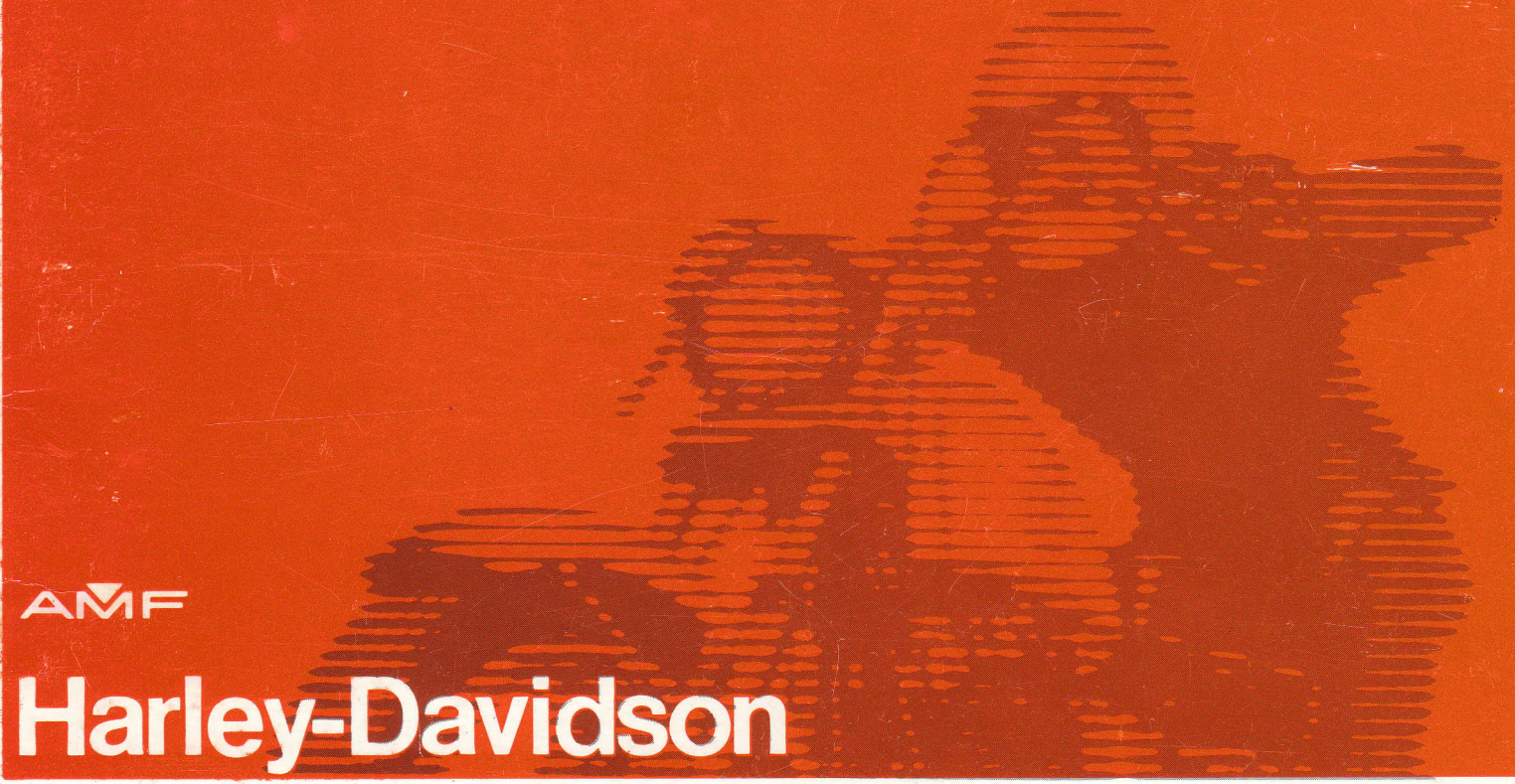


AMF

Harley-Davidson

1978 Owner's Manual

MX 250 COMPETITION MODEL

IMPORTANT NOTICE

The MX-250 Model is sold by Harley-Davidson Motor Co., Inc. without warranty. This vehicle is designed and manufactured for competition use only. It does not conform to federal motor vehicle safety standards and operation on public streets, roads or highways is illegal.

Some state laws prohibit operation of this vehicle except in an organized racing or competitive event upon a closed course which is conducted under the auspices of a recognized sanctioning body or by permit issued by the local governmental authority having jurisdiction.

For off-road use other than sanctioned racing events, an additional spark arrester-muffler may be required by law. Such spark arresters are available commercially to comply with noise level and spark arrester laws and regulations. Performance will be decreased and retuning may be necessary.

This motorcycle is designed and constructed as an **operator only** model. The vehicle load limit and seat do not safely permit carrying a passenger. Before operating your motorcycle, first determine that operation is legal.
For safe operation and proper maintenance, read the owner's manual carefully.

HARLEY-DAVIDSON MOTOR CO., INC.

YOUR OWNER'S MANUAL

Welcome to the Harley-Davidson Motorcycling Family! Your new Harley-Davidson Motorcycle is designed and manufactured to be the finest in its field. The instructions in this book have been prepared to provide a simple and understandable guide for your motorcycle's operation and care. Follow the instructions carefully for its maximum performance and your personal motorcycling pleasure.

Your owner's manual contains instructions for owner care, maintenance and minor repair. Your Harley-Davidson dealer has the facilities, experience and genuine Harley-Davidson parts necessary to properly maintain this vehicle.

Harley-Davidson Motor Co., Inc.

TABLE OF CONTENTS

TECHNICAL DATA

DIMENSIONS AND WEIGHT

Overall length	83.6 in. (212.5 cm)
Handlebar width	34.2 in. (87 cm)
Ground clearance	12 in. (30.5 cm)
Wheelbase	57.3 in. (145.5 cm)
Dry weight	233 lbs. (105 Kg)
Steering angle	45°
Rake	30°
Trail	5.5 in. (140 mm)
Front suspension	Telescopic oil dampened 8.9 in. (225 mm) travel
Rear suspension	Swinging arm, coil spring oil dampened

CAPACITIES

Fuel tank	2.2 US Gallons (8.5 lt) No reserve
Transmission	2 1/2 pts. (1200 cc)
Front fork	7 oz. (wet) each side (210 cc)

ENGINE

Model designation letter	MX
Type	2 cycle, single cylinder
Bore	2.835 in. (72 mm)
Stroke	2.346 in. (59.6 mm)
Piston displacement	3.590 in. (242.6 cc)
Compression ratio	11.8 : 1
Lubrication system	Fuel and oil mixture 20 : 1
Starter system	Primary kickstarter

IGNITION SYSTEM

Type	Capacitor Discharge DANSI or CDI Motoplat
Ignition timing	0.100 in. (2.5 mm) (21°) before TDC
Trigger air gap	(Dansi) 0.012 - 0.016 in. (0.40 - 0.50 mm)
Spark plug	Champion N59G
Spark plug electrode gap	0.020 in. (0.5 mm)

CARBURETOR

Type	Dell'Orto PHM 38 GS
Venturi dia	1.496 in. (38 mm)
Main jet	180
Low speed jet	70

Starting jet 75
Throttle slide 40
Metering pin K2
Main nozzle ..... 260 AB
Idle mixture screw setting ..... 1 1/2 turns open
Air filter ..... Plastic foam element

TRANSMISSION SYSTEM

Clutch ..... wet, multi plate
Primary drive pinion gear ..... 22 teeth
Primary drive clutch gear ..... 60 teeth
Primary ratio 2.727
Gear ratios:
First gear .....(1:1.928) ... 14/27
Second gear .....(1:1.555) ... 18/28
Third gear .....(1:1.238) ... 21/26
Fourth gear .....(1:1 ...) ... 21/21
Fifth gear .....(1:0.826) ... 23/19

