ALL MODELS

American Motors
Chrysler Corp.
Ford Motor Co.
General Motors

LUBRICATION

SERVICE INTERVALS

American Motors – Check fluid level every 5,000 miles.

Chrysler Corp. – Check fluid level every oil change.

Ford Motor Co. – Check fluid level every 5,000 miles.

General Motors – Check fluid level every 6 months or 7,500 miles.

CHECKING FLUID LEVEL

American Motors & General Motors – Check fluid level with engine stopped and fluid at normal operating temperature (about 170°F). Fluid level must be to full mark on dipstick.

Chrysler Corp. – Check fluid level with engine stopped and fluid at ambient temperature (70-80°F). Fluid level must be to "FULL COLD" mark on dipstick.

Ford Motor Co. – With fluid at normal operating temperature and system properly bled, shut off engine. Fluid level on dipstick must show on cross hatching between bottom of stick and full mark. Do not overfill.

Recommended Fluid Type

Application	Fluid Type
American Motors	Dexron Auto. Trans. Fluid
Chrysler Corp.	①Power Steering Fluid (2084329)
Ford Motor Co.	Power Steering Fluid (D2AZ-19582-A)
General Motors	②Power Steering Fluid (1050017)

① – Do not use automatic transmission fluid.

② – Automatic transmission fluid (Dexron Type) may be used in an emergency.

REFILLING & BLEEDING SYSTEM

American Motors & General Motors – Turn wheels to full left position and add power steering fluid to cold mark on dipstick. Start engine and run at fast idle, check fluid level and add as necessary to cold mark on dipstick. Bleed system by turning wheel from side to side without hitting stops. Maintain fluid level just above pump housing. Fluid with air in it will have a light tan or red appearance. All air must be eliminated before normal steering action can be obtained. Return wheels to center position and operate engine for another 2-3 minutes. Road test vehicle and recheck fluid level. Level must be at hot mark on dipstick after fluid is at normal operating temperature.

Chrysler Corp. – Fill pump reservoir with power steering fluid, start engine and check for leaks. Bleed system by turning wheels from stop to stop several times. Shut off engine and recheck fluid level.

Ford Motor Co. – Disconnect coil wire and fill pump reservoir with fluid. Crank engine with starter and add fluid until level remains constant. While cranking engine, turn steering wheel about 30° to each side and recheck fluid level. Connect coil wire, start engine and allow it to run for several minutes. Rotate steering wheel from stop to stop several times, stop engine and recheck fluid level.

PURGING SYSTEM (FORD MOTOR CO. ONLY)

Air trapped in power steering system which causes a whine-type noise between 20-45 MPH on light acceleration, can be removed by using a power steering pump air evacuator assembly (Devac Tool) or by the Vacuum Fill Process.

Devac System – Fabricate an air evacuator tool as shown in *Fig. 1*. Make sure that fluid level is correct, raise front of vehicle so wheels are off ground and support. Remove coil wire, crank engine and recheck fluid level while turning wheels from side to side. Replace coil wire, insert tool into pump filler and apply vacuum from vacuum pump. DO NOT use engine vacuum. Maintain for 3 minutes with engine idling, recheck fluid level, and apply vacuum again. Cycle steering lock-to-lock every 30 seconds for 5 minutes. Remove tool, check fluid level and add if necessary, lower car.

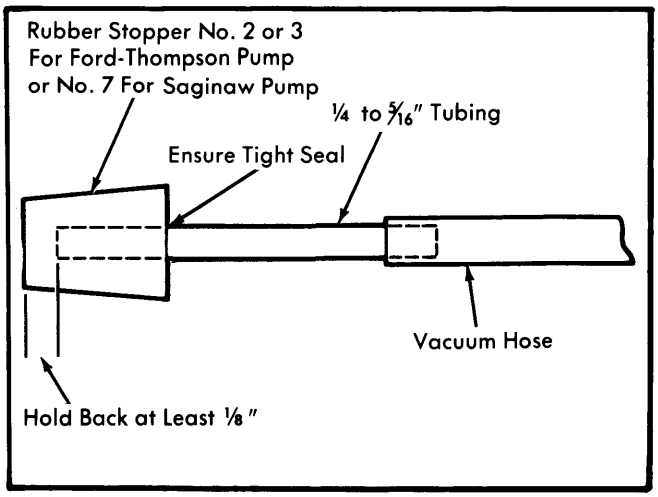

Fig. 1 Air Evacuator Tool

Vacuum Fill Process – 1) This procedure is used primarily for vehicles that have hydro-boost brake system. System should be used whenever pump, gear, or hydro-boost is removed, serviced and reinstalled into hydraulic system. To perform this operation, assemble vacuum fill system as shown in *Fig. 2*. On Saginaw pumps, a modified cap should be constructed as shown. On Ford pumps, the air evacuation tool may be used for the filler cap. In place of vacuum pump, intake manifold vacuum source from another vehicle may be used.

