

TUNE-UP

ENGINE IDENTIFICATION

VEHICLE IDENTIFICATION NUMBER CODE

Fifth digit of Vehicle Identification Number, located on plate attached to top left side of instrument panel, is the engine code letter.

VIN Code

Application	Code
265" 2-Bbl.	S
301" 4-Bbl.	W
301" Turbo.	T
305" 4-Bbl.	H
350" 4-Bbl.	R
350" 4-Bbl.	X
350" Diesel	N

ENGINE IDENTIFICATION NUMBER CODE

Engine code is part of Engine Identification Number located on a machined pad on front of cylinder block below right cylinder head.

TUNE-UP NOTES

NOTE — In order to comply with emission standards, specifications shown on engine compartment emission control tune-up decal must be used in all instances.

CAUTION — Before making a compression test or cranking engine with a remote starting switch, disconnect ignition switch connector (pink wire) from H.E.I. system distributor.

CAUTION — Do not remove spark plug wires with engine running. High Energy Ignition secondary voltage is higher than standard ignition systems and may inflict harmful electrical shock.

CAUTION — Damage to H.E.I. electronic module and/or ignition coil may result if "TACH" terminal, in distributor cap connector, is directly grounded.

CAUTION — Adjustments of injectors or internal adjustment of injector pump must be done in a properly equipped injector shop with a clean environment.

ENGINE COMPRESSION

GASOLINE MODELS

Compression Ratio	
265" 2-Bbl.	8.3:1
301" 4-Bbl.	8.2:1
301" Turbo	7.5:1
305" 4-Bbl.	8.3:1
350" VIN R	8.3:1
350" VIN X	8.0:1

Recommended Fuel..... Unleaded (87 AKI Minimum)
 Compression Pressure (All)..... 120-160 psi
 Max. Variation Between Cylinders..... 30%

Test compression with engine warm, all spark plugs removed and throttle and choke valves wide open. Crank engine through at least four compression strokes.

NOTE— If using a remote starting switch, disconnect the ignition switch connector (pink wire) at H.E.I. distributor.

DIESEL MODELS

NOTE — Prior to checking compression, be sure batteries are fully charged to avoid run-down. When turning engine over during test, 6 "puffs" per cylinder should be used to obtain reading.

Compression Ratio	22.5:1
Compression Pressure	275 psi (min.)
Max. Pressure Variation	①
Recommended Fuel	Diesel 2-D②

- ① — Lowest cylinder must read within 70° of highest.
- ② — Use 1-D for vehicle operation below 20° F.

1) Remove air cleaner. Install air crossover screened cover (J-26996-1).

2) Disconnect electrical wire from fuel solenoid terminal of injection pump.

3) Disconnect glow plug wires. Remove all glow plugs.

4) Use suitable compression tester (J-26999 or equivalent) to test individual cylinders.

NOTE — Compression should build evenly and rapidly to proper level while rotating engine past 6 compression strokes. If piston rings are worn or cracked, compression will read low on first stroke, will rise each stroke thereafter, but will not reach normal level.

VALVE TAPPET CLEARANCE

Hydraulic Lifters Zero Lash

VALVE ARRANGEMENT

Diesel & 350" VIN R
 I-E-I-E-E-I-E-I (Front to rear, both banks)
 All Others
 E-I-I-E-E-I-I-E (Front to rear, both banks)

SPARK PLUGS

Application	Gap	Torque
265" 2-Bbl.060"	15 ft. lbs.
301" 4-Bbl.060"	15 ft. lbs.
301" Turbo060"	20 ft. lbs.
305" 4-Bbl.045"	22 ft. lbs.
350" VIN R080"	25 ft. lbs.
350" VIN X060"	25 ft. lbs.

1980 Pontiac V8 Tune-Up

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Spark Plug Type

Application	AC No.
265" 2-Bbl.	R45TSX
301" 4-Bbl.	R45TSX
301" Turbo.	R45TSX
305" 4-Bbl.	R45TS
350" VIN R	R46SX
350" VIN X	R45TSX

GLOW PLUGS

Glow plugs are small heaters. One is screwed into each cylinder to preheat the cylinder and aid in cold starting. Glow plugs are activated when the ignition switch is turned to "RUN" position. Two types of glow plugs are used and cannot not be interchanged. The 12 volt type utilizes a 1/4" spade connector, and the 6 volt type utilizes a 5/16" spade connector.