Gearshift pattern ..... 1 down - 4 up
Transmission sprocket ..... 14 teeth
Chain type ..... 5/8 x 1/4 Harley-Davidson
Part No. 40000-77M

WHEELS AND BRAKES

Front wheel tire ..... 3.00 x 21 in.
Rear wheel tire ..... 4.50 x 18 in.
Front brake .... internal expanding, single leading shoe type, i.d. 140 mm
Rear brake ..... internal expanding, single leading shoe type, i.d. 140 mm
Rims ..... Akront, shoulderless light alloy
Spokes ..... 36/wheel, 4 mm dia.
Tire pressure ... 10 psi (0.7 Kg/cm^2) front and rear

1. Throttle control grip
2. Front brake control lever
3. Rear brake pedal
4. Kickstarter lever

Fig. 1 - Right side view

1. Gearshift lever
2. Clutch lever
3. Fuel valve
4. Fuel tank filler cap

Fig. 2 - Left side view

Running in the Motorcycle

The MX 250 requires a short breaking in period. Operate the motorcycle for the first hour using not more than half throttle. Maintain light load on the engine without high RPM or lugging.
This practice will help moving parts to break-in properly. The running-in should be performed not only with new motorcycles, but also after replacing cylinder, piston and/or piston rings.

Fuel and oil recommendation

The MX 250 has a two-stroke engine which requires a gasoline-oil mixture for proper lubrication. Use the correct oil quality and mixture ratio in order to avoid engine damage.
Use a high quality SAE 30 viscosity racing oil. 20 : 1 is the correct gas to oil mixture ratio for this engine.
Use only Premium Grade (high octane) leaded gasoline.

CAUTION

Too little oil in the mixture will cause severe engine wear and possible engine damage. Too much oil will cause spark plug fouling and excessive carbon formation that may lead to preignition.

Fuel mixing procedure

- Always mix gasoline and oil in a clean container. Pour the oil and the gasoline into the container and shake thoroughly for a few minutes. Make sure that the fuel is properly mixed, before filling the fuel tank.

CAUTION

Do not mix vegetable and mineral oils.
Remember that vegetable oils do not mix as easily with gasoline as mineral oils do.
Use the oil-gas mixture within a few days.

Transmission oil

Use a premium quality SAE 10 W - 40 or 20 W - 50 engine oil.

OPERATING INSTRUCTIONS

Starting the engine

- When the engine is cold, raise the fuel mixture enrichment lever (A - fig. 3). Push down the kick-starter lever sharply without opening the throttle grip. Open the throttle valve when the engine starts. Lower the fuel mixture enrichment lever when the engine warms up.
- When the engine is warm, do not use the fuel mixture enrichment lever (fig. 4). Open the throttle 1/4 of a turn and operate the kick starter lever.

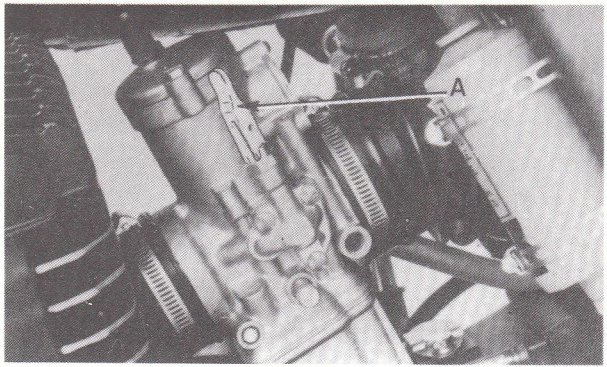


Fig. 3 - Fuel mixture enrichment lever - ON (open)

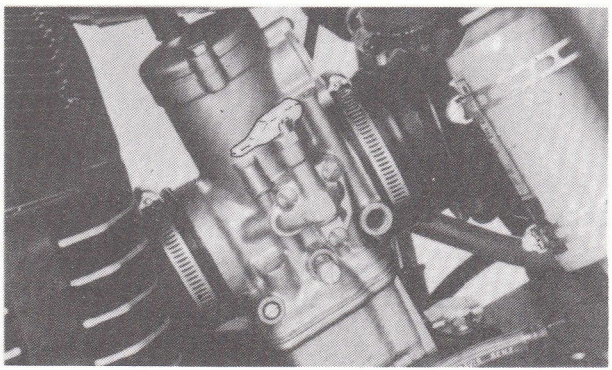


Fig. 4 - Fuel mixture enrichment lever - OFF (closed)

Gearshift lever

The five-speed gearbox operates as shown in fig. 5. To engage low gear, push the gear shift lever down from the neutral position, which is located between low and second gear. To engage higher gears, pull up the shift lever once for each gear. To shift into neutral, push down or raise the lever a half of the travel between low and second gear.

Engine stop button

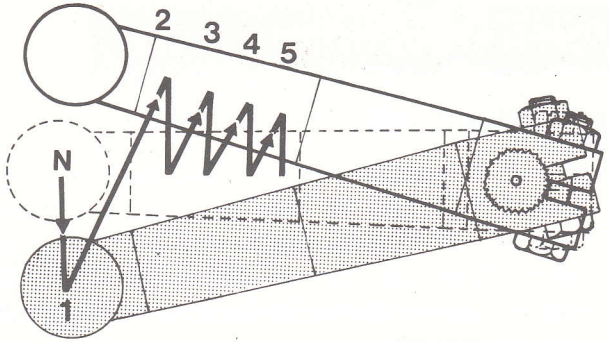
To start the engine, just operate the kickstarter lever, as no ignition switch is fitted on this motorcycle.

To stop the engine, push the engine stop button. Turn the fuel tank valve lever to the "off" position, when the engine is stopped.

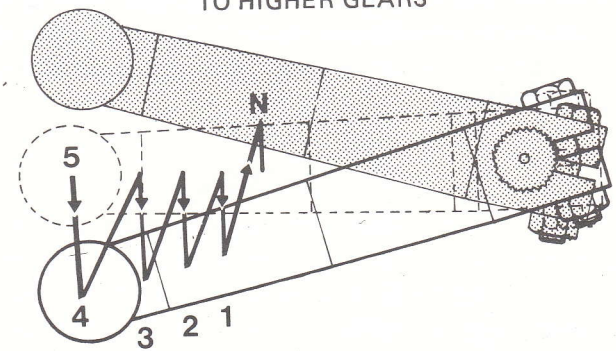
Rear suspension units

The spring preload may be adjusted by means of spacers located under the upper spring collar after removing the spring.

The rear shock absorbers cannot be adjusted; do not attempt to disassemble them, as they must be replaced with new ones when damaged or worn out.



SHIFTING SEQUENCE – NEUTRAL TO HIGHER GEARS



SHIFTING SEQUENCE TO LOWER GEARS

Fig. 5 - Shifter

Front brake

Front brake lever free travel, measured at the tip of the lever, should be maintained at 1/2 to 3/4 in. Adjustment can be performed by means of two adjusters, one of which is located at the front brake lever (1 - fig. 6) and the other at the lower end of the cable (1 - fig. 7).