2) Install system on vehicle and tighten all connections. Close all valves and fill remote reservoir with more fluid than is required to fill system. Open valve no. 1 and allow fluid to drain through filler cap, then close valve. Install cap on filler neck. Open valve no. 2 and 3, start vacuum pump and operate until a gauge reading of 25-30 inches of mercury is obtained. Close valve no. 3 and shut off vacuum pump. If vacuum gauge drops more than 1" in 30 seconds, a leak in system or filler system exists which must be repaired.

ALL MODELS (Cont.)

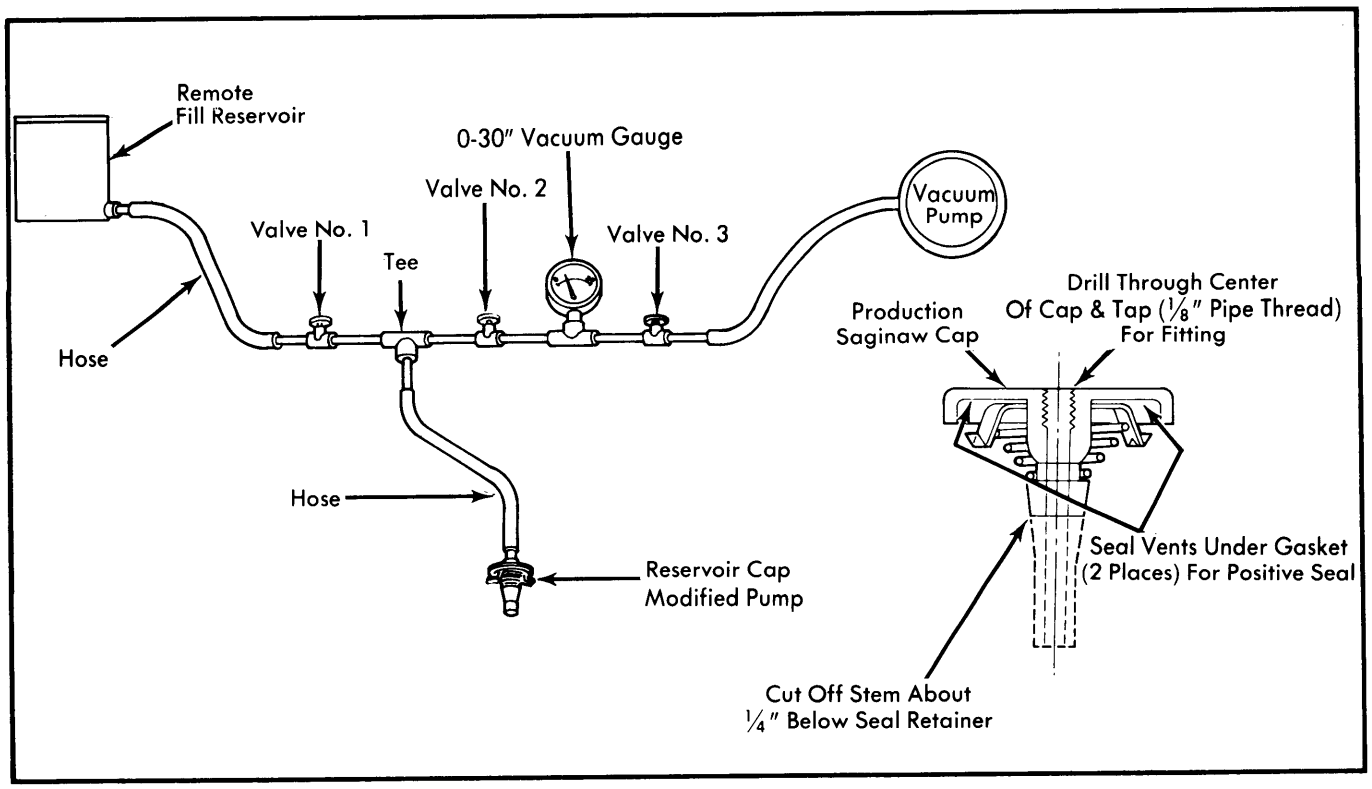

Fig. 2 Vacuum Fill System

3) Restart vacuum pump and open valve no. 3. Operate pump until 25-30" of vacuum is obtained, then close valve no. 2 and shut off vacuum pump. Open valve no. 1 to fill system with fluid. Remote fill reservoir should be higher than steering pump. When fluid stops draining, close valve no. 1 and remove cap from steering pump. Adjust fluid level in pump noting that there will be a slight drop in level when engine is first started and steering cycled. Operate engine at idle for 15 minutes and inspect for leaks. If some air is noted in system, remove by using Devac procedure.

SERVICE

BELT TENSION

Tension (Lbs.) Using Strand Tension Gauge

Application	New Belt	Used Belt
American Motors	125-155	90-115
Chrysler Corp.	120	70
Ford Motor Co.	120-160	90-120
General Motors		
Buick	155	90
Cadillac	125	90
Chevrolet	125	90
Oldsmobile		
3/16" Belt	80	50
3/8" Belt	140	70
3/16" Belt	165	90
3/8" Cogged Belt		60
Pontiac		
V6 & V8	135-145	80-100
L4	120-130	75-80

TROUBLE SHOOTING

RATTLE OR CHUCKLE NOISE

Loose steering gear mountings. Worn steering linkage. Loose pitman shaft. Incorrect overcenter adjustment. Pressure hose touching body or frame.

SQUAWK IN GEAR WHEN TURNING

Worn spool valve damper "O" ring.

CHIRP OR SQUEAL AT FULL WHEEL TRAVEL

Loose drive belt tension.

WHINE OR GROWL NOISES

Low fluid level. Hose restriction or kink. Pressure hose touching body or frame. Worn or damaged pump.

GROANING NOISE

Low fluid level. Air in system. Worn or damaged pump.

POOR STEERING RETURN

