Revcon Incorporated Bulletin

10870 Kalama River Road, Fountain Valley, California 92708, (714) 968-3346

PAINT SPECIFICATIONS

From 1980 to Present

SHERWIN WILLIAMS Sunfire 421
an Acrylic Urethane Enamel

PAINT CODES:

Sequential Number 32323 Quality F6

REX	NAME
36-32323	Dk. Brown Exterior

YR	MANUFACTURER	PART NUMBER	COLOR
0	Revcon, Inc.	SF-905	N

Color Match Grade A New

Sequential Number 32322 Quality F6

REX	NAME
36-32322	Limestone Exterior

YR	MANUFACTURER	PART NUMBER	COLOR
0	Revcon, Inc.	SF-900	G

Color Match Grade A New

To prepair coach to paint on the aluminum mix:

PPG Polyelutch Wash Primer 97-687 100%

PPG Polyclutch Wash Primer Thinner 97-731 150%

PPG Polyclutch Wash Primer Acid 1/2 pint to a gallon

CAUTION: AFTER WASH IS MIXED THE LIFE IS ONLY 3 HOURS.

PAINT SPECIFICATIONS

1983

SHERWIN WILLIAMS Sunfire 421,
An Acrylic Urethane Enamel

PAINT CODES:

36-33702	Limestone	36-33701	Light Taupe Met
36-32323	Dark Brown	36-34442	Black
36-312416	Dark Blue Met	36-31231-G	Midnight Green
36-31244-G	Ice Blue Met	36-30774-G	Light Green

To prepair the coach for painting on the aluminum, mix the following:

PPG Polyelutch Wash Primer 97-687 100%

PPG Polyelutch Wash Primer Thinner 97-731 150%

PPG Polyelutch Wash Primer Acid 1/2 pint to a gallon

CAUTION: After Wash is mixed, the life is only 3 hours.

PAINT SPECIFICATIONS

From 1980 to 1982

SHERWIN WILLIAMS Sunfire 421
an Acrylic Urethane Enamel

PAINT CODES:

Sequential Number 32323 Quality F6

REX	NAME
36-32323	Dk. Brown Exterior

YR	MANUFACTURER	PART NUMBER	COLOR
0	Revcon, Inc.	SF-905	N

Color Match Grade A New

Sequential Number 32322 Quality F6

REX	NAME
36-32322	Limestone Exterior

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To prepair coach to paint on the aluminum mix:

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PPG Polyclutch Wash Primer Thinner 97-731 150%

PPG Polyclutch Wash Primer Acid 1/2 pint to a gallon

CAUTION: AFTER WASH IS MIXED THE LIFE IS ONLY 3 HOURS.

1978 & 1979

1978 & 1979 PAINT FORMULAS

These formulas are based on a Ditzler paint mixing scale.

REVCON LIMESTONE ACRYLIC ENAMEL

Mixing Color #	# of Parts (Scale Reading)
DMR 400	1012
" 490	1038
" 486	1166
" 484	1188
" 476	1210
DXR 495	1290 (Drier)
DMR 499	Fill to top (Clear)

REVCON TRIM BROWN SEMI - GLOSS

Mixing Color #	# of Parts (Scale Reading)
DMR 464	120
" 486	396
" 490	1820
" 400	1852
" 476	20000
DXR 495	2080 (Drier)
DMR 499	3000 (Clear)
DX 265	Fill to Top (Flatening Agent)

1978 - 1979

REVCON SILVER BULLET

DITZLER PAINT SCALE

SILVER POLY (TOP)

3 - 5 Gal. DAR 8967

MED. GRAY POLY (CENTER)

2 - 5 Gal. DAR 2967

SEMI GLOSS BLACK (LOWER)

8 - Gal. DAR 9000

*DAR refers to Delstar

CALIBRATION

To calibrate your monitoring panel, simply fill all of your tanks with tap water. Set the selector switch to the tank to be calibrated. Press the test switch and, using a small flat bladed screwdriver, rotate the adjustment located behind the small hole on the face of the panel and identified by the small black letter above. As the adjustment is turned, the lights will turn on or off in sequence. When the last light (light marked F) is just fully lit, the tank is properly calibrated. If all the lights will not go on when the adjustment is at the limit of its travel, add more aluminum foil pad.

MAKING A MEASUREMENT

First, set switch to either TANKS, BATTERY , or LPG. For battery or LPG reading, just push the TEST switch. For TANKS, select either FRESH (water), GREY (dish and shower waste water), or BLACK (septic waste water) and then push the TEST switch.

DIGITAL CLOCK (106ACO)

The digital clock is connected to +12 volt power at all times. For this reason a switch is provided (labelled DISPLAY) wich turns the current to the LED display on and off. When the display is off a very small amount of current is used (10ma.) and a normal sized automobile type battery will last approximately one year. This allows the clock to be left on so that it will keep time while the vehicle is in storage.

When the monitoring panel is first installed and power supplied or after the battery has been disconnected and reconnected, the display will flash on and off. This warns the user that the time is incorrect. Pressing either the minutes or hours switch will cause the display to return to normal.

Pressing the minutes switch causes the minutes to advance at a 2 per second rate. Pressing the hours switch causes the same thing to happen to the hours display. The little red dot in the upper left hand corner of the display indicates either AM. or PM.

INSTALLATION AND TROUBLE SHOOTING HINTS

1. Before mounting the panel, connect temporarily to battery power. Switch to battery position and check to see that the battery indication is in the good region.

2. Place the two bare ends of the wires, which normally would connect to the pads on the tank, between moistened thumb and forefinger. The wire ends should not actually touch each other. With the proper tank selected, squeeze the wires while pushing test switch. The lights on the panel should light up. As you release pressure they should go out. If this does not happen, you may not be connected to the battery properly. (Scrape battery terminals to get rid of corrosion).

3. After installing the panel and running wires to the tanks, but before actually connecting to the copper pads, do the test again. This will check that you are still connected to the battery properly and that you are hooking up to the correct tank.

4. After installing aluminum foil pads, copper pads and hooking up the cables, place one hand on one pad and one on the other. When the test switch is pressed you should get the same results as when you were squeezing the wires. If you do not, check your connections carefully. (An ohmeter will help).

The following chart will help locate troubles.

Symptom - No lights at all when pressing test switch.

Possible Cause - 1. Connector on backwards.
2. Bad battery connection.
3. Wires to battery reversed.

Symptom - Lights fail to go on during finger test.

Possible Cause - 1. Calibration adjustment all the way counter-clockwise.
2. Connector not firmly seated.
3. Possible bad cable - inspect connector for broken or loose wires.

Symptom - Some or all lights stay on all the time.

Possible Cause - 1. Panel connected to convertor output.
2. Short between tank wires.

Symptom - Cannot get all lights to come on with full tank.

Possible Cause - Some tanks are built thicker than others, and require more aluminum foil pad. Add more aluminum foil.

Symptom - Erratic reading. Can't get full scale reading.

Cause A - Aluminum foil is touching the metal frame, metal floor or other metal which is connected to the vehicle frame.

Solution A - Carefully inspect the aluminum foil and make sure it does not contact any metal except the copper pad.

Cause B - Shield wire or mylar foil touching the center conductor or the aluminum foil. (Refer to Fig. 2 of the installation instructions). The cable which connects the monitoring panel to the tank is a special type of shielded wire. The shield consists of a thin metalized mylar foil wrapped around the insulator which covers the inner conductor. Lying between this foil and the insulator is a small stranded wire. If either this small wire or the mylar foil touches the aluminum foil, the copper pad or the inner conductor, it will short out the signal causing an erratic or reduced reading.

Solution B - Carefully strip the mylar foil and the small stranded wire back so that they cannot touch any other metal. Wrapping the place where they are exposed with insulating tape is a good idea.

Symptom - Several lights glow dimly and some lights are on even with the tanks empty.

Cause - Power wire connected to convertor output.

Solution - Connect power wires (red and white) directly to the terminals of your battery.

Symptom - Reading varies as lights or other electrical elements are turned on or off.

Cause - Voltage to the monitoring panel is being affected by the lights or other loads. These loads can cause a reduction in voltage below the amount needed for proper operation of the panel.

Solution - Connect power wires to a point as close to the battery terminals as possible. This will also improve the accuracy of your battery reading.

CHEVROLET MOTOR DIVISION
General Motors Corporation
Chevrolet Engineering Center
30003 Van Dyke Avenue
Warren, Michigan 48090

PRICE QUOTATION
Chevrolet Power Plants
(OEM On-Highway Motor Vehicles)

Addendum No.2, Quotation No. 3106

Date August 1, 1983

REVCON, INCORPORATED

WARRANTY

B. Warranty On New Service Replacement Parts Purchased From Chevrolet

Chevrolet (Chevrolet Motor Division, General Motors Corporation) warrants to the OEM (Original Equipment Manufacturer) only that for a period of 90 days after sale of new Chevrolet service replacement parts by an OEM's authorized parts outlet, it will reimburse or credit OEM for any defective or malfunctioning part. This warranty covers only malfunctions resulting from defects in material or workmanship.

This warranty does not cover malfunctions resulting from negligence, alternation, accident or lack of performance of normal maintenance services; use for a purpose for which the part is not designed or approved by Chevrolet, loss of time, inconvenience, loss of use of the vehicle or other consequential damages; or labor for removal or reinstallation of defective or malfunctioning parts.

Chevrolet will reimburse or credit the OEM for any part found to be defective or the cause of a malfunction. Such reimbursement or credit will be at Chevrolet's current price of such part to the OEM.

Defective or malfunctioning parts qualifying under this warranty must be held at the OEM's place of business for examination by Chevrolet.

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This warranty is the only warranty applicable to service parts and is expressly in lieu of any other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular purpose, and of any other obligation or liability on the part of Chevrolet, and Chevrolet neither assumes nor authorizes any other person to assume for it any other liability in connection with such parts.

CHEVROLET MOTOR DIVISION
General Motors Corporation
Chevrolet Engineering Center
30003 Van Dyke Avenue
Warren, Michigan 48090

REVCON, INCORPORATED

PRICE QUOTATION
Chevrolet Power Plants
(OEM On-Highway Motor Vehicles)

Addendum No. 2, Quotation No. 3106

Date August 1, 1983

WARRANTY

A. Warranty On New Chevrolet Engines, Transmissions, Clutches, Or Axles Used in OEM On-Highway Motor Vehicles

Chevrolet, (Chevrolet Motor Division, General Motors Corporation) warrants to the OEM (Original Equipment Manufacturer) only each new engine, transmission, clutch or axle, (hereafter called component), including all accessories thereon, manufactured or supplied by Chevrolet and sold to the OEM for installation in its new on-highway motor vehicles, that for a period of 12 months or 12,000 miles, whichever first occurs, it will reimburse or credit OEM for necessary repairs or replacements of any defective or malfunctioning part of such component.

The warranty period shall begin on the date the OEM on-highway motor vehicle is delivered to the first retail purchaser or, if the vehicle is first placed in service prior to sale at retail, on the date the vehicle is first placed in such service.

This warranty covers only malfunctions resulting from defects in material or workmanship.

This warranty does not cover malfunctions resulting from misuse, negligence, accident, alterations not approved by Chevrolet, lack of performance of normal maintenance services, or improper installation; the replacement of maintenance items (such as spark plugs, ignition points, positive crankcase ventilator valve, filters, and brake linings) made in connection with normal maintenance services; loss of time, inconvenience, loss of use of the vehicle or other consequential damages; or labor for removal from or reinstallation of the component in the vehicle.

Chevrolet will reimburse or credit the OEM for the repair or replacement under this warranty for any part found to be defective or the cause of a malfunction. Such reimbursement or credit will be at Chevrolet's current price of such part to the OEM, and bench repair labor.

Defective or malfunctioning parts qualifying under this warranty must be held at the OEM's place of business for examination by Chevrolet.

* * *

This warranty is the only warranty applicable to engines, transmissions, clutches, or axles and is expressly in lieu of any other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular purpose, and of any other obligation or liability on the part of Chevrolet, and Chevrolet neither assumes nor authorizes any other person to assume for it any other liability in connection with such components.

ENGINEERING DIRECTIVE

Revcon Incorporated

FORM NO. 758

ORIGINATING DEPARTMENT		ENGINEERING RELEASE AUTHORIZATION	X	BY W.R.E	EFFECTIVITY
ENGINEERING	X	ENGINEERING CHANGE ORDER		DATE 1-10-84	DAY 10
PRODUCTION		ENGINEERING STOP ORDER			MONTH 1
		REQUEST FOR CHANGE			YEAR 84

MODEL ALL — DWG. NO.

BILL OF MATERIAL — CUT LIST

REASON FOR CHANGE	
PROD. IMPROVEMENT	X
CHANGE OF VENDOR	
COST REDUCTION	
ERROR	
OTHER EXPLAIN	

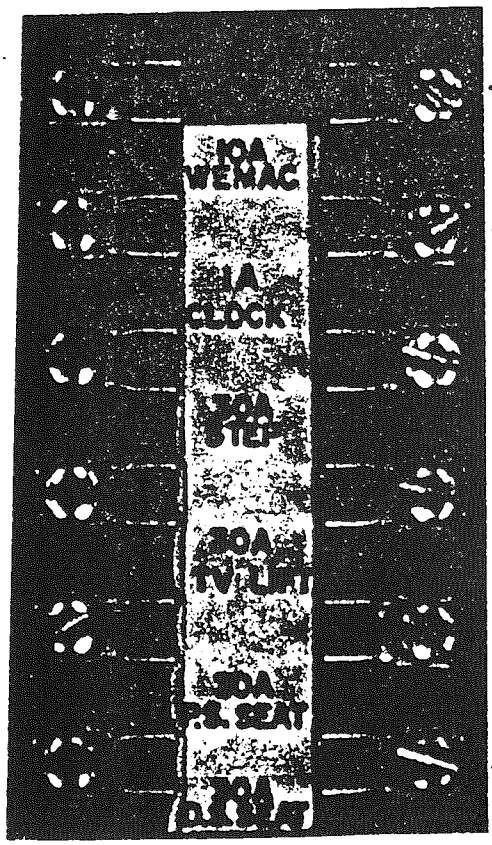
REMARKS

REVISION to E.C.O. NO 755 Changing fuse Location's on 6 Block Fuse holder

DISTRIBUTION:	
QUALITY CONTROL	X
GENERAL MGR.	X
PRODUCTION MGR.	X
SALES	X
PURCHASING	X
INVENTORY CONT.	X
ENGINEERING	X
WARRANTY	X
SERVICE	X
ACCOUNTING	X
CHASSIS	
SKIN	
PLUMBING	
ELECTRICAL	X
PAINT	
ENGINE	
CABINET	
FINAL FINISH	X
RMC	X
SERVICE PARTS	X

DESCRIPTION

Change Six Block Fuses per Print below



ENGINEERING APPROVAL

DATE 1/10/84

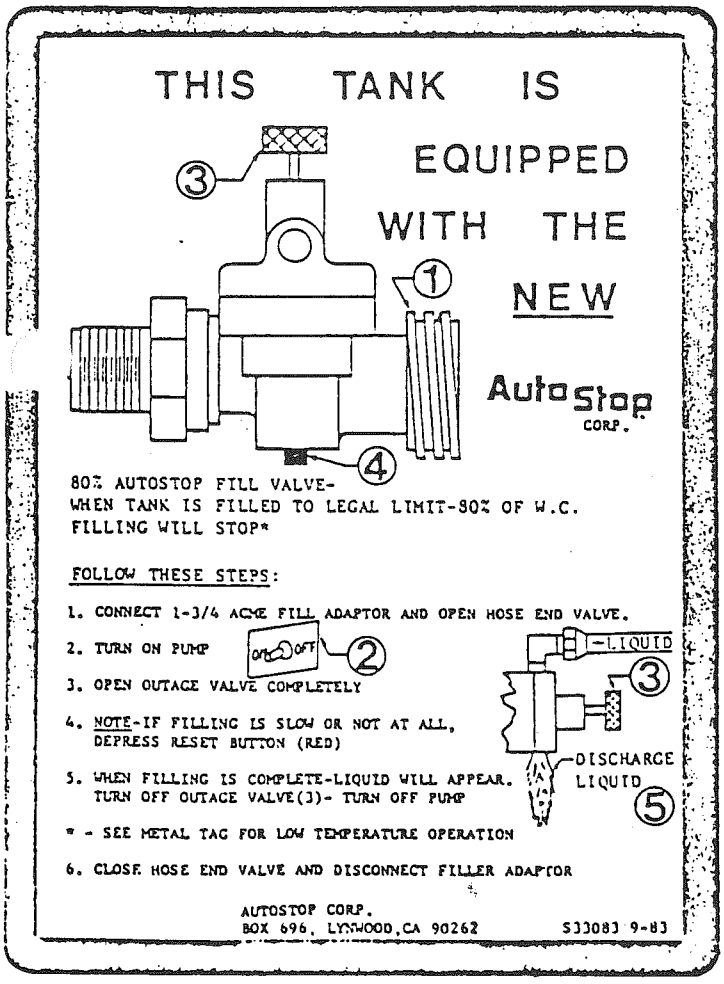
YES X

NO

AutoStop Corporation
P.O. Box 696, LYNWOOD, CA 90262

OWNER INSTRUCTIONS
AUTO STOP FILL VALVE ON PROPANE TANK

A. Your LP-gas (propane) tank is equipped with an 80% Auto Stop Fill Valve as required by the 1982 edition of NFPA and ANSI A119.2. Your LP-gas dealer and/or dispenser/operator may not be familiar with this new safety fill valve. Therefore, please follow instructions in proper sequence as listed below and on the tank. (All gas appliance pilots must be OFF prior to filling.)



B. Key Points to Consider (Trouble Shooting):

a. Valve will not accept LP-gas unless outage valve is completely open. (See Step 3) Conventional propane tanks do not require this feature.

b. Note: If filling is slow or not at all, depress red reset button. (See Step 4)

c. In the event that problems still occur with reference to filling, operator should shut down pump, shut off valve, disconnect Acme filler, reconnect, and repeat sequence.

C. PURPOSE OF 80% STOP FILL DEVICES

Automatic stop fill devices are now manditory by code in order to prevent overfilling of propane tanks. Overfilling for years has been abused and can cause premature relief valve discharge allowing propane into the atmosphere. This, coupled with any source of ignition, can cause fires and serious accidents.

(11/1/83)

NEW OWNER INFORMATION 5-17-84

1. Tank Capacities

31' & 33' Main gasoline tank is 63 gallons
Auxiliary gasoline tank is 37 gallons
28' Gasoline tank is 57 gallons. No auxiliary.
Propane tank is 19.3/100 pounds.
Gray water is 30 gallons.
Sewage is 20 gallons.
Fresh water is 50 gallons.

Caution: When you fill the fresh water tank, make sure the vent cap is removed. If this is not done the fresh water tank might rupture.

Drive Train

Engine oil change without filter is 5qts. With filter is 6 qts. Oil filter types is Quakerstate QS8A, Fram PH84, AC PF2, GM 6435675, Motorcraft FL-1

Radiator capacity, dry fill including rear auto heater, dash auto heater, and heat exchanger for hot water heater is 30 quarts.

Transmission

Hydramatic #475 with RV Convertor capacity new is 14 quarts. Transfer case is 1½ quarts (Dextrin II)

2. To connect to city water supply, the connector is located on the outside and has only one connector. It has a built in pressure regulator and does not fill the fresh water tank.

3. To drain the waste tanks, always pull the sewage valve first. After all sewage is drained, pull the gray water valve. This will keep the drain hose clean. Caution never leave the waste dry. After draining tanks add at least one gallon of fresh to each tank. It don't take long for what ever is left in the tanks to dry hard. This will lower the capacity of the tanks and if any of the dry material should come off it will jam the the shut off valve and destroy the rubber seals, then the valve will start leaking.

4. To drain the fresh water system, there is one or two valves located under the sink. Pull out the botton drawer under the sink and on the floor will be one or two gate valves. Open and go outside and look under the motor home at the kitchen window and water should be draining out.

NEW OWNER INFORMATION PAGE THREE

11. RADIATOR HOSES

The hose on water punp is DAYCO #70778. Next is a straight piece of 1½ inch inside. Next is a DAYCO #70855.

Lower on engine is DAYCO #70735. Next is DAYCO #70855 on Radiator.

To drain the fresh water tank there is a valve in the rear under the bed by the fresh water tank. Open this valve to drain and go outside look under the motor home and water should be draining out.

5. On all 1984 Revcons there is a rear Auto Heater. Before 1984 it was a option. To get the radiator water back to the rear auto heater there is red hoses going from the heat exchanger to the rear heater which give off a great deal of heat into the coach. This you don't need when it is hot outside. Pull the bottom drawer out from under the kitchen sink and up along side the hot water heater their are some brass valves. Turn off the one that leads to the rear of the coach.

6. If the auto battery goes dead and you can't start the engine, start generator and push the battery booster switch on the dash while simultaneously turn the key and start the engine. DO BOTH AT THE SAME TIME.
   If you can't start the generator, start the engine and push the battery booster switch and generator start switch on the dash at the same time.

7. The correct front tire pressure is 63 pounds COLD.
   The correct rear tire pressure is 57 pounds COLD.

8. Keep the front end in aligment and at the right ride height. See the alignment booklet in the warranty package and/or Service manual.

9. In 1984 Revcon change the convertor to a convertor with a regulator so it can't overcharge the house batterys. This converator has on the face of it fuses and breaker switches for the coach. It is located under the wardrobe faceing the hall.
   If you don't have this you have a converator only. To avoid overcharging the house batterys when plugged into shore power or when running your generator for long time it would be wise to check your batterys for overcharging. If the batterys are hot or boiling over, you should turn off the converator. You can do this by turning off the convertor switch in the bedroom. If you don't have that switch go out to the shore cord door and inside is a white cord, unplug this cord untill you have used some electricity out of the batterys.

10. The engine beltspart numbers are:

ALTERNATOR	"Dayco" #15490
AIR CONDITIONER	"Eaton" #15591
POWER STEERING	"Dayco" #15410

SERVICE TECHNICAL BULLETIN

Revcon Incorporated
10870 Kalama River Road, Fountain Valley, California 92708 (714) 968-3346

PAINT SPECIFICATIONS

1984

SHERWIN WILLIAMS Sunfire 421
An Acrylic Urethane Enamel

PAINT CODES:

36-33702	Limestone	36-30695-G	Silver Metallic
36-32323	Dark Brown	36-30442	Black

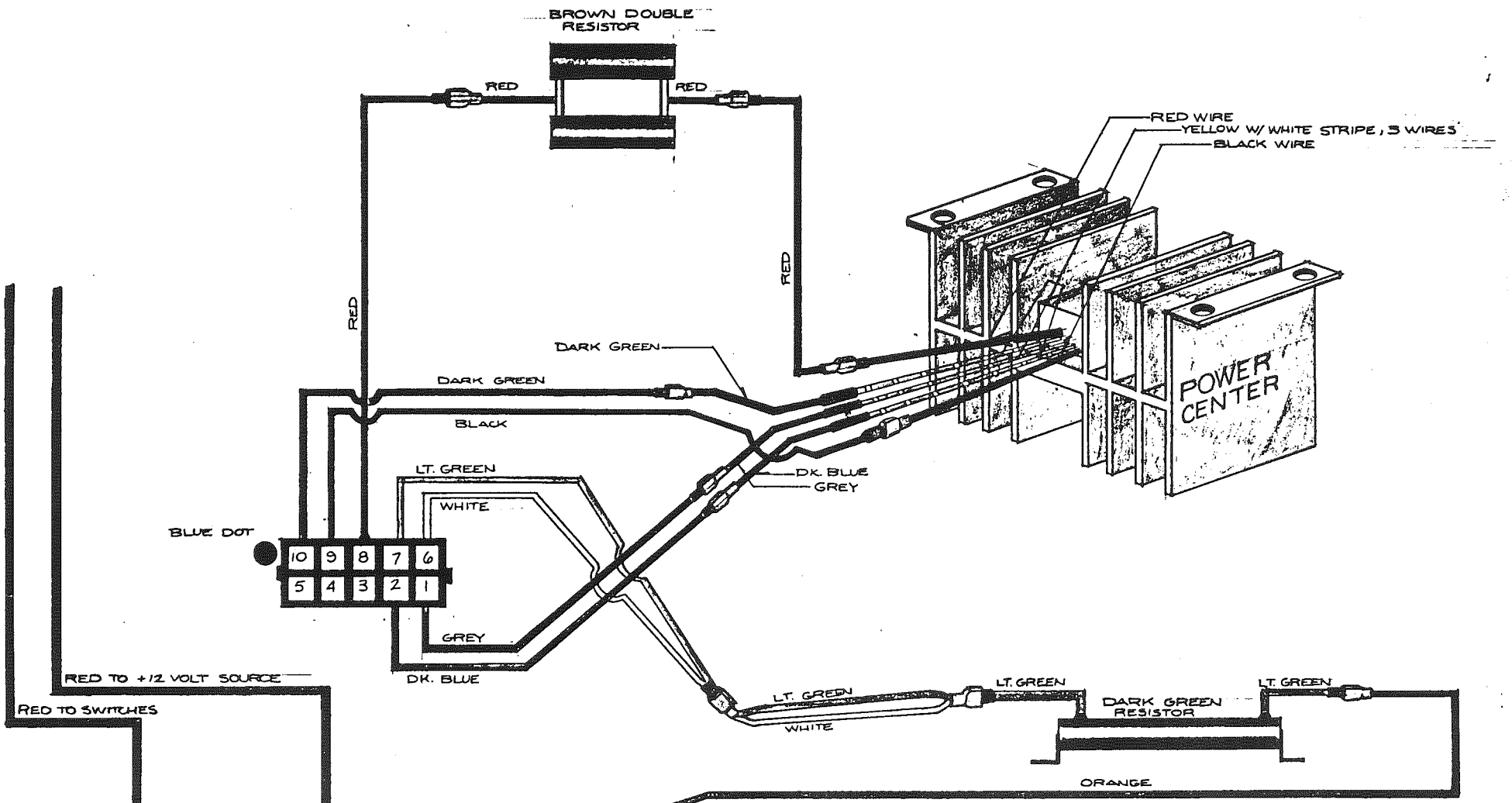
To prepair the coach for painting on the aluminum, mix the following:

PPG Polyelutch Wash Primer 97-687 100%

PPG Polyelutch Wash Primer Thinner 97-731 150%

PPG Polyelutch Wash Primer Acid ½ pint to a gallon.

CAUTION: After Wash is mixed, the life is only 3 hours.



NOTE: ORANGE WIRE IS SPLICED INTO GREY WIRE THAT GOES INTO PLUG MARKED W/ PINK DOT

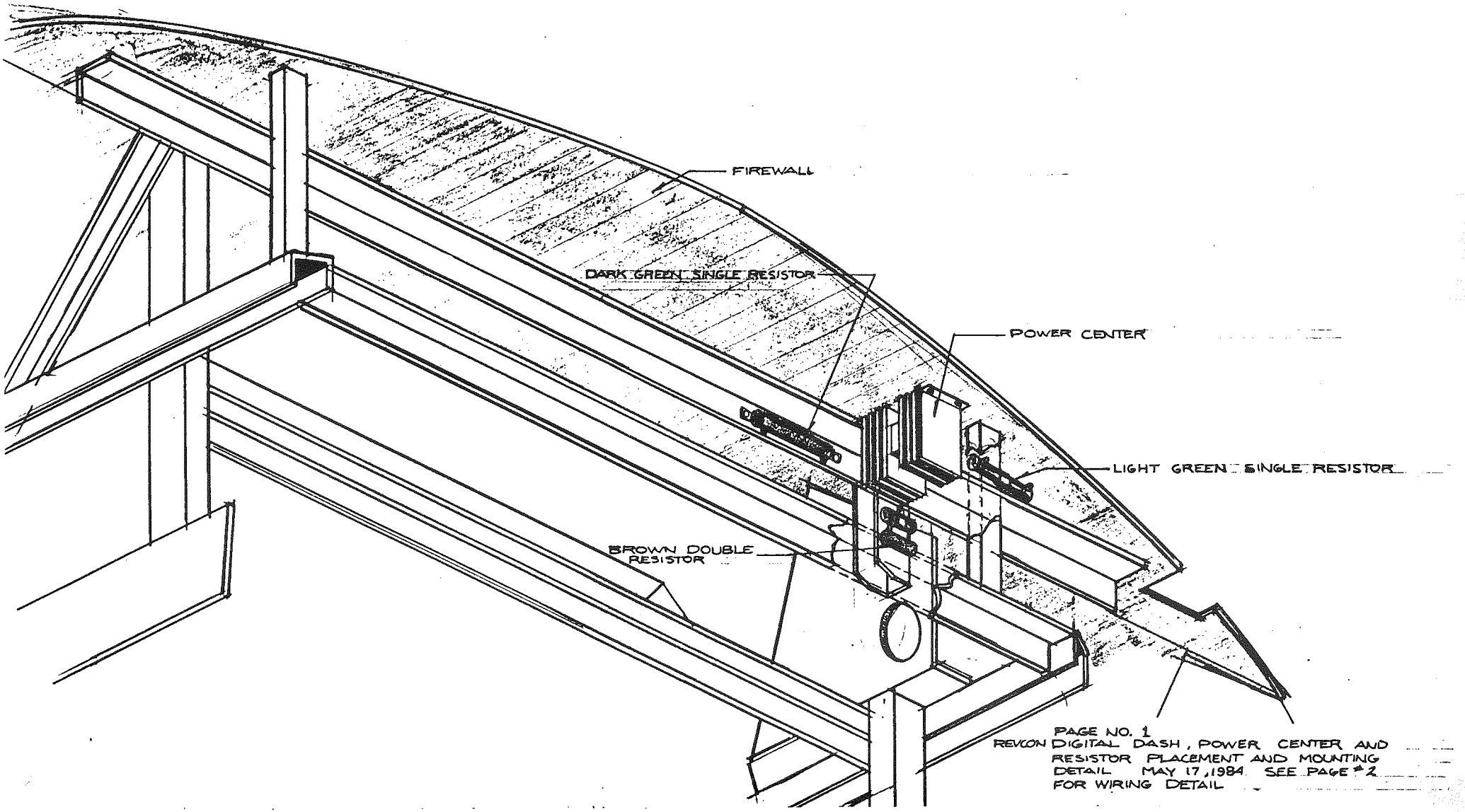
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES: ± ∠±
DO NOT SCALE DRAWING

Revcon Incorporated
10870 Kalama River Road, Fountain Valley, California 92708

TITLE: DIGITAL DASH POWER CENTER AND RESISTOR WIRING DETAIL (MOUNTED UNDER FIREWALL)

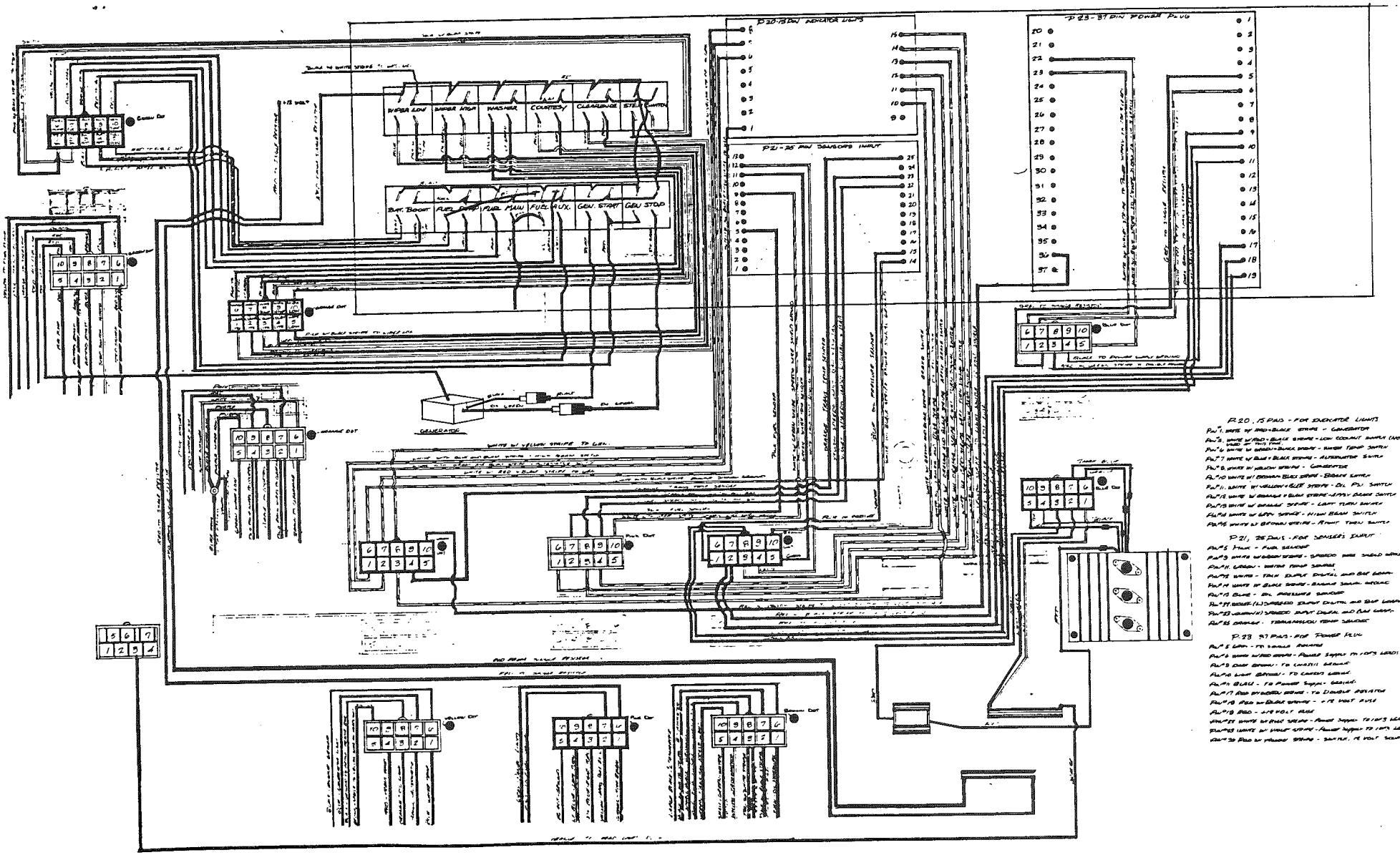
EFFECTIVITY

DRAWN BY	DATE	DWG. SIZE	DWG. NO.	SHEET
JOHN DEKOSTER	MAY 18, 1984			PAGE NO. 2
APPROVED BY	SCALE NONE			



PAGE NO. 1

REVCON DIGITAL DASH, POWER CENTER AND RESISTOR PLACEMENT AND MOUNTING DETAIL MAY 17, 1984 SEE PAGE #2 FOR WIRING DETAIL



P.20 , 15 PINS - FOR INDICATOR LIGHTS

Pin 1, WHITE W/ RED + BLACK STRIPE - GENERATOR
Pin 2, WHITE W/ RED + BLACK STRIPE - LOW COOLANT SUPPLY UNIT
Pin 6 WHITE W/ GREEN + BLACK STRIPE - WATER TEMP SWITCH
Pin 7 WHITE W/ BLUE + BLACK STRIPE - ALTERNATOR SWITCH
Pin 8, WHITE W/ YELLOW STRIPE - GENERATOR
Pin 10 WHITE W/ BROWN + BLACK STRIPE - BRAKE SWITCH
Pin 11, WHITE W/ YELLOW + BLUE STRIPE - OIL PSI. SWITCH
Pin 12, WHITE W/ ORANGE + BLACK STRIPE - ASSY. BRAKE SWITCH
Pin 13 WHITE W/ ORANGE STRIPE - LEFT TURN SWITCH
Pin 14 WHITE W/ GRN STRIPE - HIGH BEAM SWITCH
Pin 15 WHITE W/ BROWN STRIPE - RIGHT TURN SWITCH

P.21, 25 PINS - FOR SENSERS INPUT

Pin 5 Yellow - FUEL SENSOR
Pin 9 WHITE W/ GREEN STRIPE - SPEEDO HOSE SHIELD WIRE
Pin 11, GREEN - WATER TEMP SENSOR
Pin 12 WHITE - TACH OUTPUT DIGITAL AND BAT LAMP
Pin 14 WHITE W/ BLACK STRIPE - BRAKE SIGNAL SENSOR
Pin 15 BLUE - OIL PRESSURE SENSOR
Pin 17, GOOSE (A) SPEEDO OUTPUT DIGITAL AND BAT LAMP
Pin 23 (GROUND) SPEEDO OUTPUT DIGITAL AND BAT LAMP
Pin 25 ORANGE - TEMPERATURE TEMP SENSOR

P.23 37 PINS - FOR POWER PLUG

Pin 5 GRN - TO SINGLE ADJUSTER
Pin 6 WHITE W/ RED STRIPE - POWER SUPPLY TO LIGHTS LEADS
Pin 8 DARK BROWN - TO CHASSIS GROUND
Pin 10 LIGHT BROWN - TO CHASSIS GROUND
Pin 14 BLUE - TO POWER SUPPLY - GROUND
Pin 17 RED W/ BLACK STRIPE - TO DOUBLE ADJUSTER
Pin 18 RED W/ BLACK STRIPE - +12 VOLT FUSE
Pin 19 RED - +12 VOLT FUSE
Pin 21 WHITE W/ BLUE STRIPE - POWER SUPPLY TO LIGHTS LEADS
Pin 23 WHITE W/ VIOLET STRIPE - POWER SUPPLY TO LIGHTS LEADS
Pin 29 RED W/ YELLOW STRIPE - SWITCH +12 VOLT SOURCE

REVCON, Incorporated, has prepared this Owner's Service and Maintenance Manual to ensure that you will derive the most efficient operation and trouble-free experience with your motor home. The manual includes descriptions and instructions on the use and operation of the various systems and appliances.

Should any questions arise regarding any function of your new motor home, please contact your REVCON dealer.

REVCON maintains a continuous product improvement program and reserves the right to modify specifications without notice or obligation.

106ACO and 106AO ACU-GAGE INSTALLATION INSTRUCTIONS

READ THESE INSTRUCTIONS COMPLETELY BEFORE INSTALLATION

The Acu-Gage 106ACO and 106AO monitors the liquid levels of three tanks, the voltage level of one battery, and the propane level of one LPG tank. The LPG tank must have provisions for mounting a Manchester 90 ohm sending unit. The sending unit must be bought separately.

Your Acu-Gage should contain the following:

1	Monitoring Panel	1	Cable assembly
1	Roll Aluminum Foil	7	Copper Foil Pads
1	Bottle (4 oz) Polyethylene Glue	1	Brush
1	Set Instructions	1	Warranty Card

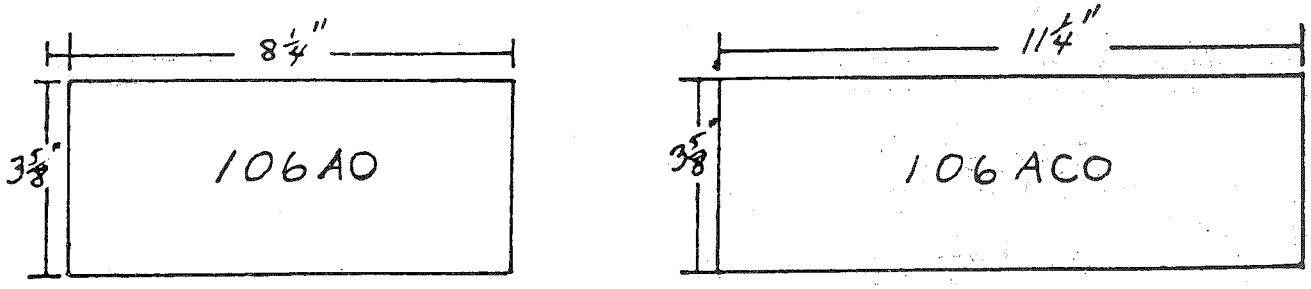
The Acu-Gage operates on a 12V DC power supply and draws only 60mA of current when operating.

I. Location of Monitor Panel

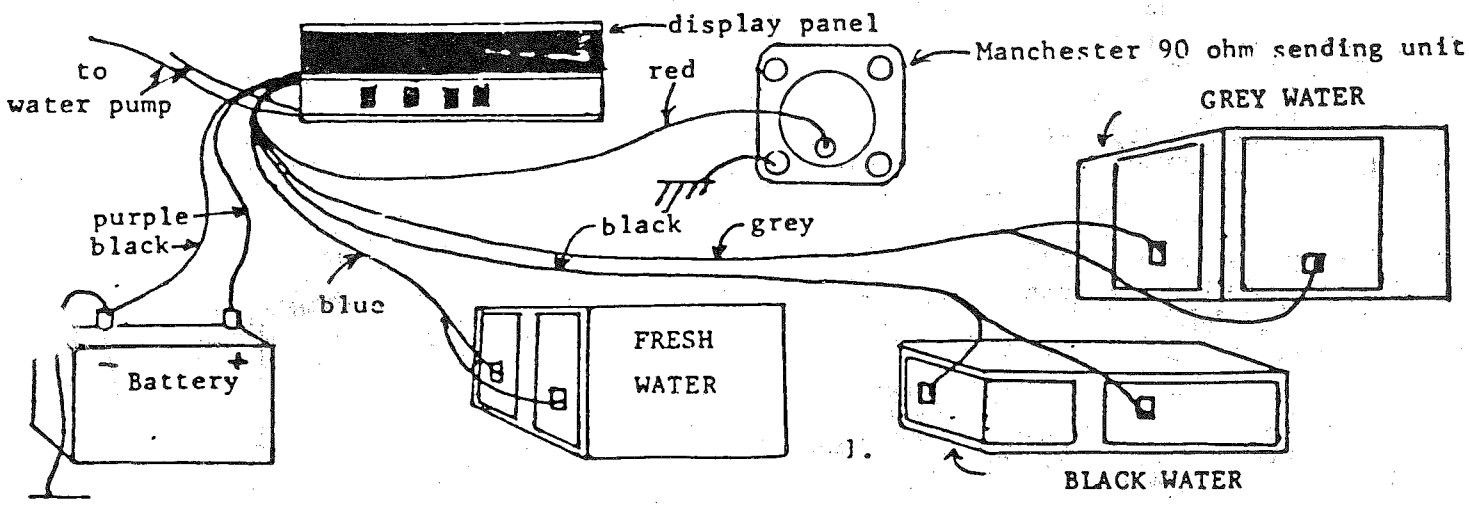
Pick a location that is convenient to reach and to see, and does not interfere with drawers or cabinets.

Make sure there is room behind the wall for the electronics and cable assembly. Nothing should press upon either.

Cut a hole to the dimensions shown below.



II. Run the cables and power wires. (Fig. A)



Run the cable to each tank as indicated. Cable is color coded as follows:

Blue - FRESH WATER
Grey - GREY WATER
Black - BLACK WATER (septic holding tank)

Do not use staples to fasten the cable down as they may damage or short the cable. We recommend nylon cable ties for this purpose.

Run both power wires (purple +, black -) DIRECTLY TO THE BATTERY. If either is connected to the converter outputs, your Acu-Gage will not work.

22 AWG or bigger wire is suitable for hook-up to the battery.

III. Tank pads

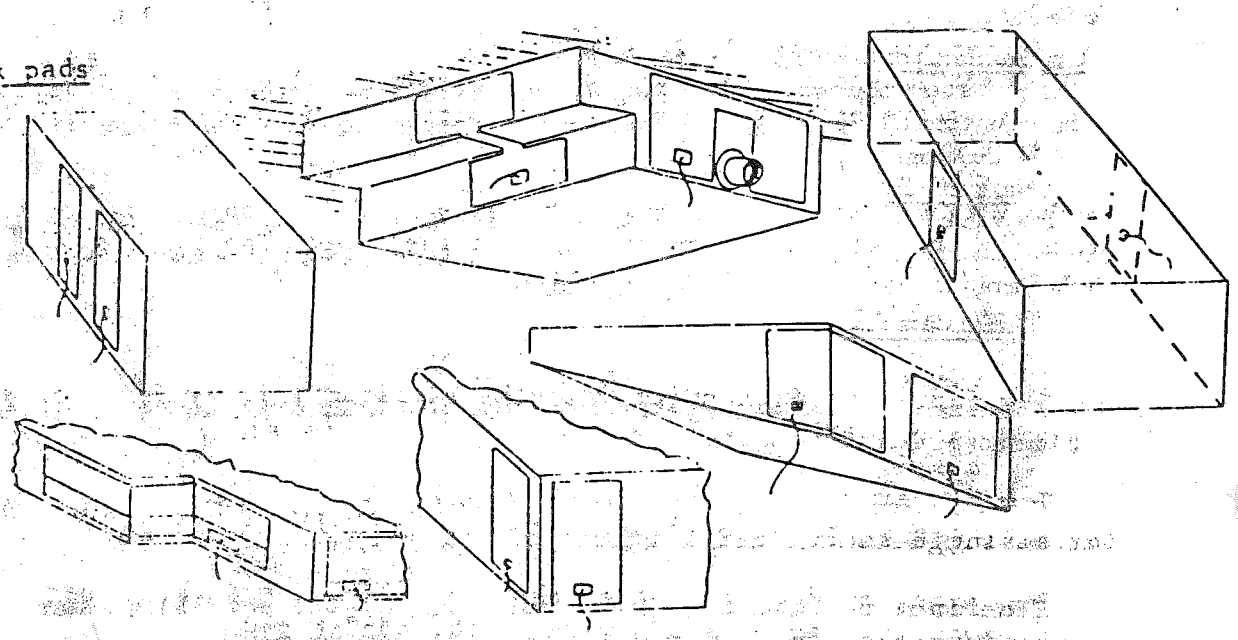


Fig. B

Fig.B illustrates some of the various pad arrangements possible. Pads should be located no closer together than 2 inches and no farther apart than 4 feet.

Polyethylene Glue

Make sure the tank surface is clean and dry. Paint the pad locations on the tank with the POLYETHYLENE GLUE provided. This glue is necessary as the aluminum foil tape will not adhear properly to bare polyethylene. (Note: it is a good idea to use the glue on any tank regardless of whether it is polyethylene or not). Let the glue dry 3 to 5 minutes before applying aluminum foil.

Aluminum Foil Tape

Self adhering aluminum foil tape provided is the same type found in most hardware stores and comes in two inch widths. First, peel off the paper backing, and then smooth on parallel, overlapping strips. The strips should be overlaped by 1/4 to 1/2 inch (see fig.1)

Foil tape may be applied horizontally as well as vertically. Foil tape must not touch any other metal (tank support straps, aluminum under-siding, coach frame, etc.).

Apply a minimum of 50 square inches of foil tape area per pad to start with, more pad may have to be added later due to differences in tank dimensions, distance between the pads, and tank wall thickness.

Foil should extend from just below the top of the tank to just above the bottom or, in the case where the tank does not empty completely, to just above the water line when empty.

It is a good idea to burnish the foil onto the tank with a smooth hard object.

IV. Wire Connections (Figs. 1, 2, & 3)

As stated before, the power wires (purple +, black -) must be connected directly to the battery. An auxilliary battery can normally be used to power your Acu-Gage.

Water Pump

Provisions for hooking up your water pump to the on-off switch are locater in the lower right corner in the rear of the panel. The two disconnect tabs mate to ¼ inch female spade connectors.

Tank Cables

The cable end is connected to the aluminum foil by means of a copper foil pad (provided).

The copper pad consists of a small square of self-adhering copper foil with a single short wire soldered to it.

The inner conductor of the cable (see Fig. 1 and 2) is then connected to the single short wire on the copper pad.

Note: The drain wire (see Fig. 2) is left unconnected at the tank and must not touch anything.

Also Note: It is not advised to shorten the cable length, excess cable length should be coiled at a convenient spot and tied down. However, if you do decide to shorten the cable length, be sure to strip the outer insulation, the foil sheild, and the drain wire back (see fig. 2) Only the inner conductor should be connected to the copper pad.

Panel Connections

Connection at the panel is made by a pre-wired P.C. board connector. Make sure that you plug the panel in with the metal fingers in the plug touching the contacts on the P.C. board. The correct wiring is shown in fig. 3.

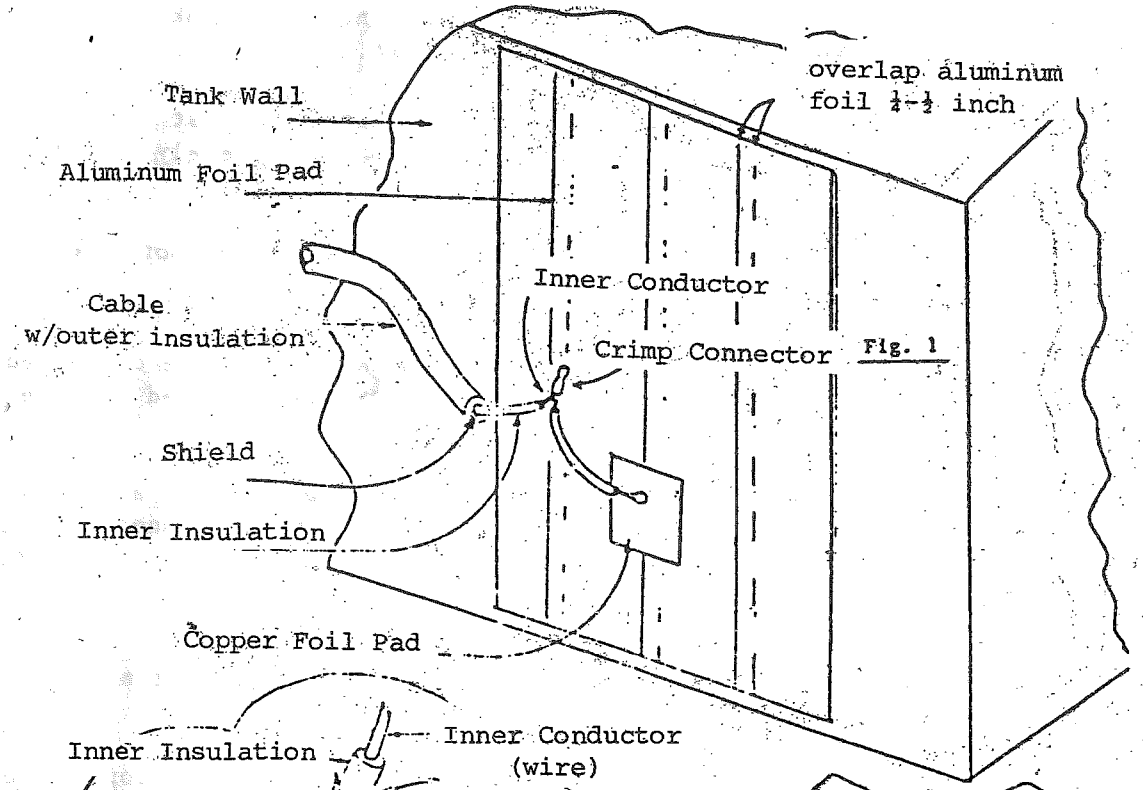


Fig. 1

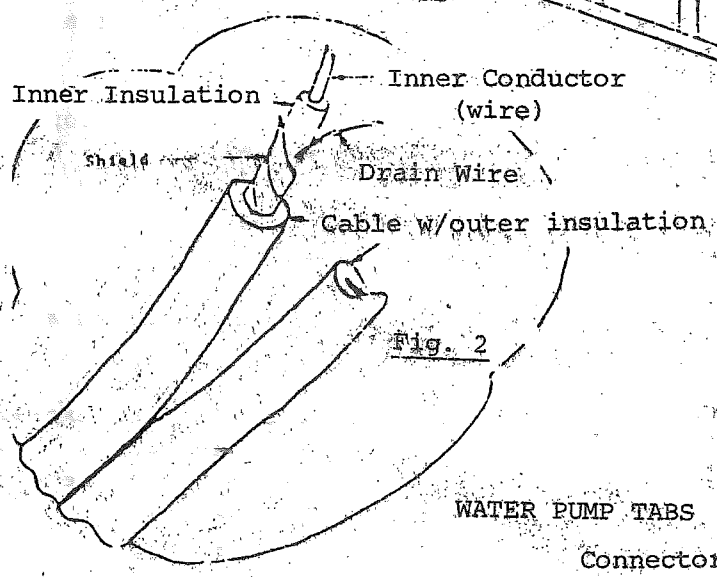


Fig. 2

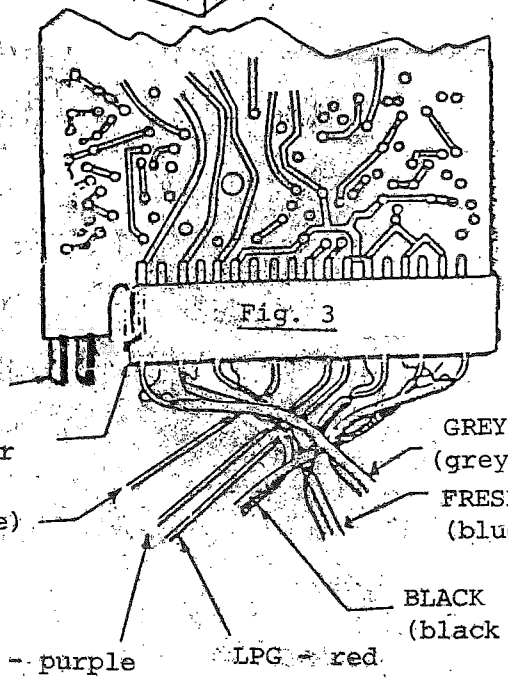


Fig. 3

Foil tape may be applied horizontally as well as vertically. Foil tape must not touch any other metal (tank support straps, aluminum under-siding, coach frame, etc.).

Apply a minimum of 50 square inches of foil tape area per pad to start with, more pad may have to be added later due to differences in tank dimensions, distance between the pads, and tank wall thickness.

Foil should extend from just below the top of the tank to just above the bottom or, in the case where the tank does not empty completely, to just above the water line when empty.

It is a good idea to burnish the foil onto the tank with a smooth hard object.

IV. Wire Connections (Figs. 1, 2, & 3)

As stated before, the power wires (purple +, black -) must be connected directly to the battery. An auxilliary battery can normally be used to power your Acu-Gage.

Water Pump

Provisions for hooking up your water pump to the on-off switch are locate in the lower right corner in the rear of the panel. The two disconnect tabs mate to ¼ inch female spade connectors.

Tank Cables

The cable end is connected to the aluminum foil by means of a copper foil pad (provided).

The copper pad consists of a small square of self-adhering copper foil with a single short wire soldered to it.

The inner conductor of the cable (see Fig. 1 and 2) is then connected to the single short wire on the copper pad.

Note: The drain wire (see Fig. 2) is left unconnected at the tank and must not touch anything.

Also Note: It is not advised to shorten the cable length, excess cable length should be coiled at a convenient spot and tied down. However, if you do decide to shorten the cable length, be sure to strip the outer insulation, the foil sheild, and the drain wire back (see fig. 2) Only the inner conductor should be connected to the copper pad.

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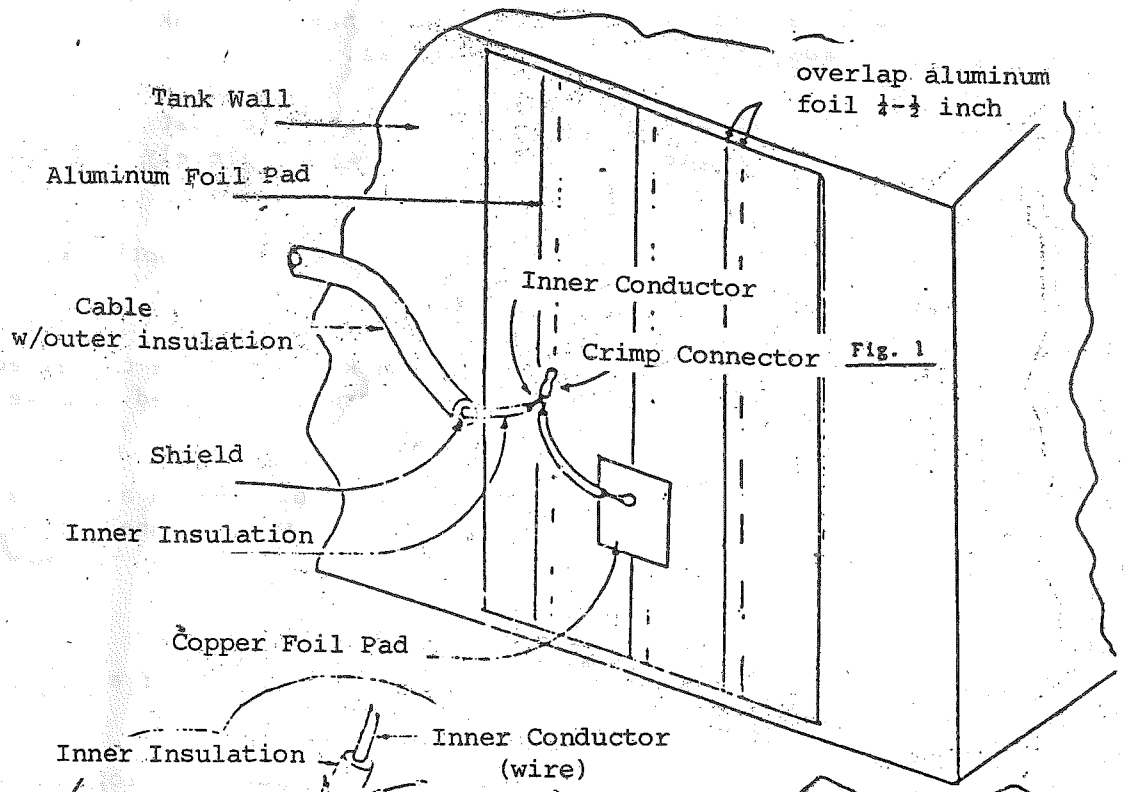


Fig. 1

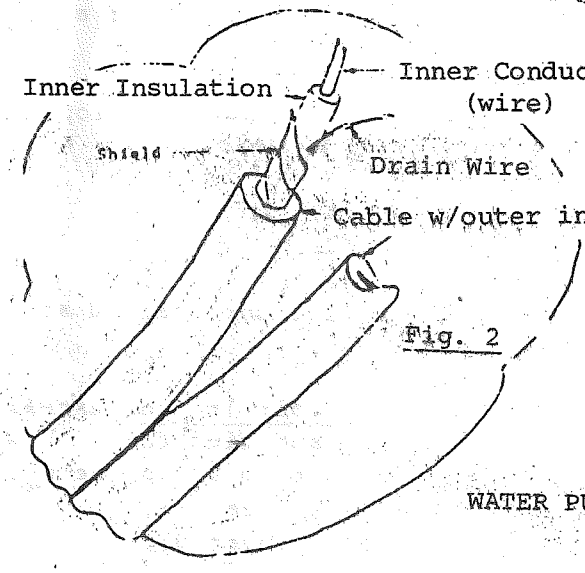


Fig. 2

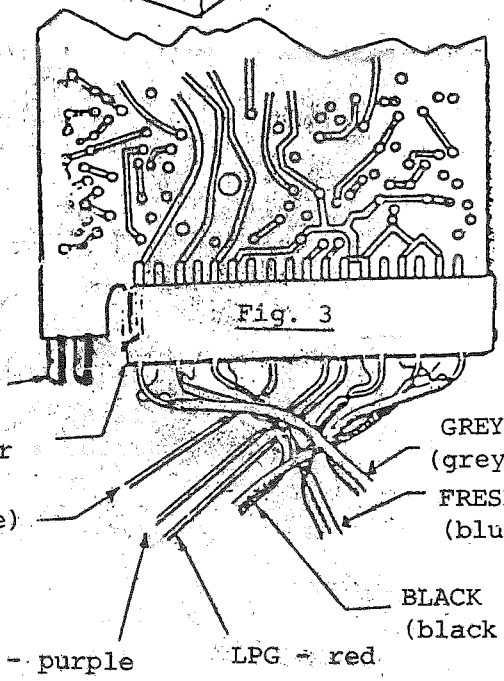


Fig. 3

PARTS & SERVICE — WARRANTY

Revcon Incorporated
10870 Kalama River Road, Fountain Valley, California 92708 (714) 968-3346

Dear Sir,

To facilitate processing warranty claims, the following procedure must be adhered to as of January 1, 1981. All warranty claims not following the procedure listed below, will be returned, unpaid.

1. The warranty manager at the Revcon factory must be notified prior to the warranty repairs, either by phone or mail, of any claims over $100.00.

2. The following information must be furnished to the warranty manager: serial number, mileage, date unit sold, customers name, address, phone number, and a complete and detailed explanation of the required repair and estimate of labor and parts.

3. At that time, a warranty claim approval number will be assigned and the warranty manager will tell you what parts must be returned to Revcon.

4. If parts are required to be returned, they must be returned with the warranty claim. If this is not done, the warranty claim and/or the parts will not be credited.

5. Your repair order is required to be sent with the warranty claim application. Your repair order must be filled out completely with the mileage, date work done, parts used, and owners signature. The repair order must be completely filled out or all will be rejected, and sent to REVCON within 10 days after work is completed.

6. Items effected by wear and exposure and misuse, such as windows, screens, curtains, carpet, cushion fabric, etc., are warranted for only 90 days after delivery to the dealer.

7. Services required due to improper storage, protection, or handling of new vehicles by dealers prior to sale, including damage to battery, cooling system, paint, windows, or bright metal parts, will not be approved.

8. Only one alignment will be credited under warranty after the coach is delivered to the dealer within the first 90 days.

9. Any major time cost repairs involving removal of transmissions, engines, differentials, etc., must not only have prior approval from the warranty manager, but also have approval from the Revcon service manager on how the work is to be done and how much time is allowed.

10. The dealer, other authorized service centers, or owner may then proceed with the warranty repairs, submitting his claim to the warranty manager following completion of repair. The dealer, other authorized service center, orowner must reference the warranty claims approval number. If a claim is returned for correction, a corrected claim must resubmitted within 10 days for credit to be allowed. A form letter will accompany the returned claim, indicating the reason for rejection.

ELVAN HOLMWOOD
Warranty

Revcon Incorporated
10870 Kalama River Road
Fountain Valley, CA 92708 (714) 968-3346

ERV LASK
PARTS MANAGER

Revcon Incorporated
10870 Kalama River Road
Fountain Valley, CA 92708 (714) 968-3346

REVCON GM 454 C.I.D. SUSPENSION

ALIGNMENT RACK PROCEDURE

1. Ride Height (Front)

   The ride height is measured from the ground to the bottom of the frame alongside the bellcrank and idler position. The correct measurement is 17".

2. Camber with 63 pounds tire pressure (Front)

   Set camber as follows:

   Left side — 0 to ¼ degrees positive
   Right side — 0 to ¼ degrees negative

3. Caster

   Set both sides at 4½ degrees + (positive) to 5 degrees + check that a clearance exists between the frame and the control arm mounting bosses on the upper control arms.

4. Toe In-Out

   After camber and caster is set use the sighting device on the gages to align the front wheels to the rear then check that the bellcrank to idler cross link is the correct length of 42 3/4" center of joint to center of joint. Set the bellcrank and idler in the straight ahead position relative to the frame. Recheck that the front wheels are still in line to the rear and by adjusting the tie-rods set the toe to 1/8" total toe out (1/16" out each side). After the toe has been set, recheck the straight ahead position of the bellcrank and idler and front to rear alignment.

5. Equal Right and Left Turn Angles

   By adjusting the drag link that connects the steering gear Pitman Arm to the bellcrank, it is possible to adjust the amount of left and right lock.

A. Turn the steering wheel to full left lock. Read the angle on the circular plate under the left wheel. It should be approx. 31 degrees.

B. Turn the steering wheel to full right lock and read the angle of the circular plate under the right wheel, it should be the same as the left. (approx. 31 degrees)

C. If the steering lock angles do not match, adjust the drag link length and repeat the lock angle measurement until both sides are turning the same amount.

6. Tighten all tie rod clamps and ball joint nuts.

7. Check that all clamps are oriented correctly and that there is no interference between any steering link clamp and the frame or steering components.

8. Check that all cotter pins are installed correctly.

9. Grease all ball joints.

10. With the steering on left lock then right lock then straight, grease the bellcrank and idler bushings.

11. Check that bellcranks and idlers have plastic bearings, not brass in center pivots.

12. Check bellcrank and idler mounting bolts for correct torque (150 foot pounds).

13. Check lug nuts for correct torque — 140-180 ft. lbs.

14. NOTE: With Michelin — Radial Tires

    The correct front tire pressure is 63 pounds per square inch.

    The correct rear tire pressure is 57 pounds per square inch.

15. After setting alignment with wheels set straight ahead, check steering wheel position. If the wheel is not straight, it can only be straightened by removing the steering shaft from between the column and gear. Straighten steering wheel with wheels straight ahead, replace steering shaft on steering gear. Do NOT adjust the drag link.

16. Jounce Stop

    Check that the rubber jounce snubber is installed and tight. Then check that there is sufficient jounce clearance between the flange on the metal jounce bracket and the control arm. With the ride height set at 17" the shortest distance from the metal flange on the jounce stop to the lower control arm where it would make contact after the snubber has compressed should be 1".

17. Leaks

    Before removing the vehicle from the alignment pit, check it for oil and water leaks. Check all hose ends and connections and check all drain plugs for looseness.

    NOTES - Never adjust torsion bars to change ride height unless the vehicle is jacked up and the suspension is hanging down in full rebound position.

Revcon Predelivery Customer Checkout

POWER TRAIN AND DRIVING

- ☐ Demonstrate "underhood" check for water, oil and transmission fluid levels
- ☐ Demonstrate checking brake and power steering fluid level
- ☐ Demonstrate filling of gas tank — water tank
- ☐ Demonstrate battery and main switch
- ☐ Demonstrate location of fuses and changing
- ☐ Demonstrate turn on lights and running lights
- ☐ Demonstrate operation of heater and air conditioner
- ☐ Demonstrate parking brake and tilt steering wheel
- ☐ Demonstrate windshield wiper and washer
- ☐ Demonstrate engine instruments and controls
- ☐ Demonstrate spare tire changing procedure
- ☐ Demonstrate rearview mirror adjustment
- ☐ Demonstrate main door lock
- ☐ Demonstrate swivel seat lock and seat belts
- ☐ Check and recommend tire operating pressures
- ☐ Demonstrate telescoping rear bumper

BUTANE SYSTEM

- ☐ Show location of components
- ☐ Explain turn on-off valve
- ☐ Explain regulator adjustment
- ☐ Explain filling procedure
- ☐ Explain danger of leaking butane

ELECTRICAL SYSTEM

- ☐ Demonstrate tape deck and radio
- ☐ Show location of switch panel and circuit breakers
- ☐ Explain 12-volt system and converter
- ☐ Explain switching of each component
- ☐ Explain battery charger operation of converter
- ☐ Demonstrate connecting and stowing of 110-volt power service cord
- ☐ Demonstrate switching from 110-volt power service cord to generator power
- ☐ Demonstrate location and operation of all switches in coach

FURNACE

- ☐ Show location of furnace
- ☐ Show lighting and turn off procedure
- ☐ Explain temperature control
- ☐ Show shut off valve and explain operation

HOLDING TANKS

- ☐ Explain dual system
- ☐ Show drains for each and valve operation
- ☐ Demonstrate connect and disconnect sewer hose and stowage

REFRIGERATOR

- ☐ Show location of refrigerator and outside inspection door
- ☐ Explain electric and gas operation
- ☐ Explain switching from electric to gas operation and lighting of gas
- ☐ Explain cleaning of gas combustion chamber
- ☐ Explain importance of leveling vehicle for better performance of refrigerator
- ☐ Explain when to use gas or electric operation

WATER SYSTEM

- ☐ Show operation of basin and kitchen sink
- ☐ Show operation of shower
- ☐ Show operation of toilet
- ☐ Show and explain pressure pump
- ☐ Warn against use of strong cleaning abrasives on tub and shower
- ☐ Show filling procedure
- ☐ Explain water heater operation
- ☐ Show heater gas turn on-off valve
- ☐ Demonstrate lighting of water heater
- ☐ Demonstrate draining of water heater
- ☐ Explain drain valves of water system
- ☐ Explain "winterizing" water system
- ☐ Demonstrate City Water hook-up

AUXILIARY POWER PLANT

- ☐ Show location and explain service requirements
- ☐ Show switch in and out procedure
- ☐ Demonstrate starting and stopping procedure
- ☐ Demonstrate basic adjustments
- ☐ Demonstrate oil changing procedure

AIR CONDITIONER

- ☐ Show location of components and explain function of each
- ☐ Explain turn on and off procedure
- ☐ Explain temperature control
- ☐ Explain dependence of system of 110-volt power or generator

STOVE AND OVEN

- ☐ Explain lighting of burners and oven
- ☐ Explain cleaning procedure
- ☐ Explain main shutoff valve and importance of caution in operation
- ☐ Explain bleeding of air from lines

Provide owner with Revcon Owner's Manual

Complete Manufacturer's registration card and mail

Have owner fill out registration section on back of this sheet and sign

Dealer Signature _____

Date _____

(OVER)

Revcon Customer Checkout And Acceptance

PRINT OR TYPE:

Name of Registered Owner _____

Address _____

Serial No. _____ Model _____

Date of Purchase _____

Name of Authorized Revcon Dealer _____

Address _____

_____

_____

_____

I certify to Revcon, Inc. that I have been checked out on all items set forth on the checkout list printed on the reverse side hereof I have received my Owner's Manual; I have read the Revcon Warranty printed in the Owner's Manual; I have inspected and accep my new Revcon, serial number and model identification as set forth above; I request that the Revcon Warranty and owner's ide tification card be issued in my name as printed above.

_____

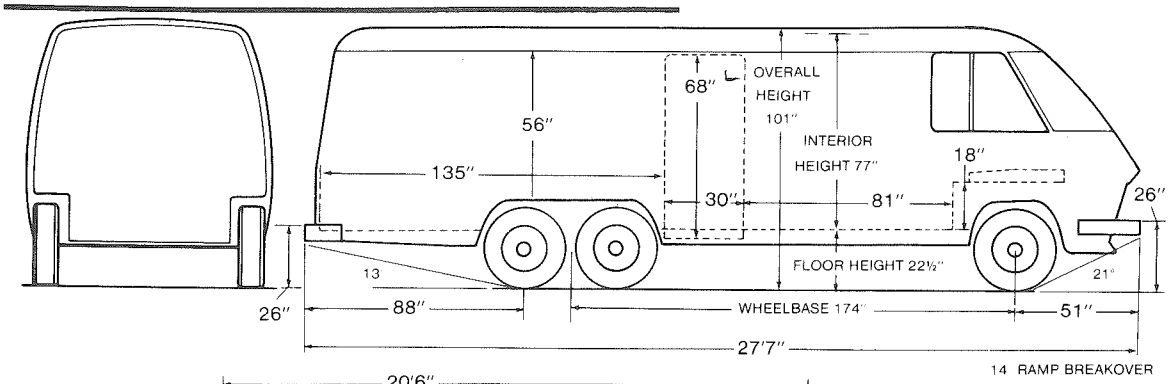
(signature of purchaser)

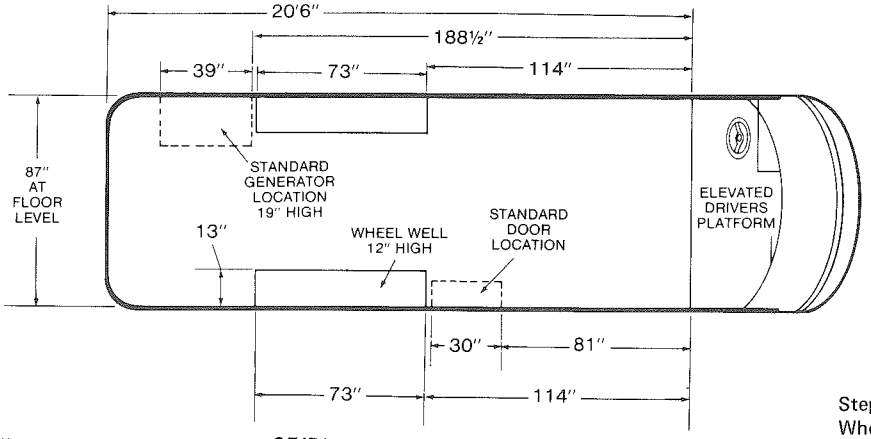
REVCON, Incorporated, has prepared this Owner's Service and Maintenance Manual to ensure that you will derive the most efficient operation and trouble-free experience with your motor home. The manual includes descriptions and instructions on the use and operation of the various systems and appliances.

Should any questions arise regarding any function of your new motor home, please contact your REVCON dealer.

REVCON maintains a continuous product improvement program and reserves the right to modify specifications without notice or obligation.

GENERAL INFORMATION

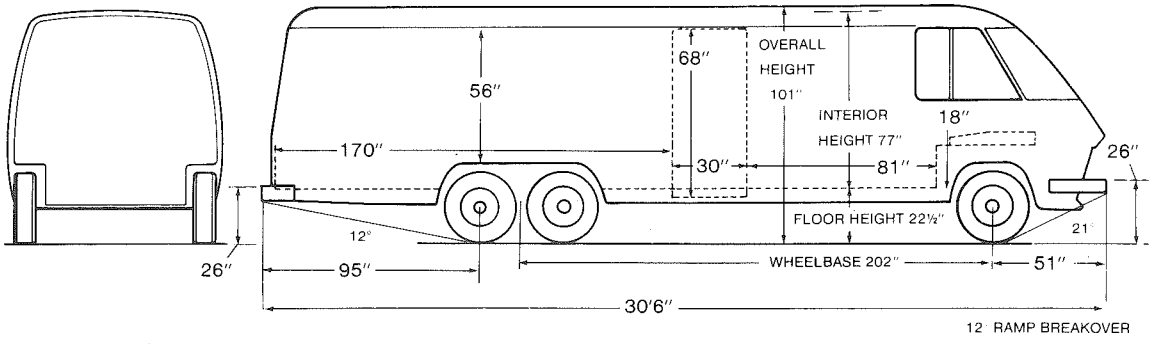


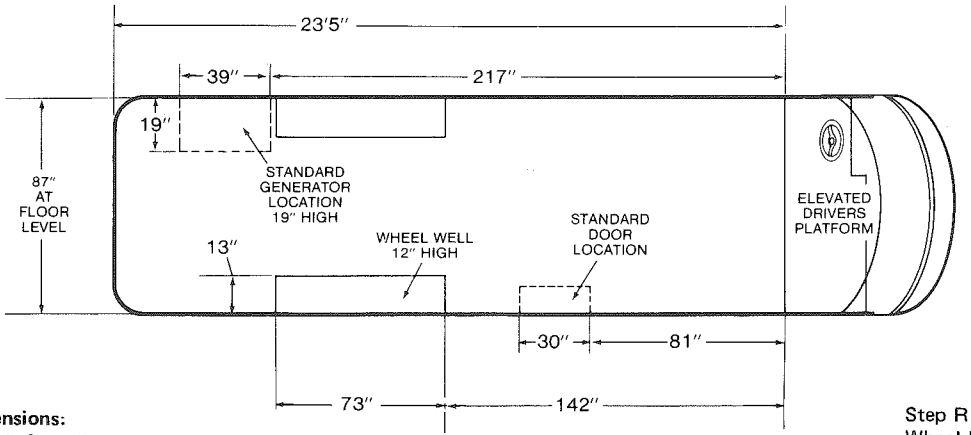


Dimensions:

Length Overall	27′7″
Width Overall	95″
Height Overall	101″
Interior Width	91″
Interior Height	77″
Floor Height (Loaded)	22″
First Step Height	12″
Step Riser	10″
Wheel Base	174″
Turning Radius	36′
RMC Vehicle Curb Weight	7600 lbs.*
Motorhome Vehicle Curb Weight	11,500 lbs.
Gross Vehicle Weight Rating	14,500 lbs.

Figure 1 – 27-ft. Motorhome





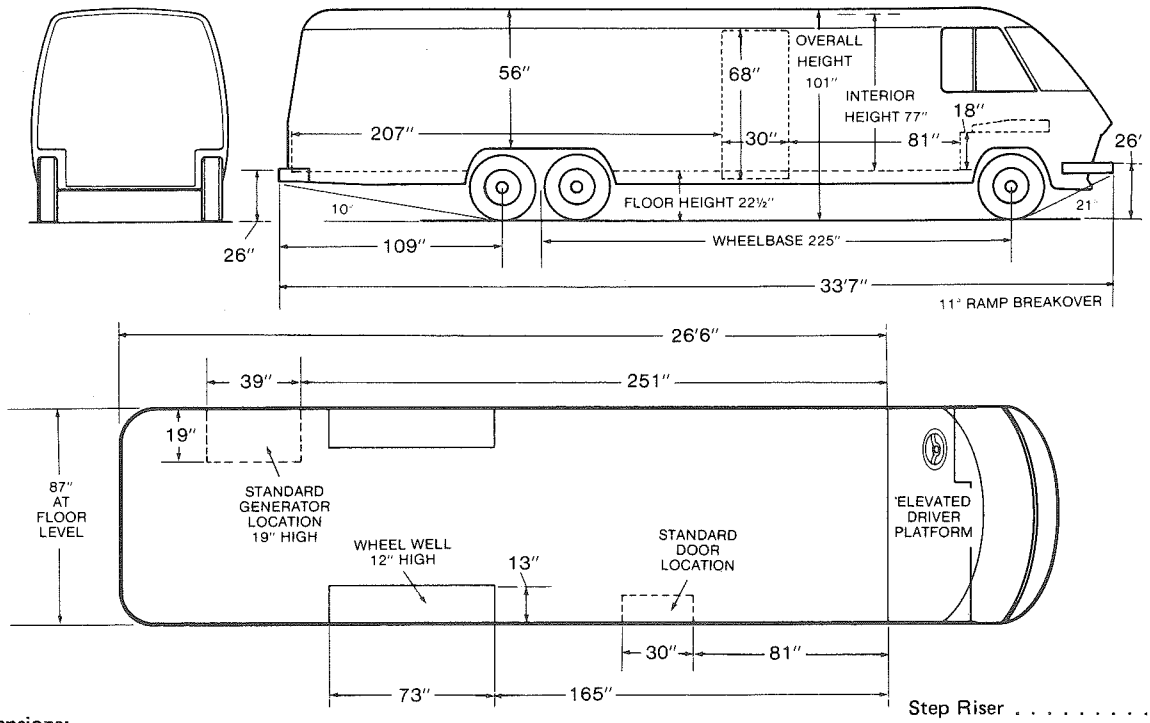
Dimensions:

Length Overall	30′6″
Width Overall	95″
Height Overall	101″
Interior Width	91″
Interior Height	77″
Floor Height (Loaded)	22″
First Step Height	12″
Step Riser	10″
Wheel Base	202″
Turning Radius	38′
RMC Vehicle Curb Weight	8000 lbs.*
Motorhome Vehicle Curb Weight	11,900 lbs.
Gross Vehicle Weight Rating	14,500 lbs.

Figure 2 – 30-ft. Motorhome

* An RMC is a base vehicle with no interior appliances, cabinets, plumbing or electric systems.

GENERAL INFORMATION (Continued)



Dimensions:

Length Overall	33′7″	Interior Width	91″
Width Overall	95″	Interior Height	77″
Height Overall	101″	Floor Height (Loaded)	22″
		First Step Height	12″

Step Riser	10″
Wheel Base	225″
Turning Radius	40′
RMC Vehicle Curb Weight	8400 lbs.*
Motorhome Vehicle Curb Weight	12,300 lbs.
Gross Vehicle Weight Rating	14,500 lbs.

Figure 3 – 33-ft. Motorhome

* An RMC is a base vehicle with no interior appliances, cabinets, plumbing or electric systems.

REVCON SPECIFICATIONS

CHASSIS SPECIFICATIONS — REVCON front wheel drive sub-frame with bolted interface to Revcon Main Frame (integral with body).

CHASSIS: (Main Frame) — Built by REVCON, Inc. 3″ x 6″ tubular rails electrically welded to die-stamped 14-gauge crossmembers and outriggers.

CHASSIS DATA

Wheel-Base	Front Tread Width	Rear Tread Width
27′ 174″	76″	80″
30′ 202″	76″	80″
33′ 225″	76″	80″

AXLES: Front capacity 5000 lbs. Rear capacity 10,000 lbs.

BRAKE SYSTEM: Power assisted by Bendix Hydraboost booster with dual (split) master cylinder to give separate front and rear systems and incorporating a proportioning valve for correct front/rear application.

BRAKES: REVCON front, disc type 12.25″ dia. x 1.25″ thick, total front swept area 257.76 sq. ins. BENDIX rear, drum type 12′ dia. x 3″ width.

Total rear swept area = 452.0 sq. ins.

WHEELS: Budd 16.5 dia. x 8.25 rim width (all) 8 studs on 6.5 dia. bolt circle. Front and rear and spare tire/wheel are all interchangeable for easy tire rotation in service.

TIRES: Front and rear - 10.00 x 16.5 load range D.

SUSPENSION SYSTEM: **Front:** REVCON independent with heavy-duty control arms featuring anti-dive, low camber change geometry torsion bars, anti-sway stabilizer bar, and heavy-duty gas/oil shock absorbers.

GENERAL INFORMATION (Continued)

SUSPENSION SYSTEM: **Rear Suspension:** Free rolling tandem axles. Walking Beam with Hendrickson suspension and heavy-duty shocks.

STEERING: Heavy-duty integral power-assisted steering gear, through a bellcrank and idler arm via tie rods, to wheel ends. Tilt wheel on column.

ENGINE: GM Chevrolet V8 454 cu. in. displacement, emissions certified for heavy-duty use in California and EPA.

Horsepower – 215 @ 3,400 rpm
Torque – 332 ft. lbs. @ 3.400 rpm.

DIESEL ENGINE: Isuzu 6 cylinder turbocharged 353 cu. in. displacement.
Horsepower – 160 @ 3200 rpm
Torque – 289 ft. lbs. @ 2000 rpm.

TRANSMISSION: 3-speed turbo hydramatic with transmission oil cooler.
Ratios:
1st gear 2.48 to 1
2nd gear 1.48 to 1
3rd gear 1.0 to 1
Reverse 2.08 to 1

TRANSFER CASE: Morse Borg-Warner (Chevrolet with 1:1.11 ratio) Diesel 1:1 ratio.

FINAL DRIVE: Dana Model 70 axle with 3.73:1 ratio. With engine and transmission in high gear, final ratio is 3.35 (Chevrolet); 3.73 (Diesel).

Note:

FUEL TANK: 63 U.S. gallons capacity. Certified to CA Air Resources Board of Emissions Compliance.

RADIATOR: Heavy-duty cross flow, with integral engine and transmission intercoolers.

ELECTRICAL SYSTEM: 12-volt negative ground systems.
Wiring: Heavy-duty all wiring is modern vinyl-insulated stranded copper, run in loom or as cable to prevent chafing. Combination circuit breaker system and fuse system.

BATTERY: 500 cold cranking Amps maintenance free.

ALTERNATOR: 60 amp (as supplied with GM engine).

INSTRUMENTS: Non-glare reflective. Includes the following: 1. Speedometer 2. Tachometer. 3. Fuel Gauge. 4. Water Temperature Gauge. 5. Voltmeter. 6. Oil Pressure Gauge. 7. Vacuum Gauge. 8. Transmission Temperature Gauge.

WARNING SYSTEMS: Included: 1. Parking Brake Warning Light. 2. Brake Failure Sentinel Light. 3. Turn Signal Indicators. 4. High Beam Indicators. 5. Emergency Flashers.

BODY SPECIFICATIONS:

Body Shell – Monocoque riveted aircraft aluminum structure.

Frame & Stringers – Heat-treated, stretch-formed aluminum.

Exterior Skin – Heat-treated, high-tensil strength, load-bearing aircraft aluminum.

Floor – 3/4" exterior 5-ply fir, grade A-C. Sealed and waterproofed on the bottom and edges.

Heating System – Automotive-type, rated at 16,000 BTU's, with three-speed fan.

Bumpers – Front and rear wrap-around bumpers at 20-inch height.

Windshield – 1/4-inch laminated safety plate glass meet-SAE standards.

Windshield Washers – Electric operated, with reserve reservoir.

Windshield Wipers – Two (2) heavy-duty electric-powered wipers.

Engine Service Access – There is a service hatch over the engine, next to the driver that is detachable for engine service, and a front engine access hood for checking fluid levels and minor service items.

Horn – Dual 12-volt, circuit-breaker protected.

Exterior Lighting – Includes headlights, clearance lights, taillights, stoplights, marker lights, back-up lights, emergency flashers, turn signal lights, and reflectors.

Mirrors – All mirrors meet federal and SAE specifications. A convex high-visibility mirror is provided for additional safety.

IMPORTANT INFORMATION ON VEHICLE LOADING

Overloading

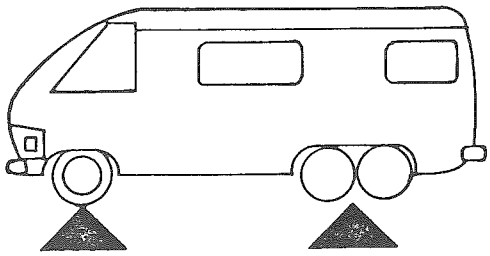
CAUTION: the components of your vehicle are designed to provide satisfactory service if the vehicle is not loaded in excess of either the Gross Vehicle Weight Rating (GVWR) or the maximum front and rear Gross Axle Weight Ratings (GAWR's). These ratings are listed on the Vehicle Identification Number (VIN). This plate is located on the side panel next to the driver's seat.

Overloading can result in loss of vehicle control and personal injury either by causing component failures or by affecting vehicle handling. It can also shorten the service life of your vehicle.

Your dealer can advise you of the proper load conditions for your vehicle. The use of selected heavier suspension comonents for added durability purposes does not increase any of the weight ratings printed on the VIN Plate and/or Vehicle Certification Label.

LOADED -- MAXIMUM GVWR: 14,500 LBS.

FRONT GAWR: 5,000 LBS. REAR GAWR: 10,000 lbs.



*Front Curb	4000 lbs.	*Rear Curb	6500 lbs.
Front Cargo & Pass. Load	700 lbs.	Rear Cargo & Pass. Load	1500 lbs.
	4700 lbs.		8000 lbs.

TOTAL WEIGHT AT GROUND: 12,700 LBS.

* Curb weight equals the weight of the vehicle without driver, passenger or cargo, but including fuel and coolant.

EXAMPLE ONLY

Figure 4 — Vehicle Weight Illustration

Maximum Front And Rear Axle Weights

The weight of the cargo load must be properly distributed over both the front and rear axles. The VIN Plate and/or Certification Label shows the maximum weight that the front axle (front GAWR) can carry. It also shows the maximum weight that the rear axle* (rear GAWR) can carry. The GVWR represents the maximum permissable loaded weight of the vehicle and takes into account the engine, transmission, frame, springs, brake, axle and tire capabilities. Actual loads at the front and the rear axles can only be determined by weighing the vehicle. This can be done at highway weigh stations or other such commercial places. Consult your dealer for assistance. The cargo load should be distributed on both sides of the centerline as equally as possible.

*IMPORTANT NOTE: The rear axle is a Tandem Axle pivoted in the center. The weight to the axles is distributed evenly over the front axle and rear axle of the tandem. The gross weight rating of the rear is the total capacity of all four rear wheels and the tandem assembly complete.

Effect on Warranty

Your New Vehicle Warranty does not apply to any part of your vehicle "which has been subject to misuse." Any part which fails because of overloading has been subject to misuse.

(VIN) Vehicle Identification Number Plate And/Or Certification Label

Your VIN Plate and the Certification Label shows the GVWR and the front and rear GAWR's for your vehicle.

Gross Vehicle Weight (GVW) is the weight of the originally equipped vehicle and all items added to it after it has left the factory. This would include bodies, winches, booms, etc.; the driver and all occupants; and the load the vehicle is carrying. The GVW must not exceed the GVWR. Also, the front and rear gross axle weights must not exceed the front and rear GAWR's.

EXAMPLE ONLY

MFD BY **REVCON INCORPORATED**
KALAMA RIVER RD. FOUNTAIN VALLEY, CA 92708

MO./YR. OF MFG. _____ TYPE VEHICLE M.P.V.

GVWR 13,000 LBS. WITH 9.50X16.5 LT. (D) TIRES, 16.5X8.25 RIMS AT 55 PSI COLD. MAX SPEED 65 MPH.

GAWR FRONT 5,000 LBS. WITH 9.50X16.5 LT. (D) TIRES,16.5X8.25 RIMS AT 55 PSI COLD. MAX SPEED 65 MPH.

GAWR REAR TOTAL 9,000 LBS. WITH 9.50X16.5 LT (D) TIRES, 16.5X8.25
*ALL AXLES, 4,500 # EACH RIMS AT 55 PSI COLD. MAX SPEED 65 MPH.

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE AS SHOWN ABOVE.

VIN _____ SERIAL NO. _____

Figure 5 — Vehicle Identification Plate

CAUTION: Luggage or other cargo should be secured in place. This will help keep such things from being thrown about and injuring people in the vehicle in an accident.

Tires

The tires on your vehicle must be of the proper size and properly inflated for the load which you are carrying.

The Vehicle Certification Label shows the originally equipped tire size and recommended inflation pressures.

BEFORE DRIVING YOUR REVCON

DRIVER DAILY CHECKLIST

Before Entering Vehicle

Be sure you know your vehicle and its equipment and how to use it safely.

1. See that windows, mirrors, and lights are clean and unobstructed.
2. Check tires for proper pressure, and inspect for damage.
3. Check that all outside lights work.
4. Look for fluid leaks.
5. Be sure everything is properly stowed.
6. Check that area to rear is clear if about to back up.

Before Driving Off

1. Lock all doors.
2. Check that all windows and vents are in suitable position for travel.
   See "Engine Exhaust Gas Caution (Carbon Monoxide) on page 10.
3. Position seat.
4. Check adjustment of inside and outside mirrors.
5. Check that warning bulbs light when key is turned to "Start,"
6. Check all gauges (including fuel, if so equipped).
7. Fasten seat belts.
8. With engine running, check that warning lights are now out.
9. Release parking brake.

See body or motor home manufacturer's information for additional items that may require checking.

Guard Against Theft

For tips on how to protect your vehicle and its contents, see the "Steering Column Controls" section of this manual.

KEYS

The key code is stamped on the "knock out" plug in the key head.

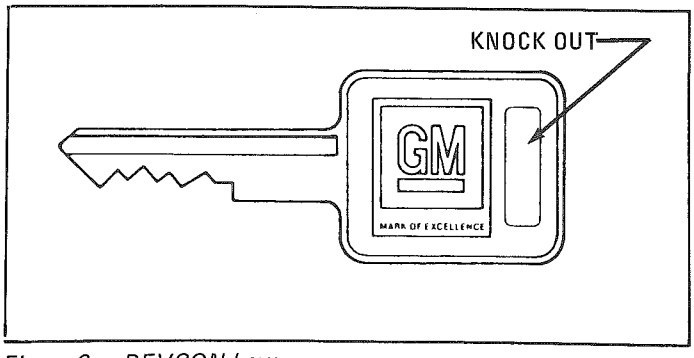


Figure 6 – REVCON keys

For Vehicle Security:

Record key code number; then knock plug out of key.

Keep the key code in a safe place such as your wallet, NOT IN THE VEHICLE.

If the key code plug has been removed or lost, the key code number can be supplied by your dealer. It has also been recorded at REVCON, Inc.

If the original key is lost, duplicates can be made using the key code. Contact any GM dealer or a locksmith.

If you park in an attended lot, separate and leave your square-headed ignition key only.

OUTSIDE REARVIEW MIRROR

Adjust the outside mirror so you can just see the side of your vehicle in the side of the mirror closest to the vehicle. This helps you determine your relation to objects seen in the mirror.

CONVEX MIRROR

Your vehicle may have an optional convex outside rear view mirror. (A convex mirror has a curved surface.) Adjust the convex mirror so you can just see the side of your vehicle in the portion of the mirror closest to the vehicle. This type of mirror is designed to give a much wider view to the rear, and especially of the lane next to your vehicle. However, cars and other objects seen in a convex mirror will *look* smaller and farther away than those seen in a flat mirror. Therefore, use care when judging the size or distance of a car or object seen in this convex mirror. Use your inside mirror to determine the size and distance of objects seen in the convex mirror.

TRAILER TOWING

Since this vehicle is designed and intended to be used mainly as a load carrying vehicle, towing a trailer will affect handling, durability and economy. Your safety and satisfaction depend upon proper use of correct equipment. Also, you should avoid overloads and other abusive use.

The maximum loaded trailer weight you can pull with your vehicle is 2000 lbs. (Class 1 hitch.)

CAUTION: Do not try to tow a trailer over 2000 pounds gross trailer weight no matter what trailer towing equipment is installed. This could seriously affect your vehicle's performance, durability, or handling, and could result in personal injury.

TIRES

When towing trailers on dead-weight hitches, inflate tires to the pressures shown on the Certificate Label affixed to this vehicle or, if applicable, on the "Tire Inflation Pressure" charts (see page 102).

It should be remembered that when a trailer is connected, the trailer tongue weight is part of the load being carried by the vehicle and, therefore, is included in the GVW of the vehicle.

TRAILER TOWING (Continued)

MAINTENANCE

More frequent service is required when using your vehicle to pull a trailer.

Refer to the Maintenance Schedule for Automatic Transmission Fluid, Engine Oil, and Rear Axle Lubricant change requirements for trailering.

Frequently, check to be sure that all trailer hitch bolts and nuts are tight. Also, check the Maintenance Schedule in this manual for important instructions on belts, cooling system care, and brake adjustment.

BREAK-IN SCHEDULE

See the new vehicle break-in instructions in this manual (page 11). Also, we recommend you drive your new vehicle for 500 miles (800 kilometers) before trailer towing.

TRAILER TOWING CAUTIONS

Brakes – To avoid towing and/or driving problems due to poor braking action, observe these precautions:

Trailer brakes of adequate size are required on trailers over 1000 pounds (450 kilograms) loaded weight.

If you use trailer brakes with your REVCON, follow the installation and balance instructions of the trailer brake manufacturer.

Do not tap into the REVCON brake system if the trailer brake system uses more than 0.02 cubic inch (0.3 centimeters) of fluid from the vehicle's master cylinder. In this case, the REVCON's brake fluid capacity will not be enough to operate both the REVCON and the trailer brakes under all kinds of use.

All brake fluid parts must be able to stand 3000 psi (20 685 kPa). The brake fluid tap must be made to the master cylinder port supplying fluid to the rear brakes. Copper tubing is subject to fatique failure and must not be used.

Hitches – To avoid towing and/or driving problems due to sway caused by such things as crosswinds, big trucks passing or road roughness, or due to separation of the trailer, observe these precautions:

Excessive tongue weight on the trailer hitch can change the weight distribution of the REVCON and the trailer combination as a whole as the REVCON is a front-wheel-drive vehicle. This can cause control problems. To avoid these problems, observe these recommendations:

Don't tow trailers in excess of 2000 pounds.

ENGINE EXHAUST GAS CAUTION (CARBON MONOXIDE)

Avoid breathing exhaust gas because it contains carbon monoxide, which by itself has no color or odor. It is a dangerous gas. Carbon monoxide can cause unconsciousness and can be lethal.

If at any time you think that exhaust fumes are entering the vehicle, have the cause determined and corrected as soon as possible. If you must drive under these conditions, drive only with ALL windows fully OPEN.

The best way to protect against carbon monoxide entry into the vehicle body is to keep the engine exhaust system, vehicle body, and body ventilation system properly maintained. We recommend that the exhaust system and body be inspected by a competent mechanic:

Each time the vehicle is raised for oil change.

Whenever a change is noticed in the sound of the exhaust system.

Whenever the exhaust system, underbody, or rear of the vehicle is damaged.

WARNING: Do not run the engine in confined areas such as garages any more than needed to move the vehicle in or out.

Special care should be taken to prevent the chance of carbon monoxide exposure if a change is made to the vehicle or other equipment is added for recreational or other usage. Also, some recreational vehicle appliances, such as lights, refrigerators, stoves, or heaters, may also give off carbon monoxide. These appliances should be used only if there is enough ventilation.

SITTING IN A PARKED VEHICLE WITH THE ENGINE RUNNING FOR A LONG TIME IS NOT RECOMMENDED.

TRAILER TOWING (Continued)

Keep the trailer tongue load at 10% of the loaded trailer weight for hitches. Tongue loads can be adjusted by proper distribution of the load in the trailer. This can be checked by weighing separately the loaded trailer and then the tongue.

Do not use axle mounted hitches. They can damage the axle housing, wheel bearings, wheels, or tires.

When you remove a trailer hitch, be sure to seal any mounting holes in the body. This will help prevent entry of exhaust fumes, dirt, or water.

OPERATION OF YOUR REVCON IN FOREIGN COUNTRIES. Your engine is designed to run on unleaded gasoline with an octane rating of about 91. If you plan to drive your vehicle outside the U.S. and its jurisdictions or Canada, there is a chance the gasolines available in some countries will not meet the needs of your engine. Low octane rated gasolines may cause engine knocking or serious engine damage for which REVCON is not responsible.

STARTING AND OPERATING

NEW VEHICLE "BREAK-IN" PERIOD

You can drive your new REVCON from its very first mile (kilometer) without a formal "break-in" schedule. However, there are things you can do during the first few hundred miles of driving that will add to the future performance and economy of your vehicle.

We recommend you limit your speed during the first 500 miles (800 kilometers) to a maximum of 55 mph (90 km/h); but do not drive for long periods at any one constant speed, either fast or slow. During this time, avoid full throttle starts and, if possible, avoid hard stops especially during the first 100 miles of driving.

Also, always drive at moderate speeds until the engine has completely warmed up.

If you plan to use your new vehicle for trailer towing, see additional information on page 9.

GUARD AGAINST THEFT

Your new REVCON has many features to help prevent theft of the vehicle itself, its equipment, and contents. But, these anti-theft features **depend upon you** to work.

The time to be most on guard is when leaving your REVCON.

- Park in a lighted spot when you can.
- Lock the ignition and take the keys. (If you must leave a key with the vehicle, leave the square-head key only. Take the other key with you. This will help prevent illegal entry into your vehicle at a later date.)
- Fully close all windows and lock all doors.
- Keep costly items out of sight. (Never leave things of value in plain sight on seat or floor.)

IGNITION SWITCH

The ignition switch is located on the steering column on the right hand side. The switch has four positions:

ACC — For operating accessories only.
OFF — Turns off engine and accessories.
ON — For normal operation after engine has started.
START — Used only when starting engine. When released, switch returns to "ON."

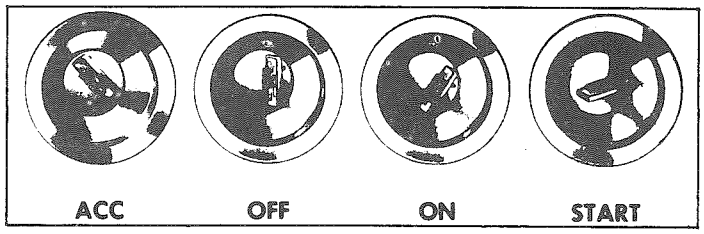


Figure 7 — Ignition Switch Positions

PARKING

When leaving your REVCON unattended:

- Firmly apply the parking brake first. (See "Parking Brake," page 13.) Do not use the transmission as a substitute for the parking brake.
- Place the automatic transmission shift lever in "PARK."
- Turn the ignition key to "OFF."
- Remove the key.
- Close all windows and secure all doors.

NOTE: If you do not apply the foot parking brake, a warning buzzer will sound when the gearshift lever is put into "PARK." This buzzer will not go off until the foot parking brake is applied, even if the ignition switch is in the "OFF" position.

TURN SIGNAL LEVER

The turn signal lever is on the left side of the steering column.

- **TURN SIGNAL** - Move the lever up to the second stop to signal a right turn. Move it down to the second stop to signal a left turn. When the turn is completed, the signal will cancel and the lever will return to horizontal.

- **LANE CHANGE SIGNAL** - In some turns, such as changing lanes, flash the signal. You can flash the turn signal by moving the lever part way (to the first stop) and holding it there. The lever will return to horizontal when you release it.

  NOTE: A green light on the instrument panel flashes to tell you that the front and rear turn signal lights are working. If the light stays on, but does not flash, check for burned-out bulbs. If the green light does not light when the lever is moved, check the fuse and indicator bulb. The turn signal lever also contains the Cruise Control switch (see "Cruise Control," page 16, in this section).

STARTING THE ENGINE

1. Apply the parking brake. (Be sure to release the parking brake before driving off.)
2. Place the transmission shift lever in "PARK" or "N" "PARK" preferred). A starter safety device is designed to prevent starter operation while the shift lever is in any

STARTING THE ENGINE (Continued)

drive position. (If you need to re-start the engine while the vehicle is moving, place the shift lever in "N."

3. Start the engine as outlined below for different conditions.

NOTE: Do not keep the starter engaged for more than 15 seconds at a time. Wait 10 to 15 seconds before trying again.

- **Cold engine** - Press the accelerator pedal to the floor and slowly release it. With your foot off the pedal, crank the engine by turning the ignition key to "START." Release key when engine starts.

If the engine starts, but fails to run, repeat this procedure. When the engine is running smoothly (about 30 seconds), you can reduce the engine idle speed by pressing down slightly on the accelerator pedal and then slowly releasing it.

NOTE: Extended running of the engine (5 minutes or more) without pressing down the accelerator pedal could cause damage to the engine and exhaust system due to overheating. Do not leave your vehicle unattended with the engine running. If the engine should overheat you would not be there to react to the temperature warning gauge. This could result in costly damage to your vehicle and its contents.

- **Warm engine** - Do not press down the accelerator pedal. With your foot off the pedal, crank the engine by turning the ignition key to "START." If crank time exceeds three seconds, press down the accelerator pedal to 1/3 of its travel while cranking. Release key when engine starts.

- **Very cold weather (below 0°C) or after vehicle has been standing idle several days** - Before cranking the engine, fully depress and release the accelerator pedal one or two times more than for the "Cold engine" start. Then, with your foot off the accelerator pedal, crank the engine by turning the key to "START." Release key when engine starts.

IF ENGINE FAILS TO START

1. Fully depress and release the accelerator pedal several times: then remove foot from pedal and crank the engine by turning the key to "START."
2. If the engine still does not start, press the accelerator pedal to the floor and hold it there while cranking the engine. This should clear any flooding condition.
3. If the engine has been flooded with too much fuel (as will be apparent from step 2 above), it may start to run but not have enough power to keep running. If this is the case, continue cranking with the accelerator fully depressed until the engine clears itself of excess gasoline and runs smoothly.

AUTOMATIC TRANSMISSIONS

After starting the engine with the selector lever in N (Neutral) or P (Park) position, select the range desired (see table) and depress the accelerator. A gradual start with a steady increase in accelerator pressure will result in best possible fuel economy. Rapid acceleration for fast starts will result in greater fuel consumption.

Automatic transmission shift quadrants of all REVCON vehicles continue the uniform sequence of selector positions. This particulary benefits multi-vehicle families and those who occasionally drive other vehicles. Shift indicators are arranged with "Park" position at one end, followed in sequence by "Reverse," "Neutral," and the forward driving ranges. All automatic transmissions are equipped with a starter safety switch designed to permit starting the engine only when the transmission selector is in the"Park" or "Neutral" position. For additional engine braking effect, as sometimes needed in mountainous driving, place the transmission in an intermediate or low range.

AUTOMATIC TRANSMISSION	
P PARK	Use only when vehicle is stopped, after parking brake is set.
R REVERSE	For backing vehicle – from stop.
N NEUTRAL	For standing (brakes applied).
3 D DRIVE	For forward driving. Depress accelerator to floor for extra acceleration below 65 mph (100 km/h); depress accelerator halfway at speeds below 30 mph (50 km/h).
2 S SECOND GEAR	For driving in heavy traffic or on hilly terrain. Shift into S at any speed. The transmission will shift into second gear and remain in second until the vehicle speed or throttle are reduced to obtain first gear operation in the same manner as in D range. S range position prevents the transmission from shifting to 3rd gear.
1 L LOW	For hard pulling through sand, mud, and snow, and for climbing or descending steep grades. Shift into L at any vehicle speed. Depending on the axle ratio of the vehicle, the transmission will shift to second gear at any speed above approximately 40 mph (60 km/h) and will shift to 1st gear as speed is reduced below 40. L range position prevents the transmission from shifting out of 1st range.

NOTE: The following practices could result in automatic transmission failure:

- Shifting between forward and reverse driving range while operating the engine at high speed or heavy throttle, such as when the driving wheels are on snow or ice - - commonly called "rocking."

- Shifting to Reverse ("R") or any forward range while operating the engine at high speed in Neutral ("N").
  Operating the transmission at or near "stall" condition for periods of more than 10 seconds. (Stall condition is when the engine is running at high speed while the transmission is in a driving range and the driving wheels aren't moving, such as when stuck in deep sand or when the vehicle is against a fixed barrier.)

- Holding vehicle on an upgrade with the throttle. (Use the regular brakes to hold vehicle on an uphill grade.)

NOTE: This vehicle is equipped with a cluth-type fan. An increase in noise level occurs when the clutch engages and may cause the sensation that the transmission is slipping.

GENERAL INFORMATION (Continued)

CAUTION: Before going down a steep or long grade, reduce speed and shift the transmission into a lower gear or lower range to control vehicle speed. Try not to hold the brake pedal down too long or too often. This could cause the brakes to get hot and not work as well.

DRIVING ON SLIPPERY SURFACES

Take care when on slippery surfaces, especially when speeding up or when shifting into lower gear. Sudden acceleration or engine braking action (due to shifting to a lower gear) could cause the front wheels to skid.

POWER STEERING

If the power steering system goes out because the engine has stalled or due to failure, the vehicle may still be steered. However, much greater effort is required, especially in sharp turns or at low speeds.

TILT STEERING WHEEL

The steering wheel can be tilted up above normal position to provide additional room for entrance and exit as well as many different selected driving positions. The tilt mechanism is located on the left side of the steering column just behind the directional signal. To operate, pull the lever towards you and move the steering wheel to your desired position; then release the lever. This permits individual selection for the most comfortable positions for all driving conditions. On longer trips, the steering wheel position may be changed to help minimize tension and fatique.

HAZARD WARNING FLASHER

NOTE: Operation of the hazard warning flasher is covered on page 18.

HORN

The horn on your vehicle is actuated by firmly pressing on the pad in the center of the steering wheel. Use of the horn should be kept at a minimum. However, should it ever become necessary to give a warning to a pedestrian or another motorist, use it.

FLOOR CONTROLS

BRAKING SYSTEM

The regular braking system is designed for braking performance under a wide range of driving conditions even when the vehicle is loaded to its full rated vehicle load.

CAUTION: Driving through water deep enough to wet the brakes may cause the brakes not to work as well, As a result, the vehicle will not slow down at the usual rate, and it may pull to the right or left. After checking to the rear for other vehicles, apply the brakes lightly to check whether this has happened. To dry them quickly, lightly apply the brakes. At the same time, keep a safe forward speed, with plenty of clear space ahead, to the rear, and to the sides. Do this until the brakes return to normal.

POWER BRAKES

- If power assist is lost because of a stalled engine or other reasons, the brakes can normally still be applied with power assist at least two times using reserve power.
- The system is designed to bring the vehicle to a full stop on reserve power if the brake pedal is applied once and held down. However, the reserve power is partly used up each time the brake pedal is applied and released. Do not pump the brakes when brake power assist has been lost, except when needed to maintain steering control on slippery surfaces.
- Without power assist, the vehicle can still be stopped by pushing much harder on the brake pedal. However, the stopping distance may be longer, even though the brakes themselves remain fully operational.

ADJUSTING BRAKES

- The only brakes that need periodical adjustment are the rear on some models. These are not self-adjusting and should be adjusted at least every 6000 miles and sooner if heavy usage occurs. They should be adjusted only by a skilled service mechanic.
- The front disc brakes adjust themselves each time the brakes are used.
- If the brake pedal goes down farther than normal it may be due to a lack of adjustment, or loss of hydraulic fluid. Proceed with utmost care to the nearest service establishment and have the brakes adjusted and the hydraulic system checked for leaks and correct functioning. See page 114 for service and adjustment functions.

NOTE: "Riding the brake" by resting your foot on the brake pedal when not intending to brake can cause overheated brakes. This can wear out the brake linings faster and damage the brakes themselves, as well as waste fuel.

PARKING BRAKE

The parking brake control is on the left of the steering column, under the instrument panel and is foot operated. The release lever is just above the pedal. The pedal is connected to a warning light system and buzzer.

- To set the parking brake, push the pedal all the way down.
- For better holding power, first press down the regular brake pedal. Then hold it while setting the parking brake.
- To release the parking brake pull the release lever.
- Never drive the vehicle with the parking brake set as this may overheat the rear brakes, reducing their effectiveness and causing excessive wear or damage.

NOTE: The parking brake should be set first whenever leaving the driver's seat. If the vehicle is parked on a grade and the transmission selector lever is placed in "PARK" before the parking brake is set, the weight of the vehicle may exert so

FLOOR CONTROLS (Continued)

much force on the parking pawl in the transmission that it may be difficult to pull selector lever out of "PARK." This condition is called "torque lock." To prevent this, the parking brake should be applied BEFORE moving the selector lever to "PARK." When preparing to move the vehicle, the selector lever should be moved out of the "PARK" position BEFORE releasing the parking brake. It is good driving practice to set the parking brake first, then release the transmission from "PARK," even on level surfaces. If "torque lock" does occur, it may be necessary to have another vehicle nudge this vehicle uphill to take some of the pressure off the transmission while the driver pulls on the transmission selector lever.

BRAKE PEDAL TRAVEL

If your vehicle has the Hydro-Boost Brake System, brake pedal travel is slightly different from the brake pedal travel on other vehicles. You can bring the vehicle to a full stop by applying normal force to the brake pedal. Although there is no need to push the pedal beyond the point where it stops, by applying more force you can push it the rest of the way to the floor. A slight hissing noise may be heard when the pedal is pushed beyond the normal travel. This extra brake pedal travel and hissing noise are normal.

HEADLIGHT BEAM CHANGER

"High" and "Low" headlight beams are controlled by the turn signal lever. The blue indicator lamp will light up when the high beams are in use. To dip or "hi-beam" the headlights, pull the turn signal lever back toward the steering wheel and when you feel it "click", release it.

INSTRUMENT PANEL AND CONTROLS

INSTRUMENTS

The instruments, gauges and indicator lights conveniently grouped in the instrument cluster are designed to tell you at a glance many important things about the performance of your vehicle. The following information will enable you to quickly understand and properly interpret these instruments.

TACHOMETER

The tachometer is located to the left of the speedometer and is offered as a driving aid. It displays the R.P.M. of the engine (revolutions per minute). The peak performance of the 454-cubic-engine is at 3400 rpm. After this rpm has been obtained the horsepower and torque will drop down and the performance will decline. Do not exceed 4000 rpm except as an emergency measure. Prolonged running of the engine over 4000 rpm could cause severe damage. An adjustable pointer is sometimes fixed to the center of the tachometer dial. Set this pointer at 4000 rpm as a reminder to change gears when low or second gear is used for hill climbing.

Never change to a high gear when descending a steep hill in low or second gear unless it is safe to do so, regardless of rpm.

SPEEDOMETER

The speedometer indicates the miles per hour and the odometer in the top half of the speedometer indicates the accumulated mileage.

NOTE: It is a federal offense to disconnect a mileage odometer or change the accumulated mileage to read less miles than the vehicle has done.

BRAKE SYSTEM WARNING LIGHT

The regular brake is a dual system designed so that one part will provide some braking action if there is a loss of hydraulic pressure on the other part of the system. The system has a "Brake" light located in the instrument panel.

- To serve as a reminder, the "Brakes" light is designed to light while the parking brake is set and the ignition key is ON.
- The light is also designed to come on briefly during engine starting so you can check that the bulb is okay.
- Have the system repaired if the light does not come on during engine starting or when the parking brake is set.
- This warning light does not do away with the need for brake inspection and maintenance. The brake fluid level must be checked regularly.

If the light comes on and stays on when the ignition key is on, after the brake pedal has been firmly pushed down, it may mean that there is something wrong with one part of the brake system.

What to do:

1. Check that the parking brake has been released. If it has been released:
2. Pull off the road and stop carefully. And remember that:
   - Stopping distances may be longer.
   - You may have to push harder on the pedal.
   - The pedal may go down farther than normal.

Continued driving without getting it repaired could be very dangerous.

- There is also an "Apply Parking Brake" light next to the "Brakes" light on the dashboard. This light will come on and a buzzer will sound when the vehicle is put into "Park" gear until the Park Brake foot pedal is applied. Then the "Apply Parking Brake" light will go out and the "Brakes" light will come on. The "Brakes" light will go out when the ignition is turned off or to accessory. Failure of the switch to function correctly may also cause the "Brake" light to stay on.

3. Try out the brakes by starting and stopping on the road shoulder; then:
   - If you judge it to be safe, drive cautiously at a safe speed to the nearest dealer for repair or have vehicle towed to dealer for repair.

INSTRUMENT PANEL & CONTROLS (Continued)

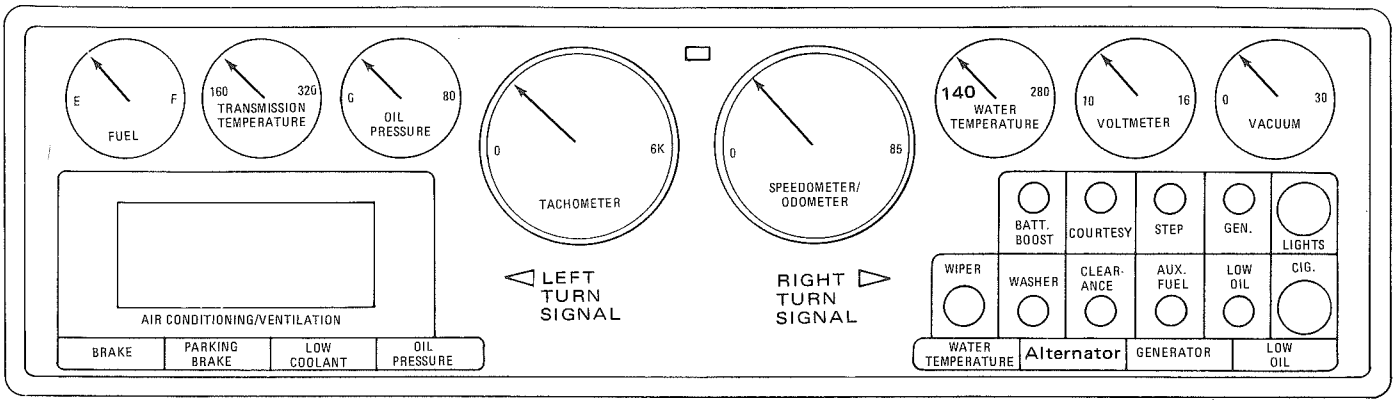


Figure 8 — Instrument Panel and Controls

VACUUM GAUGE

The vacuum gauge is offered not only as a tuning aid and diagnostic tool to your service mechanic, but also as a fuel economy driving aid. The higher the vacuum gauge reads the better your fuel economy during driving.

IMPORTANT NOTE- In your driving habits, train yourself to keep a good watch on all your gauges and warning lights. Not only will it improve your driving awareness, it may save you costly repairs! Or even help prevent an accident.

TRANSMISSION OIL TEMPERATURE GAUGE

The transmission oil temperature gauge indicates the oil temperature in the transmission oil pan and aids in determining frequency of oil changes. Under normal driving conditions the gauge will read 170°F to 220°F. Climbing a long hill on a hot day or towing a trailer will cause a higher reading. Consistent higher readings above 220°F will require more frequent oil changes. Avoid exceeding 320°F for long periods of time as the transmission oil deteriorates rapidly at 400° - 500°F and the transmission may be damaged.

VOLTMETER

The voltmeter indicates the automotive electrical system voltage. With engine not running and ignition switch "ON", the gauge will show 11 to 12-volts. Running the engine at fast idle with no electrical load, will cause a voltage indication of approximately 14 volts. Turning on the headlights and air conditioning will cause the voltmeter reading to decrease. A reading continuously far to the left or right indicates an electrical system failure. The cause of failure should be corrected.

ELECTRONIC OIL DIPSTICK (Optional)

The engine oil level may be checked before starting the engine and without raising the engine cover. To check the oil level the engine must be cold and the ignition "ON." Press the "Check Oil" toggle switch and hold. The light will come on, and then go out. Continue to hold down for 20 seconds. If light starts flashing, add a quart; if light does not flash, engine oil level is correct. A standard metal dipstick should be used periodically to confirm the accuracy of the electronic oil dipstick.

THERE ARE SEVERAL SWITCHES ON THE RIGHT SIDE OF THE DASH:

Low Oil Switch. This enables the checking of the engine oil level without using the more standard method of using the oil dipstick at the engine.

Auxiliary Fuel Switch. Flipping this switch to "M" causes fuel to be drawn from the main fuel tank. Moving the switch to "A" or "Aux. Fuel" causes the fuel to be drawn from the auxiliary fuel tank. The switch also makes the fuel gauge read the fuel level in the desired tank.

Clearance Switch. Depressing the switch shuts off the running lights to signal other drivers on interstate highways. Releasing the switch brings the lights back on.

Windshield Wiper and Washer Switches. Depressing the washer switch sprays water onto the windshield. The wiper control or the switch controls the dual windshield wipers.

Indicator Lights. The indicator lights are designed to come on to provide the driver with additional information:

1. **Low Oil** — The light is used with the low oil switch to check the engine oil level before starting the engine.
2. **Generator** — The light comes on when the auxilary powerplant (generator set) is operating.
3. **Alternator** — The light comes on when the ignition switch is in the "Run" position, but before the engine is started. After the engine starts, the light should go out and remain out. If the light remains on when the engine is running, have your authorized service center locate and correct the trouble.
4. **Water Temperature** — The light comes on to warn the driver that engine coolant has overheated and immediate action should be taken. See the "Engine Coolant" in "In Case of Emergency" paragraph on page 19.
5. **Oil Pressure** — The light will come on as the engine oil pressure drops below 6 psi. Occasionally, the light may flicker momentarily while the engine is running. The oil level should be checked and oil

INSTRUMENT PANEL & CONTROLS (Continued)

added if necessary. If light stays on continuously and gauge shows no pressure, stop engine immediately and determine cause and repair.

6. **Low Coolant** — The light will come on when the coolant level in the radiator coolant recovery bottle drops below the sensor probes in the bottle. The level in the bottle is lowest when the coolant is cold and rises as the engine warms up. Add water to the coolant recovery bottle if the light comes on.

LIGHT SWITCH

The three-position light switch controls the instrument lamps, headlamps, marker lamps, parking lamps, tail lamps, and interior lamp. Instrument light intensity can be varied by turning knob clockwise or counterclockwise. Full counterclockwise position turns on interior light in some models.

CRUISE CONTROL

The cruise control is also a part of the turn signal lever. To set the control, slide the finger control to the "on" position and at the desired cruising speed, push the button in the end of the lever. To change the speed higher, accelerate to the higher speed and push the button again. To lower the cruise speed, slide the control to "OFF" then "ON" and push the button to set at desired speed. The cruise control will automatically disconnect if the brakes are applied.

CRUISE CONTROL OPERATING INSTRUCTIONS

In the regulator box of your Speed Control is a safety switch which will not let the system operate until your vehicle is moving above a pre-selected low speed. At the factory this "low speed switch" is set to close between 27 and 33 mph; it should, however, be checked during the Road Test. The **Control Switch** is the switch you use to operate all features of the system described in the following paragraphs. It is installed where the turn signal lever is normally located and serves that purpose as well.

SET SPEED — On the control switch, move the slide button to the ON position and drive at any speed above 32 mph at which you want automatic control. Hold that speed with your foot while you press and release the SET/COAST button. One second after release, take your foot off the accelerator pedal. You can increase speed at any time with the accelerator pedal. When you release the pedal, you will return to the set speed.

ACCELERATION — Hold the slide button in the RESUME/ACCEL position and your vehicle will accelerate until you release it, then your vehicle will slow to your set speed and again control there. If you want to make the higher speed your new set speed, release the slide button when you reach the speed you want, and as you do, quickly press and release the SET/COAST button. Remember, you set speed as you release the button - not when you press it.

COAST — When you press and hold the SET/COAST button, you erase the set speed from the regulator's memory and allow the vehicle to coast. Just before you reach the lower speed you want, release the button and it will control there, providing it is above the low speed setting.

DISENGAGEMENT — Depress the brake pedal about an inch and you again are in control of the vehicle speed. You can also disengage the Speed Control by pushing the slide button to OFF, but this erases the set speed from the regulator's memory.

RESUME — When you disengage the system with the brake, you do not erase the set speed from the regulator's memory, even if you come to a complete stop. To return to your chosen speed, drive to a speed above 32 mph, then move the slide button to the RESUME/ACCEL position and release it. The Speed Control will take you back to your set speed and control there. If the rate of acceleration is faster or slower than you like, drive with the accelerator to a speed close to the set speed, then slide the button to the RESUME/ACCEL position and release it.

UNUSUAL CONDITONS — When the regulator is adjusted right, your selected speed should be held within plus or minus 4 mph so long as grades do not exceed 7% (most interstate highways). Since the Speed Control is vacuum operated, this speed range will widen as you drive at higher altitudes. Any opening of the throttle lowers the vacuum to some degree. A wide open throttle can drop the vacuum almost to zero. When you are pulling an extra heavy load, climbing a very steep hill, or bucking a severe head wind, a much wider than normal throttle opening is called for, but this drops the vacuum so low that the throttle is deprived of the strength it needs to hold speed. The way to handle these once-in-a-while problems is to bring the vehicle up to speed with the accelerator pedal - and then let the Speed Control take over again.

OTHER CONTROLS AND FEATURES

There are several switches on the right side of the dash:

- **The Generator Switch** will stop or start the auxillary generator.
- **Battery Boost Switch.** If the automotive battery gets discharged to the point that it will not crank the engine, use the following procedure:

1. Start the auxiliary generator (it is cranked by the "house" batteries).
2. With the generator running depress the battery boost switch. (This will connect both the house and automotive batteries in parallel).
3. Start the automotive engine in the normal way.
4. Release the battery boost switch:
   - If the "house" battery will not start the generator and the automotive battery is able to start the engine. With the engine running, press the battery boost switch and then start the generator. When the generator is running, release the battery boost switch.

OTHER CONTROLS & FEATURES (Continued)

- If both batteries are discharged follow the "jump start" instructions in Section 3.
- **Step Switch** (where applicable). This switch will keep the electric entry step out or in and override the entry door switch.
- **Courtesy Light Switch.** This controls the courtesy lights installed by the entry door and under the dash.
- **Heater and Air Conditioner Controls.** The heater/air controls are located on the lower left side of the dash. Starting in 1983, these controls are to the right of the steering column.

AUTOMOTIVE HEATING & AIR CONDITIONING SYSTEM

The automotive heating and air conditioning system provides circulation of cool air during hot weather and warm air in cold weather. The system may be adjusted to dehumidify incoming air in cool, humid weather. Another feature of the system is that warm air may be directed at the driver and passenger side windows through the dashboard end outlets.

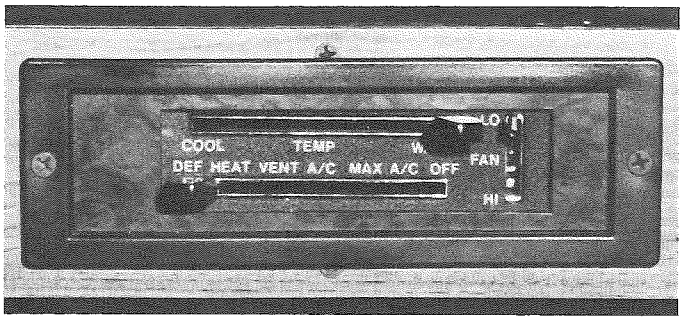


Figure 9 — Automotive Air Conditioner/Heater Controls

AIR OUTLETS — Air is directed through the two heater floor vents, the four dashboard vents and the defroster vents at the back of the windshield.

AIR CONDITIONING CONTROLS — The controls consist of a 3-speed fan switch, a sliding heater temperature lever, and a lever for selecting the type and source of air.

FOR COOLING: Move the bottom lever to either "MAX A/C" or "A/C." For maximum cooling or quick cool down, place this lever to "MAX A/C." This provides 100% recirculated air regardless of fan speed. Moving the lever to "A/C" provides 100% fresh air. The top temperature lever should be in "COOL" position for best cooling but may be moved to "WARM" for dehumified warm air. This dehumified warm air can be used to clear the driver's compartment windows in humid, rainy weather.

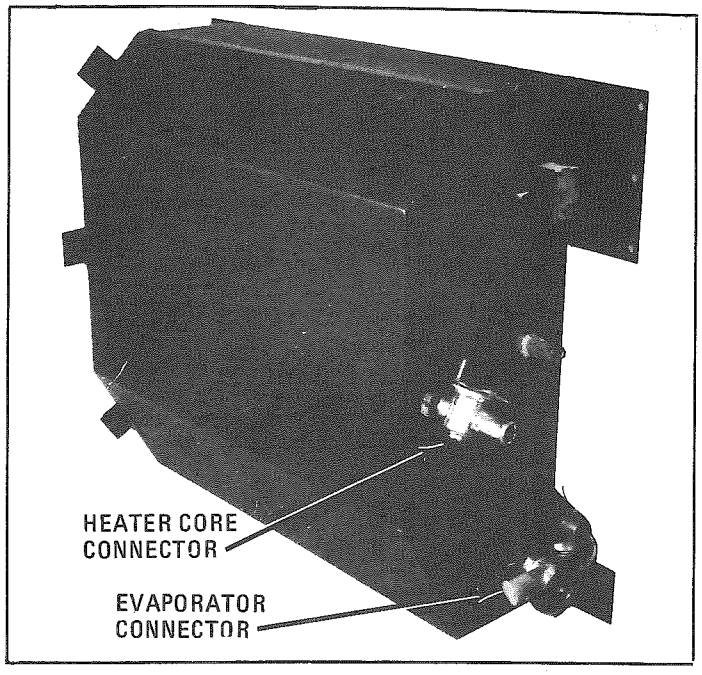


Figure 11 — Automotive Heater Core/Evaporator

FOR VENTILATING: With the bottom lever in "VENT" position, 100% fresh air enters the vehicle through the dashboard vents. Heat may be added to vent air by operating the top temperature lever. By redirecting the outboard vents to the side windows, these windows may be defogged with warm air.