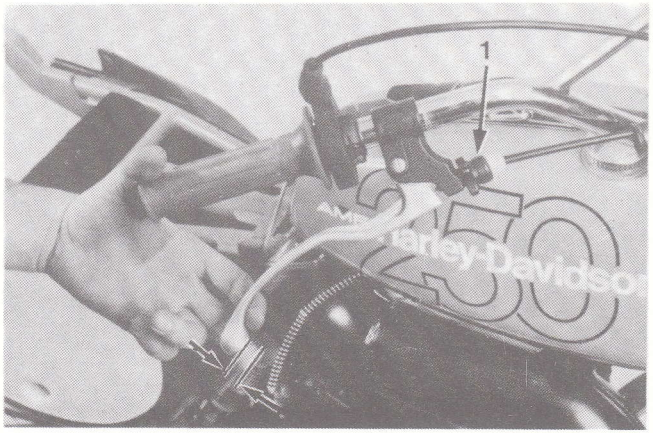


Fig. 6 - Brake adjuster

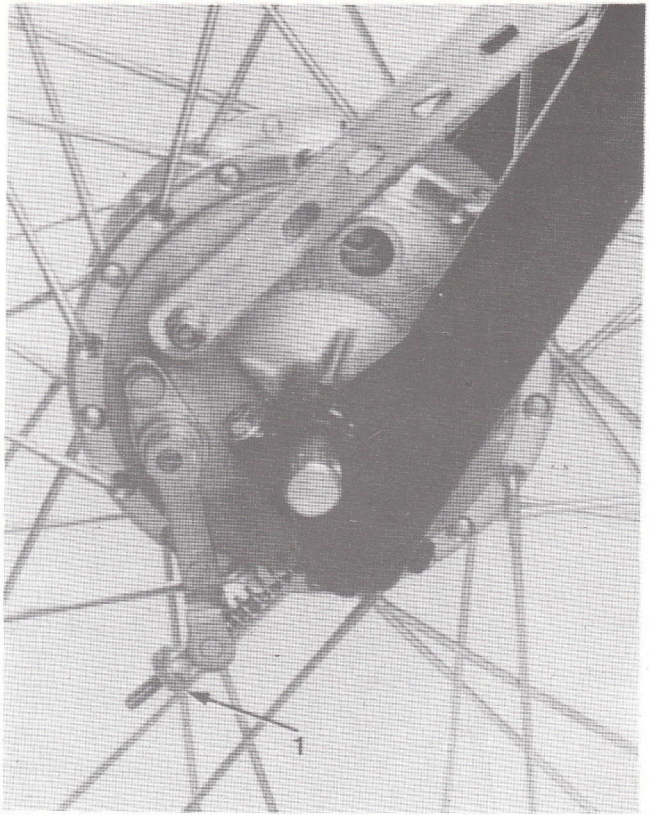


Fig. 7 - Brake adjuster

Rear brake

Rear brake pedal free travel, measured at the tip of the pedal, should be one inch (fig. 8). Adjustments are performed by means of an adjusting nut (A) fitted at the end of the cable (fig. 9).

Clutch

The normal clutch lever free travel is one-half inch (measured at the tip of the lever). Adjustments can be performed by means of lower adjuster (1 - fig. 10) and upper adjuster (2 - fig. 11). If the free travel cannot be adjusted to the above value or when clutch is not operating correctly, adjust controls as follows (see fig. 10).

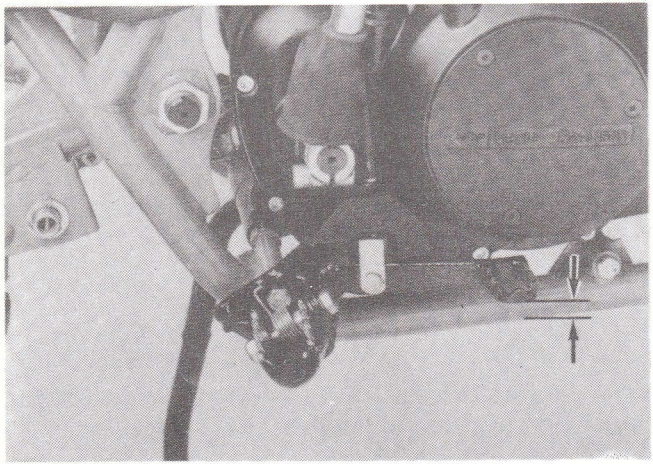


Fig. 8 - Brake pedal free travel

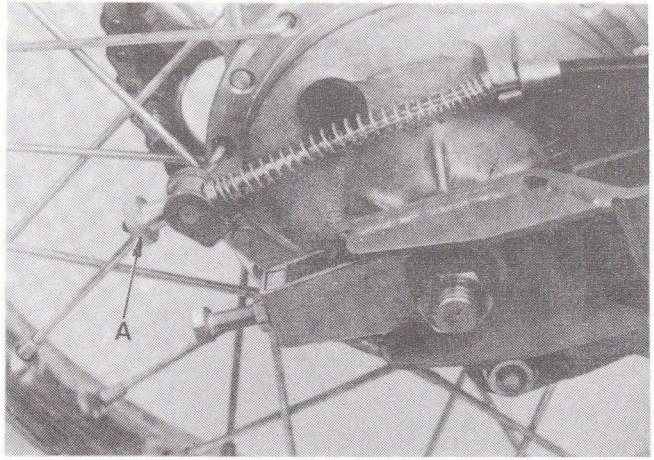


Fig. 9 - Rear brake adjusting nut

1. Remove access cover screws and access cover from right side crankcase.
2. See that clutch cable adjuster on left handlebar is adjusted outward several turns.
3. Loosen locknut on control coil lower adjusting screw (1) and turn adjuster inward all the way.
4. Loosen locknut (A) on release screw (B) and turn screw inward until it starts to release the clutch (screw turns harder). Then turn the screw one turn farther inward. (This centers release balls in lowest position on cam.).
5. Turn cable adjuster (1) back out to the position where all slack in cable is eliminated (no play at handlever) and tighten locknut.
6. Adjust clutch releasing screw (B) by backing off until clutch is engaged (screw turns easier). Turn screw inward until point where free play is eliminated (screw turns harder), then back screw out 1/8 turn to establish slight release bearing free play and retighten locknut (A). Adjust cable adjuster at handlever for 1/2 in. handlever free play.

Minor cable adjustment can be made by loosening locknut and turning knurled nut located at clutch handlever on handlebar.

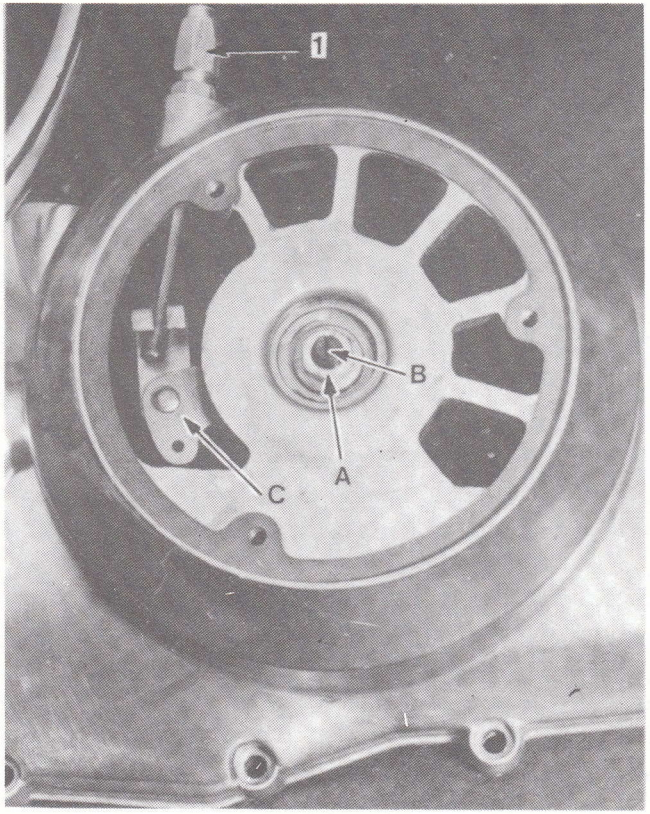


Fig. 10 - Clutch lower adjuster

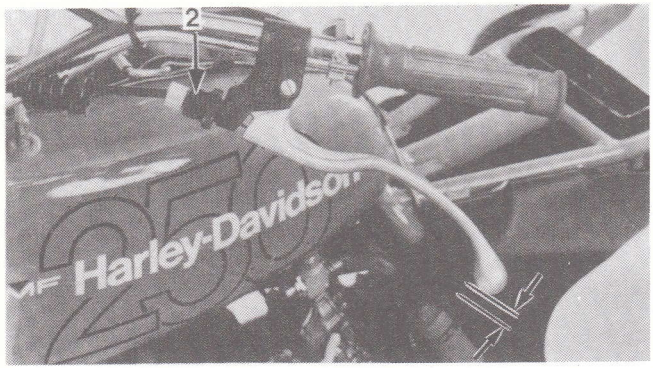


Fig. 11 Clutch upper adjuster

Carburetor

The throttle cable must have a 0.02 in. free travel. Adjustment can be performed with the cable adjuster on the carburetor cap.

