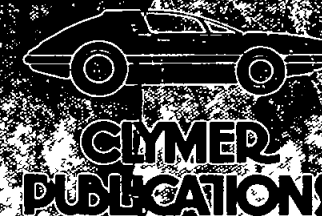


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Printed in U S A



DATSUN

SERVICE • REPAIR HANDBOOK

510 and Pick-up • 1968-1972



Car No PL 510-834200 (April, 1969)

Engine No L16-217847

Type WPL 510

DATSUN

SERVICE • REPAIR HANDBOOK

510 AND PICK-UP • 1968-1972

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CHAPTER ONE

GENERAL INFORMATION

This manual provides maintenance information on the Datsun 510-Series and 521-Series of vehicles. The 510-Series includes the two door sedan, four door sedan, and station wagon. The 521-Series is the pick-up truck. Coverage is from 1968 through 1972 models.

All models use the L16 engine, a 96-horsepower, four-cylinder, overhead camshaft design. The 510 has a fully synchronized four-speed manual or three-speed automatic transmission. The 521 has a four-speed manual transmission only. In 1972, horsepower rating was lowered to 92 horsepower due to changes in emission control device requirements. **Figure 1** is an overall view of the four door sedan, **Figure 2** shows the station wagon, and **Figure 3** illustrates the pick-up truck.

Over the years, the 510 and 521 series have remained essentially the same, with the exception of changes to the emission control systems and overall body styling. In this manual, every effort has been made to pinpoint significant differences between model years.

The use of special tools and test equipment has been avoided wherever possible. When necessary, special tools and test equipment are illustrated, either in actual use or alone. A well equipped mechanic may find he can substitute

similar tools or make his own to fulfill a requirement.

Recommendations are occasionally made to refer service or maintenance to a Datsun dealer or a specialist in a specified field. In these cases, work will probably be done more quickly and economically than if the mechanic performs them himself.

MODEL IDENTIFICATION

Body Number Plate

The body number is stamped on the fire wall in the engine compartment. The numbers give the chassis model and serial number.

Model Identification Plate

The model identification plate, **Figure 4**, is mounted within the engine compartment. This plate gives engine number and vehicle number.

Engine Identification

The engine identification marking is stamped on the right-hand side of the cylinder block just below the third and fourth spark plugs.

Model Identification Numbers

The following numbers have been assigned to the 510- and 521-Series vehicles.

Sedan

Four-speed Floor Shift P510-UT, PL510-T,
PL510 UT

Automatic Three-speed P510-UA, PL510-A,
PL510 UA

Wagon

Four speed Floor Shift WP510-UT, WPL510-T,
WPL510-UT

Automatic Three speed WP510 UA, WPL510-A,
WPL510-UA

Pick-up

Four-speed Floor Shift PL521 TU, PL521-TN

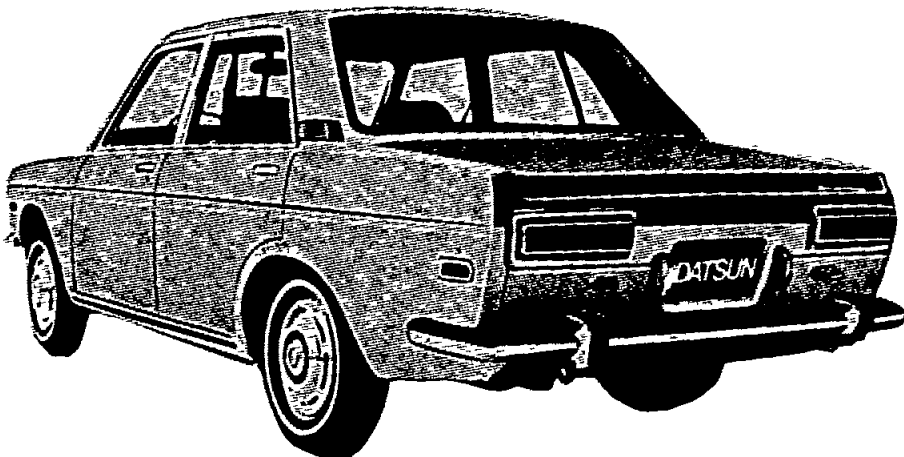
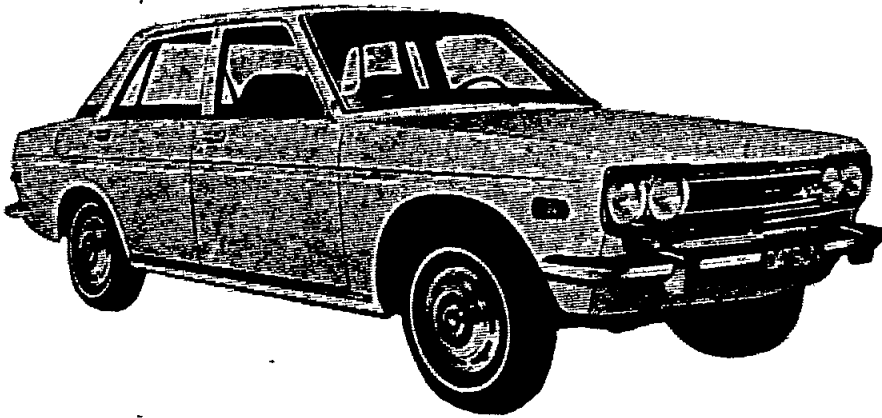
MAIN SPECIFICATIONS AND DIMENSIONS

Table 1 covers general specifications and dimensions. Detailed system specifications, including clearances, tolerances, and torque tightening information, are presented within each chapter.

