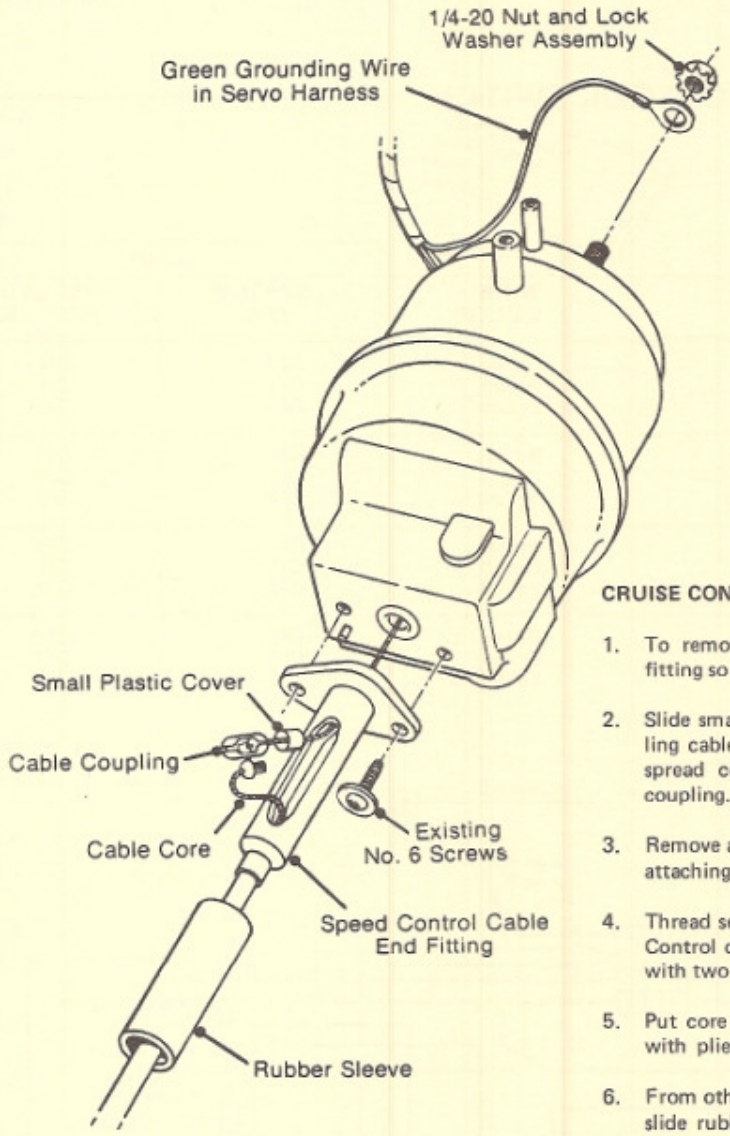


CRUISE CONTROL CABLE REMOVAL

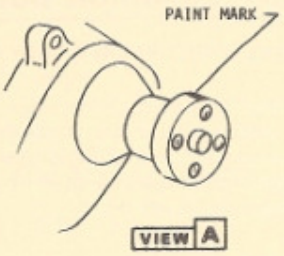
1. To remove old cable, slide rubber sleeve off cable end fitting so slots are exposed.
2. Slide small plastic cover off coupling and onto servo coupling cable. Use side cutter pliers or small screwdriver to spread coupling. Remove core end of old cable from coupling.
3. Remove and retain two No. 6 screw and washer assemblies attaching cable end fitting to servo.
4. Thread servo coupling cable into end fitting of new Speed Control cable and out through slot. Attach cable to servo with two screws retained.
5. Put core end of cable in coupling and squeeze it closed with pliers. Slide small plastic sleeve back onto coupling.
6. From other end of cable, pull all slack from cable core and slide rubber sleeve back into place over end fitting slots.

Figure 48 – Cruise Control Cable Removal

NOTE: The fan clutch "yellow" paint mark is to be matched with paint mark on O.D. and backside of water pump hub at assembly.

Do not allow the clutch assembly to rest on front face as loss of lubricant fluid may occur.

1) *Pulley*
2) *Bolt/Screw*
3) *Blade Assembly*
4) *Clutch Assembly*
5) *Nut*
6) *Belt*
7) *Stud*



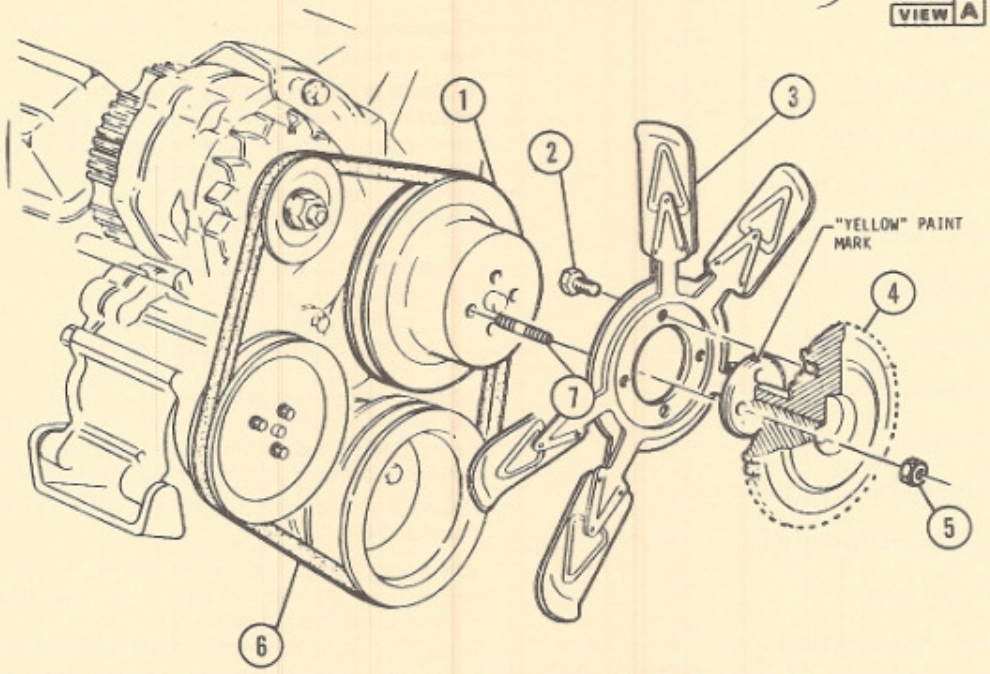
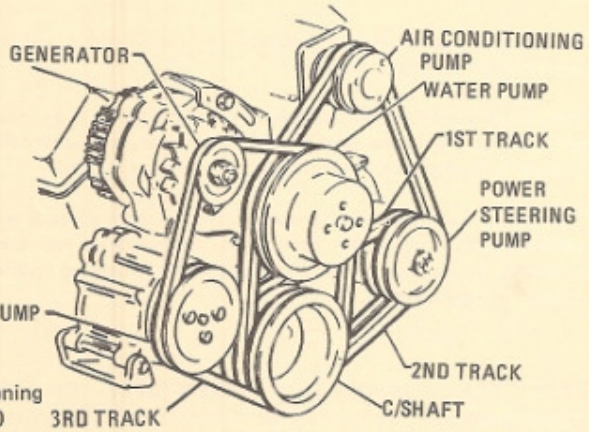


Figure 49 — Fan and Fan Clutch Assembly

BELT TENSIONS (Newtons)

Tension should be checked within 15 minutes after vehicle has completed chassis rolls test. For belts driving more than one adjustable accessory, use highest tension specified.

CAUTION: Any tensioning of replacement belts, or re-tensioning of previously installed but unrun belts, must adhere to the above specifications (maximums prior to engine operation and minimums after engine operation). Any re-tensioning of previously run belts must be set to the "after-chassis rolls" specifications -0+50 Newtons. Belt tensions should be measured with a Borroughs Gauge BT-33-95 ACBN. At no time should belt exceed maximum initial installation tension.



TENSIONING	Generator	Power Steering	Air Conditioning
Max. Initial Installation	750	750	750
Min. after Chassis Rolls	400	400	400

Figure 50 — Belt Routing

ENGINE EMISSION CONTROLS

GENERAL DESCRIPTION & COMPONENTS

The normal operation of the engine results in the release of several compounds to the atmosphere. Federal Government and State of California legislation has placed limitations on the quantities of three compounds which can be emitted. The three controlled compounds are:

Hydrocarbons - HC

Carbon Monoxide - CO

Oxides of Nitrogen - NOx

The emission control systems for the engine include:

Carburetor Calibration

Distributor Calibration

Early Fuel Evaporation (EFE)

Positive Crankcase Ventilation (PCV)

Choke Calibration

Thermostatic Air Cleaner (THERMAC)

Evaporation Control System (ECS)

Air Injection Reactor (AIR)

CARBURETOR CALIBRATION – While the carburetor's main function is to provide the engine with a combustible air/fuel mixture, the carburetor calibration is critical to maintaining proper emission levels.

The carburetor's idle, off-idle, main metering, power enrichment, and accelerating pump systems are calibrated to provide the best possible combination of engine performance fuel economy and exhaust emission control. Carburetor adjustments and service must be performed using the recommended procedures to insure engine exhaust emission levels remain within official limits.

See page 54 for carburetor adjustment specifications and recommended service procedures.

DISTRIBUTOR CALIBRATION – The distributor is an integral part of the engine ignition system and the distributor calibration is an important part of exhaust emission control.

The initial timing centrifugal advance and vacuum advance are calibrated to provide the best engine performance and fuel economy at varying speeds and loads while remaining within exhaust emission limits.

EARLY FUEL EVAPORATION SYSTEM (EFE) – The EFE system is used to provide a source of rapid heat to the engine induction system during cold driveaway. Rapid heating is desirable because it provides for quick fuel evaporation and more uniform fuel distribution to aid cold driveability.It also reduces the length of time carburetor choking is required making reductions in exhaust emission levels possible.

EFE systems may use a valve which increases the exhaust gas flow under the intake manifold during cold engine operation. The valve is vacuum operated and is controlled by a thermal vacuum switch (TVS) which applies vacuum when the coolant temperature is below the calibration valve.

Diagnosis and service procedures of the EFE system can be found on page 73.

CLOSED POSITIVE CRANKCASE VENTILATION SYSTEM (PCV) – All engines have closed Positive Crankcase Ventilation System to provide more complete scavenging of crankcase vapors. An engine which is operated without any crankcase ventilation can be damaged seriously. Therefore, it is important to replace the ventilator valve periodically.

> **NOTE:** If an engine is idling too slow or rough, this may be caused by a clogged ventilator valve or plugged hose; therefore, never adjust the carburetor idle without first checking the PCV valve and hose.

After installing a new PCV valve, readjust engine idle if necessary. With this system, any blow-by in excess of the system capacity (from a badly worn engine, sustained heavy load, etc.) is exhausted into the air cleaner and is drawn into the engine.

Diagnosis and service procedures for the PCV system can be found on page 73.

CHOKE SYSTEM – An automatic choke system maintains proper engine performance during engine warm-up. Modifications to the choke system have been necessary in recent years to meet the lower legislated exhaust emission levels.