Binding in steering column or linkage. Incorrect tire pressure. Incorrect wheel alignment. Power cylinder damaged. Defective spool valve. Steering gear damaged or adjusted too tight. Bent power cylinder rod (non-integral steering only). Hose restriction or kink.

ALL MODELS (Cont.)

STEERING WANDER

Incorrect tire pressure. Incorrect wheel bearing adjustment. Defective valve body. Incorrect steering gear adjustment. Incorrect wheel alignment. Loose steering gear mountings.

HARD STEERING OR LACK OF ASSIST

Incorrect tire pressure. Loose drive belt tension. Low fluid level. Sticking flow control valve. Low pump pressure. Internal steering gear leakage. Steering column misalignment. Incorrect wheel alignment. Hose restriction or kink.

KICKBACK OR LOOSE STEERING

Air in system. Loose steering gear mountings. Loose flexible coupling. Steering linkage worn. Incorrect wheel bearing adjustment. Worn poppet valve. Excessive overcenter lash. Loose steering gear preload.

STEERING WHEEL JERKS

Low fluid level. Loose drive belt tension. Low pump pressure. Steering linkage hitting chassis or engine at turn wheel travel.

LOW PUMP PRESSURE

Defective flow control valve. Defective pressure plate. Worn cam ring. Scored pressure plate, thrust plate or rotor. Defective or mis-assembled vanes (vane type pump).

TESTING

PRESSURE TEST

All Except Ford Motor Co. – 1) With belt tension correct, disconnect power steering pump pressure hose, keeping hose end raised to prevent excess fluid loss. Connect pressure hose of power steering pressure gauge to power steering pump fitting. Connect a second pressure hose from valve side of tester to steering gear inlet. Open valve fully and run engine until fluid obtains normal operating temperature. Check fluid level and add fluid if necessary.

2) On all models except Chrysler Corp., note pressure reading with valve open and engine idling. This pressure should be 80-125 psi. If pressure is in excess of 200 psi, check hoses for restrictions and poppet valve (in gear) for proper assembly. On all models, close tester valve fully and re-open three times. Record highest pressure noted each time. **CAUTION** – *Do not hold valve closed for more than five seconds as pump damage may result.* If pressures are within specifications and range of readings is within 50 psi, pump is operating satisfactory.

