SECTION 3-B

FUEL SYSTEM TROUBLE DIAGNOSIS

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3-4 HARD STARTING

a. Improper Starting Technique

Hard starting may be due to improper starting technique. If possible, observe the owner's method of starting; if not correct, suggest that he use the following procedure.

1. Place control lever in "P" or "N" position. Starter cannot be operated in any other position.

2. Engine Cold. Depress accelerator pedal to floor once and release. This presets the automatic choke and throttle.

Engine Warm. Hold accelerator pedal about 1/3 down.

3. Turn ignition switch to "START" and release when engine starts. As soon as the engine is running smoothly, "jab" the accelerator pedal to slow the engine down to warm-up speed.

If engine "floods", hold accelerator to floor to open choke; then crank engine until it fires regularly.

If engine has not been started for several days, the carburetor may be dry due to evaporation. If engine does not start in normal time, depress accelerator pedal several times to pump any fuel accumulated in bottom of carburetor into the engine.

b. Improper Ignition

Before attempting any correction in fuel system make certain that the battery and ignition system are in proper condition. See paragraphs 10-13 and 10-33.

c. Improper Adjustment of Fast Idle Cam or Choke Unloader

An incorrectly adjusted fast idle cam may not provide insufficient throttle opening and stalling will result.

If the choke unloader goes into action too soon it may cause hard starting when engine is cold. If choke unloader goes into action too late or not at all, it may cause hard starting when engine is flooded. See paragraph 3-17 (Rochester 2-Bbl.), 3-21 (Carter), or 3-25 (Rochester 4-Bbl.).

d. No Fuel at Carburetor

No fuel may be delivered to carburetor due to empty gasoline tank or stoppages in filters, strainers or feed hoses, or inoperative fuel pump. Test fuel supply as described in paragraph 3-12.

e. Improper Carburetor Adjustment

Improper setting of carburetor idle needle valves may cause stalling after starting. A high fuel level in float bowl will cause flooding and consequent hard starting. Adjust carburetor (par. 3-8).

f. Low Grade Gasoline

Low grade gasoline is usually insufficiently volatile to provide easy starting in cold weather even though it may perform reasonably well after the engine is started and warmed up. A change to higher grade gasoline is the only remedy.

g. Volatile Gasoline

In some parts of the country, gasoline are marketed which are very volatile and generally advertised as "easy starting gasolines." Some of these fuels are so volatile they boil (commonly referred to as "percolation") in a carburetor bowl which is only normally warm, especially when the engine is shut off following a run. This overloads the manifold, resulting in an over rich mixture which may cause "delayed" starting.

Such gasolines are not necessary in a Buick since the automatic choke has been designed and calibrated to provide easy and positive starting with fuels of ordinary volatility, but if the owner wishes to use volatile gasolines the automatic choke thermostat should be adjusted for a "lean" setting (par. 3-8).

3-5 IMPROPER ENGINE PERFORMANCE

a. Engine Idles Too Fast

A cold engine should operate on fast idle for two to five minutes depending on air temperature. At 32°F. the fast idle cam should move to slow idle position in approximately 1/2 to 3/4 mile of driving. At higher temperatures it should move to slow idle position in a correspondingly shorter distance.

If the engine operates too long on the fast idle cam, check the choke thermostat setting (par. 3-8) and the fast idle adjustment. See paragraph 3-17 (Rochester 2-Bbl.), 3-21 (Rochester 4-Bbl.), or 3-25 (Carter).

If engine idles faster than the specified idle speed when off the fast idle cam, check throttle linkage for binding or weak return spring and adjust throttle stop screw (par. 3-8). This trouble can also be caused by a sticking choke or dash pot.

b. Improper Idle and Low Speed Performance

Rough idling and tendency to stall may be caused by idling speed set below the specified speed. Idle mixture may be wrong due to improper needle valve adjustment (par. 3-8).

Rough idling, poor performance, and back firing at low speeds frequently originates in improper ignition. Check ignition system (par. 10-33).

High fuel pump pressure will cause rough idling and poor low speed performance (par. 3-12).

An intake manifold air leak will cause rough idling and poor low speed performance. A manifold air leak produces a low, erratic reading on a vacuum gauge connected to the intake manifold. Check for leaks at all pipe connections and check manifold joints with gasoline.

When rough idling and poor low speed performance cannot be corrected by checks of carburetion and ignition mentioned above, check cylinder compression.

