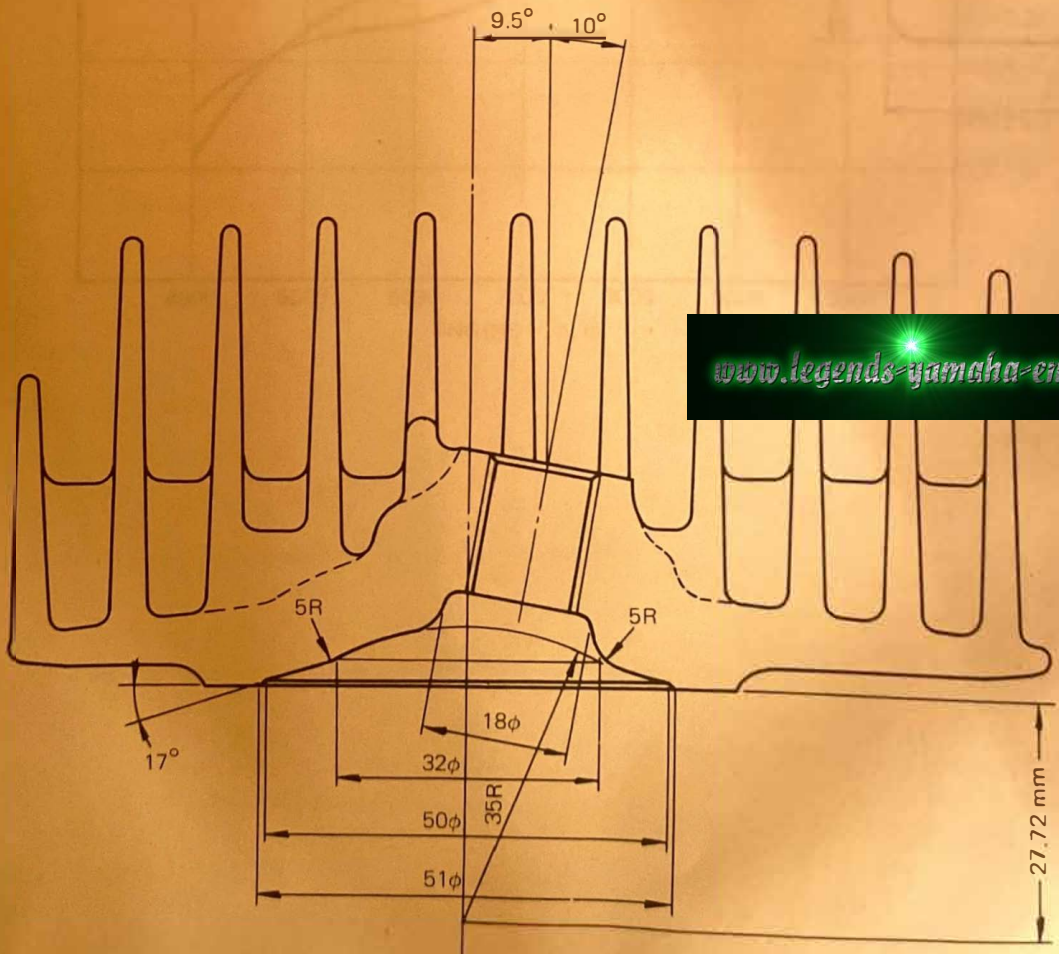
| Model | YAMAHA HT1B-MX |
|---|---|
| Secondary reduction system Secondary reduction ratio | Chain Standard 52/14 (3.714) |
| Chassis: Frame Suspension system, front Suspension system, rear Cushion system, front Cushion system, rear | Tubular, double loop Telescopic fork Swing arm, hydraulic shock Coil spring, oil damper Coil spring, oil damper |
| Steering system: Steering angle Caster Trail | 49° both right and left 60.5° 4.5 in. |
| Braking system: Type of brake Operation system, front Operation system, rear | Internal expansion Right hand, single leading shoe Right foot, single leading shoe. |
| Tire size: Front Rear | 3.00-18-4PR, trials universal 3.25-18-4PR, trials universal |
| Magneto: Model Manufacturer | F130-04 HITACHI Ltd. |
| Tanks: Gasoline tank capacity Oil tank capacity | 1.7 U.S.gal. 1.3 U.S.qt. |
| Gear oil: Volume | 700 c.c. ± 50 c.c. (0.67 ~ 0.77 U.S.gt.) (SAE 10W/30) |
| Front fork oil: Volume | Fork oil or 10W/30 132-147 c.c. (ca. tube) depending on ferrain and rider's choice |
| Autolube and/or Pre mix. oil: | 1) Shell 2t or castrol "R" under race condi- tions. 2) Yamalube or air-cooled engines. |