THERMOSTATIC AIR CLEANER (THERMAC) – The Thermostatic Air Cleaner (THERMAC), installed on all engines, uses a damper assembly in the air cleaner inlet, and it is controlled by a vacuum motor to mix pre-heated and non pre-heated air entering the air cleaner to maintain a controlled air temperature into the carburetor. The vacuum motor is modulated by a temperature sensor in the air cleaner. The preheating of the air cleaner inlet air allows leaner carburetor and choke calibrations resulting in lower emission levels, while maintaining good driveability. Diagnostics and service procedures for the thermostatic air cleaner can be found on page 73.

AIR INJECTION REACTOR SYSTEM (AIR) – An air injection reactor (AIR) is used to provide additional oxygen to continue the combustion process after the exhaust gases leave the combustion chamber. An engine driven pump provides pressurized air which is injected into the exhaust port of the cylinder head or exhaust pipe and then into the exhaust system. The AIR system operates at all times and will bypass air only for a short duration of time during deceleration and at high speeds. The diverter valve performs the bypass function, and the check valve protects the air pump from damage by preventing a back flow of exhaust gas.

Diagnosis and service procedures for air injection reactor system is on page 76.

VACUUM CONTROLS – Various types of vacuum controls are used in the emission control system to modify or control

the operation of the various emission control components to optimize emission control effectiveness, while minimizing any negative effect on driveability.

ON-VEHICLE SERVICE
EARLY FUEL EVAPORATION (EFE)

INSPECTION (See Figure 51.)

Visually inspect exhaust heat valve for damage or binding linkage.

Check that linkage is connected and vacuum hoses are properly routed and connected.

Move exhaust heat valve by hand. If binding or stuck, free with manifold heat valve lubricant, GM Part No. 1050422 or equivalent. If valve cannot be freed, replace valve.

CHECKING EFE SYSTEM

1. With engine cold, position transmission in neutral or park and apply parking brake.
2. Start engine and observe movement of actuator rod and exhaust heat valve. Valve should move to its closed position.
3. If valve does not close, disconnect hose at actuator and check for vacuum.

If there is vacuum, replace actuator.

If there is no vacuum, disconnect hose at TVS-to-vacuum source.

If there is vacuum at hose, replace TVS.

If there is no vacuum, check for deteriorated hose and vacuum source to determine lack of vacuum.

4. When coolant reaches 180° F (82° C), the exhaust heat valve should move to its open position.

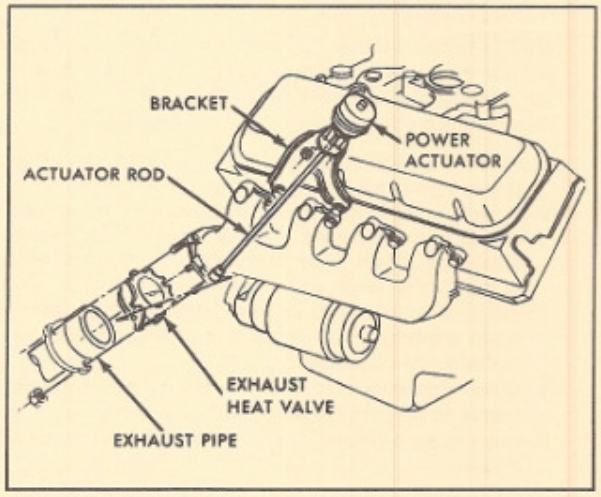


Figure 51 – Early Fuel Evaporation System

5. If valve does not move, disconnect hose at actuator and check for vacuum.

If there is vacuum, replace TVS.

If there is no vacuum, replace actuator.

COOLANT TEMPERATURE THERMAL VACUUM SWITCH (TVS)

Replacement

1. Drain coolant below level of engine coolant outlet housing.
2. Disconnect hoses at TVS ports.
3. Remove TVS.
4. Apply a soft setting sealant uniformly on replacement TVS male threads. No sealant should be applied to sensor end of TVS.
5. Install TVS, tighten to 120 pound inches, and then hand torque clockwise as required to align TVS to accommodate hoses.
6. Connect hoses to TVS ports.
7. Add coolant as required.

ACTUATOR AND ROD ASSEMBLY – The actuator and rod assembly is located on a bracket attached to right exhaust manifold.

Replacement

1. Disconnect hose from actuator.
2. Remove two nuts attaching actuator-to-bracket.
3. Disconnect rod from valve and remove actuator and rod.
4. Install actuator and rod reversing steps 1 and 3.
5. Tighten nuts to 25 pound inches.

EXHAUST HEAT VALVE – V8

Replacement

1. Remove right side exhaust header pipe.
2. Disconnect rod from valve.
3. Remove valve.
4. Install valve and connect rod.
5. Install right side header pipe.

POSITIVE CRANKCASE VENTILATION SYSTEM (PCV) – Ventilation air is drawn through a filter assembly located in the air cleaner, through a hose, down into the crankcase, up through the ventilator valve, through a hose and into the intake manifold. Intake manifold vacuum draws any fumes from the crankcase to be burned in the engine.

When air flow through the carburetor is high, added air from the PCV system has no noticeable effect on engine operation. However, at idle speed, air flow through the carburetor is so low that any large amount added by the ventilating system would upset the air-fuel mixture, causing rough idle.

For this reason, a flow control valve is used which restricts the ventilating system flow whenever intake manifold vacuum is high.

PCV ON VEHICLE SERVICE

1. Remove PCV valve from intake manifold or rocker arm shaft cover.
2. Run the engine at idle.
3. Place your thumb over end of valve to check for vacuum. If there is no vacuum at valve, check for plugged hoses or valve. Replace deteriorated hoses.
4. Shut off the engine and remove PCV valve. Shake valve and listen for the rattle of check needle in the valve. If valve does not rattle, replace valve.

THERMOSTATIC AIR CLEANER (THERMAC) ON VEHICLE SERVICE

Vacuum Motor Check

1. Check all hoses for proper hook-up. Check for kinked, plugged, or damaged hoses.

ENGINE EMISSION CONTROLS (Continued)

2. With the engine not running, observe damper door position through snorkel opening. If position of snorkel makes observation difficult, use the aid of a mirror. At this point damper door should be in such a position that the heat stove passage is covered (snorkel passage open). If not, check for binds in linkage.
3. Apply at least 7 inches Hg. of vacuum to the diaphragm assembly through hose disconnected at sensor unit. Damper door should completely close snorkel passage when vacuum is applied. If not, check to see if linkage is hooked up correctly and for a vacuum leak.
4. With vacuum applied, bend or clamp hose to trap vacuum in diaphragm assembly, Damper door should remain in position (closed snorkel passage). If it does not, there is a vacuum leak in diaphragm assembly. Replace diaphragm assembly.

Sensor Check (Quick Check of System)

1. Start test with engine cold, air cleaner at a temperature below 80°F (27°C). If the engine has been in recent use, allow it to cool. Placing a cool wet rag on sensor will aid in cooling.
2. Observe the damper door before starting the engine; it should be in the open snorkel position.
3. Start the engine and allow it to idle. Immediately after starting the engine, the damper door should be in the closed snorkel passage position.
4. As the engine warms up, the damper door should start to allow outside air and heated air to enter the carburetor inlet.
5. The system is operating normally as described above. If the air cleaner fails to operate as above, or if correct operation of the air cleaner is still in doubt, proceed to the thermometer check of sensor.

Thermometer Check of Sensor

1. Start test with air cleaner temperature below 80°F (27°C). If engine has been run recently, remove air cleaner and place a cool wet rag on sensor (this will help to cool the air cleaner quickly). Remove air cleaner cover and place thermometer as close as possible to the sensor. Let air cleaner cool until thermometer reads below 80°F (27°C) about 5 to 10 minutes. Reinstall air cleaner on engine and continue to step 2 following.
2. Start and idle engine. Damper door should move to close the snorkel passage immediately if engine is cool enough. When damper door starts to open the snorkel passage (in a few minutes), remove air cleaner cover and read temperature gauge. It must read 100°F + 20°F (38oC+7°C).
3. If the damper door does not start to open up the snorkel passage at temperature indicated, temperature sensor is malfunctioning and must be replaced.

Checking Air Cleaner – On Vehicle Service

1. Inspect system to be sure all hoses and ducts are connected.
2. If engine is warm above 80°F (27°C), remove air cleaner. Permit it to cool to room temperature.
3. Install cooled air cleaner with cold air intake hose disconnected (if equipped).
4. Start engine. Watch damper valve in air cleaner snorkel.
5. When engine is first started, valve should be closed. As air cleaner warms up, valve should slowly open.

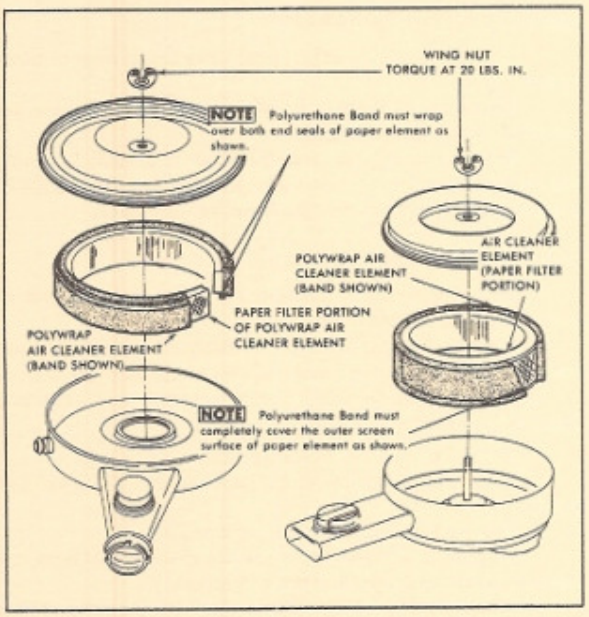


Figure 52 – Air Cleaner Assembly

NOTE: In hot weather the room temperature may be too hot for the snorkel valve to close when the engine is started. In this case, cool the temperature sensor in the air cleaner with a cool wet rag.

6. If valve doesn't close when the engine is started, check for vacuum at the diaphragm.
7. If vacuum is present, check for binding in the damper valve and operating link. If damper moves freely, replace diaphragm. (Failure of the diaphragm to close more likely is the result from mechanical bind due to a damaged or corroded snorkel assembly than from a failed diaphragm, This should be checked first before replacing the diaphragm.)
8. If no vacuum is present, check hoses for disconnects, cracks, or pinches. Repair or replace as necessary.
9. If hoses are okay, replace temperature sensor in the air cleaner.

Air Cleaner Element Replacement (See figure 52.)

Paper Element

1. Remove air cleaner cover.
2. Remove element.
3. Install new element in air cleaner with either end up.
4. Install air cleaner cover. Do not over-torque wingnut.