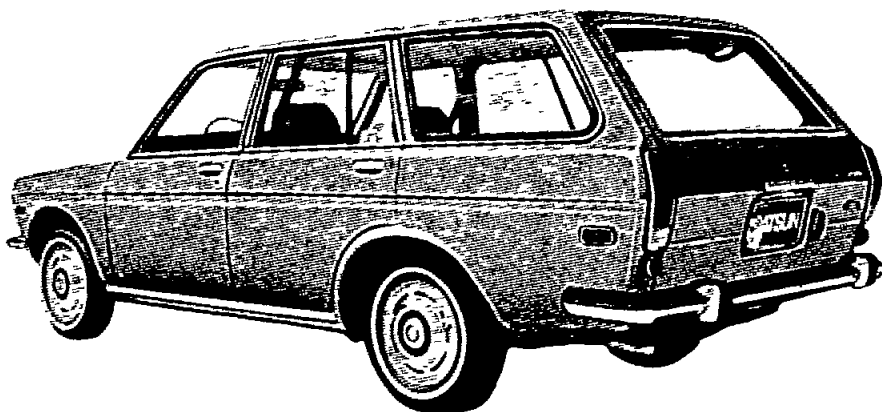
Parts Replacement

When you order parts from the dealer or other parts distributor, always order by engine and

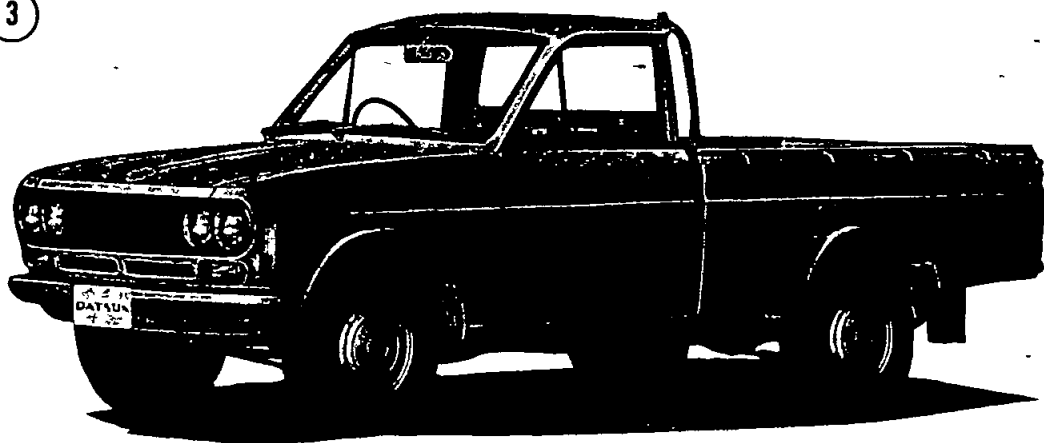
①



2



3



4

DATSUN

TYPE 510

ENGINE CAPACITY	1595 cc
MAX HP at RPM	96 HP at 5600 rpm
WHEELBASE	2420 mm
ENGINE NUMBER	L16-00988
CAR NO	P610-00034

NISSAN MOTOR CO., LTD.

YOKOHAMA JAPAN

chassis number Write the numbers down and carry them in your wallet.

Service Hints

Throughout this manual, keep two conventions in mind: "Front" refers to the front of the vehicle. The "left" and "right" sides of the vehicle refer to a person sitting in the car facing forward. For example, the steering wheel is on the left-hand side. All dimensions and capacities are expressed in units familiar to a United States mechanic, such as inches and pounds. Metric measurements are also given. Metric tools are required to work on the Datsun.

