1975

OPEL

SERVICE MANUAL SUPPLEMENT

1975

OPEL 1900 MANTA

SUPPLEMENTAL SERVICE MANUAL

The information herein contained is supplemental to the 1974 Opel Chassis Service Manual which must be used for carryover information.
The contents of this supplement, based on the latest product information, were accurate at the time of publication approval. All rights are reserved to deviate at any time without notice.

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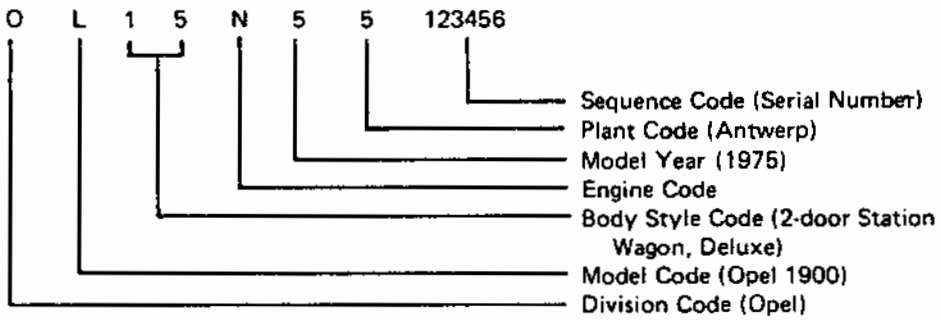
GROUP 0

GENERAL INFORMATION

MODEL DESIGNATIONS

OL11 - OPEL 1900 2 DR SEDAN
OL15 - OPEL 1900 2 DR WAGON
OL77 - MANTA 2 DR SPT. CPE.



SERIES	MODEL AND NAME	WHEEL-BASE	FRONT TREAD	REAR TREAD	CURB WEIGHT		OVERALL		
					FED.	CAL.	WIDTH	LENGTH	HEIGHT
Opel 1900	51 - 2 DR Sedan	95.7	52.4	52	2208	2227	64.3	164.6	54.8**
	54- 2 Dr Wagon				2281	2300		170.2	55.1**
Manta	57- 2 Dr Spt. Cpe.				2237	2256		176.1	53.3**

**At Curb Weight

500A1

EXTERIOR PAINT		
CODE	NAME	MODELS
CC	POLAR WHITE	ALL
FF	SIGNAL BLUE	ALL
HH	JADE MIST	ALL
QQ	RALLYE GOLD	ALL
RR	FLAME RED	ALL
SS	GRECIAN SILVER	ALL
TT	ANTIQUE BRONZE	ALL
XX	FIRE GLOW	ALL
YY	SIGNAL YELLOW	ALL
VINYL TOP - Available in Black and only on Model 57		

500A2

LUBRICATION AND GENERAL MAINTENANCE

When To Perform Services (Months or Miles, Whichever Occurs First)	Item No.	Services
Every 6 months or 7,500 miles	1	*Chassis Lubrication
	2	* • Fluid Levels Check
	3	*Engine Oil Change
Every Engine Oil Change	4	*Oil Filter Change
See Explanations	5	Tire Rotation (Steel Belted Radial)
	6	Rear Axle Lube Change
	7	Clutch
Every 12 Months	8	Air Conditioning Check
Every 12 months or 15,000 miles	9	*Cooling System Check
Every 30,000 miles	10	Coolant Change and Hose Replacement
	11	Wheel Bearing Repack
	12	*Auto. Trans. Fluid and Filter Change

SAFETY MAINTENANCE

Every 6 months or 7,500 miles	13	Owner Safety Checks
	14	Tire and Wheel Inspection
	15	*Exhaust System Check
	16	*Drive Belt Check
	17	Suspension and Steering Check
Every 24 months or 30,000 miles	18	*Belt Replacement
Every 12 months or 15,000 miles	19	Brake Check
	20	Drum and Parking Brake Check
	21	Accelerator Linkage Check
	22	Underbody Flush and Check
	23	Bumper Check

EMISSION CONTROL MAINTENANCE

Every 12 months or 15,000 miles	24	Intake System Check
	25	Engine Timing Adjustment, Distributor, Dwell Vacuum Retard System, Hoses and Coil Check
	26	Engine Idle Speed
	27	Fuel Filter
	28	Positive Crankcase Ventilation System
	29	EFI System and Wiring
	30	Spark Plug Wires
	31	Spark Plugs
	32	ECS System
Every 24 months or 30,000 miles	33	Fuel Cap, Tank and Lines Check
	34	Air Cleaner Element Replacement

*Also an Emission Control Service •Also a Safety Service 500C1

LUBE & GENERAL MAINTENANCE

SERVICES

CHASSIS AND BODY – Lubricate transmission shift linkage hood latch, parking brake cable guides and linkage, door hinges and check links and heater bowden cables.

FLUID LEVELS – Check level of fluid in brake master cylinder, battery, engine, axle, transmission* and windshield washer. Engine coolant should be checked for proper level and freeze protection to at least -20°F or to the lowest temperature expected during the period of vehicle operation*. Proper engine coolant also provides corrosion protection.

Any significant fluid loss in any of these systems or units could mean that a malfunction is developing and corrective action should be taken immediately. A low fluid level in the brake master cylinder front reservoir could be an indication that the disc brake pads need replacing.

ENGINE OIL – Change each 6 months or 7,500 miles, whichever occurs first under normal driving conditions or each 3 months or 3,000 miles when the vehicle is operated under the following conditions: (a) driving in dusty conditions, (b) trailer pulling, (c) extensive idling or (d) short-trip operation at freezing temperatures (with engine not thoroughly warmed-up).

*Use only SE rated current viscosity oil.

ENGINE OIL FILTER – Replace at every oil change.

TIRES AND WHEELS – To equalize wear, rotate tires. Refer to Group 3. Adjust tire pressures as recommended on tire placard on glove box door. Check disc brake pads and condition of rotors while wheels are removed. Check tires for excessive wear or damage. Make certain wheels are not bent or cracked and wheel nuts are tight.

REAR AXLE – Change lubricant every 15,000 miles when using vehicle to pull a trailer. (Level should be maintained to lower edge of filler hole.)

AIR CONDITIONING – Check condition of air conditioning system hoses and refrigerant charge at sight glass (if so equipped). Replace hoses and/or refrigerant if need is indicated.

COOLING SYSTEM – At 12-month or 15,000-mile intervals, wash radiator cap and filler neck with clean water, pressure test system and radiator cap for proper pressure holding capacity, (tighten hose clamps and inspect condition of all cooling and heater hoses*). Replace hoses every 24 months or 30,000 miles, or earlier if cracked, swollen or otherwise deteriorated.

Also each 12 months or 15,000 miles, clean exterior of radiator core and air conditioning condenser. Every 24 months or 30,000 miles, drain, flush and refill the cooling system with a new coolant solution.

WHEEL BEARINGS – Clean and repack front wheel bearings with grease GM No. 1051344 or equivalent.

AUTOMATIC TRANSMISSION FLUID – Under normal driving conditions, change the transmission fluid and service the sump filter every 30,000 miles.

Under unusual conditions such as constant driving in heavy city traffic, trailer pulling, and commercial applications, services should be performed at 15,000-mile intervals.

*Check fluid level at each engine oil change. To make an accurate fluid level check:

1. Be sure transmission is at normal operating temperature (180° - 190°F.)
2. Park vehicle on level surface.
3. Place selecter lever in "Park" with engine running.
4. Remove dipstick and wipe clean.
5. Reinsert dipstick until cap seats.
6. Remove dipstick and note reading.

If fluid level is at or below the "ADD" mark, add sufficient DEXRON® II or equivalent to raise the level to the "F" mark. One pint will raise the level from "ADD" to "F". DO NOT OVERFILL.

CLUTCH – Adjust clutch when necessary as indicated by clutch warning lamp.

SAFETY MAINTENANCE

NOTE: Items a thru t can be checked by the owner. It is particularly important that any safety systems which may have been adversely affected in

an accident be checked and repaired as necessary before the vehicle is returned to use.

SAFETY CHECKS TO BE PERFORMED BY OWNER – The following checks should be made regularly during operation at no greater interval than 6 months or 7,500 miles, whichever occurs first, and more often when the need is indicated.

a. **STEERING COLUMN LOCK** – Check for proper operation by attempting to turn key to LOCK position and turning steering wheel with car stationary. Steering wheel should turn as long as key remains in lock. When key is removed steering wheel should lock. Key should be removable only in LOCK position.

b. **PARKING BRAKE AND TRANSMISSION "PARK" MECHANISM** – Check parking brake holding ability by parking on a fairly steep hill and restraining the vehicle with the parking brake only. On cars with automatic transmissions, check the holding ability of the "PARK" mechanism by releasing all brakes after the transmission selector lever has been placed in the "P" position.

> **CAUTION:** *Before making the two checks below, be sure to have a clear distance ahead and behind the car, set the parking brake and firmly apply the foot brake. Do not depress accelerator pedal. Be prepared to turn off ignition switch immediately if engine should start.*

c. **NEUTRAL START SWITCH (AUTOMATIC TRANSMISSION CARS)** – Check neutral start switch by attempting to start the engine with the transmission in each of the driving gears. The starter should operate only in the Park ("P") or Neutral ("N") positions.

d. **TRANSMISSION SHIFT INDICATOR** – Check to be sure automatic transmission shift indicator accurately indicates the shift position selected.

e. **STEERING,** – Be alert to any changes in steering action. The need for inspection or servicing may be indicated by "hard" steering, excessive free play or unusual sounds when turning or parking.

f. **WHEEL ALIGNMENT AND BALANCE** – In addition to uneven or abnormal tire wear, the need for wheel alignment service may be indicated by a pull to the right or left when driving on a straight and level road. The need for wheel balancing is usually indicated by a vibration of the steering wheel or seat while driving at normal highway speeds.

g. **BRAKES** – Be alert to illumination of the brake warning light or changes in braking action, such as repeated pulling to one side, unusual sounds either when braking or between brake applications, or increased brake pedal travel. Any of these could indicate the need for brake system inspection and/or service.

h. **EXHAUST SYSTEM** – Be alert to any change in the sound of the exhaust system or a smell of fumes which may indicate a leak. Check complete exhaust system and nearby body areas and trunk lid for broken, damaged, missing or mispositioned parts, open seams, holes, loose connections or other deterioration which could permit exhaust fumes to seep into the trunk or passenger compartment. Dust or water in the trunk may be an indication of a problem in one of these areas. Any defects should be corrected immediately. To help insure continued integrity, exhaust system pipes and resonators rearward of the muffler must be replaced whenever a new muffler is installed.

i. **WINDSHIELD WIPERS AND WASHER** – Check operation of wipers, as well as condition and alignment of wiper blades. Check amount and direction of fluid sprayed by washers during use.

j. **DEFROSTERS** – Check performance by moving controls to "DEF" and noting amount of air directed against the windshield.

k. **REARVIEW MIRRORS AND SUN VISORS** – Check that friction joints are properly adjusted so mirrors and sun visors stay in the selected position.

l. **HORN** – Blow the horn occasionally to be sure that it works. (Ignition switch must be in the "ON" position.)

m. **LAP AND SHOULDER BELTS** – Check belts, buckles, adjustable latch plates, retractors, reminder systems, guide loops, clips, and anchors for impaired operation or damage. Check to make certain that anchor mounting bolts are tight.

n. **HEAD RESTRAINTS** – Check that no head restraint components are missing, damaged or loose.

o. **SEAT BACK LATCHES** – Check to see that seat back latches are holding by pulling forward on the top of each folding seat back.

p. **LIGHTS AND BUZZERS** – Check all instrument panel illuminating and warning lights, seat belt reminder light and buzzer, ignition key buzzer, interior lights, license plate lights, side marker lights, headlamps, parking lamps, tail lamps, brake lights, turn signals, backup lamps, and hazard warning flashers. Have someone observe operation of each exterior light while you activate the controls.

q. **GLASS** – Check for broken, scratched, dirty or damaged glass on vehicle that could obscure vision or become an injury hazard.

r. **DOOR LATCHES** – Check for positive closing, latching and locking.

s. **HOOD LATCHES** – Check to make sure hood closes firmly by lifting on the hood after each closing. Check also for broken, damaged or missing parts which might prevent secure latching.

t. **FLUID LEAKS** – Check for fuel, water, oil or other fluid leaks by observing the ground beneath the vehicle after it has been parked for a while. (Water dripping from air conditioning system after use is normal.) If gasoline fumes or fluid are noticed at any time, the cause should be determined and corrected without delay because of the possibility of fire.

TIRES AND WHEELS – To equalize wear, rotate tires as illustrated in Group 3. Adjust tire pressures as recommended on tire placard on glove box door (left front door on some models). Check disc brake pads and condition of rotors while wheels are removed. Check tires for excessive wear or damage. Make certain wheels are not bent or cracked and wheel nuts are tight.

EXHAUST SYSTEM – Check complete exhaust system and nearby body areas and trunk lid for broken, damaged, missing or mispositioned parts, open seams, holes, loose connections or other deterioration which could permit exhaust fumes to seep into the trunk or passenger compartment. Dust or water in the trunk may be an indication of a problem in one of these areas. Any defects should be corrected immediately. To help insure continued integrity, exhaust system pipes and resonators rearward of the muffler must be replaced whenever a new muffler is installed.

ENGINE DRIVE BELTS – Check belts on driving fan, alternator, and air conditioning compressor for cracks, fraying, wear and tension. Adjust or replace as necessary.

It is recommended that belts be replaced every 24 months or 30,000 miles, whichever occurs first.

SUSPENSION AND STEERING – Check for damaged, loose or missing parts or parts showing visible signs of excessive wear or lack of lubrication in front and rear suspension and steering system. Questionable parts noted should be replaced.

BRAKES – Check disc brake pads, rotors, lines and hoses for proper attachment, leaks, cracks, chafing, deterioration, etc. Any questionable parts noted should be replaced or repaired immediately. When abrasion or wear is evident on lines or hoses, the cause must be corrected.

DRUM BRAKES AND PARKING BRAKE – Check drum brake linings and other internal brake components at each wheel (drums, wheel cylinders, etc.). Parking brake and rear brake adjustment should be checked whenever drum brake linings are checked.

ACCELERATOR LINKAGE – Check for damaged or missing parts, interference or binding. Any deficiencies should be corrected without delay. To lubricate, remove circlips and press ball studs out of ball cups. Apply silicon grease to all ball cups as well as bearing bushing of connecting rod. Assemble ball studs into ball cups and secure.

UNDERBODY – In geographic areas using a heavy concentration of road salt or other corrosive materials for snow removal or road dust control, flush and inspect the complete underside of the car at least once each year, preferably after a winter's exposure. Particular attention should be given to cleaning out underbody members where dirt and other foreign materials may have collected.

BUMPERS – Check the front and rear bumper systems at 12-month/15,000-mile intervals to be sure that impact protection and clearance originally designed into these systems remain in a state of full readiness. They also should be checked whenever there is obvious bumper misalignment, or whenever the vehicle has been involved in a significant collision in which the bumpers were struck, even when slight or no damage to the bumper systems can be seen.

EMISSION CONTROL MAINTENANCE

NOTE: Additional recommended maintenance instructions relating to vehicle use, evidence of maintenance, and service replacement parts are included in the New Car Warranty Information folder.

INTAKE SYSTEM – Check complete intake system for leaks, such as loose, damaged or mispositioned parts, hoses and gaskets, or deterioration which could permit air to enter into the system. Make sure, that oil dipstick is positioned properly.

ENGINE TIMING ADJUSTMENT, DISTRIBUTOR, DWELL, VACUUM RETARD SYSTEM AND HOSES, AND COIL CHECK – Replace distributor points and adjust ignition timing, and dwell accurately (following the specifications shown on the label under the hood) at 12 month or 15,000 mile intervals. Inspect vacuum retard

hose for loose, kinked, pinched, or deteriorated conditions. Carefully inspect the interior and exterior of the distributor cap, distributor rotor, and coil for cracks, carbon tracking, and terminal errosion.

ENGINE IDLE SPEED – Check and adjust engine idle speed if necessary every 15,000 miles (following the specifications shown on the label under the hood). Adjustments must be made with test equipment known to be accurate.

FUEL FILTER – Replace filter in front of fuel tank at 15,000-mile/12 month intervals or more frequently if clogged.

POSITIVE CRANKCASE VENTILATION SYSTEM – PCV hose should be cleaned at 15,000 mile intervals under normal use, and at 7,500 mile intervals when the vehicle is used under the following conditions: driving in dusty conditions, extensive idling, trailer pulling and short trip operation at freezing temperatures (engine not thoroughly warmed-up).

EFI SYSTEM AND WIRING – Check every 15,000 miles. Check connectors and plugs of Electronic Fuel Injection wiring harness for proper installation and tight fit on the Electronic Fuel Injection components.

a) Check wiring harness plugs of every fuel injector, air flow meter, throttle valve switch, temperature sensor, auxiliary air valve and thermotime switch for proper fit.

b) Check terminals at ignition distributor for proper installation and tight fit.

c) Check condition of both relay plugs, plug connections of pre-resistor and plug board at control unit.

SPARK PLUG WIRES – Clean exterior of wires; remove any evidence of corrosion on end terminals. Inspect spark plug wires for evidence of checking, burning, or cracking of exterior insulation and tight fit at distributor cap and spark plugs or other deterioration. If corrosion cannot be removed or other conditions above are noted, replace wire.

SPARK PLUGS – Replace plugs at 15,000 mile intervals with AC 42.6 FS or equivalent.

EVAPORATION CONTROL SYSTEM (ECS) – Check all fuel and vapor lines and hoses for proper connections and correct routing as well as condition. Remove canister and check for cracks or damage. Replace damaged or deteriorated parts as necessary. Replace filter in lower section of canister.

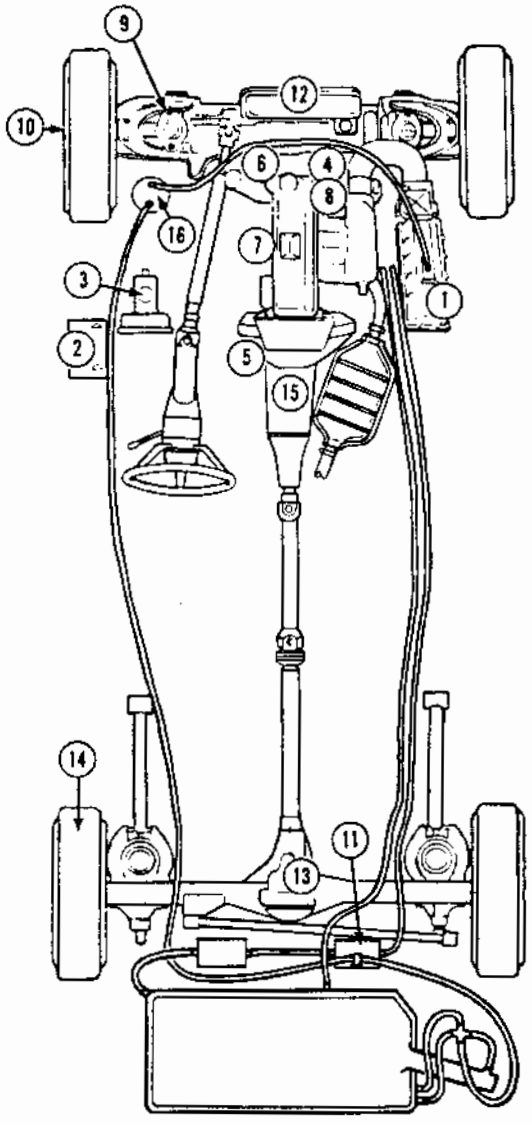
FUEL CAP, FUEL LINES AND FUEL TANK – Inspect the fuel tank, cap and lines for damage which could cause leakage. Inspect fuel cap for correct sealing ability and indications of physical damage. Replace any damaged or malfunctioning parts.

AIR CLEANER ELEMENT – Replace the engine air cleaner element under normal operating conditions every 30,000 miles. Operation of vehicle in dusty areas will necessitate more frequent element replacement.

> **CAUTION:** *Do not operate the engine without the air cleaner unless temporary removal is necessary during repair or maintenance of the vehicle.*

1. AIR CLEANER ELEMENT - Replace every 24 months or 30,000 miles.
2. BATTERY - Check fluid level periodically. Use colorless, odorless drinking water.
3. BRAKE MASTER CYLINDER - HBF - Maintain level between MIN. and MAX. marks on reservoir.
4. P.C.V. HOSE - Clean every 12 months or 15,000 miles.
5. CLUTCH ADJUSTMENT - Adjustment is only required if the indicator light (hazzard warning flasher) comes on.
6. ENGINE BELTS - Check for condition and proper tension every 6 months or 7,500 miles. Replace at 24 months or 30,000 miles.
7. ENGINE OIL - EO - Drain and refill every 6 months or 7,500 miles. If operated under adverse conditions, replace at 3 months or 3,000 miles.
8. ENGINE OIL FILTER - Replace at every engine oil change.
9. FRONT SUSPENSION - No lubrication required.
10. FRONT WHEEL BEARINGS - WBL - Repack when brakes are inspected or serviced with a premium high melting point grease. Part No. 1051344 or equivalent.
11. FUEL FILTER - (In line) - Replace every 12 months or 15,000 miles.
12. RADIATOR - Maintain coolant level 2" below top of filler neck. Check level at each oil change. Replace coolant every 24 months or 30,000 miles.
13. REAR AXLE - MPG - Check lubricant level every 6 months or 7,500 miles and maintain to filler plug hole. Use SAE-80W or SAE-80W-90 GL-5 gear lubricant (SAE-80WGL-5 in Canada).
14. TIRES - Rotate tires at first 6 months or 7,500 miles then every 15,000 miles. Maintain pressure periodically. Refer to Group 3 for rotation method and pressures.
15. TRANSMISSION - AUTOMATIC - AT - Check fluid level at 6 months or 7,500 mile intervals. Drain and replace strainer if needed. Normal 30,000 miles - Heavy Duty 15,000 miles.

    MANUAL - MPG - Check lubricant level every 6 months or 7,500 miles and maintain to filler plug hole. Use SAE-80 or SAE-80W-90 GL-5 gear lubricant, (SAE-80W GL-5 in Canada).
16. VAPOR CANISTER - Replace foam rubber filter in lower part of canister every 12 months or 15,000 miles.



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LUBRICANTS	
AT -	DEXRON®II Automatic Transmission fluid G.M. Part No. 1050568-69-70 or equivalent.
EO -	Engine Oil (Current Viscosity) SE
HBF -	Hydraulic Brake Fluid - Delco Supreme No. 11 or equivalent.
WBL -	High Melting Point Wheel Bearing Lubricant Part No. 1051344 or equivalent.
MPG -	Multi-Purpose Gear Lubricant SAE - 80W or SAE-80W-90 GL-5 (SAE-80W GL-5 in Canada).

CAPACITIES	OPEL 1900 MANTA
Cooling System (Qts.)	6
Crankcase	
Refill Qts.	3½
With Oil Filter Change	4
Fuel Tank (Gals.)	11½
Transmission (Pts.)	
Manual Trans.	2½
Auto. Trans. with converter	5
Rear Axle (Pts.)	2½

GROUP 1

ELECTRICAL

BATTERY CABLES

A braided copper strap is now being used instead of the battery ground cable of previous models.

SEAT-BELT SYSTEM

The seat belt-starter interlock system has been deleted for 1975 and replaced with a seat belt warning system. This warning system involves the drivers seat belt buckle switch, a warning lamp, a warning buzzer and a time relay. The warning system in no way affects starting of the engine.

When the drivers seat is occupied and the seat belt properly fastened, the warning light and buzzer will remain inoperative even when the key is turned. If the seat belt is not fastened, both the warning light and buzzer will become activated for a period of four to eight seconds when the key is turned. If the drivers seat belt is buckled prior to the seat being occupied, only the warning light will come on for the four to eight second period when the key is turned.

IGNITION SYSTEM

SPARK PLUGS

Spark plugs having a slightly hotter heat range are specified for 1975. This new spark plug is known as AC42.6FS and have a larger diameter center electrode. If not available, equivalent spark plugs may be used.

DISTRIBUTOR

The combination vacuum advance-retard unit as used on previous model distributors has been replaced by a single function vacuum unit. The location of the contact points and the vacuum unit attachment on the breaker plate have changed to provide a means for vacuum retard instead of vacuum advance. See Figure 1C-1.

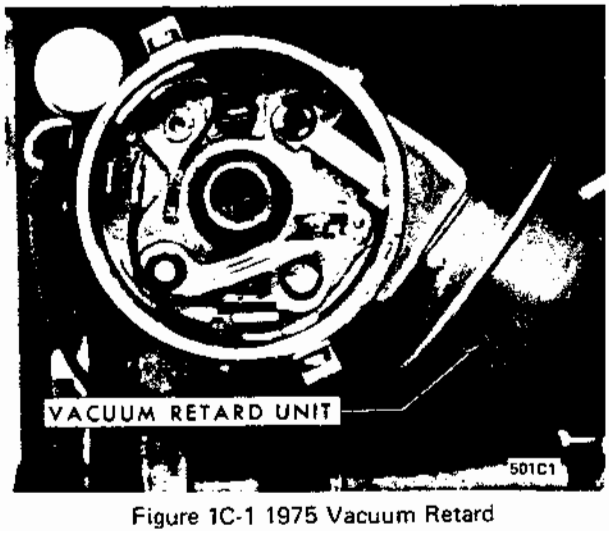


Figure 1C-1 1975 Vacuum Retard

Removal and installation of the distributor no longer requires removal and installation of the fuel pump. The mechanical fuel pump has been replaced by an electric fuel pump which is located near the left front corner of the gas tank.

ENGINE TIMING

The timing marks are now located at the lower left front of the engine. The pointer is part of a bracket attached to the engine block. A timing mark is located on the crankshaft pulley. See Figure 1C-2.

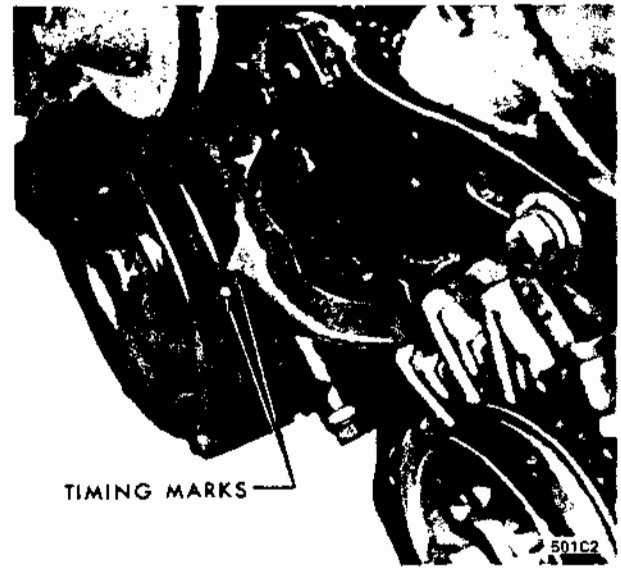


Figure 1C-2 1975 Timing Marks

The vacuum hose must be disconnected and plugged to check and set timing. Correct initial timing is indicated when the timing mark on the pulley is aligned with the mark on the pointer. When the vacuum hose is unplugged and reconnected, the timing will retard approximately 3 to 6 degrees.

Refer to the tune-up section for distributor specifications.

CHARGING SYSTEM

ALTERNATOR

A new K1, 45 amp alternator is used on all 1975 models. Operation and testing procedures remain the same as for the 35 amp alternator while overhaul procedures are somewhat different from those mentioned in the 1974 service manual.

ALTERNATOR OVERHAUL

Removal

1. Disconnect ground strap from battery.
2. Unplug wiring connector from alternator.
3. Disconnect battery and ground leads from alternator.
4. Remove adjusting brace nut, bolt and washers.
5. Loosen pivot bolt, push alternator toward engine and remove belt.
6. Rotate alternator outward, remove nut, bolt, washers and lift alternator from support.

Disassembly

1. Suitably support alternator in vise to remove nut, washers, spacers, pulley, woodruff key and fan from rotor shaft.

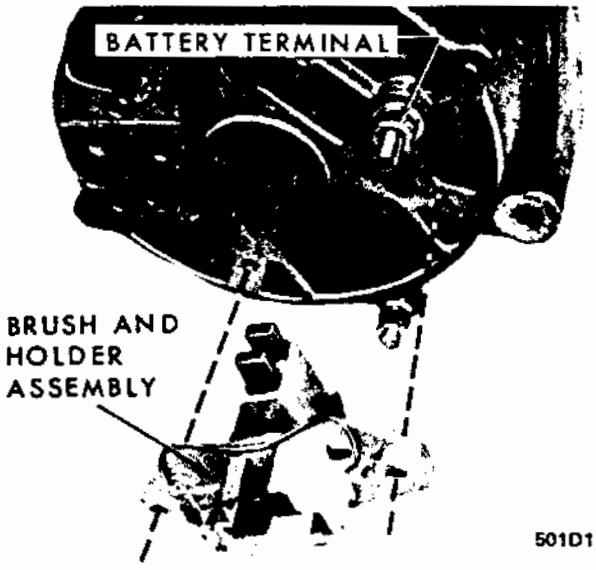


Figure 1D-1 Brush and Holder Assembly

2. Remove two screws and brush holder assembly. See Figure 1D-1.
3. If brushes are worn to a length of 3/8 inch or less, remove and solder new brushes in place. To do this, hold brush wire in flat-nose pliers to prevent solder from flowing between strands of wire and make them rigid. See Figure 1D-2.

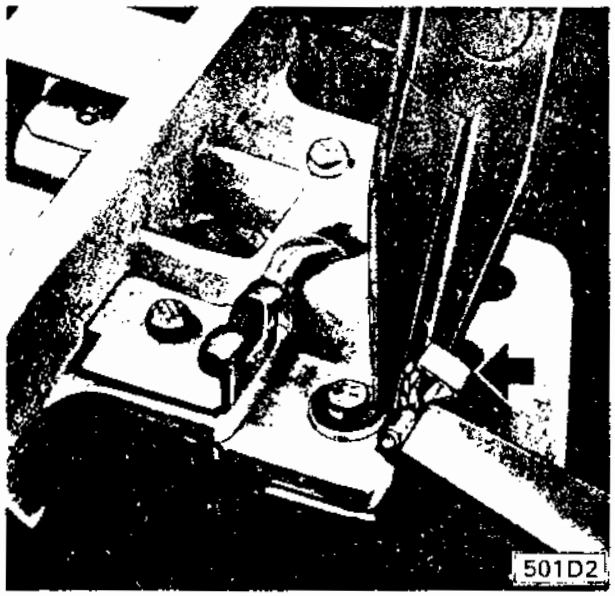


Figure 1D-2 Brush Replacement

4. Remove battery terminal nut, lock washer, flat washer and insulated washer.
5. Remove nut and washer from bottom through bolt.
6. Scribe a mark on drive end frame, stator and slip ring end frame to assure correct reassembly.
7. Remove the four through bolts, slip ring end frame and stator assembly from alternator noting the wave washer on the bearing or in the end frame.
8. Remove the three heat sink to slip ring end frame screws. See Figure 1D-3.
9. Remove stator and heat sink assembly from slip ring end frame noting battery terminal insulating sleeve and flat washer.

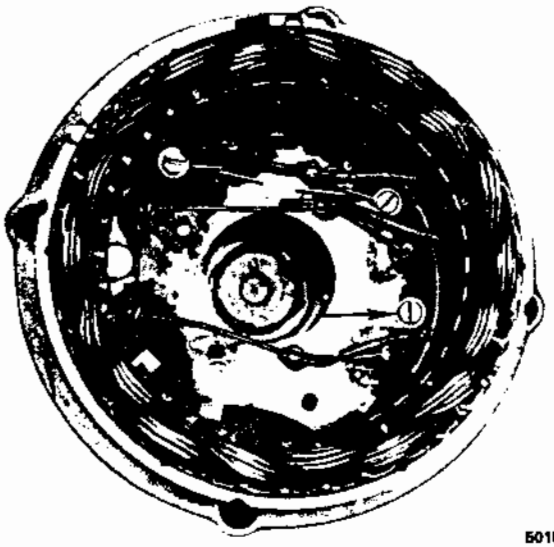


Figure 1D-3 Stator and Heat Sink Removal

10. Unsolder stator winding ends from heat sink assembly quickly using a very hot soldering iron, as diodes are heat sensitive. See Figure 1D-4.

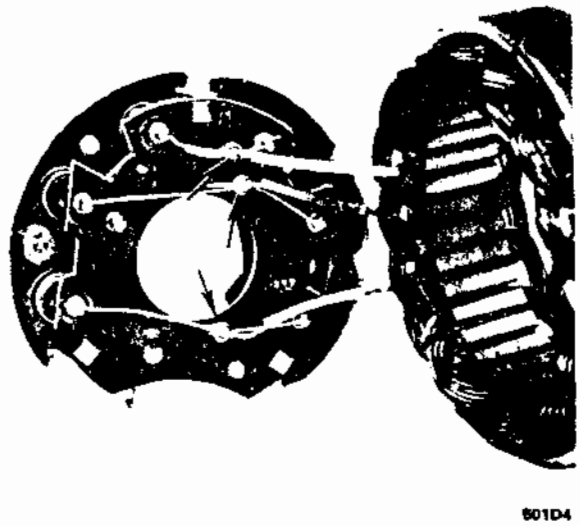


Figure 1D-4 Stator Lead Attachment

11. Support inside of drive end frame and press rotor shaft out of bearing.

12. Remove screws, retainer and bearing from drive end frame.

13. Using puller, remove rear bearing from rotor shaft. See Figure 1D-5.

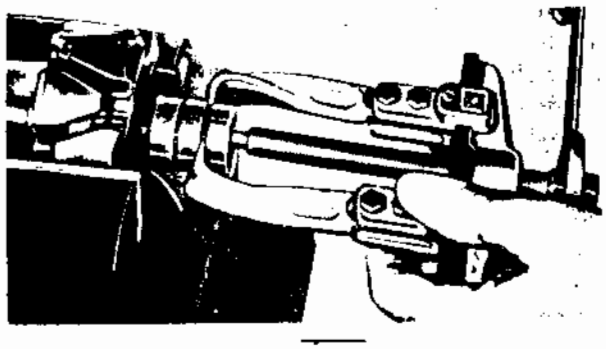


Figure 1D-5 Removing Rear Bearing

Component Testing

1. Test rotor windings and slip rings for a ground, using a test lamp or an ohmmeter. Test lamp should not light; ohmmeter should read near infinite resistance end of scale. See Figure 1D-6.

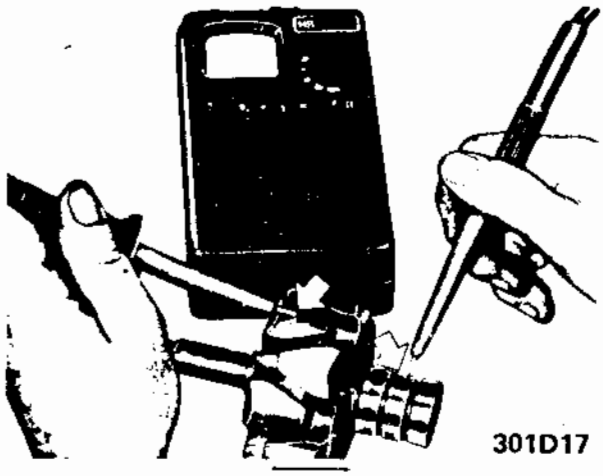


Figure 1D-6 Checking Rotor for Ground

Figure 1D-7 Checking Rotor for Short

2. Test rotor windings for a short by connecting an ohmmeter between the two slip rings. Ohmmeter should read between 4.0 and 4.4 ohms. See Figure 1D-7.

3. Clean slip rings with fine emery cloth and polish them. To avoid creating flat surfaces on slip rings, spin rotor on a lathe when cleaning and polishing. Slip rings that are not concentric can be turned down to a diameter of 1-1/4 inches. When doing this, remove only enough material to clean up the worn surface, then polish slip rings and blow clean with compressed air.

4. Test stator windings for a ground, using a test lamp or an ohmmeter. Test lamp should not light; ohmmeter should read near infinite resistance end of scale. See Figure 1D-8.

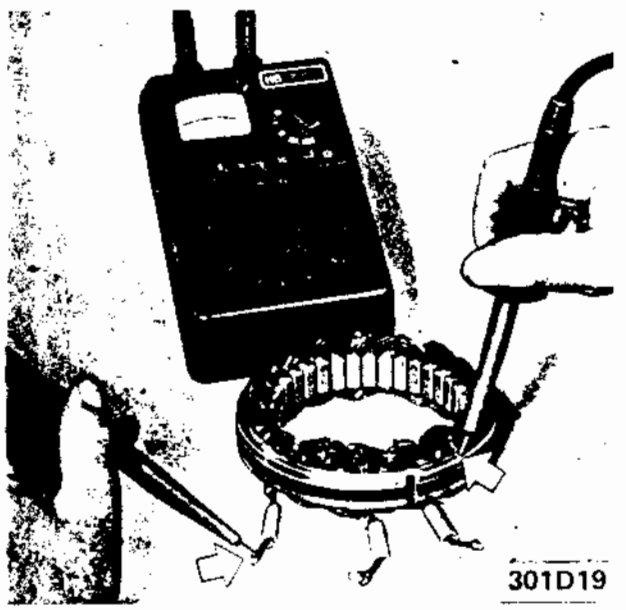


Figure 1D-8 Checking Stator for Ground

5. Test stator windings for a short, using a low reading ohmmeter. Check two phases at a time by holding ohmmeter probes alternately on winding ends. Ohmmeter should read between .18 and .19 ohms. See Figure 1D-9.

6. Using test lamp, test positive diodes by holding plus probe of test lamp onto diode connection and the other probe on diode housing. Test lamp should light. Reverse the probes and the test lamp should not light. Positive diodes allow current to pass from the connections to the housing and block current flow in opposite direction. If a positive diode is defective, replace the heat sink assembly. See Figure 1D-10.

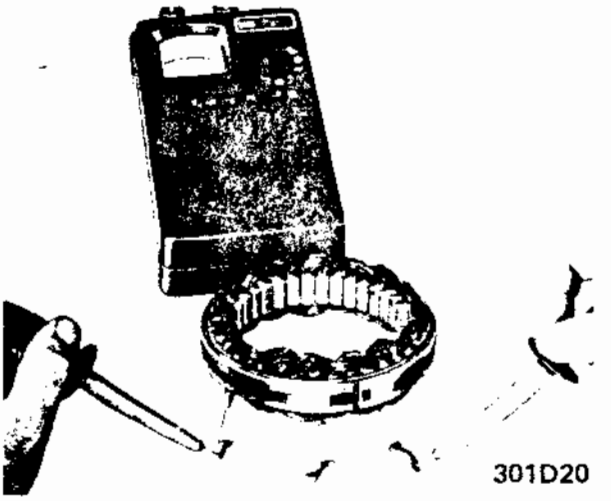


Figure 1D-9 Checking Stator for Short

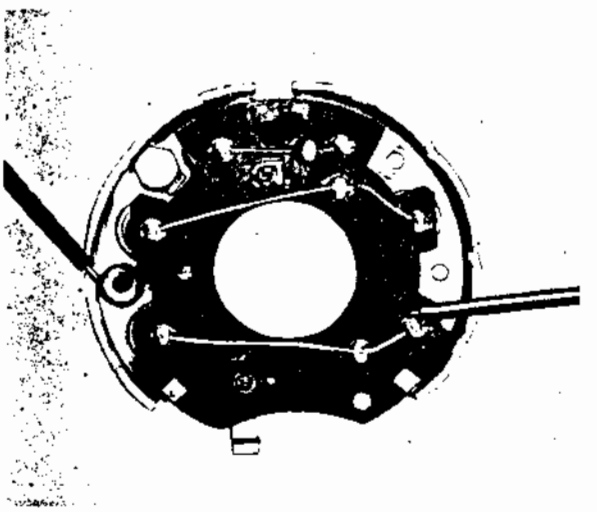


Figure 1D-10 Testing Positive Diodes

7. Using a test lamp, check negative diodes by holding the plus probe of test lamp onto diode housing and the other probe on the diode connection. The test lamp should light. Reverse the probes and the lamp should not light. Negative diodes allow current to pass from the housing to the connection and block current flow in opposite direction. If a negative diode is defective, replace the heat sink assembly. See Figure 1D-11.

8. Using a test lamp, check exciter diodes in the same manner as the positive diodes. Hold plus probe of test lamp onto diode connection and the other probe on the contact rail. If an exciter diode is defective, replace the heat sink assembly. See Figure 1D-12.

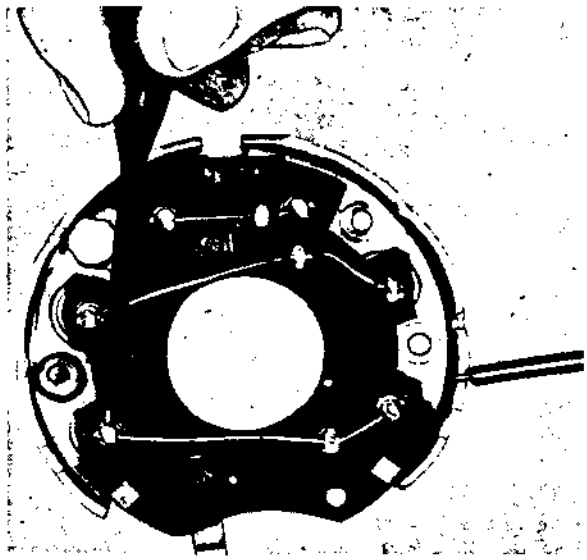
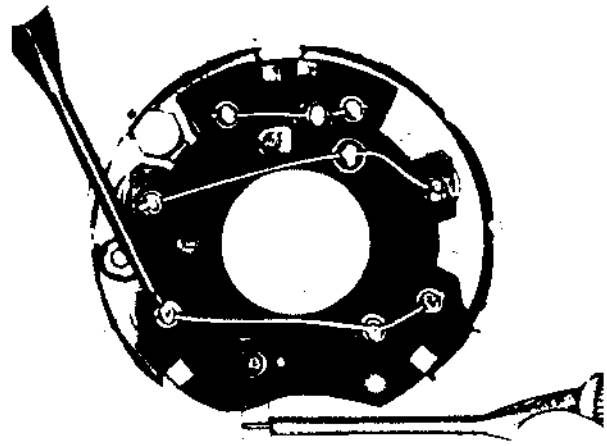


Figure 1D-11 Testing Negative Diodes



501D7

Figure 1D-12 Testing Exciter Diodes

Assembly

1. Clean and inspect all parts.

2. Lubricate both bearings with special ball bearing lubricant.

3. Install drive end frame bearing and retainer.

4. Press rear bearing onto rotor shaft and rotor assembly into drive end frame bearing.

5. Solder stator leads to correct heat sink locations quickly with a very hot soldering iron as the diodes are sensitive to heat.

6. Making sure the battery terminal insulating sleeve and flat washer are in place in the slip ring end frame, install the heat-sink-stator assembly and secure with three screws. The longer screw goes in the middle hole.

7. Position wave washer in bearing cavity of slip ring end frame using a little bearing lubricant.

8. Assemble stator and slip ring end frame assembly to rotor and drive end frame assembly.

9. With scribe marks aligned, install the four through bolts and torque them evenly to 38 in. lbs. The longest bolt goes in the bottom hole.

10. Install fan, spacers, woodruff key, pulley, spacer lock washer and nut. Tighten to 30 ft. lbs.

11. Install insulated washer, flat washer, lock washer and nut on battery terminal.

12. Install washer and nut on bottom through bolt.

13. Install brush and holder assembly and secure with two screws.

14. Bench test alternator if possible. If not, install on car and test.

Installation

Reverse removal procedures for installation.

ALTERNATOR

45 AMP

ALTERNATOR NUMBER	K114V45A20
RATED OUTPUT IN VOLTS	14
CONTINUOUS RATED OUTPUT IN AMPERES	45
TEST OUTPUT IN AMPERES AT 2000 ENGINE RPM	30 MIN.
RESISTANCE OF FIELD COIL IN OHMS	4-4.4
RESISTANCE OF STATOR WINDINGS IN OHMS	.18-.19
ALTERNATOR PULLEY NUT TORQUE IN LB.FT.	30
BELT TENSION IN POUNDS	45

REGULATOR

REGULATOR NUMBER	AD 1/14 V
REGULATOR SETTING IN VOLTS AT 2500 ENGINE R.P.M.	13.9-14.8

501D8

LIGHTING SYSTEMS

COURTESY LIGHT

The courtesy has been redesigned and now is equipped with a functional three-way switch. When the switch is in the down or number 3 position as illustrated, the light will be on continually. In the number 2 position, the light will remain off at all times. When the switch is moved to the top or number 1 position, the light will automatically come on when either front door is opened. See Figure 1F-1.

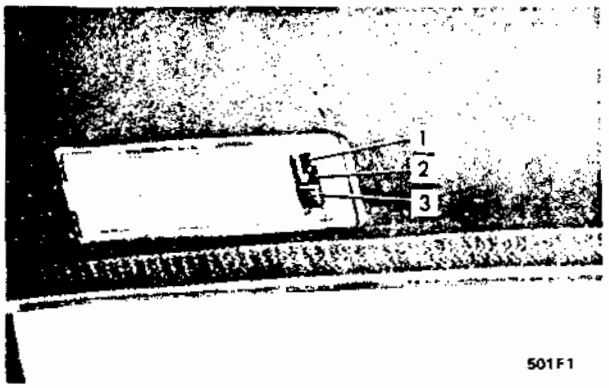


Figure 1F-1 Courtesy Light and Switch

WIRING CIRCUITS

FUEL INJECTION WIRING HARNESS – R&R

Removal

1. Disconnect battery.

2. Disconnect the air flow meter and throttle plate switch electrical connectors.

3. Loosen air flow meter to support bracket retaining nut (10 mm).

4. Loosen top of air cleaner retaining clips and remove top of air cleaner and air flow meter. (It is not necessary to disconnect the air flow meter to throttle plate hose.)

