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 Engine Codes

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

ENGINE IDENTIFICATION NUMBER CODE

An engine identification number code is stamped on cylinder block in the following locations:

265", 301" & 305" – Stamped on right front of block.
350" & 350" Diesel – Stamped on left front of block.

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.*

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 coil may result if "TACH" terminal in distributor cap connector is directly grounded.*

CAUTION – *Adjustment 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.	8.2:1
301" 4-Bbl.	8.2:1
305" 4-Bbl.	8.6:1
350" VIN R	8.3:1
350" VIN X	8.0:1
Recommended Fuel	Unleaded (87 AKI Minimum)
Minimum Compression Pressure	100 psi
Max. Variation Between Cylinders	30%

Test compression with engine warm, all plugs removed and throttle and choke valves open.

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.
① – 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 1st stroke, will rise each stroke thereafter, but will not reach normal level.*

VALVE TAPPET CLEARANCE

Hydraulic Lifters	Zero Lash

VALVE ARRANGEMENT

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

SPARK PLUGS

Gap	
265", 301" & 350" (VIN X)	.060"
305"	.035"
350" (VIN R)	.080"
Torque	
265", 301" & 350"	15 ft. lbs.
All Others	24 ft. lbs.

Spark Plug Type

Application	AC No.
265" 2-Bbl.	R45TSX
301" 4-Bbl.	R46TSX
305" 4-Bbl.	R45TS
350" 4-Bbl. (VIN R)	R46SX
350" 4-Bbl. (VIN X)	R45TSZ

TUNE-UP (Cont.)

GLOW PLUGS

Glow plugs are small heaters screwed into each cylinder to preheat 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 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 wire.

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.

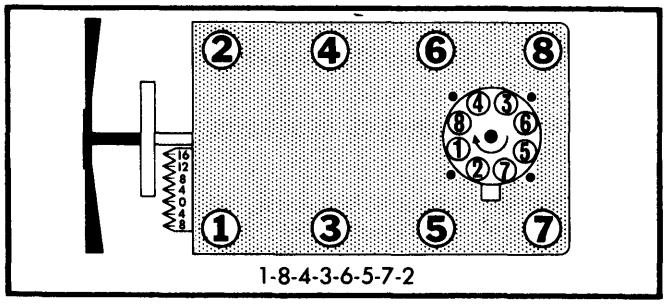

Fig. 1 305" Firing Order and Timing Marks

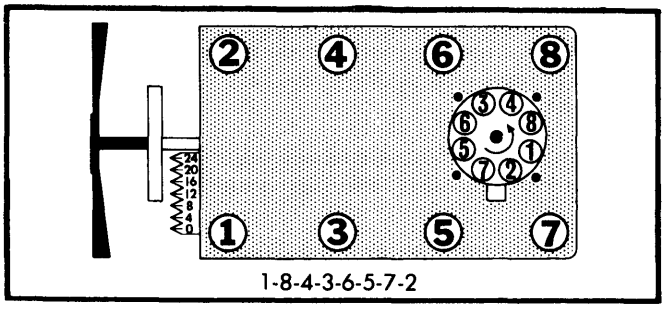

Fig. 2 265", 301" & 350" (VIN R) Firing Order and Timing Marks

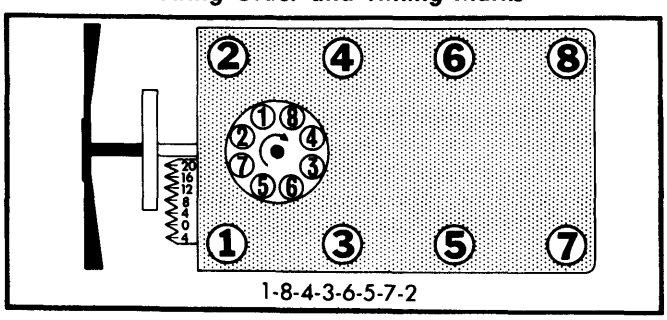

Fig. 3 350" (VIN X) Firing Order and Timing Marks

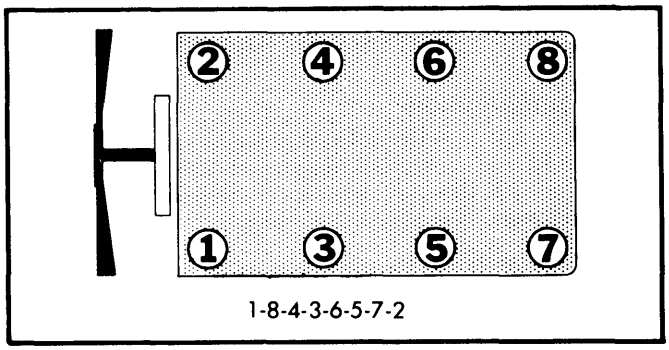

Fig. 4 350" Diesel Firing Order

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 conventional light.*

Check or adjust ignition timing with engine at normal operating temperature, choke fully open, air conditioning "OFF", distributor vacuum advance hose disconnected and plugged (unless otherwise specified on emission Control Tune-Up decal) and engine running at specified RPM.