Table 1 MAIN SPECIFICATIONS AND DIMENSIONS

ITEM	Sedan	Wagon	Pick-up
Engine Type	L16	L16	L16
Valve Arrangement	Overhead Cam	Overhead Cam	Overhead Cam
Bore	3.2677 in (83mm)	3.2677 in (83mm)	3.2677 in (83mm)
Stroke	2.902 in (73.7mm)	2.902 in (73.7mm)	2.902 in (73.7mm)
Displacement	97.3 cu in (1595cc)	97.3 cu in (1595cc)	97.3 cu in (1595cc)
Compression Ratio	8.5:1	8.5:1	8.5:1
Maximum SAE Horsepower	96 @ 5,600 rpm	96 @ 5,600 rpm	96 @ 5,600 rpm
Maximum SAE Torque	99.8 ft.-lb (13.8 kg/m)	99.8 ft.-lb (13.8 kg/m)	99.8 ft.-lb (13.8 kg/m)
Fuel Octane	85	85	85
Length	162.2 in (4,120mm)	163.2 in (4,145mm)	168.9 in (4,290mm)
Width	61.4 in (1,560mm)	61.4 in (1,560mm)	62.8 in (1,595mm)
Height	55.1 in (1,400mm)	56.5 in (1,435mm)	60.8 in (1,545mm)
Wheelbase	95.3 in (2,420mm)	95.3 in (2,420mm)	99.6 in (2,530mm)
Room Space			
Inner Length	63.3 in (1,610mm)	67.3 in (1,710mm)	72.8 in (1,850mm)
Inner Width	49.9 in (1,270mm)	50.7 in (1,290mm)	56.3 in (1,430mm)
Inner Height	44.4 in (1,130mm)	44.6 in (1,135mm)	15.7 in (399mm)
Tread			
Front	50.4 in (1,280mm)	50.2 in (1,275mm)	49.2 in (1,250mm)
Rear	50.4 in (1,280mm)	49.6 in (1,260mm)	49.9 in (1,267mm)
Road Clearance	7.4 in (188mm)	6.4 in (163mm)	7.87 in (200mm)
Weight			
4-Speed	2,061 lb (935 kg)	2,138 lb (970 kg)	2,127 lb (965 kg)
Automatic	2,114 lb (959 kg)	2,182 lb (990 kg)	—
Minimum Turning Radius	15.7 ft (4.8m)	15.7 ft (4.8m)	17.1 ft (5.2m)
Seating Capacity	5	5	2
Battery			
Volt	12	12	12
Capacity	40 or 50 AH	40 or 50 AH	40 or 60 AH
Connection	Negative ground	Negative ground	Negative ground
Fuel Tank Capacity	11.9 gal (45 liter)	11.9 gal (45 liter)	10.8 gal (41 liter)
Oil Pan Capacity	4.2 qts. (4.0 liter)	4.2 qts. (4.0 liter)	1.06 gal (4.0 liter)
Oil Filter Capacity	74 qt. (0.7 liter)	74 qt. (0.7 liter)	1.48 pint (0.7 liter)
Transmission Capacity	1.8 qt. (1.7 liter)	1.8 qt. (1.7 liter)	2.11 qt. (2.0 liter)
Differential Capacity	85 qt. (8.0 liter)	1.1 qt. (1.0 liter)	.87 qt. (0.83 liter)
Coolant Capacity	7.2 qt. (6.8 liter)	7.2 qt. (6.8 liter)	7.2 qt. (6.8 liter)
Clutch Type	Dry, single disc Diaphragm spring	Dry, single disc Diaphragm spring	Dry, single disc Diaphragm spring

Table 1 MAIN SPECIFICATIONS AND DIMENSIONS (continued)

ITEM	Sedan	Wagon	Pick-up
Transmission Type	Manual, Automatic	Manual, Automatic	Manual
Final Gear Type	Hypoid	Hypoid	Hypoid
Steering Gear Type	Recirculating ball	Recirculating ball	Recirculating ball
Brake			
Front	Disc	Disc	Drum
Rear	Drum	Drum	Drum
Parking Brake	Mechanical, rear wheels	Mechanical, rear wheels	Mechanical, rear wheels
Suspension Front	Independent strut type with tension rods and stabilizer	Independent strut type with tension rods and stabilizer	Independent torsion bar
Suspension Rear	Independent semi-trailing arms with coil springs and shock absorbers	Semi-elliptic leaf spring	Semi-elliptic leaf spring
Tires	5 60-13-4PR	5 60-13-4PR	6 00-14-6PRLT

TORQUES: SPARK PLUGS 11-15 LB-FT
 ENGINE DRAIN
 TRANS DRAIN + FILL 15-22(D) / 18-25(F)
 DIFF DRAIN + FILL
 WHEEL LUG NUTS
 FRONT WHEEL BEARING SPINDLE NUT TIGHTEN TO 23-24 LB FT, SPIN & BACK OFF 40°-70°

TIMING 10° BTDC @ 700 RPM

VALVE SETTINGS: INTAKE COLD .008 HOT 0,010
 EXHAUST 0010 0,012

SPARK PLUGS 0,031 - 0,035

CHAPTER TWO

PERIODIC MAINTENANCE

To ensure good performance, dependability, and safety, regular periodic maintenance is necessary. This chapter outlines routine and periodic maintenance for the average driver. Under heavy usage, servicing intervals will be shortened. Regular routine maintenance will help avoid expensive repairs.

ROUTINE CHECKS

The following checks should be performed at each fuel stop

- 1 Check engine oil level. Top up as required.
- 2 Check radiator coolant level. Top up as required.
- 3 Check battery electrolyte. The battery case is marked with upper limit and lower limit lines. Level should be maintained between the lines.
- 4 Check that the master cylinder brake fluid reservoir level is between the "max" and "min" lines marked on the plastic case.
- 5 Check the plastic clutch cylinder reservoir level. Level should be between the "max" and "min" lines.
- 6 Check the windshield washer fluid reservoir. Top up as required.