5. Remove air cleaner element and the two (2) retaining nuts of the lower portion of the air cleaner.

6. Remove lower portion of the air cleaner and disconnect the wiring harness ground at the rear of the intake manifold (10 mm). See Figure 11-1.

7. Disconnect the following electrical connectors:

NOTE: All electrical connectors and their components are the same color.

Component	Color Code of Connector
Rear Connector of Combination Relay	White
Pre-Resistor	White
Cold Start Injector	Blue
Injectors (4)	Tan
Auxiliary Air Valve	Black
Thermo Time Switch	Brown
Temperature Sensor	White

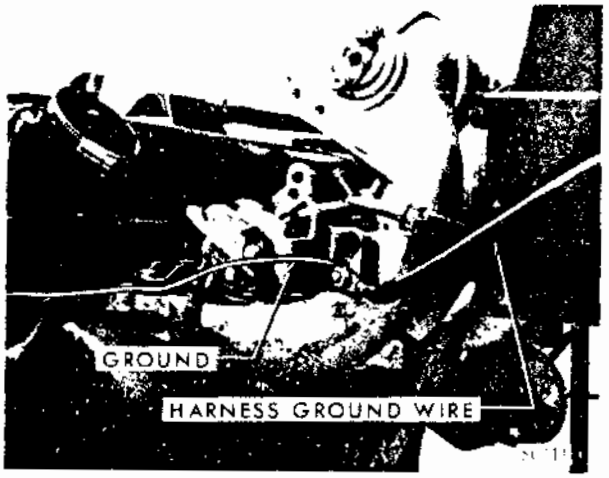


Figure 11-1 Harness Ground Wires

8. Remove the glove box retaining screws and remove the glove box unit.

9. Pull the right door edge beading rearward and remove the right kick panel.

10. Release the control unit electrical plug retaining clip by pushing the clip forward. Detach the electrical connector by pulling up on the forward end.

11. Disconnect the coil input wire. (Single green wire approximately 6" from multiple connector of control unit.)

12. Pull the rubber grommet and harness through the cowl from outside.

Installation

1. Insert the control unit electrical plug through the cowl.

2. Attach the control unit electrical connector to the control unit, and connect the coil input wire connection. (Single green wire.)

NOTE: The high altitude compensator unit plug will not normally be used.

3. Set the rubber grommet in the fire wall.

4. Install the glove box unit and install the six (6) retaining screws.

5. Install right kick panel and secure the door edge beading.

6. Connect the ground lead of the wiring harness to the rear of the intake manifold and tighten the retaining nut.

NOTE: There will be two (2) ground wires on this connection – the fuel injection harness ground and a brown wire that comes from the dual relay (front connection) wiring harness.

7. Connect the following electrical connectors:

Component	Color Code of Connector
Temperature Sensor	White
Thermo Time Switch	Brown
Auxiliary Air Valve	Black
Injectors (4)	Tan

NOTE: The injector wires are numbered one (1) through four (4). The number one (1) wire goes to the front injector and so on toward the rear. (Wire number four (4) goes on the rear injector.)

Component	Color Code of Connector
Cold Start Injector	Blue
Pre-Resistor	White
Rear Connector of Combination Relay	White

8. Install the lower portion of air cleaner and tighten the two (2) retaining nuts (10 mm).

9. Position the top of the air cleaner and air flow meter to the lower portion of the air cleaner and air flow meter support bracket. Secure the air cleaner clips and tighten the air flow meter to support bracket retaining nut (10 mm).

10. Connect the air flow meter and throttle plate switch electrical connectors.

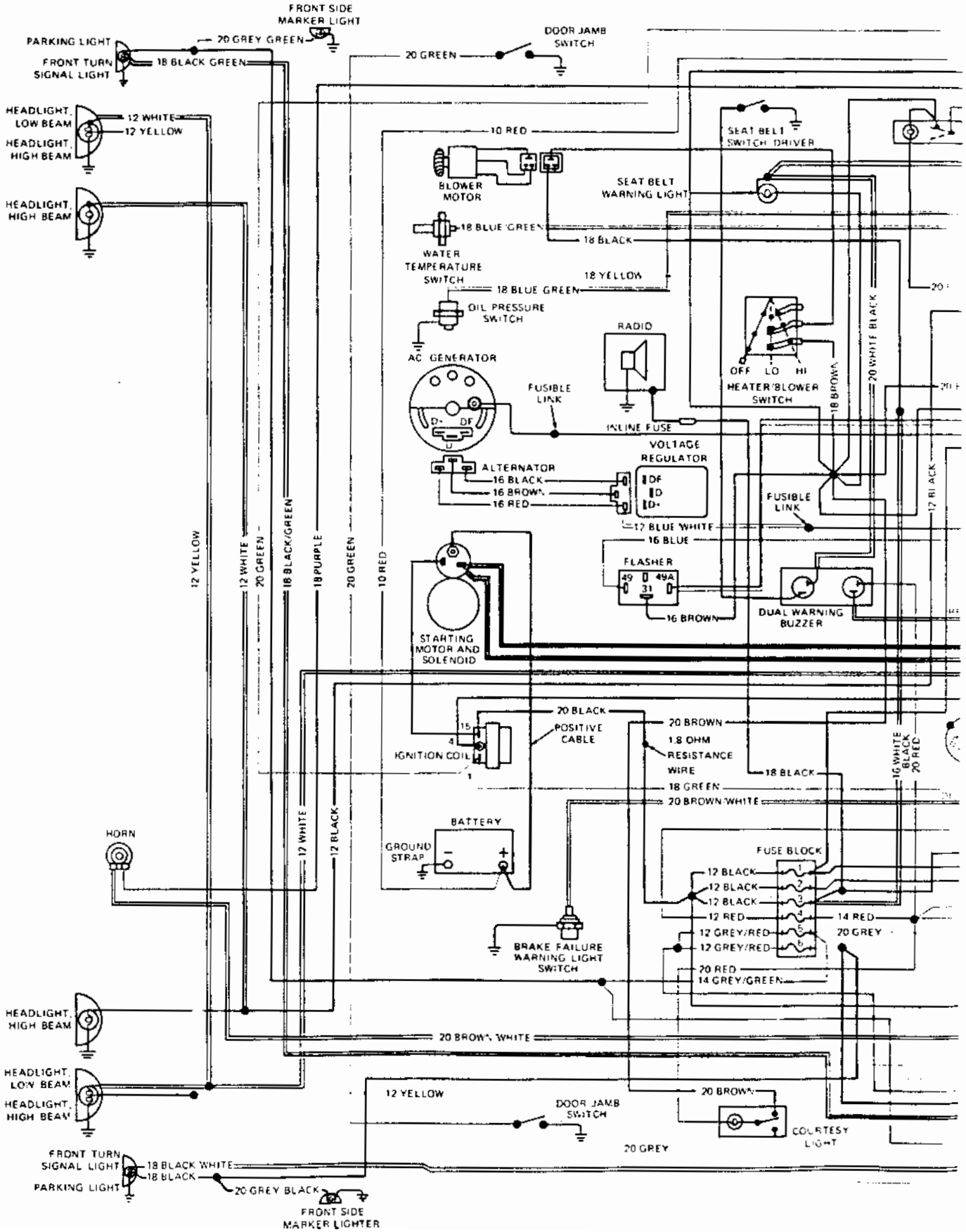
11. Connect battery.

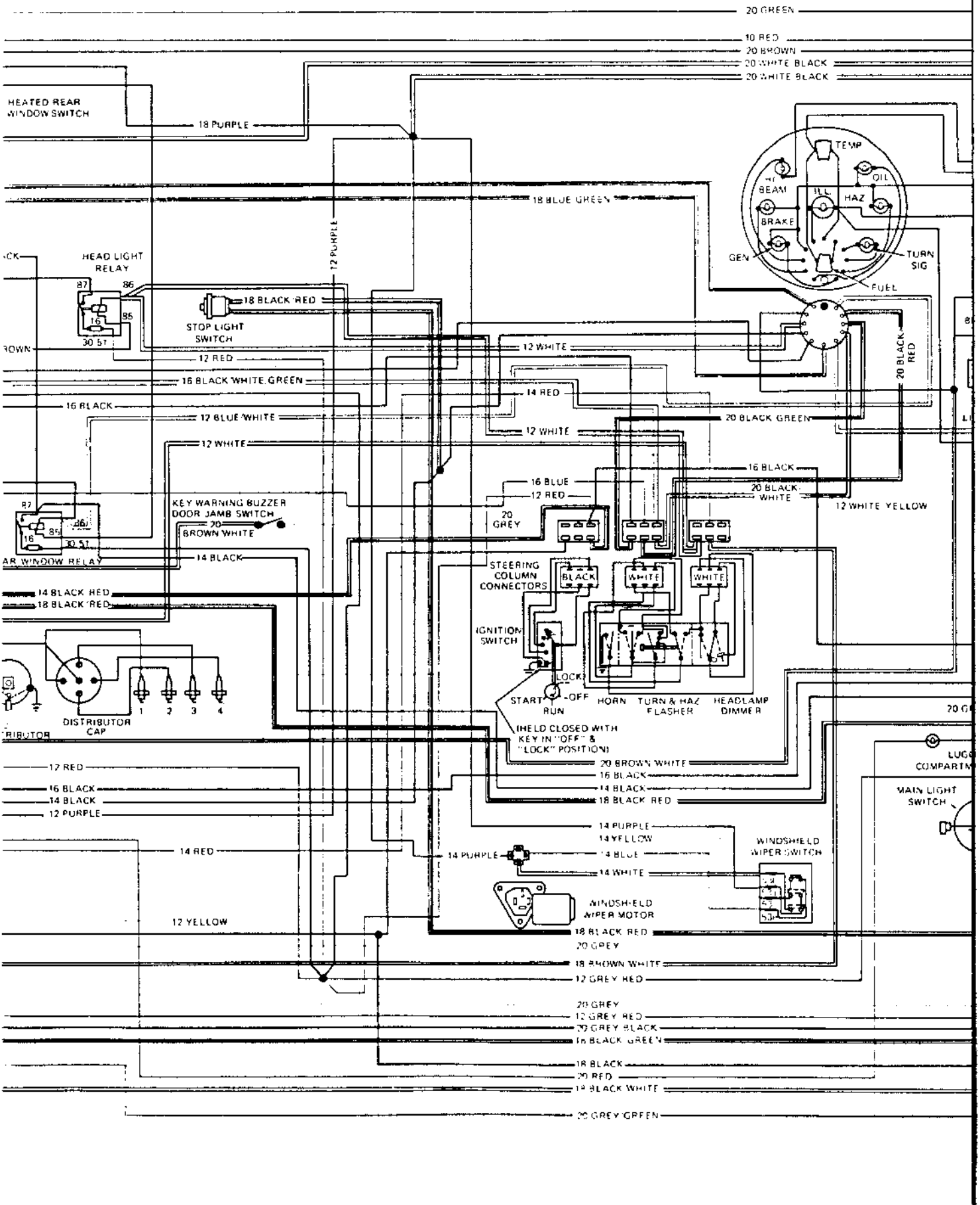
NOTE: If engine will not start, check the following:

A. Electrical connections for proper color code.

B. The two (2) ground wires that are connected to the stud on the rear of the intake manifold.

C. The coil input wire is connected (behind right kick panel).


FRONT SIDE MARKER LIGHT
PARKING LIGHT
FRONT TURN SIGNAL LIGHT
20 GREY GREEN
18 BLACK GREEN
DOOR JAMB SWITCH
20 GREEN
HEADLIGHT, LOW BEAM
HEADLIGHT, HIGH BEAM
12 WHITE
12 YELLOW
10 RED
SEAT BELT SWITCH DRIVER
BLOWER MOTOR
SEAT BELT WARNING LIGHT
18 BLUE GREEN
18 BLACK
WATER TEMPERATURE SWITCH
18 YELLOW
OIL PRESSURE SWITCH
RADIO
AC GENERATOR
FUSIBLE LINK
OFF LO HI
HEATER BLOWER SWITCH
INLINE FUSE
VOLTAGE REGULATOR
ALTERNATOR
16 BLACK
16 BROWN
16 RED
12 BLUE WHITE
16 BLUE
FLASHER
DUAL WARNING BUZZER
STARTING MOTOR AND SOLENOID
20 BLACK
POSITIVE CABLE
20 BROWN
1.8 OHM RESISTANCE WIRE
IGNITION COIL
18 GREEN
20 BROWN WHITE
BATTERY
GROUND STRAP
FUSE BLOCK
12 BLACK
12 RED
14 RED
12 GREY/RED
20 GREY
BRAKE FAILURE WARNING LIGHT SWITCH
20 RED
14 GREY/GREEN
HORN
20 BROWN WHITE
12 YELLOW
COURTESY LIGHT
18 BLACK WHITE
20 GREY BLACK
FRONT SIDE MARKER LIGHTER


20 GREEN
10 RED
20 BROWN
20 WHITE BLACK
20 WHITE BLACK
HEATED REAR WINDOW SWITCH
18 PURPLE
18 BLUE GREEN
12 PURPLE
HEAD LIGHT RELAY
87
86
16
85
30 51
18 BLACK RED
STOP LIGHT SWITCH
12 WHITE
12 RED
16 BLACK WHITE GREEN
14 RED
16 BLACK
12 BLUE WHITE
12 WHITE
20 BLACK GREEN
16 BLACK
16 BLUE
12 RED
20 GREY
KEY WARNING BUZZER DOOR JAMB SWITCH
20 BROWN WHITE
14 BLACK
14 BLACK RED
18 BLACK RED
STEERING COLUMN CONNECTORS
BLACK
WHITE
WHITE
IGNITION SWITCH
LOCK
START
RUN
OFF
HORN
TURN & HAZ FLASHER
HEADLAMP DIMMER
(HELD CLOSED WITH KEY IN "OFF" & "LOCK" POSITION)
DISTRIBUTOR CAP
1
2
3
4
12 RED
16 BLACK
14 BLACK
12 PURPLE
14 RED
12 YELLOW
20 BROWN WHITE
16 BLACK
14 BLACK
18 BLACK RED
14 PURPLE
14 YELLOW
14 BLUE
14 WHITE
WINDSHIELD WIPER SWITCH
WINDSHIELD WIPER MOTOR
18 BLACK RED
20 GREY
18 BROWN WHITE
12 GREY RED
20 GREY
12 GREY RED
20 GREY BLACK
18 BLACK GREEN
18 BLACK
20 RED
18 BLACK WHITE
20 GREY GREEN
TEMP
OIL
HI BEAM
ILL.
HAZ
BRAKE
GEN
TURN SIG
FUEL
20 BLACK RED
12 WHITE YELLOW
MAIN LIGHT SWITCH

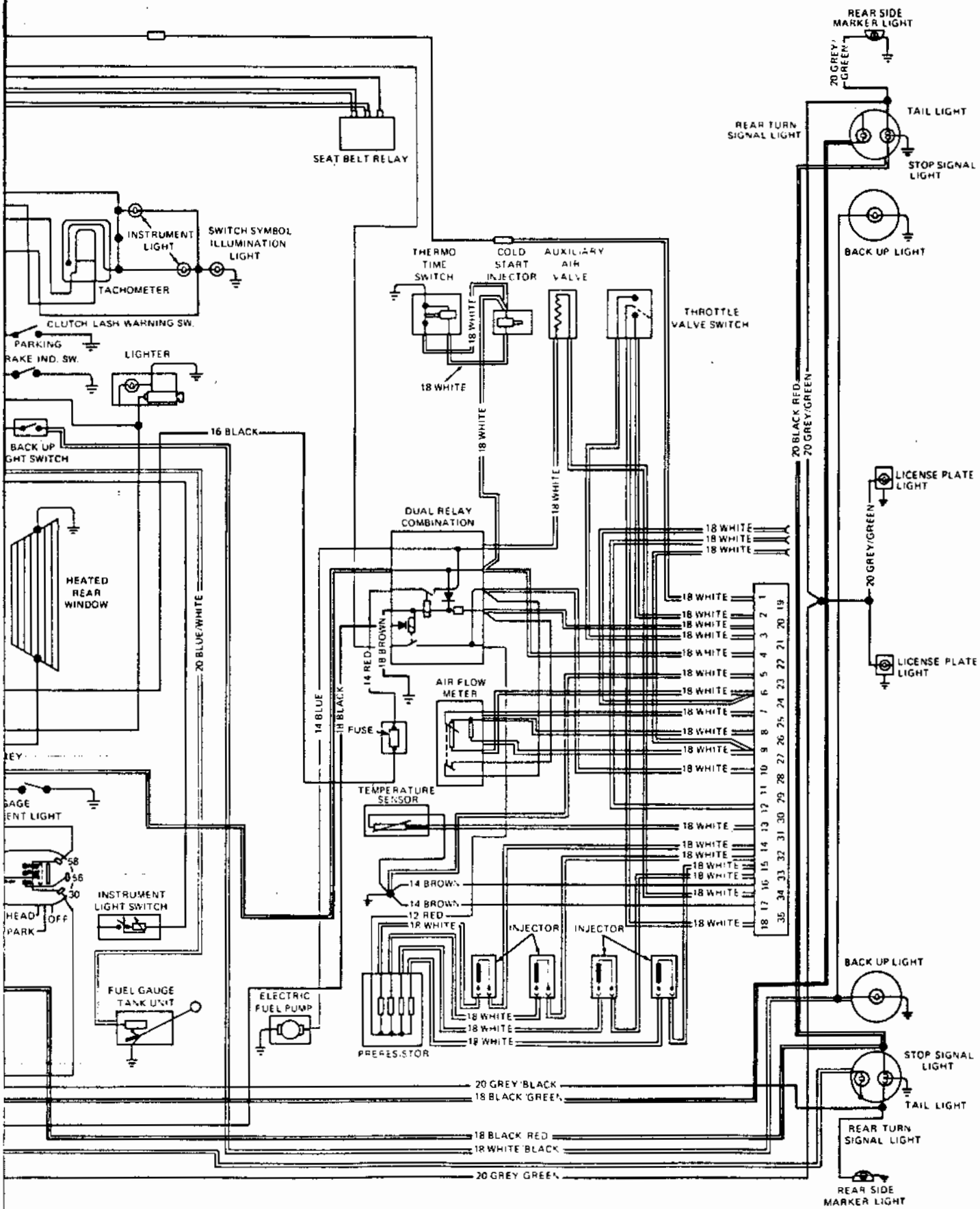
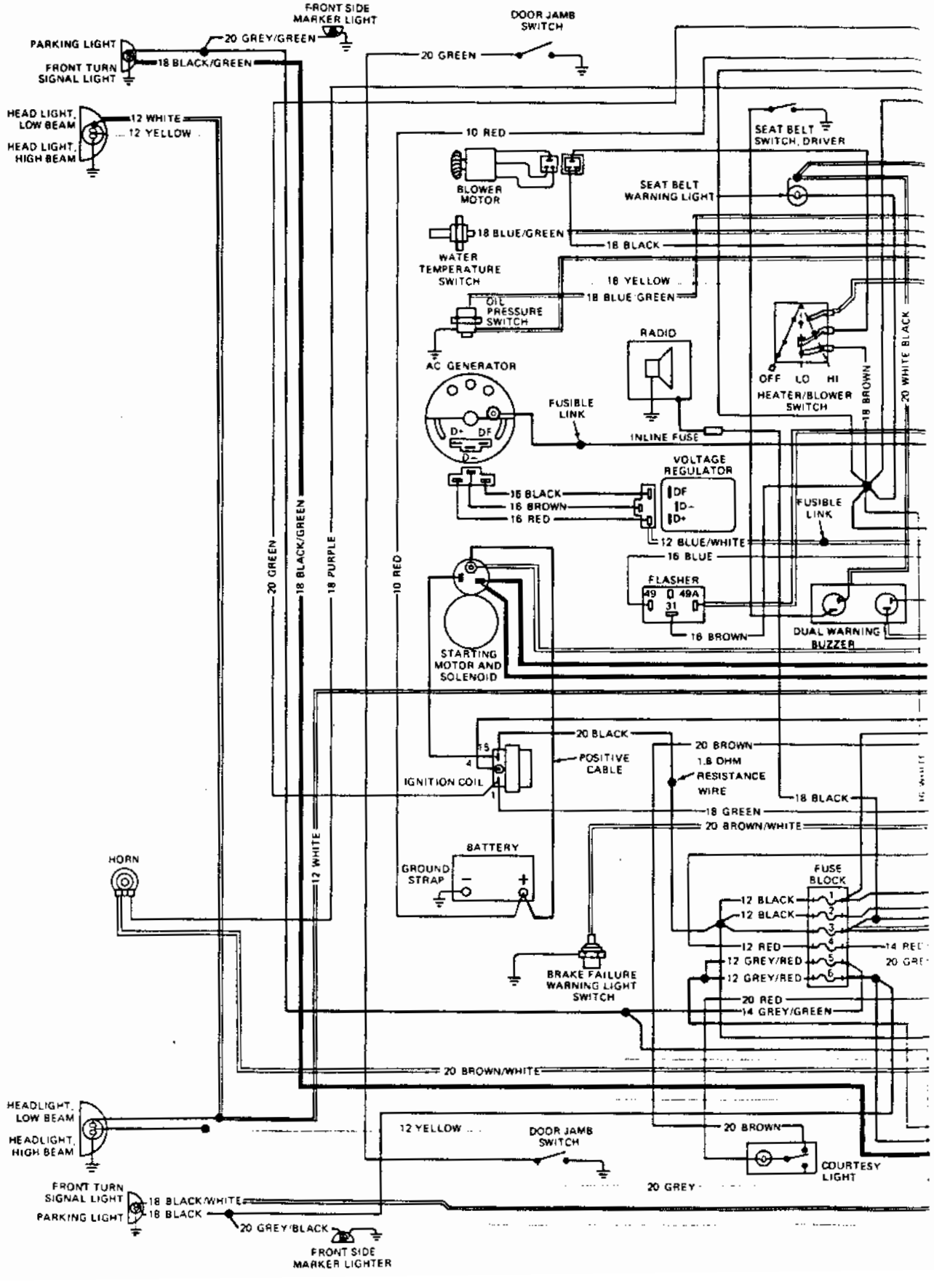
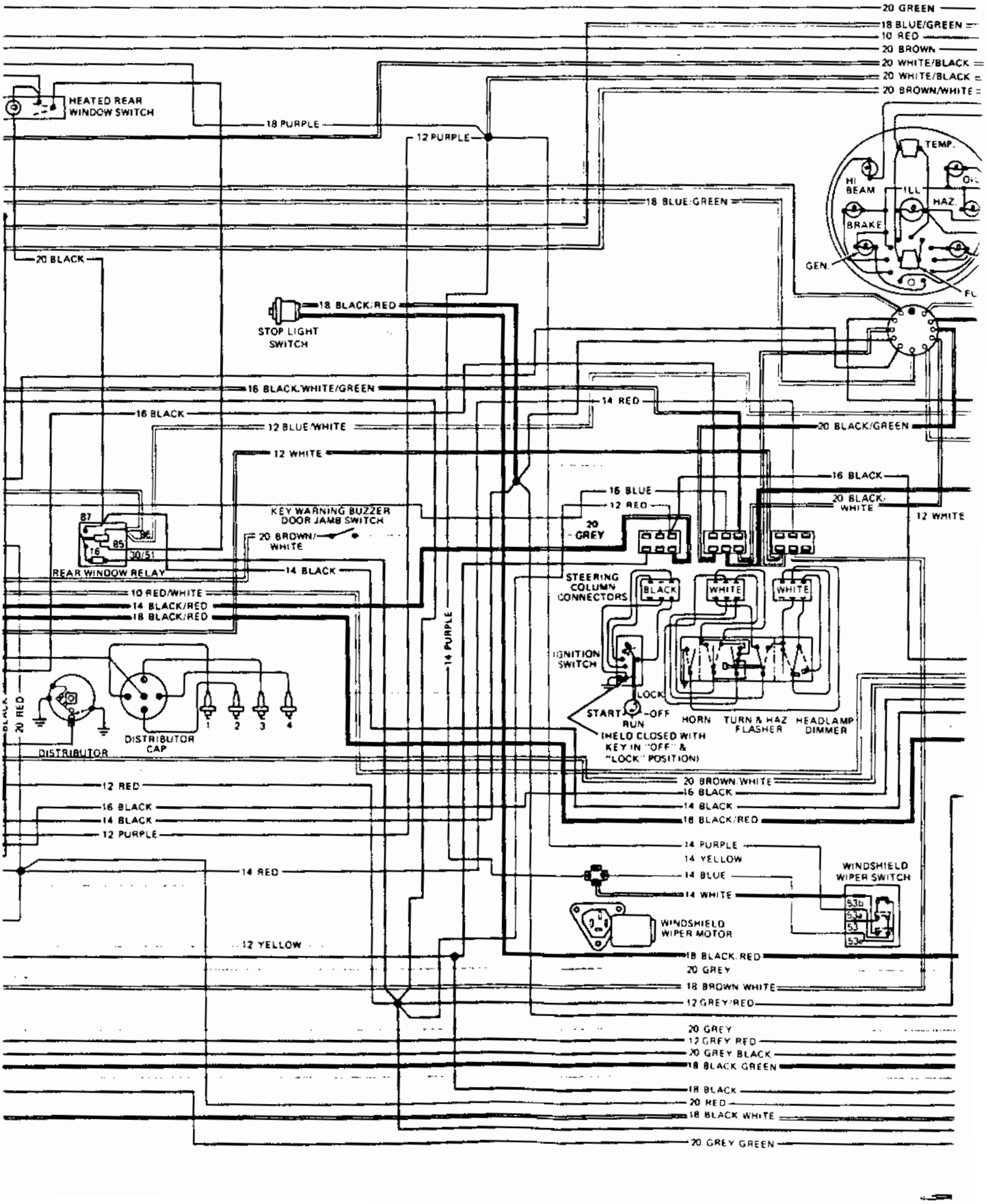


Figure 11-2 Model 51 Wiring Color Schematic


FRONT SIDE MARKER LIGHT
DOOR JAMB SWITCH
PARKING LIGHT
FRONT TURN SIGNAL LIGHT
20 GREY/GREEN
18 BLACK/GREEN
20 GREEN
HEAD LIGHT, LOW BEAM
HEAD LIGHT, HIGH BEAM
12 WHITE
12 YELLOW
10 RED
SEAT BELT SWITCH, DRIVER
BLOWER MOTOR
SEAT BELT WARNING LIGHT
18 BLUE/GREEN
18 BLACK
WATER TEMPERATURE SWITCH
18 YELLOW
18 BLUE/GREEN
OIL PRESSURE SWITCH
RADIO
AC GENERATOR
OFF LO HI
HEATER/BLOWER SWITCH
18 BROWN
20 WHITE/BLACK
FUSIBLE LINK
INLINE FUSE
D+ DF D-
VOLTAGE REGULATOR
16 BLACK
16 BROWN
16 RED
DF
D-
D+
12 BLUE/WHITE
16 BLUE
FUSIBLE LINK
FLASHER
49 49A 31
16 BROWN
DUAL WARNING BUZZER
STARTING MOTOR AND SOLENOID
20 BLACK
20 BROWN
1.8 OHM RESISTANCE WIRE
POSITIVE CABLE
IGNITION COIL
18 BLACK
18 GREEN
20 BROWN/WHITE
HORN
BATTERY
GROUND STRAP
FUSE BLOCK
12 BLACK
12 BLACK
12 RED
12 GREY/RED
12 GREY/RED
14 RED
20 GRE
BRAKE FAILURE WARNING LIGHT SWITCH
20 RED
14 GREY/GREEN
20 BROWN/WHITE
HEADLIGHT, LOW BEAM
HEADLIGHT, HIGH BEAM
12 YELLOW
DOOR JAMB SWITCH
20 BROWN
COURTESY LIGHT
20 GREY
FRONT TURN SIGNAL LIGHT
PARKING LIGHT
18 BLACK/WHITE
18 BLACK
20 GREY/BLACK
FRONT SIDE MARKER LIGHTER
20 GREEN
18 BLACK/GREEN
18 PURPLE
10 RED
12 WHITE


20 GREEN
18 BLUE/GREEN
10 RED
20 BROWN
20 WHITE/BLACK
20 WHITE/BLACK
20 BROWN/WHITE
HEATED REAR WINDOW SWITCH
18 PURPLE
12 PURPLE
18 BLUE/GREEN
TEMP.
HI BEAM
ILL
HAZ.
BRAKE
GEN.
20 BLACK
18 BLACK/RED
STOP LIGHT SWITCH
16 BLACK/WHITE/GREEN
14 RED
16 BLACK
12 BLUE/WHITE
20 BLACK/GREEN
12 WHITE
16 BLUE
12 RED
20 GREY
16 BLACK
20 BLACK/WHITE
12 WHITE
KEY WARNING BUZZER DOOR JAMB SWITCH
20 BROWN/WHITE
87
86
85
16
30/51
REAR WINDOW RELAY
14 BLACK
10 RED/WHITE
14 BLACK/RED
18 BLACK/RED
STEERING COLUMN CONNECTORS
BLACK
WHITE
WHITE
IGNITION SWITCH
LOCK
START
OFF
RUN
HORN
TURN & HAZ FLASHER
HEADLAMP DIMMER
(HELD CLOSED WITH KEY IN "OFF" & "LOCK" POSITION)
14 PURPLE
20 RED
BLACK
DISTRIBUTOR
DISTRIBUTOR CAP
1
2
3
4
20 BROWN/WHITE
16 BLACK
14 BLACK
18 BLACK/RED
12 RED
16 BLACK
14 BLACK
12 PURPLE
14 PURPLE
14 YELLOW
14 RED
14 BLUE
14 WHITE
WINDSHIELD WIPER SWITCH
53b
53a
53
53e
WINDSHIELD WIPER MOTOR
12 YELLOW
18 BLACK/RED
20 GREY
18 BROWN/WHITE
12 GREY/RED
20 GREY
12 GREY/RED
20 GREY/BLACK
18 BLACK/GREEN
18 BLACK
20 RED
18 BLACK/WHITE
20 GREY/GREEN

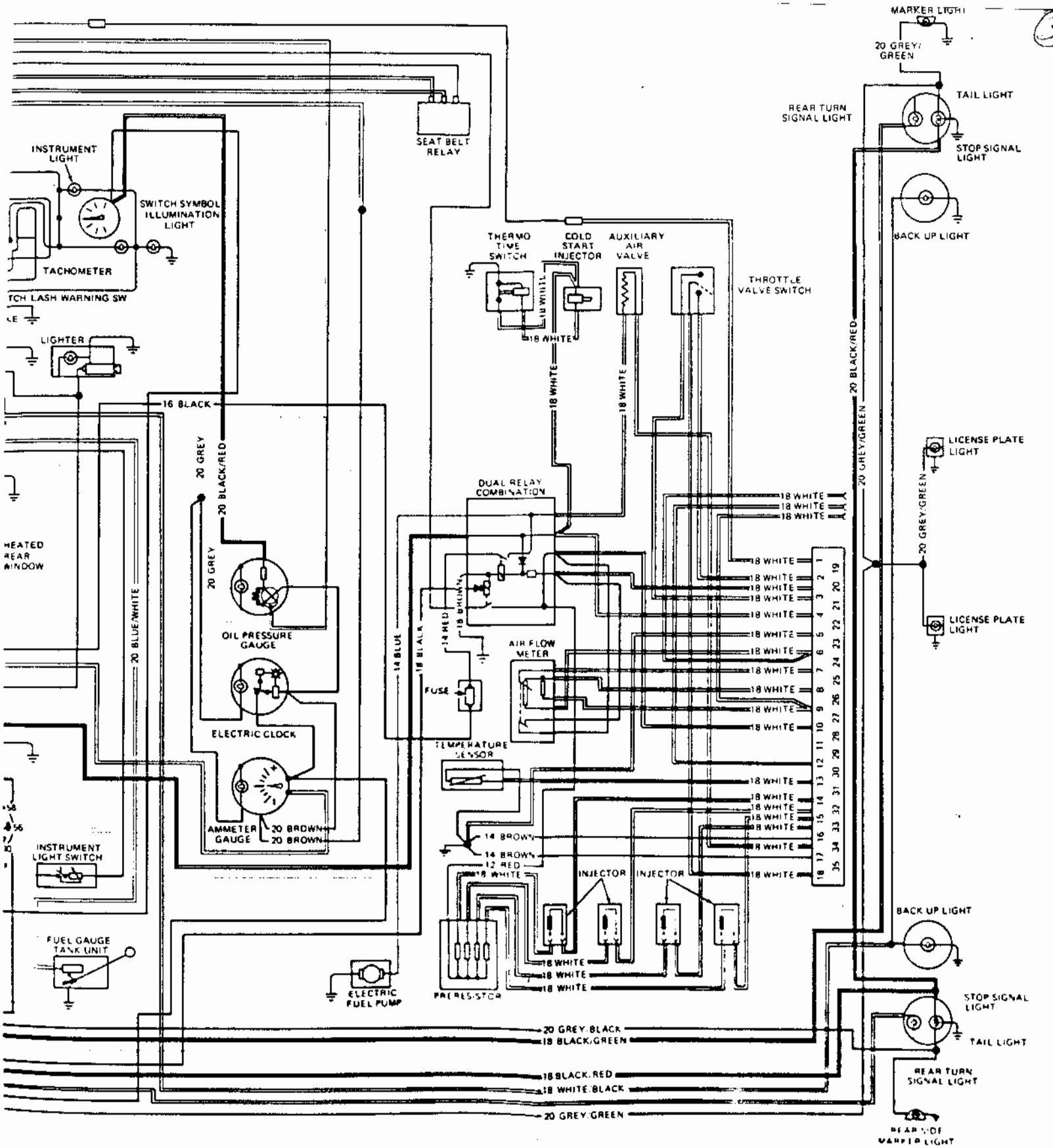
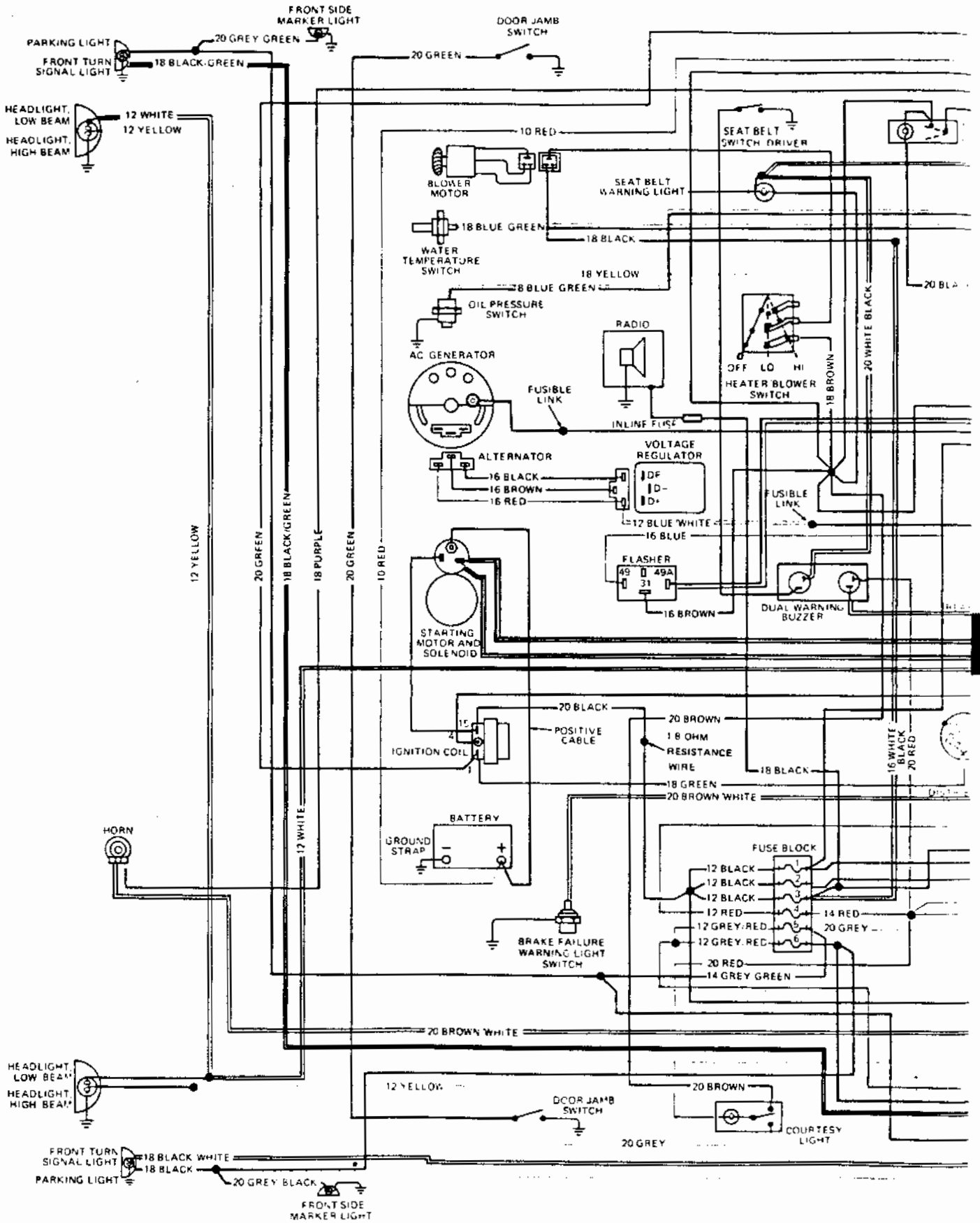
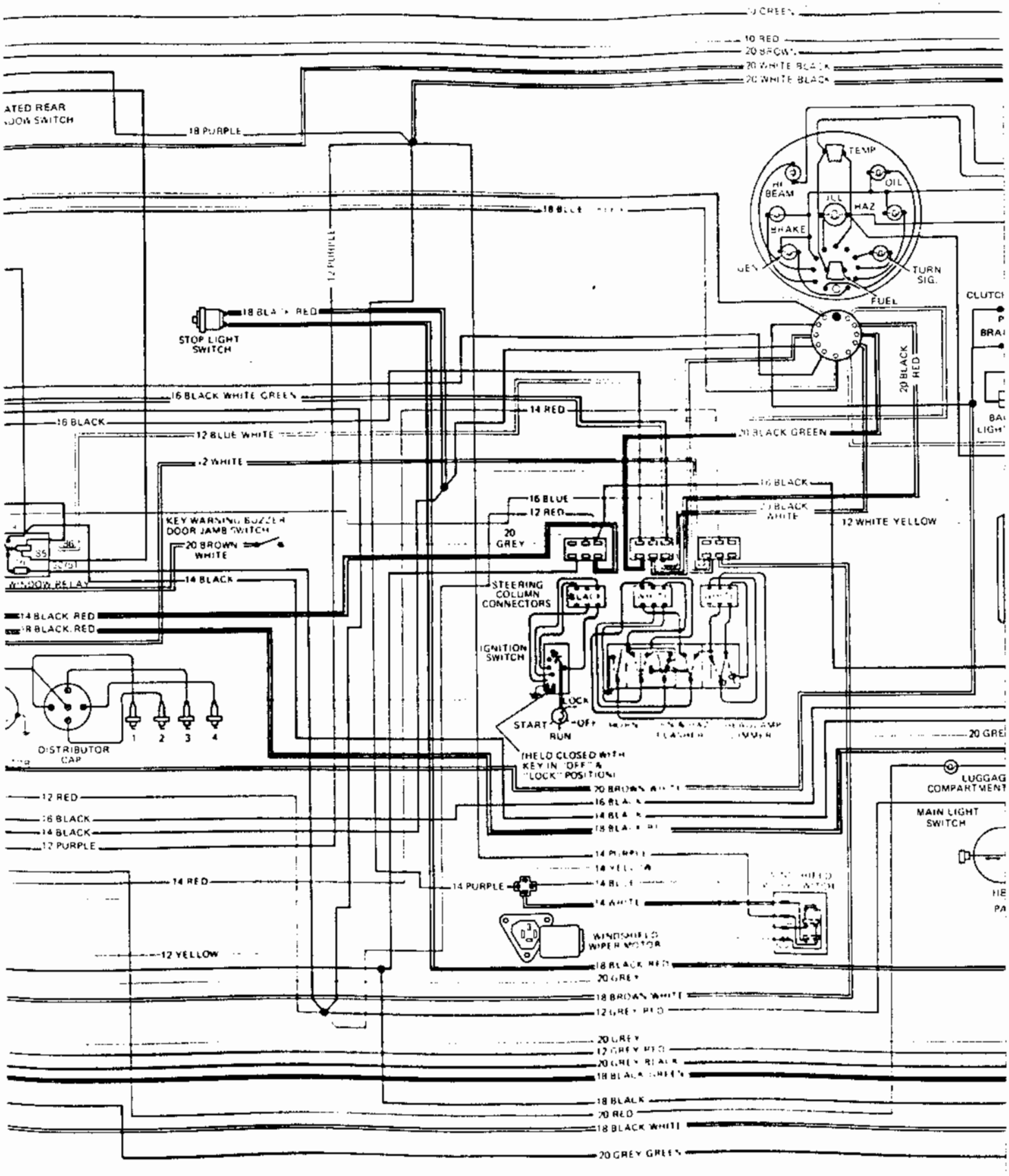


Figure 11-3 Model 54 Wiring Color Schematic


FRONT SIDE MARKER LIGHT
DOOR JAMB SWITCH
PARKING LIGHT
FRONT TURN SIGNAL LIGHT
20 GREY GREEN
18 BLACK GREEN
20 GREEN
HEADLIGHT, LOW BEAM
HEADLIGHT, HIGH BEAM
12 WHITE
12 YELLOW
10 RED
SEAT BELT SWITCH DRIVER
BLOWER MOTOR
SEAT BELT WARNING LIGHT
18 BLUE GREEN
WATER TEMPERATURE SWITCH
18 BLACK
18 YELLOW
OIL PRESSURE SWITCH
RADIO
AC GENERATOR
OFF LO HI
HEATER BLOWER SWITCH
FUSIBLE LINK
INLINE FUSE
20 WHITE BLACK
18 BROWN
ALTERNATOR
VOLTAGE REGULATOR
16 BLACK
16 BROWN
16 RED
DF
D-
D+
12 BLUE WHITE
16 BLUE
FLASHER
49
49A
31
16 BROWN
DUAL WARNING BUZZER
STARTING MOTOR AND SOLENOID
20 BLACK
20 BROWN
POSITIVE CABLE
18 OHM RESISTANCE WIRE
IGNITION COIL
18 BLACK
18 GREEN
20 BROWN WHITE
16 WHITE
BLACK
20 RED
BATTERY
GROUND STRAP
HORN
FUSE BLOCK
12 BLACK
12 BLACK
12 BLACK
12 RED
12 GREY RED
12 GREY RED
14 RED
20 GREY
20 RED
14 GREY GREEN
BRAKE FAILURE WARNING LIGHT SWITCH
12 YELLOW
18 BLACK/GREEN
18 PURPLE
20 GREEN
12 WHITE
20 BROWN WHITE
20 BROWN
DOOR JAMB SWITCH
COURTESY LIGHT
20 GREY
FRONT TURN SIGNAL LIGHT
PARKING LIGHT
18 BLACK WHITE
18 BLACK
20 GREY BLACK
FRONT SIDE MARKER LIGHT


20 GREEN
10 RED
20 BROWN
20 WHITE BLACK
20 WHITE BLACK
18 PURPLE
12 PURPLE
18 BLUE
TEMP
OIL
HI BEAM
ILL
HAZ
BRAKE
GEN
TURN SIG.
FUEL
18 BLACK RED
STOP LIGHT SWITCH
16 BLACK WHITE GREEN
16 BLACK
12 BLUE WHITE
14 RED
20 BLACK GREEN
20 BLACK RED
12 WHITE
16 BLACK
16 BLUE
12 RED
20 GREY
20 BLACK WHITE
12 WHITE YELLOW
KEY WARNING BUZZER DOOR JAMB SWITCH
20 BROWN WHITE
14 BLACK
14 BLACK RED
18 BLACK RED
STEERING COLUMN CONNECTORS
IGNITION SWITCH
LOCK
START
OFF
RUN
HELD CLOSED WITH KEY IN "OFF" & "LOCK" POSITION
DISTRIBUTOR CAP
1
2
3
4
20 GREY
LUGGAGE COMPARTMENT
MAIN LIGHT SWITCH
12 RED
16 BLACK
14 BLACK
12 PURPLE
14 RED
14 PURPLE
14 WHITE
WINDSHIELD WIPER MOTOR
12 YELLOW
18 BLACK RED
20 GREY
18 BROWN WHITE
12 GREY RED
20 GREY
12 GREY RED
20 GREY BLACK
18 BLACK GREEN
18 BLACK
20 RED
18 BLACK WHITE
20 GREY GREEN

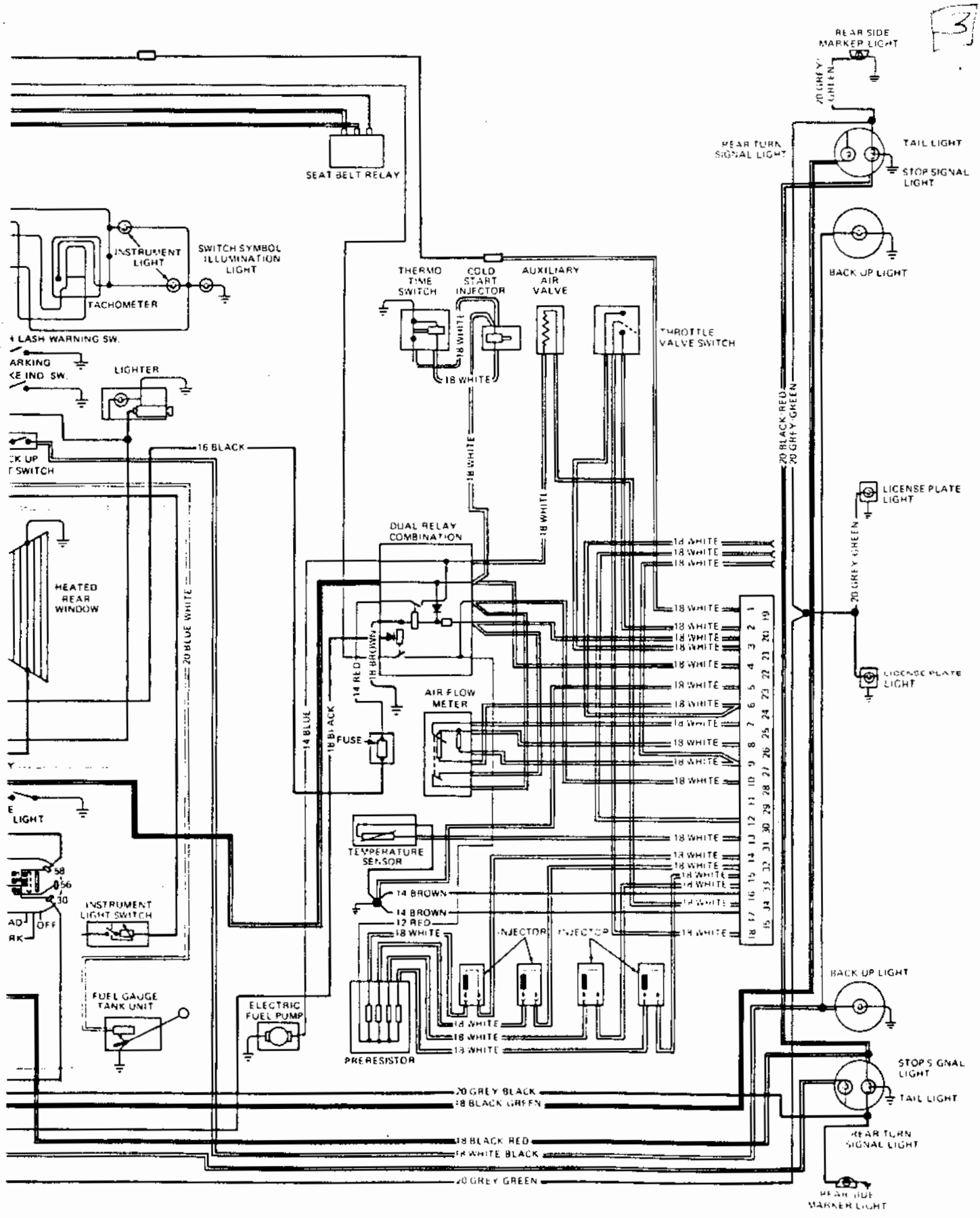


Figure 11-4 Model 57 Wiring Color Schematic

GROUP 2

BODY AND BUMPERS

GROUP 3

SUSPENSION AND STEERING

FRONT SUSPENSION

MAINTENANCE AND ADJUSTMENTS

FRONT WHEEL BEARING ADJUSTMENT

1. Raise front of car, remove grease cap, cotter pin, and spindle nut. Discard cotter pin.

2. Torque spindle nut to 18 lb. ft. while rotating wheel. This will allow the bearing to settle.

3. Back off spindle nut 1/4 turn. If slot in nut is not aligned with a hole, DO NOT TIGHTEN. Back off nut until the next slot is in alignment with the next hole in the spindle (up to 1/20 additional turn) install a new cotter pin.