Ignition Timing Specifications (Degrees BTDC@RPM)

Application	Auto. Trans.
265" 2-Bbl.	10@700
301" 4-Bbl.	12@500
305" 4-Bbl.	4@550
350" VIN R	①18@1100
350" VIN X	15@550

① – Calif. 16@1100.

INJECTOR TIMING (DIESEL ENGINES ONLY)

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

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

NOTE – *In order to rotate pump to align 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.

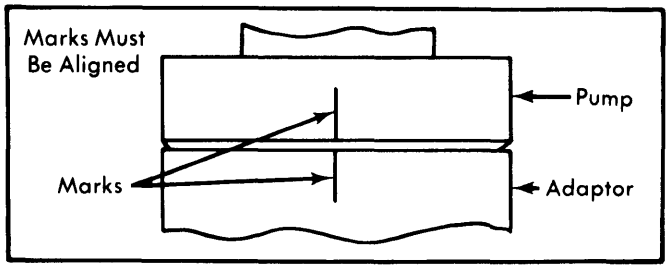

Fig. 5 Timing Marks on Injection Pump and Adapter

TUNE-UP (Cont.)

HOT (SLOW) IDLE RPM

GASOLINE MODELS

NOTE – *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:*

Vehicles W/O Air Conditioning – Set curb idle speed adjusting screw on low step of fast idle cam. Turn idle speed screw to obtain specified "Curb Idle" RPM.

Vehicles W/Air Conditioning – **1)** Turn A/C off (solenoid de-energized) and place idle speed screw on low step of fast idle cam. Turn idle speed screw to obtain specified "Curb Idle" RPM.

2) Disconnect A/C compressor lead at compressor. Turn A/C on and place transmission in Drive. Open throttle slightly to allow solenoid plunger to fully extend, then turn solenoid screw to obtain specified "Solenoid Energized" RPM. Reconnect compressor lead after adjustment.

Idle Speed (RPM)

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

DIESEL MODELS

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

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

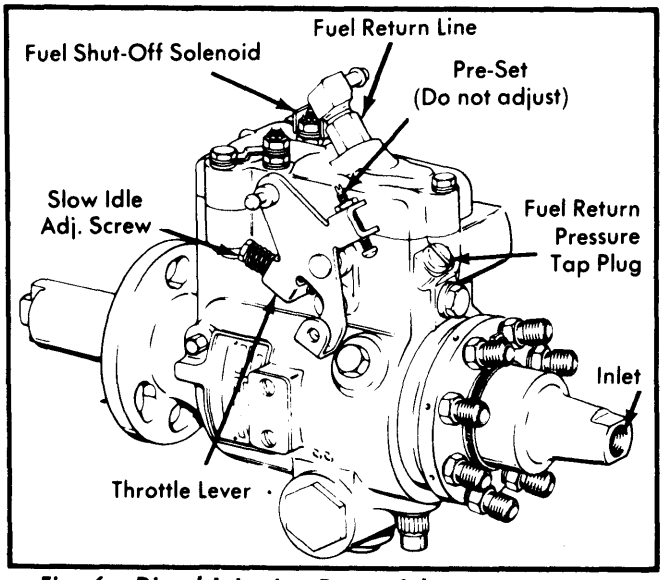

Fig. 6 Diesel Injection Pump Adjustment Locations.

2) Adjust slow idle screw on injection pump to obtain specifications shown on emissions control label. *See Fig. 6 for adjustment 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 two 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 plug.

PROPANE ENRICHMENT PROCEDURE (FEDERAL ONLY)

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

2) Connect tachometer to engine. Disconnect vacuum advance and set timing to specification 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

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 at 2000 RPM for 30 seconds. Put transmission in DRIVE (manual transmission in NEUTRAL). Check idle speed. If idle speed agrees with idle speed shown on Emission Decal, idle mixture is correct. Proceed to step **8)**.

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.

TUNE-UP (Cont.)

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 specification, readjust idle speed screw to "enriched RPM" with propane flowing. Turn off propane, place transmission in NEUTRAL and accelerate engine to 2000 RPM for 30 seconds. Recheck idle speed. Idle speed should agree with specifications. If not, repeat procedure starting with step **6)**.