Slow running adjustment should be made with the engine already warmed up. When engine is at slow idle, screw the idle mixture adjusting screw (A - fig. 12) inward until seated; then screw it out until the engine idles at a high speed. Unscrew the throttle-stop screw (B) to obtain a normal idle. Repeat the procedure screwing in or out the idle mixture adjusting screw, until the normal idle is obtained.

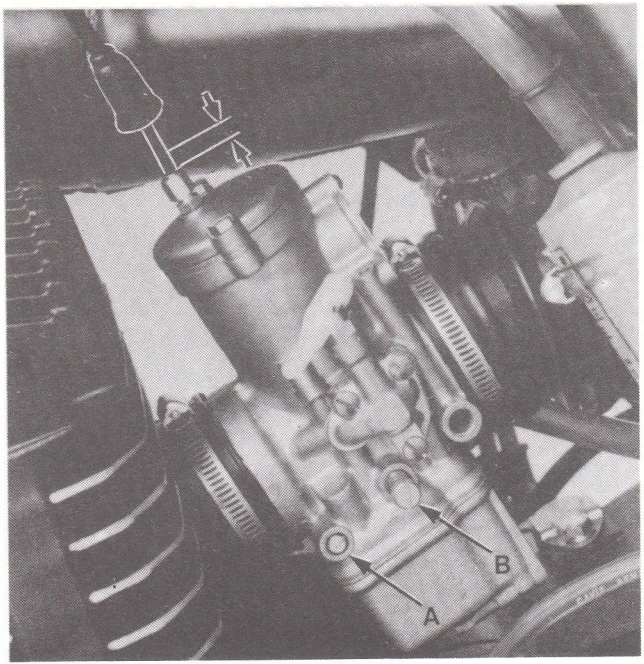


Fig. 12 - Carburetor adjustment

Caution: Before adjusting idle speed screw inward, hold throttle partially open to prevent damage to slide.

Drive chain

When the chain tension is correct, there should be a 2 3/4 in. free play on the lower run of the chain, midway between the sprockets. The rear wheel must be clear of the ground, and the drive chain tensioner (A) must be disconnected from the spring (B) while performing this measurement (fig. 13).

To adjust the drive chain tension, slacken the rear wheel axle nut (C) loosen then the locknuts (D) and turn both adjusting bolts (E) an equal amount until correct tension is obtained (fig. 14).

Always check wheel alignment after the adjustment is made. Tighten axle nut securely.

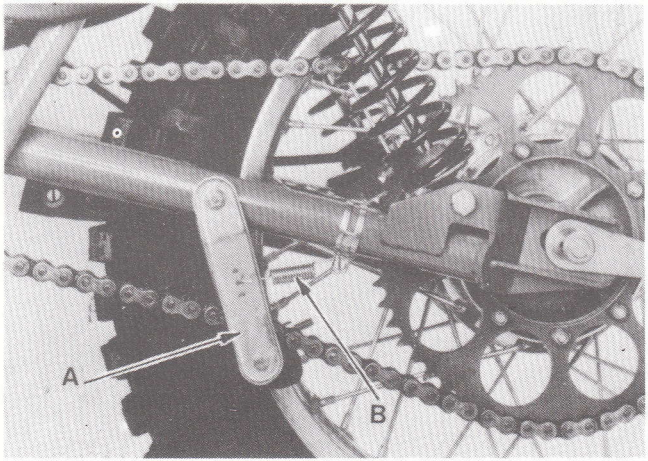


Fig. 13 - Checking chain tension

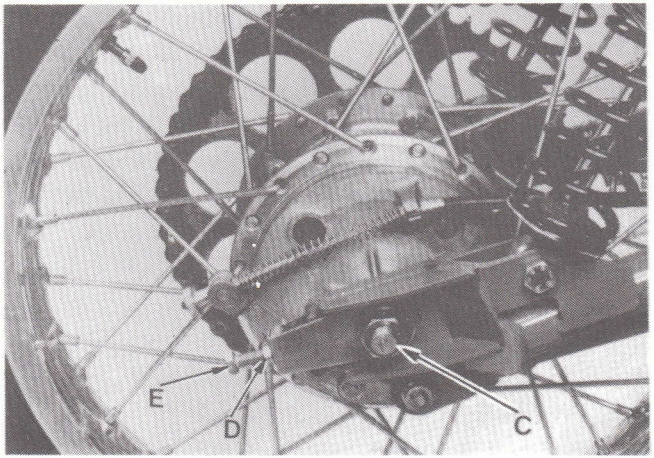


Fig. 14 - Chain tension adjustment

Steering head bearing

Support the crankcase on a wooden block or a stand so that the front wheel is clear of the ground. Check for over-looseness by grasping the bottom of each fork leg and attempting to move it backwards and forwards. No play should be detected. Adjustments can be performed by turning the head nut with a spanner wrench. Do not overtighten the nut (fig. 15). Check for over-tightness by turning fork from stop to stop. There should be no bind.

Swinging arm bushings

Check swinging arm bushings for play by grasping the swinging arm with one arm and the frame with the other (refer to fig. 16). Try to move the swinging arm sideways; no side movement should be felt. No adjustment can be made; if necessary renew bushes ans spindle.

Wheel bearings

No side play should be felt at the wheel rim (check as shown in fig. 17).
If any play is detected, replace the bearings.

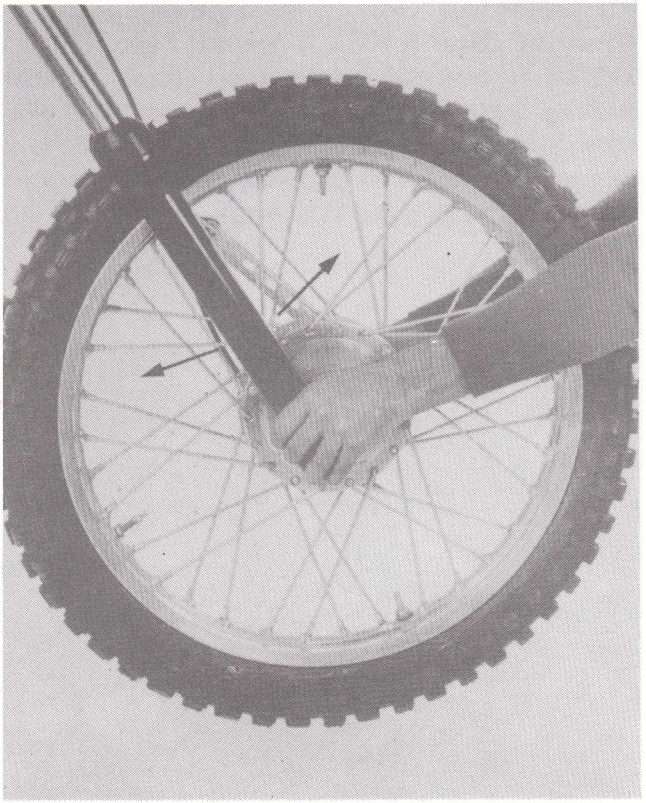


Fig. 15 - Checking front fork play

Tire pressure

Too high or too low tire pressures must be avoided in order to obtain good traction and long tire life.