Polywrap Element

1. Remove air cleaner cover.
2. Remove element.
3. Remove polywrap band from paper element and discard element.

ENGINE EMISSION CONTROLS (Continued)

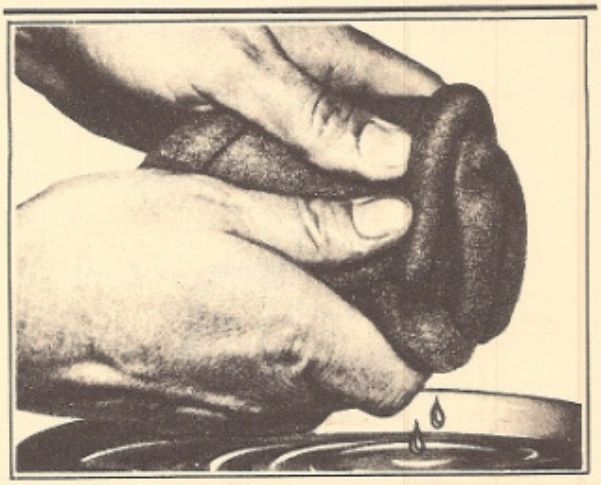


Figure 53 – Cleaning Polywrap Band

4. Clean bottom section of air cleaner and inspect cover seal for tears and cracks. Replace seal if damaged.
5. Inspect band for tears and replace if damaged.
6. If band is usable, wash in kerosene or mineral spirits and squeeze out excess solvent (see figure 53).

NOTE: Never use a hot degreaser or any solvent containing acetone or similar solvent; also, never shake, swing or wring the element to remove excess solvent as this may tear the polyurethane material. Instead,"squeeze" the excess solvent from the element.

7. Dip band into light engine oil and squeeze out excess oil.
8. Install band around outer surface of new paper element.
9. Install element in bottom section of air cleaner with either end up.
10. Install air cleaner cover. Do not over-torque wingnut.

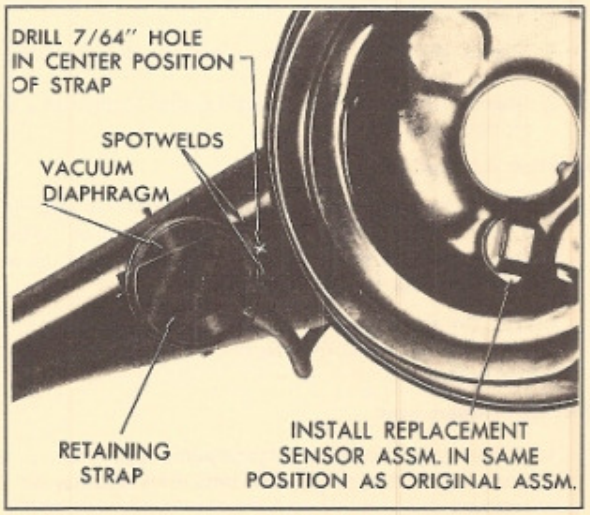


Figure 54 – Vacuum Diaphragm Replacement

Vacuum Motor Removal

1. Remove air cleaner.
2. Disconnect vacuum hose from motor.

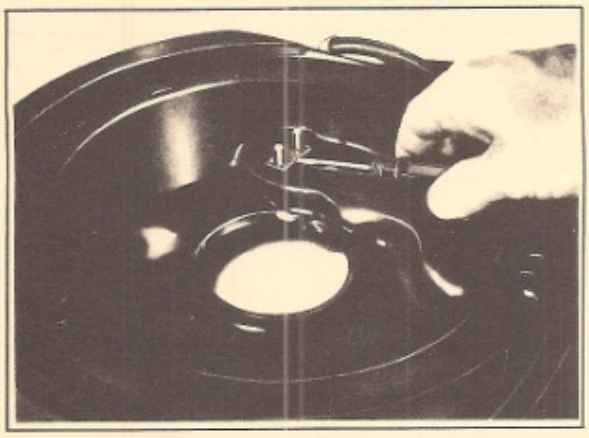


Figure 55 – Removing Sensor Unit

3. Drill out the two spotwelds initially with a 1/6-inch hole; then enlarge as required to remove the retaining strap. Do not damage the snorkel tube.
4. Remove motor retaining strap.
5. Lift up motor, cocking it to one side to unhook the motor linkage at the control damper assembly.

Vacuum Motor Installation

1. Drill a 7/64-inch hole in the snorkel tube at center of vacuum motor retaining strap (see figure 54).
2. Insert vacuum motor linkage into control damper assembly.
3. Use the motor retaining strap and sheet metal screw provided in the motor service package to secure the retaining strap and motor to the snorkel tube.
4. Make sure the screw does not interfere with the operation of the damper assembly. Shorten screw if required.
5. Connect vacuum hose to motor and install air cleaner.

Sensor Removal

1. Remove air cleaner.
2. Detach hoses at sensor.

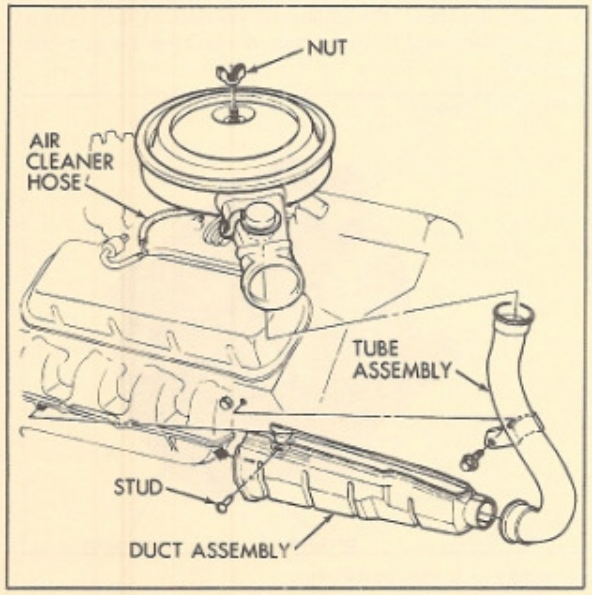


Figure 56 – Air Cleaner

ENGINE EMISSION CONTROLS (Continued)

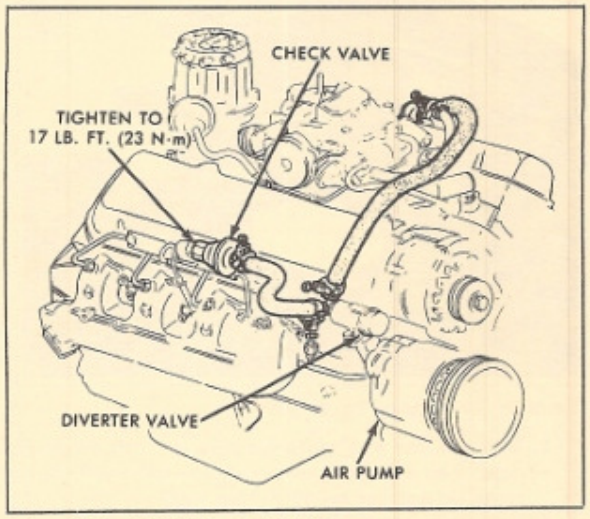


Figure 57 – A.I.R. Pipe Installation

3. Pry up tabs on sensor retaining clip (see figure XX); remove clip and sensor from air cleaner. Note position of sensor for reinstallation.

Sensor Installation

1. Install sensor and gasket assembly in original position.
2. Press retainer clip on hose connectors.
3. Connect vacuum hoses and install air cleaner on engine.

AIR INJECTION REACTOR SYSTEM (AIR) – The Air Injection Reactor System (AIR) consists of: an air injection pump (with necessary brackets and drive attachments), air diverter valve, a check valve and air pipe hose necessary to connect diverter valve (see figures 58 and 59).

The air injector pump (see figure 58) with an integral filler, compresses the air and injects it through the air manifolds, into the exhaust system in the area of the exhaust valves. The fresh air helps burn the unburned portion of the exhaust gases in the exhaust system, thus minimizing exhaust contamination.

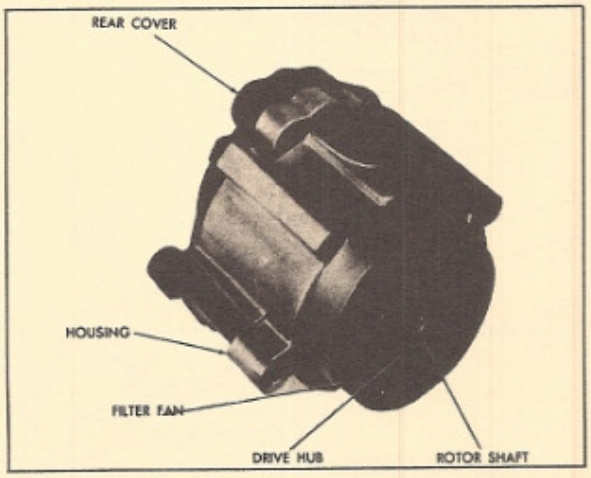


Figure 58 – Air Injection Pump

The diverter valve (see figure XX) when triggered by a sharp increase in manifold vacuum, shuts off the injected air to the exhaust port areas and prevents backfiring during this richer period.

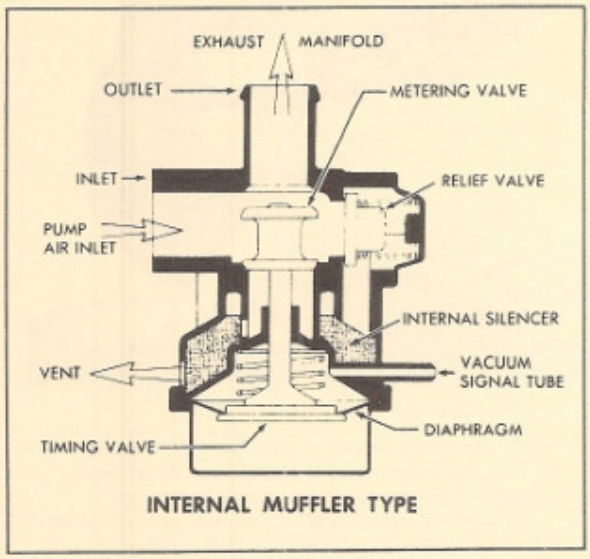


Figure 59 – Diverter Valve

On engine overrun, the total air supply is dumped through the muffler on the diverter valve. At high engine speeds the excess air is dumped through the pressure relief valve which is incorporated in the diverter valve.

The check valve (see figures 57 through 59) prevents exhaust gases from entering and damaging the air injection pump, as back flow can occur even under normal operating conditions.

AIR INJECTION REACTOR SYSTEM (AIR) ON VEHICLE SERVICE

Drive Belt Inspection

1. Inspect drive belt for wear, cracks, or deterioration, and replace if required.
2. Inspect belt tension and adjust if below 70 lbs., using a tension gauge.

Drive Belt Adjustment

Loosen pump mounting bolt and pump adjustment bracket bolt. Move pump until belt is properly tensioned; then tighten adjustment bracket bolt and mounting bolt. Use a belt tension gauge to check adjustment.

NOTE: Do not pry on the pump housing. Distortion of the housing will result in extensive damage to the air injection pump.

Drive Belt Replacement

1. Loosen pump mounting bolt and pump adjustment bracket bolt; then swing pump until drive belt may be removed.
2. Install a new drive belt and adjust as outlined above.

Pump Pulley Replacement

1. Hold pump pulley from turning by compressing drive belt; then loosen pump pulley bolts.

ENGINE EMISSION CONTROLS (Continued)

2. Remove drive belt as outlined above; then remove pump pulley.

Pump Pulley Installation

1. Install pump pulley with retaining bolts hand tight. Install and adjust drive belt as outlined above.
2. Hold pump pulley from turning by compressing drive belt; then torque pump pulley bolts to 24 lbs. ft.
3. Recheck drive belt tension and adjust if required.