A properly adjusted wheel bearing has a small amount of end play and loose flat washer when adjusted in the above manner.

FRONT END ALIGNMENT

SPECIFICATIONS

WHEEL ALIGNMENT SPECIFICATIONS

CASTER	CAMBER	TOE-IN	OUTER WHEEL WITH INNER WHEEL AT 20°
*+3° to +6°	+1/4° to -1 1/4°	1/8" ± 1/32"	19 1/4°

**Variation from left to right - 1° max.*

WHEELS AND TIRES

CONTENTS

DESCRIPTION AND OPERATION

WHEELS

Standard wheels are of steel construction. The center or spider and rim are joined by spot welds or rivets. Wheels are attached with 4 right hand threaded nuts. Replacement wheels must be equivalent to original equipment wheels in load capacity, diameter, rim width, and offset.

USE OF TIRE CHAINS

Tire chains may be used on the rear wheels of all models equipped with standard size tires provided there is enough clearance. Do not use tire chains on the front wheels as they may interfere with steering.

TIRES

The factory installed tires are designed to operate with loads up to the full rated load capacity, when inflated to the recommended pressures. Correct tire pressures and driving habits have an important influence on tire life. When replacement is necessary, the original equipment type tire should be used. Refer to the Tire Inflation placard on the car.

TIRE SIZE

Tire size is indicated by a combination of numbers and letters such as 165 SR-13. The first number (165) refers to the approximate cross section width of an inflated tire in millimetres. The letter S stands for a European performance specification and the R means the tire is a radial. The last number (13) is the inner diameter of the tire.

REPLACEMENT TIRES

When replacing tires, only the size, load range, and construction type (bias, bias-belted, or radial) originally installed on the vehicle are recommended. Use of any other tire size or type tire may seriously affect ride, handling, speedometer/odometer calibration, vehicle ground clearance and tire clearance to the body and chassis. The following also should be considered when replacing tires:

1. Because of possible adverse effects on vehicle handling, do not mix radial ply tires with other type tires on the same vehicle.

2. It is recommended that new tires be installed in pairs on the same axle.

3. When replacing only one tire, it should be paired with the tire having the most tread, to equalize braking traction and be of the same make and size.

DIAGNOSIS

IRREGULAR AND/OR PREMATURE WEAR

Irregular and premature wear has many causes. Some of them are: incorrect inflation pressures, lack of tire rotation, driving habits, improper alignment.

If the following conditions are noted, rotation is in order:

1. Front tire wear is different from rear.

2. Uneven wear exists across the tread of any tire.

3. Left front and right front tire wear is unequal.

4. Left rear and right rear tire wear is unequal.

5. There is cupping, flat spotting, etc.

A wheel alignment check is in order if the following conditions are noted:

1. Left front and right front tire wear is unequal.

2. Wear is uneven across the tread of any front tire.

3. Front tires' treads have scuffed appearance with "feather" edges on one side of tread ribs or blocks.

WEAR INDICATORS

The original equipment tires have built-in tread wear indicators to show when tires need replacement. These indicators will appear as 1/2 inch wide bands when the tire tread depth becomes 1/16 of an inch. When the indicators appear in two or more adjacent grooves, at three locations around the tires, or when cord or fabric is exposed, tire replacement due to tread wear is recommended. Figure 3G-1.

Figure 3G-1 Wear Indicators Showing

VIBRATION

Correcting tire balance and radial force variation solves 95% of car vibration problems. Wheel and tire out of balance causes 75% of highway speed vibrations, so balance should be checked first.

Radial Force Variation

For a tire-wheel assembly to cause car vibration, it must first cause movement in the spindle or axle of the car. The spindle or axle of car must be moved before the car can "feel" a vibration.

Think of a "perfectly" round tire as a number of identical "springs" (Figure 3G-2). As the tire and wheel rotate, each one of these springs contacts the road and flexes.

If the amount of flexing of each spring is uniform as the tire rolls over the smooth road surface, it does not cause the spindle to move. As long as all the spring have the same stiffness the spindle will

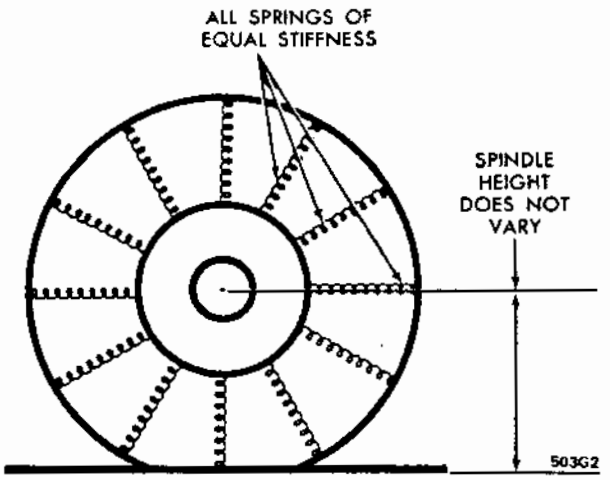


Figure 3G-2

not be moved and thus the car will not "feel" any vibration.

If one of these springs is stiffer than the others, and the tire comes into contact with the road at this stiffer point, Figure 3G-3, the spindle will move upward because the stiffer spring does not "give" as much as the other springs in the tire.

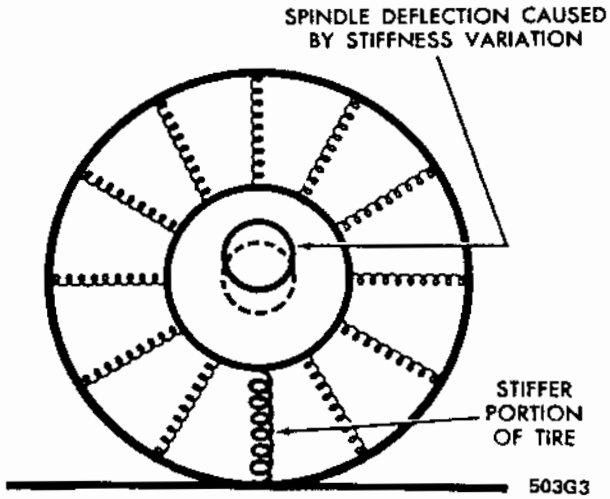


Figure 3G-3

Loaded Radial Runout

As the tire revolves faster, this spindle movement speeds up. At highway speed, it matches the resonant frequency of most cars' suspension systems and causes a shake-type ride or car vibration.

The differences in the stiffness of the tire is called tire "radial force variation" and is a cause of vehicle vibration. The more the spindle movement (loaded radial runout), the more the car will vibrate.

Lateral Force Variation (Radial Tire Waddle)

Complaint Description

Waddle is side to side movement at the front and/or rear of the car. Figure 3G-4. It is caused by the steel belt not being straight within the tire. It is most noticeable at low speed, 5 to 30 MPH. It may also appear as a ride roughness at 50 to 70 MPH.

It is possible to road test a car and tell on which end of the car the faulty tire is located. If the waddle tire is on the rear, the rear end of the car will shake from side to side or "waddle". From the driver's seat it feels as though someone is pushing on the side of the car.

If the faulty tire is on the front, the waddle is more visual. The front sheet metal appears to be moving back and forth and the driver feels as though he is at the pivot point in the car.

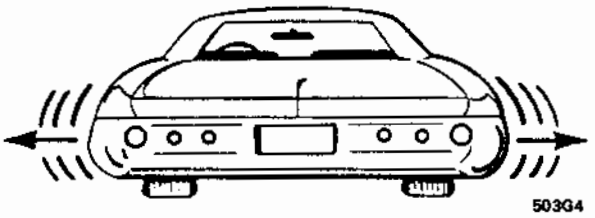


Figure 3G-4 Waddle Condition

LEAD

"Lead", is the straying of the vehicle from a straight path on a level road with no pressure on steering wheel.

Lead is usually caused by these conditions: (1) alignment, (2) uneven brake adjustment, and (3) tire construction. This diagnosis relates how to tell between tire lead and the need for alignment correction.

The way in which a tire is built can produce lead in a vehicle. An example of this is placement of the belt. Off center belts on radial tires can cause the tire to develop a side force while rolling straight down the road. If one side of the tire is a little larger diameter than the other, the tire will tend to roll to one side. This will develop a side force which can produce vehicle lead.

The procedure in Fig. 3G-13 should be used to make sure that front alignment is not mistaken for tire lead.

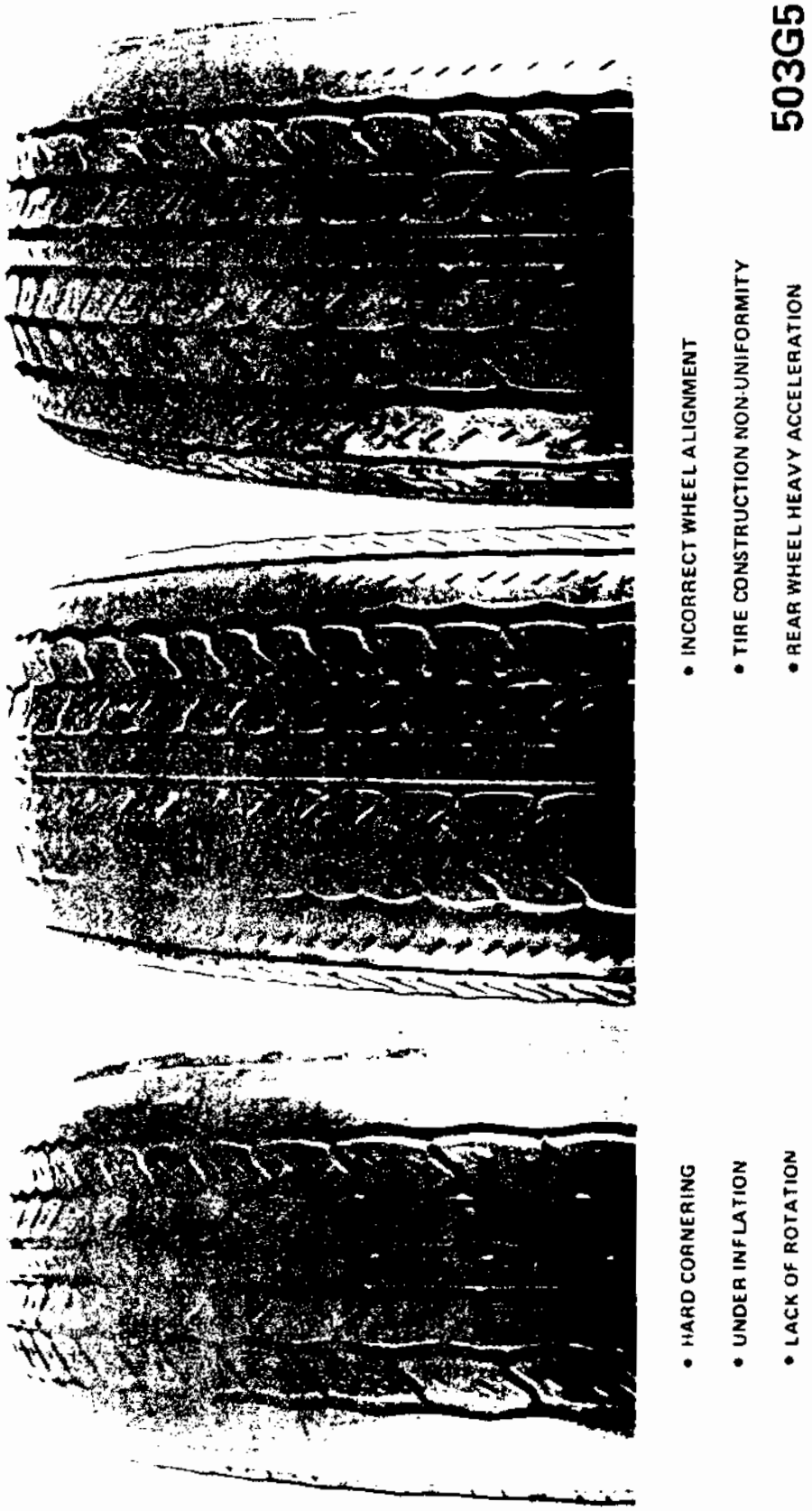


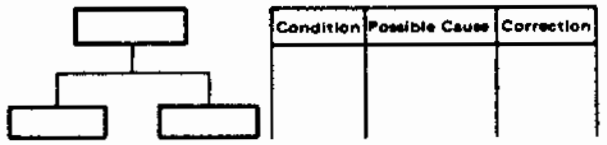
Figure 3G-5 Examples of Tire Wear

DIAGNOSIS CHARTS

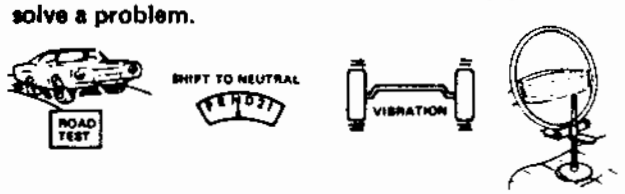
Using the TPD for RADIAL-LATERAL VIBRATION

Introduction

This section presents a systematic method of diagnosing and troubleshooting RADIAL--LATERAL VIBRATION. The charts you will be using are different from the ones you have used before. They aren't "go—no go" decision trees or tables.



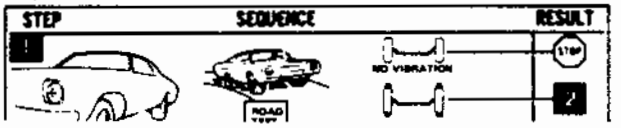
Instead the new diagnosis and troubleshooting charts use pictures plus a few words to help you solve a problem.



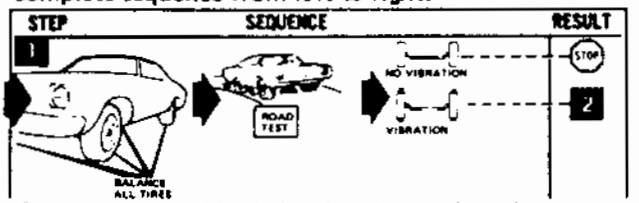
and symbols have replaced words.

Using the Charts

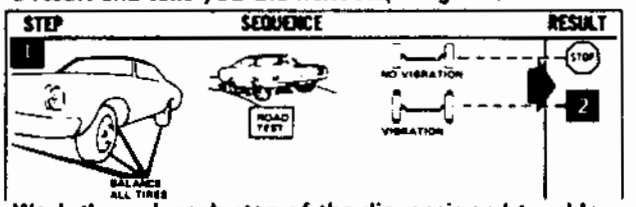
The charts are divided into three sections: step, sequence and result.



Always start at the first step and go through the complete sequence from left to right.



A sequence could be balancing tires and road testing for vibration. Each sequence ends with a result and tells you the next step to go to.



Work through each step of the diagnosis and trouble-shooting charts till the system is repaired. STOP

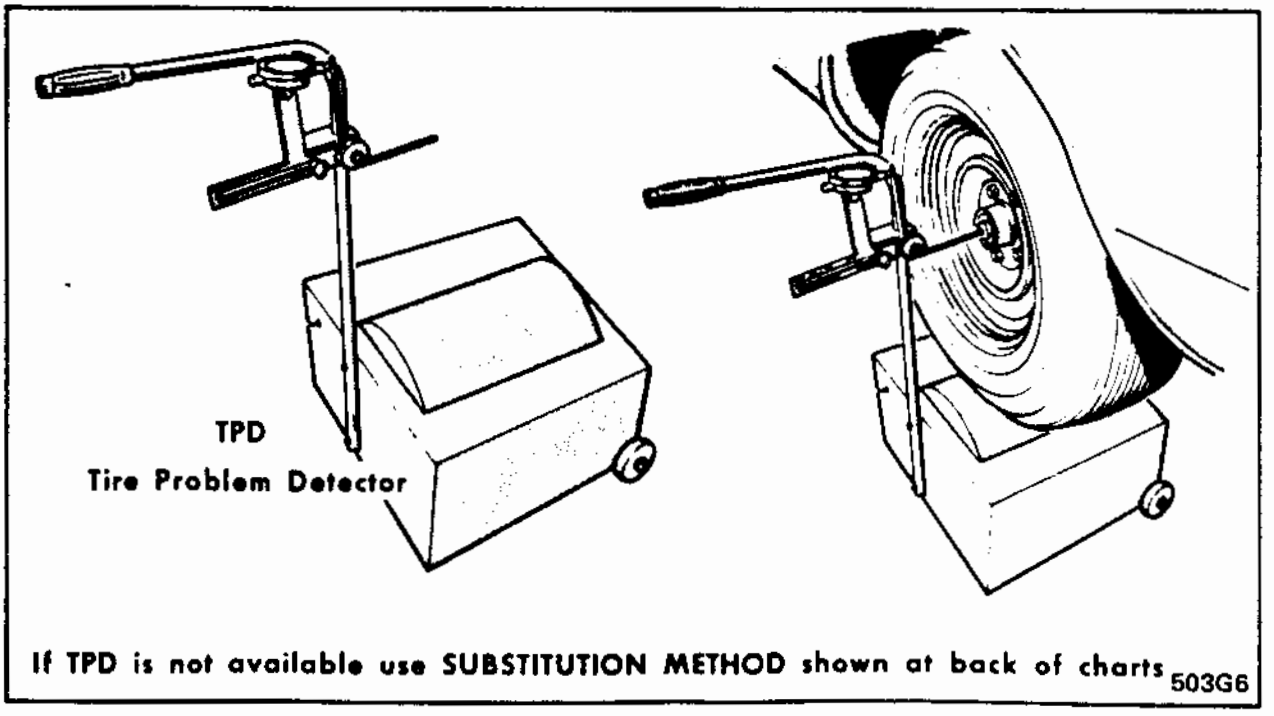


Figure 3G-6

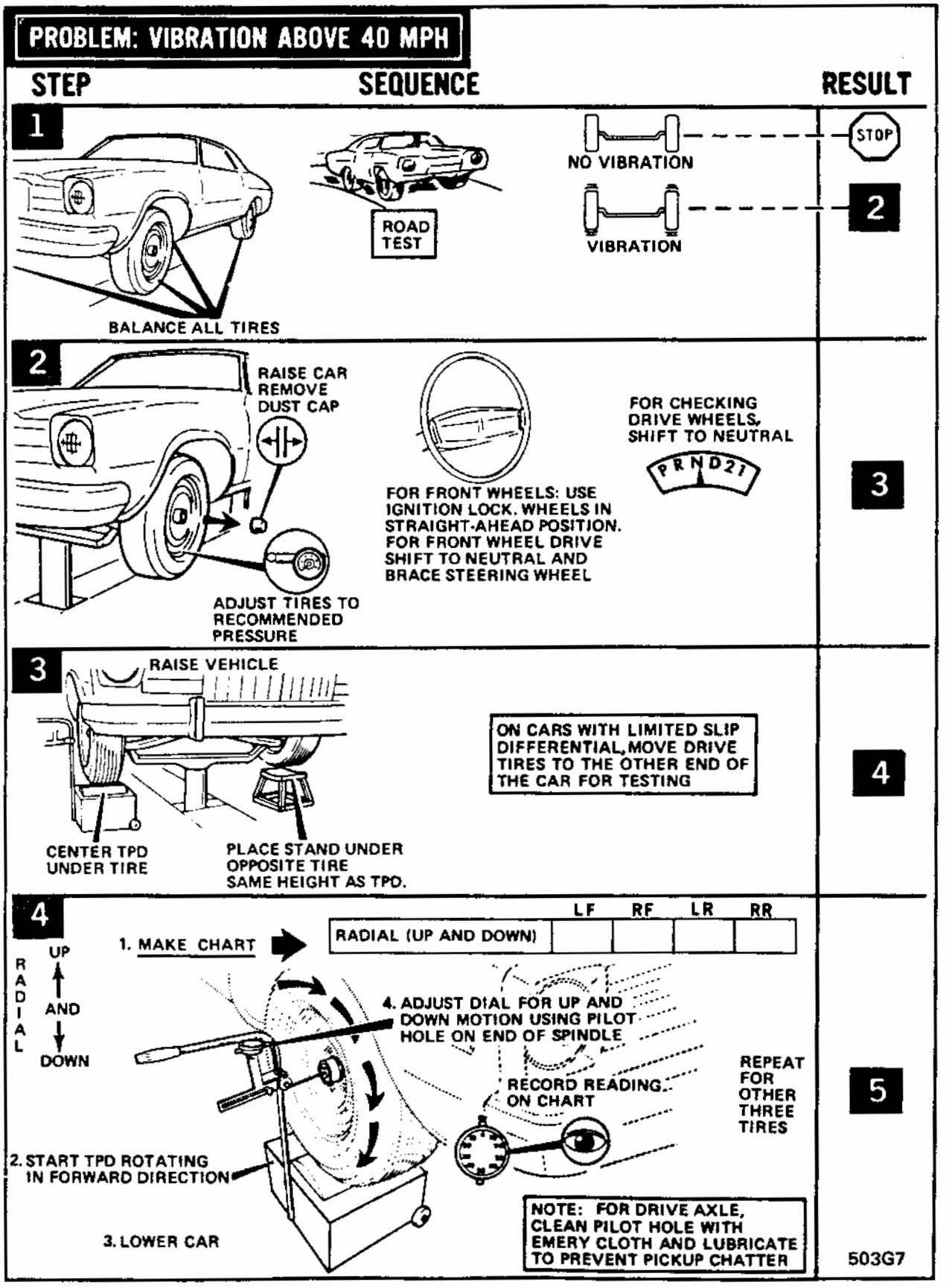

PROBLEM: VIBRATION ABOVE 40 MPH
STEP
SEQUENCE
RESULT
1
BALANCE ALL TIRES
ROAD TEST
NO VIBRATION
STOP
VIBRATION
2
2
RAISE CAR
REMOVE DUST CAP
ADJUST TIRES TO RECOMMENDED PRESSURE
FOR FRONT WHEELS: USE IGNITION LOCK. WHEELS IN STRAIGHT-AHEAD POSITION. FOR FRONT WHEEL DRIVE SHIFT TO NEUTRAL AND BRACE STEERING WHEEL
FOR CHECKING DRIVE WHEELS, SHIFT TO NEUTRAL
P R N D 2 1
3
3
RAISE VEHICLE
CENTER TPD UNDER TIRE
PLACE STAND UNDER OPPOSITE TIRE SAME HEIGHT AS TPD.
ON CARS WITH LIMITED SLIP DIFFERENTIAL, MOVE DRIVE TIRES TO THE OTHER END OF THE CAR FOR TESTING
4
4
LF RF LR RR
RADIAL (UP AND DOWN)
1. MAKE CHART
RADIAL
UP
AND
DOWN
2. START TPD ROTATING IN FORWARD DIRECTION
3. LOWER CAR
4. ADJUST DIAL FOR UP AND DOWN MOTION USING PILOT HOLE ON END OF SPINDLE
RECORD READING ON CHART
REPEAT FOR OTHER THREE TIRES
5
NOTE: FOR DRIVE AXLE, CLEAN PILOT HOLE WITH EMERY CLOTH AND LUBRICATE TO PREVENT PICKUP CHATTER
503G7

Figure 3G-7

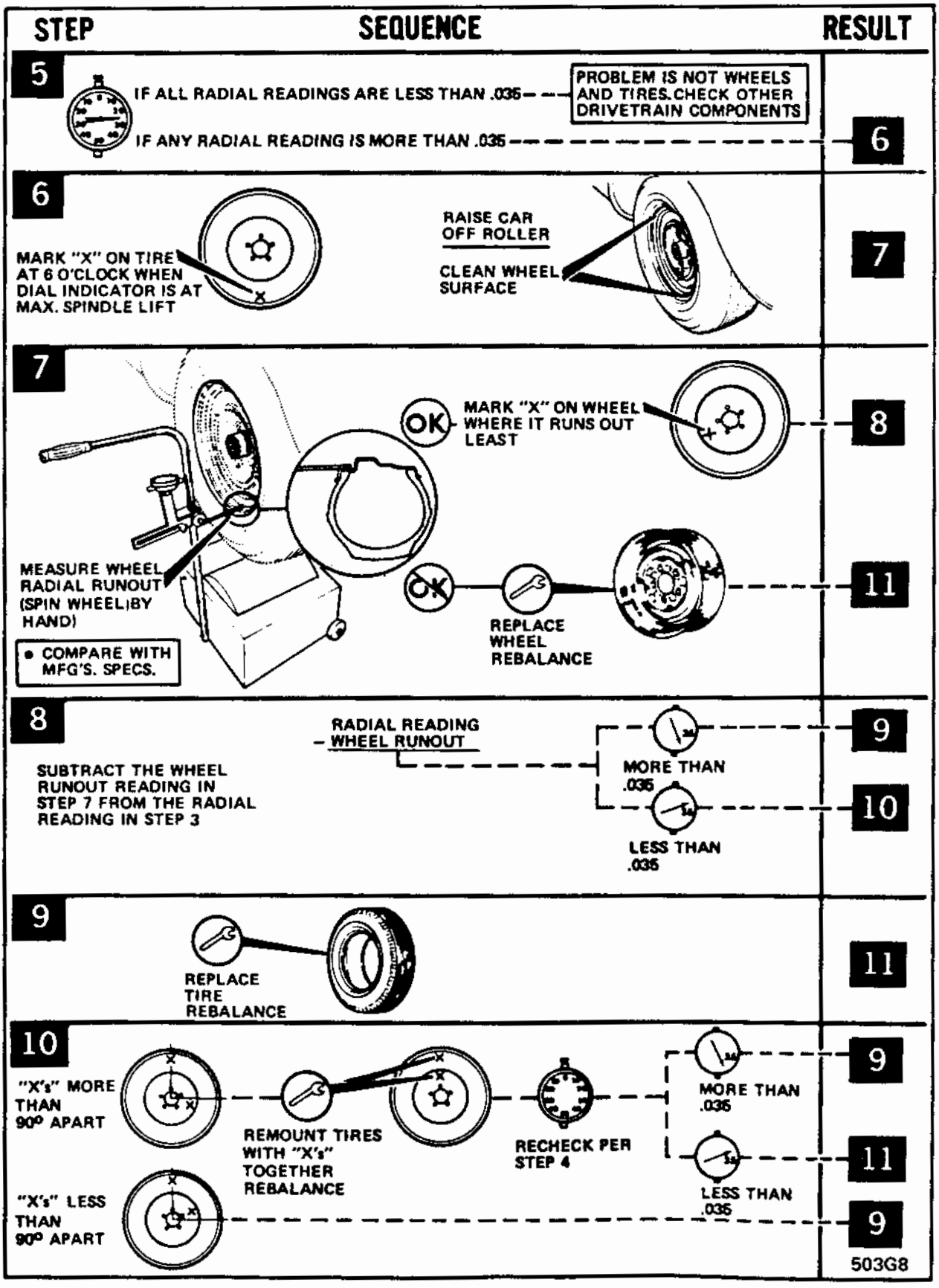

STEP
SEQUENCE
RESULT
5
IF ALL RADIAL READINGS ARE LESS THAN .035
PROBLEM IS NOT WHEELS AND TIRES. CHECK OTHER DRIVETRAIN COMPONENTS
IF ANY RADIAL READING IS MORE THAN .035
6
6
MARK "X" ON TIRE AT 6 O'CLOCK WHEN DIAL INDICATOR IS AT MAX. SPINDLE LIFT
RAISE CAR OFF ROLLER
CLEAN WHEEL SURFACE
7
7
OK
MARK "X" ON WHEEL WHERE IT RUNS OUT LEAST
8
MEASURE WHEEL RADIAL RUNOUT (SPIN WHEEL) BY HAND)
• COMPARE WITH MFG'S. SPECS.
OK
REPLACE WHEEL REBALANCE
11
8
SUBTRACT THE WHEEL RUNOUT READING IN STEP 7 FROM THE RADIAL READING IN STEP 3
RADIAL READING – WHEEL RUNOUT
MORE THAN .035
9
LESS THAN .035
10
9
REPLACE TIRE REBALANCE
11
10
"X's" MORE THAN 90° APART
REMOUNT TIRES WITH "X's" TOGETHER REBALANCE
RECHECK PER STEP 4
MORE THAN .035
9
LESS THAN .035
11
"X's" LESS THAN 90° APART
9
503G8

Figure 3G-8

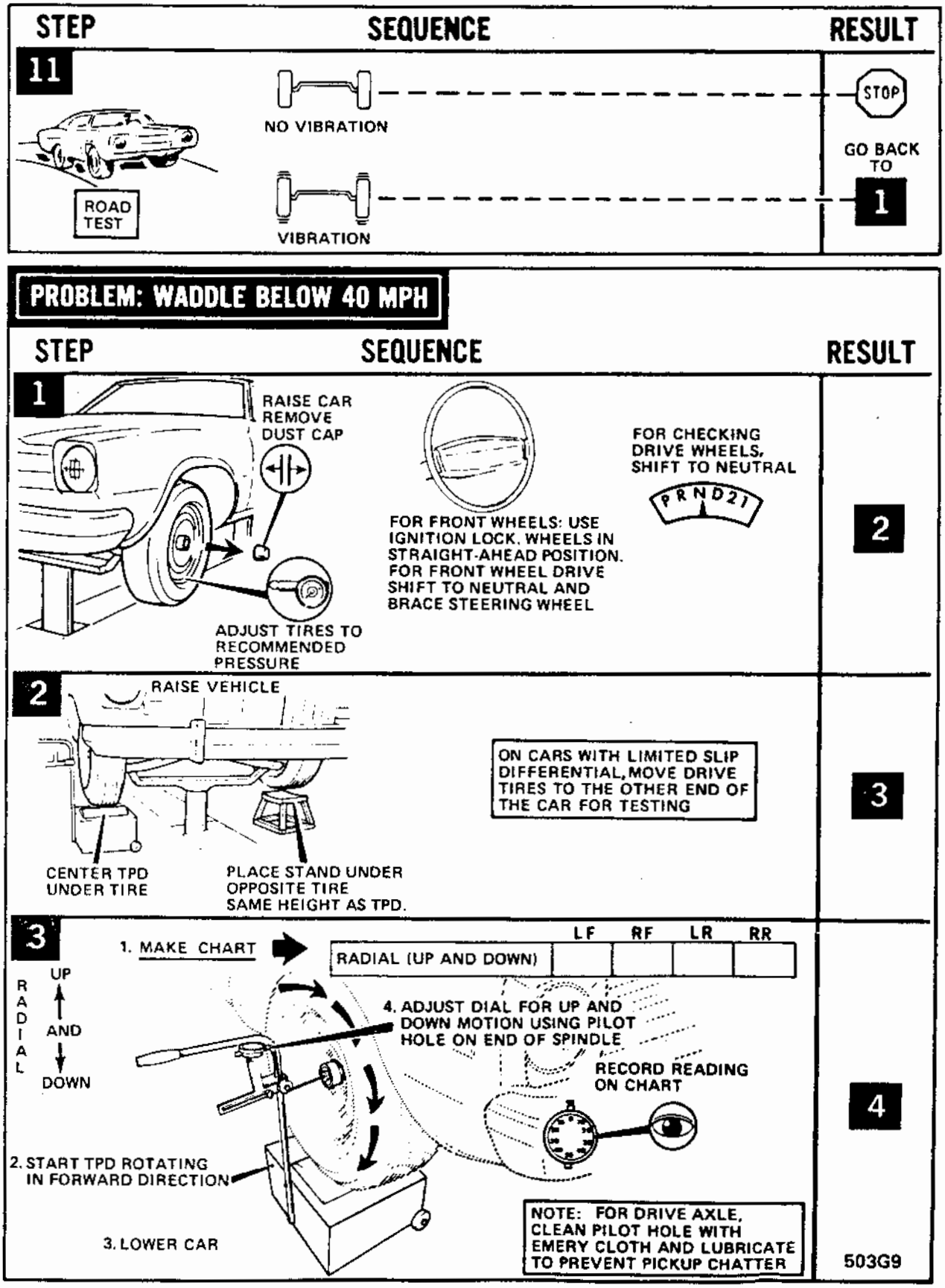

STEP
SEQUENCE
RESULT
11
ROAD TEST
NO VIBRATION
VIBRATION
STOP
GO BACK TO
1
PROBLEM: WADDLE BELOW 40 MPH
STEP
SEQUENCE
RESULT
1
RAISE CAR
REMOVE DUST CAP
ADJUST TIRES TO RECOMMENDED PRESSURE
FOR FRONT WHEELS: USE IGNITION LOCK. WHEELS IN STRAIGHT-AHEAD POSITION. FOR FRONT WHEEL DRIVE SHIFT TO NEUTRAL AND BRACE STEERING WHEEL
FOR CHECKING DRIVE WHEELS, SHIFT TO NEUTRAL
P R N D 2 1
2
2
RAISE VEHICLE
CENTER TPD UNDER TIRE
PLACE STAND UNDER OPPOSITE TIRE SAME HEIGHT AS TPD.
ON CARS WITH LIMITED SLIP DIFFERENTIAL, MOVE DRIVE TIRES TO THE OTHER END OF THE CAR FOR TESTING
3
3
1. MAKE CHART
LF RF LR RR
RADIAL (UP AND DOWN)
RADIAL
UP
AND
DOWN
2. START TPD ROTATING IN FORWARD DIRECTION
3. LOWER CAR
4. ADJUST DIAL FOR UP AND DOWN MOTION USING PILOT HOLE ON END OF SPINDLE
RECORD READING ON CHART
NOTE: FOR DRIVE AXLE, CLEAN PILOT HOLE WITH EMERY CLOTH AND LUBRICATE TO PREVENT PICKUP CHATTER
4
503G9

Figure 3G-9

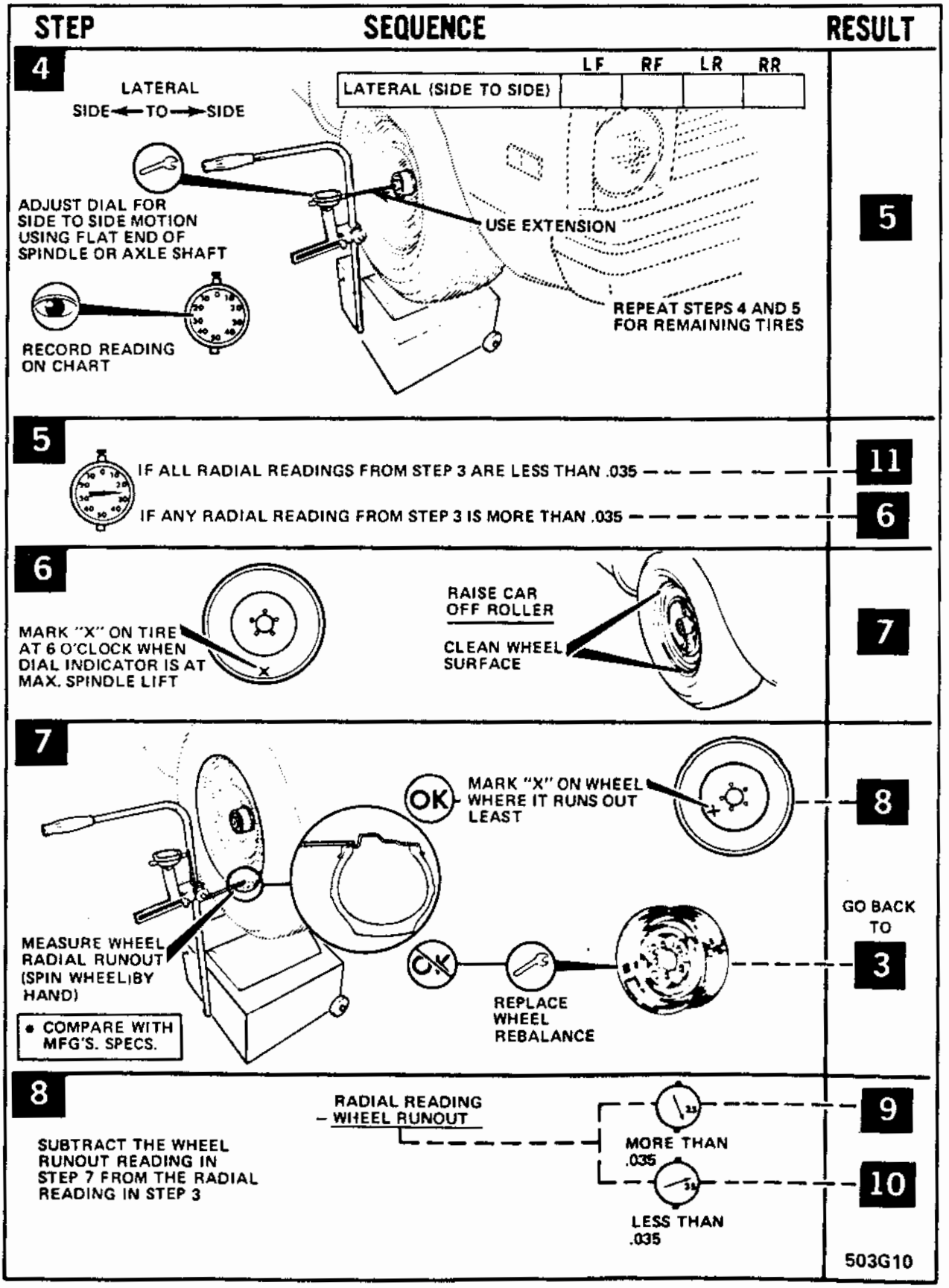

STEP
SEQUENCE
RESULT
4
LATERAL
SIDE ← TO → SIDE
LF RF LR RR
LATERAL (SIDE TO SIDE)
ADJUST DIAL FOR SIDE TO SIDE MOTION USING FLAT END OF SPINDLE OR AXLE SHAFT
USE EXTENSION
RECORD READING ON CHART
REPEAT STEPS 4 AND 5 FOR REMAINING TIRES
5
5
IF ALL RADIAL READINGS FROM STEP 3 ARE LESS THAN .035
11
IF ANY RADIAL READING FROM STEP 3 IS MORE THAN .035
6
6
MARK "X" ON TIRE AT 6 O'CLOCK WHEN DIAL INDICATOR IS AT MAX. SPINDLE LIFT
RAISE CAR OFF ROLLER
CLEAN WHEEL SURFACE
7
7
OK
MARK "X" ON WHEEL WHERE IT RUNS OUT LEAST
8
MEASURE WHEEL RADIAL RUNOUT (SPIN WHEEL BY HAND)
• COMPARE WITH MFG'S. SPECS.
OK
REPLACE WHEEL REBALANCE
GO BACK TO
3
8
SUBTRACT THE WHEEL RUNOUT READING IN STEP 7 FROM THE RADIAL READING IN STEP 3
RADIAL READING – WHEEL RUNOUT
MORE THAN .035
9
LESS THAN .035
10
503G10

Figure 3G-10

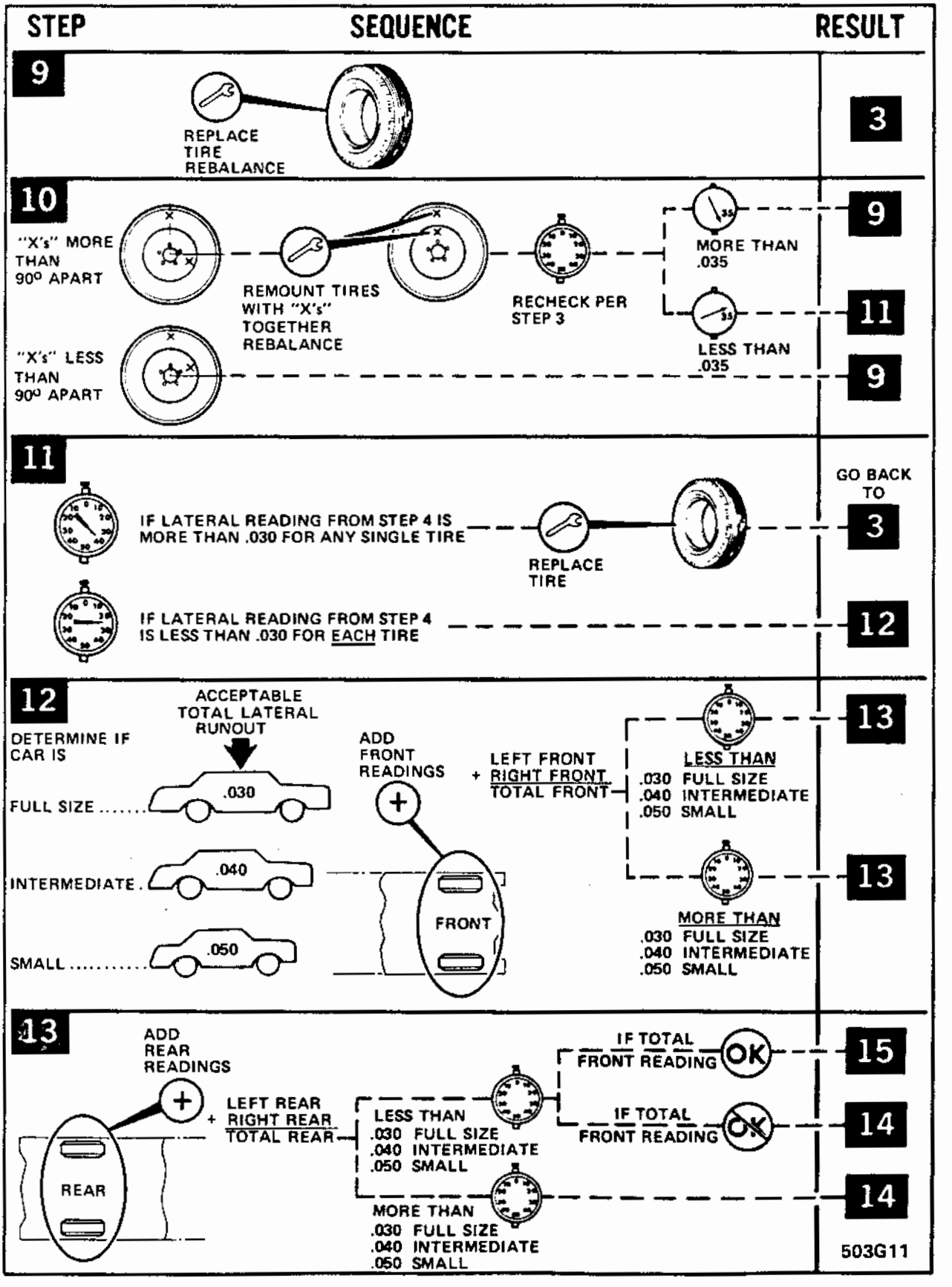
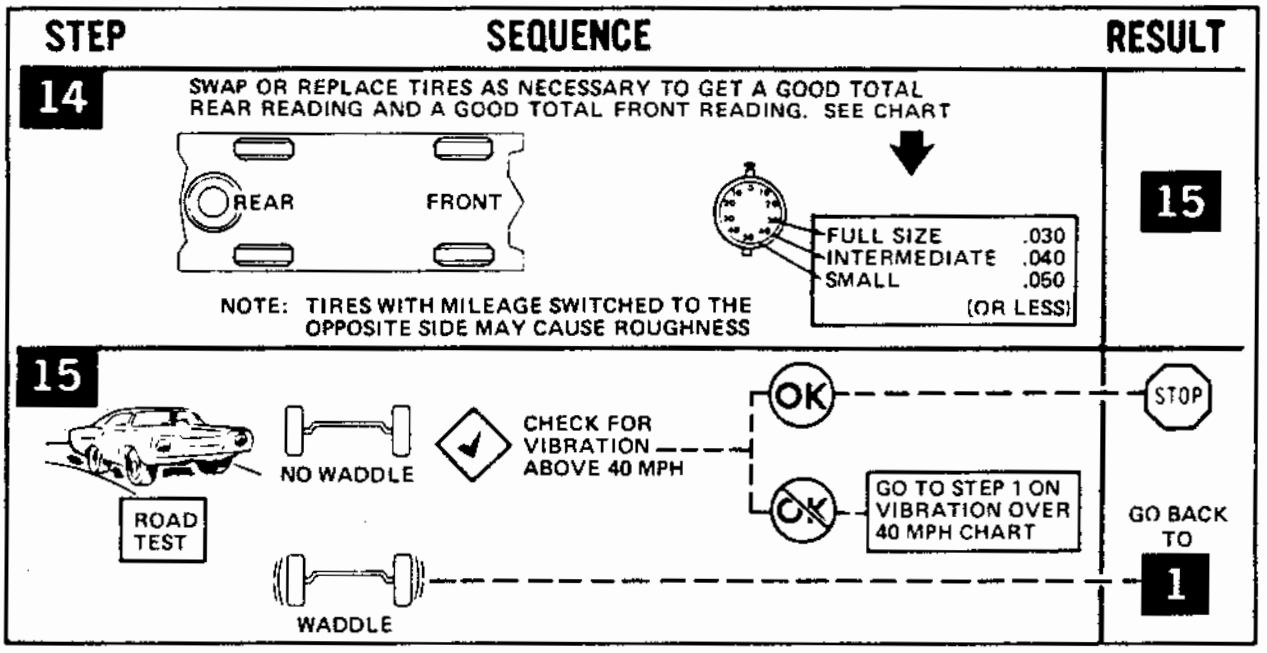
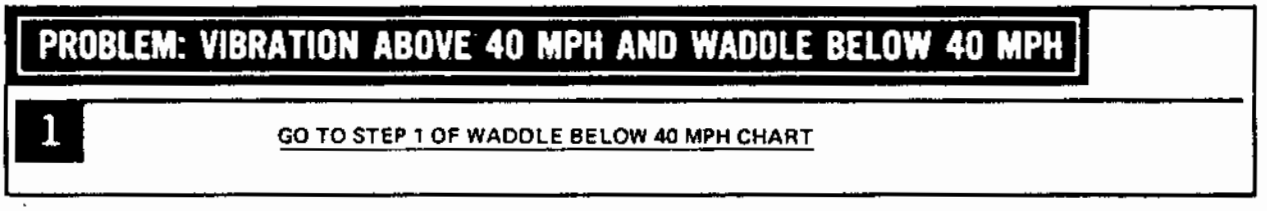