Front: 10 psi (0.7 Kg/cm^2)
Rear: 10 psi (0.7 Kg/cm^2)

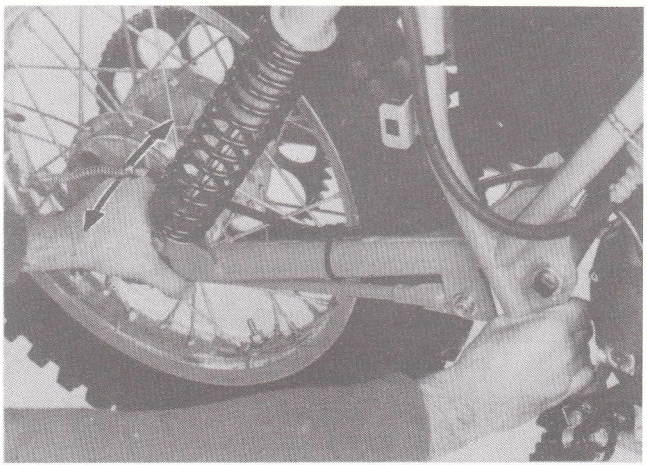


Fig. 16 - Checking swinging arm play

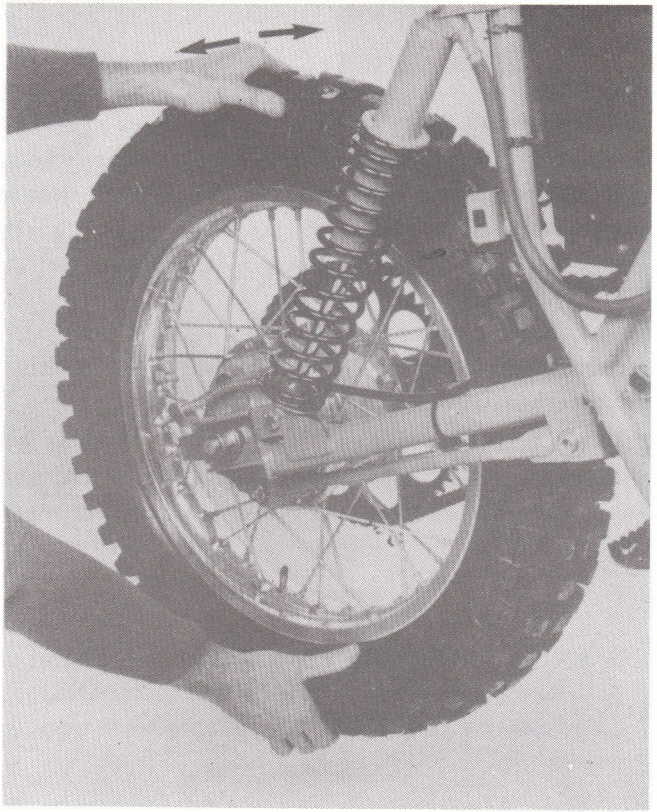


Fig. 17 - Checking wheel bearing play

Ignition timing

Ignition timing should be checked before each race. The marks on the rotor and on the pick-up should be aligned as in fig. 18 (DANSI) or in fig. 19 (Motoplat), when the piston is 0.100 in. before T.D.C. (2.5 mm).

Whenever it is necessary, or if any part of the C.D.I. system has been disassembled, perform the ignition timing adjustment as follows:

DANSI: turn the crankshaft until the piston is 2.5 mm before T.D.C., then slacken the screws (A) and move the pick-up plate to obtain the correct mark alignment.

NOTE

A special timing tool to indicate when piston is 0.100 in. (2.5 mm) before T.D.C. (DANSI CDI System) (fig. 19 A) is available from your dealer.

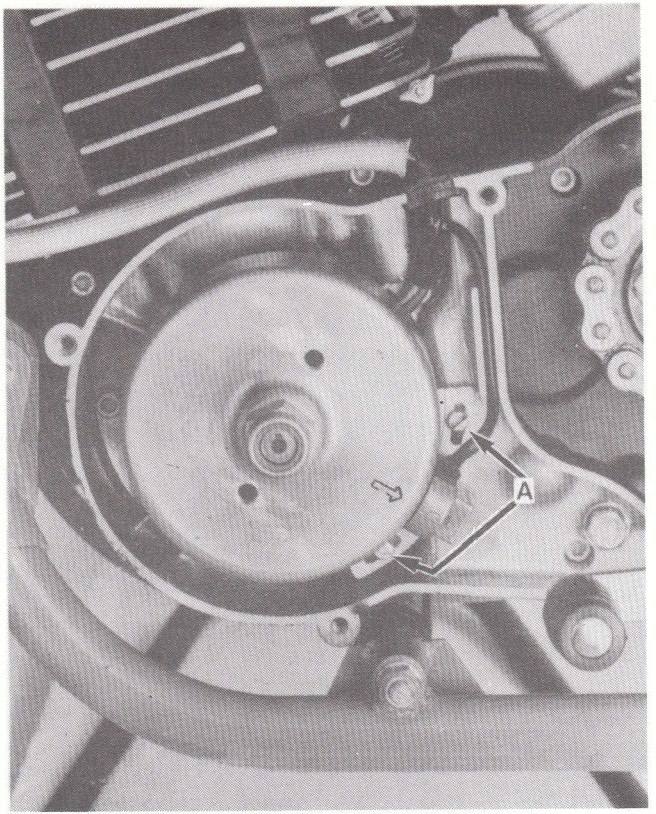


Fig. 18 - Checking Dansi ignition timing

MOTOPLAT: remove the rotor and slacken the screws that hold the base plate. Refit the rotor and insert a 2 mm pin in the hole (1 - fig. 19) of the rotor. Turn the rotor until the 2 mm pin can be inserted into the 2 mm hole in the base plate.

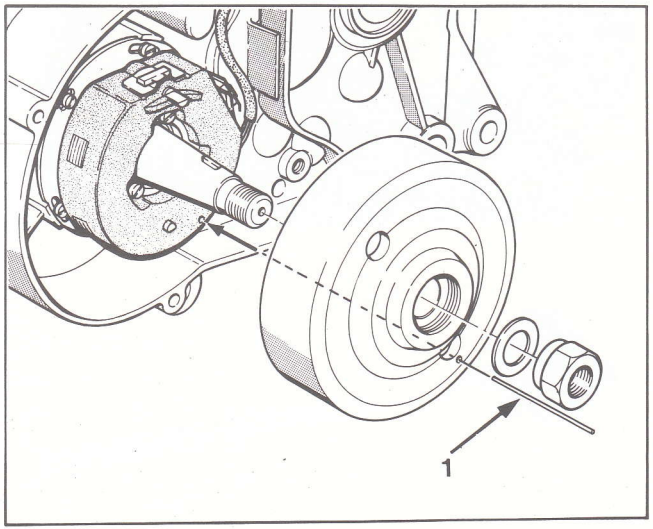


Fig. 19 - Checking Motoplat ignition timing

Turn the rotor and the base plate until the piston is 2.5 mm before T.D.C.
Check piston position by means of a dial gauge holding tool fitted in the spark plug hole.

