

CHAPTER TWO

TROUBLESHOOTING

Every motorcycle engine requires an uninterrupted supply of fuel and air, proper ignition and adequate compression. If any of these are lacking, the engine will not run.

Diagnosing mechanical problems is relatively simple if you use orderly procedures and keep a few basic principles in mind.

The troubleshooting procedures in this chapter analyze typical symptoms and show logical methods of isolating causes. These are not the only methods. There may be several ways to solve a problem, but only a systematic approach can guarantee success.

Never assume anything. Do not overlook the obvious. If you are riding along and the bike suddenly quits, check the easiest, most accessible problem spots first. Is there gasoline in the tank? Has a spark plug wire fallen off?

If nothing obvious turns up in a quick check, look a little further. Learning to recognize and describe symptoms will make repairs easier for you or a mechanic at the shop. Describe problems accurately

and fully. Saying that "it won't run" isn't the same thing as saying "it quit at high speed and won't start," or that "it sat in my garage for 3 months and then wouldn't start."

Gather as many symptoms as possible to aid in diagnosis. Note whether the engine lost power gradually or all at once. Remember that the more complicated a machine is, the easier it is to troubleshoot because symptoms point to specific problems.

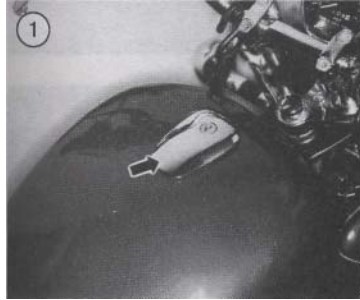
After the symptoms are defined, areas which could cause problems are tested and analyzed. Guessing at the cause of a problem may provide the solution, but it can easily lead to frustration, wasted time and a series of expensive, unnecessary parts replacements.

You do not need fancy equipment or complicated test gear to determine whether repairs can be attempted at home. A few simple checks could save a large repair bill and lost time while the bike sits in a dealer's service department. On the other hand, be

realistic and don't attempt repairs beyond your abilities. Service departments tend to charge heavily for putting together a disassembled engine that may have been abused. Some won't even take on such a job—so use common sense and don't get in over your head.

OPERATING REQUIREMENTS

An engine needs 3 basics to run properly: correct fuel/air mixture, compression and a spark at the correct time. If one or more are missing, the engine will not run. Four-stroke engine operating principles are described under *Engine Principles* in Chapter Four. The electrical system is the weakest link of the 3 basics. More problems result from electrical breakdowns than from any other source. Keep that in mind before you begin tampering with carburetor adjustments and the like.



If the machine has been sitting for any length of time and refuses to start, check and clean the spark plugs and then look to the gasoline delivery system. This includes the fuel tank, fuel pump, fuel filter, fuel shutoff valve and fuel lines to the carburetors. Gasoline deposits may have formed and gummed up the carburetor jets and air passages. Gasoline tends to lose its potency after standing for long periods. Condensation may contaminate the fuel with water. Drain the old fuel (fuel tank, fuel lines and carburetors) and try starting with a fresh tankful.

TROUBLESHOOTING INSTRUMENTS

Chapter One lists the instruments needed and instruction on their use.

TROUBLESHOOTING ,

When the bike is difficult to start, or won't start at all, it doesn't help to wear down the battery using the electric starter. Check for obvious problems even before getting out your tools. Go down the following list step-by-step. Do each one; you may be embarrassed to find the engine stop switch off, but that is better than wearing down the battery.

Engine Fails to Start

If the bike will not start, perform the following checks in order:

- a. Fuel system check.
- b. Compression check.
- c. Battery check.
- d. Ignition system check.

Fuel system check

WARNING

Do not use an open flame to check in the tank. A serious explosion is certain to result.

1. Is there fuel in the tank? Remove or open the filler cap (**Figure 1**) and rock the bike. Listen for fuel sloshing around.
2. Is the fuel shutoff valve in the ON position (**Figure 2**) and on models so equipped, is the vacuum line to the valve from the engine still connected?

3. Make sure the engine stop switch (**Figure 3**) is not in the OFF position.
4. Is the choke in the correct position? The choke knob should be pulled *out* (**Figure 4**) for a cold engine and pushed *in* (**Figure 5) for a warm engine.**

Compression check

A compression test shows how much pressure builds in a cylinder during starting. If the compression falls below specified levels, the engine will become difficult to start or will not start. Refer to *Compression Testing* in Chapter Three. Interpret results as follows:

- a. Normal: Perform the *Ignition Check* in this chapter.
- b. Abnormal: If the engine compression is low, perform the procedures listed under *Compression Testing* in Chapter Three.