1-2 Source of High Power Performance

Expansion Chamber

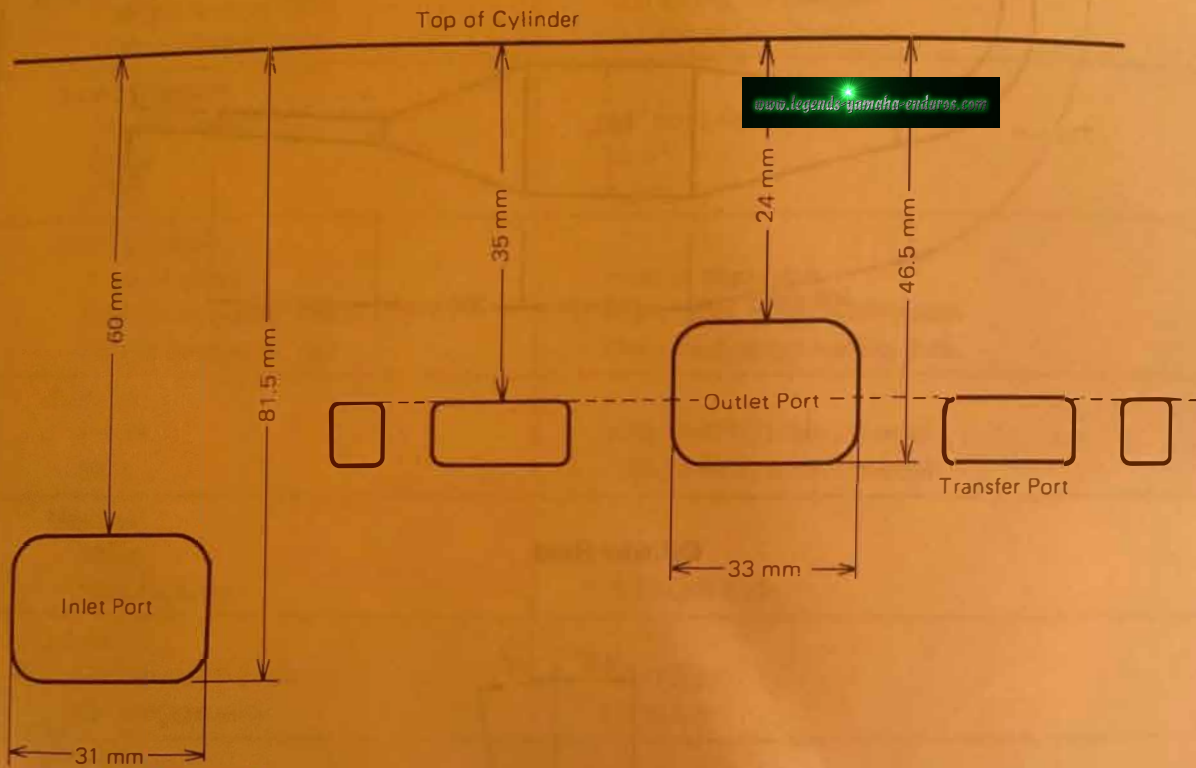


Cylinder Head



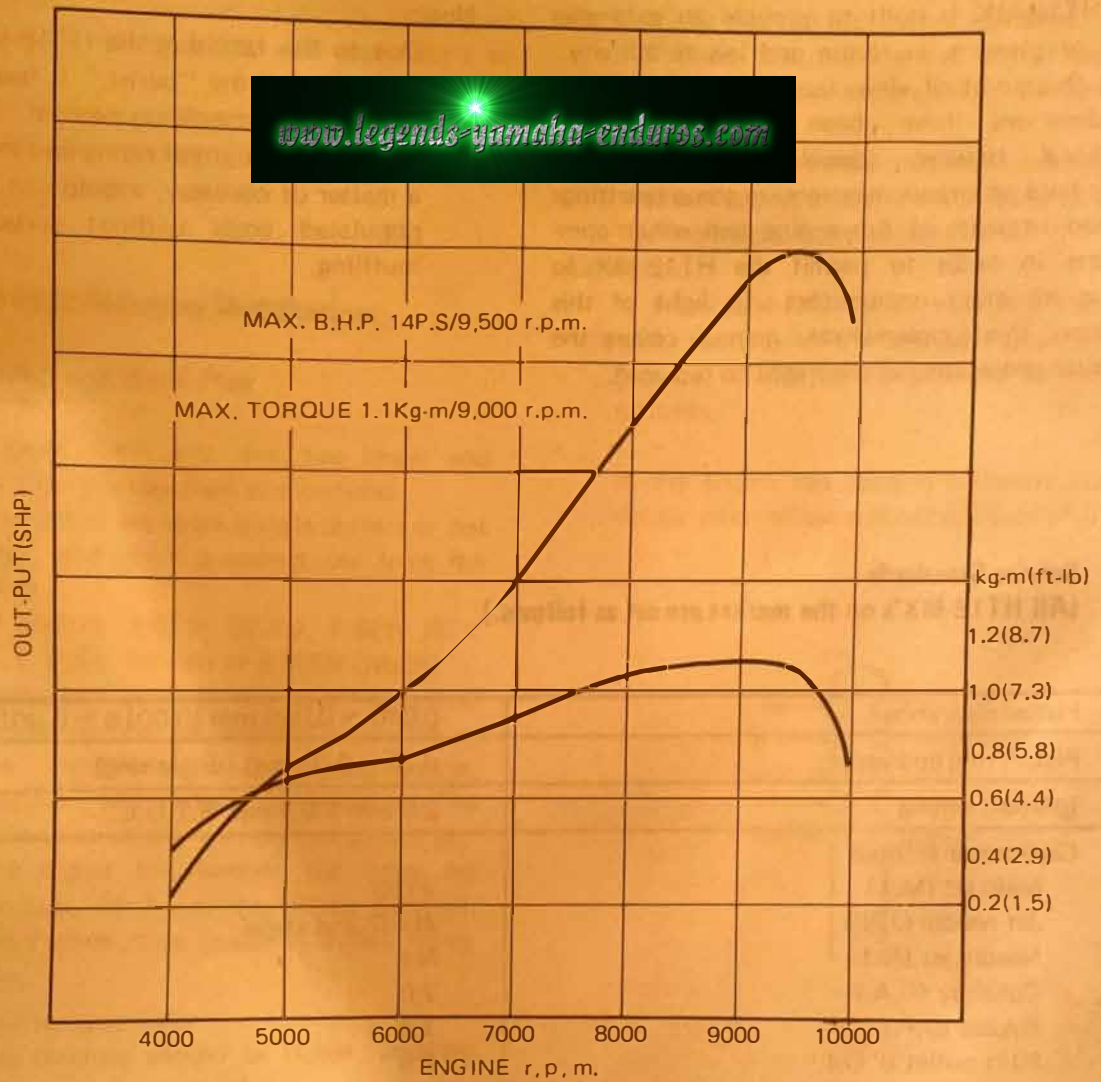
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HT1B-MX CYLINDER PORT TIMING



1-3 HT1B-MX Engine Performance Curves

HT1B-MX ENGINE PERFORMANCE CURVES



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CHAPTER 2. SERVICE INTRODUCTION

SERVICE INTRODUCTION

The HT1B-MX is built to provide an extensive range of pleasure in racing and leisure activity. From this point of view, the best possible design considerations have been taken into the HT1B-MX. However, special circumstances in a racing field or circuit may require some resettings or readjustments of the engine and other components in order to permit the HT1B-MX to outrun all other competitors. In light of this situation, this supplementary manual covers the technical procedures which might be required.

Note:

Due to the fact that the HT1B-MX has been designed for the "purist," it has no lighting equipment and a racing exhaust. Therefore, it is not legal for street riding and in addition, as a matter of courtesy, should not be ridden in populated areas without suitable exhaust muffling.