FOR HEATING: Move the bottom lever to "HEAT" to bring heated air to the two heater floor vents. The top lever should be positioned for the desired air temperature and the fan switch moved for the proper air flow.

FOR DEFROSTING: Moving the bottom lever to "DEF" brings 100% fresh air to the defroster vents. Adjusting the top temperature lever and fan switch produces the desired temperature and air volume.

SERVICING HEAT/COOL UNIT — The blower assembly, heater core and evaporator may be individually removed from the case. These parts must be removed from forward of the firewall. Remove the sheet metal angle at the front top of the case. Take out the screws securing the front cover of the case (one screw is accessible from under the dashboard) and remove the cover. Disconnect the wires or hoses and slide out the defective part.

An adjustable A/C evaporator thermostat is mounted on the case in the passenger footwell. This control should be rotated fully clockwise.

The fresh air/recirculated air vacuum motor is also mounted on the heat/cool unit and is accessible from the front of the vehicle.

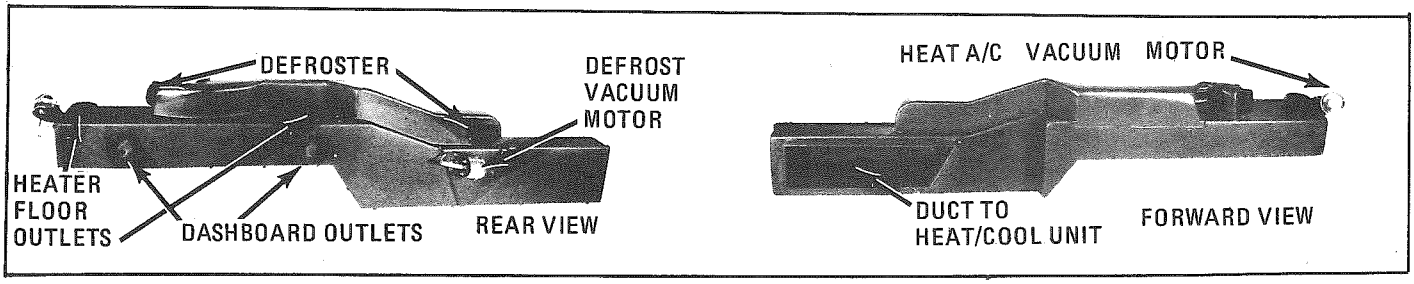


Figure 10 — Automotive Dash Air Conditioner Outlets

OTHER CONTROLS AND FEATURES (Continued)

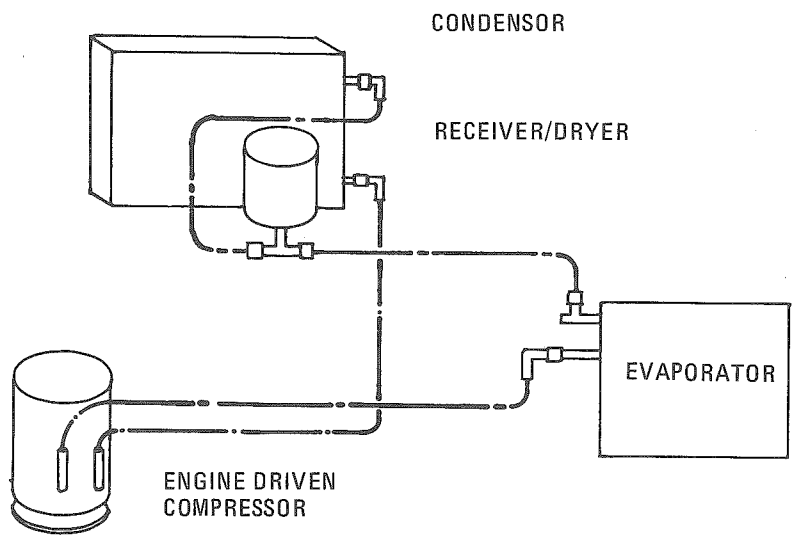
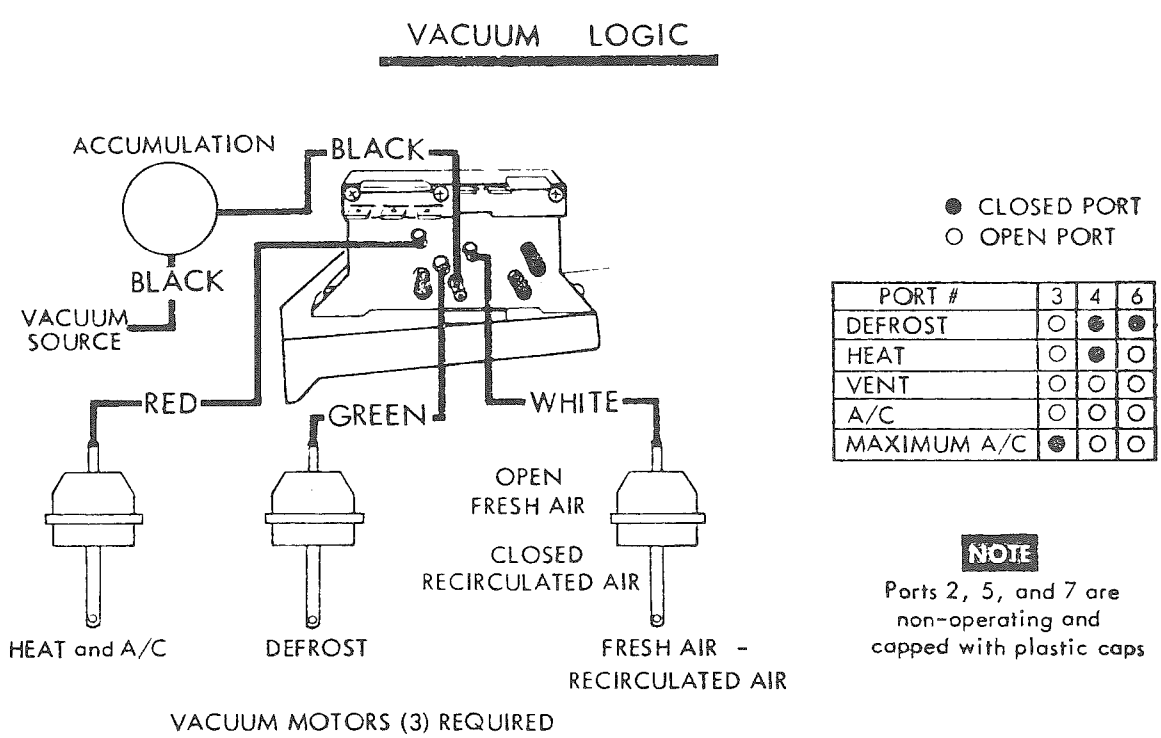


Figure 12 – Automotive Air Conditioning Hose Routing



PORT #	3	4	6
DEFROST	○	●	●
HEAT	○	●	○
VENT	○	○	○
A/C	○	○	○
MAXIMUM A/C	●	○	○

Figure 13 – Vacuum System Schematic for Automotive Air Conditioning/Heater System

IN CASE OF EMERGENCY

FOUR-WAY HAZARD WARNING FLASHER

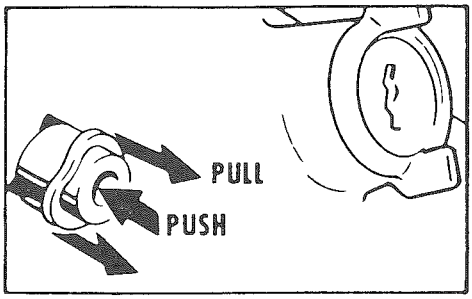


Figure 14 – Hazard Warning Flasher

Use the warning flasher to warn other drivers any time your vehicle becomes a traffice hazard, day or night.

Avoid stopping on the roadway if possible.

Turn on the hazard warning flasher by pushing in on the button (inside the collar) located on the column just below the steering wheel. The flasher will work with the ignition key either on or off.

The turn signals do not work when the hazard flashers are on.

If the brake pedal is depressed, the lights will not flash; they will stay on until the brake is released.

To turn off the flasher, pull the button collar out.

EMERGENCY STARTING

NOTE: Do not push or tow this vehicle to start it. Under some conditions, this may damage parts of the vehicle.

If your vehicle has a discharged battery, it can be started by using energy from another battery – a procedure called, "jump starting." Before resorting to jump starting, however, see information on the Battery Boost Switch on page 16.

JUMP STARTING (Use Only If Vehicle Cannot Be Started Using Battery Boost Switch)

CAUTION: Be sure to exactly follow the instructions given below or personal injury (particularly to eyes) or property damage may result from battery explosion, battery acid, or electrical (short circuit) burns.

THE MAJOR SAFETY PRECAUTION IS TO MAKE THE FINAL CONNECTION TO GROUND (a solid, stationary metallic object) on the engine at some distance from the battery. This helps reduce the chance of an explosion due to sparks.

To lessen the chance of an explosion, never expose the battery to open flames or electric sparks. Also, do not smoke near the battery. Batteries give off a gas which is inflammable and explosive.

To lessen the risk of injury in case an explosion does occur, wear eye protection or shield your eyes when working near any battery. Do not lean over a battery.

Do not allow battery fluid to contact eyes, skin, fabrics, or painted surfaces because battery fluid is a corrosive acid. Flush any contacted area with water immediately and thoroughly. Also, get medical help if eyes are affected.

To lessen the risk of a short circuit, remove rings, metal watch bands, and other metal jewelry. Also, do not allow metal tools to contact at the same time the positive battery terminal (or any metal connected to this terminal) and any other metal on either vehicle. Make certain when attaching the jumper cable clamps to the positive terminals of the batteries that neither clamp contacts any other metal.

This vehicle has 12-volt battery and a negative ground electrical system. Make sure that the other vehicle also has a 12-volt battery and that the negative terminal is grounded (attached to a metal part of the vehicle). Its owner's manual may give you that information.

CAUTION: If unsure of the other vehicle's voltage (or if the voltage and ground on the other vehicle are different from your vehicle), do not try to jump start as a personal injury or severe damage to electrical and electronic parts may result.

Position the vehicle with the good (charged) battery so that the jump starting cables will reach. Do not allow vehicles to touch.

Turn off all electric motors and accessories in both vehicles. Turn off all lights except those needed to protect the vehicle or light up the work area. Turn off the ignition; apply the parking brake firmly and put the automatic transmission in "PARK" (manual transmission in "NEUTRAL") in both vehicles.

If the discharged battery has filler caps, check the fluid level. (Do not check with an open flame and do not smoke.) Add clear drinking water to the proper level if low, and replace caps before jump starting. If the battery is a Delco sealed type, do not try to jump start the vehicle, or charge, or test the battery if the test indicator in the battery is bright or light yellow (see illustration). Instead, install a new battery.

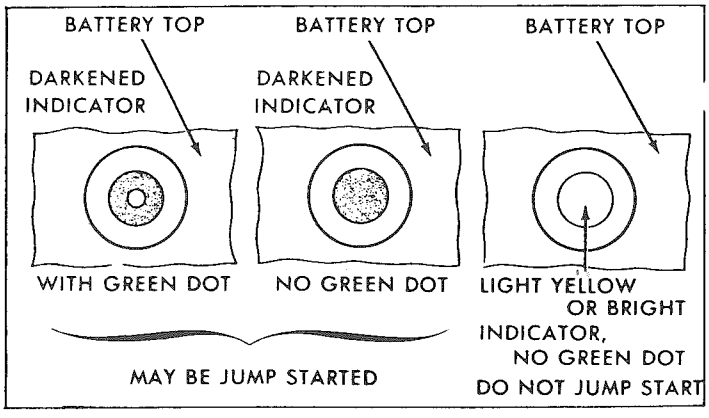


Figure 15 – Battery Charge Indication

For jumper cable connection instructions, see illustration. Make the connections in numerical order, as follows:

Connect the first jumper cable from the positive "+" (red) terminal on one battery to the positive "+" (red) terminal on the other battery. **NEVER** connect "+" (red) terminal to "-" (black), or "-" to "+".

IN CASE OF EMERGENCY (Continued)

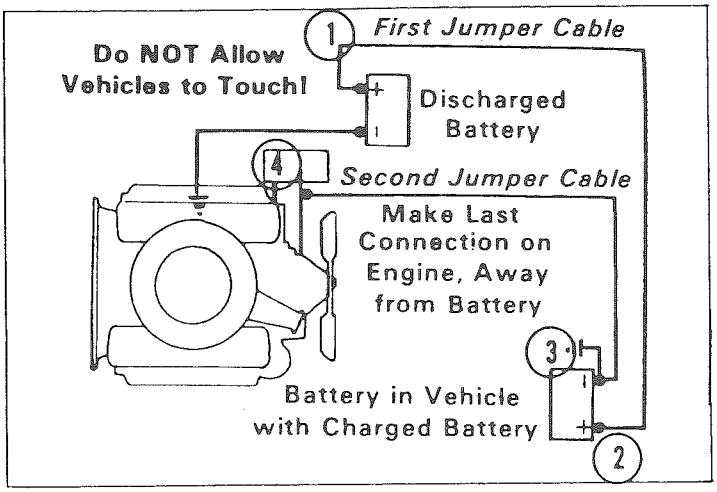


Figure 16 – Battery Jumper Cable Schematic

Next, connect one end of the second cable to the grounded negative "-" (black) terminal of the good (charged) battery.

Lastly, connect the other end of the second jumper cable to a solid, stationary, metallic point on the engine of the vehicle with the discharged battery but at a point away from the battery – 18 inches (450 millimeters) or more from the battery if possible. Do not connect it to pulleys, fans, or other parts that move. Don't touch hot manifolds which can cause severe burns. (The mounting brackets for the Delcotron generator, or the air conditioning compressor, generally make a good point for this final ground attachment. Take care that the jumper cable does not contact moving parts on or near the generator or compressor.)

Start the engine on the vehicle with the good (charged) battery and run the engine at a moderate speed.

Start the engine of the REVCON that has the discharged battery.

Remove the battery cables by reversing the above sequence exactly. Start by removing the last clamp first; that is, remove the jumper cable from the engine of the vehicle with the discharged battery as the first step.

ENGINE COOLANT

Your cooling system may overheat temporarily during severe operating conditions, such as:

Climbing a long hill on a hot day.
Stopping after high-speed driving.
Idling for long periods in traffic.
Towing a trailer.

If the coolant temperature gauge needle goes over 250°F and your air conditioner is on, turn it off. If the gauge shows over 250°F while stopped in traffic, place the transmission shift lever in Neutral ("N").

The water temperature warning light will also come on to indicate overheating.

If the temperature gauge needle doesn't start to drop within a minute or two:

Pull over to a safe place and stop the vehicle. Set the parking brake and shift to "Park."

DON'T TURN OFF THE ENGINE. INCREASE THE ENGINE IDLE SPEED until it sounds like it's going about twice as fast as normal idle speed. Bring the idle back to normal after two or three minutes.

If the temperature needle doesn't start to drop, NOW TURN OFF THE ENGINE and proceed as follows:

Open the engine hood. Look at the coolant level in the "see through" coolant recovery tank. The coolant level should be between the "Full Hot" and "Full Cold" marks on the tank. If the coolant appears to be "boiling," wait until it stops before proceeding further. (It should not be necessary to remove the radiator cap to check the coolant level, and it can be dangerous if the engine is still hot.

CAUTION: To help avoid the danger of being burned:
DO NOT REMOVE the coolant recovery cap while the coolant is boiling, and
DO NOT REMOVE the radiator cap while the engine and radiator are still hot.
Scalding fluid and steam can be blown out under pressure if either cap is taken off too soon.

If the coolant level is low:

Look for leaks at the radiator hoses and connections, heater hoses and connections, radiator, and water pump. See that the fan belts are not broken or off the pulleys, and that the fan turns when the engine is started.

Add coolant to the coolant recovery tank.

If the coolant level in the coolant recovery tank is at the correct level and the gauge needle is still in the warning zone, air may be trapped in the cooling system. This may prevent coolant from returning to the radiator. In this case, it may be necessary to add coolant directly to the radiator. (See page 28 for Coolant Replacement information.)

After the gauge needle is back to normal, resume driving at a reduced speed. Return to normal driving after about 10 minutes if the needle does not go back to the warning zone. Normal temperature for the coolant is 195° to 220°F.

JACKING

CAUTION: To reduce the possibility of personal injury:

Use this jack only for lifting vehicle during wheel changing.

Never get beneath the vehicle when supported by this jack.

Do not start or run the engine while vehicle is supported by this jack.

MODELS	JACKING POINT ON VEHICLE	
	FRONT	REAR
ALL	Chassis Sub-frame "Box"	Housing Near Wheel at Centre of Tandem Only

IN CASE OF EMERGENCY (Continued)

JACKING INSTRUCTIONS

Park on level surface and set parking brake firmly.

Set automatic transmission in "Park."

Turn on hazard warning flasher.

Remove any wheel opening cover, if equipped. Remove lug-nut decor caps.

Loosen, but do not remove, wheel nuts by rotating wrench counterclockwise.

NOTE: Capped chrome nuts can be damaged if wheel nut wrench is not fully seated on wheel nuts.

Locate jack beneath vehicle (base must sit flat).

Block front and back of wheel diagonally opposite jack position.

Pump jack up & down so tire just clears surface. (Always operate jack with a slow smooth motion.)

Replace wheel and slightly tighten wheel nuts. Wheel must be seated on hub.

Turn hydraulic release on jack to lower vehicle, then fully tighten wheel nuts in a criss-cross sequence.

Wheel nut torque should be set to specifications shown below.

WHEEL NUT TORQUE

CAUTION: When the Motor Home , or wheel, or fasteners are new, have a mechanic tighten wheel nuts with a torque wrench at 100, 1000, and 6000 miles (160, 1600, and 9600 kilometers). This precaution is necessary because the clamping system used on REVCON Motor Home wheels in some cases needs to seat before the fasteners will hold a uniform clamp load and remain fully tightened. Also have a mechanic tighten wheel nuts with a torque wrench as soon as possible after installing any wheel. In addition, nut tightness on all wheels should be set with a torque wrench every 6000 miles (9600 kilometers).

Use the correct torque listed for the type of wheels as shown in the table which follows. Wheel nuts should be tightened alternately and evenly to the correct torque in the sequence shown below. Never use oil or grease on studs or nuts. Improperly tightened wheel nuts could eventually allow the wheel to come off while the Motor Home is in motion, possibly causing loss of control. (Also see the caution in the Service and Maintenance section of this manual regarding the danger of mixing metric and customary fasteners.)

	DESCRIPTION	TORQUE
REVCON WHEELS	5/8" and 9/16" Bolts	Power Torque (all bolts) 110 - 140 ft. lbs. Hand Torque (all bolts) 140 - 160 ft. lbs.

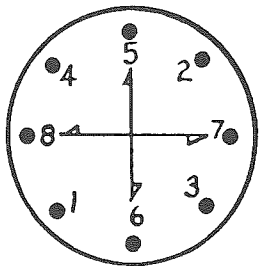


Figure 17 – Wheel Nut Torque Sequence

STOWAGE OF TIRE AND JACK

CAUTION: Always securely restow the spare tire assembly, all jacking equipment, and any covers or doors, using the means provided. This will help keep such things from being thrown about and injuring people in the vehicle in an accident.

TOWING YOUR REVCON

Proper equipment must be used to prevent damage to vehicles during any towing. State (Provincial in Canada) and local laws which apply to vehicle in tow must be followed. Get detailed towing instructions from your dealer.

Your vehicle may be towed on all six wheels, at speeds of less then 35 mph (60 km/h), for distances up to 50 miles (80 kilometers), provided the driveline and steering are normally operable. For such towing the steering must be unlocked, transmission in neutral, and the parking brake released. Connect to main structural parts of the vehicle. Do NOT attach to bumpers or brackets. Remember also that power brakes and power steering will not work when engine is "Off." REVCON does not recommend that the vehicle be towed in this manner.

If the vehicle is to be towed by a wrecker, use only equipment designed for this purpose following the instructions of the wrecker manufacturer. A safety chain system must be used for all towing. Your REVCON is provided with tow hooks at the front for lifting or towing. Please use them if lifting or towing is necessary.

FREEING VEHICLE FROM SAND, MUD, SNOW OR ICE

If your vehicle gets stuck in sand, mud, snow or ice, move the shift lever from Drive ("D") to Reverse ("R") in a repeat pattern. Apply a light pressure to the accelerator pedal while the transmission is in the "D" or "R" range. Remove your foot from the accelerator while shifting between ranges. Do not race the engine. For best traction, avoid spinning the wheels. Incorrect rocking of vehicle while stuck may result in damage to vehicle components.

CAUTION: Do not spin wheels faster than 20 mph (35 km/h). Personal injury and damage, including tire, transmission and/or front axle failure, may result from excessive wheel spinning.

If vehicle remains stuck after several rocking attempts, seek other assistance.

APPEARANCE CARE

CAUTION: Many cleaners may be poisonous or flammable, and their improper use may cause personal injury or damage the inside of the vehicle. Therefore, when cleaning the inside of the vehicle, do not use volatile cleaning solvents such as: acetone, lacquer thinners, enamel reducers, nail polish removers; or such cleaning materials as laundry soaps, bleaches or reducing agents (except as noted in the manufacturers cleaning instruction on stain removal.) Never use carbon tetrachloride, gasoline or naphtha for any cleaning purpose.

Because fumes are more dangerous in a small, enclosed space, be sure the vehicle is well ventilated while using any cleaning agent. Follow the manufacturer's advice in using such products.

CARE AND CLEANING OF INTERIOR TRIM

With the use of modern trim materials, it is VERY IMPORTANT that proper cleaning techniques and cleaners be used. Failure to do this on the first cleaning may result in water spots, spot rings, or setting of stains or soilage, all of which make it more difficult to remove in a second cleaning. If in doubt about cleaning interior items, ask your REVCON dealer's advice.

EXTERIOR

Frequent washing and a thorough cleaning after exposure are recommended to prevent damage to vehicle finish from calcium chloride and other salts, road tar, insects, tree sap, factory chemical and other foreign matter. Use either cold or lukewarm water. Never wash vehicle in the direct rays of the sun. Be very careful if you climb on the roof to stand on rivet "lines," where the reinforcement structure is attached to the outside skin, otherwise you may dent or damage the "stressed skin" of the vehicle.

UNDERBODY MAINTENANCE

Corrosive materials used for ice and snow removal and dust control can collect on the underbody. If these materials are not removed, accelerated corrosion (rust) can occur on underbody parts such as fuel lines, frame, floor pan, and exhaust system.

At least every spring, flush these materials from the underbody with plain water. Take care to clean well any areas where mud and other debris can collect. Sediment packed in closed areas of the frame should be loosened before being flushed.

If desired, your dealer can perform this service for you. Your dealer can also recommend additional underbody rust preventive materials which will help protect your vehicle from the corrosion.

SERVICE AND MAINTENANCE

CAUTION: As with any machine, care should be taken when making any check, doing any maintenance, or making any repair to avoid being injured. Improper or incomplete service could also lead to the vehicle itself not working properly which may result in personal injury, or damage to the vehicle or its equipment. If you have any question about carrying out some service, have the service done by a skilled mechanic.

REPLACEMENT FASTENERS

During vehicle maintenance, any fasteners used to replace older ones must have the same measurements and strength as those removed, whether metric or customary. (The numbers on the heads of metric bolts and on the surfaces of metric nuts show their strength. Customary bolts use radial lines to show this, while most customary nuts do not have strength markings.) Fasteners taken from the vehicle should be saved for re-use in the same spot when possible. Where a fastener cannot be used again, care should be taken to choose a replacement that matches the old one. For information and help, see your dealer.

CAUTION: This vehicle has some parts dimensioned in the metric system as well as in the customary system. Some of the fasteners are metric and are very close in dimension to well known customary fasteners in the inch system. Mismatched or incorrect fasteners can result in damage to the vehicle or possibly personal injury.

MAINTENANCE SCHEDULE

For owner convenience, a complete maintenance schedule will be found on the chart on page 29. It also briefly describes the safety, emission control, lubrication, and general service that your vehicle requires.

FUEL REQUIREMENTS

Your **Heavy Duty Emission Class Vehicle** engine is designed to operate on unleaded gasoline. It minimizes spark plug fouling and emission control system damage. **The engine requires Premium grade fuel.** If there is "knocking," a metallic rapping noise that sometimes happens during the combustion process, and the knocking persists, consult your dealer. Continuous or excessive knocking may result in engine damage. Failure to take steps to stop such knocking is misuse of the engine for which the manufacturing division is not responsible under the terms of the new vehicle warranty.

Use 91 octane rated unleaded gasoline meeting Federal Government regulations. The Federal Government specifies the minimum octane number of unleaded gasoline. Federal regulations require that pumps delivering such gasoline be labeled with the words: UNLEADED – MINIMUM 91 OCTANE RATED GASOLINE TO BE USED.

ENGINE OIL AND FILTER RECOMMENDATIONS

(GASOLINE ENGINES)

Use only SE or better quality engine oils (see markings on the containers).

SERVICE & MAINTENANCE (Continued)

Change the engine oil and the engine oil filter as outlined on page 33.

The oil and filter change intervals for your engine are based on the use of SE-quality oils and high-quality filters like AC oil filters. Use of non-SE oils or oil change intervals longer than listed on page 29, could reduce engine life and might affect your warranty.

Your engine was filled with an SE-quality engine oil when it was built. You do not have to change this oil before the suggested change period. Keep in mind your engine may use more oil when it is new. Check the oil level more often when your engine is new.

OIL VISCOSITY

Engine oil viscosity (thickness) has a noticeable effect on fuel economy. Lower viscosity engine oils can provide increased fuel economy; however, higher temperature weather conditions require higher viscosity engine oils for satisfactory lubrication. The following chart lists the engine oil viscosities that will provide the best balance of fuel economy, engine life, and oil economy.

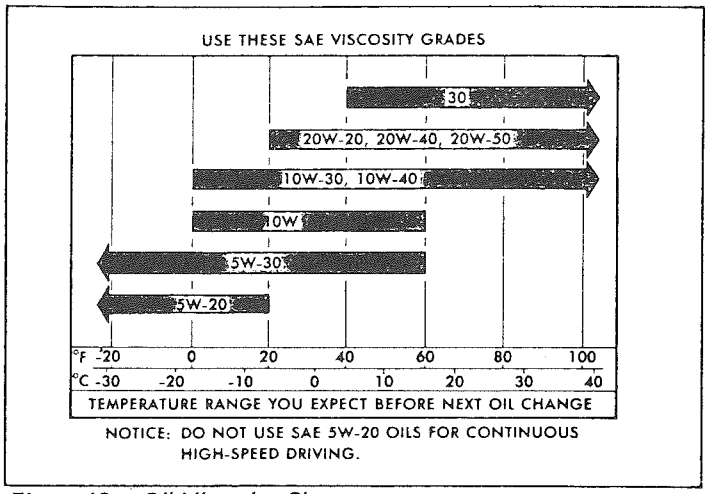


Figure 18 — Oil Viscosity Chart

CHECKING OIL LEVEL

Electronic Oil Dipstick — The use of the electronic oil dipstick was described on page 15. A metal dipstick also is supplied with the REVCON to check engine oil level if desired. Disconnect the spring at the top of the oil dipstick tube. Pull out the orange electronic dipstick. Check the oil level with the metal dipstick as required. Carefully reinstall the orange electronic dipstick. Do not damage the sensor at the bottom.

Warm — The best time to check the engine oil level is when the oil is warm, such as during a fuel stop. First, allow about five (5) minutes for the oil to drain back to the oil pan. Then pull the dipstick out, wipe it clean, and push it back down all the way. Now pull the dipstick out and look at the oil level on the dipstick. Some dipsticks are marked with "Add" and "Full" lines. Others are marked "Add 1 QT" and "Operating Range." In all cases, keep the oil level above the "Add" line. Push the dipstick back down all the way after taking the reading. Add oil if needed.

Cold — If you check the oil level when the oil is cold, do not run the engine first. The cool oil will not drain back to the pan fast enough to give a true oil level.

ENGINE OIL ADDITIVES

There are many extra engine oil helpers or additives for sale. Your engine should not need these extra additives if you use SE-quality engine oil and change it as suggested. If you think your engine has an oil related problem, talk to your authorized dealer. If needed, your dealer can provide you with a tested and approved oil additive called "GM Engine Oil Supplement."

AUTOMATIC TRANSMISSION FLUID RECOMMENDATIONS

Use only automatic transmission fluid labeled DEXTRON®II You can buy this fluid from your dealer or other service outlets.

CHECK THE FLUID LEVEL WITH CARE

Check the automatic transmission fluid level at each engine oil change. Before checking the fluid level, set the parking brake and then start the engine. Apply the regular brakes and then move the shift lever through all of the gear ranges, ending in "Park." You must check the fluid level with the engine running at slow idle and the vehicle level.

NOTE: You cannot read the correct fluid level if you have just driven the vehicle for a long time at high speed, in city traffic in hot weather, or if the vehicle has been pulling a trailer. Wait until the fluid has cooled down (about 30 minutes).

Remove the dipstick. Carefully touch the wet end of the dipstick to find out if the fluid is cool, warm or hot. Wipe it clean and push it back in until the cap seats. Pull out the dipstick and read the fluid level.

If it felt cool (about room temperature), the level should be 1/8 to 3/8 inch (3 to 10 millimeters) below the "Add" mark. The dipstick has two dimples below the "Add" mark to show this range.

If it felt warm, the level should be close to the "Add" mark (either above or below).

If it was too hot to hold, the level should be at the "Full" marks.

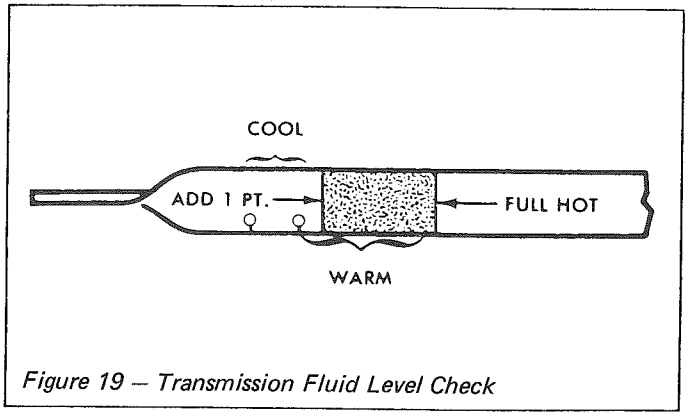


Figure 19 — Transmission Fluid Level Check

Add just enough DEXRON®II fluid to fill the transmission. It takes only one pint (0.5 litre) to raise the level from "Add" to "Full" with a hot transmission.

SERVICE & MAINTENANCE (Continued)

Do not overfill the transmission. Overfilling can cause foaming and loss of fluid, which could result in transmission damage. Automatic transmissions are often overfilled because the fluid level is checked when the fluid is cold. When cold, the dipstick shows that fluid should be added. However, the cold low reading is normal; the fluid level will rise about 3/4 inch (19 millimeters) as the fluid warms up from 60°F to 180°F (16°C to 82°C).

AUTOMATIC TRANSMISSION DRAIN INTERVALS

Change the transmission fluid and change the filter (or clean the screen) as outlined on page 29.

ENGINE COOLING SYSTEM

The coolant recovery system is standard. The coolant in the radiator expands with heat, and the overflow is collected in the recovery tank. When the system cools down, the coolant is drawn back into the radiator.

The cooling system has been filled at the factory with a quality coolant that meets GM Specification 1899-M. Because the cooling system has been designed to use coolant rather than plain water, the coolant solution should be used year round. It has many advantages, such as:

Provides boiling protection up to 262°F (128°C).

Protects against rust and corrosion in the cooling system.

Maintains the proper engine temperature for efficient operation and emission control.

Allows proper operation of the coolant gauge.

The coolant should be replaced in accordance with the maintenance schedule on page 28.

COOLING SYSTEM CARE

It is not usually necessary to remove the radiator cap to check the coolant level. Open the hood and look at the "see through" coolant recovery tank. This should be done at regular intervals, such as during fuel stops. When the engine is cold, the coolant level should be at or slightly above the "Full Cold" mark on the tank. When the engine has fully warmed up, the level should be at or slightly below the "Full Hot" mark on the tank. If the coolant level is low, remove the cap on the coolant recovery tank. Add enough of a 50/50 mixture of a good quality ethylene glycol (antifreeze) and water to the tank to bring the level up to the proper mark. Reinstall the cap on the tank.

There are conditions which can happen, such as air being trapped in the system, that may affect the coolant level in the radiator. It is recommended that the coolant level in the radiator be checked at periodic intervals such as at the time of engine oil changes when the engine is cold. Follow steps 1, 8, 9, and 10 of the following section "Coolant Replacement," (page 24). for radiator cap removal and coolant addition method.

If coolant has to be added more than four times a year, either to the recovery tank or to the radiator, see your dealer for a cooling system check.

NOTE: If the proper quality antifreeze is used, there is no need to add extra inhibitors or additives that claim to improve the system. They may be harmful to the proper operation of the system.

COOLANT SYSTEM SERVICE

The cooling system should be serviced as follows:

1. Wash the radiator cap and filler neck with clean water. See step 1 of "Coolant Replacement," (page 24,) to remove radiator cap.

2. Check the coolant level in the radiator and have it tested for freeze protection. Add ethylene glycol antifreeze, if needed, to maintain the specified freeze protection.

3. Have the cooling system and radiator cap tested for a pressure capacity of 15 psi (105 kPa). If a replacement cap is needed, use an AC-Delco cap, or an equivalent cap, designed for coolant recovery systems and specified for your model.

4. Tighten all radiator and heater hose clamps and inspect all hoses. Replace the hoses if they are "checked" or swollen, or otherwise worn.

5. Clean the front of the radiator core and air conditioning condenser to remove dirt and other objects. Also clean the auxiliary engine and/or transmission oil cooler if the vehicle has them.

COOLANT REPLACEMENT

1. Remove the radiator cap when the engine is cool:

   Turn the cap slowly to the left until it reaches a "stop." (Do not press down while turning the cap.)

   Wait until the pressure is relieved (indicated by a hissing sound), then press down on the cap and continue to turn it to the left.

CAUTION: To help avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if the cap is taken off too soon.

2. When the cap is removed, run the engine until the upper radiator hose is hot (this shows that the thermostat is open and the coolant is flowing through the system).

3. Stop the engine and open the radiator drain valve to drain the coolant. (Drainage may be speeded by removing the drain plugs in the block.)

4. Close the drain valve (install block drain plugs, if removed). Add water until the system is filled and run the engine until the upper radiator hose is hot again.

5. Repeat steps 3 and 4 several times until the drained liquid is nearly colorless.

SERVICE & MAINTENANCE (Continued)

6. Drain the system and then close the radiator drain valve tightly. (Install block drain plugs, if removed.)

7. Disconnect all hoses from the coolant recovery tank. Remove the tank and pour out any fluid. Scrub and clean the inside of the tank with soap and water. Flush it well with clean water and drain. Reinstall the tank and hoses.

8. Add enough ethylene glycol coolant (meeting GM Specification 1899-M) and water to provide the required cooling, freezing, and corrosion protection. Use at least a 50% solution, -34°F (-37°C), but no more than a 70% solution. Fill the radiator to the base of the filler neck and fill the coolant recovery tank to the "Full Hot" mark. Install recovery tank cap.

9. Run the engine, with the radiator cap removed, until the upper radiator hose is hot.

10. With the engine idling, add coolant to the radiator until it reaches the bottom of the filler neck. Install the radiator cap, making sure that the arrows on the cap line up with the overflow tube.

It is the owner's responsibility to:

Maintain cooling system freeze protection at -20°F (-29°C) to ensure protection against corrosion and loss of coolant from boiling. This should be done even if freezing temperatures are not expected.

Add ethylene glycol base coolant that meets GM Specification 1899-M when coolant has to be added because of coolant loss or to provide added protection against freezing at temperatures lower than -20°F (-29°C); -35°F (-37°C) in Canada.

NOTE: Alcohol or methanol base coolants or plain water alone should NOT be used in your vehicle at any time. They will boil at a lower point than that at which the hot light indicator (or temperature gauge) works, and they do not provide proper protection against corrosion.

RADIATOR PRESSURE CAP

The radiator cap, a 15 psi (105 kPa) pressure type, must be installed tightly, otherwise coolant may be lost and damage to engine may result from overheating. Radiator pressure caps should be checked periodically for proper operation. If replacement is required, an AC-Delco cap is recommended.

THERMOSTAT

The engine coolant temperature is controlled by a thermostat. It stops coolant flow through the radiator until a preset temperature is reached. This thermostat is installed in the engine coolant outlet on the engine block. The same thermostat is used in both winter and summer. When a replacement is needed, AC-Delco parts are recommended.

DRIVE AXLE/DIFFERENTIAL

Add lubricant, if needed, to fill to level of filler plug hole. Use SAE 80W or SAE 80W-90 GL-5 gear lubricant. (For those vehicles driven in Canada, use SAE 80W GL-5 gear lubricant.) You can also use GM 1052271 or 1052272 gear lubricant, available at your dealer.

TRANSFER CASE

Add lubricant, if needed to level of fill plug hole. Use recommended lubricant. Tighten fill plug to 20 ft. lbs. torque.

POWER STEERING

Check the fluid level in the pump reservoir at each oil change period.

Add GM Power Steering fluid GM No. 1050017 (or equivalent) as necessary to bring level into proper range on filler cap indicator depending upon fluid temperature.

If at operating temperature (approximately 150°F (66°C) which would be hot to the touch), fluid should be between 1/2 and 3/4 full. If at room temperature (approximately 70°F (21°C), fluid should be at the 1/2 full level. Fluid does not require periodic changing.

BRAKE MASTER CYLINDER

Check master cylinder fluid level in both reservoirs. If the fluid is low in the reservoir, it should be filled to a point about 1/4-inch below lowest edge of each filler opening with Delco Supreme No. 11 or DOT-3 fluids.

HYDRO-BOOST BRAKE SYSTEM HYDRAULIC PUMP

On vehicles equipped with power steering, the power steering pump also is used as the hydro-boost pump. See the section on the Power Steering System when checking fluid level or adding fluid.

NOTE: Power steering fluid and brake fluid cannot be mixed, since seal damage may result.

AIR CLEANER ELEMENT

When replacement of air cleaner filter element is necessary, an AC air filter element is recommended.

Operation of vehicle in dusty areas will necessitate more frequent replacement. Your dealer can be of assistance in determining the proper replacement frequency for the conditions under which you operate your vehicle.

CAUTION: If the air cleaner is removed during repair or maintenance, be sure to put it back on correctly. If the air cleaner is not correctly installed, there could be a fire in the engine compartment (if there should happen to be a backfire), or other engine malfunction.

FRONT WHEEL BEARINGS

The front wheel bearings have been engineered and selected to last at least 24,000 miles without repacking. Should a seal get damaged or leak, they should be serviced immediately.

NOTE: Tapered roller bearing used in this vehicle have a slightly loose feel when properly adjusted. They must never be over tightened (preloaded) or severe bearing damage may result. Consult your authorized dealer for service. Damage can occur if service procedures are not followed. Longfiber or viscous type greases should not be used. Do not mix wheel bearing lubricants. Never attempt wheel bearing service yourself. Have a qualified service department do it. See page 29.

FRONT SUSPENSION AND STEERING LINKAGE

Lubricate fittings with water resistant EP Chassis Lubricant which meets GM Specification 6031M.

NOTE: Ball joints should not be lubricated unless their temperature is 10°F (-12oC), or higher. During cold weather, they should be allowed to warm up as necessary before being lubricated.

SERVICE & MAINTENANCE (Continued)

CHASSIS LUBRICATION

Lubricate the following points with water-resistant EP chassis lubricant-

Steering Linkage and Suspension

1. Upper and lower ball joints – 4 fittings.
2. Bell crank – 1 fitting.
3. Idler arm – 1 fitting.
4. Drag link – 2 fittings.
5. Intermediate rod – 2 fittings.
6. Tie rods – 4 fittings.

Drive Shafts

1. Drive shaft slip joint – 1 fitting.
2. Half shafts to each front wheel:
   Slip joint – 1 fitting

FRONT DRIVE SHAFTS (AXLE TO WHEEL HUB)

Lubricate inboard carden joint and slip joint. Check condition of the rubber boot over the constant velocity joint at the outboard end (wheel end) of the shaft. If grease is leaking from the boot have your dealer or service dept. change it immediately and re-pack the C/V joint.

BATTERY

Your new vehicle battery needs no periodic maintenance. Its top is permanently sealed (except for two small vent holes) and has no filler caps. You will never have to add water.

CAUTION: Follow the precautions listed in the Jump Starting Section (see the "In Case of Emergency" section (page 19), in this manual) when working on or near the battery. Personal injury (particularly to eyes) or property damage may result from battery explosion, battery acid, or electrical (short circuit) burns.

TIRES

The tires installed on your vehicle, shown on the Vehicle Certification Label, are engineered to provide a proper balance of performance characteristics for normal vehicle operation. This section contains some tips on how you can obtain the most benefit from these tires. See page 28 in this manual for "Important Information on Vehicle Loading."

TIRE INFLATION PRESSURE

The cold inflation pressures for your factory installed tires are listed on the Certification Label. Your tires must be inflated to these pressures to obtain the GVWR (Gross Vehicle Weight Rating) or GAWR (Gross Axle Weight Rating). Incorrect tire inflation pressures can have adverse effects on tire life and vehicle performance. Too low an air pressure causes increased tire flexing and heat build-up. This weakens the tire and increases the chance of damage or failure and can result in tire overloading, abnormal tire wear, adverse vehicle handling, and reduced fuel mileage. Too high an air pressure can result in abnormal wear harsh ride and also increase the chance of damage from road hazards.

Lower inflation pressures can be used with reduced vehicle loads. After finding the load on each tire by weighing the vehicle on a scale, the minimum cold inflation pressures can be found in the Tire/Wheel Load & Inflation Pressure Chart (see page 106).

Tire inflation pressures should be checked at least monthly (including the spare if so equipped). Always check tire inflation pressures when tires are "cold."

1. The "cold" tire inflation pressure applies to the tire pressure when a vehicle has not been driven more than one mile (1.6 kilometers) after sitting for three hours or more.

2. It is normal for tire pressures to increase 4 to 8 pounds per square inch (30 to 60 kilopascals) or more, when the tires become hot from driving. **Do not** "bleed" or reduce tire inflation pressures after driving your vehicle. Bleeding serves to reduce "cold" inflation pressure and increase tire flexing which can result in tire damage and failure.

3. **For sustained driving at speeds over 65 mph (100 km/h), where such speeds are permitted by law,** cold inflation pressures should be increased 10 psi (70 kPa) above those stated in the Tire/Wheel Load and Inflation Pressure Charts for the load being carried. Do not exceed the wheel capacity limit shown in the Wheel Code and Limits Charts.

Sustained speeds over 65 mph (100 km/h) are not advised where the 10 psi (70 kPa) pressure increase would exceed the wheel capacity limit.

For special operating conditions, cold inflation pressures may be increased up to 10 psi (70 kPa) above those shown in the table. For correct inflation at load see your local tire dealer or the tire inflation specifications put out by the tire manufacturer.

CAUTION: Be sure to keep the tires properly inflated. A tire that is run while significantly underinflated will overheat to the point where the tire may blow out and/or catch fire, possibly resulting in damage to the vehicle and its contents and/or personal injury to its occupants and persons in the area.

4. For proper inflation pressures when towing trailers, see page 106 in this manual.

5. Always use a tire pressure gauge (a pocket-type gauge is advised) when checking inflation pressures. A visual inspection of tires for inflation pressures is not enough, especially in the case of radial tires. Underinflated radial tires may look similar to correctly inflated radial tires. If the inflation pressure on a tire quite often is found to be low, have your dealer correct the cause.

6. Be sure to reinstall the tire inflation valve caps, if they are so equipped, to prevent dirt and moisture from getting into the valve core which could cause air leakage.

7. If an air loss occurs while driving, do not drive on the deflated tire more than is needed to stop safely. Driving even a short distance on a deflated tire can damage a tire and wheel beyond repair.

TIRE INSPECTION AND ROTATION

1. Inspect your tires daily. Look for bulges, penetrations, cracks, cuts, and/or oil contamination. If any such damage

SERVICE & MAINTENANCE (Continued)

is found, have it inspected by a qualified tire inspector and repaired or discarded immediately, at his discretion.

2. Although your Maintenance Schedule may recommend rotating tires at 6000 mile intervals, you should only rotate tires if necessary. If the tires are wearing evenly, there is no need to rotate them. If uneven wear is experienced, it may be due to a variety of reasons. Ask your dealer for advice if uneven tire wear persists.

CAUTION: Before installing wheels, remove any build up of corrosion on the wheel mounting surface and brake drum or disc mounting surface by scraping and wire brushing. Installing wheels without good metal-to-metal contact at the mounting surfaces can cause the wheel nuts to loosen, which can later allow a wheel to come off while the vehicle is moving, possibly causing loss of control.

WHEEL/TIRE ALIGNMENT AND BALANCE

Proper front-end alignment improves tire tread mileage. Your vehicle's front-end suspension parts should be inspected often and aligned when needed. Improper alignment will not cause the vehicle to vibrate. However, improper toe alignment will cause the front tires to roll at an angle which will result in faster tire wear. Incorrect caster or camber alignment will cause your front tires to wear unevenly and can cause the vehicle to "pull" to the left or right.

Proper tire balancing provides the best riding comfort and helps to reduce tire tread wear. Out of balance tires can cause annoying vehicle vibration and uneven tire wear such as cupping and flat spots.

TIRE TRACTION

A decrease in driving, cornering, and braking traction occurs when water, snow, ice, gravel, or other material is on the road surface. Driving practices and vehicle speed should be adjusted to the road conditions.

When driving on wet or slushy roads, it is possible for a wedge of water to build up between the tire and road surface. This is known as hydroplaning and may cause partial or complete loss of traction, vehicle control, and stopping ability. To reduce the chance of traction loss, follow these tips:

1. Slow down during rainstorms or when roads are slushy.
2. Slow down if road has standing water or puddles.
3. Replace tires when tread wear indicators are showing.
4. Keep tires properly inflated.

If you equip your vehicle with snow tires, use snow tires of the same size, load range, and construction type (bias, bias-belted, or radial) as your other tires.

Snow tires should be inflated 10 psi above the cold inflation pressures for the load being carried. However, do not exceed the wheel capacity limits shown on page 102.

Vehicle speed should be limited to 65 mph (100 mn/h) with truck-type snow tires.

SNOW CHAINS

NOTE: Your REVCON is a front-wheel-drive vehicle; only mount chains to front wheels.

To prevent chain damage to your vehicle:

Install the chains as tightly as possible, then tighten again after driving 1/4 to 1/2 mile (0.4 to 0.8 kilometers).

Do not exceed 45 mph (70 km/h), or the chain manufacturer's speed limit if lower.

Drive in a restrained manner avoiding large bumps, potholes, severe turns and other maneuvers which could cause the tires to bounce up and down.

Follow the chain manufacturer's instructions.

TIRE REPLACEMENT

CAUTION: Do not mix different construction types of tires on your vehicle (such as radial, bias, and bias-belted tires) except in emergencies, because vehicle handling could be affected and may result in loss of control.

You should replace your tires when:

1. Your tires are worn to a point where 2/32 inch (1.6 millimeters) or less tread remains, or the cord or fabric is exposed. To help you detect this, your tires have built-in tread wear indicators that appear between the tread grooves when the tread depth is 2/32 inch (1.6mm) or less. When the indicators appear in two or more adjacent grooves at three spots around the tire, the tire should be replaced.

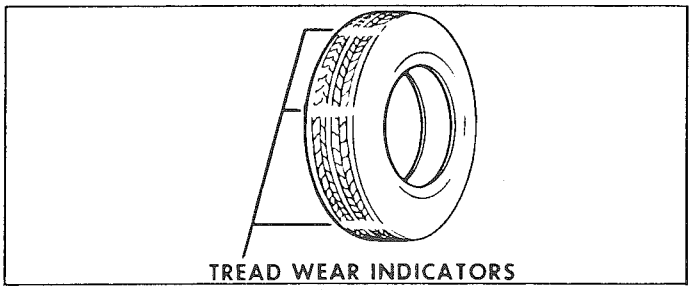


Figure 20 — Tire Tread-Wear Indicators

2. Your tire tread or sidewall is cracked, cut, or snagged deep enough to expose the cord or fabric.
3. Your tire has a bump, bulge, or split.
4. Your tire sustains a puncture, cut, or other injury that can't be correctly repaired because of the size or location of the injury.

When replacing tires, you should use the same size, load range. and construction type (bias, bias-belted, or radial) as the original tires on your vehicle (see the Certification Label). Use of any other size or type tire may affect load carrying capacity, ride, handling, speedometer/odometer calibration, vehicle ground clearance, and tire clearance to the body and chassis. If replacing only a single tire, it should be paired on the same axle with the least worn tire of the others.

SERVICE & MAINTENANCE (Continued)

WHEEL REPLACEMENT

Wheels must be replaced if they become damaged (for example: bent, heavily rusted, leak air) or if wheel nuts often become loose. Do not use bent wheels which have been straightened, and do not use inner tubes in leaking wheels which are designed for tubeless tires. Such wheels may have structural damage and could fail without warning.

The wheels originally equipped on your vehicle will provide optimum life up to the maximum load and inflation pressures shown in the Wheel Code and Limits Chart. Maximum loads, maximum inflation pressures, wheel identification codes, and wheel sizes are stamped on each wheel. Service tested and approved wheels are available from your authorized dealer. When obtaining wheels for any reason from any other source, the replacement wheels should be equal in load capacity, inflation pressure capacity, diameter, width, offset and mounting configurations to those originally installed on your vehicle.

A wheel of the wrong size or type may adversely affect load carrying capacity, wheel and bearing life, brake cooling, speedometer/odometer calibration, stopping ability, headlight aim, bumper height, vehicle ground clearance, and tire clearance to the body and chassis. Replacement with "used" wheels is not advised: they may have been subjected to harsh treatment or very high mileage and could fail without warning.

NOTE: The use of wheels and/or tires with higher load carrying limits than originally equipped on your vehicle does not in itself increase the GAWR or the GVWR of the vehicle.

Wheels having diameters ranging from 16 through 19.5 inches that have been certified for **radial tire application** have the word "radial" stamped on the rim. Wheels in the 16 inch through 19.5 inch diameter range without the "radial" identification stamp are **not** to be used with radial tires. Because of the different stresses exerted by radial tires, these wheels could become fatigued and fail without warning.

Proper replacement wheels can be obtained from your dealer.

TIRE WARRANTY

Tires are warranted by the tire manufacturers. Warranty information is included in the manufacturer's warranty folder furnished with your vehicle.

REVCON MOTOR HOME MAINTENANCE SCHEDULE

To retain the safety, dependability, and emission control performance originally built into your REVCON, it is essential that it receive periodic inspections, maintenance, and service parts replacement.

IMPORTANT NOTE: Maintenance services should be performed by your authorized REVCON dealer or any other qualified automotive service or repair establishment which is competent to provide such services and which can be relied upon to use proper parts and practices.

In addition to the in-shop type services detailed in the schedule, this manual also includes safety checks which you, the vehicle owner or driver, should perform periodically.

EXPLANATION OF VEHICLE MAINTENANCE SCHEDULE

Presented below is a brief explanation of each of the services listed in the preceding REVCON Maintenance Schedule.

NORMAL VEHICLE USE – The owner's or driver's maintenance instructions contained in this maintenance schedule are based on the assumption that your vehicle will be used as designed:

To carry passengers and cargo within the limitations indicated on the certification label.

On reasonable road surfaces within legal operating limits, as a general rule, for at least several miles (kilometers) on a daily basis.

Unusual operating conditions will require more frequent vehicle maintenance as specified in the respective sections included below.

* Also a Safety Service

After each of the following maintenance services has been performed, it is recommended that you insert the month, day, and the mileage in the maintenance schedule under the appropriate "Owner Service Log" column.

SECTION A – LUBE & GENERAL MAINTENANCE

A-1 CHASSIS – Lubricate all grease fittings in front suspension, steering linkage*, and on drive axle universal joints. Lubricate transmission cable and gearshift linkage*, hood latch, hood and door hinges, parking brake cable guides*, parking linkage, propeller shaft slip joint, universal joints, and brake and throttle pedal springs. Lubricate suspension and steering linkage every 2 months or 3000 miles (4800 km) when operating under dusty or muddy conditons. Check all oil lines for leaks or damage.

A-2 FLUID LEVELS – Check level of fluid in brake master cylinder*, power steering pump*, radiator, axles, transmismission and windshield washer*. Keep engine freeze protection to -34° F (-37° C) or the lowest expected outdoor temperature. Engine coolant also prevents corrosion. Large fluid loss in any of these units may point out a problem. Repair these problems promptly. A low fluid level in the brake master cylinder can indicate worn disc brake pads, and should be checked accordingly.

A-3 AXLE/CASE – Every 4 months or 6000 miles (9600 km) check front axle and transfer case and add lubricant when necessary. Lubricate propeller shaft slip joint and drive axle, and universal joint. Check vent breather on front axle and transfer case for leaks and proper installation.

A-4 DRIVE SHAFT C. V. JOINTS – Every 4 months or 6000 miles, check the boot protecting the constant velocity universal joint at the wheel end of the front wheel drive shafts. If it is leaking grease, damaged or cut, it must be replaced immediately.

MAINTENANCE SCHEDULE (Continued)

When to Perform Services (Months or Miles/ Kilometres, Whichever Occurs First)	Item No.	Services (For Details, See Numbered Paragraphs)	OWNER'S SERVICE LOG (Miles/Kilometres) Insert Month, Day and Mileage (i.e. May/5/6,000) In Column Closest to Mileage When Service is Performed							
			6,000 (9 600)	12,000 (19 200)	18,000 (28 800)	24,000 (38 400)	30,000 (48 000)	36,000 (57 600)	42,000 (67 200)	48,000 (76 800)
Section A — Lubrication and General Maintenance										
Every 4 months or 6,000 miles (9 600 km)	A-1	• Chassis Lubrication	✓	✓	✓	✓	✓	✓	✓	✓
	A-2	• Fluid Levels Check	✓	✓	✓	✓	✓	✓	✓	✓
	A-3	• Axle and Transfer Case Check	✓	✓	✓	✓	✓	✓	✓	✓
	A-4	Driveshaft CV Joint Check	✓	✓	✓	✓	✓	✓	✓	✓
	A-5	* Engine Oil Change	✓	✓	✓	✓	✓	✓	✓	✓
See Explanation	A-6	* Engine Oil Filter Change	✓		✓		✓		✓	
	A-7	Tire Rotation	✓	✓	✓	✓	✓	✓	✓	✓
	A-8	Drive Axle Lube Change				✓				✓
	A-9	Wheel Bearings Check		✓		✓		✓		✓
Every 12 months or 12,000 miles (19 200 km)	A-10	* Cooling System Check		✓		✓		✓		✓
Every 24,000 miles (38 400 km)	A-11	Auto. Trans. Fluid & Filter Change				✓				✓
	A-12	Power Steering Gear Check	✓	✓	✓	✓	✓	✓	✓	✓
	A-13	Drive Transfer Case Fluid				✓				✓
		Section B— Safety Maintenance								
Every 4 months or 6,000 miles (9 600 km)	B-1	Owner Safety Checks	✓	✓	✓	✓	✓	✓	✓	✓
	B-2	Tire, Wheel and Disc Brake Check	✓	✓	✓	✓	✓	✓	✓	✓
	B-3	Exhaust System Check	✓	✓	✓	✓	✓	✓	✓	✓
	B-4	Suspension and Steering Check	✓	✓	✓	✓	✓	✓	✓	✓
	B-5	Brakes and Power Steering Check	✓	✓	✓	✓	✓	✓	✓	✓
Every 12,000 miles (19 200 km)	B-6	* Engine Drive Belts Check		✓		✓		✓	✓	✓
Every 12 months or 12,000 miles (19 200 km)	B-7	Drum Brakes and Parking Brake Check		✓		✓		✓		✓
	B-8	Throttle Linkage Check		✓		✓		✓		✓
	B-9	Bumpers		✓		✓		✓		✓
		Section C — Emission Control Maintenance								
At 1st 4 months or 6, 000 miles — then at 12 month/12,000 mile intervals	C-1	Engine Idle Speed Adjustment	✓	✓		✓		✓		✓
	C-2	Idle Stop Solenoid Check	✓	✓		✓		✓		✓
Every 12,000 miles (19 200 km)	C-3	Spark Plug Wire Check & Plug Replacement		✓		✓		✓		✓
	C-4	Engine Timing Adjust. & Distributor Check		✓		✓		✓		✓
	C-5	Air Cleaner Element Replacement		✓		✓		✓		✓
Every 12 months or 12,000 miles (19 200 km)	C-6	Carburetor Mounting Torque		✓		✓		✓		✓
	C-7	Thermo. Controlled Air Cleaner Check		✓		✓		✓		✓
	C-8	Manifold Heat Valve Check		✓		✓		✓		✓
	C-9	Carburetor Fuel Filter Replacement		✓		✓		✓		✓
	C-10	Throttle Return Control Check		✓		✓		✓		✓
	C-11	PCV System Check		✓		✓		✓		✓
		— PCV Valve & Filter Service				✓				✓
Every 24 months or 24,000 miles (38 400 km)	C-12	ECS System Check & Filter Replacement				✓				✓
	C-13	Fuel Cap, Lines and Tank Check				✓				✓
	C-14	Engine Idle Mixture Adjust				✓				✓
	C-15	EFE System Check				✓				✓
	C-16	Vacuum Advance System Check				✓				✓
	C-17	Carburetor Choke Check				✓				✓

• Also A Safety Service *Also An Emission Control Service ✓ When to Perform Service

A-5 ENGINE OIL** — Change every 4 months or 6000 miles (9600 km), whichever occurs first, or each 2 months or 3000 miles (4800 km) when the vehicle is operated under the following conditions: (a) Dust conditions. (b) Trailer pulling. (c) Frequent idling. (d) Short trips where engine does not thoroughly warm up. Change oil and filter as soon as you can after driving in a dust storm.

A-6 ENGINE OIL FILTER** — Replace at the first oil change, and then every second oil change if mileage, 6000 miles (9600 km), determines oil change. If time (4 months) determines oil change, or you change the oil at 3000 miles (4800 km) or 2 months, replace filter at each oil change.

A-7 TIRES — To equalize wear, rotate tires as per chart above. Adjust pressures as shown on the Certification Label, under the dash. Rotate radial tires at 6000 miles (9600 km), and then each 12,000 miles (19,200 km). In addition, rotate all tires whenever you see uneven wear.

** Also an Emission Control Service.

A-8 DRIVE AXLE (DIFFERENTIAL)
On REVCON/Dana Axle, change lubricant every 24,000 miles (38,400 km). Change lubricant every 12,000 miles (19,200 km) on differential axles under severe operating conditions.

A-9 WHEEL BEARINGS — Front wheel bearings - only require repacking with grease at 24,000 mile intervals unless seals fail. Check front steering knuckle around bearing seals for excessive lubricant loss (grease buildup around seal) at each 6000 miles or 4-month period. See page 25. For rear bearings, clean and repack every 12,000 miles. Use 525° high-temperature lubricant.

A-10 COOLING SYSTEM — Each 12 months or 12,000 miles (19,200 km) wash radiator filler neck and cap with clean water. Test system and cap for proper pressure capacity. Tighten hose clamps and inspect all cooling and heater hoses. Replace radiator cap if faulty. Replace hoses at 24,000 miles

MAINTENANCE SCHEDULE (Continued)

(38,400 km), or sooner if checked, swollen, or rotted. Clean outside of radiator and air conditioning condenser. Each 24 months or 24,000 miles (28,400 km), drain, flush, and refill system with new coolant as described on page 24.

A-11 AUTOMATIC TRANSMISSION FLUID – Change the transmission fluid and filter (or service the screen) every 12,000 miles (19,200 km) if the vehicle is mainly driven under one or more of these hot conditions.

In heavy city traffic where the outside temperature regularly reaches 90° F (32° C).

In hill or mountain areas.

Frequent trailer pulling.

If vehicle is not used mainly under any of these conditions, change the fluid and filter (or service the screen) every 24,000 miles (38,400 km).

A-12 POWER STEERING GEAR – Check for seal leakage around the pitman shaft and housing. If leakage is evidenced by oil oozing out – not just oily film. This should be corrected immediately.

A-13 DRIVE TRANSFER CASE FLUID CHANGE – Drain and refill with automatic transmission fluid according to instructions in chart on this page every 24,000 miles.

SECTION B – SAFETY MAINTENANCE

The owner or driver can check Items B1 (a) through (y), but only a qualified mechanic should check Items B-2 through B-9. **For your safety and that of others, any of the safety items identified in this manual that may have been damaged in an accident should be checked. Make any needed repairs before driving the vehicle.**

The following checks should be made each 6000 miles (9600 km) or 12 months, whichever comes first. Check more often when needed.

B-1 SAFETY CHECKS TO BE MADE BY OWNER OR DRIVER:

Promptly take any problems to a mechanic for service advice.

(a) **STEERING COLUMN LOCK (IF SO EQUIPPED)** – While parked, check by trying to turn the key to "Lock" in each gear range. The key should turn to "Lock" only when gear is in "Park."

(b) **STEERING COLUMN LOCK (WITH KEY RELEASE LEVER – IF SO EQUIPPED)** While parked, check by trying to turn the key to "Lock" without depressing the lever. The key should turn to "Lock" only with the key lever depressed. The key should remove only in "Lock."

(c) **PARKING BRAKE** – Park on a fairly steep hill and hold the vehicle with the parking brake only. This checks holding ability.

CAUTION: Before checking (d) or (e) below, be sure to have enough room around the vehicle. Then firmly apply both parking brake and regular brake. Do not use the accelerator pedal. If the engine starts, be ready to turn off the ignition switch promptly. Take these precautions because the vehicle could move without warning and possibly cause personal injury or property damage.

RECOMMENDED FLUIDS & LUBRICANTS

USAGE	FLUID/LUBRICANT
Power steering system and pump reservoir	GM power steering fluid Part No. 1050017 or equivalent
Transfer drive box	Dexron II automatic transmission fluid
Differential - standard or locking Propeller shaft slip joint	SAE-80W or SAE-80W-90 GL-5 gear lubricant (SAE-80W-GL-5 in Canada)
Brake system and master cylinder	Delco Supreme 11 fluid or DOT-3
Hood Latch assembly	a. Engine oil b. WD 40 spray or equivalent
Hood and Door hinges	Engine oil
Automatic transmission shift linkage	Engine oil
Chassis lubrication	Chassis grease meeting requirements of GM 6031-M
Engine	"SE" Engine Oil conforming to GM specs GM 6136-M
Constant Velocity Universal Joint	GM Lubricant Part No. 1050679 or grease meeting requirements of GM 6040-M
Automatic transmission	Dexron II automatic transmission fluid
Parking brake cables	Chassis grease
Front wheel bearings	Lithium base 525° high-temperature lubricant.
Body door hinge pins, hinge and linkage, folding seat, fuel door hinge	Engine oil
Windshield washer solvent	GM Optikleen washer solvent Part No. 1051515 or equivalent
Engine coolant	Mixture of water and high quality Ethylene Glycol base type anti-freeze conforming to GM Spec. 1899-M
Key Lock Cylinders	WD-40 Spray Lubricant or equivalent

NOTE: Fluids are lubricants identified with GM part numbers or GM specification numbers may be obtained from a Chevrolet dealer.

(d) **STARTER SAFETY SWITCH (AUTOMATIC TRANSMISSION)** – Check by trying to start the engine in each gear. The starter should crank only in "Park" and "Neutral."

(e) Check page 19 for correct start sequence and warning light descriptions.

(f) **TRANSMISSION SHIFT INDICATOR** – Check that the indicator points to the gear chosen.

(g) **STEERING** – Be alert for any changes in steering action. An inspection or service is needed when: the steering wheel is harder to turn or has too much free play, or if there are strange sounds when turning or parking.

(h) **WHEEL ALIGNMENT, BALANCE AND TIRES** – Uneven or abnormal tire wear, or a pull right or left on a straight and level road may show the need for a wheel alignment. A vibration of the steering wheel or seat at

MAINTENANCE SCHEDULE (Continued)

normal highway speeds means a wheel balancing is needed. Check tire pressure when the tires are "cold," at least monthly (include the spare). Check the pressure more often if daily check shows it's needed (see page 28 for Driver's Daily Checklist). Adjust tire pressure as needed when changing loads.

(i) **BRAKES** – Watch for the "Brake" light coming on. Other signs of possible brake trouble are such things as: repeated pulling to one side, strange sounds when braking or between brake applications, or increased brake pedal travel. If you note one of these conditions, have the system checked promptly and repaired if needed.

(j) **EXHAUST SYSTEM** – Be alert for any changes in the sound of the exhaust system or any smell of fumes. These are signs the system may be leaking or overheating. Have it checked and/or repaired promptly.

(k) **WINDSHIELD WIPERS AND WASHERS** – Check the operation and condition of the wiper blades. Check the flow and aim of the washer spray.

(l) **DEFROSTERS** – Turn the control lever to "DEF" and the fan lever to "HI." Then check the air flow from the ducts at the inside base of the windshield.

(m) **REARVIEW MIRRORS AND SUN VISORS** – Check that friction joints will hold mirrors and sun visors in place.

(n) **HORN** – Blow the horn now and then to be sure it works. Check all button locations.

(o) **LAP AND SHOULDER BELTS (IF SO EQUIPPED)** – Check belt system, including: webbing, buckles, latch plates, retractors, light and buzzer reminders, guide loops, clips, and anchors for proper operation, and for damage.

(p) **SEAT ADJUSTERS** – When adjusting a manual seat, be sure that seat adjusters latch, by pushing the seat forward and back.

(q) **SEATBACK RECLINER** – Check to see that seatback recliner (if present) is holding, by pushing and pulling on top of the seatback while it is reclined.

(r) **SEATBACK LATCHES** – Vehicles with folding front seats (and folding rear seats) have mechanical seatback latches. They are designed to prevent forward motion of the seatback when the vehicle slows suddenly. Check to see that seatback latches are holding by pulling forward on the top of folding seatback.

(s) **LIGHTS AND BUZZERS** – Check panel lighting and warning lights (see page 15 for correct function of each warning system). On the outside, check: license plate lights, side marker lights, headlights, parking lights, taillights, brake lights, turn signals, backup lights, clearance lights, identification lights, and hazard warning flashers. Have headlight aim checked promptly if beams seem improperly aimed.

(t) **GLASS** – Check for broken, scratched or damaged glass that could reduce vision or cause injury.

(u) **DOOR LATCHES** – Check that doors close, latch, and lock tightly.

(v) **HOOD LATCHES** – Check that hood closes firmly. Check for broken, damaged, or missing parts that might prevent tight latching. Check that springs are intact and all fasteners tight or adjusted correctly.

(w) **FLUID LEAKS** – Check for fuel, water, oil or other fluid leaks by looking at the surface beneath the vehicle after it has been parked awhile. Water dripping from the air conditioning system after use is normal. If you notice fuel fumes or fluid **at any time** have the cause found and corrected promptly.

(x) **SPARE AND JACK** – Check that spare tire, all jack gear, and any covers or doors are securely stowed at all times.

(y) **UNDERBODY** – Corrosive materials used for ice and snow removal, and dust control, can collect on the underbody. If these materials are not removed, accelerated corrosion (rust) can occur on underbody parts such as fuel lines, frame floor pan, and exhaust system. At least every Spring, flush these materials from the underbody with plain water. Take care to clean well any areas where mud and other debris can collect. Sediment should be loosened before being flushed.

SAFETY CHECKS TO BE MADE BY MECHANIC:

B-2 TIRES, WHEELS AND DISC BRAKES – During tire rotation, check disc brake pads for wear, and surface condition of rotors while wheels are removed (see Item A-7). Check tires for excessive or abnormal wear, or damage. Be sure that wheels are not bent or cracked and that wheel nuts have been tightened to the torque value and at the intervals indicated on page 27.

B-3 EXHAUST SYSTEM – Check the complete exhaust system. Check body areas near the exhaust system. Look for broken, damaged, missing, or out-of-position parts. Also, inspect for open seams, holes, loose connections, or other conditions which could let exhaust fumes seep into the passenger compartment. Dust or water in the passenger compartment may indicate a leak in the area. Needed repairs should be made at once. To help maintain system integrity, replace the exhaust pipes and resonators rearward of the muffler whenever a new muffler is put on. (Also see Item B-1 (j)).

B-4 SUSPENSION AND STEERING – Check front and rear suspension, and steering system. Look for damaged, loose or missing parts; also for parts showing signs of wear, or lack of lubrication. Replace questionable parts at once.

B-5 BRAKES AND POWER STEERING – Check lines and hoses for proper hook-up, binding leaks, cracks, chafing, etc. Any questionable parts should be replaced or repaired at once. When rubbing or wear is noted on lines or hoses, the cause must be corrected promptly.

B-6 ENGINE DRIVE BELTS – Check belts driving the fan, air pump, generator, power steering pump, and the air conditioning compressor. Look for cracks, fraying, wear and proper tension. Adjust or replace as needed.

B-7 DRUM BRAKES AND PARKING BRAKE – (See Item B-2 for disc brake check.) Check drum brake linings for wear or cracks. Also inspect other brake parts at each wheel, such as drums, wheel cylinders, etc. Check parking brake adjustment also when inspecting drum brake linings.

MAINTENANCE SCHEDULE (Continued)

NOTE: Check for damaged or missing parts, interference or binding. Fix any problems at once.

B-8 THROTTLE LINKAGE – Check for damaged or missing parts, interference or binding. Fix any problems at once.

B-9 BUMPERS – Check front and rear bumper systems for proper impact protection and clearance. Check also when a bumper looks out of position or if it was struck hard - even if no damage can be seen.

SECTION C
EMISSION CONTROL MAINTENANCE

C-1 ENGINE IDLE SPEED – Adjust to the specifications shown on the underhood label. You must use precise test equipment.

C-2 IDLE STOP SOLENOID AND/OR DASHPOT – Check that parts work properly. Replace them as needed.

C-3 SPARK PLUG WIRES AND PLUG REPLACEMENT – Clean wires. Remove corrosion on terminals. Check the wires for checks, burns, cracks or other damage. Check the boot fit at distributor cap and spark plugs. Replace wire if damaged or if corrosion cannot be cleaned. Replace spark plugs as shown on Maintenance Schedule, page 29.

C-4 TIMING AND DISTRIBUTOR CAP – Adjust timing to underhood label specifications. Check the inside and outside of the cap and rotor for cracks, carbon tracking and corrosion. Clean or replace as needed.

C-5 AIR CLEANER ELEMENT – Replace at mileage shown on schedule. Replace more often under dusty conditions. Ask your dealer for the proper replacement times for your driving conditions.

C-6 CARBURETOR MOUNTING – Torque mounting bolts and/or nuts at mileage shown on Maintenance Schedule.

C-7 THERMOSTATICALLY CONTROLLED AIR CLEANER- Check all hoses and ducts for correct hookup. Be sure valve works properly.

C-8 MANIFOLD HEAT VALVE – Some engines are equipped with a manifold heat valve which should be inspected and repaired as necessary to insure free operation.

C-9 CARBURETOR FUEL FILTER – Replace at mileage shown on Maintenance Schedule or sooner if clogged.

C-10 THROTTLE RETURN CONTROL (TRC) SYSTEM – Check hoses for proper connections, cracking, abrasion, or deterioration and replace as necessary. Check for proper operation of system.

C-11 POSITIVE CRANKCASE VENTILATION SYSTEM (PCV) – Check that system works properly and clean filter, if it is on the valve cover, each 12,000 miles (19,200 km). Each 24,000 miles (38,400 km), replace the valve. Replace worn or plugged hoses and filter if it is in the air cleaner. Clean filter if it is on the valve cover.

C-12 EVAPORATION CONTROL SYSTEM (ECS) Check all fuel and vapor lines and hoses for proper hookup, routing, and condition. Check that purge valves work properly, if equipped. Remove canisters, check for cracks or damage. Replace as needed. Replace canister filter.

C-13 FUEL CAP, FUEL LINES AND FUEL TANK – Check the fuel tank, cap and lines for damage or leaks. Remove fuel cap, check gasket for an even filler neck imprint, and any damage. Replace parts as needed.

C-14 ENGINE IDLE MIXTURE – At designated intervals or in case of a major carburetor overhaul, or when poor idle quality exists, adjust mixture by a mechanical method (lean drop), following the specifications shown on the label under the hood.

C-15 EARLY FUEL EVAPORATION (EFE) SYSTEM – Check that valve works properly, and correct any binding. Check that thermal vacuum switch works properly. Check hoses for cracks, rubbing, or decay. Replace parts as needed.

C-16 VACUUM ADVANCE SYSTEM AND HOSES – Check that system works properly. Check hoses for proper hookup, cracks, rubbing or decay. Replace parts as needed.

C-17 CARBURETOR CHOKE AND HOSES – Check that choke and vacuum break work properly. Correct any binding caused by damage or gum on the choke shaft. Check hoses for proper hookup, cracks, rubbing, or decay, correct as needed.

TRAILER TOWING TIPS

GETTING STARTED

Before entering traffic with a trailer equipped with electric brakes, start the vehicle and trailer moving and apply the trailer brakes by hand to be sure the trailer brakes are working and the trailer electrical system is connected.

CAUTION: Before going down a steep or long grade, reduce speed and shift the transmission into a lower gear to control your vehicle's speed. Try not to hold the brake pedal down too long or too often. This could cause the brakes to get hot and not work as well.

LONG UPHILL GRADES

When going up long grades, you can reduce the chance of engine overheating by down-shifting the transmission to a lower gear and reducing speed to 45 mph (70 km/h) or below.

PARKING

You should not park your REVCON with a trailer on a grade (hill). However, if you must park on a grade, these steps must be followed:

1. Apply regular brakes.
2. Have someone place wheel chocks under trailer wheels.
3. When wheel chocks are in place, release regular brakes until chocks absorb load.
4. Apply parking brake.
5. Place transmission in "PARK."

CAUTION: If the REVCON is parked on a grade, don't shift the transmission lever to "PARK" until the trailer wheels are chocked and the parking brake is set. If you do, the weight of the vehicle and trailer may exert so much force on the parking pawl in the transmission that it may be hard to get the shift lever out of "PARK."

When starting, after being parked on a grade:

1. Apply regular brakes and hold until steps 2 and 3 (immediately preceding) are completed.
2. Start engine in "PARK."
3. Shift into gear and release parking brake.
4. Release regular brakes and drive until the chocks are free.
5. Apply regular brakes and have helper remove chocks.

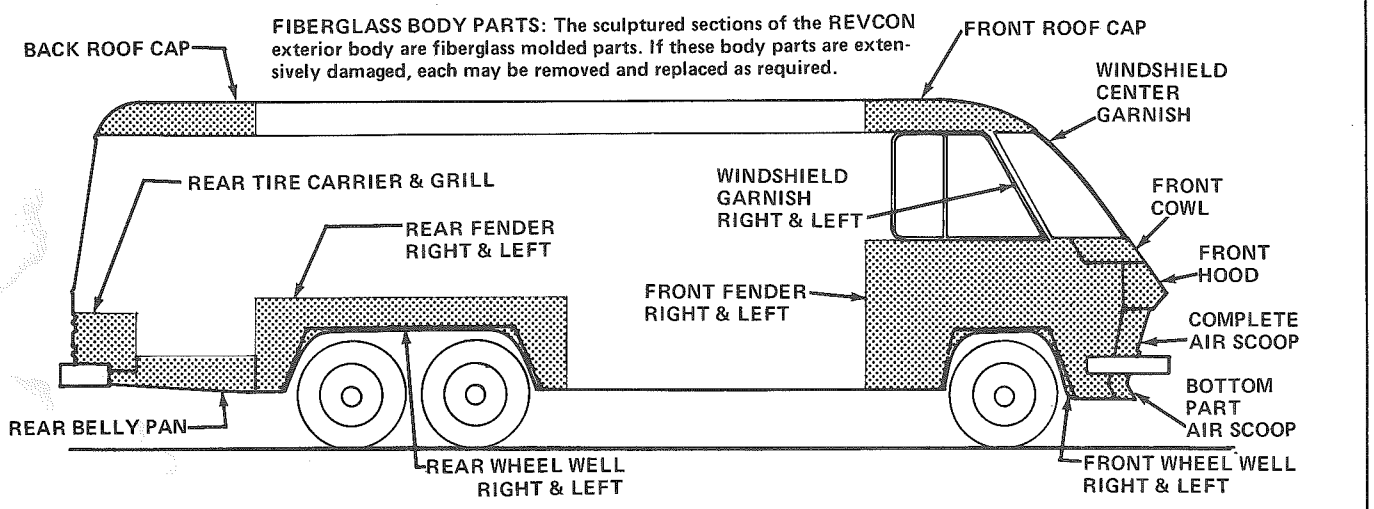


Figure 21 — Outside Fiberglass Body Parts Diagram

REVCON FLUID SPECIFICATIONS

Engine Oil and Filter Change:

Dry Fill	7 Quarts
Oil Change with Filter	6 Quarts
Oil Change without Filter	5 Quarts

Oil Filter Location and Type:

Location — Backside of main crossmember

Type: Fram PH 8A
Quaker State QS 8A
AC PF2
GM 6435675
Motorcraft FL-1

Radiator:

Capacity — 30 Quarts
(Dry fill including rear auto heater and water heater Heat Exchanger)

Transmission Hydramatic 475:

Capacity — 14 Quarts
(Complete overhaul)

Transfer Case:

Capacity (Dextron II) — 1 1/8 Quarts

Differential-

Capacity — 7.2 pints

WINDSHIELD REPLACEMENT – To gain access to the sealed edges of the windshield, the top, side, center, and cowl fiberglass trim must be removed.

1. Separate the side trim from the cowl at the parting line (see figure A), by cutting the fiberglass and/or plastic filler with a hacksaw or other suitable tool.

2. Remove the drip-rail over the windshield to expose the top trim rivets.

3. Drill out the top trim rivets and pull the top and side trim away from the body. There are also rivets in the side trim which will become apparent as the trim is pulled away. Some plastic filler (see illustration) will be broken away as the side trim is removed.

4. The cowl must be removed by detaching at the fender and at the firewall lip.

5. Remove center trim which is sealed in place with rubber adhesive plus a single screw (see illustration).

6. The windshield edges are now exposed to allow standard removal and installation procedures.

7. Reinstallation of trim will require the repair of those areas cut during removal.

1) Rubber Sealant
2) Attaching Screw
3) Access Door
4) Top Trim
5) Center Trim
6) Break plastic filler here
7) Parting line between side trim and cowl trim

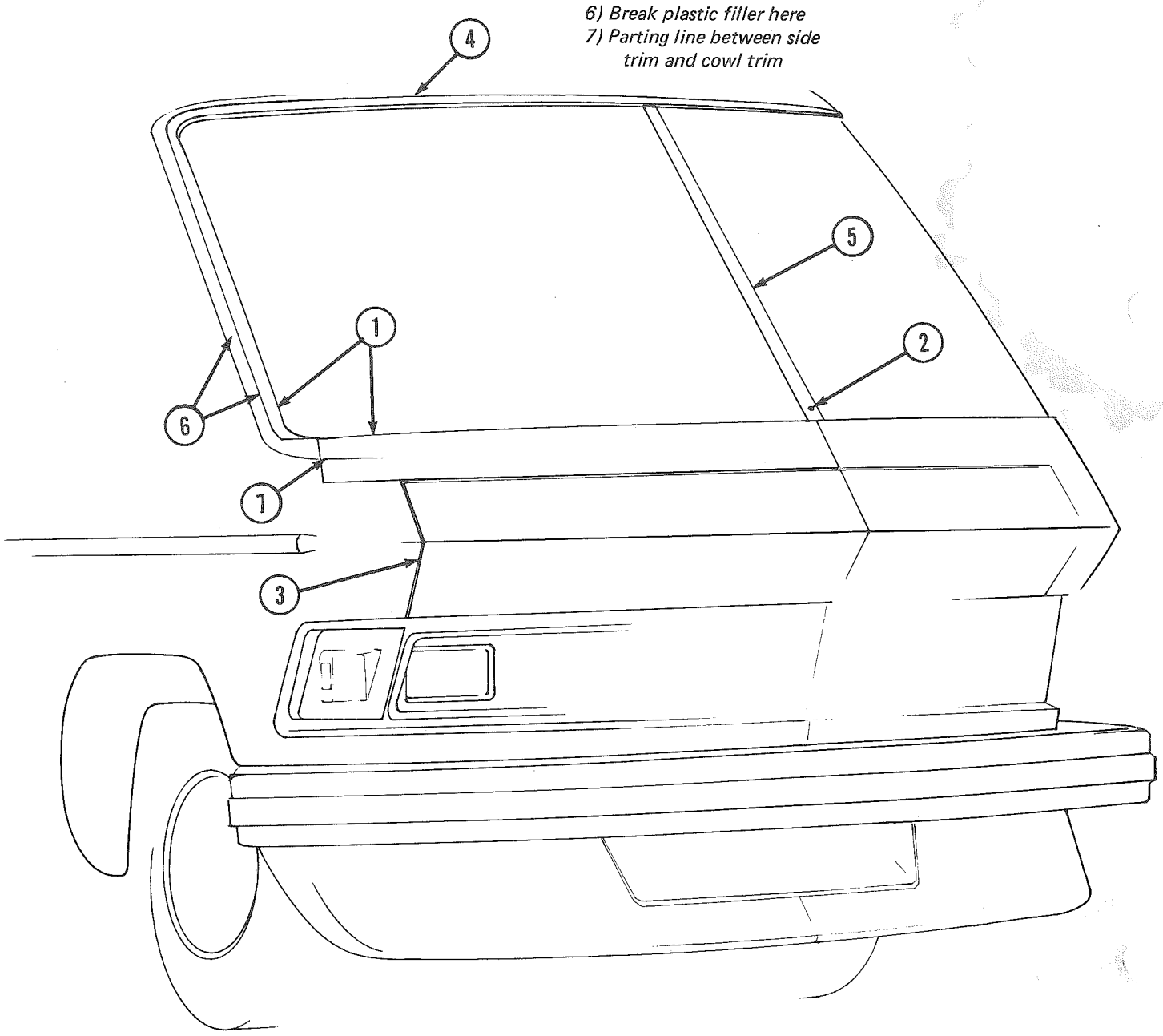


Figure A – Windshield Replacement

ENGINE & DRIVING GEAR

Your REVCON vehicle is certified by the United States Environmental Protection Agency as conforming to the requirements of the regulations for the control of air pollution from new motor vehicles. This certification is contingent on certain adjustments being set to factory standards. In most cases, these adjustment points either have been permanently sealed and/or made inaccessible to prevent indiscriminate or routine adjustment in the field. For this reason, the factory procedure for temporarily removing plugs, caps, etc., for purposes of servicing the product must be strictly followed and, wherever practicable, returned to the original intent of the design.

ENGINE GENERAL INFORMATION

THE FOLLOWING INFORMATION ON ENGINE SERVICE SHOULD BE NOTED CAREFULLY, AS IT IS IMPORTANT IN PREVENTING DAMAGE, AND IN CONTRIBUTING TO RELIABLE ENGINE PERFORMANCE.

When raising or supporting the engine for any reason, do not use a jack under the oil pan. Due to the small clearance between the oil pan and the oil pump screen, jacking against the oil pan may cause it to be bent against the pump screen resulting in a damaged oil pick-up unit.

It should be kept in mind, while working on the engine, that the 12-volt electrical system is capable of violent and damaging short circuits. When performing any work where electrical terminals could possibly be grounded, the ground cable of the battery should be disconnected at the battery.

Any time the carburetor or air cleaner is removed, the intake opening should be covered. This will protect against accidental entrance of foreign material which could follow the intake passage into the cylinder and cause extensive damage when the engine is started.

IN THE MECHANICAL PROCEDURES DESCRIBED IN THIS SECTION, GENERALLY NO REFERENCES WILL BE MADE TO THE REMOVAL OF OPTIONAL EQUIPMENT SUCH AS POWER STEERING PUMP, AIR CONDITIONING COMPRESSOR, ETC.

SHOULD IT BECOME NECESSARY TO REMOVE ANY SUCH ITEM TO PERFORM OTHER SERVICE, REFER TO THE APPROPRIATE SECTION OF THIS SERVICE MANUAL FOR SPECIFIC INFORMATION.

ENGINE DIAGNOSIS INTRODUCTION

Engine Performance Diagnosis procedures are guides that will lead to the most probable causes of engine performance complaints. They consider all of the components of the fuel, ignition, and mechanical systems that could cause a particular complaint, and then outline repairs in a logical sequence.

The procedures are based on Symptoms that are listed in the Table of Contents.

Each Symptom is defined, and it is vital that the correct one be selected based on the complaints reported or found.

Review the Symptoms and their definition to be sure that only the correct terms are used.

The words used may not be what you are used to in all cases, but because these terms have been used interchangeably for so long, it was necessary to decide on the most common usage and then define them. If the definition is not understood, and the exact Symptom is not used, the Diagnostic procedure will not work.

It is important to keep two facts in mind:

1. The procedures are written to diagnose problems on vehicles that have "run well at one time" and that time and wear have created the condition.

2. All possible causes cannot be covered, particularly with regard to emission controls. If doing the work prescribed does not correct the complaint, then either the wrong Symptom was used or a more detailed analysis will have to be made.

All of the Symptoms can be caused by worn out or defective parts. If time and/or mileage indicate that parts should be replaced, it is recommended that it be done.

ENGINE DIAGNOSIS

SYMPTOM	DEFINITION
A. Dieseling	Engine continues to run after the switch is turned off. It runs unevenly and makes knocking noises.
B. Detonation	A mild to severe ping, usually worse under acceleration. The engine makes sharp metallic knocks that change with throttle opening. Sounds like pop corn popping.
C & D. -- Stalls, Cold or Hot	The engine quits running. It may be at idle or while driving.
C & D. -- Rough Idle, Cold or Hot	The engine runs unevenly at idle. If bad enough, it may make the vehicle shake.
E. Miss	Steady pulsation or jerking that follows engine speed, usually more pronounced as engine load increases. Not normally felt above 1500 rpm or 30 mph. The exhaust has a steady spitting sound at idle or low speed.
F. Hesitates	Momentary lack of response as the accelerator is depressed. Can occur at all vehicle speeds. Usually most severe when first trying to make the car move, as from a stop sign. May cause the engine to stall if severe enough.
G. Surges	Engine power variation under steady throttle or cruise. Feels like the vehicle speeds up and slows down with no change in the accelerator pedal.

SYMPTOM	DEFINITION
H. Sluggish	Engine delivers limited power under load or at high speed. Won't accelerate as fast as normal; loses too much speed going up hills, or has less top speed than normal.
I. Spongy	Less than the anticipated response to increased throttle opening. Little or no increase in speed when the accelerator pedal is pushed down a little to increase cruising speed. Continuing to push the pedal down will finally give an increase in speed.
J. Poor Gas Mileage	Self describing.
K. Cuts Out	The engine exhibits a significant or total temporary loss of power at sharp, irregular intervals. This may occur repeatedly or intermittently and is usually worse under heavy acceleration.
L. Hard Start /Cold	Self describing.
M. Hard Start /Hot	Self describing.

ENGINE PERFORMANCE DIAGNOSIS

SYMPTOM	CORRECTION PROCEDURE
A. Dieseling	1. Make visual checks of the following for sticking: a. Carburetor, choke, and throttle linkage. b. Fast idle cam (See cleaning, inspection of carburetor.) 2. Check and reset ignition timing and idle speed settings. Refer to emission control information label. 3. Remove carbon with top engine cleaner. Follow instructions on can. If condition still exists, suggest that owner try different gasoline.
B. Detonation	1. Check for obvious overheating problems. a. Low coolant. b. Loose fan belt. c. Restricted air flow, etc. 2. Check ignition timing per emission control information label. 3. Remove carbon with top engine cleaner. Follow instructions on can. If condition still exists, suggest that owner try different gasoline.
C. Stalls or Rough Idle – Cold	1. With engine running, remove air cleaner cover and filter. Damper door in air cleaner snorkel should be closed when engine is cold. It may be necessary to place cold wet rag over sensor to close it if engine is too warm. If damper door does not close, apply vacuum directly to vacuum motor. If door closes, replace sensor. If door stays open, replace vacuum motor. 2. Visually check the following. a. Hot air tube to air cleaner connection and condition of hot air stove. b. Vacuum hoses for splits, kinks, and proper connections. See Hose Routing Schematic on Vehicle Emission Control Information Label. c. Air leaks at carburetor mounting and intake manifold. d. Ignition wires for cracking, hardness, and proper connections. Repair or replace as necessary. 3. Check the following for sticking: a. Carburetor, choke, and throttle linkage. b. Fast idle cam. c. Carburetor flooding. 4. With engine running, visually check vacuum break linkage for movement while removing and reinstalling vacuum hose. If the linkage does not move and vacuum is at hose, replace vacuum break assembly. 5. With engine off, check all choke adjustments. 6. Check engine timing and idle speed. See Emission Control Information Label. 7. Check E.F.E. valve. Disconnect E.F.E. hose from tube and connect an extra vacuum hose from any manifold vacuum source to E.F.E. tube. Observe actuator linkage for movement. If no movement, repair as necessary.
D. Stalls or Rough Idle – Hot	1. With engine running, remove air cleaner cover and filter. Damper door in air cleaner snorkel should be open. If closed and engine is hot, check temperature operation of sensor unit. 2. Visually check the following: a. Vacuum hoses for splits, kinks, and proper connections. See hose routing Schematic, Vehicle Emission Control Information Label. b. Air leaks at carburetor mounting and intake manifold. c. Ignition wire for cracking, hardness, and proper connections. Repair or replace as necessary. d. Check idle solenoid. Replace as necessary. 3. Check engine timing and idle speed. See Emission Control Information. 4. Check P.C.V. valve for proper operation by placing finger over inlet hole in valve end several times. Valve should snap back. If not, replace valve. 5. Remove carbon with top engine cleaner. Follow instructions on can. If idle is still rough, run a cylinder compression check.

SYMPTOM	CORRECTION PROCEDURE
E. Miss	1. Visually check the following: a. Vacuum hoses for splits, kinks, and proper connections. See Hose Routing Schematic, Vehicle Emission Control Information Label. b. Air leaks at carburetor mounting and intake manifold. c. Ignition wires for cracking, hardness and proper connections. Repair or replace as necessary. 2. Disconnect air cleaner. 3. Remove one spark plug wire at a time with insulated pliers. If there is an rpm drop on all cylinders, go to rough idle (hot) diagnosis charts. 4. If there is no rpm drop on one or more cylinders, remove spark plug(s) and check for: a. Cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary. 5. Check spark plug wires by connecting ohmmeter to end of each wire in question. If meter reads over 50,000 ohms, replace wire(s). 6. Visually check distributor cap and rotor for moisture, dust, cracks, burns, etc. Clean and/or repair as necessary. 7. Perform compression check on questionable cylinder(s). If compression is low, repair as necessary. 8. Remove rocker covers. Check for bent push rods, worn rocker arms, broken valve springs, worn cam shaft lobes. Repair as necessary.
F. Hesitates	1. Visually check the following: a. Vacuum hoses for splits, kinks, and proper connections. See Hose Routing Schematic on the Vehicle Emission Information Label. b. Air leaks at carburetor mounting intake manifold. c. Check ignition wires for cracking, hardness, and proper connections. Repair as necessary. 2. Note: Cold Engine Only. Check the following for sticking or faulty operation: a. Carburetor, choke, and throttle linkage. b. Fast idle cam. See cleaning, inspection, and adjustment of carburetor. 3. Check carburetor accelerator pump operation. With air cleaner removed and engine off, hold choke valve open and look for gas squirt in carburetor bore while moving throttle. 4. If weak or no pump squirt, remove carburetor air horn and repair pump system as necessary. Check float level adjustment before replacing air horn and pump rod adjustment after assembly.

SYMPTOM	CORRECTION PROCEDURE
	5. Disconnect and plug vacuum advance hose; connect tachometer and timing light. Check ignition timing and idle speed against specs on emission label. 6. With engine running, remove air cleaner cover and filter. Damper door in air cleaner snorkel should be closed when engine is cold. It may be necessary to place cold wet rag over sensor to close if engine is too warm. If damper door does not close, apply vacuum directly to vacuum motor. If door closes, replace sensor. If door stays open, replace vacuum motor.
G. Surges	1. With engine running, remove air cleaner cover and filter. Damper door in air cleaner snorkel should be closed when engine is cold. It may be necessary to place cold wet rag over sensor to close if engine is too warm. 2. Visually check the following: a. Vacuum hoses for splits, kinks, and proper connections. See Hose Routing Schematic, Vehicle Emission Control Information Label. b. Air leaks at carburetor mounting and intake manifold. c. Ignition wires for cracking, hardness, and proper connections. Repair or replace as necessary. 3. Check ignition timing per Emission Control Label. To check mechanical advance, observe timing marks. It should advance as throttle is opened and return to mark as throttle is closed. 4. With engine off, remove vacuum hose from distributor vacuum advance. Connect vacuum pump and apply 15" vacuum. Vacuum should hold steady for 15 seconds. If vacuum drops, replace vacuum advance unit. 5. Check carburetor fuel inlet filter. Replace if dirty or plugged. 6. Test fuel pump by connecting hose from carburetor fuel feed line to a suitable container. Start engine and let idle for 15 seconds. a. Mechanical pump should supply 1/2 pint or more. If not, go to step 7. If OK, go to step 9. 7. To check mechanical fuel pump, connect a vacuum gauge. Crank or run engine until maximum vacuum is reached. If less than 12 inches, replace pump. If vacuum reading is 12 inches or more, go to step 8.

SYMPTOM	CORRECTION PROCEDURE
	8. Check fuel lines and hoses for splits, leaks, or kinks by disconnecting each section of line and connect vacuum gauge. Crank or run engine until vacuum gauge peaks. Vacuum should be at least 12 inches. If less, repair or replace defective line or hose. 9. If fuel lines and pump check OK, remove tank unit, replace strainer and clean fuel tank, if necessary. 10. Remove spark plugs. Check for cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary.
H. Sluggish or Spongy	1. Remove air cleaner and check air filter for dirt or being plugged. Replace as necessary. 2. With engine running, damper door in air cleaner snorkel should be closed when engine is cold. It may be necessary to place cold rag over sensor to close if engine is too warm. If damper door does not close, apply vacuum directly to vacuum motor. If door closes, replace sensor. If door stays open, replace vacuum motor. 3. Check ignition timing per Vehicle Emission Control Information Label. Check mechanical advance as throttle is opened and closed. 4. Remove air cleaner and check for full throttle valve opening in carburetor by depressing accelerator pedal to floor; also check for full choke valve opening and free the operating air valve (if equipped). Repair as necessary. See carburetor cleaning and inspection. 5. With engine off, remove vacuum hose from distributor vacuum advance. Connect vacuum pump and apply 15" vacuum. Vacuum should hold steady for 15 seconds. If vacuum drops, replace vacuum advance unit. 6. Remove spark plugs. Check for cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary. 7. Remove carburetor air horn and check the following: a. Power piston for freeness b. Dirt in carburetor c. Float adjustment d. Metering rods e. Power valve(s) Refer to carburetor cleaning and inspection.

SYMPTOM	CORRECTION PROCEDURE
I. Poor Gasoline Mileage	1. With engine running, remove air cleaner cover and filter. Check filter for dirt or being plugged. Replace as necessary. Damper door in air cleaner snorkel should be closed when engine is cold. It may be necessary to place cold wet rag over sensor to close it if engine is too warm. If damper door does not close, apply vacuum directly to vacuum motor. If door closes, replace sensor. If door stays open, replace vacuum motor. 2. Visually check the following: a. Vacuum hoses for splits, kinks and proper connections. See hose routing Schematic, Vehicle Emission Control Information Label. b. Air leaks at carburetor mounting and intake manifold. c. Ignition wires for cracking, hardness, and proper connections. Repair or replace as necessary. 3. Check ignition timing per Emission Control Information Label. To check mechanical advance, observe timing mark. It should advance as throttle is opened and return to mark as throttle is closed. 4. Check carburetor choke linkage and settings. Clean and repair as necessary. See carburetor choke adjustments, cleaning and inspection. 5. With engine off, remove vacuum hose from distributor vacuum advance. Connect vacuum pump and apply 15" vacuum. Vacuum should hold steady for 15 seconds. If vacuum drops, replace vacuum advance unit. 6. Remove spark plugs, check for cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary. 7. If in previous checks, adjustments have not been made that could improve mileage, remove carburetor air horn and check the following: a. Power piston for freeness b. Dirt in jets and metering passages c. Metering rods d. Power valve(s) e. Float adjustment See carburetor cleaning, inspection, and adjustments. 8. Suggest owner fill tank and recheck mileage.

SYMPTOM	CORRECTION PROCEDURE
J. Cuts Out	1. Check ignition wires, boots, cap and coil for: a. Damage b. Deterioration c. Loose connections d. Carbon tracking Clean, tighten and/or replace defective parts as necessary. 2. Check ignition system. Check distributor for: a. Worn shaft b. Bare or shorted wires Repair or replace defective parts as necessary. 3. Remove spark plugs. Check for cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary. 4. Check carburetor fuel inlet filter. Replace if dirty or plugged. 5. Test fuel pump by connecting hose from carburetor fuel feed line to a suitable container. Start engine and let idle for 15 seconds. Fuel pump should supply 1/2 pint or more. If not, go to step 7. 6. To check mechanical fuel pump, disconnect inlet hose at pump and then connect a vacuum gauge. Crank or run engine until maximum vacuum is reached. If less than 12 inches, replace pump. If vacuum reading is 12 inches or more, go to step 8. 7. Check fuel lines and hoses for splits, leaks, or kinks by disconnecting each section of line and connecting a vacuum gauge. Crank or run engine until vacuum gage peaks. Vacuum should be at least 12 inches. If less, repair or replace defective line or hose as necessary. 8. If fuel pump and fuel lines check OK, remove tank unit, replace strainer and clean fuel tank, if necessary. If carburetor is suspected, remove the air horn and check the following: a. Power piston(s) or main fuel piston for freeness. b. Dirt in jets and metering passages. c. Metering rods. d. Power valve(s) or main fuel valve(s). e. Float adjustment. See Carburetor Cleaning Inspection and Adjustment.
K. Hard Start - Cold (Engine Cranks OK)	1. Visually check the following: a. Vacuum hoses for splits, kinks and proper connections. See hose routing charts. b. Air leaks at carburetor mounting and intake manifold. c. Ignition wires for cracking, hardness, proper connections, and carbon tracking. Repair or replace as necessary. d. Check choke and vacuum break operation and adjustment. 2. Check ignition timing per emission control information label. If timing is too early - speed up engine to see if timing mark moves. If not, check for stuck mechanical advance. Repair as necessary and recheck timing. 3. Check the following: a. Choke, throttle linkage and fast idle cam for sticking. b. Carburetor flooding. Clean and repair as necessary. If repairs are necessary, see carburetor, cleaning and inspection. 4. Check ignition system. Check distributor for: a. Worn shaft b. Bare and shorted wires c. Repair or replace as necessary. 5. Remove spark plugs. Check for cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary. 6. Test the fuel pump by connecting hose from carburetor fuel feed line to a suitable container. Start engine and let idle for 15 seconds. Pump should supply 1/2 pint or more. If more than 1/2 pint, check filter in carburetor. Replace if necessary. If less than 1/2 pint, for mechanical pump, go to step 7. 7. Disconnect inlet hose at pump and connect a vacuum gauge. Crank or run engine until maximum vacuum is reached. If less than 12 inches, replace pump. If more than 12 inches, go to step 8. 8. Check fuel lines and hoses for splits, leaks, or kinks by disconnecting each section of line and connect vacuum gauge. Crank or run engine until vacuum gauge peaks. Vacuum should be at least 12 inches. If less, repair or replace defective line or hose. 9. If fuel lines and pump check OK, remove tank unit, replace strainer and clean fuel tank, if necessary.

SYMPTOM	CORRECTION PROCEDURE
L. Hard Start - Hot (Engine cranks OK)	1. Visually check the following: a. Vacuum hoses for splits, kinks and proper connections. See hose routing Schematic, Vehicle Emission Control Information Label. b. Air leaks at carburetor mounting and intake manifold. c. Ignition wires for cracking, hardness, proper connections, and carbon tracking. Repair or replace as necessary. 2. Check ignition timing per Emission Control Information Label. If timing is too early - speed up engine to see if timing mark moves. If not, check for stuck mechanical advance. Repair as necessary and recheck timing. 3. Check the following: a. Choke, throttle linkage and fast idle cam for sticking. b. Carburetor flooding. Clean and repair as necessary. If repairs are necessary, see carburetor cleaning and inspection. 4. Check ignition system. Check distributor for: a. Worn shaft b. Bare and shorted wires c. Faulty pick up coil, module, ignition coil, and shorted condenser. Repair or replace as necessary. 5. Remove spark plugs. Check for cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary. 6. Also check steps 6, 7, 8, 9 - Hard Start - Cold.

ENGINE MECHANICAL DIAGNOSIS

The following diagnostic information covers common problems and possible causes. When the proper diagnosis is made, the problem should be corrected by adjustment, repair or part replacement as required. Refer to the appropriate section of the manual for these procedures.

CONDITION

Excessive Oil Loss

POSSIBLE CAUSE	CORRECTION
1. External oil leaks.	1. Tighten bolts and/or replace gaskets and seals as necessary.
2. Improper reading of dipstick.	2. Check oil with car on a level surface and allow adequate drain down time.
3. Improper oil viscosity.	3. Use recommended S.A.E. viscosity for prevailing temperatures.
4. Continuous high speed driving and/or severe usage such as trailer hauling.	4. Continuous high speed operation and/or severe usage will normally cause decreased oil mileage.
5 P.C.V. system malfunctioning.	5. Service as necessary.
6. Valve guides and/or valve stem seals worn, or seals omitted.	6. Ream guides and install oversize service valves and/or new valve stem seals.
7. Piston rings not seated, broken or worn.	7. a. Allow adequate time for rings to seat. b. Replace broken or worn rings as necessary.
8. Piston improperly installed or misfitted.	8. Replace piston or repair as necessary.

Low Oil Pressure

1. Slow idle speed	1. Set idle speed to specification.
2. Incorrect or malfunctioning oil pressure switch.	2. Replace with proper switch.
3. Incorrect or malfunctioning oil pressure gauge.	3. Replace with proper gauge.
4. Improper oil viscosity or diluted oil.	4. a. Install oil of proper viscosity for expected temperature. b. Install new oil if diluted with moisture or unburned fuel mixtures.
5. Oil pump worn or dirty.	5. Clean pump and replace worn parts as necessary.
6. Plugged oil filter.	6. Replace filter and oil.
7. Oil pickup screen loose or plugged.	7. Clean or replace screen as necessary.
8. Hole in oil pickup tube.	8. Replace tube.
9. Excessive bearing clearance.	9. Replace as necessary.
10. Cracked, porous or plugged oil galleys.	10. Repair or replace block.

POSSIBLE CAUSE	CORRECTION
11. Galley plugs missing or misinstalled.	11. Install plugs or repair as necessary.

Valve Train Noise

1. Low oil pressure.	1. Repair as necessary. (See diagnosis for low oil pressure.)
2. Loose rocker arm attachments.	2. Inspect and repair as necessary.
3. Worn rocker arm and/or pushrod.	3. Replace as necessary.
4. Broken valve spring.	4. Replace spring.
5. Sticking valves.	5. Free valves.
6. Lifters worn, dirty or defective.	6. Clean, inspect, test and replace as necessary.
7. Camshaft worn or poor machining.	7. Replace camshaft.
8. Worn valve guides.	8. Repair as necessary.

ENGINE KNOCK DIAGNOSIS

CONDITION

a. Engine knocks cold and continues for two to three minutes. Knock increases with torque. [1]

POSSIBLE CAUSE	CORRECTION
1. EFE equipped engines may have valve knock.	1. Replace EFE valve.
2. Flywheel contacting splash shield.	2. Reposition splash shield.
3. Loose or broken balancer or drive pulleys.	3. Tighten or replace as necessary.
4. Excessive piston to bore clearance.	4. Replace piston.

b. Engine has heavy knock hot with torque applied.

1. Broken balancer or pulley hub.	1. Replace parts as necessary.
2. Loose torque converter bolts.	2. Tighten bolts.
3. Accessory belts too tight or nicked.	3. Replace and/or tension to specs as necessary.
4. Exhaust system grounded.	4. Reposition as necessary.
5. Flywheel cracked.	5. Replace flywheel.
6. Excessive main bearing clearance.	6. Replace as necessary.
7. Excessive rod bearing clearance.	7. Replace as necessary.

c. Engine has light knock hot in light load conditions.

1. Detonation or spark knock.	1. Check engine time and fuel quality.
2. Loose torque converter bolts.	2. Tighten bolts.
3. Exhaust leak at manifold.	3. Tighten bolts and/or replace gasket.
4. Excessive rod bearing clearance.	4. Replace bearings as necessary.

d. Engine knocks on initial start up but only lasts a few seconds.

1. Fuel pump.	1. Replace pump.
2. Improper oil viscosity.	2. Install proper oil viscosity for expected temperatures.
3. Hydraulic lifter bleed down.[2]	3. Clean, test and replace as necessary.
4. Excessive crankshaft end clearance.	4. Replace crankshaft thrust bearing.

e. Engine knocks at idle hot.

1. Loose or worn drive belts.	1. Tension and/or replace as necessary.
2. Compressor or generator bearing.	2. Replace as necessary.
3. Fuel pump.	3. Replace pump.
4. Valve train.	4. Replace parts as necessary.
5. Improper oil viscosity.	5. Install proper viscosity oil for expected temperature.
6. Excessive piston pin clearance.	6. Ream and install oversize pins.

POSSIBLE CAUSE	CORRECTION
7. Connecting rod alignment.	7. Check and replace rods as necessary.
8. Insufficient piston to bore clearance.	8. Hone and fit new piston.

[1] Cold engine piston knock usually disappears when the cylinder is grounded out. Cold engine piston knock which disappears in 1.5 minutes should be considered acceptable.

[2] When the engine is stopped, some valves will be open. Spring pressure against lifters will tend to bleed lifter down. Attempts to repair should be made only if the problem is consistent and appears each time engine is started.

ENGINE AND DRIVING GEAR (Continued)

GENERAL DESCRIPTION

CYLINDER BLOCK

The cylinder block is made of cast iron and has 8 cylinders arranged in a "V" shape with 4 cylinders in each bank. Five bearings support the crankshaft which is retained by bearing caps that are machined with the block for proper alignment and clearances. Cylinders are completely encircled by coolant jackets.

CYLINDER HEAD

The cast iron cylinder heads have individual intake and exhaust ports for each cylinder. Valve guides are integral, and rocker arms are retained on individual threaded studs.

CRANKSHAFT AND BEARINGS

The crankshaft is cast nodular iron, and is supported by five main bearings. Number five bearing is the end thrust bearing.

All main bearings are lubricated from oil holes that connect to the main oil gallery. This runs along the left side of the cylinder case, just above the oil pan rail. Two additional galleries supply oil to the valve lifters.

A torsional damper on the forward end of the crankshaft dampens any engine torsional vibrations.

CAMSHAFT AND DRIVE

The cast iron camshaft is supported by five bearings and is chain driven. A steel crankshaft gear drives the timing chain which in turn drives the camshaft through an aluminum and nylon sprocket.

Cam lobes are ground, hardened and tapered with the high side toward the rear. This, coupled with a spherical face on the lifter, causes the valve lifters to rotate.

Camshaft bearings are lubricated through oil holes which intersect the main oil gallery. The main oil gallery is rifle drilled down the left side of the cylinder case.

PISTONS AND CONNECTING RODS

The pistons are made of cast aluminum alloy using two compression rings and one oil control ring. Pins are Chromium steel and have floating fit in the pistons. They are retained in the connecting rods by a press fit.

Connecting rods are made of forged steel. Full pressure lubrication is directed to the connecting rods by drilled oil passages from the adjacent main bearing journal. Oil holes at the connecting rod journals are located so that oil is supplied to give maximum lubrication just prior to full bearing load.

VALVE TRAIN

A very simple ball pivot-type train is used. Motion is transmitted from the camshaft through the hydraulic lifter and push rod to the rocker arm. The rocker arm pivots on its ball and transmits the camshaft motion to the valve. The rocker-arm ball is retained by a nut.

HYDRAULIC VALVE LIFTERS

Hydraulic Valve Lifters are used to keep all parts of the valve train in constant contact.

The hydraulic lifter assembly consists of: the lifter body, which rides in the cylinder block boss, a plunger, a push rod seat, a metering valve, a plunger spring, a check ball and spring, a check ball retainer and a push rod seat retainer.

When the lifter is riding on the low point of the cam, the plunger spring keeps the plunger and push rod seat in contact with the push rod.

When the lifter body begins to ride up the cam lobe, the check ball cuts off the transfer of oil from the reservoir below the plunger. The plunger and lifter body then rise as a unit, pushing up the push rod and opening the valve.

As the lifter body rides down the other side of the cam, the plunger follows with it until the valve closes. The lifter body continues to follow the cam to its low point, but the plunger spring keeps the plunger in contact with the push rod. The ball check valve will then move off its seat and the lifter reservoir will remain full.

INTAKE MANIFOLD

The intake manifold is of cast iron double level design for efficient fuel distribution. The carburetor pad is centrally located with a passage running underneath the pad (E.F.E.) through which exhaust gases are forced to promote faster fuel vaporization when the engine is cold.

EXHAUST MANIFOLDS

Two cast iron exhaust manifolds are used to direct exhaust gases from the combustion chambers to the exhaust system. The right hand side manifold receives a heat shield that is used to route heated air to the air cleaner for better fuel vaporization.

COMBUSTION CHAMBERS

Combustion Chambers are cast to insure uniform shape for all

ENGINE AND DRIVING GEAR (Continued)

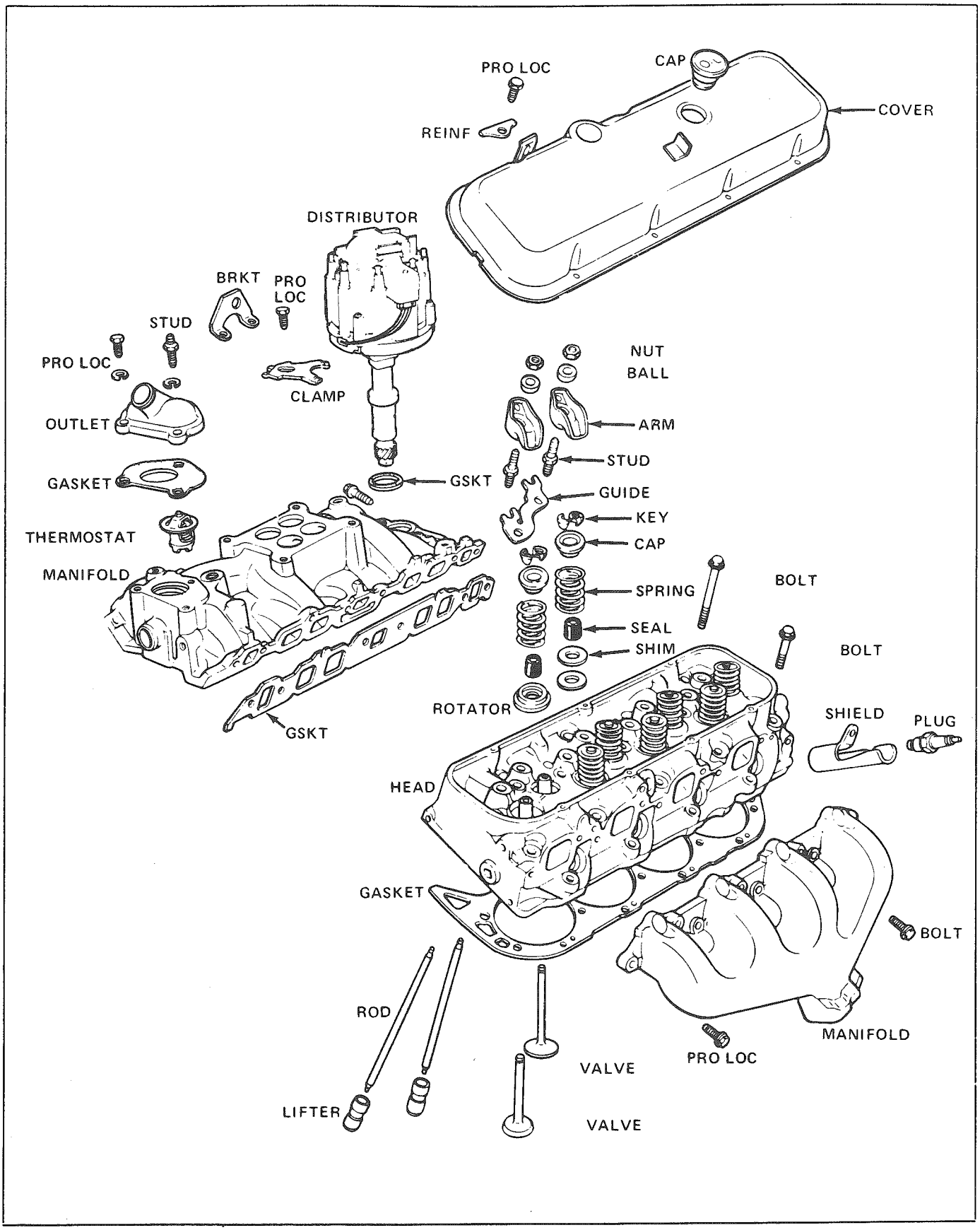


Figure 22 – Engine Upper End (Exploded View)

ENGINE AND DRIVING GEAR (Continued)

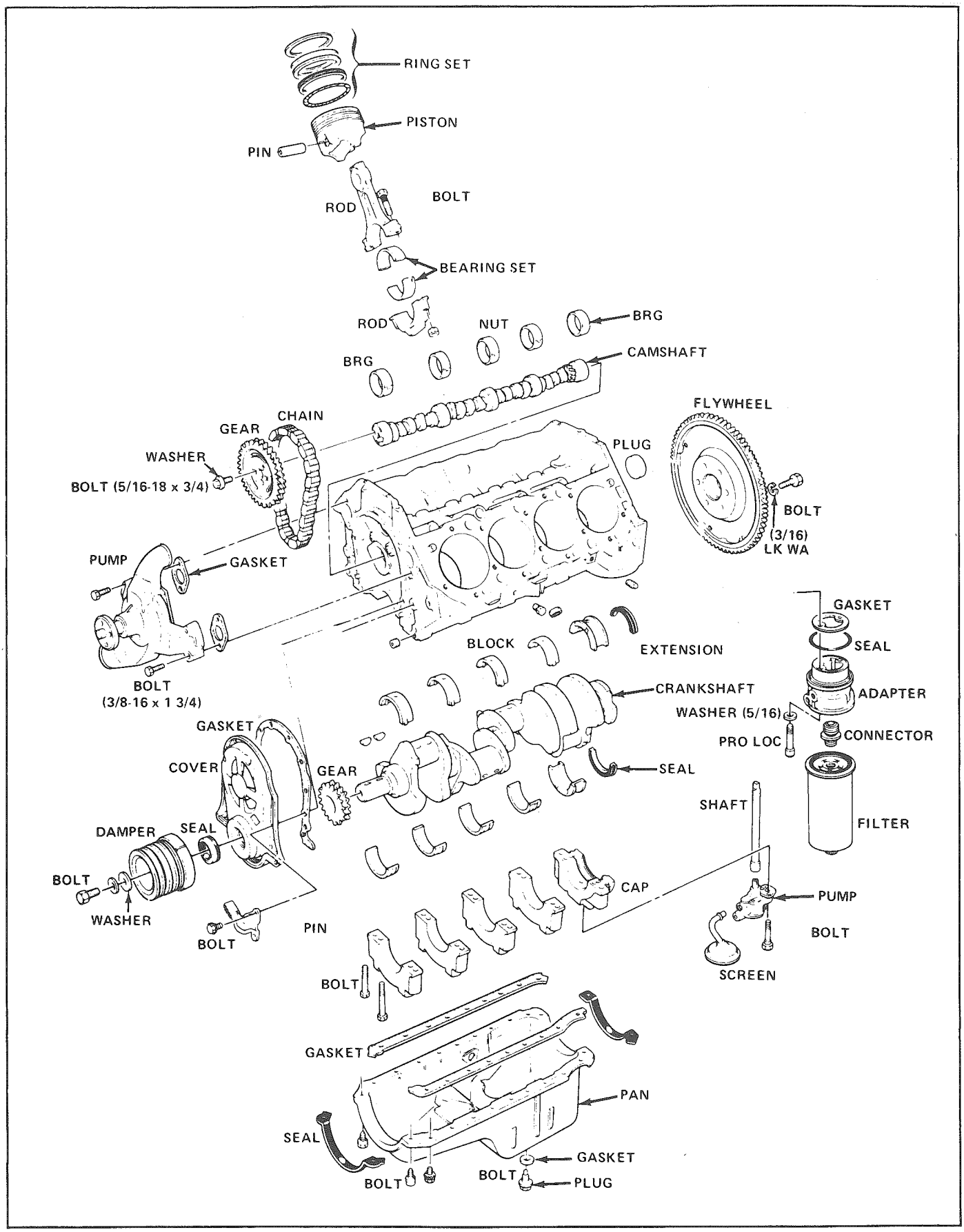


Figure 23 – Engine Lower End (Exploded View)

ENGINE AND DRIVING GEAR (Continued)

cylinders. Spark plugs are located between the intake and exhaust valves.

The contoured wedge shape of the combustion chamber minimizes the possibility of detonation, facilitates breathing, and provides swirling turbulence for smooth, complete combustion.

ENGINE LUBRICATION

Full pressure lubrication through a full flow oil filter, is furnished by a gear-type oil pump. The distributor, driven by a helical gear on the camshaft, drives the oil pump. The main oil gallery feeds oil, through drilled passages, to the camshaft and crankshaft to lubricate the bearings. The valve lifter oil gallery feeds the valve lifters which, through hollow push rods, feed the individually mounted rocker arms.

ON VEHICLE SERVICE

ENGINE MOUNTS

Engine mounts are the non-adjustable type and seldom require service. Broken or deteriorated mounts should be replaced immediately, because of the added strain placed on other mounts and drive line components.

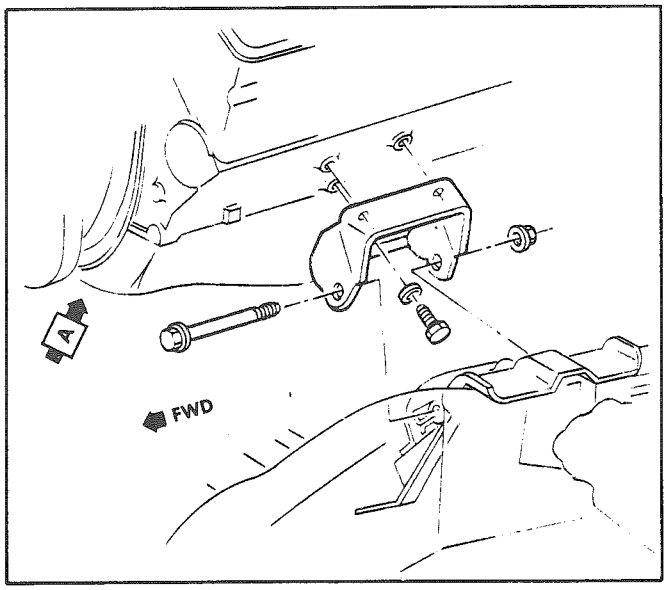


Figure 24 – Engine Mounting Bracket (Upper Section)

Checking Engine Mounts

Front Mount

Raise the engine to remove weight from the mounts and to place a slight tension in the rubber. Observe both mounts while raising engine. If an engine mount exhibits:

a. Hard rubber surface covered with heat check cracks
b. Rubber separated from a metal plate of the mount
c. Rubber split through center

Replace the mount. If there is relative movement between a metal plate of the mount and its attaching points, lower the engine on the mounts and tighten the screws or nuts attaching the mount to the engine, frame, or bracket.

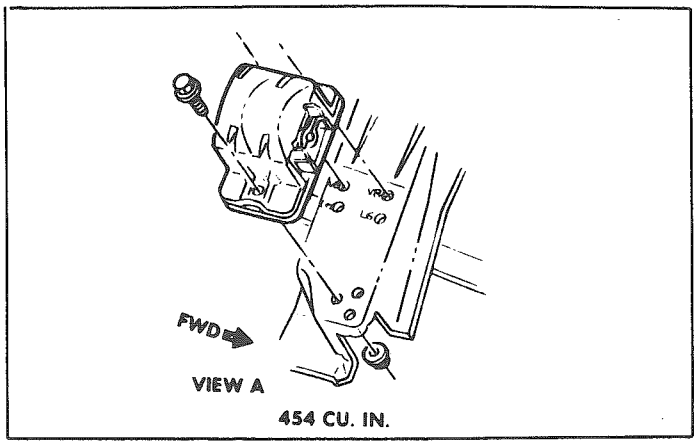


Figure 25 – Engine Mounting Bracket (Lower Section)

Rear Mount

Raise the vehicle on a hoist. Push up and pull down on the transmission tailshaft while observing the transmission mount. If the rubber bushings allow the transfer case support plate to contact the crossmember, replace both bushings. For more information see the section on the transfer care.

Front Mount Replacement

1. Remove mount retaining bolt from below frame mounting bracket.
2. Raise front of engine and remove mount-to-engine bolts and remove mount. Raise engine only enough for sufficient clearance. Check for interference between rear of engine and cowl panel which could cause distributor damage.
3. Replace mount to engine and lower engine into place.
4. Install retaining bolt and torque all bolts to specifications.

MINOR ENGINE ADJUSTMENTS

ROCKER ARM COVER

Removal

1. Remove air cleaner.
2. Disconnect crankcase ventilation hoses at rocker arm covers.
3. Disconnect electrical wiring harness from rocker arm clips.
4. Remove carburetor heat stove pipe from right exhaust manifold.
5. If the vehicle is equipped with air conditioning, remove the A/C compressor upper brace.
6. Remove rocker arm cover to head attaching bolts and remove rocker arm cover.

   NOTICE: If cover adheres to cylinder head, shear off by bumping end of rocker arm cover with a rubber mallet. If cover will not come loose, **CAREFULLY** pry until loose. DO NOT DISTORT SEALING FLANGE.

Installation

1. Clean sealing surface on cylinder head and rocker arm cover with degreaser. Using a 3/16" (5mm) bead of RTV, or equivalent, place rocker arm cover on the head, install

ENGINE AND DRIVING GEAR (Continued)

retaining bolts and torque to specification. Loose RTV sealant, or pieces causing installation interference, must be removed from both cylinder head and cover seal surfaces prior to applying new sealant.

When going around the attaching bolt holes, always flow the RTV on the inboard side of the holes.

2. On A/C equipped vehicles, install the A/C compressor upper brace. Adjust pulley belt to specification.
3. Install carburetor heat stove pipe.
4. Connect electrical wiring harness at clips on rocker arm cover.
5. Connect crankcase ventilation hoses.
6. Install air cleaner start engine and check for leaks.

VALVE MECHANISM

Adjustment

1. Adjust valves when lifter is on base circle of camshaft lobe as follows:
   a. Crank engine until mark on torsional damper lines up with center or "O" mark on the timing tab fastened to the crankcase front cover and the engine is in the No. 1 firing position. This may be determined by placing fingers on the No. 1 valve as the mark on the damper comes near the "O" mark on the crankcase front cover. If the valves are not moving, the engine is in the No. 1 firing position. If the valves move as the mark comes up to the timing tab, the engine is in No. 6 firing position and should be turned over one more time to reach the No. 1 position.
   b. With the engine in the No. 1 firing position as determined above, the following valves may be adjusted.
   -- Exhaust -- 1, 3, 4, 8
   -- Intake -- 1, 2, 5, 7

   c. Back out adjusting nut until lash is felt at the push rod then turn in adjusting nut until all lash is removed. This can be determined by rotating push rod while turning adjusting nut (see figure 26). When play has been removed, turn adjusting nut in one full additional turn (to center lift plunger).

   d. Crank the engine one revolution until the pointer "o" mark and torsional damper mark are again in alignment. This is No. 6 firing position. With the engine in this position, the following valves may be adjusted.
   -- Exhaust -- 2, 5, 6, 7
   -- Intake -- 3, 4, 6, 8
4. Install rocker arm covers as previously outlined.
5. Start engine and adjust carburetor idle speed.

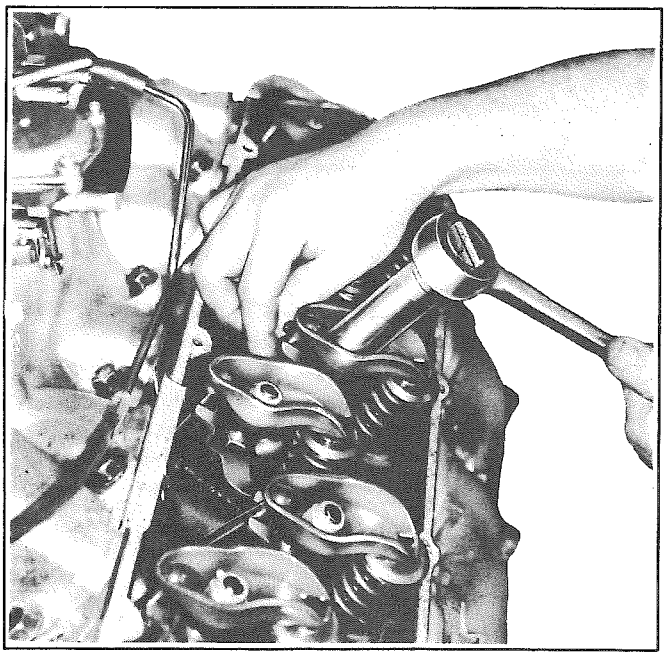


Figure 26 — Valve Adjustment

OIL PAN

Removal

1. Disconnect battery negative cable.
2. Loosen fan shroud.
3. Remove air cleaner.
4. Remove distributor cap.
5. Raise vehicle and drain oil pan.
6. Remove torque converter cover.
7. Remove mount "through" bolts and raise engine.
8. Remove oil pan bolts and drop pan.