Pump Filter Replacement

1. Remove drive belt and pump pulley as previously outlined.
2. Insert needle nose pliers and pull fan from hub (see figure 60).

NOTE: Care should be taken to prevent fragments from entering the air intake hole. Do not insert a screwdriver between pump and filter. It is seldom possible to remove the filter without destroying it. Do not attempt to remove the metal hub.

Pump Filter Installation

1. Install the new filter by drawing it on with the pulley and pulley bolts (see figure 61). Do not attempt to install a filter by hammering it on or pressing it on.
2. Draw the filter down evenly by alternately torquing the bolts. Make certain that the outer edge of the filter slips into the housing. The slight amount of interference with the housing bore is normal.

NOTE: The new filter may squeal upon initial operation until its O.D. sealing lip has worn in.

Air Hoses and Tubes Inspection

1. Inspect all hoses for deterioration or holes.
2. Inspect all tubes for cracks or holes.
3. Check all hose and tube connections.
4. Make repairs or replace parts as needed.
5. Check all tube and hose routing. Interference may cause wear.
6. If leak is suspected on the pressure side of the system or any tubes and/or hoses have been disconnected on the pressure side, the connections should be checked for leaks with soapy water solution.
7. With the pump running, bubbles will form if a leak exists.

Air Hoses & Tubes Replacement

To replace any hose and/or tube, note routing then remove hose(s) and/or tube(s) as required.

Install

1. Install new hose(s) and/or tube(s), routing them as when removed.
2. Tighten all connections.

Check Valve Inspection

1. The check valve should be inspected whenever the hose is disconnected from the check valve or whenever check valve failure is suspected. (A pump that had become inoperative and had shown indications of having exhaust gases in the pump would indicate check valve failure.)

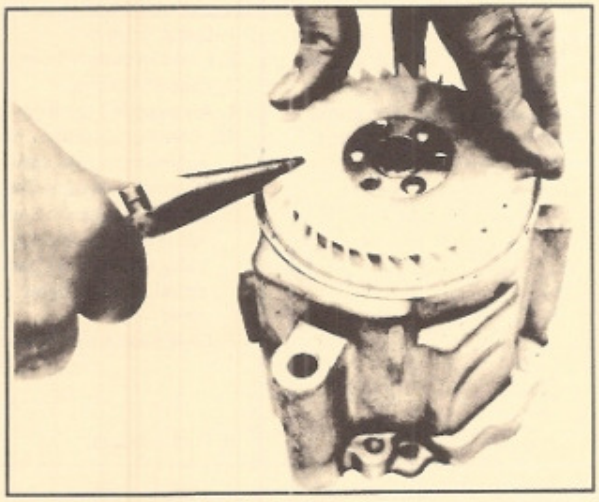


Figure 60 – Filter Fan Removal

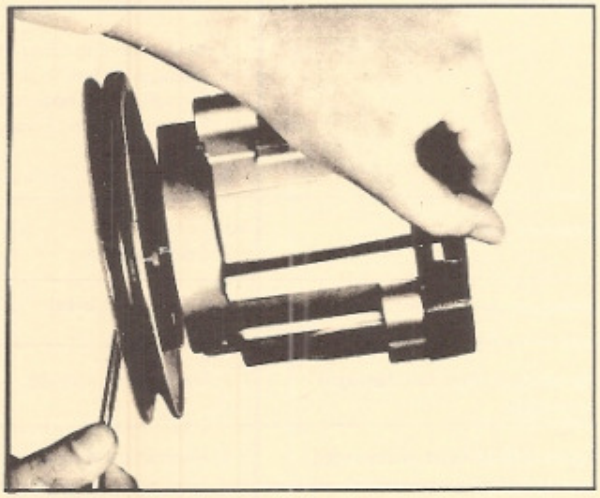


Figure 61 – Filter Fan Installation

2. Blow through the check valve (toward the cylinder head) then attempt to suck back through check valve. Flow should only be in one direction (toward the exhaust manifold). Replace valve which does not function this way.

Check Valve Replacement

Disconnect pump outlet hose at check valve. Remove check valve from pipe assembly, being careful not to bend or twist the assembly.

Diverter Valve and Silencer Assembly Inspection

1. Check condition and routing of all lines especially the signal line. All lines must be secure without crimps and not leaking. Replace deteriorated lines.

ENGINE EMISSION CONTROLS (Continued)

DIAGNOSIS – AIR INJECTION REACTOR SYSTEM		
CONDITION	**POSSIBLE CAUSE**	**CORRECTION**
No air supply – accelerate engine to 1500 rpm and observe air flow from hoses. If the flow increases as the rpm's increase, the pump is functioning normally. If not, check possible cause.	1. Loose drive belt. 2. Leaks in supply hose. 3. Leak at fittings. 4. Air expelled through by-pass valve. 4a. Connect a vacuum line directly from engine manifold vacuum to by-pass 4b. Connect vacuum line from engine manifold vacuum source to by-pass valve through vacuum differential valve directly, by passing the differential vacuum delay and separator valve. 5. Check valve inoperative. 6. Pump failure.	1. Tighten to specifications. 2. Locate leak and repair. 3. Tighten or replace clamps. 4a. If this corrects the problem, go to step 4b. If not, replace air by-pass valve. 4b. If this corrects the problem, check differential vacuum, delay and separator valve and vacuum source line for plugging Replace as required. If it doesn't, replace vacuum differential valve. 5. Disconnect hose and blow through hose toward check valve. If air passes, function is normal. If air can be sucked from check valve, replace check valve. 6. Replace pump.
Excessive pump noise, chirping, rumbling, knocking, loss of engine performance.	1. Leak in hose. 2. Loose hose. 3. Hose touching other engine parts. 4. Vacuum differential valve inoperative. 5. By-pass valve inoperative. 6. Pump mounting fasteners loose. 7. Pump failure. 8. Check valve inoperative.	1. Locate source of leak using soap solution and correct. 2. Reassemble and replace or tighten hose clamp. 3. Adjusr hose position. 4. Replace vacuum differential valve. 5. Replace by-pass valve. 6. Tighten mounting screws as specified. 7. Replace pump. 8. Replace check valve.
Excessive belt noise.	1. Loose belt. 2. Seized pump.	1. Tighten to specifications. 2. Replace pump.
Excessive pump noise. Chirping.	1. Insufficient break-in.	1. Run vehicle 10 to 15 miles at interstate speeds. Recheck.
Centrifugal filter fan damaged or broken.	1. Mechanical damage.	1. Replace centrifugal filter fan.
Exhaust tube bent or damaged.	1. Mechanical damage.	1. Replace exhaust tube.
Poor idle or driveability.	1. A defective AIR system cannot cause poor idle or driveability.	1. Do not replace AIR system.

2. Disconnect signal line at valve. A vacuum signal must be available with engine running.

Diverter Valve and Silencer Installation

1. Install diverter valve to pump or elbow with new gasket. Torque valve attaching screws to 85 lb. in.

2. Install outlet and vacuum signal hoses and check system for leaks.

Air Injection Pump Inspection

Accelerate engine to approximately 1500 rpm and observe air flow from hose(s). If air flow increases as engine is accelerated, pump is operating satisfactorily. If air flow does not increase or is not present, proceed as follows:

1. Check for proper drive belt tension.

2. Check for a leaky pressure relief valve. Air may be heard leaking with the pump running.

NOTE: The AIR System is not completely noiseless. Under normal conditions, noise rises in pitch as engine speed increases. To determine if excessive noise is the fault of the Air Injection Reactor System, operate the engine with the pump drive belt removed. If excessive noise does not exist with the belt removed proceed as follows:

3. Check diverter valve attaching screws for tightness. Screws should be torqued to 85 lb. in. (10N-m).

4. Defective valves should be replaced (see Functional Test).

ENGINE EMISSION CONTROLS (Continued)

Diverter Valve Replacement

1. Disconnect vacuum signal line. Disconnect valve outlet hose.
2. Remove diverter valve from pump or elbow.
3. Check for seized Air Injection Pump.
4. Check hoses, tubes and all connections for leaks and proper routing.

CAUTION: DO NOT OIL AIR PUMP.

5. Check diverter valve.
6. Check AIR injection pump for proper mounting and bolt torque.
7. Repair irregularities in these components as necessary.
8. If no irregularities exist and the Air Injection Pump noise is still excessive, remove and replace pump.

Air Injection Pump Replacement

1. Disconnect the hoses at the pump.
2. Remove pump pulley as outlined.
3. Remove pump mounting bolts and remove pump.

Air Injection Pump Installation

1. Install pump with mounting bolts loose.
2. Install pump pulley as outlined.
3. Install and adjust belt as outlined.
4. Connect the hoses at the pump.
5. Tighten mounting bolts to 20-35 lb. ft.

THROTTLE RETURN CONTROL SYSTEM (TRC)

GENERAL DESCRIPTION —The TRC system used on heavy emission vehicles consists of three major components (see figure 62 .

1. Throttle Lever Actuator - Mounted as part of the carburetor assembly, this device opens the primary throttle blades a preset amount in excess of curb idle when engine vacuum is applied to it. This actuating vacuum is controlled by a separate solenoid control valve.

2. Solenoid Vacuum Control Valve - Mounted separately from the carburetor, this off-on valve is held open above a present nominal engine speed by a signal from an electronic speed sensor. The valve when open allows a vacuum signal to be applied to the throttle lever actuator as long as the present engine speed is exceeded.

3. Electronic Speed Sensor - Mounted separately from the solenoid vacuum control valve, this switching device monitors engine speed at the distributor and supplies a continuous electrical signal to the solenoid vacuum control valve as long as the preset engine speed is exceeded.

CHECKING AND ADJUSTING TRC SYSTEM — Check hoses for cracking, abrasion, or deterioration and replace as necessary. Check for shorted or broken wires and ensure that electrical connectors are fully engaged at the distributor, speed switch and vacuum solenoid. Check system function for proper operation and adjust as necessary.