HIGH TENSION WIRE RESISTANCE

Carefully remove ends of wire from spark plug and distributor. Using an ohmmeter, check resistance while gently twisting wire. If resistance is not to specification, or fluctuates from infinity to any value, replace cable.

Resistance (Ohms) Per Wire

Wire Length	Resistance
Under 24".....	30,000 Max.
Over 24"	50,000 Max.

DISTRIBUTOR

All models are equipped with High Energy Ignition systems and no adjustments are required.

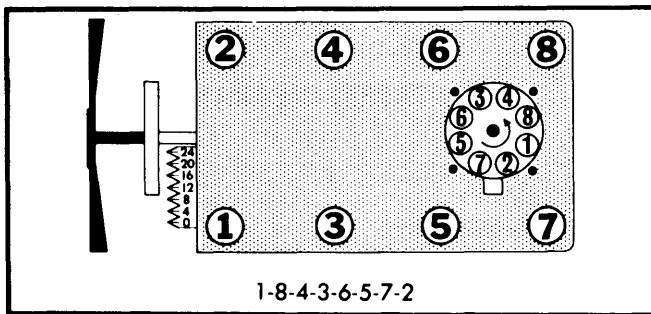


Fig. 1 265", 301" & 350" VIN R Firing Order and Timing Marks

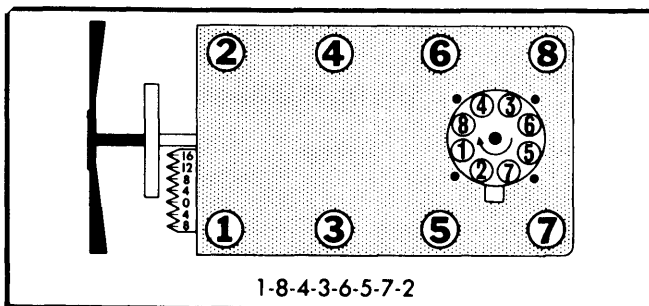


Fig. 2 305" Firing Order and Timing Marks

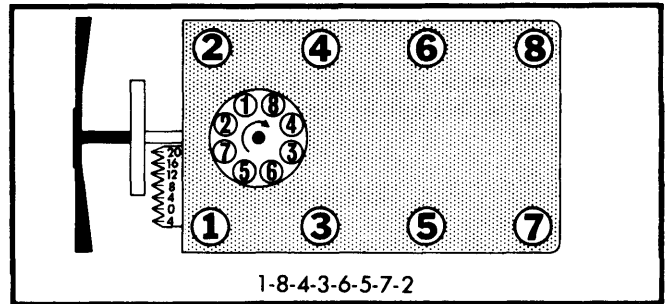


Fig. 3 350" VIN X Firing Order and Timing Marks

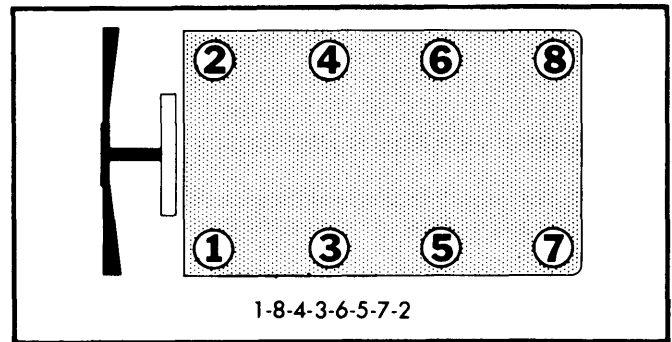


Fig. 4 350" Diesel Firing Order

IGNITION TIMING

NOTE — Engines are equipped with a receptacle for a magnetic probe timing light, located 9.5° ATDC. Do not use this location for timing with a conventional light.

Ignition timing procedures will vary with vehicle model and component application. Refer to Emissions Control Decal in engine compartment for correct adjustment procedures and proceed as follows:

- 1) Set parking brake and block drive wheels. Timing is checked and adjusted with engine at normal operating temperature, choke open and A/C off. Place transmission in Park or Neutral.
- 2) Disconnect and plug vacuum hose at distributor. Set specified timing at or below recommended idle speed.