STEP
SEQUENCE
RESULT
9
REPLACE TIRE REBALANCE
3
10
"X's" MORE THAN 90° APART
REMOUNT TIRES WITH "X's" TOGETHER REBALANCE
RECHECK PER STEP 3
MORE THAN .035
9
LESS THAN .035
11
"X's" LESS THAN 90° APART
9
11
IF LATERAL READING FROM STEP 4 IS MORE THAN .030 FOR ANY SINGLE TIRE
REPLACE TIRE
GO BACK TO
3
IF LATERAL READING FROM STEP 4 IS LESS THAN .030 FOR EACH TIRE
12
12
DETERMINE IF CAR IS
ACCEPTABLE TOTAL LATERAL RUNOUT
FULL SIZE .....
.030
INTERMEDIATE .....
.040
SMALL .....
.050
ADD FRONT READINGS
+
FRONT
LEFT FRONT
+ RIGHT FRONT
TOTAL FRONT
LESS THAN
.030 FULL SIZE
.040 INTERMEDIATE
.050 SMALL
13
MORE THAN
.030 FULL SIZE
.040 INTERMEDIATE
.050 SMALL
13
13
ADD REAR READINGS
+
REAR
LEFT REAR
+ RIGHT REAR
TOTAL REAR
LESS THAN
.030 FULL SIZE
.040 INTERMEDIATE
.050 SMALL
IF TOTAL FRONT READING OK
15
IF TOTAL FRONT READING OK
14
MORE THAN
.030 FULL SIZE
.040 INTERMEDIATE
.050 SMALL
14
503G11

Figure 3G-11





SUBSTITUTION METHOD

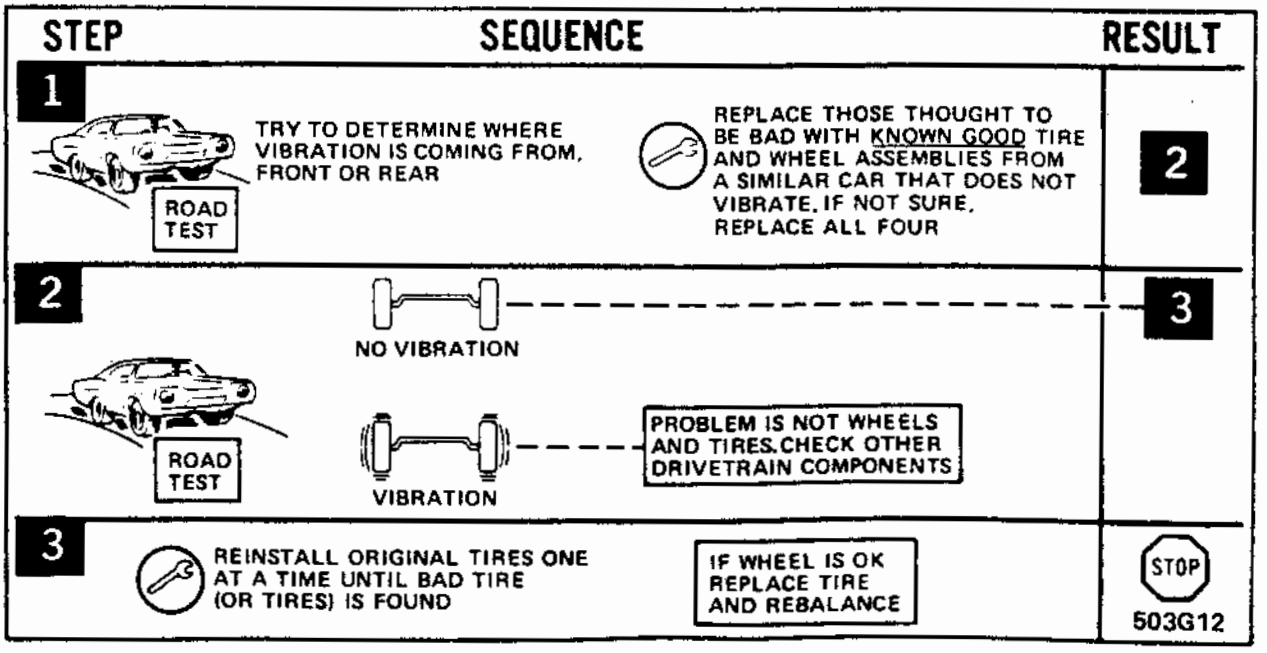


Figure 3G-12

RADIAL TIRE LEAD DIAGNOSIS CHART

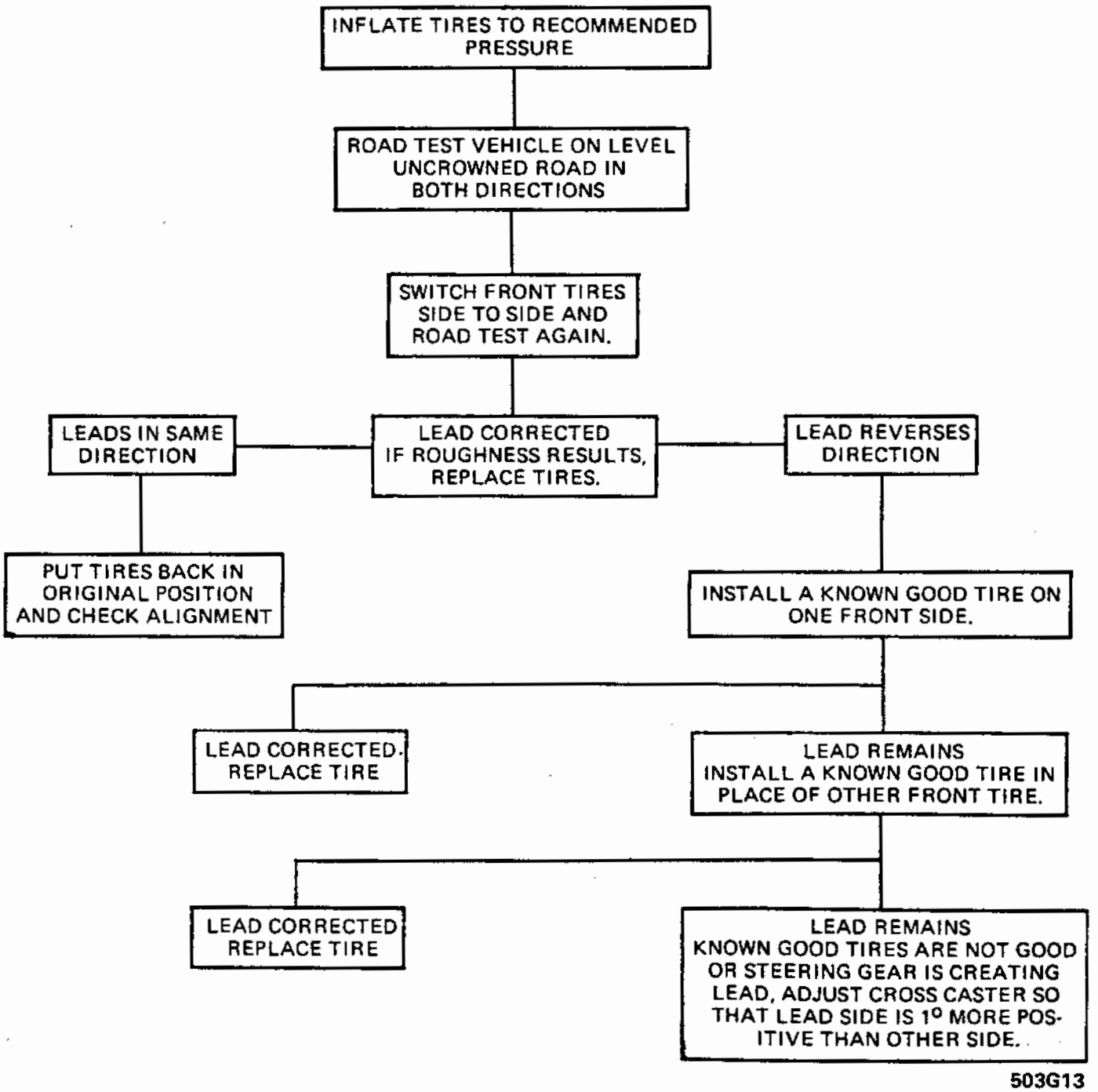


Figure 3G-13 Radial Tire Lead Diagnosis

• Part of the lead diagnosis procedure is different from the proper radial tire rotation pattern currently in the Owners Manual. The Owners Manual recommends front to rear rotation only. If a medium to high mileage tire is moved to the other side of the car, be sure to check that ride roughness has not developed.

• Rear Tires will not cause lead.

MAINTENANCE AND ADJUSTMENTS

WHEEL MAINTENANCE

Wheels must be replaced if they are bent, dented, have excessive lateral or radial runout, leak air through welds, have elongated bolt holes, if lug nuts won't stay tight, or if they are heavily rusted. Wheels with greater runout than shown in Figure 3G-14 may cause objectional vibrations.

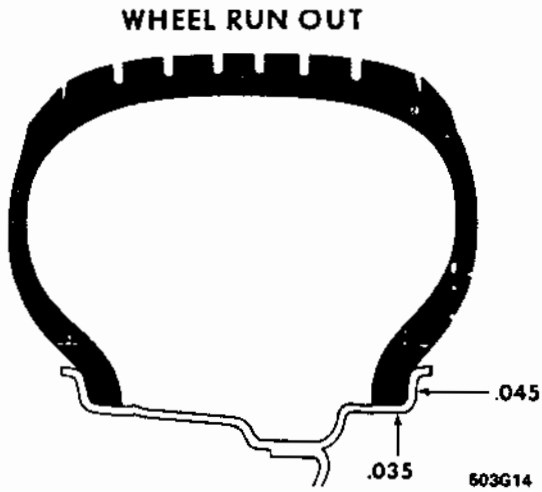


Figure 3G-14 Wheel Runout

Wheel repairs that use welding, heating, or peening are not approved. An inner tube is not an acceptable repair for leaky wheels or tires.

Wheel nuts must be tightened in sequence and to proper torque to avoid bending wheel or brake drum or rotor. See Figure 3G-15.

INFLATION OF TIRES

Correct inflation pressure is an important item of tire care. The pressure recommended for any model is carefully calculated to give a satisfactory ride, stability, steering, tread wear, cord life and resistance to bruises.

Tire pressure should be checked monthly or before any extended trips and set to specifications on the placard label. Check the tires cold (after car has set for 3 hours, or driven less than one mile).

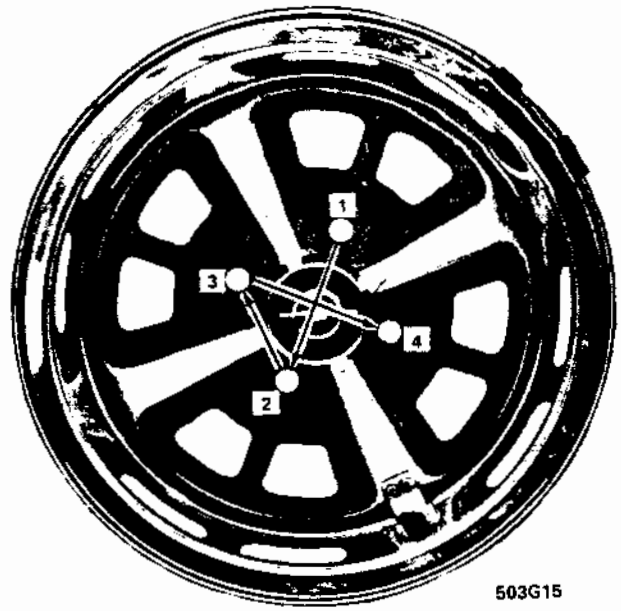


Figure 3G-15 Wheel Nut Tightening Sequence

Valve caps or extensions should be on the valve to keep dust and water out.

For continuous high speed operation (over 75 MPH) increase pressures 4 PSI up to maximum of 32 PSI cold, for load range B tires, 36 PSI for load range C, or 40 PSI for D rated tires. (Sustained speeds above 75 MPH are not recommended when the 4 PSI adjustment would require pressures greater than maximum.)

Tire pressures may increase as much as 6 PSI when hot.

Higher Than Recommended Pressure Can Cause:

1. Hard ride.
2. Tire brusing or carcass damage.
3. Poor traction at rear wheels.
4. Rapid tread wear at center of tire.

Lower Than Recommended Pressure Can cause:

1. Tire squeal on turns.
2. Hard Steering.
3. Rapid and uneven wear on the edges of the tread.
4. Tire rim bruises and rupture.
5. Tire cord breakage.
6. Tramp and shimmy.

7. High tire temperatures.
8. Poor Handling.
9. High fuel consumption.

Unequal Pressure on Same Axle Can Cause:

1. Uneven braking.
2. Steering lead.
3. Poor handling.
4. Swerve on acceleration.

TIRE ROTATION

To equalize wear, rotate tires according to Figure 3G-16 radial tires. Do not use the X method on radials as roughness and irregular wear can result. Radial tires should be rotated at the first 7,500 miles and then at least every 15,000 miles.

Due to their design, radial tires tend to wear at a faster rate in the shoulder area, particularly in front positions. This makes regular rotation necessary.

There are two rotation plans; one for four tires and one for five tires. See rotation chart Figure 3G-16.

Unusual wear such as flat spots, cups, gouges, and wavy wear can be caused by loose or neglected suspension or tire balance.

The importance of regular rotation and alignment check cannot be over-emphasized.

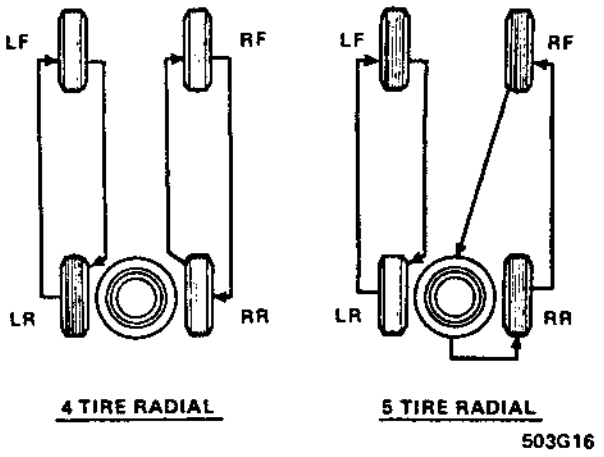


Figure 3G-16 Tire Rotation

BALANCING WHEELS

There are two types of wheel and tire balance: static and dynamic. Static balance is the equal distribution of weight around the wheel. Wheels that are statically unbalanced cause a bouncing action called wheel tramp. This condition will eventually cause wear and damage to the tire. Figure 3G-17.

Dynamic balance is the equal distribution of weight on each side of the centerline so that when the tire spins, there is no tendency for the assembly to move from side to side. Wheels that are dynamically unbalanced may cause a vibration at any speed. Figure 3G-18.

General Balance Precautions

Deposits of mud, etc. must be cleaned from the inside of the rim. Stones should be pried from the tread in order to avoid operator injury during spin

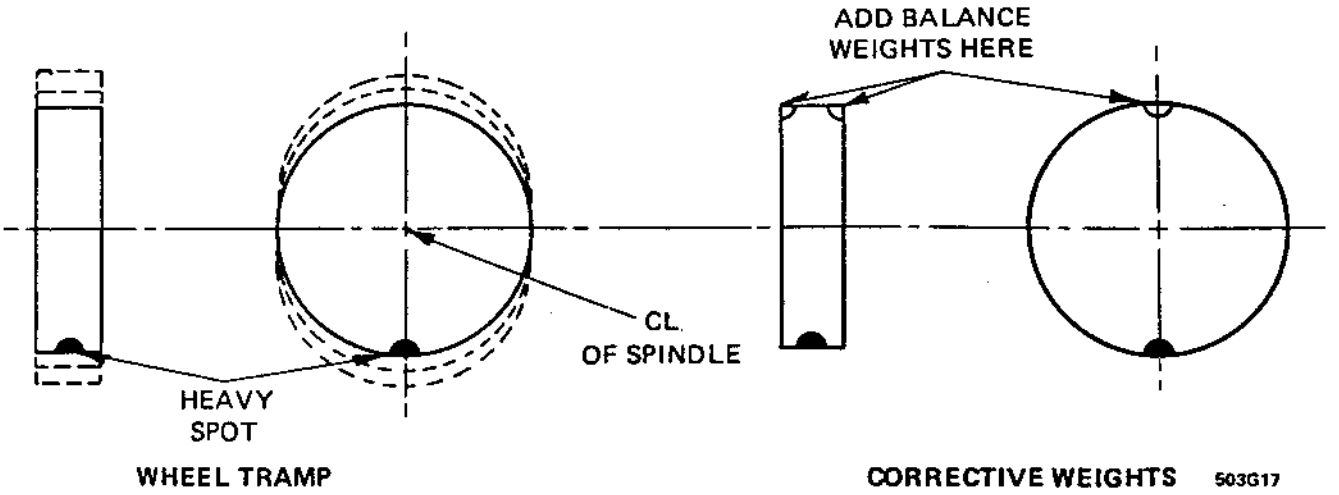


Figure 3G-17 Static Unbalance

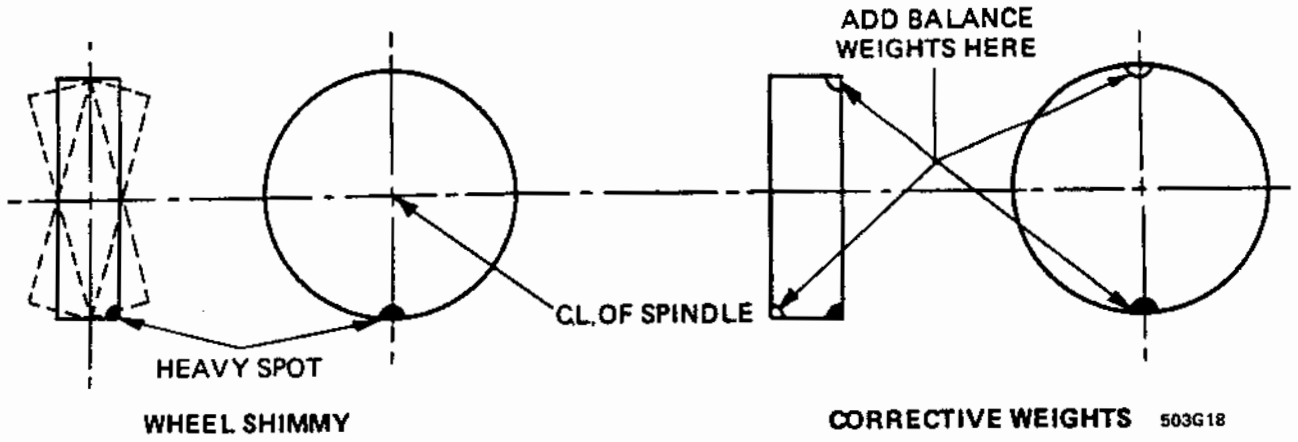


Figure 3G-18 Dynamic Unbalance

balancing and to obtain a good balance. The tire should be inspected for any damage, then balanced according to the equipment manufacturer's recommendation.

WARNING: DRIVE WHEEL SPIN SHOULD BE LIMITED TO 35 MPH AS INDICATED ON THE SPEEDOMETER. THIS LIMIT IS NECESSARY BECAUSE THE SPEEDOMETER ONLY INDICATES ONE-HALF OF THE ACTUAL WHEEL SPEED WHEN ONE DRIVE WHEEL IS SPINNING AND THE OTHER DRIVE WHEEL IS STOPPED. UNLESS CARE IS TAKEN IN LIMITING DRIVE WHEEL SPIN, THE SPINNING WHEEL CAN REACH EXCESSIVE SPEEDS. THIS CAN RESULT IN POSSIBLE TIRE DISINTEGRATION OR DIFFERENTIAL FAILURE, WHICH COULD CAUSE SERIOUS PERSONAL INJURY OR EXTENSIVE VEHICLE DAMAGE.

MAJOR REPAIR

TIRE REPAIR

Punctured tires should be removed from the wheel and permanently repaired from the inside. (Follow tire manufacturer's recommendations).

Punctures in the tread area up to 1/4" in diameter can be repaired. Figure 3G-19. A head type of plug repair is recommended as it not only patches the injury from the inside, but it also plugs the injury.

Externally applied plug type repairs should be considered temporary and the tire should be permanently repaired as soon as possible.

Never Repair A Tire With:

1. Ply separation.

Figure 3G-19 Repairable Area of Tire

2. Broken or damaged bead wires.
3. Loose cords.
4. Tread separation.
5. Cracks which extend into the tire fabric.
6. Sidewall puncture.
7. Tires with tread wear indicators showing.

DEMOUNTING AND MOUNTING OF TUBELESS TIRE

Use a tire changing machine to mount or demount tubeless tires. Follow the equipment manufacturer's instructions.

Rim bead seats should be cleaned with a wire brush or coarse steel wool to remove lubricants, old rubber, and light rust.

CAUTION: *Do not use hand tools or tire irons to change tires as they may damage the tire beads or wheel rim.*

WARNING: DO NOT STAND OVER TIRE WHEN INFLATING. BEAD WIRE MAY BREAK WHEN BEAD SNAPS OVER SAFETY HUMP AND CAUSE SERIOUS INJURY.

Inflate to 40 PSI, so that beads are completely seated.

WARNING: DO NOT EXCEED 40 PSI PRESSURE WHEN INFLATING. IF 40 PSI PRESSURE WILL NOT SEAT BEADS, DEFLATE, RELUBRICATE AND REINFLATE. OVERINFLATION MAY CAUSE THE BEAD WIRE TO BREAK AND CAUSE SERIOUS PERSONAL INJURY.

Install valve core and inflate to proper pressure. Check the locating rings of the tire to be sure they show around the rim flanges on both sides.

SPECIFICATIONS

WHEEL AND TIRE SPECIFICATIONS

Use a reliable torque wrench when tightening the parts listed below. This will prevent strain or distortion of the parts or damage to the threads. The specifications given are for clean and lubricated threads only. Dry or dirty threads produce increased friction and prevent accurate measurement of tightness. It is important that these specifications be strictly observed. Overtightening may damage threads and prevent the attainment of the proper torque.

Torque Specification .....65 lb. ft.
Wheel Size ..... 5 1/2 J x 13 (8 vent slots)
Tire Size .....165 SR x 13 (Steel Belted Radial)

Tire Pressures (Cold)

	AVERAGE LOAD		HIGHER LOAD	
MODEL	FRONT	REAR	FRONT	REAR
51, 57	22 psi	26 psi	24 psi	30 psi
54	23 psi	26 psi	27 psi	35 psi

GROUP 4

PROPELLER SHAFT AND DIFFERENTIAL

PROPELLER SHAFT

DESCRIPTION

All 1975 Opels will be using an aluminum die cast rear axle extension torque tube instead of the steel tubes used in the past. This change does not affect service procedures.

SPECIFICATIONS

Part	Location	Torque Lb. Ft.
Nut	Pinion Flange	87
Bolt	Drive Pinion Extension Shaft Flange to Universal Joint	11
Bolt	Central Joint Support to Underbody	36
Bolt	Central Joint Support to Rubber Cushion	15
Bolt	Support Cushion	29

DIFFERENTIAL

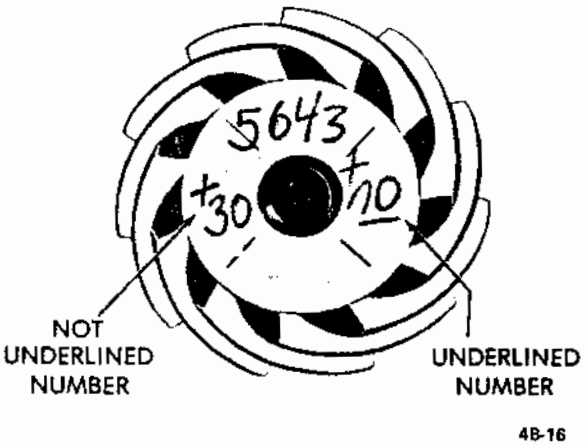


Figure 4B-1 Pinion Gear Reference Number

NOTE: *The digit "1", when written in German, resembles the digit "7". However, the digit "7", when written in German, always has a horizontal line drawn through it ("7"). Reading is always given in hundredth millimeters.*

MAJOR REPAIR

REMOVAL AND INSTALLATION OF AXLE SHAFT BEARINGS

When installing a rear axle shaft bearing and/or retainer, on 1975 and prior model Opels, use installer J-21694-1.

SETTING PINION DEPTH

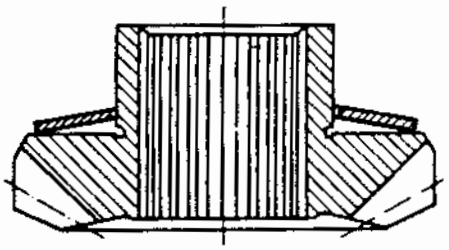
The underlined control figure on the face of the pinion is given in hundredth millimetres. To help select the correct pinion depth shim, this figure should be converted from hundredth millimetres to inches. See Figure 4B-1.

ASSEMBLY AND INSTALLATION OF DIFFERENTIAL CASE

The thrust washers that are used to adjust end play clearance between the side gears and case must be installed with the concave side towards the side gear. See Figure 4B-3.

504B17

Figure 4B-2



504B3

Figure 4B-3

SPECIFICATIONS

DIFFERENTIAL SPECIFICATIONS

General Specifications

Rear Axle Type ..... Semi-Floating Hypoid
Rear Axle Oil Capacity ..... 2-1/2 Pt.
Ring and Pinion Gear Set Type ..... Hypoid

Axle Ratios

Model	Engine	Transmission		Axle Ratio	
	1.9	4-Speed Manual	3-Speed Automatic	4-Speed	Automatic
51	Std.	Std.	Opt.	3.44	3.44
54	Std.	Std.	Opt.	3.44	3.44
57	Std.	Std.	Opt.	3.44	3.44

50484

Figure 4B-4

GROUP 5

BRAKES

POWER BRAKE BOOSTER

DESCRIPTION AND OPERATION

The size of the Power Brake Booster used on all 1975 Opels has been increased to 8 inches. The increase in size does not affect service procedures. The Booster however, is not interchangeable with past model Opels.

DISC BRAKES

DESCRIPTION AND OPERATION

Disc brake rotor diameter on all 1975 Opels has been increased to 9.685 inches and disc thickness increased to .500 inches. Caliper size has also been increased to compensate for the rotor change. Service procedures will remain the same as in 1974.

SPECIFICATIONS

Disc Brake Type	2 Piston Fixed Caliper - Disc
Location	Front Wheels Only
Disc Type	Solid Cast Iron
Disc Diameter	9.685
Disc Lateral Runout (Maximum)	.004
Disc Thickness (New)	.500
Disc Thickness (Minimum)	.465
Disc Parallelism (Thickness Tolerance)	.0004
Brake Shoe and Lining Type	Bonded
Brake Shoe and Lining Thickness (New)	.550
Brake Shoe and Lining Minimum Thickness Before Replacement	.280
Disc Brake Master Cylinder Bore	.810
Disc Brake Caliper Cylinder Bore	1.890
Disc Brake Shoe Adjustment	Self-Adjusting

GROUP 6

ENGINE

ENGINE MECHANICAL AND MOUNTS

MAJOR REPAIR

INTAKE MANIFOLD REMOVAL AND INSTALLATION

Removal

1. Raise hood and cover fenders.
2. Disconnect wires at:
a. Cold start injector
b. Fuel injectors (4)
c. Throttle valve switch
d. Temperature sensor
e. Thermo time switch
f. Auxiliary air valve
g. Air flow meter
3. Remove air flow meter and air cleaner assembly.
4. Disconnect throttle body housing inlet hose and move out of way.
5. Disconnect Bowden cable from accelerator linkage.
6. Disconnect hoses from:
a. Auxiliary air valve (2)
b. Distributor vacuum retard hose at vacuum tee.
c. A/C thermo vacuum switch hose at vacuum tee.
d. EGR vacuum hose at throttle body housing.
7. Disconnect EFI wiring harness ground at rear of intake manifold.
8. Disconnect EGR pipe at throttle body housing.
9. Disconnect vacuum brake booster hose.
10. Remove accelerator linkage springs (2).
11. Disconnect fuel return hose at both ends of intake manifold.
12. Disconnect fuel pressure regulator hose at wheel house panel.
13. Remove intake manifold.

Installation

1. Install intake manifold by reversing removal procedure using a new gasket and applying Loctite (or equivalent) on exhaust and intake manifold hold down bolts.

EXHAUST MANIFOLD REMOVAL AND INSTALLATION

Removal

1. Remove intake manifold as outlined above.
2. Disconnect front exhaust pipe from exhaust manifold.
3. Remove exhaust manifold.

Installation

1. Install exhaust manifold by reversing removal procedure using a new gasket and applying Loctite (or equivalent) to all intake manifold and exhaust manifold hold down bolts.

CYLINDER HEAD REMOVAL AND INSTALLATION

Removal

1. Remove air flow meter and air cleaner assembly. To gain access to intake and exhaust manifold bolts.
2. Remove EGR valve hold down bolt from thermostat housing.
3. Disconnect all hoses and electrical connectors from thermostat housing and auxiliary air valve.
4. From this point on cylinder head removal is the same as the 1974 Opel Service Manual.

Installation

1. Install cylinder head by reversing removal procedure.

SPECIFICATIONS

BOLT TORQUE SPECIFICATIONS

Use a reliable torque wrench to tighten all parts listed, to insure proper tightness without straining or distorting parts. These specifications are for clean and lightly-lubricated threads only; dry or dirty threads produce increased friction which prevents accurate measurement of tightness.

PART	TORQUE LB. FT.
Connecting Rod Bolts	33
Crankshaft Main Bearing Bolts	73
Cylinder Head To Block Bolts	72
Cylinder Head To Timing Chain Cover Bolts	17
Rocker Arm Stud in Cylinder Head	25
Spark Plugs	29
Timing Chain Cover to Cylinder Blocks Bolts	11
Engine Support to Cylinder Blocks Bolts	33
Starter to Bell Housing Bolts	57
Support to Starter Nut	3
*Intake and Exhaust Manifold to Cylinder Head Bolts	29

*Use Loctite or equivalent on these bolts.

General Specifications

Exhaust Valve Seat Inserts	Induction Hardened
Fuel Requirements	Unleaded Fuel only
Octant Requirements	
Motor	82
Research	91

COOLING SYSTEM

CONTENTS

DESCRIPTION AND OPERATION

COOLANT CIRCULATION

With engine not yet at operating temperature, the coolant is drawn by the water pump from the cylinder head through the thermostat housing, and finally forced into the engine block. The Thermostat is closed in flow direction from the radiator, and the flow direction from the cylinder head is fully opened, see Figure 6B-1.

As coolant temperature in the engine begins to warm up the thermostat begins to close off hot coolant flow from the cylinder head into the thermostat housing. At the same time the thermostat begins to close off hot coolant flow it also opens cold coolant flow from the radiator into the thermostat housing. This mixture of hot and cold coolant then passes through the water pump and on into the engine block.

The by-pass regulation thermostat closes the housing inlet from the cylinder head at the same rate it opens the housing inlet from the radiator (See Figure 6B-2).

As the coolant temperature reaches normal operating temperature the passage from the cylinder head to the thermostat housing is closed. The hot coolant from the cylinder head is now flowing through the upper radiator hose. The passage from the lower radiator hose to the thermostat housing is now fully open and coolant flow is as follows.

BY-PASS REGULATION THERMOSTAT, WITH CLOSED RADIATOR COOLANT CIRCUIT (INLET PORT - FROM RADIATOR).

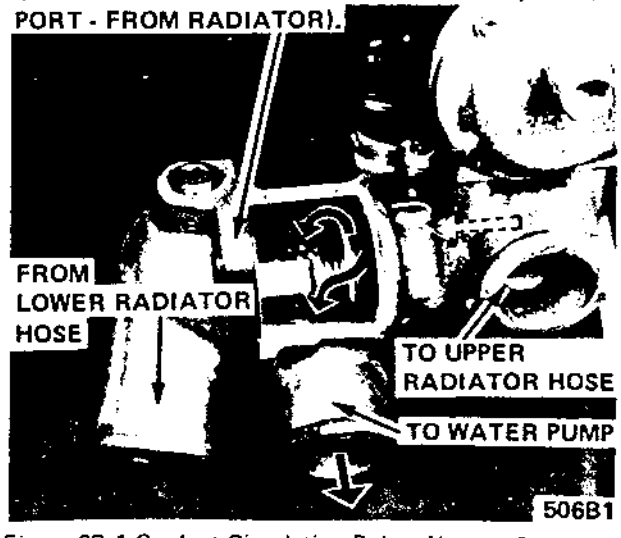


Figure 6B-1 Coolant Circulation Below Normal Operating Temperature

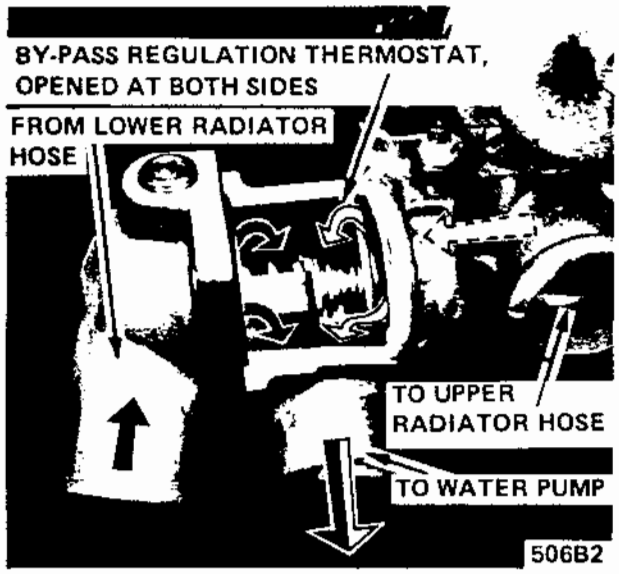


Figure 6B-2 Hot/Cold Coolant Mixture

The hot coolant from the cylinder head enters the upper radiator hose into the radiator, where it is cooled, then into the lower radiator hose, to the thermostat housing and to the water pump and on into the cylinder block, then back to the cylinder head. See Figure 6B-3.

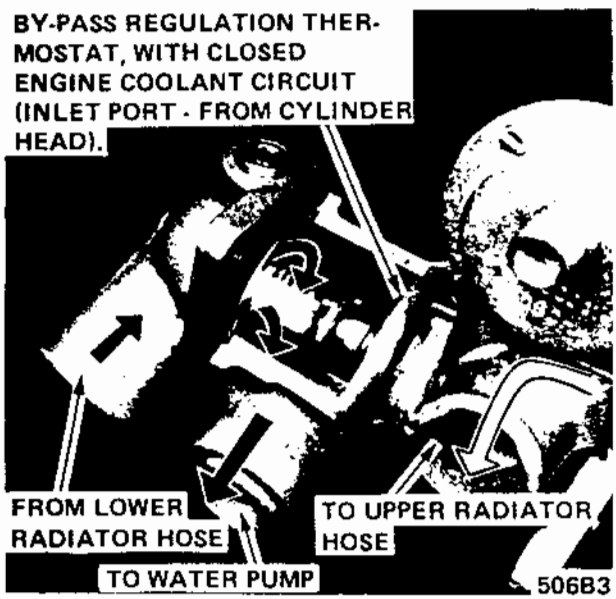


Figure 6B-3 Coolant Flow at Normal Operating Temperature

MAJOR REPAIR

WATER PUMP REMOVAL AND INSTALLATION

Removal

1. Raise hood and cover fender.
2. Remove radiator cap.
3. Drain radiator by disconnecting lower radiator hose at radiator (if equipped with A/C splash shield must be removed to gain access to lower radiator hose).
4. Remove fan shroud and radiator mounting screws.
5. Disconnect upper radiator hose at radiator and radiator overflow hose.
6. Remove radiator first then fan shroud.
7. Remove fan clutch assembly (the hold down bolt for the fan clutch is a left-hand thread).
8. Loosen fan belt.
9. Disconnect thermostat housing hose and heater hose at water pump.
10. Remove water pump (water pump and pulley are serviced as an assembly).

Installation

1. Install the water pump by reversing the removal procedure using a new water pump gasket.

FAN SHROUD AND/OR RADIATOR REMOVAL AND INSTALLATION

Removal

1. Raise hood and cover fender.
2. Remove radiator cap.
3. Drain radiator by disconnecting lower radiator hose at radiator (if equipped with A/C splash shield must be removed to gain access to lower radiator hose).
4. Remove fan shroud and radiator mounting screws.
5. Disconnect upper radiator hose at radiator and radiator overflow hose.
6. Remove radiator first then fan shroud.

Installation

1. Install fan shroud by reversing removal procedures.

AUTOMATIC FAN CLUTCH REMOVAL AND INSTALLATION

Removal

1. Raise hood and cover fender.
2. Remove radiator cap.

3. Drain radiator by disconnecting lower radiator hose at radiator (if equipped with A/C splash shield must be removed to gain access to lower radiator hose).

4. Remove fan shroud and radiator mounting screws.

5. Disconnect upper radiator hose at radiator and radiator overflow hose.

6. Remove radiator first then fan shroud.

7. Remove fan clutch assembly (the hold down bolt for the fan clutch is a left-hand thread).

Installation

1. Install automatic fan clutch by reversing removal procedures.

THERMOSTAT REMOVAL AND INSTALLATION

Removal

1. Raise hood and cover fender.

2. Drain radiator as outlined under radiator removal and installation.

3. Remove air flow meter and air cleaner assembly.

4. Remove throttle lever spring.

5. Disconnect accelerator linkage springs.

6. Disconnect EGR pipe from throttle body housing.

7. Disconnect accelerator linkage at throttle body housing.

8. Remove thermostat.

Installation

1. Install thermostat by reversing removal procedures, and using a new gasket.

THERMOSTAT HOUSING REMOVAL AND INSTALLATION

Removal

1. Raise hood and cover fenders.

2. Drain radiator as outlined under radiator removal.

3. Remove air flow meter and air cleaner assembly.

4. Disconnect throttle body housing inlet hose and swing out of way.

5. Disconnect EGR pipe at throttle body housing.

6. Remove spring from throttle lever.

7. Disconnect springs from accelerator linkage.

8. Remove thermostat gooseneck lower bolt.

9. Disconnect hoses from auxiliary air valve.

10. Disconnect wires at thermo time switch, temperature sensor, auxiliary air valve and temperature sending unit.

11. Remove temperature sensor.

12. Remove front injector hold down bolts (3) and move injectors out of the way.

13. Remove water hoses (3) from thermostat housing.

14. Remove thermostat housing.

Installation

1. Install thermostat housing by reversing removal procedures and using a new thermostat housing gasket.

SPECIFICATIONS

General Specifications

Cooling System Coolant	GM Specification 1899-M
Fan Drive	Fluid Fan Clutch
Cooling System Capacity	7-Quarts
Thermostat	
Starts to Open	176°F.
Fully open	203°F.

Drive Belt Tension Specifications

	NEW BELT	USED BELT
Alternator	100 Lbs.	60 Lbs.
Air Conditioning	125 Lbs.	80 Lbs.

FUEL SYSTEM

CONTENTS

DESCRIPTION AND OPERATION

FUEL SYSTEM

The fuel tank is of conventional design. A sock-type fuel filter is part of the tank sending unit. Fuel is drawn from the fuel tank by an electrically driven pump, through a fuel filter to the injectors and pressure regulator. The pressure regulator by-passes excess fuel back to the fuel tank. The tank is vented to a charcoal canister located in the engine compartment. The fuel tank filler neck has a restricted opening that is designed for the new smaller nozzles that deliver unleaded fuel.

MAJOR REPAIR

FUEL PUMP REMOVAL AND INSTALLATION

Removal

1. Disconnect the fuel pump electrical connector.
2. Remove the fuel pump lower bracket bolt with a 10 mm socket.
3. Open the fuel pump bracket and remove the fuel pump and the fuel pump insulator.
4. Loosen the fuel hose clamps and remove the fuel hoses.

> CAUTION: *Fuel is under pressure. Some fuel will be lost when fuel hoses are disconnected. Plug fuel lines until new fuel pump is installed.*

5. Remove fuel pump insulator from fuel pump.

Installation

1. Install fuel pump insulator to fuel pump.
2. Connect fuel hoses and tighten hose clamps.
3. Install fuel pump and insulator in bracket and install the bracket bolt (10 mm).
4. Connect the fuel pump electrical connector.
5. Start engine and check for fuel leaks.