Installation

If installing new oil pan, transfer dipstick tube from old unit.

1. With clean sealing surfaces on pan and block, place oil pan on block and install oil pan bolts. Torque to 135 lb. in. (15N·m).
2. Lower engine on mounts and install mount through bolts. Torque to 75 lb. ft. (100 N·m).
3. Install torque converter cover.
4. Lower vehicle.
5. Install distributor cap and tighten fan shroud.
6. Fill crankcase with oil.
7. Install air cleaner and connect battery negative cable.

OIL PUMP

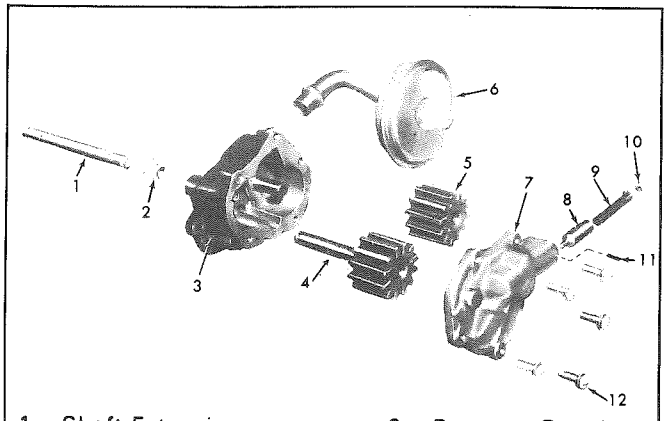
Removal

1. Remove oil pan as previously outlined.
2. Remove pump to rear main bearing cap bolt and remove pump and extension shaft.

Disassembly *(See figure 27)*

1. Remove the pump cover attaching screws and the pump cover.
2. Mark gear teeth so they may be reassembled with the same teeth indexing. Remove the idler gear and the drive gear and shaft from the pump body.
3. Remove the pressure regulator valve retaining pin, pressure regulator valve and related parts.

ENGINE AND DRIVING GEAR (Continued)



1. Shaft Extension
2. Shaft Coupling
3. Pump Body
4. Drive Gear and Shaft
5. Idler Gear
6. Pickup Screen and Pipe
7. Pump Cover
8. Pressure Regulator Valve
9. Pressure Regulator Spring
10. Washer
11. Retaining Pin
12. Screws

Figure 27 – Oil Pump

4. If the pickup screen and pipe assembly need replacing, the entire pump must be replaced. The screen and pipe assembly is welded to the pump body.

Cleaning and Inspection

1. Wash all parts in cleaning solvent and dry with compressed air.
2. Inspect the pump body and cover for cracks or excessive wear.
3. Inspect pump gears for damage or excessive wear.

   The pump gears and body are not serviced separately. If the pump gears or body are damaged or worn, replacement of the entire oil pump assembly is necessary.
4. Check the drive gear shaft for looseness in the pump body.
5. Inspect inside of pump cover for wear that would permit oil to leak past the ends of the gears.
6. Inspect the pickup screen and pipe assembly for damage to screen, pipe or relief grommet.
7. Check the pressure regulator valve for fit.

Assembly *(See figure 27)*

1. Install the pressure regulator valve and related parts.
2. Install the drive gear and shaft in the pump body.
3. Install the idler gear in the pump body with the smooth side of gear towards pump cover opening.
4. Install gasket and the pump cover and torque attaching screws to specifications.
5. Turn drive shaft by hand to check for smooth operation.

Installation

1. Assemble pump and extension shaft to rear main bearing cap, aligning slot on top end of extension shaft with drive tang on lower end of distributor drive shaft.
2. Install pump to rear bearing cap bolt and torque to specifications.
3. Install oil pan previously outlined.

ENGINE COOLING

ENGINE COOLING GENERAL DESCRIPTION

Your Revcon has a pressure type engine cooling system with thermostatic control of coolant circulation. The cooling system is sealed by a pressure type radiator filler cap which causes the system to operate at higher than atmospheric pressure. The higher pressure raises the boiling point of the coolant which increases the cooling efficiency of the radiator. The 15 pound (103 kPa) pressure cap used raises the boiling point of coolant to approximately 258° F (125° C) at sea level.

The radiator cap should be washed with clean water and pressure checked every 12 months.

All models have a closed cooling system using a round pressure cap and a coolant reservoir. Coolant can be added without removing the radiator cap.

A pressure-vacuum valve radiator cap is used which allows the coolant to expand through the pressure valve in the center of the cap without building unnecessary pressure. The expanding coolant flows into the coolant reservoir. The vent valve closes due to expansion and coolant flow. The nominal 15 pound (103 kPa) pressure will not be reached until the system is working at maximum capacity.

Any air or vapor in the cooling system will be forced to the coolant reservoir under the liquid level and leave through the vent tube at the top of the reservoir. As the system cools, the extra coolant in the reservoir will be drawn back to the radiator through the vent valve. In this manner, the radiator will keep itself full at all times.

COOLANT LEVEL

The need for additional coolant can be detected by observing the level of coolant in the "see through" reservoir while the engine is at normal operating temperature. The radiator cap need not normally be removed.

The coolant level should be at the "Full Cold" mark when the system is cool or at ambient temperature. After the vehicle has been driven sufficiently to obtain normal operating temperatures, the level should be above the "Full Cold" mark.

Periodically, the radiator cap should be removed to observe coolant level in the radiator.

CAUTION: The radiator coolant level should only be checked when the engine is cool. If the radiator cap is removed from a hot cooling system, serious personal injury may result.

The recovery bottle should be at its appropriate mark when checked.

Regardless of whether freezing temperatures are expected or not, cooling system protection should be maintained at least to -34° F (-37° C), to provide adequate corrosion protection and loss of coolant from boiling. With glycol content less than requirement for -34° F (-37° C) protection, coolant boiling point is less than the temperature indicating light setting.

GENERAL DATA:

TYPE		90° V-8 GASOLINE
DISPLACEMENT	LITRE (*)	7.4 (W)
RPO		LE8
BORE		4.250
STROKE		4.000
COMPRESSION RATIO		8.5:1
FIRING ORDER		1-8-4-3-6-5-7-2

CYLINDER BORE:

DIAMETER			4.2495-4.2525
OUT OF ROUND	PRODUCTION		.001 MAX.
	SERVICE		.002 MAX.
TAPER	PRODUCTION	THRUST SIDE	.0005 MAX.
		RELIEF SIDE	.001 MAX.
	SERVICE		.001 MAX.

PISTON:

CLEARANCE	PRODUCTION	.0030-.0040
	SERVICE	.0050 MAX.

PISTON RING:

COMPRESSION	GROOVE CLEARANCE	PRODUCTION	TOP	.0017-.0032
			2ND	.0017-.0032
		SERVICE		HI LIMIT PRODUCTION +.001
	GAP	PRODUCTION	TOP	.010-.020
			2ND	.010-.020
		SERVICE		HI LIMIT PRODUCTION +.010
OIL	GROOVE CLEARANCE	PRODUCTION		.005-.0065
		SERVICE		HI LIMIT PRODUCTION +.001
	GAP	PRODUCTION		.015-.055
		SERVICE		HI LIMIT PRODUCTION +.010

* VIN Designation

PISTON PIN

		LE8
DIAMETER		.9895-.9898
CLEARANCE	PRODUCTION	.00025-.00035
	SERVICE	.001 MAX.
FIT IN ROD		.0013-.0021 INTERFERENCE

CRANKSHAFT

MAIN JOURNAL	DIAMETER		#1-2-3-4 2.7481-2.7490
			#5 2.7476-2.7486
	TAPER	PRODUCTION	.0002 MAX.
		SERVICE	.001 MAX.
	OUT OF ROUND	PRODUCTION	.0002 MAX.
		SERVICE	.001 MAX.
MAIN BEARING CLEARANCE	PRODUCTION		#1-2-3-4 .0013-.0025
			#5 .0024-.0040
	SERVICE		#1-4 .001-.0025 #5 .0025-.0035
CRANKSHAFT END PLAY			.006-.010
CRANKPIN	DIAMETER		2.2000-2.1990
	TAPER	PRODUCTION	.0005
		SERVICE	.001 MAX.
	OUT OF ROUND	PRODUCTION	.0005
		SERVICE	.001 MAX.
ROD BEARING CLEARANCE	PRODUCTION		.0009-.0025
	SERVICE		.0030 MAX.
ROD SIDE CLEARANCE			.013-.023

CAMSHAFT

LOBE LIFT ± .002	INTAKE	.2343
	EXHAUST	.2530
JOURNAL DIAMETER		1.9482-1.9492

Figure 28 — Engine General Data Specifications

ENGINE AND DRIVING GEAR (Continued)

VALVE SYSTEM

LIFTER			HYDRAULIC
ROCKER ARM RATIO			1.50:1
VALVE LASH	INTAKE		ONE TURN DOWN FROM ZERO LASH
	EXHAUST		
FACE ANGLE (INT. & EXH.)			45°
SEAT ANGLE (INT. & EXH.)			46°
SEAT RUNOUT			.002 MAX.
SEAT WIDTH	INTAKE		1/32 - 1/16
	EXHAUST		1/16 - 3/32
STEM CLEARANCE	PRODUCTION	INT.	.0010 - .0027
		EXH.	.0010 - .0027
	SERVICE		HI LIMIT + .001 INTAKE + .002 EXHAUST
VALVE SPRING (OUTER)	FREE LENGTH		2.03
	PRESSURE LBS. @ IN.	CLOSED	76-84 @ 1.70 INT. @ 1.61 EXH
		OPEN	194-206 @ 1.25 INT. @ 1.16 EXH
	INSTALLED HEIGHT ± 1/32"		1-23/32 INT. 1-19/32 EXH.
DAMPER	FREE LENGTH		1.86
	APPROX. # OF COILS		4

Figure 29 — Valve System Specifications

TORQUE SPECIFICATIONS

CRANKCASE FRONT COVER	80 LB. IN.
FLYWHEEL HOUSING COVER	80 LB. IN.
OIL FILTER BYPASS VALVE	80 LB. IN.
OIL PAN (TO CRANKCASE) (1/4-20)	80 LB. IN.
OIL PUMP COVER	80 LB. IN.
ROCKER ARM COVER	45 LB. IN.
CAMSHAFT SPROCKET	20 LB. FT.
OIL PAN TO CRANKCASE (5/16-18)	165 LB. IN.
CLUTCH PRESSURE PLATE	30 LB. FT.
DISTRIBUTOR CLAMP	25 LB. FT.
FLYWHEEL HOUSING	30 LB. FT.
MANIFOLD (EXHAUST)	20 LB. FT.[1]
MANIFOLD (INLET)	30 LB. FT.
WATER OUTLET	30 LB. FT.
WATER PUMP	30 LB. FT.
CONNECTING ROD CAP	45 LB. FT.
CYLINDER HEAD	65 LB. FT.
MAIN BEARING CAP	80 LB. FT.[2]
OIL PUMP	65 LB. FT.
FLYWHEEL	60 LB. FT.
TORSIONAL DAMPER	60 LB. FT.
TEMPERATURE SENDING UNIT	20 LB. FT.
OIL FILTER	25 LB. FT.
OIL PAN DRAIN PLUG	20 LB. FT.
SPARK PLUG	17-27 LB. FT.

[1] Inside bolts on 5.7 (L) 30 LB. FT.
[2] Intermediate outer bolts are 70 LB. FT.

Figure 30 — Torque Specifications

When adding solution due to loss of coolant for any reason or in areas where temperatures lower than -34° F (-37° C) may occur, a sufficient amount of an ethylene glycol base anti-freeze that meets GM Specification 1899-M should be used.

NOTICE: Alcohol or methanol base anti-freeze, or plain water, are not recommended for your engine at anytime. They will not provide proper protection against corrosion.

Flushing Cooling System

Various methods and equipment may be used to perform this service. If special equipment such as a back flusher is used, equipment manufacturer's instructions should be followed. However, it is advisable to remove the thermostat before flushing the system.

THERMOSTAT

The thermostat consists of a restriction valve actuated by a thermostatic element. This is mounted in the forward part of the intake manifold, under the coolant outlet.

Your thermostat is designed to open and close at predetermined temperatures and if not operating properly should be removed and tested.

DIAGNOSIS

If the cooling system requires frequent addition of coolant in order to maintain the proper level, check all units and connections in the cooling system for evidence of leakage. Inspection should be made with cooling system cold. Small leaks which may show dampness or dripping can easily escape detection when the engine is hot, due to the rapid evaporation of coolant. Tell-tale stains of grayish white or rusty color or dye stains from anti-freeze, at joints in cooling system are almost always sure signs of small leaks even though there appears to be no damage.

Air may be drawn into the cooling system through leakage at the water pump seal or through leaks in the coolant recovery system. Gas may be forced into the cooling system through leakage at the cylinder head gasket(s) even though the leakage is not sufficient to allow coolant to enter the combustion chamber.

ENGINE COOLING SYSTEM CHECKS

Exhaust Leaks

To check for exhaust leaks into the cooling system, drain the system until the coolant level stands just above the top of the cylinder head(s), then disconnect the radiator upper hose and remove the thermostat and fan belt(s). Start the engine and quickly accelerate several times. At the same time note any appreciable coolant rise or the appearance of bubbles which are indicative of exhaust gases leaking into the cooling system.

NOTICE: A defective head gasket may allow exhaust gases to leak into the cooling system. This is particularly damaging to the cooling system as the gases combine with the water to form acids which are harmful to the radiator and engine.

Water Pump

Water pump operation may be checked by running the engine

ENGINE AND DRIVING GEAR (Continued)

while squeezing the radiator upper hose (engine warm). A pressure surge should be felt. Check for a plugged venthole in pump.

Radiator

Test for restriction in the radiator, by warming the engine up and then turning the engine off and feeling the radiator. The radiator should be hot along the left side and warm along the right side, with an even temperature rise from right to left. Cold spots in the radiator indicate clogged sections.

Thermostat

An operational check of the thermostat can be made by hanging the thermostat on a hook in a 33% glycol solution 25° F (4° C) above the temperature stamped on the thermostat valve. Then submerge the valve completely and agitate the solution thoroughly. Under this condition the valve should open. Now remove the thermostat and place it in a 33% glycol solution 10° F (-12°C) below temperature indicated on the valve. With valve completely submerged and coolant agitated thoroughly, the valve should close completely.

Overheat and/or Noise

Engine overheat and/or cooling system noise may be caused by restrictions in the cooling system. Components which may be prone to this condition are cylinder head, water pump, block. thermostat housing and inlet manifold. Symptoms of this condition are as follows:

1. Engine may make snapping/cracking noises.
2. Heater core may gurgle or surge.
3. Radiator hoses may collapse and expand.
4. Heater hoses may vibrate and thump.
5. Overheat light may or may not come on.

Symptoms are the result of coolant boiling at some localized area and may not be noticed after extending idling and/or while being driven. Determine which side of the engine is involved and whether it is more at the front or rear of engine.

Diagnosis/Inspection

1. Isolate area of engine the localized boiling is originating from. This can be done by probing engine with a sounding bar (large screwdriver).
2. With radiator cap removed, observe water being circulated in radiator. Feel the front area of radiator for cold spots which indicate blockage. Blocked radiators generally occur on units that have accrued miles and not on new vehicles.

   CAUTION: The radiator cap should be removed from a cool engine only. If the radiator cap is removed from a hot cooling system, serious personal injury may result.

3. Inspect thermostat to see if it opens completely.
4. Inspect thermostat housing to make sure it is completely free of obstructions.
5. Remove water pump from vehicle and remove the back cover on the pump. All internal passages can be inspected using a flashlight.
6. Inspect crossover at the front of the inlet manifold. This entire passage can be seen with only the thermostat re-removed.
7. Remove heads, but lay them aside for now and check the block first because the heads are the most complex pieces as far as coolant passages are concerned.
8. With water pump and heads removed, ALL coolant passages CAN be inspected by using a penlight flashlight. All water jacket areas can be seen directly and a block should never be replaced as being suspect unless the restricted area can be DIRECTLY SEEN.
9. If none of the above inspections reveal the problem area, the heads must be considered prime suspect. Heads with blocked coolant passages generally have more than one area that is blocked. Inspect the heads for signs of overheat discoloration (a dark blue or black area). If none are found look in the coolant passages for blockage and probe all passages that are accessible. The head is very intricate and all passages cannot be reached. Use a probe that is fairly substantial as a tag wire may go through or around a partially blocked area. If nothing is found by visual inspection and probing, inspect the passages for a rough ragged appearance. The roughest internal passages are probably the ones that are blocked. Replace a blocked or suspect head and inspect the replacement head before installing it.

FAN CLUTCH

1. **Noise** – Fan noise is sometimes evident under the following conditions:
   a. When clutch is engaged for maximum cooling.
   b. During first few minutes after start-up until the clutch can re-distribute the silicone fluid back to its normal disengaged operating condition after overnight settling.

   Fan noise or an excessive roar will generally occur continuously, however, under all high engine speed conditions (2500 rpm and up) if the clutch assembly is locked up due to an internal failure. If the fan cannot be rotated by hand or there is a rough grating feel as the fan is turned, the clutch should be replaced.
2. **Looseness** – Under various temperature conditions, there is a visible lateral movement that can be observed at the tip of the fan blade. This is a normal condition due to the type of bearing used. Approximately 1/4" (6.5mm) maximum lateral movement measured at the fan tip is allowable. This is not cause for replacement.
3. **Silicone Fluid Leak** – The operation of the unit is generally not affected by small fluid leaks which may occur in the area around the bearing assembly. If the degree of leakage appears excessive, however, proceed to item 4.
4. **Engine Overheating** – If the fan and clutch assembly free-wheels with no drag (revolves over five times when spun by hand), the clutch should be replaced.

ENGINE COOLING SYSTEM COMPLAINT

To avoid needless time and cost in diagnosing cooling system complaints, the driver should consider driving conditions that would place abnormal loads on the cooling system.

1. **DOES OVERHEATING OCCUR WHILE PULLING A TRAILER?**

   If answer is affirmative, how heavy is trailer? If trailer weight is greater than 2000 lbs., your REVCON is overloaded. Further diagnostic checks should not be required.

ENGINE AND DRIVING GEAR (Continued)

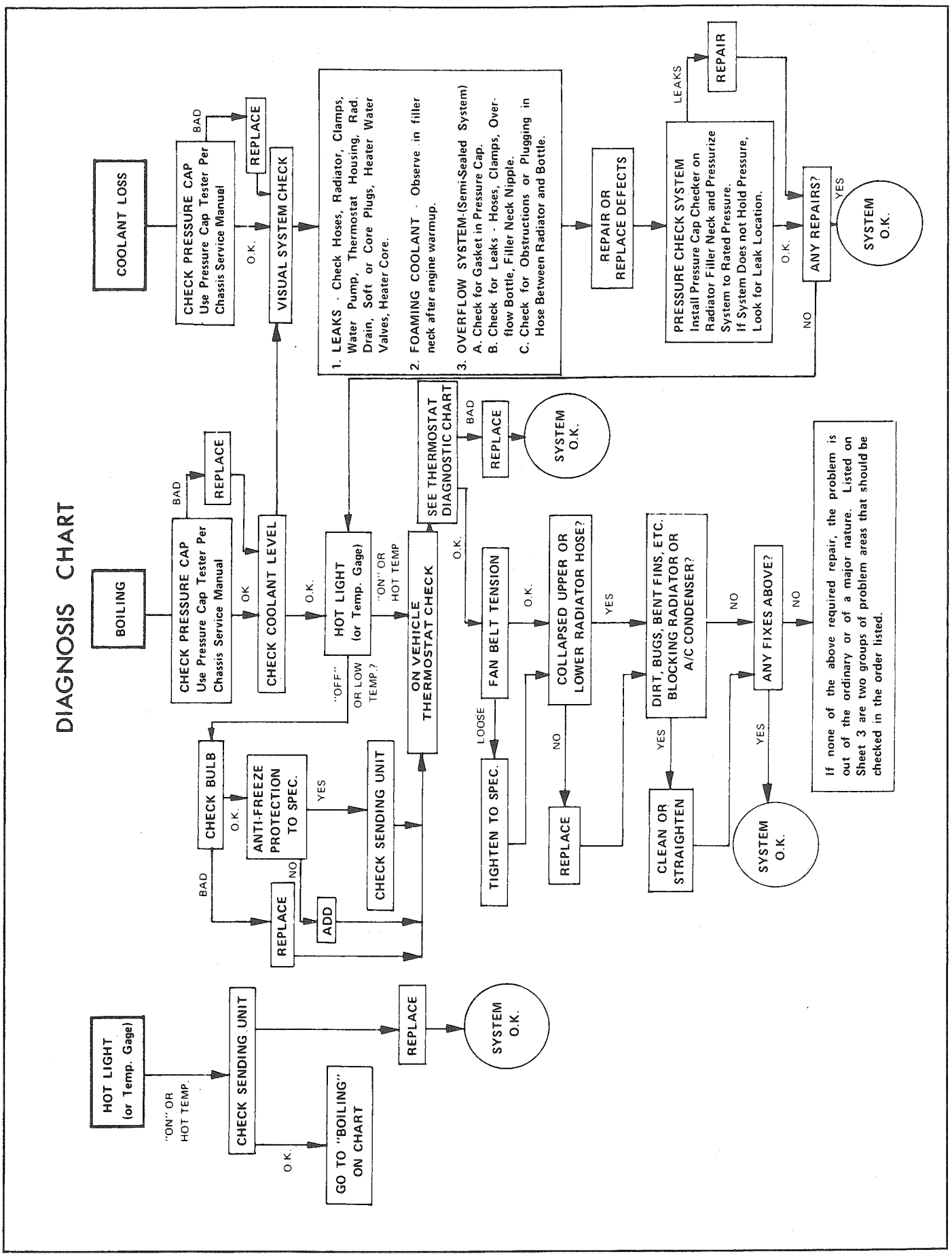


Figure 31 — Engine Cooling Diagnosis Chart

ENGINE COOLING SYSTEM COMPLAINT

2. **IS OVERHEATING OCCURRING AFTER PROLONGED IDLE, IN GEAR, A/C SYSTEM OPERATING?**

   If answer is affirmative, the driver should practice certain driving techniques that would avoid overheating, such as:
   a. Idle in neutral as much as possible – Increase engine rpm to get higher air flow and water flow through the radiator.
   b. Turn air conditioning system off during extended idling if overheating is indicated by hot light or temperature gauge.

3. **IS OVERHEATING OCCURRING AFTER PROLONGED DRIVING IN SLOW CITY TRAFFIC, TRAFFIC JAMS, PARADES, ETC.?**

   If answer is affirmative, the driver should practice techniques that would avoid overheating – same as for prolonged idling. Further checks should not be required.

IF NONE OF THE ABOVE APPLY, GO TO THE DIAGNOSTIC CHART *(See figure 31).*

To effectively use this chart, the driver should practice certain driving techniques that would avoid overheating (see paragraphs a and b, immediately preceding).

To effectively use this chart, determine which of the following categories applies to the complaint:

a. Hot Light or hot indication on the temperature gauge.
b. Boiling.
c. Coolant loss.

1. **If Complaint is Hot Light or Hot indication on Temperature Gauge:**

   Was Hot Light accompanied by boiling? If answer is "Yes."
   Go to Boiling on Chart.
   If answer is "No."
   Go to Hot Light on Chart.

2. **If Complaint is Boiling** – Go to Boiling on Chart.

3. If complaint is cooling loss, determine if system is being overfilled. This would normally result in small amounts of coolant loss through the overflow tube. If this is the case, check system for proper level. If overfilling is not the problem, go to Coolant Loss on the chart.

NOTE: Anytime cooling system is obviously contaminated, the system should be drained and flushed.

CAUTION – The cooling system is designed to operate at 15 psi pressure at temperatures exceeding 200°F.
CAUTION SHOULD BE EXERCISED WHEN REMOVING PRESSURE CAP OR WHEN SERVICING THE SYSTEM.

ON VEHICLE SERVICE

WATER PUMP

Removal

1. Disconnect battery negative cable at battery.
2. Drain cooling system.
3. Remove accessory drive belts.
4. Remove fan to water pump hub (or fan clutch to water pump hub) attaching bolts (or nuts) and remove fan and pulley.
5. Remove generator lower brace to water pump attaching bolts and swing brace down and out of way.
6. Remove generator upper brace to water pump attaching bolts.
7. Remove lower radiator hose and heater hose from water pump. On 7.4 liter engine, remove bypass hose.
8. Remove water pump to block attaching bolts and remove pump.

Installation – If installing new water pump, transfer heater hose fitting from old unit. On 7.4 liter engine, also transfer bypass fitting.

1. With clean sealing surfaces on both water pump and block, place 1/8" (3mm) bead of RTV or equivalent, along the sealing edge of each water pump leg. Place pump against block and retain with attaching bolts. Torque bolts to 20 N-m.
2. Attach lower radiator hose and heater hose to water pump. On 7.4-liter engine, install bypass hose.
3. Attach generator upper and lower braces to water pump. Torque bolts to 35 N-m.
4. Install water pump pulley and fan (or fan clutch) to water pump hub. Torque fasteners to 30 N-m.
5. Install acessory drive belts. Adjust to specifications.
6. Connect battery negative cable.
7. Fill cooling system with an ethylene glycol anti-freeze and water mixture of 50/50%.
8. Start engine and run, with radiator cap removed, until radiator upper hose becomes hot (thermostat open).
9. With engine idling, add coolant to radiator until level reaches bottom of filler neck.
10. Install cap, making sure arrows line up with overflow tube.

THERMOSTAT

Removal (All Engines)

1. Disconnect battery negative cable at battery.
2. Drain cooling system until radiator coolant level is below thermostat.
3. Remove water outlet attaching bolts and remove outlet. Remove thermostat.

Installation (All Engines) – Prior to installing thermostat, make sure thermostat housing and coolant outlet sealing surfaces are clean.

1. Place a 1/8" (3mm) bead of RTV sealer, No. 1052366 or equivalent, all around the coolant outlet sealing surface on the thermostat housing.

ENGINE AND DRIVING GEAR (Continued)

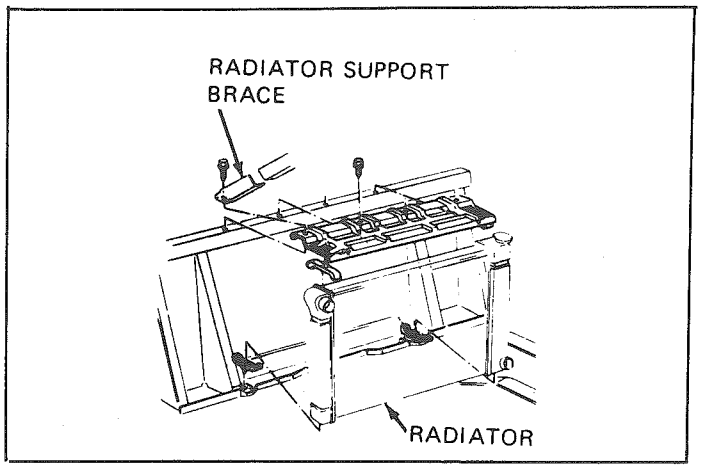


Figure 32 – Radiator Support Bracket

2. Place thermostat in housing.
3. Install coolant outlet while RTV is still wet. Torque retaining bolts to 20 lbs. ft. (27 N-m).
4. Connect battery negative cable.
5. Fill cooling system with an ethylene glycol anti-freeze and water mixture of 50/50%.
6. Start engine and run, with radiator cap removed, until radiator upper hose becomes hot (thermostat open).
7. With engine idling, add coolant to radiator until level reaches bottom of filler neck.
8. Install cap, making sure arrows line up with overflow tube.

RADIATOR *(See figure 32.)*

Removal

1. Disconnect battery negative cable at battery.
2. Drain cooling system.
3. Remove radiator hoses from radiator.
4. Remove overflow hose from radiator.
5. Remove fan shroud, and disconnect transmission cooler lines.
6. Remove radiator to radiator support retainers and remove radiator down between subframe rails.

Installation

1. Place radiator in vehicle and install radiator to radiator support retainers.
2. Install fan shroud.
3. Connect overflow hose to radiator.
4. Connect radiator hoses to radiator.
5. Connect battery negative cable.
6. Fill cooling system with an ethylene glycol anti-freeze and water mixture of 50/50%.
7. Start engine and run, with radiator cap removed, until radiator upper hose becomes hot (thermostat open).
8. With engine idling, add coolant to radiator until level reaches bottom of filler neck.
9. Install cap, making sure arrows line up with overflow tube.

FAN SHROUD *(See figure 33.)*

Removal

1. Disconnect battery negative cable.
2. Remove fan shroud to radiator retainer attaching screws.
3. Remove fan clutch to water pump hub attachments.
4. Remove shroud by pulling up and out of lower retaining clips. Fan shroud and fan clutch assembly must be removed together.

Installation

1. Lower fan shroud and fan clutch along back of radiator. Make sure lower edge fits into lower retaining clips.
2. Install fan clutch to water pump attachments and torque to 27 N-m.
3. Install shroud to radiator retainer attaching screws. Torque to 6 N-m.
4. Connect battery negative cable.

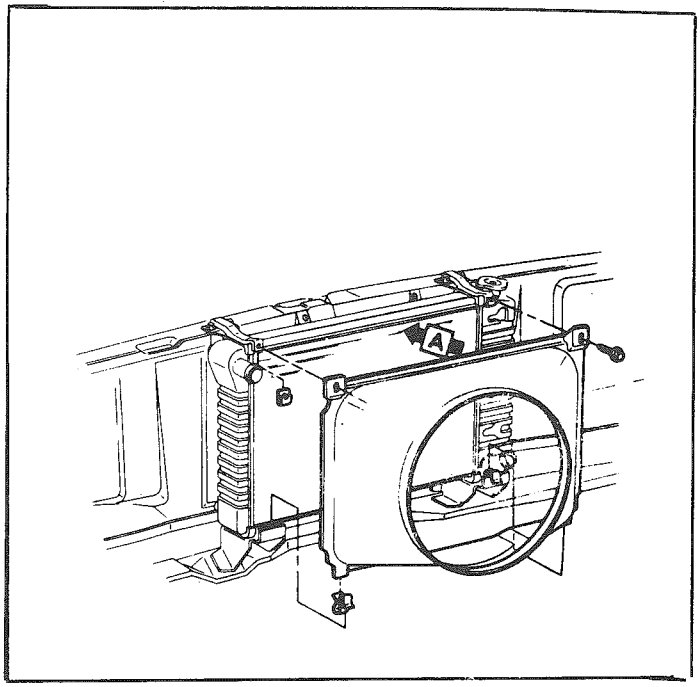


Figure 33 - Fan Shroud

FAN/ FAN CLUTCH

Removal (All)

1. Remove battery negative cable at battery.
2. Remove radiator fan shroud as required.
3. Remove fan clutch hub-to-water pump hub attaching bolts or nuts, as applicable, and remove fan clutch assembly.
4. Remove fan from fan clutch hub.

Installation (All)

CAUTION: If a fan blade is bent or damaged in any way, no attempt should be made to repair and/or reuse the damaged part. A bent or damaged fan assembly should always be replaced with a new fan assembly.

CAUTION: It is essential that the fan assembly remain in proper balance. Balance cannot be assured once a fan assembly has been bent or damaged. A fan assembly that is not in proper balance could fail and fly apart during subsequent use, creating an extremely dangerous condition.

All mating surfaces (water pump hub and fan clutch hub) should be inspected for smoothness and reworked as necessary to eliminate burrs or other imperfections.

1. With fan on fan clutch hub, install fan clutch assembly to water pump hub. Torque attaching bolts, or nuts, to 20 lb. ft. (27 N·m). Be sure to align reference marks on both hubs.
2. Install radiator shroud as required.
3. Connect battery negative cable.

CARBURETOR MODEL M4MC

GENERAL DESCRIPTION

A hot air choke model M4MC carburetor is used on the REVCON vehicle. This carburetor is a 4-barrel, 2-stage design. A triple venturi with plain tube nozzle is used in each primary bore resulting in precise fuel metering control during the off-idle and part throttle ranges of engine operation. The secondary side has two large bores which, added to the primary, gives sufficient air capacity to meet most engine requirements. An air valve is used on the secondary side for fuel metering control.

The main metering system has separate main fuel wells which feed each fuel nozzle for good fuel flow through the venturi. During off-idle and part throttle operation, fuel metering is accomplished by two tapered primary metering rods, operating in metering jets, positioned by a conventional spring-loaded power piston that is responsive to manifold vacuum.

Adjustable Part Throttle

An adjustable part throttle (APT) feature is used to provide a close tolerance adjustment in the main metering system. The APT adjustment very accurately sets the depth of the metering rods in the primary metering jets.

The adjustment feature consists of a pin pressed in the side of the power piston which extends through a slot in the side of the piston well. When the power piston is down (economy position), the side of the pin stops on top of a flat surface on the adjustment screw located in the cavity next to the power piston. The adjustment screw is held from turning by a tension spring beneath the head of the adjustment screw. During production flow test, this adjustment screw is turned up or down which in turn raises or lowers the power piston and metering rod assembly. This very accurately controls the fuel flow between the rods and jets to meet emission requirements.

No attempt should be made to change the APT adjustment. If float bowl replacement is required, the new bowl assembly will include an adjustment screw pre-set by the factory.

Carburetor Operation

The carburetor M4MC has six basic systems. They are float, idle, main metering, power, pump, and choke.

ON-VEHICLE SERVICE

GENERAL INFORMATION

A carburetor is designed to meet the particular requirements of the engine, transmission and vehicle and although they may look alike, they are not usually interchangeable. Refer to carburetor part number and/or specifications when making adjustments.

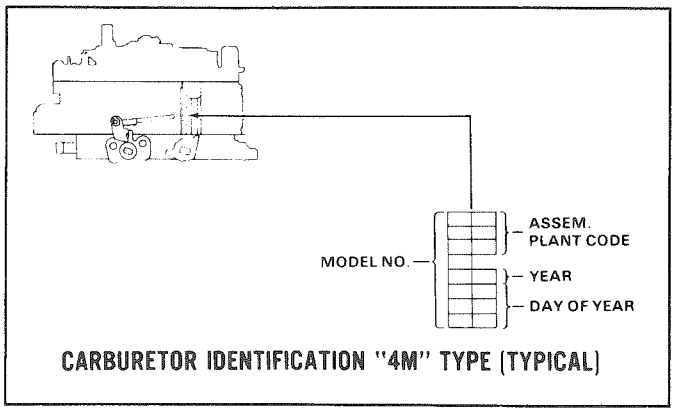


Figure 34 – Carburetor Identification

Before checking or resetting the carburetor as the cause of poor engine performance or rough idle; check ignition system including distributor, timing, spark plugs and wires. Check air cleaner, evaporative emission system, EFE System, PCV system, and engine compression. Also inspect intake manifold, vacuum hoses and connections for leaks and check torque of carburetor mounting bolts/nuts. Make all adjustments with engine at normal operating temperature, choke full open, air cleaner installed. Except as noted air conditioning should be "off" and all vacuum lines and all electrical leads connected. Set parking brake and block drive wheels. Air cleaner can be removed for set-up accessibility but must be completely installed during actual setting.

EXTERNAL FLOAT CHECK

The float level can be checked without removing the air horn by using float gauge J-9789-130 or equivalent and following external float level checking procedures.

CARBURETOR CHOKE CHECK

General Procedure

1. Remove air cleaner. With engine off, hold throttle half open. Open and close choke several times. Watch linkage to be certain all links are connected and there are no signs of damage.
2. If choke or linkage binds, sticks or works sluggishly, clean with choke cleaner X-20-A or equivalent. Use cleaner as directed on can.
3. Visually inspect carburetor to be certain all vacuum hoses are connected. Inspect hoses for cracks, abrasions, hardness or other signs of deterioration. Replace or correct as necessary.
4. Make sure the vacuum break diaphragm shaft is fully extended when engine is off. If shaft is not fully extended, replace vacuum break assembly. Shaft should fully retract within 10 seconds after starting engine. If unit fails to retract, replace vacuum break assembly.

Checking Hot Air Choke

1. With parking brake applied, drive wheels blocked, transmission in Park or Neutral, start engine and allow engine

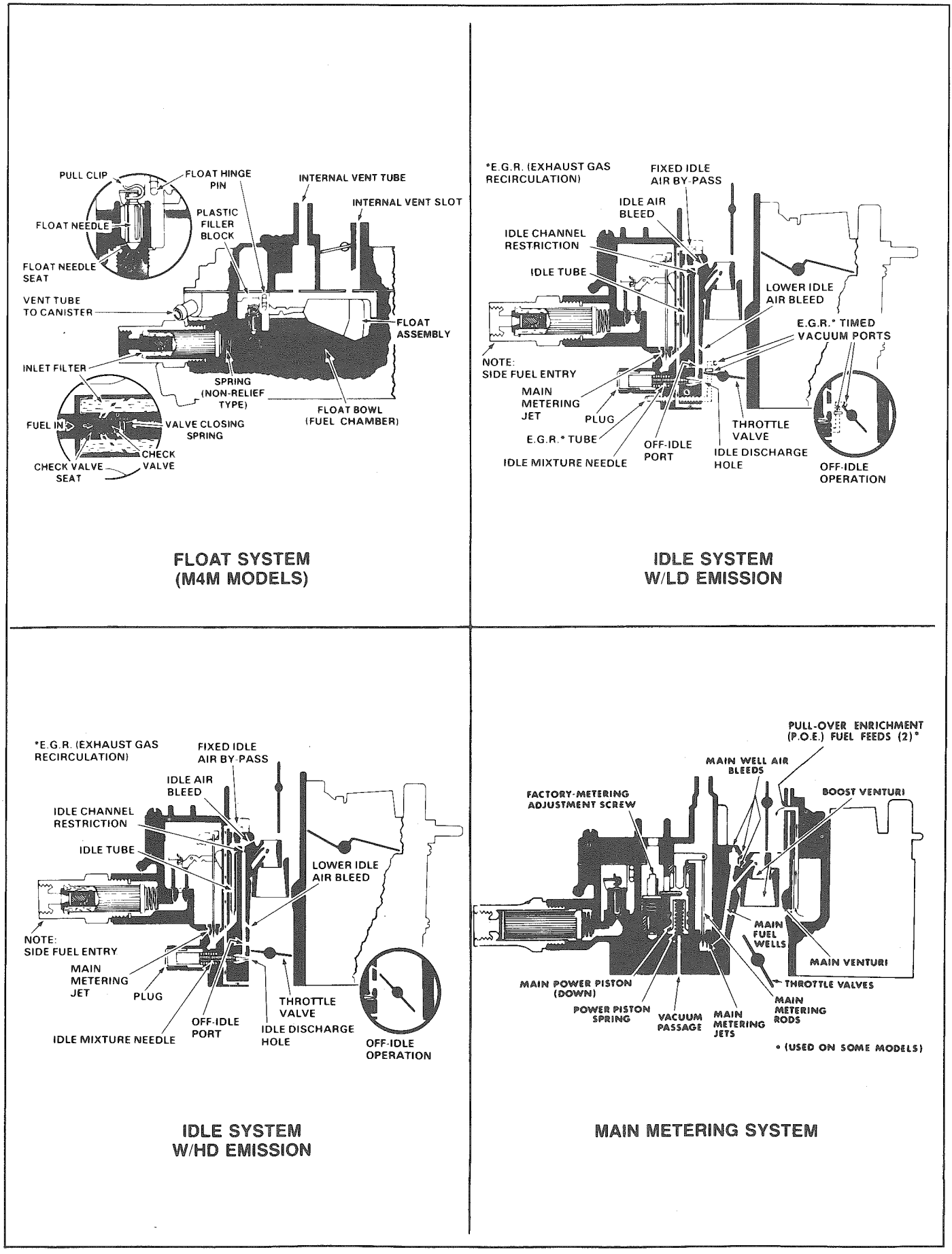
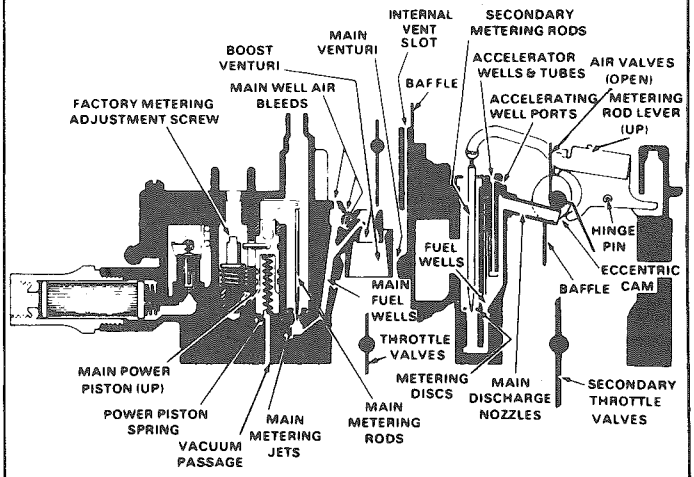
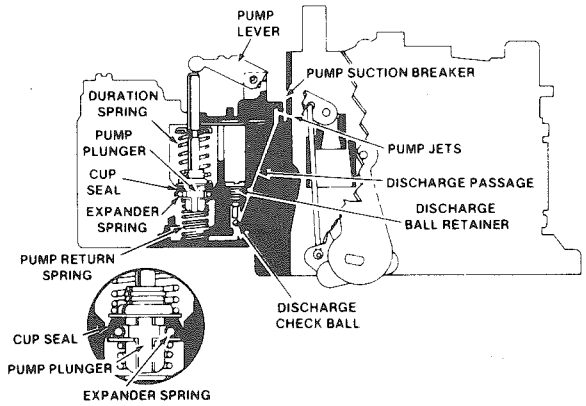


Figure 35 — Carburetor Model M4MC (Float, Idle, Main Metering Systems)

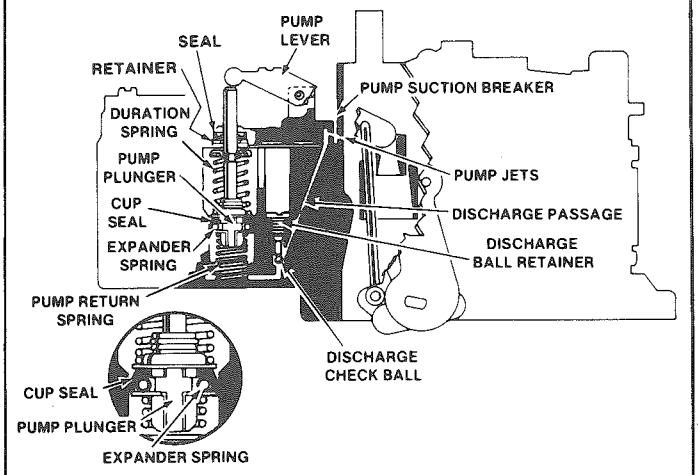
ENGINE AND DRIVING GEAR (Continued)



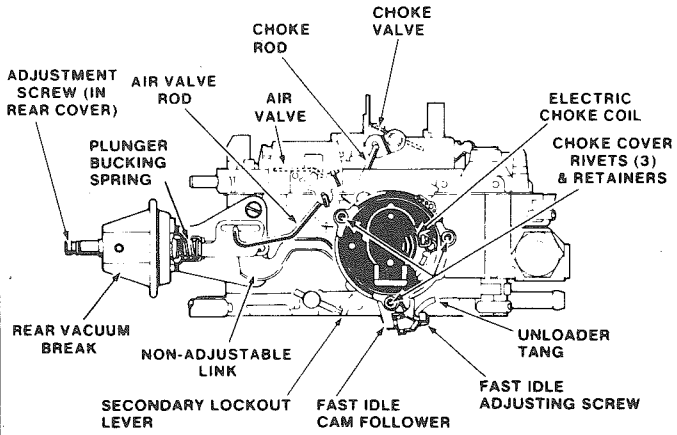
POWER SYSTEM



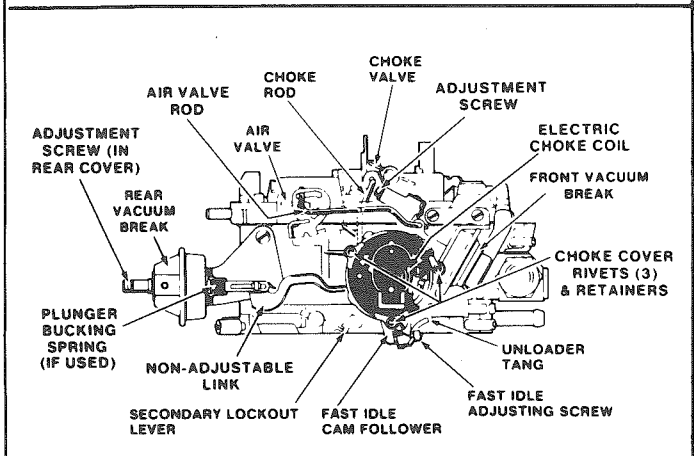
PUMP SYSTEM
W/HD EMISSION



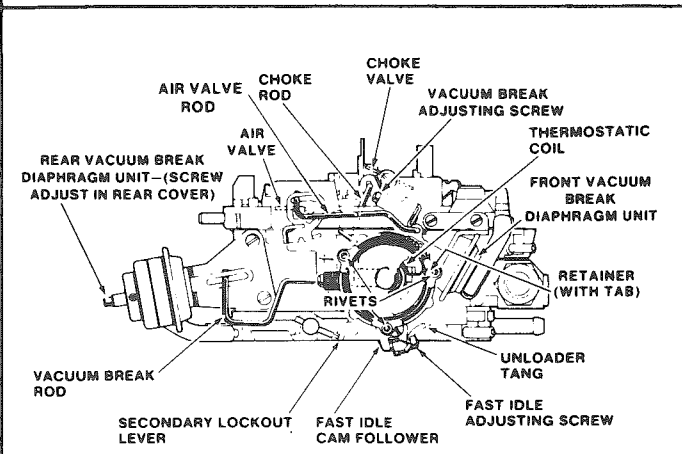
PUMP SYSTEM
W/LD EMISSION



CHOKE SYSTEM
M4ME (FEDERAL)
(ELECTRIC CHOKE TYPE)



CHOKE SYSTEM
M4ME (CALIFORNIA)
(ELECTRIC CHOKE TYPE)



CHOKE SYSTEM
W/HD EMISSION
(HOT AIR TYPE)

Figure 36 – Carburetor Model M4MC (Power, Pump, Choke Systems)

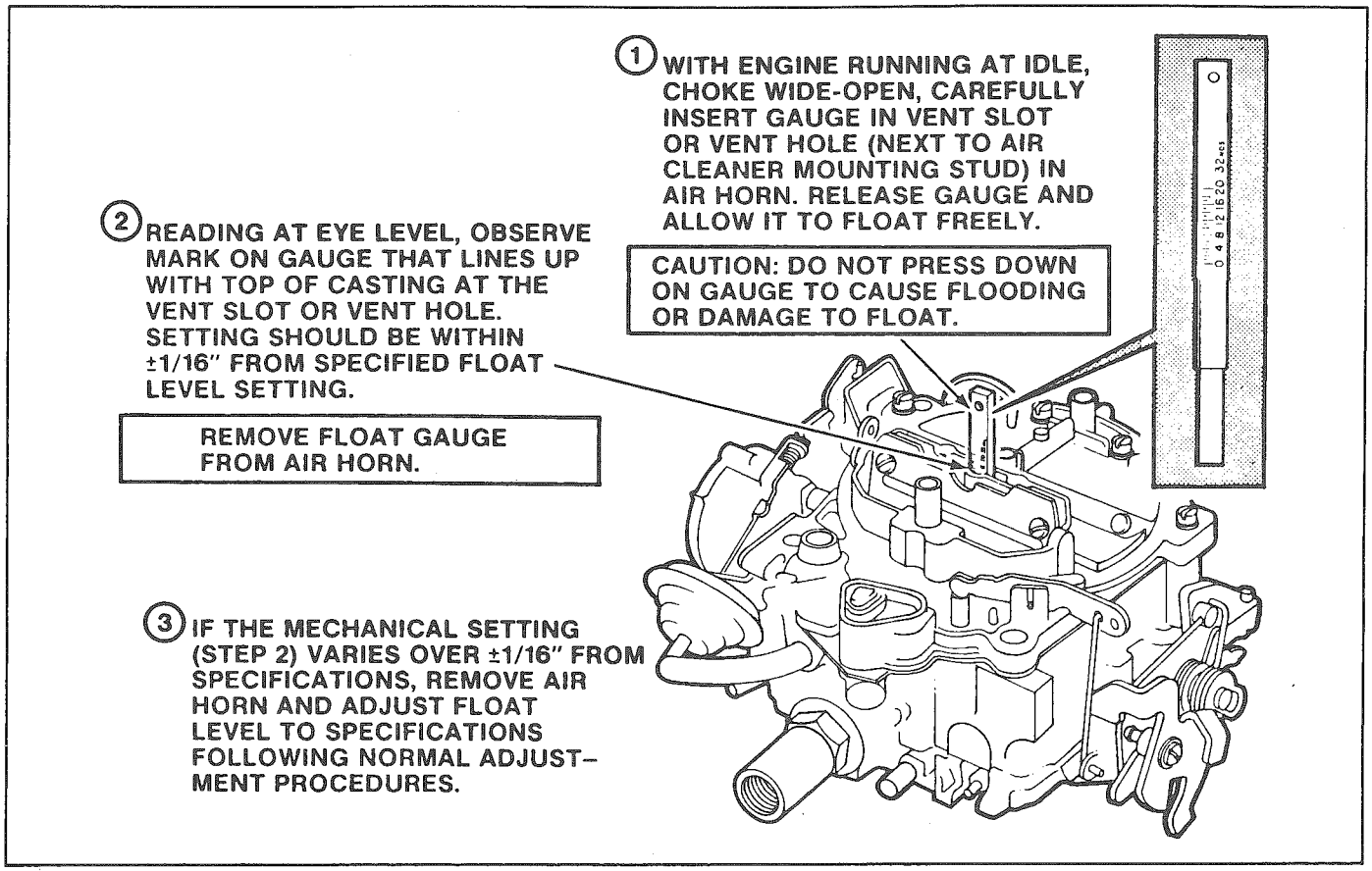


Figure 37 – External Float Level Check

to warm up, visually checking to be certain choke valve opens fully.

2. If choke valve fails to open fully, momentarily touch choke housing and hot air inlet pipe or hose to determine if sufficient heat is reaching the choke coil.

   CAUTION: The choke housing and hot air inlet pipe or hose are "Hot" to the touch. Use care to prevent burning of hands.

3. If choke housing and/or heat inlet are cool to the touch, check for loss of vacuum to the housing, restricted heat inlet in the choke housing or choke heat pipe, collapsed or deteriorated heat inlet hose, or restricted passages in the manifold choke heat stove. Replace or correct as necessary.

SPEED ADJUSTMENTS

Refer to figure 38 for throttle lever actuator adjustment.

IDLE MIXTURE ADJUSTMENT - BEST IDLE METHOD

Idle mixture needles have been preset at the factory and sealed. Idle mixture should be adjusted only in the case of major carburetor overhaul, throttle body replacement, or high emissions as determined by official inspections.

If necessary, remove idle needle plugs.

Perform this adjustment with engine at operating temperature, parking brake applied, drive wheels blocked and transmission in park or neutral.

1. Remove air cleaner.
2. Connect tachometer and vacuum gauge to engine.
3. As a preliminary adjustment, turn idle mixture needles in lightly to seat and back out 2 turns.

   NOTICE: Do not turn idle mixture needle tightly against seat or damage may result.

4. With engine running (choke wide open and transmission in neutral) adjust idle speed screw to idle speed specified on Vehicle Emission Control Information label.
5. Adjust each idle mixture needle to obtain highest RPM.

ENGINE AND DRIVE GEAR (Continued)

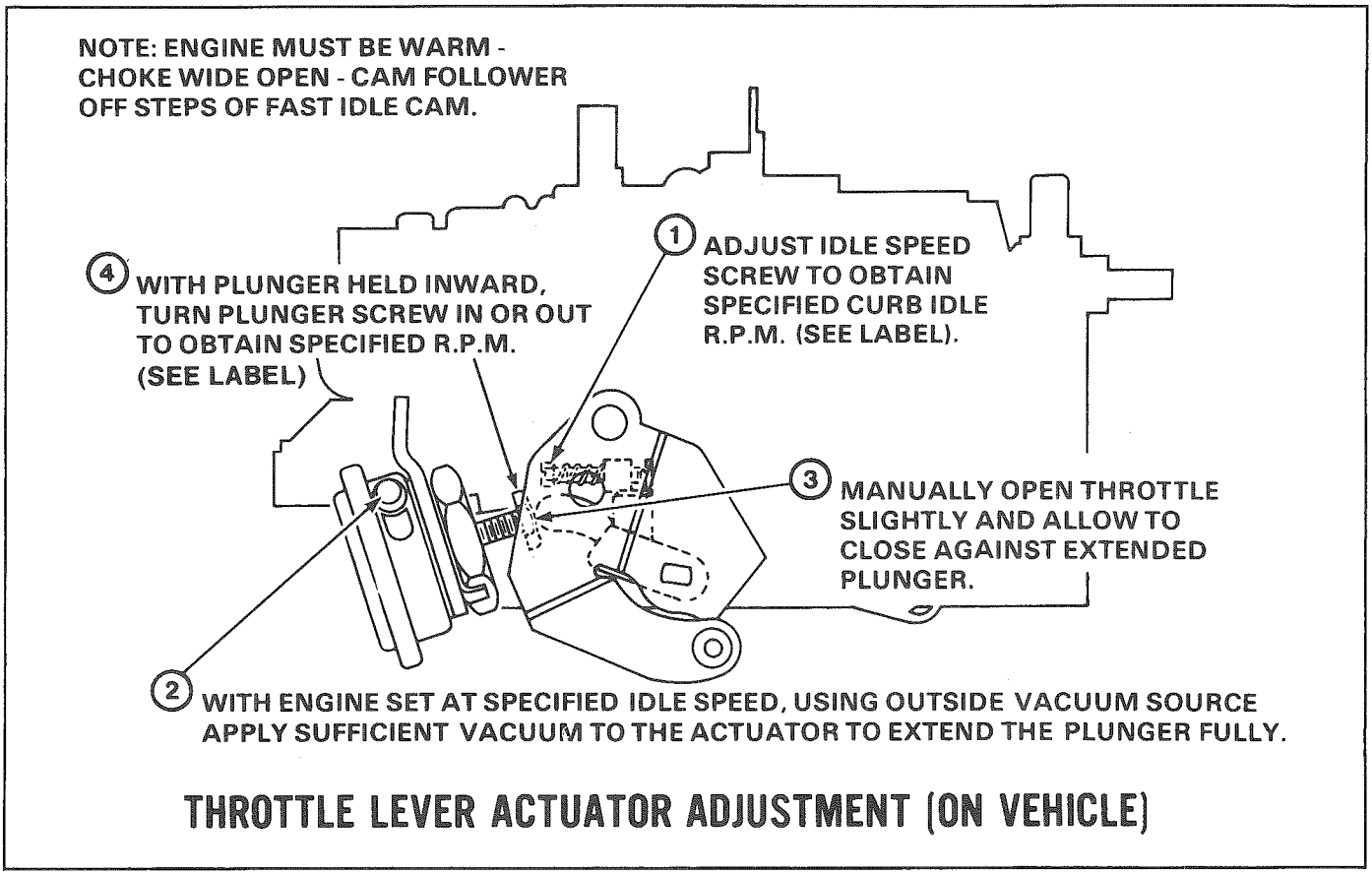


Figure 38 – Throttle Lever Actuator Adjustment

6. Repeat steps 4 and 5 until "best" idle is obtained.
7. If necessary, reset curb idle speed to specifications on underhood label.
8. After adjustments are complete, seal the idle mixture needle setting using silicone sealant RTV rubber or equivalent. The sealer is required to prevent tampering with the setting and to prevent the possibility of loss of fuel vapors.
9. Check and, if necessary, adjust throttle lever actuator.
10. Check and, if necessary, adjust fast idle speed as described on Emission Control Information label.
11. Turn off engine, remove gauges, unplug and reconnect vacuum hoses. Install air cleaner.
12. Remove block from drive wheels.

CARBURETOR MOUNTING TORQUE

When torquing carburetor after removal overhaul, replacement or when installing a new heat insulator, torque mounting bolts, in a clockwise direction, to 16 N·m (144 in. lbs.). When retorquing carburetor at recommended maintenance intervals, check in clockwise direction. If less than 7 N·m (60 in. lbs.), retorque to 11 N·m (96 in. lbs.); if greater than 7 N·m (60 in. lbs.) do not retorque.

CARBURETOR REPLACEMENT

Removal

Flooding, stumble on acceleration and other performance complaints are in many instances, caused by presence of dirt, water, or other foreign matter in the carburetor. To aid in diagnosis, the carburetor should be carefully removed from engine without draining fuel from bowl. Contents of fuel bowl may then be examined for contamination as carburetor is disassembled. Check filter.

Removal procedure

1. Remove air cleaner and gasket.
2. Disconnect wire at solenoid, if equipped.
3. Disconnect fuel pipe and vacuum lines.
4. Disconnect choke system.
5. Disconnect accelerator linkage.
6. If equipped with cruise control, disconnect linkage.
7. Remove carburetor attaching bolt, carburetor and insulator.

Installation

1. Clean sealing surfaces on intake manifold and carburetor.
2. Fill carburetor bowl before installing carburetor.
3. Install carburetor with new insulator and tighten bolts to correct torque (See Carburetor Mounting Torque).
4. Connect cruise control cable as required.
5. Connect accelerator linkage.
6. Connect choke system.
7. Connect fuel pipe and vacuum hoses.
8. Connect solenoid as required.
9. Install air cleaner.
10. Check and adjust idle speed.

FUEL FEED AND VAPOR PIPES

GENERAL DESCRIPTION

Fuel feed pipes are secured to the underbody with clamp and screw assemblies. Flexible hoses are located at fuel tank fuel, vapor and return lines and fuel pump. The pipes should be inspected occasionally for leaks, kinks or dents. If evidence of dirt or foreign material is found in carburetor, fuel pump or pipes, pipe should be disconnected and blown out. Dirt or foreign material may be caused by a damaged or omitted fuel strainer in fuel tank.

ON-VEHICLE SERVICE

Fuel Line Repair

Replacement

1. If replacement of a fuel feed, fuel return or emission pipe is required use welded steel tubing meeting GM Specification 124-M or its equivalent.
2. Do not use copper or aluminum tubing to replace steel tubing. Those materials do not have satisfactory durability to withstand normal vehicle vibrations.
3. When rubber hose is used to replace pipe, use only reinforced fuel resistant hose which meets GM Specification 6165-M. Hose inside diameter must match pipe outside diameter.
4. Do not use rubber hose within 4" (100 mm) of any part of the exhaust system.
5. In repairable areas, cut a piece of fuel hose 4" (100 mm) longer than portion of the line removed.

   If more than a 6 inch (152 mm) length of pipe is removed, use a combination of steel pipe and hose so that hose lengths will not be more than 10 inches (254 mm).

   Follow the same routing as the original pipe.
6. Cut ends of pipe remaining on vehicle square with a tube cutter. Using the first step of a double flaring tool, form a bead on the end of both pipe sections. If pipe is too corroded to withstand bead operation without damage, the pipe should be replaced. If a new section of pipe is used, form a bead on both ends of it also.
7. Use screw type hose clamp, Part Number 2494772, or equivalent. Slide clamps onto pipe and push hose 2" (51 mm) onto each portion of fuel pipe. Tighten clamps on each side of repair.
8. Pipes must be properly secured to the frame to prevent chafing.

EVAPORATIVE CONTROL SYSTEM (ECS)

GENERAL DESCRIPTION (See Diagram, page 67.)

The REVCON is equipped with a system designed to prevent escape of fuel vapor to the atmosphere. Vapor generated by evaporation of fuel in the tank, previously exhausted to the atmosphere, is transferred by an emission line to the engine compartment, During periods of operation, vapors are fed directly to the engine for consumption. During periods of inoperation, an activated charcoal conister located in the emission line stores any vapor generated for consumption during the next period of operation.

The amount of vapor drawn into the engine at any time is too small to have any effect on fuel economy or engine operation.

With this closed system it is extremely important that only vapors be transferred to the engine. To avoid the possibility of liquid fuel being drawn into the system, these following features are included as part of the total system:

1. A fuel tank overfill protector is provided on all series to assure adequate room for expansion of liquid fuel volume with temperature changes.
2. A one point fuel tank venting system is provided on all series to assure that the tank will be vented under any conceivable vehicle attitude.
3. To protect the tank from mechanical damage in the event of excessive internal or external pressures resulting from the operation of this closed system, a pressure-vacuum relief valve, located in the gas cap, will control the tank internal pressure.

ON-VEHICLE SERVICE

Maintenance requirement is that the oiled fiberglass filter assembled in the bottom of the canister, be replaced at intervals shown on page 29 . Under extremely dusty conditions, more frequent attention may be required.

Check operation of bowl vent and purge valve.

Canister and Filter

Removal

1. Note installed position of hoses on canister.
2. Disconnect hoses from top of canister.
3. Loosen clamps and remove canister.
4. If replacing filter, pull out filter from bottom of canister with your fingers.

Inspection

1. Check hose connection openings. Assure that they are open.
2. Check operation of purge valve by applying vacuum to the valve. A good valve will hold vacuum.

Installation

1. Install new filter.
2. Install canister and tighten clamp.
3. Connect hoses in same order.

Canister Purge Valve

Disassembly

1. Disconnect lines at valve.
2. Snap off valve cap (slowly remove cap as diaphragm is under spring tension). Remove diaphragm, spring retainer and spring.
3. Replace parts as necessary. Check orifice openings.

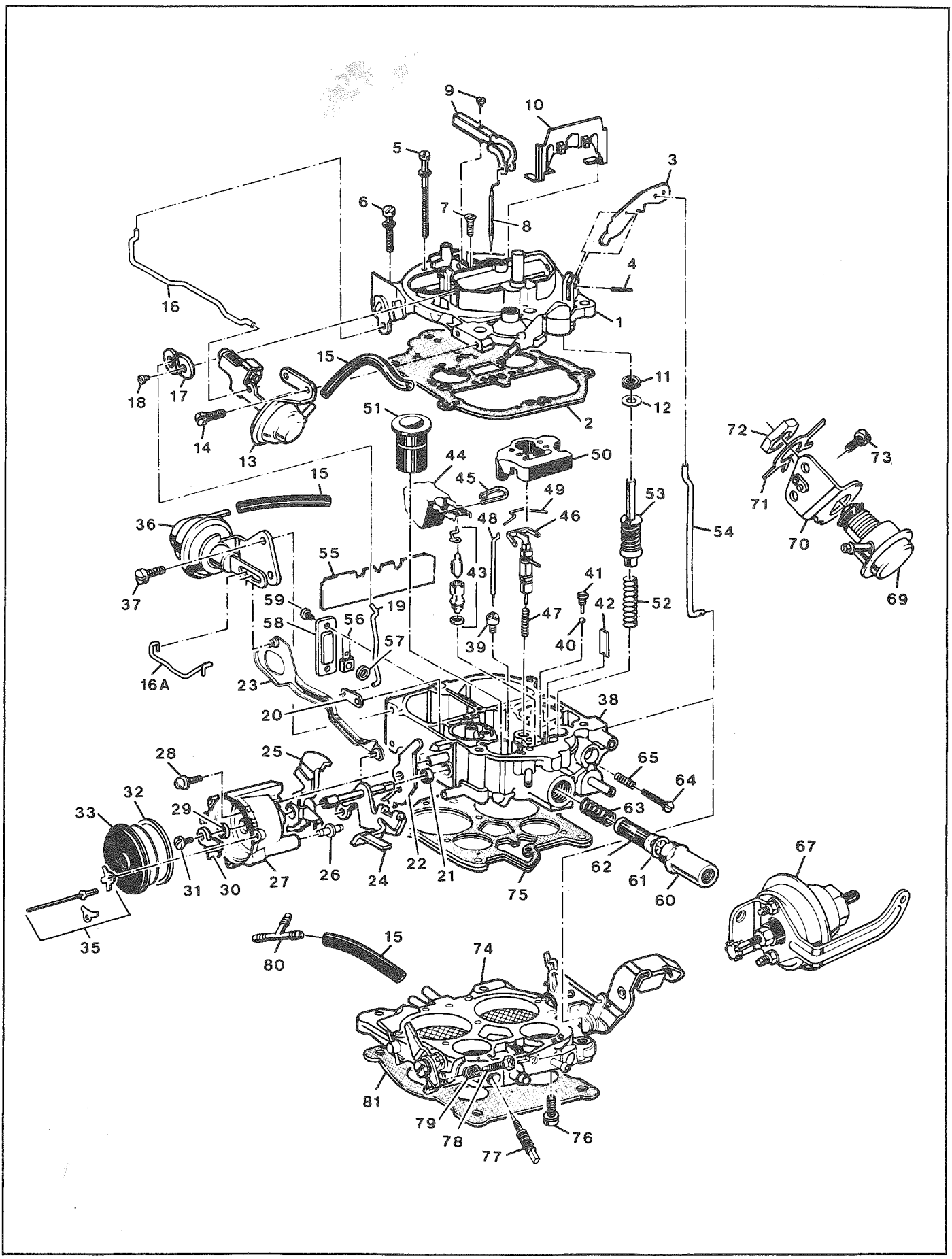


Figure 39 — Carburetor Exploded View

AIR HORN PARTS

1 – Air Horn Assy.
2 – Gasket – Air Horn
3 – Lever – Pump Actuating
4 – Roll Pin – Pump Lever Hinge
5 – Screw – Air Horn Long (2)
6 – Screw – Air Horn Short ( )
7 – Screw – Air Horn Countersunk (2)
8 – Metering Rod – Secondary (2)
9 – Holder and Screw – Secondary Metering Rod
10 – Baffle – Secondary Air
11 – Seal – Pump Plunger
12 – Retainer – Pump Seal

CHOKE PARTS

13 – Vac. Brake Control & Bracket – Front
14 – Screw – Control Attaching (2)
15 – Hose – Vacuum
16 – Rod – Air Valve
16A– Rod – Air Valve (Truck)
17 – Lever – Choke Rod (Upper)
18 – Screw – Choke Lever
19 – Rod – Choke
20 – Lever – Choke Rod (Lower)
21 – Seal – Intermediate Choke Shaft
22 – Lever – Secondary Lockout
23 – Link – Rear Vacuum Break
24 – Int. Choke Shaft & Lever
25 – Cam – Fast Idle
26 – Seal – Choke Housing to Bowl (Hot Air Choke)
27 – Kit – Choke Housing
28 – Screw – Choke Housing to Bowl
29 – Seal – Intermediate Choke Shaft (Hot Air Choke)
30 – Lever – Choke Coil
31 – Screw – Choke Coil Lever
32 – Gasket – Stat Cover (Hot Air Choke)
33 – Stat Cover & Coil Assy. (Hot Air Choke)
35 – Kit Stat Cover Attaching
36 – Rear Vacuum Break Assembly
37 – Screw – Vacuum Break Attaching (2)

FLOAT BOWL PARTS

38 – Float Bowl Assembly
39 – Jet – Primary Metering (2)
40 – Ball – Pump Discharge
41 – Retainer – Pump Discharge Ball
42 – Baffle – Pump Well
43 – Needle & Seat Assembly
44 – Float Assembly
45 – Hinge Pin – Float Assembly
46 – Power Piston Assembly
47 – Spring – Power Piston
48 – Rod – Primary Metering (2)
49 – Spring – Metering Rod Retainer
50 – Insert – Float Bowl
51 – Insert – Bowl Cavity
52 – Spring – Pump Return
53 – Pump Assembly
54 – Rod – Pump
55 – Baffle – Secondary Bores
56 – Idle Compensator Assembly
57 – Seal – Idle Compensator
58 – Cover – Idle Compensator
59 – Screw – Idle Compensator Cover (2)
60 – Filter Nut – Fuel Inlet
61 – Gasket – Filter Nut
62 – Filter – Fuel Inlet
63 – Spring – Fuel Filter
64 – Screw – Idle Stop
65 – Spring – Idle Stop Screw
66 – Idle Speed Solenoid & Bracket Assembly
67 – Idle Load Compensator & Bracket Assembly
68 –
69 – Actuator – Throttle Lever
70 – Bracket – Throttle Lever Actuator
71 – Washer – Actuator Nut
72 – Nut – Actuator Attaching
73 – Screw – Bracket Attaching (2)

THROTTLE BODY PARTS

74 – Throttle Body Assembly
75 – Gasket – Throttle Body
76 – Screw – Throttle Body (3)
77 – Idle Mixture Needle & Spring Assy. (2)
78 – Screw – Fast Idle Adjusting
79 – Spring – Fast Idle Screw
80 – Tee – Vacuum Hose
81 – Gasket – Flange

Assembly

1. Install spring, spring retainer, diaphragm and cap.
2. Connect lines to valve.

Checking Purge Valve

1. Remove purge valve control vacuum line. Check for a vacuum signal with engine operating above idle (1500 RPM).
2. Apply an external vacuum source to the purge valve control diaphragm. A good valve will hold vacuum.
3. If the valve will not hold vacuum, replace canister.
4. If valve holds vacuum, remove purge line and check for vacuum. If no vacuum, check PCV hoses and system. Repair or replace as necessary.

Checking Bowl Vent Valve

1. Remove the bowl vent vapor hose from the carburetor.
2. Check the open condition of the valve by connecting to a manual vacuum pump. It should not be possible to obtain .5 inch Hg if the valve is open.
3. If a high resistance or plugged system is found, check for a plugged or restricted hose. Hose may be cleared with compressed air. If the hose is clear, remove the canister filler. If the restriction persists, replace the canister.
4. A simple check of the valve closed condition can be obtained with the same procedure as in Step 2, but with the engine operating at operating temperature. Manifold vacuum will be applied to the valve through the control line. The bowl vent line should exhibit a plugged condition.

5. If the valve is not closed, remove the control vacuum line and check for vacuum. If no vacuum is present, check hose for restriction or vacuum leak. Repair or replace as required. If vacuum is present, replace canister.

Pressure Checking Evaporative Control System

1. Stabilize vehicle by operating until warmed up.
2. Remove tank line at canister and observe for liquid in the line. Hook-up pressure device.
3. Apply 15" H_2O pressure to the fuel vapor line.
   a. Observe for excessive loss of pressure.
   b. If negligible pressure loss occurs observe for fuel vapor smell or fuel loss at connection points.
   c. Remove fuel filler cap(s) and observe for pressure in tank(s).

ACCELERATOR CONTROLS

General – The accelerator control system is cable type. There are no linkage adjustments. A reference between the bottom of accelerator pedal and floor pan should be used only as a check for bent bracket assembly. Check torque references. Check for correct opening and closing positions by operating the accelerator pedal and if any binding is present, check routing of cable.

ACCELERATOR CONTROL CABLE – Refer to figure 41 for removal and installation of accelerator control cable.

ACCELERATOR PEDAL – Refer to figure 40 for removal and installation of accelerator pedal.

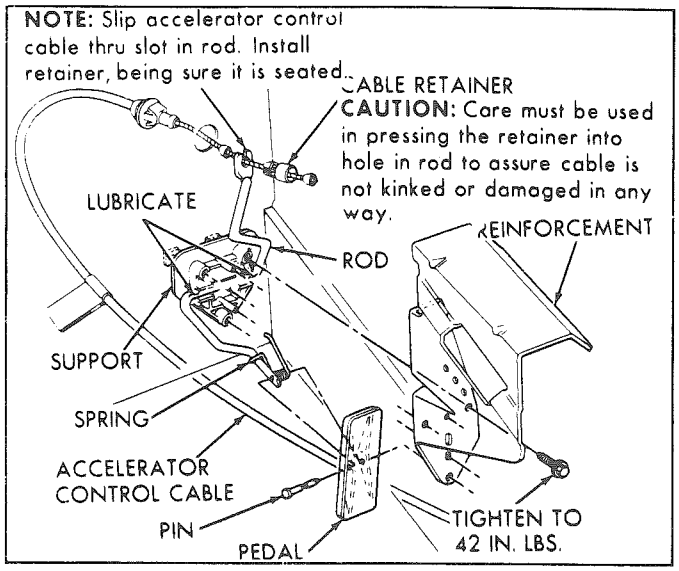


Figure 40 – Accelerator Pedal

GENERATOR

General – The generator does not require periodic lubrication. The rotor shaft is mounted on ball bearings at the drive end and roller bearings at the slip ring end, and each contains a permanent grease supply. At periodic intervals, check mounting bolts for tightness and adjust belt tension. When adjusting belt tension, apply pressure at center of generator, never against either end frame.

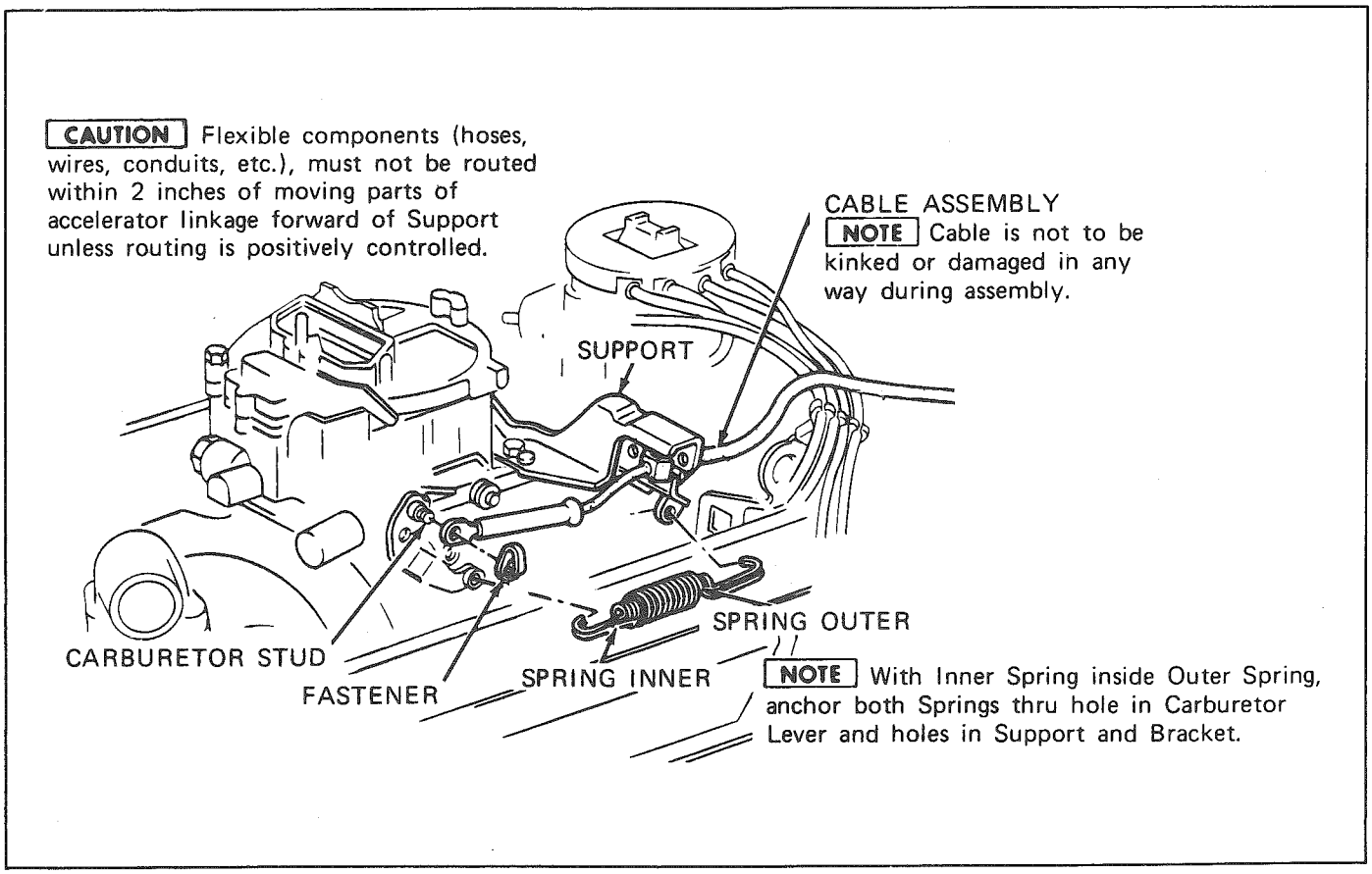


Figure 41 – Accelerator Controls

Removal

1. Disconnect negative battery terminal at battery.

CAUTION: Failure to observe this step may result in an injury from hot battery lead at generator.

2. Remove terminal plug and battery leads on back of generator.
3. Loosen adjusting bolts.
4. Remove generator drive belt.
5. Remove through bolt which retains generator.
6. Remove generator from vehicle.

Installation

1. If removed from vehicle, install generator to mounting bracket with bolts, washers, and nuts. Do not tighten.
2. Install generator drive belt.
3. Tighten belt to the specified belt tension. See Engine Cooling Section for proper belt tensioning procedures.
4. Tighten bolts.
5. Install generator terminal plug and battery lead to generator.
6. Connect negative battery terminal.

AUTOMATIC TRANSMISSION

General – The service procedures contained in this section are common to the automatic transmission sections contained in the manual. Refer to the proper automatic transmission section for specific service procedures.

Diagnosis – Before diagnosis of any transmission complaint is attempted, there must be understanding of oil checking procedure and what appearance the oil should have. Many times a transmission malfunction can be traced to low oil level or improper reading of the dipstick. Due to the transmission fluid that is now being used, it may appear to be darker and have a stronger odor. This is normal, and not a positive sign of required maintenance or transmission failure.

Also, when the dipstick is removed, it should be noted whether the oil is devoid of air bubbles or not. Oil with air bubbles gives an indication of an air leak in the suction lines, which can cause erratic operation and slippage. Water in the oil imparts a milky, pink cast to the oil and can cause spewing. Water in the oil can also cause swelling of nylon parts.

Preliminary Check Procedure

1. Check and correct oil level (see fluid level and capacity).
2. Road test vehicle to verify transmission problem using all selective ranges, noting discrepancies in operation.
3. If engine performance indicates an engine tune-up is required, this should be performed before road testing is completed or transmission correction attempted. Poor engine performance can result in transmission problems.
4. Check and correct vacuum lines and fittings.
5. Check and correct manual linkage.
6. Install oil pressure gauge and compare with pressure readings in the appropriate transmission section.
7. Isolate the unit or circuit involved in the malfunction.

R.T.V. Silicone Sealant – Various transmission models may be built with R.T.V. (room temperature vulcanizing) Silicone Sealant in place of some gaskets – i.e, oil pan and side cover. Refer to specific transmission section for removal procedure if R.T.V. Sealant has been used as a gasket on any part.

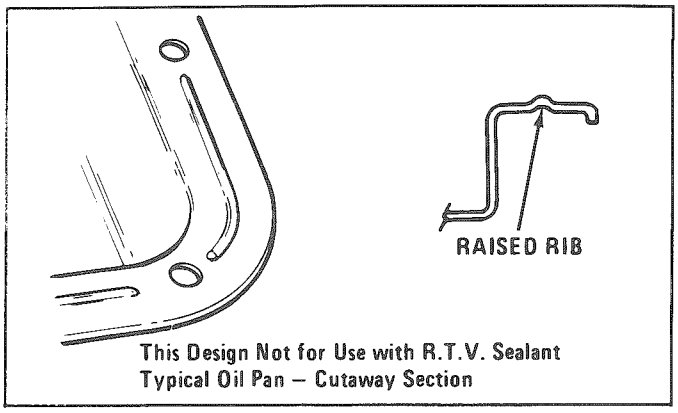


Figure 42 – Raised Rib Oil Pan Design

Sealant Application

1. R.T.V. Sealant is an effective gasket substitute for the following applications, depending on pan design. If R.T.V is used on an oil pan or side cover, the flange surface must be either flat or have depressed stiffening ribs. Do not use R.T.V. on pans which have raised stiffening ribs (see figure 42).
2. Before applying R.T.V. Sealant, the mating surfaces of both parts must be cleaned with solvent and air dried.
3. Apply a (1/16") bead of R.T.V. Sealant to the part flange and assemble wet. The bead of R.T.V. should be applied around the inside of the bolt holes. If the part

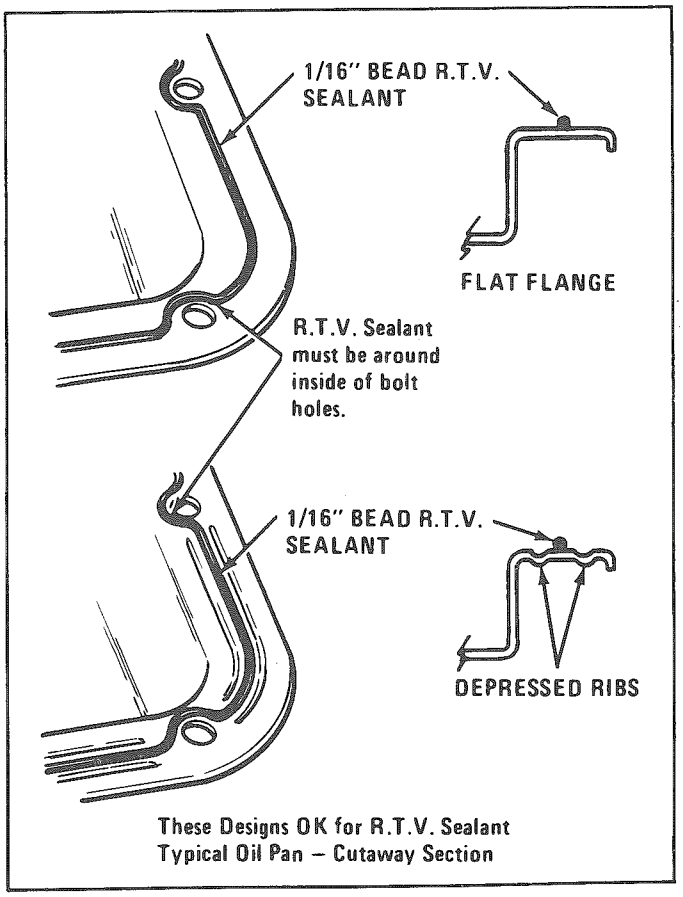


Figure 43 – Depressed Ribs

has depressed stiffening ribs, the bead of R.T.V. must be installed on the high portion of the surface, not in the groove. (See figure 42.)

MAINTENANCE SCHEDULE – The fluid level should be checked at each oil change (see below). When adding or changing fluid, use DEXRON -II or equivalent automatic transmission fluid. Under normal driving conditions, change transmission fluid every 24,000 miles (39, 000 km).

Fluid Drain Intervals – The transmission operating temperature resulting from the type of driving conditions under which the vehicle is used is the main consideration in establishing the proper frequency of transmission fluid changes.

Change the transmission fluid and filter every 12,000 miles (19,200 km) if the vehicle is usually driven under one or more of the following conditions which are considered severe transmission service.

1. In heavy city traffic where the outside temperature regularly reaches 90^{o}_{F} (32^{o}C).
2. In very hilly or mountainous areas.
3. Frequent trailing pulling.
4. Commercial use, such as taxi, police car, or delivery service.

If the vehicle is not used under any of these conditions, change the fluid filter every 24,000 miles (39,000 km).

Fluid Level and Capacity

To bring fluid level from ADD mark to FULL mark requires one pint (.5 liters) of fluid. Fluid level should be checked at every engine oil change.

Fluid level should be to FULL MARK with transmission fluid at normal operating temperature 220^{o}F (93^{o}C). With fluid at room temperature, 70^{o} F (21^{o} C), level will be between the two dimples on the dipstick. The normal operating temperature is obtained only after at least 15 miles (24 km) of highway type driving.

Checking and Adding Fluid
(Transmission at Operating Temperature)

The automatic transmission is designed to operate at the "FULL HOT" mark on the dipstick at normal operating temperatures of 220^{o} - 240^{o} F and should be checked under these conditions. The normal operating temperature is obtained only after at least 15 miles of highway type driving.

To determine proper level, proceed as follows:

1. Apply parking brake and block vehicle wheels.
2. With the selector lever in the PARK position, start engine. DO NOT RACE ENGINE. Move selector lever through each range.
3. Immediately check fluid with the selector lever in PARK, engine running at SLOW IDLE and the car on a LEVEL surface. The fluid level on the dipstick should be at the "FULL HOT" mark.
4. If additional fluid is required, add sufficient fluid to bring to the "FULL HOT" mark on the dipstick.

Checking and Adding Fluid
(Transmission at Room Temperature 65^{o} to 85^{o} F)
(18^{o} to 29^{o} C)

Automatic transmissions are frequently overfilled because the fluid level is checked when the fluid is cold and the dipstick indicates fluid should be added. However, the low reading is normal since the level will rise as the fluid temperature increases. A level change of over 19.05mm (3/4") will occur as fluid temperature rises from 60^{o} to 180^{o} F (16^{o} to 82^{o} C). (See figure 44.)

Overfilling can cause foaming and loss of fluid through the vent. Slippage and transmission failure can result.

Fluid level too low can cause slipping, particularly, when the transmission is cold or the vehicle is on a hill.

Check the transmission fluid level with the engine running, the shift lever in park, and the vehicle level.

If the vehicle has recently been operated for an extended period at high speed or in city traffic in hot weather or the vehicle is being used to pull a trailer, an accurate fluid level cannot be determined until the fluid has cooled down, usually about 30 minutes after the vehicle has been parked.

Remove the dipstick and touch the transmission end of the dipstick cautiously to find out if the fluid is cool, warm or hot.

Wipe it clean and re-insert until cap seats. Remove dipstick and note reading.

1. If the fluid feels cool, about room temperature, 65^{o} to 85^{o} F (18^{o} to 29^{o} C), the level should be between the two dimples below the "ADD" mark.
2. If it feels warm, the level should be close to the "ADD" mark (either above or below).
3. If it feels hot (cannot be held comfortably), the level should be between the "ADD" and "FULL" marks.

Changing Fluid

1. Raise vehicle.
2. With the drain pan placed under transmission oil pan, remove oil pan attaching bolts from front end and side of pan.
3. Loosen rear pan attaching bolts approximately four (4) turns.
4. Carefully pry transmission oil pan loose with screwdriver, allowing fluid to drain.
5. Remove remaining bolts and remove oil pan and gasket.
6. Drain fluid from oil pan. Clean pan with solvent and dry thoroughly with clean compressed air.
7. If required, remove screen/filter-to-valve body bolts. Remove screen/filter and gasket.
8. Thoroughly clean screen assembly in solvent and dry thoroughly with clean compressed air. Paper or felt type filters should be replaced.
9. Install as required, a new gasket or "O" ring onto the screen/filter assembly. Lubricate "O" rings with petrolatum. If required, install screen/filter attaching bolts and torque bolts as specified in each transmission section.

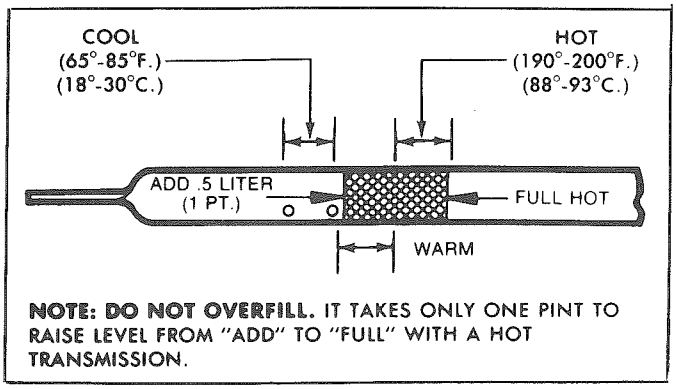


Figure 44 — Transmission Dipstick

10. Install new gasket on oil pan and install oil pan. Torque attaching bolts as specified in each transmission section.
11. Lower vehicle and then add the proper amount of DEXRON-II automatic transmission fluid or its equivalent through filler tube
12. With selector lever in PARK position, apply parking brake, start engine and let idle (carburetor off fast idle step.) DO NOT RACE ENGINE.
13. Move selector lever through each range and, with selector lever in PARK range, check fluid level.
14. Add additional fluid to bring level between the dimples on the dipstick (cool level).

DETENT DOWNSHIFT SWITCH

Vacuum Modulator System

A vacuum modulator is used to automatically sense any change in torque input to the transmission. The vacuum modulator transmits this signal to the pressure regulator, which controls line pressure, so that all torque requirements of the transmission are met and smooth shifts are obtained at all throttle openings.

Vacuum Modulator Diagnosis

A failed vacuum modulator can cause one or more of the following complaints.

1. Harsh upshifts and downshifts.
2. Delayed upshifts.
3. Soft upshifts and downshifts.
4. Slips in low, drive and reverse.
5. Transmission overheating.
6. Engine burning transmission oil.

If any one of the above complaints are encountered, the modulator must be checked.

Vacuum Diaphragm Check

Turn modulator so vacuum line stem points downward. If transmission oil comes out, the vacuum diaphragm is bad.

Gasoline and/or water vapor may settle in the vacuum side of the modulator. If this is found in a vehicle which may be exposed to 10° F (-12° C) temperatures or below, the modulator must be changed.

Check solution that comes out of the modulator for evidence of lubricity. If the solution does not have the feel of oiliness, it can be assumed the solution is a mixture of gas and/or water.

The only way transmission oil can be on the vacuum side of the modulator is by a leak in the vacuum diaphragm.

If oil is found, the modulator must be replaced. If oil is not found in the vacuum side of the modulator, but the transmission oil level is continually low, and no external leaks are found, there is a possibility that a pin hole leak exists in the diaphragm and the modulator should be replaced.

Atmospheric Leak Check

1. Apply a liberal coating of soap bubble solution to the vacuum connector pipe seam, the crimped upper to lower housing seam.
2. Using a short piece of rubber hose, apply air pressure to the vacuum pipe by blowing into the tube and looking for bubbles. If bubbles appear, replace the modulator. Do not use any method other than human lung power for applying air pressure, as pressures over 6 psi may damage the modulator.

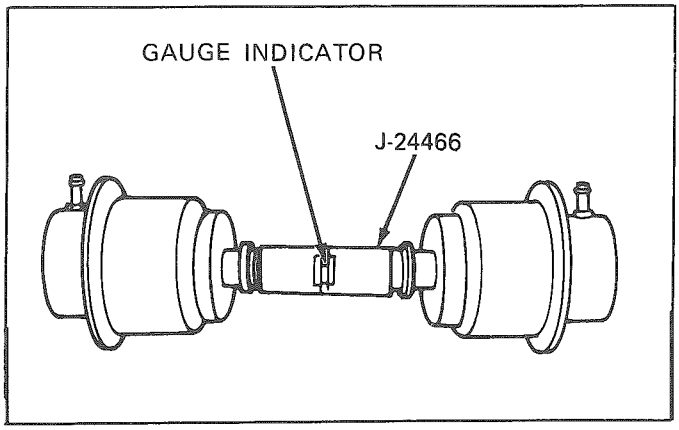


Figure 45 — Checking Modulator

Load Check

This check is made using an available tool, J-24466. The gauge compares the load of a known good modulator with a modulator being checked.

1. Install the modulator that is known to be acceptable on either end of the gauge.
2. Install the modulator in question on the opposite end of the gauge (see figure 45).
3. Holding the modulators in a horizontal position, bring them slowly together under pressure. If the modulator in question is bad, the gauge line will remain blue. If the modulator is good, the gauge line will be white. When making the comparison, make sure that both modulators are of the same type. The part numbers are stamped on the dome of the modulator.

Sleeve Alignment Check

Roll the main body of the modulator on a flat surface and observe the sleeve for concentricity to the can. If the sleeve is concentric and the plunger is free, the modulator is acceptable.

If the modulator passes the above checks, the following items should also be checked as a possible cause of the problem.

1. Check freeness of modulator valve in transmission case.

ENGINE AND DRIVE GEAR (Continued)

2. Check the vacuum line from the manifold to modulator for holes, cracks or dents. Check the rubber hose connection at the modulator and at the intake manifold for leaks.

Causes of Improper Vacuum At Modulator

1. Engine.
   a. Tune up.
   b. Loose vacuum fittings or improperly routed hoses/lines.
   c. Vacuum operated accessory leak — (hoses, vacuum valve, etc.).
   d. Engine exhaust system restricted.

2. Vacuum line to modulator.
   a. Leak.
   b. Loose fitting.
   c. Restricted orifice or incorrect orifice size.
   d. Carbon build up at modulator vacuum fitting.
   e. Pinched line.
   f. Grease in pipe (delayed or no upshift-cold).

TRANSMISSION

Parts Cleaning & Inspection

Cleanliness is an important factor in the overhaul of the transmission. Before attempting any disassembly operation, the exterior of the transmission should be thoroughly cleaned to prevent the possibility of dirt entering the transmission internal mechanism. During inspection and reassembly, all parts should be thoroughly cleaned with cleaning fluid and then air dried. Wiping cloths or rags should not be used to dry parts. Do not use solvents on neoprene seals, composition-faced clutch plates or thrust washers. All oil passages should be blown out and checked to make sure that they are not obstructed. Small passages should be checked with tag wire. All parts should be inspected to determine which parts are to be replaced.

The various inspections of parts are as follows:

1. Inspect linkage and pivot points for excessive wear.
2. Bearing and thrust surfaces of all parts should be checked for excessive wear and scoring.
3. Check for broken seal rings, damaged ring lands and damaged threads.
4. Inspect seals and "O" rings.
5. Mating surfaces of castings and end plate should be checked for burrs and irregularities. These may be removed by lapping the surface with crocus cloth. The crocus cloth should be laid on a flat surface such as a piece of plate glass.
6. Castings should be checked for cracks and sand holes.

Oil Cooler Lines

If replacement of transmission steel tubing cooler lines is required, use only double wrapped and brazed steel tubing meeting GM specification 123M or equivalent. Under no condition use copper or aluminum tubing to replace steel tubing. Those materials do not have satisfactory fatigue durability to withstand normal vehicle vibrations. Steel tubing should be flared using the double flare method.

Cooler Line Flushing

In a major transmission failure, where particles of metal have been carried with the oil throughout the units of the transmission, it will be necessary to flush out the oil cooler and connecting lines. To flush the oil cooler and lines, use the following procedure:

1. Disconnect both cooler lines from the transmission.
2. Place a hose over the end of the cooler inlet line (from the bottom of the cooler) and insert the hose into an empty container.
3. Flush clean oleum solvent or equivalent through the return line (from the top of the cooler) using an oil suction gun until clean solvent comes out of the hose. This will "back flush" the cooler.
4. Remove the hose from the inlet cooler line and place it on the return line.
5. Flush clean oleum solvent or equivalent through the inlet line until clean solvent comes out the return line. Remove remaining solvent from cooler with compressed air applied to the return line and flush with transmission fluid.
6. Reconnect oil cooler lines and torque nuts to 17 N·m (12 ft. lbs.).

SPEEDOMETER DRIVEN GEAR

Removal and Installation

1. Disconnect speedometer cable.
2. Remove retainer bolt, retainer, speedometer driven gear and "O" ring seal.
3. To install, reverse removal procedure, using new "O" ring seal (if required) and adjust fluid level.

REAR OIL SEAL

Removal and Installation

1. Remove propeller shaft.
2. Pry out lip oil seal with suitable tool.
3. Coat outer casing of new lip oil seal with a non-hardening sealer and drive it into place with Installer J-21359 or J-24057.
4. Install propeller shaft and adjust fluid level.

GOVERNOR (475)

Removal and Installation

1. Raise vehicle.
2. Remove governor cover attaching screws, cover and gasket. Discard gasket.
3. Remove governor assembly from case.
4. Install governor.
5. Using a new gasket, install cover and retaining bolts.
6. Lower vehicle and adjust fluid level.

THE FOLLOWING PARTS CAN BE SERVICED WITH THE TRANSMISSION IN THE VEHICLE.

1. Governor Cover and Seals
2. Governor Assembly
3. Governor Pipes
4. Intermediate Servo Piston Assembly
5. Rear Servo Assembly
6. Front Servo Assembly
7. Oil Pan and Oil Screen (Intake Pipe) Assembly
8. Control Valve Assembly (Valve Body)
9. Check Balls and Valve Body Space Plates and Gaskets
10. Pressure Regulator Parts
11. Manual Detent Roller and Spring Assembly
12. Parking Pawl Actuator Rod
13. Parking Pawl Bracket
14. Parking Pawl
15. Manual Shaft and Seal
16. Manual Valve
17. Manual Valve Link
18. Extension Housing and Gasket
19. Rear Seal
20. 1-2 Accumulator Assembly
21. Vacuum Modulator
22. Cooler Fittings
23. Oil Filter Pipe and 'O' Ring
24. Speedometer Driven Gear Assembly
25. Down Shift Solenoid
26. Electrical Connectors
27. Governor Feed Screen
28. Pump Pressure Screen
29. Modulator Valve

ENGINE COMPARTMENT

ENGINE ACCESSIBILITY

Access to the engine is provided by an engine cover located between the driver and passenger seats. The cover is designed to be secured by spring-loaded latches.

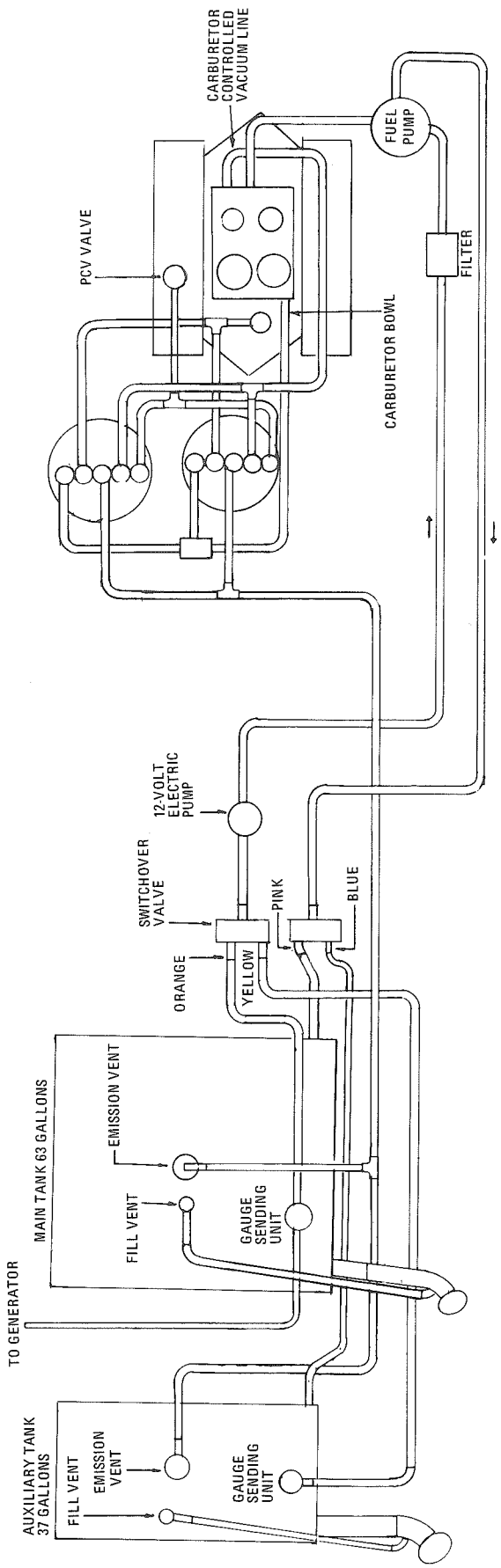


Figure 45A – Evaporative Control System Diagram

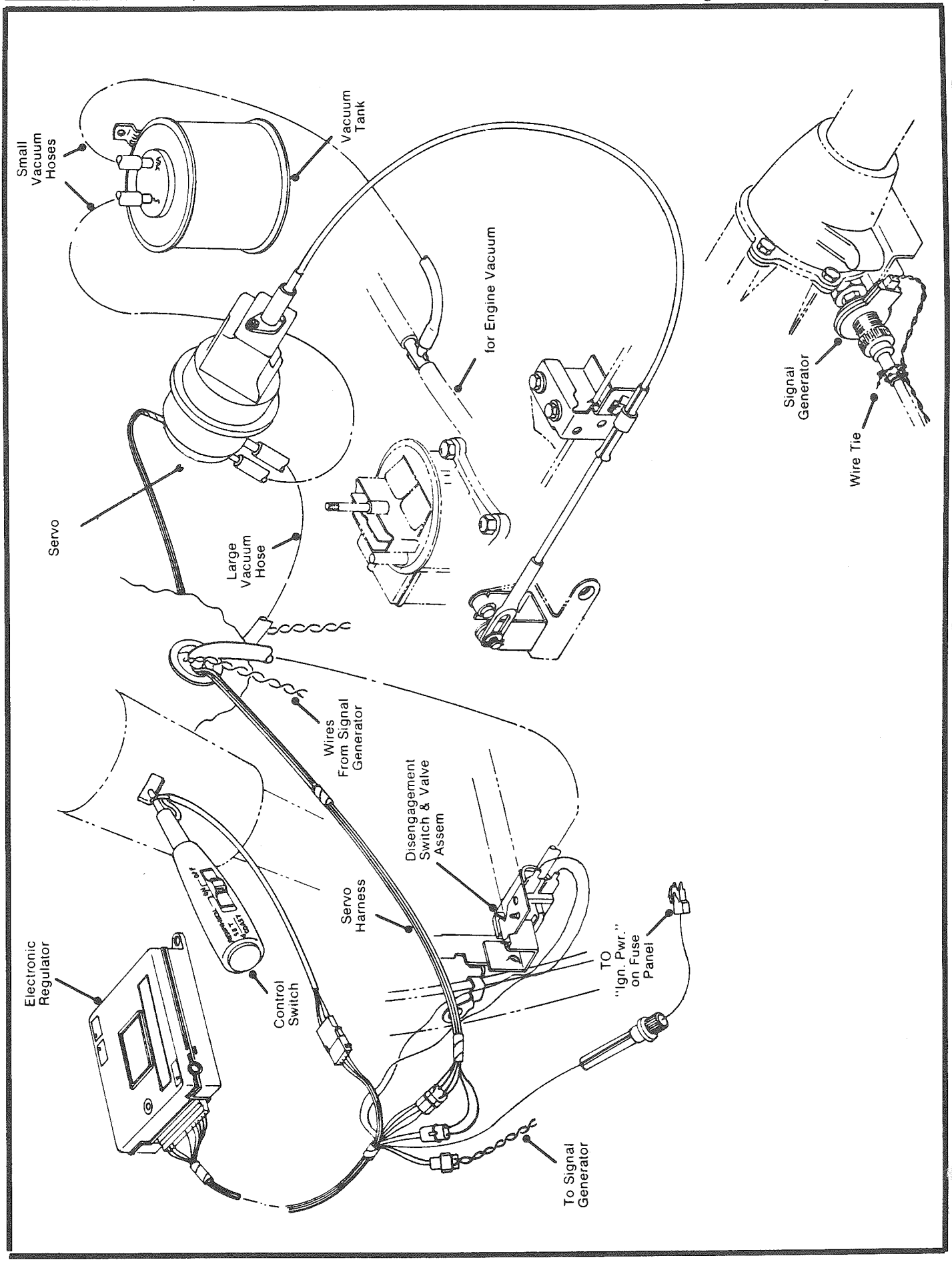
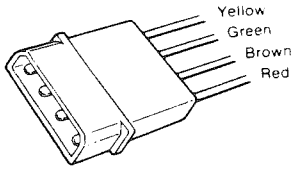


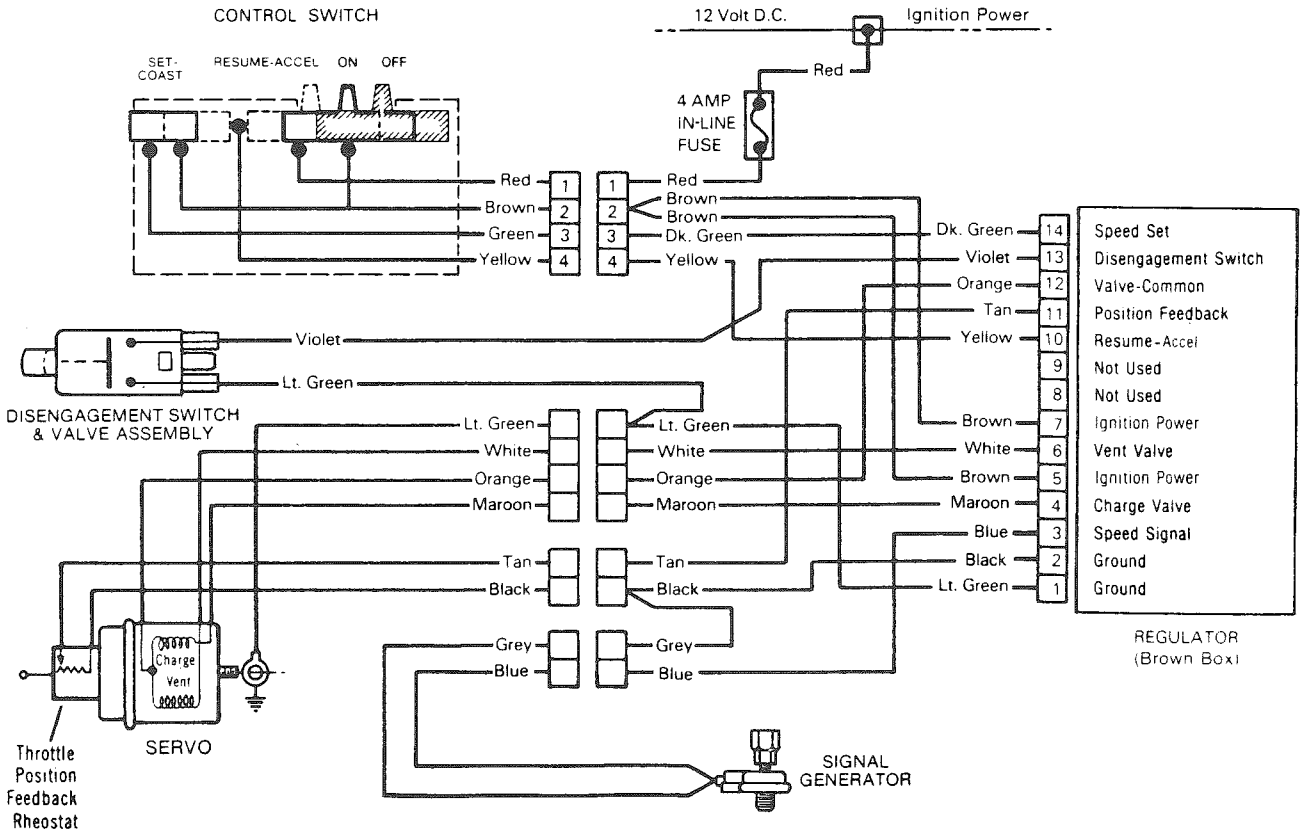
Figure 46 — Dana Perfect Circle Electronic Cruise Control

CONTROL SWITCH

Use 12 volt test light and jumper wire. Disconnect **Control Switch** at flat, 4-wire harness connector. Connect jumper wire from 12 volt power source to red wire terminal of **Control Switch.**

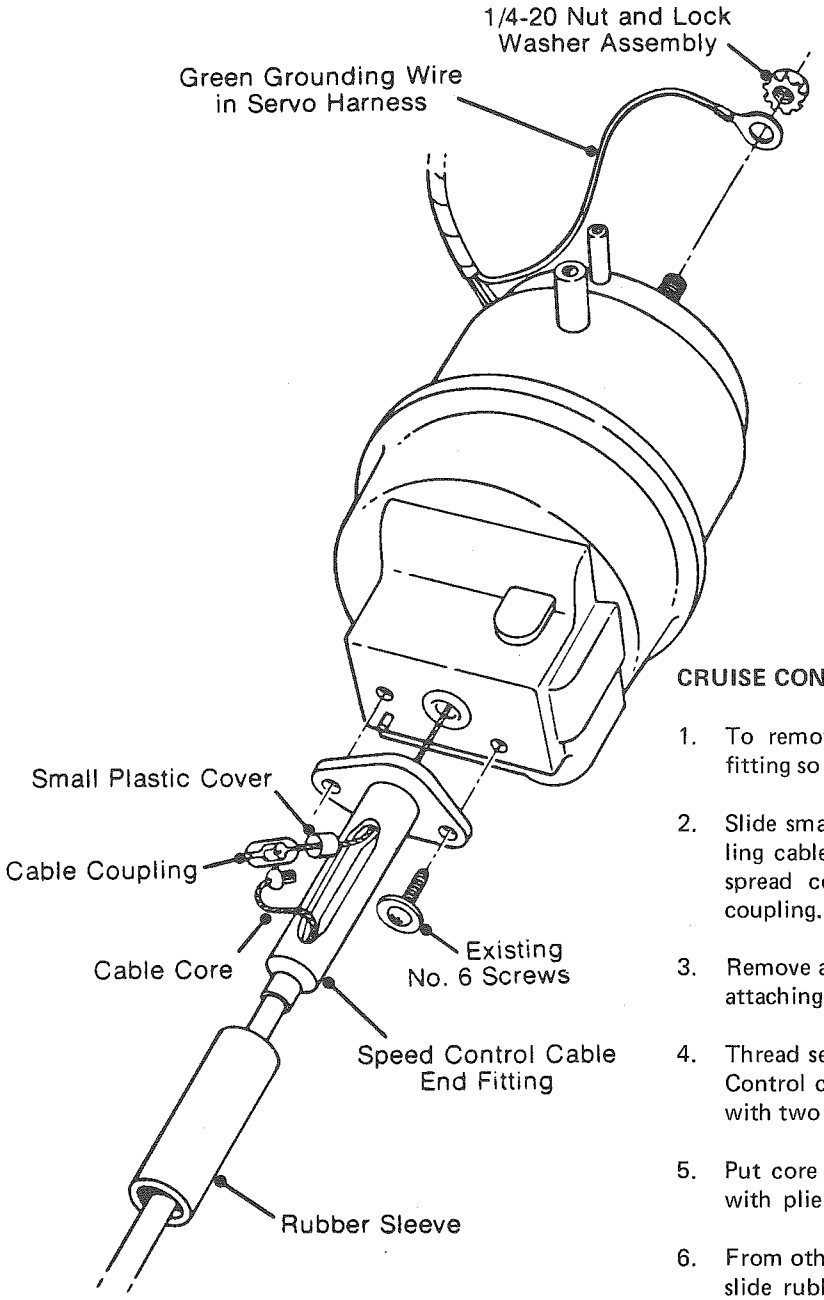


TEST CONDITION	WIRE COLOR	LIGHT	
		SWITCH O.K.	REPLACE SWITCH
Slide switch **OFF**, ground one test light lead, touch other test lead in turn, to terminal of	Brown Green Yellow	OFF OFF OFF	ON ON ON
Slide switch **ON**, ground one test light lead, touch other test lead in turn, to terminal of:	Brown Green Yellow	ON ON OFF	OFF OFF ON
Slide switch **ON**, hold **"SET/COAST"** button in. Ground one test light lead, touch other test lead in turn, to terminal of:	Brown Green Yellow	ON OFF ON	OFF ON OFF
Press and hold **"RESUME/ACCEL"** slide. Ground one test light lead, touch other test lead in turn, to terminal of:	Brown Green Yellow	ON ON ON	OFF OFF OFF



WIRING SCHEMATIC

Figure 47 — Dana Perfect Circle Electronic Cruise Control — Test & Wiring Schematic



CRUISE CONTROL CABLE REMOVAL

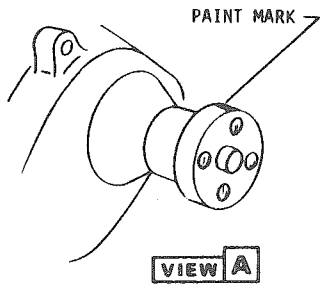
1. To remove old cable, slide rubber sleeve off cable end fitting so slots are exposed.
2. Slide small plastic cover off coupling and onto servo coupling cable. Use side cutter pliers or small screwdriver to spread coupling. Remove core end of old cable from coupling.
3. Remove and retain two No. 6 screw 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*



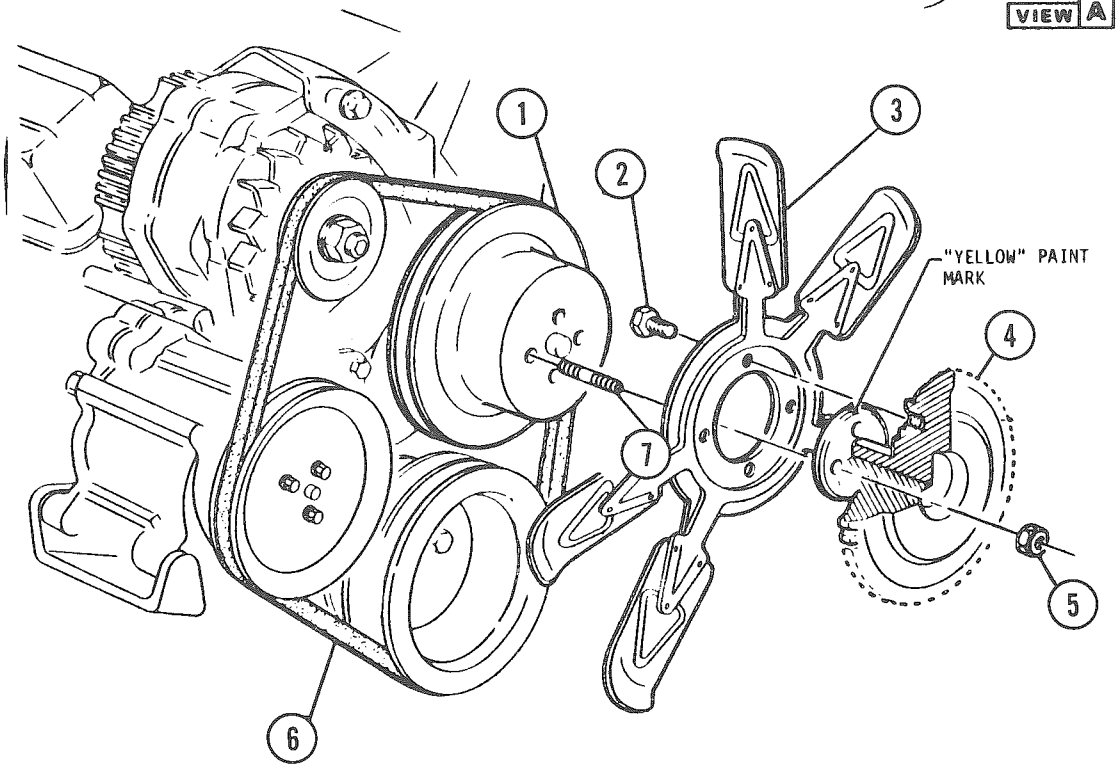
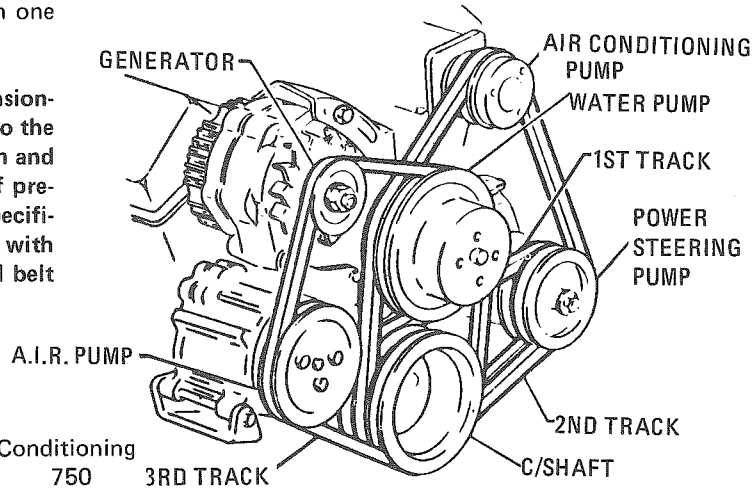


Figure 49 – Fan and Fan Clutch Assembly

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.

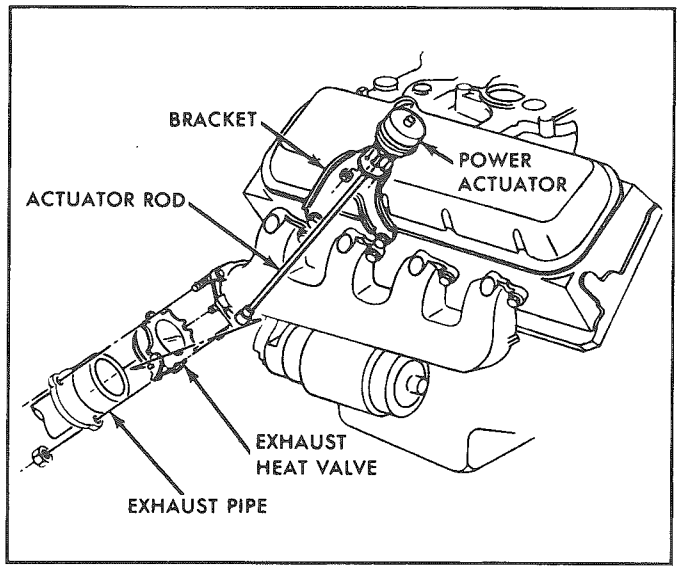


Figure 51 – Early Fuel Evaporation System

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.

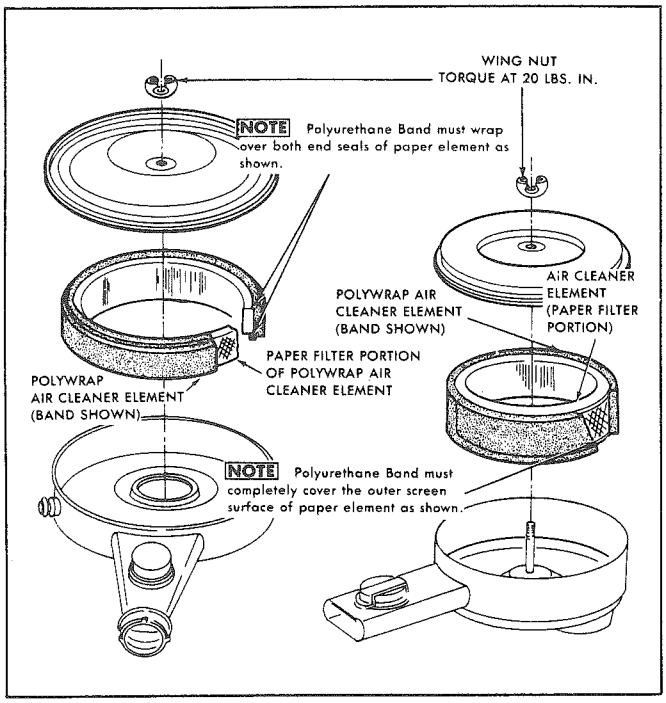


Figure 52 — Air Cleaner Assembly

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)

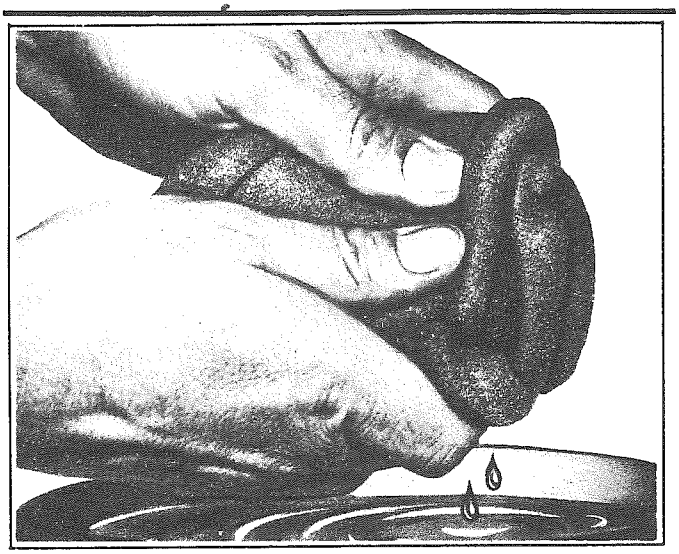


Figure 53 — Cleaning Polywrap Band

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.

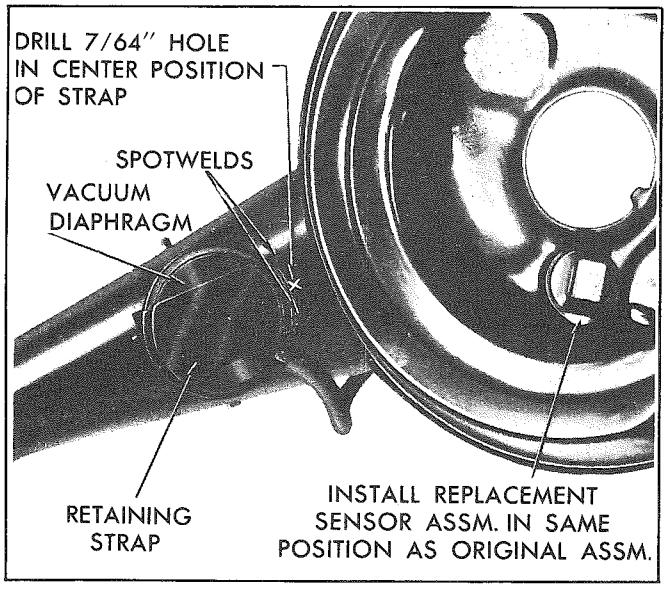


Figure 54 — Vacuum Diaphragm Replacement

Vacuum Motor Removal

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

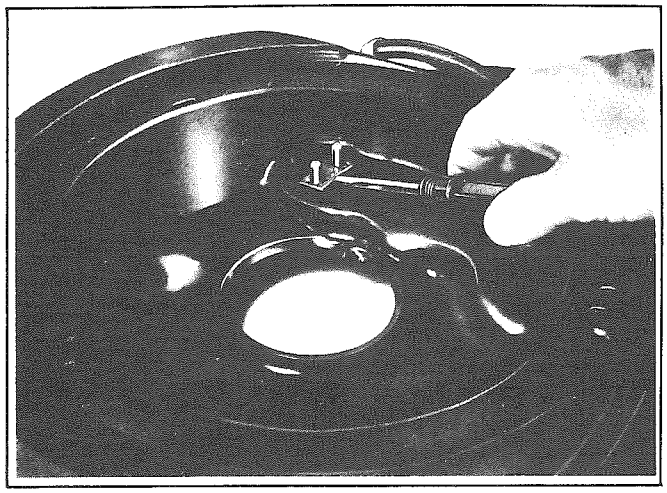


Figure 55 — Removing Sensor Unit

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.

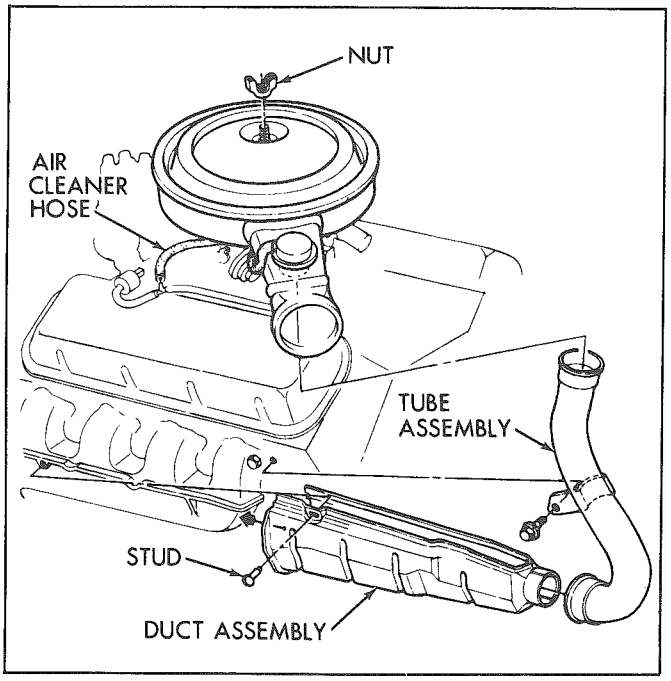


Figure 56 — Air Cleaner

ENGINE EMISSION CONTROLS (Continued)

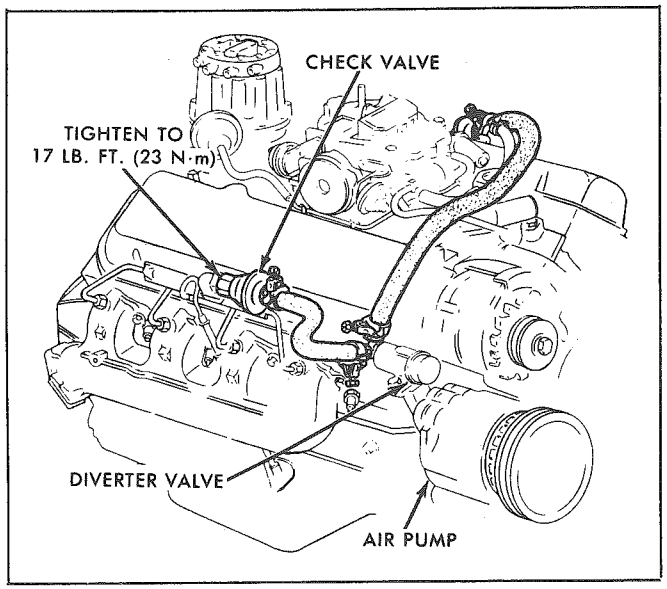


Figure 57 – A.I.R. Pipe Installation

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.