2-1 Service Standards

(All HT1B-MX's on the market are set as follows:)

| | |
|----------------------------|--|
| Piston clearance | 0.040 ~ 0.045 mm (0.0016 ~ 0.0018 in.) |
| Piston ring end gap | 0.15 ~ 0.35 mm (single ring) |
| Ignition timing | 2.5 mm ± 0.1 mm B.T.D.C. |
| Carburetor settings | |
| Main jet (M.J.) | #130 |
| Jet needle (J.N.) | 4DH7-2nd stage |
| Needle jet (N.J.) | N-8 |
| Cutaway (C.A.) | 2.0 |
| Bypass (B.P.) | 1.4 |
| Pilot outlet (P.O.) | 0.6 |
| Pilot jet (P.J.) | #30 |
| Air screw (A.S. turns out) | 1-1/4 (out from lightly seated position) |
| Valve seat (V.S.) | 2.0 |
| Starter jet (G.S.) | #40 |
| Identification (I.D.) | 276MI |
| Float level | 25.5 mm |
| Fuel mixing ratio | |
| Autolube pump installed | 30 : 1 |
| Autolube pump removed | 15 : 1 |

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* Gasoling should of low lead, high octane value. (90+)

Recommended oil: shell super M, castrol R30 or shell super 2T

Note:

When the Autolube pump is installed, pump plunger stroke should be adjusted to:

Minimum:

0.20 ~ 0.25 mm (0.008 ~ 0.010 in.)

Maximum:

1.85 ~ 2.05 mm (0.074 ~ 0.082 in.)

2-2 Changes in Specifications

Prior to each race, the machine should be so adjusted as to meet the conditions of the racing field, including road surfaces, lengths of straightaways, shapes and number of curves, slope gradients, weather, temperature and the rider's experience.

To examine these conditions, the rider himself has to make trial runs on the racing course.

Run the engine at full throttle under load, on the course, and observe engine condition:

If at full throttle the engine runs roughly, the main jet is probably too large.

If at full throttle the engine seems to want to have more power, the main jet is too small.

If the engine does not run smoothly at medium speed, adjust the jet needle (J. N.) by moving its clip to upper positions.

Example:

If the engine fails to run smoothly (too rich) with the clip in the standard position (2nd groove), it should be changed to the first position.

If the engine has starting difficulty, turn in the air screw or use a larger pilot jet (P. J.)

2-3 Main Parts Requiring Modifications

1. Carburetor and Spark Plug

- a. Have spare main jets one size larger and smaller than the specified size on hand.
- b. Judge whether the spark plug is correct or not by color, and select a correct one from the following:
B-7EN (N4G), B-8EN (N3G), B-9EN (STD N2G), B-10EN (N54R) or B11EN (N52R)

* Carburetor settings and spark plug heat ranges should be changed according to the conditions of the racing course, weather and rider's experience. The calibration is stamped on every main jet. The higher the number, the richer the mixture. First, use the richest main jet, and then decrease its size by experimentation.

At lower temperatures:

The mixture should be richer. Increase the size of the main jet.

At high altitude (+3,500') or rainy/humid weather:

The mixture should be leaner. Try one size smaller M. J.

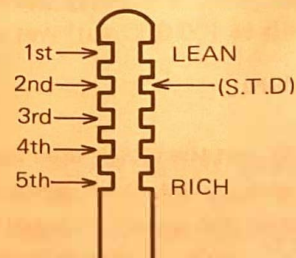
* After a trial run, remove the spark plug and check for color. Then, adjust carburetor settings.

Color of (STD) spark plug:

If sooty, the mixture should be made leaner.

If whitish, the mixture should be made richer.

If light to medium tan, the mixture is correct.



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2. Secondary Reduction Ratio

- a. The combination of drive and wheel sprockets should be so adjusted that the engine will pull strongly when shifting, into third and fourth gears.
 - 1) Sprockets must be so combined as to allow the machine to run with a maximum of engine output.
 - 2) Combinations will vary according to the condition of the racing course, transmission, weather and rider's experience.

- b. Racing course
If the racing course is suitable for high speed riding, the reduction ratio should be smaller. (e.g. 52/15). If it has many slopes or curves, the reduction ratio should be larger. (e.g. 52/13) (52/14 STD)
- c. Weather
If it rains, the reduction ratio should be larger.
- d. Rider
The reduction ratio should be set according to the rider's driving skill in cornering.



3. Engine Break-in

Ride the machine at 6,000 r.p.m. for about five minutes. Repeat this three times at intervals of 10 minutes. After each run, remove the spark plug and check it for proper color. (i.e. light to medium tan)

After the final run, remove the cylinder and check the piston. If the piston is found to have any glossy or scoped areas because of hard friction between the piston and the cylinder wall, the marks should be smoothed out with (#400-600 grit) wet sandpaper.