FUEL FILTER REMOVAL AND INSTALLATION

Removal

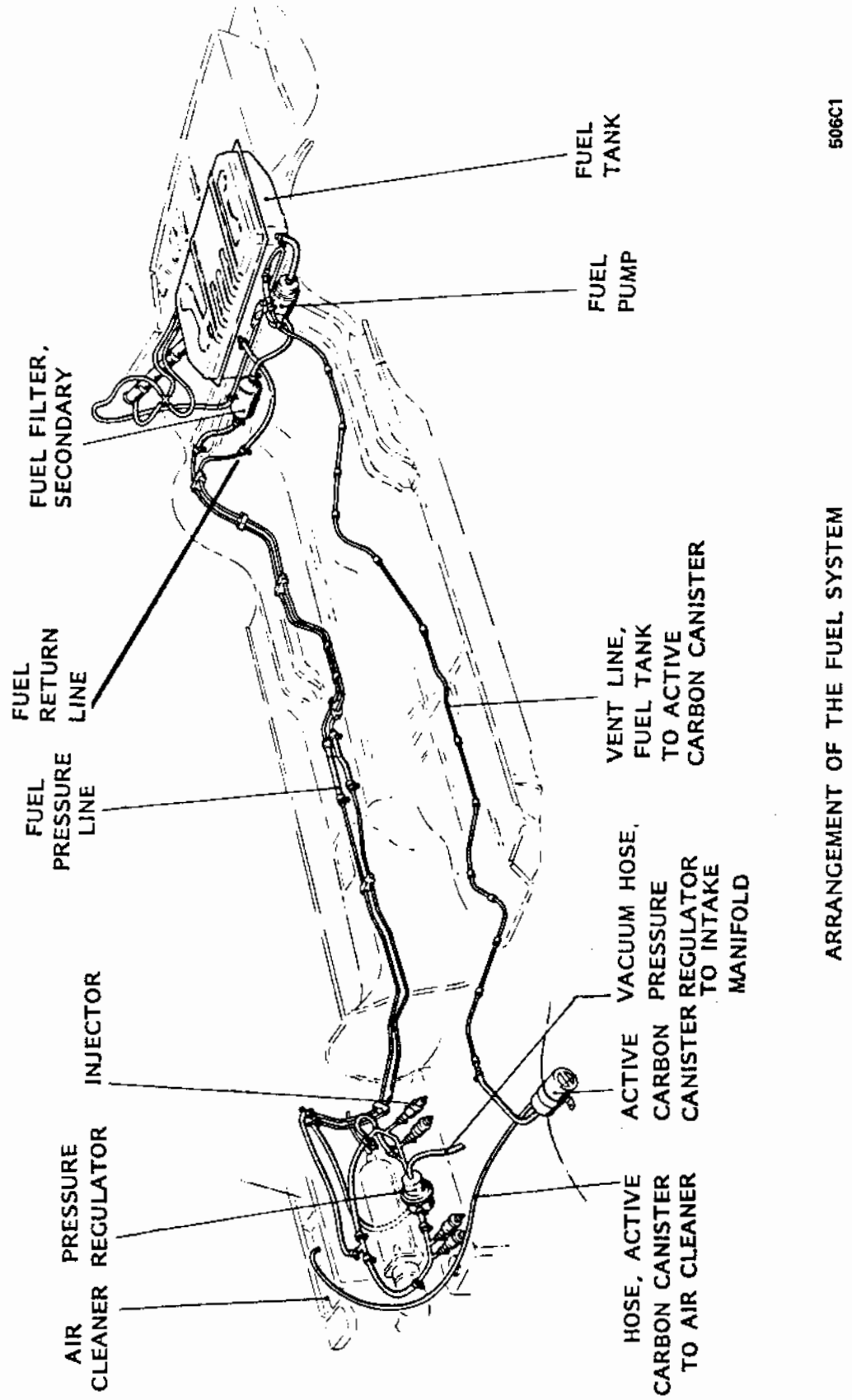
1. Remove fuel filter bracket bolt.
2. Open fuel filter bracket and remove fuel filter and fuel filter insulator.
3. Loosen the two (2) hose clamps and remove the fuel hoses.

> CAUTION: *Fuel is under pressure. Some fuel will be lost when fuel hose is removed.*

4. Remove the insulator from the fuel filter.

Installation

1. Install the fuel filter insulator around the fuel filter.
2. Connect the two (2) fuel hoses to the fuel filter.
3. Position the fuel filter and insulator in the fuel filter bracket and install the bracket hold down bolt.
4. Start engine and check for fuel leaks.



ARRANGEMENT OF THE FUEL SYSTEM

Figure 6C-1 Fuel System

SPECIFICATIONS

General Specifications

Fuel Pump Type	Electric
Fuel Pump Pressure at Cranking Speed	31-44 P.S.I.

EXHAUST SYSTEMS

MAJOR REPAIR

Non California exhaust systems are the same as 1974 exhaust systems.

FRONT EXHAUST PIPE REMOVAL AND INSTALLATION (CALIFORNIA ONLY)

Removal

1. Disconnect front exhaust pipe at exhaust manifold (6) bolts.
2. Remove clamp at front of catalytic converter.
3. Disconnect EGR line at front exhaust pipe.
4. Remove front exhaust pipe.

Installation

1. Install front exhaust pipe by reversing removal procedure and applying exhaust system sealer to all slip joints and use new "U" clamps.

CATALYTIC CONVERTER REMOVAL AND INSTALLATION (CALIFORNIA ONLY)

Removal

1. Remove front and rear converter clamps.
2. Remove converter with a twisting and pulling motion.

Installation

1. Install converter by reversing removal procedure and applying exhaust system sealer to all slip joints and use new "U" clamps.

FRONT MUFFLER AND CENTER EXHAUST PIPE REMOVAL AND INSTALLATION (CALIFORNIA ONLY)

Removal

To help insure continued integrity, exhaust system pipes and mufflers rearward of the front muffler must be replaced whenever a new front muffler is installed.

1. Remove front muffler clamp.
2. Remove rubber "O" rings (4) from exhaust system hangers.
3. Remove rear muffler front clamp.
4. Remove rear muffler and tailpipe assembly from center exhaust pipe.
5. Remove front muffler, and center exhaust pipe as an assembly.

Installation

1. Install front muffler, center exhaust pipe, rear muffler and tailpipe assembly by reversing removal procedures and using new "U" clamps and exhaust system sealer to all slip joints.

EXHAUST PIPE REMOVAL AND INSTALLATION (CALIFORNIA ONLY)

Removal

1. Remove clamps at both ends of the exhaust pipe.
2. Remove exhaust pipe.

Installation

1. Reverse removal procedure using new clamps and apply exhaust system sealer to all slip joints.

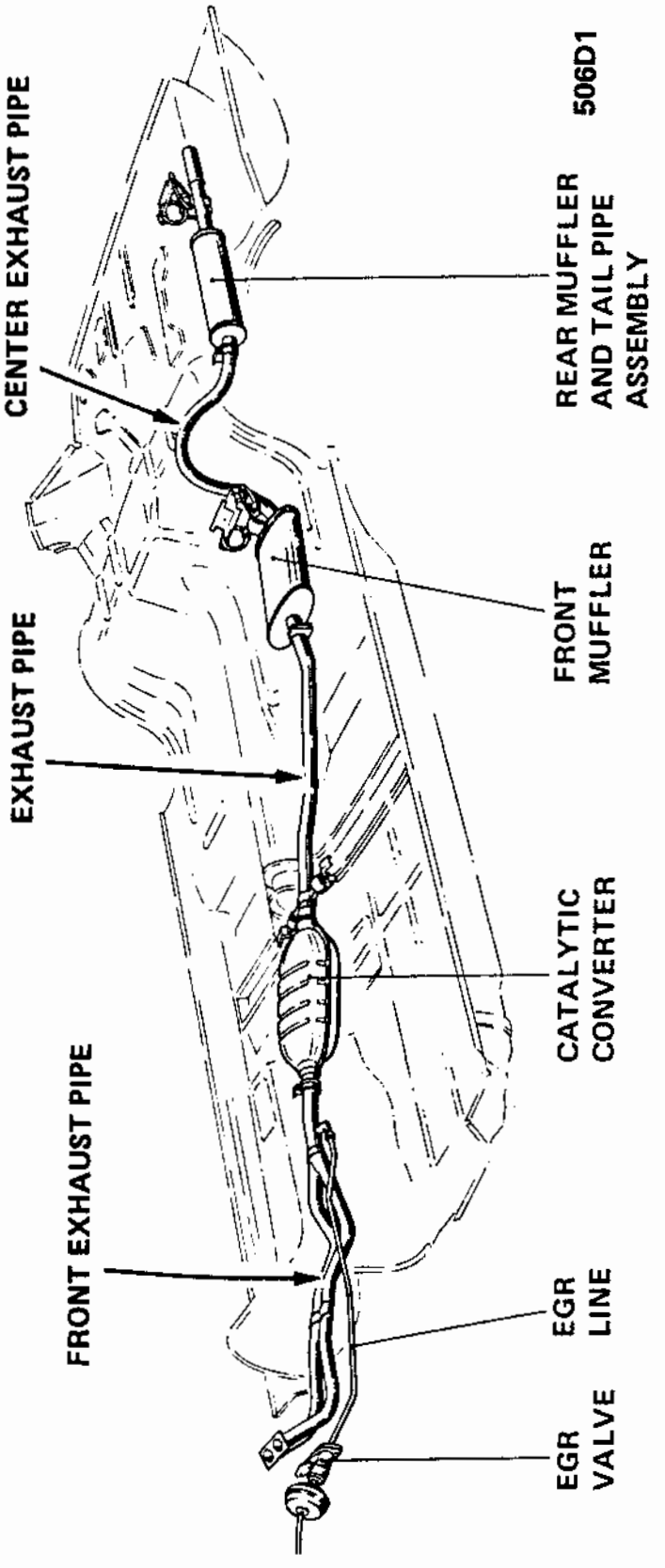


Figure 6D-1 Exhaust System (California Only)

ELECTRONIC FUEL INJECTION SYSTEM

CONTENTS

DESCRIPTION AND OPERATION

GENERAL DESCRIPTION OF ELECTRONIC FUEL INJECTION

The Fuel Injection System is a Pulse Time Manifold Injection System that injects metered fuel into the intake manifold near the intake valves by electronically controlled injection valves.

Various components of the EFI System electronically monitor a wide range of driving factors which are fed into a control unit. The control unit use the information it receives from the variou components to continuously compute the desirec air/fuel ratio under all operating conditions. Th control unit, using the information listed below continuously calculates the proper air/fuel ratic and controls the pulse time of the fuel injectors tc achieve this.

INFORMATION RECEIVED BY THE CONTROL UNIT

SOURCE OF INFORMATION	CONTENT OF INFORMATION
Air Flow Meter	Load condition of engine and temperature of inlet air (Measures flow of air)
Throttle Valve Switch	Position of Throttle: (a) Idling. (b) Full Throttle.
Temperature Sensor	Engine Coolant Temperature.
Ignition Distributor	RPM
Battery	Current Supply.
Starter Solenoid (via dual relay terminal 86 a)	Engine is cranking.
Ignition Switch (via dual relay terminal 86 c)	Ignition switch is in the start and/or ON position.

OTHER SOURCES OF INFORMATION THAT AFFECT EFI OPERATION THAT DO NOT INFLUENCE THE CONTROL UNIT

COMPONENT THAT IS THE SOURCE OF INFORMATION OR SIGNAL	FUNCTION THE SIGNAL AFFECTS OR PERFORMS
Starter Solenoid	1. Supplies current to the cold start injector and the thermo time switch. 2. Closes relay to supply current to electric fuel pump and auxiliary air valve during cranking.
Air Flow Meter Terminals 36 and 39 (When Engine is Running)	1. Supplies electrical heating of auxiliary air valve. 2. Supplies current to the fuel pump relay (part of dual relay).
Intake Manifold Vacuum	1. Decrease fuel pressure with increase in manifold vacuum. 2. Actuates and controls the deceleration valve.

CONTROL UNIT

The control unit is attached to the wiring harness by means of a 35-poled terminal plug connecting it to all other components. Figure 6E-0

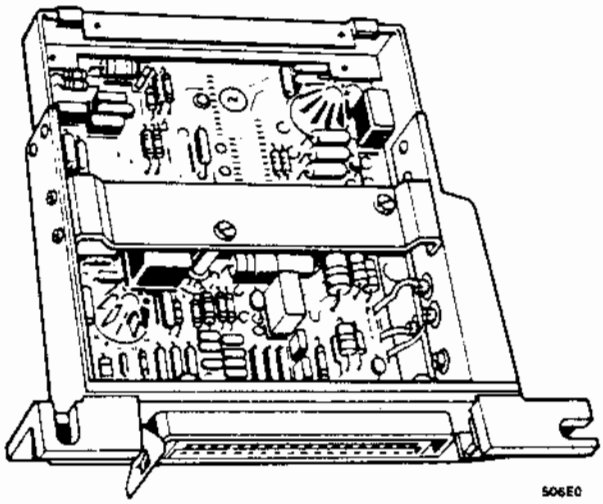


Figure 6E-0 Control Unit

The control unit consists of three integrated circuits containing a certain number of electronic components. These are to be considered as the main feature of the circuits. In addition, several semi-conductors, condensers, and resistors are used. Suppression filters are used to filter out voltage peaks so that the control unit is not damaged. The control unit contains approximately 80 electronic components. Its function is to control the impulse of the injectors, to open them for a definite time. The control unit, using the information it has received electrically from the air flow meter, throttle valve switch, coolant temperature sensor, distributor, starter solenoid, and battery, computes the proper pulse time of the injectors. The control unit then pulses the injectors by completing the electric circuit of the injectors. The electric circuit of the injectors starts at the battery and travels to the dual relay, to the pre-resistor unit, to the four injectors, through the coil in the injector, to the control unit which completes the circuit to ground. The period of time the circuit is energized is referred to as a pulse time. The control unit is grounded via the wiring harness to the intake manifold.

All of the injectors inject at the same time and inject twice per four stroke cycle (once per crankshaft revolution).

AIR FLOW METER

The primary purpose of the air flow meter is to furnish the control unit with information concerning rate of the air flow going into the intake manifold. The air flow is measured by a baffle plate fitted in the meter. The angular position of the baffle plate is directly related to the rate of air flow. The plate is mechanically connected to a potentiometer, which converts the baffle plate position into an electric voltage signal given to the control unit. By using a compensating flap and chamber, a dampening effect is exerted on the baffle plate. This feature reduces the effect of pulsations in intake air flow and results in smoother operation of the baffle plate. To eliminate any possible damage to the air flow meter, in case of engine backfire, a one-way relief valve is built into the baffle plate.

A by-pass channel is built into the air flow meter. This "by-pass air" is not measured by the air flow meter and is used to set the fuel/air mixture at idle. An adjustment screw is provided for this purpose.

In addition to the potentiometer, an air temperature sensor is built into the air flow meter. This sensor supplies a signal to the control unit as to air temperature of the air that is being drawn into the intake manifold.

Also contained in the air flow meter is a set of contact points that controls the electrical supply to the electric fuel pump and auxiliary air valve. When no air flow is present, the contact points are open cutting off the electrical current to the fuel pump and auxiliary air valve. This feature prevents the fuel pump from pumping when the engine is not operating. (These contacts are by-passed during cranking so that the fuel pump receives current for starting purposes.) Figure 6E-1.

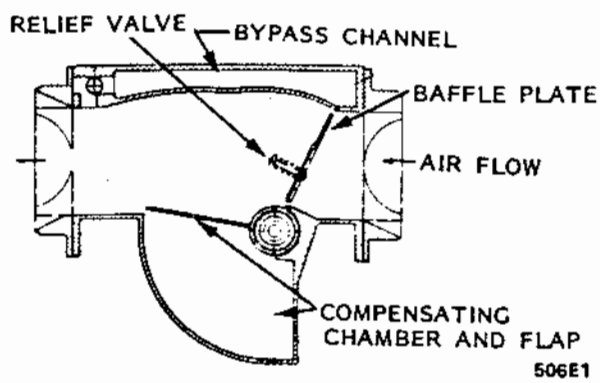


Figure 6E-1 Air Flow Meter

THROTTLE VALVE SWITCH

Two switch contacts are located inside the throttle valve switch, which is attached to the throttle valve. The throttle valve shaft is connected to the switch contacts. One switch closes the circuit when the throttle valve is closed and the other switch closes when the throttle valve is fully opened. During part throttle operation, both switches are open. The electrical signal from these switches are transmitted to the control unit and informs the control unit what position the throttle plate is in.

(a) Idle Position.

(b) Full Throttle Position.

The control unit then uses this information to further refine the pulse time of the injectors. (Full throttle operation requires a slightly richer air/fuel mixture than part throttle operation.) Figure 6E-2

TEMPERATURE SENSOR (COOLANT)

The coolant temperature sensor is located in the thermostat housing and supplies a signal to the control unit, which informs the control unit as to the coolant temperature of the engine. This function takes place until engine operating temperature is normal, at which time the temperature sensor has no effect upon the control unit. The control unit uses the information from the temperature sensor to enrichen the air/fuel mixture during starting and during the warm-up period. A temperature dependent resistor is located in the housing of the temperature sensor. As temperature increases, the resistance of the resistor is reduced.

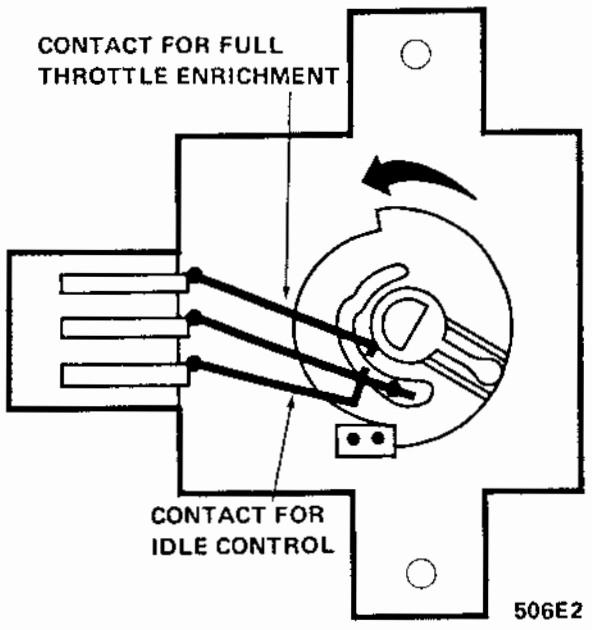


Figure 6E-2 Throttle Valve Switch

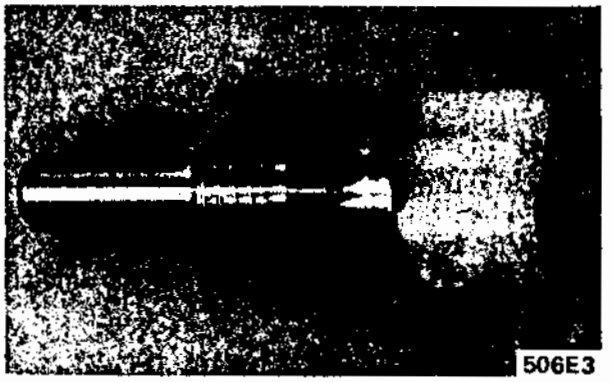


Figure 6E-3 Temperature Sensor (Coolant)

This type of resistor is known as an NTC (negative temperature coefficient) resistor. Increasing the coolant temperature decreases the resistance and the enrichment of the air/fuel mixture decreases. When the engine coolant reaches 176° Farenheit, the temperature sensor has no further effect upon the control unit. Figure 6E-3.

INJECTORS

The injectors contain a small solenoid, the core of which is a spring loaded needle. Figure 6E-4 The spring holds the needle in a closed position. When current is passed through the solenoid, the needle is pulled from its seat allowing fuel to inject into the intake manifold. The length of time current is allowed to flow is in milliseconds and is regulated by the control unit. The time range is from 1.5 to 10 milliseconds depending on engine requirements. Fuel pressure at the injector is 42 ± 2 PSI when intake manifold vacuum is "0". As intake manifold vacuum increases, fuel pressure is reduced. (See Pressure Regulator section.) All of the injectors are operated simultaneously. To obtain better fuel atomization, half of the fuel quantity required for a complete working cycle is injected each crankshaft revolution.

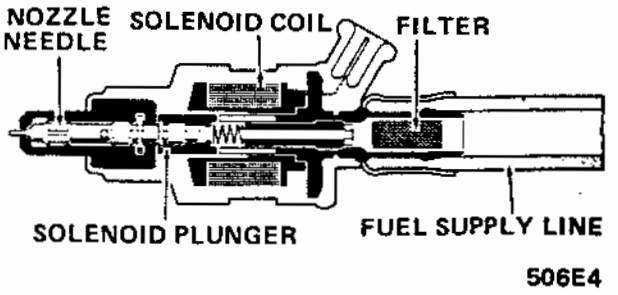


Figure 6E-4 Injectors

COLD START INJECTOR

The cold start injector also contains an electro-magnetic valve. When energized during cranking, fuel is sprayed into the intake manifold. The position the valve is mounted in results in all cylinders getting approximately the same amount of fuel when this valve operates. Current supply is controlled by the thermo time switch. Fuel pressure is the same as supplied to the injectors. Figure 6E-5

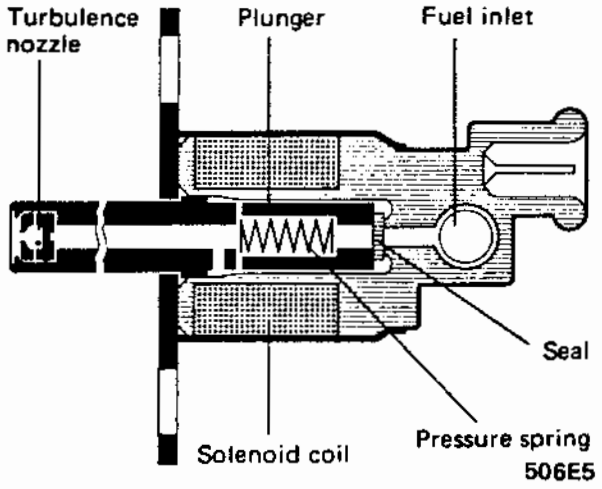


Figure 6E-5 Cold Start Injector

PRE-RESISTORS

The purpose of the pre-resistors is mainly to reduce the response time of the injectors. The pre-resistors are connected in series between the injectors and the dual relay. Figure 6E-6.

Figure 6E-6 Pre-Resistors

THERMO TIME SWITCH

The thermo time switch controls the cold start injector by furnishing a ground for its solenoid. The thermo time switch has a bimetal contact surrounded by a heating coil. The heating coil receives current during cranking. The bimetal contact breaks the ground circuit of the cold start injector whenever the heating coil or water coolant heats the bimetal to a temperature of 95° Farenheit or above. In extreme cold weather, it requires about 8 seconds for the heating coil to heat the bimetal contact to 95° Farenheit. The warmer the outside temperature is, the less time required to heat the bimetal contact. By limiting the operation time of the cold start injector by using the thermo time switch, engine flooding is prevented during prolonged cranking. Figure 6E-7.

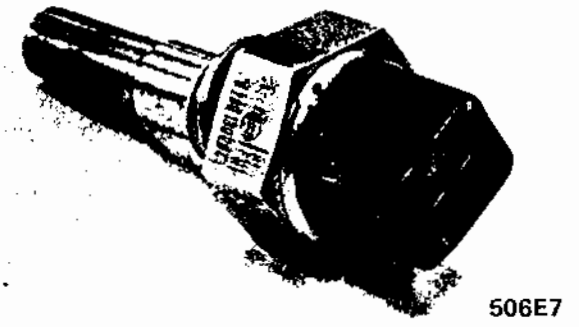


Figure 6E-7 Thermo Time Switch

AUXILIARY AIR VALVE

The purpose of the auxiliary air valve is to control additional air flow through the by-pass channel in the throttle valve to the intake manifold to increase idle RPM during engine warm up. The valve contains a slotted disc that rotates to open, close, or partially close the air passage. The position of the disc is controlled by a bimetal spring. When cold, the disc is open and closes progressively as the bimetal spring is heated. The bimetal spring is heated by an electric coil, which receives current whenever the engine is running. When the valve reaches approximately 158° Farenheit, the valve closes completely. By locating the valve on the thermostat housing, engine heat is transferred to the valve which aids in keeping the

valve closed or partially closed during short periods when the engine is turned off. Figure 6E-8.

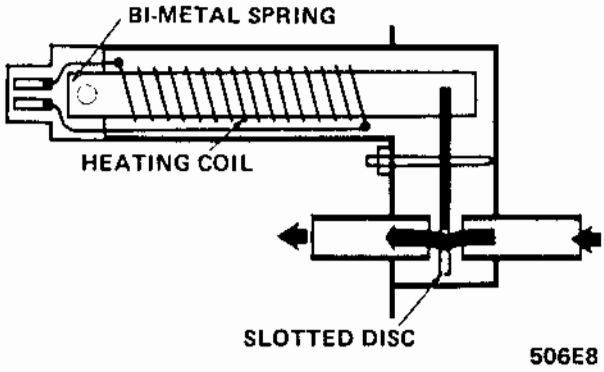


Figure 6E-8 Auxiliary Air Valve

FUEL PRESSURE REGULATOR

Fuel enters the pressure regulator inlet connections (2) from the fuel manifold that furnishes fuel to the injectors and cold start injector. A spring loaded diaphragm maintains desired pressure and excess fuel is returned to the fuel tank. As intake manifold vacuum increases, less pressure is required by the injectors. To compensate for this, a vacuum line is connected from the intake manifold to the pressure regulator valve. The vacuum pulls on the pressure regulator diaphragm with the result of lowering the fuel pressure. Depending on intake manifold vacuum, fuel pressure will vary from 31 PSI at high manifold vacuum to 44 PSI at zero or low manifold vacuum such as encountered during acceleration. Figure 6E-9.

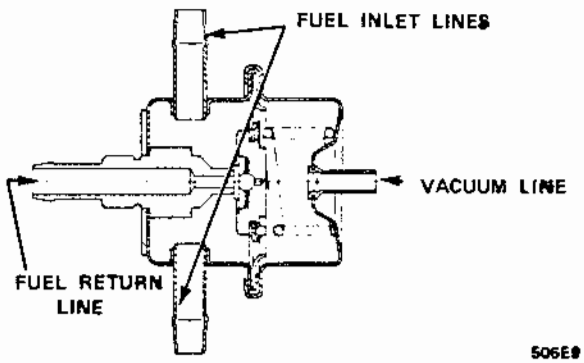


Figure 6E-9 Fuel Pressure Regulator

DECELERATION VALVE

During deceleration, the deceleration valve bypasses some air around the throttle valve. This results in more complete combustion during the coast down phase of driving. The valve is controlled by manifold vacuum. Whenever intake manifold vacuum is 12 inches of Mercury or higher, the valve is open and closed when vacuum is lower than 12 inches. The valve is closed during idle operation. Figure 6E-10.

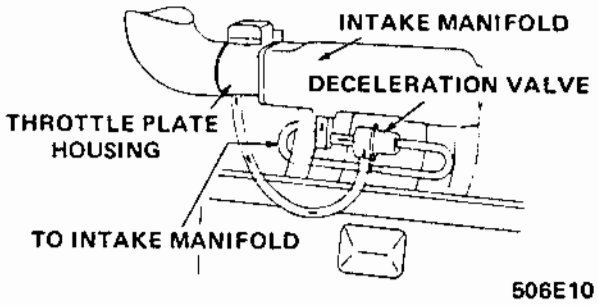


Figure 6E-10 Deceleration Valve

DUAL RELAY

The dual relay is comprised of two relays that control the current supply for the entire electronic fuel injection system and disengages the system from the battery when the ignition switch is off.

When the ignition switch is turned on, the main relay points close providing battery voltage to the control unit and pre-resistors of the electronic fuel injection system.

The other relay within the dual relay controls current to the electric fuel pump. The points in this relay close and complete the circuit to the fuel pump during cranking and when the points close in the air flow valve. This is designed to cut off current to the fuel pump in the event the engine stops (air flow valve closed). Figure 6E-11.

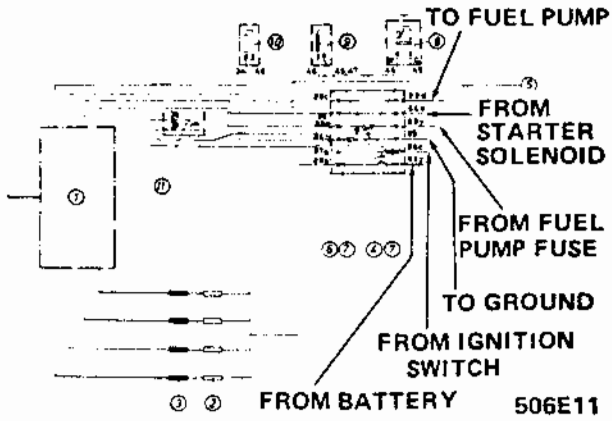


Figure 6E-11 Dual Relay Circuits

DIAGNOSIS

DIAGNOSIS AND CHECKING PROCEDURES

Proper diagnosis requires that the operation of the Electronic Fuel Injection System be understood. Read the Description and Operation section prior to performing any diagnosis or repair.

Prior to performing actual checks on EFI components, review the following section entitled, "Important Precautions".

Use of the diagnosis guide will assist in locating malfunctions with a systematic manner. This approach is designed to eliminate any basic problems before performing more detailed checks.

The following items of equipment are required to check the EFI System:

- Tachometer
- J-25401-3, 12-Volt (2 Watt Bult) Test Lamp
- J-25401-2, Fuel Pressure Gauge
- J-25401-1, Idle Drop Tester
- J-25401-4, Ohmmeter (0-10,000 Ohms)
- J-25401-5, Control Unit Connector, Overlay

With the above equipment, all portions of the system, with the exception of the control unit, can be checked. When a malfunctioning control unit is suspected, substitute with a known good unit to determine whether or not the problem is the control unit. Tester J-25400, with instructions, is available as an alternate method of rapid and systematic diagnosis.

IMPORTANT PRECAUTIONS WHEN SERVICING ELECTRONIC FUEL INJECTION

1. Remove control unit from car if it will be exposed to temperature of 175° Farenheit, or higher (such as body shop work or heated paint booth).

2. Never start engine when battery connections are loose.

3. Never start engine when a battery fast charge is attached to the car's battery.

4. Always disconnect battery terminals from battery when using a booster-charger to charge the battery.

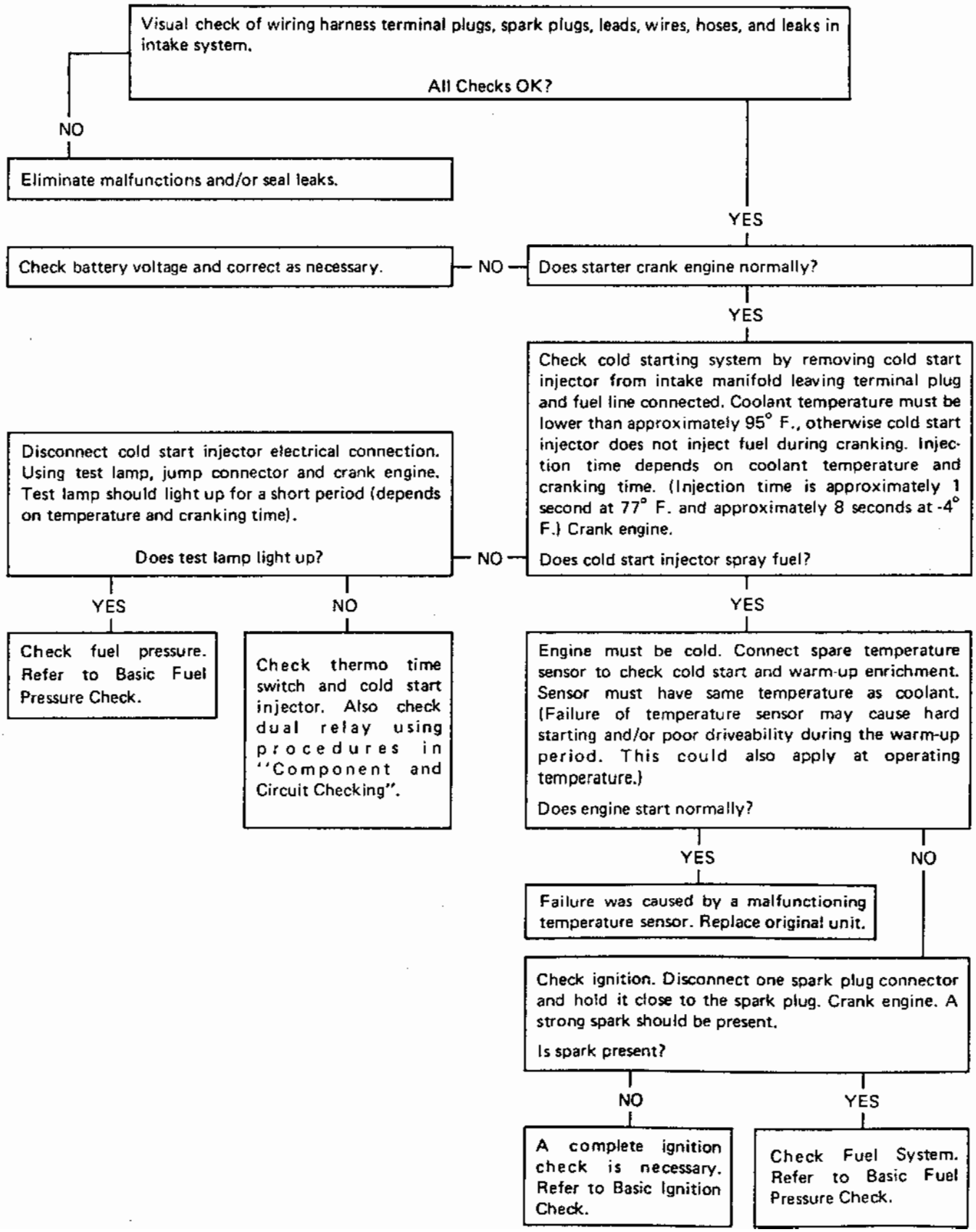
5. Never detach or attach wiring harness terminal plug to or from the control unit when the ignition switch is on.

6. Never start any diagnosis or repair of the E.F.I. system until the ignition system has been completely checked (points, spark plugs, dwell, timing, spark plug wires, etc.).

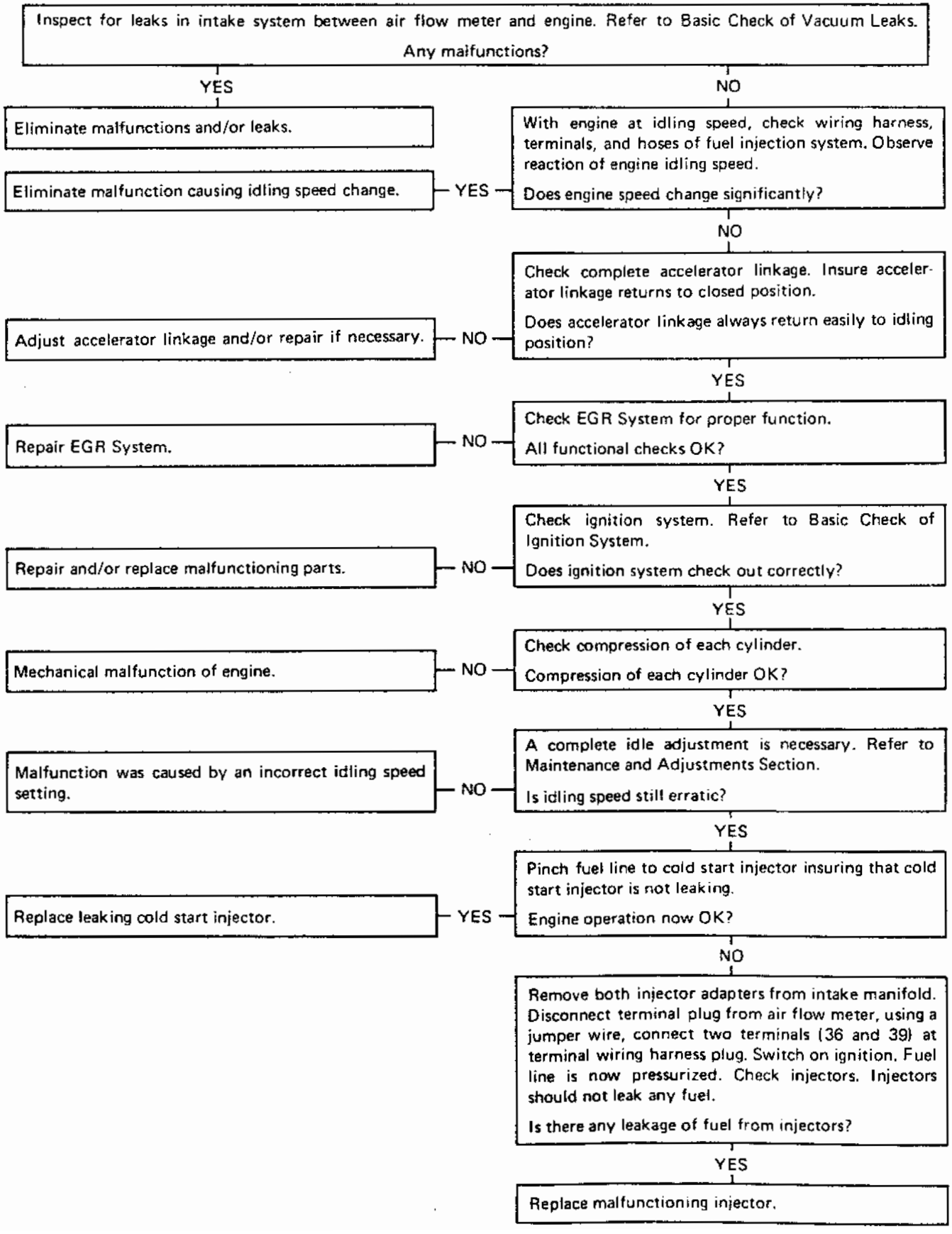
7. Never start any diagnosis or repair of the E.F.I. system until the circuits from the main wiring harness going to the dual relay have been completely checked.

8. Whenever using ohmmeter, make sure ignition switch is in the "OFF" position. Ohmmeter can be damaged if subjected to a live circuit.

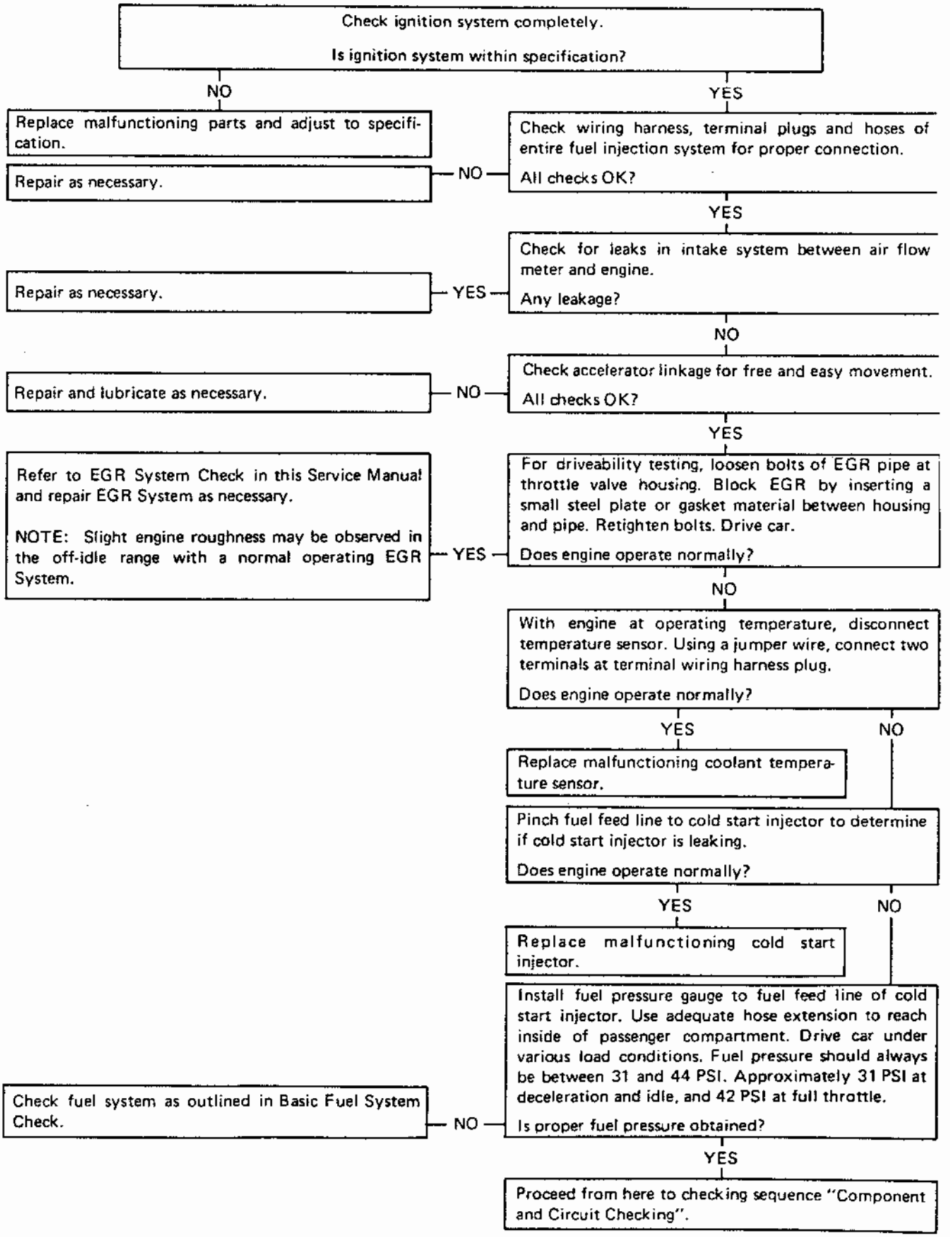
HARD STARTING — WITH COLD ENGINE



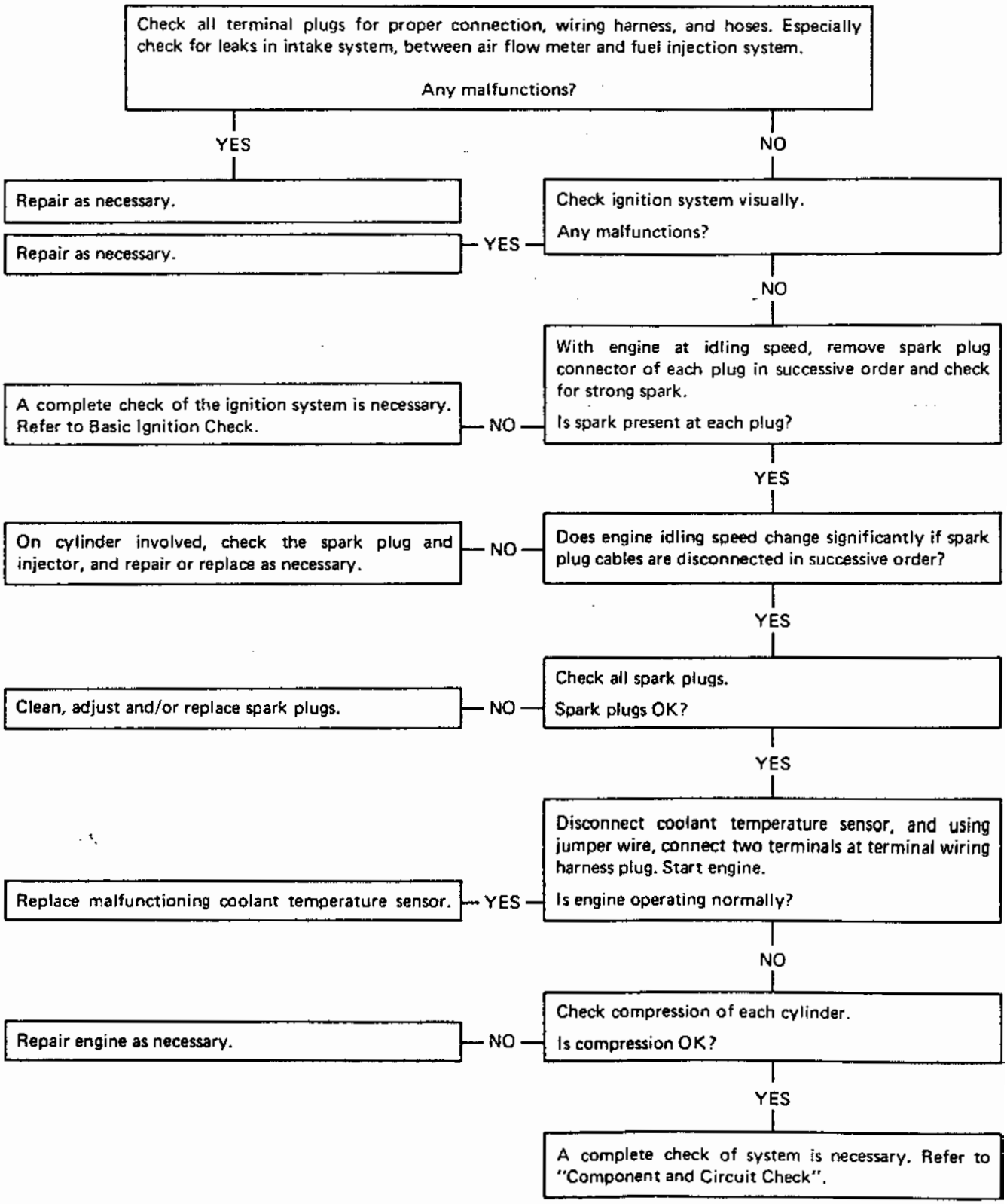
POOR OR ERRATIC IDLING



POOR ENGINE OPERATION



ENGINE MISFIRES UNDER ALL DRIVING CONDITIONS



EXCESSIVE FUEL CONSUMPTION

Make visual check of wiring harness, terminal plugs, hoses, for leaks in intake system, and complete ignition system check.

All checks OK?

NO → Repair as necessary.

YES → Install fuel pressure gauge to fuel feed line of cold start injector. Use adequate hose extension to reach inside of passenger compartment. Drive car under various load conditions. Fuel pressure should be between 31 and 44 PSI. Approximately 31 PSI at deceleration and idle, and 42 PSI at full throttle.

Is proper fuel pressure obtained?

NO → A complete check of the fuel supply system is necessary. Refer to Basic Fuel System Check.

YES → With engine at normal operating temperature, remove cold start injector from manifold leaving fuel hose and wiring harness connected. Crank engine to insure maximum fuel pressure.

Does injector leak fuel?

YES → Replace cold start injector.

NO → Disconnect terminal plug of coolant temperature sensor. Coolant must be at operating temperature (above 175° F). Measure across the temperature sensor terminals with an ohmmeter. Resistance should be less than 350 ohm.

Is resistance less than 350 ohm?

NO → Replace malfunctioning temperature sensor.

YES → Remove flex hose to air flow meter and manually actuate the baffle plate.

Does baffle plate return to the closed position and operate freely?

NO → Repair or replace air flow meter as necessary.

YES → Check compression of each cylinder.

Is compression OK?

NO → Repair engine as necessary.

YES → Check valve timing, especially if engine repair has been completed previously.

Is valve timing OK?

NO → Repair engine as necessary.

YES → Complete system check is necessary. Refer to "Component and Circuit Check".

ENGINE CRANK — BUT ENGINE WILL NOT START

Visual check of wiring harness terminal plugs, spark plugs, leads, wires, hoses and leaks in intake system.

All Checks OK?