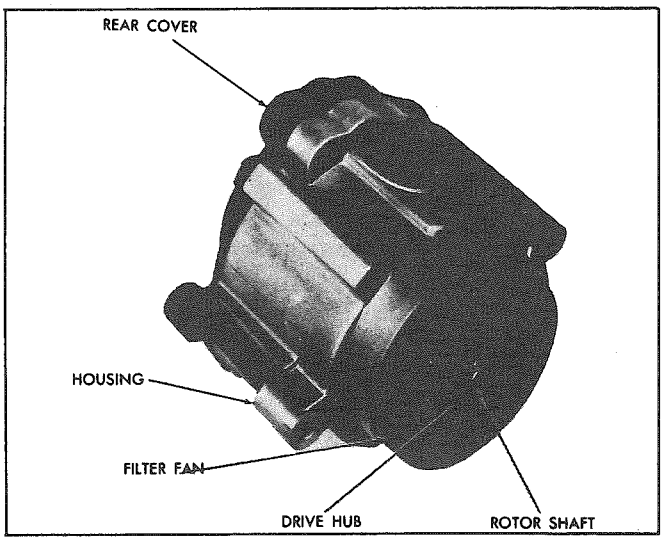


Figure 58 – Air Injection Pump

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.

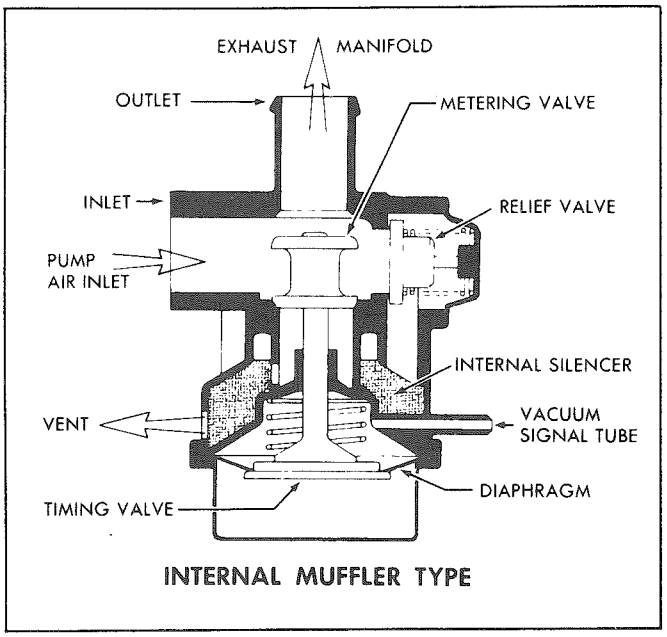


Figure 59 – Diverter Valve

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.)

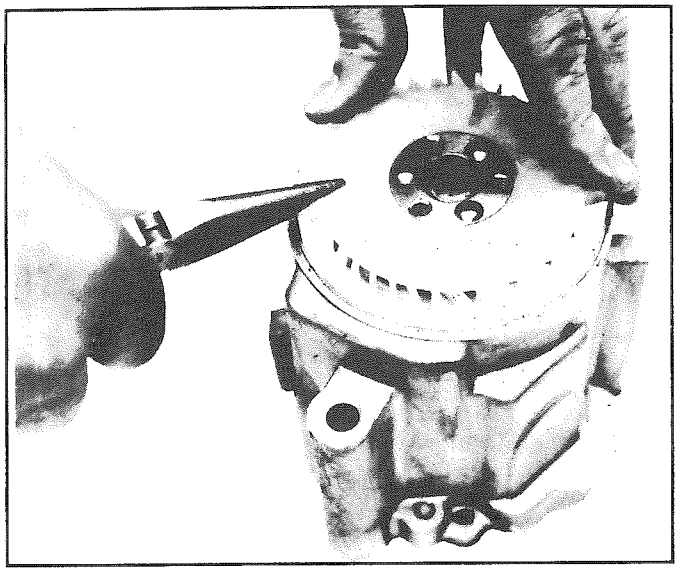


Figure 60 — Filter Fan Removal

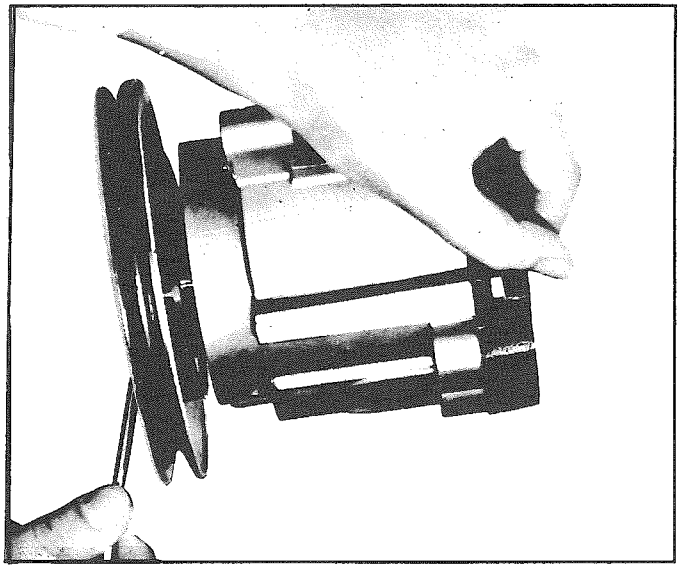


Figure 61 — Filter Fan Installation

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.

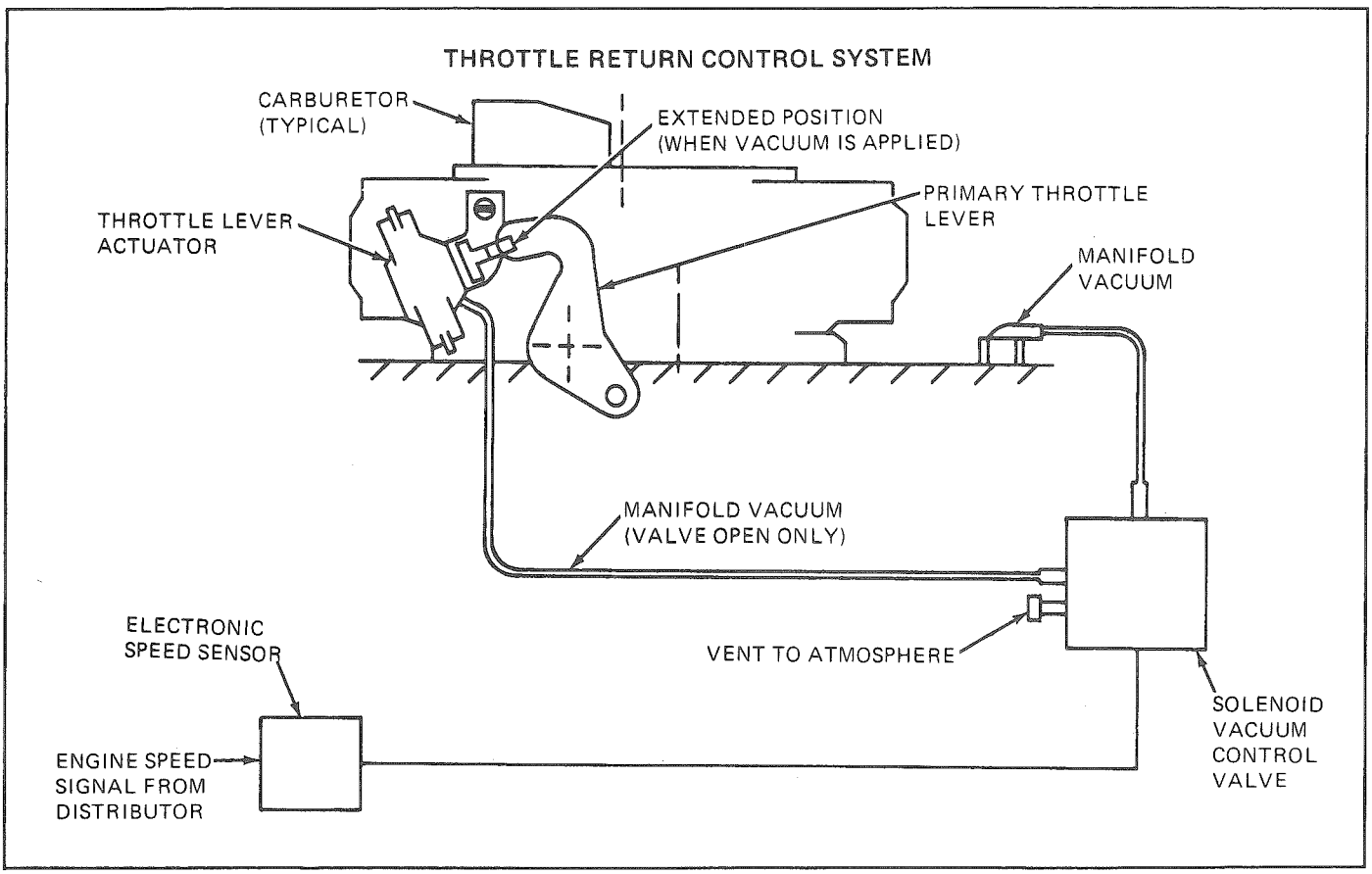


Figure 62 — Throttle Return Control System

ENGINE EMISSION CONTROLS (Continued)

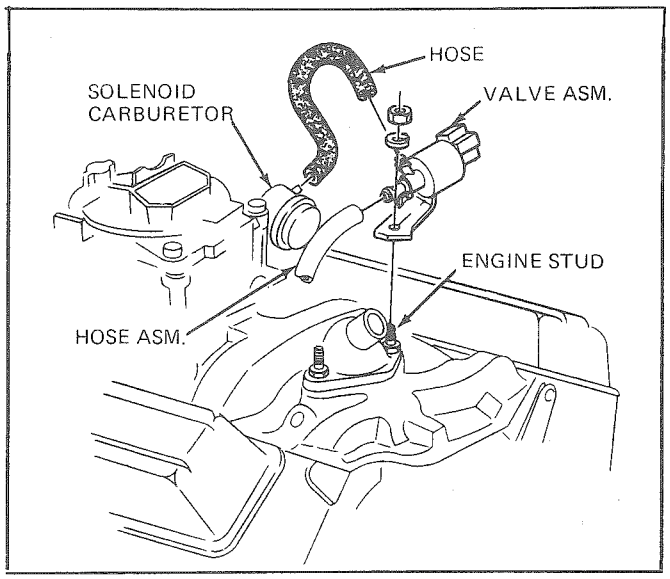


Figure 63 – Throttle Valve

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 0 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 subframe 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)

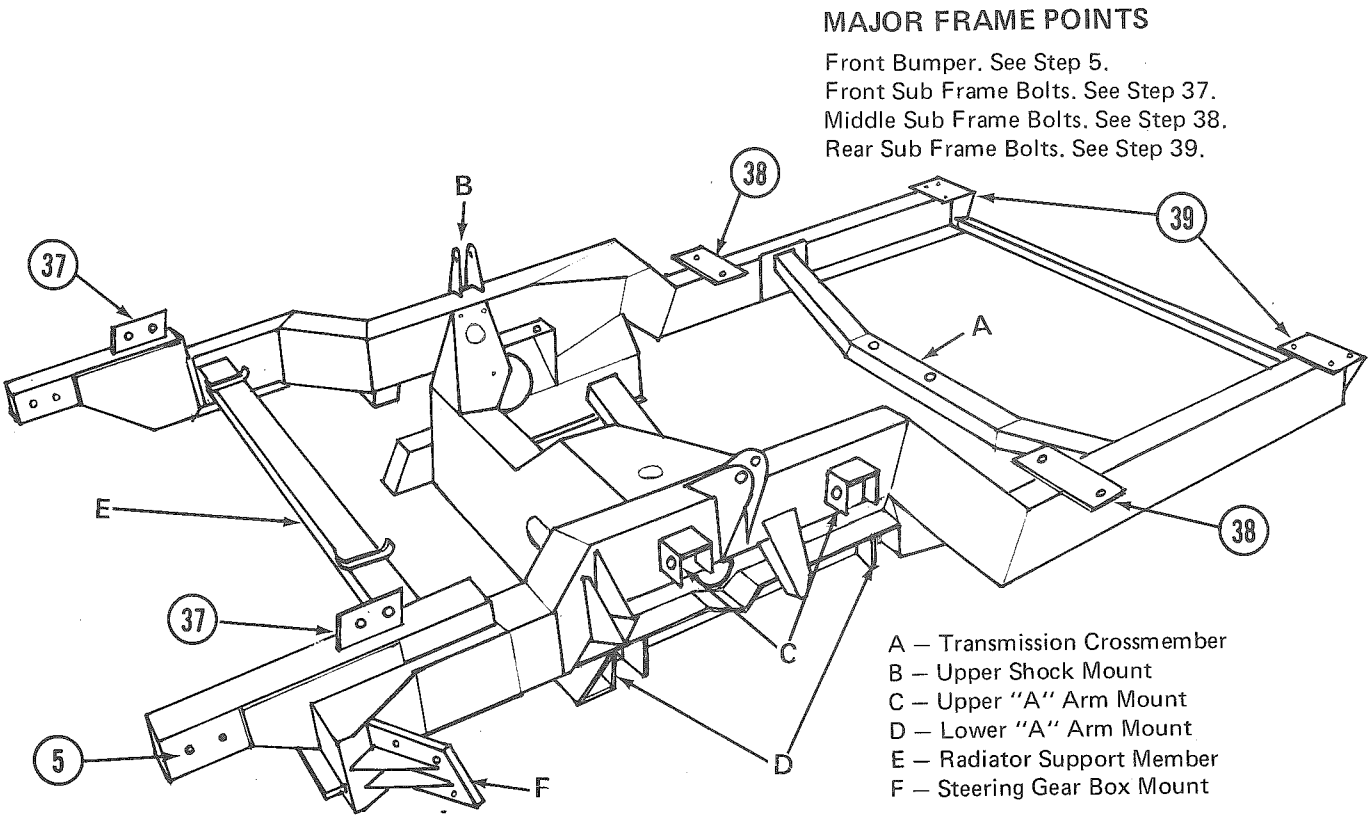


Figure 64— Revcon Engine and Sub Frame Removal

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.

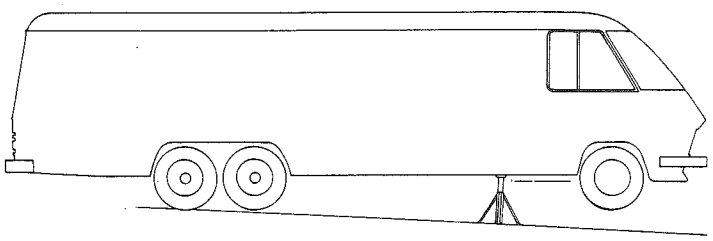


Figure XX — Jacking Vehicle: With a hydraulic jack placed at the forward crossmember of the sub-frame, elevate the vehicle so the height from the floor to the bottom of the bumper is 3'6", Place a rated 5-ton jackstand at either side, 6" between the sub-frame at the frame rails.

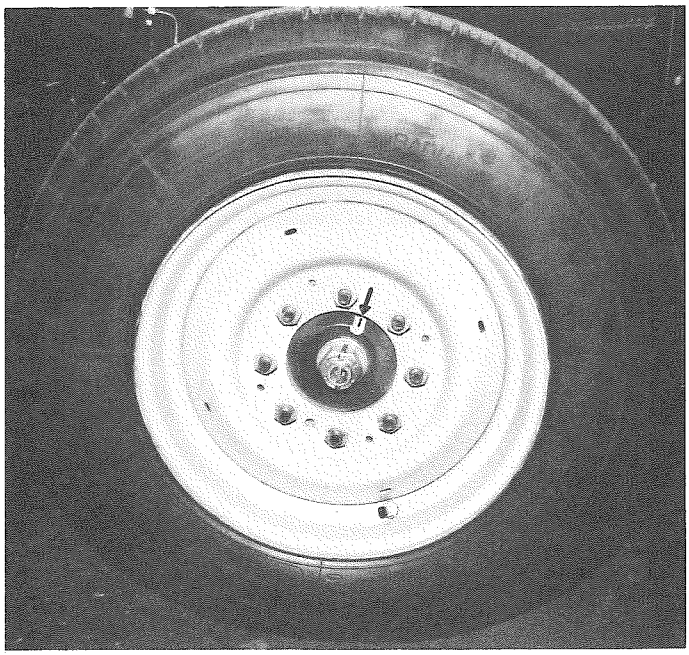


Figure 65 —Front Wheels: Remove the front wheels and tires to gain access for the removal of the wheel liners. Be sure to mark the wheel and hub before removing so they will remain in balance after re-installation. Also, be sure to mark the wheels as to either right or left.

ENGINE & SUB-FRAME REMOVAL (Continued)

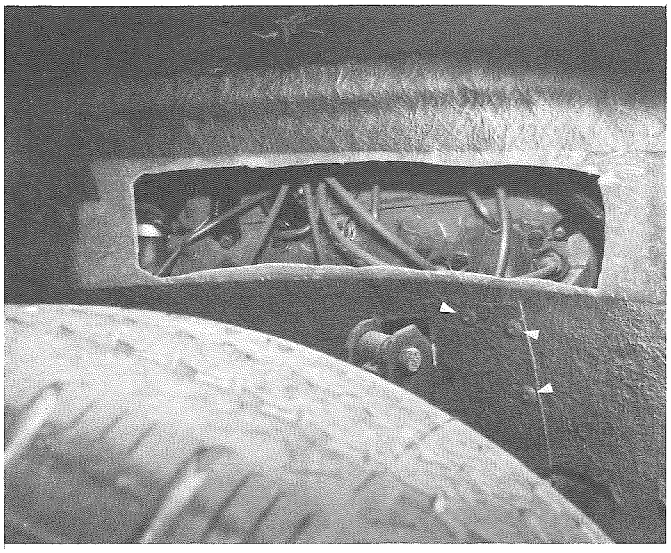


Figure 66 — Front Wheel Liners: The front wheel liners are sectional and divided into three pieces — forward, center, and rear. The liners are coated with a tar-based undercoat and should be resealed in various places for protection, when the liners are re-installed. The liners are fastened into position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

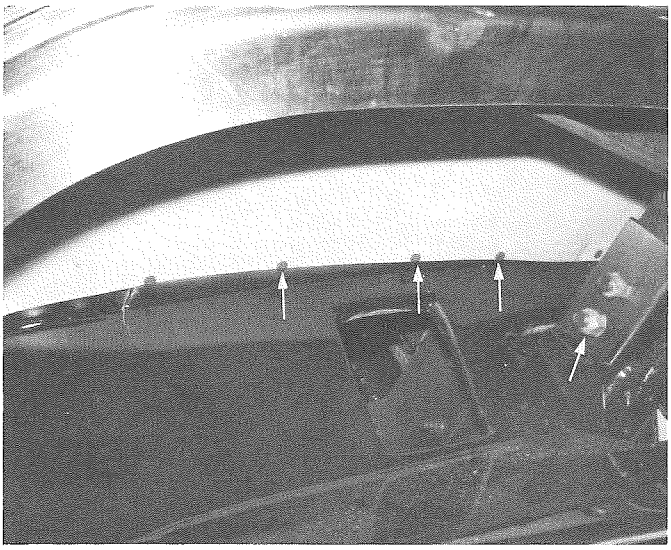


Figure 67 — Bumper & Dressout: The bumper dressout panel extends from the main body to the inner edge of the bumper top surface. It has three sections and is fastened to the flange of the main body panel below the bumper. Remove approximately 26 Phillips-head self-tapping screws.

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.

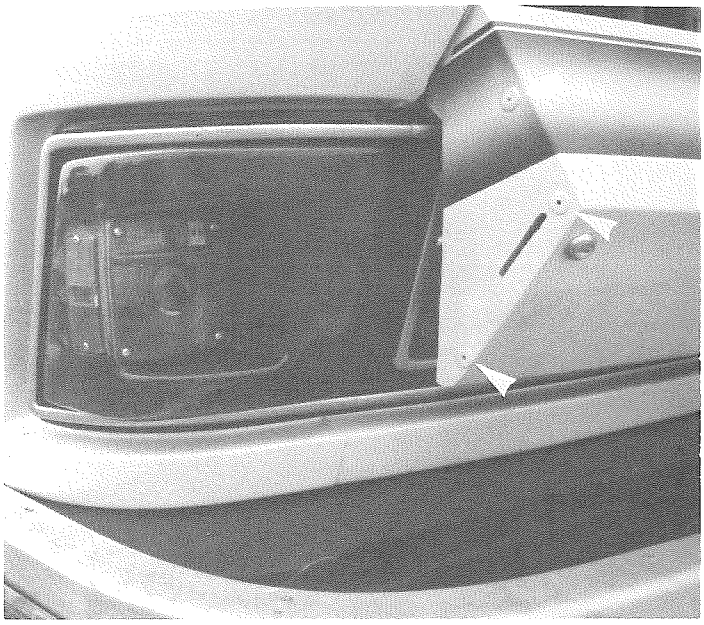


Figure 68 — Exterior Engine Access Cover Removal: Remove the rivets that fasten the fiberglass cover to the hinge plate at either side. There are six (6) 30-AD66 BSLF pop rivets, .251-.375 grip length, .192-.196 hole diameter. These pop rivets may be drilled out.

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)

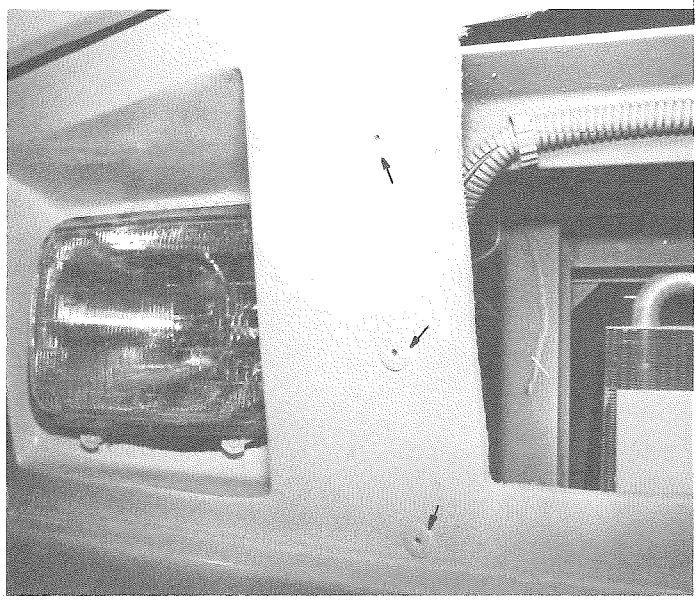


Figure 70 – Main Front Body Panel Removal: After the simulated grille has been removed, notice 3 rivets at each side running vertical at the inner structure upright support. Remove these 6 AD66BS pop rivets, .126-.250 grip length, .192-.196 hole diameter.

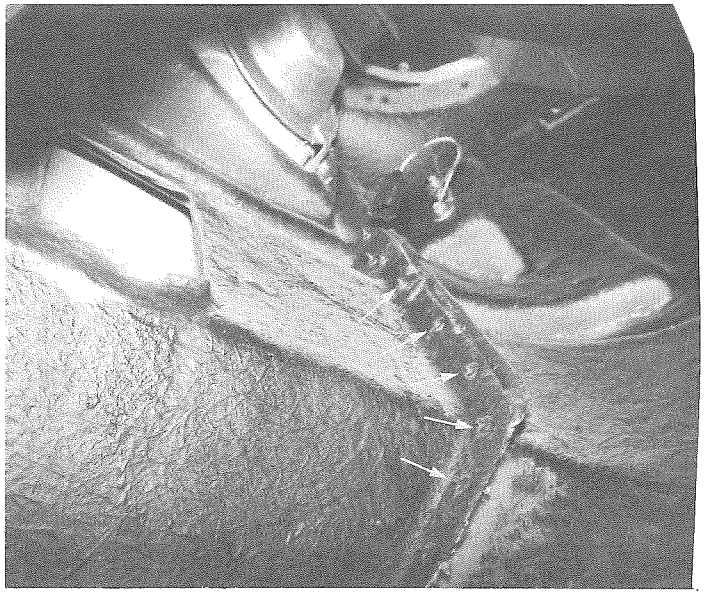


Figure 71 – Main Front Body Panel Removal: The body panel is fastened at the two uprights at the upper structure, 6 rivets on the face of the panel. There also are approximately 26 rivets that fasten the panel at the interface of the left and right fenders. Silopreme sealant also is used to secure these 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.

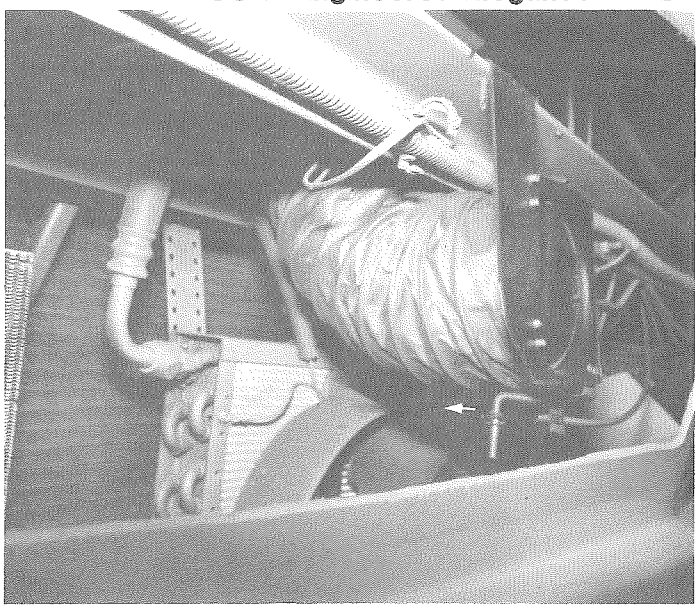


Figure 72 – Air Inlet Hose Removal: Remove the 4½"-diameter air inlet hose that is fastened to the back side of the firewall. With the inlet hose disconnected, you can begin removal of the upper air deflector. Starting with the 1981 models, the hose can be disconnected at the grille.

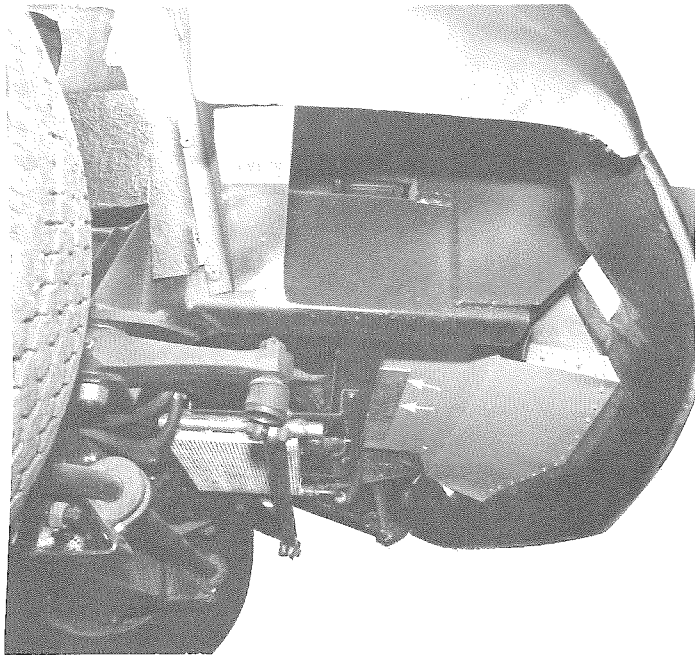


Figure 73 – Upper Air Deflector Removal: Remove the four equally spaced rivets that fasten the air deflector to the crossmember that supports the top side of the radiator. These are 4 AD45 H pop rivets, .251-.312 grip length, .129-.133 hole diameter.

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)

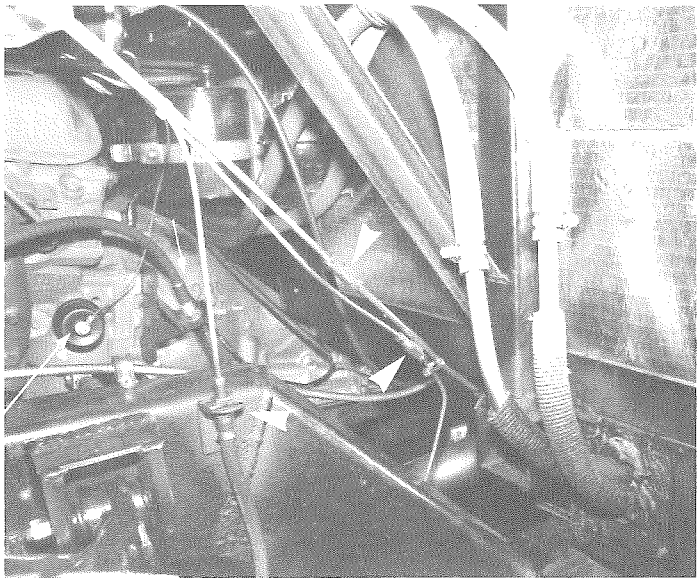


Figure 74 — Transmission Shift Cable Removal: The transmission shift cable must be removed by disconnecting at the shift lever near the base of the bellhousing. Remove the 7/16" nut from the stud. Also, remove the 15/16" nut from the shift cable support bracket; the cable should remove easily.
Speedometer 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.

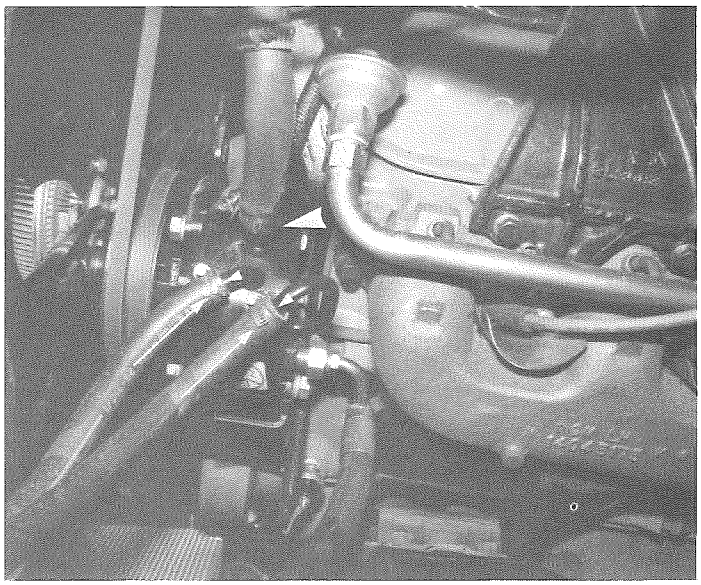


Figure 75 — Engine Coolant Sender Disconnect: Disconnect the engine coolant sensor by removing the wire at the terminal. The sensor is located at the center and left side of the engine.
Power Steering Pump Hose Disconnect: Remove three (3) 3/8" I.D. steering pump hoses, being sure to mark each hose and 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.

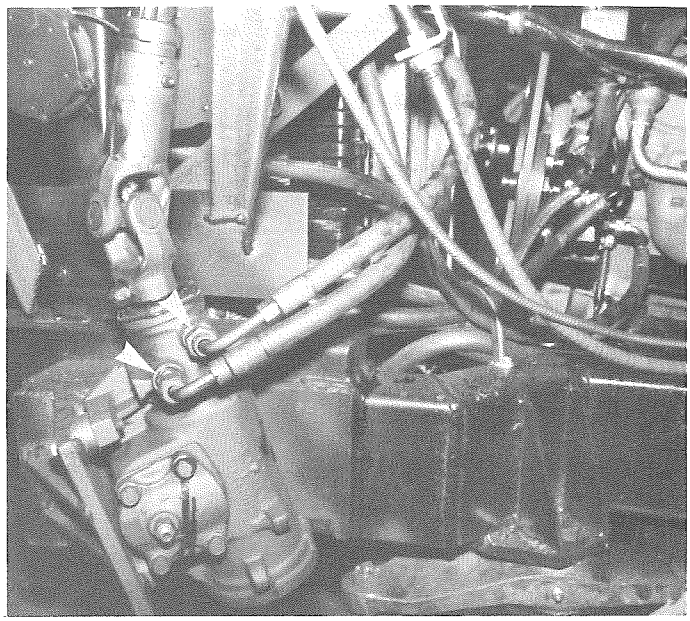


Figure 76 — Power Steering Gear Box Hoses: Disconnect the two power steering fluid hoses at the elbow stems. Be sure to mark each line with tape as to upper or lower.
Engine Coolant Overflow Disconnect: Remove the engine coolant line by loosening the hose clamp. The coolant recovery line is located at 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.

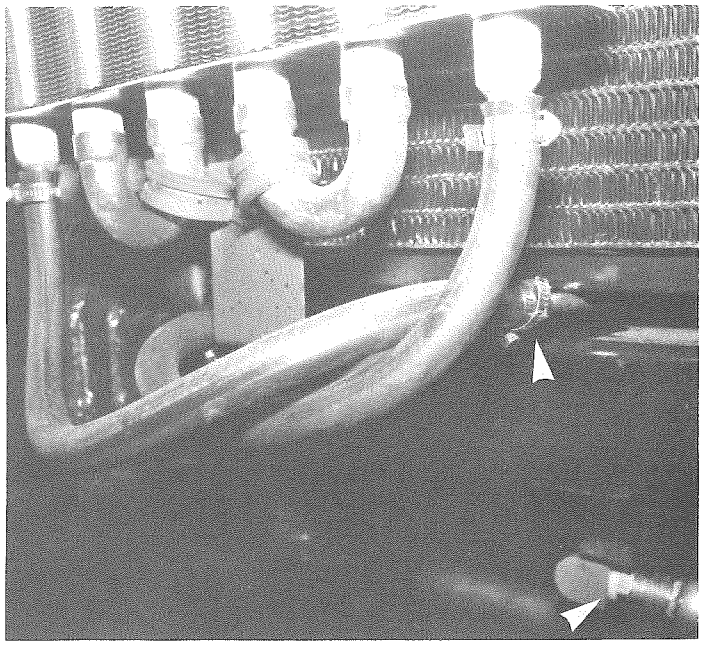


Figure 77 — Oil LInes Disconnect: Disconnect the 2 oil cooler lines at the inlet located at the base of the radiator.
Ground Cable Disconnect: Disconnect the ground cable lead from the battery to the sub-frame. The large red cable is located at the right side bumper mount on the structure.
Transmission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

ENGINE & SUB-FRAME REMOVAL (Continued)

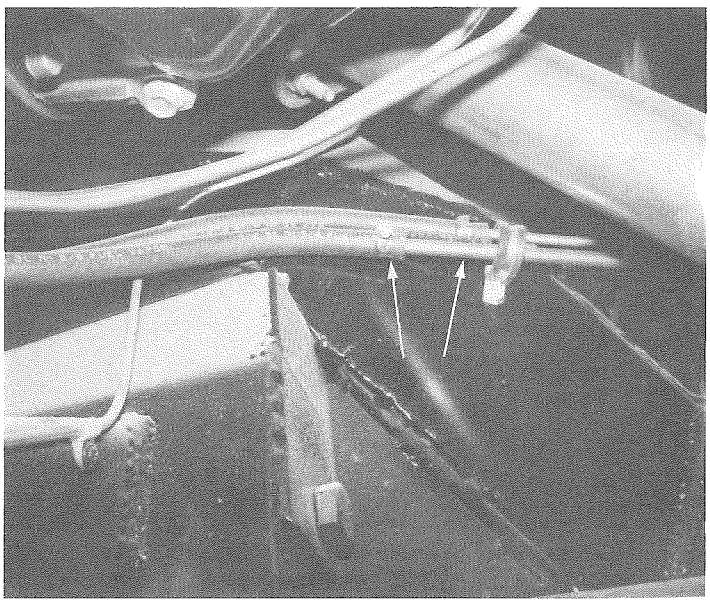


Figure 78 – Fuel Lines Disconnect: Disconnect the fuel lines by loosening the hose clamps. Be sure to mark the lines with masking tape. The fuel lines are located near the starter motor, fastened to the frame rail.

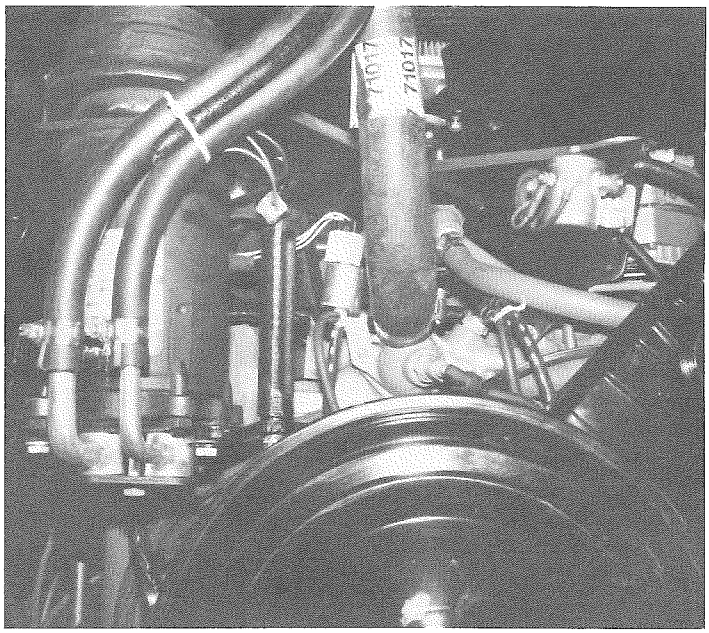


Figure 79 – Exhaust Pipe Disconnect: Disconnect both right and left side exhaust pipes by loosening the "U" bolt connectors at the right side forward of the muffler and the left side near the transfer case.

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.

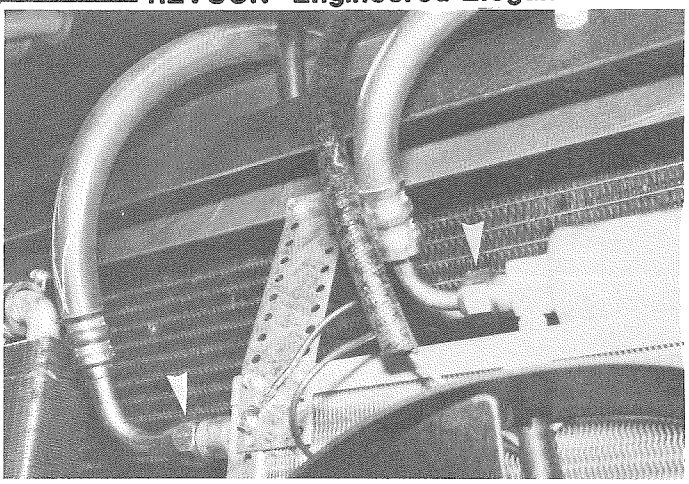


Figure 80 – Air Conditioning Condenser Lines: Disconnect the coolant lines by removing the 2 hoses located at the right side of the condenser.

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.

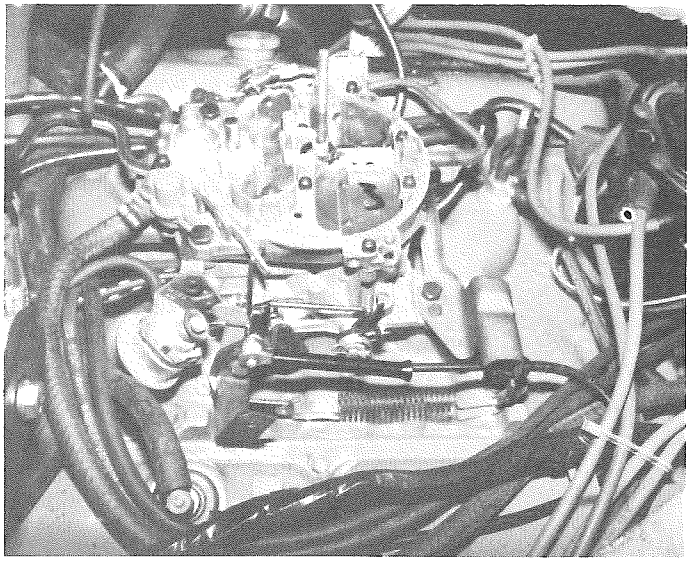


Figure 81 – Throttle Disconnect: Disconnect the throttle linkage by removing the spring clip-type retainer, located at dash-pot. Then completely remove cable from engine and frame.

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)

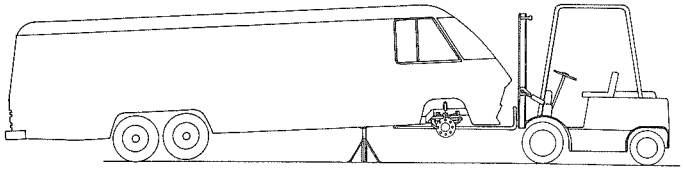


Figure 82 – Auxiliary Equipment Removal: If there are any auxiliary items remaining, these should be removed prior to the placement of a 6000-lb. forklift at front of vehicle. Do not remove any frame bolts until the forklift is in position.

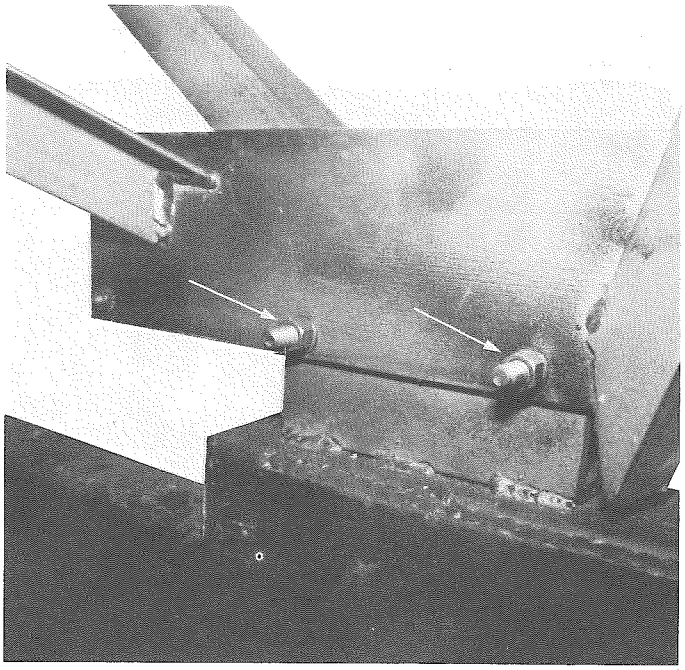


Figure 83 – Sub-Frame Mounting Positions: There are three mounting positions located on both right and left frame rails. The first position is located forward near the bumper mount at the upright of the upper structure. Remove two (2) 9/16" diameter nuts from both sides, but do not remove bolts at this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

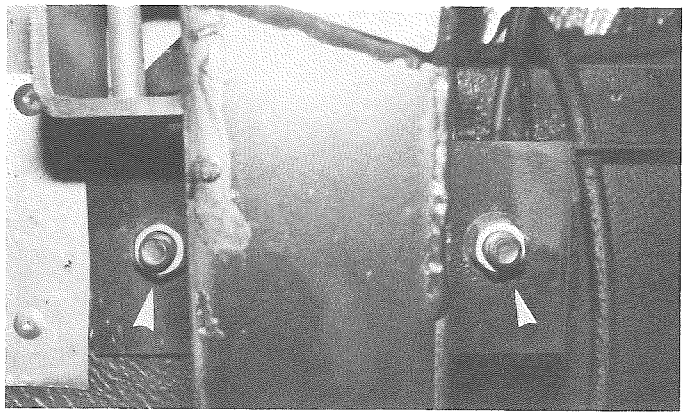


Figure 84 – Sub-Frame Mounting Position (2): The second mounting position is located on the frame rails, behind the raised deck at the lower main frame. Remove two(2) 5/8" diameter bolts at both sides.

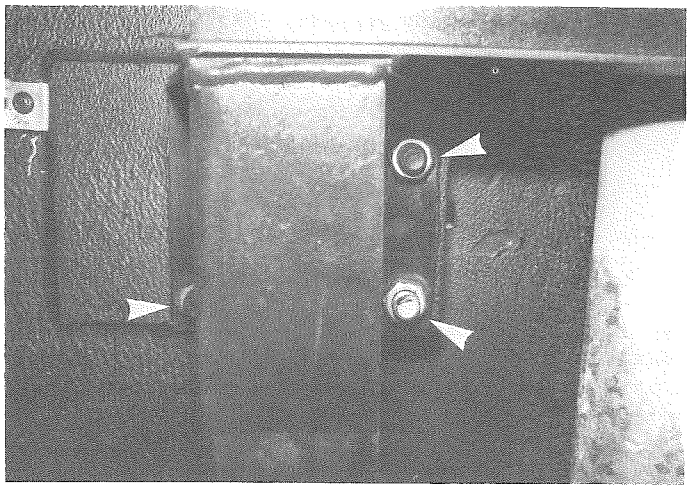


Figure 85 – Sub-Frame Mounting Position (3): The third mounting position is located at the extreme end of the sub-frame at the frame rail. Remove three (3) 5/8" diameter bolts on both sides.

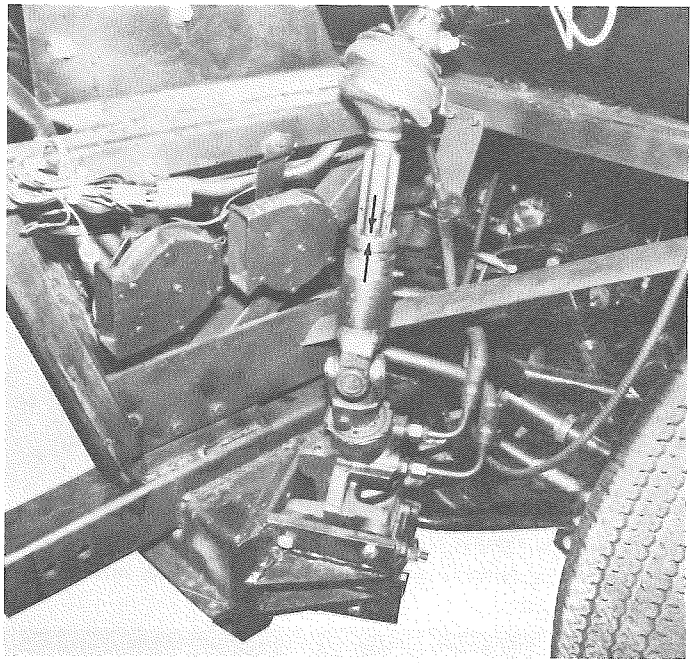


Figure 86 – Steering Slip Spline Disconnect: Carefully ease apart the steering slip spline as the sub-frame is being carefully lowered with a forklift. Be sure to mark the slip spline for correct alignment when re-installing the sub-frame.

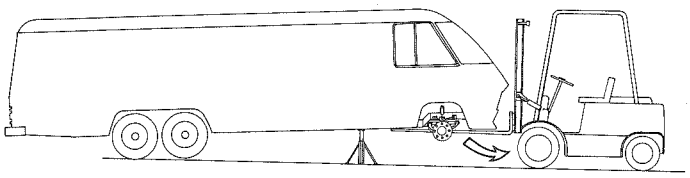


Figure 87 –Sub-Frame Lowered From Vehicle: The sub-frame should be carefully lowered with a 6000-pound minimum capacity forklift, The blades should be a minimum of 7'0" and spaced 3'0" center to center. As the sub-frame is being lowered be sure all cables, hoses, and fixtures are free. Continue to watch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

TRANSMISSION REMOVAL

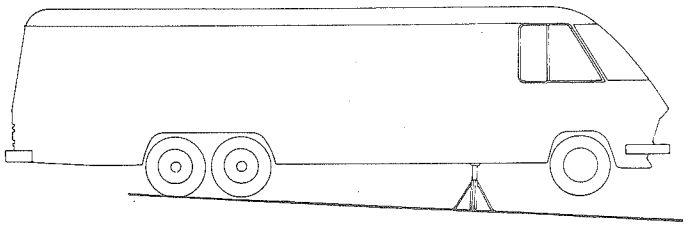


Figure 88 –JACKING VEHICLE – With a hydraulic jack placed at the forward crossmember of the sub-frame or at the sub- frame/bumper mount rails, elevate the vehicle so the floor to underside of the bumper height is 3'6". Place a rated 6-ton jackstand at both right and left frame rails at approximately 6" behind the sub-frame.

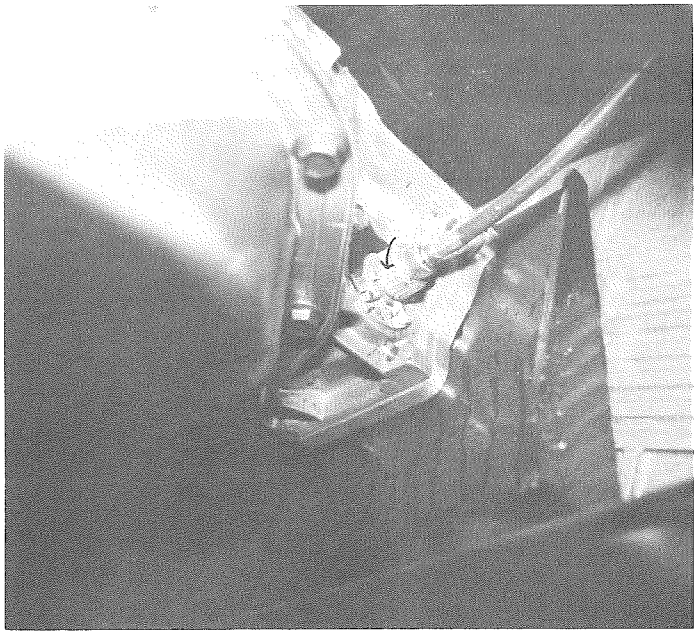


Figure 89 – SPEEDOMETER CABLE REMOVAL – Disconnect the speedometer cable, located at the far left side of the transmission.

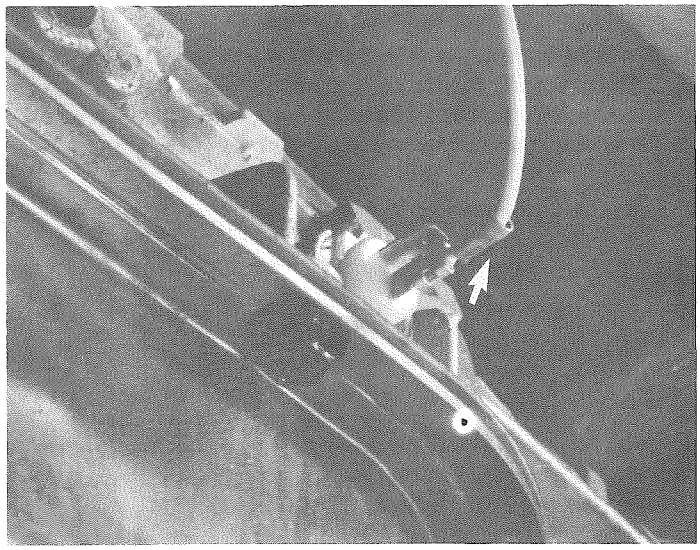


Figure 90 – THROTTLE KICK-DOWN SWITCH DISCONNECT – Remove the wire lead to the throttle kick-down switch, located at the lower left side of the transmission.

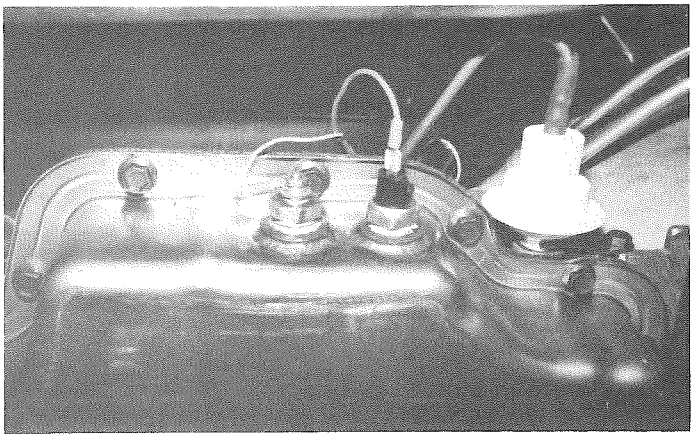


Figure 91 – VACUUM LINE DISCONNECT – Disconnect the vacuum line to the shift modulator.

TRANSMISSION TEMPERATURE SENSOR PROBES – Remove wires located at right side of the transmission oil pan. Mark lines for reinstallation.

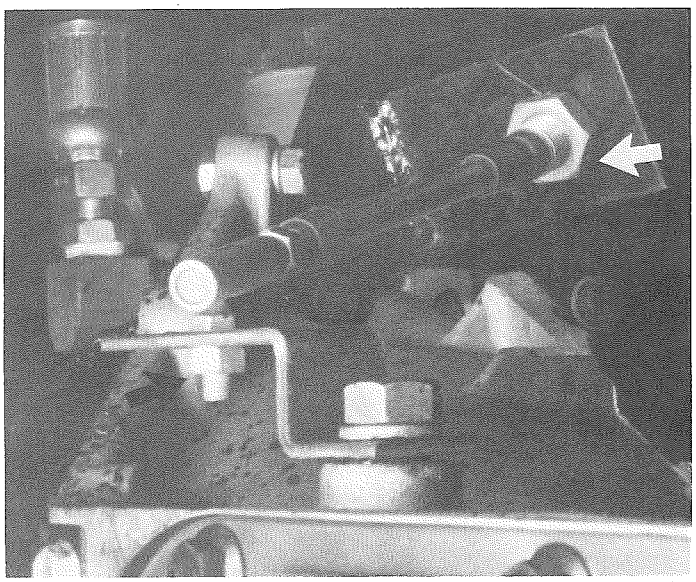


Figure 92 – SHIFT CABLE REMOVAL – Remove the transmssion shift cable by removing the nut from the stud at the shift lever. Also, remove the large nut at shift cable and bracket at the bellhousing.

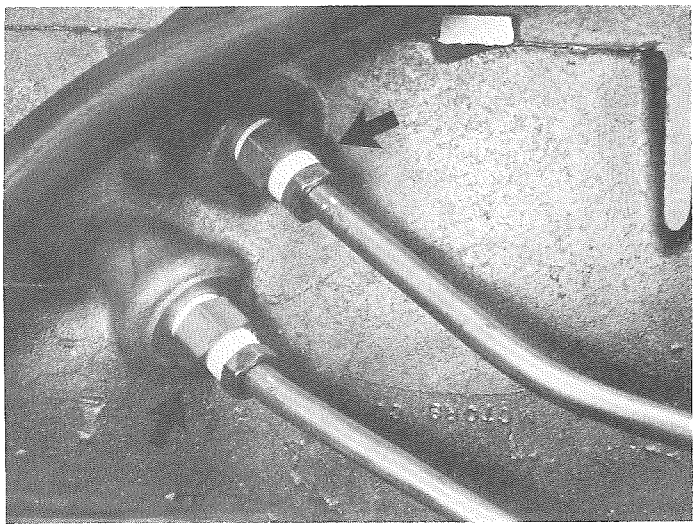


Figure 93 – TRANSMISSION COOLANT LINES DISCONNECT – Disconnect the transmission fluid coolant lines.

TRANSMISSION REMOVAL (Continued)

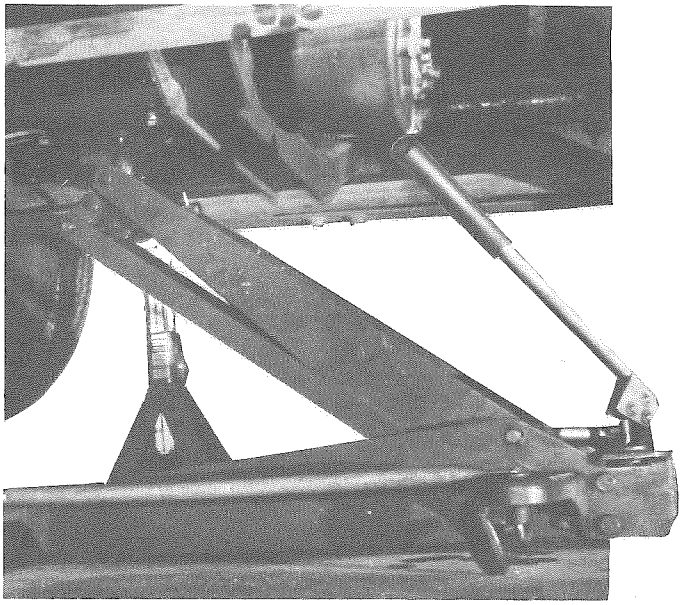


Figure 94 – TRANSMISSION JACK – With the transfer case removed (see page XX), remove the support bracket for the transfer case. NOTE: Be sure to support the transmission with a transmission jack before proceeding.

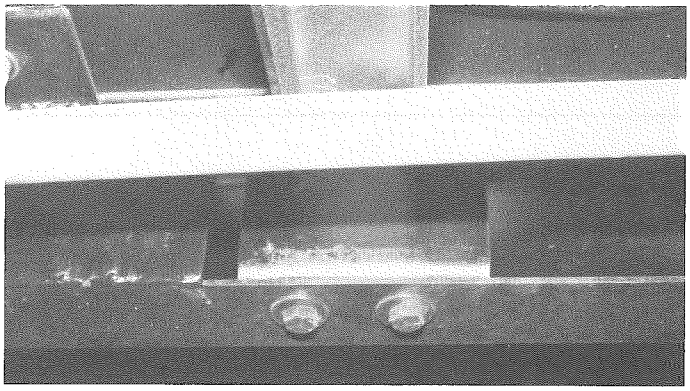


Figure 95 – No. 3 CROSSMEMBER – No. 3 crossmember is held securely with four (4) 1/2" diameter bolts located at each side on the frame rail. Two bolts are located at the plate facing outward toward center of the vehicle and two bolts are located underside of the frame rail. Remove these bolts and slide the crossmember toward the rear of the vehicle. For reinstallation, torque these bolts to 75-80 ft. lbs.

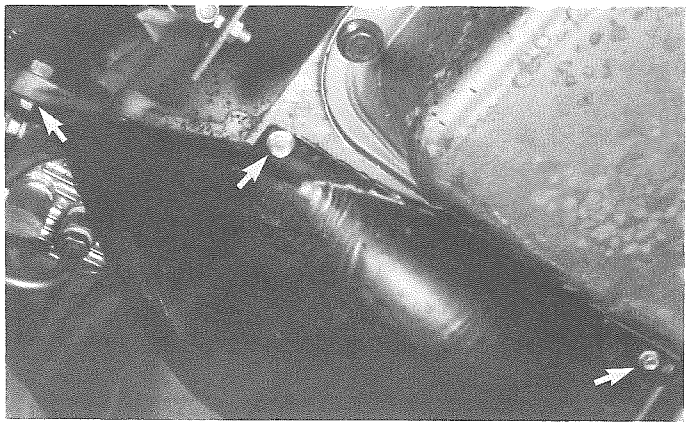


Figure 96 – DUST COVER REMOVAL – Remove three (3) 3/8" self-tapping screws and one (1) 3/8" bolt that secures the dust cover of the transmission.

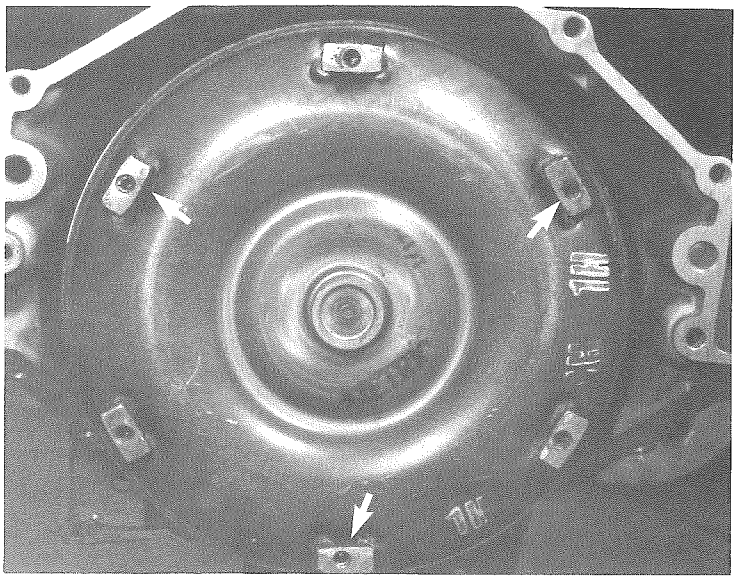


Figure 97 – TORQUE CONVERTER – With the dust cover removed, unbolt the six (6) 15mm bolts that secure the torque converter to the flywheel. (See figure 100.)

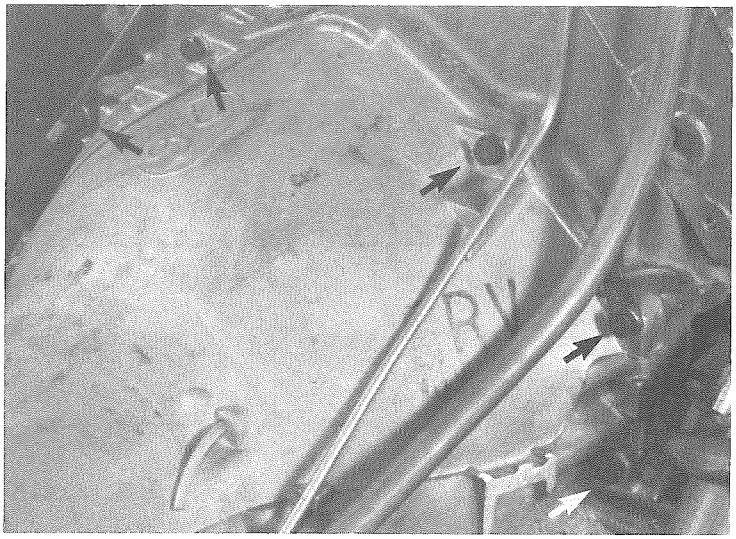


Figure 98 – BELLHOUSING – Remove the six (6) 9/16" head bolts about the bellhousing that secure the transmission to the engine.

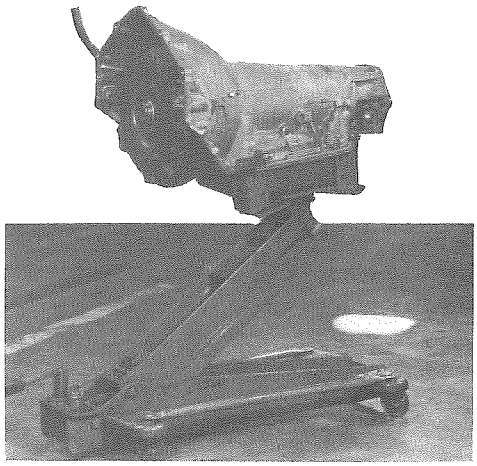
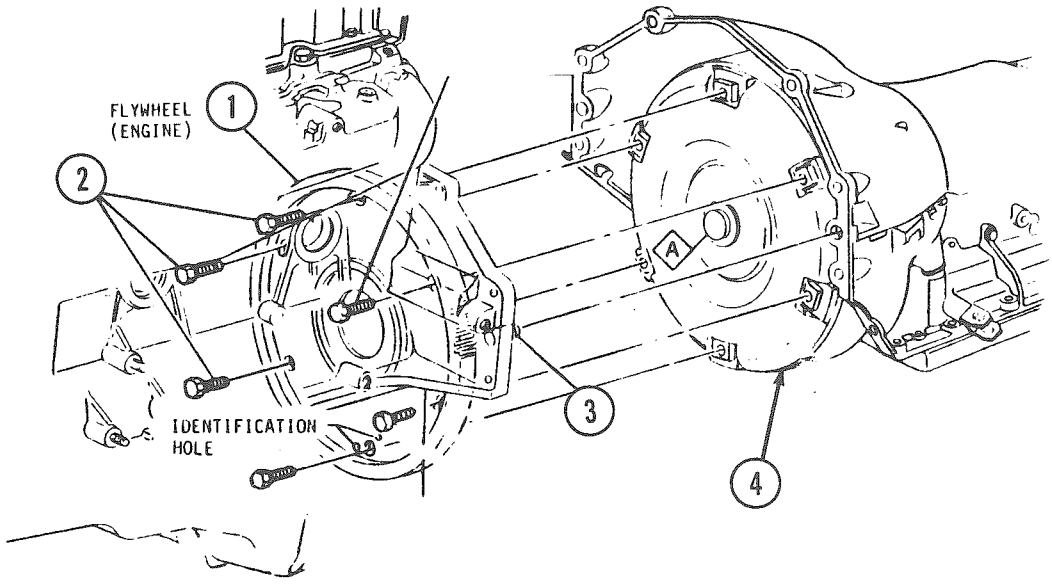


Figure 99 – LOWER TRANSMISSION – Carefully manuever the transmission with the torque converter rearward approximately 4". Lower transmission and torque converter.

TRANSMISSION REMOVAL (Continued)



1) Flywheel
2) Bolts (6 each)
3) Dowel (2 each)
4) Converter

Figure 100 – Torque Converter to Flywheel Installation

TRANSFER CASE REMOVAL

1. Remove drive line rear "U" bolts and swivel drive line away from transfer case output shaft.
2. Place a transmission jack under transmission and raise transmission, transfer case, and drive line to relieve strain on rear transfer case support plate bolts. Place a drain pan under transfer case; remove drain plug and drain fluid from case.
3. Remove two (2) upper bolts from transfer case first. (Figure 101.)
4. Remove the lower four (4) nuts from studs on rear of the transmission case. (Figure 103.)
   NOTE: It may be necessary to raise and lower transmission and case 1 1/2" to get better access in removing (and to install) nuts and bolts securing units.
5. Remove rear transmission and transfer case support plate, by removing two (2) bolts at the bottom of the plate. (See figure 104.)
6. Lower transfer case and transmission approximately 1 1/2" to clear the underside of coach floor during transfer case removal.
7. With two men working, slip transfer case off rear studs.

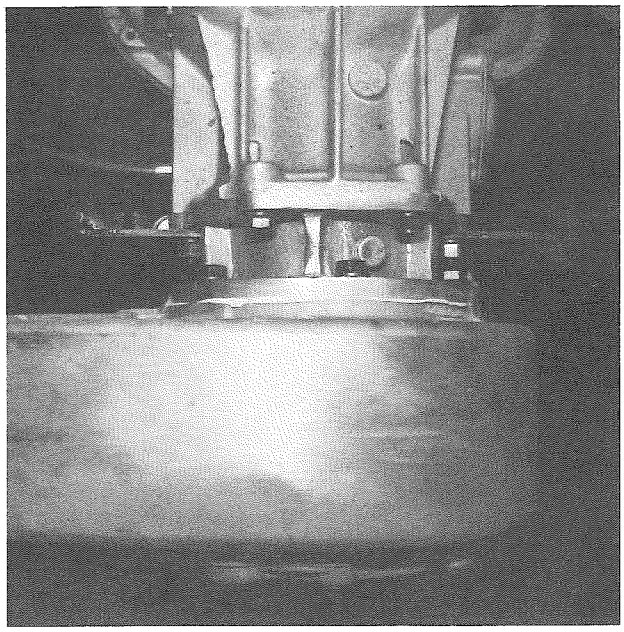


Figure 101 – Upper Transfer Case Bolts

TRANSFER CASE

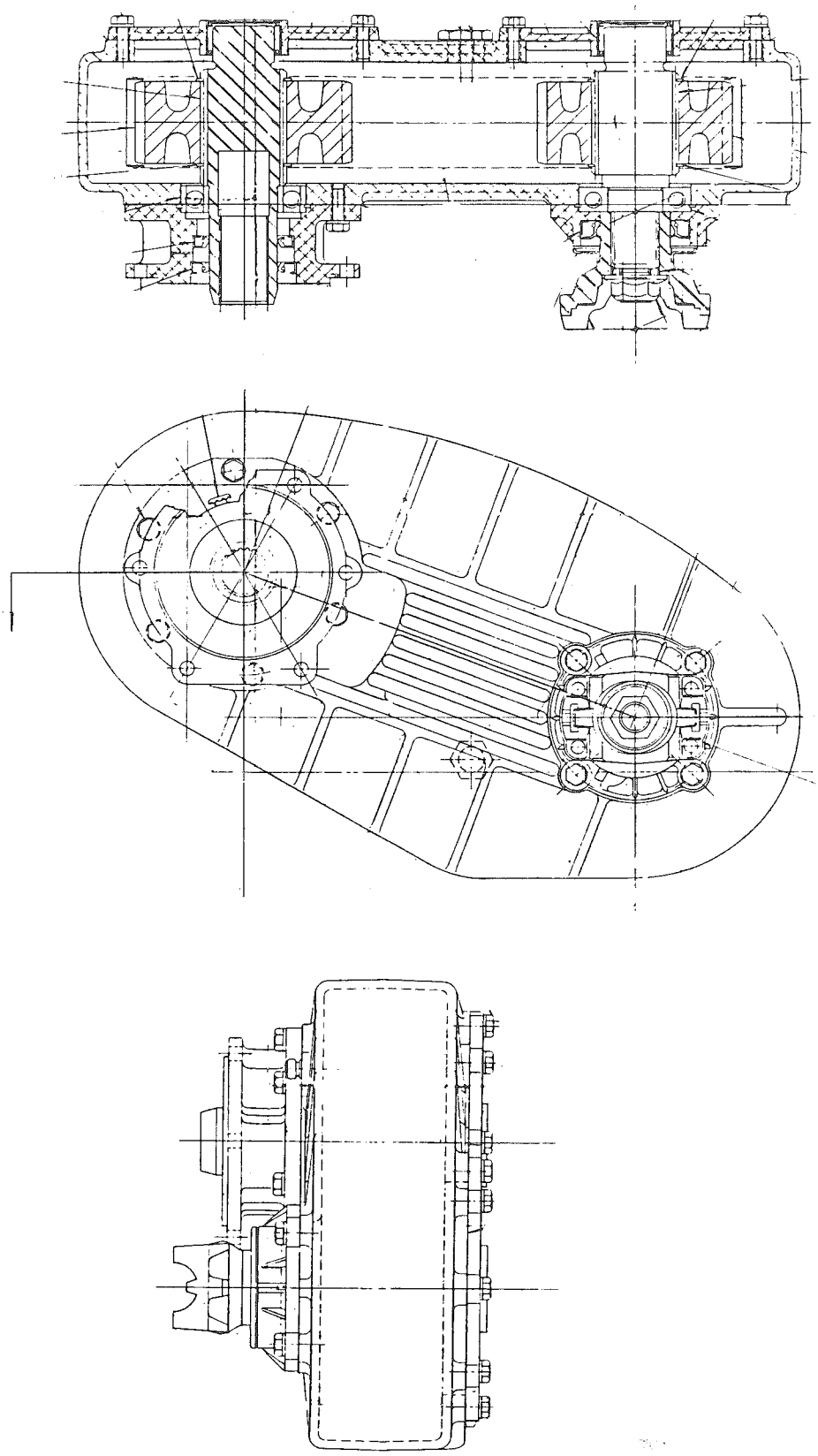


Figure 102 – Drive Train Transfer Case

TRANSFER CASE INSTALLATION

1. Before installing transfer case, inspect "O" ring seal and replace if damaged.
2. With the hydraulic jack still in place, carefully lift the transfer case into position on the rear transmission studs. Be sure that the bottom four (4) studs of the transmission protrude through the back of the transfer case about 3/16" or just enough to allow the support plate to be replaced.
   NOTE: Care must be taken to insure that the case is safely supported by a mechanic since the studs are just to position the case at this point.
3. After the transfer case support plate is placed, slide the transfer case forward as far as it will go and install the bottom four (4) nuts on the transmission studs. Finger tighten only.
4. Install upper two (2) bolts and nuts; then tighten bottom nuts.
5. Lower transfer case and transmission assembly, and install the two (2) lower rear transfer plate bolts. Be sure that the two (2) rubber bushings are in place.
6. Reinstall engine drive line and "U" bolts to the transfer case.
7. Install drain plug; remove filler plug and fill with Dextron II or equivalent automatic transmission fluid. Install filler plug.
8. Remove jack and check for leaks.

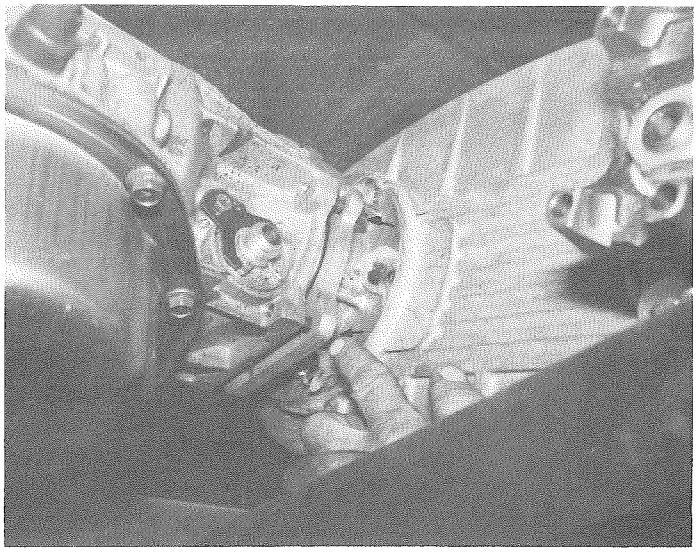


Figure 103 – Lower Transfer Case Bolts

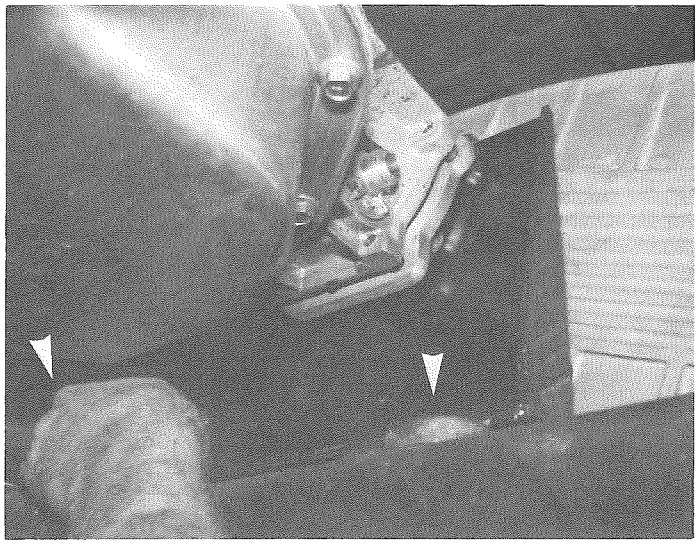


Figure 104 – Transfer Case Support Bolts

DIFFERENTIAL REMOVAL

For the differential removal, follow the steps shown in the illustrations beginning on the next page.

DIFFERENTIAL REMOVAL

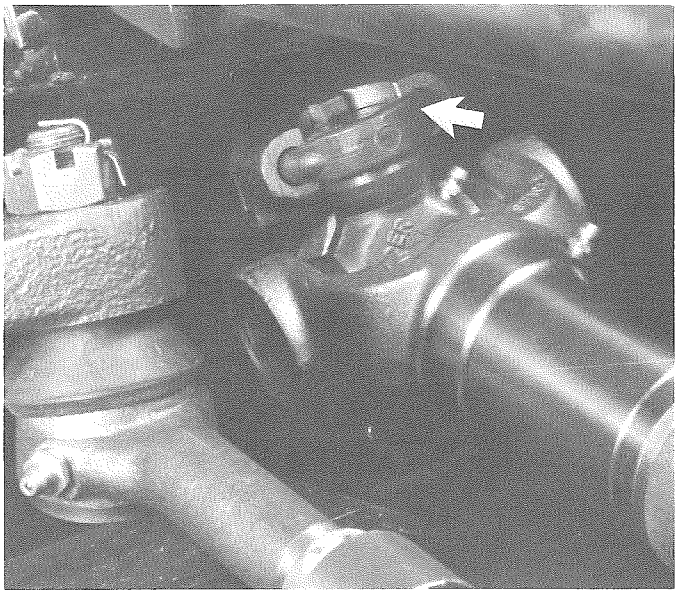


Figure 105 – AXLE SHAFT REMOVAL – Disconnect both axle shafts at the differential by removing four (4) nuts from the two (2) "U" bolts at each universal.

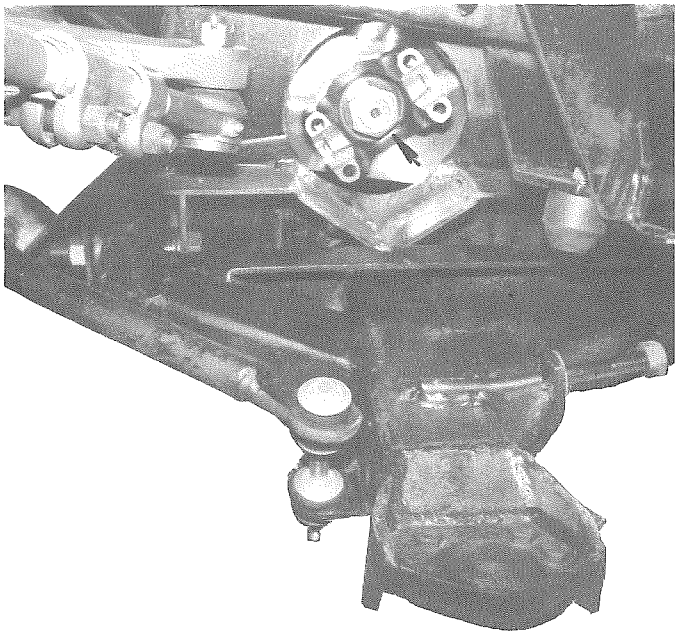


Figure 106 – INNER YOKE REMOVAL – Remove 1 11/16" retaining nut that secures the inner yoke. Remove the inner yoke by using a claw puller.

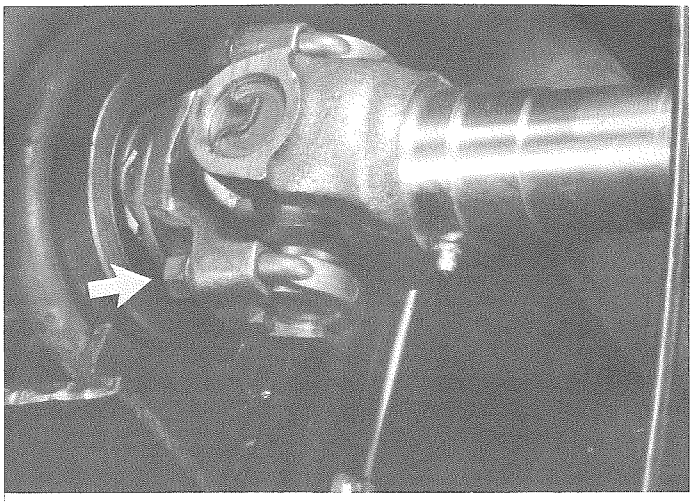


Figure 107 – DIFFERENTIAL UNIVERSAL DISCONNECT Remove the four (4) nuts to the two (2) "U" bolts at the main driveshaft universal at the differential. Slide the drive shaft toward the rear and to one side.

Figure 108 – FLOOR JACK – Place a hydraulic floor jack beneath the differential to take the pressure from the crossmember supporting the differential.

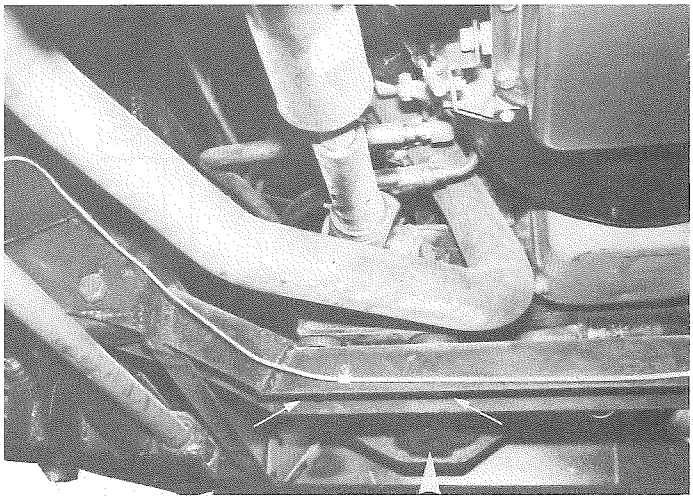


Figure 109 – "U" BOLT REMOVAL – Remove the large "U" bolt that secures the differential to the crossmember support.

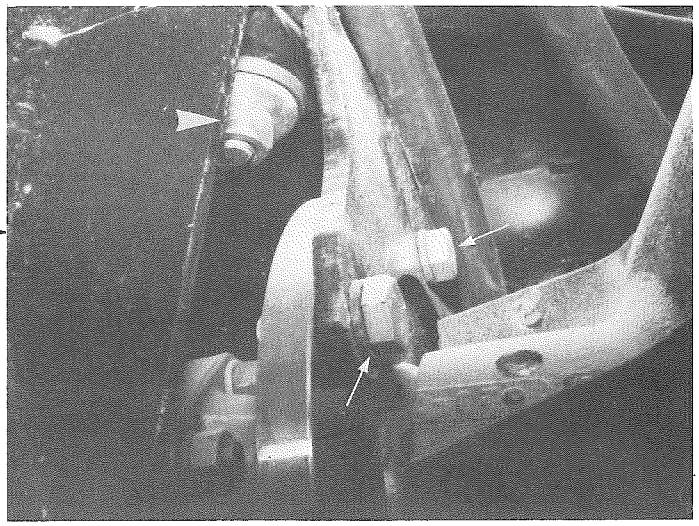


Figure 110 – SIDE MOUNTING BRACKETS – Remove the three (3) 1/2" diameter bolts that secure the differential to the side mounting brackets. The side mounting brackets are located inside the frame rails. Loosen the two (2) bolts topside of the support brackets for easier removal of the differential. Carefully lower and maneuver the differential away from the chassis.

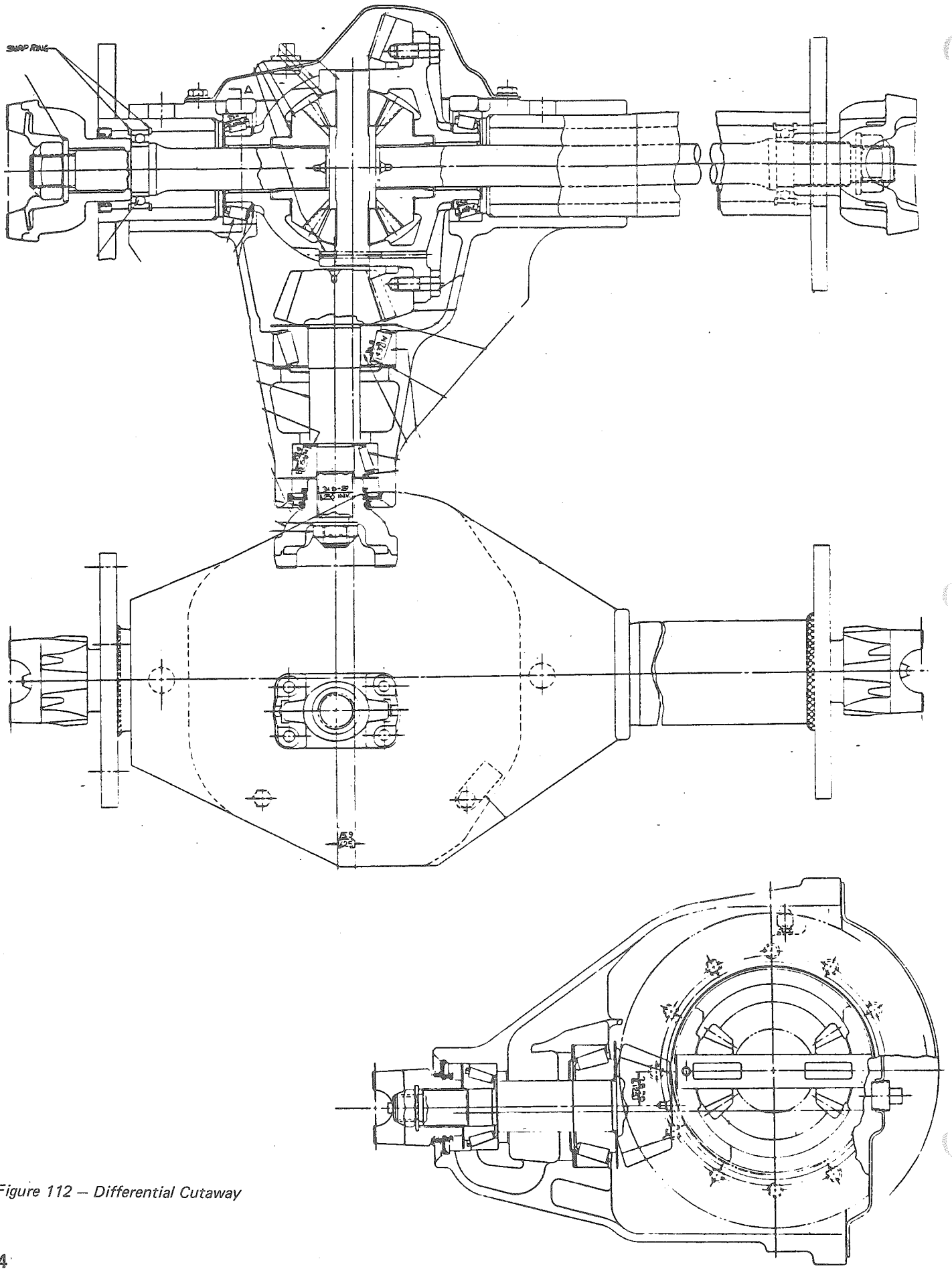


Figure 112 – Differential Cutaway

AXLE HALF-SHAFT

REVCON HALF-SHAFT SERVICE – These joints are precision built and should be treated and serviced with care. Freedom from grit and other harmful substances, as well as proper lubrication, is important. Use only a best grade, non-channeling lubricant, free from corrosive agents. Usually, in wheel applications, the same lubricant may be used in the joint as is used for the wheel bearings and is usually of a No. 1 or No. 2 consistency. It should be of a type which will cling to the surfaces and be of proper consistency for the climate in which it is to be used.

Half-Shaft Interchangeability of Parts – All joints up to and including the "OC" (1 1/4") series are furnished with either standard or oversized .009+ balls. All joints from and including the "OE" (1 1/2") series are furnished with either standard or oversize .012+ balls. All standard ground assemblies have interchangeable parts in like assemblies, and all oversize ground assemblies have interchangeable parts in like assemblies.

All oversize parts are electrially etched with either a .009+ or .012+ and can readily be identified. The etching can be found on the ground locating face of the outer race; on the ground face of the inner race, and on either ground face of the ball cage. The balls can be identified with micrometers.

Half-Shaft Recommended Greases –

Amoco	Rykon, EP #1
Mobil Oil Co.	Mobilplex, EP #1 or #2
Pure Oil Co.	POCO HT-EP #2
Shell Oil Co.	Alvania EP #1 or #2
Sun Oil Co.	Sunaplex 991 EP or Prestige 741 EP

HALF-SHAFT DISASSEMBLY –

1. Remove axle shaft. Several different shaft locking means are employed and specific instructions are available from Con-Vel engineering.
2. Tilt inner race to double angle of cage (see figure 114) until one ball can be removed. Roll inner race and cage into corresponding position for removal of adjacent ball. Proceed until all six balls are removed.
3. Position cage and inner race at right angles with outer race so that rectangular cage openings mesh with opposite teeth of outer race (see figure 115). Withdraw cage and inner race assembly.
4. Turn inner race within cage until one tooth projects through rectangular opening of cage (see figure 116). Roll inner race out of cage.

HALF-SHAFT REASSEMBLY –

1. Clean and lightly lubricate all parts.
2. Secure outer race in upright position with large opening facing upward.
3. Put inner race into cage by inserting one inner race tooth into rectangular opening of cage and roll inner race in place (see figure 116).
4. Insert cage and inner race into outer race. Position rectangular openings of cage to clear opposite teeth of outer race (figure 115). Lower cage with inner race into place and turn into position. Inner race must be positioned so stamped arrow on face is exposed as shown in figure 113.
5. Tilt inner race and cage so that one ball can be inserted through cage opening into groove (figure 114). Inner race should be inclined approximately twice the cage angle. Then roll all parts to corresponding position for adjacent ball, and so on until all balls are assembled. A slight amount of tapping with a soft object may be necessary during assembly, but do not use excessive force while inserting the balls, because it is possible to lock the joint after two or three balls are inserted, and some difficulty may be experienced in trying to insert the remaining balls.

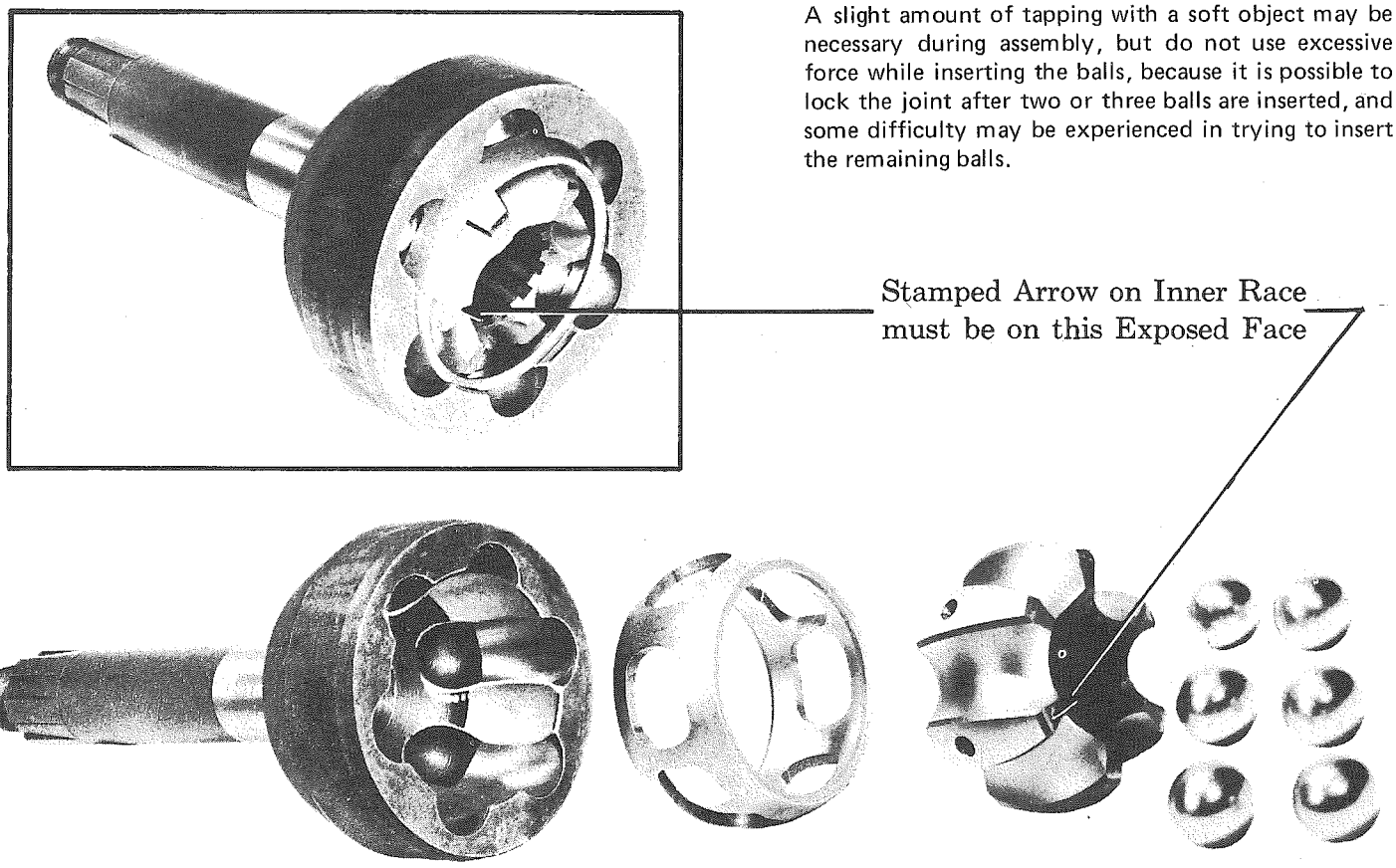


Figure 113 – Bell Joint Assembly (Half-Shaft Assembly)

AXLE HALF-SHAFT (Continued)

Figure 114 – Tilting inner race.

Figure 116 – Turning inner race within cage.

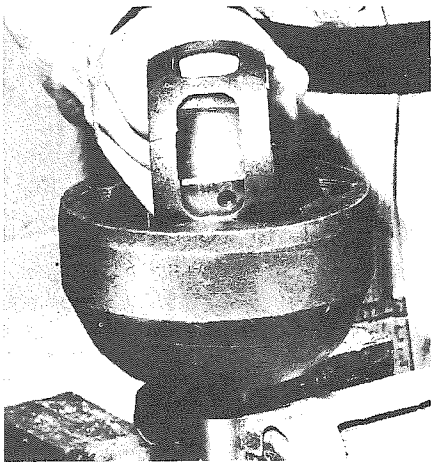


Figure 115 – Positioning cage and inner race.

6. Fill splined hole and cavity below splined hole with lubricant.
7. Inset splined shaft into inner race by placing shaft end into the inner race until the snap ring rests in the large chamfer. Centralize the snap ring with the fingers. Use a soft hammer and strike a sharp blow downward on the end of the shaft; the snap ring will collapse and slide through the splined hole to lock the shaft with the snap ring expanding against the inner chamfer of the spline. It is important that the snap ring be well centered before driving the shaft down. Other shaft locking means are employed. Specific instructions are available from Con-Vel engineering.
8. A locking tendency while swinging the shaft across center is usually present when the joint is not rotating. This may be disregarded and will not occur when the joint is rotating during operation.
9. Cover joint to guard against entry of foreign particles or grit.
10. When joint is installed in housing, fill housing to specified grease quantity, or level.

SUSPENSION SYSTEM

NOTE: Refer to numbered callouts on illustrations and photographs that correspond to assembly procedure following.

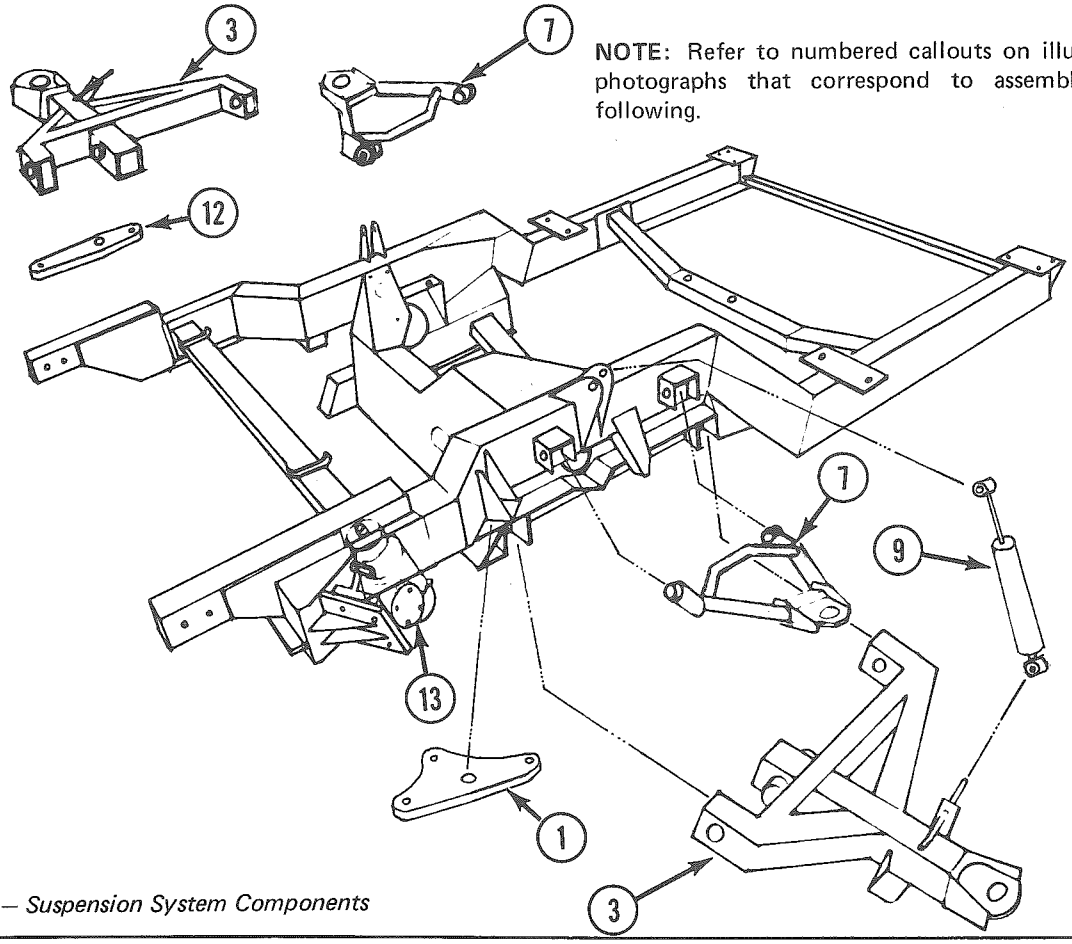


Figure 117 – Suspension System Components

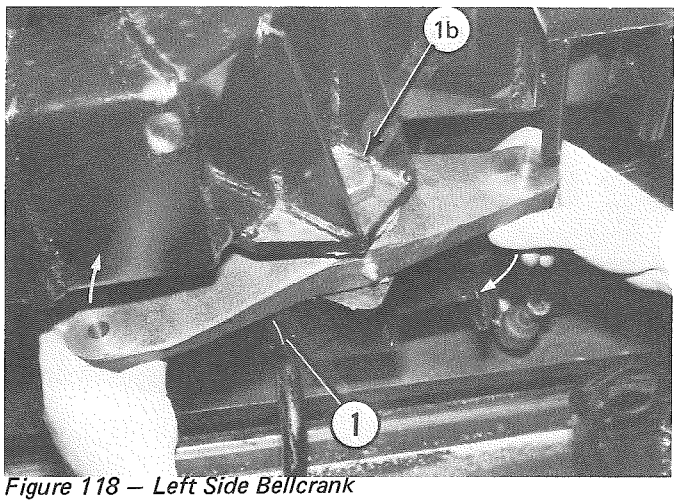


Figure 118 – Left Side Bellcrank

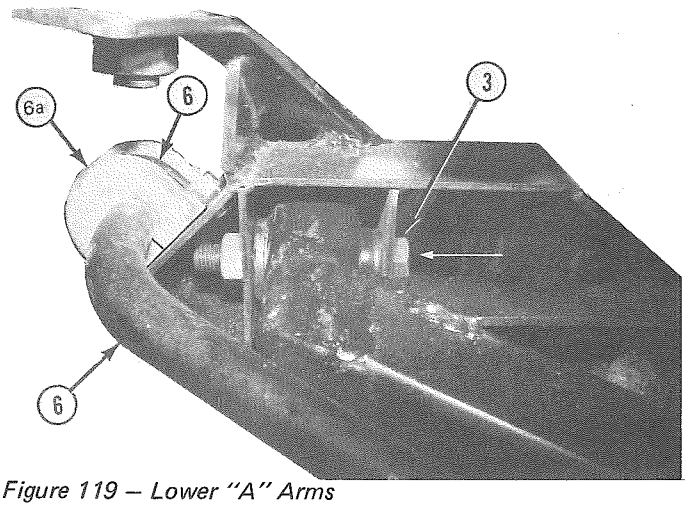


Figure 119 – Lower "A" Arms

1. **LEFT SIDE BELLCRANK:**
   NOTE: Be sure that stainless steel washers and Teflon lubricator disc are in place, except on later models which use a flanged bushing.*
   a. Slip bellcrank assembly between flange supports at right side of frame, being sure that short arm of the idler is to the rear of frame and the grease fitting is pointed out from the frame.
   b. Torque nut down to 100-150 ft. lbs. so as to allow arm to be moved with one hand firmly, with no up and down rocking movement (see figure 118).

2. **INSTALL RIGHT AND LEFT JOUNCE STOPS.**

3. **LOWER RIGHT AND LEFT "A" ARMS:**
   NOTE: Be sure torsion bar socket is open to the rear of the frame, since arms are NOT interchangeable.
   a. Install two (2) bolts and nuts from rear of arm.
   b. Torque bolts to 120-150 ft. lbs. so that there is metal-to-metal contact between bushing collars and frame flanges.
   c. Tighten bolts so that "A" arm remains in level position when work is complete in step 3b.

*Flanged 2-piece bushing is not interchangeable with early design.

SUSPENSION SYSTEM (Continued)

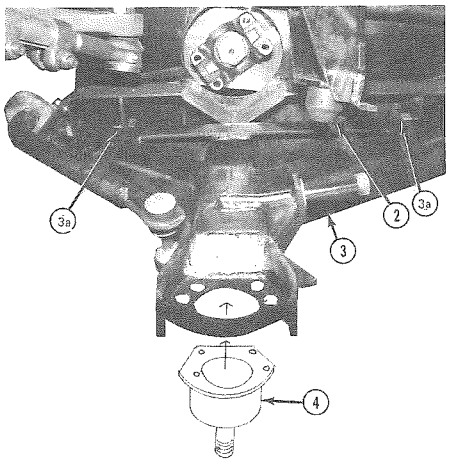


Figure 120 – Lower Ball Joint Installation

4. **LOWER BALL JOINTS INSTALLATION:**
   NOTE: Ball joint spindle to be pointed down, then raised into contact with "A" arm (see figure 120).
   a. Use four (4) binding locknut washers with nuts being installed from above.

5. **14" TIE ROD AT LEFT SIDE OF COACH:**
   a. Same as step 9, being sure to install to rear position of bellcrank.

6. **FRONT SWAY ARM INSTALLATION:**
   a. Cut rubber bushings on one side only to slip over sway arm at required location.
   b. Secure to frame with two (2) "U" clamps, using two (2) binding locknuts and bolts at both sides.

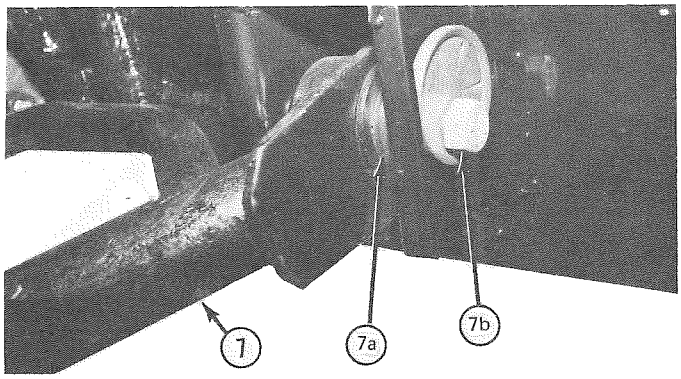


Figure 121 – Upper "A" Arm Installation

7. **UPPER "A"ARM INSTALLATION:**
   NOTE: Upper "A" arms are identical, left or right.
   a. Use mallet to tap upper arms into place, aligning bushing sleeves with frame bolt holes.
   b. Install camber bolts and washers with smooth side of washer always pointed to center of "A" arm on both sides (see figure 121).
   c. Torque bolts to 50 ft. lbs.

8. **UPPER BALL JOINT INSTALLATION:**
   a. Insert ball joint spindle from above "A" arm.
   b. Install ball joint flexible boot from below; then secure with four (4) binding locknuts.

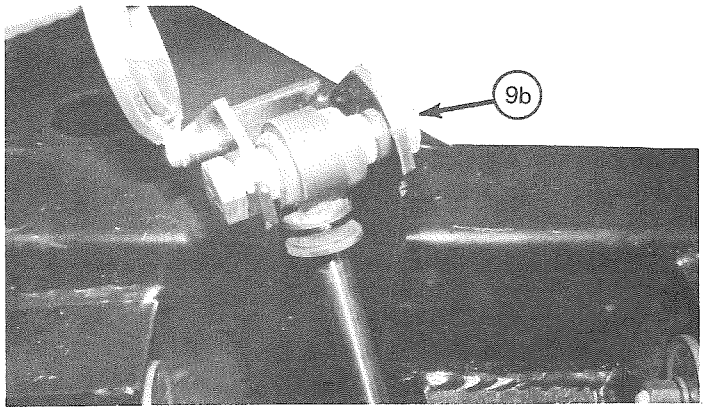


Figure 122 – Front Shock Installation

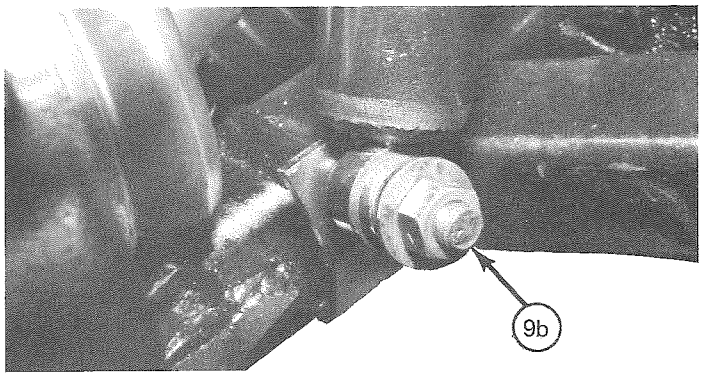


Figure 123 – Front Shock Locknut

9. **FRONT SHOCK INSTALLATION:**
   a. Extend shock arm to full extension being sure that while doing so the shock is vertical with the housing body down (so as to prevent shock fluid leakage).
   b. Install bolt and nut at top of shock (figure 122). Install nut only at bottom of welded stud on lower arm (fig.123).
   c. Torque locknuts to 60-75 ft. lbs.

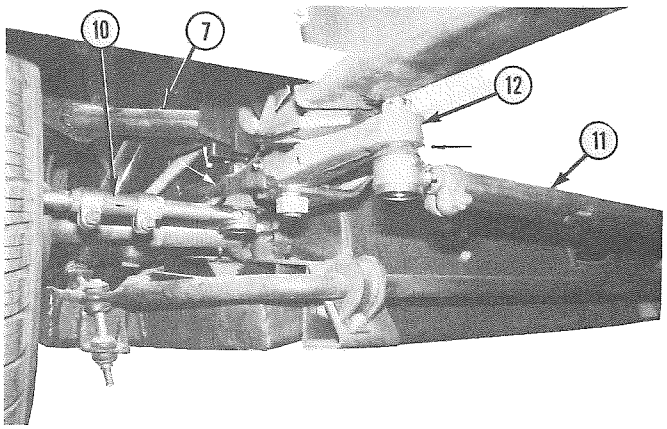


Figure 124 – Steering Linkage

10. **14" TIE-ROD AT RIGHT SIDE OF COACH:**
    a. Insert tie-rod into rear position of idler arm from below. **NOTE:** Center link is interchangeable side to side.
    b. Torque nut to 75 ft. lbs.

11. **48" CENTER LINK INSTALLATION:**
    a. Insert center link into front position of idler arm from below.
    b. Torque nut to 75 ft. lbs.

SUSPENSION SYSTEM (Continued)

12. **RIGHT SIDE IDLER ARM:**
    NOTE: Be sure that stainless steel washers and Teflon lubricator disc are in place (see figure 124), except on later models which use a flanged bushing.
    a. Slip idler assembly between flange supports at right side of frame, being sure that short arm of the idler is to rear of frame and the grease fitting is pointed out from the frame.
    b. Torque nut down to 100-150 ft. lbs. so as to allow arm to be moved with one hand firmly with no up and down movement (see figure 124).

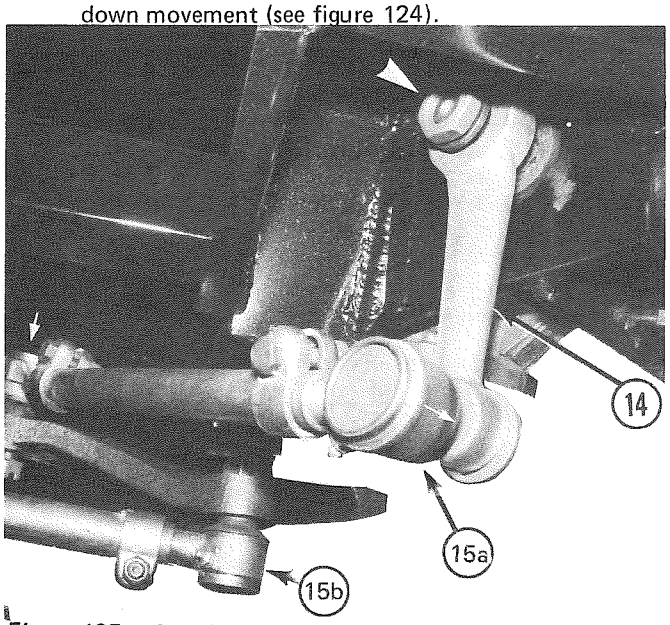


Figure 125 – Steering Gear Box

13. **STEERING GEAR BOX:** (See figure 125.)
    a. Install with four (4) bolts torqued down to 100 ft. lbs. each.
    NOTE: Steering spline shaft must be centered. This is done by first marking a spot on top of the housing and top spline.
    b. Next, rotate the top spline completely to the left (either direction will do).
    c. Now note total rotation of spline to the right about the marked spot and split the difference to center the top spline.

14. **PITMAN ARM:**
    a. Insert over spline shaft of steering gear box and torque nut to 150 ft. lbs.

15. **DRAG LINK:**
    a. Install drag link to lower pitman arm position.
    b. Install drag link to middle bellcrank position.

FRONT SUSPENSION ALIGNMENT RACK PROCEDURE

1. **RIDE HEIGHT (Front)** – The ride height is measured from the ground to the bottom of the frame alongside the bellcrank and idler position. The correct measurement is 17".

2. **CAMBER with 63 pounds tire pressure (Front)** – Set camber as follows:
   Left side – 0 to 1/4 degrees positive
   Right side – 0 to 1/4 degrees negative

3. **CASTER** – Set both sides at 4 1/2 degrees + (positive) to 5 degrees + . Check that a clearance exists between the frame and the control arm mounting bosses on the upper control arms.

4. **TOE IN-OUT** – After camber and caster is set, use the sighting device on the gauges to align the front wheels to the rear; then check that the bellcrank-to-idler cross link is the correct length of 42 3/4" center of joint to center of joint. Set the bellcrank and idler in the straight ahead position relative to the frame. Recheck that the front wheels are still in line to the rear and, by adjusting the tie-rods, set the toe to 1/8" total toe out (1/16" out each side). After the toe has been set, recheck the straight ahead position of the bellcrank and idler and front to rear alignment.

5. **EQUAL RIGHT AND LEFT TURN ANGLES** – By adjusting the drag link that connects the steering gear Pitman Arm to the bellcrank, it is possible to adjust the amount of left and right lock.
   a. Turn the steering wheel to full left lock. Read the angle on the circular plate under the left wheel. It should be approximately 31 degrees.
   b. Turn the steering wheel to full right lock and read the angle of the circular plate under the right wheel, it should be the same as the left, (approximately 31 degrees).
   c. If the steering lock angles do not match, adjust the drag link length and repeat the lock angle measurement until both sides are turning the same amount.

6. **TIE-ROD CLAMPS** – Tighten all tie rod clamps and ball joint nuts.
   NOTE: Check that all clamps are oriented correctly and that there is no interference between any steering link clamp and the frame or steering components. Also, check that all cotter pins are installed correctly.

7. **BALL JOINTS** – Grease all ball joints.

8. **STEERING** – With the steering on left lock– then right lock – then straight –, grease the bellcrank and idler bushings.

9. **BELLCRANKS AND IDLERS** – Check that bellcranks and idlers have plastic bearings, not brass, in center pivots. Tighten bellcrank and idler mounting bolts to 150 ft. lbs. torque.

10. **LUG NUTS** – Tighten lug nuts to 140-180 ft. lbs.

11. **TIRE INFLATION** – With Michelin radial tires, the correct front tire pressure is 63 psi. The correct rear tire pressure is 57 psi.

12. **STEERING WHEEL POSITION** – After setting alignment with wheels set straight ahead, check steering wheel

SUSPENSION SYSTEM (Continued)

position. If the wheel is not straight, it can only be straightened by removing the steering shaft from between the column and wheel. Straighten steering wheel with wheels straight ahead. Replace steering shaft on steering gear. Do **NOT** adjust the drag link.

13. **JOUNCE STOP** – Check that the rubber jounce snubber is installed and tight. Then check that there is sufficient jounce clearance between the flange on the metal jounce bracket and the control arm. With the ride height set at 17", the shortest distance from the metal flange on the jounce stop to the lower control arm where it would make contact after the snubber has compressed, should be 1".

14. **LEAKS** – Before removing the vehicle from the alignment pit, check it for oil and water leaks. Check all hose ends and connections and check all drain plugs for looseness.

NOTE: Never adjust torsion bars to change ride height unless the vehicle is jacked up and the suspension is hanging down in full rebound position.

SUSPENSION DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
Vehicle leans to one side.	1. Incorrect tire pressure. 2. Improper tire/wheel usage. 3. Vehicle overloaded or unevenly loaded. 4. Loose, worn or damaged front or rear suspension components. 5. Improper spring usage or improperly installed and seated. 6. U-bolt loose at rear axle.	1. Assure uniform tire pressure for all six tires. 2. Install correct tire/wheel combination. 3. Correct as required. 4. Visually inspect suspension systems. Repair or replace as required. 5. Correct as required. 6. Jounce vehicle. Tighten U-bolts to specs. Recheck height.
Front bottoming or riding low.	1. Incorrect tire pressure. 2. Improper tire/wheel usage. 3. Vehicle overloaded or unevenly loaded. 4. Broken or incorrectly installed torsion bar adjusting cams. 5. Loose or broken shock absorbers. 6. Distorted or split jounce bumper. 7. Improper ride height.	1. Correct as required. 2. Install correct tire/wheel combination. 3. Correct as required. 4. Repair or replace as necessary. 5. Tighten or replace as necessary. 6. Correct as required. 7. Measure vertical distance between ground and bottom of front frame next to bell-crank and idler arms. If height is below ride heights, adjust torsion bars to correct.
Dog tracking of rear wheels	1. Loose or damaged front or rear suspension components. 2. Loose rear spring U-bolts. 3. Rear springs improperly installed on axle. 4. Rear spring center bolt bent.	1. Inspect, repair or replace as required. 2. Tighten to specification. 3. Repair as required. 4. Replace center bolt.
Shimmy or wheel tramp	1. Tire pressure. 2. Excessive tire sidewall deflection. 3. Irregular tire wear or tire sizes not uniform. 4. Loose wheel lug nuts. 5. Wheel bearing adjustment. 6. Out-of-round wheels. 7. Out-of-round tires. 8. Wheel and tire lateral runout not to specifications. 9. Wheel and tire balance. 10. Front wheel alignment (toe-in caster). 11. Deteriorated "A" arm bushing. 12. Loose or damaged shock absorbers. 13. Loose, worn or damaged steering linkage and idler arm connections. 14. Broken or sagging springs. 15. Loose steering gear mounting. 16. Incorrect steering gear adjustment. 17. Worn ball joints.	1. Adjust air pressure in tires. 2. Inspect, adjust air pressure and replace as necessary. 3. Check front wheel alignment, adjust and replace with same size tires. 4. Tighten to specifications. 5. Adjust to specifications. 6. Replace as required. 7. Replace as required. 8. Follow tire and wheel runout check 9. Balance wheels and tires. 10. Set toe to specifications. Set caster to specifications. 11. Replace. 12. Tighten and replace as necessary. 13. Tighten or replace as necessary. 14. Replace as required. 15. Tighten to specifications. 16. Adjust to specifications. 17. Replace ball joints.

SUSPENSION SYSTEM (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
Sway or roll	1. Unequal load distribution (side-to-side). 2. Excessive load or body height. 3. Tire pressure. 4. Loose wheel lug nuts. 5. Worn or loose stabilizer assembly. 6. Loose or defective shock absorbers. 7. Broken or sagging spring. 8. Steering gear adjustment. 9. Loose steering gear mounting. 10. Excessive front or rear overhang. 11. Broken tie bolts on rear spring.	1. Correct as necessary. 2. Correct as necessary. 3. Adjust air pressure in tires. 4. Tighten to specifications. 5. Tighten or replace as required. 6. Tighten or replace as required. 7. Replace as required. 8. Adjust to specifications. 9. Tighten to specifications. 10. Correct as necessary. 11. Replace as required.

STEERING DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
Power steering pump leaks.	1. Fluid, cap and dipstick 2. Loose or damaged hose connections. 3. Leakage between reservoir and housing. 4. Leakage at pump shaft seal area.	1. Check for indications of false leakage — overfilled reservoir, improperly installed, damaged or lost cap or dipstick. 2. Repair or replace as required. 3. Repair or replace as required. 4. Replace shaft seal or pump.
Noise in steering column. Squeak or creak Clunk	1. Steering column cover interference. 2. Steering column out of alignment. 3. Lack of lubrication where horn brush contacts rub plate of steering wheel. 4. Loose steering column mounting bolts. 5. Spline coupling bottoming. 6. Loose coupling to steering column bolt. 7. Improper steering gear mesh load.	1. Adjust or reposition as required. 2. Align or adjust as required. 3. Lube or adjust as required. 4. Tighten to specification. 5. Align or adjust as required. 6. Tighten to specification. 7. Readjust to specification.
Steering wheel off-center.	1. Improperly installed steering wheel. 2. Incorrect toe setting. 3. Misalignment of intermediate shaft to coupling.	1. Readjust steering wheel relative to column. 2. Set to specification. 3. Align as required.
Excessive Steering Effort	1. Improper oversized tires. 2. Tires not uniform. 3. Tire pressure. 4. Misaligned flexible coupling (if so equipped) to gear interference. 5. Steering wheel to column interference. 6. Steering column alignment. 7. Steering linkage or front axle ball joints for a binding condition or lack of lubrication. 8. Bind in bellcrank or idler arm. 9. Steering gear adjustment. 10. Power steering pump belt loose, glazed or broken. 11. Power steering pump fluid level and possible leak in system. 12. Power steering pump pressure and flow below specification. 13. Air in power steering system. 14. Contaminated fluid, incorrect fluid. 15. Steering gear valve binding or out of adjustment. (Integral Power Steering) 16. Excessive internal integral gear leakage. 17. Obstruction within steering gear or lines (including bent or kinked steel tubing).	1. Install correct tire and wheel combination. 2. Install correct tire and wheel combination. 3. Adjust air pressure in tires. 4. Align or adjust as required. 5. Align or adjust as required. 6. Align or adjust as required. 7. Lube, inspect, adjust or replace as required. 8. Lube, inspect, adjust or replace as required. 9. Adjust to specification. 10. Inspect, adjust belt tension or replace as required. 11. Add fluid, tighten connections and correct as necessary. 12. Conduct pump flow and relief pressure tests and adjust or repair as necessary. 13. Add fluid, tighten connections and bleed system. 14. Replace with correctly specified fluid. 15. Inspect, adjust. 16. Inspect, repair or replace as required. 17. Inspect, remove obstruction(s), and repair or replace as required.
Wanders Side to Side —	1. Vehicle overloaded or unevenly loaded. Alignment incorrect.	1. Correct as required.

WHEELS AND TIRES

NOTE: The Wheel bolt and nut fasteners are an important attaching part in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.

GENERAL DESCRIPTION – The factory installed tires and wheels are designed to operate satisfactorily with loads up to and including the full rated load capacity when inflated to the recommended inflation pressures.

Correct tire pressures and driving techniques have an important influence on tire life. Heavy cornering, excessively rapid acceleration, and unnecessary sharp braking increase tire wear.

REPLACEMENT TIRES

CAUTION: Do not mix different types of tires on the same vehicle such as radial, bias, and bias-belted tires except in emergencies, because vehicle handling may be seriously affected and may result in loss of control.

Some truck-type tires and most passenger-car-type radial tires have a TPC Spec. No. (Tire Performance Criteria Specification Number) molded into the tire sidewall near the tire size marking. This shows that the tire meets rigid size and performance standards which were developed for the vehicle. The TPC Spec. No. assures a proper combination of endurance, load capacity, handling, and traction on wet, dry and snow covered surfaces. When replacing tires with tires having the same TPC Spec. No., tires will be compatible with the vehicle. When replacing tires with those not having a TPC Spec. No. use the same size, load range, and construction type (bias, bias-belted, or radial) as the original tires on the vehicle.

Use of any other size or type tire may affect load carrying capacity, ride, handling, speedometer/odometer calibration, vehicle ground clearance, and tire clearance to the body and chassis. If replacing only a single tire, it should be paired on the same axle with the least worn tire of the others.

All tires on four-wheel drive vehicles must be of equal size (but not necessarily the same ply rating) and have the same tread configuration.

Replace tires when:

1. Tires are worn to a point where 2/32 inch (1.6 millimeters) or less tread remains, or the cord or fabric is exposed. To help detect this, tires have built-in tread wear indicators (figure 127) that appear between the tread grooves when tread depth is 2/32 inch (1.6mm) or less. When the indicators appear in two or more adjacent grooves at three spots around the tire, the tire should be replaced.
2. Tire thread or sidewall is cracked, or snagged deep enough to expose the cord or fabric.
3. Tire has a bump, bulge, or split.
4. Tire sustains a puncture, cut, or any other injury that cannot be correctly repaired because of the size or location of the injury.

METRIC TIRES – Metric tires are available in two load ranges: Standard load and Extra load. Figure 126 shows the meaning of the metric tire format. Most metric tire sizes do not have the exact corresponding alpha tire sizes. For example, a P205/75R15 is not exactly equal in size and load carrying capacity to an FR 78-15. For this reason, replacement tires should be of the same size, load range, and construction as those originally on the car. If metric tires must be replaced with other sizes, such as in the case of snow tires, a tire dealer should be consulted. Tire companies can best recommend the closest match of alpha to metric sizes within their own tire lines.

The metric term for tire inflation pressure is the Kilopascal (kPa). Tire pressure will usually be printed in both kPa and psi. Metric tire gauges are available from tool suppliers. The chart (figure 127) converts commonly-used inflation pressures from kPa to psi.

REPLACEMENT WHEELS – Wheels must be replaced if they become damaged (for example: bent, heavily rusted, leak air) or if wheel nuts often become loose. Do not use bent wheels which have been straightened, and do not use inner tubes in leaking wheels which are designed for tubeless tires. Such wheels may have structural damage and could fail without warning.

The wheels originally equipped on the vehicle will provide optimum life up to the maximum load and inflation pressures

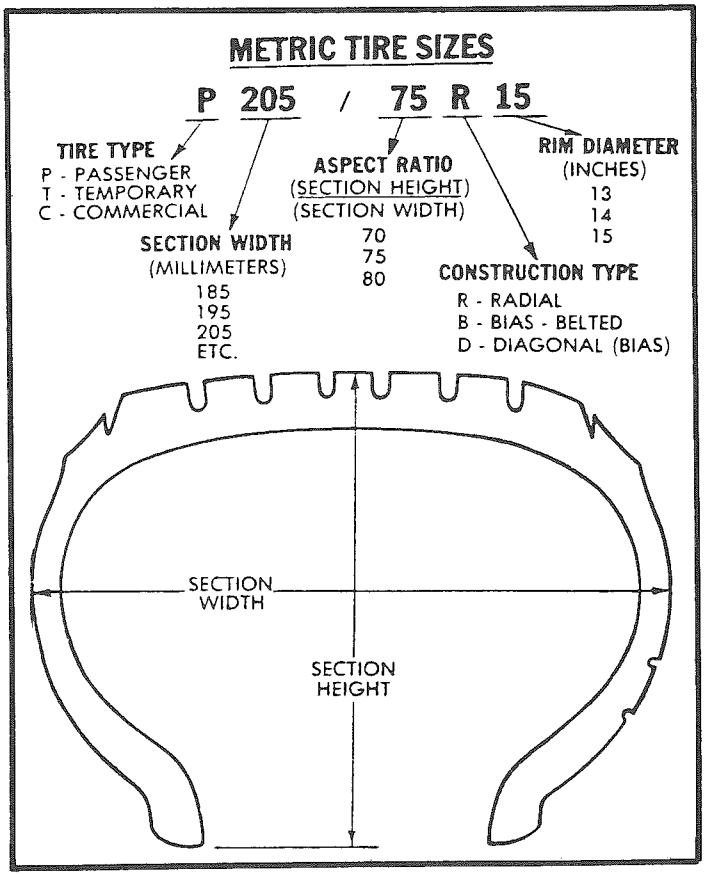


Figure 127 – Metric Tire Size Formula

WHEELS AND TIRES (Continued)

shown in the Wheel Code and Limits Chart. Maximum loads, maximum inflation pressures, wheel identification codes, and wheel sizes, are stamped on each wheel. Service tested and approved wheels are available from service. When obtaining wheels for any reason from any other source, the replacement wheels should be equal in load capacity, inflation pressure capacity, diameter, width, offset, and mounting configurations to those originally installed on the vehicle.

A wheel of the wrong size or type may adversely affect load carrying capacity, wheel and bearing life, brake cooling, speedometer/odometer calibration, stopping ability, headlight aim, bumper height, vehicle ground clearance, and tire clearance to the body and chassis. Replacement with "used" wheels is not advised: they may have been subjected to harsh treatment or very high mileage and could fail without warning.

The use of wheels and/or tires with higher load carrying limits than originally equipped on the vehicle does not in itself increase the GAWR or the GVWR of the vehicle.

REVCON RIM AND TIRE SIZES:

FRONT-RIM – 8.25 x 16.5 with 10R x 16.5 tire
GAWR – 5000 lbs.

REAR-RIM – 8.25 x 16.5 with 10R x 16.5 tire

GAWR per axle: 5000 lbs. all models

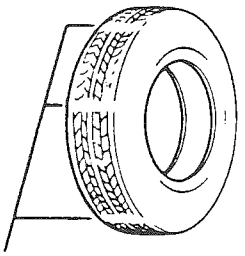
NOTE: REVCON wheel has a 2.71 inch offset. (1979 models and newer)

INFLATION PRESSURE CONVERSION CHART
(KILOPASCALS TO PSI)

kPa	psi	kPa	psi
140	20	215	31
145	21	220	32
155	22	230	33
160	23	235	34
165	24	240	35
170	25	250	36
180	26	275	40
185	27	310	45
190	28	345	50
200	29	380	55
205	30	415	60

Conversion: 6.9 kPa = 1 psi

Figure 126 – Inflation Pressure Conversion



TREAD WEAR INDICATORS

Figure 127 – Tread Wear Indicators

TIRE SERVICE OPERATIONS –

CAUTION: Servicing of tires mounted on multi-piece rims requires proper tools, safety equipment and specialized training. Severe injuries can result from improper servicing techniques.