Ignition check

Perform the following spark test to determine if the ignition system is operating properly.

1. Remove one of the spark plugs as described in Chapter Three.
2. Attach the spark plug wire connector to the spark plug and touch the spark plug base to a good ground like the engine cylinder head. Position the spark plug so you can see the electrodes.

WARNING

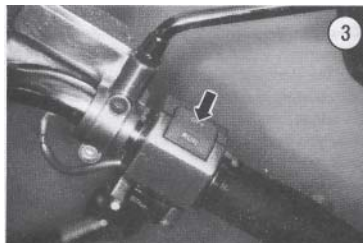
During the next step, do not hold the spark plug, wire or connector with fingers or a serious electrical shock may result. If necessary, use a pair of insulated pliers to hold the spark plug or wire. The high voltage generated by the ignition system could produce serious or fatal shocks.

3. Crank the engine over with the starter. A fat blue spark should be evident across the spark plug electrodes.

NOTE

*If the starter does not operate or if the starter motor rotates but the engine does not turn over, refer to *Engine Will Not Crank* in this section.*

4. If the spark is good, recheck the fuel and compression systems.
5. If the spark is not good, check for one or more of the following:
 - a. Loose electrical connections.
 - b. Dirty electrical connections.
 - c. Loose or broken ignition coil ground wire.
 - d. Broken or shorted high tension lead to the spark plug(s).
 - e. Ignition unit malfunction.



- f. Clutch or sidestand switch malfunction.
- g. Ignition or engine stop switch malfunction.
- h. Blown fuse.

Battery check

If ignition system tests okay, but the starter turns slowly, service the battery as described under *Battery* in Chapter Three.

Engine is Difficult to Start

Check for one or more of the following possible malfunctions:

- a. Fouled spark plug(s).
- b. Improperly adjusted choke.
- c. Intake tube(s) air leak.
- d. Contaminated fuel system.
- e. Improperly adjusted carburetor(s).
- f. Weak ignitor unit.
- g. Weak ignition coil(s).
- h. Poor compression.
- i. Engine and transmission oil too heavy.

Engine Will Not Crank

Check for one or more of the following possible malfunctions:

- a. Blown fuse.
- b. Discharged battery.
- c. Defective starter motor and/or starter clutch.
- d. Seized piston(s).
- e. Seized crankshaft bearings.
- f. Broken connecting rod(s).
- g. Sidestand, neutral or clutch safety switch(s) malfunction.
- h. Engine stop switch malfunction.
- i. Defective starter motor button and contact.

ENGINE PERFORMANCE

In the following check list, it is assumed that the engine runs, but is not operating at peak performance. This will serve as a starting point from which to isolate a performance malfunction.

Engine Will Not Idle

- a. Carburetor(s) incorrectly adjusted.

- b. Fouled or improperly gapped spark plug(s).
- c. Leaking head gasket.
- d. Obstructed fuel line or fuel shutoff valve.
- e. Obstructed fuel filter.
- f. Ignition timing incorrect due to defective ignition component(s).
- g. Valve clearance incorrect.

Engine Misses at High Speed

- a. Fouled or improperly gapped spark plugs.
- b. Improper carburetor main jet selection.
- c. Ignition timing incorrect due to defective ignition component(s).
- d. Weak ignition coil(s).
- e. Obstructed fuel line or fuel shutoff valve.
- f. Obstructed fuel filter.
- g. Clogged carburetor jets.
- h. Dirty air filter element.

Engine Overheating

- a. Incorrect carburetor adjustment or jet selection.
- b. Ignition timing retarded due to defective ignition component(s).
- c. Improper spark plug heat range.
- d. Cooling system malfunction.
- e. Incorrect coolant level.
- f. Oil level low.
- g. Oil not circulating properly.
- h. Valves leaking.
- i. Heavy engine carbon deposits.
- j. Dragging brake(s).
- k. Clutch slipping.

Engine Overheating

- a. Clogged radiator.
- b. Damaged thermostat.
- c. Worn or damaged radiator cap.
- d. Water pump worn or damaged.
- e. Thermostatic switch malfunction.
- f. Damaged fan blades.

Smoky Exhaust and Engine Runs Roughly

- a. Clogged air filter element.

- b. Carburetor adjustment incorrect—mixture too rich.
- c. Choke not operating correctly.
- d. Water or other contaminants in fuel.
- e. Clogged fuel line.
- f. Spark plug(s) fouled.
- g. Ignition coil(s) defective.
- h. Ignitor unit or pickup coil defective, i. Loose or defective ignition circuit wire(s).
- j. Short circuit from damaged wire insulation, k. Loose battery cable connection.
- l. Valve timing incorrect, m. Intake tube(s) or air filter(s) air leak.