7 Check tire pressures when the tires are cold. Front and rear tire pressures should be 24 pounds under normal driving conditions. Tire pressure should be 28 pounds for high-speed driving conditions.

8 Check the engine for general condition. Check for leaky or cracked hoses and loose wiring.

9 Check condition of windshield wiper blades.

PERIODIC CHECKS

Table 1 provides periodic checks and maintenance that should be performed on a set schedule. Table 2 gives recommended lubricants and Table 3 specifies the grades of oil that should be used. Procedures for performing the services are presented in various chapters of this manual.

Table 3 RECOMMENDED GRADES OF OIL

Temperature	Engine Oil (MS)
Above 32° C (90° F) average	SAE 30, 10W-30
32° to 0° C (90° to 32° F)—minimum	SAE 20, 20W, 10W-30
0° to -12° C (32° to 10° F)—minimum	SAE 10W, 10W-30
Below -12° C (10° F)—minimum	SAE 10W, 10W-30

Table 1 ENGINE LUBRICATION AND MAINTENANCE

	FREQUENCY, EVERY:				
	Week	3,000 miles (5,000 km)	6,000 miles (10,000 km)	12,000 miles (20,000 km)	24,000 miles (40,000 km)
Check engine oil level, top-up if required	X				
Change engine oil		X			
Lubricate carburetor linkage			X		
Lubricate distributor rotor shaft and arm shaft			X		
Apply grease to distributor cam heel			X		
Check radiator coolant level	X				
Change radiator coolant			X		
Change radiator coolant additive					X
Check battery electrolyte level	X				
Check specific gravity of battery				X	
Check engine starting, exhaust color	X				
Tighten cylinder head, manifolds, and pipe flanges			X		
Adjust valve clearance			X		
Check ignition timing			X		
Tighten carburetor fittings	X				
Check fan belt tension		X			
Check for oil pan leakage	X				
Tighten engine mounts				X	
Check fuel strainer			X		
Replace fuel strainer					X
Check for fuel leaks	X				
Replace oil filter			X		
Check spark plugs		X			
Replace spark plugs				X	
Check distributor cap, rotor, and points		X			
Adjust engine idle speed		X			
Check air cleaner fittings			X		
Clean oil filler cap			X		
Clean battery cables and terminals			X		
Check alternator and voltage regulator function				X	
Check starter motor function				X	
Replace air cleaner element					X
Check fuel pump function					X
Check cylinder compression					X
Clean carburetor jets and float chamber					X
Check distributor condenser					X
Check crankcase ventilation control valve				X	

Table 2 RECOMMENDED LUBRICANTS

	Manufacturer						Lubricating points
	Shell	Mobil	Caltex	Esso	BP	Castrol	
Single-grade Engine oil	Shell Super Motor Oil Shell x -100 10W-30	Mobiloil Special HD 10W-30	Havoline Custom made 10W-30	Esso Extra Motor Oil 10W-30 20W-40	BP Viscostatic Longlife Motor Oil or Viscostatic Motor Oil	Castrolite 10W-30	Engine Carburetor linkage Distributor shaft
Multi-grade Engine oil	Shell x -100 30, 20 20W, 10W	Mobiloil Arctic or Mobiloil A or AF	Havoline or RPM Motor Oil HD	Esso Motor Oil, 30 10W, 20W	BP H D Motor Oil	Castrol 20HD 30HD	Engine Carburetor linkage Distributor shaft
Multi-purpose Grease	Shell Retrax A	Mobil Grease	Marfak	Esso Multi-purpose Grease or Beacon	BP Energrease L ₂	Castrol-lease LM	Distributor cam heel

CHAPTER THREE

TROUBLESHOOTING

Troubleshooting the Datsun can be relatively simple if done logically. The first step must always be to define symptoms as closely as possible. Subsequent steps involve testing and analyzing areas which could cause the symptoms. Procedures in this chapter analyze typical symptoms, and give logical methods of isolation. These are not the only methods. There may be several approaches to solving a problem, but all must have one thing in common—a logical, systematic approach.

TROUBLESHOOTING EQUIPMENT

The following equipment is necessary to properly troubleshoot an engine:

- 1 Voltmeter, Ammeter, and Ohmmeter
- 2 Hydrometer
- 3 Compression Tester
- 4 Vacuum Gauge
- 5 Fuel Pressure Gauge
- 6 Dwell Meter
- 7 Tachometer
- 8 Stroboscopic Timing Light
9. Exhaust Gas Analyzer

Items 1 through 8 are essential. Item 9 is necessary for exhaust emission control compliance. The following is a brief description of the function of each instrument

Voltsmeter, Ammeter, and Ohmmeter

For testing the ignition and electrical systems, a good voltmeter is required. For automotive use, an instrument covering 0-20 volts is satisfactory. It should have an accuracy of about $\pm 1/2$ volt, which excludes the common automotive type found in instrument panels.

An ohmmeter measures electrical resistance, and is required to check electrical continuity (open- and short-circuits), and for testing fuses and lights.