How To Check The TRC System

1. Connect precision tachometer (capable of resolving 10 rpm) to the distributor "TACH" terminal.

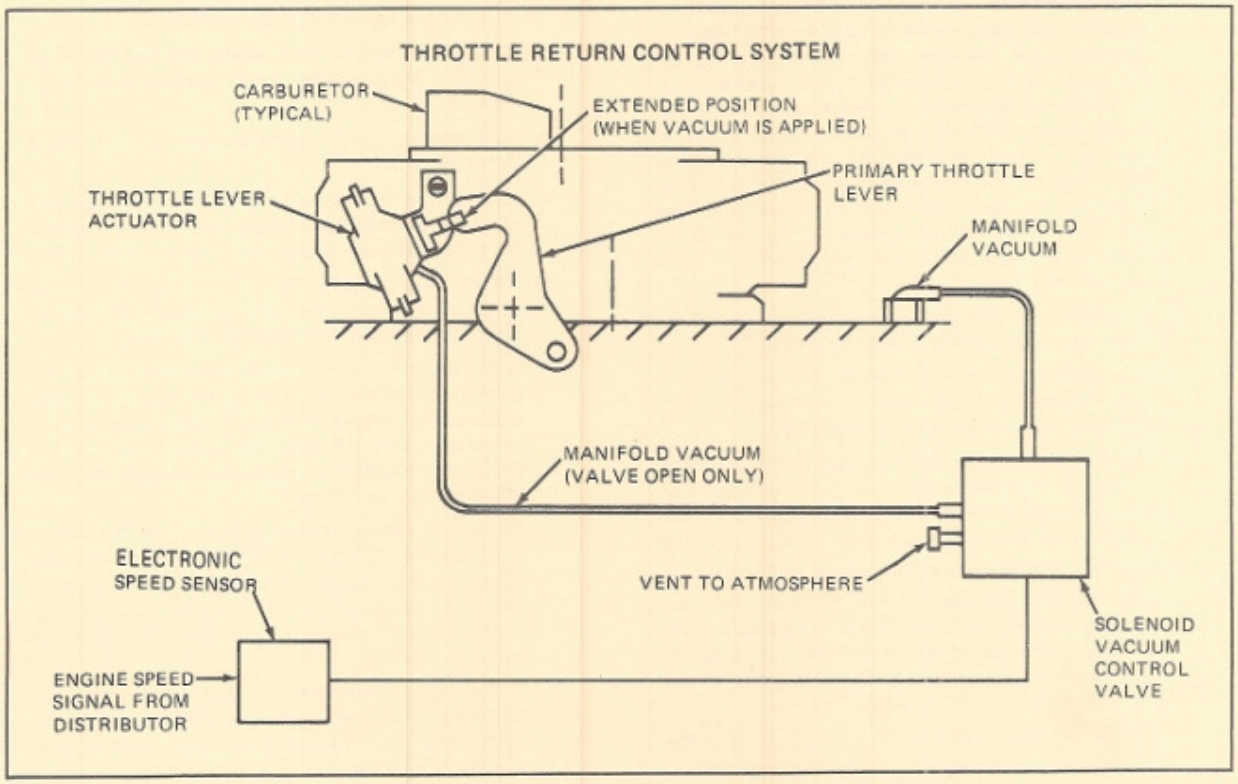


Figure 62 — Throttle Return Control System

ENGINE EMISSION CONTROLS (Continued)

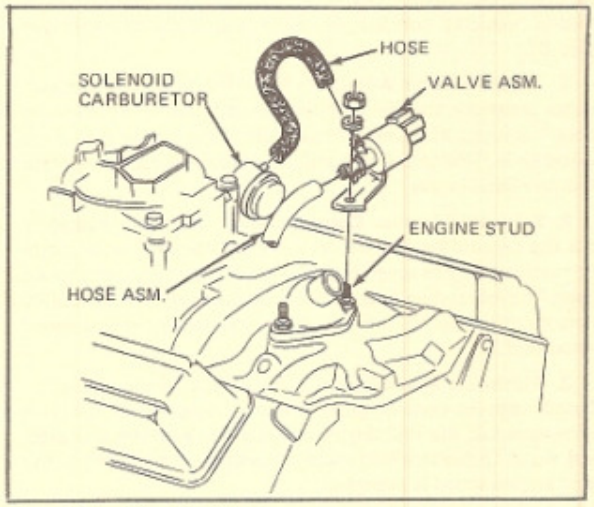


Figure 63 – Throttle Valve

2. Start engine and advance throttle to indicated 1890 rpm. Throttle lever actuator should be extended at this speed.

3. Reduce throttle opening to indicated 1700 rpm. Throttle lever actuator should be retracted at this speed.

4. If the throttle lever actuator operates outside of the 1700 to 1890 rpm limits, the speed switch is out of calibration and should be replaced.

5. If the actuator does not operate at any speed, proceed with the following steps:

a. With a voltmeter, check for voltage at the vacuum solenoid and speed switch. This is accomplished by connecting the negative probe of the voltmeter to the engine "ground" and inserting the positive probe in the connector cavity of the voltage source wire. A voltage of 12-14 volts should be measured at this terminal on both the solenoid and speed switch. When making this measurement, it is not necessary to unplug the connector from its component. The voltmeter probe can be inserted in the connector body on the wire side of the connector to contact the metal terminal.

b. If voltage is present at one device and not the other, repair the engine wiring harness as required.

c. If voltage is not present at either device, check the engine harness connections at the distributor and/or bulkhead connector. Repair as required.

d. If the proper voltage exists at each device, to check for proper solenoid valve operation "ground" the solenoid-to-switch connecting wire terminal at the solenoid connector using a jumper wire. The throttle lever actuator should extend (engine running).

e. If it does not extend, remove the hose from the solenoid side port that connects to the actuator hose. Visually check the orifice in this port for plugging. Clear the orifice as required. If not plugged, replace the solenoid.

f. If the actuator extends in Step d, ground the solenoid-to-switch wire terminal at the speed switch. If it does not extend, repair the wire connecting the speed switch and solenoid. If it does extend, check the speed switch ground wire for "ground" - it should read O volts when checked with a voltmeter with the engine running; check the speed switch-to-distributor wire for proper connection. With both the ground and distributor wires properly connected and if the actuator does not extend when operating above 1890 rpm, replace the speed switch.

6. If the actuator remains extended at all speeds, proceed as with following steps:

a. Remove connector from vacuum solenoid.

b. If actuator remains extended, check the orifice in the solenoid side port for plugging. If plugged, clear and reconnect system and recheck. If the actuator again remains extended, remove the solenoid connector. If the actuator does not retract, replace the vacuum solenoid.

c. If the actuator retracts with the solenoid connector off, reconnect and then remove the speed switch connector. If the actuator retracts, replace the speed switch. But if the actuator does not retract, the solenoid-to-switch wire is shorted to ground in the wiring harness. Repair as required.

Throttle Lever Actuator - Checking Procedure

1. Disconnect valve to actuator hose at valve and connect to an external vacuum source equipped with a vacuum gauge.
2. Apply 20 in. Hg vacuum to the actuator and seal off the vacuum source. If the vacuum gauge reading drops, then the actuator is leaking and must be replaced.
3. To check the actuator for proper operation:

a. Check the throttle lever, shaft, and linkage to be sure that they operate freely without binding or sticking.

b. Start engine and run until warmed up and idle is stable. Note idle rpm.

c. Apply 20 in. Hg vacuum to the actuator. Manually open the throttle slightly and allow to close against the extended actuator plunger. Note the engine rpm.

d. Release and reapply 20 in. Hg vacuum to the actuator and note the rpm to which the engine speed increases (do not assist the actuator).

e. If the rpm obtained in step d, is not within 150 rpm of that obtained in step c, then the actuator plunger may be binding due to dirt, corrosion, varnish, etc., or the actuator diaphragm may be too weak. If binding is not indicated or cannot be corrected, then the actuator must be replaced.

f. Release the vacuum from the actuator and the engine speed should return to within 50 rpm of the idle speed noted in step 2. If it does not, the plunger may be binding due to dirt, corrosion, varnish, etc. If the problem cannot be corrected, the actuator must be replaced.

g. If the engine rpm noted in step 3 is not within the specified TRC speed range, the TRC actuator must be adjusted. See Throttle Lever Actuator Adjusting Procedure page xx.

ENGINE SUB-FRAME REMOVAL

ENGINE & SUB-FRAME REMOVAL (Step-by-step illustrations are shown on the following pages.)

1. With the use of a hyrdaulic jack and two (2) 5-ton jackstands, raise the front of the vehicle as shown in figure 61.
2. Remove the front wheels (see figure 62).
3. Remove the front fiberglass wheel liners (see figure 63).
4. Remove the bumper and dressout panels (figure 64).
5. Unbolt the front bumper and remove (figure 64).
6. Remove rivets fastening the fiberglass cover to the hinge plates (figure 65).
7. Remove the grille (figure 66).
8. Remove the front body panel (figure 67).
9. Remove the rivets and sealant securing the front body panel (figure 68).
10. Remove the electrical headlight connections (figure 68).
11. Remove air inlet hose (figure 69).
12. Remove the air deflector (on pre-1980 models only). (See figure 70). NOTE: Before removing deflector, score along body seam to minimize damage to the paint and fiberglass.
13. Lower air deflector (see figure 70).
14. Remove brake lines.
15. Remove transmission shift cable (see figure 71).
16. Remove speedometer cable (figure 71).
17. Remove oil pressure sending unit (figure 71).
18. Remove engine coolant sensor (figure 72).
19. Remove power steering hose clamps at pump (figure 72).
20. Remove power sreering gearbox hoses (figure 73). NOTE: Remove all hose and wiring retaining clamps.
21. Remove engine coolant overflow bottle (figure 73).
22. Disconnect upper radiator plate and hose clamp (figure 73). NOTE: On pre-1981 models, remove the lower radiator mounting bolts.
23. Disconnect transmission cooler lines (figure 74).
24. Disconnect starter motor witing.
25. Remove fuel line hose clamps near starter)figure 75).
26. Disconnect exhaust pipes (at header tube) (figure 76).
27. Remove air conditioner pressure lines (figure 76).
28. Remove air conditioner condensor lines.
29. Remove heater hoses and clamps (figure 76).
30. Remove air conditioner condensor motor wiring and thermo-vacuum switch wiring (figure 77).
31. Remove throttle linkage and cable (make sure cable is completely free of engine and frame) (figure 78).
32. Remove distributor wiring.
33. Disconnect emission controls air line (figure 78).
34. Remove carburetor vacuum line.
35. Disconnect alternator and starter wiring. NOTE: After this step, all auxiliary equipment should be removed. You are now ready to remove the engine sub-frame assembly. The sequence is as follows:
36. Position the 6000-lb. forklift at front of vehicle. This should be done before any frame bolts are removed (figure 80).
37. Remove the rear sub-frame bolts, three at each side (see figure 81).
38. Disconnect steering clip spline after marking for correct alignment (figure 83).
39. Lower sub-frame with forklift (after removing front frame bolts (figure 84) and position on 5-ton jackstands (see figure 85).
40. To reinstall sub-frame and engine, reverse above procedure.

RE-INSTALLATION NOTES:

A. When re-installing sub-frame assembly, step 38 (steering slip spline) must align exactly as frame is brought into alignment with frame bolts and bolt holes (see steps 37, and 36).

B. When re-installing exhaust header tube (figure 76), take care not to bind pipes since this will allow cool air to reach exhaust valves causing them to become damaged.

C. After the Revcon is complerely reassembled, re-torque all fittings for oil, transmission, vacuum lines — after topping off all fluid levels, run engine to verify that there are no oil leaks.

D. Also re-torque all frame, wheel, and bumper mount bolts. This is a must to insure that during reassembly the frame was properly aligned.