Engine Loses Power at Normal Riding Speed

- a. Carburetor incorrectly adjusted.
- b. Engine overheating.
- c. Ignition timing incorrect due to defective ignition component(s).
- d. Incorrectly gapped spark plugs.
- e. Obstructed muffler.
- f. Dragging brake(s).

Engine Lacks Acceleration

- a. Carburetor mixture too lean.
- b. Clogged fuel line.
- c. Ignition timing incorrect due to defective ignition component(s).
- d. Dragging brake(s).
- e. Slipping clutch.

ENGINE NOISES

Often the first evidence of an internal engine problem is a strange noise. That knocking, clicking or tapping sound which you never heard before may be warning you of impending trouble.

While engine noises can indicate problems, they are difficult to interpret correctly; inexperienced mechanics can be seriously misled by them.

Professional mechanics often use a special stethoscope (which looks like a doctor's stethoscope) for isolating engine noises. You can do nearly as well with a "sounding stick" which can be an ordinary piece of doweling, a length of broom handle or a section of small hose. By placing one end in contact with the area to which you want to listen and the

other end near your year, you can hear sounds emanating from that area. The first time you do this, you may be horrified at the strange sounds coming from even a normal engine. If you can, have an experienced friend or mechanic help you sort out the noises.

Consider the following when troubleshooting engine noises:

1. *Knocking or pinging during acceleration*—Caused by using a lower octane fuel than recommended. May also be caused by poor fuel. Pinging can also be caused by a spark plug of the wrong heat range or carbon build-up in the combustion chamber. Refer to *Correct Spark Plug Heat Range* and *Compression Test* in Chapter Three.
2. *Slapping or rattling noises at low speed or during acceleration*—May be caused by piston slap, i.e., excessive piston-cylinder wall clearance.
3. *Knocking or rapping while decelerating*—Usually caused by excessive rod bearing clearance.
4. *Persistent knocking and vibration*—Usually caused by worn main bearing(s).
5. *Rapid on-off squeal*—Compression leak around cylinder head gasket or spark plug(s).
6. *Valve train noise*—Check for the following:
 - a. Valves adjusted incorrectly.
 - b. Valve sticking in guide.
 - c. Low oil pressure.

ENGINE LUBRICATION

An improperly operating engine lubrication system will quickly lead to engine seizure. The engine oil level should be checked weekly and topped up, as described in Chapter Three. Oil pump service is described in Chapter Four.

Oil Consumption High or Engine Smokes Excessively

- a. Worn valve guides.
- b. Worn or damaged piston rings.

Excessive Engine Oil Leaks

- a. Clogged air filter breather hose(s).
- b. Loose engine parts.
- c. Damaged gasket sealing surfaces.

Black Smoke

- a. Clogged air filter element.
- b. Incorrect carburetor fuel level (too high).
- c. Choke stuck open.
- d. Incorrect main jet (too large).

Gray Smoke

- a. Worn valve guide.
- b. Worn valve oil seal.
- c. Worn piston ring oil ring.
- d. Excessive cylinder and/or piston wear.

CLUTCH

The four basic clutch troubles are:

- a. Clutch noise.
- b. Clutch slipping.
- c. Improper clutch disengagement or dragging.
- d. Low hydraulic level in master cylinder or air in hydraulic fluid line.

All clutch troubles, except adjustments, require partial clutch disassembly to identify and cure the

problem. The troubleshooting chart in **Figure 6** lists clutch troubles and checks to make. Refer to Chapter Five for clutch service procedures.