8) 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 **2)**. If idle is correct, turn engine off and remove propane tool. Connect PCV system and reconnect all other hoses.

Propane Enriched Idle Speed (RPM)

Application	Enriched RPM
265" 2-Bbl.	590
301" 4-Bbl.	550
305" 4-Bbl.	540
350" VIN R	575
350" VIN X	590

MIXTURE CONTROL ADJUSTMENT – C-4 (CALIFORNIA ONLY)

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.*

1) Before adjusting idle air bleed valve, mixture control solenoid adjustment must be checked and corrected as necessary. See *Rochester E2ME, E4ME & E4MC Carburetor article in FUEL SYSTEMS Section.*

2) To adjust idle air bleed valve, set parking brake and block drive wheels. Disconnect and plug hoses as directed on Emissions Control Tune-Up decal in engine compartment. Check ignition timing and adjust if necessary.

3) Connect a dwell meter to lead wire from mixture control solenoid in carburetor, then set dwell meter on 6 cylinder scale. Start engine and run at idle until normal operating temperature is reached and a varying dwell is noted on dwell meter.

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 and/or falls outside the 10-50° range, perform the following:

5) With engine off, cover primary and secondary inlets with a shop towel. Use n a number 35 drill to drill rivet head, then 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 step carefully. The idle air bleed valve is very sensitive in controlling air/fuel ratios and the valve should be turned only in ⅛ 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 3/16" thin wall deep socket and turn each idle mixture inward until lightly seated. Then, back out each mixture needle 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 ½ 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 Emission Control Decal for correct procedures for setting fast idle RPM.

Fast Idle Speed (RPM)

Application	RPM
265" 2-Bbl.	2200
301" 4-Bbl.	2500
305" 4-Bbl.	2200
350" VIN X	1850
350" VIN R	①700

① – Transmission in Drive

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 battery 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.

TUNE-UP (Cont.)

AUTOMATIC CHOKE

NOTE – *For 1980, all Rochester carburetors are equipped with chokes that are non-adjustable. 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

For pressure test, pinch off fuel return line (if equipped), connect pressure gauge to fuel line at carburetor.

Pressure	
265" & 301"	7-8.5 psi
305"	7.5-9 psi
350"	5.5-6.5 psi
Volume	
All	1 pint in 30 sec.

INJECTION PUMP FUEL PRESSURE (DIESEL ENGINES ONLY)

1) Remove air crossover. Install screened covers (J-29996-2). 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	8-12 psi
Maximum Fluctuation	2 psi

5) If pressure does not read within specifications, replace fuel return line connector assembly.

6) Remove tachometer, gauge and adapter. Install new pressure tap plug screw seal on plug. Install plug in housing. Remove screened covers. Install air crossover and torque 4 bolts to 22 ft. lbs.

INJECTION NOZZLES (DIESEL ENGINES ONLY)

If engine starts but idles roughy, check injection nozzles as follows:

1) Start engine. Loosen injection line fitting at each nozzle, 1 at a time. Be sure to direct fuel away from hot surfaces.

2) When a nozzle is loosened, and the idle speed does not change or quality does not change, replace that nozzle and repeat test.

EXHAUST EMISSION SYSTEMS

See EXHAUST EMISSION SYSTEMS section.

GENERAL SERVICING

IGNITION

DISTRIBUTOR

Delco High Energy Ignition.

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

IGNITION COIL

Resistance	
Primary (At 75°F)	.4-1.0 ohms
Secondary (At 75°F)	6,000-30,000 ohms
Coil Output	
At all engine speeds	25-35 KV Minimum①

① – Replace if below 25 KV.

CARBURETION

CARBURETORS

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

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

DIESEL FUEL INJECTION

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

Other Data & Specifications – *See Tune-Up and General Motors Diesel Fuel Injection in FUEL SYSTEMS Section.*

ELECTRICAL

BATTERY

12 Volt – Negative Ground.

GENERAL SERVICING (Cont.)

Application	Cold Crank (Amps.@0°F)	Reserve Capacity (Minutes)
Standard	350	80
Optional	430 & 465	80 & 100
Diesel	540	135

STARTER

Delco-Remy solenoid-actuated with overrunning clutch.

Free Speed Voltage	
265" & 301"	9@7000-11,900 RPM
305"	9@6800-10,300 RPM
350"	9@7500-10,500 RPM
350" Diesel	9@8000-13,000 RPM
Free Speed Amperage	
265" & 301"	45-70@7000-11,900 RPM
305"	60-85@7500-10,500 RPM
350"	65-95@7500-10,500 RPM
350" Diesel	40-140@8000-13,000 RPM

ALTERNATOR

Application	Standard (Amps)	Optional (Amps)
265" & 301"	42	63 & 70
305"	37	55 & 70
350" Vin R & X	42	63 & 70
350" Diesel	55	63 & 70

ALTERNATOR REGULATOR

Delco-Remy nonadjustable, integral with alternator.