E. A test drive of your vehicle is required after any major work such as this — to insure vehicle safety.

ENGINE & SUB-FRAME REMOVAL (Continued)

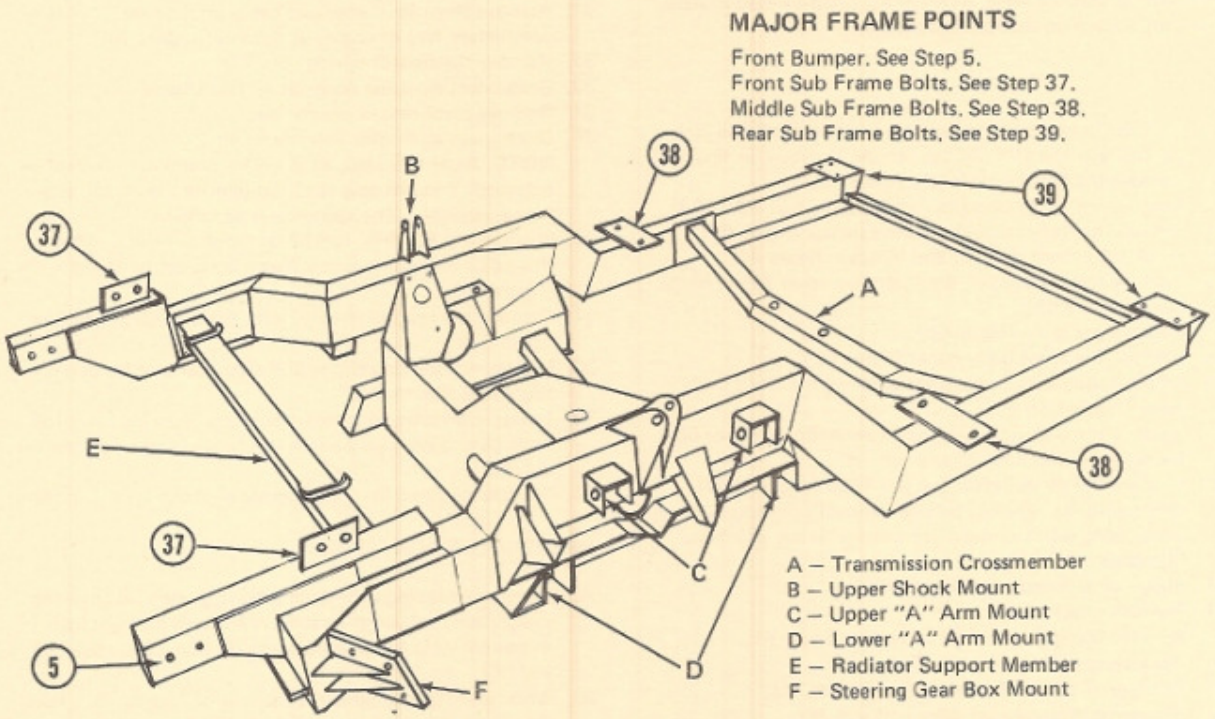


Figure 64 – Revcon Engine and Sub Frame Removal

ENGINE & SUB FRAME REMOVAL

Your Revcon must be serviced with only the proper tools and techniques as described in this service manual. This is most important in the sub frame removal. Due to the construction of your Revcon, the removal of the sub frame can only be accomplished with the use of a 6000-lb. forklift with 7'0" minimum blades, 3'0" wide spacing. Without this piece of equipment and an operator for the forklift, do not attempt to remove the sub frame. Contact your nearest Revcon Service Outlet for further information and locations to have this work performed.

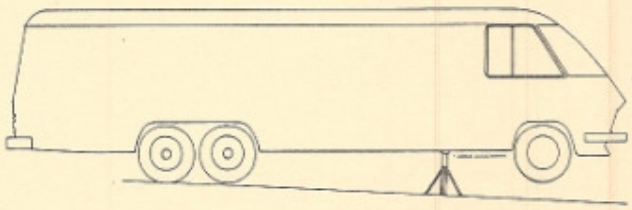


Figure XX – Jacking Vehicle: With a hydraulic jack placed at the forward crossmember of the sub-frame, elevate the vehicle so the height from the floor to the bottom of the bumper is 3'6", Place a rated 5-ton jackstand at either side, 6" between the sub-frame at the frame rails.

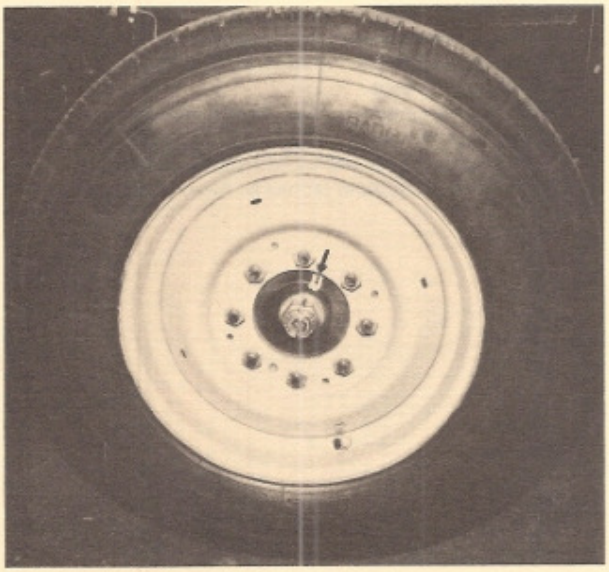


Figure 65 – Front Wheels: Remove the front wheels and tires to gain access for the removal of the wheel liners. Be sure to mark the wheel and hub before removing so they will remain in balance after re-installation. Also, be sure to mark the wheels as to either right or left.

ENGINE & SUB-FRAME REMOVAL (Continued)

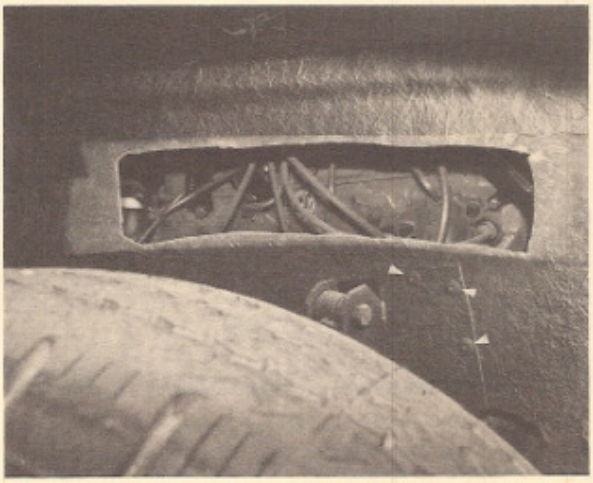


Figure 66 – Front Wheel Liners: The front wheel liners are sectional and divided into three pieces – forward, center, and rear. The liners are coated with a tar-based undercoat and should be resealed in various places for protection, when the liners are re-installed. The liners are fastened into position with approximately 28 30-AD66 BSLF pop rivets, .251-.357 grip length, .192-.196 hole diameter.

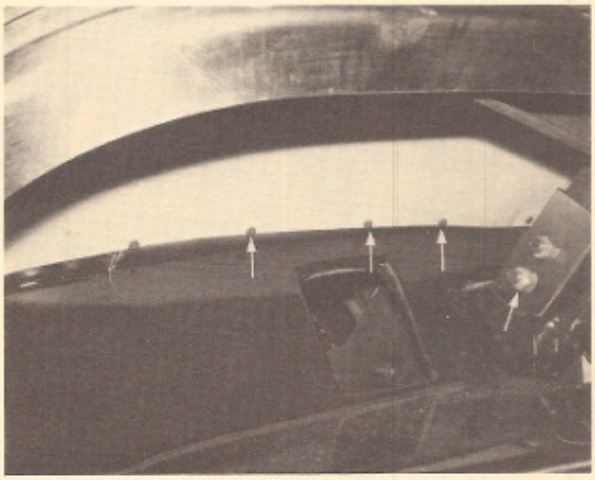


Figure 67 – Bumper & Dressout: The bumper dressout panel extends from the main body to the inner edge of the bumper top surface. It has three sections and is fastened to the flange of the main body panel below the bumper. Remove approximately 26 Phillips-head self-tapping screws.

NOTE: The dressout panel does not need to be removed from the bumper.

Figure 64 – Front Bumper Removal: The front bumper is bolted to the sub-frame with 4 large bolts. Remove the four 7/16" diameter bolts, flat washers, lockwashers, and nuts. Be sure to have several men ready to hold the bumper while it is being slid away from the body. The dressout should remain attached, forward at the bumper.

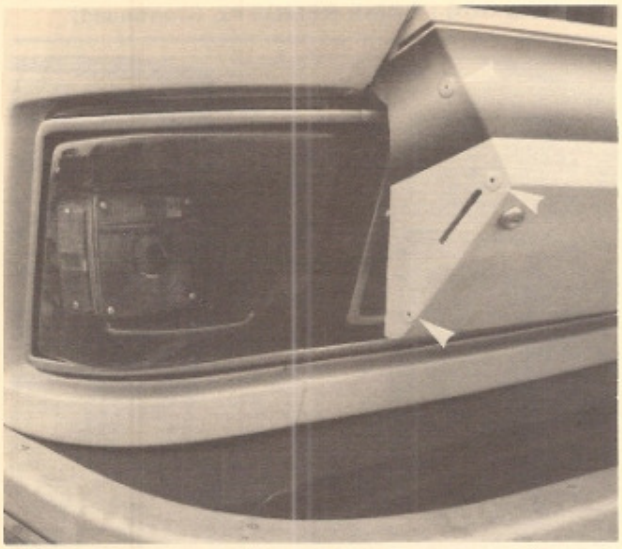


Figure 68 – Exterior Engine Access Cover Removal: Remove the rivets that fasten the fiberglass cover to the hinge plate at either side. There are six (6) 30-AD66 BSLF pop rivets, .251-.375 grip length, .192-.196 hole diameter. These pop rivets may be drilled out.

Figure 69 – Grille Removal: Remove 13 No. 6 pan head Phillips, black-painted heads. Screw locations include 3 at each end, 3 at the center, and 4 across the top.

ENGINE & SUB-FRAME REMOVAL (Continued)

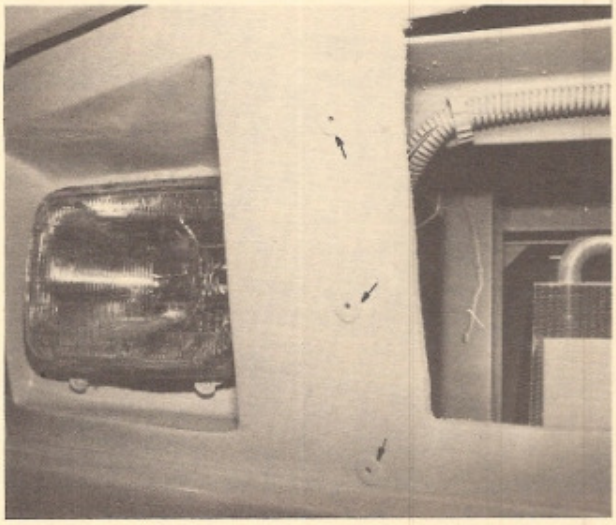


Figure 70 – Main Front Body Panel Removal: After the simulated grille has been removed, notice 3 rivets at each side running vertical at the inner structure upright support. Remove these 6 AD66BS pop rivets, .126-.250 grip length, .192-.196 hole diameter.