The ammeter measures electrical current. One for automotive use should cover 0-10 and 0-100 amperes. An ammeter is useful for checking battery charging and starting current. The starter and generator procedures in this manual use an ammeter to check for shorted windings. Several inexpensive VOM's (volt-ohmmeters) combine all instruments and fit easily into any tool box. The ammeter ranges are often too small for automotive work, though.

Hydrometer

A hydrometer is necessary to check battery condition and charge. It measures specific gravity of the electrolyte in each cell.

Compression Tester

The compression tester measures compression

pressure built up in each cylinder. The readings, when properly interpreted, indicate general cylinder and valve condition.

Vacuum Gauge

The vacuum gauge is easy to use, but difficult for an inexperienced mechanic to interpret. The results, when considered with other findings, can provide valuable clues to possible trouble.

Connect the vacuum gauge with a T-connection in the hose from the carburetor to the vacuum advance on the distributor. Start the engine and let it warm up thoroughly. Vacuum reading should be steady at 18-22 inches.

NOTE *Subtract 1 inch from reading for every 1000 feet of altitude*

Figure 1 shows numerous typical readings with interpretations. Results are not conclusive without comparing to other tests, such as compression readings.

Fuel Pressure Gauge

This instrument is vital for evaluating fuel pump performance. Often, a vacuum gauge and fuel pressure gauge are combined.

Dwell Meter

A dwell meter measures the distance, in degrees of cam rotation, that the breaker points remain closed while the engine is running. Since this angle is determined by breaker point gap, the dwell angle is an accurate indication of point gap. Many tachometers intended for tuning and testing incorporate a dwell meter as well. Follow the manufacturer's instruction to measure dwell on the Datsun.

Tachometer

A tachometer is essential for tuning Datsuns with exhaust emission control devices. Ignition timing and carburetor adjustments must be performed at the specified idle speed. The best instrument for this purpose is one with a range of 0-1,000 or 0-2,000 rpm. Extended range (0-6,000 or 8,000) instruments lack accuracy at lower speeds. The instrument should be capable of detecting changes of 25 rpm.

Stroboscopic Timing Light

This instrument permits accurate ignition timing. By flashing a light at the precise instant cylinder No. 1 fires, the position of the crankshaft pulley at that instant can be seen. Marks on the pulley line up with a reference pointer on the block during the timing procedure. Suitable lights are neon bulb types and xenon strobe lights. Neon timing lights are difficult to see and must be used in dimly lit areas. Xenon strobe lights can be used in bright sunlight. Use the light according to the manufacturer's instructions.

Exhaust Analyzer

Of all instruments described here, this is the least likely to be owned by a home mechanic. One instrument samples the exhaust gases from the tailpipe and measures the thermal conductivity of the exhaust gas. Since different gases conduct heat at varying rates, thermal conductivity of the exhaust is a good indication of gases present. This instrument is vital for accurately checking the effectiveness of exhaust emission control adjustments, but is too expensive for an amateur mechanic to consider buying.

STARTER

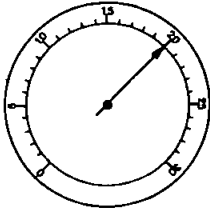
Starter system troubles are relatively easy to isolate. The following are common symptoms and cures.

1 *Engine cranks very slowly or not at all*

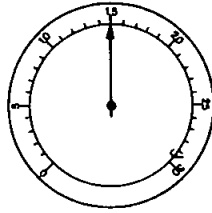
Turn on the headlights, if the lights are very dim, most likely the battery or the connecting wires are at fault. Check the battery using the procedures described in the Tune-up chapter. Check wiring for breaks, shorts, and dirty connections.

If the battery and connecting wires check good, turn the headlights on and try to crank the engine. If the lights dim drastically, the starter is probably shorted to ground. Remove the starter and test it using the procedures given in Chapter Nine. If the lights remain bright or dim slightly when cranking the engine, the trouble may be in the starter, solenoid, or wiring. To isolate the trouble, short the two large solenoid terminals together (not to ground), if the starter cranks normally, check the solenoid and wiring up to the

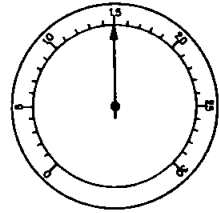
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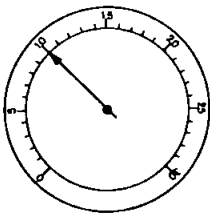
1. NORMAL READING
18-22" at idle



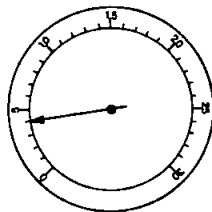
2. NORMAL READING
High lift cam with large overlap



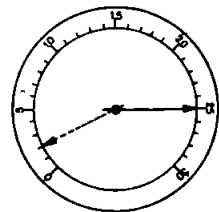
3. LATE IGNITION TIMING
14-17" at idle Normal cam lap



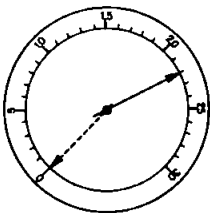
4. LATE VALVE TIMING
8-15" at idle



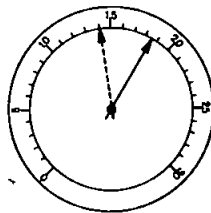
5. INTAKE LEAK
Low steady reading



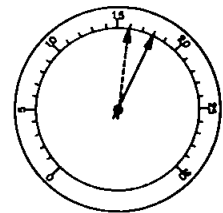
6. NORMAL READING
Drops to 2, then rises to 25 when accelerator is rapidly depressed and released.