Ignition Timing (Degrees BTDC@RPM)

Application	Auto. Trans.
265" 2-Bbl.	10@600
301" 4-Bbl.	12@500
301" Turbo	8@600
305" 4-Bbl.	4@550
350" VIN R	18@1100
350" VIN X	15@550

INJECTOR TIMING (DIESEL ENGINES ONLY)

- 1) With engine off, use tool (J-26987 or equivalent) to loosen 3 pump retaining nuts.

TUNE-UP (Cont.)

2) Align mark on injection pump with mark on adapter and tighten nuts to 35 ft. lbs.

NOTE — In order to rotate pump with marks, use a 3/4" wrench on the boss at front of injector pump.

3) Adjust throttle rod with engine off. On cruise control equipped models, remove cruise control rod clip and remove rod from bellcrank.

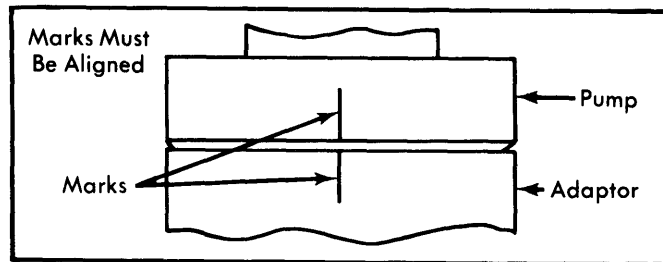


Fig. 5 Timing Marks on Injector Pump and Adapter

HOT (SLOW) IDLE RPM

GASOLINE MODELS

Idle speed adjustment procedures will vary with vehicle model and component application. Refer to Emission Control Tune-Up decal in engine compartment for adjustment preparations, then proceed as follows:

Vehicle W/Air Cond. — Disconnect purge hose at canister. Set idle RPM screw on carburetor to obtain specified RPM. Turn A/C control switch on. Open throttle control to insure solenoid plunger is fully extended. Set solenoid RPM by adjusting solenoid plunger.

Vehicles w/o Air Cond. — Disconnect purge hose at carburetor. Set curb idle by adjusting solenoid plunger. Set basic idle RPM by adjusting idle speed screw on carburetor with solenoid wire disconnected.

Idle Speed (RPM)

Application	Curb Idle	Solenoid Energized
265" 2-Bbl.	525	650
301" 4-Bbl.	500	650
301" Turbo.	600	650
305" 4-Bbl.	550	650
350" VIN R	550	650
350" VIN X	550	670

DIESEL MODELS

NOTE — Use magnetic pickup tachometer (J-26925 or equivalent) to check idle speed. Insert probe in timing indicator hole.

1) Block driving wheels and engage parking brake. Start engine.

2) Adjust slow idle screw on injection pump to obtain specification shown on emissions decal. See Fig. 6.

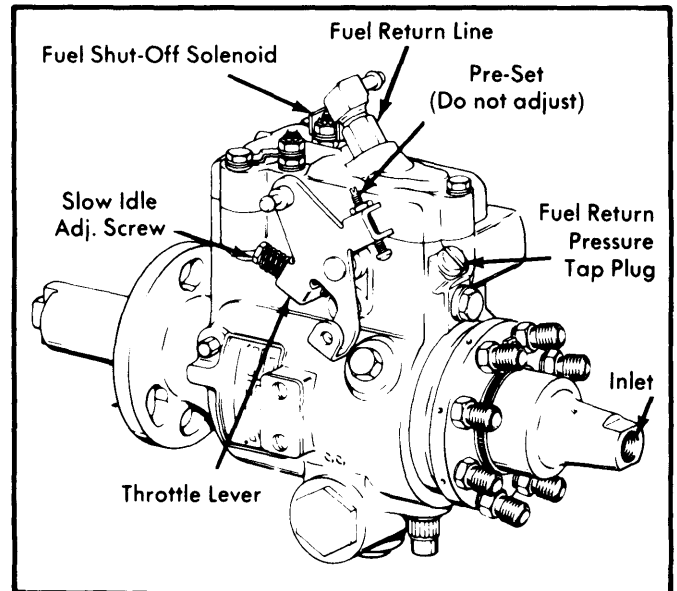


Fig. 6 Diesel Injection Pump Locations

IDLE MIXTURE

NOTE — Idle mixture is not part of normal tune-up. Idle mixture should be adjusted only in case of major carburetor overhaul or high idle CO.

