

SERVICE FOR IMPROVING OIL MILEAGE / 1200, 1340 MODELS

This bulletin is intended to aid in the diagnosis and correction of excessive oil consumption.

The amount of oil used by the motorcycle depends upon a number of factors, including the operating conditions the motorcycle is subjected to, loss of oil occurring through the breather, and how much is supplied through the rear chain oiler. However, the usual cause of excessive oil consumption is related to the mechanical condition of the engine, usually after a period of extended service when wear affects the pistons, rings, valves, etc.

The following diagnostic procedures should be used for customer complaints of low oil mileage or exhaust smoke.

TROUBLESHOOTING LIST
ENGINE USES TOO MUCH OIL OR SMOKES EXCESSIVELY

1. Oil not returning to oil tank.
2. Chain oiler adjusting screw adjusted for an excessive amount of oil.
3. Insufficient chain case vacuum.
4. Piston rings badly worn or broken, or not seating properly.
5. Cylinder walls badly worn, out-of-round or tapered.
6. Valve guides worn or loose in the cylinder head.
7. Breather valve incorrectly timed or breather passages restricted.
8. Restricted oil lines, passages or fittings.

EXCESS OIL OUT OF CRANKCASE BREATHER (AIR CLEANER)

1. Insufficient chain case vacuum.
2. Oil not returning to oil tank.
3. Oil lines or passages restricted.
4. Gearcase cover gasket not sealing.
5. Leakage between passages and pockets in gearcase cover and gearcase.

EXCESS OIL OUT OF CRANKCASE BREATHER WHEN STARTING ENGINE

1. Oil pump check ball stuck open.
2. Poor seal between feed and return gears in pump.

OIL DOES NOT RETURN TO OIL TANK

1. Oil tank empty.
2. Scavenge pump gear key sheared.
3. Restricted oil lines or fittings.
4. Oil feed pump not functioning.

TESTS TO MAKE

1. Check oil return to the oil tank. If oil is not returning to the tank, check the scavenge section of the oil pump for a sheared key.
2. Check adjustment of rear chain oiler. Normal adjustment is 1/4 turn open. Inspect chain for evidence of over-oiling and reduce oil if necessary.
3. Check primary chain case vacuum with gauge part No. 96950-68. To use the gauge, remove one of the screws from the primary chain inspection cover and install the gauge. With the engine idling, the gauge should read 9 to 11 inches of water. With the chain case vent line closed off (pinched), the gauge reading should be 25 inches of water or more.

If chain case vacuum is low, check for leaks. Pressurize the chain case with compressed air and look and listen for leaks. Check at the following locations:

All gasket surfaces
Oil seals and O-rings
Around hose fittings
Solenoid mounting surfaces
Starter drive mounting surfaces

(Over)

On the primary chain case cover check the following:

Cover gasket surface
Front chain inspection cover
Clutch cover gasket
Starter drive mounting

4. If the primary chain case vacuum is satisfactory, perform a cylinder leakage test or compression test following equipment manufacturer's instructions. (See the specific instructions given later in this bulletin.)

If the equipment required for cylinder leakage tests and compression tests are not available, proceed as follows to analyze cause of excessive smoking.

- a. Block off the oil supply to the cylinder heads (remove the overhead oil pipe at the crankcase and plug the outlet).
 - b. Run the engine at idle until there is a visible change or for two minutes. If the smoking stops, the problem is in the heads. If the smoking does not stop, the problem is in the cylinder or piston.
5. If the cylinder heads appear to be at fault, remove the cylinder heads and gaskets and check the following:
- a. Any oil wet areas such as around the oil return hole indicate imperfect gasket seal. Check to be sure this is not caused by an uneven gasket surface. Also be sure the lip on top of the cylinder does not contact the cylinder head. Always use a new gasket when reassembling.
 - b. Condition of valve faces and seats
 - c. Valve stem to guide clearance
 - d. Make sure valve guides are tight in the head
 - e. Make sure oil return passages are not clogged
 - f. Check for casting porosities that may allow oil to leak into the combustion chamber

6. If the problem appears to be in the cylinder area, carefully examine the cylinder, piston and piston rings.

CYLINDER LEAKAGE TEST

A cylinder leakage test will show intake and exhaust valve leaks, excessively worn piston rings or cylinder walls, and broken or stuck piston rings. A cylinder leakage tester applies compressed air to the cylinder at controlled volume and pressure and measures the percent of cylinder leakage.

Use a cylinder leakage tester (Sun Electric or Snap-On tools or equivalent). Follow the specific instructions supplied with the tester.

The following are specific instructions that apply to Harley-Davidson V-twin engines:

1. Run engine until it reaches normal operating temperature.
2. Stop engine. Clean dirt from around spark plugs and remove the spark plugs.
3. Remove the air cleaner and set the carburetor choke and throttle in the wide open position.
4. Remove the timing inspection plug from the crankcase.
5. The piston in the cylinder being tested must be at top dead center during the test.
6. To keep the engine from turning over when air pressure is applied to the cylinder, engage transmission in fourth gear and lock the rear brake.
7. Following the manufacturer's instructions, perform a cylinder leakage test on the front cylinder. Make a note of the percent leakage. Any cylinder with 30 percent leakage or more requires further attention.