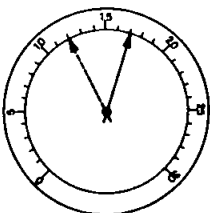
7. WORN RINGS, DILUTED OIL
Drops to 0, then rises to 22 when accelerator is rapidly depressed and released



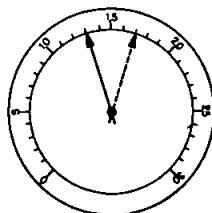
8. STICKING VALVE(S)
Normally steady Intermittently flicks downward about 4"



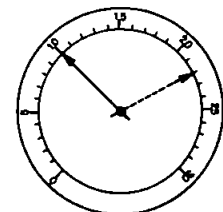
9. LEAKY VALVE
Regular drop about 2"



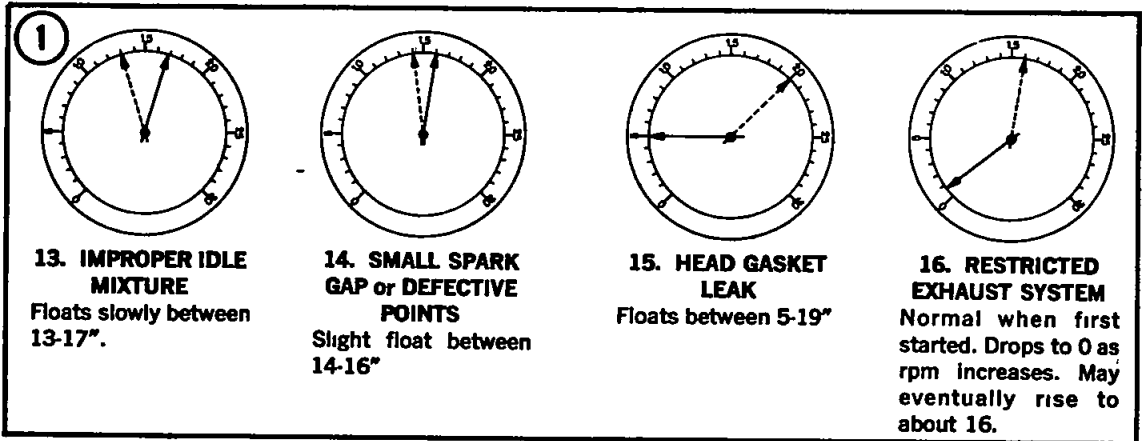
10. BURNED OR WARPED VALVE
Regular, evenly spaced down-scale flick about 4"



11. WORN VALVE GUIDES
Oscillates about 4"



12. WEAK VALVE SPRINGS
Violent oscillations (about 10") as rpm increases. Often steady at idle.



ignition switch. If the starter still fails to crank properly, remove the starter and test it.

2. Starter turns, but does not engage with engine.

This trouble is usually a defective pinion or solenoid shifting fork. It may also be that the teeth on the pinion, flywheel ring gear, or both are worn down too far to engage properly.

3. Starter engages, but will not disengage when ignition switch is released.

This trouble is usually caused by a sticking solenoid, but occasionally the pinion can jam on the flywheel. With manual transmissions, the pinion can be temporarily freed by rocking the car in high gear. Naturally, this is not possible in automatics; the starter must be removed.

4. Loud grinding noises when starter runs.

This usually means the teeth on the pinion and/or flywheel are not meshing properly. It may also mean the over running clutch is broken. In the first case, remove the starter and examine the gear teeth. In the latter, remove the starter and replace the pinion drive assembly.

CHARGING SYSTEM

Charging system troubles may be in the alternator, voltage regulator, or fan belt. The following symptoms are typical:

1. Alternator warning lamp does not come on when ignition is turned on.

This may indicate a defective ignition switch, battery, voltage regulator, or lamp. First, try to

start the car. If it doesn't start, check the ignition switch and battery.

If the car starts, find the voltage regulator and disconnect the white/red wire, this is the lamp wire. Ground the wire. If the lamp lights, the voltage regulator is defective, not properly grounded (try tightening the mounting screws), or the alternator brushes are not contacting the commutator. If the lamp does not light when the wire is grounded, the lamp is probably burned out; replace it.

2. Alternator warning lamp comes on and stays on.

This usually indicates that no charging is taking place. First check the fan belt tension and adjust if necessary. Check the battery condition with the hydrometer, and check all electrical connections in the charging system. Finally isolate the trouble to the alternator or voltage regulator.