3) If pressures recorded are high, but do not repeat within 50 psi, flow control valve is sticking. If pump performance is to specifications, turn steering wheel to both stops with valve open and note highest pressures. Compare readings with maximum pump output. **CAUTION** – *Do not hold wheel against stops over 5 seconds as pump may be damaged.* If pump output cannot be met in either side of gear, gear is leaking internally. Shut off engine and remove tester. Reconnect all hoses and recheck fluid level.

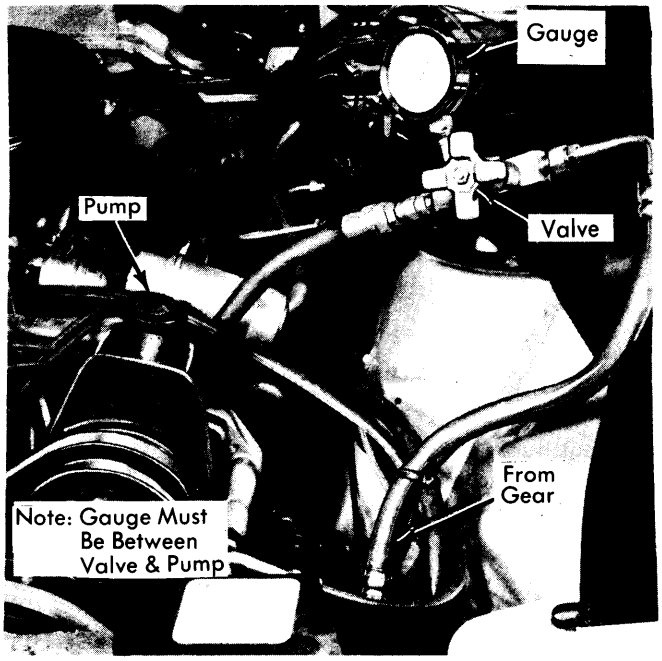

Fig. 3 Power Steering Pressure Test (All Exc. Ford Motor Co.)

Ford Motor Co. – Pump flow and pressure tests are accomplished using a suitable flow/pressure analyzer (970-001) to determine system back pressure, pump flow, and internal leakage in the steering gear, control valve and cylinder. Prior to making these tests, assure that tire pressure, belt tension and fluid levels are proper. Check entire system for damage and note pulley size and pump model for proper vehicle application. Model identification labels are attached to the reservoir body with adhesive. HBC (Ford/TRW) pumps will have a suffix giving pump model, while HBA pumps (Saginaw) will only indicate the letters GS, GR, or GT on the tag. Reservoir must be kept full and at normal operating temperature (165-175° F) during testing. Using *Figs. 4 through 7,* attach tester and proceed as follows:

1) With engine idling, note flow (A) at approximately 2 gallons per minute and pressure (B) 150 psi or less (200 psi if hydroboost equipped). On non-integral power steering, jiggle steering wheel to insure spool valve centering prior to testing. Higher than normal pressures (B) indicate line or poppet valve (Saginaw) restrictions.

2) Partially close tester valve to build pressure to 625 psi and note flow (C) to be at least equal to flow (A). Lower flow indicates further pump servicing is required.

3) Completely close and partially open valve three times noting pressure (D). (Do not allow valve to be closed for more than five seconds). Pressure readings 100 psi lower or 50 psi higher than specified indicate control valve cleaning or replacement is required.

4) Increase engine speed to approximately 1500 RPM and note flow (E) within one gallon/minute of idle flow (A). Control valve servicing will be required if flow varies beyond this amount.

ALL MODELS (Cont.)

5) Return engine to idle and turn steering wheel to left and right stops. Record pressure and flow (F) at stops to be nearly the same as maximum output pressure, while flow should drop below one gallon/minute (integral power steering) or ½ gallon/minute (non-integral). If pressure does not rise or flow does not drop as indicated, internal leakage is occurring. Steering gear or control valve and cylinder must be removed and serviced.

6) Turn steering wheel slightly in both directions and release quickly while watching pressure gauge. Needle should move from normal reading and snap back as wheel is released. A sticky or slow moving needle indicates that the rotary valve (integral) or control valve (non-integral) is sticking and requires further service.