NO

Eliminate malfunctions and/or seal leaks.

YES

Check ignition. Disconnect one spark plug connector and hold close to spark plug. Crank engine. A strong spark should be present during cranking.

Is spark present?

NO — A complete ignition check is necessary.

YES

Check voltage supply. Connect test lamp between center wire of pre-resistors and ground. Switch on ignition. Test lamp should light up.

Does test lamp light up?

NO — Using test lamp, check main wiring and red wire at relay. Replace dual relay if necessary.

YES

Check coolant temperature sensor by disconnecting terminal plug from sensor, and using a jumper wire, connect two terminals on wiring harness plug. This simulates a warm engine. Crank engine.

Does engine start?

YES — Malfunctioning temperature sensor. Replace temperature sensor.

NO

Check fuel pressure. Connect fuel pressure gauge to fuel line, leading to cold start injector. Disconnect vacuum hose from pressure regulator to intake manifold. Crank engine. Fuel pressure should be 42 ± 2 PSI.

Is fuel pressure obtained?

NO — A complete check of the fuel supply system is necessary. Refer to Basic Fuel System Check.

YES

Disconnect terminal plug of one injector. Connect a spare injector to loose terminal plug. Start engine. Injector needle should actuate.

Does injector needle actuate?

NO — Refer to "Component and Circuit Checking".

YES

Check complete fuel injection system using tester, J-25400, if available. If not available, check complete system as outlined in "Component and Circuit Checking" section.

Are any malfunctions detected?

YES — Adjust, repair, or replace as necessary.

NO

Connect spare control unit for checking purposes only, and crank engine.

Does engine start and run normally?

YES — Reconnect original control unit. Crank engine several times.

Does engine start and run normally?

NO

Failure is not caused by the fuel injection system. Other mechanical or electrical failure is the cause.

NO

Replace control unit.

YES

Malfunction possibly caused by poor connection of the main wiring harness terminal plug. Visual check of same. Correct or repair as necessary.

ENGINE STARTS — BUT FAILS TO KEEP RUNNING

Visual check of wiring harness terminal plugs, spark plugs, leads, wires, hoses, and leaks in intake system.

All Checks OK?

NO

Eliminate malfunctions and/or seal leaks.

YES

Check coolant temperature sensor by disconnecting plug from sensor, and using a jumper wire, connect two terminals in wiring harness plug. Start engine.

Does engine run normally?

YES — Malfunctioning coolant temperature sensor gives wrong temperature signal to control unit. Replace malfunctioning temperature sensor.

NO

Check fuel pressure.

Is fuel pressure maintained as long as engine runs?

NO — Is fuel pressure of 42 ± 2 PSI obtained during cranking?

YES

Disconnect terminal plug of an injector. Connect a spare injector to disconnected plug. Start engine. Injector needle should actuate.

If injector needle does not actuate, refer to "Component and Circuit Checking".

If normal operation is not obtained, refer to "Component and Circuit Checking".

NO

A complete check of the fuel supply system is necessary. Refer to Basic Check of Fuel System.

YES

Does fuel pressure drop below 28 PSI after cranking?

YES

Check fuel pump contact in air flow meter and dual relay. Refer to "Component and Circuit Checking".

HARD STARTING — WITH A WARM ENGINE

Visual check of wiring harness terminal plugs, spark plugs, leads, wires, hoses, and leaks in intake system.

All Checks OK?

NO

Eliminate malfunctions and/or seal leaks.

YES

Engine must be at operating temperature, at least 104°F. Check coolant temperature sensor by disconnecting terminal plug from sensor, and using a jumper wire, connect two terimnals on wiring harness plug. This simulates operating temperature. Start engine.

Does engine start normally?

YES — Malfunction of engine was caused by a malfunctioning temperature sensor. Replace same.

NO

Check cold starting system by removing terminal plug from cold start injector. Start engine.

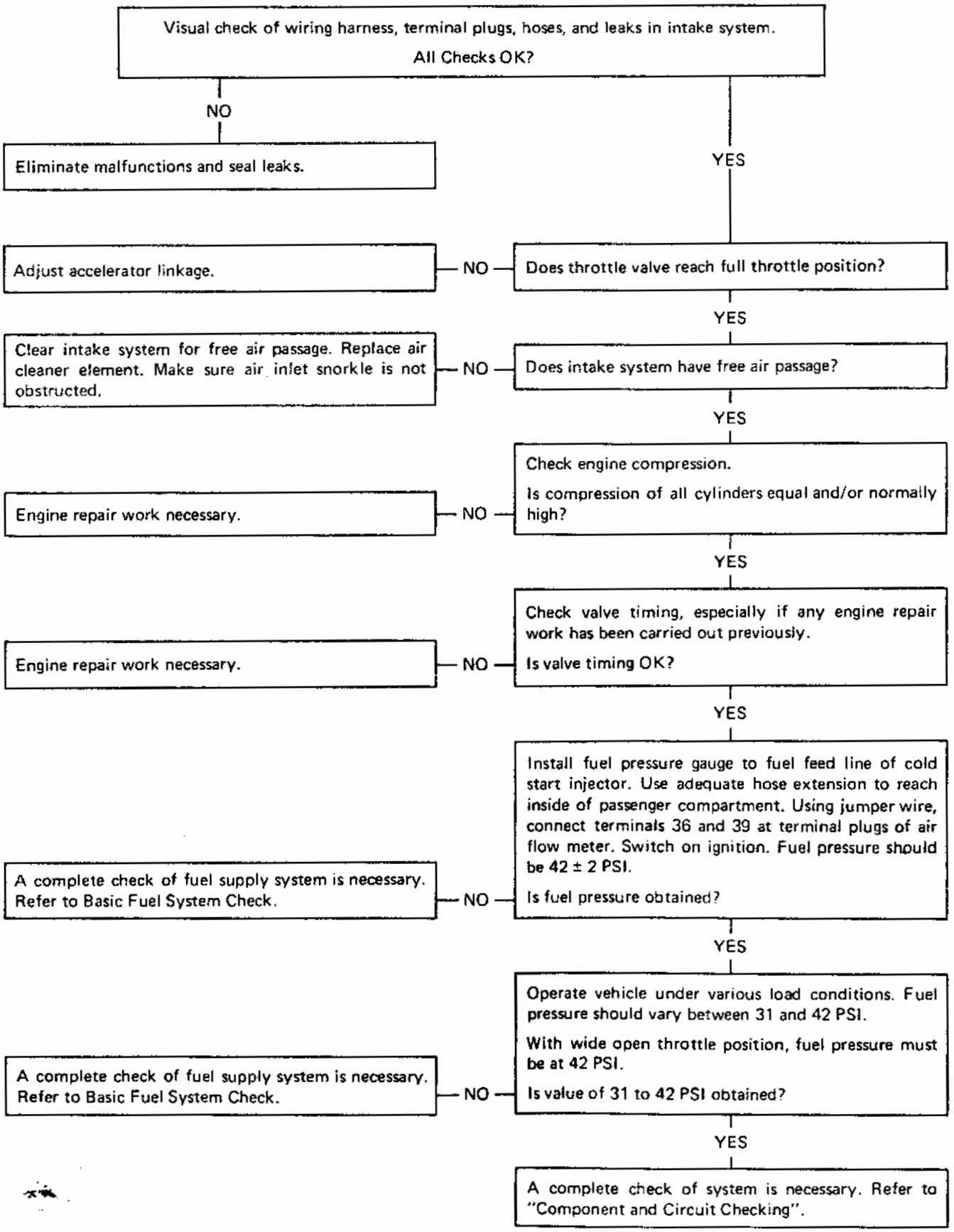
Does engine start normally?

YES — Malfunction was caused by the thermo time switch, causing cold start injector to spray fuel during starting when engine is warm. Replace malfunctioning thermo time switch.

NO

Check ignition system.

POOR ENGINE ACCELERATION



BASIC CHECKS

IGNITION SYSTEM

1. Hold a spark plug wire 1/4" away from engine block and crank engine.

2. If a strong spark is seen, check dwell and timing. (Reset if necessary.) If dwell and timing are okay, trouble is probably not with the ignition system.

3. If no spark or an intermittent spark is seen, remove the coil high tension wire from the distributor cap. Hold the coil high tension wire 1/4" from engine block and crank engine.

4. If strong spark is seen, check distributor cap and rotor for cracks or carbon tracking. Check lead between distributor and coil for broken or burned terminals or cracks in insulation. Replace malfunctioning parts.

5. If no spark or intermittent spark is seen, connect test lamp J-25401-3 to ignition switch side of coil.

6. With ignition switch turned to the "ON" position, the lamp should light. If not, the problem is in the ignition switch and/or wiring harness.

7. Connect test lamp J-25401-3 to distributor side of coil; crank engine; lamp should flicker. If lamp does not flicker, it indicates malfunctioning points, or condenser, or coil.

8. Disconnect distributor lead at coil; connect test lamp J-25401-3 to terminal; turn on ignition switch. If test lamp does not light, malfunctioning coil is indicated.

9. Refer to Electrical section for checking of distributor advance and vacuum retard.

VACUUM LEAKS

A vacuum leak in the manifold system, between the air flow meter and combustion chamber, may cause or contribute to any of the following:

- Engine misfire
- Poor or erratic idling
- Hard starting with a cold or warm engine
- Engine fails to keep running

When a vacuum leak is suspected, proceed as follows:

- Tighten intake manifold to cylinder head bolts.
- Visually check the following for correct installation:
  - Hose between air flow meter and throttle plate housing, including PCV hose.
  - Throttle valve housing to manifold connection.
  - Pressure regulator vacuum hose.
  - Auxiliary air valve hose.
  - Throttle valve housing to deceleration valve hose.
  - Automatic transmission vacuum line connections.
  - Distributor vacuum retard line.
  - EGR lines and hoses.
  - Brake booster hose.
  - Check proper installation of oil dipstick.

BASIC VACUUM LEAK CHECK

If a vacuum leak is still suspected, the complete manifold system must be checked using the following procedure:

- Disconnect brake booster hose at intake manifold.
- Install an air hose in the manifold fitting, and pressurize the intake manifold. (Use regulated air pressure of approximately 5 PSI. DO NOT EXCEED 15 PSI.)
- Brush on soapy water solution to all fittings and around all gasket surfaces.
- Bubbles indicate a leak that must be repaired.

DUAL RELAY CIRCUITS

Check of all circuits on plug terminal (A) at the dual relay. See Figure 6E-12.

1. Disconnect the main wiring harness terminal plug (A) from the dual relay.

2. Connect one end of test lamp J-25401-3 to ground. Use other end to probe connector that goes to terminal 88Z. See Figure 6E-13. Test lamp should light; if not, wire has a disconnect or open between the plug and the battery.

3. Using test lamp J-25401-3 in the same way, probe terminal that goes to terminal 88Y. See Figure 6E-13. Test lamp should light; if not, the fuel pump fuse is blown (located in its own fuse holder beside fuse box). See Figure 6E-14.

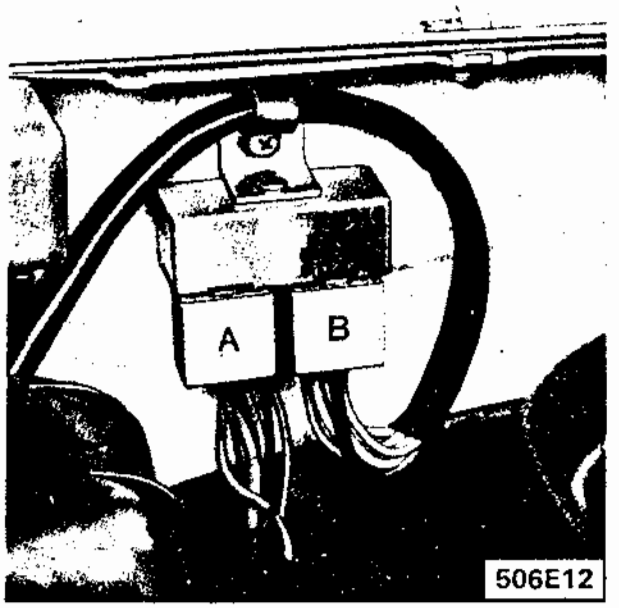


Figure 6E-12 Dual Relay Plug Terminals

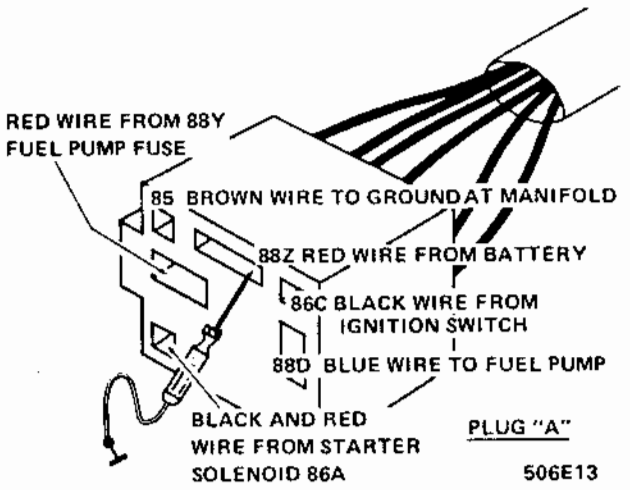


Figure 6E-13 Terminal Plug (A)

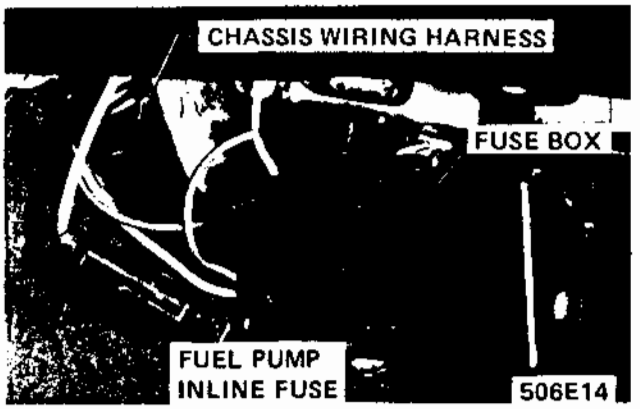


Figure 6E-14 Location of Fuel Pump Fuse

4. Using test lamp J-25401-3 in the same way, probe terminal 86C. See Figure 6E-13. Test lamp should light when ignition switch is turned on. If not, the wire between the plug and the ignition switch has an open.

5. Using test lamp J-25401-3 in the same way, probe terminal 86A. See Figure 6E-13. Test lamp should light when the starter is engaged; if not, black and red wire is disconnected from the starter solenoid.

6. Using an ohmmeter, check for continuity between terminal 85 in plug and ground. See Figure 6E-13. If there is no continuity, the brown wire is broken between the terminal plug and where it fastens to the intake manifold.

FUEL SUPPLY SYSTEM

1. Install fuel pressure gauge to fuel feed line of the cold start injector. See Figure 6E-15. Fuel pressure should be between 31 and 44 PSI depending on intake manifold vacuum. It will vary from approximately 31 PSI on deceleration and idle to as much as 44 PSI at full throttle. Pressure between these limits should be obtained during cranking and engine running.

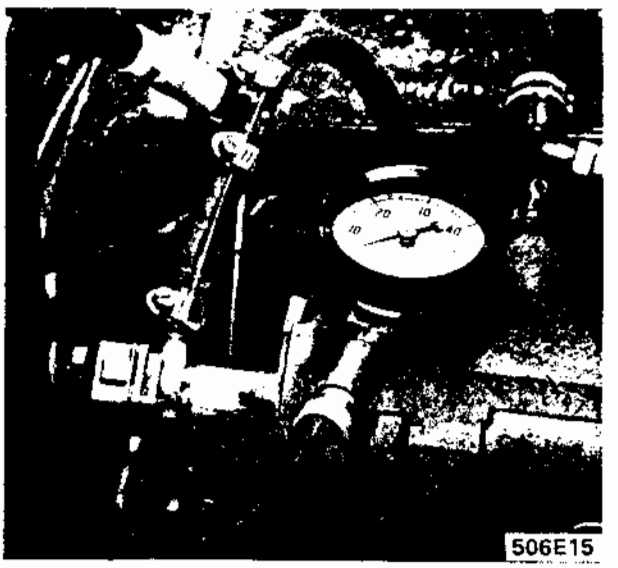


Figure 6E-15 Fuel Pressure Gage Installed

2. If no pressure is present, indicating fuel pump is not operating, check electrical circuit to fuel pump as follows:

a. Check fuse.

b. Remove "A" plug terminal from the dual relay. See Figure 6E-13. Using a jumper wire between terminals 88D and 88Y of the terminal

plug, determine if the pump operates. If fuel pump does not run, check for poor connection at the fuel pump and check ground wire at fuel pump. If voltage is present at the fuel pump and it does not run, replace the fuel pump.

c. If pump operates with jumper wire connected between terminals 88D and 88Y, and would not operate when cranking engine with terminal plug "A" connected, the dual relay may be malfunctioning. Substitute a known good relay and recheck. If problem still exists, check all circuits in plug "A" terminals of dual relay, as outlined under dual relay circuits.

3. If fuel pressure is normal during cranking but is not maintained with engine running, the circuit to the contacts in the air flow meter must be checked. Disconnect electrical connector to the air flow meter. Connect a jumper wire between terminals 36 and 39 of the wiring harness plug. See Figure 6E-16. Turn on ignition switch; if pump operates, it indicates the wiring harness and dual relay are okay, and malfunction is in the air flow meter. Check for continuity in the air flow meter (terminals 36 and 39). See Figure 6E-17. Disconnect hose at front of air flow meter, and manually operate baffle plate. Continuity must be made when baffle plate is moved from the closed position.

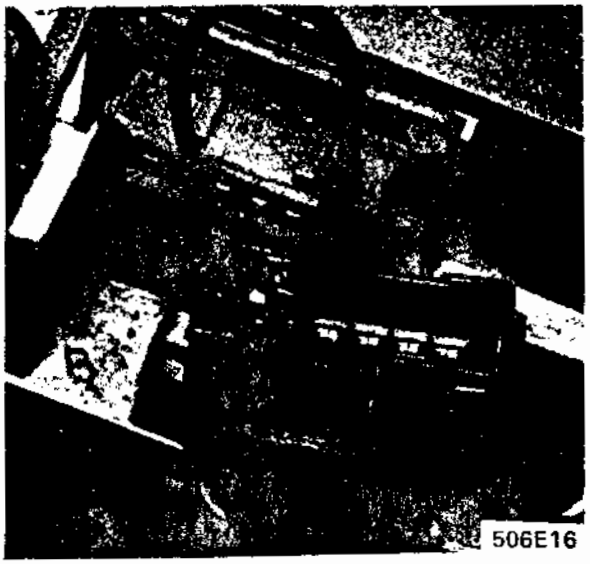


Figure 6E-16 Jumper Wire Installed on Air Flow Meter Connector Plug

4. If fuel pump operates and no pressure is obtained, check for restrictions in fuel lines and/or filters. (Filter on tank gauge unit as well as the in-line fuel filter.)

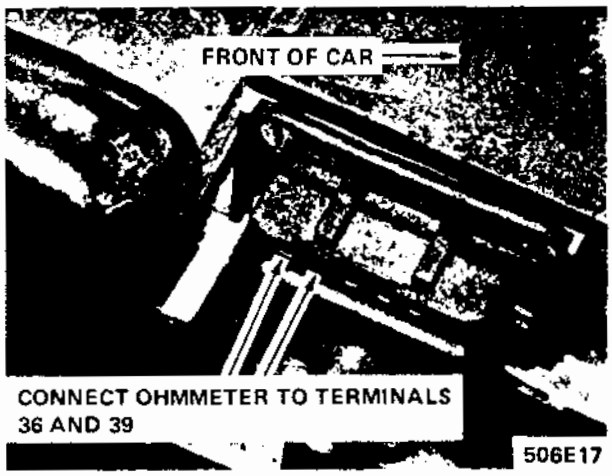


Figure 6E-17 Air Flow Meter Terminals 36 and 39

5. Using test lamp J-25401-3 in the same way, pressure is obtained, proceed as follows:

a. If pressure is over 44 PSI, check for restricted fuel return line from pressure regulator valve to the fuel tank. If lines are not restricted, the pressure regulator valve is malfunctioning;

b. If pressure does not vary with intake manifold vacuum (31 to 44 PSI), it indicates no vacuum to pressure regulator valve or a malfunctioning valve.

c. If low pressure is obtained, it indicates either a malfunctioning pressure regulator valve, or fuel pump, or restricted fuel filter and/or lines.

6. Insufficient Fuel Flow. To check fuel flow, remove fuel line from cold start injector and connect a long hose to the fuel line. Put other end of long hose into a large container. Remove "A" plug terminal from dual relay. Using a jumper wire between terminals 88D and 88Y, operate fuel pump See Figure 6E-13. Pump volume should be a minimum of 1.5 qts. for one minute operation. If flow is inadequate, check for restricted fuel line or filters. If there are no restrictions, replace fuel pump.

COMPONENT AND CIRCUIT CHECKING

After it has been determined that the ignition system, fuel system, all vacuum connections in the intake system, and circuits in the main wiring system to the dual relay are correct, and the system still does not operate correctly, a complete electrical check of the system must be made. Proceed as follows:

1. Remove right side kick panel as outlined under major repair.

2. The control unit is now exposed; to remove

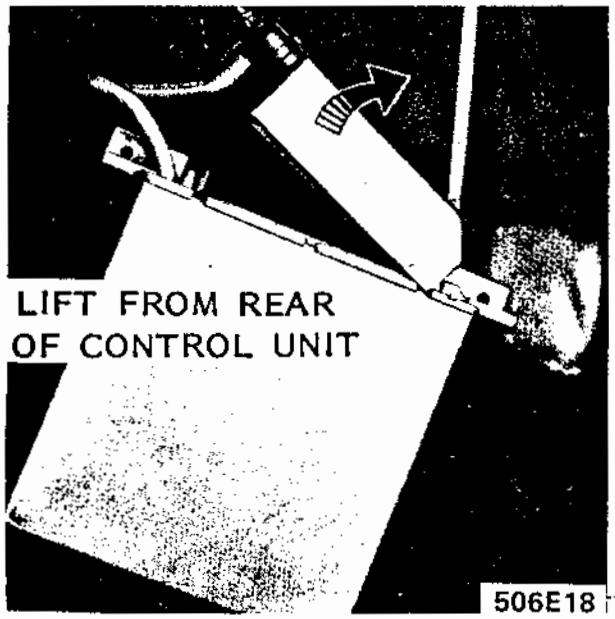


Figure 6E-18 Disconnecting Control Unit Plug

the wiring harness multiple plug from the control unit, the clip, located on the forward side of the control unit, has to be pushed forward and the plug pulled upward as shown in Figure 6E-18. (Ignition switch off.)

(On air conditioned cars, access to the multiple plug and control unit can best be reached by removing the glove compartment box.)

3. The entire system can be checked using the following chart with a 12-volt test lamp (2 Watt Bulb) J-25401-3 and an ohmmeter J-25401-4. The problem could be in the component, the wiring harness, or wiring harness connections, By carefully following the steps outlined in the chart, this can be determined and appropriate repairs or replacement made.

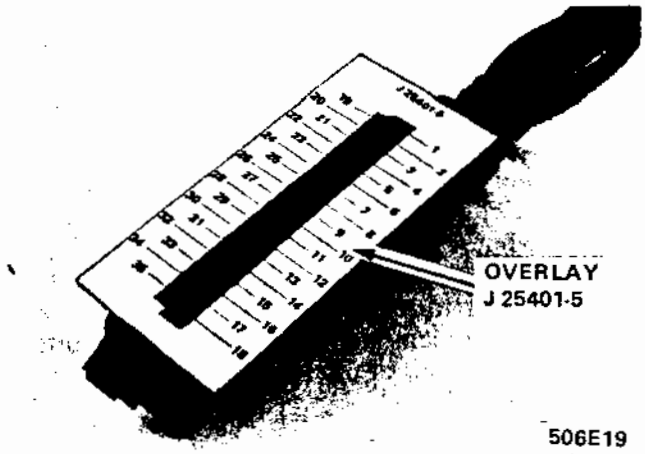


Figure 6E-19 Control Unit—Wiring Harness Connector Overlay

4. Caution must be taken to probe the correct terminals. By placing J-25401-5, Connector Overlay, over the wiring harness plug, the need for counting the terminals is eliminated. The terminals on the wiring harness plugs are not marked, and if tool J-25401-5 is not available, the terminals must be counted starting with terminal 1. Terminals 1 to 18 are located in the longest row of terminals with number 1 starting at the wiring harness end. Terminals 19 to 35 are located in the shortest row of terminals with number 19 starting at the wiring harness end. Terminals 11, 19, 21 to 31, and 35 are vacant. See Figure 6E-19.

Function or Component to be Checked:	Check with:	Measure or Check Between Terminals of the Multiple Plug That Fastens to the Control Unit	To check, proceed as follows:	Reading	Possible Trouble and Cause
Supply Voltage Fig. 6E-20	12-Volt Test Lamp	Red Probe – Black Probe 10 and Ground	Ignition on.	Test Lamp should light.	Dual relay or wiring harness or terminals plugs are malfunctioning. Be sure basic checks of dual relay circuits are okay before changing dual relay.
Ground Circuit of Injection System Fig. 6E-20	12-Volt Test Lamp	Red Probe – Black Probe 10 and 5 10 and 16 10 and 17	Ignition on.	Test Lamp should light.	No ground connection; check ground connection at intake manifold.
Triggering Impulse from Ignition Distributor Fig. 6E-21	12-Volt Test Lamp	Red Probe – Black Probe 10 and 1	Actuate starter for 5 seconds	Test Lamp should flicker (opening and closing of the ignition points).	Green wire from coil has an open or disconnect – check connection of green wire to E.F.I. wiring harness 6" from multiple plug inside car. If okay, trace wire back to coil. Malfunctioning ignition points can cause malfunction.
Start Signal Fig. 6E-22	12-Volt Test Lamp	Red Probe – Black Probe 4 and 5	Briefly actuate starter.	Test Lamp should light.	Open in Terminal 4 wiring in harness or malfunctioning dual relay. Be sure basic checks of dual relay circuits are okay before changing dual relay.
Portion of the Dual Relay During Starting. Fig. 6E-23	12-Volt Test Lamp	Red Probe – Black Probe 20 and 5	Briefly actuate starter.	Test Lamp should light.	Malfunctioning dual relay. Change relay. Be sure basic checks of dual relay circuits are okay before changing dual relay.
Auxiliary Air Valve Fig. 6E-24	12-Volt Test Lamp	Red Probe – Black Probe 34 and 5	Briefly actuate starter	Test Lamp should light.	Open in wiring harness or malfunctioning auxiliary air valve. Check air valve by itself to determine which is malfunctioning. To check air valve, disconnect E.F.I. harness plug from air valve. Measure ohms resistance across air valve terminals – should be 45-55 ohms.

Function or Component to be Checked:	Check with:	Measure or Check Between Terminals of the Multiple Plug That Fastens to the Control Unit	To check, proceed as follows:	Reading	Possible Trouble and Cause
Injectors Fig. 6E-25	12-Volt Test Lamp	Red Probe – Black Probe 14 and 5 15 and 5 32 and 5 33 and 5	Ignition on.	Test Lamp should light.	Open in wiring harness, malfunctioning pre-resistor, or malfunctioning injector – check pre-resistor separately and injectors separately to determine which is malfunctioning. The resistance check of injectors and pre-resistors is covered in a later step.
Fuel Pump Contact in Air Flow Meter Fig. 6E-26	12-Volt Test Lamp	Red Probe – Black Probe 20 and 5	Remove air hose from air flow meter. Ignition on. Push Baffle Plate to partially open position.	Test Lamp should light.	Open in wiring harness or malfunctioning air flow meter. Disconnect terminal at the air flow meter and and check Terminals 36 and 39 of the air flow meter with ohmmeter while working baffle plate manually to see if contact switch is working. See Figure 6E-28. Switch points should close when baffle is opened.
Air Flow Meter Fig. 6E-27	Ohmmeter	7 and 8 6 and 9	Ignition off.	Between 120-170 ohms. Between 230-330 ohms.	Open in wiring harness or malfunctioning air flow meter. If these values are not obtained, remove harness connector at air flow meter and check between same terminal numbers on air flow meter. (See Figure 6E-28.) Also remove large air hose and actuate flapper valve to assure free movement.
Check of Injectors and Pre-Resistor for Proper Electrical Resistance Fig. 6E-29	Ohmmeter	14 and 15 32 and 33	Ignition off.	15 to 19 Ohms. 15 to 19 Ohms. NOTE: This is simultaneously checking two pre-resistors and two injectors, in series.	Open circuit or poor contact in wiring harness or malfunctioning injector or pre-resistor. Separate check of individual components should show cause of problem. Refer to Figures 6E-30 and 6E-31. Injectors should be 2 to 3 ohms. Pre-resistors should be 5.5 to 6.5 ohms checking from common terminal to individual resistor terminals.

Function or Component to be checked:	Check with:	Measure or Check Between Terminals of the Multiple Plug That Fastens to the Control Unit	To check, proceed as follows:	Reading	Possible Trouble and Cause
Cold Start Injector and Switch Figure 6E-32	Ohmmeter	4 and 5	Ignition off. Disconnect plug "B" for fuel injection system from dual relay. Reconnect after checking.	Above 95° F. ± 5° 50 to 75 Ohms. Below 95° F. ± 5°. 3 to 5 Ohms. NOTE: Contacts in thermo time switch open at approximately 95° F.	Open in wiring harness, malfunctioning thermo time switch or cold start injector. Check resistance of the cold start injector. Should read approximately 4 Ohms at 68° F. See Figure 6E-33. If cold start injector checks okay, replace thermo time switch.
Temperature Sensor (Coolant) Fig. 6E-34	Ohmmeter	13 and 5	Ignition off. Read Note.	Temperature sensitive. at 32° F. 4,550 to 6,500 Ohms. at 68° F. 2,100 to 2,900 Ohms. at 176° F. 270 to 390 Ohms. NOTE: If the engine has not been run or will not run and is at room temperature use values listed under 68° F. To check sensor. If the engine is runable start engine and let run until normal operating temperature is reached, use values listed under 176° F. to check sensor. If desired to check sensor at 32° F. sensor must be submerged in ice water for at least 10 minutes.	Open in wiring harness, or malfunctioning temperature sensor. Check temperature sensor individually to determine malfunction. Not necessary to remove from engine. Values should correspond with engine coolant temperatures.

Function or Component to be Checked:	Check with:	Measure or Check Between Terminals of the Multiple Plug That Fastens to the Control Unit	To check, proceed as follows:	Reading	Possible Trouble and Cause
Idle Contact in Throttle Valve Switch Fig. 6E-35	Ohmmeter	2 and 18	Ignition off.		Open in wiring harness, or malfunctioning throttle plate switch. Check throttle plate switch by removing harness connector and repeating ohmmeter check at numbered terminals. (See Figure 6E-37)
			Accelerator Pedal at Idle	0 Ohms.	
			Actuate Accelerator Pedal.	No continuity. Infinite reading on ohmmeter.	
Full Throttle Contact in Throttle Valve Switch Fig. 6E-36	Ohmmeter	3 and 18	Ignition switch off. Accelerator Pedal at Idle.	No continuity. Infinite reading on ohmmeter.	Open in wiring harness, or malfunctioning throttle plate switch, or accelerator linkage not set correctly – check accelerator linkage to be sure wide open throttle is achieved. Check throttle switch individually to determine malfunctions – similan to previous step (Figure 6E-37)
			Fully depress accelerator pedal.	0 Ohms.	

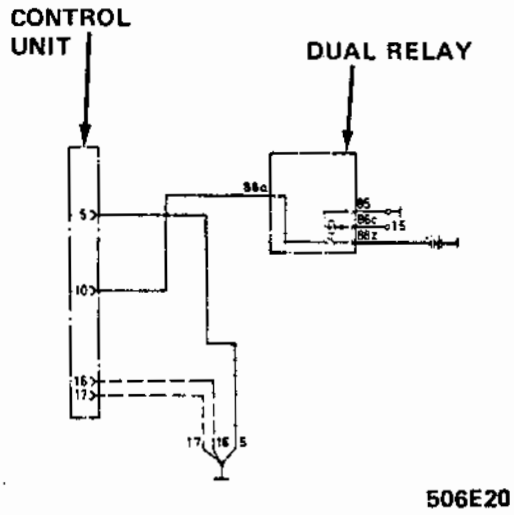


Figure 6E-20 Supply Voltage Circuit

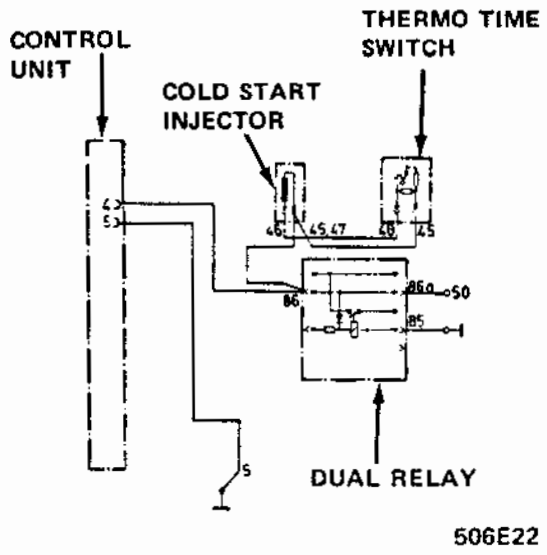


Figure 6E-22 Start Signal Circuit

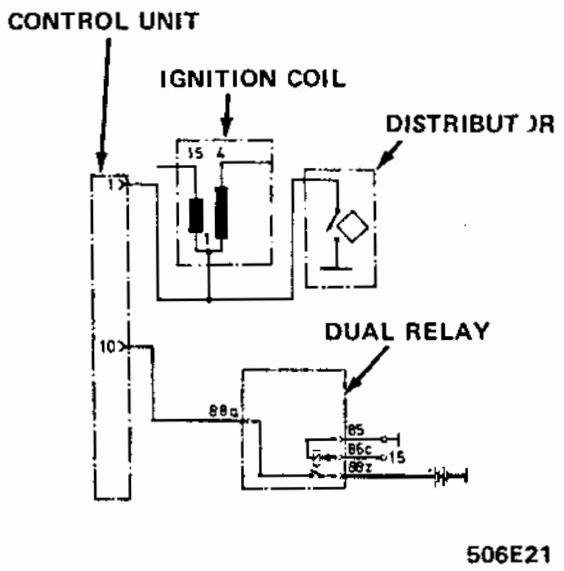


Figure 6E-21 Triggering Impulse from Ignition Distributor Circuit

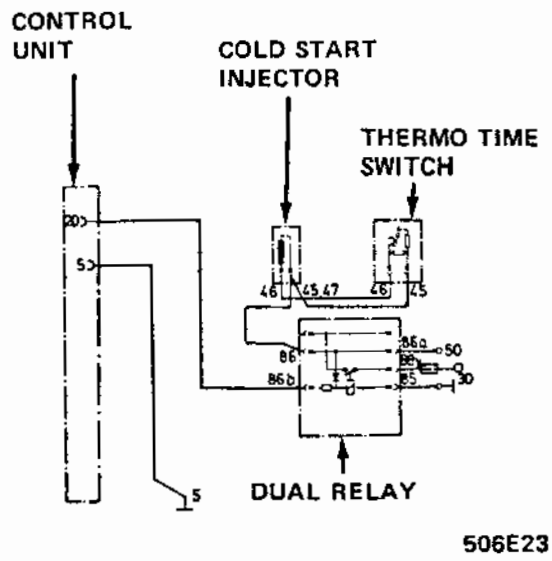


Figure 6E-23 Portion of the Dual Relay During Starting

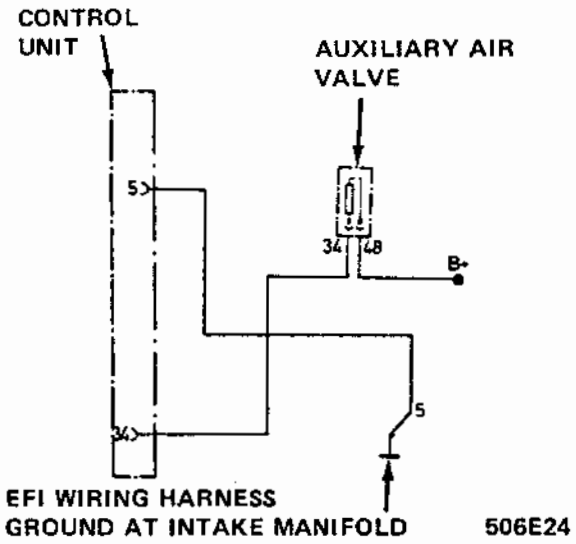


Figure 6E-24 Auxiliary Air Valve Circuit

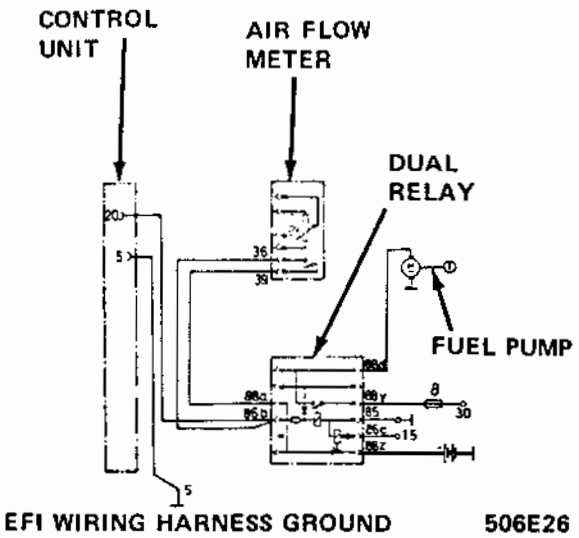


Figure 6E-26 Fuel Pump Contact in Air Flow Meter

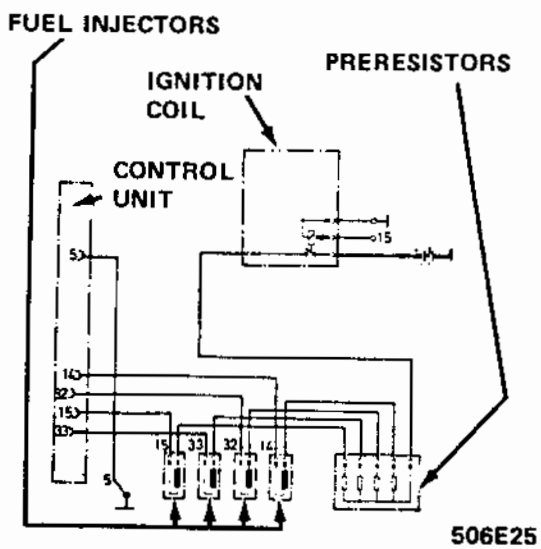


Figure 6E-25 Fuel Injectors

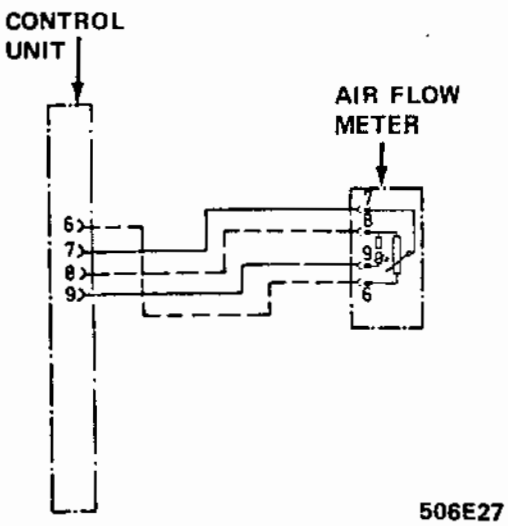


Figure 6E-27 Air Flow Meter

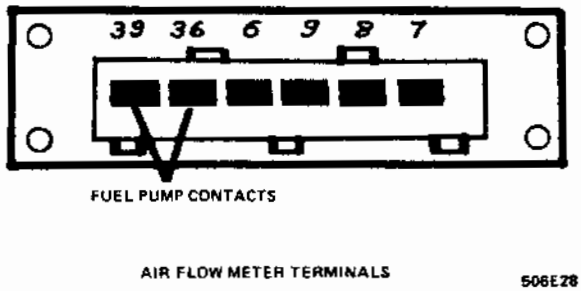


Figure 6E-28 Air Flow Meter Terminals

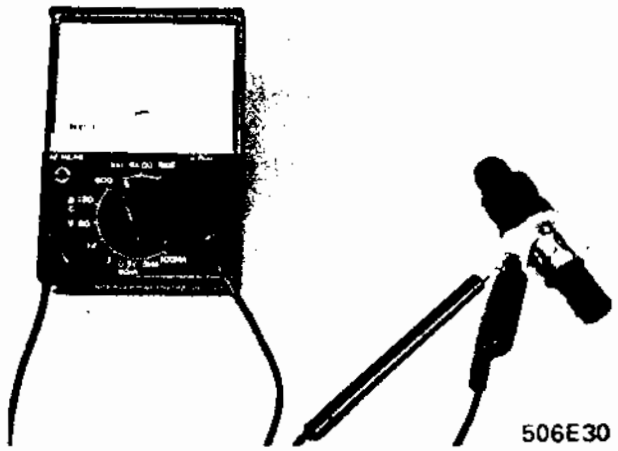


Figure 6E-30 Resistance Check of Injector

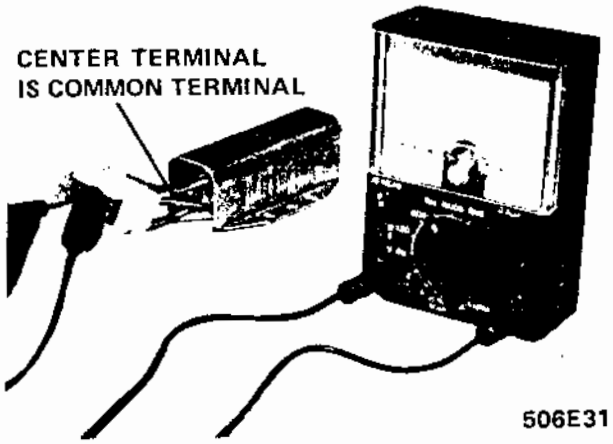


Figure 6E-31 Resistance Check of Pre-Resistors

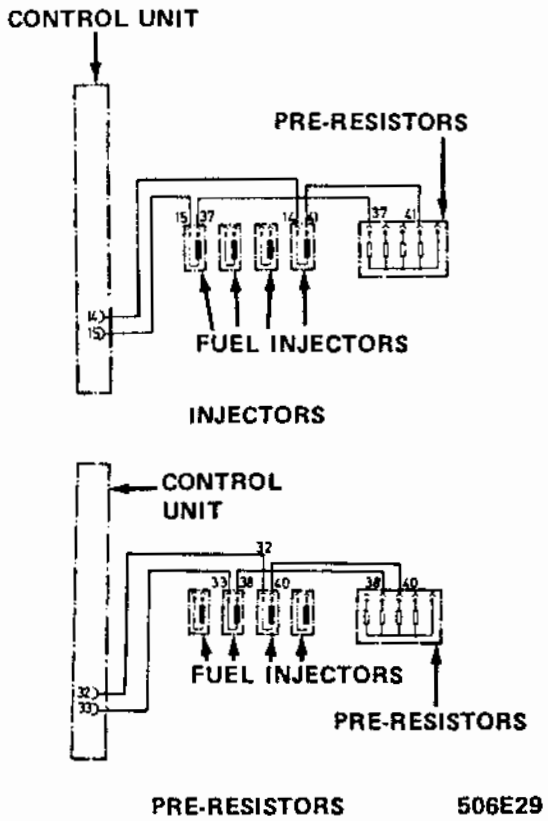


Figure 6E-29 Check of Injectors and Pre-Resistors for Proper Electrical Resistance

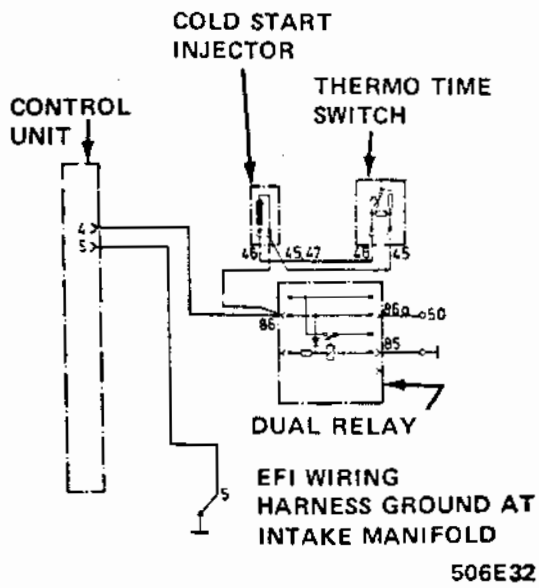


Figure 6E-32 Cold Start Injector and Thermo Time Switch

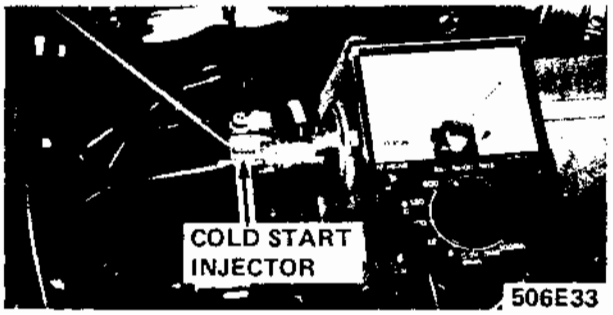


Figure 6E-33 Cold Start Injector

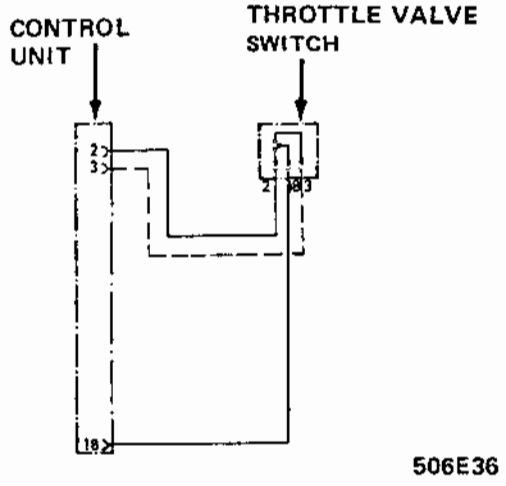


Figure 6E-36 Full Throttle Contact in Throttle Valve Switch

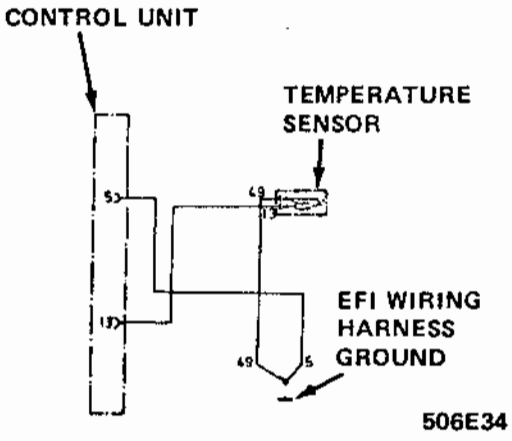


Figure 6E-34 Temperature Sensor

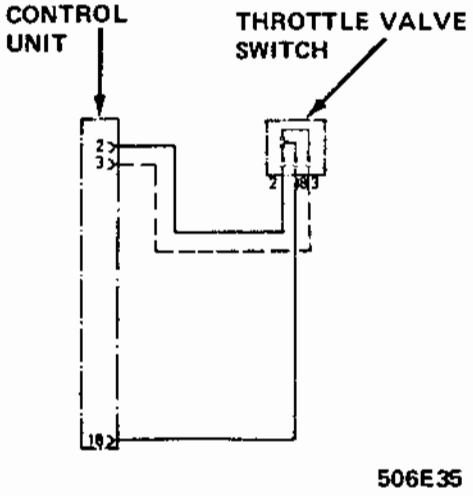


Figure 6E-35 Idle Contact in Throttle Valve Switch

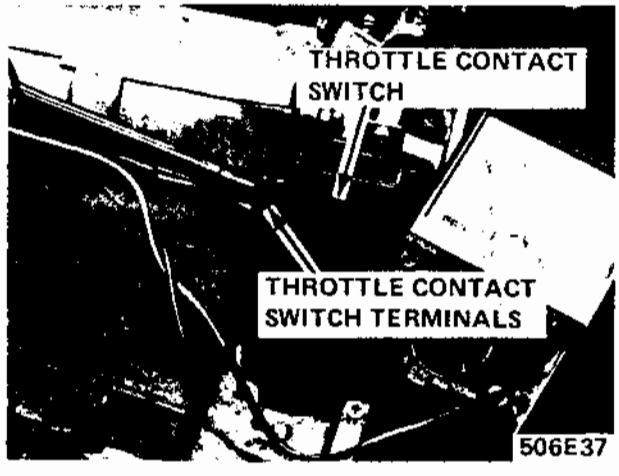


Figure 6E-37 Throttle Contact Switch

MAINTENANCE AND ADJUSTMENTS

DECELERATION VALVE FUNCTIONAL TEST

1. With engine at normal operating temperature and idling, hook up tachometer and note idle RPM.

2. Disconnect and plug vacuum hose from throttle valve to deceleration valve. See figure 6E-38. With a proper operating valve, the idle RPM will remain the same. If idle RPM drops significantly, the valve is malfunctioning and must be replaced.