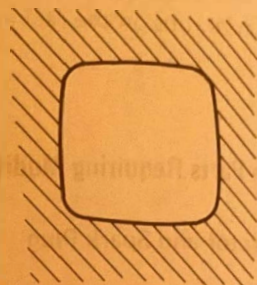
4. Procedure

Smooth out the glossy area on the piston with sandpaper. The best sandpapering method will leave the cross-hatch pattern intersecting at a 90° angle, as shown in the figure below. (Moisten the sandpaper with gasoline or oil at times, and move the sandpaper at an angle of 45° to the piston bottom edge.)

Wash the piston thoroughly in solvent after sanding.

After smoothing the piston, clean the adjacent area to the port as shown in the figure to the left.

In addition, check the port chambers and reshape as necessary to prevent ring breakage. Do not remove an excessive amount of material as this will affect port timing. Wash thoroughly afterwards and pre-lube piston and cylinder wall prior to re-assembling. The port timing for the HT1B-MX cylinder is shown in the specifications section.



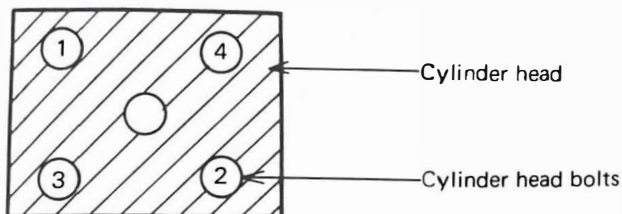
2-4 Check-ups and Service Prior to A Race

The rider must be in good shape so that he can display his best in the race, and the machine must also be carefully checked to allow plenty of practice time.

1. Cylinder Head

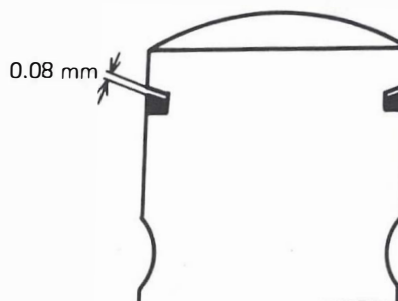
- a. Prior to each race, clean the combustion chamber, removing all carbon accumulations. Care should be taken not to scratch aluminum surfaces. Avoid using a tool having a sharp point or edge.
- b. Check the sealing surfaces between the cylinder head and the cylinder for gas leakage. If any leakage is found, check the flatness of the surfaces by using a surface plate. If necessary, smooth out the surfaces with (#400-600) wet sandpaper placed on the plate or resurface using a machine tool. Such operation is rarely needed if the cylinder head is correctly torqued during assembly, and therefore, the cylinder head gasket should be more carefully checked. If in doubt, the gasket should be replaced.

- c. Tighten the cylinder head bolts with a torque wrench. Proper torque is 1.8 ~ 2.2 kg-m (13.0 ~ 15.9 ft-lbs). The bolts should be tightened in order of 1, 2, 3 and 4, with a torque of 0.5 kg-m (3.6 ft-lbs), 1 kg-m (7.2 ft-lbs), 1.5 kg-m (10.45 ft-lbs), and 2.0 kg-m (14.5 ft-lbs), in this order.
- d. Re-torque the cylinder head bolts for each race



3. Piston and Piston Rings

- a. Check the piston skirt and recessed edges, piston pin holes, and rims for cracks. If the piston is cracked, even slightly, it should be replaced.
- b. If the ring groove locating pin is found excessively worn, or if the ring land clearance is more than 0.08 mm (0.00315 in.), the piston should be replaced. Measure the ring land clearance with a feeler gauge as shown below.



Note:

If desired, a metallic base head gasket sealant (commercially available) can be used on the head gasket prior to assembly to ensure against the possibility of leaks. In addition, a light application of securing compound can be used on chassis fittings (in addition to safety wire) to ensure against these coming adrift.

2. Cylinder

- a. Check the cylinder ports and wall for scratches. If any scratches are found, they should be smoothed out with wet sandpaper (#400-600) in the same manner as in the case of the piston. If scratches are too many or too deep to be corrected, the cylinder should be replaced with a new one. In this case, the piston and piston rings should be carefully checked. If necessary, they should be carefully checked. If necessary, they should be replaced.
- b. If the cylinder bore is found worn more than 0.03%, it should be replaced. If the taper exceeds 0.0015", the cylinder should be replaced. (1st (0.25) and 2nd (0.50) oversize pistons and rings are available.)