NOTE

A special rotor puller is needed to remove the rotor. Contact your local Harley-Davidson dealer for purchase.

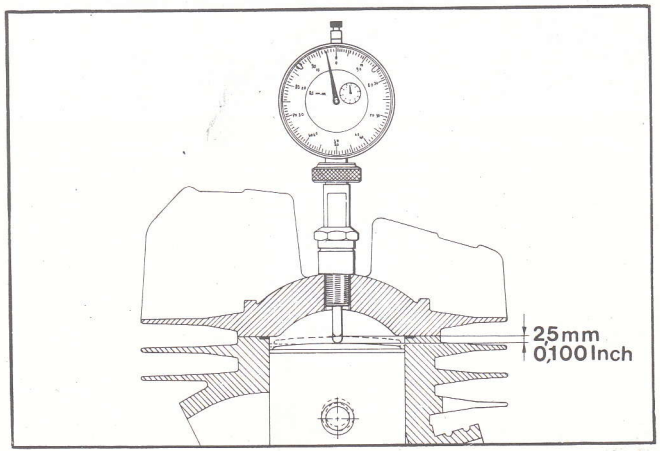


Fig. 19 A - Special tool YA- 2266

Transmission oil

The transmission oil must be changed every two races. Drain the transmission oil thoroughly, while the engine is warm. Refit the drain plug and tighten it firmly. Refill the transmission to correct level with transmission oil (refer to page 6).

The amount of oil to be added is 2 1/8 pints (1200 cc). The oil level must be checked every race. Measure the level by means of the dipstick (A - fig. 20) on the transmission filler plug, with the motorcycle standing up-right on level ground. Insert the dipstick until the cap contacts the filler opening, **but do not screw the cap in.**

The oil level must always be maintained between upper and lower level marks on the dipstick (fig. 21).

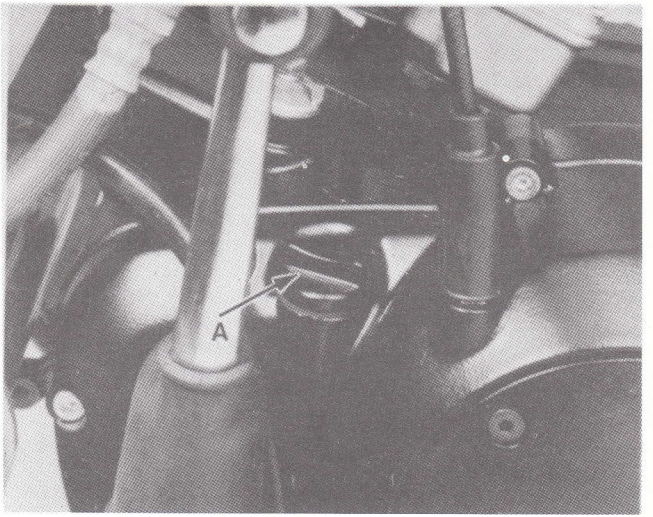


Fig. 20 - Oil dipstick

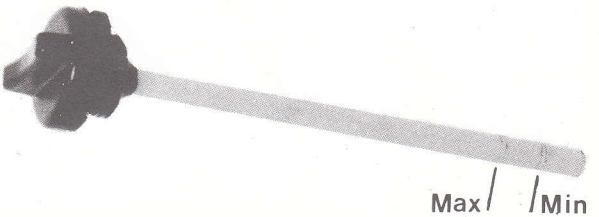


Fig. 21 - Oil level marks on dipstick

Decarbonizing

Remove the cylinder head and the cylinder barrel and carefully remove carbon from piston, cylinder head, cylinder ports and exhaust pipe. Be very careful not to scratch or damage any part of the engine. Decarbonizing should be performed every ten races or whenever it is necessary.

When refitting the cylinder head, take care to place the copper gasket correctly. Use a small amount of grease to hold it in the right position while fitting the head.

Air cleaner

The air cleaner element should be cleaned every race. Wash the element in gasoline and dry it thoroughly. Soak it in SAE 30 motor oil; squeeze out excess oil and refit the element in its housing (fig. 22 - 23).

WARNING

Gasoline is extremely flammable and is explosive under certain conditions. Refuel in a well ventilated area with engine stopped. Do not smoke or allow open flames or sparks when refueling or servicing the fuel system.

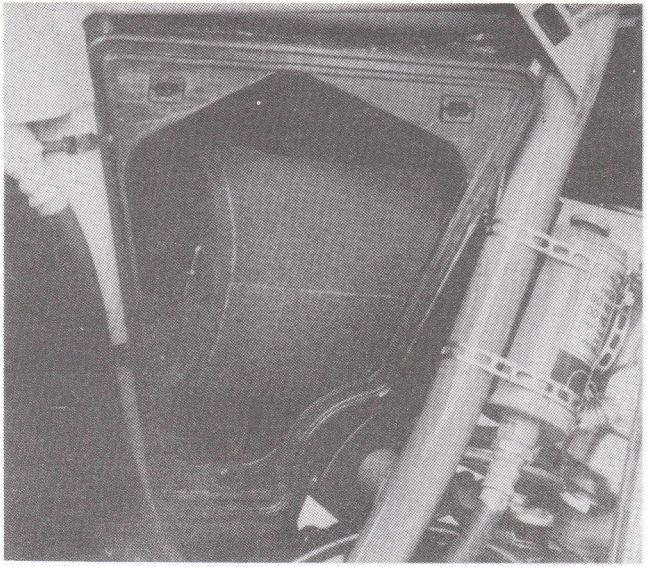


Fig. 22 - Air cleaner housing

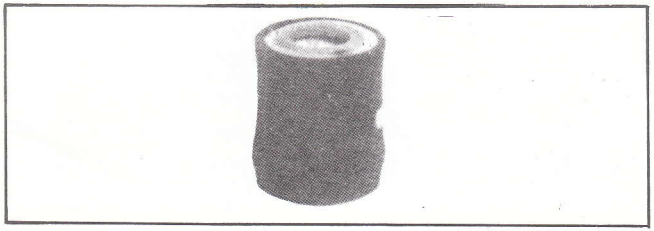


Fig. 23 - Air cleaner element

Fuel valve

Periodically disassemble the fuel tank valve and thoroughly clean the gauze filter with solvent. Another gauze filter, that should also be periodically cleaned, is fitted in the carburetor.

Drive chain lubrication

Always keep the drive chain properly lubricated with a high quality chain lubricant. A dry chain wears rapidly and may even break; also its efficiency is affected and there is less power available at the rear wheel.

Clean the chain thoroughly with a solvent such as kerosene and apply the lubricant. The use of a chain lubricant containing molybdenum disulfide is strongly recommended.

Brake lining

Both front and rear brakes are equipped with inspection openings for checking brake linings thickness without removing the wheels (fig. 24). Minimum lining thickness: 0.080 in. (2 mm).