MIXTURE SCREW PLUG REMOVAL

If plugs must be removed, perform following procedure.

- 1) Remove carburetor from engine, invert carburetor and drain fuel into suitable container. Place inverted carburetor on suitable holding fixture manifold side up.
- 2) Place a punch between the 2 locator marks on throttle body beneath mixture screw plug (manifold side) and break out throttle body to gain access to plug.
- 3) Use punch to drive out plug. If hardened plug shatters, remove loose pieces.
- 4) Repeat steps 2) and 3) to remove remaining plugs.

PROPANE ENRICHMENT PROCEDURE (FEDERAL ONLY)

1) With engine at normal operating temperature, choke fully open and air conditioning "OFF", set parking brake and block drive wheels. Disconnect and plug hoses as directed on Emission Control/Tune-Up Decal under hood.

2) Connect tachometer to engine. Disconnect vacuum advance and set timing to specifications on Emission Decal. Reconnect vacuum advance. Disconnect crankcase ventilation tube from air cleaner. Insert hose with rubber stopper tool J-26911 from propane valve into positive crankcase ventilation tube opening in air cleaner.

3) Propane cartridge must be in vertical position. Slowly open propane control valve until maximum engine speed is reached.

TUNE-UP (Cont.)

NOTE — Too much propane will cause engine speed to drop.

4) Observe propane flow meter to ensure propane cartridge is full. With propane flowing, adjust idle speed screw to the "Enriched RPM" (see specifications). Readjust propane flow to be certain of maximum engine speed and adjust idle speed if necessary.

5) Turn off propane. Place transmission in neutral and run engine at 2000 RPM for 30 seconds. Place automatic transmission in "D". Check idle speed. If idle speed is set to specification shown on Emission Control decal, idle mixture is correct, proceed to step 9).

6) If idle speed is too low, use a $\frac{3}{16}$ " deep socket to back screws out $\frac{1}{8}$ turn at a time until correct speed is reached. If speed is too high, turn screws in $\frac{1}{8}$ turn at a time until correct speed is obtained.

NOTE — It may be necessary to remove air cleaner to reach idle mixture screws. Reinstall air cleaner to check idle speed.

7) Turn propane on again to check maximum engine idle speed. If speed is different from specifications, readjust idle speed screw to "Enriched RPM" with propane flowing.

8) Turn off propane, place transmission in neutral and accelerate engine to 2000 RPM for 30 seconds. Recheck idle speed. Idle speed should be to specifications. If not, repeat procedure starting with step 6).

9) If idle is unusually rough, turn mixture screws in until lightly seated. Back screws out equally to previous position and rerun propane idle test starting with step 3). If idle is correct, turn engine off and remove propane tool. Connect PCV system and reconnect all other hoses.

Propane Enriched Idle Mixture RPM

Application	Enriched RPM
265" 2-Bbl.	580-590
301" 4-Bbl.	540-550
301" Turbo	640-650
350" VIN X	590

NOTE — The C-4 system is sensitive to any changes in mixture control. Because of this, "Propane Enrichment" cannot be used to set mixture. The following procedure should only be used in the event of emissions failure or major carburetor work.

MIXTURE CONTROL ADJUSTMENT — C-4
(CALIFORNIA ONLY)

1) Before adjusting air bleed valve, mixture control solenoid adjustment must be checked and corrected as necessary. See Rochester M2ME, M4ME & M4MC Carburetor article in FUEL SYSTEMS Section.

2) To adjust idle air bleed valve, set parking brake and block rear wheels. Disconnect and plug hoses as directed on Emission Control Decal in engine compartment. Check ignition timing and adjust if necessary.

3) Connect dwell meter to lead wire from mixture control solenoid in carburetor, then set dwell meter to 6 cylinder scale. Start engine and run at idle until normal operating tem-

perature is reached and a varying dwell is noted on dwell scale.