- c. If any part of the piston gives particular resistance to the cylinder wall, it should be smoothed down with an oil stone or wet sandpaper (#400-600). Lightly wet sand the high spot on the piston with a cross-hatch pattern.
- d. The piston ring should always be replaced after a maximum 300 miles (500 km) of racing. If the end gap is more than specified, replace the ring also.
 - 1) Ring end gap should be 0.15 ~ 0.35 mm (0.006 ~ 0.013 in.) when it is placed in the cylinder parallel to the cylinder bottom edge.
 - 2) The specified ring gap, when the ring is fitted in the land, is 0.28 inches (7 mm). If the gap is less than 0.2 inches, replace the ring as this is an indication of weakening and collapse.
- e. Check the piston ring for scratches caused by any cylinder part. If the ring has a scratch longer than one-third of the width of the ring, it should be replaced. In particular, check the exhaust port side. If a scratch is found, check port chamber on all ports. Correct as necessary.

- f. Check the clearance between the piston and the cylinder wall; it should be 0.040 ~ 0.045 mm (0.0016 ~ 0.0018 in.) replace if clearance exceeds 0.0023". Replace the cylinder if its wear exceeds 0.03%.
- g. After about 300 miles of operation, replace the piston, rings etc. with new.

Note:

When fitting the ring in the piston avoid pulling the ring ends apart more than 0.8 inches (20 mm), as the ring may be deformed or broken.

4. Piston Pin and Piston Pin Clip

- a. Make sure that the piston pin can be snugly fitted in the piston hole (the pin can be inserted into the hole by lightly pushing it with your finger).
If the piston pin hole has burrs, they should be removed with a reamer. If the piston pin is discolored due to heat or has steps worn in it, it should be replaced.
- b. Check the piston pin circlip. If the bent portion is worn or deformed by the piston pin, or if it is loose when fitted in the piston pin hole, it should be replaced. If possible, the clips should be replaced for each race.

5. Connecting Rod Small End

- a. Check the connecting rod small end for smoothness prior to each race.
- b. It is advisable to replace parts relating to the small end every 300 ~ 500 miles of racing.

6. Crankshaft

Rotate the Crankshaft hand prior to each race, and check for noise, wear, and other defects.

- a) Seizure of the connecting rod large end.
- b) Smoothness of the connecting rod large end. (when the crankshaft is rotated).
- c. Check the connecting rod for bends.
- c. Check the crankshaft bearings for smoothness prior to each race.
- d. Crankshaft wear tolerances can be found in the HT1B-MX Service Manual.

7. Oil Seals

- a. Check each oil seal every 300 miles of operation. If any oil seal is found worn or scratched, it should be replaced.

8. Gaskets

- a. Replace any broken or excessively worn crankcase cover gasket.
It is advisable to apply a bond to the cover. It prevents breakage or slipping out of the gasket and possible oil leaks.

9. Checking prior to each race.

- a. As machine speed increases, road shocks will become greater, and all bolts, nuts and screws tend to come loose. Before each race, re-tighten all fasteners and make sure that safety, wire locks are in place.

Times to Safety Wire

| | |
|-----|--------------------------------------|
| 1. | Axle nuts |
| 2. | Transmission drain plug |
| 3. | Front fork tube pinch bolts |
| 4. | Engine mounting bolts |
| 5. | Handle bar pinch bolts |
| 6. | Wheel spokes (at the crossing point) |
| 7. | Carburetor manifold nuts |
| 8. | Expansion chamber securing bolt(s). |
| 9. | Rear cushion mounting bolts |
| 10. | Oil tank securing bolts. |

Note:

A thread sealing agent can be used on many of the above in place of safety wire, with the exception of items #1, #2, #4 and #6 See p.9).



CHAPTER 3. HT1B-MX PARTS CHART

Engine Section

| Parts Number | Parts Name | Q'ty | Inspection |
|--------------|-------------------------|------|------------|
| 276-11111-70 | Head, cylinder | 1 | |
| 276-11311-70 | Body, cylinder | 1 | |
| 276-11631-70 | Piston | 1 | |
| 276-11635-70 | Piston (0.25 1st O. S.) | 1 | |
| 276-11636-70 | Piston (0.50 2nd O. S.) | 1 | |
| 276-11611-70 | Ring, piston top | 1 | |
| 94701-00014 | Plug, spark (B-8EN) | 1 | |
| 94701-00016 | Plug, spark (B-9EN) | 1 | |
| 94701-00017 | Plug, spark (B-10EN) | 1 | |