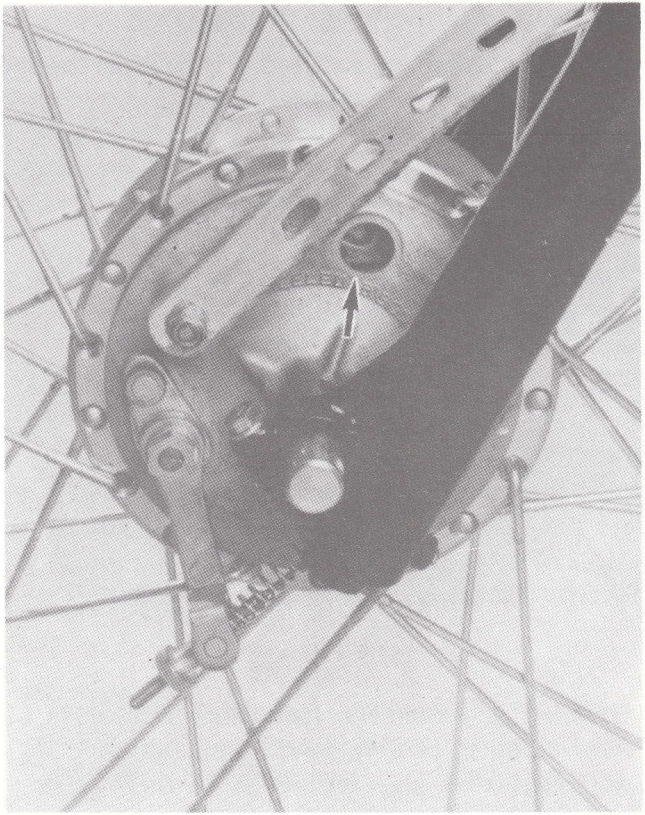


Fig. 24 - Brake inspection openings

Front fork

Remove the front fork filler caps and the screw-type drain plugs and drain the oil.
Reinstall the drain plugs (A) and fill each leg with 210 cc. of new fork oil (fig. 25).
Recommended oil: Harley-Davidson fork oil type B.

Spark plug

The recommended spark plug for your MX-250 is the Champion N59G.

It is installed as standard and is of the right heat range for average operating conditions.

Periodically remove the spark plug and measure the electrode gap with a wire gauge. The gap can be adjusted by carefully bending the side electrode.
Specified plug gap: 0.020 in. (0.5 mm).
Spark plug tightening torque: 25 ft - lbs (3.5 Kgm).
Replace the spark plug every 3 races.

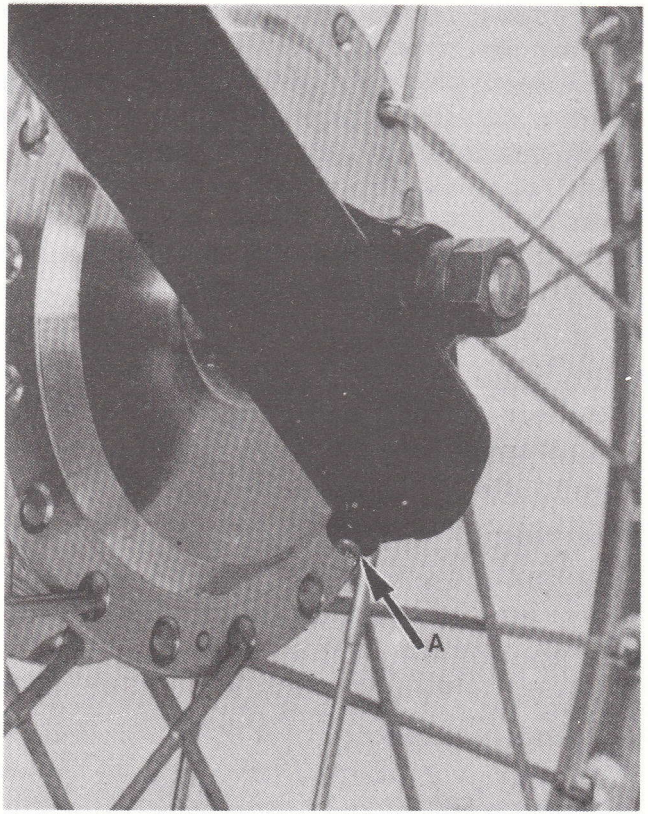


Fig. 25 - Front fork drain plug

Sometimes it may be advisable to use a plug of a different heat range.

If the spark plug tip shows traces of overheating (whitish insulator and eroded electrodes), replace it with one of the next colder heat range.

If the spark plug tip is wet and the insulator is black, use a hotter plug.

When the heat range is correct, the spark plug insulator shows a light brown color.

NOTE

The above remarks apply only when the carburetor setting is correct, the ignition timing is properly adjusted, and correct gas-oil mixture is used.

Final tuning

Your MX-250 is tuned for average conditions by the factory. However, depending on conditions in the field, you may have to modify the carburetor setting, the spark plug and the final drive ratio.

Carburetor adjustment

The carburetor standard setting is as follows:

- Main jet: 180
- Low speed jet: 70

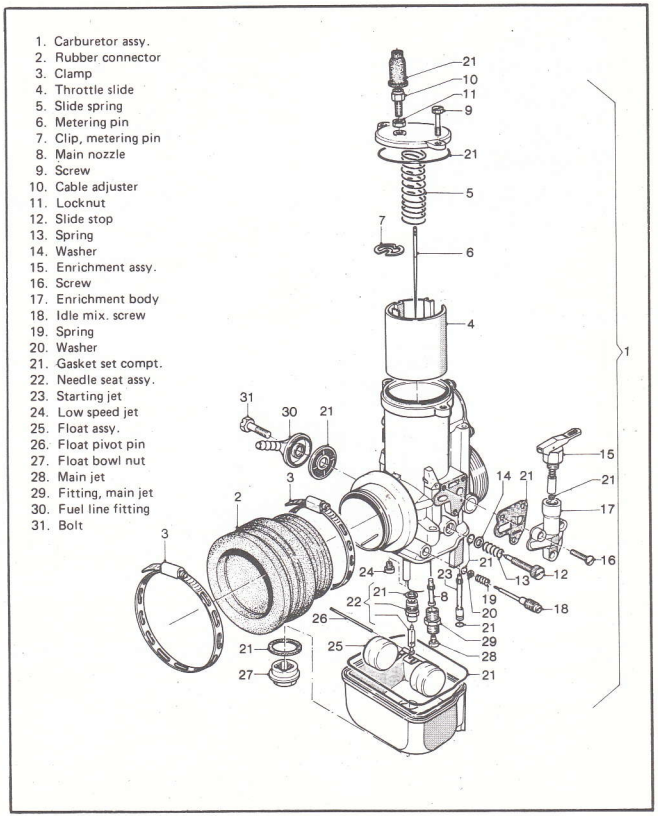


Fig. 26 - Dell'Orto carburetor exploded view

- Metering pin: K2
- Throttle slide: 40
- Low speed mixture adjusting screw: 1-1/2 turns

Carburetor setting should be adjusted to suit racing conditions (race field, weather etc.) in order to obtain maximum performance.

A visual inspection of the spark plug insulator is a good way to judge carburetor setting.

Switch the ignition off when running at full throttle in top gear, disengage the clutch and stop the motorcycle.

Remove the spark plug and inspect the insulator. A sooty, black insulator nose indicates a rich mixture. A whitish insulator nose, with burned or eroded electrodes, indicates a lean mixture.

The correct carburetor setting is obtained when the spark plug insulator nose is light brown.

NOTE

The spark plug readings are an accurate means for judging carburetor setting, when the plug heat range is correct, the ignition timing properly adjusted and when using the correct gasoline/oil mixture.

Remember that between 1/4 and 3/4 throttle opening the air/fuel mixture ratio is affected mainly by the metering pin position. Raise the needle clip position to obtain a richer mixture; lower the clip position to obtain a leaner mixture.

Between 3/4 and full throttle, the mixture adjustment is made by changing the main jet.

Low speed mixture adjusting screw regulates the air-fuel ratio from idle to 1/4 throttle (refer to page 2).

TROUBLESHOOTING

The following checklist will be helpful in locating most operating troubles.