NOTE — It is absolutely essential that engine is operated for sufficient length of time to ensure that engine coolant sensor, and oxygen sensor in exhaust, are at full operational temperature.

4) Adjust curb idle speed, if necessary. With engine idling, observe dwell reading. If within, or varying between 10-50° range, no further adjustment is necessary. If dwell does not vary, or falls outside the 10-50° range, perform the following:

5) With engine off, cover primary and secondary inlets with a shop towel. Align a number 35 drill on the rivet head holding the air bleed valve cover. Drill only enough to remove rivet head, use a small punch and drive remainder of rivet from air bleed tower. Remove air bleed cover and discard.

6) Restart engine and allow to idle, using a screwdriver that fully fits in valve. Slowly turn valve up or down until dwell reading varies and falls within the 25-35° range, attempting to be at or as close to 30° as possible.

CAUTION — Perform this carefully. The idle air bleed valve is very sensitive in controlling air/fuel ratios and the valve should be turned only in $\frac{1}{8}$ turn increments.

7) If after performing this adjustment, the dwell reading does not vary and is not within the 25-35° range, it will be necessary to remove carburetor to gain access to plugs covering the idle mixture needles and adjust the idle mixture as follows:

8) With idle mixture needle plugs removed, use a $\frac{3}{16}$ " thin wall deep socket and turn each idle mixture screw inward until lightly seated. Then, back out each mixture screw 2 turns.

9) Reinstall carburetor (without air cleaner and gasket). Start engine, run until fully warm, and repeat Idle Air Bleed Adjustment until dwell reading is varying and within specified limits.

10) If unable to achieve varying dwell and specified range, turn mixture needle out an additional $\frac{1}{2}$ turn. Then, reset Idle Air Bleed Valve to obtain dwell limit specifications.

11) If necessary, reset curb idle speed and fast idle speed to specifications. Disconnect dwell meter and tachometer. Unplug and reconnect vacuum hoses, reinstall air cleaner and gasket.

COLD (FAST) IDLE RPM

See Emissions Control Decal for correct procedures for setting fast idle RPM.

Fast Idle (RPM)

Application	RPM
265" 2-Bbl.	2200
301" 4-Bbl.	2500
301" Turbo	2400
305" 4-Bbl.	1600
350" VIN R	Ⓞ700
350" VIN X	1850

Ⓞ — Transmission in Drive.

TUNE-UP (Cont.)

FAST IDLE SOLENOID (DIESEL ENGINES ONLY)

- 1) Block driving wheels and engage parking brake. Start engine.
- 2) Disconnect A/C, compressor clutch wires. If not equipped with A/C disconnect electrical connection at solenoid. Connect jumper wires to solenoid terminals. Ground 1 jumper wire and connect the other to a 12 volt source.
- 3) With solenoid energized, adjust solenoid plunger until engine speed is 750 RPM with transmission in DRIVE. Adjustments are made with A/C on.

AUTOMATIC CHOKE

NOTE — For 1980, all Rochester carburetors are equipped with chokes that are nonadjustable. On these carburetors, the choke cover has a tab that fits into a slot cut into the choke housing and cannot be turned. The choke cover retaining ring is riveted in the choke housing.

FUEL PUMP

Make all tests at Idle RPM. For pressure test, pinch off fuel return line (if equipped). Connect pressure gauge to fuel line at carburetor using a 8-10" piece of hose and hold pressure gauge at carburetor level.

IGNITION

DISTRIBUTOR

Delco-Remy — High Energy Ignition.

NOTE — Module must be replaced as a unit. A liberal coat of silicone grease **MUST** be applied to the surface on which module will be mounted.

IGNITION COIL

Resistance

Primary (at 75°F) 0-1.0 ohms
Secondary (at 75°F) 6,000-30,000 ohms

Coil Output

At all engine speeds 25-35 KV Minimum[Ⓢ]

[Ⓢ] — Replace if below 25 KV.