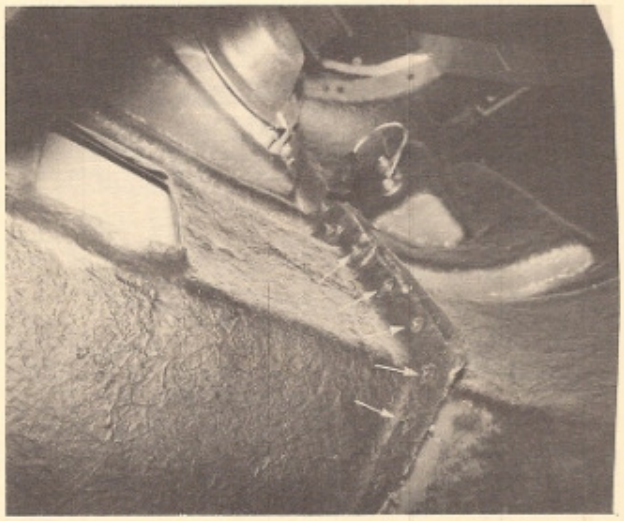


Figure 71 – Main Front Body Panel Removal: The body panel is fastened at the two uprights at the upper structure, 6 rivets on the face of the panel. There also are approximately 26 rivets that fasten the panel at the interface of the left and right fenders. Silopreme sealant also is used to secure these body panels together with the aid of the rivets. Care must be taken when separating the body panels so as not to crack the fiberglass. A large flat blade screwdriver or putty knife will be necessary to pry these parts apart. Rivet size and type – AD66 BS pop rivet, .126-.250 grip length, .192-.196 hole diameter. During assembly, 3/16" bolts may be used to fasten the flanges together. Large diameter flat washers should be used with the bolts.

Figure 71 – Electrical Headlight Connection: Before the main front body panel can be removed, the electrical plug connection must be removed from the headlights. The 3-prong connector pulls apart from the headlight.

Figure 72 – Air Inlet Hose Removal: Remove the 4½"-diameter air inlet hose that is fastened to the back side of the firewall. With the inlet hose disconnected, you can begin removal of the upper air deflector. Starting with the 1981 models, the hose can be disconnected at the grille.

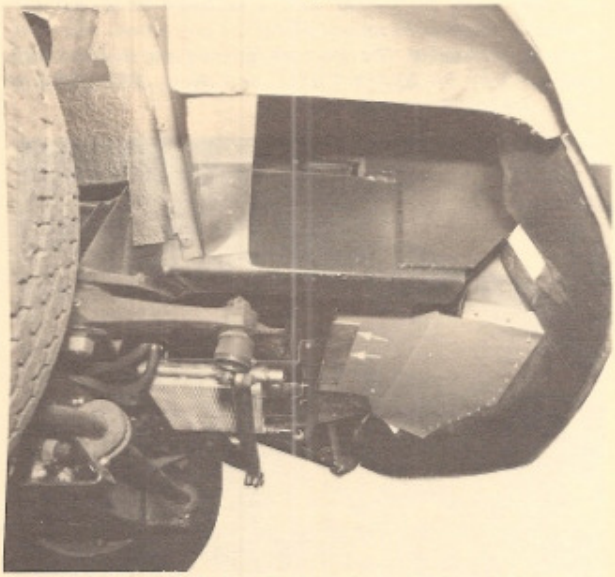


Figure 73 – Upper Air Deflector Removal: Remove the four equally spaced rivets that fasten the air deflector to the crossmember that supports the top side of the radiator. These are 4 AD45 H pop rivets, .251-.312 grip length, .129-.133 hole diameter.

NOTE: Starting with the 1981 models, no air defelctor is used.

Lower Air Deflector Removal: Remove the lower air deflector by drilling out the rivets that fasten it to the crossmember that supports the radiator. These are AD45 H pop rivets, .251-.321 grip length, .129-.321 grip length, .129-.133 hole diameter.

Brake Lines: Disconnect the three brake lines at the 1/2" diameter nuts, located at the front left wheel arch. Be sure to have some container to catch the brake fluid.

ENGINE & SUB-FRAME REMOVAL (Continued)

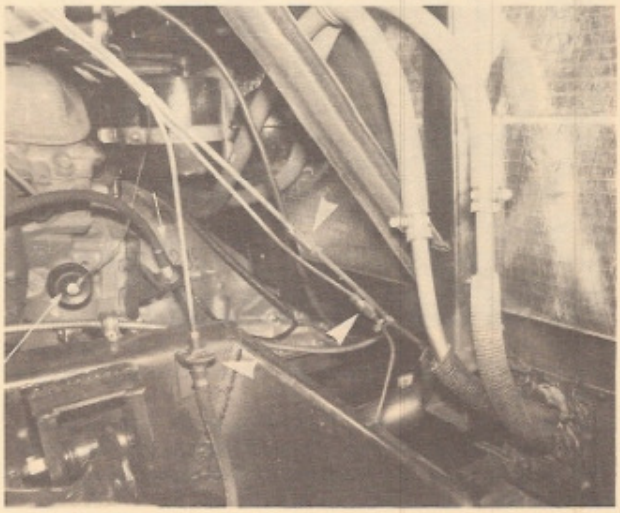


Figure 74 – Transmission Shift Cable Removal: The transmission shift cable must be removed by disconnecting at the shift lever near the base of the bellhousing. Remove the 7/16" nut from the stud. Also, remove the 15/16" nut from the shift cable support bracket; the cable should remove easily.
Speedometer Cable Removal: Remove the speedometer cable by unscrewing the 1"-diameter thumb nut. The cable is located at the extreme rear of the transmission near the transfer case.
Oil Pressure Sending Unit: Disconnect the oil pressure sending unit by removing the wire from the terminal. The sending unit is located at the lower left side of the engine.

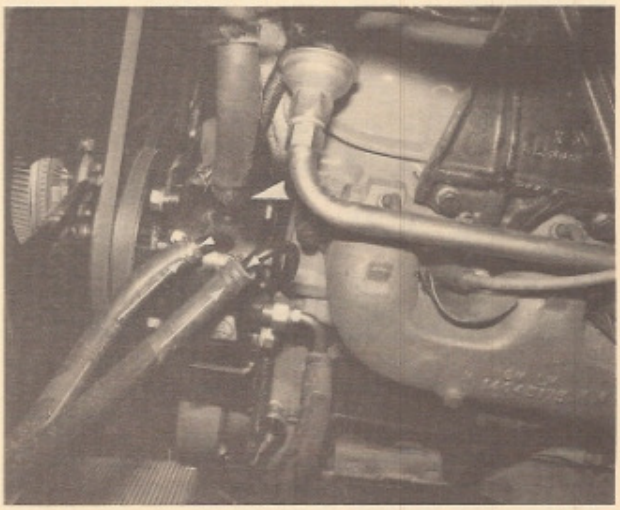


Figure 75 – Engine Coolant Sender Disconnect: Disconnect the engine coolant sensor by removing the wire at the terminal. The sensor is located at the center and left side of the engine.
Power Steering Pump Hose Disconnect: Remove three (3) 3/8" I.D. steering pump hoses, being sure to mark each hose and each connector with masking tape so there will be no confusion for re-installation. Also, remove the large 1½" O.D. hose that leads to the filler reservoir. The pump is located forward of the engine near the fan shroud.

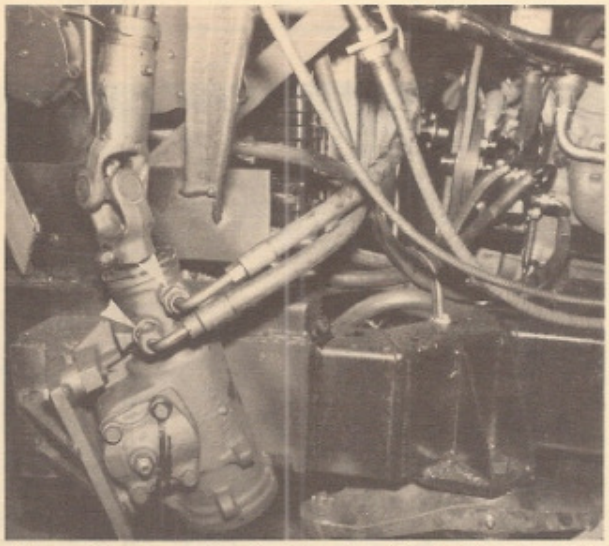


Figure 76 – Power Steering Gear Box Hoses: Disconnect the two power steering fluid hoses at the elbow stems. Be sure to mark each line with tape as to upper or lower.
Engine Coolant Overflow Disconnect: Remove the engine coolant line by loosening the hose clamp. The coolant recovery line is located at the top right side of the radiator.
Radiator Mounting Disconnect: The radiator must be unbolted at the upper radiator mounting crossmember. Remove the 1/4"-diameter bolt located either end, top side of the radiator. The bottom of the radiator rests within a saddle-type mount on the lower crossmember.

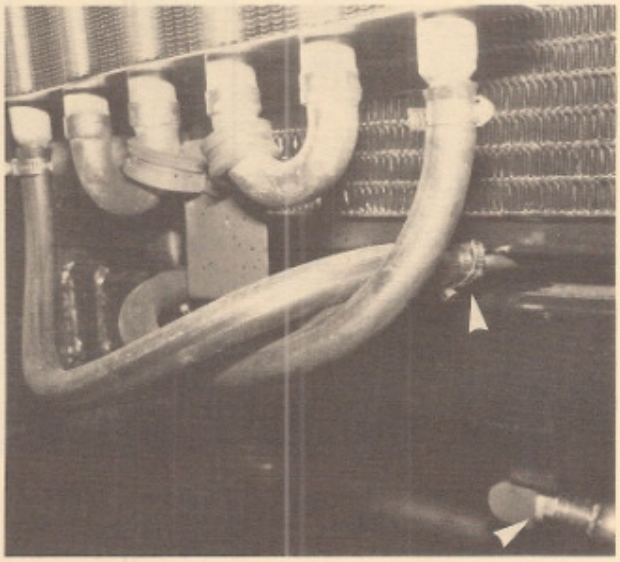


Figure 77 – Oil Lines Disconnect: Disconnect the 2 oil cooler lines at the inlet located at the base of the radiator.
Ground Cable Disconnect: Disconnect the ground cable lead from the battery to the sub-frame. The large red cable is located at the right side bumper mount on the structure.
Transmission Fluid Coolant Lines: Disconnect cooler lines by loosening the 2 hose clamps located on the bottom of the cooler.

ENGINE & SUB-FRAME REMOVAL (Continued)

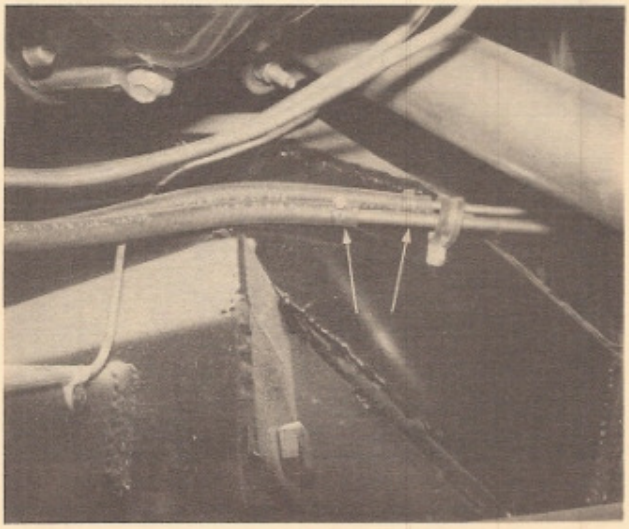


Figure 78 – Fuel Lines Disconnect: Disconnect the fuel lines by loosening the hose clamps. Be sure to mark the lines with masking tape. The fuel lines are located near the starter motor, fastened to the frame rail.