TURNING EFFORT TEST (FORD MOTOR CO. ONLY)

With front wheels properly aligned and tire pressures correct, park vehicle on dry concrete and set parking brake. Idle engine for 2-3 minutes and turn steering wheel side to side several times to warm fluid. With engine running, attach a pull scale to rim of steering wheel. Measure pull required to turn wheel one complete revolution in each direction. Pull should be to specifications.

TURNING EFFORT SPECIFICATIONS

Application	Effort (Lbs.)
Maverick, Comet, Granada, Monarch	7.0
All Other Models	5.0

PRESSURE TEST SPECIFICATIONS

Application	Pump Output Pressure (psi) Idle Pressure	Relief Pressure
American Motors		
All 6 Cyl.	80-125	1000-1100
All V8	80-125	1100-1200
Chrysler Corp.		
6 Cyl. With A/C		1000-1100
V8 & 6 Cyl. Without A/C		1200-1300
Ford Motor Co.		
Ford Thompson (TRW) Pump		
HBCW and V	150	1050
HBC-U	150	1200
HBC-T	150	1300
Saginaw Pump (All)	150	1350
General Motors		
Cadillac (Exc. Seville)	80-125	1425-1475
Corvette	80-125	900-1000
All H Series①	80-125	750-850
All Others	80-125	1350-1450