CARBURETION

CARBURETORS

Application	Model
265" 2-Bbl.	Rochester M2ME
301" 4-Bbl.	Rochester M4ME
301" Turbo	Rochester M4ME
305" 4-Bbl.	Rochester E4ME
350" VIN R	Rochester E4MC
350" VIN X	Rochester M4MC

Fuel Pump Specifications

Pressure (At Idle)	
265" 2-Bbl. & 301" 4-Bbl.	7.0-8.5 psi
305" 4-Bbl.	7.5-9.0 psi
350" 4-Bbl.	5.5-6.5 psi
Volume (At Idle)	
All Models	One pint in 30 seconds

INJECTION PUMP FUEL PRESSURE (DIESEL ENGINES ONLY)

- 1) Remove air crossover. Install screened covers (J-26996-2). Remove fuel return pressure tap plug. See Fig. 6.
- 2) Screw pressure tap adapter (J-28526 or equivalent) into pump housing. Be sure to use seal from tap plug on tap adapter before installing. Connect a low pressure gauge to adapter.
- 3) Connect magnetic pickup tachometer (J-26925 or equivalent). Place shift lever in PARK position. Start engine.
- 4) Raise engine speed to 1000 RPM. Pressure should be as follows:
Pressure 5.5-6.5 psi.
Maximum Fluctuation 2.0 psi
- 5) If pressure does not read within specifications, replace fuel line connector assembly.

EXHAUST EMISSION SYSTEMS

See EXHAUST EMISSION SYSTEMS section.

GENERAL SERVICING

Other Data & Specifications — See Tune-Up and Rochester Carburetors in FUEL SYSTEMS Section.

FUEL INJECTION (DIESEL ENGINES ONLY)

Application	Type
350" Diesel	Gear Driven Mechanical Fuel Injection Pump (High Pressure Rotary)

Other Data & Specifications — See Tune-Up and General Motors Diesell Fuel Injection in FUEL SYSTEMS Section.

ELECTRICAL

BATTERY

12 Volt — Negative Ground.

Application	Cold Crank (Amps@0°F)	Reserve Capacity (Minutes)
Standard	350	80
Optional	465	125
Diesel	540	135

GENERAL SERVICING (Cont.)

STARTER

Delco-Remy solenoid actuated with overrunning clutch.

Free Speed Voltage

350" VIN R	9@7500-10,500 RPM
350" Diesel	9@8000-13,000 RPM
All Others	9@7000-11,900 RPM

Free Speed Amperage

350" VIN R	65-95@7500-10,500 RPM
350" Diesel	40-140@8000-13,000 RPM
All Others	45-70@7000-11,900 RPM

ALTERNATOR

Application	Rated Amp. Output
Standard	
265" & 301"	42
All Others	63
Optional	63 & 70

ALTERNATOR REGULATOR

Delco-Remy nonadjustable, integral with alternator.

Operating Voltage (at 80°F)..... 13.8-14.4

ENGINE

INTAKE MANIFOLD TIGHTENING

265" & 301" - Tighten intake manifold attaching bolts evenly to 40 ft. lbs.

305" - Tighten intake manifold attaching bolts, in sequence shown in Fig. 7, to 40 ft. lbs.

350" VIN X - Tighten intake manifold attaching bolts, in sequence shown in Fig. 8, to 45 ft. lbs.

350" VIN R & Diesel - Tighten intake manifold attaching bolts, in sequence shown in Fig. 9, to 40 ft. lbs.

