

TUNE-UP

ALL MODELS

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DESCRIPTION AND OPERATION

PURPOSE OF TUNE-UP

The purpose of an engine tune-up is to restore power and performance that may have been lost through, loss of adjustment, wear, corrosion, or deterioration of one or more parts or units. In the normal operation of an engine, these changes take place gradually at quite a number of points so that it is seldom advisable to attempt an improvement in performance by correcting one or two items only. Time will be **saved** and more lasting results will be assured by following a definite and thorough procedure of analysis and correction of all items affecting power and performance. Because of Federal laws, limiting exhaust emissions, it is even more important that the engines tune-up is done accurately, using the specifications listed and the tune-up sticker found in each engine compartment.

Economical, trouble free operation can better be assured if a complete tune-up is performed at first 4 months or 6,000 miles of operation - then at 12 month or 12,000 mile intervals.

The parts or units which affect power and performance may be divided, into three groups (1) compression, (2) ignition and (3) carburetion. The tune-up procedure should cover these groups in the order given. While the items affecting compression and ignition may be handled according to individual preference, correction of items in the carburetion

group should not be attempted until all items in compression and ignition have been satisfactorily corrected.

MAINTENANCE AND ADJUSTMENTS

ENGINE TUNE-UP OPERATIONS

Compression

To make sure hydrocarbon and carbon monoxide emissions will be within limits, it is very important that the adjustments be followed exactly.

The suggested procedure for engine tune-up *is as follows:*

1. Remove all spark plugs.
2. Position throttle and choke valve in full open position.
3. Connect jumper wire between distributor terminal of coil and ground on engine to avoid high tension sparking while cranking engine.
4. Hook up starter remote control cable and turn ignition switch to "on" position.
5. Firmly insert compression gage in spark plug port. Crank engine to obtain highest possible reading.

6. Check compression of each cylinder. *Repeat* compression check and record highest reading obtained on each cylinder during the two pressure checks.

The recorded compression pressures are to be considered normal if the lowest reading cylinder is more than 75 percent of the highest reading cylinder. See the following example and the "Compression Pressure Limit Chart." See Figure 6G-2.

Seventy-five percent of 140 (highest) is 105. Thus, cylinder No. 4 is less than 75 percent of No. 3. This condition, accompanied by low speed missing, indicates an improperly seated valve or worn or broken piston ring. See Figure 6G-1.

CYLINDER NO.	PRESSURE (PSI)
	129
2	135
3	140
4	100

6G-1

Figure 6G-1 Example of Compression Check

7. If one or more cylinders read low, inject about a tablespoon of engine oil on top of pistons in low reading cylinders through spark plug port. Repeat compression check on these cylinders.

a. If compression improves considerably, rings are worn.

b. If compression does not improve, valves are sticking or seating poorly.

c. If two adjacent cylinders indicate low compression and injecting oil does not increase compression, the cause may be the head gasket leaking between the cylinders. Engine coolant **and/or** oil in cylinders could result from this defect.

Compression Pressure Limit Chart

This chart may be used when checking cylinder compression pressures. It has been calculated so that the lowest reading number is 75 percent of the highest reading number. See Figure 6G-2.

EXAMPLE: After checking the compression pressures in all cylinders, it was found that the highest pressure obtained was 182 psi. The lowest pressure reading was 145 psi. By locating 182 in the maximum column, it is seen that the minimum allowable pressure

MAXIMUM PRESSURE POUNDS/SQ. INCH	MINIMUM PRESSURE POUNDS/SQ. INCH	MAXIMUM PRESSURE POUNDS/SQ. INCH	MINIMUM PRESSURE POUNDS/SQ. INCH
134	101	188	141
136	102	190	142
138	104	192	144
140	105	194	145
142	107	196	147
146	110	198	148
148	111	200	150
150	113	202	151
152	114	204	153
154	115	206	154
156	117	208	156
158	118	210	157
160	120	212	158
162	121	214	160
164	123	216	162
166	124	218	163
168	126	220	165
170	127	222	166
172	129	224	168
174	131	226	169
176	132	228	171
178	133	230	172
180	135	232	174
182	136	234	175
184	138	236	177
186	140	238	178

6G-2

Figure 6G-2 Compression Pressure Limit Chart

is 136 psi. Since the lowest reading obtained was 145 psi, the car is within limits and the compression is considered satisfactory.

Spark Plugs

1. Inspect, clean and regap or replace spark plugs as required. Correct gap is .030.
2. Install spark plugs. Tighten to 30 lb.ft.

Secondary Ignition System

1. Inspect ignition cables for broken, swollen or deteriorated insulation.
2. Check terminal ends and condition of rubber boots. Replace as required.
3. Inspect the condition of the distributor cap and rotor.
4. Clean the ignition coil and inspect for cracks or carbon paths which could cause high voltage leakage.