TIRE INSPECTION AND ROTATION – Front and rear tires perform different jobs and can wear differently depending on the type of roads driven, individual driving habits, etc. To obtain maximum tire life, tires should be inspected and rotated regularly .

For the longest tire life, any time irregular wear is noticed, the tires should be inspected and rotated and the cause of the uneven wear corrected. Be certain to check wheel nut tightness and to adjust the tire pressures, front and rear, after rotation to agree with those recommended in the tire inflation charts.

TIRE INFLATION PRESSURE – Improper tire inflation pressures for the load the vehicle is carrying can adversely affect tire life and vehicle performance. The cold inflation pressures for the factory installed tires are given in the alignment specifications and also on the manufacturer's plate in the REVCON.

Too low an air pressure can result in tire overloading, abnormal tire wear, adverse vehicle handling, and reduced fuel economy. The tire flexes more and can build up excessive heat, which weakens the tire and increases susceptibility to damage from road hazards. Lower inflation pressures should be used only with reduced vehicle loads and the rear tire pressure may be equal to or less than the front pressure on single wheel application. After determining the load on each tire by weighing the vehicle on a scale, the correct cold inflation pressures for the actual tire loads can be obtained from the Tire/Wheel Load and Inflation Pressure Charts shown in this section.

CORRECTING IRREGULAR TIRE WEAR

Heel and Toe Wear – This is a saw-toothed effect where one end of each tread block is worn more than the other. The end that wears is the one that first grips the road when the brakes are applied.

Heel and toe wear is less noticeable on front tires than on rear tires, because the propelling action of the front wheels creates a force which tends to wear the opposite end of the tread blocks.

WHEELS AND TIRES (Continued)

The two forces, propelling and braking, make for even wear of the front tires, whereas only the braking forces act on the rear wheels, and the saw-tooth effect is more noticeable.

A certain amount of heel and toe wear is normal. Excessive wear is usually due to high speed driving and excessive use of brakes. The best remedy, in addition to cautioning the owner on his driving habits, is to interchange tires regularly.

Side Wear – This may be caused by incorrect wheel camber, underinflation, high cambered roads or by taking corners at too high a rate of speed. The first two causes are the most common. Camber wear can be readily identified because it occurs only on one side of the treads, whereas underinflation causes wear on both sides. Camber wear requires correction of the camber first and then interchanging the tires. There is, of course, no correction for high cambered roads. Cornering wear is discussed further on.

Misalignment Wear – This is wear due to excessive toe-in or toe-out. In either case, tires will revolve with a side motion and scrape the tread rubber off. If misalignment is severe, the rubber will be scraped off of both tires; if slight, only one will be affected. The scraping action against the face of the tire causes a small feather edge of rubber to appear on one side of the tread and this feather edge is certain indication of misalignment. The remedy is readjusting toe-in, or rechecking the entire front end alignment if necessary.

Uneven Wear – Uneven or spotty wear is due to such irregularities as unequal caster or camber, bent front suspension parts, out-of-balance wheels, brake drums out of round, brakes out of adjustment or other mechanical conditions. The remedy in each case consists of locating the mechanical defect and correcting it.

Cornering Wear – When a motorhome makes an extremely fast turn, the weight is shifted from an even loading on all wheels to an abnormal load on the tires on the outside of the curve and a very light load on the inside tires, due to centrifugal force. This unequal loading may have unfavorable results.

The transfer of weight may also overload the outside tires so much that they are laterally distorted resulting in excessive wear on the outside half of the tire, producing a type of wear like that caused by excessive positive camber.

Cornering wear can be most easily distinguished from abnormal camber wear by the rounding of the outside shoulder or edge of the tire and by the roughening of the tread surface which denotes abrasion.

Cornering wear often produces a fin or raised portion along the inside edge of each row in the tread pattern. In some cases this fin is almost as pronounced as a toe-in fin, and in others, it tapers into a row of tread blocks to such an extent that the tire has a definite "step wear" appearance.

The only remedy for cornering wear is the proper instruction of operators. Driving more slowly on curves and turns will avoid grinding rubber off tires. To offset normal cornering wear as much as possible, tires should be interchanged at regular intervals.

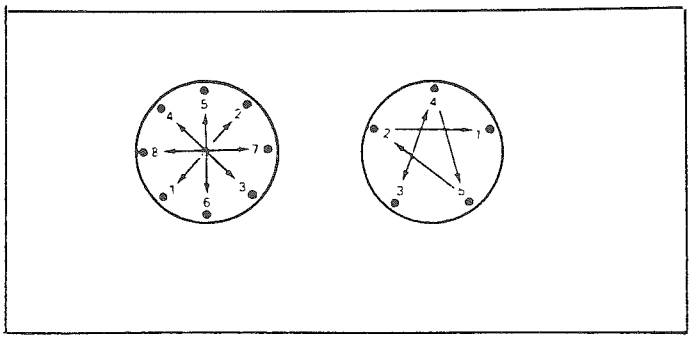


Figure 128 – Wheel Nut Tightening Sequence

Wheel and Tire Balancing – It is desirable from the standpoints of tire wear and vehicle ride and handling ease, to maintain proper balance of wheel and tire assemblies on all models. This may be accomplished by either of the two types of balancing systems in current use which balance wheels either on the vehicle or off.

> **NOTE:** The "on the vehicle" type, however, is the more desirable in that all rolling components (brake drums, bearings, seals, etc.) are included in the balancing procedure and thereby have any existing unbalance corrected.

Wheel Balance Weights – Wheel balance weights should be installed on both inner and outer flanges of each wheel.

Dynamic Balance – Dynamic balance (sometimes called running balance) means that the wheel must be in static balance, and also run smoothly at all speeds.

To insure successful, accurate balancing, the following precautions must be observed:

Wheel and tire must be clean and free from all foreign matter.

The tires should be in good condition and properly mounted with the balance mark on the tire, if any, lined up with the valve.

Bent wheels that have runout over 1/16" should be replaced.

Inspect tire and wheel assembly to determine if an eccentric or out-of-round condition exists. Note that this condition, if severe, cannot be "balanced out." An assembly which has an out-of-round condition exceeding 3/16" on tire sizes through 16.5" is not suitable for use on the front of the vehicle. Its use on the rear should be governed by its general condition and whether the roundness defect seriously detracts from overall ride quality.

When balancing wheels and tires, it is recommended that the instructions covering the operation of the wheel balancer being used be closely followed.

On-the-motor-home type balancing is to be used for the best results.

WHEELS AND TIRES (Continued)

FRONT WHEEL ASSEMBLY BALANCING PROCEDURE – The front wheel/tire assembly should be balanced as a unit. This is due to the many major components that make up the front-drive-wheel assembly, anyone of which can cause front-end vibration. For this reason, REVCON uses the following method to spin balance their coaches:

NOTE: The rear tires must be spin balanced on the vehicle. (See Rear Tire Balancing procedure on this page.)

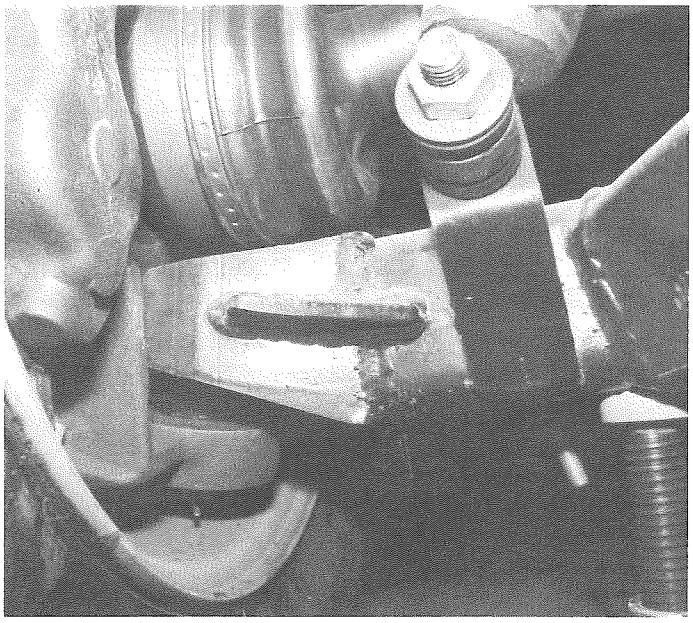


Figure 129 – Jack Location for Wheel Balancing

The Revcon's own engine is used to spin the front wheels. Do not use the electric drive of the spin balancer, only use the sensors and strobe of the unit.

1. With a 5-ton minimum floor jack, raise the wheel/drive line of the tire to be tested as follows: Place the jack pad as far outboard as possible under the lower "A" arm (see figure 129). Raise "A" arm so that the tire clears the ground and the half-shaft is nearly parallel with the ground.*
   NOTE: By raising the coach on one wheel, as shown, only the raised wheel will be driven. This is made possible by the construction of the differential. If properly done, this method is safe. However, safety precautions must be observed. Do not stand in front of the coach, and do not work under the coach when front-drive is engaged.
2. With one operator in the coach to operate the engine and speed, and another operator outside using the balancing equipment, start the engine and raise speed to 55-60 mph, registered. Stop the wheel gradually with light brake pressure, as required.
3. Balance tire, checking to see if the inside operator feels any vibrations through the steering wheel. When all vibrations are eliminated from one side, proceed to other side and repeat the procedure. Be sure to install lead weights on inner and outer side of wheel, to evenly balance the tires.

*Do not spin the wheel if both wheels are allowed to hang by the suspension. The half-shafts will be damaged.

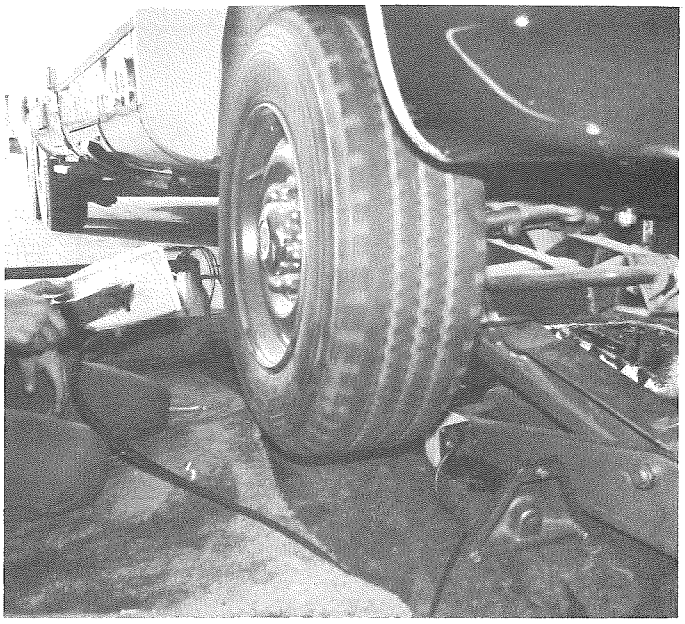


Figure 130 – Wheel Balancing

4. Remember to always mark one wheel stud in relation to any wheel to be removed, since the drive line has been balanced, not just the wheel.

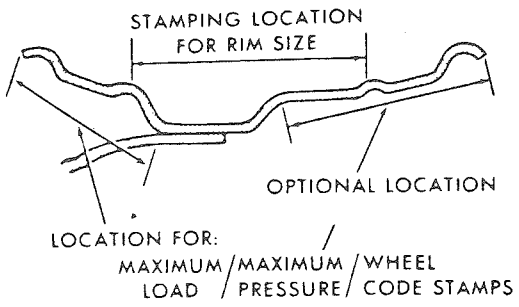
REAR TIRE BALANCING (See figures 131 and 133.)

Notes: The rear brake drums **are not balanced** and must be mounted on the axle with the tire and steel wheel. Each tire must be balanced as a unit, tire, steel wheel, and brake drum, with a spin balancing unit.

1. Raise both tires of one side at rear axle hanger beam. (See figure 133.)
2. Place vibration sensor of spin balancer under the "walking beam" as close to the wheel being balanced as possible and under rear axle bar.
3. Proceed with wheel balancing using the electric motor drive of the spin balancer and the strobe light.
4. If wheel weights allow, distribute the weight on both the front and back of the steel wheels.

Figure 131 – Rear Tire Balancing

WHEELS AND TIRES (Continued)



WHEEL CODE AND LIMITS			
PART NUMBER & CODE	TYPE AND SIZE OF WHEEL	WHEEL LIMITS	
		MAX. LOAD (LBS.)	MAX. PRESS. (PSI)
BUDD P/N	16.5 x 8.25	2,750	65
R92250	2.71 inches offset		

TIRE/WHEEL LOAD & INFLATION PRESSURE

Wheel Code	Tire Size	Load Range	Tire Load Limits at Various Inflation Pressures									
			30	35	40	45	50	55	60	65*	70	75
WIDE BASE TUBELESS TIRES USED AS SINGLES												
* 10 R x 16.5	D	–	–	–	1870	2047	2235	2417	2625			

Figure 132 – Tire/Wheel Load and Inflation Pressure

*65 psi is maximum pressure allowable by wheel specifications.

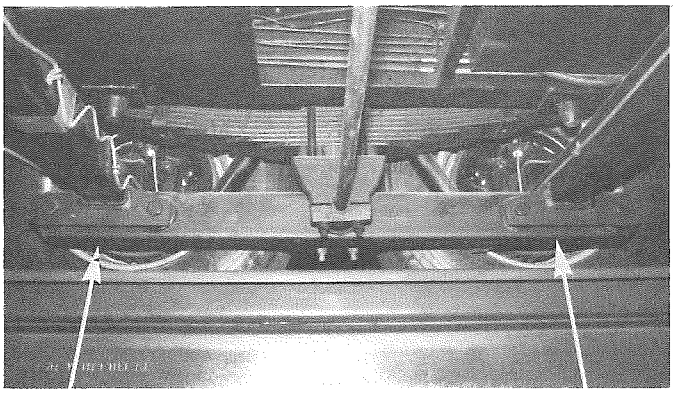


Figure 133 – Rear Axle Hanger Beam

WHEEL INSTALLATION (Single Wheels) – When installing the tire and wheel on the vehicle, follow this procedure:

After wheel nuts are put on loosely, turn the wheel until one nut is at the top of the bolt circle; tighten the nut just snug.

Snug up the remaining nuts criss-cross to minimize runout; then tighten the nuts to the recommended torque alternately and evenly to avoid excessive runout.

RADIAL TIRES MOUNTING – Recommended truck tire mounting and inflation procedures are especially important with radial truck tires. Failure to follow these recommendations can cause bead deformation in both tube type and tubeless tires due to incorrect bead setting. Bead deformation may lead to chafing, lower sidewall and bead area cracking, demounting difficulties, eccentric wear, ride vibration, and non-retreadable casing.

Series	Description	Torque
8 bolts on 6½" bolt circle	9/16" bolts (8) or 5/8" bolts (8)	150 ft.lbs.

Figure 134 – Wheel Nut Torque .

To insure correct mounting and bead seating and to prevent bead deformation, the following steps must be taken:

Tubeless Tires

1. Only use rims approved for radial tire usage by rim manufacturer. Thoroughly clean rim, removing all rust and other foreign material.
2. Thoroughly lubricate tire beads and rim bead seats with an approved rubber lubricant.

NOTE: Do not use silicone base lubricants. This could cause the tire to slip on the wheel.

3. Inflate tire to operating pressure. Due to the construction of radial truck tires, particularly in the lower sidewall and bead area, it may be difficult to get the tire to take air. An inflation aid may be necessary to help seat the bead of tubeless radial tires. Two types of inflation aids are commercially available: 1) Metal rings which use compressed air to seat beads, and 2) Rubber rings which seal between the tirebead and rim bead seat, allowing the bead to move out and seat. Lubrication is mandatory with both items. The Michelin tire may be inflated to 90 psi to assure that the tire seats.
4. Check bead seating. This check is made by measuring the space between the rim flange and one of the three lower sidewall rim line rings while the tire is laying flat (measurements should be taken each 90 degrees around the circumference of the rim flange). If spacing is uneven around the bead from side to side, repeat steps 1 through 3, and recheck.

NOTE: It is important that this procedure be followed to insure proper bead seating in order to prevent bead deformation.

5. Radial tires, as well as the bias tires, must be mounted and inflated in accordance with safety precautions noted in RMA Radial and Bias Truck Tire Service Manuals. Adjust tire pressure per alignment specification section.

TIRE REPAIR – There are many different materials and techniques on the market to repair tires. As not all of these work on all types of tires, tire manufacturers have published

WHEELS AND TIRES (Continued)

detailed instructions on how and when to repair tires. These instructions can be obtained from the tire manufacturers.

SNOW TIRES – If the vehicle is expected to encounter muddy or snowy driving conditions it is recommended that front driving wheels be equipped with mud and snow type tires.

If you equip your vehicle with mud and snow tires, they should be of the same size, load range, and construction as original equipment tires. It is recommended that vehicle speeds be limited to a maximum of 65 mph if mud and snow tires are installed.

TIRE WEAR AND ROTATION – Uneven or abnormal tire wear is usually the result of incorrect inflation pressure, improper wheel alignment, wheels being out-of-balance, or poor driving habits. Under-inflation, over-inflation, incorrect toe or camber and fast cornering produce different types of abnormal wear which can be diagnosed by your dealer.

To equalize wear it is recommended that the tires be rotated every 6000 miles (or sooner if irregular wear develops) as shown.

NOTE: It is recommended that disc brake pads be inspected for wear whenever tires are rotated.

The original equipment tires incorporate built-in tread wear indicators to assist you in determining when your tires have worn to the point of needing replacement. These indicators appear as 1/2-inch wide bands when tire tread depth is 1/16-inch or less. When the indicators appear in two or more adjacent grooves, tire replacement due to tread wear is recommended.

TIGHTENING WHEEL STUD NUTS – When your REVCON is new or after wheels have been replaced, it is the owner's responsibility to check wheel stud nuts at 500 miles and after every wheel removal thereafter. Nuts should be tightened to 150-ft.lbs. torque in sequence shown in figure 128.

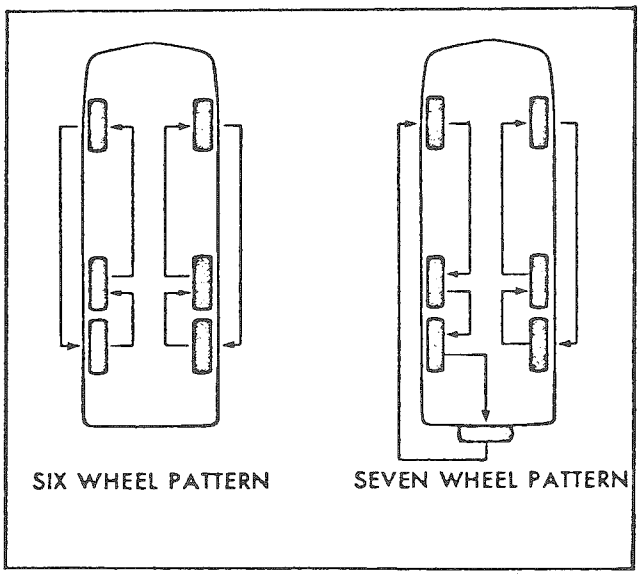


Figure 135 – Tire Rotation Diagram

TIRE SERVICE DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
Tires show excess wear on edge of tread	1. Under inflated tires. 2. Vehicle overloaded. 3. High-speed cornering 4. Incorrect toe setting.	1. Adjust air pressure in tires. 2. Correct as required. 3. Correct as required. 4. Set toe to specification.
Tires show excess wear in center of tread	Tires over inflated.	Adjust air pressure in tires.
Other excessive tire wear problems	1. Improper tire pressure. 2. Incorrect tire/wheel usage. 3. Loose or leaking shock absorbers. 4. Front end out-of-alignment. 5. Front wheel bearings out of adjustment. 6. Loose, worn or damaged suspension components, bushings and ball joints. 7. Wheels and tires out of balance. 8. Excessive lateral and/or radial runout of wheel or tire.	1. Adjust air pressure in tires. 2. Install correct tire and wheel combinations. 3. Tighten or replace as necessary. 4. Align front end. 5. Adjust front wheel bearings. 6. Inspect, repair or replace as required. 7. Balance wheels and tires. 8. Check, repair or replace as required. Use dial indicator to accurately determine runout.
Excessive vehicle vibration, rough steering, or severe tire wear.	1. Loose or improper attaching parts. 2. Overloading or unbalanced loads.	1. Tighten or replace. 2. Check wheel and tire specs against work load requirements. Recommend correct tire and rim. Check on loading procedure.

WHEELS AND TIRES (Continued)

TIRE SERVICE DIAGNOSIS (Continued)		
CONDITON	POSSIBLE CAUSE	CORRECTION
Vehicle vibrations	1. Loose or worn driveline or suspension parts.	1. Identify location of vibration carefully as it may be transmitted through frame making a rear end vibration appear to come from the front. Repair or replace loose and worn parts.
	2. Improper front end alignment.	2. Align front end.
	3. Excessive lateral runout (wheel or tire). Use a dial indicator to accurately verify runout reading.	3. Replace wheel or tire.
	4. Bent or distorted wheel disc from overloading, road impact hazards or improper handling.	4. Replace wheel. Attempts to straighten wheel can result in fractures in the steel and weakening of the disc or the weld between disc and rim. Check loading and operating conditions and the shop practices.
	5. Loose mountings — damaged studs, cap nuts, enlarged stud holes, worn or broken hub face or foreign material on mounting surfaces.	5. Tighten and/or replace worn or damaged parts. Clean mounting surfaces.
	6. Out-of-balance wheel and/or tire or hub and drum assembly.	6. Determine the out-of-balance component and balance or replace.
	7. Out-of-round wheel or tire (excessive radial runout). Use a dial indicator to accurately verify runout reading.	7. Replace the wheel or tire and check for overloading and unbalanced loads, rugged operating conditions, proper wheel and tire specifications.
	8. Water in tires.	8. Remove water.
Wheel mounting is difficult	1. Improper application or mismatched parts, including studs and nuts.	1. Follow manufactures specifications.
	2. Corroded or worn parts.	2. Clean or replace.
Wheel-rust corrosion	Poor maintenance.	Keep clean and protect with paint.

REPACKING FRONT WHEEL BEARINGS AND RESURFACING BRAKE DISC — To replace the front wheel bearings or to resurface the brake discs, the hub/disc/knuckle assembly must be removed from the vehicle and disassembled.

DISASSEMBLY

1. Remove the brake caliper and place the caliper so that the brake hose is not damaged.
2. Remove the upper and lower ball joint tapered studs from the steering knuckle. Also, remove the tie-rod end stud from the knuckle.
3. Remove the nut which holds the hub to the half-shaft and slide the assembly off the half-shaft splines.
4. Pry or press the hub/disc sub-assembly out of the inner bearing of the knuckle. Separate the disc and hub. If the disc is to be resurfaced, press out the lug bolts. Pry the outer bearing from the center shaft of the hub. Discard inner and outer seals. Each bearing set consists of two (2) races, two (2) bearings, and a spacer. Each part of the set has a 4-digit number scribed on it (such as 4897). One race and one bearing will have the letter "A" behind the number (such as 4897A) and are to be used together. Record the part position as they are removed if the bearings are to be reused.
5. Lubricate the bearings with Quaker State Lithum Complex NLG1 No. 2, 525°F high temperature grease or equivalent brand.

REASSEMBLY

1. To reassemble the hub and disc, place the eight (8) lug bolts in the holes. Install a flat washer and nut on each lug bolt and tighten the bolts to draw the hub and disc together. Discard the washers and nuts.
2. Install outer bearing and outer seal into knuckle and place knuckle over the center shaft of hub/disc assembly. Using a suitable collar, press the outer bearing down the center shaft of the hub. Use a force of 500 ft. lbs. maximum if necessary to "bottom" the bearing.
3. Install the spacer.
4. Press the inner bearing down the center shaft of the hub and install the inner seal.
5. Reattach the hub/disc/knuckle assembly to vehicle. Torque half-shaft nut to 150 ft. lbs.

POWER STEERING

POWER STEERING GEAR – The Saginaw power steering unit (see figures 136 and 137) is a torsion-bar type of hydraulic-assisted system. The system furnishes power to reduce turning effort at the steering wheel. It also reduces road shock and vibrations.

The torsion bar power steering unit includes a worm and one-piece rack piston, meshed to the gear teeth on the steering sector shaft. The unit also includes a rotary style hydraulic valve consisting of input shaft, control valve body, and torsion bar. The valve body is pinned to the worm, and the input shaft is connected to the worm through the torsion bar. Hydraulic action is generated by relative rotary motion between input shaft and worm/sleeve assembly.

The torsion-bar type of power steering gear is designed with the one-piece rack piston, worm, sector shaft, and the rotary valve assembly in one housing. This makes possible internal fluid passages between valve and power cylinder, eliminating all external lines and hoses, except the pressure and return hoses between the pump and gear assembly.

The power cylinder piston is an integral part of the gear housing. The piston is double acting, in that fluid pressure may be applied to either side of the piston.

The control valve is a unique rotary design that uses relative rotational motion of the input shaft and valve body to direct fluid flow. In a neutral (straight ahead) position, where no

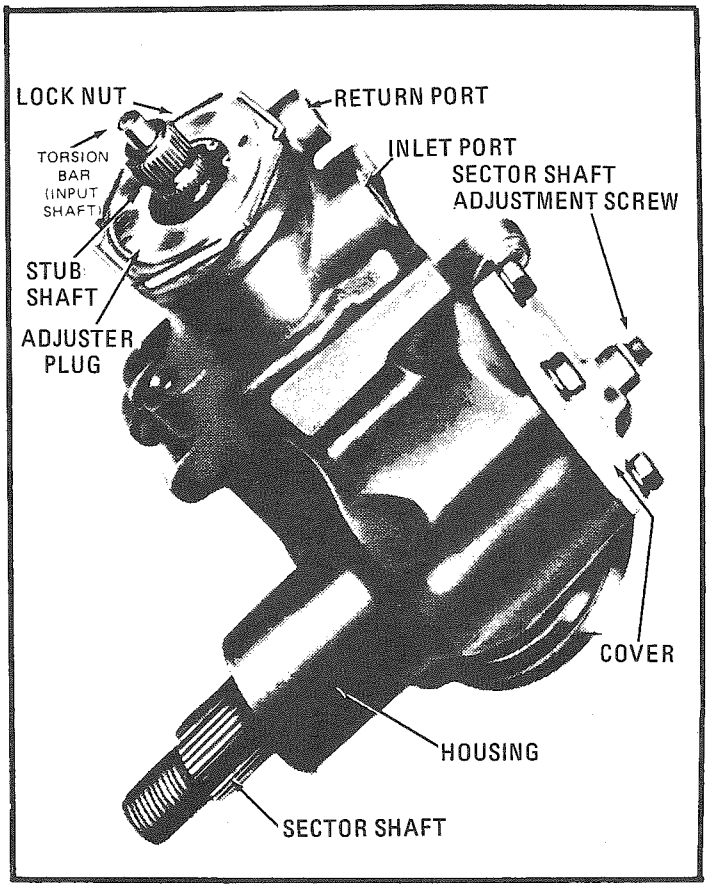


Figure 136 – Steering Gear

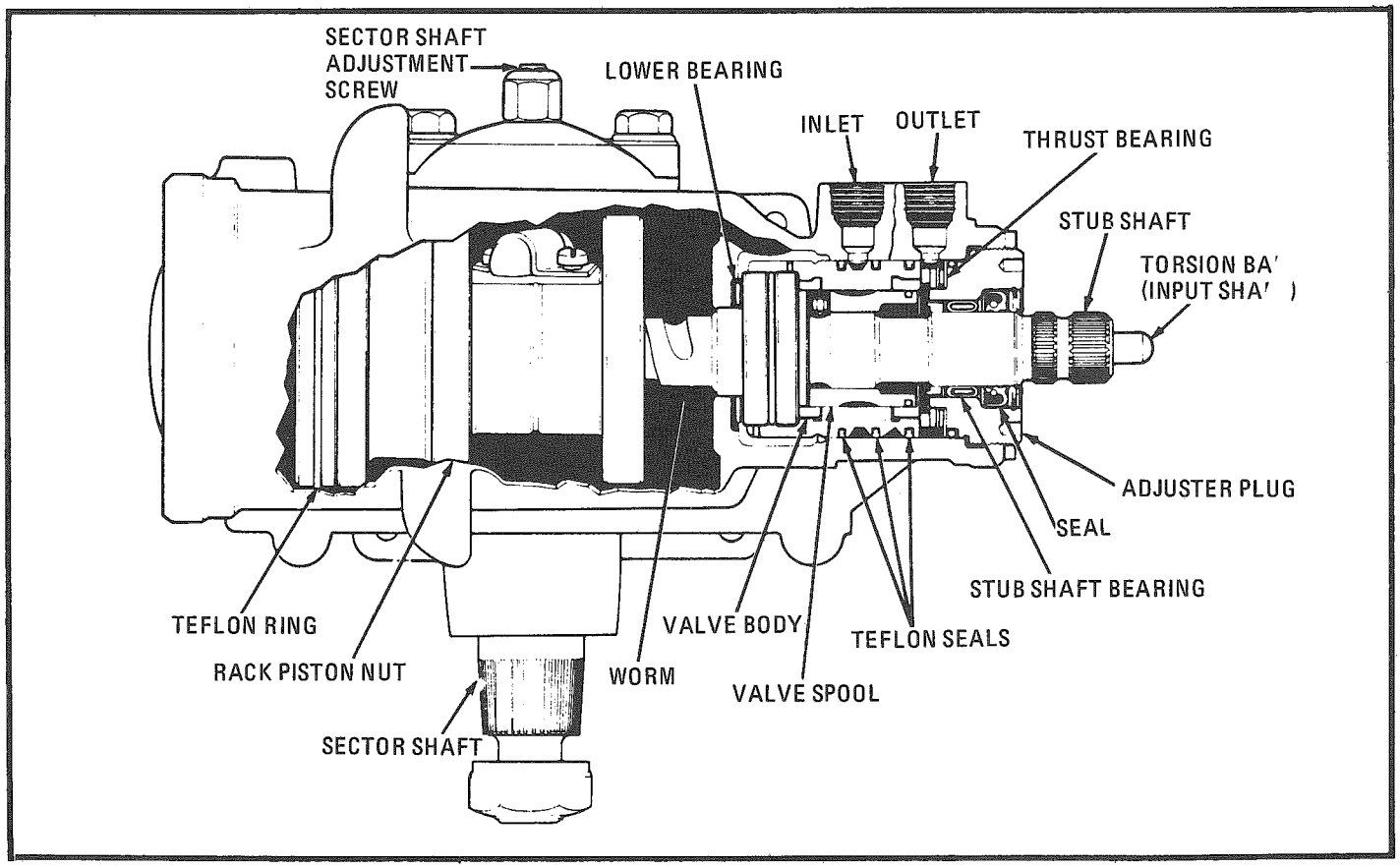


Figure 137 – Cutaway View of Steering Gear

POWER STEERING (Continued)

power assist is required, the valve input shaft and body are held in a central position by the torsion bar. The fluid flows from the inlet port through the valve to the outlet port and back to the pump. No area of the steering gear is under high pressure in this position. The valve and housing cylinder are always full of power steering fluid, which dampens road shock that otherwise would be transmitted to the driver through the steering wheel. The steering force, applied through the steering wheel/column to the input shaft, is transmitted to the worm where it meets the resisting forces of the road wheels. When the steering forces are great enough, rotational deflection (twisting) of the torsion bar occurs. This deflection changes the relative position of the input shaft and control valve body causing throttling of the hydraulic flow and directing high pressure fluid to the appropriate end of the piston in the gear housing.

The difference in pressure forces on the piston helps move the sector shaft, thus assisting in the turning effort. The oil in the opposite end of the gear housing is forced out through the return outlet of the control valve and back to the pump reservoir.

With higher steering efforts, increased valve displacement will give the driver proportionately higher assisting pressure. The driver will have a smooth hydraulic assist at all times.

When the driver stops applying steering effort, the valve body and input shaft are returned to a centered position.

The valve input shaft is attached on one end to the steering column and steering wheel. The same end is connected to the worm through the torsion bar providing the load to the road wheel side of the steering system.

NOTE: A hissing noise is a normal characteristic of rotary valve steering gear and in no way affects steering. A replacement valve will also exhibit slight noise, so it is not always a cure for the complaint. Any metal-to-metal contacts at the flexible steering shaft coupling (due to column misalignment) will transmit severe valve hissing noise into the passenger compartment and should be corrected.

POWER STEERING DIAGNOSIS AND TESTING –

CONDITION	POSSIBLE CAUSE	CORRECTION
Feedback (rattle, chuckle, knocking noises in steering gear). Feedback is a condition that is noticed when a car is driven over rough pavement and this roughness felt in the steering wheel by the driver. In addition, if the gear is not adjusted properly, excessive rattle, knocking and/or chuckle noises can be heard inside the car.	1. Deteriorated shock absorbers. 2. Gear loose on frame. 3. Steering linkage balljoints loose/worn. 4. Insufficient meshload. 5. Pressure hose touching other parts of vehicle. 6. Loose pitman arm.	1. Replace shock absorbers. 2. Tighten mounting bolts (3) to specification. 3. Replace appropriate tie rod end assemblies. 4. Set meshload to specification. 5. Loosen, reposition and retighten fitting to specified torque. 6. Tighten sector shaft nut to specification.
Heavy Steering Efforts, Poor Assist A heavy effort and poor assist condition is recognized by the driver while turning corners and especially while parking. A road test can verify the condition.	**Poor Assist – Both Directions.** 1. Low steering system fluid fill. 2. Engine idle too low. 3. Low power steering pump belt tension. 4. Pump flow/relief pressure not to specification. 5. External leakage giving low fluid level. 6. Two or more valve plastic O-rings cut or twisted. 7. Piston plastic O-ring cut or twisted. 8. Loose/missing rubber backup piston O-ring. 9. Valve/gear housing oil passages blocked. 10. Leakage past piston end cap. 11. Porosity in piston bore on housing casting. **Poor Assist – One Turn Direction** 12. One valve plastic O-ring.	1. Add steering fluid to proper level. 2. Set engine idle to specification. 3. Set belt tension to specification. 4. Test pump, and service as necessary. 5. See diagnosis guide for external leakage. 6. Replace valve plastic O-rings. 7. Replace piston plastic O-ring. 8. Replace/install rubber backup piston O-ring. 9. Replace gear housing or valve housing as required. 10. Tighten piston end cap to specification. 11. Replace gear housing. 12. Replace valve plastic O-rings.

POWER STEERING (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
Poor Returnability — Sticky Feeling Poor returnability is a condition that is noticed when the vehicle is in a turn and returns to center with effort from the driver. In addition, when the driver returns the steering wheel to center, it may have a sticky or catchy feel.	1. Wheel alignment not to specification. 2. Binding steering column. 3. Steering column not properly aligned — flex coupling distorted. 4. Meshload set to tight. 5. End lash adjusting screw not properly staked to sector. 6. Damaged stub shaft bearing. 7. Binding in valve assembly.	1. Reset wheel alignment. 2. Service steering column as required. 3. Align steering column. 4. Reset meshload to specification. 5. Replace sector assembly. 6. Replace valve assembly. 7. Replace valve assembly.
External Leakage One of the most common conditions causing repeat repairs is fluid leaks. Make sure you clean off the steering gear first before any steering gear external leakage checks are performed.	1. Overfilled reservoir. 2. Loose hose fittings. 3. Missing/damaged hose assembly O-rings. 4. Leak from stub shaft seal. 5. Leak at adjuster plug face to housing joint. 6. Leak at sector adjuster screw lock nut. 7. Leak at sector shaft seal. 8. Leak between torsion bar and stub shaft. 9. Leak at housing ball seat. 10. Leak at housing end plug. 11. Leak from gear housing.	1. Adjust to proper level. 2. Tighten hose fittings to specification. 3. Install/replace O-rings. 4. Replace stub shaft seal and dust seal. 5. Replace adjuster plug O-ring. 6. Replace lock nut. 7. Replace sector shaft seals and examine sector shaft for pitting or corrosion. Replace sector shaft if necessary. 8. Replace valve assembly. 9. Install new ball per directions in service manual. 10. Replace end plug O-ring. 11. Replace gear housing.
Hissing Sound There is some noise in all power steering systems. One of the most common is a hissing sound most evident at standstill parking. There is no relationship between this noise and the performance of the steering gear.	1. "Hiss" may be expected when the steering wheel is at the end of travel or when turning it at standstill.	1. Hiss is a normal characteristic of rotary valve steering gears and in no way affects steering. Do not replace the input shaft and valve assembly unless the hiss is extremely objectionable. A replacement valve will also exhibit a slight noise and is not always a cure for the condition. Investigate for a grounded column or a loose boot at the dash panel. Any metal to metal contacts will transmit valve hiss - into the passenger compartment through the steering column. Verify clearance between flexible coupling components. Be sure steering column shaft and gear are aligned so flexible coupling rotates in a flat plane and is not distorted as shaft rotates.

MESH LOAD – GEAR REMOVED –

1. Turn the input shaft stub from stop to stop, counting the total number of turns. Starting at either stop, turn the stub shaft 1/2 the total number of turns. This is the "center" of the gear. (The flat on the stub shaft is normally up when the gear is "on center" (see figure 137) and the block tooth on the sector shaft is in line with the mesh adjusting screw (see figure 137).
2. Loosen the locknut and turn the mesh adjusting screw clockwise (left hand thread) until it stops, then turn it counterclockwise one full turn.
3. Rotate the torque wrench approximately 45 degrees each side of the center, and "read" near or on center (highest reading) (see figure 138). Turn the mesh adjusting screw until the correct "O" center torque, in excess of the reading just taken, is obtained (see figure 139).

NOTE: Limits for "new" and "used" gears differ as follows:

a. "New" gear overcenter torque to be 4-8 in.-lbs. additional torque.
b. "Used" gear (more than 400 miles) overcenter torque to be 4-5 in.-lbs.

POWER STEERING (Continued)

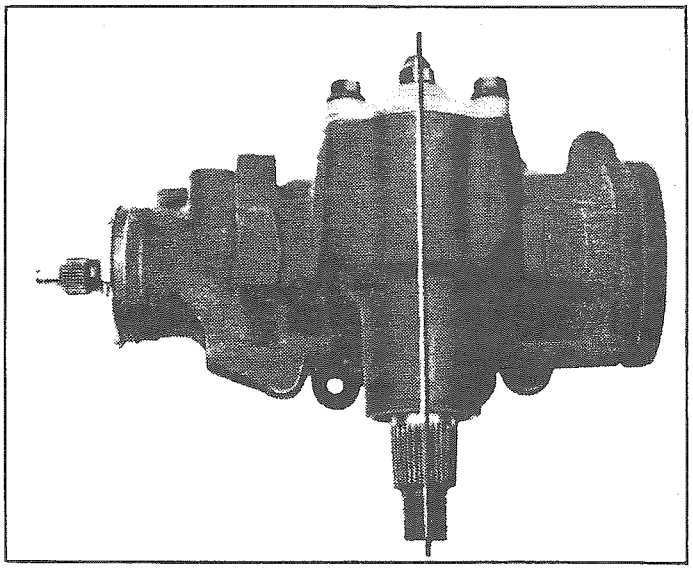


Figure 138 – Aligning Sector Shaft Block Tooth

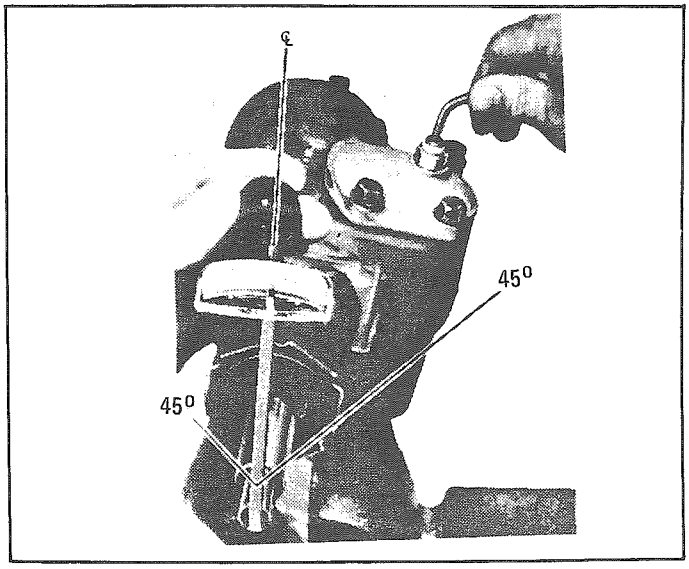


Figure 139 – Checking Overcenter Rotational Torque

Tighten the lock nut to 27-37 ft.-lbs. while holding the mesh adjuster screw. Recheck the overcenter adjustment.

MESH LOAD – IN VEHICLE – Adjust the total overcenter position load (mesh load) to eliminate excessive lash between the sector shaft and rack piston teeth as follows:

1. Disconnect the Pitman arm from the sector shaft. Remove the steering wheel hub.
2. Disconnect the fluid return line at the reservoir, and cap the reservoir return line pipe.
3. Place the end of the return line in a clean container and turn the steering wheel from left to right to discharge the fluid from the gear.
4. Turn the gear one-half turn off center in either direction. Using 24 in.-lbs. torque wrench on the steering wheel nut, determine the torque required to rotate the shaft slowly through a 20 degree arc.
5. Turn the gear back to center and repeat step 4. Loosen the adjuster lock nut and turn the mesh adjusting screw inward using 7/32-inch Allen wrench, until the reading is 5 in.-lbs. greater than the reading taken in step 4. Retighten the lock nut while holding the mesh adjusting screw in place.
6. Recheck the readings and replace the Pitman arm and steering wheel hub.
7. Connect the fluid return line to the reservoir and fill the reservoir with C1AZ-19582-A, C, or -D or equivalent to specification.

STEERING GEAR REMOVAL – When servicing the steering gear, label hoses before disconnecting them.

1. Remove the Pitman arm at this time from the sector shaft using a Pitman arm puller.
2. Position a drain pan under the steering gear. Disconnect the pressure and return lines from the steering gear and plug the lines and ports in the gear to prevent entry of dirt.
3. Raise the vehicle on a hoist and remove the drag link from the Pitman arm.
4. Remove the nuts that secure the cardan joint to the steering column shaft assembly (see figure 140).
5. Support the steering gear and remove the steering gear attaching bolts.
6. Remove the bolt from the U-joint and remove the coupling from the gear.

STEERING GEAR INSTALLATION –

1. Before installing the gear in the vehicle, attach U-joint from steering column to the steering gear. Install bolt and tighten to specification.
2. Slide the steering gear into place on the frame side rail. Install the attaching bolts and tighten to 70 ft.-lbs.
3. Center the steering gear stub shaft.
4. Install the Pitman arm on the sector shaft with Pitman arm facing forward. Install the Pitman arm attaching washer and nut. Tighten nut to specification.

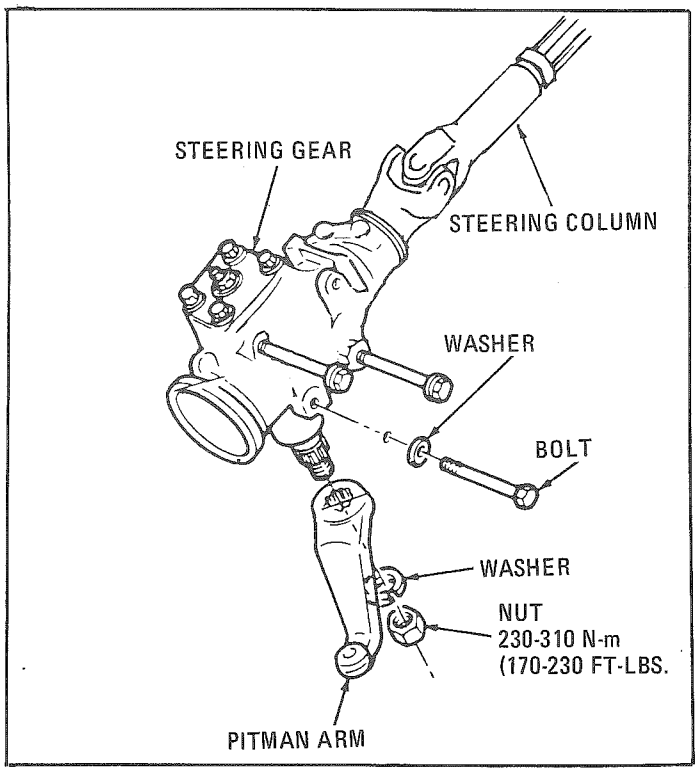


Figure 140 – Power Steering Gear Installation

POWER STEERING (Continued)

NOTE: If new steering gear attaching bolts and washers are required, use only the bolt and washer specified. Use grade 8 bolts.

5. Move steering column shaft flange into place on the cardan joint.
6. Connect and tighten the pressure and return lines to the steering gear. Tighten fittings to specifications.
7. Fill the power steering pump reservoir to specification with power steering fluid C1AZ-19582-A, C. D, or equivalent. Run the engine and turn the steering wheel from left to right to distribute the fluid and bleed out trapped air. Inspect for fluid leaks.
8. Recheck fluid level and add fluid C1AZ-19582-A, C, D or equivalent, if necessary.

STEERING GEAR DISASSEMBLY AND ASSEMBLY – Take the following precautions when servicing the steering gear:

Use a clean workbench and tools.

Thoroughly clean the exterior of the gear with solvent and drain off excess hydraulic fluid, if necessary.

Do not use solvent on seals.

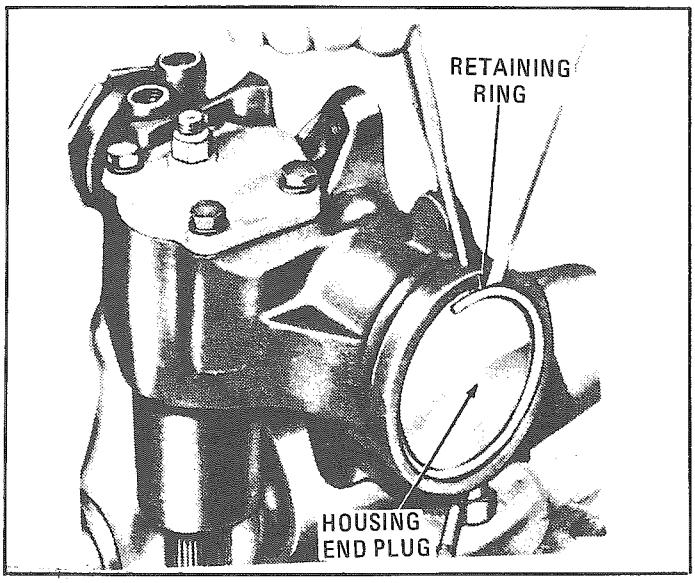


Figure 141 – Removing End Plug Retaining Ring

1. Mount the steering gear in a vise (see figure 140).
2. Rotate the housing end plug retaining ring until one end of the ring is opposite the hole in the housing.
3. Working through the hole in the housing (figure 140), unseat the retaining ring and work it out of the groove with a screwdriver.
4. Rotate the input shaft clockwise, using a 3/4 inch, 12-point socket wrench to force the end plug out of the housing. **Do not rotate the shaft any more than necessary to remove the plug. Further rotation will allow the balls to fall from their circuit and allow the rack-piston to become disengaged from the sector shaft.** Remove the O-ring from the housing and discard it.
5. Rotate the input shaft counterclockwise one-half turn to draw the piston inward.
6. Turn the rack-piston end plug (figure 140), counterclockwise out of the piston using a 1/2-inch drive extension.
7. Remove the lock nut from the mesh adjusting screw. Discard the nut.
8. Remove the cover attaching screws. Rotate the mesh adjusting screw with an Allen wrench until the cover is free of the housing. Remove the cover and the O-ring. Discard the O-ring.
9. Turn the input shaft to center the sector shaft teeth in the housing.
10. Tap the end of the sector shaft with a soft-faced hammer to free it from the housing.
11. Remove the adjuster plug lock nut.
12. Remove the adjuster plug using spanner wrench number T65P-3A537-A (see figure 145).
13. Insert Tool T65P-3D517-A, rack piston arbor (figure 144) into the end of the rack-piston until it contacts the worm shaft. Rotate the stub shaft clockwise until the worm is free of the rack-piston. Withdraw the rack-piston from the housing holding the tool all the way in the piston to avoid dropping the balls. **Do not disassemble the rack-piston at this time.**
14. Pull the stub shaft and valve assembly from the housing.
15. Lift the worm, lower thrust bearing and races out of the housing.

STEERING GEAR ASSEMBLY –

1. Secure the steering gear housing in a vise.
2. Lubricate the worm shaft, lower thrust bearing, and races with steering gear fluid D, or equivalent, and install the thrust bearing and races on the worm.

   Align the valve body drive pin on the worm with the narrow pin slot in the valve body. Install the O-ring seal between the valve body and the worm flange. Lubricate the Teflon ring and lower cap O-ring with petrolatum.
3. Place the valve assembly and worm shaft in the housing as a unit (figure 142). **Do not push against the stub shaft as this could cause the stub shaft and cap to pull out of the valve body, allowing the spool seal to slip into valve body fluid grooves.** Install the valve assembly by pushing on the outer diameter of the valve body with the finger tips. Be sure that the Teflon rings do not bind inside the housing. The valve assembly is correctly seated when the fluid return hole in the gear housing is fully visible.
4. Place the Tool R65P-3A537-B, adjuster plug seal protector, over the end of the stub shaft (see figure 145).
5. Lubricate a new adjuster plug "O"-ring with Power Steering Fluid, C1AZ-19582-A, C, D, or equivalent, and install in groove on adjuster plug. Place Seal Protector T65P-3A537-B over stub shaft, then install the adjuster plug assembly in the housing until it seats against the valve body (figure 145). Remove Seal Protector.
6. Adjust the thrust bearing pre-load according to the procedure given under Adjustments in this part.
7. Install Tool T65P-3805-A piston rack seal compressor in the steering gear housing. Position the rack-piston as shown in figure 144. Be sure Tool T65P-3D517-A, rack-piston arbor, contacts the worm shaft. Push the rack-piston inward until it contacts the worm shaft, while keeping pressure applied to Tool T65P-3D517-A. Turn the stub shaft counterclockwise until the middle rack groove in the rack-piston is aligned with the center of the sector shaft roller bearing. Remove the tool from the housing.
8. Install a new O-ring. Lubricate it with power steering fluid, C1AZ-19582-A, C, D, or equivalent and place it in the

POWER STEERING (Continued)

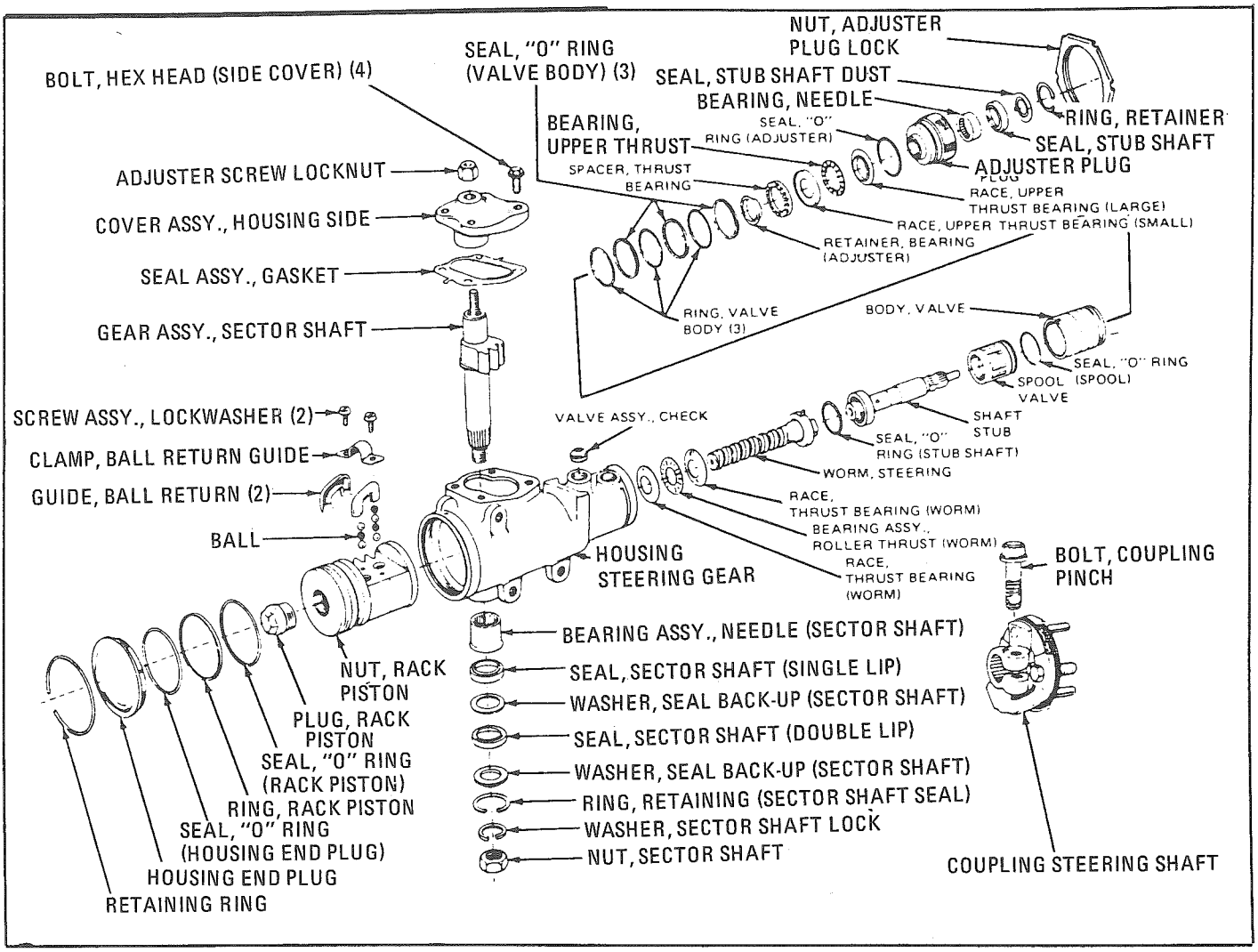


Figure 142 – Steering Gear Disassembled

sector shaft cover.

9. Thread the sector shaft cover onto the adjusting screw until it bottoms, then back it off one and one-half turns.
10. Install the sector shaft so the center gear tooth meshes with the center groove in the rack-piston. Be sure the cover gasket is in place before pushing the cover down on the housing.
11. Install the cover screws and lockwashers and tighten to 54-68 ft.-lbs.
12. Install a new adjuster lock nut halfway on the mesh adjusting screw adjuster screw.
13. Install the rack piston end plug in the rack-piston. Tighten the plug to 80-140 ft.-lbs.
14. Lubricate a **new** housing end plug O-ring with power steering fluid, C1AZ-19582-A, C, D, or equivalent and install it in the housing.
15. Place the housing end-plug in the gear housing and seat it against the O-ring seal. It may be necessary to tap the end plug lightly with a soft-faced mallet to seat it properly.
16. Snap the retainer ring in place with the fingers. Tap lightly on the ring to be sure it is securely bottomed in the housing.
17. Adjust the overcenter mesh load of the sector according to the procedure given under Adjustments.
18. After obtaining proper mesh load, tighten the sector shaft adjusting screw lock nut to 27-37 ft.-lbs.

STEERING GEAR HOUSING – Disassembly and Assembly.

1. Remove the snap ring (figure 142) that secures the sector shaft seals in the lower end of the housing. Remove the lower spacer washer.
2. Remove the lower seal (double lip), spacer washer, and upper seal (single lip) using Tools T58L-101-A puller attachment and T59L-100-B, slide hammer.
3. Check the selector shaft bearing for wear and damage and remove if necessary. Working from the lower end of the

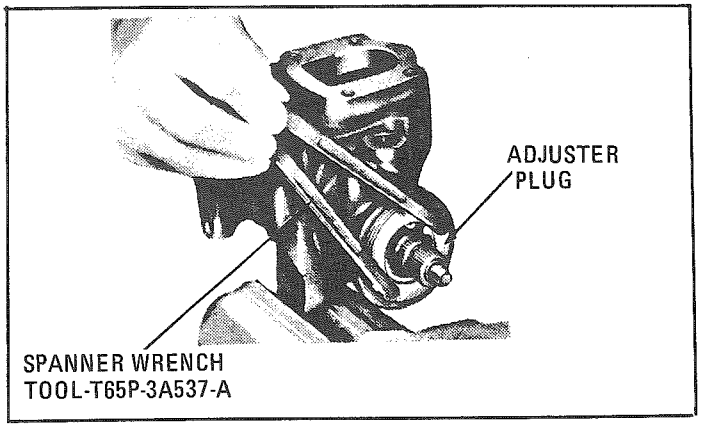


Figure 143 – Removing Adjuster Plug

POWER STEERING (Continued)

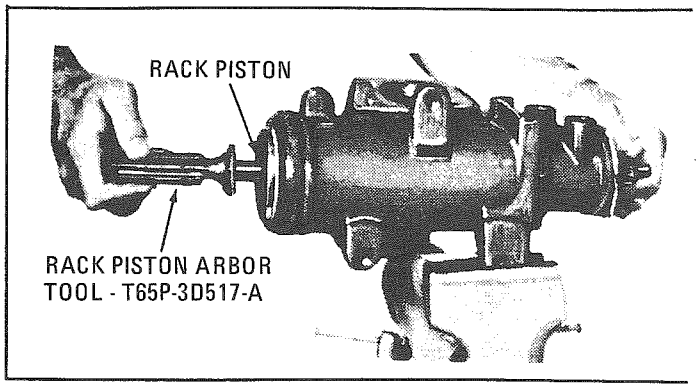


Figure 144 – Removing Rack Piston

housing (figure 144), press the bearing out of the housing. Discard the bearing.

4. Working from the upper end of the housing, press in a new bearing until the upper end is 0.76 mm (0.030 inch) below the housing bore. When installing the bearing, be sure to press only on the identification (stamped) end.
5. Lubricate the new sector shaft seals in ESW-M2C33-F (C1AZ-19582-A, C, or D) automatic transmission fluid or equivalent. Install the single lip seal first, then a back-up washer. Using Tool T65P-3D642-A, sector shaft seal installer, drive the seal and the washer in only far enough to provide clearance for the other seal and the back-up washer and the retaining ring. **Do not let the seal bottom on the end of the counterbore.** Install the double lip seal and back-up washer. Using Tool T65P-3D642-A drive the seal and washer in only far enough to provide clearance for the retaining ring. Install the sector shaft seal retaining ring with snap ring pliers, making certain that the ring seats properly.

CHECK VALVE REMOVAL AND INSTALLATION – If the inlet port check valve requires service, refer to figure 142.

ADJUSTER PLUG – Disassembly and Assembly.

1. Lift the adjuster plug off the stub shaft (see figure 145).
2. Pry the thrust bearing retainer off the adjuster plug as shown in figure 145. **Be careful not to score the roller bearing bore.** Discard the retainer.
3. Lift the spacer, thrust bearing, races and O-ring, off the plug. Discard the O-ring.

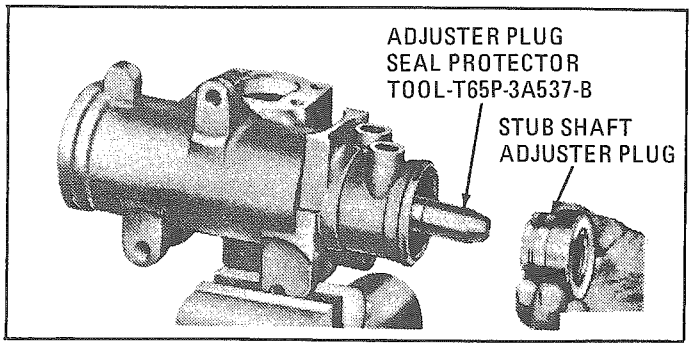


Figure 146 – Installing Adjuster Plug

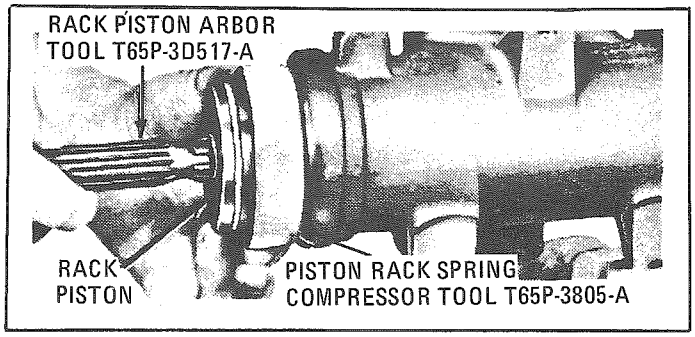


Figure 147 – Installing Rack Piston

4. If the roller bearing must be replaced, remove the dust seal retaining ring. Working from the spacer end of the adjuster plug, remove the roller bearing, oil seal and dust seal.

   Do not remove the roller bearing if it is not damaged. Pry the dust seal and oil seal off the adjuster plug with a screwdriver.
5. Place a **new** roller bearing on Tool T65P-3D525-A, adjuster plug bearing tool with the bearing manufacturer's identification facing toward the tool.

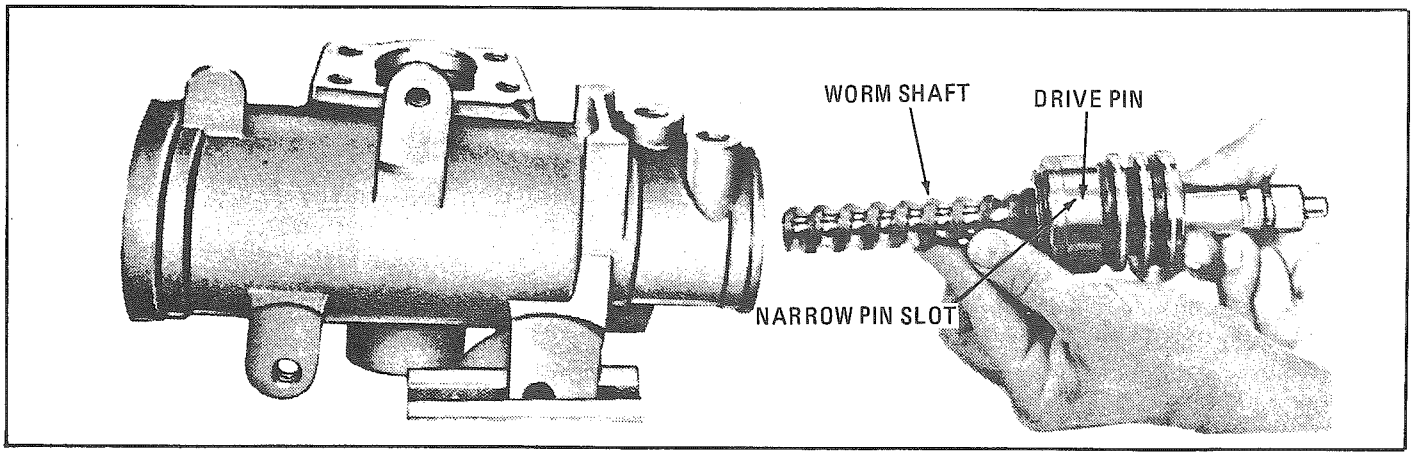


Figure 145 – Installing Valve and Worm Shaft Housing

POWER STEERING (Continued)

STEERING DIAGNOSIS		
CONDITION	**POSSIBLE CAUSE**	**CORRECTION**
Wanders side to side—Loose steering	Power Steering 1. Vehicle overloaded or unevenly loaded. 2. Improper (mismatched) tires and wheels. 3. Tire pressure. 4. Loose steering gear mounting. 5. Front and rear suspension components for looseness, wear. or damage. 6. Steering linkage connections for looseness, wear, or damage. 7. Loose wheel lug nuts. 8. Bellcrank binding. 9. Front wheel bearing adjustment. 10. Steering gear conditioning and adjustments. 11. U-joint coupling fractured. 12. Incorrect toe setting.	1. Correct as required. 2. Install correct tire and wheel combination. 3. Adjust air pressure in tires. 4. Adjust to specification. 5. Tighten or replace as necessary. 6. Tighten or replace as necessary. 7. Tighten to specifications. 8. Lubricate bellcrank. 9. Adjust to specification. 10. Adjust to specification. 11. Replace as required. 12. Set to specifications.
Pulls to one side	Power steering 1. Check tire sizes of each wheel to be sure they are the same size and type. 2. Tire pressure. 3. Vehicle unevenly loaded. 4. Improper brake operation or adjustment. 5. Front wheel bearing adjustment or faulty rear wheel bearing. 6. Broken or sagging springs on front and/or rear suspension. 7. Loose steering gear mountings. 8. Loose, worn or damaged steering linkage. 9. Bent spindle or spindle arm. 10. Bent rear axle housing and/or loose, worn or damaged spring, shock absorber and suspension arm attaching points. 11. Frame or underbody out of alignment. 12. Front wheel alignment. 13. Belted tires (misaligned belts). 14. Steering gear valve binding or out of adjustment (Integral Power Steering).	1. Install correct tire and whee combination. 2. Adjust air pressure in tire. 3. Correct as required. 4. Inspect, adjust, and correct as required. 5. Adjust or replace as required. 6. Inspect and replace as required. 7. Tighten to specification. 8. Tighten and replace as required. 9. Inspect and replace as required. 10. Inspect, tighten and replace as required. 11. Correct as required. 12. Set to specification. 13. Replace as required. 14. Clean and replace as necessary.
Returnability poor	1. Tire pressure. 2. Steering column alignment. 3. Steering linkage for a binding condition or lack of lubrication. 4. Steering gear adjustment. 5. Tight bellcrank. 6. Bind in idler arm. 7. Glazed, loose or broken power steering pump belt. 8. Kinked return hose or tube. 9. Obstruction within steering gear or lines. 10. Scored piston bore in housing (Integral Power Steering). 11. Excessively worn power steering pump parts.	1. Adjust air pressure in tires. 2. Align or adjust as required. 3. Lube, adjust or replace as required. 4. Adjust to specification. 5. Lube, correct as required. 6. Lube, correct as required. 7. Inspect, adjust or replace as required. 8. Inspect and repair or replace as required. 9. Inspect, remove obstructions, and repair or replace. as required. 10. Inspect, correct as required. 11. Replace as required.

BRAKES

BRAKES – The following note applies to one or more steps in the assembly procedure of components in this portion of the manual as indicated at appropriate location by the terminology "See Note on page XX of this section."

NOTE: This fastener is an important attaching part in that it could affect the performance of vital components and systems, and/or could result in major repair expense. It must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.

CAUTION: When servicing wheel brake parts, do not create dust by grinding or sanding brake linings or by cleaning wheel brake parts with a dry brush or with compressed air. (A water dampened cloth should be used.) Many wheel brake parts contain asbestos fibers which can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm."

BRAKES – GENERAL DESCRIPTION – All vehicles are equipped with a dual hydraulic brake system. The split system consists basically of two separate brake systems. When a failure is encountered on either, the other is adequate to stop the vehicle. If one system is not functioning, it is normal for the brake pedal lash and pedal effort to substantially increase. This occurs because of the design of the master cylinder which incorporates an actuating piston for each system. When the rear system loses fluid, its piston will bottom against the front piston. When the front system loses fluid, its piston will bottom on the end of the master cylinder body. The pressure differential in one of the systems causes an uneven hydraulic pressure balance between the front and rear systems. The combination valve (near the master cylinder) detects the loss of pressure and illuminates the brake alarm indicator light on the instrument panel. The pressure loss is felt at the brake pedal by an apparent lack of brakes for most of the brake travel and then, when failed chamber is bottomed, the pedal will harden.

If a vehicle displays these symptoms, it is a good indication that one of the systems contains air or has failed, and it is necessary to bleed or repair the brakes.

MASTER CYLINDER – The system is designed with a separate hydraulic system for the front and rear brakes using a dual master cylinder. The cylinder has two separate reservoirs and outlets in a common body casting.

COMBINATION VALVE – All REVCON vehicles have a combination valve. The front and rear hydraulic lines are routed through this combination "metering" and "brake failure warning switch" to their appropriate wheel cylinders or caliper.

The metering portion of the combination valve tends to "hold off" front hydraulic pressure until the rear brake system overcomes the pull back springs; then pressure is allowed to flow with the result being a good distribution of braking effort.

The brake failure warning switch portion of the combination valve "senses" a loss of hydraulic pressure, if a failure should occur, and turns "on" a red light in the dash to warn the operator of the failure.

DISC BRAKES FRONT – All models have disc brakes on the front. The one piece caliper mounts on the steering knuckle/steering arm, which is also a one piece casting, and astride the brake disc. The caliper is the dual piston design which is said to be a sliding caliper sliding piston. No front brake adjustment is necessary once the system is in operation and the pedal has been stroked to "seat" the shoes to the caliper.

DRUM BRAKES REAR – The rear brakes are duo servo and self adjusting. Brake adjustment takes place when the brakes are applied with a firm pedal effort while the vehicle is backing up. Applying the brakes moves the actuator which turns the star wheel and lengthens the adjuster screw assembly. This action moves the shoes outward until clearance between the lining and drum is within proper limits.

BRAKE DIAGNOSIS

INSPECTION AND TESTING BRAKES – New linings must be protected from severe use for several hundred miles. Brakes should be tested on dry, clean, reasonably smooth and level roadway. A true test of brake performance cannot be made if roadway is wet, greasy, or covered with loose dirt so that all tires do not grip the road equally. Testing will also be adversely affected if roadway is crowned so as to throw weight of vehicle toward wheels on one side or if roadway is so rough that wheels tend to bounce.

Test brakes at different vehicle speeds with both light and heavy pedal pressure; however, avoid locking the wheels and sliding the tires on roadway. Locked wheels and sliding tires do not indicate brake efficiency since heavily braked but turning wheels will stop vehicle in less distance than locked wheels. More tire-to-road friction is present with a heavily braked turning tire than with a sliding tire.

External Conditions That Affect Brake Performance:

1. **Tires** – Tires having unequal contact and grip on road will cause unequal braking. Tires must be equally inflated and tread pattern of right and left tires must be approximately equal.
2. **Vehicle Loading** – When vehicle has unequal loading, the most heavily loaded wheels require more braking power than others. A heavily loaded vehicle requires more braking effort.
3. **Rear Wheel Bearings** – A loose rear wheel bearing permits the drum to tilt and have spotty contact with the brake shoe linings causing erratic action.
4. **Front End Alignment** – Misalignment of the front end, particularly in regard to limits on camber and caster pin inclination, will cause the brakes to pull to one side.

HYDRO-BOOST – Prior to performing the Booster Function Tests, or the Accumulator Leakdown Test, the following preliminary checks must be made:

NOTE: The power steering fluid and brake fluid cannot be mixed. If brake seals contact steering fluid or steering seals contact brake fluid, seal damage will result.

BRAKES (Continued)

1. Check all power steering and brake lines and connections for leaks and/or restrictions.
2. Check and fill brake master cylinder with brake fluid.
3. Check and fill power steering pump reservoir with power steering fluid. Be sure fluid is not aerated (air mixed with fluid).
4. Check power steering pump belt for tension and/or damage. Adjust if necessary.
5. Check engine idle speed and adjust if necessary.
6. Check steering pump pressure.

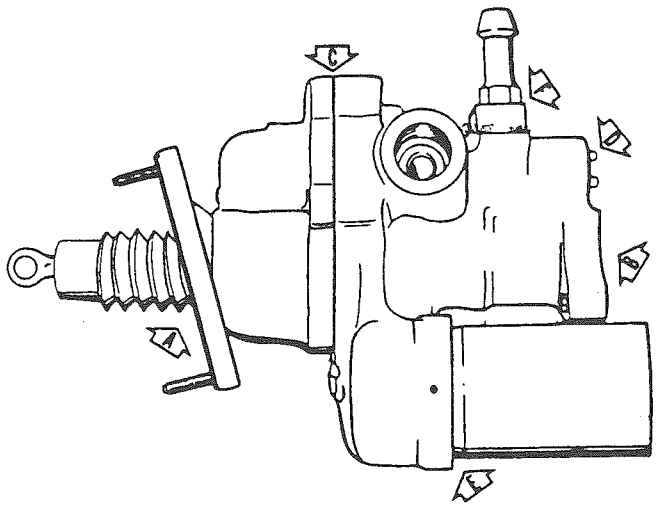
SEAL LEAK DIAGNOSIS

1. **Input Rod Seal** – A damaged seal will show up as a fluid leak from the mounting bracket vent hole. The booster must be removed from the vehicle and disassembled. The input rod bore should be checked for any scratches that may cause the leak. If scratches are present, housing cover must be replaced. If no excessive scratches are present, then the booster seal kit can be used to replace the appropriate seals.
2. **Power Piston Seal** – Power piston seal damage will be noticed by fluid leaking out at the common master cylinder-brake booster vent and possible reduction in power assist. The booster must be removed from the vehicle and disassembled. The piston should be checked for any scratches that may be the cause of the leak. If scratches are present, then the input rod and power piston assembly must be replaced. If no excessive scratches are present, then the booster seal kit can be used to replace the appropriate seals.
3. **Housing Seal** – If the housing seal is damaged, fluid will leak out from between the two housings. The booster must be removed from the vehicle and disassembled. The booster seal kit should be used to replace the housing and input rod and power piston seals.
4. **Spool Valve Plug "O" Ring Seal** – Damage to this seal will be noticed by fluid leaking out past the plug. The booster need not be removed from the vehicle. The master cylinder should be disconnected from the booster. Press in on spool plug, insert a small screwdriver between snap ring and housing bore. This unseats one side of the spool plug snap ring from its groove in the bore. Then remove the snap ring from the bore.
5. **Accumulator "O" Ring Seal** – Damage to this seal will result in fluid leakage past the accumulator cap. The seal can be replaced while the booster is installed on the vehicle. A catch basin should be placed under the booster to catch the fluid when the accumulator or spring cap is removed.

CAUTION: Before removing the cap, the brake pedal must be pumped 4-5 times to deplete accumulator pressure. Refer to "Pneumatic Accumulator On-Vehicle Service Procedure."

6. **External Leakage at the Return Port Fitting** – Tighten fitting to 7 lb. ft. (10 N·m). If it continues to leak, replace "O" ring under fitting.
7. **External Leakage at the High Pressure Gear or Pump** – Torque tube nut to 30 lb. ft. (40 N·m). If it continues to leak, check for damaged tube flares; if OK, replace tube seats.

HYDRO-BOOST TROUBLE SHOOTING AND TESTING – The Hydro-Boost differs from vacuum brake boosters not only in the source of power (hydraulic versus vacuum) but in the fact that it is also a part of another major sub-system of the vehicle - - the power steering system. Therefore, problems or malfunctions in the steering system may affect the operation of the booster, just as a problem in the booster may affect the



HYDRO— BOOST SEAL LEAKAGE

A. INPUT SEAL LEAK — Fluid leakage from housing cover end of booster near reaction bore. Replace seal(s).

B. PISTON SEAL LEAK — Fluid leakage from vent at front of unit near master cylinder. Replace seal.

C. HOUSING — Fluid leakage between the housing and housing cover. Replace seal.

D. SPOOL VALVE SEAL — Fluid leakage near plug area. Replace seal.

E. ACCUMULATOR CAP SEAL — Fluid leakage from accumulator area. Replace seal.

F. RETURN PORT FITTING SEAL — Replace seal.

Figure 148 – Seal Leakage Diagnosis (Backside of Booster)

BRAKES (Continued)

steering system. The following noises are associated with the Hydro-boost system and may or may not be cause for customer complaint. Some are normal and for the most part temporary in nature. Others may be a sign of excessive wear or the presence of air in either the booster or the steering system.

1. Moan or low frequency hum usually accompanied by a vibration in the pedal and/or steering column may be observed during parking maneuvers or other very low speed maneuvers. This may be caused by a low fluid level in the power steering pump or by air in the power steering fluid due to holding the pump at relief pressure (steering wheel held all the way in one direction) for an excessive amount of time (more than 5 seconds). Check the fluid level and fill to mark. System must sit for 1 hour to remove the air. If the condition persists, this may be a sign of excessive pump wear and the pump should be checked;.
2. At or near power runout, (brake pedal near fully depressed position) a high speed fluid noise (faucet type) may be heard. This is a normal condition and will not be heard except in emergency braking conditions, or with vehicle stopped and pedal pushed near fully depressed position.
3. Whenever the accumulator pressure is used, a slight hiss may be noticed. It is the sound of the hydraulic fluid escaping through the accumulator valve, and is completely normal.
4. After the accumulator has been emptied, and the engine is started again, another hissing sound may be heard during the first brake application or the first steering maneuver. This is caused by the fluid rushing through the accumulator charging orifice. It is normal and will only be heard once after the accumulator is emptied. However, if this sound continues, even though no apparent accumulator pressure assist was made, it could be an indication that the accumulator is not holding pressure and should be checked using the procedure for "Accumulator Leakdown Test."
5. After bleeding, a "gulping" sound may be present during brake applications as noted in the bleeding instructions.

CHECKING THE RESERVE SYSTEM

1. Start engine and charge accumulator by applying the brake pedal or by turning the steering wheel from stop to stop. Turn off engine and let vehicle sit for one hour. After one hour there should be at least two power assisted applications with the engine off.
2. If the reserve system will not retain a charge for one hour, but functions normally immediately following charging, the accumulator valves are at fault and the booster must be disassembled and the accumulator valves replaced.
3. If the accumulator can be heard charging and discharging, but it does not hold a charge, disassemble the booster and replace the accumulator valves.
4. Deplete the accumulator by pressing the brake pedal 4 or 5 times. If the accumulator can has lost its gas charge, it is possible to rotate or wobble the accumulator can with respect to the housing. Replace the accumulator assembly.

BOOSTER FUNCTIONAL TEST – With the engine off, apply the brake pedal several times until the accumulator is completely depleted. Depress the brake pedal (approximately 40 pounds/180 N pedal force) and start the engine. The pedal should fall and then push back against driver's foot.

ACCUMULATOR LEAKDOWN TEST – Start engine and charge accumulator by either applying the brake pedal (approximately 100 pounds/450 N force) or by turning the steering wheel from stop to stop. Turn off engine and let vehicle sit for one hour. After one hour there should be two power assisted applies with engine stopped.

BRAKES ON-VEHICLE SERVICE

PEDAL TRAVEL – At reasonably frequent intervals, the brakes should be inspected for pedal travel, which is the distance the pedal moves toward the floor from a fully-released position. Inspection should be made with the brake pedal firmly depressed (approximately 90 lbs.) while the brakes are cold.

NOTE: Revcon pedal measurement: 3.5" (90 mm)

Before making pedal travel checks, pump the pedal a minimum of three times with the engine off. This exhausts all vacuum from the power booster.

STOPLIGHT SWITCH ADJUSTMENT – The design of the stoplight switch and valve mounting (see figure 149) provides for automatic adjustment when the brake pedal is manually returned to its mechanical stop, as follows:

1. With brake pedal depressed, insert switch and/or valve assembly into tubular clip until switch body and/or valve assembly seats on tube clip. Note that audible "clicks" can be heard as threaded portion of switch and valve are pushed through the clip toward the brake pedal.
2. Pull brake pedal fully rearward against pedal stop, until audible "click" sounds can no longer be heard. Switch and/or valve assembly will be moved in tubular clip providing proper adjustment.

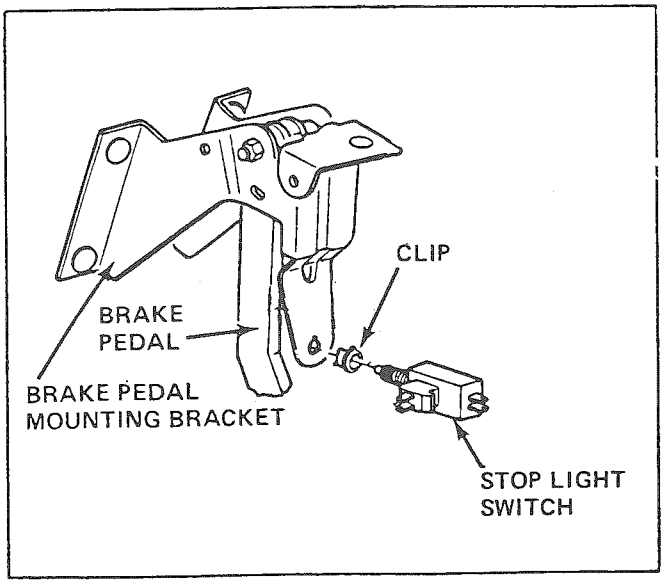


Figure 149 – Stoplight Switch on Brake Pedal

BRAKES (Continued)

3. Release brake pedal, and then repeat step 2 to assure that no audible "click" sounds remain.

BLEEDING AND FLUSHING BRAKE SYSTEM – A bleeding operation is necessary to remove air whenever it is introduced into the hydraulic brake system. It may be necessary to bleed the hydraulic system at all four wheel cylinders if air has been introduced through low fluid level or disconnecting brake lines at the master cylinder. If brake line is disconnected at any wheel cylinder, then that wheel cylinder only need be bled. If lines are disconnected at any fitting located between the master cylinder and wheel cylinders, then all wheel cylinders served by the disconnected line must be bled.

MANUAL BLEEDING OF BRAKE SYSTEM – Initially, deplete the vacuum reserve by applying the brakes several times.

1. Fill the master cylinder with brake fluid and keep at least one-half full of fluid during bleeding operation.

Continued on page 124

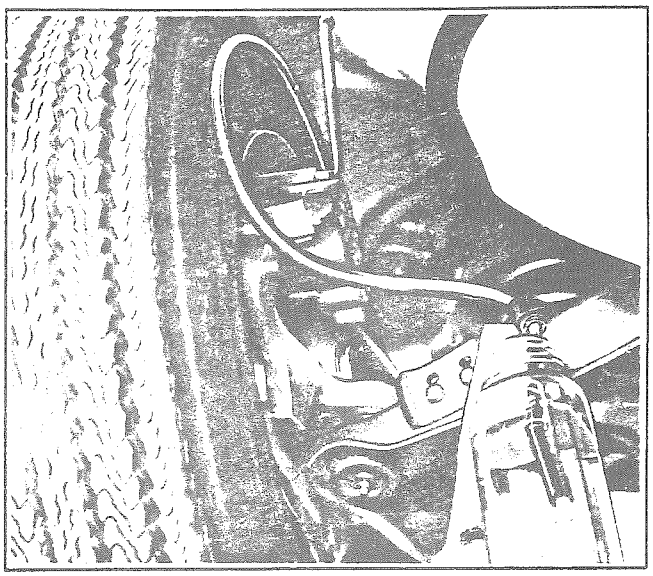


Figure 150 – Bleeding Wheel Cylinder

HYDRO-BOOST DIAGNOSIS

CONDITION	CAUSE	CORRECTION
Excessive Brake Pedal Effort	1. Loose or broken power steering pump belt.	1. Tighten or replace the belt.
	2. No fluid in power steering reservoir.	2. Fill reservoir and check for external leaks.
	3. Leaks in Hydro-Boost.	3. Replace faulty parts.
	4. Leaks at Hydro-Boost tube fittings.	4. Tighten fittings or replace tube seats, if faulty.
	5. External leakage at accumulator	5. Replace "O" ring and retainer.
	6. Faulty booster piston seal causing leakage at booster flange vent.	6. Overhaul with new seal or input rod and piston assembly.
	7. Faulty booster input rod seal with leakage at input rod end.	7. Overhaul with new seal kit.
	8. Faulty booster cover seal with leakage between housing and cover.	8. Overhaul with new seal kit.
	9. Faulty booster spool plug seal.	9. Overhaul with spool plug seal kit.
Slow Brake Pedal Return	1. Excessive seal friction in booster.	1. Overhaul with new seal kit.
	2. Faulty spool action.	2. Flush steering system while pumping brake pedal.
	3. Restriction in return line from booster to pump reservoir.	3. Replace line.
	4. Damaged input rod end.	4. Replace input rod and piston assembly.
Grabby Brakes	1. Faulty spool action caused by contamination in system.	1. Flush steering system while pumping brake pedal.
Booster Chatters - Pedal Vibrates	1. Power steering pump belt slips.	1. Tighten belt.
	2. Low fluid level in power steering pump reservoir.	2. Fill reservoir and check for external leaks.
	3. Faulty spool operation caused by contamination in system.	3. Flush steering system while pumping brake pedal.
Accumulator Leak Down-System does not hold charge	1. Contamination in steering hydro-boost system.	1. Flush steering system while pumping brake pedal.
	2. Internal leakage in accumulator system.	2. Overhaul unit using accumulator rebuild kit and seal kit.

BRAKES (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
Pulls	1. Incorrect tire pressures.	1. Inflate evenly on both sides to the recommended pressures.
	2. Front end out of line.	2. Check and align to manufacturer's specifications.
	3. Unmatched tires on same axle.	3. Tires with approximately the same amount of tread should be used on the same axle.
	4. Restricted brake pipes or hoses.	4. Check for soft hoses and damaged lines. Replace with new hoses and new double-walled steel brake tubing.
	5. Malfunctioning caliper assembly	5. Check for stuck or sluggish pistons, proper lubrication. Remove and rebuild caliper.
	6. Defective or damaged shoe and lining (grease or brake fluid on lining or bent shoe).	6. Install new shoe and lining in complete axle sets.
	7. Malfunctioning rear brakes.	7. Check for inoperative auto adjusting mechanism, defective lining (grease or brake fluid on lining) or defective wheel cylinders. Repair as necessary.
	8. Loose suspension parts.	8. Check and torque all suspension mountings to specifications.
	9. Loose calipers.	9. Check and torque bolts to specifications.
Noise (high pitched squeak without applying brake).	1. Front linings worn out.	1. Replace linings.
Brake roughness or chatter (Pedal Pulsates)	1. Excessive lateral runout.	1. Check per instructions and replace or machine rotor, if not within specifications.
	2. Parallelism not within specifications.	2. Check per instructions and replace or machine the rotor, if not within specifications.
	3. Wheel Bearings not adjusted.	3. Adjust wheel bearings to correct specifications.
	4. Rear drums out of round.	4. Check runout and, if not within specifications, turn the drums (not over maximum of 0.060 on the diameter).
	5. Shoe reversed (steel against iron).	5. Replace shoe and lining and machine rotor within specifications.
Excessive Pedal Effort	1. Malfunctioning power brake.	1. Check power brake and repair if necessary.
	2. Partial system failure.	2. Check front and rear brake system and repair, if necessary. Also, check and repair brake warning light circuit if a failed system is found and light did not function.
	3. Excessively worn shoe and lining.	3. Check and replace in axle sets.
	4. Piston in caliper stuck or sluggish.	4. Remove caliper and rebuild.
	5. Fading brakes due to incorrect lining.	5. Remove and replace with original equipment lining (or equivalent).
Excessive Pedal Travel	1. Partial brake system failure.	1. Check both front and rear system for a failure and repair. Also check and repair warning light circuit. It should have indicated a failure.
	2. Insufficient fluid in master cylinder.	2. Fill reservoirs with approved brake fluid. Check for leaks. Check warning light.
	3. Air trapped in system.	3. Bleed system.
	4. Rear brake not adjusting.	4. Adjust rear brakes and repair auto adjusters.
	5. Bent shoe and lining.	5. Replace axle set of shoe and lining.

BRAKES (Continued)

Dragging Brakes (A very light drag is present in all disc brakes immediately after pedal is released.)	1. Master cylinder pistons not returning correctly. 2. Restricted brake pipes or hoses. 3. Incorrect parking brake adjustment on rear brakes. 4. Check valve installed in outlet to front disc brakes. 5. Incorrect installation of inboard shoe and lining.	1. With reservoir cover off, check for fluid spurt at bypass holes as pedal is depressed. Adjust push rod, if necessary, or rebuild master cylinder. 2. Check for soft hoses or damaged pipes and replace with new hoses and new double-walled steel brake tubing. 3. Check and readjust to correct specifications. 4. Check master cylinder outlet and remove check valve if present. 5. Refer to caliper installation in this section.
Grabbing or uneven Braking Action	1. All conditions listed under "PULLS." 2. Malfunction of combination valve. 3. Malfunction of power brake unit. 4. Binding brake pedal mechanism.	1. All corrections listed under "PULLS." 2. Replace and bleed system. 3. Check operation and repair, if necessary. 4. Check and lubricate, if necessary. Possible replace pedal bushing and/or spacer.
Pulsation (roughness) Felt during normal brake application.	1. Uneven pad wear caused by caliper not sliding due to improper clearance or dirt. 2. Uneven rotor wear causing a thickness variation between the two braking surfaces.	1. Remove caliper and correct as necessary. 2. Machine rotors as follows: a. Machine rotors to obtain a circumferential thickness variation no greater than .0005" in 360° and a lateral runout no greater than .004" (max. rate of change not to exceed .001" in 30°). b. Check caliper freeness. With rotor removed, install caliper and mounting bolts (pins). Check for .005" - .012" clearance at both top and bottom of caliper. If less than .005" is found, file with a flat file until at least .005" is obtained. DO NOT EXCEED A MAXIMUM of .012" per end or .024" total clearance. Caliper clearance to inboard and outboard reaction pads must be equal within .004" both at the top and bottom of the caliper. This is to ensure correct alignment of caliper to knuckle during a brake application. c. Remove caliper after freeness check. Clean pins and sleeves, replace "O" rings, and apply a light coating of silicone grease or equivalent to all contact points and "O" rings.

BRAKES (Continued)

CAUSE / Symptom	Excessive Brake Pedal Travel	Brake Pedal Travel Gradually Increases	Excessive Brake Pedal Effort	Excessive Braking Action	Brakes Slow to Respond	Brakes Slow to Release	Brakes Drag	Uneven Braking Action (Front to Rear)	Uneven Braking Action (Side to Side)	Scraping Noise from Brakes	Brakes Squeak During Application	Brakes Squeak During Stop	Brakes Chatter (Roughness)	Brakes Groan at End of Stop	Brake Tell-Tale Glows During Stop
Leaking Brake Line or Connection	X	XX							X						XX
Leaking Wheel Cylinder or Piston Seal	X	XX		X				X							X
Leaking Master Cylinder	X	XX													X
Air in Brake System	XX								X						XX
Contaminated or Improper Brake Fluid					X	X	X								X
Worn out Brake Lining - Replace			X	X				X	X	X	X	X		X	
Uneven Brake Lining Wear Replace and Correct	X			X				X	X	X	X	XX		X	X
Grazed Brake Lining			XX		X			X	X		X	X			
Incorrect Lining Material - Replace			X	X				X	X			X		X	
Contaminated Brake Lining - Replace				XX				XX	XX	X	X	X		X	
Linings Damaged by Abusive Use - Replace			X	XX				X	X	X	X	X		X	
Corrosive Brake Lining Dust			X	XX				XX	XX		X	XX		X	
Heat Spotted or Scored Brake Drums or Rotors				X				X	X		X	X	XX	X	
Out-of-Round or Vibrating Brake Drums												X	XX		
Out-of-Parallel Brake Rotors													XX		
Excessive Rotor Run-Out													X		
Faulty Automatic Adjusters	X						X	X	X						X
Incorrect Wheel Cylinder Sizes			X	X				X	X						
Weak of Incorrect Brake Shoe Retention Springs				X		X	XX	X	X	XX	X	XX			
Brake Assembly Attachments-Missing or Loose	X						X	X	X	X		X	X	X	
Insufficient Brake Shoe Guide Lubricant						X	X	X	X	XX	XX				
Restricted Brake Fluid Passage or Sticking Wheel Cylinder Piston		X	X		X	X	X	X	X						
Faulty Metering Valve	X		X	X	X	X	X		X						X
Brake Pedal Linkage Interference or Binding			X		X	XX	XX								
Improperly Adjusted Parking Brake							X								
Drums Tapered or Threaded										XX					
Incorrect Front End Alignment								XX							
Incorrect Tire Pressure								X	X						
Incorrect Wheel Bearing Adjustment	X									X			X		
Loose Front Suspension Attachments								X		XX			X	X	
Out-of-Balance Wheel Assemblies													XX		
Operator Riding Brake Pedal	X	X	X				X		X					X	
Improperly Adjusted Master Cylinder Push Rod	X					X	XX								X
Sticking Wheel Cylinder or Caliper Pistons			X			X	X	X	X						
Faulty Proportioning Valve			X		X	X	X								

X - Indicates causes XX - Indicates more probable cause(s)

BRAKES (Continued)

Bleed right rear brake, left rear brake, right front and left front brake.

2. With the proper size box-end wrench or tool J-21472 over bleeder valve, attach bleeder tube to valve and allow tube to hang submerged in brake fluid in a clean glass jar (see page 120).
3. Open the bleeder valve and fully depress the brake pedal.
4. Close bleeder valve and release brake pedal.
5. Repeat steps 3 and 4 until all air is evacuated.

NOTE: Check and refill master cylinder reservoir as required to prevent air from being drawn through master cylinder.

6. Repeat the bleeding procedure at all wheels if the entire system is to be bled.
7. Check the brake pedal, feeling it for "sponginess." Repeat entire bleeding procedure, if necessary.

PRESSURE BLEEDING BRAKE SYSTEM — Pressure bleeding equipment must be of the diaphragm type. That is, it must have a rubber diaphragm between the air supply and the brake fluid to prevent air, moisture, oil, and other contaminants from entering the hydraulic system.

1. Install pressure bleeding adapter (J-23518) to the master cylinder.
2. Make sure the pressure tank is at least 1/3 full of Supreme No. 11 brake fluid or its equivalent. The bleeder ball must be re-bled each time fluid is added.
3. Charge the bleeder ball to between 20 and 25 psi (140 and 170 kPa).
4. When ready to begin bleeding, connect hose to master cylinder bleeder adapter and open the tank valve.
5. Disc brakes require a manual override of the front brake metering or combination valve to permit flow to the front wheels. Therefore, it will be necessary to hold the valve stem open manually for pressure bleeding. To hold the metering valve open to bleed the front brakes, the valve stem must be either pushed in or pulled out. Install metering valve actuator J-23709.
6. Bleed the brakes in the following sequence: right rear, left rear, right front, and left front.
7. With the proper size wrench over the bleeder valve, attach bleeder tube. The discharge end must hang submerged in a clean container partially filled with brake fluid.
8. Open the bleeder valve at least 3/4 turn and allow flow to continue until no air is seen in the fluid.
9. Close the bleeder valve. Be sure it seals.
10. Repeat steps 7 through 9 for the remaining bleeder valves (see step 6 for proper sequence).
11. Check the pedal feel for "sponginess' and repeat the entire procedure , if necessary.
12. Dispose of all removed brake fluid.
13. Remove metering valve actuator tool J-23709 from the combination valve and tighten the mounting bolt.
14. Disconnect bleeder equipment from the brake bleeder adapter.
15. Remove bleeder adapter. Wipe all areas dry if fluid was spilled during adapter removal.
16. Fill master cylinder reservoir(s) to proper level and install master cylinder diaphragm and cover.

FLUSHING BRAKE HYDRAULIC SYSTEM — It is recommended that the entire hydraulic system be thoroughly flushed with clean brake fluid whenever new parts are installed in the hydraulic system. Flushing is also recommended if there is any doubt as to the grade of fluid in the system. If fluid has been used which contains the slightest trace of mineral oil, all rubber parts that have been subjected to the contaminated fluid should be replaced.

HYDRO-BOOST BLEEDING PROCEDURE — Whenever the booster is removed and reinstalled, the steering system should be bled as outlined below.

NOTE: Power steering fluid and brake fluid cannot be mixed. If brake seals contact steering fluid or steering seals contact brake fluid, seal damage will result.

1. Fill oil reservoir to proper level and let oil remain undisturbed for at least two minutes.
2. Start engine and run momentarily.
3. Add oil, if necessary.
4. Repeat above procedure until oil level remains constant after running engine.
5. Raise front end of vehicle so that wheels are off the ground.
6. Turn the wheels (off ground) right and left, lightly contacting the wheel stops.
7. Add oil if necessary.
8. Lower the vehicle.
9. Start engine and depress the brake pedal several times while rotating the steering wheel from stop to stop.
10. Turn engine off and then pump brake pedal 4 to 5 times to deplete accumulator pressure.
11. Check oil level and refill as required.
12. If oil is extremely foamy, allow vehicle to stand a few minutes with engine off and repeat above procedure.
    a. Check belt tightness and check for a bent pulley.
    b. Check to make sure hoses are not touching any other parts of the vehicle, particularly sheet metal.
    c. Check oil level, filling to proper level if necessary, following steps 1 through 10. This step and step "d" following are extremely important as low oil level and/or air in the oil are the most frequent causes of objectionable pump noises.
    d. Check the presence of air in the oil. Air will show up as milky appearing oil. If air is present, attempt to bleed system as described in steps 1 through 10. If it becomes obvious that the pump will not bleed after a few trials, proceed as outlined under Power Steering System Test Procedure, page 110.
13. The presence of trapped air in the system will cause the fluid level in the pump to rise when the engine is turned off. Continue to bleed system until this condition no longer occurs.

BRAKE LINES REPLACEMENT —

CAUTION: Never use copper tubing because copper is subject to fatique cracking and corrosion which could result in brake failure.

1. Procure the recommended tubing and steel fitting nuts of the correct size. (Outside diameter of tubing is used to specifiy size.)
2. Cut tubing to length required. Correct length may be determined by measuring the old line using a cord and

BRAKES (Continued)

adding 1/8" (3 mm) for each double flare.

3. Double flare tubing ends using a suitable flaring tool such as J-23530. Follow instructions included in tool set. Make sure fittings are installed before starting second flare.

CAUTION: Double flaring tool must be used as single flaring tools cannot produce a flare strong enough to hold the necessary pressure.

4. Bend line assembly to match old line, using tubing bender. Clearance of .75" (19 mm) must be maintained to all moving or vibrating parts.

BRAKE HOSES INSPECTION – The flexible hydraulic hoses which transmit hydraulic pressure from the steel brake line on the frame to the rear axle and to the calipers should be inspected every four (4) months or 6000 miles (9600 km). The brake hose assembly should be checked for road hazard damage, for cracks and chafing of the outer cover, and for leaks and blisters. A light and mirror may be needed for an adequate inspection. If any of the above conditions are observed on the brake hoses, it will be necessary to replace it.

NOTE: Replace a flexible brake hose if it shows signs of softening, cracking, or other damage. When installing a new brake hose, position the hose to avoid contact with other vehicle parts. Whenever a brake hose is disconnected from a wheel cylinder or brake caliper, install a new copper washer connecting the hose.

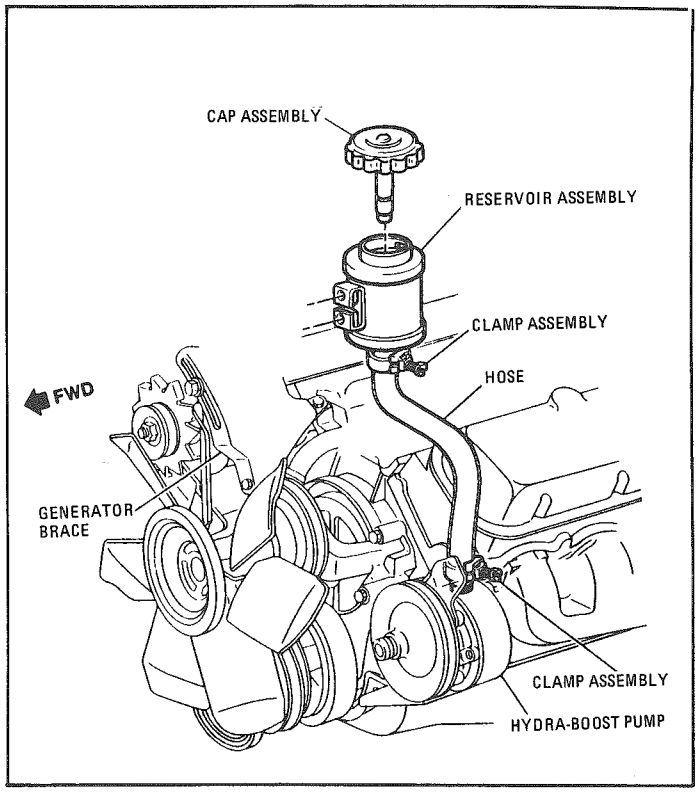


Figure 151 – Hydra-Boost Reservoir

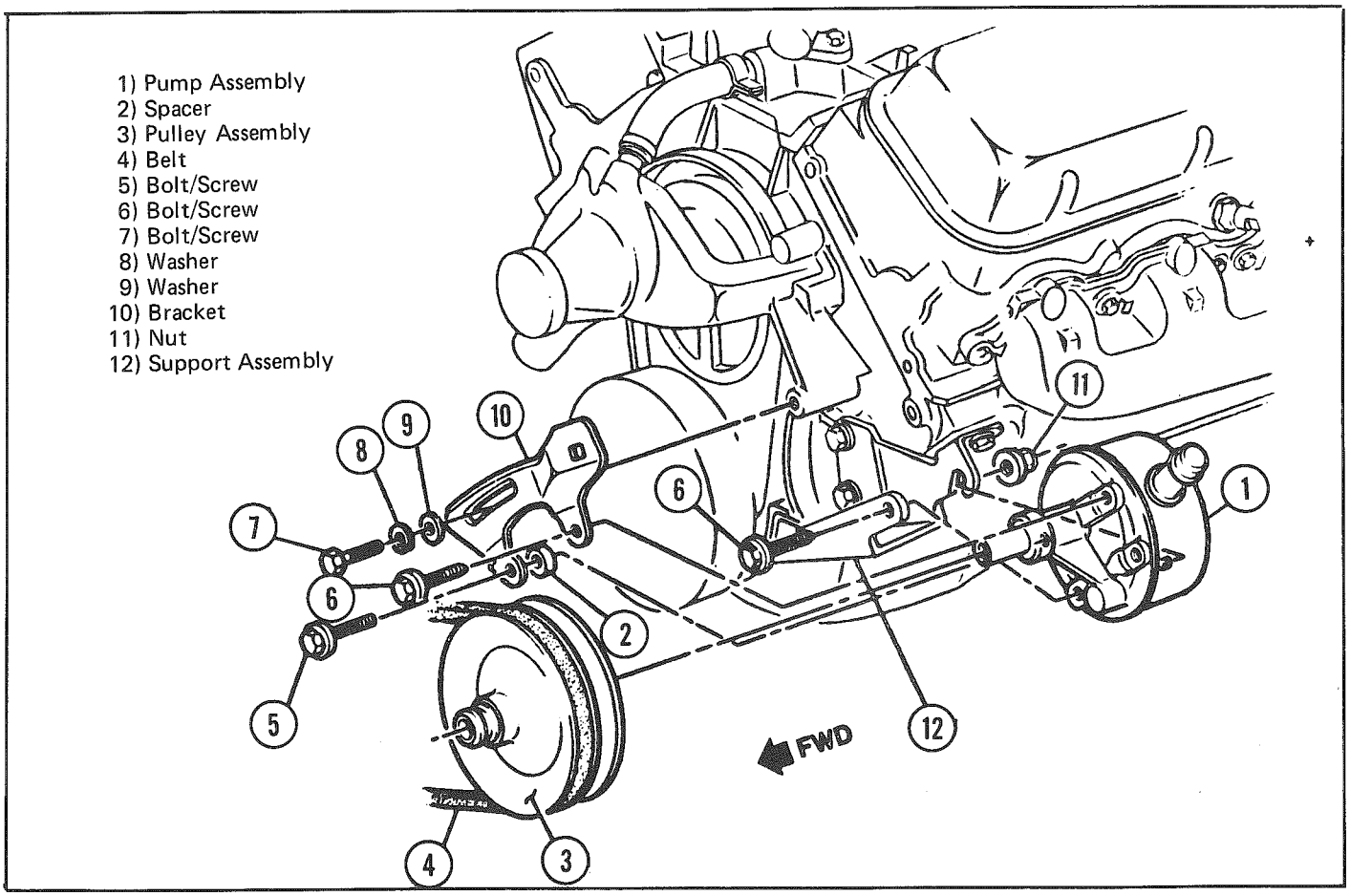


Figure 152 – Power Steering Pump Mounting

BRAKES (Continued)

HYDRO-BOOST SYSTEM – The brake system diagram for a Hydro-Boost installation is illustrated in figure 153. The Hydro-Boost is normally mounted on the front side of the firewall and used with a suspended brake pedal. The Hydro-Boost is either mounted directly to the firewall or to brackets attached to the firewall. In addition to mechanical connections to the pedal or input rod, four (4) hydraulic connections also need to be made. One connection is from the supply pump to the booster inlet port. A second connection delivers the hydraulic flow from the booster gear port to the steering gear. A third hose returns internal leakage and fluid from the boost cavity to the pump reservoir. The fourth connection returns fluid from the steering gear.

The hydro-boost unit includes a nitrogen charged pneumatic accumulator. The accumulator provides two or more reserve power assisted brake applications in the event of pressure supply loss, such as when the engine dies, or the belt breaks, etc. The number of reserve stops varies with the severity and duration of the applications.

BENDIX MINI-MASTER CYLINDER DISASSEMBLY

1. Remove the reservoir cover and diaphragm, and drain the fluid from the reservoir.
2. Remove the four bolts that secure the body to the reservoir using Socket J-25085.
3. Remove the small "O" ring and the two compensating valve seals from the recessed areas on the bottom side of the reservoir.

   Do not remove the two small filters from the inside of the reservoir unless they are damaged and are to be replaced.
4. Depress the primary piston using a tool with a smooth rounded end. Then remove the compensating valve poppets and the compensating valve springs from the compensating valve ports in the master cylinder body.
5. Using a small screwdriver, remove the snap ring at the end of the master cylinder bore. Then release the piston and remove the primary and secondary piston assemblies from the cylinder bore. It may be necessary to plug the front outlet port and to apply low air pressure to the front compensating valve port to remove the secondary piston assembly.

BENDIX MINI-MASTER CYLINDER ASSEMBLY

1. Lubricate the secondary piston assembly and the master cylinder bore with clean brake fluid.
2. Assemble the secondary spring (shorter of the two springs) in the open end of the secondary piston actuator, and assemble the piston return spring (longer spring) on the projection at the rear of the secondary piston.

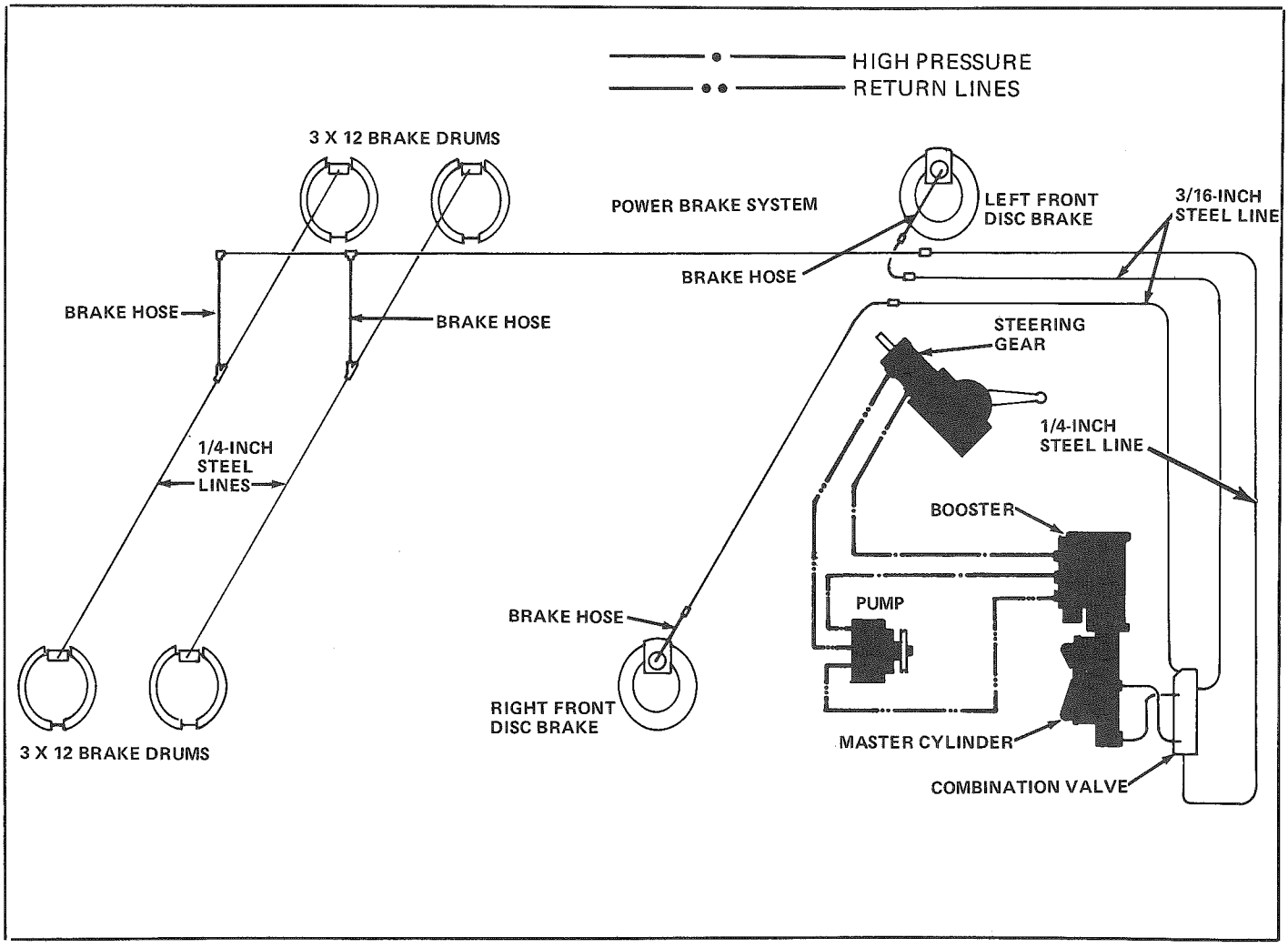


Figure 153 – Hydro-Boost System Schematic

BRAKES (Continued)

3. Insert the secondary piston assembly, actuator end first, into the master cylinder bore, and press assembly, actuator end first, into the master cylinder bore, and press assembly to the bottom of the bore.
4. Lubricate the primary piston assembly with clean brake fluid. Insert the primary piston assembly, actuator end first, into the bore.
5. Place the snap ring over a smooth round ended tool and depress the pistons in the bore.
6. Assemble the retaining ring in the groove in the cylinder bore.
7. Assemble the compensating valve seals and the small "O" ring seal in the recesses on the bottom of the reservoir. Be sure that all seals are fully seated.
8. While holding the pistons depressed, assemble the compensating valve springs and the compensating valve poppets in the compensating valve ports.
9. Holding the pistons compressed, position the reservoir on the master cylinder body and secure with the four mounting bolts. Tighten the bolts to 12-15 lb. ft. (16-20 N·m).

RAIL SLIDER CALIPER, BRAKE SHOES AND LININGS REMOVAL AND INSTALLATION – Replace shoe and lining assemblies as follows when the lining is worn to a minimum thickness of 1/32" (0.794 mm) above the backing plate. Always replace all shoes and lining assemblies on an axle. Never service one wheel only.

1. To avoid fluid overflow when the caliper pistons are pressed into the caliper cylinder bores, siphon or dip part of the brake fluid out of the larger master cylinder reservoir, (connected to the front disc brakes). Discard the removed fluid.
2. Raise the vehicle and install safety stands. Remove the the front wheel and tire assembly.
3. Remove the key retaining screw (see figure 155).
4. Using a brass rod and light hammer, drive out the key and spring, (see figure 156). It is not necessary to disconnect the hydraulic line to the caliper.
5. Remove the caliper from its support assembly by rotating the key and spring end out and away from the rotor. Slide the opposite end of the caliper clear of the slide in the support and off the rotor. Lay the caliper on the tie rod or axle.

NOTE: Do not let the caliper hang with its weight on the brake hose or the hose may become stretched or twisted.

6. Remove the caliper brake shoe anti-rattle spring and the inner and outer shoe and lining assemblies.
7. Thoroughly clean the areas of the caliper and support that contact during the sliding action of the caliper and apply lubricant D7AZ-19590-A or equivalent to the contact areas.

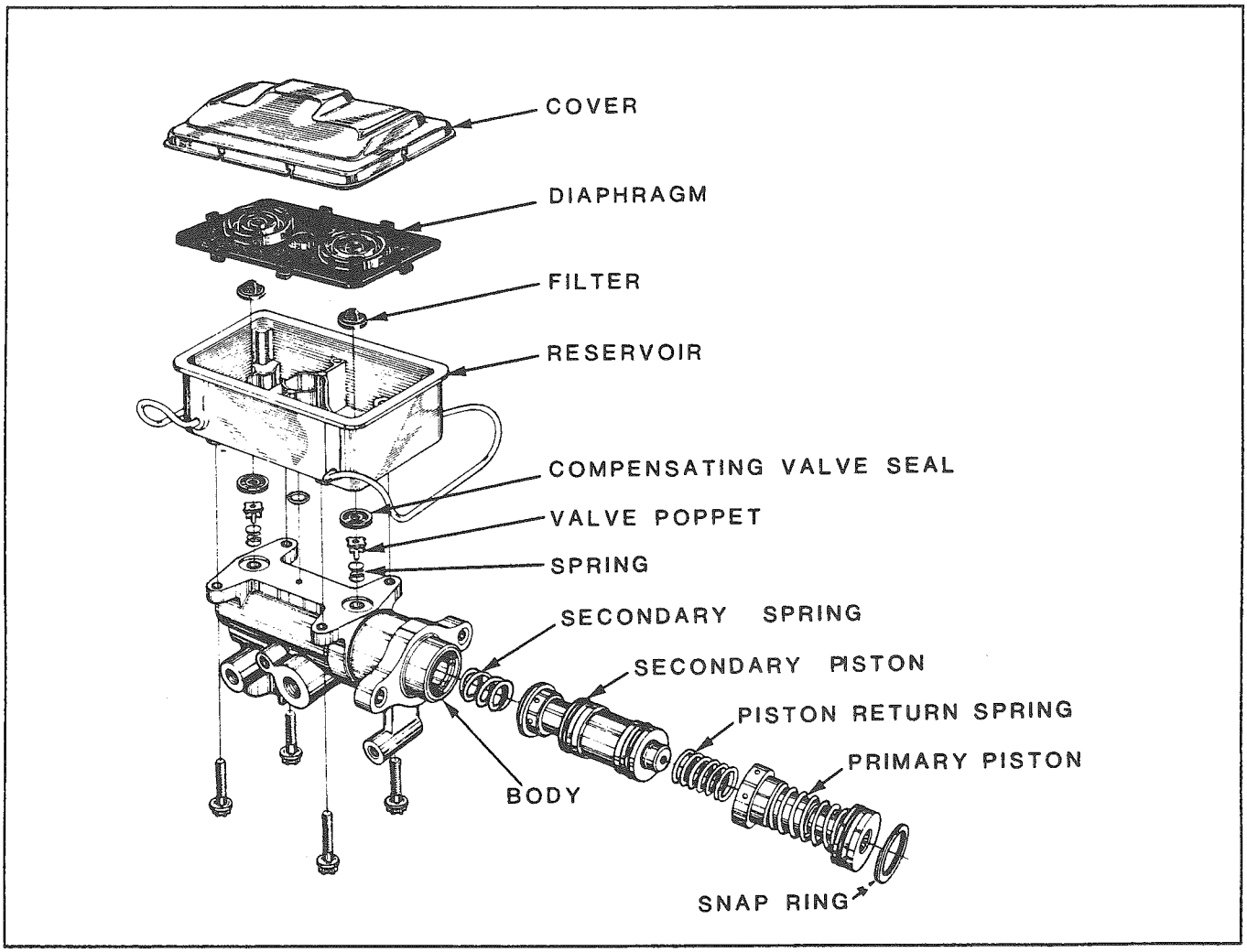


Figure 154 – Bendix Mini-Master Cylinder – Exploded View

BRAKES (Continued)

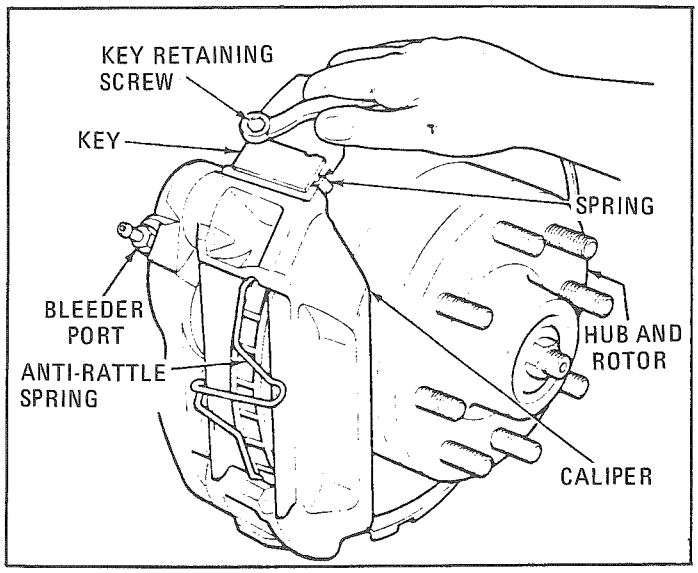


Figure 155 – Removing Key Retaining Screw

8. Place a C-clamp on the caliper housing midway between the piston bores, (see figure 157), and using the old inner shoe and lining over the pistons, tighten the clamp to bottom the caliper pistons in the cylinder bores. Remove the clamp and the inner shoe lining assembly.

BRAKE CALIPER, SHOES, LININGS INSTALLATION –

1. Check to be sure that the caliper pistons are fully bottomed in the cylinder bore.
2. Install new inner and outer shoe. Install anti-rattle spring.

NOTE: Always replace all shoe and lining assemblies on an axle. Never service one wheel only. There is a raised section at one end of each shoe so that installation can be made in one direction only.

3. Position the caliper rail into the slide on the support and rotate the caliper onto the rotor.
4. Position the key and spring, (figure 156), and hand start the subassembly between the caliper and support. Note that the spring is between the key and caliper and that the spring tangs overlap the end of the key, (figure 157). Use a brake adjusting tool or screwdriver to hold up the caliper, if required, against the support assembly.
5. Using a hammer, drive the key and spring into position aligning the correct notch with the existing hole in the support.
6. Secure the key to the support with the key retaining screw, (figure 158). Tighten the screw to 12-20 (lbs.-ft.).
7. After new shoe and lining assemblies and the wheel assemblies have been installed on both front wheels, lower the vehicle. Check the master cylinder reservoirs and fill if necessary with heavy duty brake fluid, C6AZ-19542-A or B (ESA-M6C25-A) or equivalent.
8. Depress the brake pedal firmly several times to seat the linings on the rotor. Do not move the vehicle until the pedal is firm.
9. Bleed the brakes.

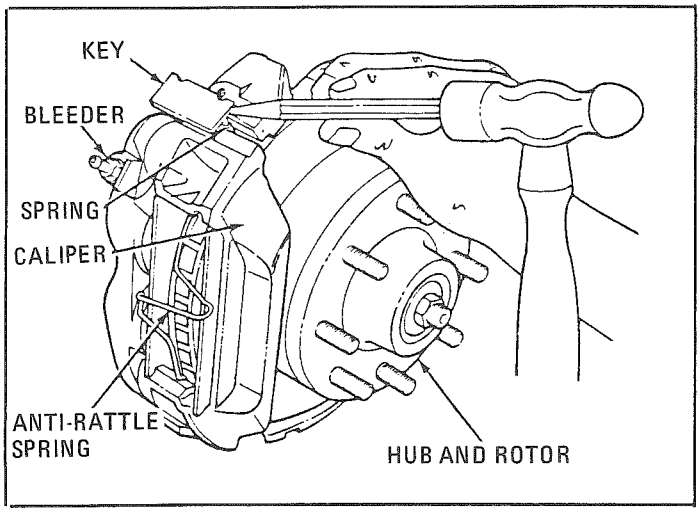


Figure 156 – Removing Spring and Key

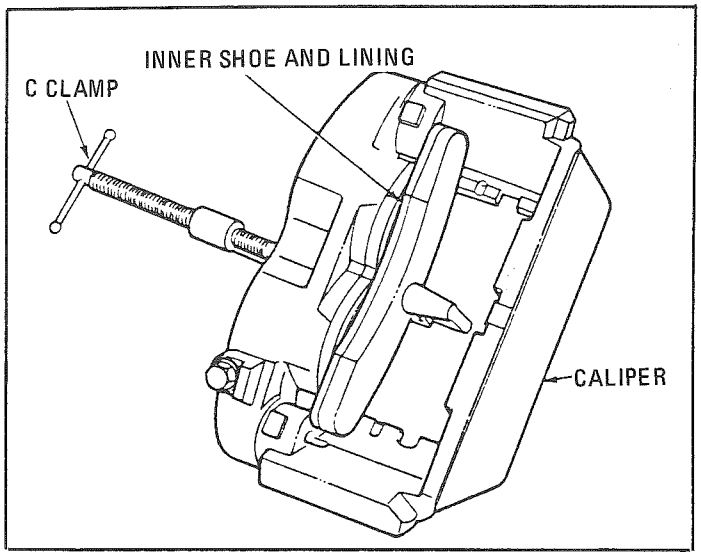


Figure 157 – Bottoming Caliper Pistons

DISC BRAKE CALIPER – RAIL SLIDING CALIPER – DISASSEMBLY AND ASSEMBLY –

1. Disconnect the flexible brake hose and plug the end to prevent brake fluid leakage. Remove the caliper, retaining screw support key and spring and remove the caliper assembly.
2. Remove the brake shoe and lining assemblies and anti-rattle spring.
3. Drain the fluid from the cylinders.
4. Secure the caliper assembly in a vise.
5. Place a block of wood between the caliper bridge and the cylinders, and apply low pressure air to the brake hose inlet. The pistons will be forced out to the wood block.
6. Remove the wood block, and remove the pistons.
7. Remove and discard the piston seals and boots.
8. If the caliper assembly is leaking, replace the piston assemblies. If the cylinder bores are scored, corroded or excessively worn, replace the caliper. Do not hone the cylinder bores. Piston assemblies are not available for oversize bores.

BRAKES (Continued)

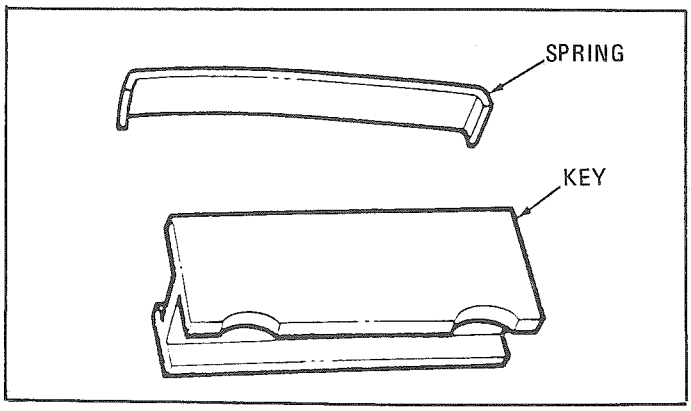


Figure 158 — Caliper Spring and Key

DISC BRAKE CALIPER & RAIL SLIDING CALIPER ASSEMBLY

CAUTION: Never re-use piston seals and dust boots. Install a new set each time the caliper is assembled.

1. Lubricate new piston seals with clean brake fluid C6AZ-19542-A or B or equivalent and install them in the seal grooves in the cylinder bores.
2. Apply a film of clean brake fluid to the cylinder bores.
3. Lubricate the retaining lips of the dust boots with clean brake fluid and install them in the boot retaining grooves in the cylinder bores.
4. Apply a film of clean brake fluid to the pistons.
5. Insert the pistons into the dust boots and start them into the cylinders by hand until they are beyond the piston seals.

NOTE: Be careful not to damage or dislodge the piston seal.

6. Place a wood block over one piston and press the piston into the cylinder being careful not to cock the piston in the cylinder. Install the second piston in the same manner. Make certain that boots are correctly seated.
7. Install the shoe and lining assemblies and anti-rattle clip in the caliper assembly. Place the caliper assembly on the support and install the caliper support spring, key and the key retaining screw. Tighten screw to 12-20 lb. ft.
8. Install the flexible brake hose with new copper washers and tighten to specification.
9. Bleed the brake system.

CAUTION: Do not move the vehicle until a firm brake pedal is obtained.

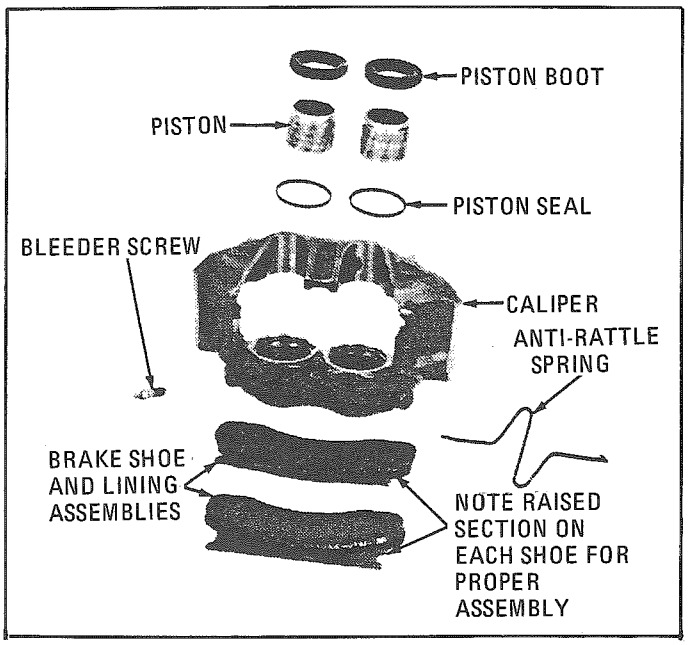


Figure 159 — Front Disc Brake Caliper Disassembled

WATER SYSTEMS

WATER STORAGE & DISTRIBUTION SYSTEMS – In the demand system, a non-pressurized supply tank is used and the water is pumped by a motor-driven pump from the tank directly to the outlet faucets. A pressure-sensing device is placed between the pump and the faucets. After the faucets are turned off, the pump continues pumping for a fraction of a second until the sensing device is triggered to turn off the pump. Each time a faucet is turned on, the pressure is momentarily reduced and the sensing device turns the pump on until the faucet again is turned off.