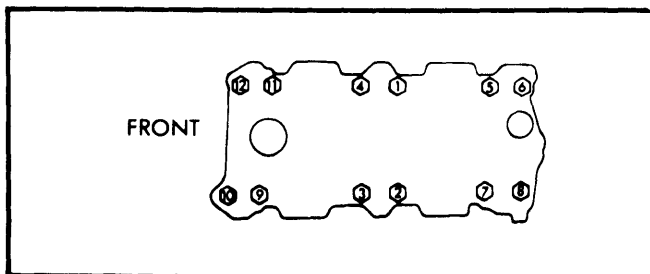


Fig. 7 305" Intake Manifold Tightening Sequence

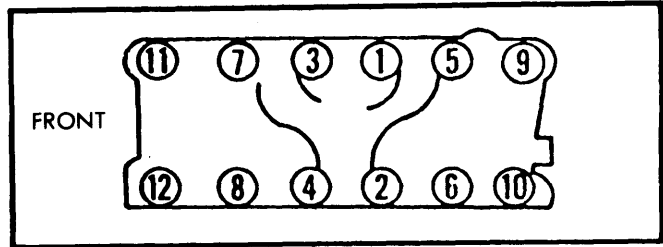


Fig. 8 350" VIN X Intake Manifold Tightening Sequence

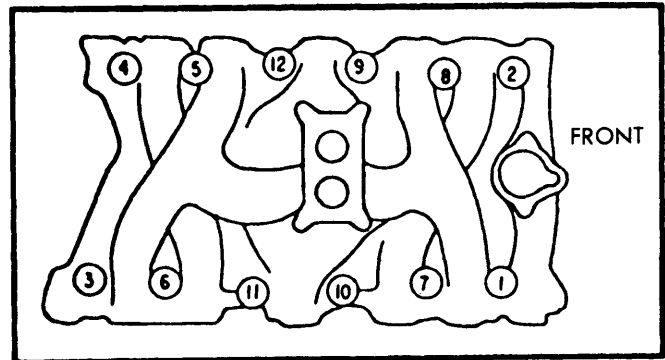


Fig. 9 350" VIN R & Diesel Intake Manifold Tightening Sequence.

BELT ADJUSTMENTS

Tension (Lbs.) Using Strand Tension Gauge

Application	New Belt	Used Belt
5/16" Wide	80 Max.	50 Min.
3/8" Wide	140 Max.	70 Min.
15/32" Wide	165 Max.	90 Min.
Cogged Belt	60 Min.

FILTERS & CLEANERS (DIESEL MODELS)

Service Item	Service Interval
Engine Oil	① Change every 3,000 mi.
Oil Filter	Replace every 3,000 mi.
Fuel Filter	Replace every 24,000 mi.
Air Filter	Replace every 30,000 mi.
PCV System	②

- ① - Use ONLY engine oils labeled with the A.P.I. designations SE and CC. Be sure the can has both the SE and CC designations. DO NOT use an oil if the designation CD appears anywhere on the can.
- ② - Clean breather cap/valve assembly and ventilation filter assembly (both valve covers) every 6000 miles. Replace breather cap/valve assembly and flow control valve every 30,000 miles.

GENERAL SERVICING (Cont.)

CAPACITIES (COOLING)	
Application	Capacity (Qts.)
Bonneville & Catalina	
265" & 301"	20.0
350" VIN X	14.0
350" VIN R	15.5
350" Diesel	17.9
Bonneville Wagon	
301"	20.0
350" VIN X	14.0
350" VIN R	15.5
350" Diesel	17.0
LeMans	
265" & 301"	19.2
305"	17.2
LeMans Wagon	
265" & 301"	19.2
305"	17.2
Grand Prix	
265" & 301"	19.2
305"	17.2
Firebird	
265" & 301"	20.4
305"	16.4

CAPACITIES (EXCEPT COOLING)	
Application	Quantity
Crankcase	
265"	①4.0 qts.
350" Diesel	②7.0 qts.
All Other Engines	③4.0 qts.
Manual Transmission (SAE 80W-90)	
All Models	3.5 pts.
Automatic Transmission (Dexron II)④	
THM 200	3.0 pts.
THM 250C	3.5 pts.
THM 350	5.5 pts.
Rear Axle (SAE 80W-90)	
7.5" Ring Gear	3.5 pts.
All Others	4.2 pts.
Fuel Tank	
Bonneville & Catalina	
Station Wagon	25.0 gals.
Diesel	27.0 gals.
All Others	22.0 gals.
Firebird	20.8 gals.
Grand Prix	18.1 gals.
Grand Am & LeMans	
Station Wagon	18.2 gals.
All Others	18.1 gals.

① - With or without oil filter.
 ② - Includes oil filter.
 ③ - Add 1 qt. with oil filter change.
 ④ - Drain and refill capacity.

FILTERS & CLEANERS (GASOLINE ONLY)

Filter or Cleaner	Service Interval
Oil Filter	Replace every 2nd oil change
Fuel Filter	Replace every 15,000 mi.
PCV Valve	Replace every 30,000 mi.
PCV Filter	Replace every 30,000 mi.
Air Filter	Replace every 30,000 mi.
Canister Filter	Replace every 30,000 mi.