8. Listen for air leaks at the carburetor intake, tailpipe and timing inspection hole. Air escaping through the carburetor indicates a leaking intake valve*. Air escaping through the tailpipe indicates a leaking exhaust valve*. Air leaking through the crankcase could be caused by worn piston rings or cylinder walls, stuck or broken rings, or a cracked piston. If air is leaking through the valves, check push rod adjustment.

*Note: Valve leakage tests should be repeated for each cylinder. Particles of carbon may prevent a valve from seating.

9. Listen around head gasket area for leaking gaskets.
10. Repeat procedure on the rear cylinder.

COMPRESSION TEST

Use a compression tester (Sun Electric or Snap-On tools or equivalent) that has a screw-in type adapter.

A proper compression test should be performed with the engine at normal operating temperature when possible. Proceed as follows:

1. Disconnect spark plug wires, clean around plug base and remove plugs.

2. Connect compression tester to front cylinder per manufacturer's instructions.
3. With choke and carburetor throttle plates in wide open position, using the electric starter, crank engine continuously until 5 to 7 full compression strokes are completed.

CAUTION - Before starting engine, after the test, make sure that throttle plate is in the closed position.

4. Note gauge readings at the end of the first and last compression strokes. Record test results.
5. Repeat steps 2 through 4 on rear cylinder.
6. If the final readings are 100 psi or more and if the final readings do not indicate more than a 10 psi variance between cylinders, compression is considered normal. If compression does not meet specifications, see diagnostic chart below.
7. Inject approximately 1/2 oz. of SAE 30 oil into each cylinder and repeat the compression tests on both cylinders. Readings that are considerably higher during the second test indicate worn piston rings.

| <u>Diagnosis</u> | <u>Test Results</u> |
|------------------|--|
| Ring Trouble | Compression low on first stroke, tends to build up on following strokes but does not reach normal. Improves considerably when oil is added to cylinder. |
| Valve Trouble | Compression low on first stroke, does not build up much on following strokes. Does not improve considerably with the addition of oil. Check tappet adjustment. |
| Head Gasket Leak | Same reaction as valve trouble. |

PISTON RING SERVICE

As a product improvement, taper face type compression rings are being used in the 2nd from top ring groove of 1340cc engines beginning December 11, 1978 (crankcase No. 1479-345-165), and in 1200cc engines beginning January 23, 1979 (crankcase No. 179-023-001).

The new ring replaces the chrome ring formerly used in the 2nd ring groove, and is identifiable by the black color instead of chrome on the outer edge. When installed in the ring groove, the lower edge of the ring seals against the cylinder wall to improve compression and oil control.

The following new part numbers for ordering piston ring sets should be used in place of the old numbers appearing in your current FLH parts catalog and supplement.

| NEW PISTON RING SETS | | |
|----------------------|-------------|-------------|
| Part No. | 1200 Models | 1340 Models |
| 22325-55B | Std. | -- |
| 22327-55B | .010 O.S. | -- |
| 22328-55B | .020 O.S. | -- |
| 22329-55B | .030 O.S. | -- |
| 22330-55B | .040 O.S. | -- |
| 22331-55B | .050 O.S. | -- |
| 22334-78A | .060 O.S. | Std. |
| 22335-78A | .070 O.S. | .010 O.S. |
| 22336-78A | -- | .020 O.S. |
| 22337-78A | -- | .030 O.S. |

Note: At the present time only standard ring sets are available. We expect all oversize sets to be available by May 1st. We are notifying you in advance so that your requirements can be ordered now.

Order your requirements of new standard piston ring sets, part No. 22325-55B (1200cc) and 22334-78A (1340cc) immediately.

Install the replacement ring sets according to service manual, part No. 99482-78E, procedure with the following noted exceptions:

1. The new 2nd compression ring must be installed with the round dot (o) or dash (-) mark facing up toward the top of the piston.
2. After removing old rings and before installing new rings, check the ring grooves for shiny wear spots to be sure the old rings were not bottoming in the ring grooves, indicating improper piston ring groove depth. Replace piston if indicated.

The latest instruction sheet used for ring sets which have the new 2nd compression ring and the recently adopted rail type oil ring is enclosed for your information.

Current old style ring sets in your parts stock should be returned for credit. Use a separate warranty claim form and report as "defective new parts per Bulletin No. M-745".

HARLEY-DAVIDSON MOTOR CO., INC.

| ROUTING | SERVICE | SALES | PARTS | CHIEF | MECHANIC | MECHANIC | MECHANIC | MECHANIC | RETURN |
|------------------|---------|---------|---------|----------|----------|----------|----------|----------|----------|
| MANAGER | MANAGER | MANAGER | MANAGER | MECHANIC | NO. 1 | NO. 2 | NO. 3 | NO. 4 | THIS TO: |
| INITIAL HERE→ | | | | | | | | | |