In the system there is a switch connected in series with the pump so the user can deactivate the pump so it will not operate when the motorhome is being stored. It also is good policy to turn this switch off when the motorhome is traveling on the highway. During such periods there is very little demand for water, and any malfunction of the water system might not be detected.

City Water Hook-Up – In addition to the water system described above, your motorhome has a city water hook-up system. This simply is a fitting connected to the high-pressure system of the motorhome which will accept the end of a high-pressure hose which can, in turn, be connected to a city water supply. A pressure regulator is connected to prevent possible damage to the system due to extremely high outside water pressure. When the city water supply is connected to the motorhome, this valve is activated to stop the demand from the fresh water storage tank.

CAUTION: Never run the water pump when hooked up to a city water source or when the tank is empty. Damage to the pump will result.

Water Purification – Water which is questionable can be purified by allowing it to boil at least five (5) minutes or by proper treatment with chlorine, iodine, or Halazone or Globaline tablets. Of these methods, chlorination is used by most motorhome owners. Chlorine bleach in the amount of two (2) drops of 5.2% solution for each gallon of water will purify against most bacteria and viruses. Super chlorination does introduce the unpleasant taste of chlorine in the water, but water purifiers are now available which will eliminate this problem. The following treatment is recommended for super chlorination to protect against all organisms.

Before refilling the water tank, pour sufficient household bleach into it to produce an ultimate solution which will amount to 20 drops of 5.2% chlorine for each gallon of water. Then fill the tank with water and run the motorhome several miles to be sure that the chlorine solution has been thoroughly mixed with the water. Then draw all drinking water through the purifier which is basically a filter charged with activated charcoal or other substances.

Some additional facts relative to water treatment might be informative. Bacterial activity increases in 100° water. Freezing does not destroy bacteria; they merely remain dormant.

Water Filter – The water filter installed in your coach is located in the under-counter cabinet below the sink. The filter is installed with a cartridge.

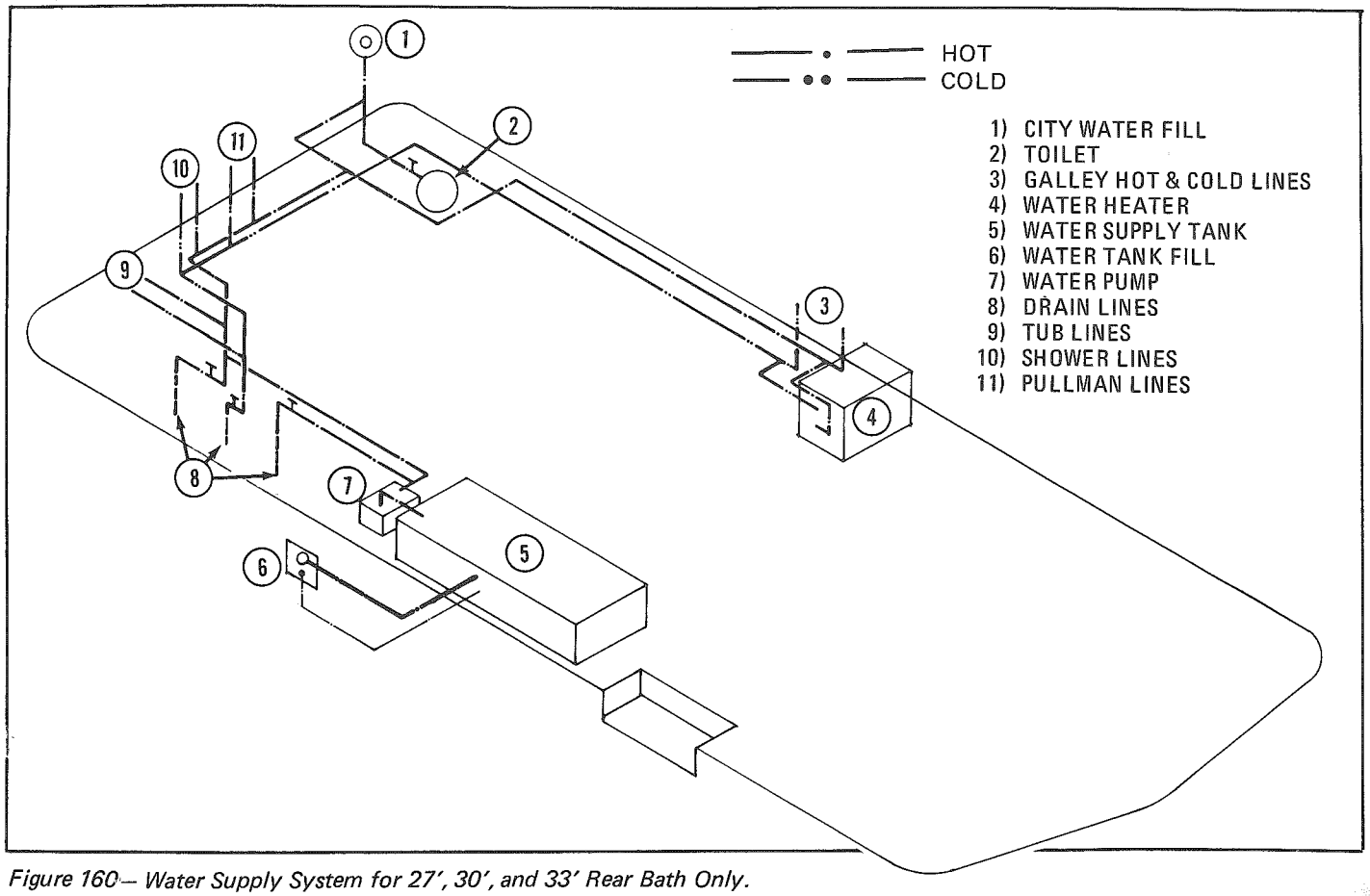


Figure 160– Water Supply System for 27', 30', and 33' Rear Bath Only.

WATER SYSTEMS (Continued)

Each time water passes through the filter, dirt particles are trapped and held in the tiny pores of the coating on the filtering element inside the cartridge. As the filter actively removes the impurities from the water, its microscopically small pores slowly fill and the amount of water from the filter gradually lessens. When the flow of the water from the unit becomes too slow for convenience, it should be serviced. If the cartridge is not changed, eventually the flow will stop entirely. It would be wise to carry a spare cartridge with you when you are traveling, just in case you fill the water tank from an exceptionally dirty source.

Even when decreasing flow does not demand it, at least one cartridge change per year is recommended for reliable performance from your water purifier system.

Filling the Tank – Using the method of super-chlorination followed by treatment with a water purifier, water can be taken on board from almost any source.

Experienced motorhome users usually carry their own water hose. Special hoses which will withstand continuous high pressure, and which will transfer drinking water without adding unpleasant tastes and odors, can be purchased from RV dealers. One or two 50' lengths of such hose should be made a part of the standard motorhome equipment.

For each system, after the tank is full, the pump switch should be turned on. After using the hose, it should be sealed by screwing the male and female ends together prior to storage.

Water Heater – Your water heater has a capacity of up to approximately 10 gallons, more than sufficient for a normal supply of hot water.

When operating the water heater with LP gas, use the controls located on the heater itself. Temperature may be set from warm to very hot. The water may be heated through the automotive heat exchanger system (see page 138).

For proper operation and maintenance, study the instructions on the heater, in addition to those provided in your Owner kit. Access to the water heater is gained through the exterior compartment.

Draining and Sanitizing Water Tank – It is a good policy to drain the water from the system at the end of each trip. After draining the tank, it is wise to close all valves so that air-borne contamination or small insects cannot enter the system.

After purchasing a new motorhome, or after a unit has been out of use for any extended period of time, the water system should be sanitized by the following procedure. Use 2/3 cup of 5% bleach solution for each 10 gallons of water, in the tank. To insure a thorough mixing of the bleach, figure out beforehand the amount of bleach required. Place a portion of it in the tank intermittently between the adding of each five or six gallons of water. When the tank is full, open the faucets and

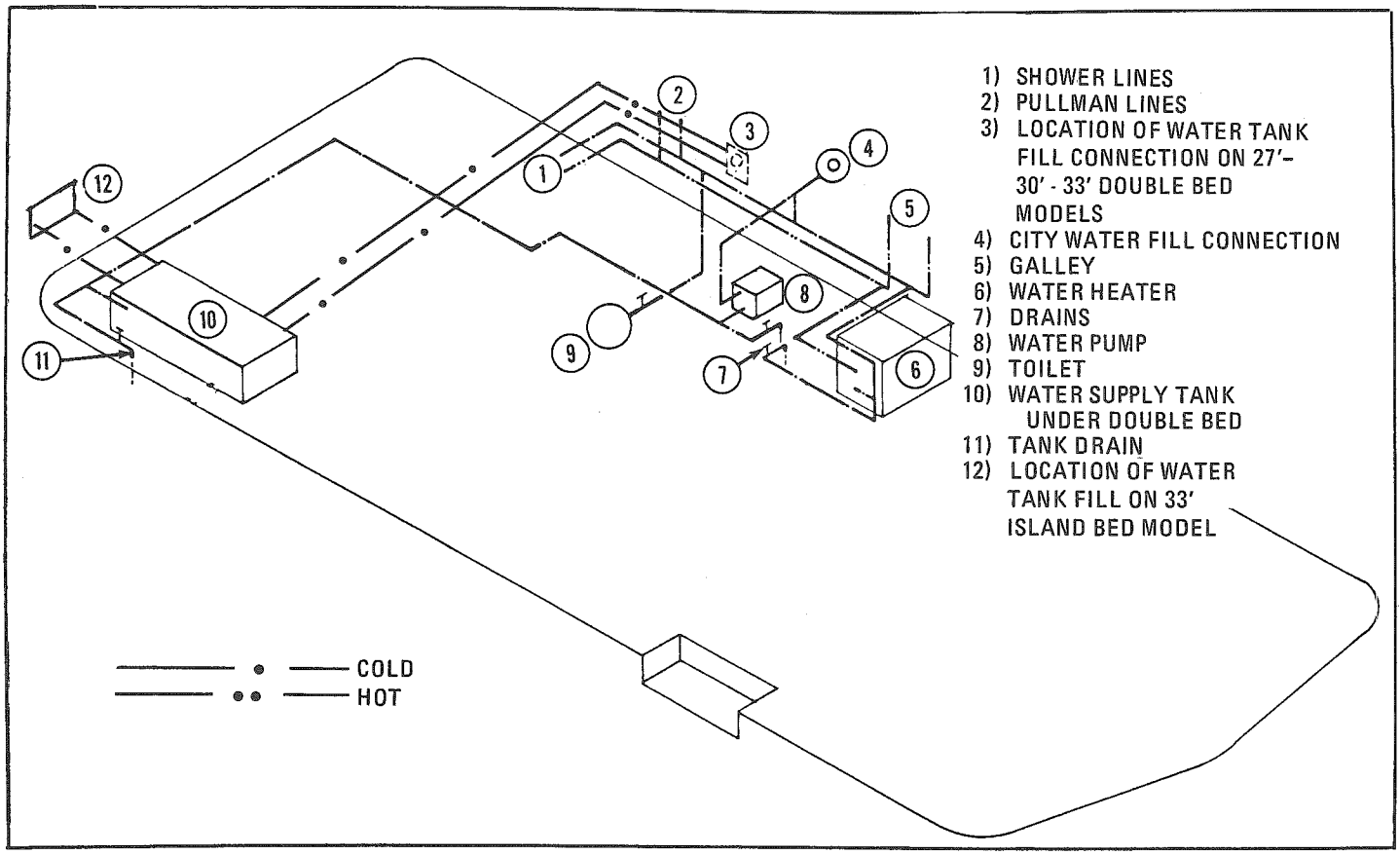


Figure 161 – Water Supply System for 27', 30', 33' Double Bed Only.

WATER SYSTEMS (Continued)

fill all waterlines. Allow the solution to stand in the system for approximately one hour. Then drain and flush the system thoroughly with fresh water.

Freeze-Proofing Water System – The use of the water system in freezing weather is a matter that must be given careful attention. Freezing can cause extensive damage to a water system.

To make sure the system is totally purged, the following procedure may be followed. Turn off the water pump and water heater. Then open all drain valves, including the valves at the bottom of each tank, at the bottom of the water heater, and at low points in the water lines. Permit water to drain out.

After all water appears to have drained out, depress the foot pedal of the toilet.

Also remove the hose connection cover on the city water hook-up fixture, and depress the button on the check valve to permit that line to drain. Turn on water pump to insure that water is expelled.

A new procedure has recently been developed using non-toxic, non-flamable anti-freeze, which can be purchased from RV dealers. The procedure is as follows: Add an adequate amount of anti-freeze to the tank to enable the pump to run it through all the lines. The motorhome is equipped with a hot-water heater that has a storage tank, enough anti-freeze will have to be used to fill the tank and allow the solution to come through all of the hot-water lines. Each faucet or water-using device should be opened one at a time until the solution begins to flow through it.

The anti-freeze can be saved and used year after year. Some users eliminate the need to fill the water-heater by disconnecting the water-heater lines and then connecting them together with a by-pass connection.

Water Disposal Systems – Wash basins, showers, bathtubs and the kitchen sink all produce waste water which must be disposed of. Since the volume of liquid that passes through these sinks and basins is relatively high, these wastes are collected in the sewage holding tank.

Holding Tank Systems – The primary principle of operation of the holding-tank systems used in your motorhome is simply that of collecting waste water and sewage into tanks and then emptying these tanks from time to time at suitable disposal stations. At the outlet of this tank there is a 3" diameter plastic tubing; then a slide valve, which can be opened or closed; then another piece of tubing and a tightly fitting cap.

All primary drain outlets of holding tanks are located on the left side of the coach and are equipped with the watertight cap. This cap must be in place while the vehicle is in motion.

Each sink, wash basin, shower, or bathtub in the motorhome empties through a water-type gas trap, called a P-trap.

The wash-water drainage system is designed with plumbing lines having a drop of 1/4" per running foot. These lines all converge at a common outlet.

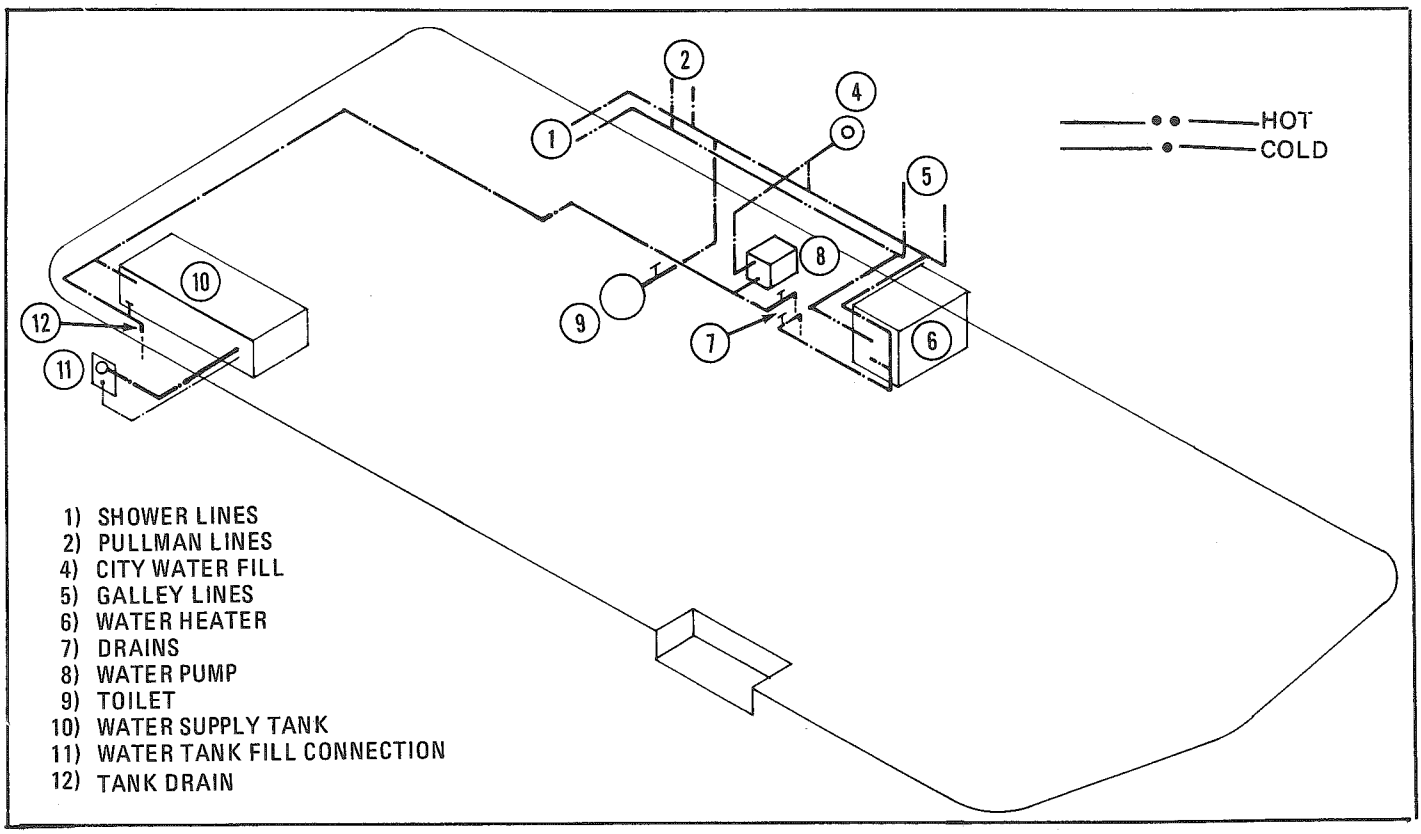


Figure 162 – Water Supply System for 27', 30', 33' Twin & Family Room Only.

WATER SYSTEMS (Continued)

The shower basin or bathtub is the lowest disposal plumbing facility in the motorhome. If the holding tanks are not emptied when they are full, flooding could occur which would involve wash water and/or sewage backing up into the shower or tub.

Approved dumping stations may be found at private campgrounds, gasoline stations, state parks, national parks, roadside rest parks, etc. A book listing the locations of many approved dumping stations may be obtained from most RV dealers.

Your REVCON motorhome has been equipped with the latest sanitation system available, including:

1. A suds, or gray tank into which the tub/shower and sinks drain.
2. A sewage, or solids, tank, into which the toilet drains.

The solids tank is mounted directly to the base of the toilet. Holding tank plumbing is designed to allow each tank to be drained separately, by using the Push-Pull valve.

It is recommended that the solids tank be drained first. Leaving the suds tank full until all solids are drained will cause the suds tank water to act as a wash, thereby cleaning the drain hose and helping to dislodge any waste that may build up.

To empty the holding tank of sewage:

1. Be sure the Push-Pull valves are closed.
2. Remove the drain tube plug.
3. Attach drain hose to drain tube.
4. Insert open end of drain hose at least two feet into the sanitary station connection.
5. Remove the metal wire retainers from the handle of the Push-Pull valve. When opening the valve, use a quick jerk to create the necessary flushing action.
6. When the tanks are drained, shut the valves and replace the retainers.
7. Remove the sewer drain hose, and rinse it thoroughly. Place it into storage.

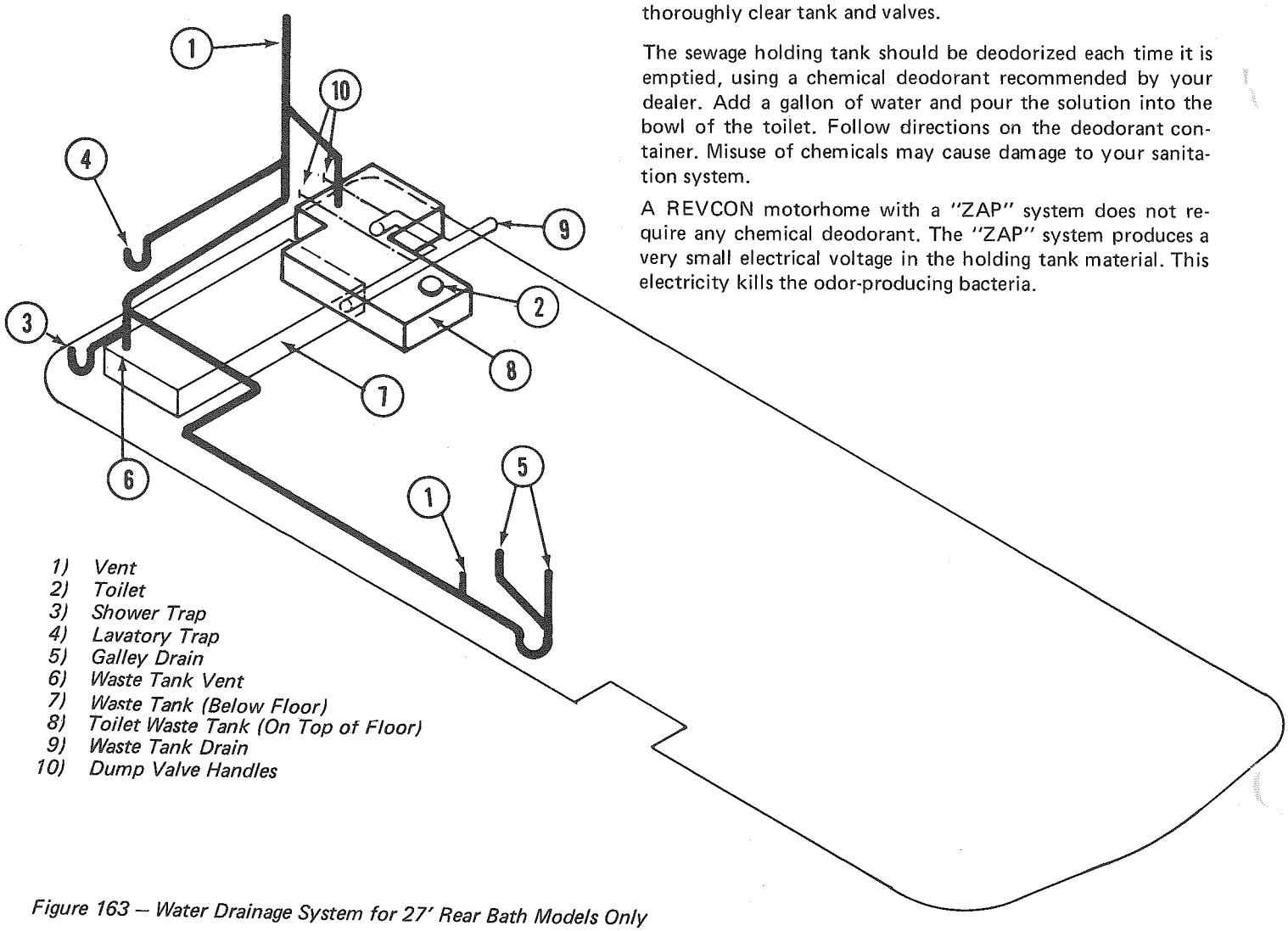
When connecting your drain hose to an in-park sewer system, keep holding tank valves closed. Empty the tanks when necessary, as stated above. This will prevent liquid run-off which causes tank clogging of solids.

If an obstruction should occur in the drain system, **do not use lye or commercial drain products. A toilet flush-through or a wire drain cleaner should clear the drain.**

To clean and sanitize your holding tanks, flush with a hose through toilet valve, then pour in a 1/4 cup of household bleach, diluted in two gallons of water, let the solution stand, and rinse thoroughly. Be sure to use plenty of water for rinsing to thoroughly clear tank and valves.

The sewage holding tank should be deodorized each time it is emptied, using a chemical deodorant recommended by your dealer. Add a gallon of water and pour the solution into the bowl of the toilet. Follow directions on the deodorant container. Misuse of chemicals may cause damage to your sanitation system.

A REVCON motorhome with a "ZAP" system does not require any chemical deodorant. The "ZAP" system produces a very small electrical voltage in the holding tank material. This electricity kills the odor-producing bacteria.



1) Vent
2) Toilet
3) Shower Trap
4) Lavatory Trap
5) Galley Drain
6) Waste Tank Vent
7) Waste Tank (Below Floor)
8) Toilet Waste Tank (On Top of Floor)
9) Waste Tank Drain
10) Dump Valve Handles

Figure 163 – Water Drainage System for 27' Rear Bath Models Only

WATER SYSTEMS (Continued)

Wintertime Use of Holding-Tank Systems – Obviously, in cold weather the contents of the holding tank might freeze and damage the plumbing. The holding tank can be used at below-freezing temperatures if an appropriate anti-freeze is placed in the tank. The owner should consult with the dealer service department from where he purchased the motorhome, to determine whether or not automotive-type anti-freezes can be used. Inquiry should also be made into the use of sodium chloride or calcuim chloride as an anti-freeze agent.

TOILET –

Your REVCON motorhome uses the "Aqua-Magic," toilet unit by Thetford. It features the unique "Micro Rinse" flush, and dual pedal fill. It comes in ivory and white decorator colors, and there is a padded seat model available.

Toilet Operating Instructions –

1. To add water to bowl, step on small pedal until water reaches desired level, then release pedal slowly.
2. To flush, step on large pedal until rinse clears bowl, release pedal slowly.

Toilet Maintenance – No routine maintenance is required. To clean toilet, use Thetford Aqua Bowl or any other high grade, non-abrasive cleaner. **Do not use highly concentrated or high acid content household cleaners or scouring powders, as they damage seals and finish.**

Winterizing –

1. **Draining Method** – Completely drain the toilet water supply line leaving the water supply valve open. This valve may be kept open by inserting a round object, like a soft drink bottle into the flush hole in the bowl.

CAUTION: When using air pressure to drain water line, toilet valve should be held in open position.)

2. **Anti-freeze Method** – Use potable water system type anti-freeze to winterize the fresh water plumbing system. (See page 133.)

CAUTION: Never use automotive type anti-freeze in fresh water system. These are highly toxic.)

CAUTION: Do not use household detergents or cleaning compounds. They may contain chemicals that would damage the plastic drain system or termination valve seals.

NOTE: If water is inadvertently frozen in the toilet, do not attempt to flush until the ice is thawed. Otherwise damage to toilet could occur.

Holding Tank Hints – After hook-up to sewer line at campgrounds, leave the vehicle termination valve on the blackwater (toilet waste) holding tank **closed until the tank is at least 3/4 full.** This provides sufficient water in the tank to insure com-

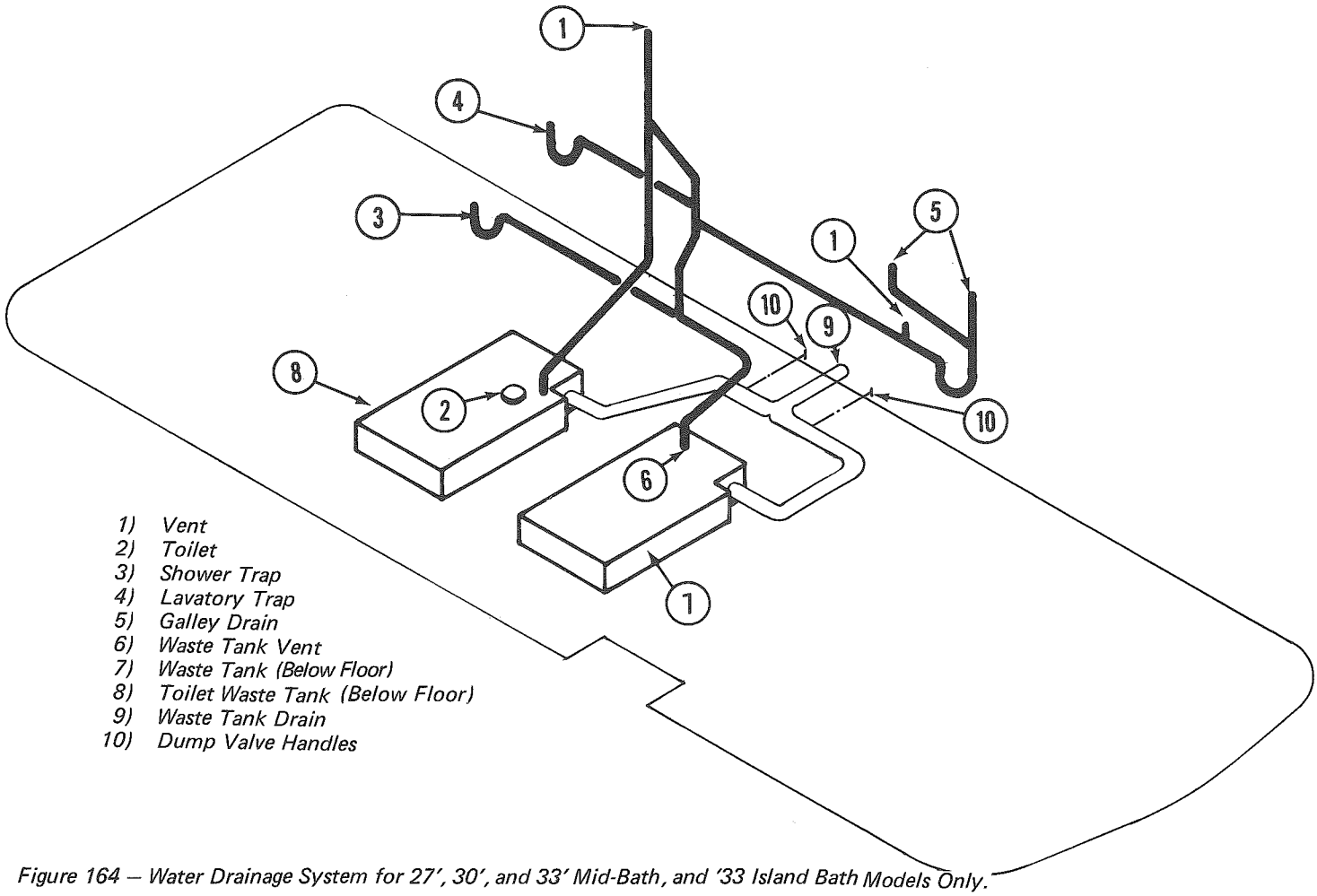


Figure 164 – Water Drainage System for 27', 30', and 33' Mid-Bath, and '33 Island Bath Models Only.

WATER SYSTEMS (Continued)

plete flushing of waste material into the outside sewer line.

Unlike the toilet at home which uses between 4 - 7 gallons of water per flush, the average RV uses from 1 cup (8 oz.) to several quarts of water per flush, which is enough water to flush the waste from the toilet into the holding tank. If there is not sufficient water in the holding tank, waste materials may not evacuate properly when the termination valve is opened and clogging could eventually result.

To empty the blackwater holding tank, **open** the termination valve. When holding tank is empty, rinse it thoroughly using Aqua-Bowl Cleaner, (or a comparable cleaner recommended by your RV dealer). Use the cleaner with several gallons of fresh water. Be sure to **close** termination valve after emptying and thoroughly rinsing out the holding tank.

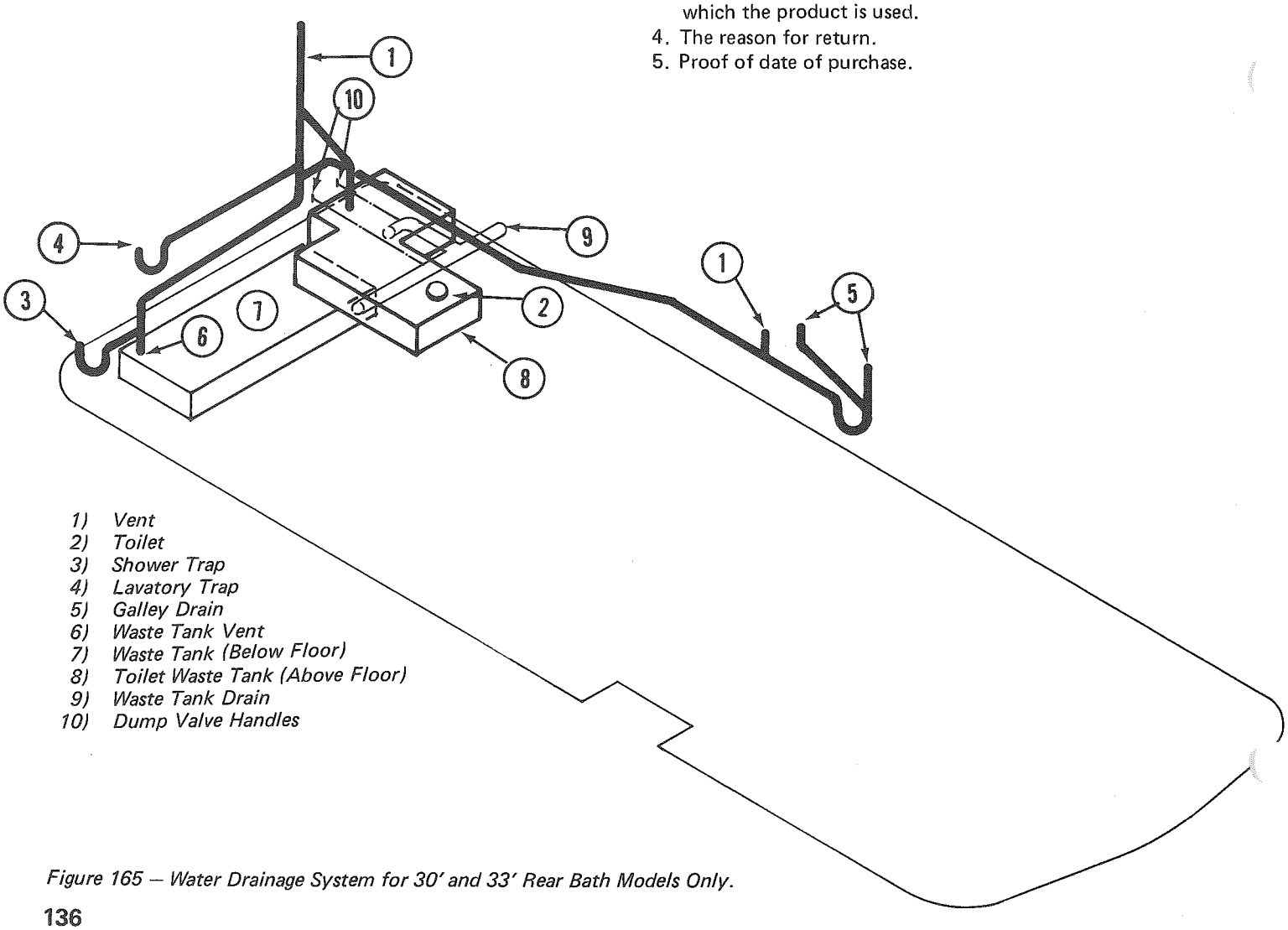
NOTE: With two holding tanks, one for blackwater (toilet waste) and one for graywater (sink and shower waste), there are two vehicle termination valves, one for each holding tank. You may leave the graywater termination valve open during hookup to an outside sewer line. Graywater contains few solid particles and will not clog the holding tank. But it is a good practice to rinse the graywater tank with clear water and the Aqua-Bowl Cleaner before closing the termination valve.

Toilet Trouble-Shooting –

1. **Symptom:** Water keeps running into bowl.
   Correction: Clean out foreign material in groove where water valve blade seats in bottom of bowl. If blade cannot close completely, neither will water valve.
2. **Symptom:** Toilet leaks, water on floor.
   Correction: If vacuum breaker leaks while flushing, replace vacuum breaker. If vacuum breaker leaks when not flushing, replace water valve. If leak is at bowl to mechanism seal, replace mechanism. If leak is at closet flange to floor seal, check flange nuts for tightness. If leak continues, remove toilet, check closet flange height. (1/4" to 7/16" above floor). Adjust accordingly. Replace flange seal if it is damaged.
3. **Symptom:** Foot pedal operates harder than normal or blade sticks.
   Correction: Apply light film of silicone spray on blade.

Toilet Service and Parts – See warranty in owner's packet for service information. Refer to your local Thetford dealer for parts and service. If it becomes necessary to send parts to a Thetford Certified Service Center for warranty consideration or to contact the factory, please include the following information:

1. Your name and address.
2. The product name, model, serial number and color.
3. The type of recreational vehicle (brand name and year) on which the product is used.
4. The reason for return.
5. Proof of date of purchase.



1) Vent
2) Toilet
3) Shower Trap
4) Lavatory Trap
5) Galley Drain
6) Waste Tank Vent
7) Waste Tank (Below Floor)
8) Toilet Waste Tank (Above Floor)
9) Waste Tank Drain
10) Dump Valve Handles

Figure 165 – Water Drainage System for 30' and 33' Rear Bath Models Only.

WATER SYSTEMS (Continued)

For Best Results Use Thetford Convenience Products –

Wherever your travels take you, Thetford offers three holding tank products:

1. Aqua-Kem, a liquid concentrate deodorant.
2. Dri-Kem, a granular holding tank deodorant.
3. Aqua Zyme, an enzymatic waste treatment liquid.

All three products are highly effective and are quick and easy to use when the label instructions are followed.

When adding Aqua-Kem, Dri-Kem, or Aqua Zyme to holding tank, be sure the vehicle termination valve is closed. Then add 8 oz. of Aqua-Kem or two, 2 oz. packets of Dri-Kem, with enough fresh water to cover the bottom of your empty holding tank. When using Aqua Zyme, add 2 oz. to toilet and flush, using two gallons of water. Variations in time periods, temperatures or usage may require changes in amount of product used. For more complete information, see label instructions on the Aqua-Kem, Dri-Kem and Aqua Zyme containers.

To prevent holding tank clogging by toilet tissue, use Aqua Soft toilet tissue. Specially formulated by Thetford, Aqua Soft fights clogs because it disintegrates and dissolves rapidly in holding tanks.

CAUTION: Aqua-Kem contains methyl alcohol and formaldehyde. It cannot be made non-poisonous. Avoid contact with skin, eyes, and mucous membranes. Avoid prolonged or repeated breathing of vapor. Prolonged or repeated contact may cause allergic irritation.

FIRST AID: In case of skin or eye contact, immediately flush affected area with plenty of water for at least 15 minutes. For eyes, get prompt medical attention. If swallowed, give one or two glasses of water or milk. Induce vomiting and call your physician or Poison Control Center immediately.

WATER PUMP – The water supply system for the REVCON incorporates an ITT Jabsco water pump which operates on 12-volt DC electrical power. The pump is capable of delivering three (3) gallons per minute under 16 psi pressure, A pressure-sensing device, in the line between the pump and the faucets or water outlets, turns the pump on when a faucet is turned on. The pump continues to operate for a fraction of a second after the faucet is turned off until the sensing device triggers to turn off the pump.

AUTO WATER HEATER EXCHANGE SYSTEM – The REVCON motorhome is equipped with a unique system which provides heated water directly from the automotive engine. The advantage of this system is that it provides hot water whenever the vehicle engine is operating to the coach outlets, thus eliminating the use of the regular water heater except when the vehicle is parked. For a schematic of this system, see figure 166.

HOT WATER HEATER – The REVCON is equipped with a 10-gallon hot water heater. The heater is equipped with a fail-safe pilot which will automatically shut off the gas supply if the pilot flame is extinguished. When the water reaches the pre-determined temperature, the water heater will automatically shut off. When the water heater switch is turned "ON" the spark should begin and the burner will light. If the spark stops before the burner lights, then turn the switch to "OFF." Wait five (5) seconds and then switch to the "ON" position. This will re-start the ignition cycle. The first start-up of the heater may require several ignition cycles before all air is purged from the gas lines.

If the burner will not come on, check the following:

1. Switch turned off.
2. Gas supply to heater empty or turned off.
3. Reset button tripped.
4. Fuse blown.

WATER HEATER THERMOSTAT AND MANUAL TEST – The water heater is provided with a high-temperature cut-off device in the event of thermostat failure. Temperature above 190°F will cause the manual reset button to trip shutting down the main burner. To activate the burner, the water temperature must be below 100°F. Push the reset button to re-activate the burner.

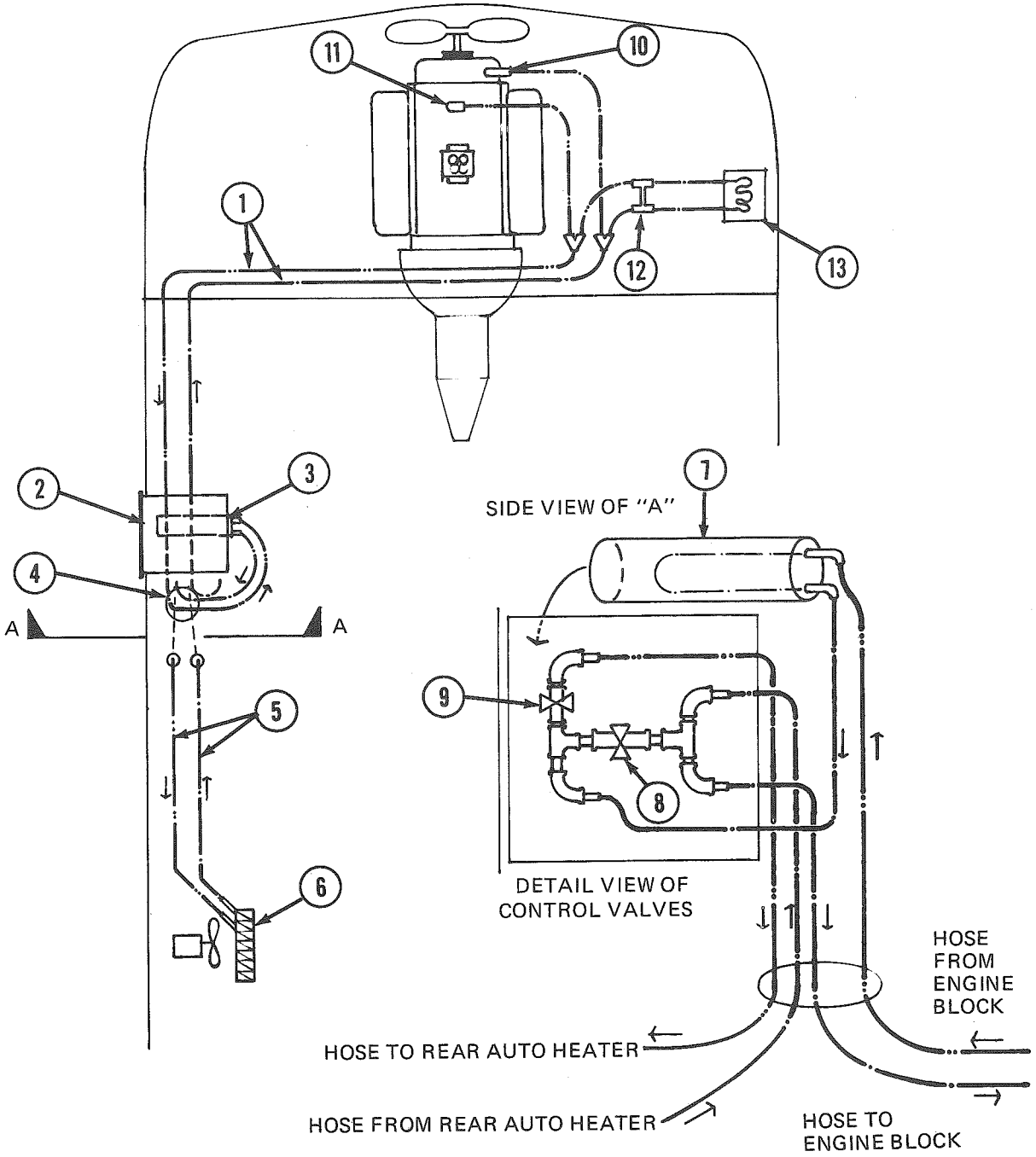
WATER HEATER BURNER – All air shutters are pre-set to obtain a blue or orange-blue flame. If it is necessary to adjust the air shutter, be sure to maintain the blue or orange-blue flame color. Do not allow the burner plate to burn with a yellow flame, because sooting will occur.

In cases where sooting has occurred, there is a possibility that this condition may be corrected by making the correct air shutter adjustment. If the burner flame continues to burn yellow after adjusting the air shutter, check for an obstruction in the burner or the flue box. A stiff brush is recommended for the removal of soot deposits. If there is soot in the burner, check to make sure the gas valve is shutting off clean. This can be checked by turning the OFF-ON switch to the OFF position. There should be no flame at the burner orifice at at the burner.

WATER PUMP DIAGNOSIS

CONDITION	POSSIBLE CAUSE
Pump operates but no water flows through faucet.	Low water level in tank. Suction line clogged or kinked. Air leak in suction line. Loose hose clamps or fittings in suction line. Defective valves or check valve.
Pump cycles on and off when faucets are closed.	Water leak in plumbing. Defective toilet flush valve. Internal leak in pump. Outlet valve not sealing.
Pump operates roughly and has excessive noise and vibration.	Intake line is restricted, kink in suction hose or fittings too small. Pump mounting inscure. Deformed or ruptured pulsation dampener in pump.
Pump fails to start when when faucet is opened.	No voltage to pump. Blown fuse. Clogged or kinked outlet line.
Pump fails to stop when faucets are closed.	Empty water tank. Outlet valve not sealing. Very low voltage to pump. Air in system. Defective pressure switch.

WATER SYSTEMS (Continued)



1) 5/8" HEATER HOSE TO AND FROM WATER HEATER AND REAR AUTO HEATER
2) WATER HEATER
3) WATER HEATER HEAT ELEMENT
4) CONTROL VALVES
5) 5/8" HEATER HOSE TO AND FROM AUTO HEATER
6) REAR AUTO HEATER
7) DETAIL OF WATER HEATER ELEMENT
8) GATE VALVE: NO. 8 OPEN NO. 9 CLOSE – HEATS ONLY WATER HEATER.
9) GATE VALVE: NO. 9 OPEN NO. 8 OPEN – HEATS WATER HEATER AND REAR AUTO HEATER.
   GATE VALVE NO. 8 AND NO. 9 CLOSED – NO HEAT TO WATER HEATER OR REAR AUTO HEATER.
10) ENGINE WATER PUMP
11) ENGINE BLOCK
12) "H" VALVE
13) DASHBOARD HEATER CORE

Figure 166 – Automotive Heat Exchanger Water System Schematic

LP GAS SYSTEMS

LP Gas Systems – Your coach uses liquid-petroleum (LP) gas as a fuel for all the appliances which require heat, such as the water heater, furnace, range, oven, and absorption-type refrigeration. LP gas is economical and effective for these purposes; when proper precautions are taken, it is a safe form of energy. There are two types of LP gas in common usage, propane and butane. If the temperature is below 32°F, butane will not vaporize. It can be used only in warm climates. Propane, on the other hand, will vaporize at any temperature above –40°F. Most LP gas used in motorhomes is propane.

Storage Tanks for LP Gas – LP gas is stored in cylindrical-shaped welded steel or aluminum tanks, having hermispherical-shaped ends. These tanks are designed to withstand the high pressure necessary to contain the LP gas in liquid form.

All LP-gas tanks are mounted to the underside of the floor of the coach and vented freely to the atmosphere so that in the case of leakage the gas will not be discharged into the interior of the coach where it might be ignited by a pilot flame and cause an explosion.

All LP-gas systems have a pressure regulator mounted in the vicinity of the tank outlet.

When any appliance is not being used, the gas shut-off valve controlling that appliance should be placed in the "OFF" position. When the motorhome is to be stored for any period of time the main shut-off valve at each tank should be closed. For maximum safety, all LP-gas valves should be turned off when the motor home is traveling on the highway.

LP Gas Leak Detector – A standard feature in all REVCON motorhomes is the LP-gas leak detector. It is designed to quickly detect leakage in any LP-gas (vapor phase) piping and appliance system. The device does not prevent leaks. It will visibly show that LP gas is leaking in the system, when the red plunger is actuated in the proper test sequence. The test is conducted as often as seems necessary. The operator should be encouraged to use it before a trip is undertaken, after arrival, and after returning home.

Checking for Leaks – The LP-gas distribution system should be checked for leaks at frequent intervals. An oily substance having a pungent odor is always mixed with LP gas so that if there is a leak, you will be able to smell it.

There are a wide assortment of gas leak-detecting instruments available, but one of the best methods to determine where the gas is leaking is to use a soap solution. Such a solution can be made by mixing ordinary liquid dishwashing detergent with water. This can be applied with a small paint brush to gas lines and connections. Bubbles will appear at any place where gas is leaking out of the system. Most leaks occur at fittings and the leak can usually be stopped by tightening the fitting. Where such tightening fails to stop the leak, the fitting must be replaced.

WARNING: No flammable material should ever be used to check for leaks in an LP-gas system.

Occasionally water may find its way into an LP-gas system and if this water freezes, the operation of the system is impaired. The injection of anhydrous methanol into the LP-gas system, using approximately one ounce for each 20 lbs. of fuel, will usually eliminate this problem. The anhydrous methanol ab-

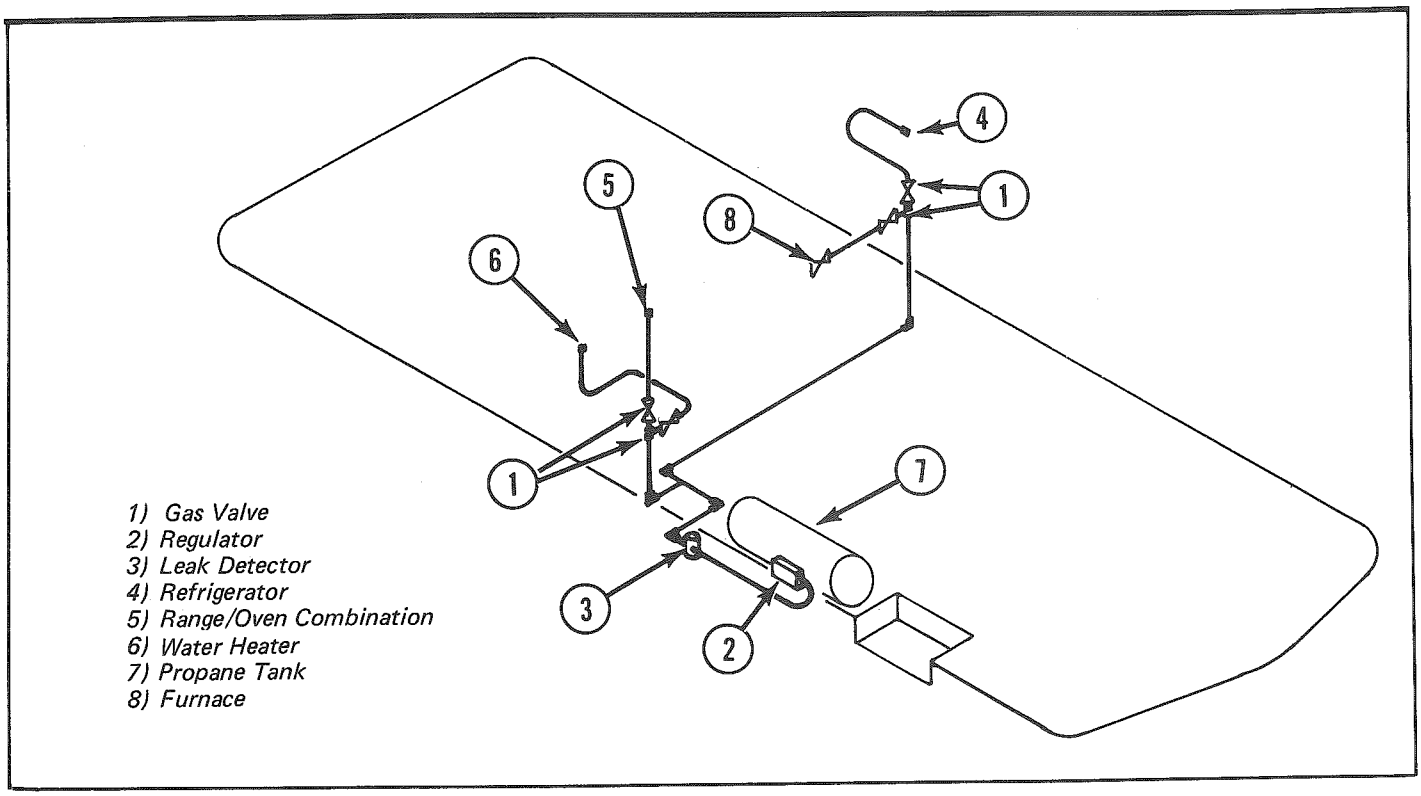


Figure 167 – 27' Rear Bath LP Gas System

LP GAS SYSTEM (Continued)

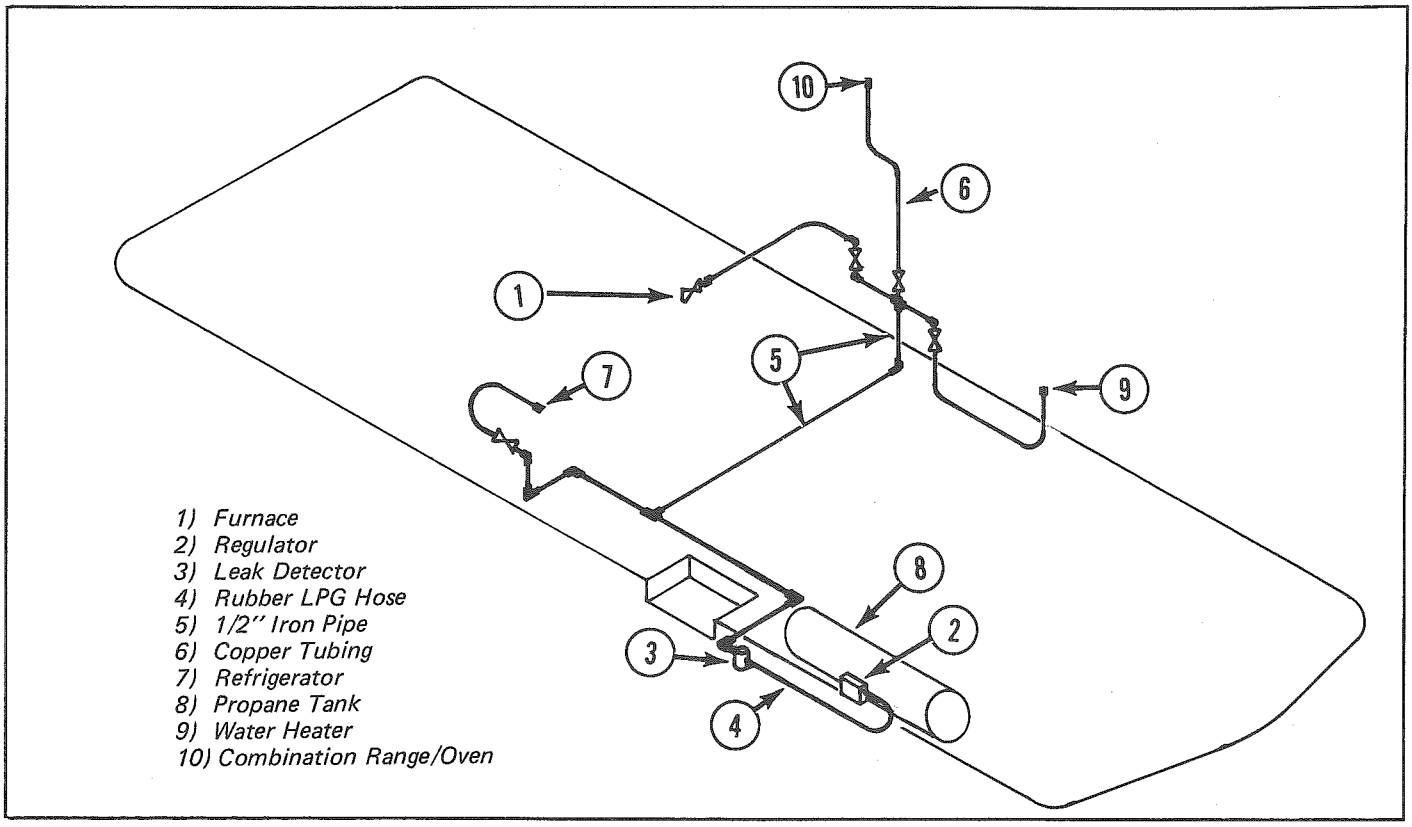


Figure 168 – 30' Rear Bath; 30' Mid-Bath; 33' Island Bath LP Gas System

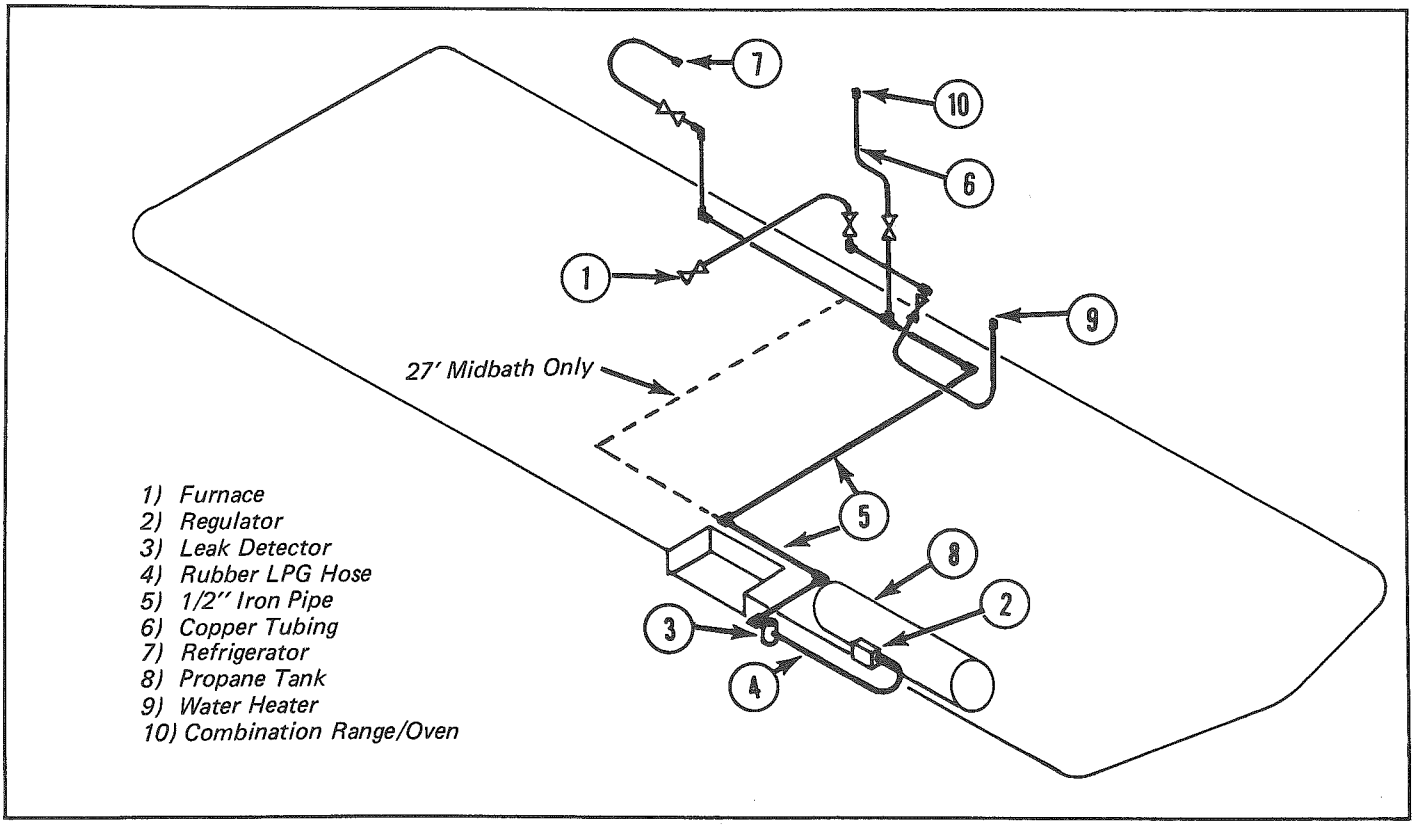


Figure 169 – 27' Mid-Bath; 33' Mid-Bath LP Gas System

LP GAS SYSTEM (Continued)

sorbs the water and it then passes out of the system as the gas is used.

Most of the gas appliances which have a continuously operating pilot light, and which go on and off intermittently and automatically, are required to have a safety device which minimizes the possibility of explosion in case one pilot light should accidently become extinguished. The appliances which usually have this device include the furnace, hot-water heater, refrigerator, and oven. Without such a device, an explosion would be likely to result if one pilot light went out and it continued to emit propane.

Lighting Gas Appliances – The water heater, furnace, and refrigerator all have automatic or built-in pilots and do not require a flame to light the pilot.

Maintenance of LP-Gas Systems – LP-gas systems normally operate for periods of time with a minimum of maintenance. However, a few tips on maintenance will be useful.

After an extended period of use, the safety devices which are actuated by pilot lights will sometimes become inoperative. If difficulty is encountered getting a main burner to ignite, the safety device should be replaced.

One of the worst enemies of LP-gas systems is the spider. Spiders are attracted to tunnels and holes. They frequently spin webs across or through the orifices of gas-fired appliances. These webs restrict the air flow and produce a weak yellow flame which typically deposits carbon. If a defective flame is observed, spider webs should be suspected, and all parts of the burner should be wiped clean and orifices should be blown clear with compressed air.

If spider webs are not present and the flame is still too yellow and filled with carbon, it is probably that the air adjustment of the burner should be modified. This can be done by trial and error until the bluishness of the flame is maximized.

FURNACE

FURNACE – The Suburban Dynatrail furnace in your Revcon is a direct vent system furnace design certified by the American Gas Association and the Canadian Gas Association for safety and performance. The Suburban NT-34L Furnace operates on LP gas only. The blower uses 12 volts DC, and the furnace is rated at 34,000 BTU per hour input.

NOTE: Preventive maintenance to the furnace is recommended at least once a year.

FURNACE OPERATING INSTRUCTIONS –

1. To light the furnace, turn the manual valve to the "OFF" position and wait five (5) minutes with blower running. (Set thermostat above actual temperature to operate blower.)
2. After five (5) minutes, set the thermostat to the "OFF" position.
3. Open manual valve. (Correct operating characteristics depend on this valve being positioned fully open. Never attempt to operate with valve partially closed.)
4. Set thermostat on desired temperature.
5. Allow 30 seconds for main burner to light.
6. If burner does not light, set thermostat on "OFF" and repeat steps 1 through 5.
7. After three (3) attempts with no ignition, go to shutdown and determine cause.

   NOTE: Do not continue to cycle furnace through thermostat in an attempt to get ignition.

TO SHUT DOWN FURNACE –

1. Turn manual valve to the "OFF" position.
2. Set thermostat on "OFF."

FURNACE BURNER ADJUSTMENT – To adjust primary air to the main burner, the small sheet metal cover found just below and to the right of the electrode must be removed. Behind the cover is a slotted screwhead. With a screwdriver, turn screwhead counterclockwise for less primary air and clockwise for more primary air. A symptom of too much primary air will be a howling or screeching noise when the burner is on (reduce air to correct). A symptom of too little air will be sooting on the exterior vent and a distinct yellow and floating flame (increase air to correct). A hard blue flame is the sign of correct adjustment.

NOTE: If a sooting condition cannot be corrected by the air adjustment on the burner, discontinue use of furnace until problem can be corrected by a qualified service agency.

SEQUENCE OF NORMAL FURNACE OPERATION –

1. When the thermostat calls for heat, the blower motor is energized immediately.
2. As the blower motor reaches approximately 75% of the normal rpm (within 3 to 5 seconds) the microswitch, in response to the air flow, will engage, allowing current flow to the module board.
3. After a 12-to-18 second delay, current will pass through the board to the solenoid valve.

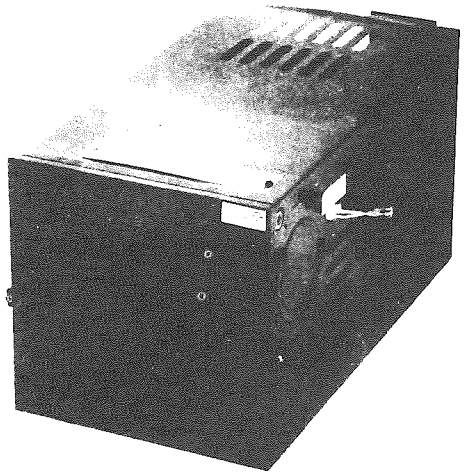


Figure 170 – Suburban Dynatrail Heater

4. The current to the valve opens it and allows gas to the main burner. The spark at the electrode then ignites the main burner.
5. After main burner ignition (usually within 18 to 25 seconds), the flame detector will sense the presence of main burner flame and de-energize the lockout feature within the board. After the 12-18 second delay, if the main burner does not ignite or the flame detector does not de-energize the lockout feature within seven (7) seconds, the unit will go into lockout. At this time, it will be necessary to set the thermostat on "OFF" and repeat steps 1 through 6 of the lighting instructions.
6. After three (3) attempts with no ignition, or main burner continues to go off within 30 seconds, go to shutdown and determine cause (see Service Hints, page 145).
7. If within a period of approximately two (2) minutes after the main burner is lit, the thermostat is turned back, both the blower motor and the solenoid valve are de-energized. However, if the furnace continues to run longer than two (2) minutes, which it normally should, a slight snap can be heard from within the casing. The snap is caused by the fan switch as it changes its position. After this occurs, if the thermostat is satisfied or turned back, the solenoid valve will close, the flame on the main burner will go out, but the blower will continue to run for a short period of time and will then shut off. The purpose of this is to remove most of the remaining gases from the heat exchanger. Be assured that this period of blower override is a part of the unit's normal operation.

FURNACE FAN SWITCH – The purpose of the fan switch is to control the sequence of the blower operation. The fan switch is a two-pole switch. When the bimetal disc of the fan switch is heated to the operating temperature, the switch closes. This completes a circuit through the motor from a direct source. The blower will continue to run as long as the chamber is hot even though the thermostat is satisfied and the main burner is off. When the chamber cools, the fan switch changes back to its original position and shuts the blower off. If blower and burner shut off simultaneously after thermostat is satisfied,

FURNACE (Continued)

then the fan switch failed to change over. This is a symptom of a faulty switch – replace it.

FURNACE LIMIT SWITCH – The purpose of the limit control is to turn off the gas to the main burner if for any reason the furnace becomes hotter than that which is safe. Improper operation of the furnace due to the limit control does not always indicate a defective control. If the circulating air is blocked or only partially so, the limit control will function and cause the main burner to cycle. Cycling on the limit is not always undesirable – if it happens only occasionally. This is a good indication of safe operation and will most likely happen on a warm day. If cycling happens too often or for an extended period, the circulating air system should be thoroughly cleaned.

If for any reason the limit control is found to be defective, there is no recommended method of repairing it. Because of its importance for safety reasons, it should be replaced with a new one.

CAUTION: Never shunt the limit control even for only temporary operation.

FURNACE MICROSWITCH – The microswitch has two purposes:

1. It is an air prover. It operates in response to the flow of air generated by the blower. Hence, if for any reason the air from the blower is not sufficient, the switch will not operate. This may be caused by a slow motor due to low voltage, restricted return air, inadequate duct discharge area, or lint accumulation on the blower wheel.
2. The switch allows time for the blower to pull in a sufficient amount of air to support combustion before it engages. Once it engages, the circuit is completed through the limit switch and module board to the gas valve. The valve opens, gas flows to the burner, and ignition occurs.

FURNACE BLOWER ASSEMBLY – Although one motor drives all wheels, the blowers are separate. The combustion-air blower is sealed so as to allow no passage of air between it and the circulating room-air blower. The combustion-air blower draws air from the outside atmosphere, discharges it into the combustion chamber, and forces the combustion products out the exhaust tube. The circulating room-air blower pulls return air in and forces it across the heat chamber, discharging into the area to be heated.

FURNACE MAINTENANCE AND CLEANING – Your furnace should be inspected annually by a professional service person. A careful inspection of all gaskets should be made and if any gaskets show signs of leakage or deterioration, they should be replaced. It is imperative that the control compartment, burner, and circulating air passageways of the furnace be kept clean. More frequent cleaning may be required due to excessive lint from carpeting, bedding material, etc.

Periodic examination of the venting system should be maintained. It is important that the flow of combustion air entering from the rear of the furnace not be obstructed. Periodic visual checks of the burner in operation should be made. Adjust the primary air of the burner for a proper flame, if required.

Cleaning of the chamber and main burner will be required if the furnace has been allowed to operate with a high yellow flame. The yellow flame is due to incomplete combustion (lack of air) and will deposit a soot formation inside the chamber and on the main burner. The furnace is equipped with an oiled, sealed blower motor and requires no oiling.

NOTE: To service the furnace, the combustion chamber assembly must be removed from the furnace cabinet (see instructions for removing chamber following).

FURNACE COMBUSTION CHAMBER REMOVAL

1. Shut off gas bottle.
2. Disconnect power supply (quick disconnect plug on right side of cabinet).
3. Disconnect gas line from manual shutoff valve.
4. Remove shutoff valve from side of furnace.
5. Remove shipping screw securing chamber shield to cabinet (lower right corner).
6. Remove the vent cap screws (outside) to free exhaust tube.
7. Remove kickboard from cabinet.
8. Pull chamber forward and out of cabinet.
9. To reinstall; reverse above procedure.

FURNACE SERVICE HINTS, DIAGNOSIS, AND CORRECTIVE MEASURES

NOTE: To service, furnace must be removed from cabinet.

CONDITION – NO HEAT

1. **Thermostat Off** – Check to be sure thermostat is caling for heat. Wire to thermostat could be off terminal.
2. **Gas Supply** – Be sure manual gas valve is in the open position (level parallel to gas line).
3. **Electrical Connections and Power** – Battery must be charged. If battery is low, there will be sufficient power to run the blower, but not enough to run the blower at full speed. If blower doesn't run at its prescribed speed, the mircroswitch cannot be engaged and gas will not flow to the main burner nor will the spark begin. Be sure the connection of the voltage lines in the terminals are tight.
4. **Malfunctioning Microswitch** – Be sure the microswitch is moving in far enough to open the solenoid valve and

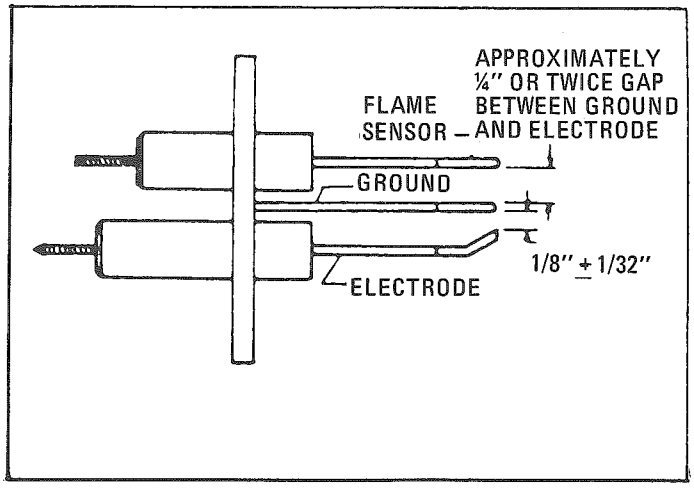


Figure 171 – Electrode Assembly

FURNACE (Continued)

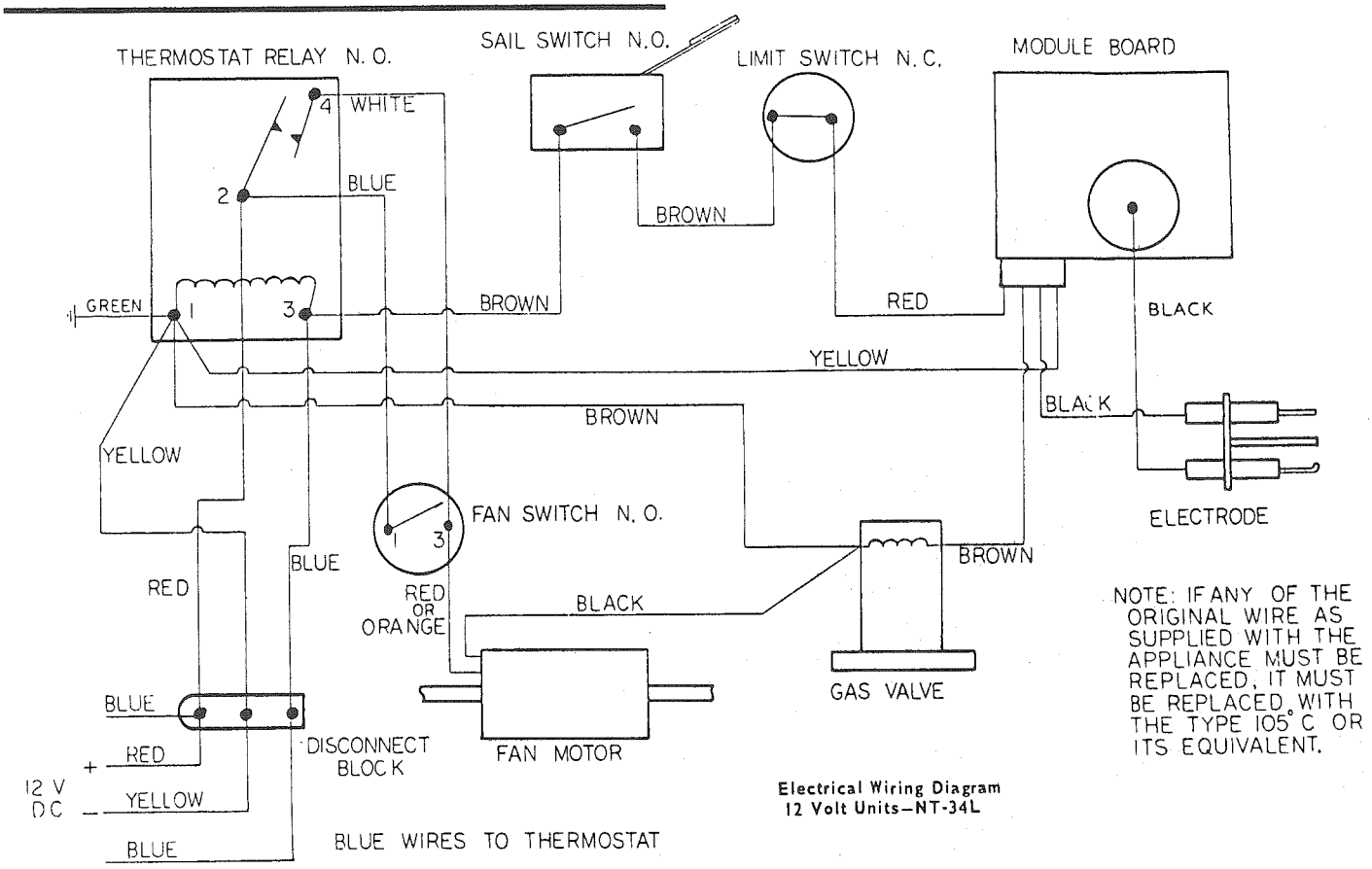


Figure 172 — Furnace Electric Wiring Diagram No. 1

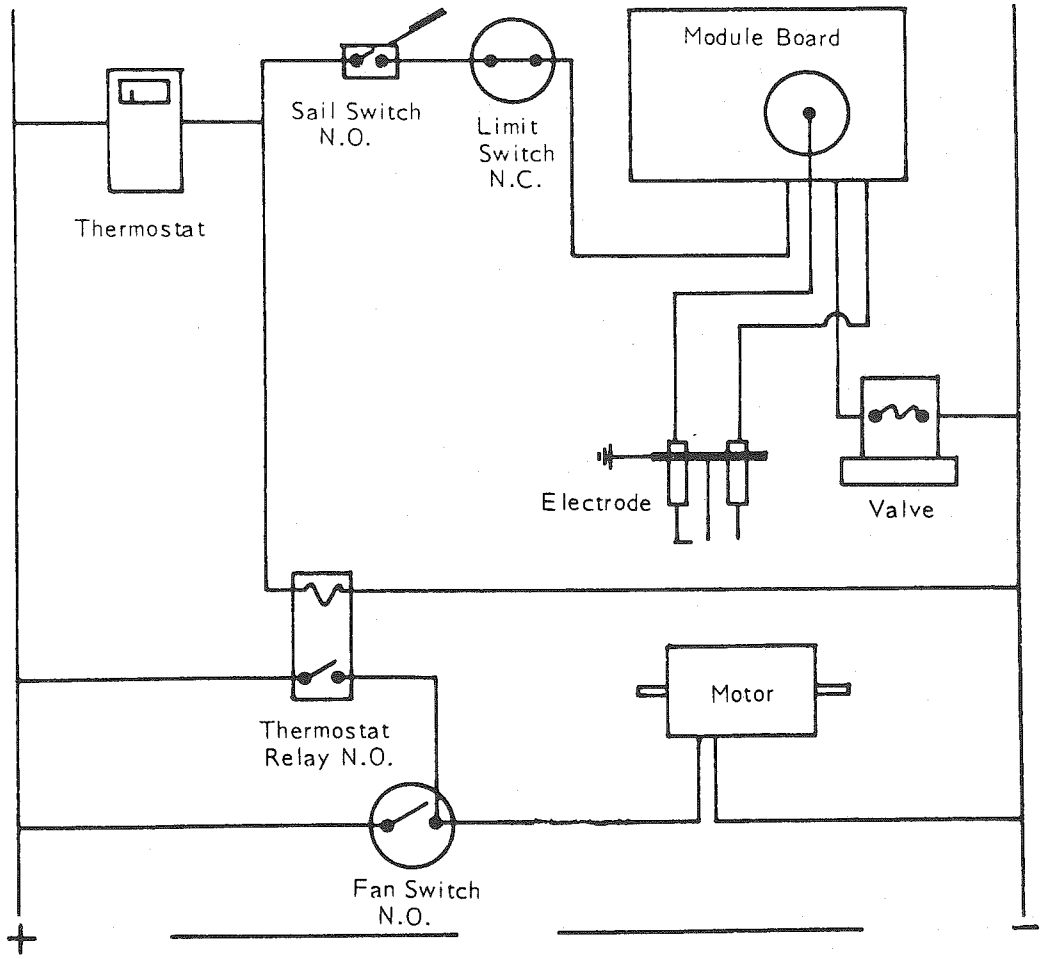


Figure 173 — Furnace Electric Wiring Diagram No. 2

FURNACE (Continued)

to energize the spark module board. If the switch is not moving in, clean any dust or dirt from the actuator pin. Other reasons for the switch not moving in are:

a. Insufficient blower speed (slow motor due to low charged battery, faulty motor, lint and dust accumulation on the blower wheels, or restriction of return air to furnace). Check wiring in accordance with unit's wiring diagram to assure the proper polarity of the 12-volt DC power supply is observed. This polarity must be observed so the motor will run the proper direction of rotation to insure correct air delivery.

b. Faulty microswitch – Replace switch if valve does not open when switch is manually engaged. Switch should also be replaced if battery is fully charged and blower motor running at top speed fails to engage switch within 6 to 7 seconds.

NOTE: To service switch, combustion chamber must be pulled out.

5. **Gas Valve** – Within 30 seconds after motor reaches 75% of its rpm and microswitches engage, check the following:
   a. Voltage at valve – If voltage is present but valve is not opening check wire connections in valve circuit.
   b. If wire connections are okay, replace the valve.
   c. If no voltage at the valve, check circuit completion through mircroswitch, limit switch, and module board.

6. **Blower Not Operating** – Possible causes:
   a. Check power supply to furnace (blown fuse).
   b. Check electrical connections at furnace.
   c. With thermostat points closed, check for circuit completion across terminals 2 and 4 of thermostat relay. if there is continuity across terminals 2 and 4 and wiring to motor is OK, replace motor.
   d. No circuit across terminal 2 and 4 and wiring to relay is OK, replace relay.

7. **Short cycling (fan switch)** – If burner and fan shut off simultaneously when the thermostat is satisfied, it indicates a defective fan switch. Replace switch (chamber must be removed).

8. **Defective relay** – Relay may be faulty if motor fails to start when thermostat calls for heat. This will be evidenced by a click when the thermostat is raised and motor fails to operate.

9. **Ignition failures – Cautions:**
   Never operate the furnace with the electrode wire disconnected nor with the electrode assembly removed from the furnace.
   Never use a battery charger to check out an electronic ignition furnace.
   Never use a screwdriver on any part of the electrode assembly while furnace is in operation.
   Be certain that the spark from the electrode never reaches the flame sensor portion of the electrode assembly.
   Be sure the electrode assembly screws are snug at all times, especially after the electrode has been removed and reinstalled.
   Discharge Module Board Before Removing From Furnace. This is accomplished by placing a screwdriver on the terminal coming out of the coil (where electrode wire connects) and grounding it to some portion of the furnace.
   If the module board is found to be defective, it must be replaced – it is not field repairable. Any attempts to repair the board may alter the board and cause it to operate in an unsatisfactory manner.
   Insure that the gap between electrode and ground is always 1/8". The gap between the ground and the flame sensor should be approximately twice the gap between electrode and ground to insure no sparking to sensor. Sparking to sensor will damage module board.

10. **Electronic Ignition System** – The electronic ignition system is made up of three main parts. The module board, the electrode assembly and the electrode wire. The module board is the brain of the electronic ignition system and it has four functions:
    a. When the blower reaches full rpm, a circuit is completed to the module board.
    b. After a 12-18 second delay, a circuit is completed to the solenoid valve.
    c. At the same instant, the elctrode produces a spark as indicated by the small neon bulb on the board as it flashes.
    d. The module board also performs the lockout function in cases where the spark fails to light the burner.When lockout occurs, the spark stops and the voltage from the module board to the gas valve is discontinued and the valve closes. The unit will remain in lockout and the blower will continue to run until the thermostat is turned off.

FURNACE PROBLEMS – It is important to determine the type of problem being experienced and then the proper checkout procedure can be made. The following is a list of problems, how to identify in which area the problem is located, and how to correct it.

1. **Electrode Not Sparking** – With blower running and microswitch engaged, check the following:
   a. Check for proper voltage at spark module board after the blower motor reaches full rpm. If no voltage, check back through circuit to determine cause.
   b. Voltage is present but no spark at electrode after 12-18 second delay. Check electrode wire connections.
   c. Wire connections OK by electrode wire does not show continuity through it; replace electrode wire.
   d. Electrode wire does show continuity through it; check electrode gap.
   e. Electrode gap OK; check electrode assembly for possible cracks or carbon on tip of electrode.
   f. Electrode OK; replace module board.

2. **Electrode Sparking But Gas Not Coming Through Burner:**
   a. Check to see if voltage is coming out of module board to gas valve after 12-18 second delay. If no voltage and wire connections are OK, replace module board.
   b. Voltage is coming out of module board to gas valve but gas valve does not open; replace gas valve.

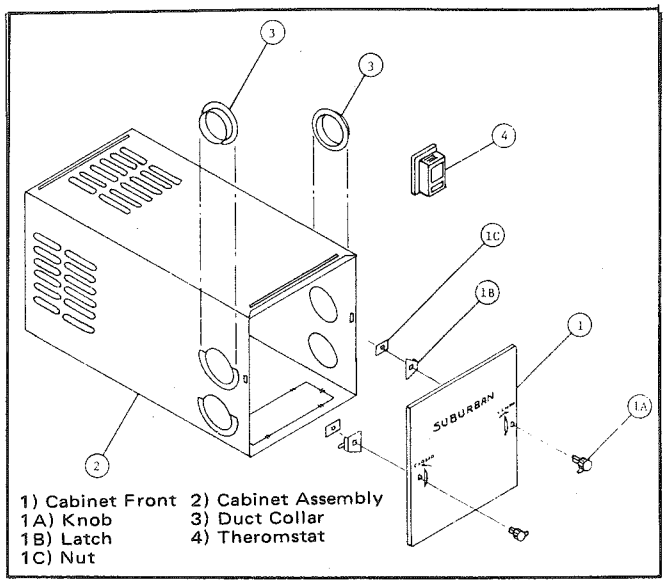
3. **Electrode Sparking and Gas Valve Opening But Burner Will Not Light:**
   a. Check to see if gas is coming through burner. If no gas is coming through the burner, check for obstruction in gas line, in main burner orifice, or in main burner.

FURNACE (Continued)

b. Gas is coming through the burner but spark will still not ignite burner; check gas pressure to be certain that it is 11 inches water column at furnace.
c. Gas pressure OK; check for obstruction on main burner. Check to be sure that air shutter is not completely closed and be sure electrode is positioned approximately 1/4" above and directly over one of the sawed slots on the main burner.
d. Check all gaskets to be sure they are tight and forming a good seal.

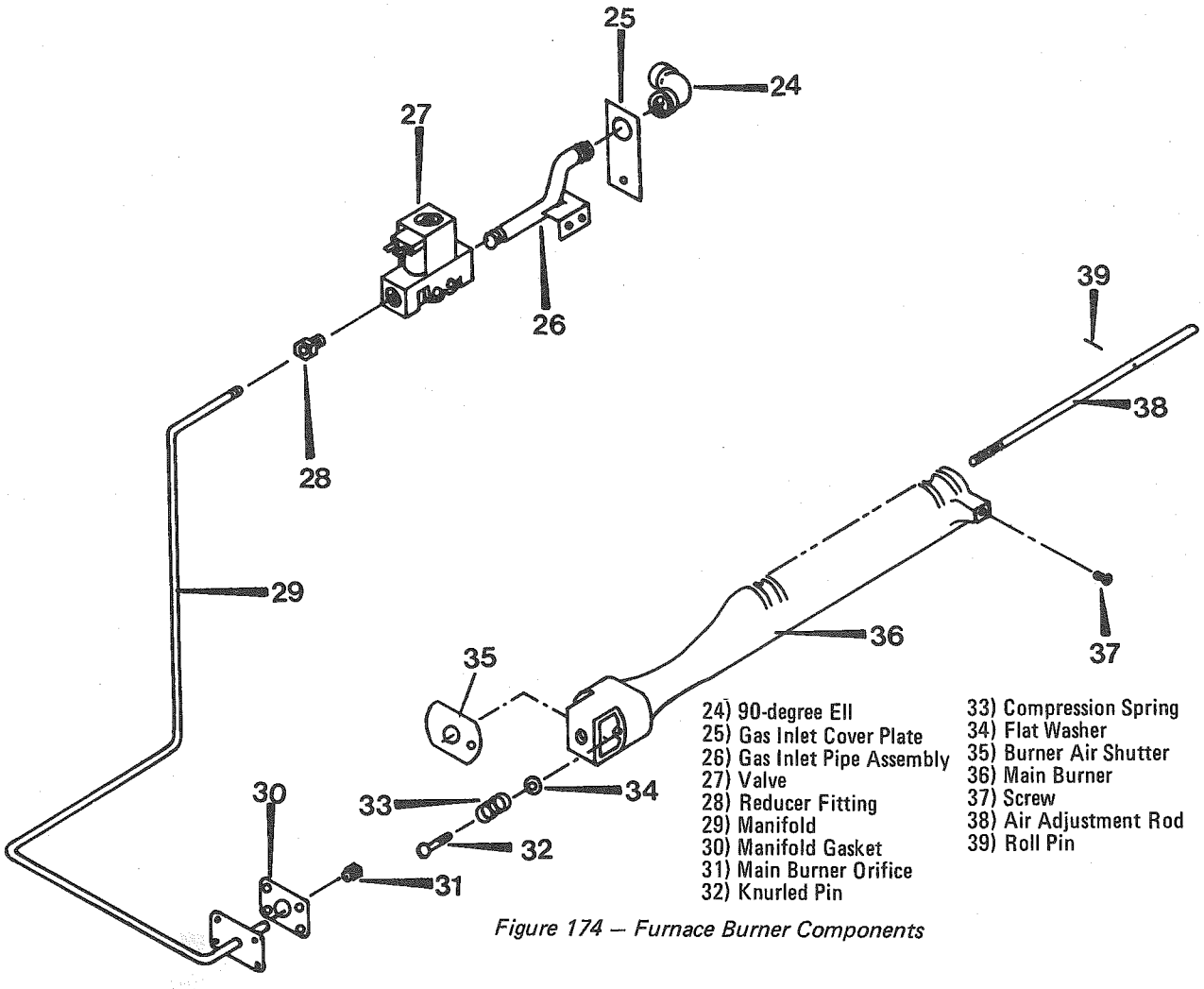
4. **Burner Ignites But Goes Off and Into Lockout:**
   a. Check to be certain that flame sensor is over one of the slots on the main burner and that the main burner flame is burning against the tip of the flame sensor. Adjust by sliding burner in direction necessary.
   b. Burner still goes off and into lockout; check wire connections at flame sensor and at module board.
   c. Wire connections OK; check continuity through flame sensor wire.
   d. Continuity of flame sensor wire OK; check with micro amp meter in series with flame sensor wire to be certain that the flame sensor is generating at least seven (7) micro amps within seven (7) seconds after the burner is ignited. Replace electrode assembly if test is negative.
   e. Flame sensor OK but burner still goes off and into lockout; replace module board.

5. **Repeated Module Board Failures:**
   a. Check to be certain that the electrode spark is not sparking against the flame sensor portion of the electrode assembly.
   b. Check to be sure module board is not shorted to the chamber wrapper.
   c. Be sure fish paper insulator covering the electrode wire connection on the coil of the module board is in place.



1) Cabinet Front
1A) Knob
1B) Latch
1C) Nut
2) Cabinet Assembly
3) Duct Collar
4) Theromstat

Figure 175 — Suburban Heater



24) 90-degree Ell
25) Gas Inlet Cover Plate
26) Gas Inlet Pipe Assembly
27) Valve
28) Reducer Fitting
29) Manifold
30) Manifold Gasket
31) Main Burner Orifice
32) Knurled Pin
33) Compression Spring
34) Flat Washer
35) Burner Air Shutter
36) Main Burner
37) Screw
38) Air Adjustment Rod
39) Roll Pin

Figure 174 — Furnace Burner Components

FURNACE (Continued)

d. High voltage – 14.5 volts DC maximum.

6. **Customer Complains of Unit Going Into Lockout Only Once In A While:**
   a. We have found that lockout can occur if the gas pressure fluctuates at the time the thermostat calls for heat. Pressure fluctuations can be caused by a malfunctioning gas bottle regulator, an obstruction or a kink in the gas bottle regulator or in the gas lines.

FURNACE ISOLATION PROCEDURE – It is difficult to check for these fluctuations that will not noticeably affect any other appliance in the coach. However, isolating the furnace from the coach gas system will determine if the gas system is responsible. This isolation procedure can be done by connecting a separate upright bottle, regulator, and gas line directly to the furnace, eliminating the coach gas system. If the occasional lockout still exists, then the furnace should be thoroughly tested to determine the cause; however, if the furnace works properly on this separate system, then the coach gas system should be checked.

When moisture in the gas system is suspected as being the problem, especially where the horizontal-type gas bottle is being used, the following steps should be taken to prepare the gas system against further moisture problems:

Corrective Measures to Eliminate Moisture:

1. Disconnect gas bottle and drain it completely dry of all gas and moisture.
2. Disconnect and blow out all gas lines completely dry.
3. Install a new pressure regulator on the gas bottle.
4. Add the drying agent: 1/2 pint of methanol alcohol per 100-lb. bottle capacity is recommended.

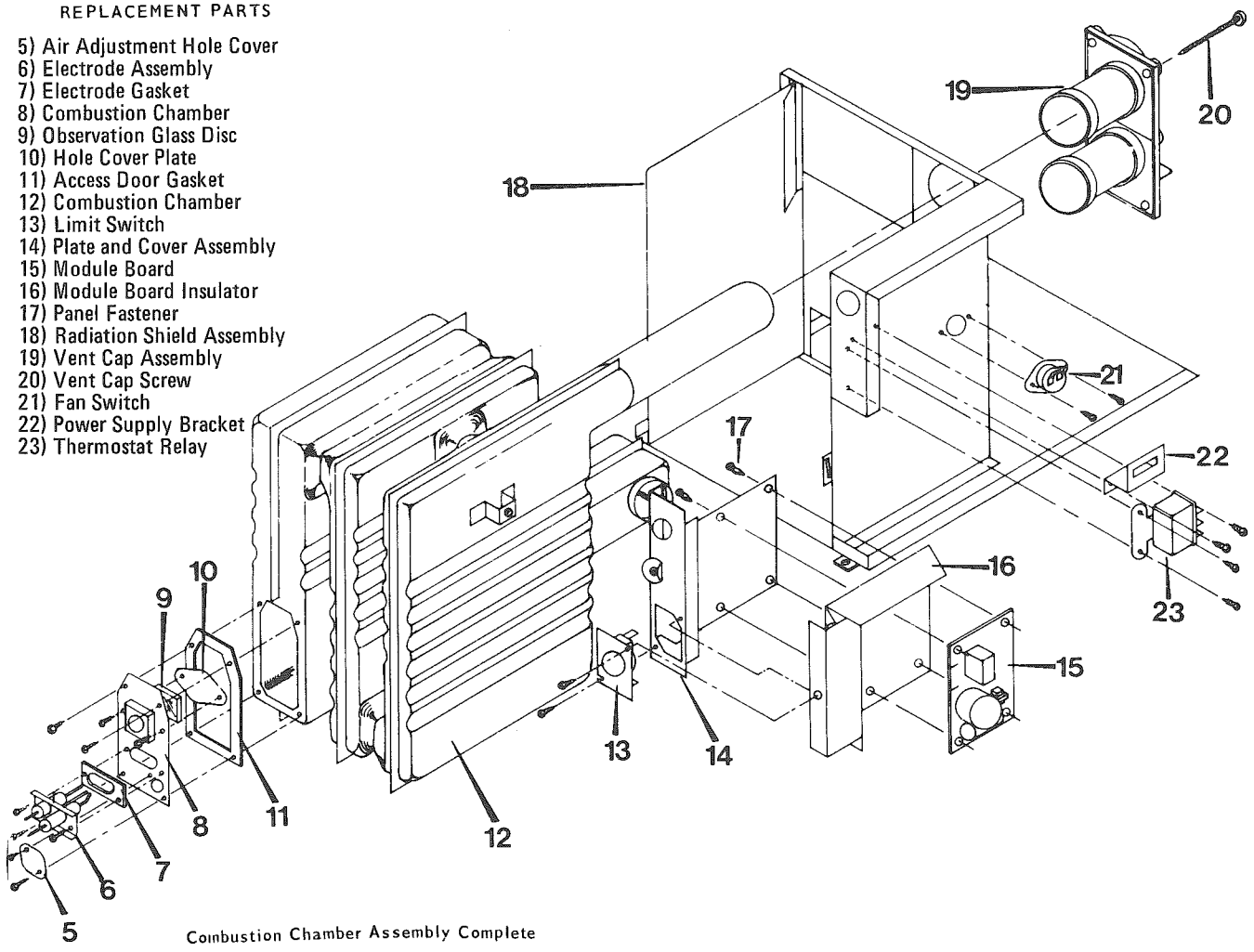
NOTE: Never fill the gas bottle over 80%. Do not use gas bottle completely dry to avoid using up the drying agent. The above procedures are effective in over 95% of the cases of all occasional lockout problems. All of these steps should be performed as described for the preparation of a contaminated gas system to be 100% effective.

CONDITION – EXCESSIVE NOISE

1. Blower out of balance; replace blower.
2. Motor hum; replace blower.
3. Air adjustment – a screeching or howling noise while burner is on due to excessive primary air. Adjust the burner to provide less air.

REPLACEMENT PARTS

5) Air Adjustment Hole Cover
6) Electrode Assembly
7) Electrode Gasket
8) Combustion Chamber
9) Observation Glass Disc
10) Hole Cover Plate
11) Access Door Gasket
12) Combustion Chamber
13) Limit Switch
14) Plate and Cover Assembly
15) Module Board
16) Module Board Insulator
17) Panel Fastener
18) Radiation Shield Assembly
19) Vent Cap Assembly
20) Vent Cap Screw
21) Fan Switch
22) Power Supply Bracket
23) Thermostat Relay



Combustion Chamber Assembly Complete

Figure 176 – Heater Combustion Chamber Assembly

FURNACE (Continued)

CONDITION – ERRATIC BLOWER OPERATION

1. If blower is going off and on, check the following:
   a. Thermostat points – if points are remaining open or closed, the internal overload switch in the motor is defective; replace motor.
   b. If thermostat points are observed opening and closing rapidly when furnace first starts, check the following:
      The quick disconnect plug on the side of the furnace. The plug must be wired as shown on the electrical diagram.
      Miswiring at thermostat relay. Check the wiring diagram.
      Shorted gas valve. If furnace runs properly with wires at gas valve disconnected, replace gas valve.
      Short in wiring. Check all connections including thermostat.

CONDITION – MAIN BURNER WILL NOT CYCLE OFF

1. Check thermostat points. The points should break cleanly.
2. Check solenoid valve; valve may be stuck open. If so, replace valve. Do not attempt to repair valve.

CONDITION – UNIT WILL NOT OPERATE

1. Check all wiring to assure connections or detect possible shorts.

REPLACEMENT PARTS

40) Room Air Blower Wheel
41) Room Air Blower Housing Assebly
42) Microswitch Assembly
43) Motor Mount Bracket
44) Crossover Tube
45) Motor
46) Motor Mount Gasket
47) Combustion Air Housing Assembly (LH Side)
48) Combustion Air Blower Wheel
49) Combustion Air Housing Gasket
50) Combustion Air Housing (RH Side)

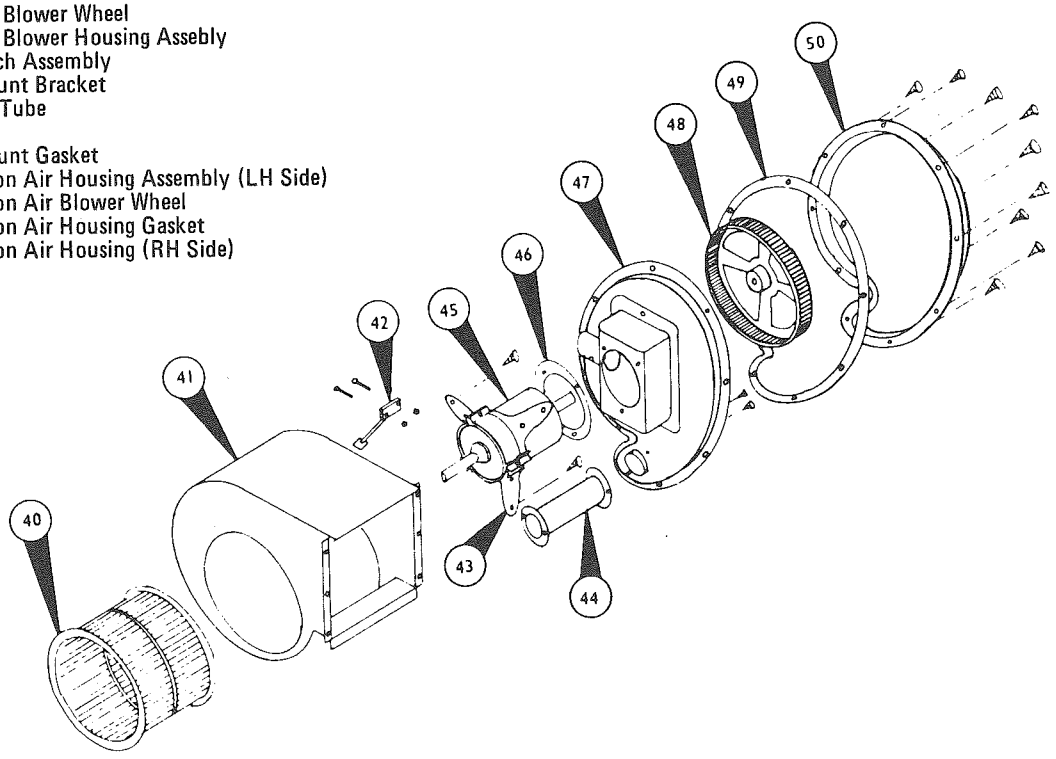


Figure 177 – Heater Fan Assembly

REFRIGERATOR

GAS/ELECTRIC REFRIGERATOR – Your Dometic gas-electric refrigerator will operate on LP gas, 12-volts DC, or 120-volt electrical source. This results in a wide range of operating modes. The unit is the continuous-absorption type, which operates by the application of a small amount of heat. No moving parts are employed. If the motor home is connected to a 110-volts AC electrical source, 12-volts DC will be supplied to the refrigerator through the power converter.

WARNING –
If the refrigerator is used intermittently, it should be checked at least once a year.

HOW TO START THE REFRIGERATOR –

Leveling –

In the boiler, ammonia vapor is distilled from an ammonia-water mixture and carried to the finned condenser, where it liquifies. The liquid flows to the evaporator, where it creates cold by evaporating into a circulating flow of hydrogen gas. If the evaporator coil is not level, the liquid readily accumulates, forming pockets which can impair the gas circulation or even block it, in which case, of course, the cooling will stop.

When the recreational vehicle is stationary it must be level for the refrigerator to perform well. A bubble level should be placed on the freezer shelf. When the vehicle is in use, the continuous rolling and pitching movement will not affect the refrigerator as long as the movement passes either side of level, but when the vehicle is temporarily parked, this sensitivity of the refrigerator should be remembered. So, once more, before you try to start the refrigerator, make sure it is level.

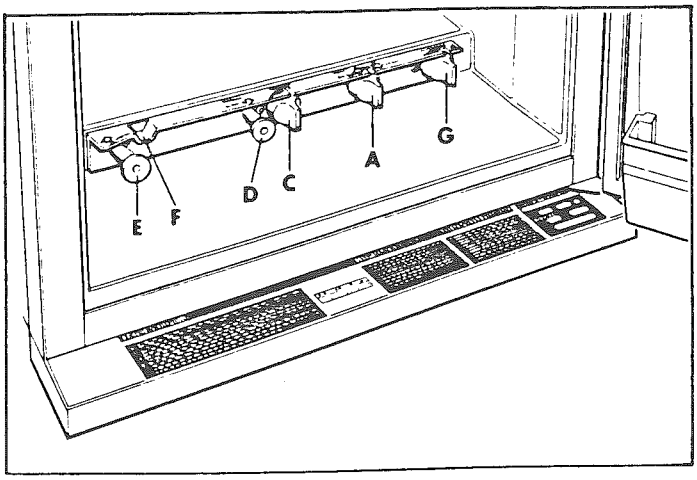


Figure 178 – Refrigerator Controls

Gas operation – (See figure 178.)

1. To start the refrigerator, turn the knob "A" to position "Gas." The gas valve is now opened and the electric circuits are broken.
2. Turn the gas thermostat knob "C" to setting 4.
3. Pull the knob "D" of the flame failure safety device and press the button "E" of the piezo lighter. The pressing of the button "E" has to be repeated until the gas is lit at the burner. Through the reflector "F" it can be observed that the burner is lit.
4. After the gas is lit, keep the knob "D" in pulled out position for 15 seconds. Then release the knob and check through the reflector that the burner flame stays burning.

NOTE: After a replacement of the gas container or a long shut-off period the gas line is likely to be filled with air. In such a case the lighting procedure has to be repeated until the air is pushed out of the line and the gas has reached the burner.

Electric Operation – (See figure 178.)

1. Check that the attachment plug of the flexible cord is correctly connected to the main supply. The refrigerator is equipped also for 12-volt DC operation; the low voltage operates the refrigerator.
2. Turn the knob "A" to "Off" position, then press the knob to the bottom and turn to desired electric position.
3. Turn the thermostat knob "G" to setting 4.

NOTE: In GAS OFF position the knob "A" is pressed and turned clockwise to position 12-volts. If 110-volts operation is desired, press once more and continue the clockwise turning to position 110-volts.

HOW TO USE THE REFRIGERATOR –

Food Storage Compartment –The food storage compartment is completely closed and unventilated, which is necessary to maintain the required low temperature for food storage. Consequently foods having a strong odor (or liable to absorb odors) should be covered. Vegetables, salads, etc., should be covered to retain their crispness. The coldest positions in the refrigerator are underneath the cooling evaporator and at the bottom of the refrigerator, and the least cold positions are on the upper door shelves. This should be considered when different types of food are placed in the refrigerator.

Defrosting – Since ice and frost are poor heat conductors, a frost build-up of 1/4-inch or more should be avoided. It decreases overall cooling capacity and increases power consumption. To lessen frost accumulation, avoid putting hot or steaming food in the refrigerator. To defrost the refrigerator, turn the thermostat to the lowest position. When accumulated ice has melted, the water can be removed from the drip pan under the freezer compartment.

Frozen Food Storage Compartment – The ice trays should be placed in direct contact with the freezer shelf for fastest ice making. Quick frozen soft fruits and ice cream should be placed in the coldest part of the compartment which is at the bottom of the aluminum liner or, in models with a shelf, on this or just below it. Frozen vegetables, on the other hand, may be stored in any part of the compartment. The compartment is not designed for the deep or quick freezing of foodstuffs. Meat or fish foods, whether raw or prepared, and provided they are precooled in the refrigerator, can, however, also be stored in the frozen food storage compartment. They can then be stored about three times as long as in the normal temperature compartment. To prevent drying out, keep food in covered dishes, in plastic bags, or wrapped in aluminum foil.

Ice Making – Ice cubes can be made in the ice trays which should be filled with water to within 1/4" from the top. To release the ice cubes, the handle should be pulled upwards. Cubes not required should be replaced in the tray. Refill the tray with water, dry the outside, and replace it in the frozen storage compartment.

REFRIGERATOR (Continued)

Ice making is accelerated if the thermostat is set to MAX. It is a good idea to do this a few hours before an anticipated need for ice, but be sure to turn the thermostat back to its original setting when the ice is formed, or the foodstuffs in the cabinet may become frozen hard. The ice making time is also reduced if unused cubes are left in the ice trays when they are refilled with water.

To Shut Down the Refrigerator – To shut down the cabinet temporarily, set the thermostat to zero and turn off the gas tap. If the cabinet is not to be in operation for a period of weeks, it should be emptied and cleaned, and the door left ajar. The ice trays should also be dried and kept outside the cabinet.

Cleaning – To clean the interior lining of the cabinet, use a lukewarm, weak soda solution. The evaporator, ice trays and shelves must, however, be cleaned with warm water only. Never use strong chemicals or abrasives to clean these parts or the protective surface will be spoiled. It is important, always, to keep the cabinet clean.

CAUTION: Do not store explosive substances in the refrigerator, such as cigarette lighter gas, petrol, ether or the like.

REFRIGERATOR GAS EQUIPMENT –

Flue Top and Baffle – The flue baffle is suspended from the top and must be in position in the central tube of the cooling unit.

The Burner and the By-pass Screw – The burner must be centrally located under the boiler tube. To change or clean the burner jet, first loosen the gas pipe from the burner, then unscrew the jet from the burner base. The burner is normally fitted with a jet for propane gas so when using butane, fit another jet size, for butane. Sizes are stamped on the jet.

The orifice in the jet is very small. It must never be cleaned by means of a pin or similar instrument, as this would enlarge or damage the orifice. If, for some reason, the jet should require cleaning, it should be blown through or washed in alcohol. The by-pass screw is accessible at the top of the thermostat.

The Gas Thermostat – The refrigerator is equipped with a thermostat which is regulated by turning the knob to different settings in order to obtain the desired controlled cabinet temperature.

At zero (indicated by a dot) – Under normal operating conditions the thermostat valve remains closed and the burner is running continuously at the by-pass rate, just enough to keep the burner lit.

At "MAX" – The thermostat valve remains open and the burner is running continuously at full gas rate. Lowest cabinet and freezer temperatures are obtained at this setting.

Between these two extremes is a numbered portion of the dial over which various controlled temperatures can be obtained, the higher the number, the lower the temperature.

As soon as the required cold temperature inside the cabinet is reached, the thermostat cuts the burner main flame leaving the by-pass flame to keep the safety valve open.

Flame Blow Out – If trouble is encountered with the flame blowing out under specially windy conditions, try to avoid the wind blowing against the wall where vent outlets are located. If the trouble persists, set the thermostat to "MAX." This later measure can, of course, only be temporary, for after a day or so at this setting, the foodstuffs in the cabinet will freeze.

Periodic Maintenance –

NOTE: Before working on the refrigerator make sure that 120-volt AC and 12-volt DC leads are disconnected.

Once or twice a year depending on use, it is necessary to clean and adjust the burner assembly. Proceed as follows:

1. Disconnect the gas pipe from the burner assembly.
2. Remove the burner bracket.
3. Remove the burner housing.
4. Clean the jet with alcohol and compressed air ONLY.
5. Clean the burner tube and especially the gauze with a brush. Blow with compressed air.
6. Reassemble.
7. Check the burner with full flame (turn thermostat to "MAX" and with by-pass flame (if the refrigerator has been working for a few hours and the thermostat bulb is colder than about 6°C or 43°F the transition from full flame to by-pass can be observed if one turns the thermostat knob slowly from "MAX" to zero.

At the same time, check the flue baffle. It should be clean and reasonably free from soot. Heavy soot formation indicates improper functioning of the burner. Clean baffle and flue. The entire gas installation should be checked for leaks at intervals. Test all pipe connections with soapy water, not with an open flame.

REFRIGERATOR ELECTRIC EQUIPMENT

Heater – The heat is supplied by an electric heater mounted in the boiler on the cooling unit inside the cover. The boiler casing normally is fitted with a blow-out protection arrangement which has to be removed before the boiler cover is fully accessible.

Switch – The electric control device also comprises an on-off switch operated by the fuel selector from the refrigerator control panel.

Electric thermostat – The temperature in the refrigerator can be regulated by turning the thermostat knob to higher or lower numbers. Although the exact setting is not critical, it will usually be found suitable to choose a setting at which the frost, which gradually forms on the cooling evaporator is just maintained in dry condition. It will be necessary to set the thermostat knob one or two numbers higher when the ambient temperature becomes higher or the load unusually heavy. If less cooling is required, a lower setting should be chosen. No attempts at adjusting the thermostat should be made.

REFRIGERATOR DIAGNOSIS –

Refrigerator Does Not Freeze Satisfactorily:

1. Jet Orifice clogged. Disengage gas pipe from burner. Unscrew nipple with jet and blow clear and wash in alcohol. Do not use wire or pin to clean orifice.
2. Check the leveling of the refrigerator.

REFRIGERATOR (Continued)

3. Flame has gone out. Remedy:
   a. Gas in bottle is used up; refill.
   b. Feeler point of the flame failure-safety-device is not heated enough by flame; clogged by-pass screw; clean or exchange it.
4. Air circulation around cooling unit is restricted. Be sure that refrigerator is properly ventilated.
5. The evaporator is heavily coated with frost; defrost.
6. Flue baffle not inserted into the central tube of the cooling unit.
7. The thermostat is incorrectly used. In hot weather the setting should be one or two numbers "colder" than usual.
8. Gauze in burner head clogged; clean.
9. Burner damaged; replace.
10. Burner may be dislocated; relocate.
11. Wrong gas pressure at the burner. Have pressure checked at burner and at gas bottle. Pressure at burner must not fall below 11" W.G. when thermostat is set on "MAX."
12. Improper operation of the thermostat. Check the position of the capillary tube between the evaporator fins. The end of the capillary tube must be in proper direct contact with the evaporator. This contact is achieved in two different ways: 1) The capillary tube is inserted in a spring-clip which is fastened between two fins. 2) The capillary tube is fastened between two fins with a sheet brace and two screws. If the position of the capillary tube end is not correct, adjust accordingly. If no improvement is obtained, exchange the thermostat.

Odor From Fumes –

1. The flame may touch side of the boiler due to dislocation of the burner; relocate. Burner dislocation may also cause smoke and discoloring of walls and ceiling.
2. Burner damaged; replace.
3. The flame touches flue baffle. Remedy: 1) Burner damaged; replace. 2) Flue baffle too low; correct the position of the baffle.
4. The flue tube is dirty. Clean flue as follows: Cover burner and jet. Remove flue top and baffle. Clean flue with special flue brush. Clean baffle before putting back in place.

All the above instructions are to be followed closely. The refrigerator is quality-guaranteed.

ROOF AIR CONDITIONING

ROOF-MOUNTED AIR CONDITIONER –

Your Coleman 13,500 BTU capacity air conditioner operates on 115 volts and is controlled from the panel located in the ceiling assembly. There are four controls on the ceiling assembly that help you control the air conditioner. They are as follows:

1. **Selector Switch** (system switch) – The selector switch determines which mode of operation the air conditioner will be in; "OFF," "LOW FAN," or "HIGH FAN," or "LOW COOL," or "HIGH COOL," or "LOW HEAT." (See figure 179.)

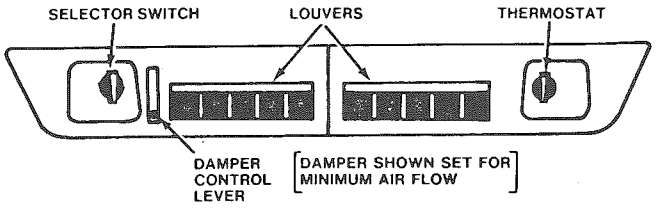


Figure 179 – Control Panel

NOTE: The rear air conditioner operates only when the motor generator set is operating. It will not work on city electrical power.

2. **Thermostat** (temperature control) – In the cooling mode the thermostat regulates the "ON" and "OFF" temperature setting at which the compressor will operate. The thermostat also controls the "ON" and "OFF" temperature settings of the heater assembly.
3. **Air Volume Regulator** (damper) – The damper regulates the volume of air that your air conditioner will be handling when it is in operation. When the lever is in the "up position" maximum air volume is achieved; in the "down position" minimum air volume is the result.
4. **Louvers** – The louvers are located at both ends of the ceiling assembly shrouds and are used in directing the discharge air from the unit.

NOTE: Elect-A-Heat is intended to take the chill out of the indoor air when the air is a few degrees too cool for comfort. The Elect-A-Heat is an effective "chill chaser."
It is not a substitute for a furnace.

In addition to these controls your Coleman RV air conditioner also has other features that are designed for your personal comfort. The long life non-allergic natural fiber filters can be cleaned and reused, and completely filter the circulated air when the air conditioner is in operation.

NOTE: As a general rule, air entering the air conditioner will be cooled about 15 to 20 degrees, depending on the outside temperature and humidity conditions.

For example, if the air entering the return air grilles in the air conditioner is 80°F., the air leaving the discharge grilles in the air conditioner will be 60° to 65°F.

As long as this temperature difference is being maintained between the return air and the discharge air, the air conditioner is operating at its capacity. If the desired inside temperature (normally 80°F.) cannot be maintained, then the heat gain is too great for the capacity of the air conditioner.

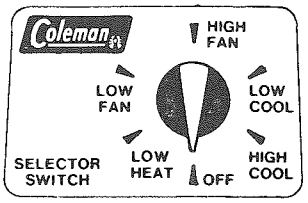
Parking the vehicle in a shaded area, keeping windows and doors shut and avoiding the use of heat producing appliances in the vehicle will help to reduce the heat gain.

ROOF AIR-CONDITIONER OPERATION:

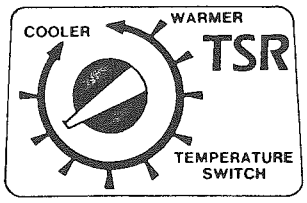
For Air Recirculation Only (see figure 180).

1. Turn the selector switch to the "LOW FAN" or "HIGH FAN" position for desired maximum air flow.
2. Adjust the damper lever to the desired volume of air flow.
3. Position the louvers to the desired direction the discharge air is to flow.

NOTE: The thermostat does not operate when the selector switch is set on "LOW FAN" or "HIGH FAN."



COOLING AND HEATING MODELS



ALL MODELS

Figure 180 – Selector Switches

For Cooling (see figure 180).

1. Turn the selector switch to the "LOW COOL" or "HIGH COOL" position.
2. Rotate the thermostat (temperature control) switch to the position that is the most comfortable to you. The compressor will automatically turn on when the temperature of the air entering the air conditioner rises a few degrees above the setting you have selected. When the temperature of the air entering the air conditioner drops below the selected setting, the compressor will automatically turn itself off. The air conditioner, while in the cooling mode, will continue to cycle the compressor on and off in the above mentioned fashion until the selector switch is turned to another mode of operation.
3. Adjust the damper lever to the desired volume of air flow.
4. Position the louvers to the desired direction the discharge air is to flow.

For Heating (See figure 180).

NOTE: The Elect-A-Heat is intended to take the chill out of the indoor air when the air is a few degrees too cool for comfort. The Elect-A-Heat is an effective "chill chaser."
It is not a substitute for a furnace.

ROOF AIR CONDITIONING (Continued)

1. Turn the selector switch to the "LOW HEAT" position.

NOTE: At "LOW HEAT" fan operates at low speed with heat output at maximum.

2. Rotate the thermostat (temperature control) switch to the position that is the most comfortable to you. The heater will automatically turn on when the temperature of the air entering the air conditioning unit drops below this setting a few degrees and automatically turns off when the temperature of the air entering the air conditioner rises a few degrees above this setting. The heater will continue to cycle on and off in this fashion until the selector switch is turned to another mode of operation
3. Adjust the damper lever to the desired volume of air flow.
4. Position the louvers to the desired direction the discharge air is to flow.

NOTE: The temperature of the discharged air can be controlled to some extent by opening and closing the damper and louvers. When the damper and louvers are closed the warmest, localized discharge air is achieved. Fully opened damper and louvers will throw the warm discharge air to the back and front of the vehicle for more efficient circulation and faster warm-up. Although the air temperature is lower with the damper and the louvers fully opened, the heating capacity is still the same.

Damper Operation — When relative humidity conditions are high, set the air damper at either a medium or high setting. In high humidity conditions we do not recommend operation of the air conditioner with the damper in the down position (minimum air) as this may cause the cooling coil to become iced-up and the air conditioner to stop cooling.

Operation During Cooler Nights (cooling operation) — It is important, when the outdoor temperature drops in the evening or during the night to below 75°F., that the thermostat (temperature control) be set at a midpoint between "Warmer" and "Colder." If the setting is at "colder," the cooling (evaporator) coil may become iced-up and stop cooling. During the day when the temperatures have risen above 75°F., reset the thermostat switch to the desired setting.

NOTE: Should icing-up occur, it is necessary to let the cooling (evaporator) coil defrost before normal cooling operation is resumed. During this time operate the unit in the "HIGH FAN" position with the dampers at maximum air flow. When increased or full air flow is observed, the cooling coil should be clear of ice.

Roof Air Conditioner Maintenance — Maintenance needed to keep the unit in good care is minimal. In fact about the only thing you, the owner, must take care of is the cleaning and replacement of the filter. The filter is a vital part of every air conditioning system. If the filters are not cleaned at regular intervals they may become partially clogged with lint, dirt, grease, etc. A clogged filter will produce a loss of air volume and may eventually cause an icing-up of the cooling (evaporator) coil.

IMPORTANT NOTE: DO NOT OPERATE YOUR AIR CONDITIONER FOR EXTENDED PERIODS OF TIME WITHOUT THE FILTER INSTALLED. An even more serious condition occurs when the air conditioner is operated without a filter. When this happens, the lint, dirt, grease, etc. that are normally stopped by the filter are now accumulating in the cooling coil. This not only leads to a loss of air volume and a possible icing-up of the cooling coil, but could also result in serious damage to the operating components of the air conditioner. We recommend that the filters be cleaned or changed at least every two weeks when the air conditioner is in operation.

Cleaning and/or Changing Roof Air Conditioner Filters:

1. Remove the selector switch and thermostat knobs from ceiling assembly.
2. Remove the two screws that secure the ceiling assembly shroud to the ceiling assembly (see figure 181).

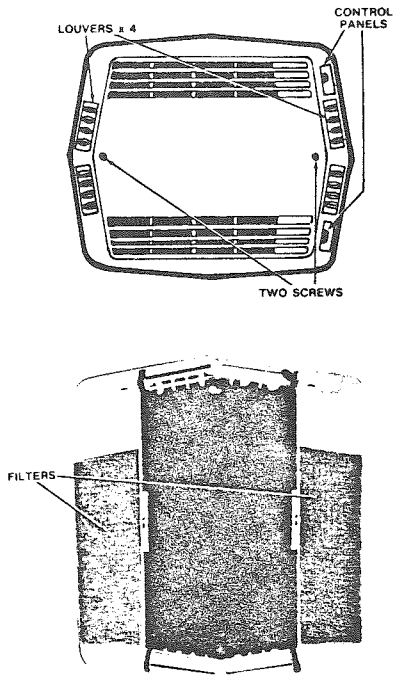


Figure 181 — Filter Removal

3. Lower the shroud and gently slide it off the control knob shafts and damper lever.
4. Take filters out and either clean or exchange with other filters.

NOTE: If replacement filters are necessary, the filters can be purchased from REVCON Authorized Service Centers or from The Coleman Company directly. It is recommended that spare filters be carried with the RV at all times to replace worn, torn, or deteriorated filters.

5. Replace the filters and reinstall the ceiling shroud in reverse order starting with step 4.

Roof-Mounted Air-Conditioner Service — All electrical work and/or inspection should be performed only by qualified service personnel. Contact REVCON or your nearest Coleman Service Center if electrical problems should arise. If the air conditioner continues to trip off the circuit breaker, have an electrician check the starting amperage and running amperage on the unit.

ROOF AIR CONDITIONING (Continued)

If all electrical power to the air conditioner is normal, but neither the fan nor the compressor will operate, the connector plug located behind the ceiling assembly control box should be checked to determine whether it is faulty.

On the heating-cooling air conditioner models, if all electrical power to the unit is normal and fan runs but you never get any heated air, then the electrical plug to the heating unit should be checked for a secure connection. If this does not correct the malfunction, the heating thermostat or limit switch may be faulty.

The air conditioner should be inspected periodically to be sure that the bolts which secure the unit to the roof are tight and in good shape. Also, an examination of the plastic shroud covering the air conditioner on the top of the roof should be made periodically. Be sure the four acorn nuts are snug and holding the shroud to the air conditioner. While examining the tightness of these acorn nuts, also examine the shroud to be sure it has not developed cracks or suffered damage from impact.

DANGER: DISCONNECT THE POWER SUPPLY TO THE UNIT BEFORE SERVICING TO PREVENT A SHOCK HAZARD OR POSSIBLE INJURY FROM MOVING PARTS.

The blower drive motor on some units, may include oiling cups at the top of the motor. There is no requirement to oil the journals under normal operating conditions. However, if lubrication to the unit is desired, use only SAE 20 non-detergent type oil. DO NOT OVER OIL, three to four drops in each oil hole once a year is sufficient.

ELECTRICAL SYSTEMS

ELECTRICAL SYSTEMS – The REVCON motor home is equipped with several sources for electrical power, as follows:

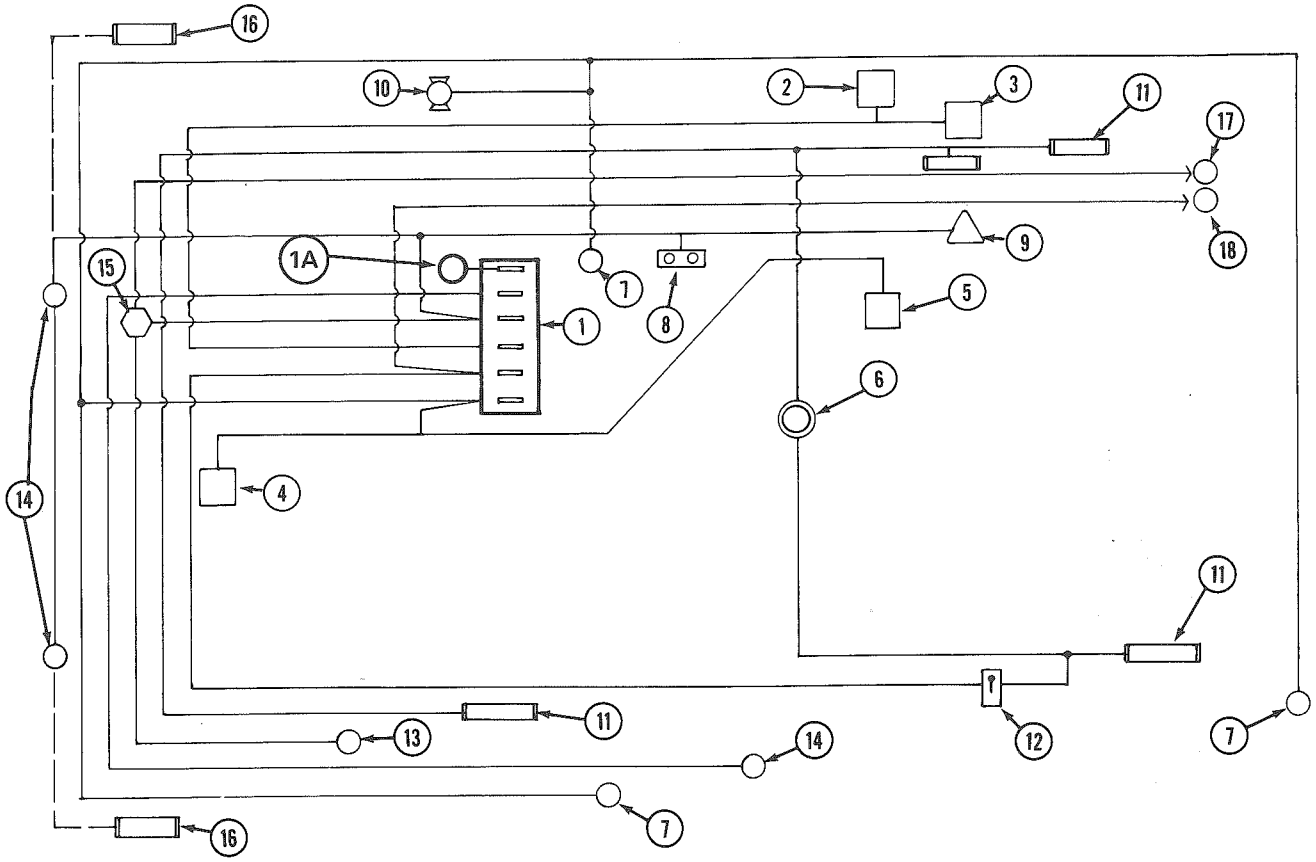
1. Two 6-volt batteries, connected in series.
2. A 12-volt alternator which is part of the motorhome chassis.
3. A 120-volt alternating current motor generator set.
4. A 120-volt alternating current external power supply.