3. To check valve for proper deceleration function, momentarily increase engine to 3500 RPM. Hold finger over valve inlet and quickly return throttle to idle position. If operation is correct, a vacuum will be noted at valve inlet while engine is decelerating. If no vacuum is noted, valve is malfunctioning and must be replaced.

4. Connect all hoses.

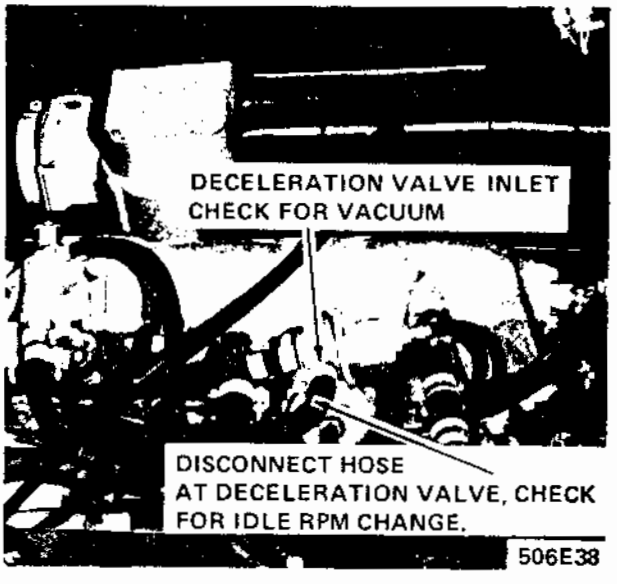


Figure 6E-38 Testing Deceleration Valve

AIR CLEANER ELEMENT

Air cleaner element should be replaced at 30,000 mile intervals as stated in the Maintenance Schedule.

Unhook spring clamps on air cleaner housing and loosen attaching nut at air flow meter. Lift upper part of air cleaner housing, remove old element, clean any foreign material from lower housing, and install new element.

Rehook spring clamps and retighten attaching nut at air flow meter.

AUXILIARY AIR VALVE

If improper operation is suspected, such as high idle RPM at all times, or no high idle following cold starts in low ambient temperatures, check valve as follows:

1. Remove valve from engine.

2. Look through air passage. Rotary disc will be slightly open at room temperature. With jumper wire, connect positive terminal of 12-volt battery to one electrical contact of the auxiliary air valve and negative terminal to other electrical contact. This will heat the valve, and in approximately five (5) minutes, rotary slide should cover passage completely.

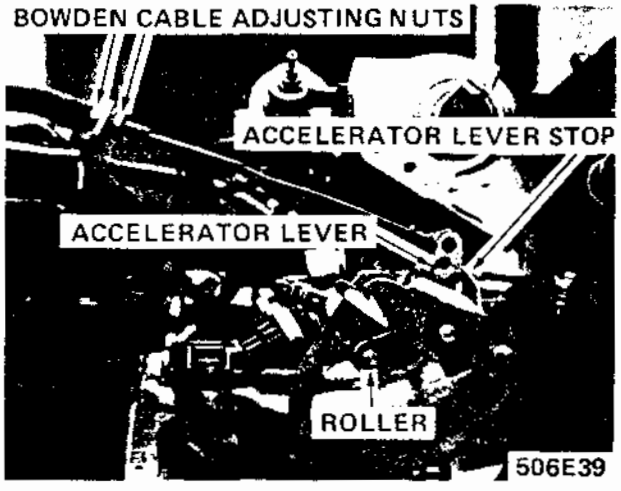


Figure 6E-39 Adjusting Bowden Cable

ACCELERATOR LINKAGE ADJUSTMENT

1. Adjust bowden cable at rocker arm cover so that the accelerator lever touches the accelerator lever stop, and slack in the bowden cable is minimal. See Figure 6E-39.

2. Clearance between roller and lever should be as small as possible and still allow roller to turn easily. See Figure 6E-39. If roller to accelerator lever clearance in not correct, adjust accelerator rod. See Figure 6E-40. Loosen the lock nuts and lengthen or shorten rod as required. Retighten lock nuts. See Figure 6E-40. When all is correctly adjusted, the throttle valve lever should rest against the throttle valve lever stop screw.

> CAUTION: *The throttle valve lever stop screw serves to prevent the butterfly valve from wedging in the throttle body and is not an adjustment for idle speed. It is pre-set at the factory and normally will not require any further adjustment.*

However, should the throttle stop screw be accidentally disturbed it can be set as outlined below:

SETTING THROTTLE VALVE LEVER STOP SCREW

1. Loosen jam nut and back screw out allowing butterfly to lightly seat in throttle bore. Turn screw into point it contacts lever and then turn in 1/4 to 1/2 turn more. Tighten jam nut.

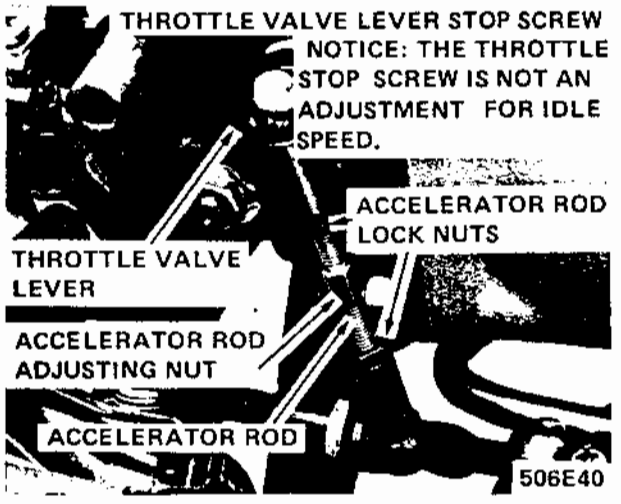


Figure 6E-40 Adjusting Accelerator Rod

ACCLERATOR LINKAGE LUBRICATION

All pivot points require lubrication at 15,000 mile intervals. To lubricate ball sockets, remove retaining clips, then snap ball socket off of ball stud with screwdriver. Clean parts, lubricate with silicone grease, and reassemble. Make sure the retaining clips are reinstalled properly.

ENGINE IDLE SPEED ADJUSTMENT

Check and adjust engine idle speed every 15,000 miles. Make certain accelerator linkage is properly adjusted, as outlined, and that engine is at normal operating temperature.

1. Connect tachometer to engine.

2. Connect idle drop tester J-25401-1 between air flow meter and wiring harness connector. Clamp off air hose from throttle body to deceleration valve and start engine. Figure 6E-41.

3. Set switch on idle drop tester to "Increased Idle" position. Engine should now operate at 1050 to 1075 RPM. If not, correct setting by turning idle air adjustment screw at throttle body. See Figure 6E-42.

4. Set switch on idle drop tester to "Normal Idle" position. Engine should now operate at 900 to 1000 RPM.

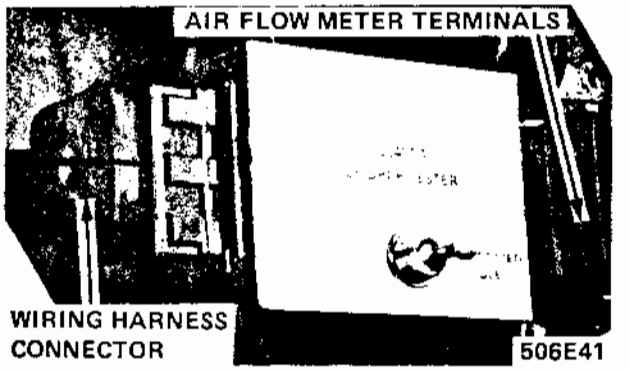


Figure 6E-41 Idle Drop Tester Installed

a. If engine RPM is lower than 900 RPM, check intake system for leaks and repair as required. If no leaks are found, remove plastic cap from by-pass mixture screw on air flow meter and turn by-pass mixture screw 1/2 turn at a time clockwise until 925 to 975 RPM are obtained. See Figure 6E-43.

b. If engine RPM is higher than 1000 RPM, turn by-pass mixture screw 1/2 turn at a time counterclockwise until 925 to 975 RPM are obtained. See Figure 6E-43.

NOTE: If any adjustment of either the idle air adjustment screw or the by-pass mixture screw was necessary, repeat steps 3 and 4 before going to step 5.

Figure 6E-42 Idle Air Adjustment Screw in Throttle Valve Housing

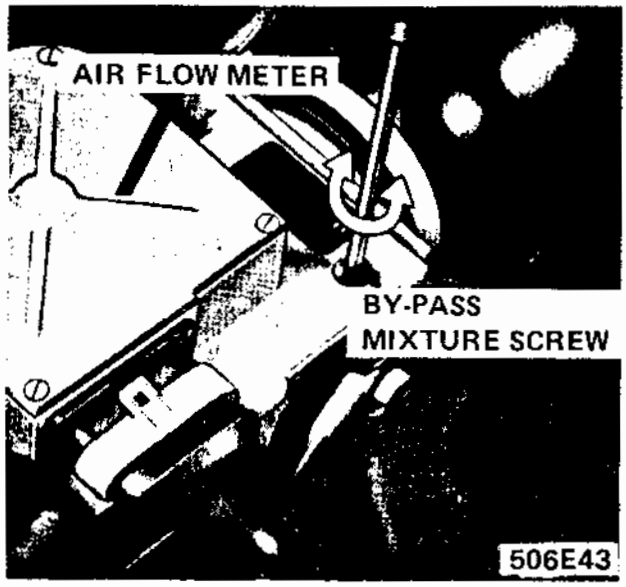


Figure 6E-43 By-Pass Mixture Screw in Air Flow Meter

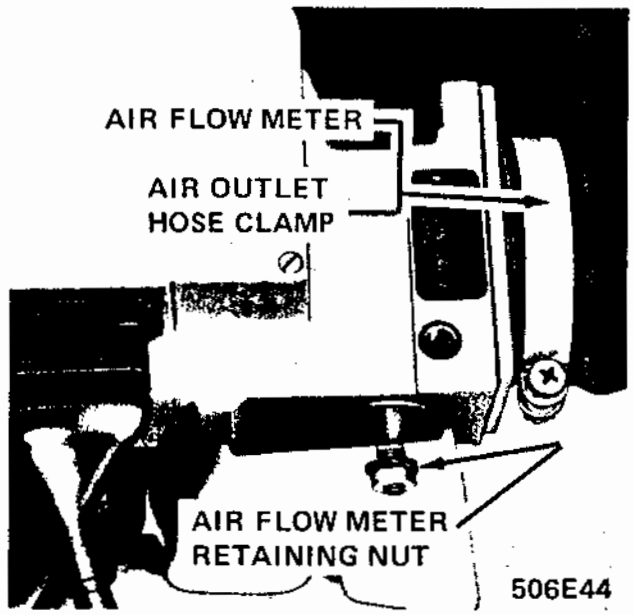


Figure 6E-44 Removing Air Flow Meter

5. Remove clamp from air hose from throttle body to deceleration valve. If engine RPM changes from obtained setting with idle drop tester in "Normal Idle" position, correct engine RPM by turning the idle air adjustment screw at throttle body.

6. Install new plastic cap (red) on air flow meter by-pass mixture screw.

7. Remove tachometer.

MAJOR REPAIR

AIR FLOW METER REMOVAL AND INSTALLATION

Removal

1. Disconnect electrical connector from air flow meter.

2. Loosen air outlet hose clamp and remove air outlet hose at the air flow meter. Figure 6E-44.

3. Loosen air flow meter retaining nut and air cleaner top retaining clips. Figure 6E-44.

4. Remove air cleaner top and air flow meter. (The air flow meter and the top of air the air cleaner should come off as one unit.)

5. Remove four (4) air cleaner to air flow meter bolts and remove gasket and air flow meter. Figure 6E-45.

Bench Check

Move baffle plate slowly rearward until it is completely open. The baffle plate should have an unrestricted path in which to move. Burrs, dirt, and other foreign objects should be removed if they restrict either the rearward or forward movement of the flap. After removal of foreign objects, a final cleaning of the flap and chamber should be done with a lint-free cloth. If an obstruction has been removed, the following procedure will indicate if the original air flow meter is now workable. With flapper valve in closed position, use an ohmmeter to determine if electrical circuits are operating correctly.

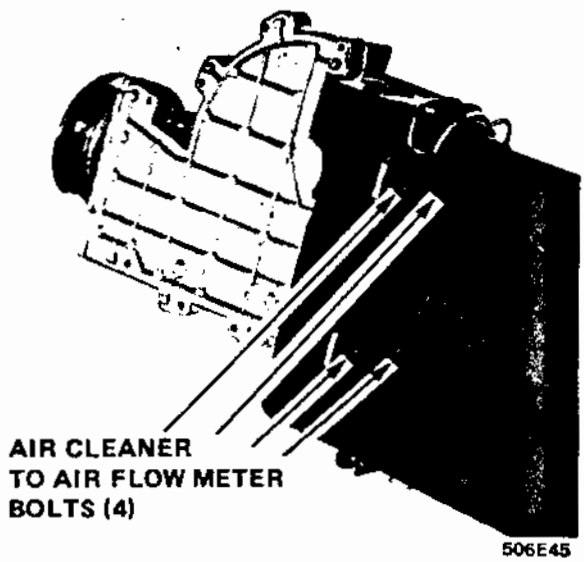


Figure 6E-45 Removing Air Flow Meter

Check with: Ohmmeter

Air Flow Meter	Reading Between	Possible Trouble and Cause
7 and 8	120-170 Ohm	Air flow meter is malfunctioning if these values are not obtained.
6 and 9	230-330 Ohm	

Use an ohmmeter between terminals 36 and 39 of the air flow meter. When baffle plate is closed, the ohmmeter should show no continuity infinite reading. When flapper valve is moved from the closed position, ohmmeter should show 0 ohms indicating continuity.

Installation

1. Install the air flow meter and gasket to the top of the air cleaner.

2. Install four (4) air cleaner to air flow meter bolts. Figure 6E-45.

3. Install top of air cleaner to the bottom portion of air cleaner and position the air flow meter to the air flow meter support bracket.

4. Secure top of air cleaner and tighten the air flow meter hold down nut. Figure 6E-44.

5. Connect outlet hose going to throttle valve. Figure 6E-44.

6. Connect electrical connector to air flow meter.

AUXILIARY AIR VALVE – REMOVAL AND INSTALLATION

Removal

1. Loosen both hose clamps; remove the throttle valve hose and the hose going to the manifold adapter.

2. Disconnect the auxiliary air valve color coded electrical connector.

3. Remove the two (2) hold down bolts with a 10 mm socket.

4. Remove auxiliary air valve from thermostat housing.

Installation

1. Position auxiliary air valve on the thermostat housing and tighten the two hold down bolts with a 10 mm socket.

NOTE: The torque on the auxiliary air valve bolts is 2.5 ft. lbs.

2. Connect color coded electrical connector to the auxiliary air valve.

3. Secure the hose coming from the throttle valve housing to the front of the auxiliary air valve and tighten hose clamp.

4. Secure the hose coming from the manifold adapter to the rear of the auxiliary air valve and tighten hose clamp.

Bench Check

Using an ohmmeter connected to the two (2) prongs of the auxiliary air valve, the resistance should between 45 to 55 ohms.

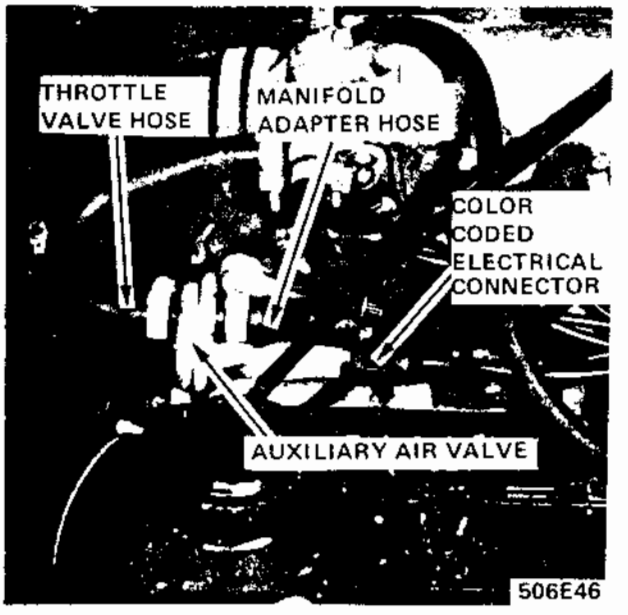


Figure 6E-46 Removing Auxiliary Air Valve

COLD START INJECTOR – REMOVAL AND INSTALLATION

Removal

1. Disconnect color coded electrical connector from cold start injector.

2. Loosen clamp and disconnect fuel feed line.

CAUTION: *Fuel is under pressure. Some fuel will be lost when fuel line is removed.*

3. Remove two (2) screws retaining injector.

4. Remove injector and gasket.

Installation

1. Install cold start injector and new gasket to intake manifold.

2. Install two (2) retaining screws. Torque to 2.5 ft. lbs.

NOTE: Torque on cold start retaining screws is 2.5 ft. lbs.

3. Connect fuel feed line to cold start injector and tighten the hose clamp.

4. Connect the color coded electrical connector to the cold start injector.

5. Start car and check for fuel leaks.

Bench Check

Connect ohmmeter to the two (2) connectors of the cold start injector. The reading should be approximately 4 ohms at 68°F.

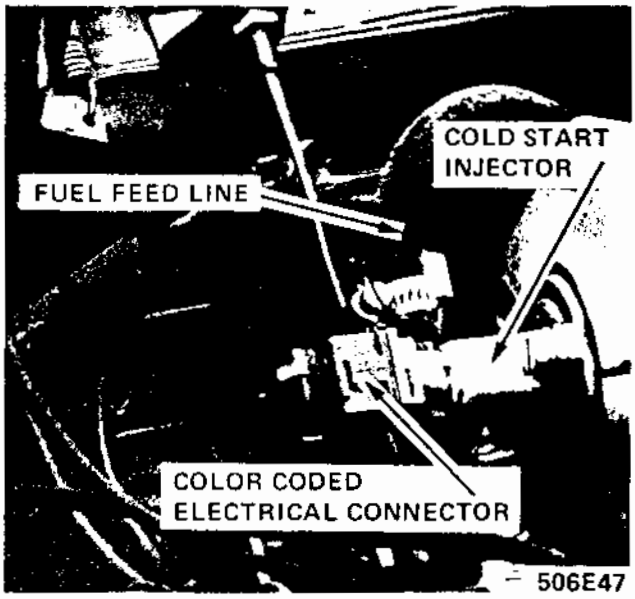


Figure 6E-47 Removing Cold Start Injector

THERMO TIME SWITCH – REMOVAL AND INSTALLATION

Removal

1. Release pressure at radiator cap by rotating the cap counter clockwise until the first stop is reached. Leave in this position until all pressure is released.

2. Disconnect thermo time switch color coded electrical connector.

3. Remove thermo time switch using a 24 mm deep socket.

NOTE: A small amount of coolant will be lost.

Installation

1. Install thermo time switch into thermostat housing.

NOTE: Make sure metal sealing ring is used. The torque of the thermo time switch is 21.7 ft. lbs.

2. Connect color coded electrical connector to thermo time switch.

3. Add additional coolant as necessary.

4. Tighten radiator cap.

5. Start engine and check for coolant leaks.

Bench Check

Using the ohmmeter connected to the two (2) prongs, the resistance of the thermo time switch should be 50 to 75 ohms above 95°F., or 3 to 5 ohms below 95°F.

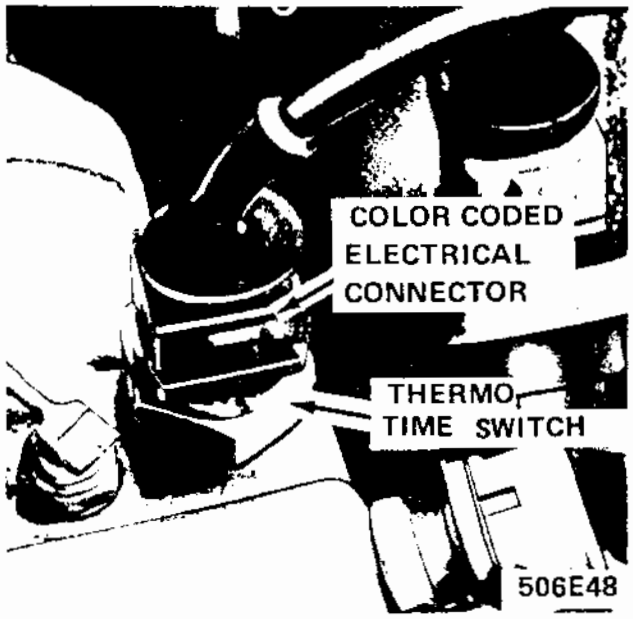


Figure 6E-48 Removing Thermo Time Switch

DUAL RELAY – REMOVAL AND INSTALLATION

Removal

1. Disconnect the two (2) color coded electrical connectors from the dual relay.

2. Remove the dual relay hold down screw and remove the dual relay and harness bracket.

Installation

1. Position the dual relay and harness bracket on the right inner fender and install the hold down screw.

2. Connect the two (2) color coded electrical connectors to the dual relay.

3. Position the wiring harness going to the rear of the dual relay under the harness bracket.

Figure 6E-49 Removing Dual Relay

TEMPERATURE SENSOR – REMOVAL AND INSTALLATION

Removal

1. Release pressure at radiator cap by rotating the cap counterclockwise until first stop is reached. Leave in this position until all pressure is released.

2. Loosen clamp and remove auxiliary air valve to manifold hose.

3. Disconnect auxiliary air valve color coded electrical connector.

4. Disconnect temperature sensor color coded electrical connector.

5. Remove temperature sensor using a 20 mm wrench.

NOTE: A small amount of coolant will be lost.

Installation

1. Install temperature sensor using a 20 mm wrench.

NOTE: The torque on the temperature sensor is 10.8 ft. lbs.

2. Connect temperature sensor color coded electrical connector.

3. Connect auxiliary air valve color coded electrical connector.

4. Secure auxiliary air valve to manifold hose and tighten clamp.

5. Add additional coolant as necessary.

6. Tighten radiator cap.

7. Start engine and check for coolant leaks.

Bench Check

Using an ohmmeter connected to the two (2) electrical prongs of the temperature sensor, the following resistance values should be obtained:

at 32°F.
4,500 to 6,500 ohms

at 68°F.
2,100 to 2,900 ohms

at 176°F.
270 to 390 ohms

NOTE: Let sensor cool to room temperature. Use 68°F values for checking.

To check at 32°F submerge sensor in ice water.

It is not necessary to check sensor at 176°F on the bench test; however; if desired to check sensor at that temperature, sensor must be heated using a thermostat tester or equivalent.

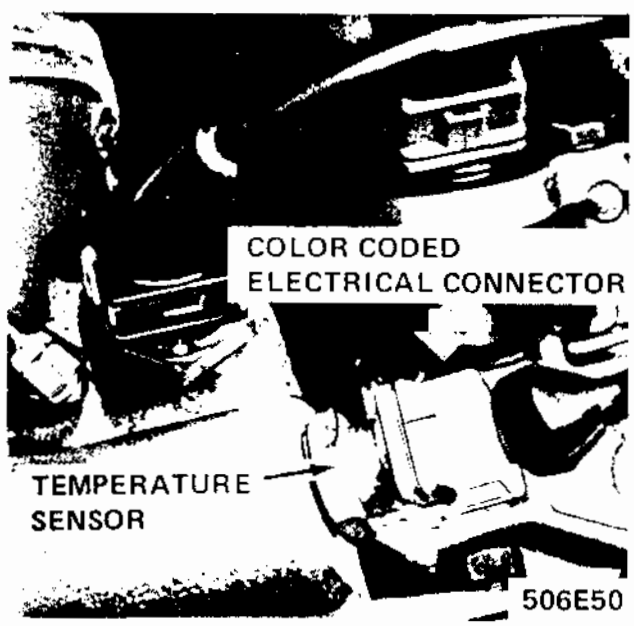


Figure 6E-50 Removing Temperature Sensor

CONTROL UNIT – REMOVAL AND INSTALLATION

Removal

1. Loosen right door edge beading by pulling rearward.

2. Remove right kick pad by pulling the kick pad rearward and then toward inboard.

3. Remove 3 retaining screws holding control unit.

4. Disconnect control unit electrical connector (ignition switch must be off). (Release clip at forward edge of the connector by pushing it forward. To detach the connector, pull up on the forward end of it.) Figure 6E-51.

Installation

1. Connect electrical connector to control unit. (Insert rearward end of connector under retaining bar of control unit. Pull forward end down to secure connector to retaining clip.)

NOTE: Coil input connector must be connected. This connection may become inadvertently disconnected in the removal of the control unit connector. Figure 6E-52.

2. Install control unit retaining screws.

3. Install kick pad by sliding the kick pad forward and inserting kick pad retainer through slotted hole.

4. Secure door edge beading.

Figure 6E-51 Removing Control Unit Wiring Connector

PRE-RESISTORS – REMOVAL AND INSTALLATION

Removal

1. Disconnect the pre-resistors color coded electrical connector.

2. Remove the two (2) pre-resistors hold down screws.

3. Remove pre-resistors unit.

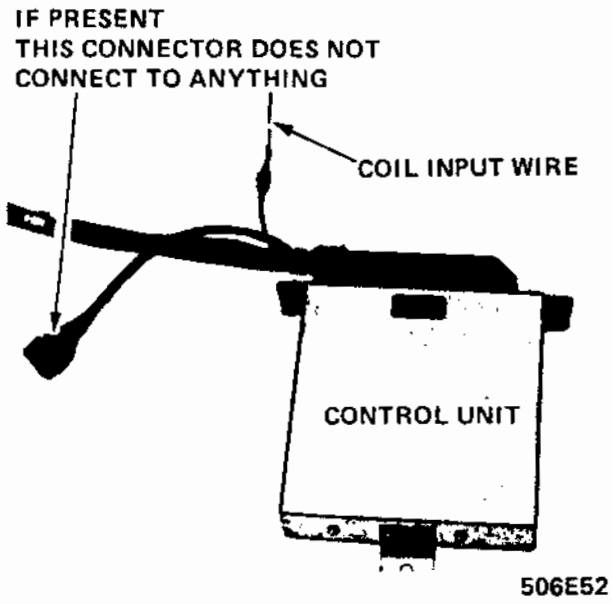


Figure 6E-52 Coil Input Wire

Installation

1. Position pre-resistors and tighten the two (2) hold down screws.

2. Connect color coded electrical connector to the pre-resistors.

Bench Check

Using an ohmmeter connected from the common terminal (center prong) of the pre-resistor to individual resistors (4 outside prongs), each reading (you will have four (4) separate readings) should be 5.5 to 6.5 ohms.

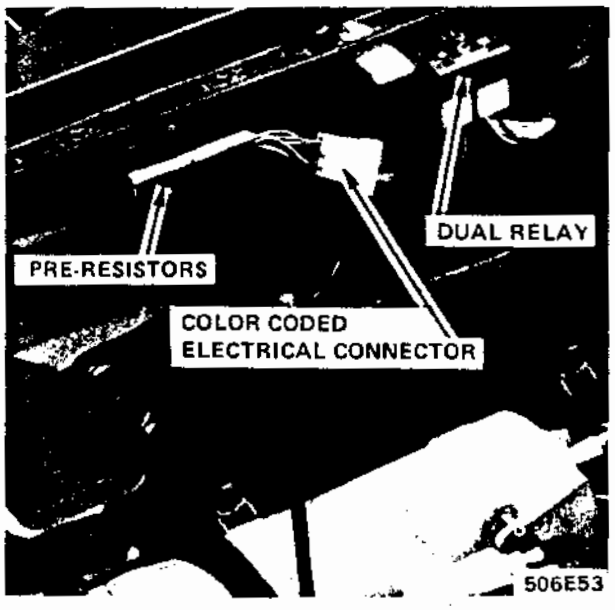


Figure 6E-53 Removing Pre-Resistors

THROTTLE VALVE SWITCH – REMOVAL AND INSTALLATION

Removal

1. Disconnect the throttle valve switch color coded electrical connector.

2., Remove the two (2) throttle valve switch retaining screws.

3. Pull switch off throttle valve housing.

Installation

1. Position throttle valve switch on throttle valve housing and install the two (2) throttle valve switch screws.

2. Connect the color coded electrical connector to the throttle valve switch.

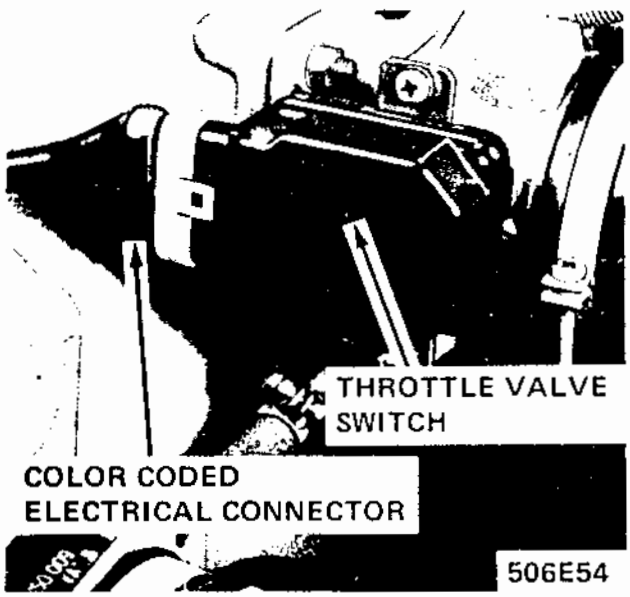


Figure 6E-54 Removing Throttle Valve Switch

FUEL PRESSURE REGULATOR VALVE – REMOVAL AND INSTALLATION

Removal

1. Remove rear injector hold down bracket bolt from the injector insulator.

2. Remove vacuum hose coming from the fuel pressure regulator valve "T".

3. Loosen the two (2) fuel feed hose clamps and remove the fuel hoses.

WARNING: FUEL IS UNDER PRESSURE. SOME FUEL WILL BE LOST WHEN THE FUEL HOSES ARE DISCONNECTED.

4. Loosen the fuel return hose clamp and remove the pressure regulator valve.

Installation

1. Insert the flanged fitting on the end of the pressure regulator valve into the fuel return hose and tighten the hose clamp.

2. Insert the two (2) flanged fittings on the side of the pressure regulator valve into the fuel feed hoses and tighten clamps.

3. Position the rear injectors to the injector insulator and install the injector hold down bracket bolt.

CAUTION: *The hold down bolt is secured to a plastic insulator. Do not over torque. Bolt torque is 2.9 ft. lbs.*

4. Connect the vacuum line coming from the pressure regulator valve "T" to the unflanged fitting on the pressure regulator valve.

5. Start engine and check for fuel leaks.

INJECTOR (PAIR) REMOVAL AND INSTALLATION

Removal

1. Disconnect color coded electrical connectors from injectors.

2. Remove injectors' center hold down bolt.

3. Loosen clamp and disconnect injector from fuel feed pipe.

WARNING: FUEL IS UNDER PRESSURE. SOME FUEL WILL BE LOST WHEN FUEL LINE IS REMOVED.

4. Remove injectors from hold down bracket.

NOTE: When handling injectors, take care not to damage the injector needle.

Replacement

1. Replace injector in hold down bracket.

2. Connect injector to fuel feed pipe.

3. Install injector sealing rings on injectors and install injectors into injector hold down bracket.

4. Install injectors to injector insulator.

5. Tighten center hold down bolt of injector bracket to injector insulator.

NOTE: The hold down bolt is secured to a plastic insulator. Do not over torque. Bolt torque is 2.9 ft. lbs.

6. Connect color coded electrical connectors to injectors.

7. Start car and check for fuel leaks.

Bench Check

Connect ohmmeter to the two (2) prongs of the injector. The reading should be 2 to 3 ohms.

This check determines the electrical portion. Substitute a known good injector if the injector is believed to be malfunctioning.

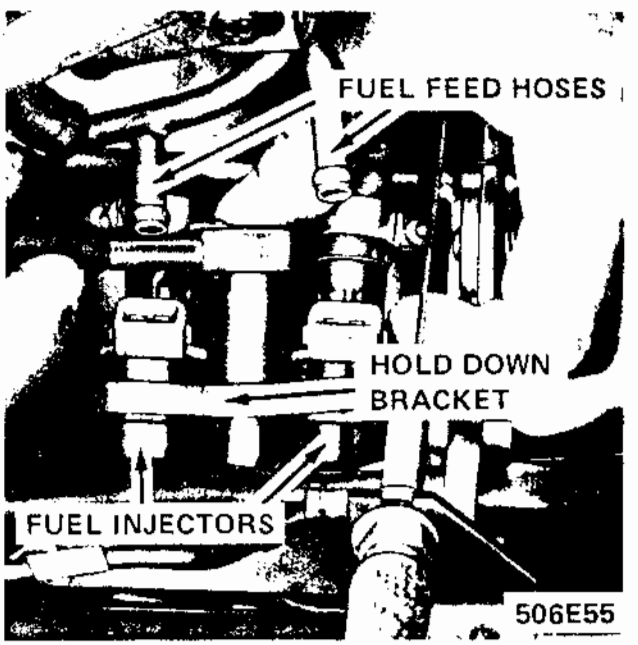


Figure 6E-55 Removing Fuel Injectors

DECELERATION VALVE REMOVAL AND INSTALLATION

Removal

1. Loosen the two (2) hose clamps at the deceleration valve.

2. Remove the three (3) hoses connected to the deceleration valve. (The hose going to the pressure regulator valve does not use a hose clamp.)

3. Remove deceleration valve.

Installation

1. Secure the unclamped hose coming from the pressure regulator "T" to the threaded fitting at the end of the deceleration valve.

2. Secure the clamped hose coming from the intake manifold adapter to the welded fitting at the end of the deceleration valve.

3. Secure the clamped hose coming from the throttle valve housing to the welded fitting on the side of the deceleration valve.

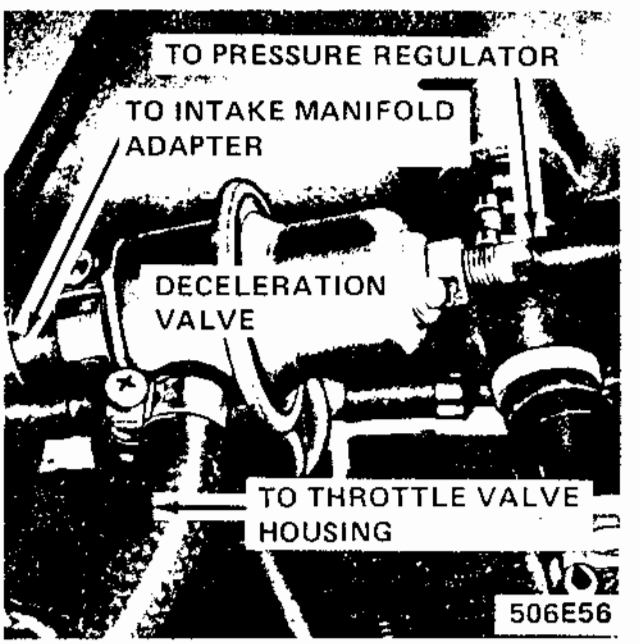


Figure 6E-56 Removing Deceleration Valve

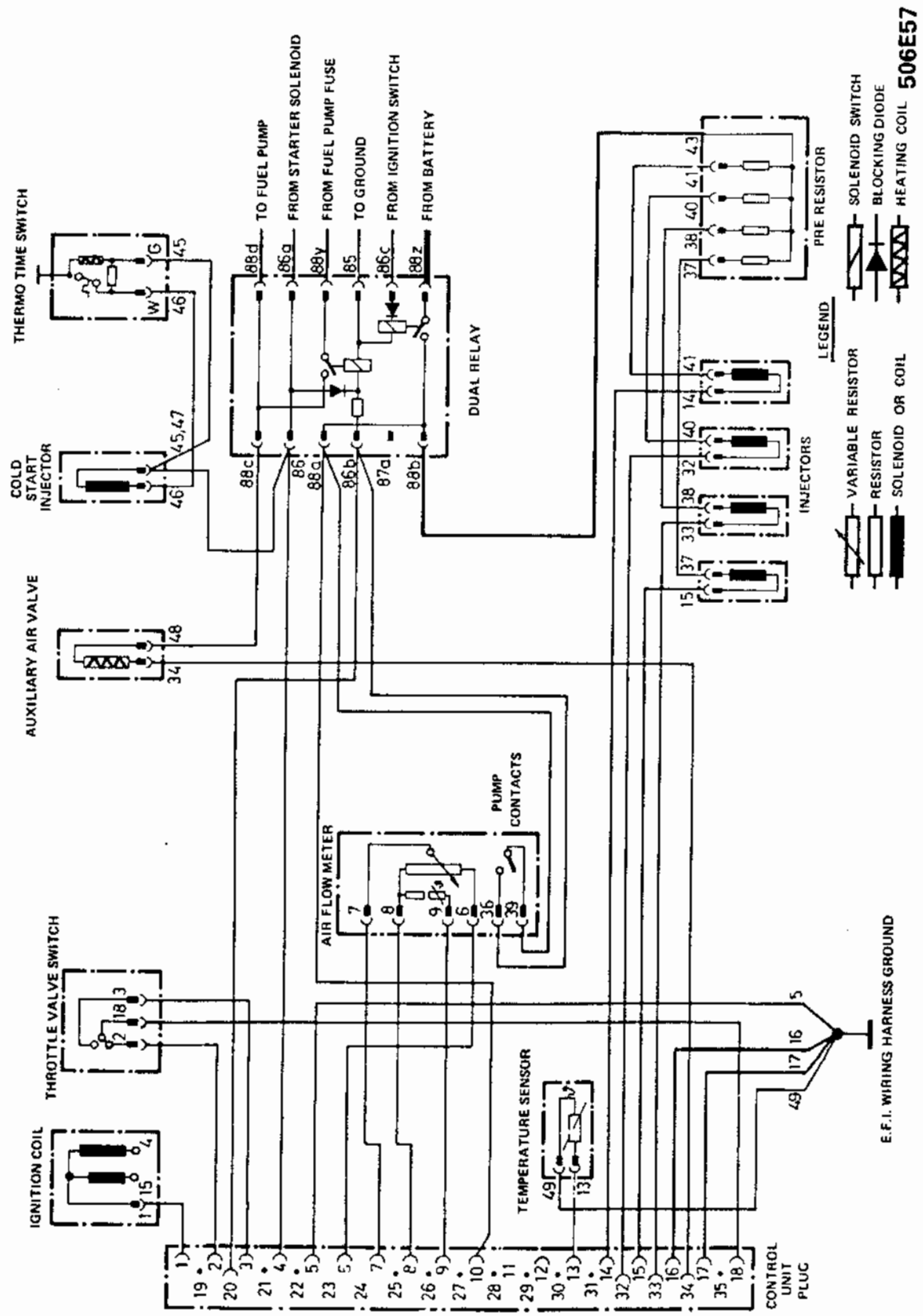


Figure 6E-57 Electronic Fuel Injection System Wiring Diagram

EMISSION CONTROL SYSTEMS

CONTENTS

DESCRIPTION AND OPERATION

EXHAUST GAS RECIRCULATION SYSTEM

The exhaust gas recirculation (EGR) system is used to reduce Nitric Oxide (NO_X) in the exhaust gas. The exhaust gas is fed back into the intake manifold after the throttle valve. A vacuum diaphragm in the EGR valve opens and closes the port that recirculates exhaust gas. The vacuum source for the EGR valve is ported vacuum at the throttle valve. Due to this, the valve functions only during part throttle. The valve remains closed at idle because of port location in throttle valve. The valve is also closed during full throttle operation because of low vacuum.

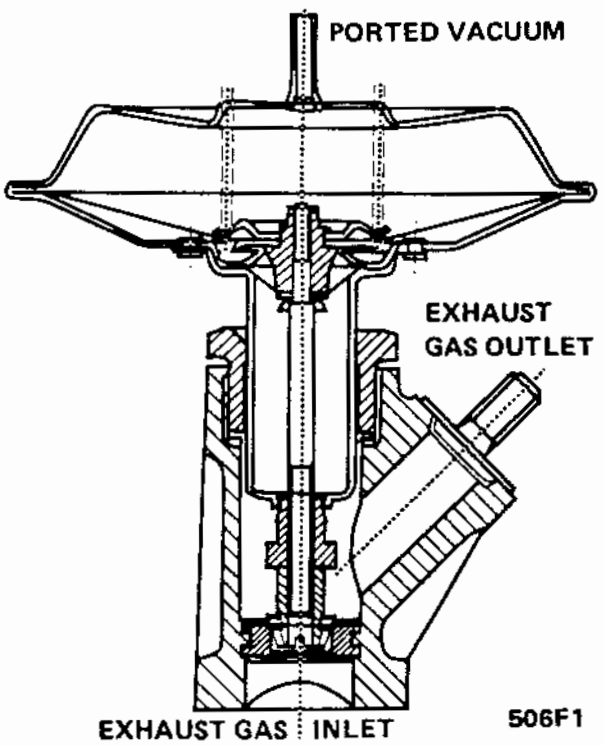


Figure 6F-1 EGR Valve

CATALYTIC CONVERTER (California Only)

The catalytic converter is an emission control device added to the exhaust system to reduce hydrocarbon and carbon monoxide pollutants from the exhaust gas stream. The converter contains beads which are coated with a catalytic material containing Platinum and Palladium. Use of the catalytic converter has allowed the engine to be designed for improved fuel economy and driveability.

ALL 1975 OPELS REQUIRE THE USE OF UNLEADED FUEL ONLY.

Periodic maintenance of the catalytic converter is not required; however, if the vehicle is raised for other service, it is advisable to check the general condition of the catalytic converter, exhaust pipes, and mufflers.

DIAGNOSIS

EGR SYSTEM

CONDITION	POSSIBLE CAUSE	CORRECTION
Engine idles abnormally rough and/or stalls.	1. EGR valve vacuum hose misrouted.	1. Correct as necessary.
	2. Leaking EGR valve.	1. Function test EGR valve.
	3. Idle speed misadjusted.	1. Set idle RPM per engine idle speed adjustment procedure.
Engine runs excessively rough on light throttle acceleration.	1. EGR valve vacuum hose misrouted.	1. Correct as necessary.
	2. Sticking or binding EGR valve.	1. Remove EGR valve and inspect for proper operation clean or replace as required.
	3. Incorrect throttle body.	1. Correct throttle body can be identified as follows: All Auto Trans – Throttle body is marked with yellow paint. Man. Trans. (Calif.) – Throttle body is marked with green paint. Man. Trans. Fed. – No paint marking.
Engine stalls on decelerations	1. Restriction in EGR vacuum line.	1. Check EGR vacuum lines for kinks, bends, etc. Remove restrictions or replace hoses as required. Check EGR valve for a sticking or binding condition.