TRANSMISSION

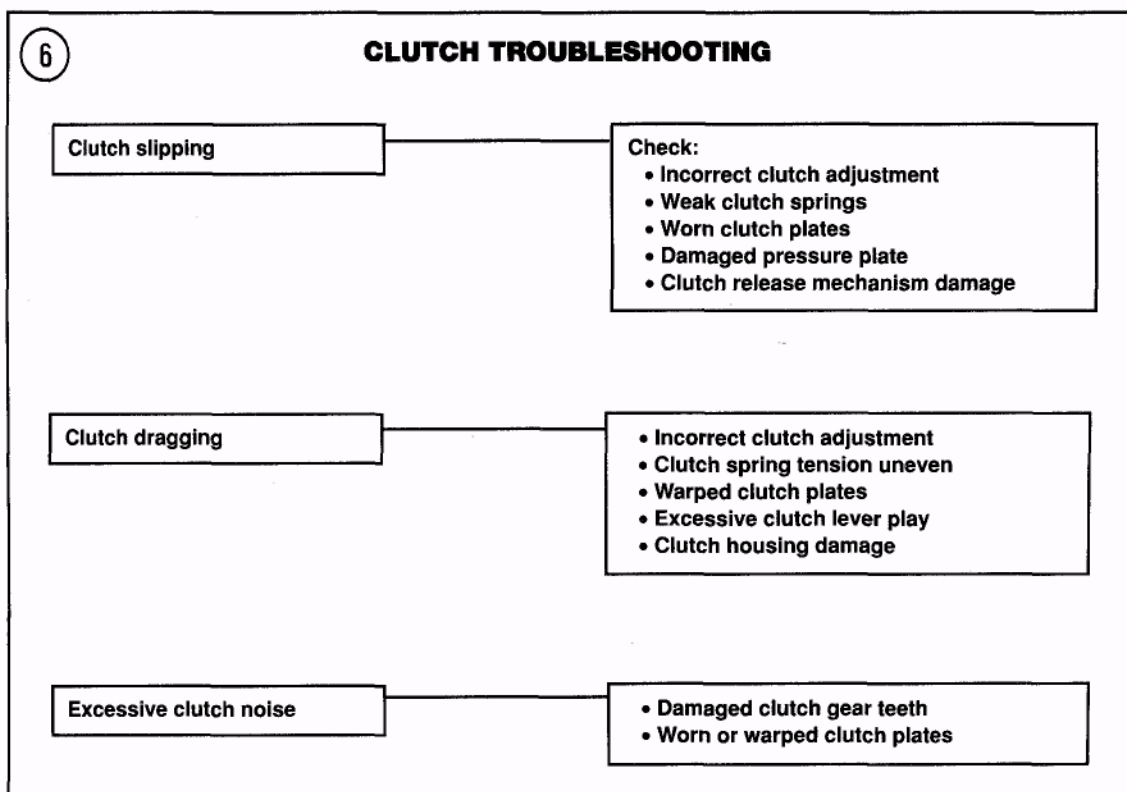
The basic transmission troubles are:

- a. Excessive gear noise.
- b. Difficult shifting.
- c. Gears pop out of mesh.
- d. Incorrect shift lever operation.

Transmission symptoms are sometimes hard to distinguish from clutch symptoms. The troubleshooting chart in **Figure 7** lists transmission troubles and checks to make. Refer to Chapter Six for transmission service procedures. Be sure that the clutch is not causing the trouble before working on the transmission.

ELECTRICAL PROBLEMS

If bulbs burn out frequently, the cause may be excessive vibration, loose connections that permit



TRANSMISSION TROUBLESHOOTING

Excessive gear noise

Check:

- Worn bearings
- Worn or damaged gears
- Excessive gear backlash

Difficult shifting

Check:

- Damaged gears
- Damaged shift forks
- Damaged shift drum
- Damaged shift lever assembly
- Incorrect main shaft and countershaft engagement
- Incorrect clutch disengagement

Gears pop out of mesh

Check:

- Worn gear or transmission shaft splines
- Shift forks worn or bent
- Worn dog holes in gears
- Insufficient shift lever spring tension
- Damaged shift lever linkage

Incorrect shift lever operation

Check:

- Bent shift lever
- Bent or damaged shift lever shaft
- Damaged shift lever linkage or gears

Incorrect shifting after engine reassembly

Check:

- Missing transmission shaft shims
- Incorrectly installed parts
- Shift forks bent during reassembly
- Incorrectly assembled crankcase assembly
- Incorrect clutch adjustment
- Incorrectly assembled shift linkage assembly

sudden current surges, or the installation of the wrong type of bulb.

Most light and ignition problems are caused by loose or corroded ground connections. Check these prior to replacing a bulb or electrical component.

EXCESSIVE VIBRATION

Usually this is caused by loose engine mounting hardware. If not, it can be difficult to find without disassembling the engine. High speed vibration may be due to a bent axle shaft or loose or faulty suspension components. Vibration can also be caused by the following conditions:

- a. Broken frame.
- b. Worn drive chain.
- c. Improperly balanced wheels.
- d. Defective or damaged wheels.
- e. Defective or damaged tires.
- f. Internal engine wear or damage.

CARBURETOR TROUBLESHOOTING

Basic carburetor troubleshooting procedures are found in **Figure 8**.