Improper performance which is most noticeable at low speeds may be caused by sticking valves. Sticking valves may be caused by the use of low grade fuel or fuel that has been in storage too long. When a car is stored for any length of time, fuel should be drained from the tank, feed hoses, fuel pump, and carburetor in order to avoid gum formation.

c. Improper High Speed Operation

Roughness or poor performance above 22 MPH indicates faulty ignition (par. 10-33) or improper settings in the high speed circuit of carburetor. Surging at high speed may be caused by low fuel pump pressure (par. 3-12).

With Rochester carburetors, surging at 75 to 80 MPH constant speed indicates that the power jet is stopped up or the vacuum piston is sticking.

If there is lack of power at top speed, check throttle linkage to insure full throttle valve opening (par. 3-9).

d. Excessive Detonation or Spark Knock

Light detonation may occur when operating an automatic transmission car in Drive with full throttle at low speed even when ignition timing is correct and proper fuel is used. This light detonation is normal and no attempt should be made to eliminate it by retarding the ignition timing, which would reduce economy and over-all performance.

Heavy detonation may be caused by improper ignition timing (par. 10-35), improper grade of fuel, or by an accumulation of carbon in combustion chambers. Series 4400 cars with the low compression engine may use regular fuel; all others require premium fuel because of their higher compression ratios.

Heavy detonation is injurious to any automotive engine. A car driven continuously under conditions and with fuels which produce heavy detonation will overheat and lose power, with the possibility of damage to pistons and bearings.

3-6 EXCESSIVE FUEL CONSUMPTION

Complaints of excessive fuel consumption require a careful investigation of owner driving habits and operating conditions as well as the mechanical conditions of the engine and fuel system; otherwise, much useless work may be done in an attempt to increase fuel economy.

Driving habits which seriously affect fuel economy are: high speed driving, frequent and rapid acceleration, driving too long in a low speed range when getting under way, excessive idling while standing.

Operating conditions which adversely affect fuel economy are: excessive acceleration, frequent starts and stops, congested traffic, poor roads, hills and mountains, high winds, low tire pressures.

High speed is the greatest contributor to low gas mileage. Air resistance increases as the square of the speed. For instance, a car going sixty miles an hour must overcome air resistance four times as great as when going thirty miles an hour. At eighty miles an hour the resistance is over seven times as great as when going thirty miles an hour.

Over seventy-five per cent of the power required to drive a car eighty miles an hour is used in overcoming air resistance, while at thirty miles an hour only thirty per cent of the power required is used to overcome air resistance.

Gas mileage records made by car owners never give a true picture of the efficiency of the engine fuel system since they include the effects of driving habits and operating conditions. Because of the wide variation in these conditions it is impossible to give average mileage figures for cars in general use; therefore, any investigation of a mileage complaint must be based on an accurate measurement of gasoline consumption per mile under proper test conditions.

a. Gasoline Mileage Test

A gas mileage test should be made with a 1/10th gallon gauge on a reasonably level road, at fixed speeds, without acceleration or deceleration. Test runs should be made in both directions over the same stretch of road to average the effect of grades and wind resistance. Test runs made at 20, 40 and 60 MPH will indicate the approximate efficiency of the low speed, high speed, and power systems of the carburetor and show whether fuel consumption is actually abnormal. If a mileage test indicates that the fuel consumption is above normal, check the following items.

1. Fuel Leaks. Check all gasoline hose connections, fuel pump, gasoline filter, and carburetor bowl gasket.

2. Tires. Check for low tire pressures (par. 1-1).

3. Brakes. Check for dragging brakes.

4. Ignition Timing--Spark Plugs. Late ignition timing causes loss of power and increases fuel consumption, (par. 10-35). Dirty or worn out spark plugs are wasteful of fuel (par. 10-36).

5. Low Grade Gasoline. Use of gasoline of such low grade that ignition timing must be retarded to avoid excessive detonation will give very poor fuel economy.

6. Exhaust Manifold Heat Valve. Check for sticking valve or improper setting of thermostat (par. 3-7).

7. Air Cleaner. Check for dirty or clogged cleaner element. (Par. 3-7).

8. Automatic Choke. Check for sticking choke valve and improper setting of thermostat (par. 3-8).

9. Valves. Check for sticking valves (par. 2-11).

10. Fuel Pump. Check for excessive fuel pump pressure (par. 3-12).

11. Carburetor Adjustment. Check idle adjustment (par. 3-8). For corrections to high speed and power systems, the carburetor must be removed and disassembled.

b. Changing Carburetor Calibrations

Under no circumstances should the jet sizes, metering rods and other calibrations of a carburetor be changed from factory specifications. The calibrations given in paragraph 3-1 must be adhered to unless these are later changed by a bulletin issued from the Buick Factory Service Department.