Batteries – Your motorhome has two battery systems, one of which is primarily associated with the chassis; and the other, with the coach system. The chassis battery is a heavy-duty, permanently sealed long-life battery, with 500 cold cranking amperes. The coach batteries are heavy-duty 200-ampere hour batteries. Your motorhome electrical system is designed so these batteries may be charged by the motor generator set, or with an external power supply through the DC converter. The chassis battery is charged by the chassis engine-driven alternator.

12-Volt Alternator – One of its major functions is to keep the chassis and coach batteries charged. This alternator produces about 12 to 15 volts and is the heavy-duty type. This alternator powers all chassis electrical systems, simultaneously charges the coach and chassis batteries, and provides at least a portion of the power necessary to operate coach systems that may be used while traveling.

Dual-Battery System – The house battery system is connected to the 12-volt system of the coach, through a cut-off switch located in the battery box. The "OFF" position cuts all power to coach 12-volt systems, and should only be used for storage or emergency situations. This switch may be used in conjunction with starting the motor generator set. When the motor generator set is running, the house batteries receive a charge from the special battery-charging coils. The batteries are also wired to the DC converter so that they will receive a charge when the converter is operating.

While driving for battery charging purposes, the dual battery



1) 12-Volt Distribution Panel
1A) 12-Volt Power Source from Converter/Battery
2) Furnace
3) Automatic Ignition Water Heater
4) Auto Heater
5) Range Oven
6) Round Flourescent Light
7) 12-Volt Outlet
8) Bar Light
9) TV Control
10) Bath Fan & Light
11) Flourescent Light
12) Switch
13) Night Light
14) Bullet Lights (not on Island Bed)
15) Flourescent Light - Island Bed only
16) Flourescent Light - Island Bed only
17) Stereo
18) Cigarette Lighter on Dashboard

Figure 182 – 12-Volt Electrical System Schematic

ELECTRICAL SYSTEMS (Continued)

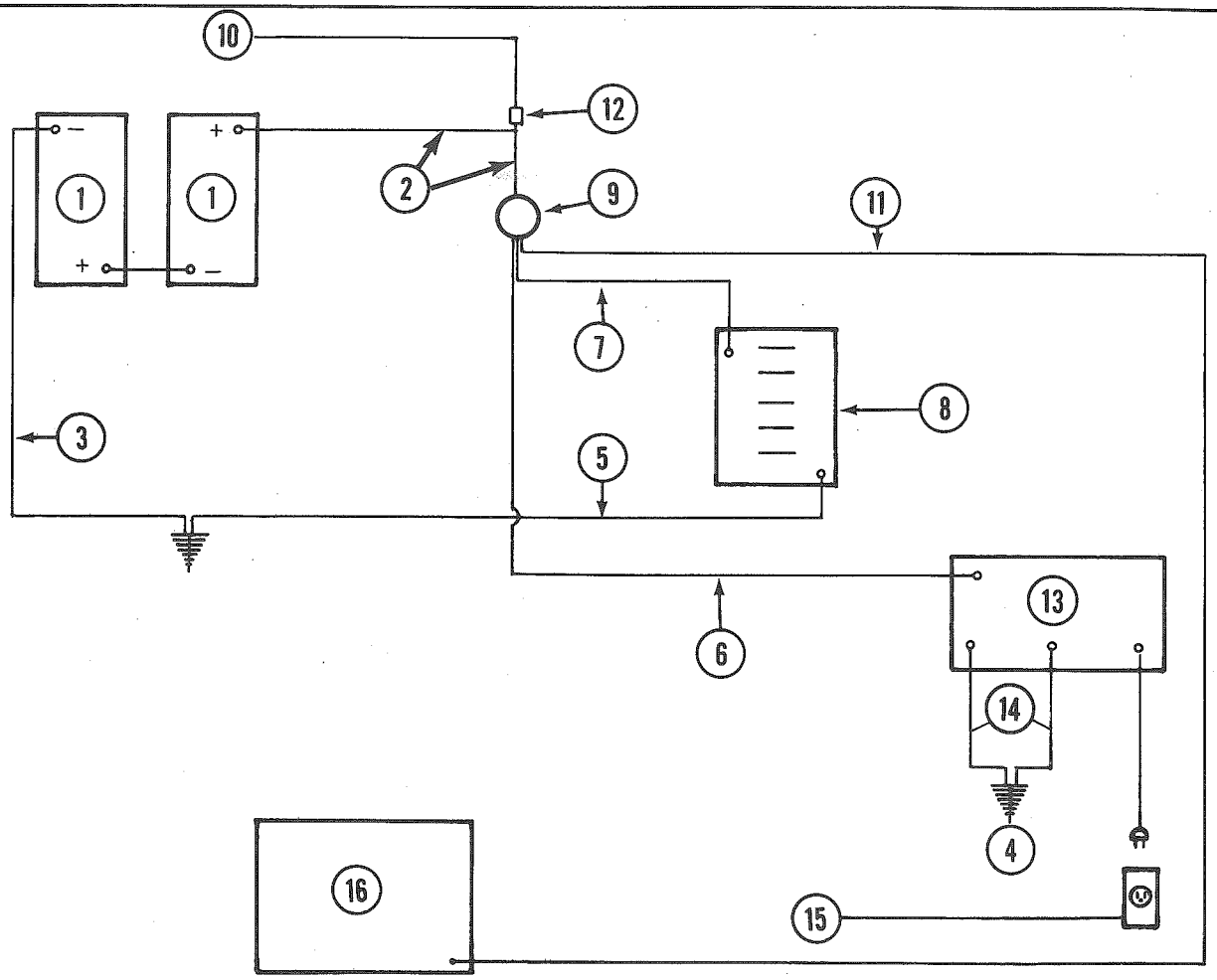
system has an isolator which connects the two battery systems together. When using this system, the isolator automatically charges both battery systems while driving. Immediately upon stopping, the isolator will switch so that the chassis battery will disconnect from the coach batteries and retain its full charge.

For your convenience, a battery boost switch has been installed in your motorhome. This switch enables the operator to parallel the house batteries with the chassis battery, in an emergency situation. If, for example, the chassis battery is drained, having no power to start the engine. Use the battery boost switch to connect the two electrical systems. The house batteries may now be used to give electrical power needed to start the automotive engine. With the motor generator set running, the set coils will charge the house batteries only. The battery boost switch may also be used for difficult starting of the motor generator set. Be sure to run the automotive engine when starting the generator set under difficult starting conditions.

NOTE: To operate the motor generator set and draw power through the 120-volt circuits, the power cord must be plugged into the 30 amp receptacle located near the power cord.

120-Volt Utility Service – The commercial 120-volt AC utility service outlet provided by the campground should supply enough electricity to meet the needs of the entire motorhome. It is capable of powering the air conditioner, convenience outlets from which 120-volt electrical appliances can be operated, and also through the power-converter, it is capable of supplying current for all of the appliances which otherwise would be powered by the 12-volt battery.

In connecting to the external source, it is extremely important to be sure that the three-wire system is connected so the



1) *Two 6-Volt Batteries*
2) *No. 2 Gauge Red Wire to Switch*
3) *No. 2 Gauge Black Wire to Ground*
4) *5/16" x 2" Ground Bolt to Chassis Frame*
5) *No. 8 Gauge Bare Ground Wire from 12-Volt Distribution Panel*
6) *No. 2 Gauge Red Wire from Converter to Switch*
7) *No. 6 Gauge Wire from Switch to 12-Volt Distribution Panel*
8) *12-Volt Distribution Panel*
9) *On - Off Battery Switch*
10) *No. 12 Gauge Brown White Stripe Wire to Clock*
11) *No. 2 Gauge Red Wire from On - Off Switch to Generator*
12) *1 Amp In-Line Fuse to Clock (Fuse located near Item 8)*
13) *Converter*
14) *Ground Wires from Converter to Chassis Ground*
15) *115-Volt Power Supply to Converter*
16) *Motor Generator Set*

ALL COACHES THE SAME

Figure 183 – Coach Battery System

ELECTRICAL SYSTEMS (Continued)

motorhome will be properly grounded; and especially for operating the roof air conditioner, it is essential that the size of the wire in the power cord be large so that a minimal voltage drop is caused by the power line itself. Roof air conditioners and other appliances will not operate properly if a long power cord of small wire-size is used. Damage to these appliances may result, and the wire itself overheat or burn up.

Power Distribution System — From whatever source the electrical power is derived, it must be converted, controlled, and conveyed to the power-using appliances by a distribution system. This system consists of converters, wires, switches, fuses, circuit breakers, etc.

The Power Converter — Your REVCON operates on what is known as the uni-volt system. Under this system almost all of the appliances operate on 12 volts. A power converter transforms 120 volts down to 12 volts between the motor-generator set or the external power source, and the 12-volt circuits of the vehicle. The only major appliances which cannot be made to operate on 12 volts are the roof air-conditioner, and a few high-wattage electrical appliances such as toasters, electric frying pans, irons, etc.

The DC converter is located to the left side of the coach to the rear. The shore power access door may be unlocked with the aluminum Hudson key. Within the shore power cord compartment, you will find the converter, slightly to the rear. The power converter should be kept clear of obstructions which could reduce air flow through and around this unit. Since these units generate considerable heat, keeping them clean eliminates a potential fire hazard.

Main Switches — It is important for the owner to understand the use of various switches, fuses, and circuit breakers which control the distribution of power. The main breaker panel location may be found on the 120-volt electrical distribution schematics. The breaker panel is marked to indicate which breaker controls a particular circuit and the particular appliances and outlets on such circuit.

NOTE: A selector switch located on the galley wall near the refrigerator is used to select your choice of microwave oven or the front overhead air conditioner operation. **Both units cannot be operated simultaneously.**

Fuses and Circuit Breakers — There are six (6) sets of fuses and circuit breakers, as follows:

1. A set that protects the automatic 12-volt system. This fuse panel is located under the dash instrument panel, by the foot controls.
2. A set that protects the 12-volt house electrical system. These are found in the 12-volt distribution panel.
3. A set that protects the house 120-volt system. These are found in the 120-volt distribution panel.
4. A set that protects the main breaker box and rear air conditioner. This breaker box is located in the area with the shore cord.
5. A set to protect the generator. These pushbutton breakers are on the motor generator set.
6. There are fusible links found in the automotive wiring at the 12-volt isolator. These protect the headlight and ignition circuitry.

Ground Fault Interrupt — This device protects you against hazardous electrical shock caused if your body becomes a

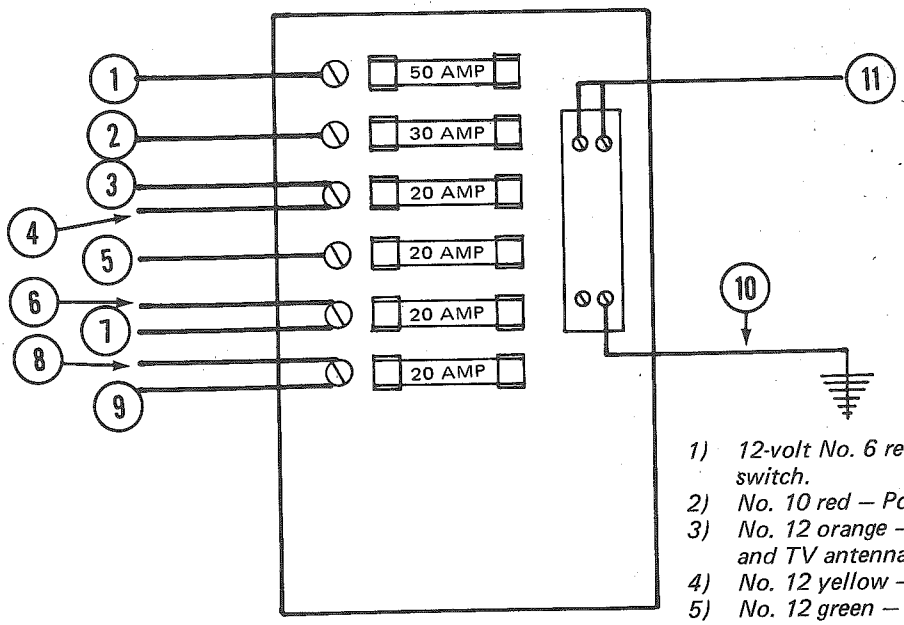


Figure 184 — 12-Volt DC Distribution Panel - All Coaches

1) *12-volt No. 6 red — Power from battery ON position switch.*
2) *No. 10 red — Power to refrigerator.*
3) *No. 12 orange — Power to locker bullet lights, bar light and TV antenna control.*
4) *No. 12 yellow — Power to stereo switch and night light.*
5) *No. 12 green — Power to furnace and automatic ignition water heater.*
6) *No. 12 red — Power to all fluorescent lights.*
7) *No. 12 blue — Power to cigarette lighter on dashboard.*
8) *No. 12 brown — Power to all 12-volt outlets.*
9) *No. 12 brown — Power to rear auto heater and range oven.*
10) *No. 8 bare copper wire — Ground.*
11) *No. 12 black — Ground to all lights and appliances.*

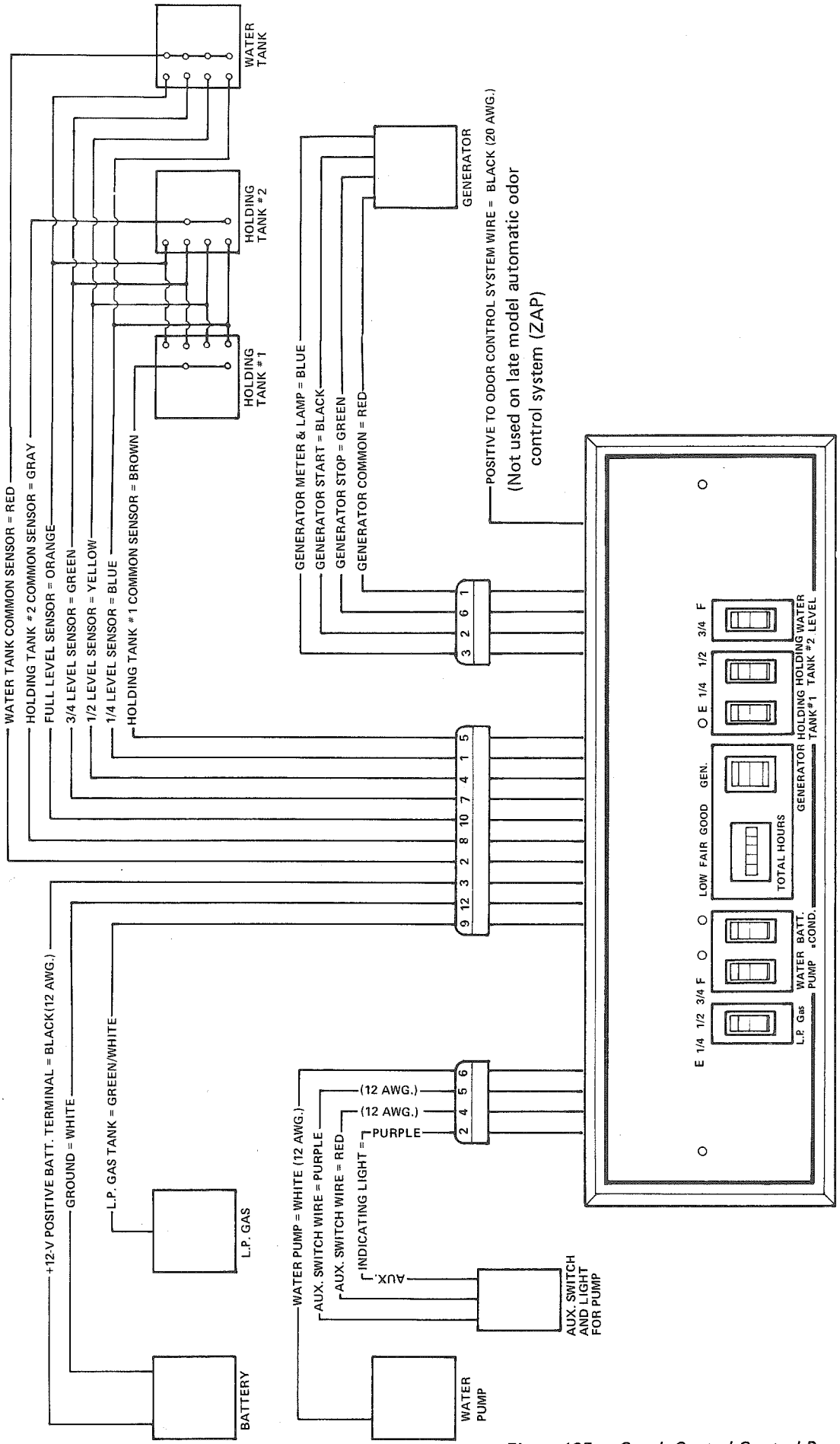


Figure 185 — Coach Central Control Panel Schematic

ELECTRICAL SYSTEMS (Continued)

path for electricity to travel through to reach ground. This can happen when you touch an appliance or cord that has become "live" through faulty mechanism, damp or worn insulation, etc. You don't even have to be standing on the ground itself to be shocked; you could be touching plumbing or other structural material that leads to ground.

When protected by Ground Fault Interrupt (GFI), you may still feel a shock, but the GFI will cut it off quickly enough to avoid electrical injury to a person in normal health. (Infants and very small children may still be affected.)

WARNING: The GFI will not protect against line-to-line shocks (like the kind gotten by touching metal objects inserted in both straight slots of an outlet); or current overloads or line-to-line short circuits. The fuse or circuit breaker at the distribution box or panel must provide such protection.

GFI Test Procedure — Like a fire extinguisher or other safety device, your GFI receptacle should be checked every month to make sure it is operating properly to protect you. Follow these simple instructions and then enter the date of the test on the reverse side of your test card:

1. Push the rectangular yellow/orange "TEST" button. The round red "RESET" button should pop out, exposing its white band. This indicates the device is working properly. Power will now be off at all outlets protected by the GFI. Verify by plugging a test lamp into such outlet. (If this receptacle has a red indicator light to right of the "RESET" button, you may observe it instead of a test lamp.) Lamp and/or indicator light should be unlit.

CAUTION: If "RESET" button does no pop out or if test lamp or indicator light remains lit when "RESET" button does pop out, do not use any outlets on the circuit. Call a qualified electrician.

2. If the GFI tests out okay, restore power by pushing the round "RESET" button back in. Test lamp and/or indicator light should light.

Some REVCON motorhomes have a GFI circuit breaker located in the main breaker box. This device should be checked every month to verify operation. You may test the device monthly by the following procedure:

1. Check to verify that panel is energized.
2. Check to verify that breaker is in "ON" position.
3. Press the "TEST" button. The handle must trip to center position. If it does not, have an electrician check for connection.
4. Reset the breaker by moving the handle to "OFF" and then "ON."
5. Record test date on the test card provided.

Maintenance of Electrical Systems — Before starting out on a trip, all electrical appliances should be checked to be certain they are in working condition.

Batteries should always be kept near full charge condition. At extremely cold temperatures, a discharged battery may freeze and be ruined. Also, battery fluid level should be checked regularly, particularly in hot weather. Low battery fluid will damage battery plates and shorten battery life.

The charge of a battery can be measured either with a voltmeter or with a hydrometer. A fully charged battery should have an open-circuit voltage, after standing idle for about five (5) minutes, of from 12.4 to 12.7 volts, at 80°F. The specific gravity of a fully charged battery should be about 1.260 per cell at 80°F. Figures below these levels will indicate a partial discharge.

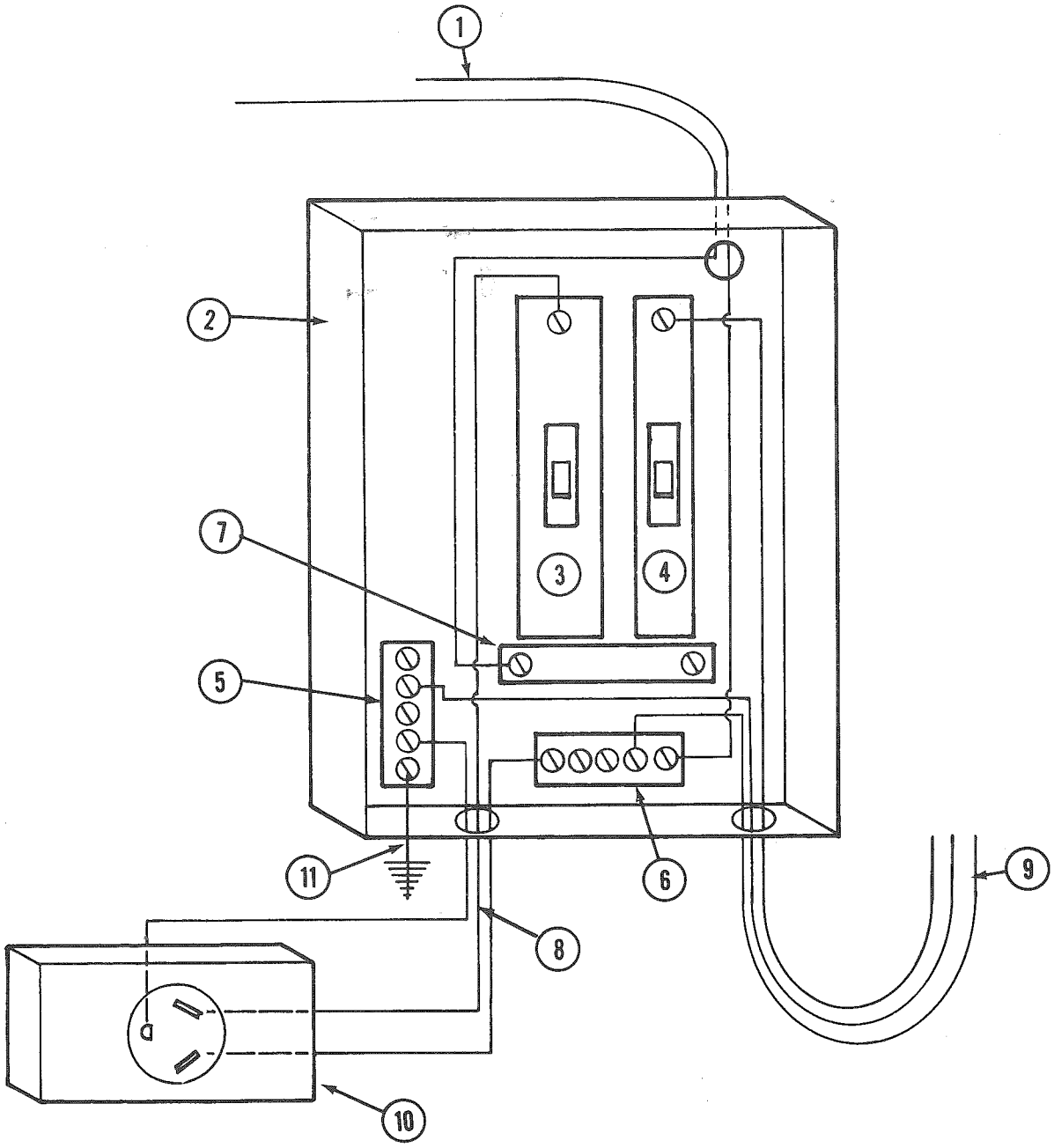
Distilled water should be added to batteries as necessary to bring electrolyte to the proper level. Chemical accumulations around terminals should be removed with hot water containing baking soda, followed by a thorough flushing with clear water.

CAUTION: Don't get any baking soda solution in the battery itself because the electrolyte will be naturalized and battery will go dead.

Battery cable terminals should be moved from time to time, cleaned and retightened on the terminal posts.

Battery connections to ground and to major terminal junctions should be checked for tightness. If the engine ground wire has been found to be missing, a separate ground wire should be connected to the engine and to the chassis.

Main switches should be normally kept in the off position when the appliances they control are not being used so there is no heavy load on the motor generator set when it is being started or stopped. In general, heavy-power-using appliances should be turned off whenever the motor-generator-set is being started or stopped. In fact, many owners consider it good practice to let the motor-generator set warm-up for a few moments before calling on it to carry the load of a major appliance.



1) *Flexible Conduit & No. 8 black and white wires from Generator to Power Breaker Panel.*
2) *Generator Power Breaker Panel.*
3) *30-Amp Circuit Breaker.*
4) *20-Amp Circuit Breaker.*
5) *Grounding Bar.*
6) *Neutral Bar.*
7) *Hot Bar.*
8) *110-Volt Power to 110-Volt Receptacle.*
9) *110-Volt Power to Rear Air Conditioner*
10) *110-Volt 30-Amp Receptacle*
11) *No. 8 Bare Ground Wire.*

Figure 186 – Generator Power Breaker Panel

ELECTRICAL SYSTEMS (Continued)

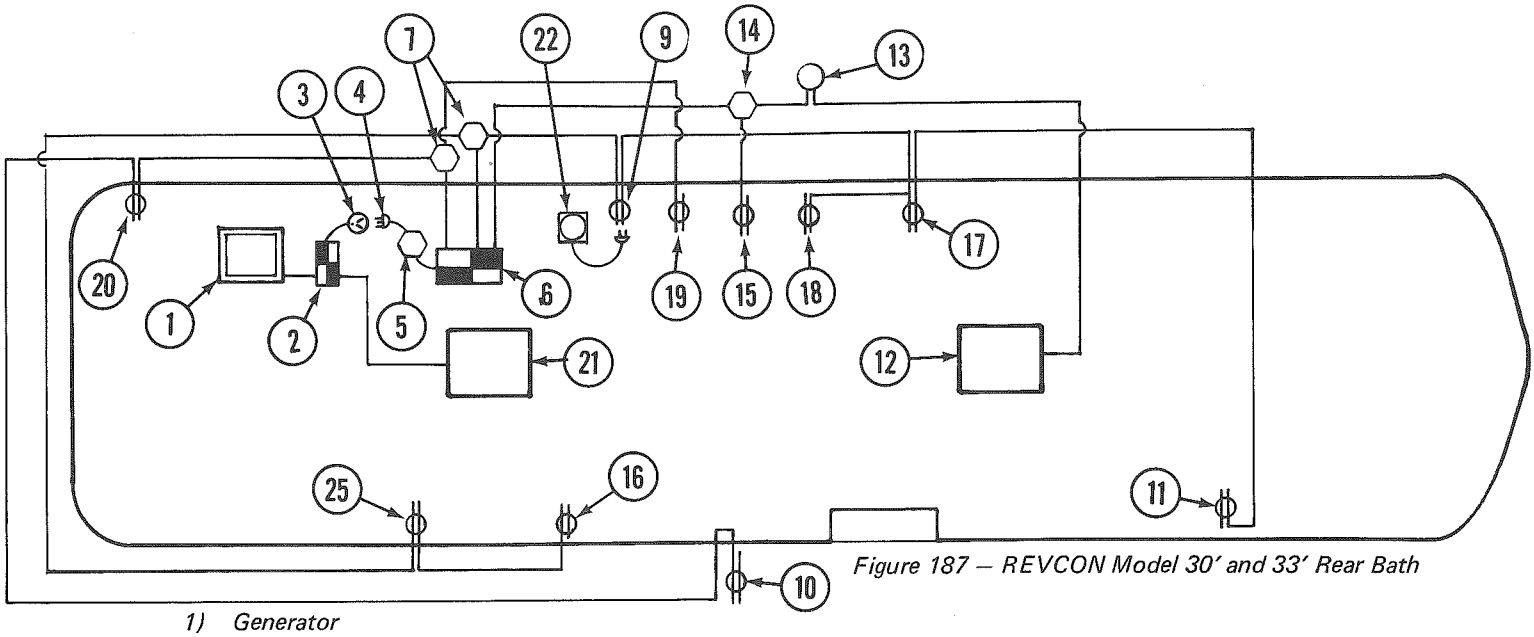


Figure 187 – REVCON Model 30′ and 33′ Rear Bath

1) *Generator*
2) *Generator Breaker Box*
3) *30 Amp Receptacle*
4) *30 Amp Shore Cord*
5) *Junction Box*
6) *Main Breaker Box*
7) *Junction Boxes*
8) *Bedroom Receptacle*
9) *Vacuum Cleaner Receptacle*
10) *Outside Weatherproof Receptacle (G.F.I.)*
11) *Front Side of Swivel Chair Receptacle*
12) *Front A.C.*
13) *Front A.C. & Microwave Oven Switch*
14) *Junction Box*
15) *Microwave Oven Receptacle*
16) *TV Antenna Receptacle*
17) *Blender & Ice Maker Receptacle*
18) *Galley Receptacle*
19) *Refrigerator Receptacle – (G.F.I.)*
20) *Bathroom Receptacle (G.F.I.)*
21) *Rear A.C.*
22) *Converter Receptacle & Converter*
23) *A.C. Unit – 27-Foot Coach Only*
24) *Roof Locker Receptacle (above dinettes)*
25) *Wardrobe Receptacle*

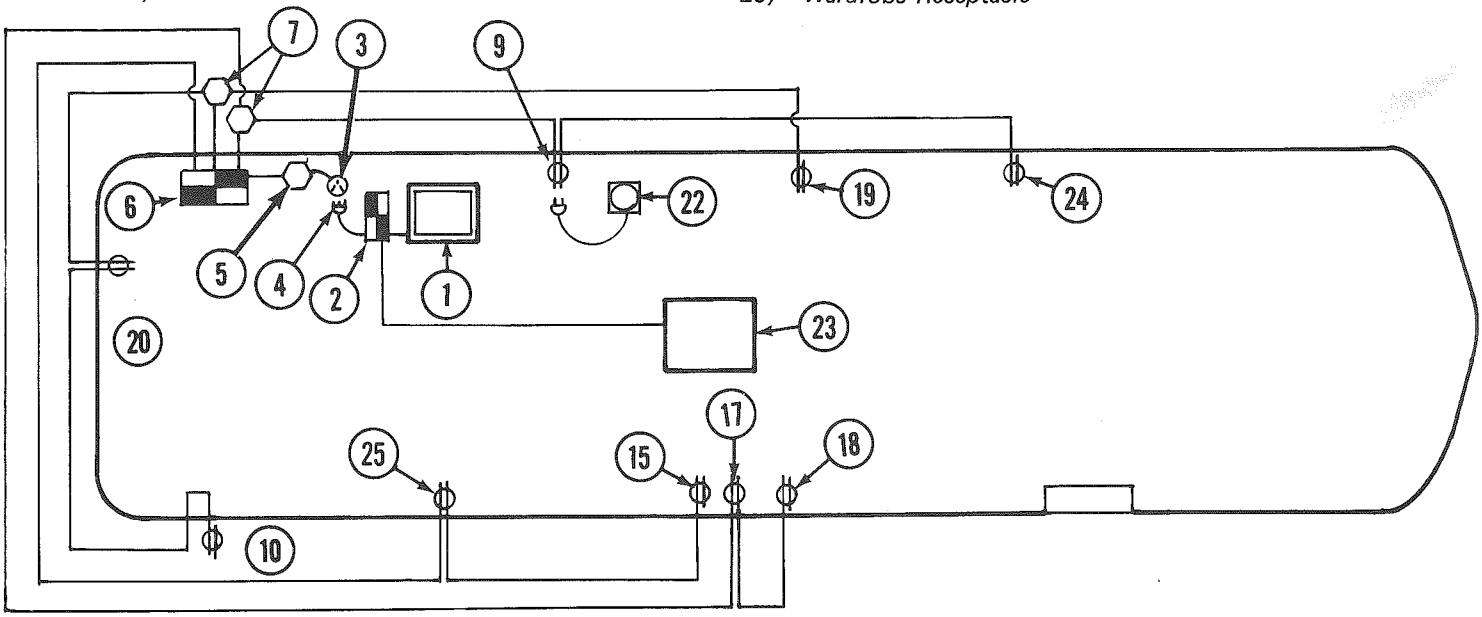


Figure 188 – REVCON Model 27′ Rear Bath

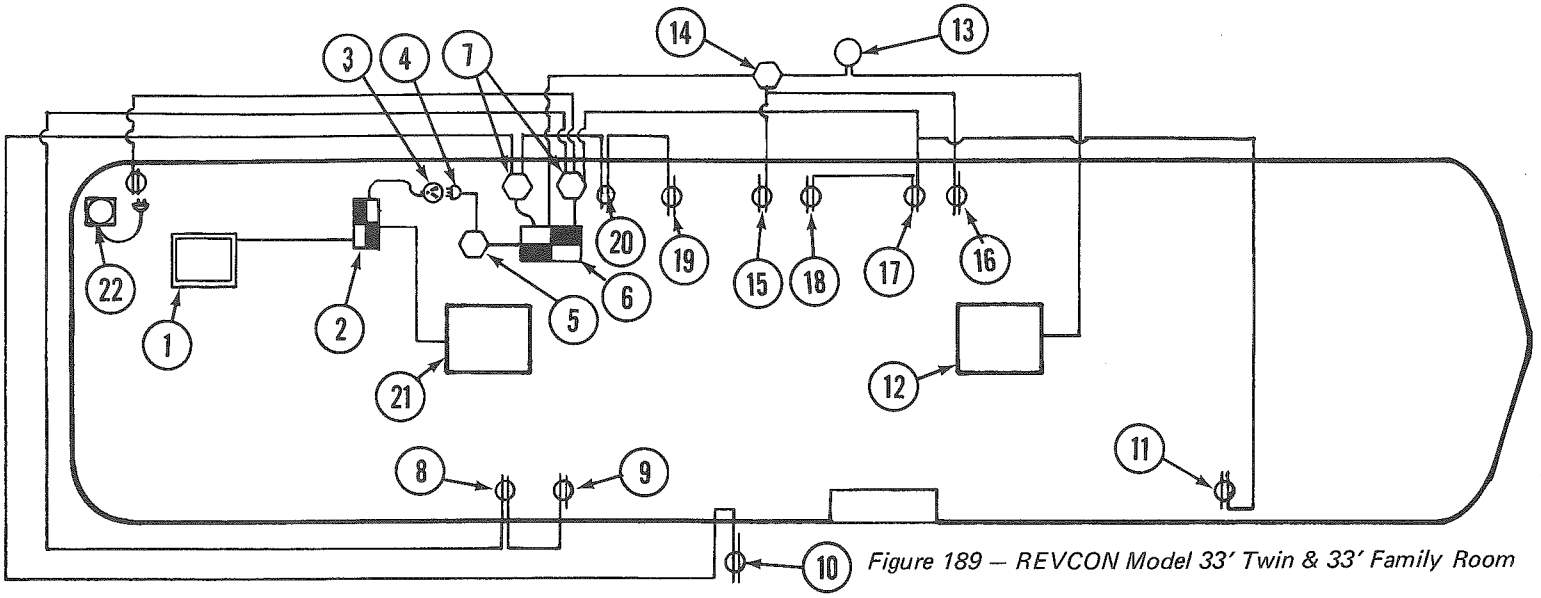


Figure 189 — REVCON Model 33′ Twin & 33′ Family Room

1) *Generator*
2) *Generator Breaker Box*
3) *30 Amp Receptacle*
4) *30 Amp Shore Cord*
5) *Junction Box*
6) *Main Breaker Box*
7) *Junction Boxes*
8) *Bedroom Receptacle*
9) *Vacuum Cleaner Receptacle*
10) *Outside Weatherproof Receptacle (G.F.I.)*
11) *Front Side of Swivel Chair Receptacle*
12) *Front A.C.*
13) *Front A.C. & Microwave Oven Switch*
14) *Junction Box*
15) *Microwave Oven Receptacle*
16) *TV Antenna Receptacle*
17) *Blender & Ice Maker Receptacle*
18) *Galley Receptacle*
19) *Refrigerator Receptacle (G.F.I.)*
20) *Bathroom Receptacle (G.F.I.)*
21) *Rear A.C.*
22) *Converter Receptacle & Converter*

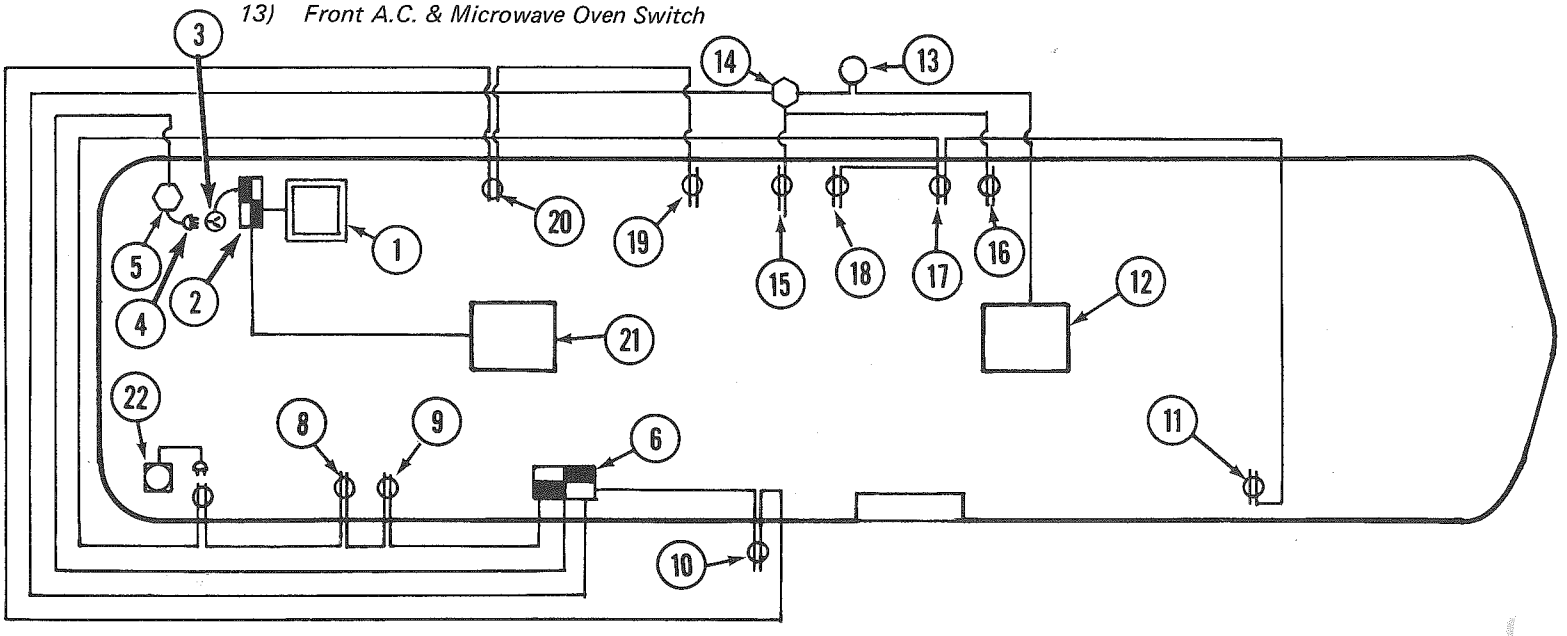


Figure 190 — REVCON Model 33′ Double Bed Only

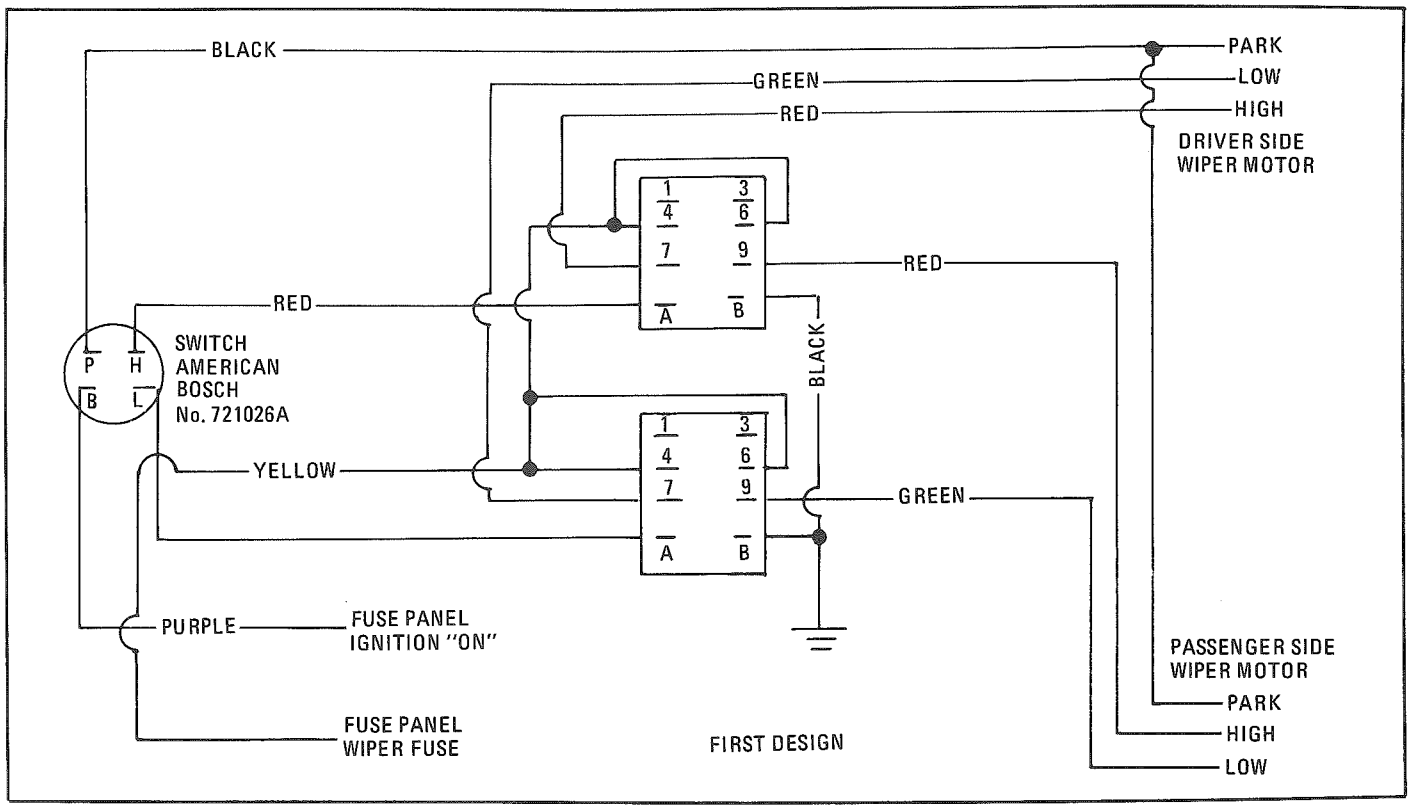


Figure 191 – Windshield Wiper Electrical Schematic - First Design

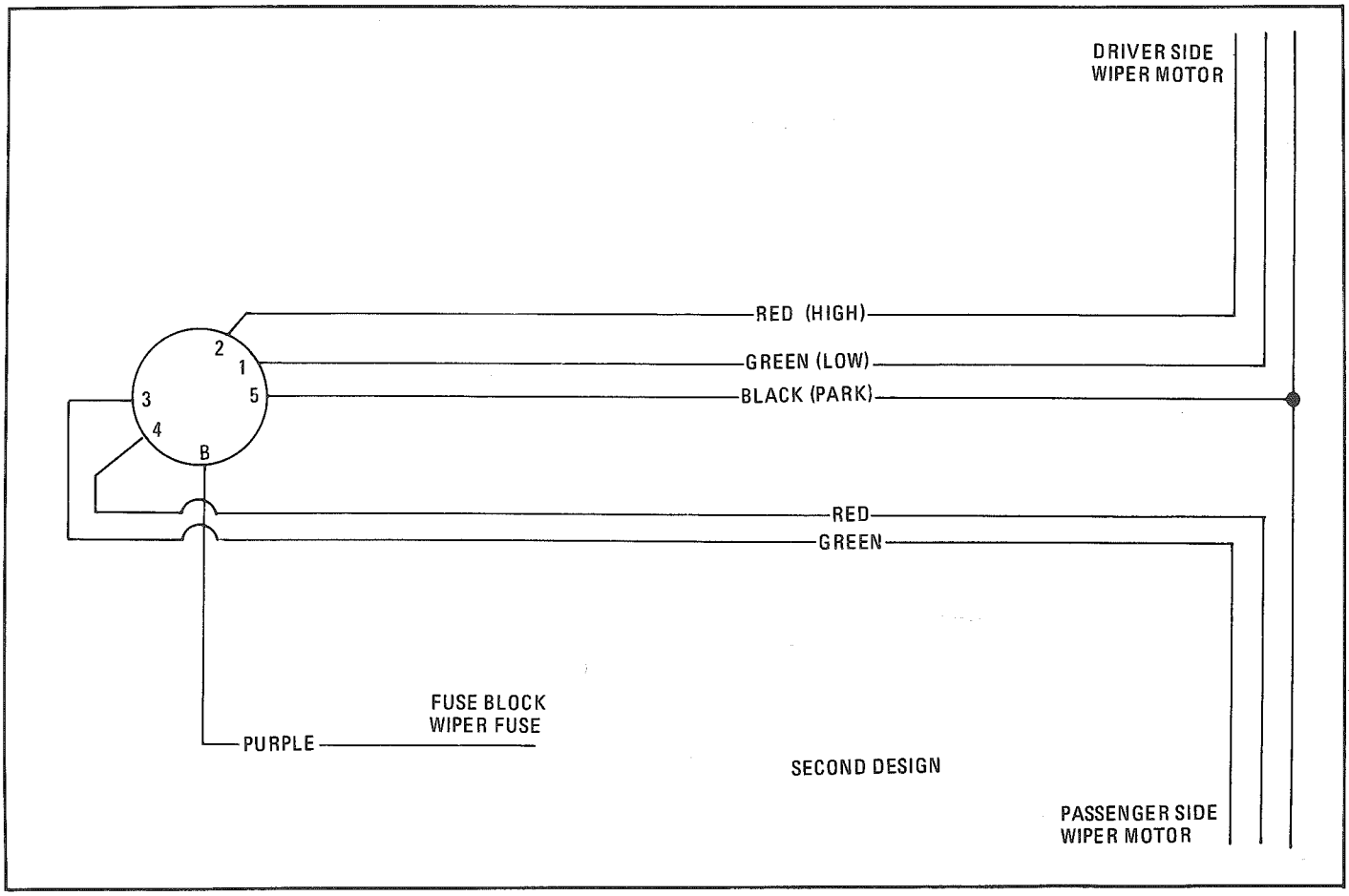


Figure 192 – Windshield Wiper Electrical Schematic - Second Design

ELECTRICAL SYSTEMS (Continued)

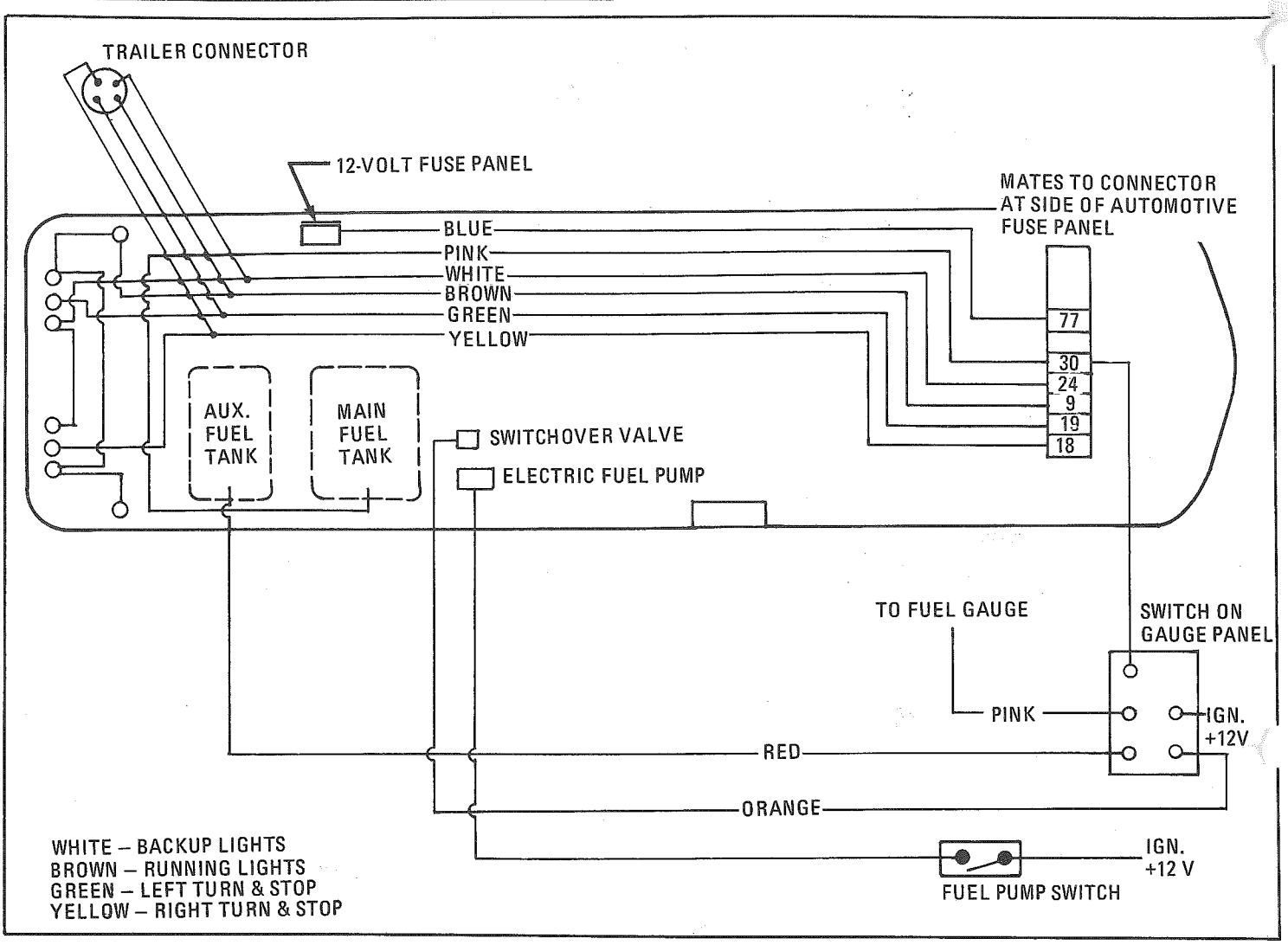


Figure 193 — Instrument Panel Electrical Wiring Schematic

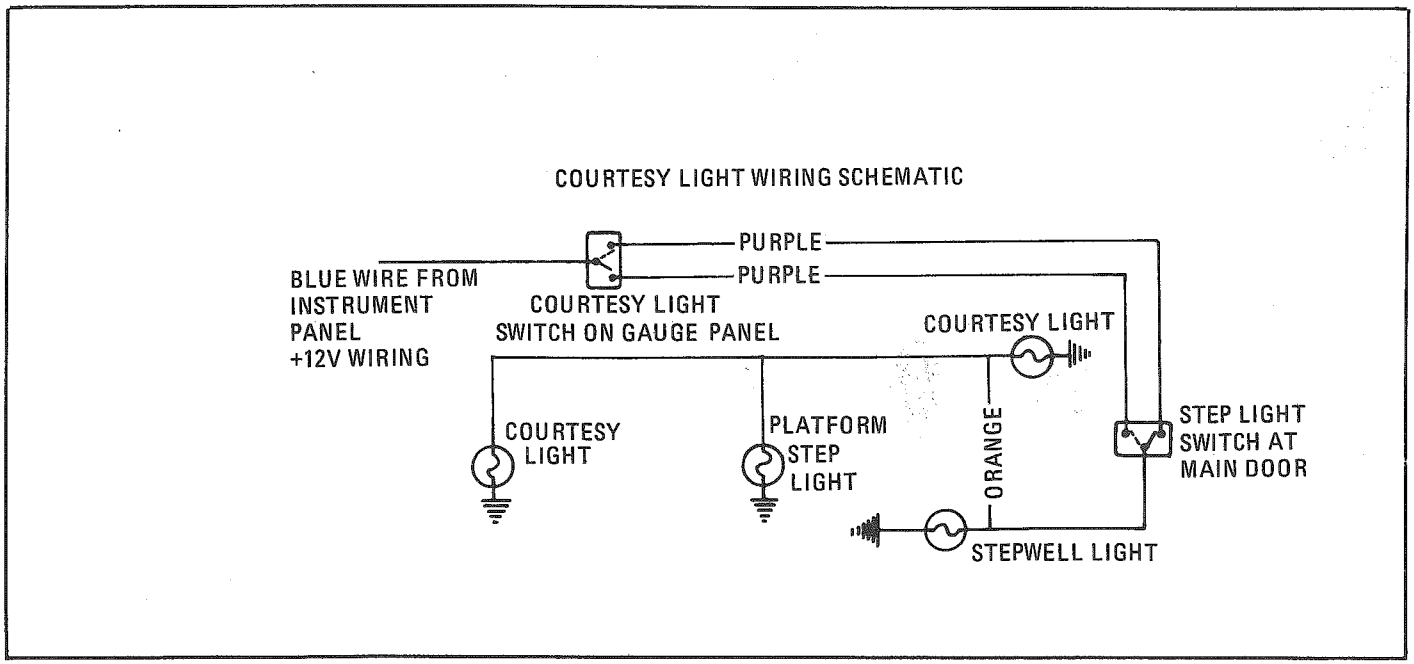


Figure 194 — Courtesy Light Wiring Schematic

ELECTRICAL SYSTEMS (Continued)

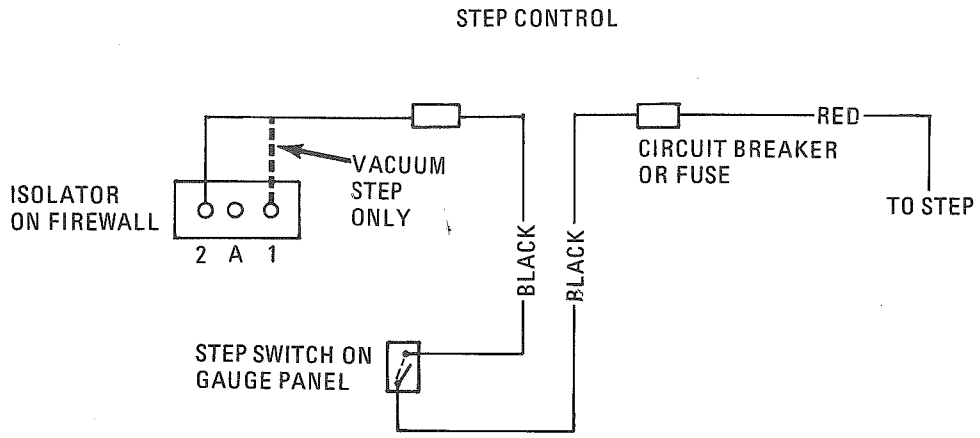


Figure 195 — Step Control Electrical Wiring Schematic

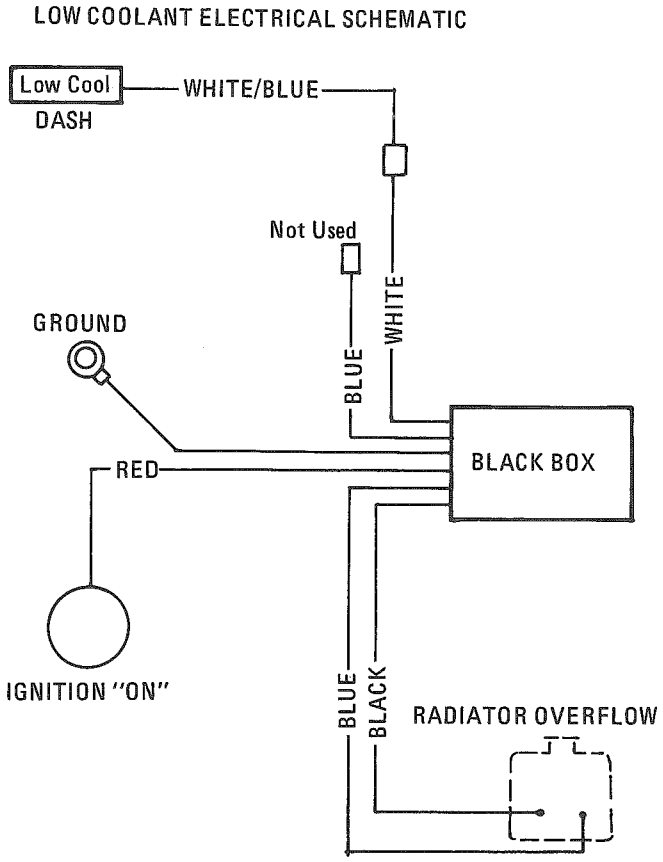
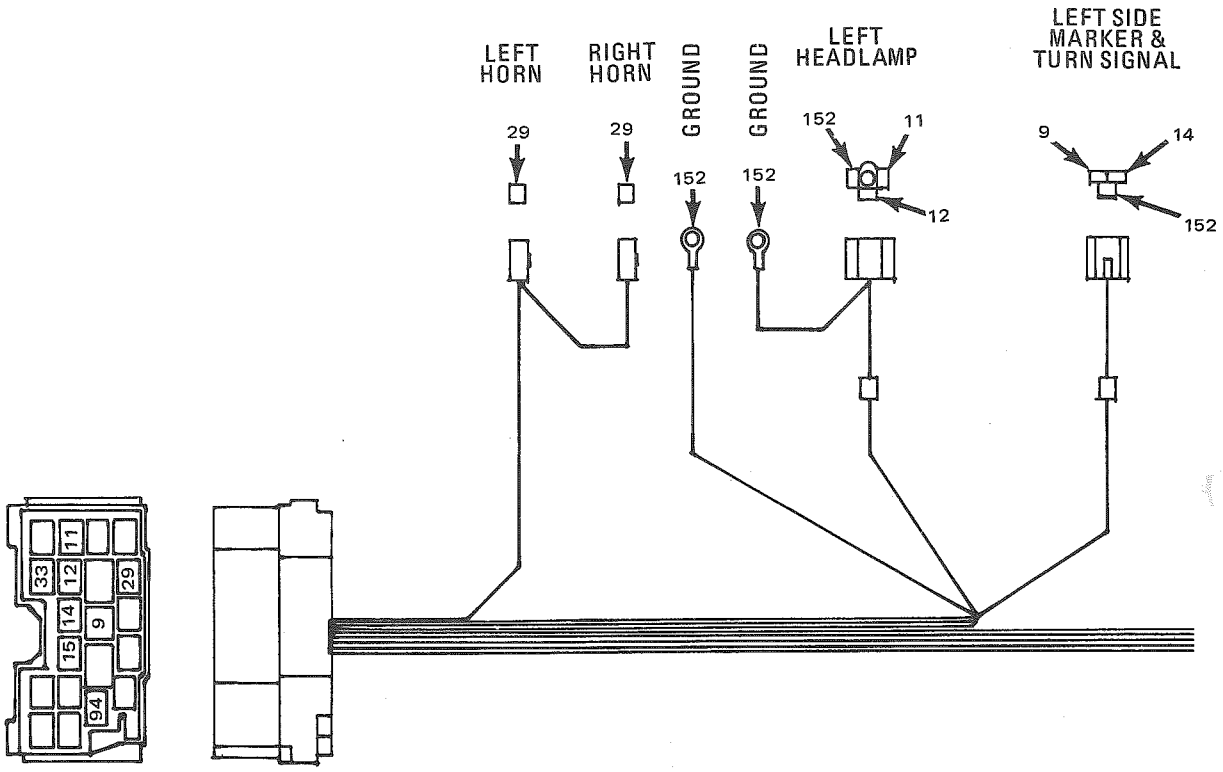


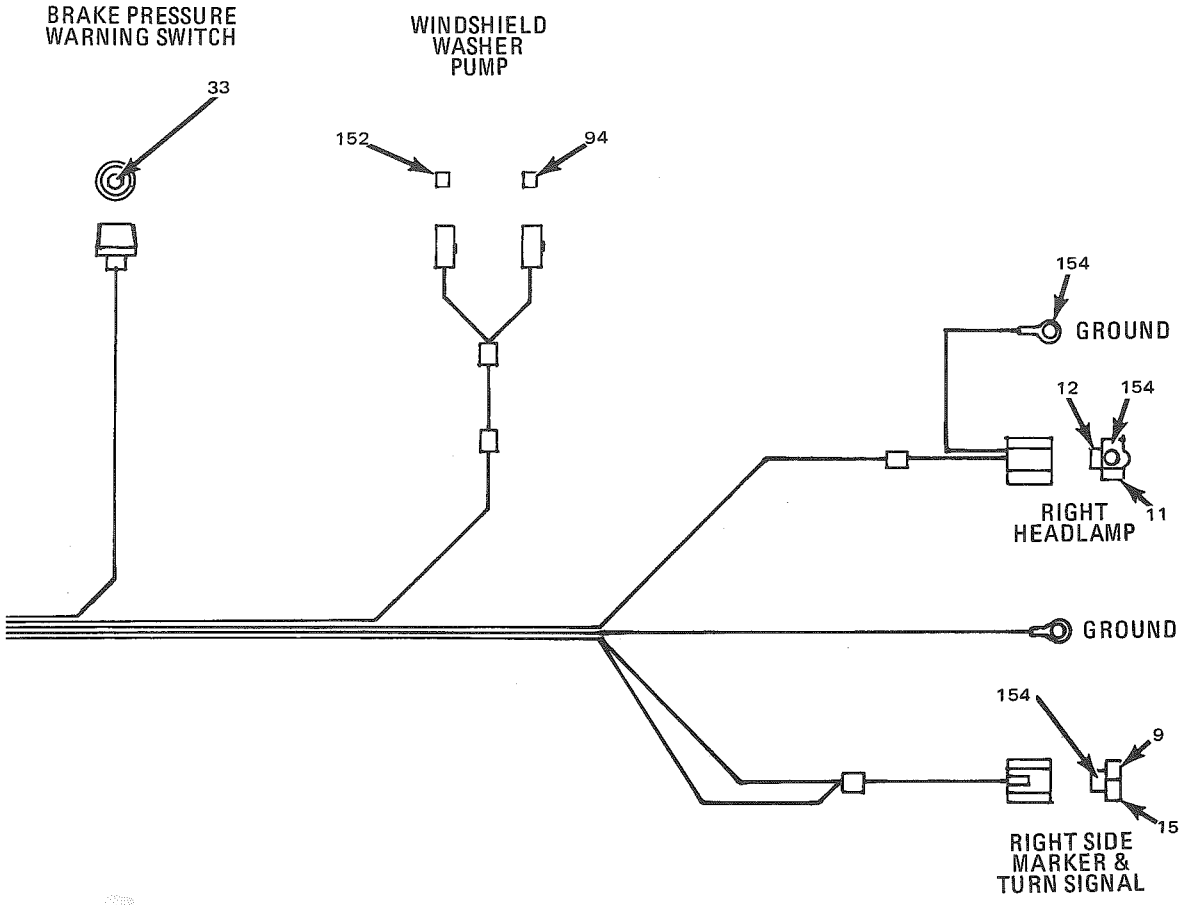
Figure 196 — Low Coolant Electrical Schematic



WIRING COLOR CODE:

9 BROWN
11 LIGHT GREEN
12 TAN
14 LIGHT BLUE
15 DARK BLUE
29 DARK GREEN
33 TAN
94 PINK
152 BLACK
154 BLACK

Figure 197 – Forward Lamp Wiring Schematic


BRAKE PRESSURE WARNING SWITCH
33
WINDSHIELD WASHER PUMP
152
94
154
GROUND
12
154
11
RIGHT HEADLAMP
GROUND
154
9
15
RIGHT SIDE MARKER & TURN SIGNAL

ELECTRICAL SYSTEMS (Continued)

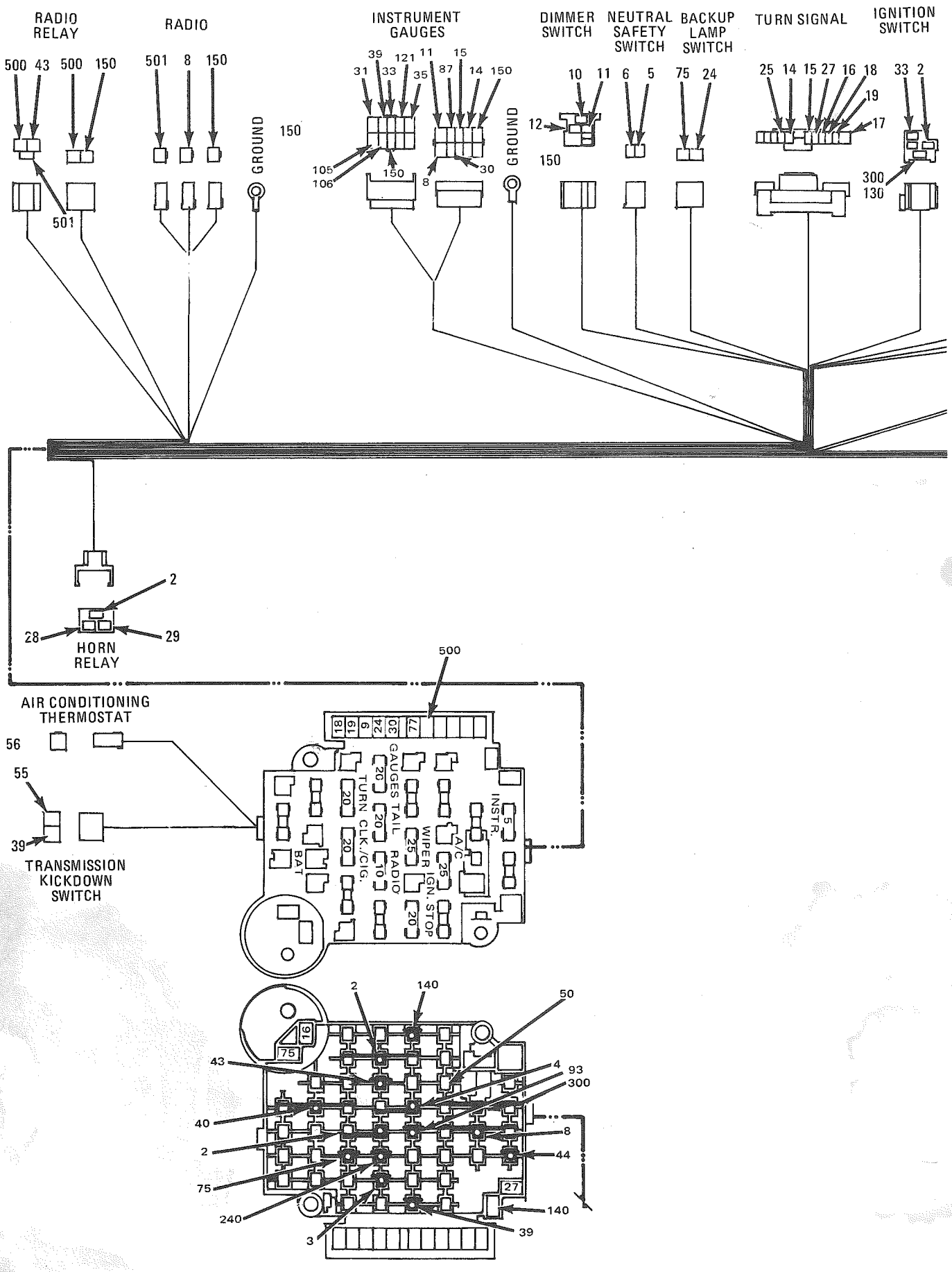
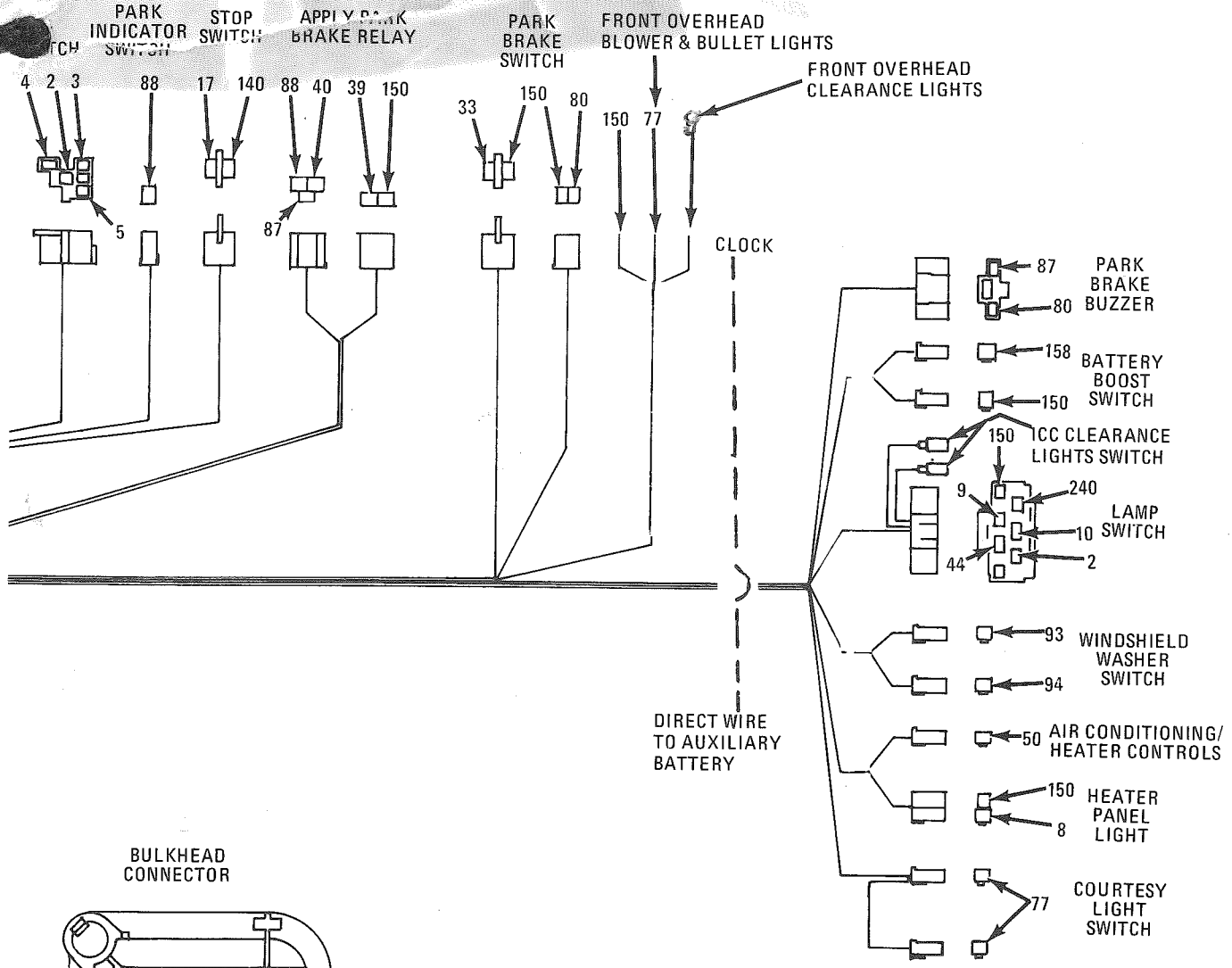
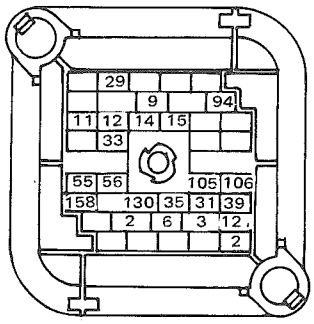


Figure 198 — Instrument Panel Wiring Schematic

ELECTRICAL SYSTEMS (Continued)

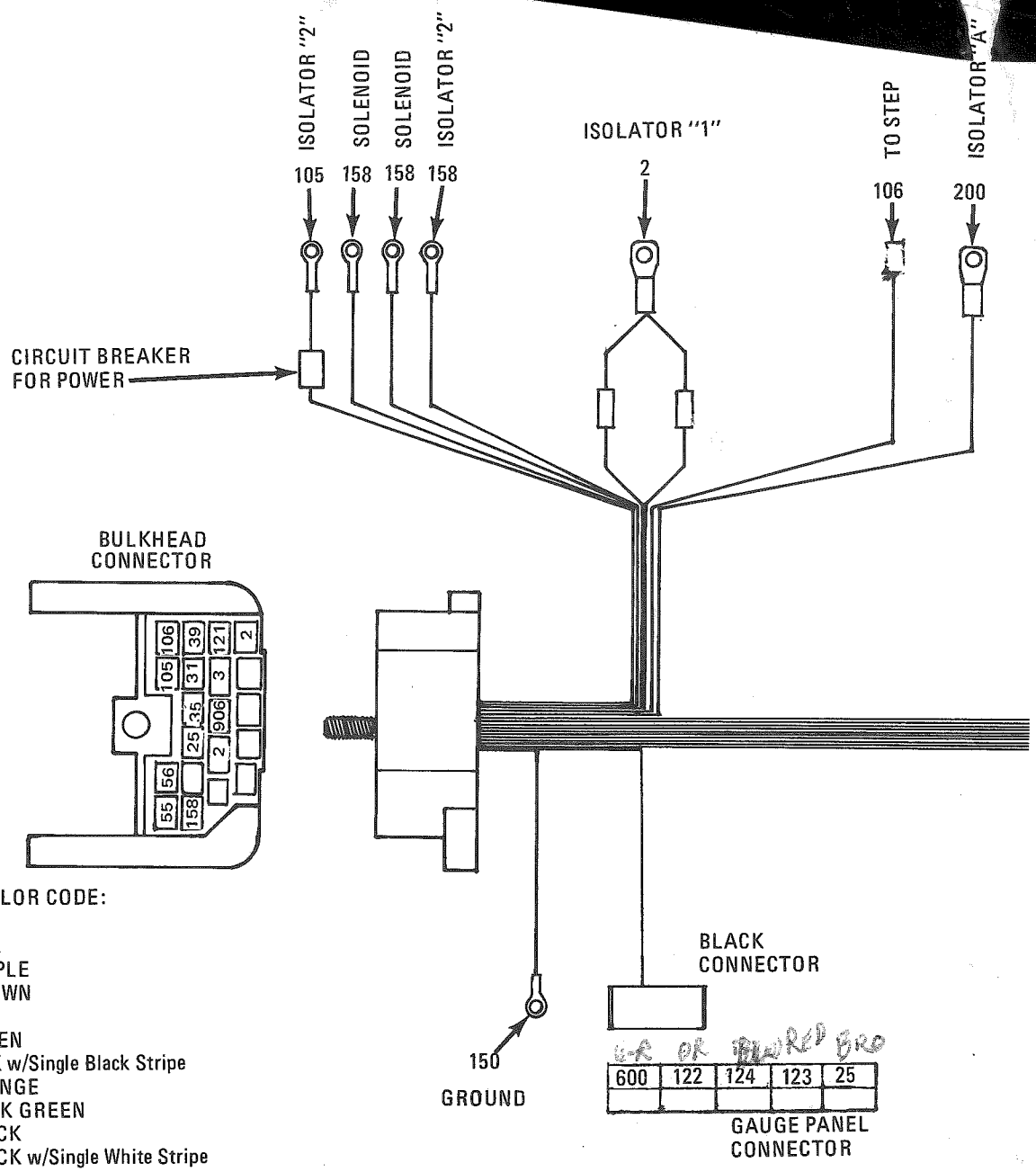


BULKHEAD CONNECTOR



WIRE COLOR CODE:

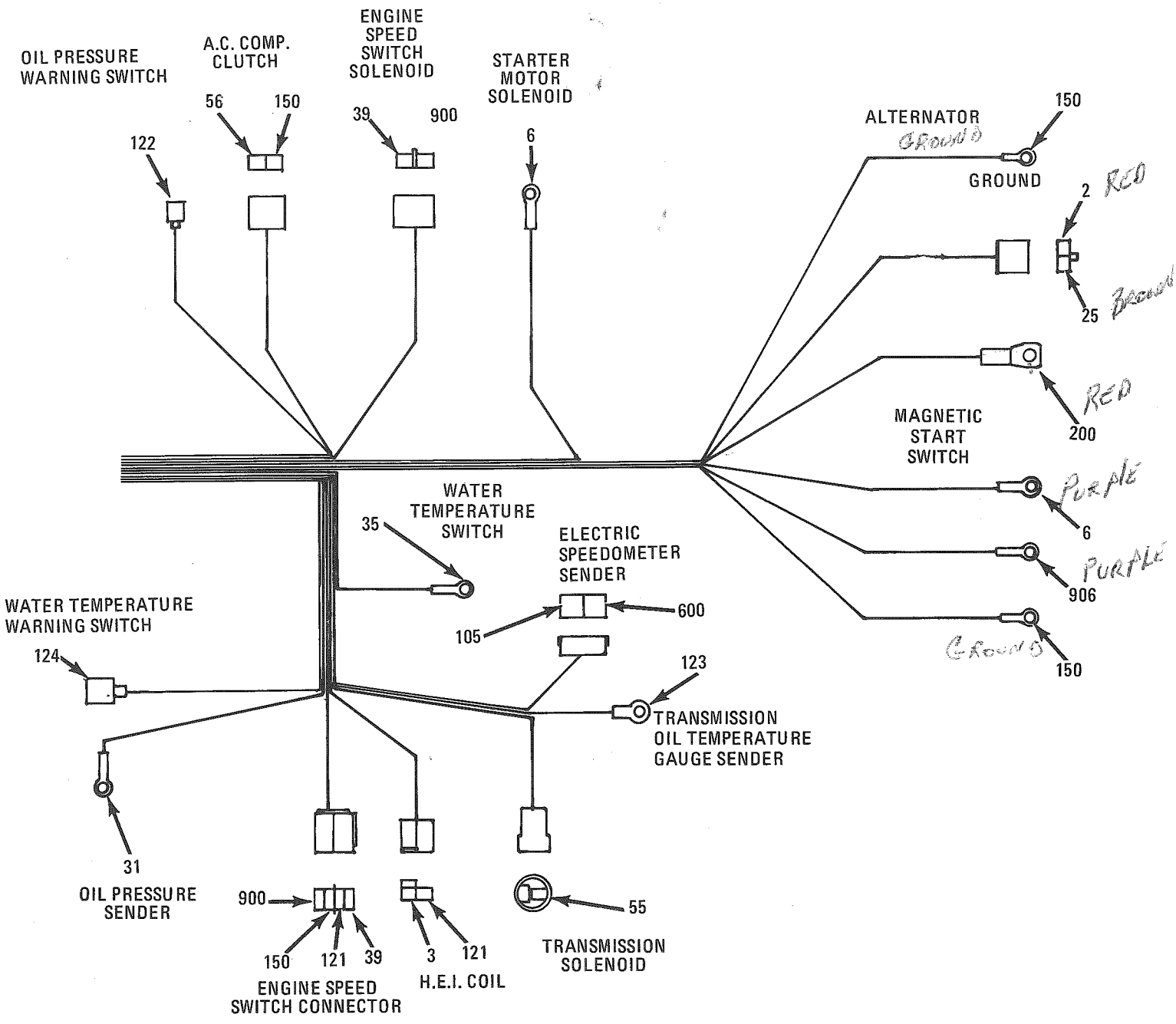
2 RED
3 PINK
4 BROWN
5 YELLOW
8 GRAY
9 BROWN
10 YELLOW
11 LIGHT GREEN
12 TAN
14 LIGHT BLUE
15 DARK BLUE
16 PURPLE
17 NATURAL WHITE
18 YELLOW
19 DARK GREEN
24 LIGHT GREEN
27 BROWN
28 BLACK
30 PINK
31 TAN
33 TAN w/Double White Stripe
35 DARK GREEN
39 PINK w/ Double Black Stripe
40 ORANGE
43 YELLOW
44 DARK GREEN
50 BROWN
55 ORANGE
56 DARK GREEN
75 DARK BLUE
77 DARK BLUE
80 LIGHT GREEN
87 YELLOW
88 TAN
93 NATURAL WHITE
94 PINK
105 BLACK
106 BLACK w/Double White Stripe
121 NATURAL WHITE
130 BROWN w/Single White Stripe
140 ORANGE
150 BLACK
158 GREEN w/Double White Stripe
240 ORANGE
300 ORANGE
500 RED
501 YELLOW w/Double Black Stripe



WIRE COLOR CODE:
- 2 RED
- 3 PINK
- 6 PURPLE
- 25 BROWN
- 31 TAN
- 35 GREEN
- 39 PINK w/Single Black Stripe
- 55 ORANGE
- 56 DARK GREEN
- 105 BLACK
- 106 BLACK w/Single White Stripe
- 121 WHITE
- 122 ORANGE
- 123 RED
- 124 BLUE
- 150 BLACK
- 158 DARK GREEN w/Single White Stripe
- 200 RED
- 600 GREEN
- 900 YELLOW
- 906 PURPLE

Figure 199 – Engine Electrical Wiring Schematic

ELECTRICAL SYSTEMS (Continued)



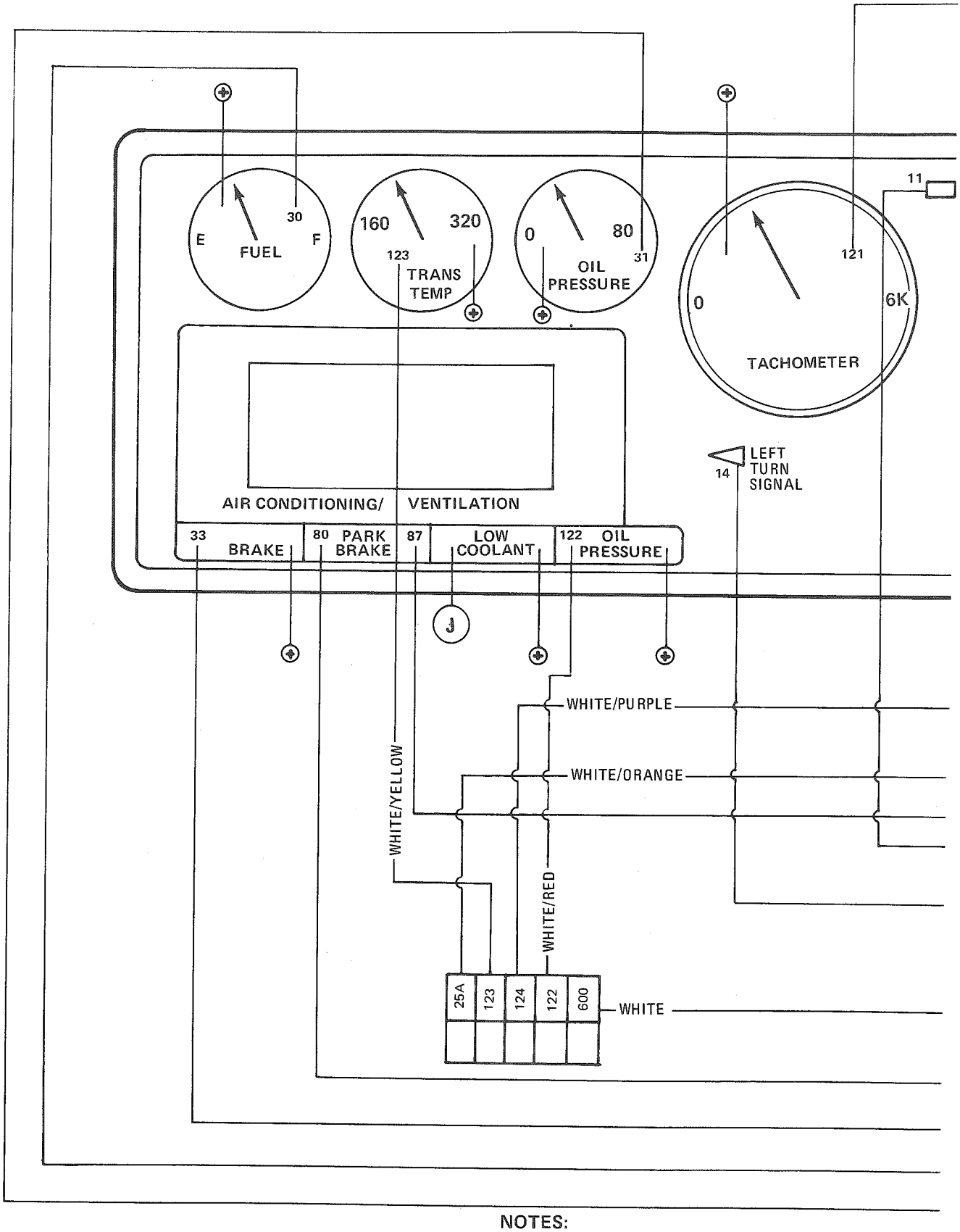
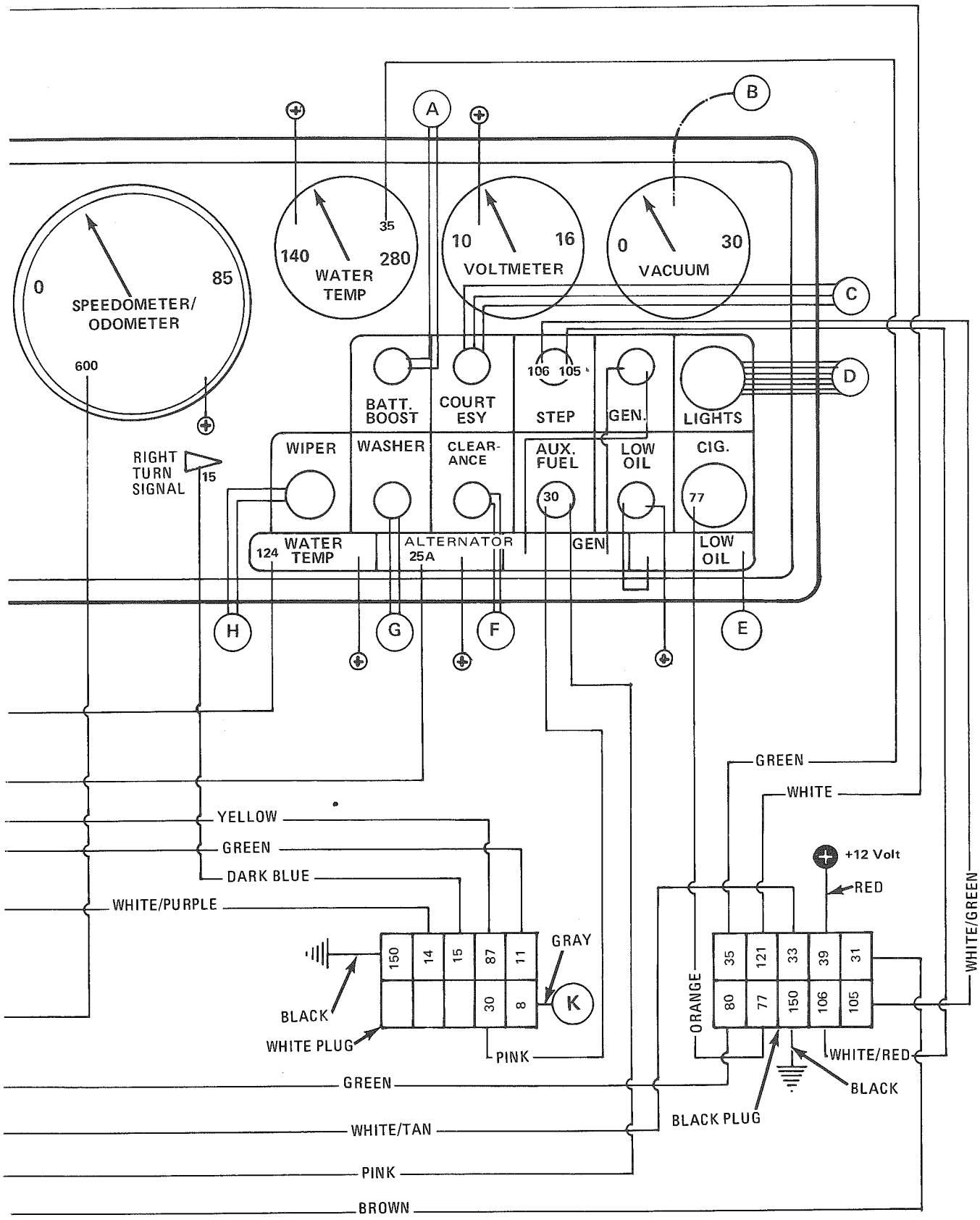


Figure 200 — Gauge Panel Wiring Schematic

NOTES:

A. Battery Boost to Instrument Panel Schematic.
B. Vacuum Tubing to Engine Manifold.
C. Courtesy Light Switch direct to Instrument Panel Schematic and Coach Wiring.

ELECTRICAL SYSTEMS (Continued)



D. Headlight Switch direct to Instrument Panel Schematic.
E. Low Oil Light to Sensor.
F. Clearance Light Switch to Instrument Panel Schematic.
G. Windshield Washer Switch to Instrument Panel Schematic.
H. Wiper Control to Wiper Schematic.
J. Low Coolant Light (See Low Coolant Schematic).
K. Panel Lights and Park Indicator.

ELECTRICAL SYSTEMS (Continued)

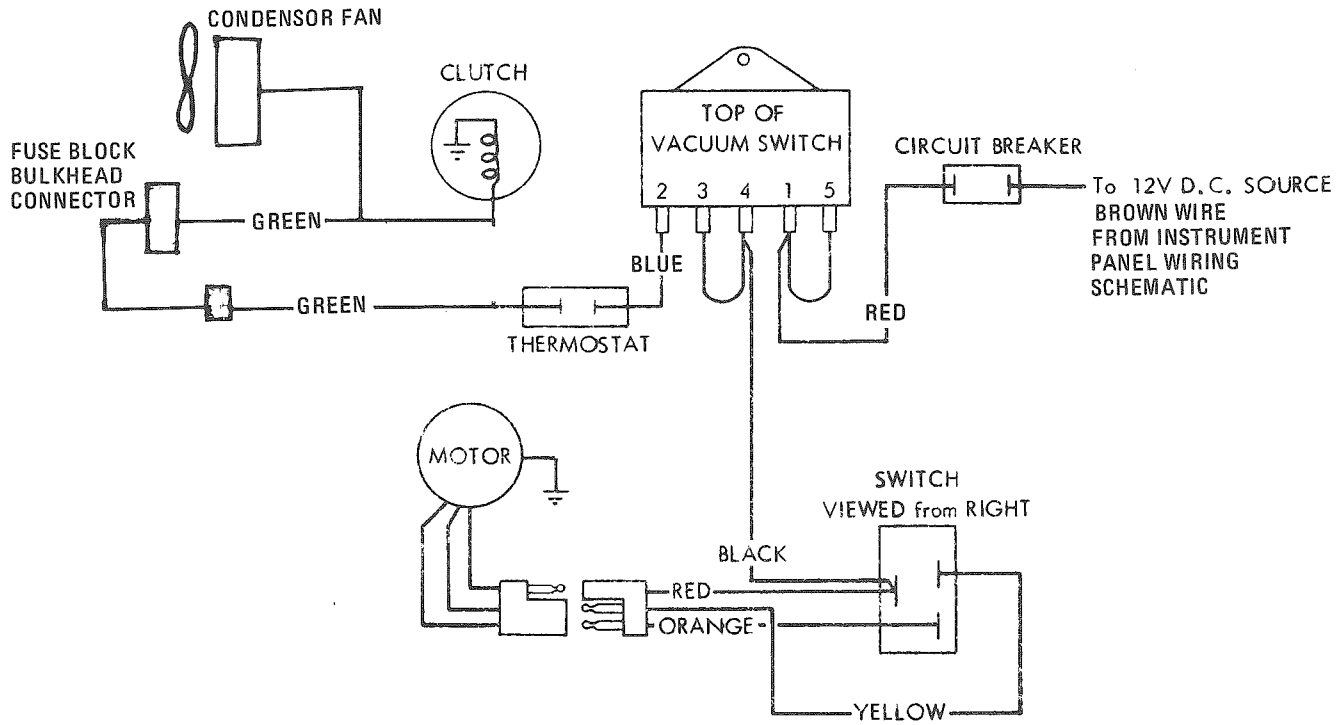


Figure 201 — Dash Air Conditioning Electrical Schematic

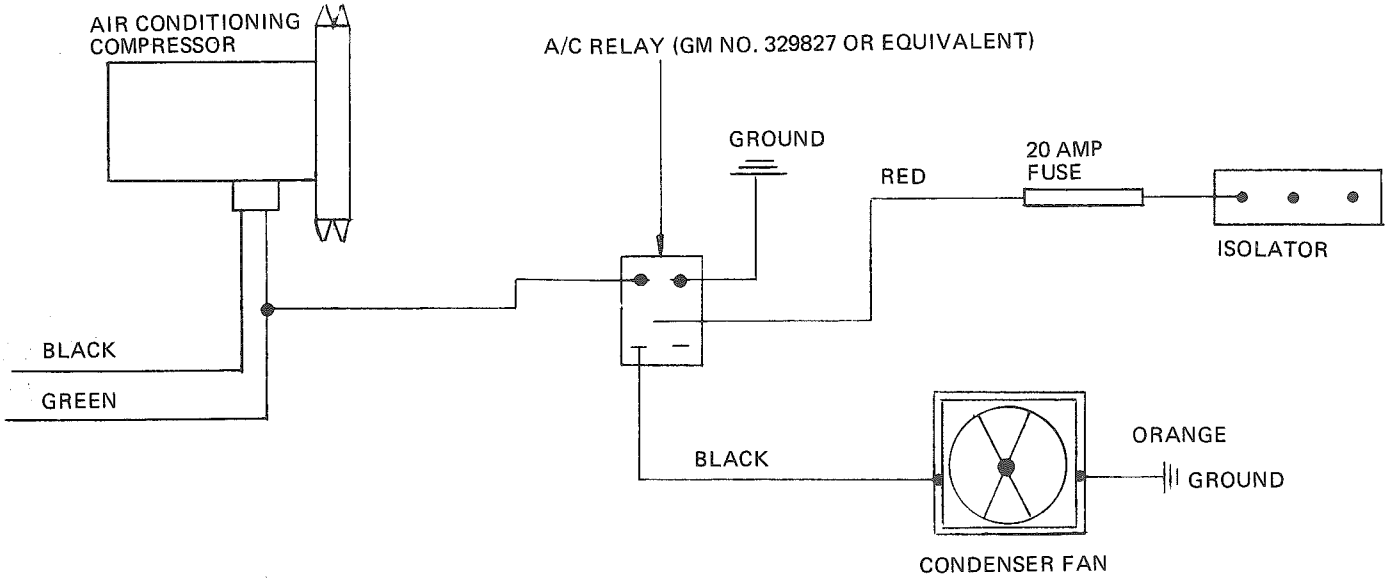


Figure 201A — Electrical Relay for Condenser Fan — Second Design

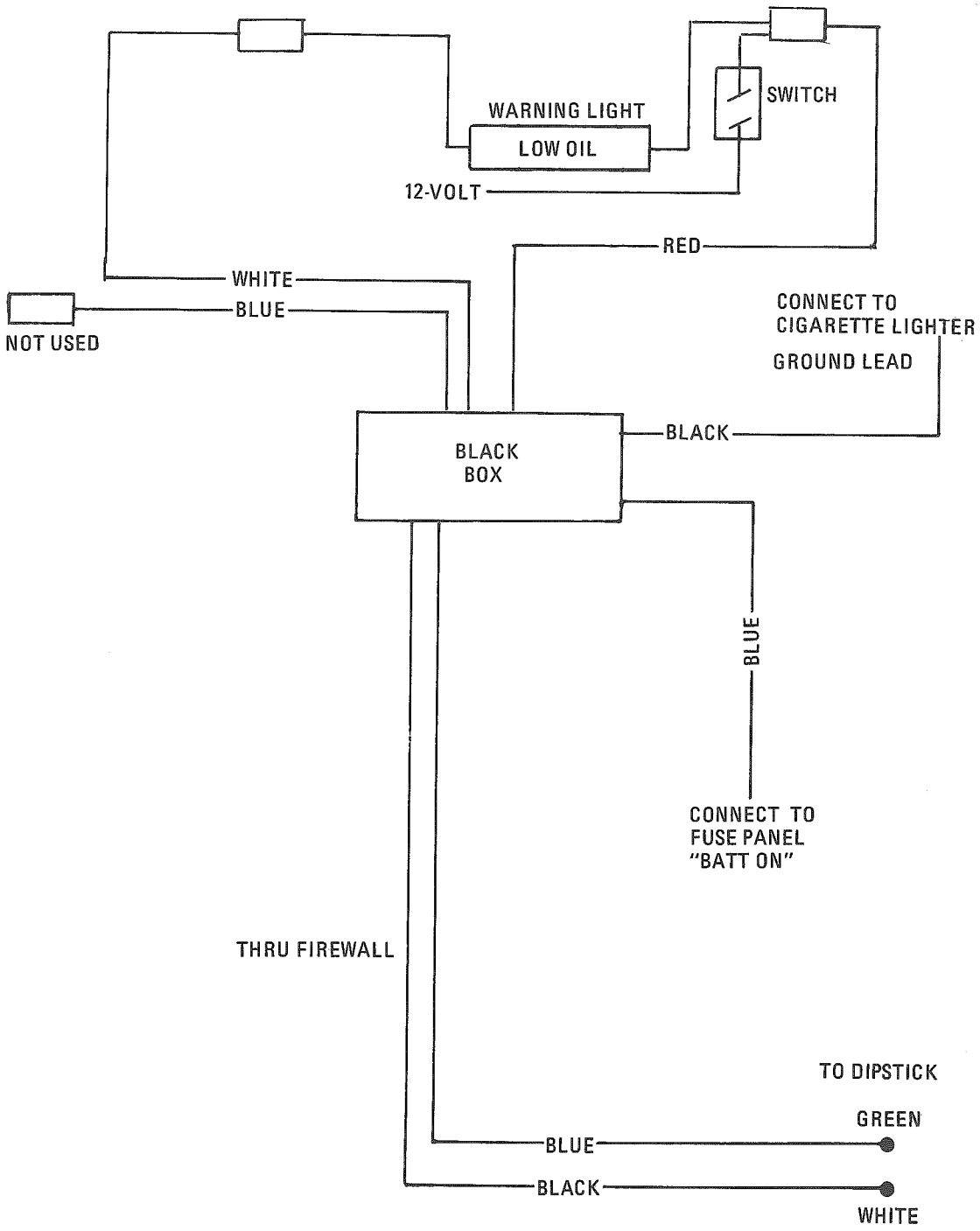


Figure 202 — Low Oil Electrical Wiring Schematic

MOTOR GENERATOR SET

AUXILIARY GENERATOR – Your REVCON is equipped with an Onan 6.5 NH gas-powered generator, installed in a compartment on the left rear side of the vehicle. This internal combustion engine drives an electrical generator providing 115-volts AC power to your coach. It can be used in exactly the same manner as electrical power taken from a commercial utility service outlet in a campground. The unit may be operated when the coach is parked where an external source of electricity is not available. The generator may also be used while the motorhome is traveling, in order to operate the roof-mounted air conditioner(s) or other electrical appliances which take 115-volt power only.

AUXILIARY GENERATOR OPERATION – The generator may be started by pressing the switch on the control center panel to the "START" position. This switch should NOT be held in "START" for more 30 seconds as internal damage to the motor generator set may occur. The generator also may be started by a switch located at the unit itself.

NOTE: All 115-volt coach appliances, particularly the roof-mounted air conditioner, should be turned off while starting the generator.

The light above the switch will be illuminated while the generator is operating. To stop the generator, press the switch to the right, to the "STOP" position and then hold for approximately 20 seconds or until the unit has stopped running.

Your REVCON is equipped with an elapsed time gauge, located on the control panel, for this generator. This gauge accumulates the hours and tenths of hours that your generator has operated, providing you with information as to when the unit should be serviced.

Fuel is supplied to the generator from the main fuel tank. As a safety feature to allow you sufficient fuel to reach a service station, the generator will stop operating when the fuel level in the main tank is down to 10 gallons.

Crankcase Oil – The set oil capacity is 3 U.S. quarts plus 1/2 quart for oil filter change. Fill the crankcase until the oil reaches the "FULL" mark on the oil level indicator (see figure 204). DO NOT OVERFILL. (Overfilling may cause

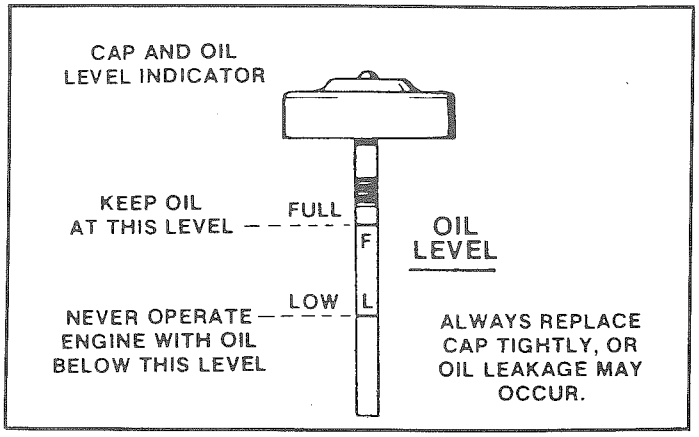


Figure 204 – Checking Oil Level

foaming and engine shutdown.) Always change the oil filter when changing oil. Be sure to fill the crankcase with oil to the "FULL" mark on the oil level indicator. Use oil with the API (American Petroleum Institute) designation SE or SE/CC. Refer to oil chart for recommended viscosity and temperature, (see figure 205).

Oil consumption may be higher with a multigrade oil than with a single grade oil if both oils have comparable viscosities at 210° F (99° C). Therefore, single grade oils are generally more desirable, unless anticipating a wide range of temperatures.

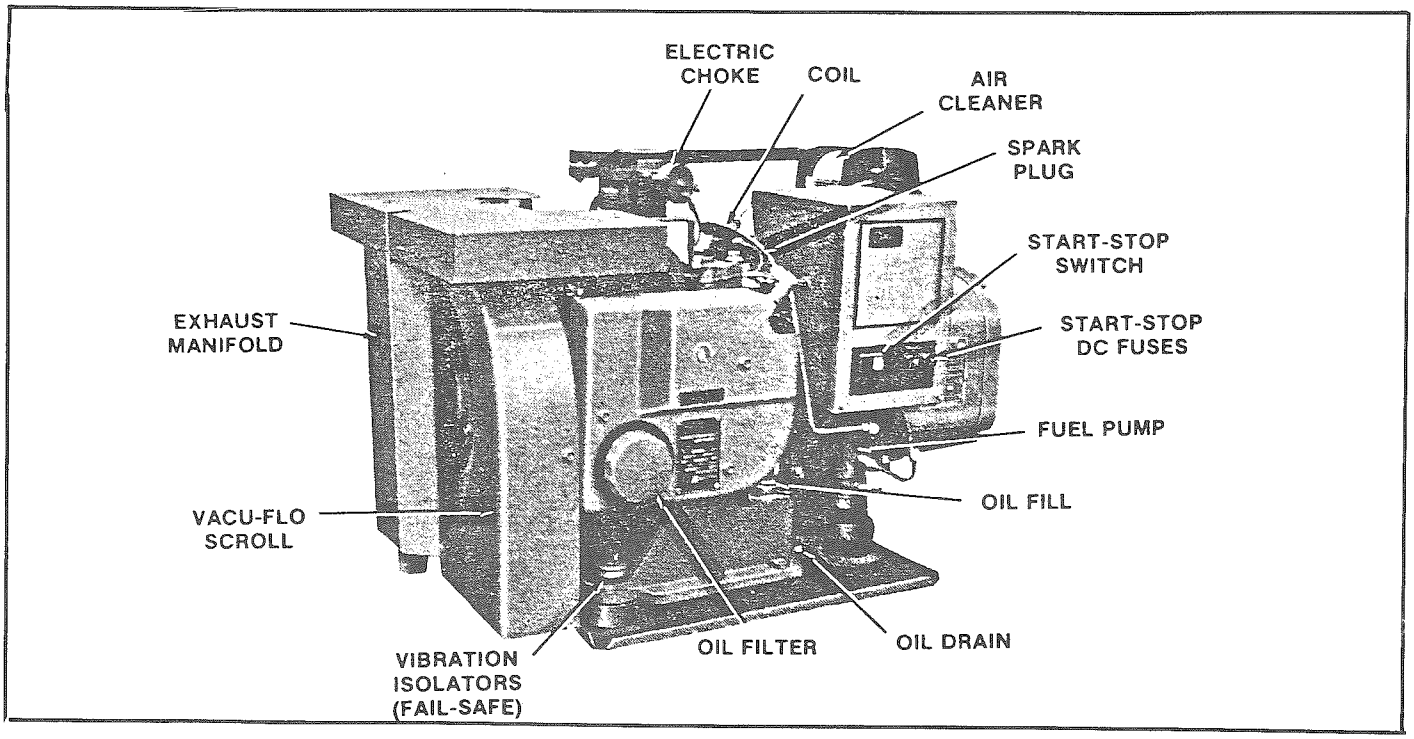


Figure 203 – Motor Generator Set

MOTOR GENERATOR SET (Continued)

Use of the same grade and quality of oil as that used in your recreational vehicle engine is acceptable as long as unit is serviced regularly and oil meets requirements shown in chart.

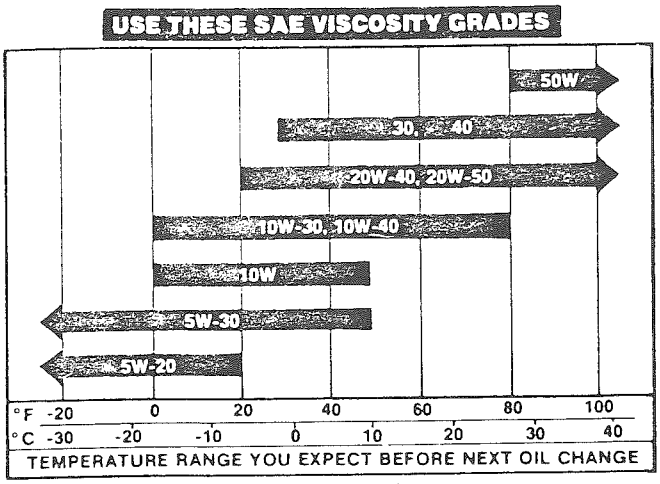


Figure 205 – Oil Viscosity Grades Chart

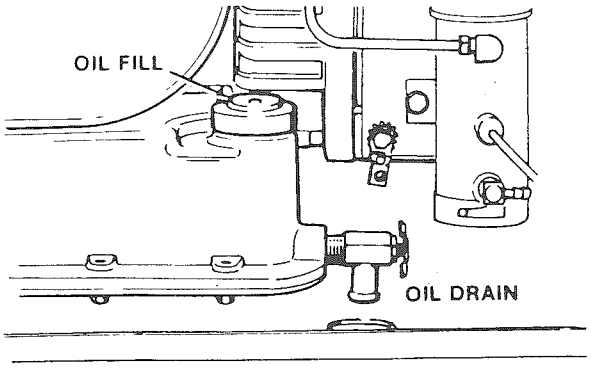


Figure 206 – Oil Drain and Fill

WARNING – Do NOT check oil while the generator is operating. Hot oil could cause burns by blowing out of oil fill tube due to crankcase pressure.

Check oil level daily and change oil every 100 normal operating hours. See figure 206 for location of oil drain. If operating in extremely dusty or dirty conditions, the oil might have to be changed sooner. When adding oil between changes, use the same brand as in the crankcase. Various brands of oil might not be compatible when mixed.

Break-in Procedure – Controlled break-in with the proper oil and a conscientiously applied maintenance program will help to assure satisfactory service from your Onan electric generating set. Break-in as follows:

1. One half hour at 1/2 load (with one air conditioner) and approximately 500 watts additional load.
2. One half hour at 3/4 load (with one air conditioner) and approximately 1500-2000 watts additional load.
3. Change crankcase oil after the first 50 hours of operation.

Applying Load – If practical, allow set to warm up before connecting a heavy load. Continuous generator overloading may cause high operating temperatures that can damage windings. Keep the load within nameplate rating.

Exercise – Infrequent use results in hard starting. Operate the generator set one 30-minute period each week. Run longer if battery needs charging. Exercising for one long period each week is better than several short periods.

Battery Charging – The battery charge rate is controlled by a fixed value resistor that allows a trickle charge rate of 1 - 1-1/2 amps under all conditions.

High Operating Temperatures –

1. See that nothing obstructs air flow to and from the set.
2. Keep cooling fins clean. Air housing should be properly installed and undamaged.
3. Keep ignition timing properly adjusted.

Low Operating Temperatures –

1. Use correct SAE oil for temperature conditions; use oil viscosity chart. Change oil only when engine is warm. If an unexpected temperature drop causes an emergency, move vehicle to a warm location.
2. Protect against moisture condensation. Below 0° F (-18° C), adjust carburetor main jet for a slightly richer fuel mixture.
3. Keep ignition system clean, properly adjusted, and the batteries in a well charged condition.
4. Partially restrict cool airflow, but use care to avoid overheating.

Extremely Dusty or Dirty –

1. Keep unit clean. Keep cooling surfaces clean.
2. Service air cleaner as frequently as necessary.
3. Change crankcase oil every 50 operating hours.
4. Keep oil and gasoline in dust-tight containers.
5. Keep governor linkage clean.
6. Clean generator brushes, slip rings, and commutator. **Do not remove normal dark brown film. Do not polish.**

High Altitude Operation – For operation at altitudes of 2500 feet above sea level, close carburetor main jet adjustment slightly to maintain proper air-to-fuel ratio. Maximum power will be reduced approximately four percent for each 1000 feet above sea level after the first 1000 feet.

GENERATOR SET MAINTENANCE

Electric Fuel Pump – Service of the generator fuel pump is limited to cleaning the filter. Every 100 hours, drain the fuel pump and check the filter element. Turn the hex nut on the base of the pump to gain access to the filter element. If the element appears dirty, replace it. Be sure to replace gaskets when reassembling (see figure 207).

Cooling System – The generator is cooled by a flywheel blower fan which pulls air over the cylinders and cooling fins. The air path is directed by sheet metal shrouds and plates. These shrouds and plates must always be installed properly so unit does not overheat. Check and clean (if necessary) the cooling fins at least every 200 hours of operation. Remove any dust, dirt or oil which may have accumulated. Check compartment air inlet and the generator set air outlet for any buildup of dirt, chaff, etc.

MOTOR GENERATOR SET (Continued)

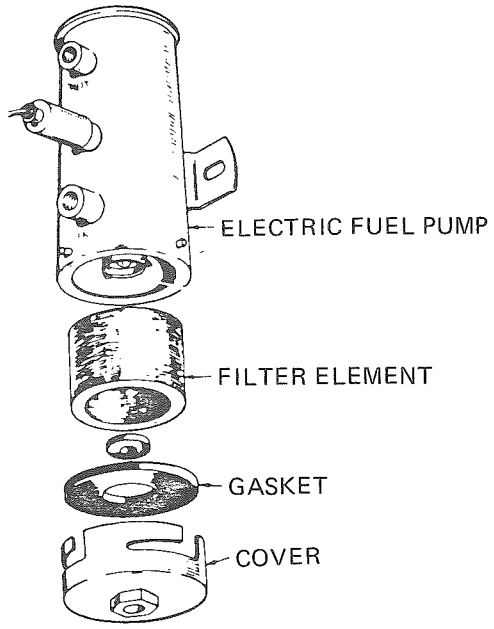


Figure 207 – Onan Fuel Pump

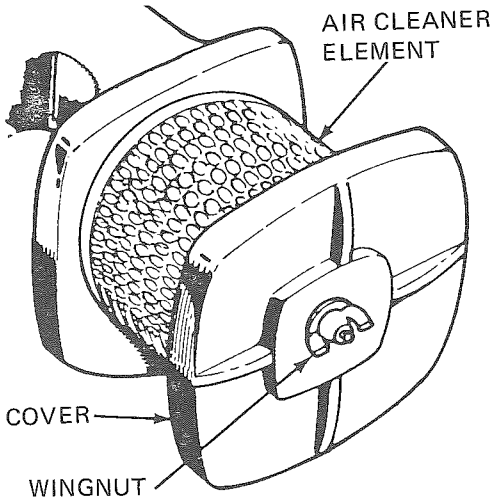


Figure 208 – Air Cleaner Element

Air Cleaner Element – Check and clean element at least every 100 hours. Loosen wing nut to remove. Clean by tapping base lightly on a flat surface. Replace element at least every 200 operating hours; clean or replace more often in dusty conditions (see figure XX).

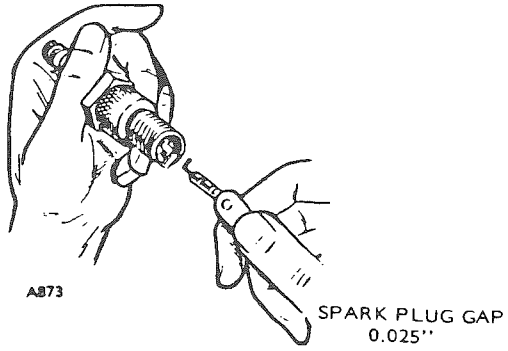


Figure 209 – Checking Spark Plug Gap

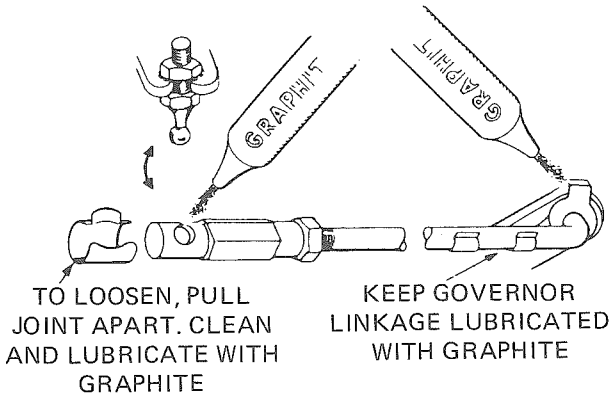


Figure 210 – Governor Linkage

Generator Spark Plugs – Replace spark plugs every 100 hours or at least once a year. A badly leaded plug will cause misfiring, poor operation, or stopping when a load is applied.

Black deposits indicate a rich mixture.

Wet plug indicates misfiring.

Badly or frequently fouled plug indicates the need for a major tuneup.

Each time the spark plugs are removed, inspect, clean, and regap (see figure 209). If the plug looks discolored or has fouled, replace it.

Governor Linkage – The linkage must be able to move freely through its entire travel. Every 50 hours of operation, clean the joints and lubricate as shown in figure 210. Also inspect the linkage for binding, excessive slack, and wear.

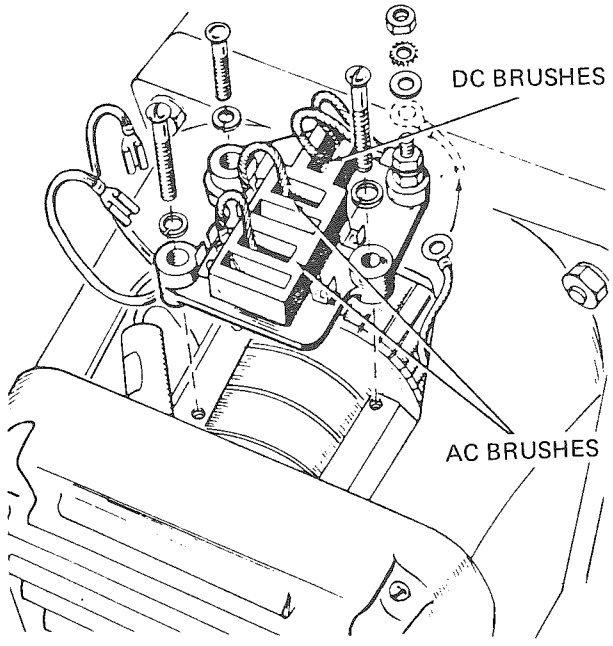
GENERATOR MAINTENANCE – The generator normally needs little care other than a periodic check of the brushes, commutator, and collector rings. If a major repair job on the generator should become necessary, have the unit checked by a competent electrician who is thoroughly familiar with the operation of electric generator equipment.

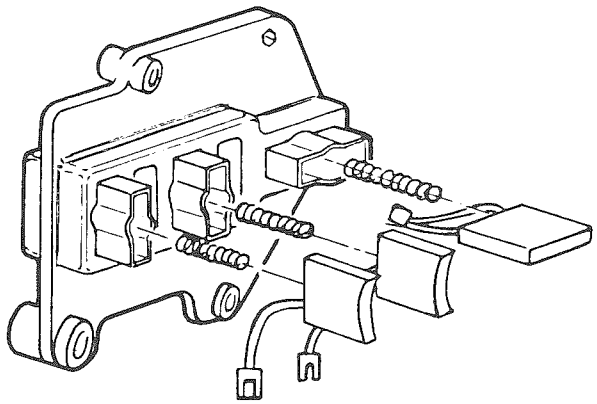
Brush Replacement – Install new brushes when the old ones are worn to the dimensions shown in figure 211. Remove the end bell band to expose the brush holders. Remove the three screws holding each brush holder in place (see figure 211). Remove the old brushes and clean the holders so the new brushes can move easily in their holders. Install the new brushes in the same manner as the old ones. Always use the correct brush as specified for this unit. Never substitute a brush which may appear to be the same for it may have different characteristics. New brushes are shaped to fit and seldom need sanding to seat properly. If some brush sparking occurs after replacing the brushes, run the generator set under a light load until the brushes wear to a good seat.

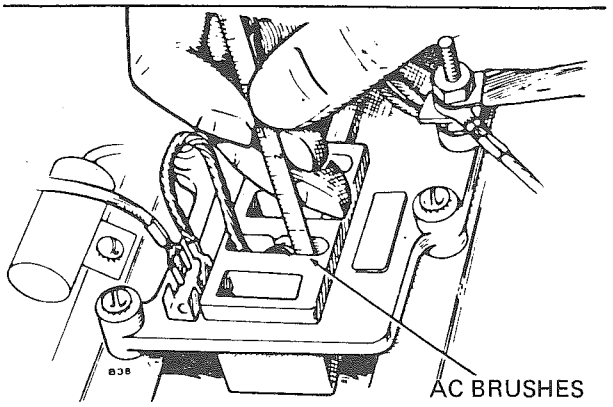
Collector rings acquire a glossy brown finish in normal operation. Do not attempt to maintain a bright newly machined surface. Ordinary cleaning with a dry, lint-free cloth usually is sufficient. Very fine sandpaper (No. 200) may be used to remove slight roughness.

Exhaust Spark Arrester – Exhaust spark arresters are necessary for safe operation. All require periodic clean-out every 50 to 100 hours of operation to maintain maximum efficiency. Some state and federal parks require them. To clean spark arrester, remove pipe plug in bottom of muffler. Run the generator set under load for five (5) minutes. Replace plug.

MOTOR GENERATOR SET (Continued)







MEASURE FROM TOP FACE OF BRUSH BLOCK TO TOP OF BRUSH

	DC	AC
NEW	5/8"	11/16"
½ WEAR	13/16"	7/8"
REPLACE	1"	1 1/16"

Figure 211 – Brush Length

GENERATOR SET MAINTENANCE SCHEDULE – Regularly scheduled maintenance is the key to lower operating costs and longer service life for the unit. The following schedule can be used as a guide. However, actual operating conditions under which a unit is run should be the determining factor in establishing a maintenance schedule. When operating in very dusty or dirty conditions, some of the service periods may have to be reduced. Check the condition of the crankcase oil, the filters, etc., frequently until the proper service time periods can be established. For any abnormalities in operation, unusual noises from engine or accessories, loss of power, overheating, etc., contact your nearest authorized REVCON or Onan dealer.

WARNING: Always allow generator set to cool off before performing any maintenance or installation work. Working on a hot unit could cause severe burns.

WARNING: All exhaust system connections must be checked regularly for any leaks and tightened as necessary. DO NOT terminate exhaust pipe under vehicle or near any window or door openings. Inspect the vapor tight seals around all openings made in the unit's compartment for wiring, conduit, etc., to prevent entrance of any noxious fumes to the motor home interior.

GENERATOR SET ADJUSTMENTS – Satisfactory generator set performance depends on correct adjustments. If trouble develops, follow an orderly procedure to determine the cause before making changes in adjustments.

Generator Carburetor – -The generator set carburetor has two mixture adjustments: an idle mixture which affects operation mainly at no load, and a main (power) adjustment which affects operation at maximum load (see figure 212). If your generator set has a "hunting" (sudden surges and drops in speed) condition at no load or full load and cannot be correct ed by carburetor adjustments, check governor, linkage, and adjustment. A hunting condition at no load can usually be corrected by an idle mixture adjustment.

CAUTION: When determining fuel mixture settings, never force the fuel mixture adjustment needles against their seats (this damages the seats and needles).

1. Adjust the carburetor idle needle with no load connected.
2. Adjust the carburetor main jet for the best fuel mixture while operating the set with a full rated load connected.

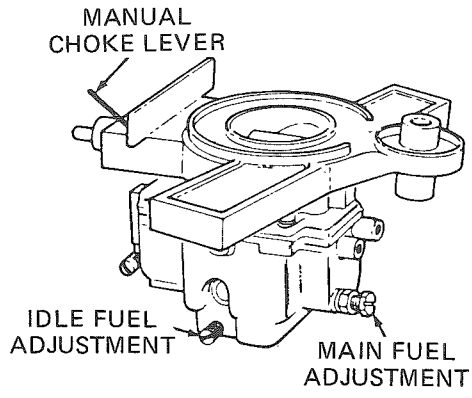


Figure 212 – Carburetor Fuel Mixture Adjustments

MOTOR GENERATOR SET (Continued)

SERVICE THESE ITEMS	AFTER EACH CYCLE OF INDICATED HOURS				
	8	50	100	200	400
General Inspection	X1				
Check Oil Level	X				
Check Battery Electrolyte Level		X			
Change Crankcase Oil			X2		
Check Air Cleaner			X2		
Check Spark Plugs			X4		
Check Breaker Points			X3		
Change Oil Filter			X2		
Clean Cooling Fins				X2	
Replace Breaker Points				X4	
Clean Crankcase Breather				X2	
Replace Air Cleaner				X2	
Remove Carbon Deposits from Heads				X	
Adjust Tappets					X
Replace Fuel Filter					X4
Clean Carburetor					X
Check Generator Brushes (Replace if Necessary)	As Required				

X1 - With set running visually and audibly check exhaust sytem for leaks.
X2 - Perform more often in extremely dusty conditions.
X3 - Replace if necessary
X4 - Replace annually or prior to storage.

3. Adjust the length of the governor linkage and check linkage and throttle shaft for binding or excessive looseness.
4. Adjust the governor spring tension for rated speed at no load operation.
5. Adjust the governor sensitivity.
6. Recheck the speed adjustment.
7. Set the carburetor throttle stop screw.

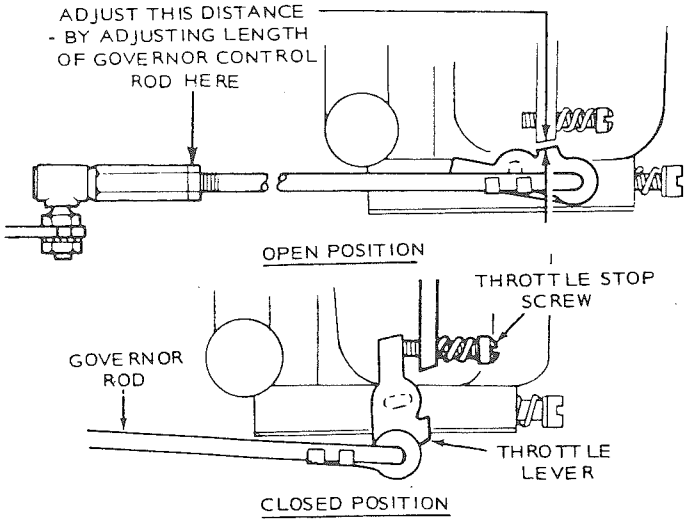


Figure 213 — Throttle Stop Screw Setting

Linkage: The engine starts at wide open throttle. The length of the linkage connecting the governor arm to the throttle shaft assembly is adjusted by rotating the ball joint. Adjust this length so that with the engine stopped and tension on the governor spring, the stop on the throttle shaft assembly almost touches the throttle stop screw housing on side of carburetor (one more turn of governor ball joint would allow throttle shaft linkage to rest against stop screw housing). (See figure 213.)

Speed Adjustment: With the warmed-up unit operating at no load, adjust the tension of the governor spring. Refer to the Voltage Chart and the Speed Chart. Turn the speed adjusting nut to obtain a voltage and speed reading within the limits shown.

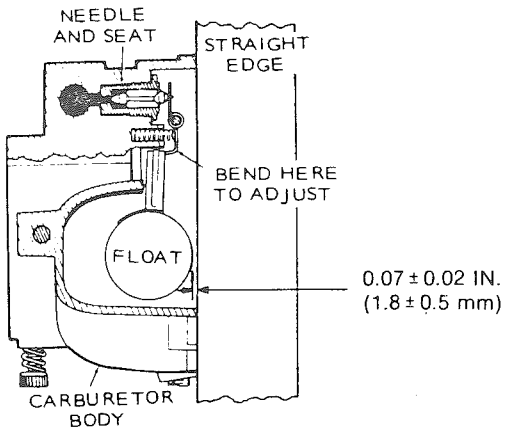


Figure 214 — Carburetor Float Setting

MOTOR GENERATOR SET (Continued)

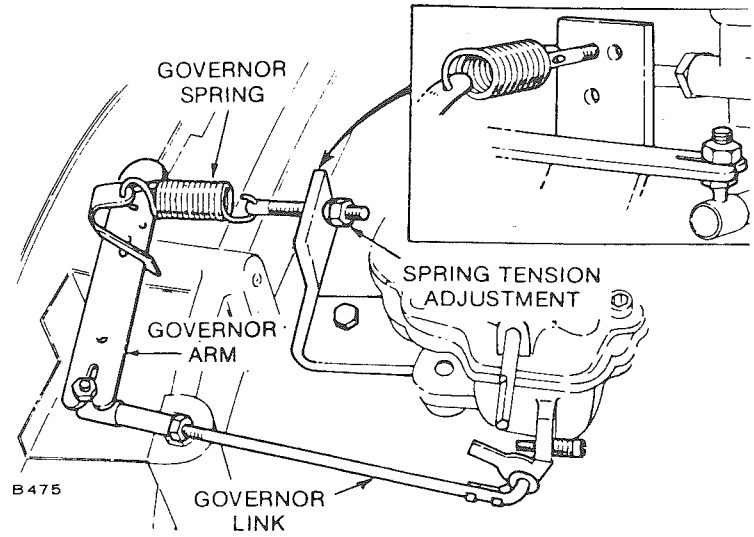


Figure 215 – Governor Adjustments

VOLTAGE CHART FOR CHECKING GOVERNOR REGULATION	120 VOLT 1 PHASE 2 WIRE
MAXIMUM NO-LOAD VOLTAGE	132
MINIMUM FULL-LOAD VOLTAGE	108

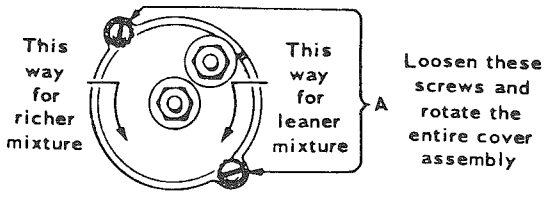
SPEED CHART FOR CHECKING GOVERNOR REGULATION	
MAXIMUM NO-LOAD SPEED (RPM)	1890
HERTZ (CURRENT FREQUENCY)	63
MINIMUM FULL-LOAD SPEED (RPM)	1770
HERTZ	59

Sensitivity Adjustment: Refer to the Governor Adjustment illustration, and to the Voltage and Speed Charts. Check the voltage and speed, first with no load connected and again with a full load. Adjust the sensitivity to give the closest regulation (least speed and voltage difference between no load and full load) without causing a hunting condition.