Inlet Section

| Parts Number | Parts Name | Q'ty | Inspection |
|--------------|--------------------|------|-----------------------|
| 276-14101-70 | Carburetor ass'y | 1 | VM24SH (AT1 Standard) |
| 248-13555-00 | Joint | 1 | |
| 248-13556-70 | Gasket | 1 | |
| 97201-08030 | Bolt | 2 | |
| 92901-08800 | Washer, plain | 2 | |
| 92901-08100 | Washer, spring | 2 | |
| 276-14453-70 | Joint, air cleaner | 1 | |
| 276-14498-70 | Stay, cleaner case | 1 | |
| 92501-06015 | Screw, pan head | 1 | |
| 92901-06100 | Washer, spring | 1 | |
| 248-26312-00 | Wire, throttle 2 | 1 | |
| 161-14526-00 | Cover, oil pump | 1 | |

Exhaust Section

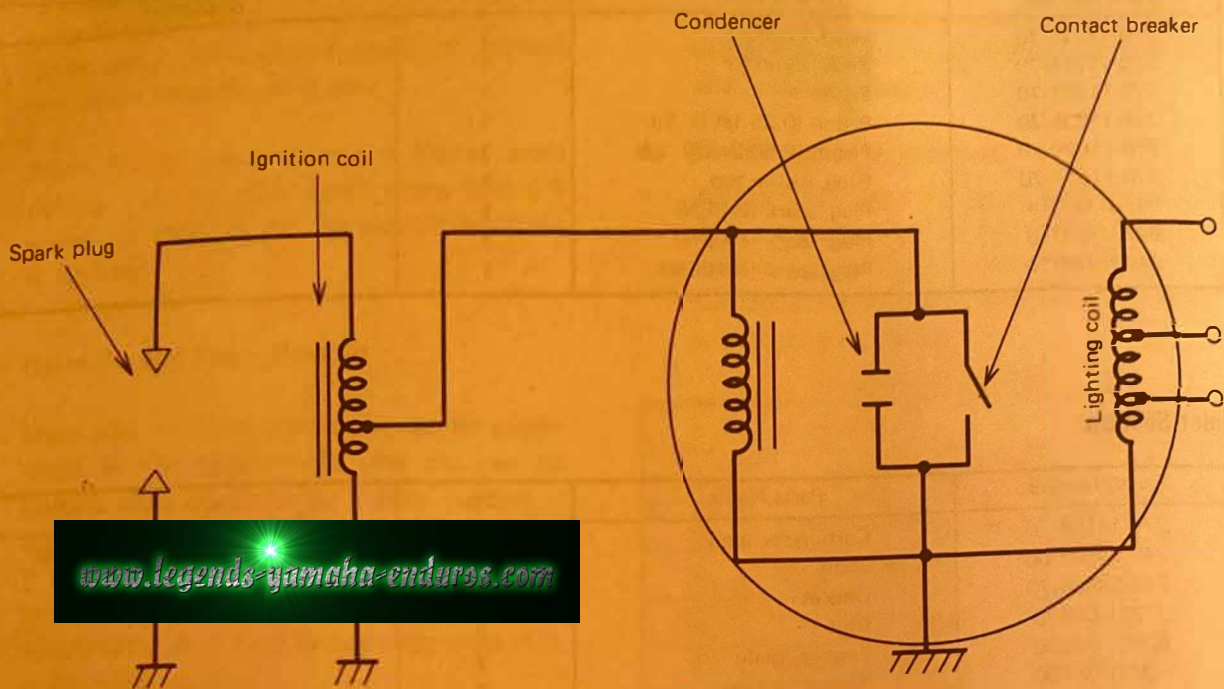
| Parts Number | Parts Name | Q'ty | Inspection |
|--------------|--------------------|------|------------|
| 276-14610-10 | Exhaust pipe ass'y | 1 | |