CATALYTIC CONVERTER (California only)

CONDITION	POSSIBLE CAUSE	CORRECTION
Exhaust system noisy.	1. Exhaust pipe joints loose at catalytic converter.	1. Tighten clamps at joint.
	2. Catalytic converter ruptured.	1. Replace catalytic converter.
	3. Loose or missing catalyst replacement plug.	1. Tighten or replace (Recharge catalyst as necessary).
Poor car performance.	1. Failed catalytic converter.	1. Replace catalytic converter. Ignition system should also be diagnosed and repairs made if necessary.
B-B size particles coming out of tailpipe.	1. Failed catalytic converter.	1. Replace catalytic converter. Ignition system should also be diagnosed and repairs made if necessary.

EXHAUST GAS RECIRCULATION VALVE FUNCTIONAL TEST (EGR VALVE)

With engine at normal operating temperature and engine idling, do the following:

1. Connect a tachometer and note engine RPM.

2. Obtain a length of rubber hose the same inside diameter of the hose that hooks to the EGR valve.

3. Disconnect rubber hose at EGR valve and connect one end of spare length of rubber hose to the EGR valve and the other end to a manifold vacuum source.

Engine idle should become rough and idle RPM should drop by at least 200 RPM. If idle RPM does not drop, clean exhaust residue from the EGR valve, the EGR line, and its connection to the exhaust pipe. Recheck as outlined above; if RPM still does not drop at least 200 RPM, replace the EGR valve.

MAINTENANCE AND ADJUSTMENTS

EGR SYSTEM

There is no scheduled maintenance on the EGR system for 1975, however, it is a good practice to function test the EGR system in conjunction with an engine tune-up.

CATALYTIC CONVERTER

There is no scheduled maintenance on the catalytic converter, however, it is a good practice to inspect the converter and the rest of the exhaust for signs of deterioration whenever the vehicle is raised up for other services.

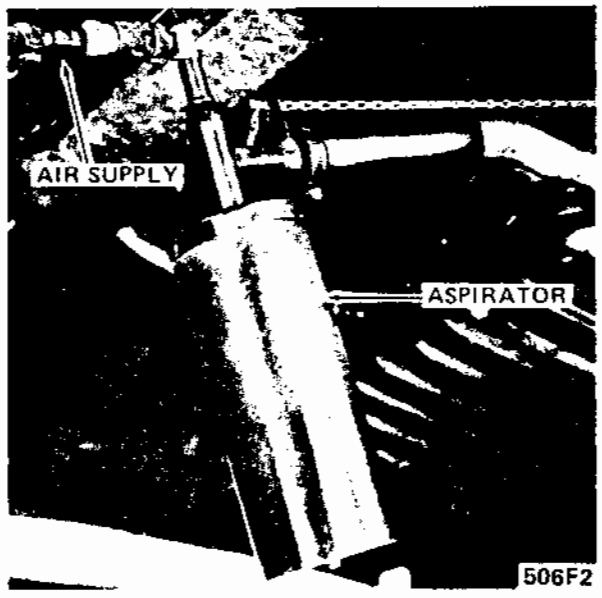


Figure 6F-2 Installing Aspirator

MAJOR REPAIR

EGR VALVE REMOVAL AND INSTALLATION

Removal

1. Raise hood and cover fender.

2. Remove air flow meter and air cleaner assembly.

3. Remove EGR valve.

Installation

1. Install EGR valve by reversing the removal procedure using new gaskets.

CATALYTIC CONVERTER

Catalyst Removal and Installation

Removal

If necessary, the catalyst in the converter can be replaced on the car with Tool J-25077.

Separate hoses should be attached to the aspirator and the vibrator with maximum available pressure. (Minimum of 60 psi in each hose.)

1. Install aspirator. See Figure 6F-2.

2. Connect air supply line to aspirator to create a vacuum in the converter to hold beads in place when fill plug is removed.

3. Remove converter fill plug with 3/4" hex wrench. See Figure 6F-3.

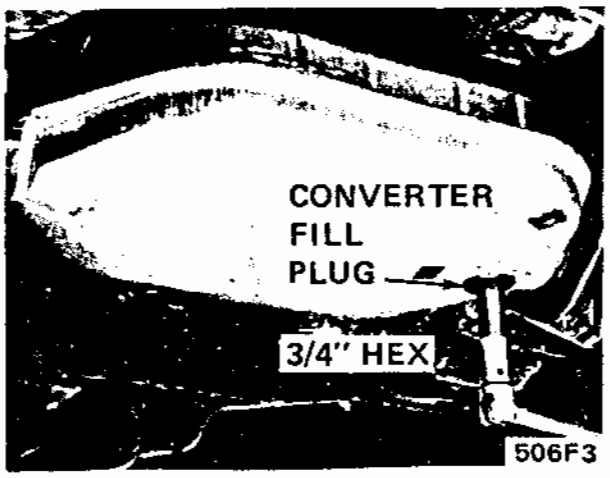


Figure 6F-3 Removing Fill Plug

Figure 6F-4 Installing Vibrator

4. Clamp on vibrator. See Figure 6F-4.

5. Install empty catalyst container to vibrator (do not install fill tube extension at this time.) See Figure 6F-4.

6. Disconnect air supply to aspirator and connect air supply to vibrator. Catalyst will now drain from the converter into the empty container.

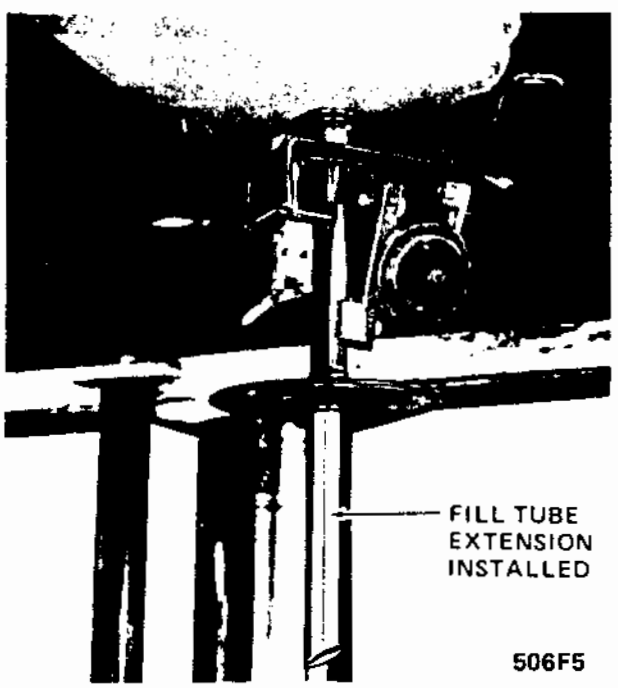


Figure 6F-5 Extension Installed

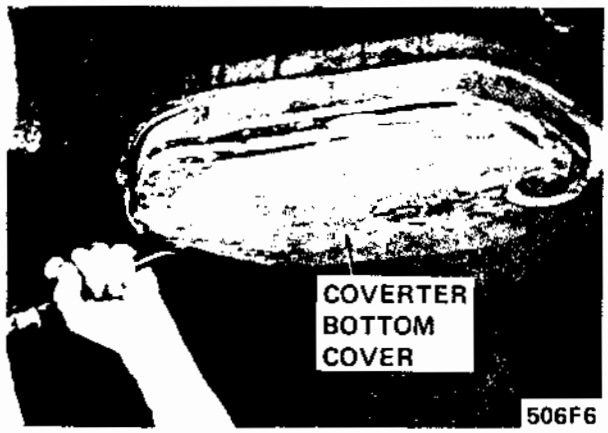


Figure 6F-6 Removing Bottom Cover

7. When all the catalyst has been removed from the converter, disconnect air supply to vibrator and remove container from the converter.

8. Discard used catalyst.

Installation

1. Fill container with approved replacement catalyst.

2. Install fill tube extension to the fixture. See Figure 6F-5.

3. Connect air supply to aspirator and vibrator.

4. Attach catalyst container to the fixture.

5. After the catalyst stops flowing, disconnect air supply to the vibrator.

6. Remove vibrator and check that catalyst has filled converter flush with fill plug hole. Add catalyst if required.

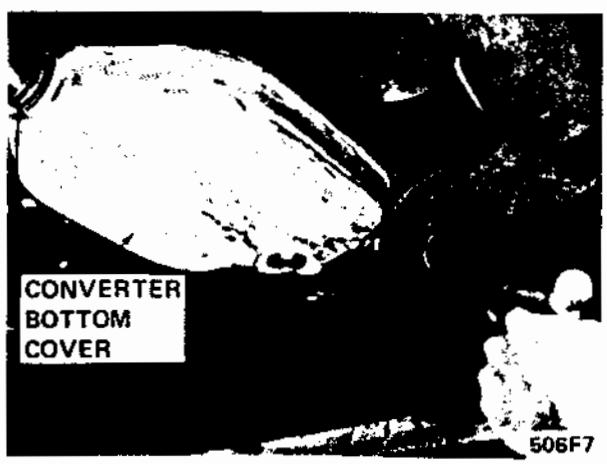


Figure 6F-7 Removing Bottom Cover

Figure 6F-8 Insulation Removed

7. Apply an anti-seize compound to the fill plug; install and tighten to 50 lb. ft.

8. Disconnect air supply to aspirator and remove.

Bottom Cover Replacement

If, for any reason, the bottom cover of the converter is torn or severely damaged, it can be replaced with a repair kit.

1. Remove bottom cover by cutting close to the bottom outside edge. See Figures 6F-6 and 6F-7. Do not remove the fill plug. The depth of the cut must be very shallow to prevent damage to the inner shell of the converter.

2. Remove insulation. See Figure 6F-8.

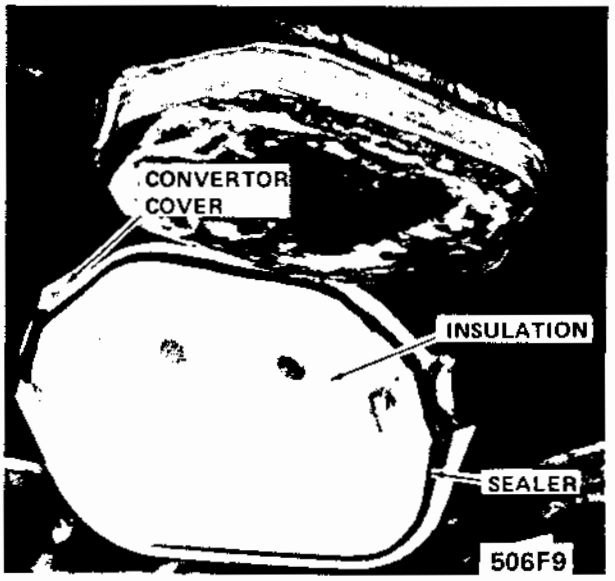


Figure 6F-9 Insulation and Sealer Applied

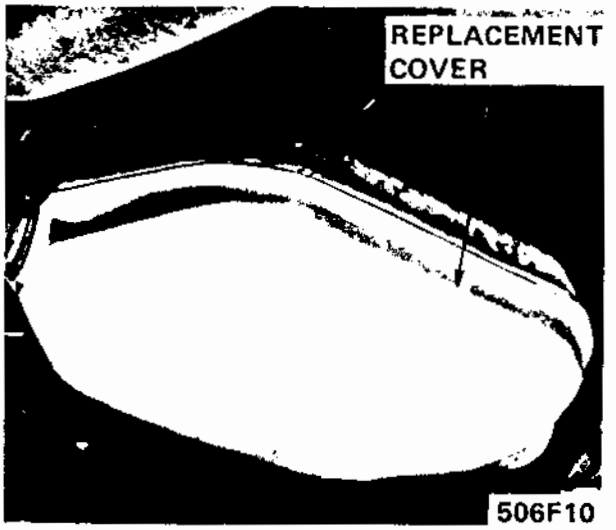


Figure 6F-10 Installing Cover

3. Inspect inner shell of the converter for damage. If there is damage in the inner shell, the converter assembly must be replaced.

4. Place new insulation in the replacement cover. Apply sealing compound, all around the cover after the insulation is in position. Apply extra sealer at the front and rear opening for the pipes. See Figure 6F-9.

5. Install replacement cover on converter. See Figure 6F-10.

6. Install cover retaining channels on both sides of the converter. See Figure 6F-11.

7. Attach 2 clamps over retaining channels at each end of the converter. See Figure 6F-12.

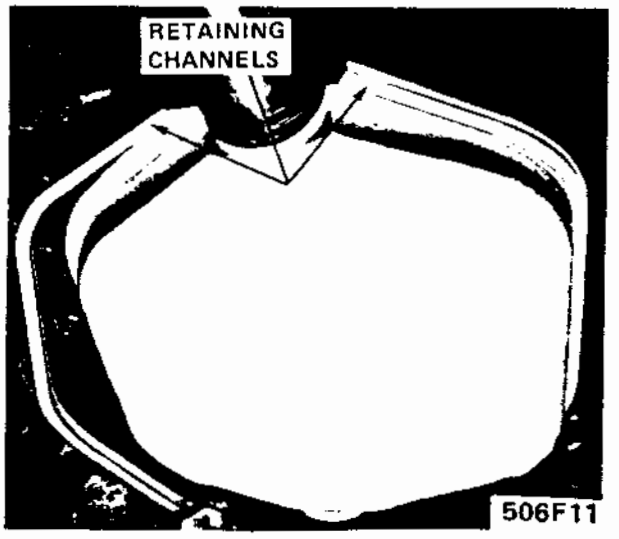


Figure 6F-11 Installing Retaining Channels

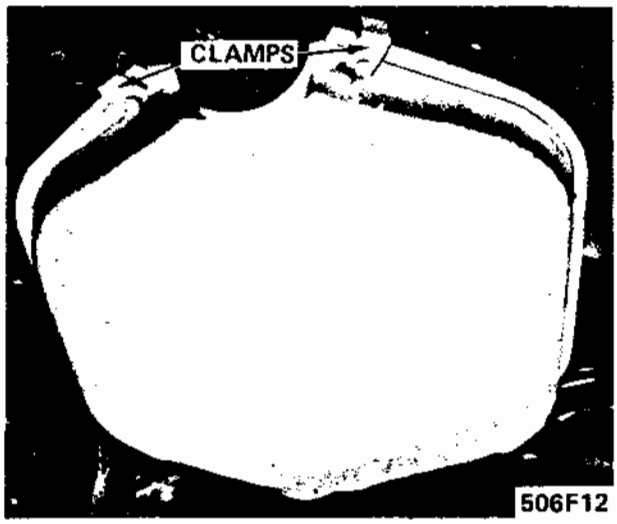


Figure 6F-12 Channel Clamps Installed

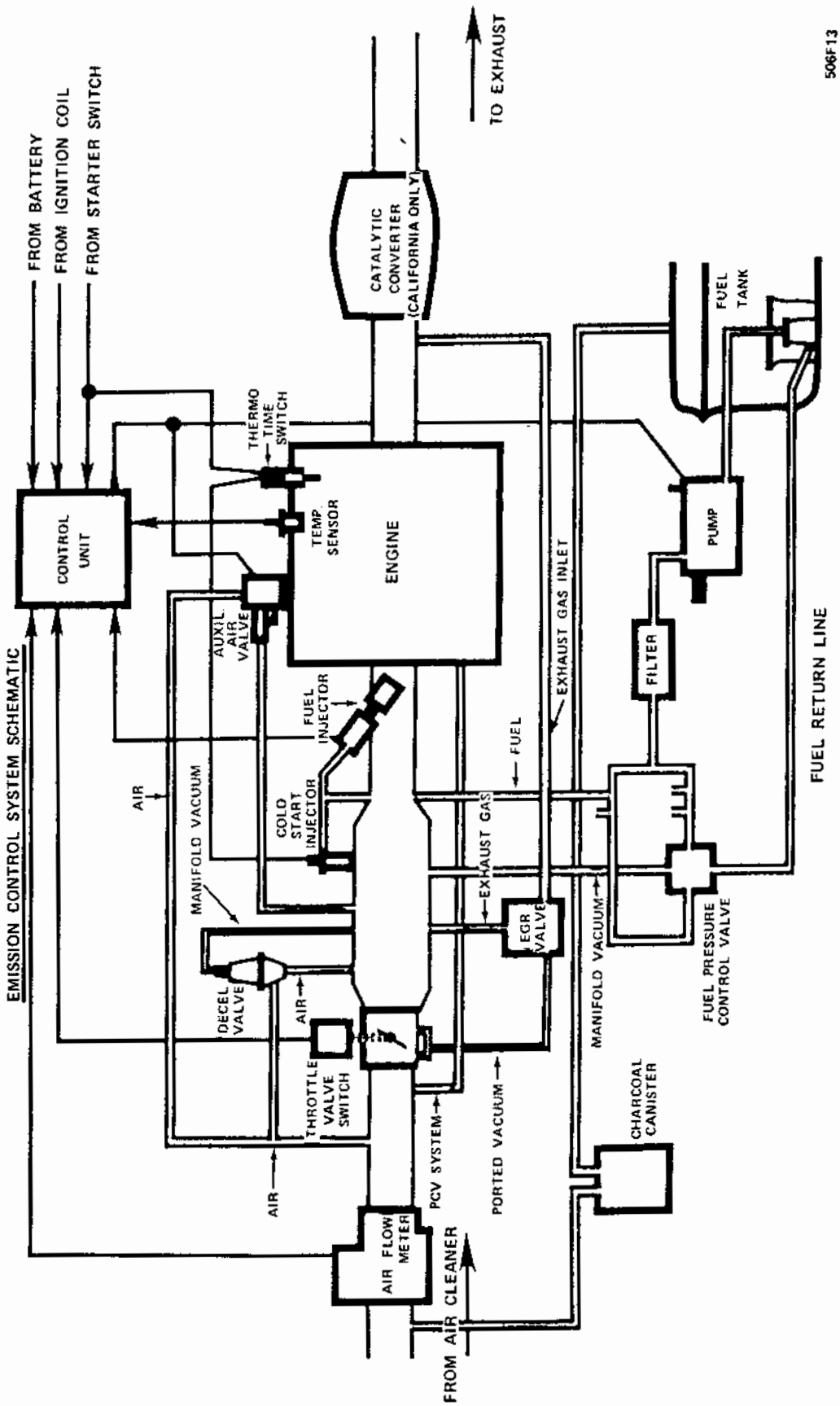


Figure 6F-13 Emission Control System Schematic

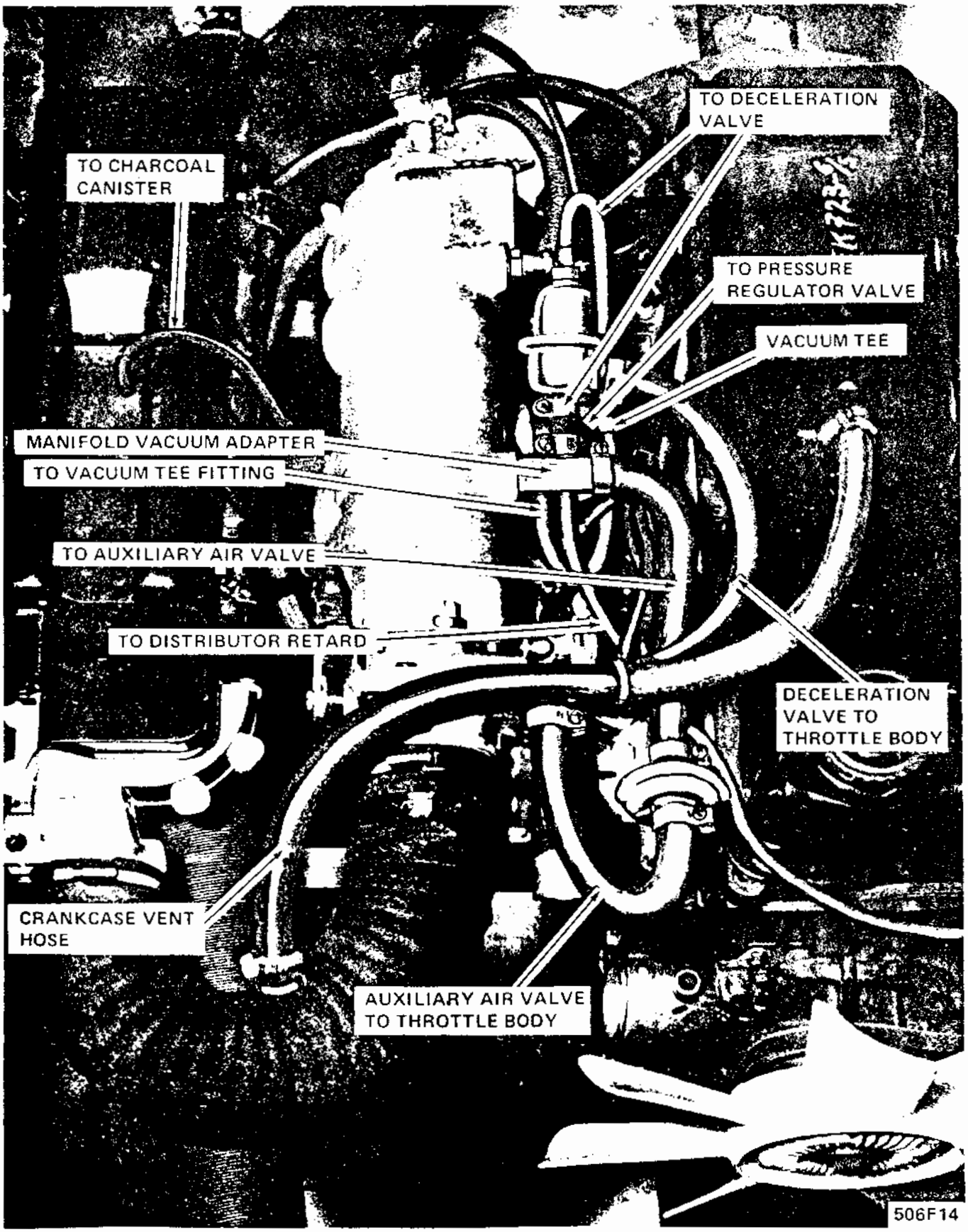


Figure 6F-14 Vacuum Hose Routing

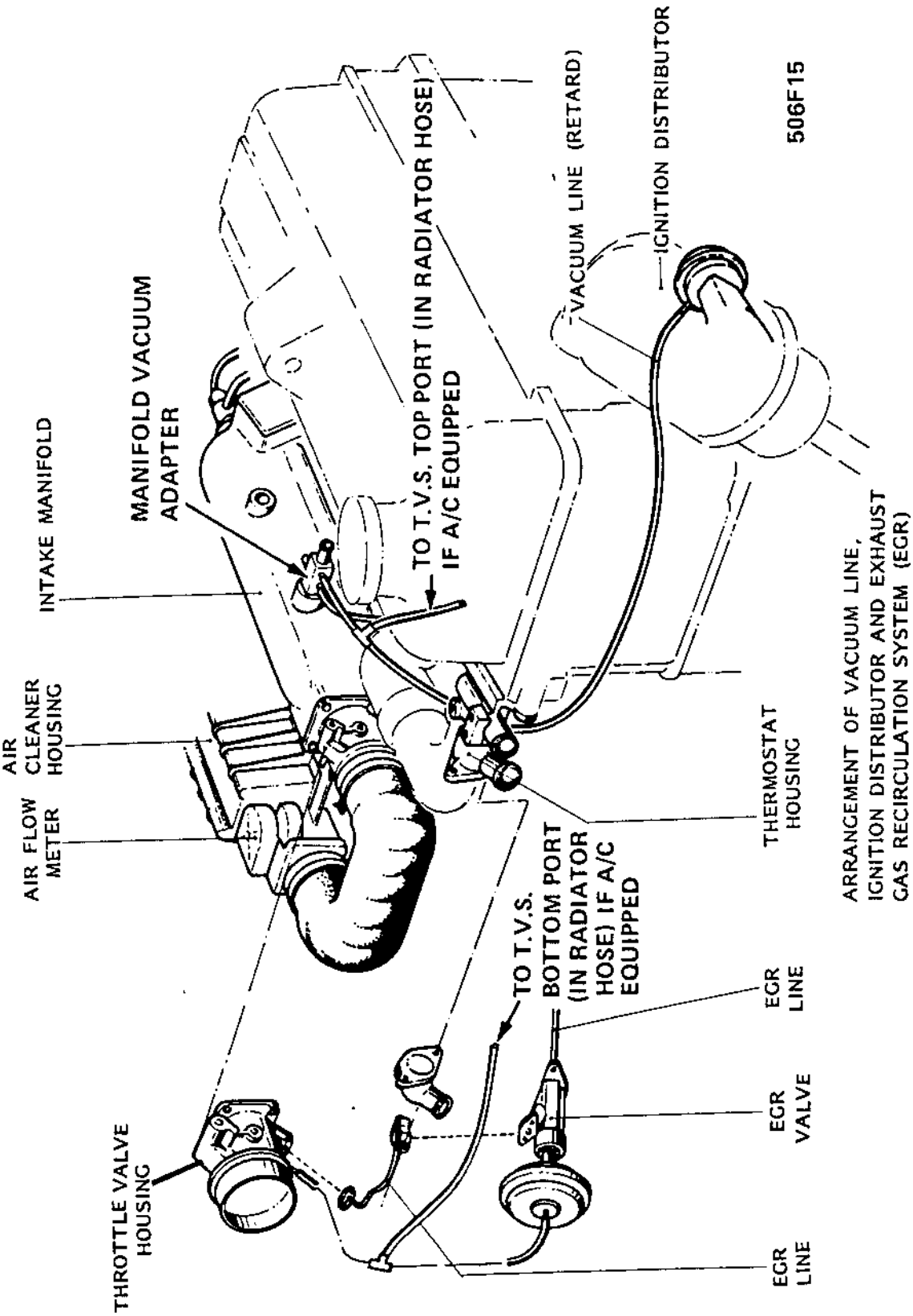


Figure 6F-15 Vacuum Hose Routing

TUNE-UP

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 ..... Max. 4 amps.
- Engine Idling 2.3

Distributor

Total Advance (Centrifugal), Engine Degrees at 3400 Engine RPM 21-25
Centrifugal Advance, Engine Degrees and RPM
- Start Advance, at RPM ..... 0° @ 1100-1400
- Medium Advance, Degrees at RPM ..... 10°-14° @ 2000
- Maximum Advance, Degrees at RPM ..... 21°-25° @ 3400

Vacuum Retard, Engine Degrees at Closed Throttle ..... 4°
Condenser Capacity in MicroFarads ..... .23-.32
Breaker Spring Tension in Ounces 18-23
Breaker Point Gap in Inches ..... .016
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 AC42.6FS
Spark Plug Torque in Lb. Ft. ..... .29
Spark Plug Gap in Inches ..... .030

Valve Lifter Adjuster

One full turn (clockwise) after zero clearance is obtained - refer to Valve Adjustment Procedure in 1974 Opel Service Manual .....

Ignition Timing

Align timing marks at crankshaft pulley with distributor retard hose disconnected and plugged .....

Engine Idle Speed Adjustment (See Fuel Injection Section)

GROUP 7

TRANSMISSION

GROUP 8

HOOD, FENDERS, AND GRILLE

GROUP 9

ACCESSORIES

REFRIGERANT COMPONENTS ALL MODELS

DESCRIPTION AND OPERATION

A/C COMPRESSOR ON/OFF OPERATION

The air conditioning compressor remains running (by selection) at engine idle speed when the engine coolant temperature is below 250°F. (121°C).

A thermostatic vacuum switch located in the upper radiator hose senses engine coolant temperature and will cut off the compressor operation if temperature of coolant should exceed 250°F (121°C). Cut off is accomplished via vacuum being switched from manifold to ported, opening the electrical circuit at the on/off switch.

Compressor operation is also interrupted at wide open throttle or when vacuum approaches "zero" since the on/off switch makes electrical contact when vacuum is applied.

MAJOR REPAIR

REMOVAL AND INSTALLATION OF COMPRESSOR

Removal

1. Disconnect negative battery cable from battery.

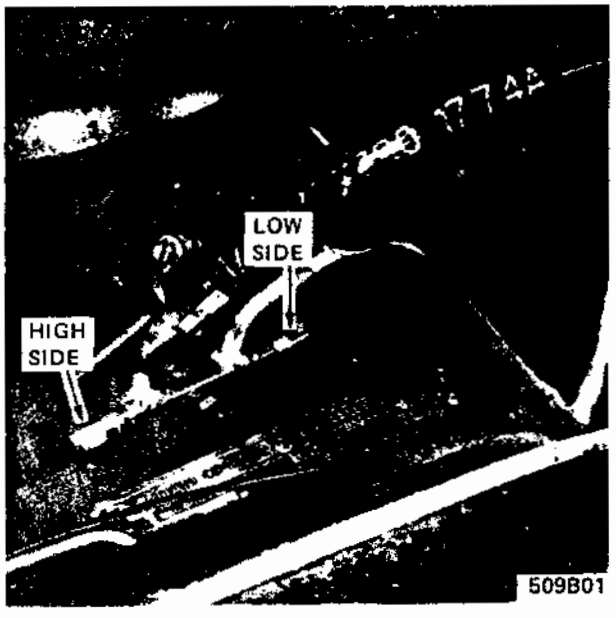


Figure 9B-1 Air Cleaner Assembly Removed

2. Disconnect the top of the air cleaner assembly and swing it out of the way.

3. Remove the bottom half of the air cleaner assembly. See Figure 9B-1.

4. Discharge system. Refer to discharging system in the 1974 service manual.

5. While system is discharging remove sheet metal stone shield. See Figure 9B-2.

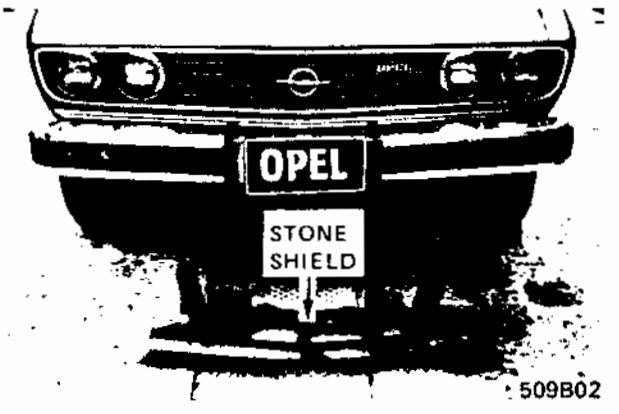


Figure 9B-2 Sheet Metal Stone Shield Removed

6. Unplug compressor clutch electrical plug and remove ground wire. See Figure 9B-3.

7. After system is completely discharged, remove refrigerant hoses from compressor manifold fitting and cap hoses and manifold fitting pipes to keep contaminants from entering.

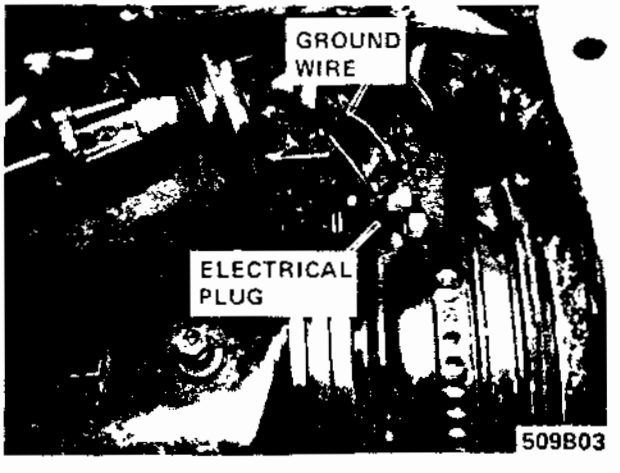


Figure 9B-3 Compressor Electrical Plug and Ground Wire

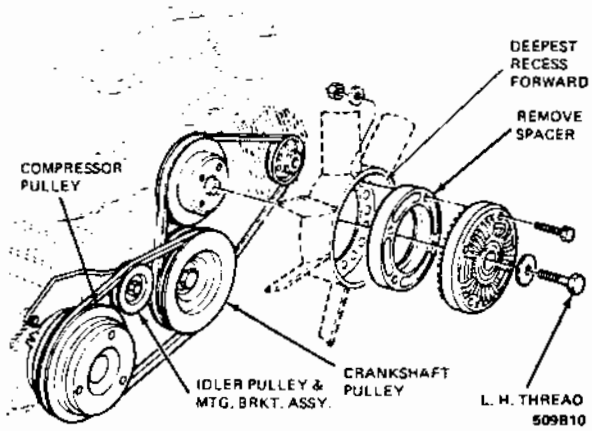


Figure 9B-4 Compressor Pulley, Idler Pulley and Mounting Bracket Assembly

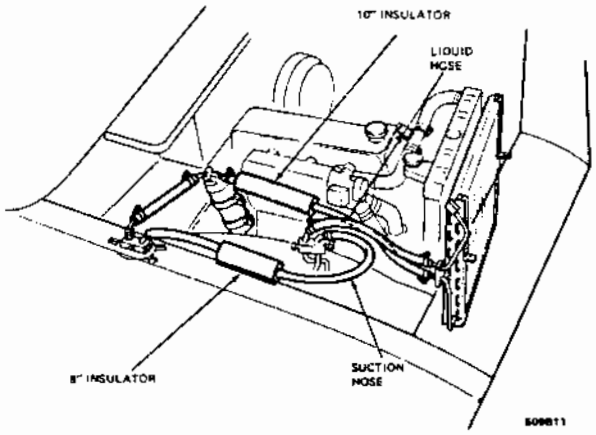


Figure 9B-5 Refrigerant Hoses

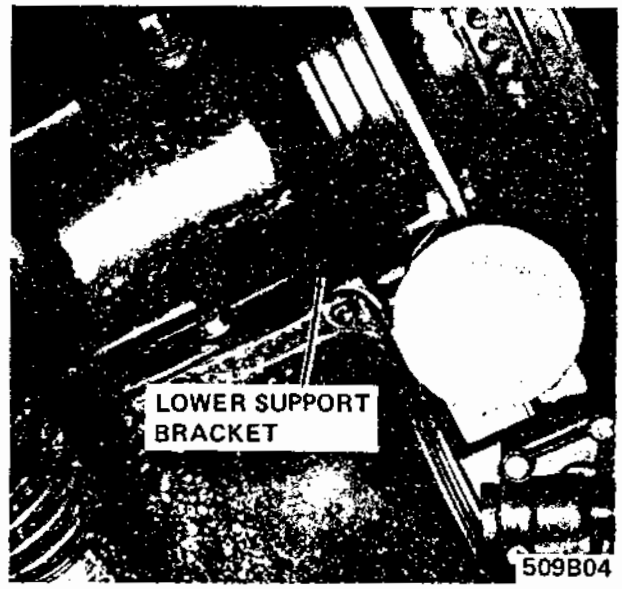


Figure 9B-6 Compressor Lower Support Bracket

8. Support compressor from underneath and remove support bracket and 3 compressor mounting support bolts. Carefully lower compressor. During removal, maintain the compressor position so that the sump is downward. Do not rotate compressor shaft. See Figure 9B-6.

Installation

1. Support compressor from underneath and install into position from under car. Insure that compressor has sufficient oil charge.

2. Install 3 compressor mounting support bolts.

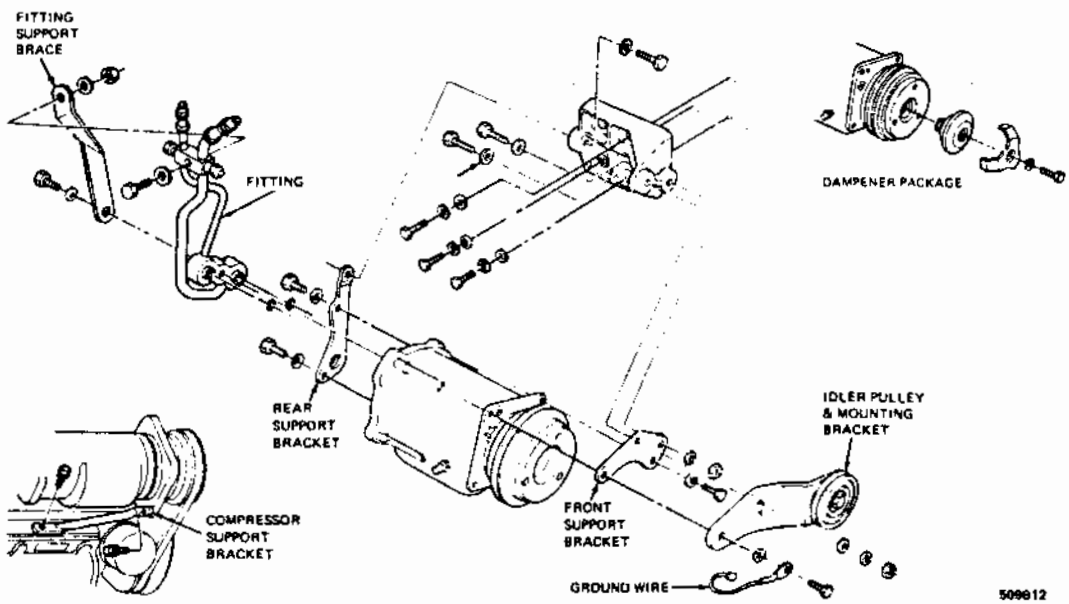


Figure 9B-7 Compressor Installation

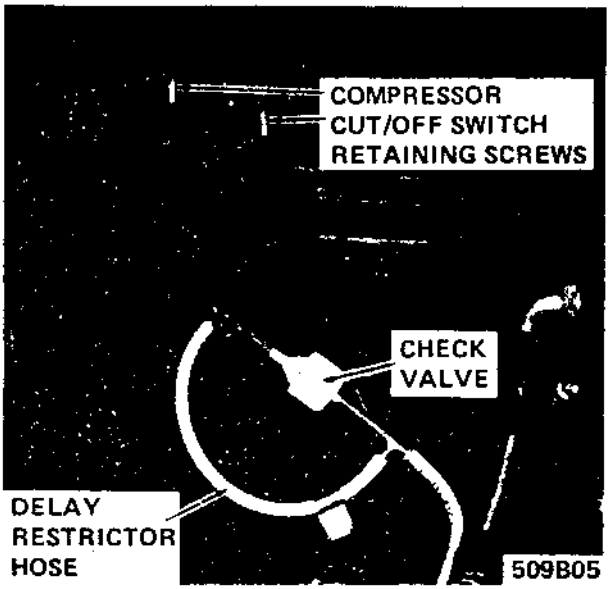


Figure 9B-8 Compressor Cut/Off Switch Retaining Screws

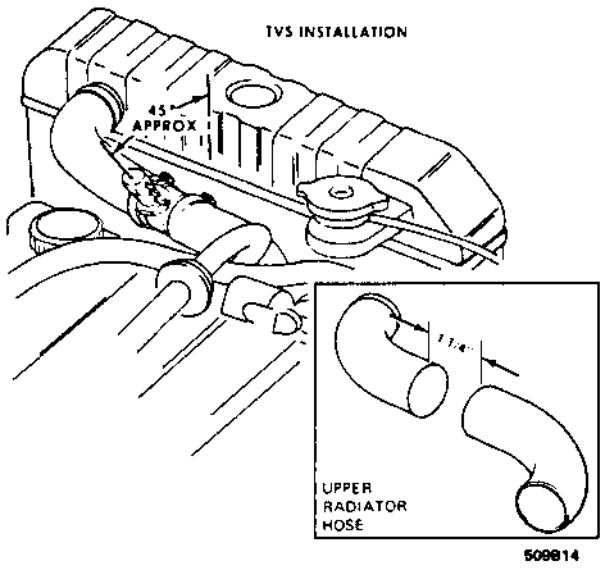


Figure 9B-11 Thermo-vacuum Sensing Switch

3. Install compressor support bracket. Torque bolts to 20 lb. ft. See Figure 9B-6.

4. Install fan belt, ground wire and plug in compressor clutch electrical plug. See Figure 9B-3.

5. Install refrigerant hoses and evacuate system. Refer to "Evacuating the System" in the 1974 service manual.

6. While system is being evacuated install sheet-metal stone shield. See Figure 9B-2.

7. Install the air cleaner assembly.

8. Install the negative battery cable and charge the system. Refer to "Charging the System" in the 1974 service manual.

Removal and Installation of Compressor Cut/Off Switch

1. Disconnect the negative battery cable from the battery.

2. From underneath the plenum chamber remove 2 screws retaining the compressor cut/off switch. See Figure 9B-8.

3. Install in the reverse of removal sealing retaining screws with silastic sealer or equivalent.

Removal and Installation of Thermostatic Vacuum Switch (TVS)

1. Loosen radiator cap to relieve cooling system pressure and retighten.

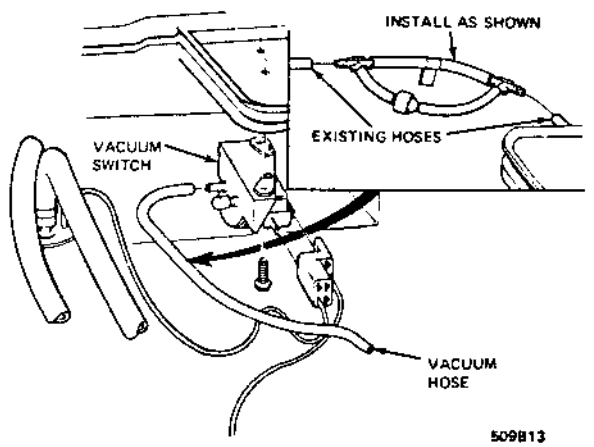


Figure 9B-10 Vacuum Hoses and Wiring

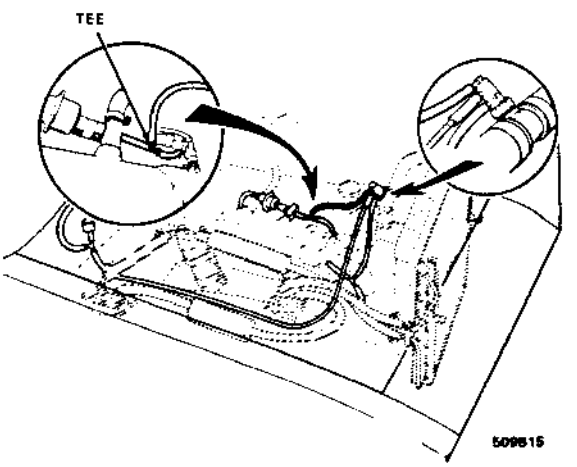


Figure 9B-12 Thermo-vacuum Sensing Switch to Manifold Vacuum

2. Identify vacuum hose installation sequence on vacuum switch and disconnect hoses.

3. Support vacuum switch housing to avoid twisting and remove switch.

4. Install in reverse of removal coating switch threads with silastic sealer or equivalent. Check for leaks.

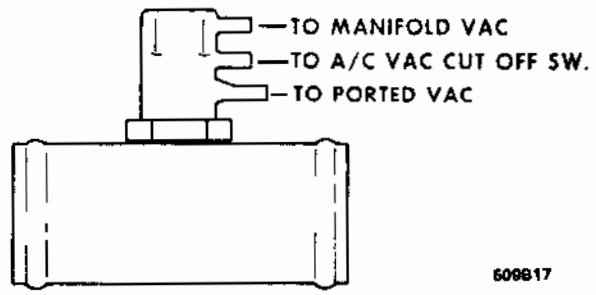


Figure 9B-14 Thermo-vacuum Sensing Switch Vacuum Logic

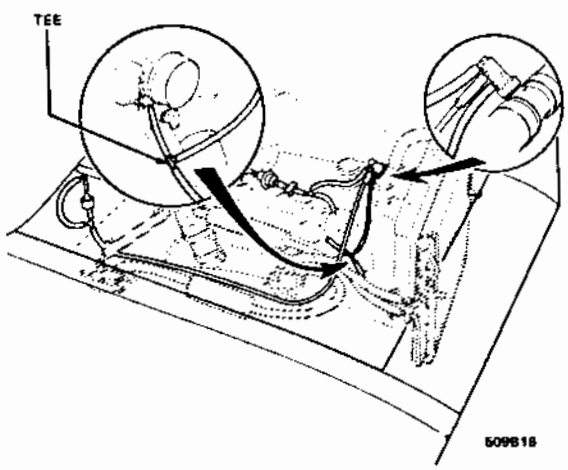


Figure 9B-13 Thermo-vacuum Sensing Switch to Ported Vacuum

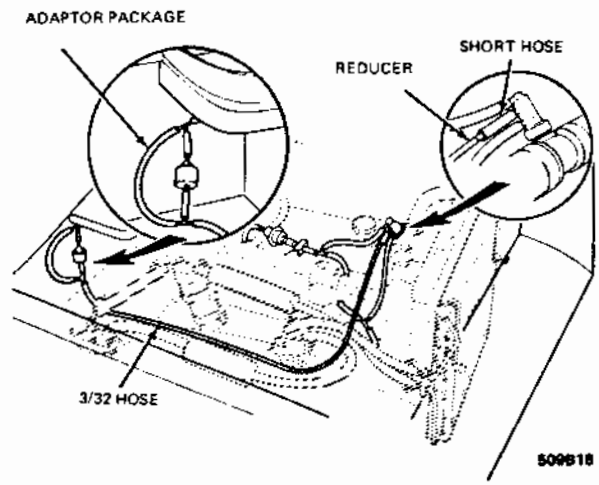


Figure 9B-15 Thermo-vacuum Sensing Switch to Cut/Off Switch