Distributor Contact Points

1. Inspect distributor contact points and replace or adjust as necessary (.016 gap).

2. If inspection of contact points indicates excessive burning, pitting or wear, check condenser and replace if necessary.

3. Inspect all connections and wires in the primary ignition circuit. Correct any abnormal conditions found.

Carburetor

1. Clean fuel strainer in fuel pump. To prevent fuel leakage in pump, disconnect "IN" line from pump and raise end above fuel level. The in-line fuel filter should be replaced every 12,000 miles or every 12 months.

2. Check for freedom of choke valve operation and clean shaft if necessary, with suitable solvent.

3. Inspect throttle cable or linkage bracket and return spring for wear. With helper depressing accelerator pedal to floor, check for wide open throttle. Adjust accelerator pedal height so wide open throttle is obtained when pedal is within 1/2 inch from floor. Lubricate linkage pivot points with engine oil.

Air Cleaner

Check paper element every 6,000 miles and replace every 24,000 miles. If a vehicle is operated in dusty territory, check condition of air cleaner element more frequently and replace if necessary.

Fan Belt

1. Inspect belt for wear, cracks or frayed points. Replace and/or adjust as necessary. Specified tension for belt using Gauge J-23600 is 45 lbs.

Cooling System

1. Inspect the radiator, water pump, cylinder head areas and all radiator and heater hose connections for evidence of engine coolant leaks.

2. Inspect all hoses for deterioration from gas and oil contact. Correct as required.

Inspection should be made with engine operating at normal temperature, cooling system completely filled, temperature control lever fully open and normal pressure in the system. Normal pressure should be 13.2 to 15.2 psi.

Engine Lubrication System

Inspect engine for evidence of oil leakage. Correct

any abnormal condition with sealastic or new seals and gaskets.

Battery

1. Inspect battery, battery mount and cables and check electrolyte level. Proper level should be just above the cell plates.

CAUTION: *Do not over fill.*

2. Determine the serviceability of the battery by applying the 421 Battery Test.

Positive Crankcase Ventilation

Clean crankcase ventilator metered orifice in the intake manifold fitting every 6,000 miles. Also all hoses and fittings should be inspected, cleaned and replaced, if necessary.

To clean, remove rubber hose from metered orifice and apply air pressure to orifice to remove any foreign particles that may be trapped.

Valve Lifter Adjustment

Refer to Engine Mechanical and Mounts section for valve lifter adjustment procedure.

Engine Tune-Up Instrument Checks

The following instrument checks and adjustments serve as a **final** check on engine condition. These checks may discover some new problems that may not have been obvious before. The engine is also given its final adjustments that will assure maximum performance, reliability, and proper emission control.

Refer to Electrical Group for checking procedures of the following:

Cranking Voltage Check

Ignition Timing

Distributor Advance

Ignition Output

Secondary Resistance

Current Output and Voltage Setting

Idle Speed and Mixture Adjustments

Refer to carburetor section.

SPECIFICATIONS

TUNE-UP SPECIFICATIONS AND ADJUSTMENTS

Voltage Regulator

Voltage Regulator Setting in Volts at 2500 Engine RPM 14±.5

Ignition Coil

Ignition Coil Current Draw, Amperes at 12.5 Volts
 Engine Stopped 3.8
 Engine Idling 2.3

Distributor

Total Advance (Centrifugal and Vacuum), Engine Degrees at 3600 Engine RPM 29-38
 Centrifugal Advance, Engine Degrees and RPM
 Start Advance, at RPM 1000-1200
 Medium Advance, Degrees at RPM 7.5-15 at 1400
 Maximum Advance, Degrees at RPM 28-32 at 3600
 Vacuum Advance, Engine Degrees and In. of Vacuum
 Start Advance.. - 5 at 2.9-4.1 In.
 Maximum Advance.. 1-5 at 4.5-5.0 In.
 Vacuum Retard, Engine Degrees at Closed Throttle - 5
 Condenser Capacity in **MicroFarads**23-.32
 Breaker Spring Tension in Ounces 14 to 19
 Breaker Point Gap in Inches016
 Dwell Angle in Engine Degrees 50 ± 3
 Firing Order 1-3-4-2
 Spark Plug or Coil Cable, Max. Resistance in Ohms 10,000

Spark Plugs

Make and Model Production **AC42FS**
 Make and Model • Replacement **AC42FS**
 If carbon fouling occurs, use **AC43FS**
 Spark Plug Torque in **Lb.Ft.**30
 Spark Plug Gap in Inches030

Valve Lifter Adjustment

One full turn (clockwise) after zero clearance is obtained • refer to Valve Adjustment Procedure

Ignition Timing

Align timing marks with distributor retard hose disconnected and plugged