Operating Voltage (At 85°F)	13.9-14.5

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 30 ft. lbs.

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

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

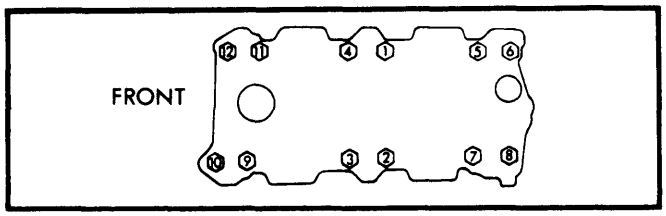

Fig. 7 305" Intake Manifold Tightening Sequence

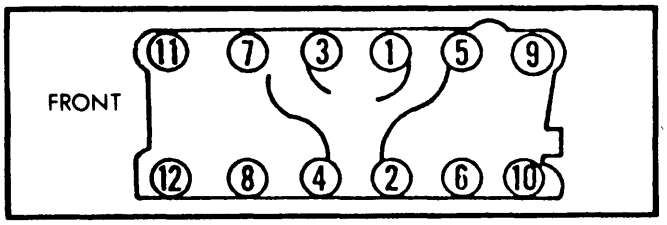

Fig. 8 350" VIN X Intake Manifold Tightening Sequence

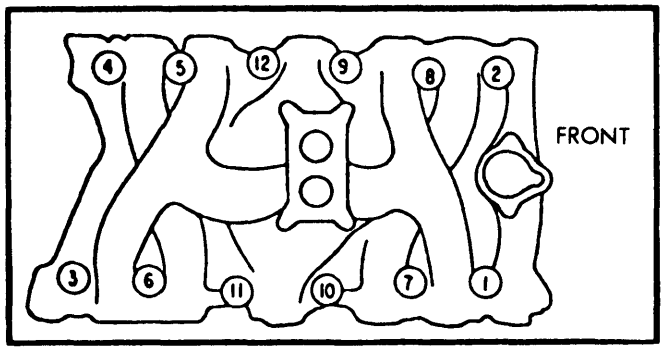

Fig. 9 350" VIN R & Diesel Intake Manifold Tightening Sequence

FILTERS & CLEANERS (DIESEL MODELS)

Service Item	Service Interval
Engine Oil①	Change every 3,000 mi.
Oil Filter	Replace every 3,000 mi.
Fuel Filter	Replace every 24,000 mi.
Air Cleaner	Replace every 30,000 mi.
PCV System	②

① – Use ONLY engine oils labeled wth 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 assemblies (both valve covers) every 6000 miles. Replace breather cap/valve assembly and flow control valve every 30,000 miles.

GENERAL SERVICING (Cont.)

FILTERS & CLEANERS (GASOLINE MODELS)

Filter or Cleaner	Service Interval
Oil Filter	Replace every 7,500 mi.
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.

BELT ADJUSTMENTS

Tension (Lbs.) Using Strand Tension Gauge

Application	New Belt	Used Belt
5/16" Wide	65-85	50 (Min.)
3/8" Wide	120-150	70 (Min)
15/32" Wide	135-165	90 (Min)
Cogged Belt		60 (Min)

CAPACITIES (COOLING)

Application	Standard (Qts.)	Optional (Qts.)
Century & Regal		
301"	20.3	20.8
305"	17.6	18.1
LaSabre, Estate Wagon & Electra		
301"	18.9	13.9
305"	14.3	14.7
350"	14.5	15.2
350" Diesel	18.3	18.0
Riviera		
350"	14.9	15.6

CAPACITIES (EXCEPT COOLING)

Application	Quantity
Crankcase	
301"	①4.0 qts.
350" Diesel	②7.0 qts.
All Others	③4.0 qts.
Auto. Trans. (Dexron II)④	
THM 200	7.0 pts.
THM 325	10.0 pts.
THM 350	6.0 pts.
THM 400	7.5 pts.
Rear Axle (SAE 80W-90)	
7.5" Ring Gear	3.5 pts.
8.5" Ring Gear	4.25 pts.
8.75" Ring Gear	5.4 pts.
Final Drive (SAE 80W-90)	3.2 pts.
Fuel Tank	
Century & Regal	18.0 gals.
LaSabre & Electra	25.0 gals.
Estate Wagon	22.0 gals.
Estate Wagon 305" Engine	27.0 gals.
Riviera	23.0 gals.

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