FRONT SUSPENSION AND STEERING

Poor handling may be caused by improper tire pressure, a damaged or bent frame or front steering components, worn wheel bearings or dragging brakes. Possible causes of suspension and steering malfunctions are listed in the following.

Irregular or Wobbly Steering

- a. Loose wheel axle nuts.
- b. Loose or worn steering head bearings.
- c. Excessive wheel hub bearing play.
- d. Damaged wheel.
- e. Unbalanced wheel assembly.
- f. Worn hub bearings.
- g. Incorrect wheel alignment,
- h. Loose or bent spoke.
- i. Bent or damaged steering stem or frame (at steering neck), j. Tire incorrectly seated on rim.

- k. Excessive front end loading from non-standard equipment.

1. Damaged fairing assembly, m.
Loose fairing mounts or brackets.

Stiff Steering

- a. Low front tire air pressure.
- b. Bent or damaged steering stem or frame (at steering neck).
- c. Loose or worn steering head bearings.

Stiff or Heavy Fork Operation

- a. Incorrect fork springs.
- b. Incorrect fork oil viscosity.
- c. Incorrect fork adjustment.
- d. Excessive amount of fork oil.
- e. Bent fork tubes.

Poor Fork Operation

- a. Worn or damage fork tubes.
- b. Fork oil level low due to leaking fork seals.
- c. Incorrect fork adjustment(s).
- d. Bent or damaged fork tubes.
- e. Contaminated fork oil.
- f. Worn fork springs.
- g. Heavy front end loading from non-standard equipment.

Poor Rear Shock Absorber Operation

- a. Damper unit leaking.
- b. Incorrect rear shock adjustment.
- c. Heavy rear end loading from non-standard equipment.
- d. Incorrect loading.

BRAKE PROBLEMS

Sticking disc brakes may be caused by a stuck piston(s) in a caliper assembly, warped pad shim(s) or improper rear brake adjustment. See **Figure 9** for disc brake troubles and checks to make. Sticking brake shoes may be caused by an out-of-round brake drum.

CARBURETOR TROUBLESHOOTING

Hard starting

Check:

- Choke not operating correctly
- Idle mixture misadjusted
- Air leak at carburetor mount or hose
- Fuel overflow

Fuel overflow

Check:

- Worn float needle valve or dirty seat
- Incorrect float level
- Damaged float bowl O-ring
- Damaged float pin
- Damaged float

Poor idling

Check:

- Idle misadjusted
- Worn idle mixture screw
- Blocked jet or port in carburetor bore
- Air leak at carburetor mount

Poor acceleration

Check:

- Clogged pilot jet
- Float level too high
- Idle mixture misadjusted

Lower power at all speeds

Check:

- Dirty or plugged carburetor passages
- Clogged fuel line
- Clogged fuel tank strainer
- Air leak at carburetor mount
- Dirty air filter
- Loose carburetor jets

Poor power at high speeds

Check:

- Loose or clogged main jet
- Incorrect float level
- Dirty or plugged carburetor passages

Fuel starvation

Check:

- Clogged fuel line
- Carburetor dirty
- Fuel tank strainer clogged or dirty
- Fuel tank dirty

DISK BRAKE TROUBLESHOOTING

Disc brake fluid leakage

Check:

- Loose or damaged line fittings
- Worn caliper piston seals
- Scored caliper piston and/or bore
- Loose banjo bolts
- Damaged sealing washers
- Leaking master cylinder diaphragm
- Leaking master cylinder secondary seal
- Cracked master cylinder housing
- Too high brake fluid level
- Loose master cylinder cover

Brake overheating

Check:

- Warped brake disc
- Incorrect brake fluid
- Caliper piston and/or brake pads hanging up
- Riding brakes during riding

Brake chatter

Check:

- Warped brake disc
- Loose brake disc
- Incorrect caliper alignment
- Loose front axle nut and/or clamps
- Worn wheel bearings
- Damaged front hub
- Restricted brake hydraulic line
- Contaminated brake pads

Brake locking

Check:

- **Incorrect brake fluid**
- **Plugged passages in master cylinder**
- **Incorrect front brake adjustment**
- **Caliper piston and/or brake pads hanging up**
- **Warped brake disc**

Insufficient brakes

Check:

- Air in brake lines
- Worn brake pads
- Low brake fluid level
- Incorrect brake fluid
- Worn brake disc
- Worn caliper piston seals
- Glazed brake pads
- Leaking primary cup seal in master cylinder
- Contaminated brake pads and/or disc

Brake squeal

Check:

- Contaminated brake pads and/or disc
- Dust or dirt collected behind brake pads
- Loose parts