TROUBLE	CAUSE
Engine will not start	1) The fuel tank is empty 2) The fuel tank valve is in the "off" position 3) The fuel tank breather is clogged 4) The spark plug is fouled 5) The spark plug is damaged or dirty with carbon 6) If there is no spark when cranking the engine with the spark plug lead end held near the cylinder head, the trouble is in the ignition system.
Engine overheats	1) Ignition timing is retarded 2) Improper carburetor setting (mixture is lean) 3) Cooling fins clogged with mud
Engine does not run smoothly; loss of power	1) Clogged air cleaner element 2) Improper carburetor setting (mixture is too rich or too lean) 3) Spark plug in bad condition 4) Worn piston and/or rings
Clutch slips	1) Incorrect clutch adjustment 2) Worn plates or weak springs
Clutch drags	1) Incorrect clutch adjustment 2) Transmission oil too heavy
Carburetor floods	1) Float valve and/or seat worn or damaged 2) Dirt or other foreign material between float valve and its seat 3) Too high float setting

MAINTENANCE SCHEDULE

After the first hour of operation

Spoke nipples	Retighten
Nuts and bolts	Retighten
Drive chain	Retighten

After the first two hours of operation

Transmission oil	Change

Each heat

Spoke nipples tension	Check
Drive chain tension	Check
Drive chain	Lubricate
Every moving part of the motorcycle with oil and grease	Lubricate

Each race

Transmission oil level	Check
Air filter	Clean
Bolts and nuts	Tighten
Spark plug	Check and clean
Ignition timing	Check

Every 2 races

Piston rings	Replace
Transmission oil	Change

Every 3 races

Spark plug	Replace
Drive chain	Replace
Throttle, clutch and brake cables	Replace
Gearbox sprocket	Replace

Every 5 races

Rear wheel sprocket	Replace
Piston	Replace
Brake linings for wear	Check

Every 10 races

Cylinder head, ports and piston	Decarbonize
Cylinder for wear	Check
Carbon from expansion chamber	Remove

SERVICE SPECIFICATIONS

- Piston clearance in bore: 0.0016 ÷ 0.0024 in. (wear limit: 0.006 in.)
  Measure piston diameter 25 mm from bottom of skirt, at right angles to piston pin axis (fig. 27).
- Piston ring end gap: 0.010 ÷ 0.016 in. (wear limit: 0.026 in.) (fig. 28).
- Piston ring side clearance in groove: 0.0025 ÷ 0.0045 in. (wear limit: 0.006) (fig. 29).
- When connecting rod small end swing exceeds 0.08 in. (2 mm) (refer to fig. 30), the connecting rod must be replaced with a new one.
- Connecting rod is supplied as a set with crankpin, big end bearing and thrust washers.
- Crankshaft runout must not exceed 0.0015 in.
- Crankshaft end float (axial play): 0.012 ÷0.024 in.
- Gear selector drum side play: 0.008 ÷ 0.016 in. (max 0.024 in.).
  Perform this measurement as shown in fig. 31. Perform this measurement several times,

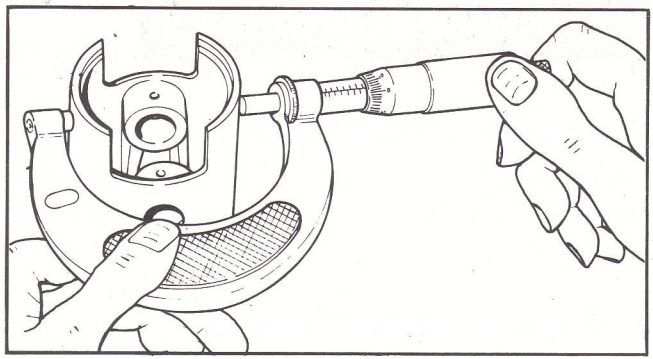


Fig. 27 - Measuring piston diameter

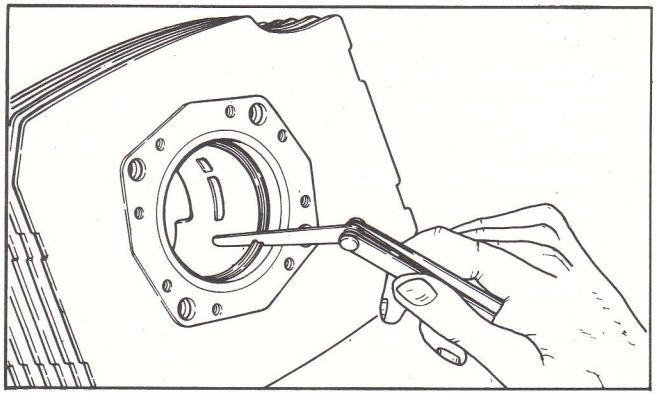


Fig. 28 - Measuring piston ring end gap

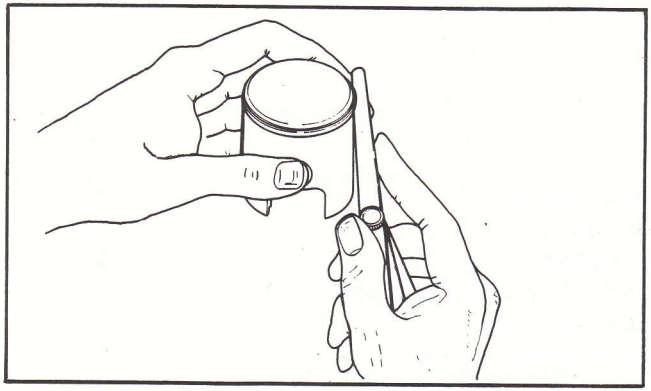


Fig. 29 - Piston ring side clearance

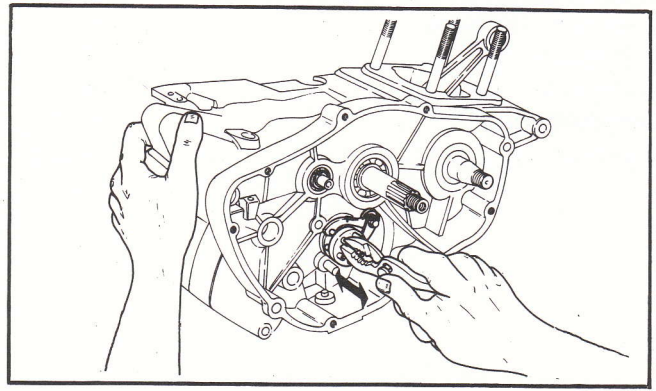


Fig. 31 - Measuring gear selector drum side play

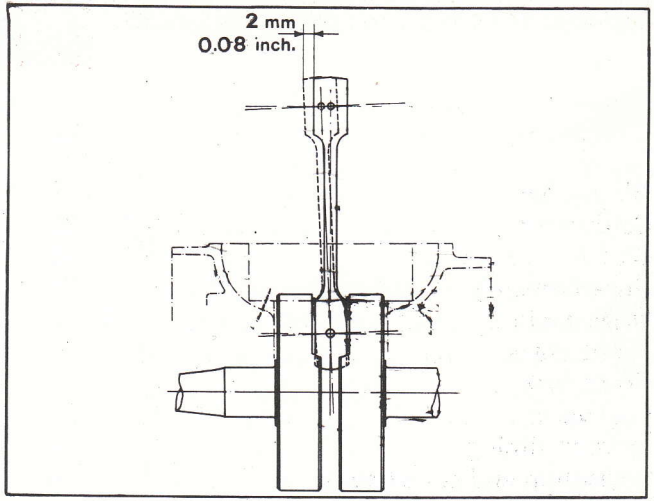


Fig. 30 - Checking connecting rod small end swing

TORQUE SETTINGS

Cylinder base nuts	18 ft-lbs
Cylinder head socket head bolts	11 ft-lbs
Clutch hub nut	70 ft-lbs
Primary drive pinion nut	75 ft-lbs
CDI rotor nut	55 ft-lbs
Spark plug	25 ft-lbs

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