3. Alternator warning lamp flashes erratically.

This usually indicates the charging system is working intermittently. Check the fan belt tension, and all electrical connections in the charging system. Check alternator brushes and condition of the commutator.

4. Battery requires frequent additions of water, or lamps require frequent replacement.

The alternator is probably overcharging the battery. The voltage regulator is probably faulty, check it using the procedures given in Chapter Nine.

5. Excessive noise from the alternator.

Check for loose alternator mounting. The

trouble may also be worn bearings. Remove the alternator and repair.

ENGINE

These procedures assume the starter cranks the engine over normally. If not, refer to Starter section in this chapter.

1 *Engine won't start.*

Could be caused by the ignition or fuel problems. First determine if high voltage to spark plug occurs. To do this, disconnect one of the spark plug wires. Hold the exposed wire terminal $\frac{1}{4}$ to $\frac{1}{2}$ inch from ground (any metal in engine compartment) with an insulated screwdriver. Crank the engine over. If sparks do not jump to ground or the sparks are very weak, the trouble may be in the ignition system. See Ignition System Troubleshooting to further check. If sparks occur properly, the trouble may be in the fuel system. See Fuel System Troubleshooting.

2 *Engine misses steadily*

Remove one spark plug wire at a time and ground the wire. If engine miss increases, that cylinder was working properly. Reconnect the wire and check the others. When a wire is disconnected and engine miss remains the same, that cylinder is not firing.

Check spark as described in Step 1. If no spark occurs for one cylinder only, check distributor cap, wire, and spark plug. If spark occurs properly, check compression and intake manifold vacuum to isolate the trouble.

3 *Engine misses erratically at all speeds*

Intermittent trouble can be difficult to find. It could be in the ignition system, exhaust system, or fuel system. Follow troubleshooting procedures for these systems carefully to isolate the trouble.

4 *Engine misses at idle only*

Trouble could exist anywhere in ignition system. Follow Ignition Troubleshooting procedure carefully. Trouble could also exist in the carburetor idle circuit. Check idle mixture adjustment and check for restrictions in the idle circuit.

5 *Engine misses at high speed only.*

Problems could be in the fuel or ignition systems.

Check accelerator pump operation, fuel pump delivery, fuel lines, etc., as described under Fuel System Troubleshooting. Also check spark plugs and wires.

6 *Low performance at all speeds, poor acceleration*

Trouble usually in ignition or fuel system. Check each with the appropriate troubleshooting procedure.

7 *Excessive fuel consumption*

Could be caused by a wide variety of seemingly unrelated factors. Check for clutch slippage, brake drag, defective wheel bearings, or poor front end alignment. Check ignition system and fuel system.

8 *Oil pressure lamp does not light when ignition switch is on*

Check the alternator warning lamp. If it isn't on either, go to Step 1, Charging System Troubleshooting. If only the oil pressure lamp is off, open the engine compartment lid and locate the oil pressure sender on the block near the oil filter. Make sure the wire is connected to the sender and making good contact. Pull the wire off and ground it. If the lamp lights, replace the sender. If the lamp does not light, replace the lamp.

9 *Oil pressure lamp lights or flickers when engine is running*

Indicates low or complete loss of oil pressure. Stop the engine immediately, coast to a stop with the clutch disengaged. This may simply be caused by a low oil level, or an overheating engine. Check the oil level and fan belt tension. Check for a shorted oil pressure sender with an ohmmeter or a continuity tester. Remove and clean the oil dipstick and check oil level and condition. Replenish or replace the oil as required. Listen for unusual noises indicating damaged bearings, etc. Do not re-start the engine until you know why the light went on and are sure that the problem has been corrected.

IGNITION SYSTEM

This procedure assumes the battery is in good enough condition to crank the engine at a normal rate.

1 *No spark to one plug*

The only possible causes are a defective distributor cap or spark plug wire. Examine the distributor cap for moisture, dirt, or carbon tracking caused by flashover, cracks, etc.

2 *No spark to any plug*

This could indicate trouble in the primary or secondary circuits. First remove the coil wire from the center post of the distributor. Hold the wire end about 1/4 inch from ground with an insulated screwdriver. Crank the engine. If sparks are produced, the trouble is in the rotor or distributor cap. Remove the cap and check for burns, moisture, dirt, carbon tracking, cracks, etc. Check the rotor for excessive burning, pitting, or cracks. Replace both if necessary.

If the coil does not produce any spark, check the secondary wire for opens. If the wire is good, turn the engine over so the breaker points are open. Examine the points for excessive gap, burning, pitting, and looseness. Replace and adjust if necessary. With the points open, check voltage to ground at the coil with a voltmeter or test lamp. If voltage is present, the coil is probably bad. Have it checked or substitute a known good one.

If voltage is not present, check wire connections to coil and distributor. Temporarily disconnect the wire from the distributor to the coil and measure from the coil to ground. If voltage is present, the distributor is shorted. Examine the breaker points and connecting wires carefully. If voltage is still not present, check the other coil terminal for ground. Voltage at this terminal but not at the other indicates a defective coil. No voltage at this terminal indicates an open wire between the terminal and the battery.