① – Monza, Skyhawk, Starfire & Sunbird

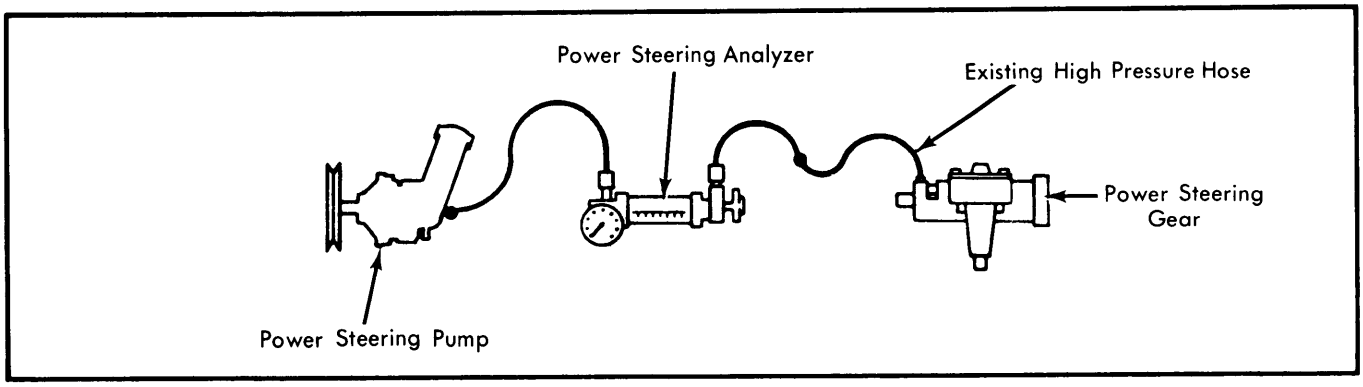

Fig. 4 Typical Installation

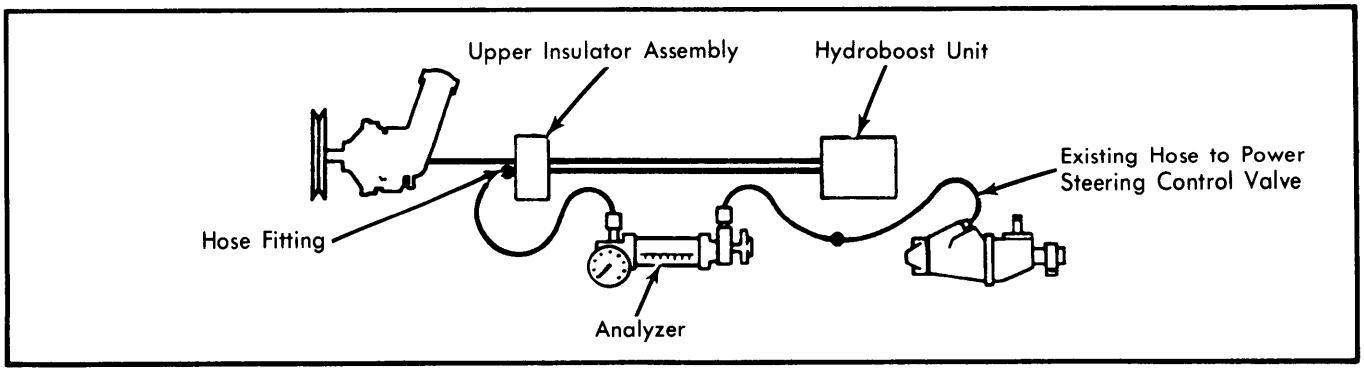

Fig. 5 Installation on 302" Granada/Monarch/Versailles with Hydroboost

ALL MODELS (Cont.)

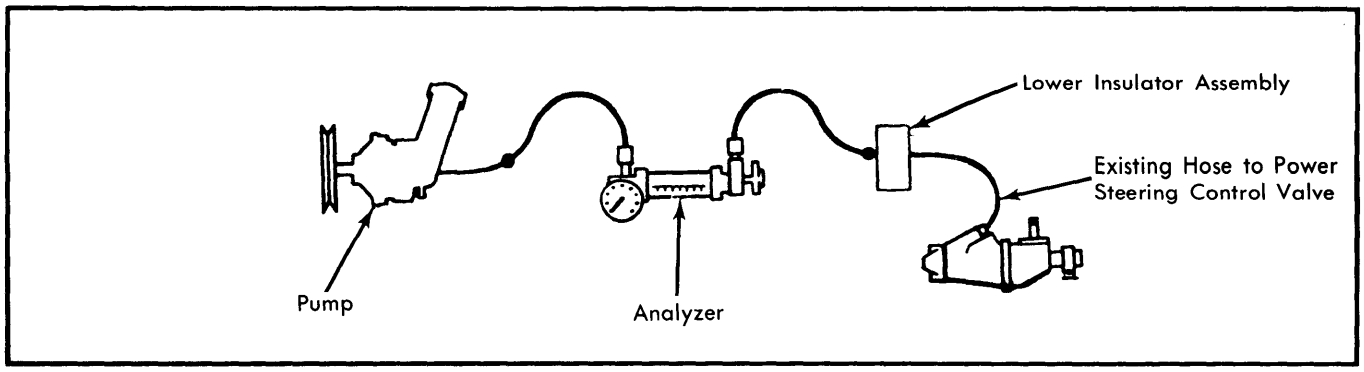

Fig. 6 Installation on 302" Granada/Monarch without Hydroboost

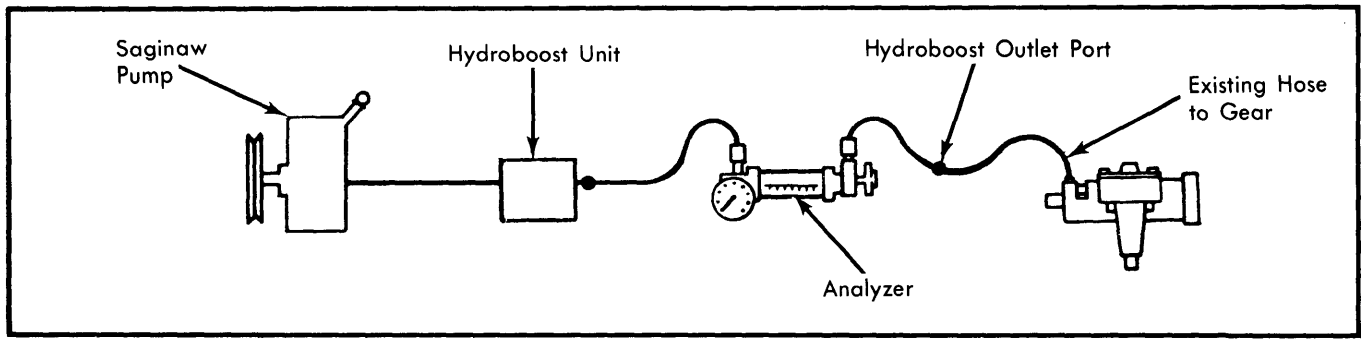

Fig. 7 Optional Installation on Hydroboost Equipped Cars (May Be Used on Saginaw Equipped Cars Which Do Not Have Insulator Assembly)