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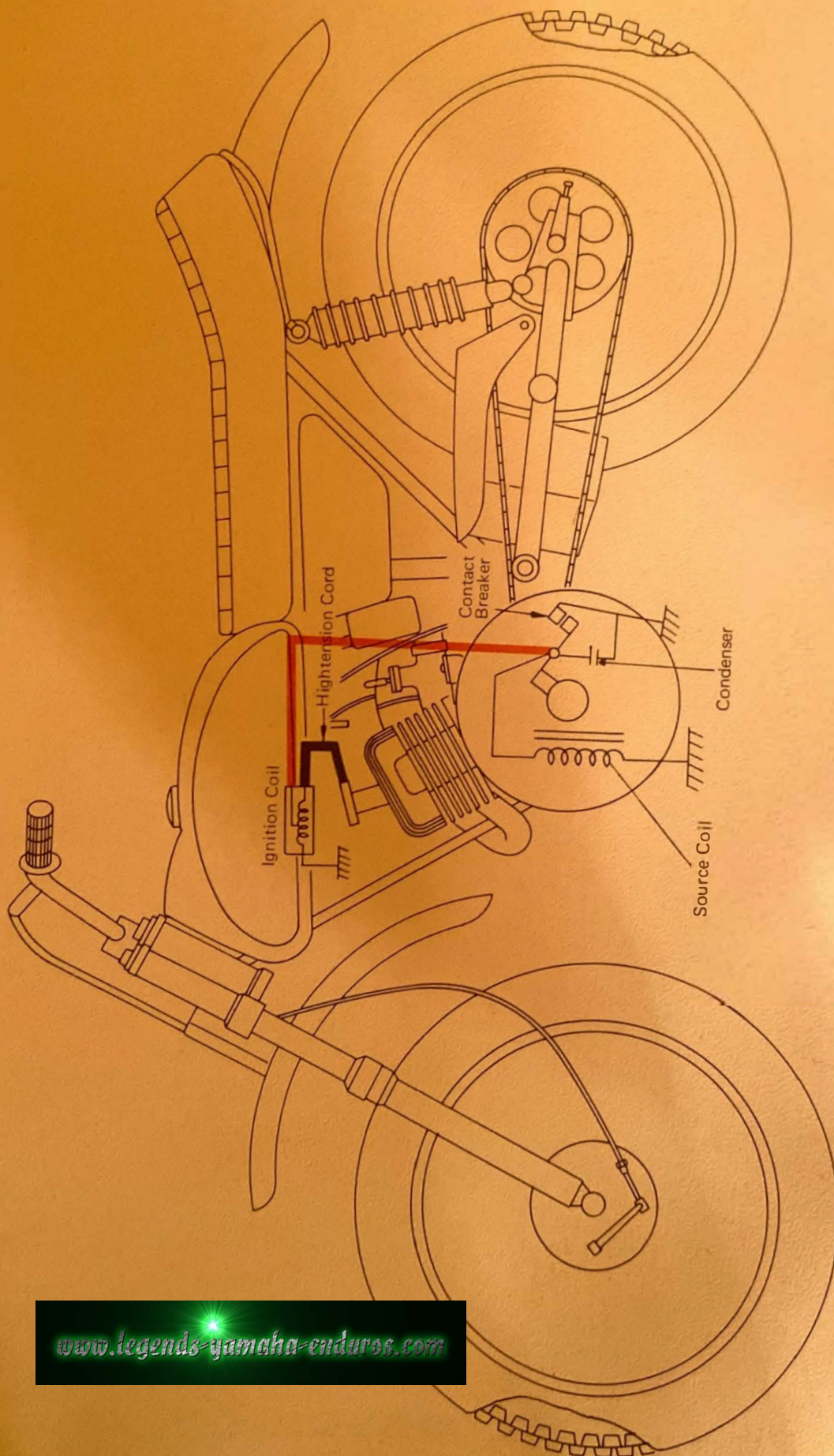
Transmission Section

| Parts Number | Parts Name | Q'ty | Inspection |
|--------------|-------------------------|------|------------|
| 174-17461-30 | Sprocket, drive | 1 | 13T |
| 174-17461-40 | Sprocket, drive | 1 | 14T |
| 174-17461-50 | Sprocket, drive | 1 | 15T |
| 174-17461-60 | Sprocket, drive | 1 | 16T |
| 248-17411-00 | Axle, main (1st pinion) | 1 | |
| 248-17211-00 | 1st wheel | 1 | |
| 248-17121-00 | 2nd pinion | 1 | |
| 248-17221-00 | 2nd wheel | 1 | |
| 248-17141-00 | 4th pinion | 1 | |
| 248-17241-00 | 4th wheel | 1 | |
| 248-17151-00 | 5th pinion | 1 | |
| 248-17251-00 | 5th wheel | 1 | |

HT1B-MX WIRING SCHEMATIC



YAMAHA HT1B-MX WIRING DIAGRAM



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