3 *Weak spark*

If the spark is so small it cannot jump from the wire to ground, check battery condition. Other causes are bad breaker points, condenser, incorrect breaker point gap, dirty or loose connections in the primary circuit, or dirty or burned rotor or distributor. Also check for worn distributor cam lobes.

4 *Missing*

This is usually caused by fouled or damaged plugs, plugs of the wrong heat range, or incorrect

plug gap. Clean and regap the spark plugs. This trouble can also be caused by weak spark (see symptom 3) or incorrect ignition timing.

5 *Spark polarity*

Less voltage is required to cause electron flow from a relatively hot electrode to a cooler electrode. Since the center electrode is hottest, this electrode should be negative. Electron flow is then from the center electrode to the outer electrode. From 20 to 40 percent more voltage is required to cause electron flow from the outside electrode to the hotter center electrode. This occurs when the spark voltage is positive. The coil wires must be connected correctly.

FUEL SYSTEM

Fuel system troubles must be isolated at the carburetor, fuel pump, or fuel lines. These procedures assume that the ignition system has been checked and properly adjusted.

1 *Engine will not start.*

First, determine that fuel is reaching the carburetor. Remove the air cleaner, look into the carburetor throat, and depress the accelerator several times. There should be a stream of fuel from the discharge tube each time the accelerator is depressed. If not, the fuel pump is not delivering fuel to the carburetor or the float system in the carburetor is not working. Make certain there is fuel in the fuel tank. Check the automatic choke (if so equipped) to make certain it is not stuck. If necessary, rebuild the fuel pump or overhaul the carburetor, whichever is determined to be faulty.

2 *Engine runs at fast idle*

Usually this is caused by misadjustment of the carburetor idle setting. Readjust as required.

3 *Rough idle or engine miss with frequent stalling*

Check idle mixture and idle speed adjustments. Inspect the overall condition of the carburetor for foreign material and clean or overhaul as required.

4 *Engine "diesels" (continues to run after engine is turned off)*

Check idle mixture and idle speed adjustments.

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5 Stumbling when accelerating from idle

Check accelerator pump diaphragm and idle speed adjustment

6 Engine misses at high speed or lacks power

This indicates possible fuel starvation. Check fuel pump pressure and capacity. Clean main jet and float needle valve.

7 Black exhaust smoke

Black exhaust smoke means a badly overrich mixture. Check idle mixture and idle speed adjustment. Check for excessive fuel pump pressure or blocked return line from carburetor to fuel tank. Check for leaky float or worn needle valve.

8 Excessive fuel consumption

This may be another indication of an overrich fuel mixture. Check that automatic choke operates (if so equipped) or that the manual choke control is not being left out. Check idle mixture and idle speed. Check for excessive fuel pump pressure, leaky float, or worn needle valve. Make certain that jets are the proper size.

Fuel Pump Pressure Testing

- 1 Install a "T" fitting in the fuel line close to the carburetor.
- 2 Connect a fuel pressure gauge to the fitting with a short tube.
- 3 Check fuel pump pressure as described in the Fuel System chapter.

EXHAUST EMISSION CONTROL

The following symptoms assume you have adjusted the ignition and carburetor to specification and that you have checked the results on an accurate exhaust gas analyzer.

1 CO content too low

Make sure idle speed is not too low. Check idle mixture adjustment (too lean). Check carburetor jets and channels. Clean and/or replace as necessary. Check engine condition with a compression and vacuum test.

2. CO content too high

Check idle mixture adjustment (too rich). Check for dirty air cleaner and defective automatic choke (if so equipped). Check carburetor jets

and channels. Clean and/or replace as necessary. Check engine condition with compression and vacuum test.

3 Hydrocarbon level too high

Check that idle speed and mixture adjustments are to specification. Check spark plug condition and gap. Check breaker points. Check ignition timing (too early). Check intake manifold for leaks. Check valve clearance (too small). Check condition of valves with compression test.

MANUAL CLUTCH**1 Slippage**

This is most noticeable when accelerating in a high gear at relatively slow speed. To check slippage, park the car on a level surface with the handbrake set. Shift to 2nd gear and release the clutch as if driving off. If the clutch is good, the engine will slow and stall. If the clutch slips, continued engine speed will give it away.

CAUTION

This is a severe test. Perform only when slippage is suspected, not periodically.

Slippage results from insufficient clutch pedal free play, oil or grease on the clutch disc, worn pressure plate, or weak springs. Also check for binding in the clutch cable and lever arm which may prevent full engagement.

2 Drag or failure to release

This problem usually causes difficult shifting and gear clash, especially when downshifting. The causes may be excessive clutch pedal free play, warped or bent pressure plate or clutch disc, excessive clutch cable guide sag, and broken or loose clutch linings. Check condition of main shaft splines.

3 Chatter or grabbing

A number of things can cause this. Check cable guide sag and tightness of transmission-to-frame and engine-to-transmission mounting bolts. Check for worn or misaligned pressure plate and misaligned release plate.

4 Other noises

Noise usually indicates a dry or defective release bearing. Check the bearing and replace if neces-