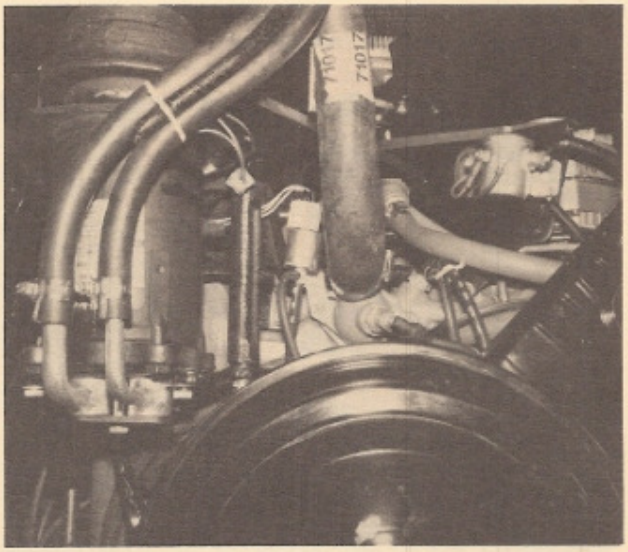


Figure 79 – Exhaust Pipe Disconnect: Disconnect both right and left side exhaust pipes by loosening the "U" bolt connectors at the right side forward of the muffler and the left side near the transfer case.
Air Conditioning Lines Removal: Remove the air conditioning high and low pressure lines. One 5/8" line is located at left; one 1/2" diameter line is located inboard. Be sure to mark the lines with masking tape before removing. Also, plug the inlets so no contaminate can enter the system. Access to the lines is by the removal of the interior engine access cover; pressure lines are located on left side of engine.

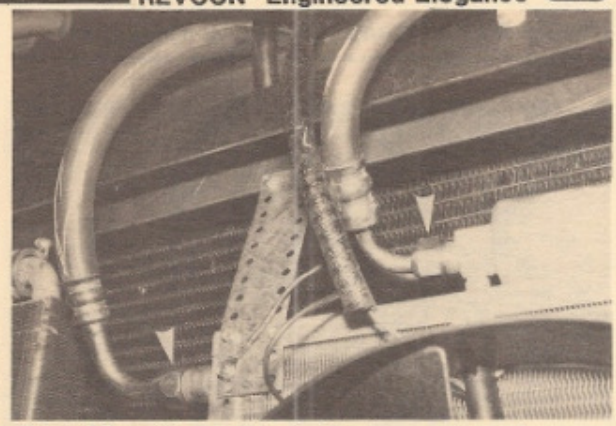


Figure 80 – Air Conditioning Condenser Lines: Disconnect the coolant lines by removing the 2 hoses located at the right side of the condenser.
Heater Hose Disconnect: Remove two (2) 5/8" diameter hoses by loosening the hose clamps. Be sure to mark each hose with masking tape. The hoses are located above the right side valve cover.
Air Conditioning Condenser Motor Wiring & Thermo Vacuum Switch Wiring: Disconnect the wiring at the air conditioning condenser motor; this includes the ground wire, the blue and black wires. Starting late 1980, the wire colors are green and black. Also, disconnect the wiring to the thermo vacuum switch; these include the yellow and pink wire leads. Starting in late 1980, the wire colors are pink, black, and yellow.

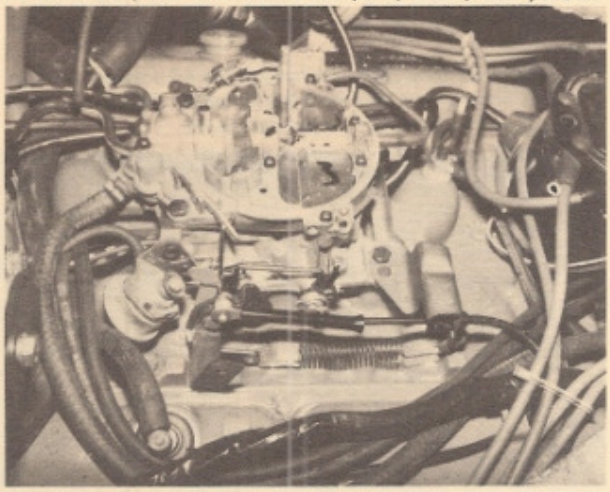


Figure 81 – Throttle Disconnect: Disconnect the throttle linkage by removing the spring clip-type retainer, located at dash-pot. Then completely remove cable from engine and frame.
Distributor Wiring Disconnect: Disconnect the pink and white wire leads located on the left side of the distributor.
Emission Lines Removal: Disconnect the emission air lines that connect at the "T" fitting.
Vacuum Air Lines Removal: Remove the air hoses that connect to the base of the carburetor.
Alternator & Starter Wire Disconnect: Disconnect the brown wire and the red wire leads that plug into the alternator. Also, disconnect the large red lead at the back of the alternator. Disconnect the brown wire lead to the starter solenoid. Starting late 1980 models, this wire is purple. Also, disconnect the red lead from the battery at the solenoid.

ENGINE & SUB-FRAME REMOVAL (Continued)

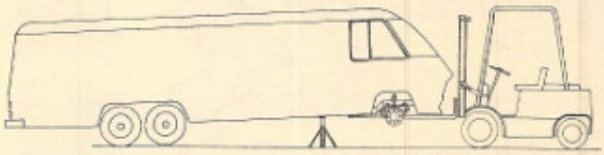


Figure 82 – Auxiliary Equipment Removal: If there are any auxiliary items remaining, these should be removed prior to the placement of a 6000-lb. forklift at front of vehicle. Do not remove any frame bolts until the forklift is in position.

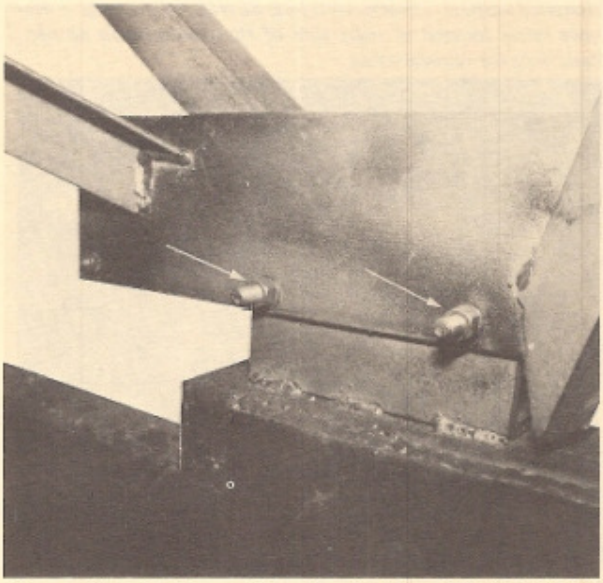


Figure 83 – Sub-Frame Mounting Positions: There are three mounting positions located on both right and left frame rails. The first position is located forward near the bumper mount at the upright of the upper structure. Remove two (2) 9/16" diameter nuts from both sides, but do not remove bolts at this time. Be sure when you begin this final phase of removing the mounting bolts that you have a way of bracing the sub-frame.

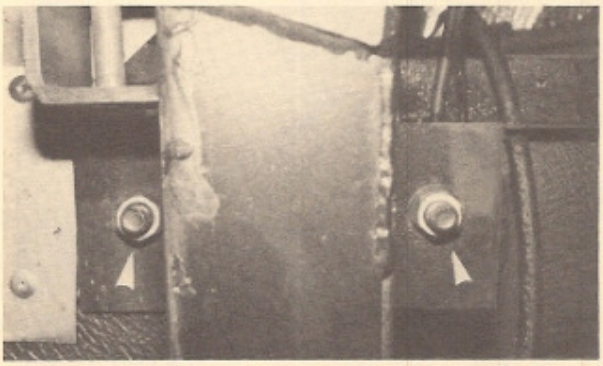


Figure 84 – Sub-Frame Mounting Position (2): The second mounting position is located on the frame rails, behind the raised deck at the lower main frame. Remove two(2) 5/8" diameter bolts at both sides.

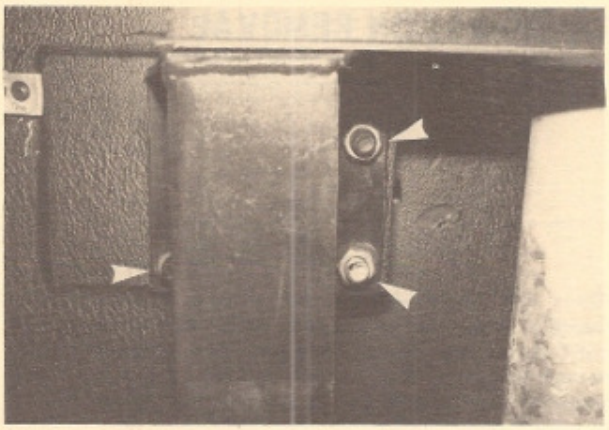


Figure 85 – Sub-Frame Mounting Position (3): The third mounting position is located at the extreme end of the sub-frame at the frame rail. Remove three (3) 5/8" diameter bolts on both sides.

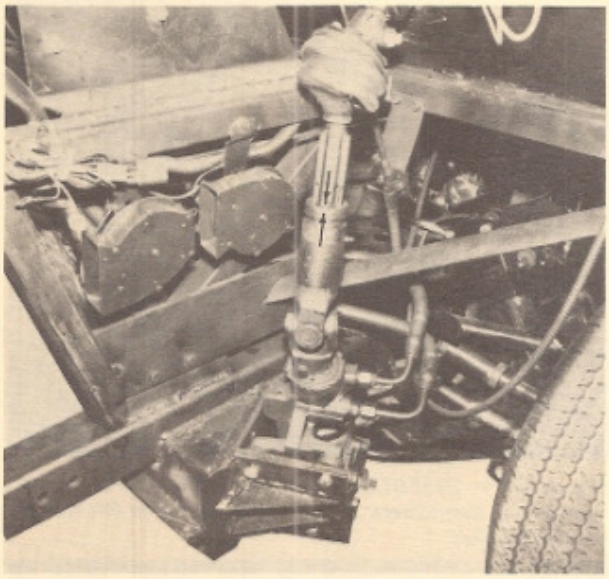


Figure 86 – Steering Slip Spline Disconnect: Carefully ease apart the steering slip spline as the sub-frame is being carefully lowered with a forklift. Be sure to mark the slip spline for correct alignment when re-installing the sub-frame.

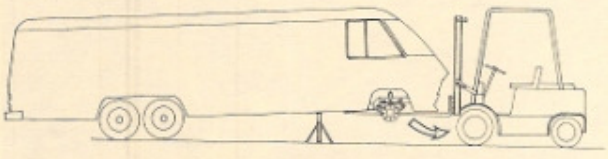


Figure 87 –Sub-Frame Lowered From Vehicle: The sub-frame should be carefully lowered with a 6000-pound minimum capacity forklift, The blades should be a minimum of 7'0" and spaced 3'0" center to center. As the sub-frame is being lowered be sure all cables, hoses, and fixtures are free. Continue to watch the steering slip spline and ease apart. With the sub-frame in a slightly lowered position, gradually ease out from beneath the raised vehicle.