To increase sensitivity (closer regulation), shift the spring toward the governor shaft.

Electric Choke – If extremes in starting temperatures require a readjustment of the choke, loosen slightly the two cover retaining screws (see figure 216). For less choking action, turn the cover assembly a few degrees in a clockwise direction. For more choking action, turn counterclockwise. Retighten the cover screws. Choke may be closed manually if desired to adjust choke settings or for troubleshooting purposes.

NOTE: If the engine starts and runs roughly after a minute or two of operation, the choke is set too rich. If the engine starts, and assuming that fuel, ignition and compression are adequate, but the engine sputters or stops before it warms up, the choke is set too lean.



AVERAGE CHOKE SETTING	
AMBIENT TEMP (F°)	CHOKE OPENING
58 (14° C)	closed
66 (19° C)	1/4 open
72 (22° C)	1/2 open
76 (24° C)	3/4 open
82 (28° C)	open

Figure 216 – Choke Adjustment

Breaker Points and Ignition Timing – The correct point gap setting is .016 cold (0.41mm) and should be adjusted as follows:

1. Remove cover by loosening screw, and lift off.
2. To set the point gap, turn the engine crankshaft with rotation until the maximum breaker point gap is obtained.
3. Using an allen head wrench, adjust set screw (B) for .016 (0.41 mm). Measure point gap with a flat thickness gauge.

NOTE: Make sure feeler gauge is clean and free of any grease, oil or dirt, (see figure 217).

The timing is adjusted during initial engine assembly and is fixed by the point gap adjustment. No other adjustment or alignment is necessary. A .016 point gap is equivalent to approximately 20° BTC.

4. Replace point box cover.

NOTE: The ignition adjustments should be made with the engine in a static condition and cold.

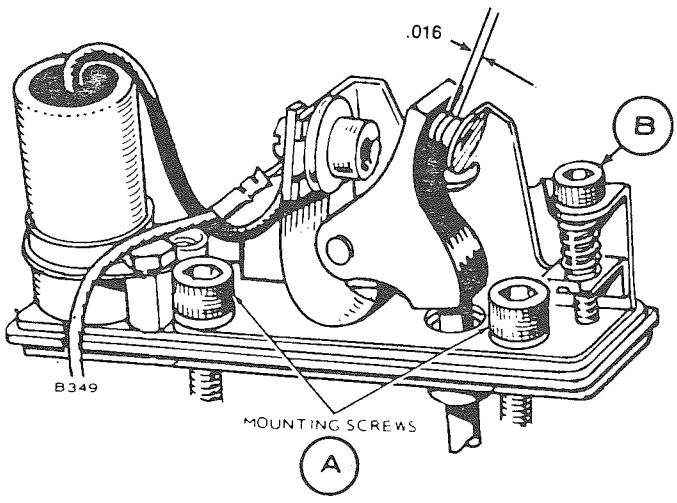


Figure 217 – Top Adjustment Points

MOTOR GENERATOR SET (Continued)

Carburetor Float Adjustment –

1. Normal operation seldom requires any adjustment of the float level. Disconnect throttle control, choke leads, air cleaner inlet hose and fuel line from carburetor.
2. Remove the four bolts that hold the intake manifold assembly in place and remove the complete carburetor and intake manifold assembly as one unit. Then remove carburetor from intake manifold for easier handling when checking float level.
3. Remove the four phillips head screws on the top of the carburetor and lift it off.
4. Invert the carburetor and check the float setting (see figure 214).The float should have a 0.07±0.5 mm) clearance from the machined mating surface (without gasket). Bend the float tab as required.
5. If it is necessary to reset the float level, loosen the screw near float valve axle (pin) and bend the float arm near float valve axle (pin) to position float flush with top edge of carburetor float bowl (see figure 214).

CAUTION: If float adjustment is necessary, be careful not to lose the buoyancy spring or the tension spring on the viton tip float needle and seat assembly.

6. Reassemble carburetor and reinstall carburetor on intake manifold assembly and then replace complete assembly on the engine.
7. Check carburetor for proper operation.

Governor Adjustments –

NOTE: If carburetor and the following governor adjustments have already been made and the governor action is still erratic, replace the governor spring (figure 215) with a new one and readjust the governor. Springs lose their calibrated tension through fatigue after long usage.

Before making governor adjustments, run the unit about 15 minutes under light load to reach normal operating temperature. (If governor is completely out of adjustment, make a preliminary adjustment at no load to first attain a safe voltage operating range).

Engine speed determines the output voltage and current frequency of the generator. By increasing the engine speed, generator voltage and frequency are increased, and by decreasing the engine speed, generator voltage and frequency are decreased. An accurate voltmeter or frequency meter (preferably both) should be connected to the generator output in order to correctly adjust the governor. A small speed drop (not noticeable without instruments) will result in an objectionable voltage drop. The engine speed can be checked with a tachometer.

A binding in the bearings of the governor shaft, in the ball joint, or in the carburetor throttle assembly will cause erratic governor action or alternate increase and decrease in speed (hunting). A lean carburetor adjustment may also cause hunting. Springs of all kinds have a tendency to lose their calibrated tension through fatigue after long usage. If all governor and carburetor adjustments are properly made, and the governor action is still erratic, replacing the spring with a new one and resetting the adjustments will usually correct the trouble.

GENERATOR ADJUSTMENTS

Satisfactory generator set performance depends on correct adjustments. If trouble develops, follow an orderly procedure to determine the cause before making changes in adjustments.

Generator Carburetor – The generator carburetor has two mixture adjustments: an idle mixture which affects operation mainly at no load and a main (power) adjustment which affects operation at maximum load (figure 217). If your generator set has a "hunting" (sudden surges and drops in speed) condition at no load or full load and cannot be corrected by carburetor adjustments, check governor, linkage and adjustment. A hunting condition at no load can usually be corrected by an idle mixture adjustment.

CAUTION: When determining fuel mixture settings, never force the fuel mixture adjustment needles against their seats (damages the seats and needles).

Carburetor Adjustments – Start generator and allow it to warm up for at least 10 minutes before making any adjustments. Remove all AC loads and connect a plug-in-type AC voltmeter into one of the receptacles in the coach. When procedure below calls for full load, turn on appliances or use an Onan load test panel. The first two adjustments are made with the generator not running. Turn unit off – proceed as follows:

1. Turn idle mixture screw out (counterclockwise) 1/2 to 3/4 turn from seated position.
2. Turn the main mixture screw 1 1/4 to 1 1/2 turns out (counterclockwise) from seated position.
3. Start set and adjust governor spring setting so engine speed is 1860 rpm at no load (62 hertz or 130 volts).
4. Hold back governor arm so that throttle lever rests on throttle stop screw. Adjust idle stop screw to 1500 rpm (50 hertz or 100 volts). Release governor arm.
5. Adjust idle mixture screw to highest rpm or voltage. Readjust governor spring setting so engine speed is 1860 rpm at no load (62 hertz or 130 volts).
6. Apply full load to generator and adjust main mixture screw to highest rpm or voltage. Readjust governor spring setting so engine speed is 1770 rpm at full load (59 hertz or 110 volts).
7. Remove and add load several times to check for a governor hunting condition. Readjust governor spring setting if required.

Throttle Stop Screw – The throttle stop screw is located on the base of the carburetor (opposite side from main power adjustment needle) near the crankcase breather valve. It must be adjusted to obtain 56 hertz at no load with the throttle closed as far as possible (throttle shaft lever touching adjustment screw (see figure 213).

OUT-OF-SERVICE PROTECTION – You should protect a generator set that will be out of service for more than 30 days from damage caused by rust or corrosion. Use the following procedure to properly protect this equipment:

1. Run the generator set with at least a 50% load until thoroughly warm Usually about one (1) hour).
2. Turn off fuel supply and allow engine to run out of fuel. Also operate the choke manually as the engine stops to help drain the carburetor completely.
3. Drain the oil from oil base while the engine is still

MOTOR GENERATOR SET (Continued)

CONDITION	PROBABLE CAUSE	CORRECTION
Fails to crank	1. Bad battery connection	1. Clean and tighten all battery and cable connections.
	2. Low battery	2. Check specific gravity. Recharge or replace battery if necessary. Reverse current, diode may be shorted or open causing a drain on battery.
	3. Faulty start solenoid	3. Check for battery voltage at terminal. Push start switch. Check start solenoid terminal voltage to ground. When battery voltage at start solenoid terminal is present, battery voltage should also appear at terminal: if not, replace start solenoid.
	4. Faulty start switch	4. Jumper switch to ground. If solenoid energizes, replace switch.
Cranks slowly	1. Bad battery connection 2. Low battery	1. See 1 above "Fails to crank." 2. See 2 above "Fails to crank."
Cranks but won't start	1. Blown fuse	1. Replace fuse on control.
	2. Faulty fuel solenoid or Fuel pump On later models, fuel solenoid is an integral part of fuel pump.	2. Fuel solenoid must open during cranking and running. Check by removing steel line from carburetor and crank engine. If fuel solenoid is open, fuel will pulsate out of this line. If it does not, the fuel solenoid and fuel pump must be checked separately to determine defective part. **WARNING: Use extreme care for this test. Direct fuel flow into a suitable container and make sure area is well ventilated to prevent accumulation of gasoline fumes.**
	3. Faulty ignition	3. Check to see if points open and close during cranking. If they do not open and close, adjust and set points. Plug and plug wires must be in good condition. Voltage at ignition coil negative terminal (-) must alternate from +12-volts to zero volts as points open and close during engine cranking.
	4. Inoperative choke	4. With engine not running, check choke vane movement by pushing choke lever arm. Choke must be in closed position with cold engine, and must be free to move against bimetal spring. As engine warms up, bi-metal spring relaxes and allows choke vane to open fully. The lever will pulsate as engine warms up.
	5. Faulty crank ignition relay	5. Check voltage from relay terminal to ground while cranking unit. Battery voltage should appear at this terminal. If not, check for voltage at relay terminals. Check wiring between start solenoid and crank ignition relay.
Unit starts, but stops immediately after releasing start switch	1. Resistor may be open	1. Check voltage. With set running voltage should be 24-32 volts DC.
	2. Run ignition relay	2. Check voltage on both sides of relay. Should be 12-volts.
	3. Low oil level	3. Check oil level. If low or empty, refill to proper level.
	4. Low oil pressure switch may be defective	4. Switch should close with set running at 10 lbs. minimum oil pressure.
Unit runs then stops	1. Low oil level	1. Check oil level. If low or empty, refill to proper level.

MOTOR GENERATOR SET (Continued)

Unit runs but surges	1. Stuck choke 2. Governor not adjusted properly	1. See 4 above "cranks but won't start." 2. Readjust governor.
Unit stops	1. Faulty ignition 2. Out of fuel 3. Low oil level	1. See 3 above "Cranks but won't start." 2. Refill fuel tank. 3. Check oil level. If low or empty, refill to proper level.
Remote running time meter or generator lamp inoperative	1. Blown fuse	1. Replace fuse on control.

warm. Replace the oil filter if so equipped. Replace drain plug and refill. Attach a warning tag stating type and viscosity of oil used.

4. Remove spark plugs. Pour one (1) ounce of rust inhibitor oil (or SAE No. 10) into each cylinder. (Spray cans work well for this application.) Turn engine over by hand at least two (2) complete revolutions. Replace the spark plugs.
5. Replace the air cleaner at least on an annual basis.
6. Plug the exhaust outlet to prevent entrance of moisture, dirt, bugs, etc.
7. Clean and oil all exposed engine parts including carburetor and governor linkage.
8. Wipe generator brushes, slip rings, housing, etc. Do not apply any lubricant or preservative.
9. Provide a suitable cover if the unit is exposed to the elements.

RETURNING GENERATOR TO SERVICE

1. Remove the cover and all protective wrapping. Wipe the oil film off all exposed engine parts. Remove the plug from the exhaust outlet.
2. Visually inspect the unit for any damage. Check to be sure the carburetor and governor linkage are free. Remove the generator end bell band and check to be sure the brushes work freely in their holders.
3. Check the tag to ensure oil of proper brand and grade has been installed. Check the oil level.
4. Remove spark plugs, clean and gap. Turn the engine over by hand several times. Reinstall spark plugs.
5. Turn on fuel supply; disconnect electric fuel pump lead and electric fuel solenoid shut-off lead if unit is so equipped. Jumper the fuel pump and electric fuel solenoid shut-off leads to the battery to prime the unit. Reconnect the leads.
6. Remove all load and start the generator set at the unit. Initial start may be slow due to oil or rust inhibitor in the cylinders. Excessive smoke and rough operation will occur until the oil or rust inhibitor is burned off.
7. Apply a 50% load after the set runs smooth. Allow the generator set to warm up (one (1) hour) with the load connected. Check speed and voltage. Unit is now ready for service.

INTERIOR FEATURES

Interior Features – The interior of your new Revcon motorhome has been designed for easy contemporary living. Coordination of texture and color are all a part of the smartly styled interior features, that promise long wear and easy maintenance.

The entire floor area is covered with high quality cut pile carpeting, for comfort and warmth.

The ceiling panelling is covered with gel-coated fiberglass. Periodic cleaning of the panelling should be done with a mild liquid detergent and a household cleaning wax, such as Pledge.

The safety plate glass windows lend to an open airy feeling throughout the coach. When the windows are open, the screens let in the fresh air and keep the winged pests out. When the windows are closed, the window seals eliminate the problem of airborn outside dirt creeping in.

Power exhaust vents are found in the galley and the bath areas.

The heavy use areas, like countertops and cabinetry, are surfaced with quality high-pressure plastic laminate. It is attractive, tough, scuff resistant, and easily maintained. The cabinetry is functionally designed, with ample storage space for all your needs.

Galley – Your REVCON motorhome has a complete self-contained galley with an array of features that will make cooking a pleasure. A large sliding window with interior screen, will bathe you in sunlight and fresh air. An overhead power exhaust vent keeps the stale air and cooking odors out. You have a 4-burner gas range and oven; some models have a microwave oven also. A double stainless steel sink features a single-throw faucet handle with a faucet tap purifier available, too. A double-door refreigerator/freezer, ice maker, and variable speed blender make for easy food preparation.

Dinette Seating – Dining seating is by the four place, finely upholstered dinette. The table top is covered with high-pressure plastic laminate, for long life and low maintenance. Additional dining seating is available by using the convenient removable table & pedestals which are stored in the rear wardrobe closets. You will find base support plates for the pedestals located on the family room models in front of the convertible sofa.

Convertible Sofa – The color coordinated sofa in the living room area of your coach leads a double life to provide additional sleeping facilities. To convert the sofa to a full size bed: remove the arm pillows, and lift the seat base from the bottom edge rail. Continue to lift until the back cushion support is lying horizontally. Now, push slightly on the rail to allow the seat base to unlock, then simply allow the seat base to arch down. You should now have a full-size bed.

The space under the sofa is recommended for convenient storage of large items. Access is gained by simply removing the front kick board, which is held in place with friction fasteners. Also, access may be gained from the lockable exterior door.

Spirits Cabinet – Across from the sofa is a unique spirits storage cabinet, with placement for your glass wear and liquor bottles. The front swings up and locks into position with a support bracket, serving as an extra table surface.

TV Antenna System – There are two television antenna outlets pre-wired into the coach. One is located just aft of the co-pilot's seat behind the barrel chair. The other is within the rear bedroom on the forward side above the dresser. Your Mini-State TV antenna system is a unique antenna system which has a built-in UHF/VHF color TV antenna in an enclosed housing, with amplifier, power supply, rotate remote control. The built-in rotator lets you pinpoint the antenna elements to every channel for strongest signal. The hand-held remote control features exclusive direction indicator lights that show where the antenna is aimed at all times. A crank inside the galley overhead cabinet raises and lowers the antenna.

Central Vacuum – Your central vacuum system is designed to give you many years of trouble free service. It is precision built, inspected, and tested to assure the highest quality workmanship and reliability.

The vacuum has no cumbersome ON and OFF switches. To start the unit, simply raise the flap on the outlet, insert the hose with a slight twist and the vacuum will be activated. Make sure the dust canister is always connected to the hose before using.

To stop the unit, remove the hose from its outlet and the unit will automatically disengage.

WARNING: Electric shock could occur if the vacuum is used on wet surfaces.

The dust canister is designed to open and empty without fuss and bother. To open, hold the canister over a trash container and twist the lower lid carefully. Empty the bubble and tap the two halves to release any dirt trapped on the filters. The canister can easily be rinsed out. First, make sure both upper and lower filters are removed before you rinse. To remove the filters, grasp the large outer ring in the upper canister half and pull gently toward you until it is free. Lift out the small inner ring from the center of the canister. With the index finger and thumb, grasp the lid filter ring and remove it by pulling gently.

To reposition a new filter, slide the small inner ring onto the red collar and push it all the way in. Next, position the large outer ring on the flange (lip) just below the dust bubble rim. Make sure the ring engages the flange all around the canister. When properly positioned, the large outer ring should rotate freely.

Gaucho – The gaucho doubles as a sofa on some models, and as an additional bed. To convert the sofa to a guest bed: Grasp the hardwood seat rail and pull toward the center side. Locate the two (2) support legs beneath the base and pull them to a vertical position. Pull the seat cushion toward the rail edge, and allow the attached back cushion to lay back upon the seat base.

Shower – The personal shower is made of color impregnated fiberglass. With this unit it is possible to take a luxurious bath, yet conserve your valuable water supply.

INTERIOR FEATURES (Continued)

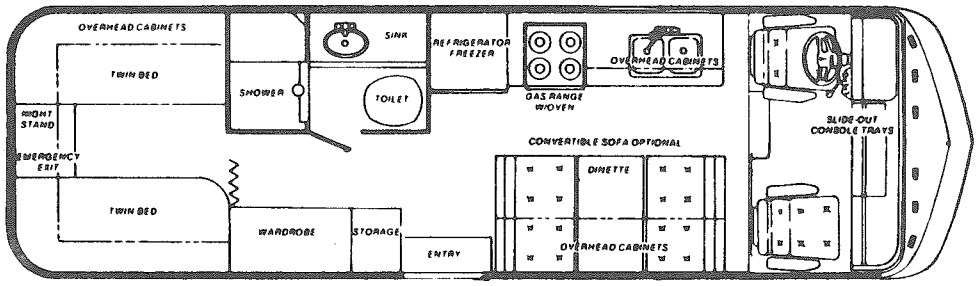
To use the shower, the hot and cold water handles at the center of the shower unit may be adjusted to obtain the desired temperature. The on-off push button on the shower head may be used intermittently. You can remove the shower head from the holder by lifting up from the holding pin. **It is important that the shower head is firmly attached to the wall holder, otherwise a sudden movement could cause the head to swing into the fiberglass walls, causing damage.**

Switch Panel – Within the bathroom near the counter, there is a panel with switches that control the overhead exhaust fan and water pump. Also, there is a 12-volt receptacle outlet. The bathroom 120-volt outlet and the exterior 120-volt outlet are on a GFI circuit breaker which helps to protect the circuit under wet conditions.

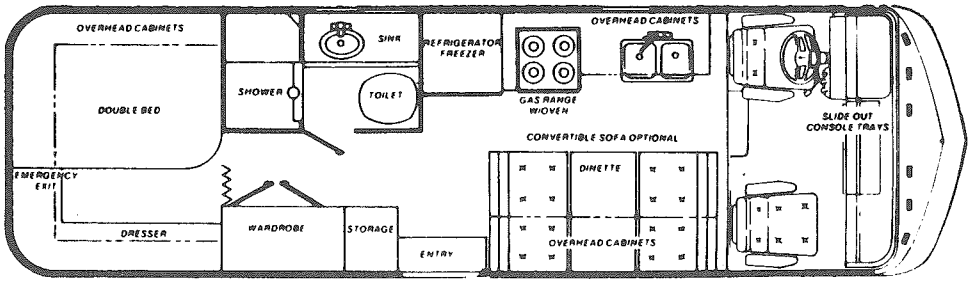
Electronic Ignition Water Heater – On the galley cabinet face is a switch for turning on the water heater.

Entry Step – The power-assisted entry door step will extend when the door is opened and retract when the door is closed. Operation of the power step may be double-checked and/or locked in or out manually from the dashboard control switch. With the ignition OFF, turn the entry step switch ON; the step will automatically actuate to the forward (OUT) position. Close the door and the step will retract. When the ignition switch is turned OFF, the step will lock into its position, whether it is OUT or IN.

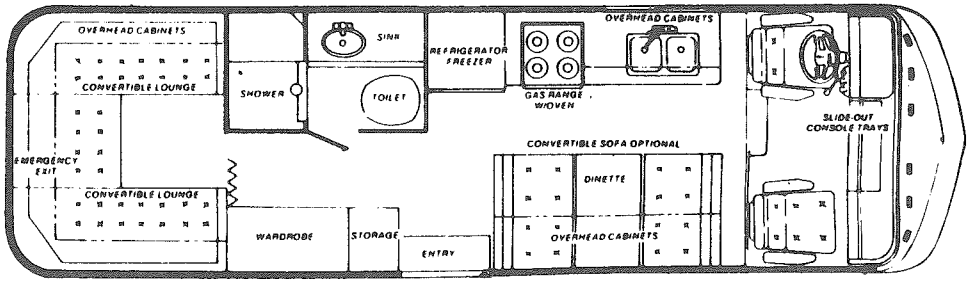
TWIN BED



DOUBLE BED

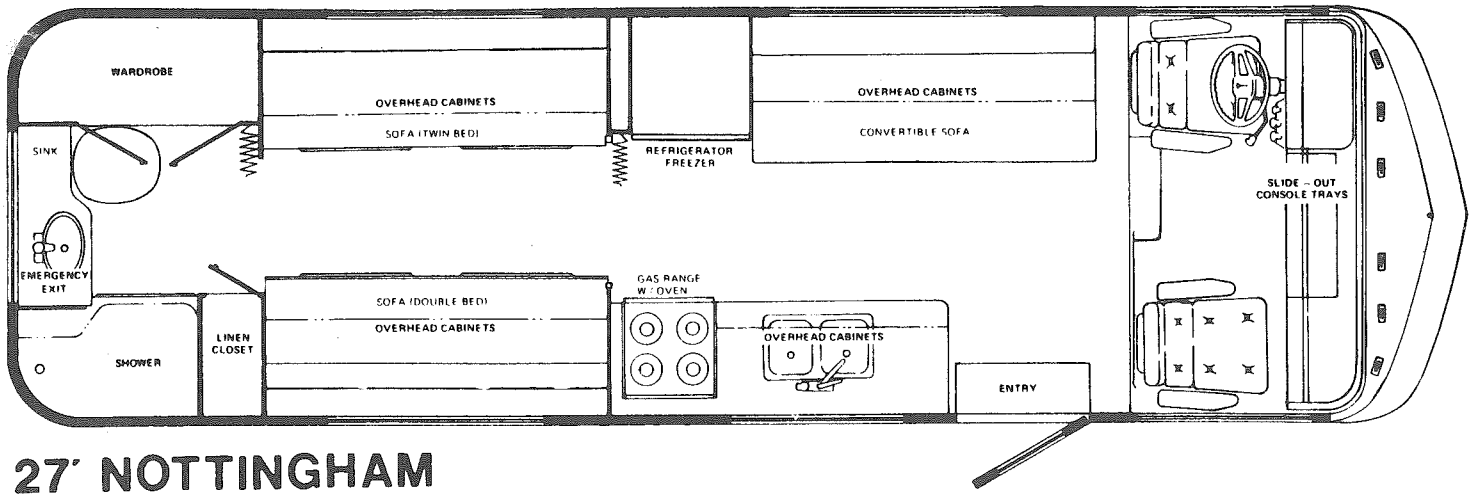


FAMILY ROOM

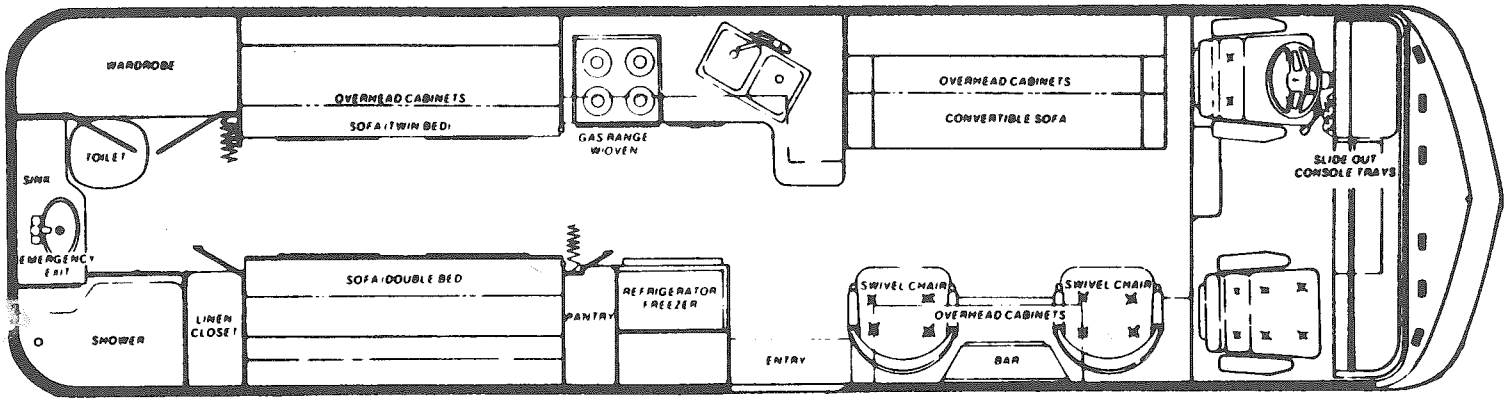


27' HYDE PARK

INTERIOR FEATURES (Continued)

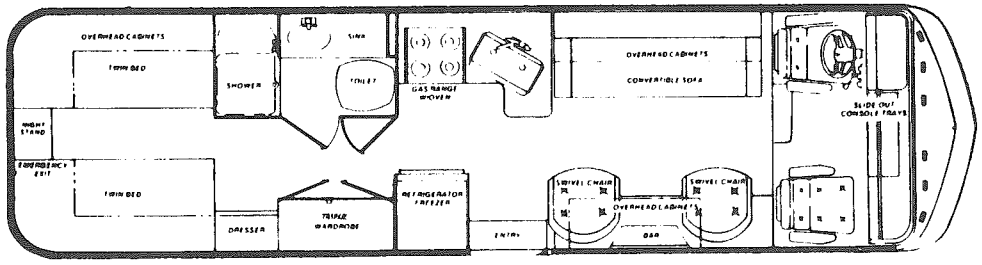


27' NOTTINGHAM



30' BUCKINGHAM

TWIN BED



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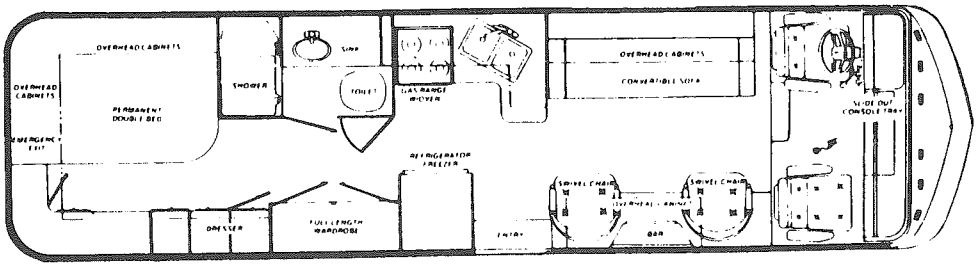
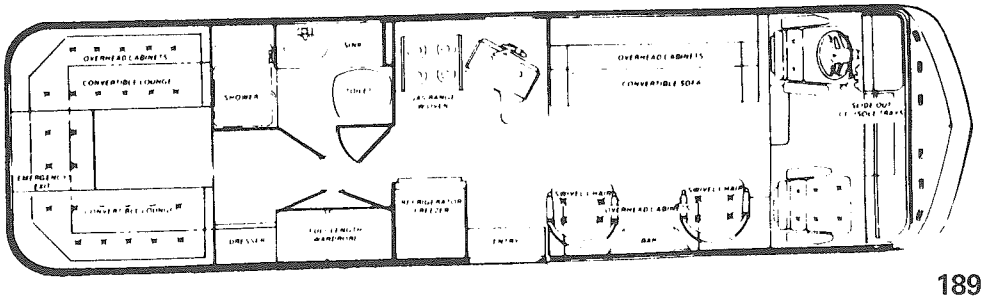
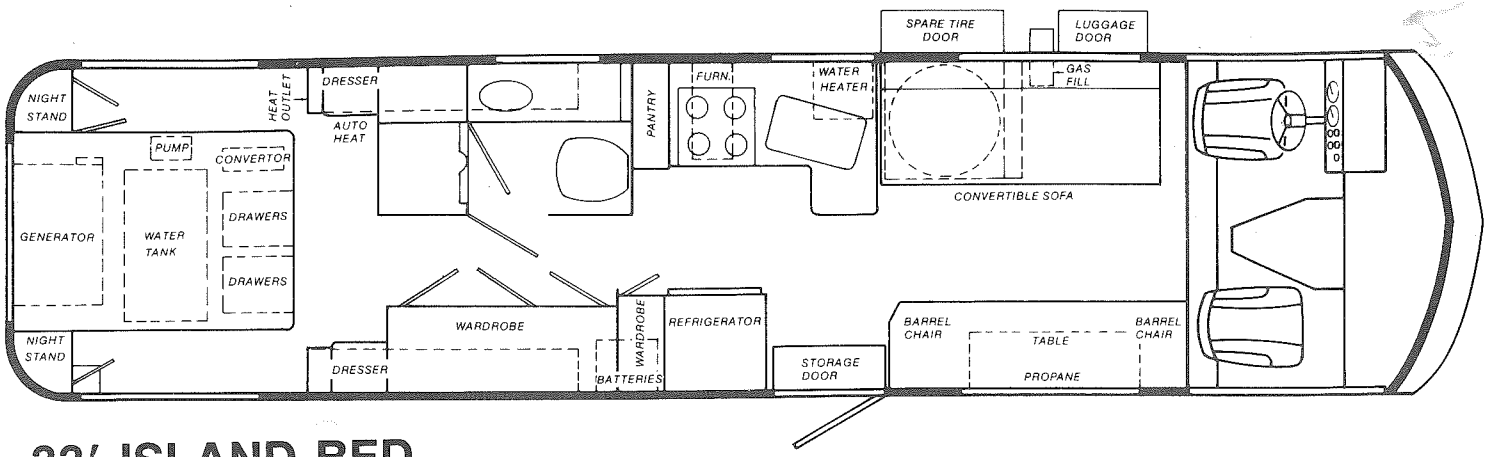


FAMILY ROOM



30' CAMELOT

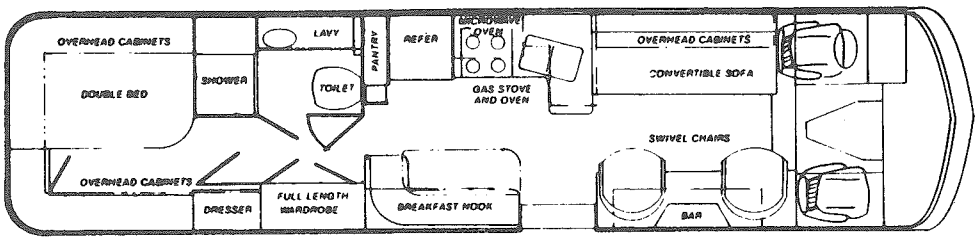
INTERIOR FEATURES (Continued)



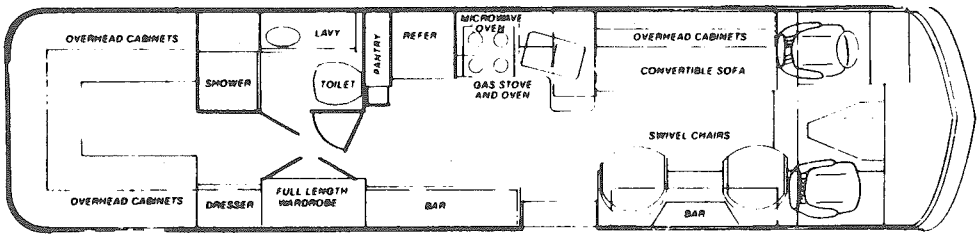
33′ ISLAND BED

33′ BUCKINGHAM

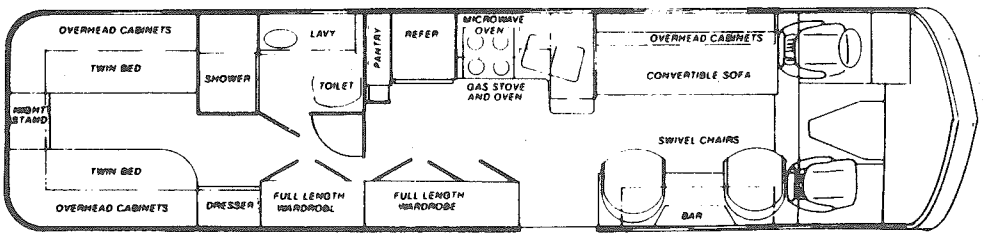
W/ BREAKFAST NOOK



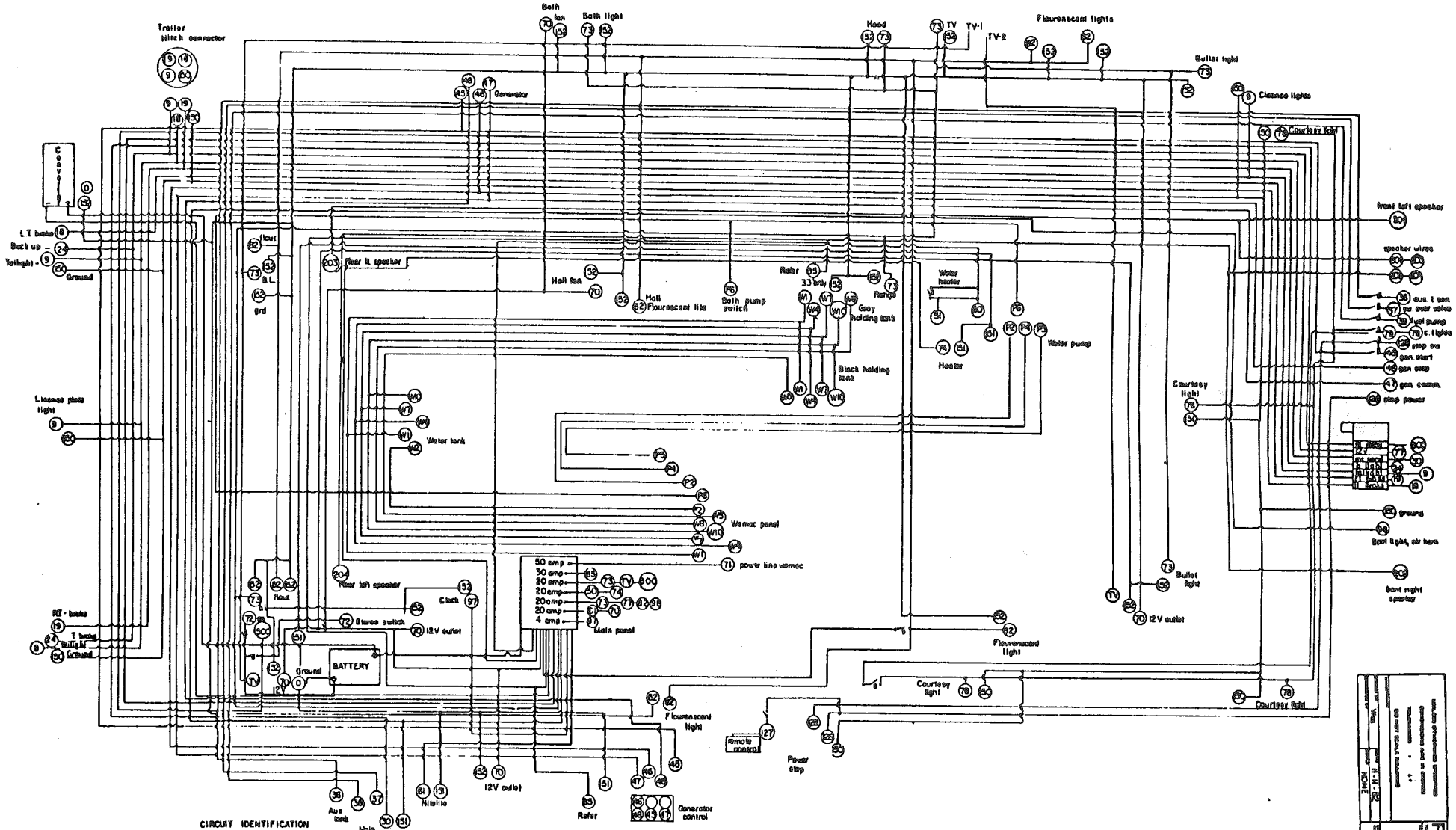
W/ BAR



W/ WARDROBE



33′ CANTEBURY



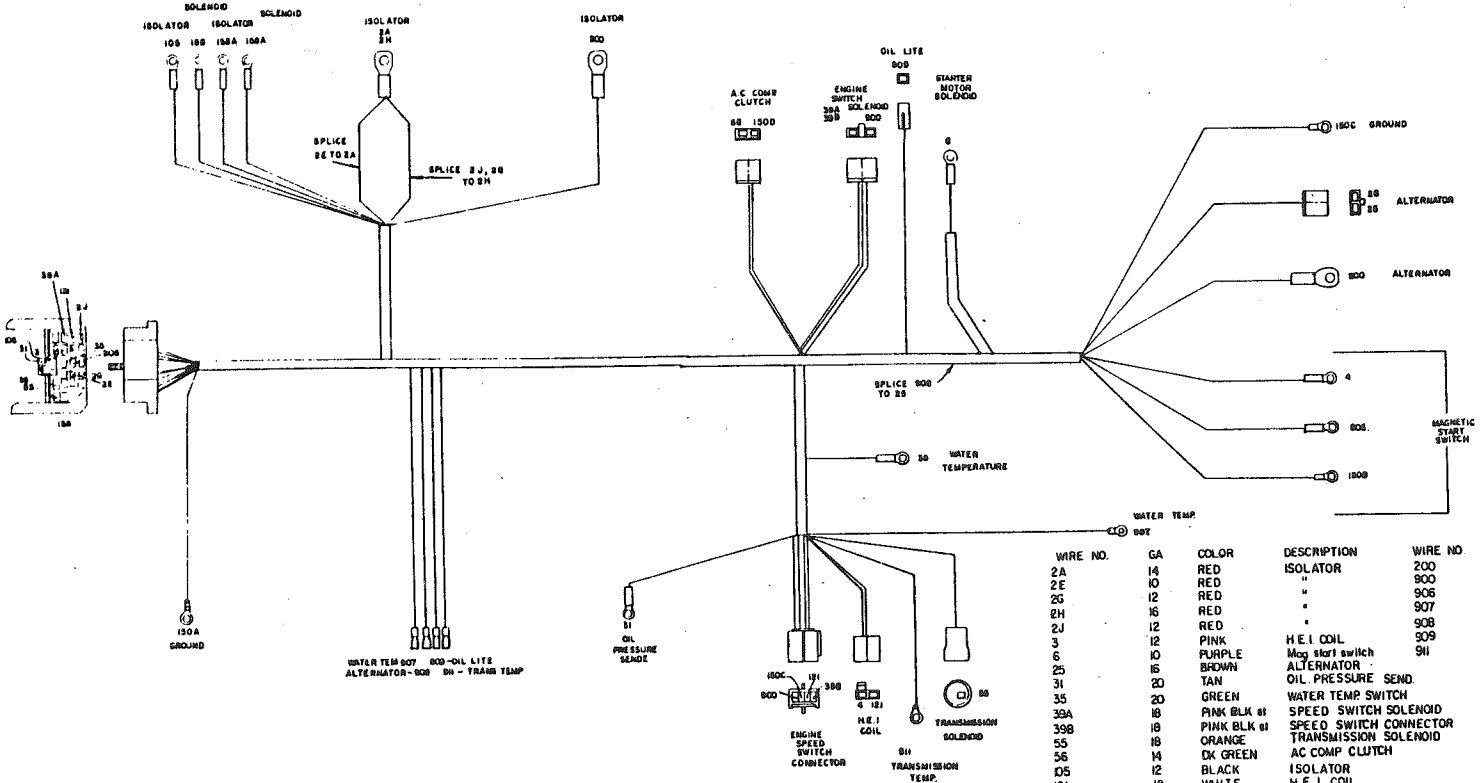
CIRCUIT IDENTIFICATION

NO.	WIRE SIZE	COLOR	DESCRIPTION
9	14Ga	Brown	Taillights
18	14Ga	Yellow	LT. Turn brake
19	14Ga	Dk green	RT Turn brake
24	14Ga	LT green	Back up lights
30	14Ga	Pink	Main tank sender
36	14Ga	Red	Aux. tank sender
37	14 Ga	Orange	Switch over valve
38	14 Ga	Yellow white/s	Fuel pump
45	14Ga	Black	Gen start
46	14Ga	Green yellow/s	Gen stop
47	14Ga	Red white/s	Gen comm
48	14Ga	Blue	Gen hr mtr
50	12 Ga	Green	WH hot line
51	12Ga	Blue	W.H. switch
60	18-2	Blue-Green	Heater thermostat
61	12 Ga	Red white/s	Nitelite
70	12 Ga	Brown	12 V outlet
71	12 Ga	Red	Wemac
72	12 Ga	Yellow	Stereo switch
73	12 Ga	Orange	Bullet lights-hood, ts,
74	12 Ga	Gray	Heater
77	12 Ga	Blue white/s	12 V dash board
78	14 Ga	Orange white/s	Courtesy lights
79	14 Ga	Purple	Courtesy intercomm.
82	12 Ga	Blue brown/s	Flourescent lights
85	10 Ga	Red	Refer
97	14 Ga	White brown/s	Clock
98	14Ga	Red yellow/s	Flood lite, ac horn
126	10Ga	White	Step power
127	12Ga	Yellow	Step switch entry
128	10Ga	Red white/s	Step switch dash
150	10Ga	Black	Clr ground
151	10Ga	Black white/s	" "
152	10Ga	Black yellow/s	" "
201	18-2	Black	FT lt speaker
202	18-2	Brown	FT rt speaker
203	18-2	White	Rear lt speaker
204	18-2	Grey	Rear rt speaker
500	14 Ga	Red blue/s	Stereo relay
P2	14Ga	Purple white/s	Pump light
P4	12Ga	Red yellow/s	Pump interconnect
P5	12 Ga	White black/s	Pump switch
P6	12Ga	White	Pump control
W1	18Ga	Blue	1/4 Full
W2	18Ga	Red	Hot line water tank
W4	18Ga	Yellow	1/2 Full
W5	18Ga	Brown	Hot line black tank
W7	18Ga	Orange	3/4 Full
W8	18Ga	Grey	Hot line grey tank
W9	14Ga	Green white	L.P.G. tank sender
W10	18Ga	Green	Full

Revcon Incorporated

MAIN DC WIRING DIAGRAM - 1983

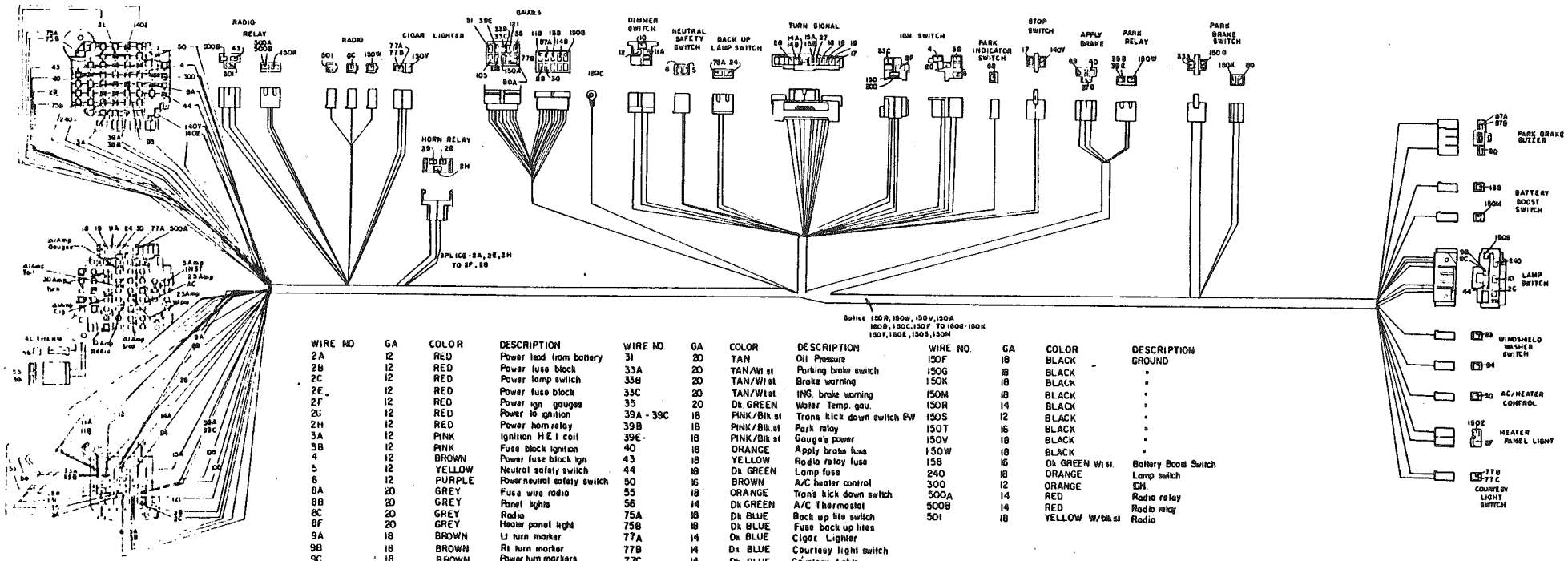
300005



WIRE NO.	GA	COLOR	DESCRIPTION
2A	14	RED	ISOLATOR
2E	10	RED	"
2G	12	RED	"
2H	16	RED	"
2J	12	RED	"
3	12	PINK	H.E.I COIL
6	10	PURPLE	Mag start switch
25	16	BROWN	ALTERNATOR
31	20	TAN	OIL PRESSURE SEND.
35	20	GREEN	WATER TEMP SWITCH
39A	18	PINK BLK st	SPEED SWITCH SOLENOID
39B	18	PINK BLK st	SPEED SWITCH CONNECTOR
55	18	ORANGE	TRANSMISSION SOLENOID
56	14	DK GREEN	AC COMP CLUTCH
105	12	BLACK	ISOLATOR
121	18	WHITE	H.E.I COIL
150A	12	BLACK	GROUND
150B	12	"	"
150C	18	"	"
150D	14	"	"
150E	12	"	"
158	16	GREEN w/ st	ISOLATOR
158A	12	" " "	ISOLATOR

WIRE NO.	GA	COLOR	DESCRIPTION
200	6	RED	ALTERNATOR
900	18	YELLOW	ENG SW SOLENOID
906	12	PURPLE	MAG START SW
907	18	BLUE	WATER TEMP
908	12	BROWN	ALTERNATOR
909	18	ORANGE	OIL LITE
911	18	RED	TRANS TEMP

REVCON 1980 SERIES
ENGINE HARNESS
PART NO. 1201 - 1956



WIRE NO	GA	COLOR	DESCRIPTION
2A	12	RED	Power lead from battery
2B	12	RED	Power fuse block
2C	12	RED	Power lamp switch
2E	12	RED	Power fuse block
2F	12	RED	Power ign gauges
2G	12	RED	Power to ignition
2H	12	RED	Power horn relay
3A	12	PINK	Ignition H E I coil
3B	12	PINK	Fuse block ignition
4	12	BROWN	Power fuse block ign
5	12	YELLOW	Neutral safety switch
6	12	PURPLE	Power neutral safety switch
8A	20	GREY	Fuse wire radio
8B	20	GREY	Panel lights
8C	20	GREY	Radio
8F	20	GREY	Heater panel light
9A	18	BROWN	Lt turn marker
9B	18	BROWN	Rt turn marker
9C	18	BROWN	Power turn markers
10	16	YELLOW	Dimmer switch
11A	16	LT GREEN	Headlamp dimmer
11B	18	LT GREEN	HI Beam
12	16	TAN	Headlamps
14A	18	LT BLUE	Lt. turn power
14B	18	LT BLUE	Lt turn signal
15A	18	Dk BLUE	Rt turn power
15B	18	Dk BLUE	Rt turn signal
16	18	PURPLE	Lt. turn dash
17	18	WHITE	Stop Lite
18	16	YELLOW	Lt turn - rear
19	16	Dk GREEN	Rt turn - rear
24	18	LT GREEN	Back up lite switch
27	16	BROWN	Emergency flasher
28	20	BLACK	Horn steering wheel
29	20	Dk GREEN	Horn
30	20	PINK	Fuel Gauge
31	20	TAN	Oil Pressure
33A	20	TAN/Wht st	Parking brake switch
33B	20	TAN/Wht st	Brake warning
33C	20	TAN/Wht st	ING. brake warning
35	20	Dk GREEN	Water Temp. gau.
39A - 39C	18	PINK/Blk st	Trans kick down switch EW
39B	18	PINK/Blk st	Park relay
39E	18	PINK/Blk st	Gauge's power
40	18	ORANGE	Apply brake fuse
43	18	YELLOW	Radio relay fuse
44	18	Dk GREEN	Lamp fuse
50	16	BROWN	A/C heater control
55	18	ORANGE	Trans kick down switch
56	14	Dk GREEN	A/C Thermostat
75A	18	Dk BLUE	Back up lite switch
75B	18	Dk BLUE	Fuse back up lites
77A	14	Dk BLUE	Cigar Lighter
77B	14	Dk BLUE	Courtesy light switch
77C	14	Dk BLUE	Courtesy lights
80	18	LT GREEN	Park brake buzzer
80A	18	GREEN	Parking brake light
87A	18	YELLOW	Apply park brake
87B	18	YELLOW	Park brake buzzer
88	18	TAN	Park indicator switch
93	18	WHITE	Windshield washer switch
94	18	PINK	Windshield washer switch
105	12	BLACK	L-Ammeter
106	12	BLACK Wt st	B-Ammeter
121	18	WHITE	Tachometer
130	20	BROWN Wt st	Gen. signal wire - 10 ohm res
140Y	18	ORANGE	Stop switch
140Z	18	ORANGE	Stop switch fuse block
150A	16	BLACK	GROUND
150B	18	BLACK	"
150C	12	BLACK	"
150E	18	BLACK	"
150F	18	BLACK	"
150G	18	BLACK	"
150K	18	BLACK	"
150M	18	BLACK	"
150R	14	BLACK	"
150S	12	BLACK	"
150T	16	BLACK	"
150V	18	BLACK	"
150W	18	BLACK	"
158	16	Dk GREEN Wt st	Battery Boost Switch
240	18	ORANGE	Lamp switch
300	12	ORANGE	IGN.
500A	14	RED	Radio relay
500B	14	RED	Radio relay
501	18	YELLOW W/blk st	Radio

REVCON - 1980-SERIES
INSTRUMENTAL HARNESS
PART NO. 1201-1955

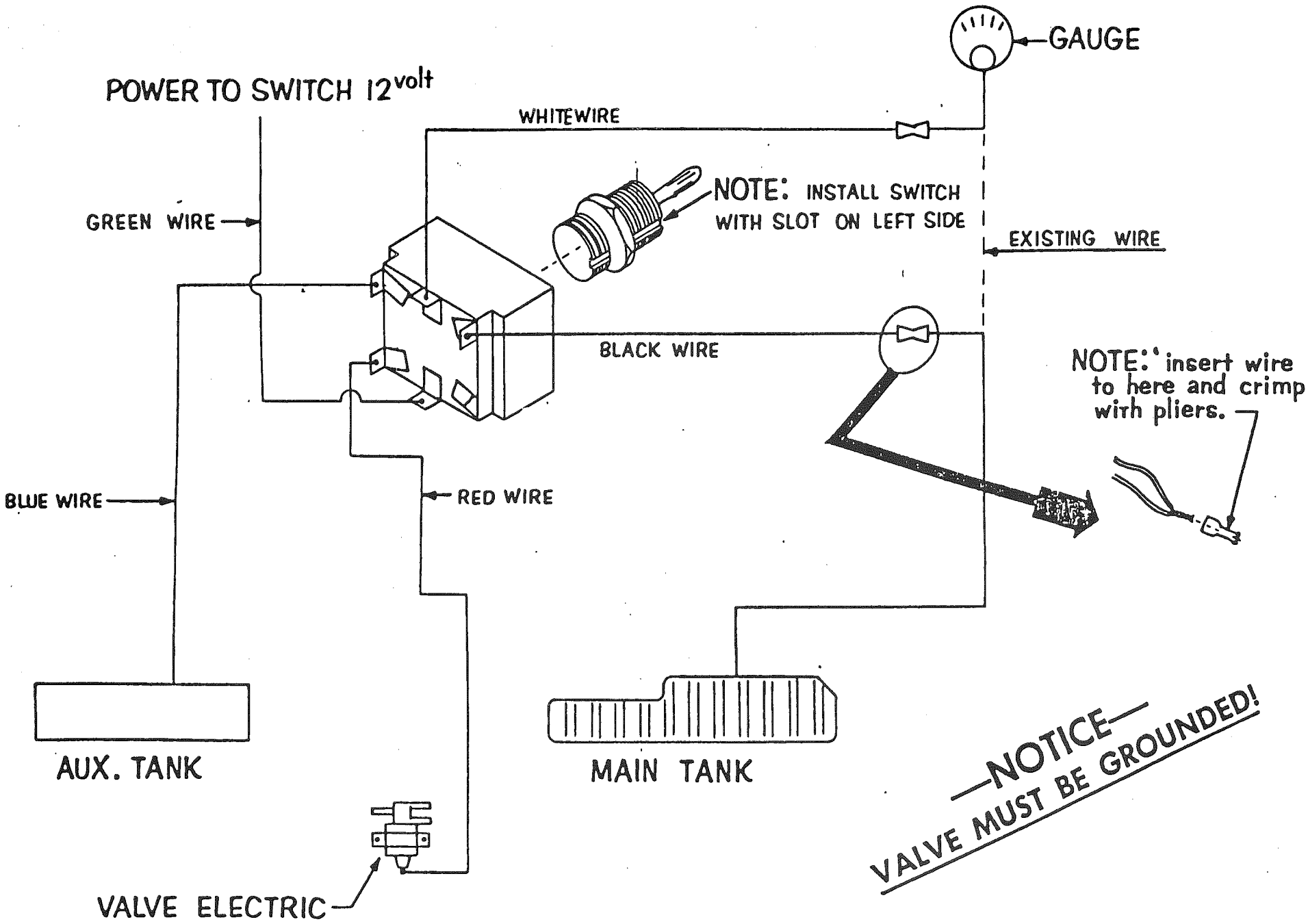

GAUGE
POWER TO SWITCH 12volt
WHITEWIRE
NOTE: INSTALL SWITCH WITH SLOT ON LEFT SIDE
GREEN WIRE
EXISTING WIRE
BLACK WIRE
NOTE: insert wire to here and crimp with pliers.
BLUE WIRE
RED WIRE
AUX. TANK
MAIN TANK
VALVE ELECTRIC
—NOTICE—
VALVE MUST BE GROUNDED!

fig. 1

ALIGNMENT RACK PROCEDURE

1. Ride Height (Front)

   The ride height is measured from the ground to the bottom of the frame alongside the bellcrank and idler position. The correct measurement is 17".

2. Camber with 63 pounds tire pressure (Front)

   Set camber as follows:

   Left side – 0 to ¼ degrees positive
   Right side – 0 to ¼ degrees negative

3. Caster

   Set both sides at 1 degree + (negative) to 2 degrees + check that a clearance exists between the frame and the control arm mounting bosses on the upper control arms.

4. Toe In-Out

   After camber and caster is set use the sighting device on the gages to align the front wheels to the rear then check that the bellcrank to idler cross link is the correct length of 42 3/4" center of joint to center of joint. Set the bellcrank and idler in the straight ahead position relative to the frame. Recheck that the front wheels are still in line to the rear and by adjusting the tie-rods set the toe to 1/8" total toe out (1/16" out each side). After the toe has been set, recheck the straight ahead position of the bellcrank and idler and front to rear alignment.

5. Equal Right and Left Turn Angles

   By adjusting the drag link that connects the steering gear Pitman Arm to the bellcrank, it is possible to adjust the amount of left and right lock.

A. Turn the steering wheel to full left lock. Read the angle on the circular plate under the left wheel. It should be approx. 31 degrees.

B. Turn the steering wheel to full right lock and read the angle of the circular plate under the right wheel, it should be the same as the left. (approx. 31 degrees)

C. If the steering lock angles do not match, adjust the drag link length and repeat the lock angle measurement until both sides are turning the same amount.

6. Tighten all tie rod clamps and ball joint nuts.

7. Check that all clamps are oriented correctly and that there is no interference between any steering link clamp and the frame or steering components.

8. Check that all cotter pins are installed correctly.

9. Grease all ball joints.

10. With the steering on left lock then right lock then straight, grease the bellcrank and idler bushings.

11. Check that bellcranks and idlers have plastic bearings, not brass in center pivots.

12. Check bellcrank and idler mounting bolts for correct torque (150 foot pounds).

13. Check lug nuts for correct torque – 140-180 ft. lbs.

14. NOTE: With Michelin – Radial Tires

    The correct front tire pressure is 63 pounds per square inch.

    The correct rear tire pressure is 57 pounds per square inch.

15. After setting alignment with wheels set straight ahead, check steering wheel position. If the wheel is not straight, it can only be straightened by removing the steering shaft from between the column and gear. Straighten steering wheel with wheels straight ahead, replace steering shaft on steering gear. Do NOT adjust the drag link.

16. Jounce Stop

    Check that the rubber jounce snubber is installed and tight. Then check that there is sufficient jounce clearance between the flange on the metal jounce bracket and the control arm. With the ride height set at 17" the shortest distance from the metal flange on the jounce stop to the lower control arm where it would make contact after the snubber has compressed should be 1".

17. Leaks

    Before removing the vehicle from the alignment pit, check it for oil and water leaks. Check all hose ends and connections and check all drain plugs for looseness.

    NOTES - Never adjust torsion bars to change ride height unless the vehicle is jacked up and the suspension is hanging down in full rebound position.

January 5, 1983

RIDE HEIGHT ADJUSTMENT FOR ALL 81-83 MODELS

The purpose of this adjustment is to eliminate wandering and bottoming out of the coach.

STEP #1: No personnel can be in the coach.

STEP #2: Coach must be on level ground.

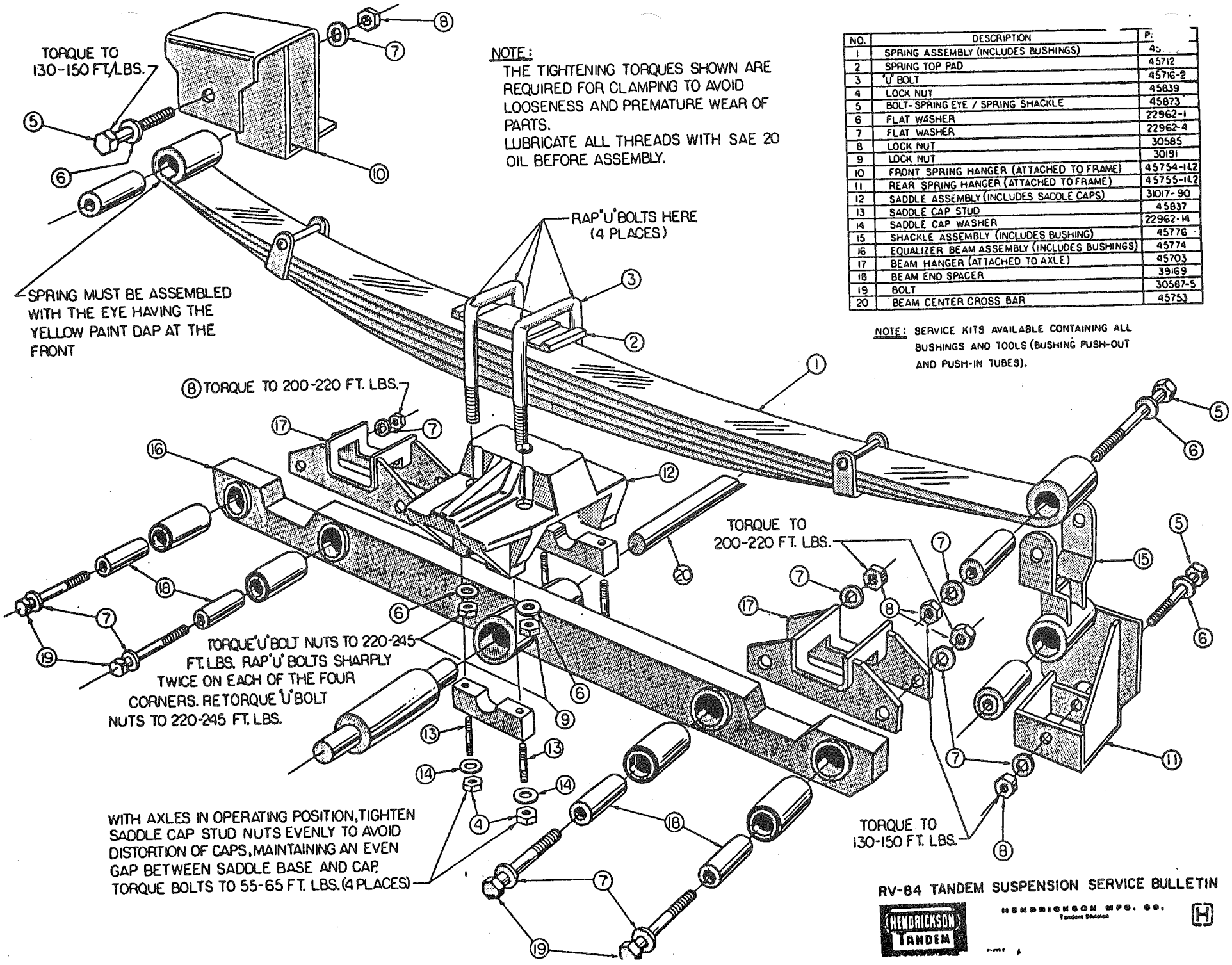
STEP #3: Measure from sub frame point in front of drag link should be 17" both sides.

STEP #4: If not equal adjust torsion bar bolts or bolt if just one side is off.

STEP #5: If ride height is not correct after bolts are adjusted all the way up the torsion bar ear could be worn out or torsion bar has been weakened. Both of these problems are caused by excessive weight on one side not balanced by the other or impacts on curbs, etc. If the coach has alot of wear the lower A-Arm socket can wear out causing ride height problems. (NOTE: This is very rare).

For the first 10,000 miles check ride height every 1,000 miles after that every 7,000 miles. This is dependent on road roughness.

RCD:tz



NOTE:
THE TIGHTENING TORQUES SHOWN ARE REQUIRED FOR CLAMPING TO AVOID LOOSENESS AND PREMATURE WEAR OF PARTS.
LUBRICATE ALL THREADS WITH SAE 20 OIL BEFORE ASSEMBLY.

NO.	DESCRIPTION	P.
1	SPRING ASSEMBLY (INCLUDES BUSHINGS)	45.
2	SPRING TOP PAD	45712
3	'U' BOLT	45716-2
4	LOCK NUT	45839
5	BOLT- SPRING EYE / SPRING SHACKLE	45873
6	FLAT WASHER	22962-1
7	FLAT WASHER	22962-4
8	LOCK NUT	30585
9	LOCK NUT	30191
10	FRONT SPRING HANGER (ATTACHED TO FRAME)	45754-142
11	REAR SPRING HANGER (ATTACHED TO FRAME)	45755-142
12	SADDLE ASSEMBLY (INCLUDES SADDLE CAPS)	31017-90
13	SADDLE CAP STUD	45837
14	SADDLE CAP WASHER	22962-14
15	SHACKLE ASSEMBLY (INCLUDES BUSHING)	45776
16	EQUALIZER BEAM ASSEMBLY (INCLUDES BUSHINGS)	45774
17	BEAM HANGER (ATTACHED TO AXLE)	45703
18	BEAM END SPACER	39169
19	BOLT	30587-5
20	BEAM CENTER CROSS BAR	45753

NOTE: SERVICE KITS AVAILABLE CONTAINING ALL BUSHINGS AND TOOLS (BUSHING PUSH-OUT AND PUSH-IN TUBES).

RV-84 TANDEM SUSPENSION SERVICE BULLETIN

HENDRICKSON TANDEM

HENDRICKSON MFG. CO. Tandem Division

PHILIPS INDUSTRIES, INC.
AXLE/ROOF GROUP
ELKHART, INDIANA

ENGINEERING SPECIFICATION #11

BEARING AND OIL SEAL SERVICE AND MAINTENANCE

REVCON USES THE 10K single wheel axle

REMOVAL:

1. Loosen oil cap from hub with wrench. Pry loose the gasket and discard.
2. Remove cotter pin, spindle adjusting nut and washer from spindle.
3. The hub may now be removed, but use caution during removal so as not to damage bearings or oil seal.

INSPECTION:

1. In the event the seal shows signs of leakage, its replacement is recommended. See Engineering Specification #12 for installation instructions.
2. Should the mating surface on the spindle show signs of wear or scoring, the installation of a wear sleeve is recommended. See Engineering Specification #12 for installation instructions.
3. For oil seal installation with shaft wear sleeve, see Engineering Specification #12.

INSTALLATION:

1. Install hub, outer bearing cone, and washer on spindle.
2. Install spindle nut and adjust per Engineering Specification #
3. Wipe all dirt from nose of hub and install oil cap with new gasket.
4. Use a wrench about 12" long and strike on the end to tighten oil cap securely.

LUBRICATION:

1. Remove the rubber filler plug on side of hub and add an amount of S.A.E. 90 EP Hypoid gear lubricant as specified in Engineering Specification #15.

E.S. #11
6-8-77

LUBRICATION: (continued)

2. Allow sufficient time for oil to flow through bearings and then check oil level on plastic cap. Add additional oil if level is below line on cap.

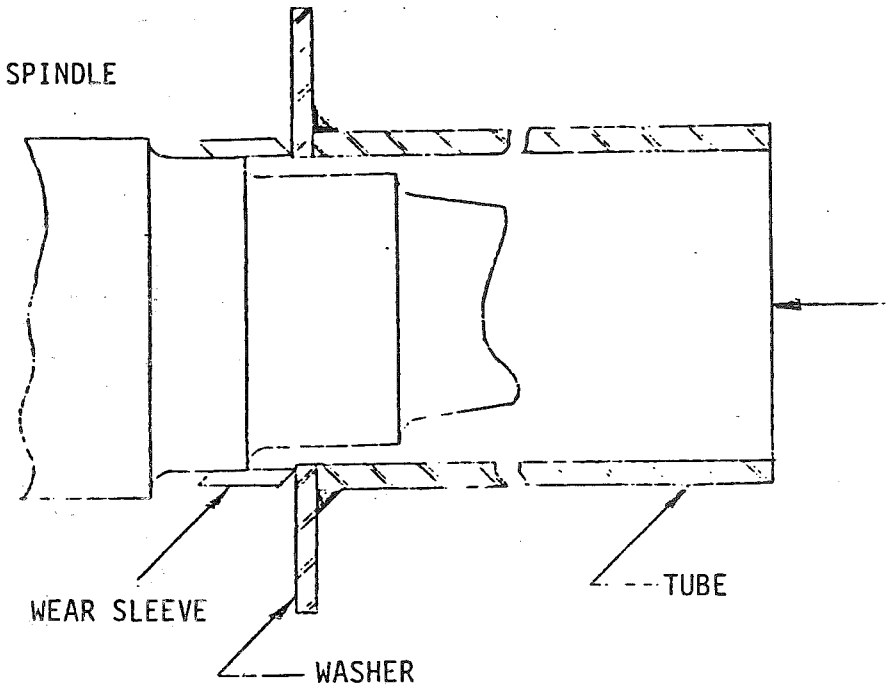
3. Reinstall rubber plug by putting screw driver in hole in the plug and forcing plug into hole in hub.

PHILIPS INDUSTRIES, INC.
AXLE/ROOF GROUP
ELKHART, INDIANA

ENGINEERING SPECIFICATION #12

WEAR SLEEVE AND GREASE/OIL SEAL REMOVAL AND INSTALLATION

When current seal is worn and no wear sleeve used, a wear sleeve and replacement seal should be installed. If unit has wear sleeve, check for damage or wear on existing wear sleeve. If worn or scored,install new wear sleeve and seal.



Recommended installation tool. Weld washer on end of tube. Important washer and tube I.D. fit over spindle diameter. Tube to extend past end of spindle.

REMOVAL

1. A wear sleeve may be removed easily by tapping with a flat hammer, by heating, or by careful use of a rounded, blunt chisel.

   CAUTION: It is not necessary to cut the sleeve completely to remove it. Avoid lengthwise scratches on spindle surface to prevent leaks.

2. Wear sleeve seating surface must be clean of all burrs or build-up before wear sleeve is installed.

3. Remove oil seal from hub.

INSTALLATION

1. Remove all dirt and oil from the seating surface.

2. Coat shaft surface with a liquid sealant or gasket cement.

3. Press wear sleeve into position with a flat plate against the tube. Do not hammer on the thin edge or the sleeve may become warped or out of round.

4. Remove the excess sealant from the wear sleeve edges. None should be left on the finished working surface or seal leakage may result.

5. Install new seal flush with face of hub. Seal lip must point towards bearing.

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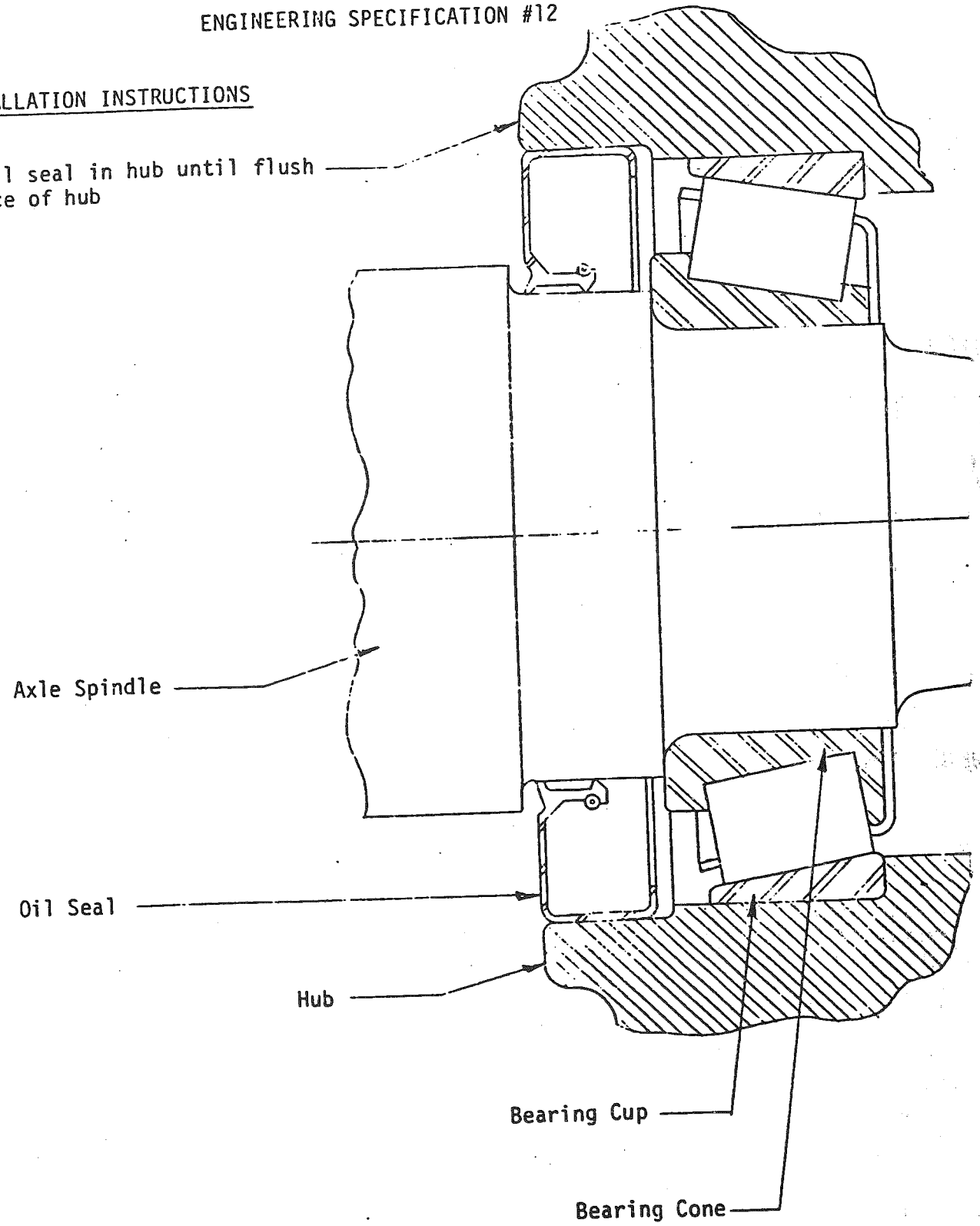
AXLE/ROOF GROUP
ELKHART, INDIANA

ENGINEERING SPECIFICATION #12

OIL SEAL INSTALLATION INSTRUCTIONS

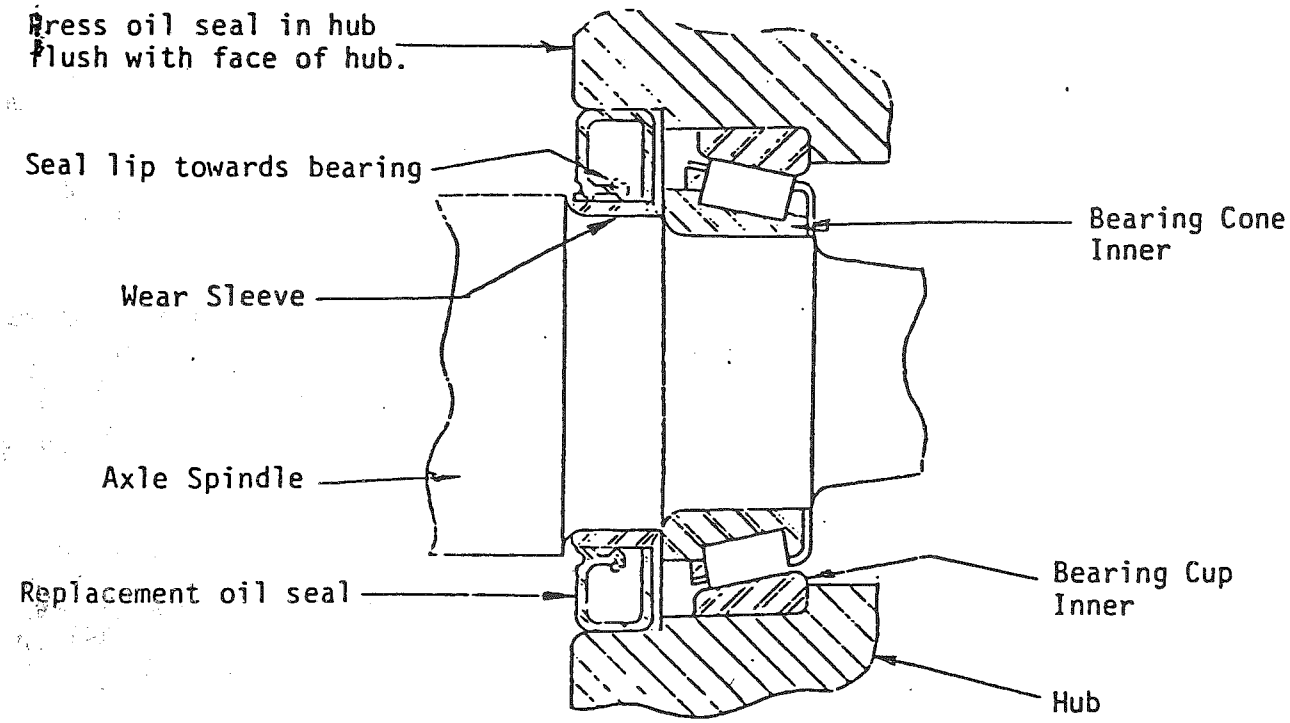


6-16-77
E.S. #12

PHILIPS INDUSTRIES, INC.
AXLE/ROOF GROUP
ELKHART, INDIANA

ENGINEERING SPECIFICATION #12

OIL AND GREASE SEAL REPLACEMENTS WITH WEAR SLEEVE



AXLES	BEARINGS OUTER	BEARINGS INNER	GREASE AND OIL SEALS	WEAR SLEEVE	OIL SEALS
TTH/TTH-4	L44610 CUP L44649 CONE	LM48510 CUP LM48548 CONE	10-4 442251 10-19 OIL	60-5 (SPECIAL)	10-37 (SPECIAL)
TTA/TTA-4	LM67010 CUP LM67048 CONE	25520 CUP 25580 CONE	10-1 440972 10-10 OIL	60-1 DEXTER J1111 NATIONAL	10-36 472920
UT/UT4	15245 CUP 15123 CONE	25520 CUP 25580 CONE	10-1 440972 10-10 OIL	60-1 DEXTER J1111 NATIONAL	10-36 472920
UTX	02420 CUP 02475 CONE	25520 CUP 25580 CONE	10-36 472920	60-6 DEXTER J1113 NATIONAL	10-38 473247
10K REVCON	382A CUP 387A CONE	394A CUP 395A CONE	10-7 OIL Cap #10-43 "O"Ring Plug #46-32	60-3 (ORIGINAL PART)	10-7
12K & 14K	28622 CUP 28682 CONE	3920 CUP 3994 CONE	10-7 OIL	60-3 (ORIGINAL PART)	10-7

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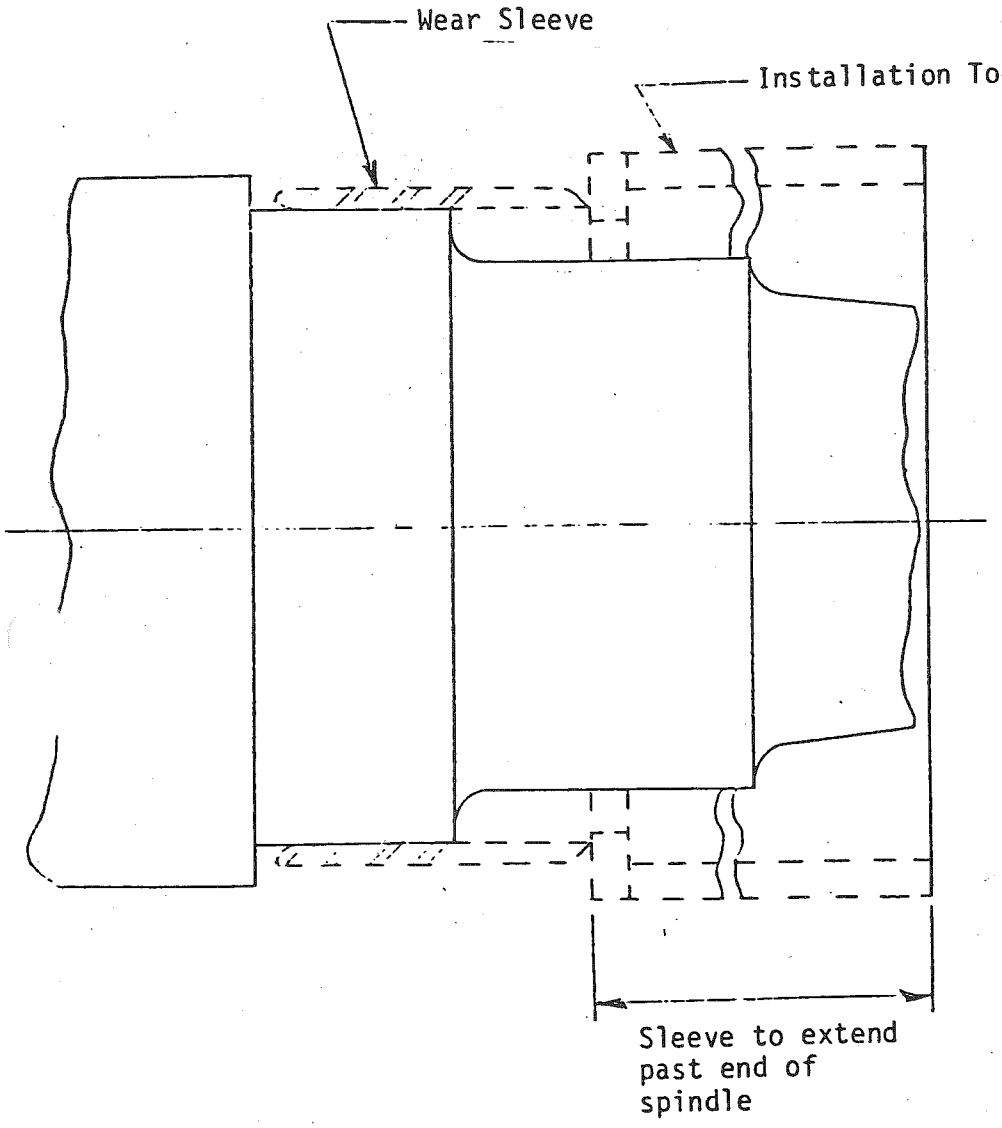
AXLE/ROOF GROUP
ELKHART, INDIANA

ENGINEERING SPECIFICATION #13

WEAR SLEEVE INSTALLATION



INSTALLATION

1. Remove all dirt and oil from the seating surface.
2. Coat shaft surface with a liquid sealant or gasket cement.
3. Press wear sleeve into position with a flat plate against the sleeve. Do not hammer on the thin edge of the sleeve may become warped or out of round.
4. Remove the excess sealant from the wear sleeve edges. None should be left on the finished working surface or seal leakage may result.

REMOVAL

1. The old wear sleeve may be removed easily by tapping with a flat hammer, by heating, or by careful use of a rounded, blunt chisel.

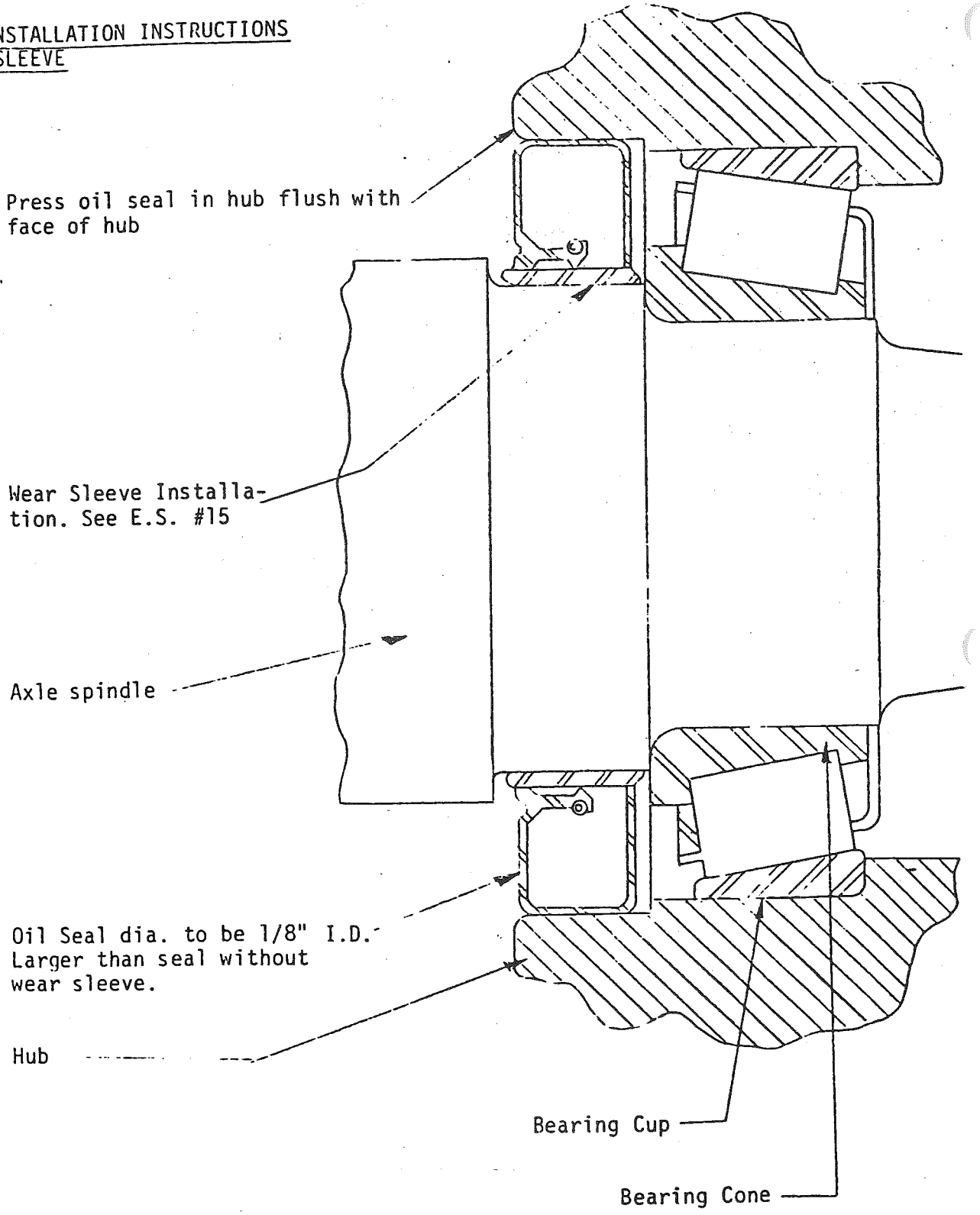
Caution: It is not necessary to cut the sleeve completely to remove it.

6-16-77

PHILIPS INDUSTRIES, INC.
AXLE/ROOF GROUP
ELKHART, INDIANA

ENGINEERING SPECIFICATION #14

OIL SEAL INSTALLATION INSTRUCTIONS WITH WEAR SLEEVE



6-16-77
E.S. #14

PHILIPS INDUSTRIES, INC.
AXLE/ROOF GROUP
ELKHART, INDIANA

ENGINEERING SPECIFICATION #16

HANDLING OF POLYCARBONATE PLASTIC OIL CAPS

The oil cap is made from a stable and generally inert plastic material. However, certain chemicals, particularly those used in painting and cleaning, have deleterious effects on the plastic. The following list defines substances which can be used safely and some which should be avoided.

Use

Freon TF
Heptane
White kerosene
Denatured alcohol #1430
V. M. & P. Naphtha
Petroleum either
Wood alcohol (methanol)
Grain alcohol (ethanol)
Isopropyl alcohol
Solution: 1% Joy detergent & water

Avoid

Methylene chloride
1, 2 dichloroethane
Chloroform
} dissolves

Low molecular weight aldehydes and ethers
Ketones
Esters
Aromatic hydrocarbons eg. benzol toluol
Perchlorinated hydrocarbons eg. trichlor, triclene
} softens or crystallizes

Alkali
Alkaline salts
Amines
Ozone
} destruction by Chemical attack

Low molecular weight hydrocarbons
Alcohol
Carbon tetrachloride
Acetone
Xylene
} crazing or shattering under stress - may be used on uninstalled parts for brief periods

E.S. #16
6-8-77

PHILIPS INDUSTRIES INC.
DEXTER AXLE DIVISION
ELKHART, INDIANA 46516

ENGINEERING SPECIFICATION #15

OIL HUB CAPACITIES

1. All hubs for the TTH axle require 1.5 oz.

2. All hubs for the TTA, UT, UTX, 8K & 9K axles require 2 oz.

REVCON 3. The hub for the 10K single wheel axle requires 6 oz. REVCON

4. The hubs for the 10K Dual, 12K, & 15K axles requires 4 oz.

REV: 10-31-80

1984 INTERIOR #1

BROWN FLORAL

Dash Vinyl	Rougue Buckskin
Carpet	Hallmark - Private Party - El Dorado #732-844
Sofa	La France - 1967 Woodland - 308 Woodland
Driver/Pass chairs	La France - 1189 Copa - #333 Brown
Barrel Chairs	La France - 1189 Copa - #333 Brown
Lounge Drapes	La France - 1189 Copa - #333 Brown
Lounge Drape Trim	La France - 1152 Caprice - #336 Tobacco
Lounge Valance	La France - 1189 Copa - #333 Brown
Lounge Valance Trim	La France 1152 Carpice - #336 Tobacco
Lounge Blinds	Levolor - Riviera - #137 Almond
Lounge Pillows	La France - 1152 Caprice - #336 Tobacco
Woven Woods	Webb Special "W" - 3817 R
Bedspread	La France - 1302 Venezia - #312 Flax
Bedspread Trim	La France 1189 Copa - #333 Brown
Bedroom Drapes	La France - 1302 Venezia - #312 Flax
Bedroom Drape Trim	La France - 1189 Copa - #333 Brown
Bedroom Sheers	Kastex - Driftwood Romance

1984 INTERIOR #2

TAN FLORAL

Dash Vinyl	Rougue Buckskin
Carpet	Hallmark - Quatre #729-833 Mushroom
Sofa	La France - #1967 Ryan - #300 Bisque
Driver & Pass. Chairs	De Portere - #2524 Lido - #623 Camel
Barrel Chairs	De Portere - #2524 Lido - #623 Camel
Lounge Drapes	De Portere - #2524 Lido - #623 Camel
Lounge Drape Trim	La France - #1152 Caprice - #325 Brown
Lounge Valance	La France - #1994 Salon - #300 bisque
Lounge Valance Trim	none
Lounge Blinds	Levolor - Riviera - #137 Almond
Lounge Pillows	La France - #1152 Caprice - #325 Brown
Woven Woods	Webb special "W" 3817R
Bedspread	La France - #1302 Venezia - #312 Flax
Bedspread Trim	La France - #1302 Venezia - #335 Cinnamon
Bedroom Drapes	La France - #1302 Venezia - #312 Flax
Bedroom Drape Trim	La France - #1302 Venezia - #335 Cinnamon
Bedroom Sheers	Kastex - Driftwood Romance

1984 INTERIOR #3

SILVER

Dash Vinyl	Fabric Leather Corp. - Lite Flite Grey - Nu Sierra
Carpet	Hallmark - Private Property - 0515 A - Silver Bullet
Sofa	De Portere - #2532 - Smoke #908
Driver & Pass Chairs	De Portere - #2524 - Silver Pearl #904
Barrel Chairs	De Portere - #2524 - Silver Pearl #904
Lounge Drapes	De Portere - #2524 - Silver Pearl #904
Lounge Drapes Trim	La France - #1152 Carpice - #686 Steel
Lounge Valance	De Portere - #2524 - Silver Pearl #904
Lounge Valance Trim	La France - #1152 Carpice - #686 Steel
Lounge Mini Blinds	Levolor - Riviera - #137 Almond
Lounge Pillows	La France - #1152 Caprice - #686 Steel
Woven Woods	Webb Special "W" 3802-R
Bedspread	Deportere - #2524 - Silver Pearl #904
Bedspread Trim	La France - #1152 Caprice - #686 Steel
Bedroom Drapes	De Portere - #2524 Silver Pearl #904
Bedroom Drapes Trim	La France - #1152 Carpice - #686 Steel
Bedroom Sheers	Kastex - Driftwood Ramance

1984 INTERIOR #4

BLUE & SILVER

Dash Vinyl	Fabirc Leather Corp. - Lite Flite Grey - Nu Sierra
Carpet	Hallmark - Private Property - 0515-A Silver Bullet
Sofa	La France - #1152 Caprice - #686 Steel
Barrel Chairs	La France - #1152 Caprice - 686 Steel
Driver/Pass. Chairs	La France - #1152 Caprice - #686 Steel
Lounge Drapes	De Portere - #2524 Silver Pearl #904
Lounge Drape Trim	La France - #1152 Caprice - #686 Steel
Lounge Valance	Deportere - #2524 Silver Pearl #904
Lounge Valance Trim	La France - #1152 Caprice - #686 Steel
Lounge Mini Blinds	Levolor - Riviera - #137 Almond
Lounge Pillows	De Portere - #2524 Silver Pearl #904
Woven Woods	Webb Special "W" 3802R
Bedspread	De Portere - #2524 Silver Pearl #904
Bedspread Trim	La France - #1152 Caprice - #686 Steel
Bedroom Drapes	De Portere - #2524 Silver Pearl #904
Bedroom Drapes Trim	La France - #1152 Caprice - #686 Steel
Bedroom Sheers	Kastex - Driftwood Romance

1984 INTERIOR #5

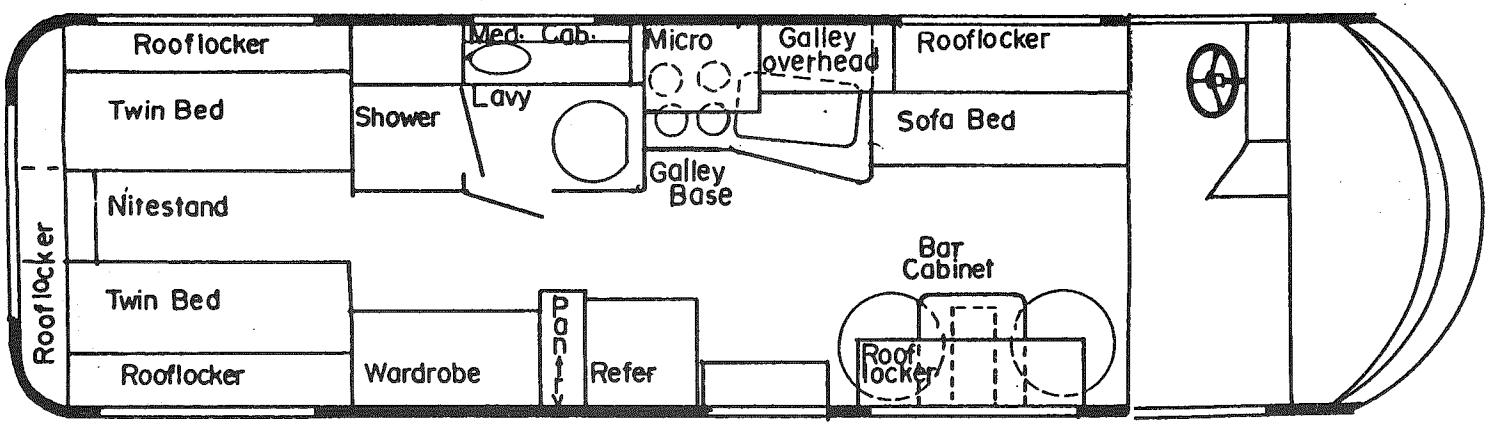
WINE

Dash Vinyl	Naugahyde - Burkshire - BRK 40 Burgundy
Carpet	Hallmark - Private Property
Sofa	La France - #1152 Caprice - #437 Raisin
Driver & Pass Chairs	La France - #1152 Caprice - #437 Raisin
Barrel Chairs	La France - #1152 Caprice - #437 Raisin
Lounge Drapes	La France - #1152 Caprice - #437 Raisin
Lounge Drape Trim	La France #1152 Caprice - #469 Garnet
Lounge Valance	La France - #1152 Caprice - #437 Raisin
Lounge Valance Trim	La France - #1152 Carpice - #469 Garnet
Lounge Blinds	Levolor- Riviera - #137 Almond
Lounge Pillows	La France - #1152 Caprice - #469 Garnet
Woven Woods	Webb Special "W"
Bedspread	La France - #1152 Caprice - #433 Cameo
Bedspread Trim	La France - #1152 Caprice - #437 Raisin
Bedroom Drapes	La France - #1152 Caprice - #433 Cameo
Bedroom Drape Trim	La France - #1152 Caprice - #437 Raisin
Bedroom Sheers	Kastex - Driftwood Romance

1984 INTERIOR #6

BUTTERSCOTCH

Dash Vinyl	Rougue Buckskin
Carpet	Hallmark Private Property - El Dorado 732 844
Sofa	La France 1302 Venezia - 312 Flax
Driver & Pass Chairs	La France 1302 Venezia - 312 Flax
Barrel Chairs	La France 1302 Venezia - 312 Flax
Lounge Drapes	La France 1302 Venezia - 312 Flax
Lounge Drape Trim	La France 1302 Venezia 335 Cinnamon
Lounge Valance	La France 1302 Venezia 312 Flax
Lounge Valance Trim	La France 1302 Venezia 335 Cinnamon
Lounge Blinds	Levolor - Riviera - 137 Almond
Lounge Pillows	La France 1302 Venezia 335 Cinnamon
Woven Woods	Webb Special "W" 3817R
Bedspread	La France 1302 Venezia #312 Flax
Bedspread Trim	La France 1302 Venezia 335 Cinnamon
Bedroom Drapes	La France 1302 Venezia #312 Flax
Bedroom Drape Trim	La France 1302 Venezia #335 Cinnamon
Bedroom Valance	La France 1302 Venezia #312 Flax
Bedroom Valance Trim	La France 1302 Venezia - #335 Cinnamon
Bedroom Sheers	Kastex - Driftwood Romance

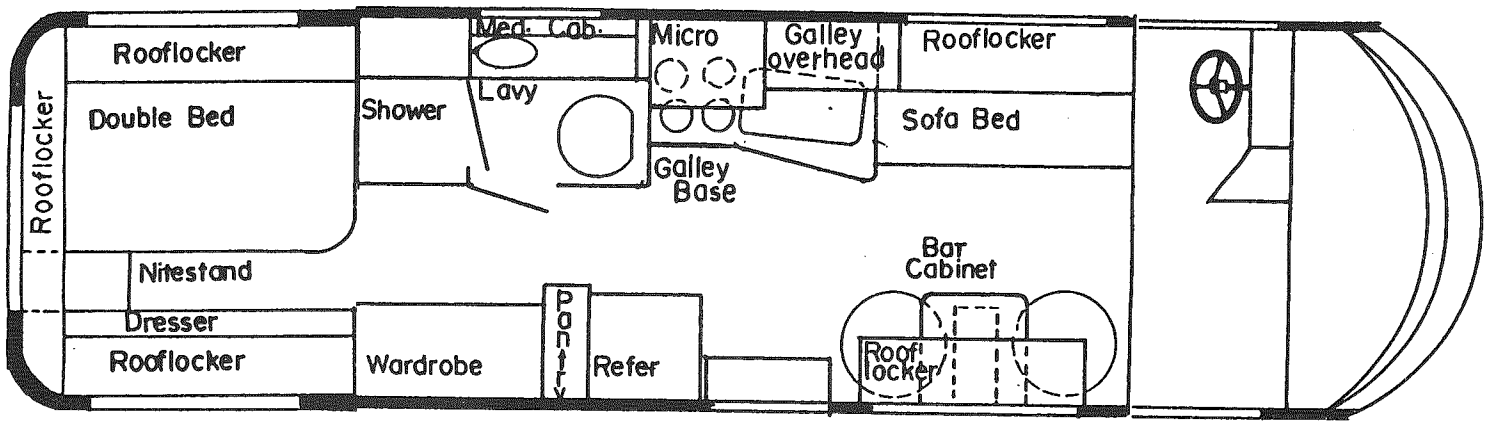


REVCON INC.

28'-DUKE-MIDBATH

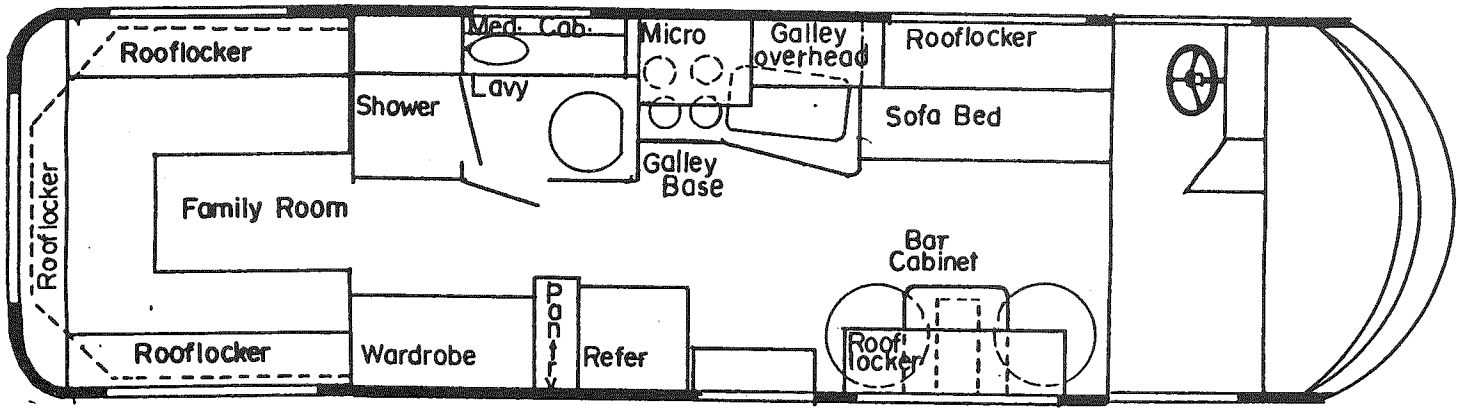
TWIN BED

28B



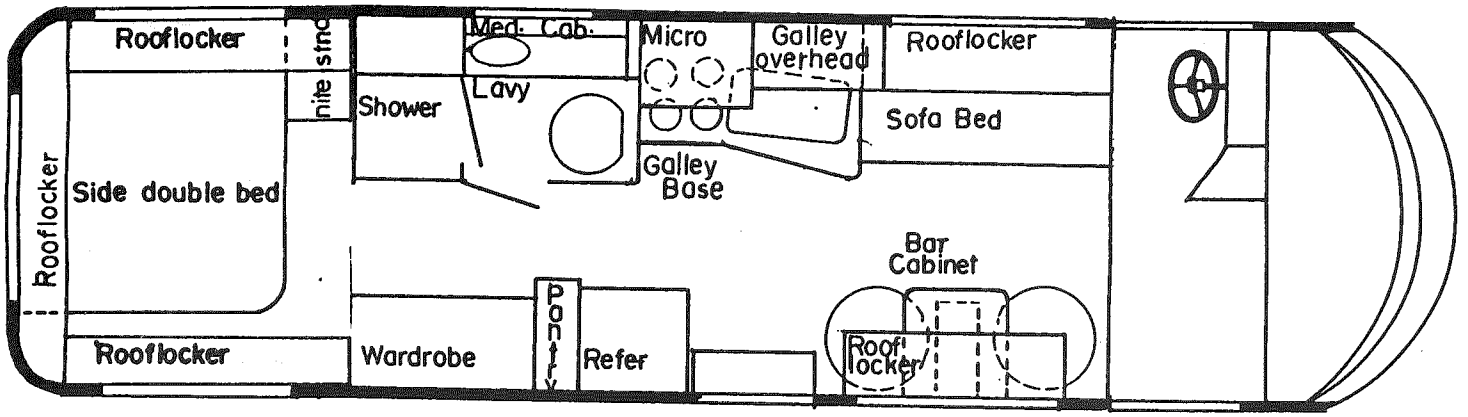
REVCON INC.

28'-DUKE-MIDBATH
DOUBLE BED
28A



REVCON INC.

28'-DUKE-MIDBATH
FAMILY ROOM
28C

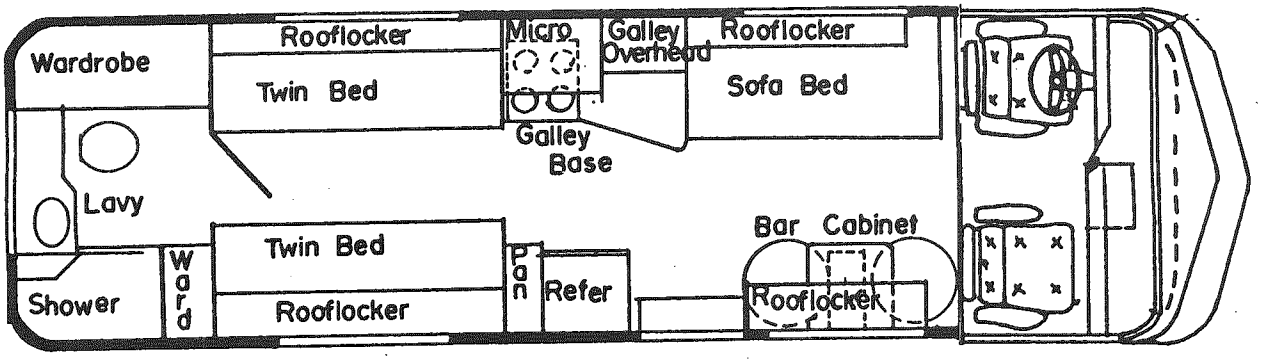


REVCON

28' DUKE

SIDE DOUBLE BED

28D

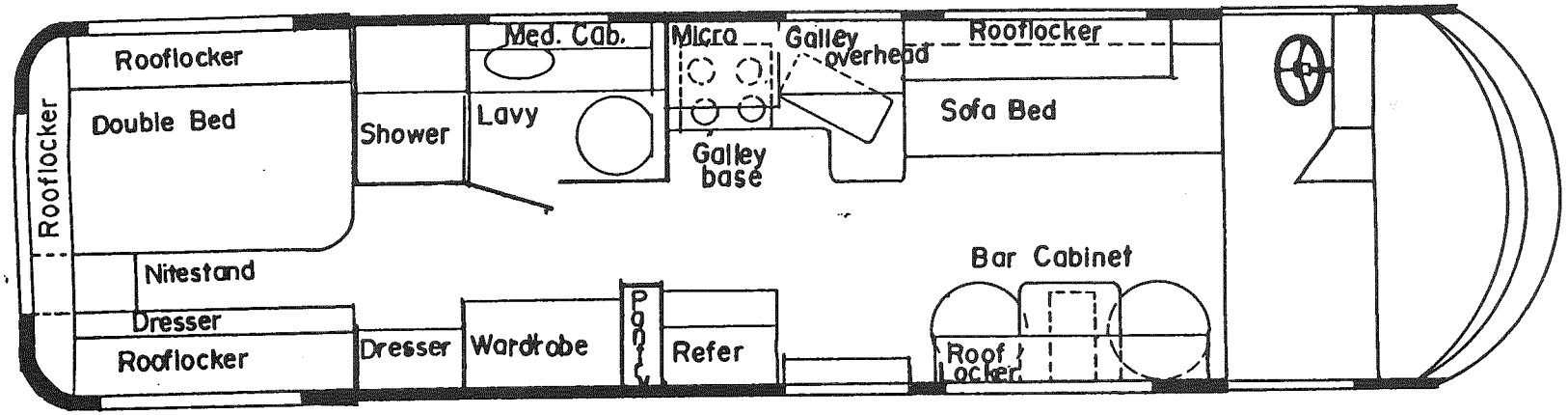


REVCON

28' DUKE

REAR BATH

28E

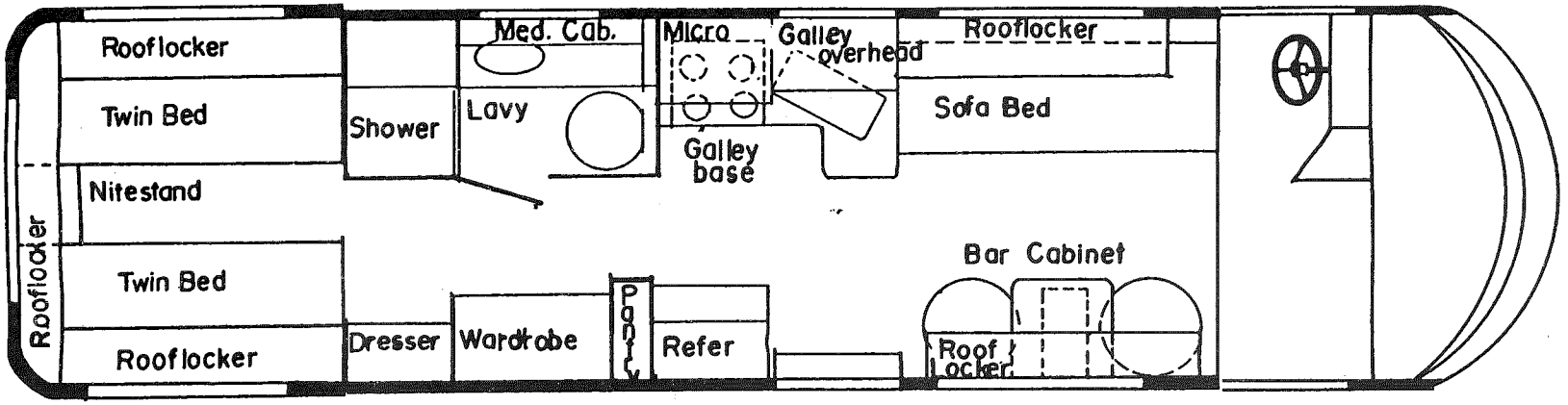


REVCON

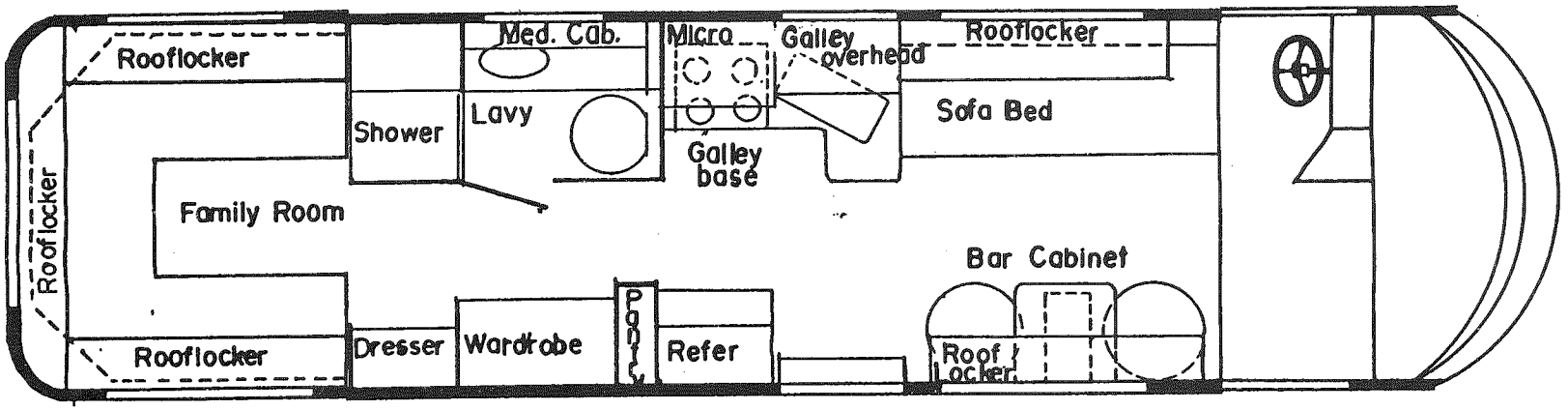
31' - PRINCE

DOUBLE BED

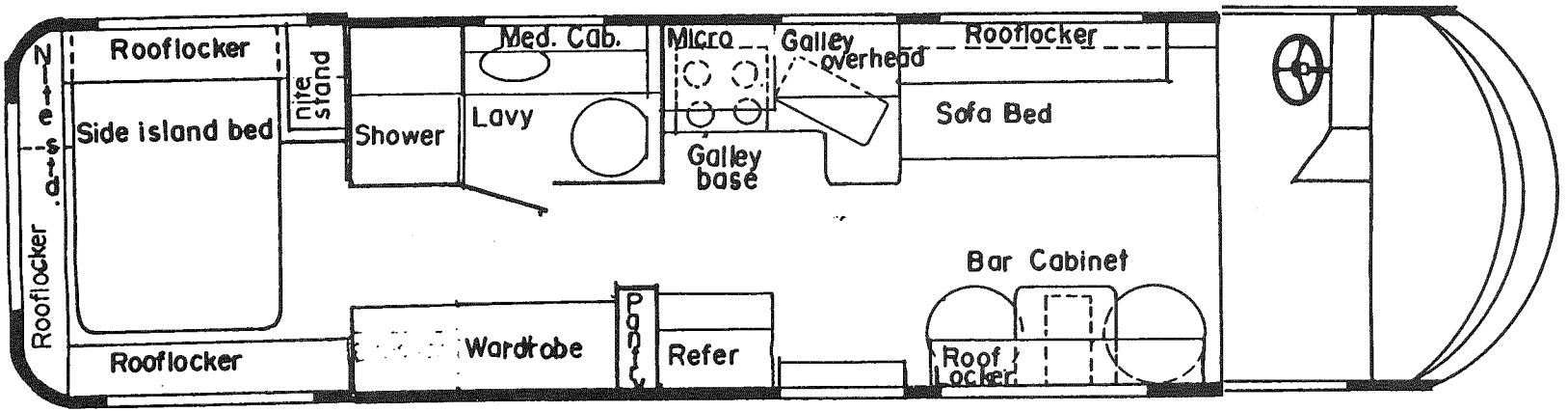
31A



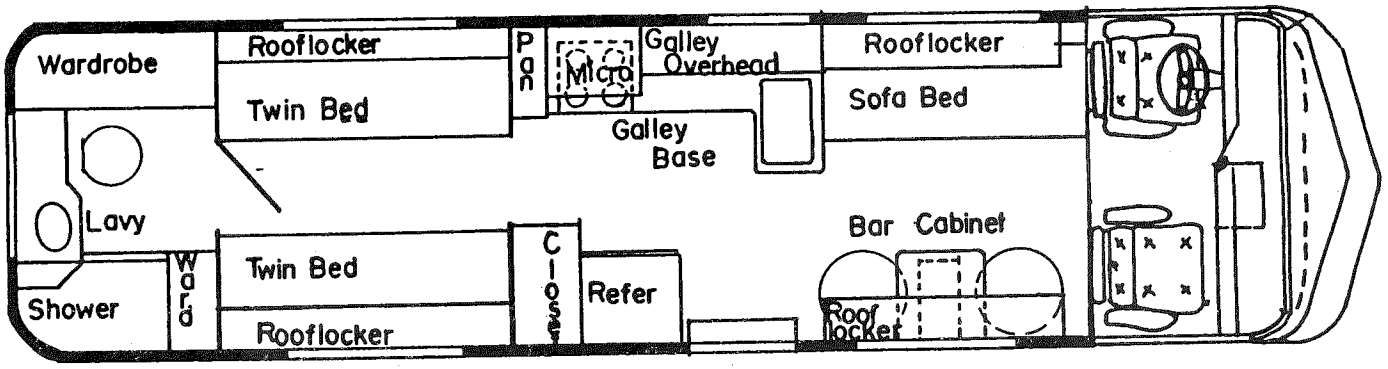
REVCON
31' - PRINCE
TWIN BED
31B



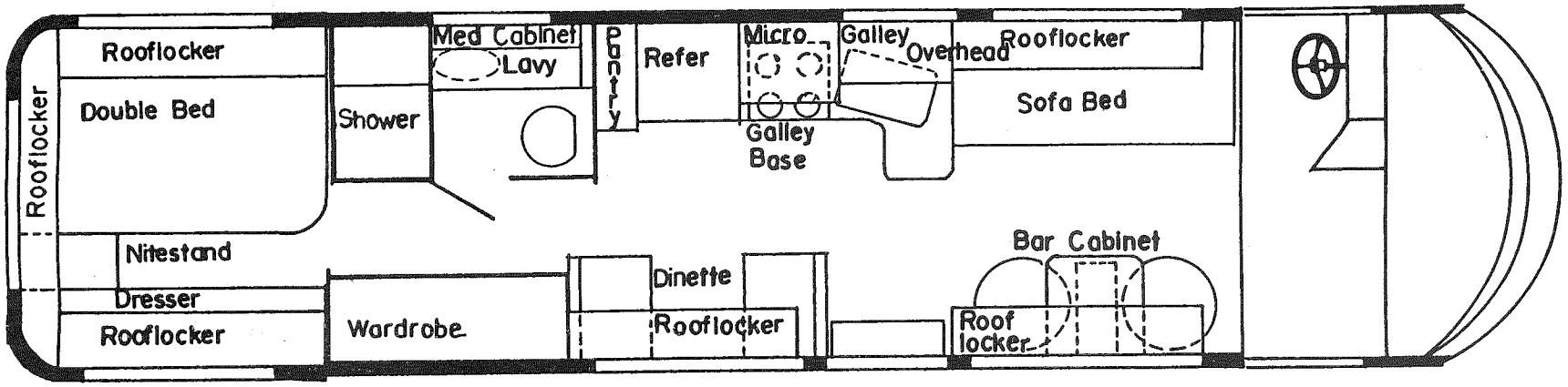
REVCON
31' - PRINCE
FAMILY ROOM
31C



REVCON
31' PRINCE
SIDE ISLAND
31D



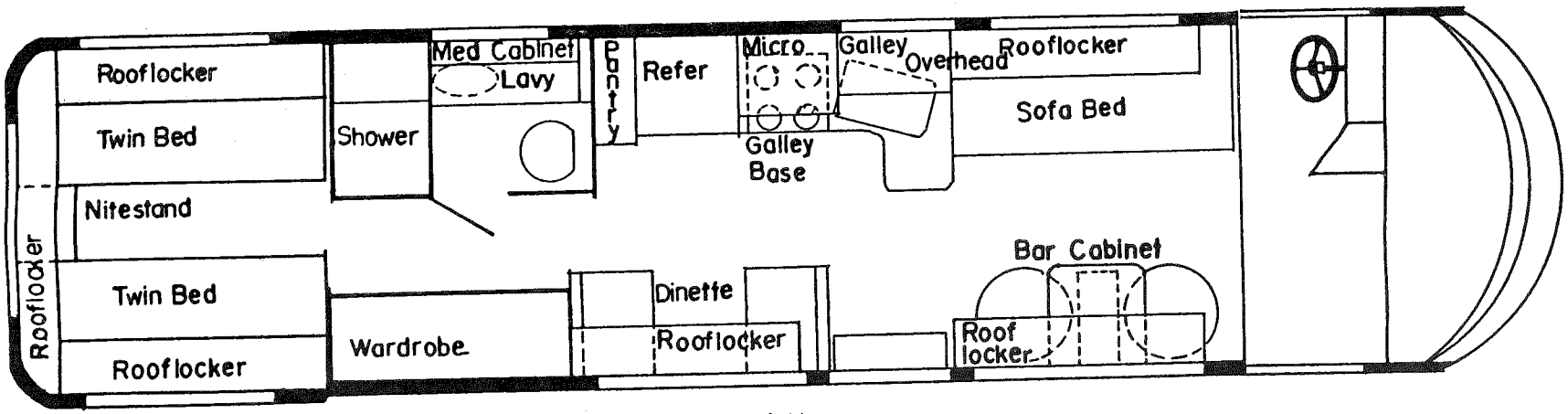
REVCON
31' REAR BATH
31E



REVCON

33' KING-MIDBATH
DOUBLE BED

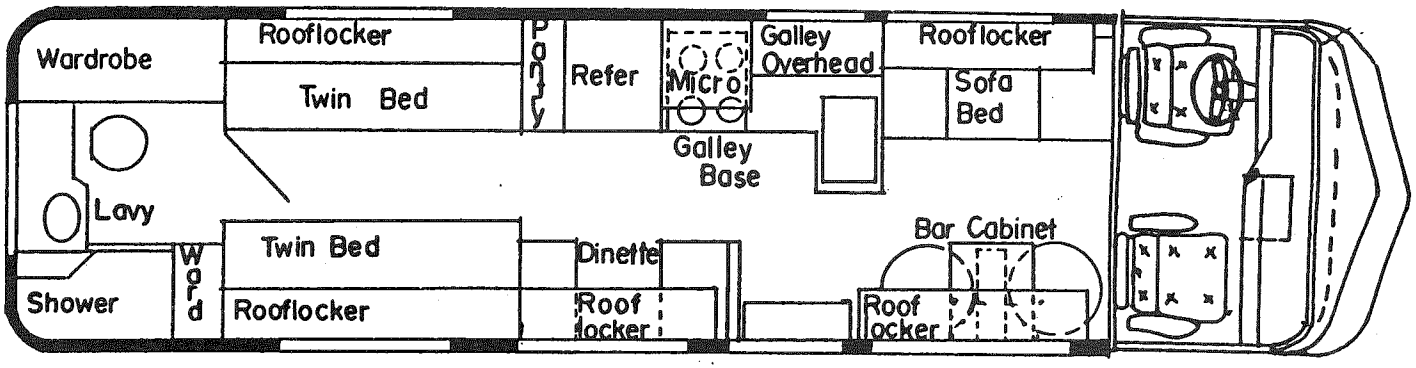
.33A



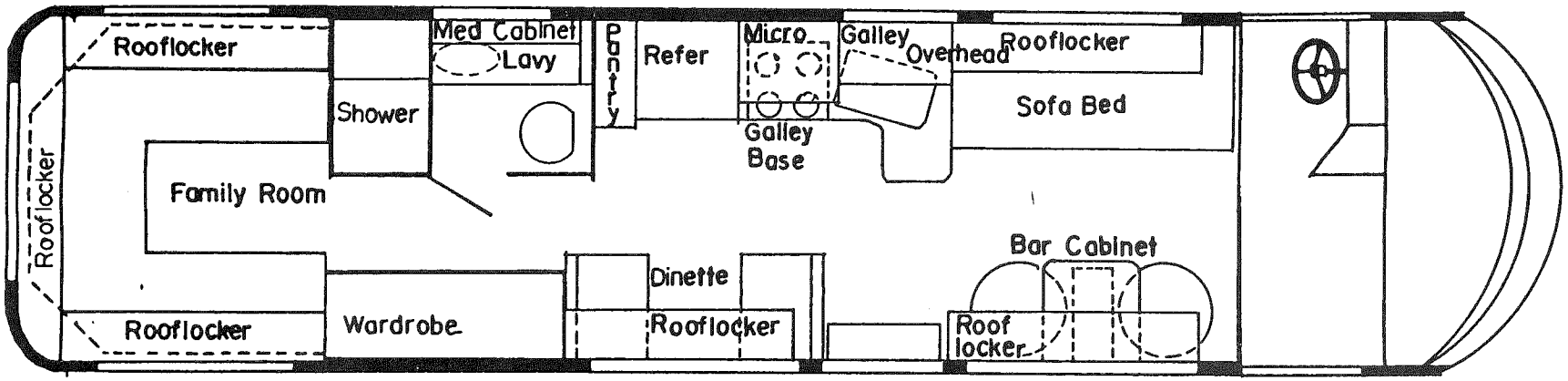
REVCON

33' KING-MIDBATH
TWIN BED

33B



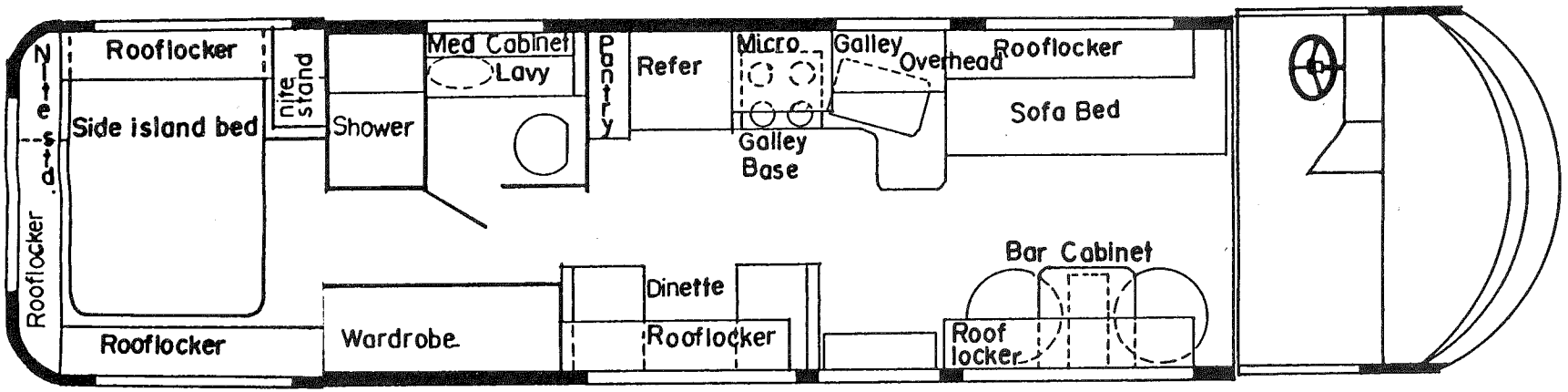
REVCON
33' KING
REAR BATH
33 E



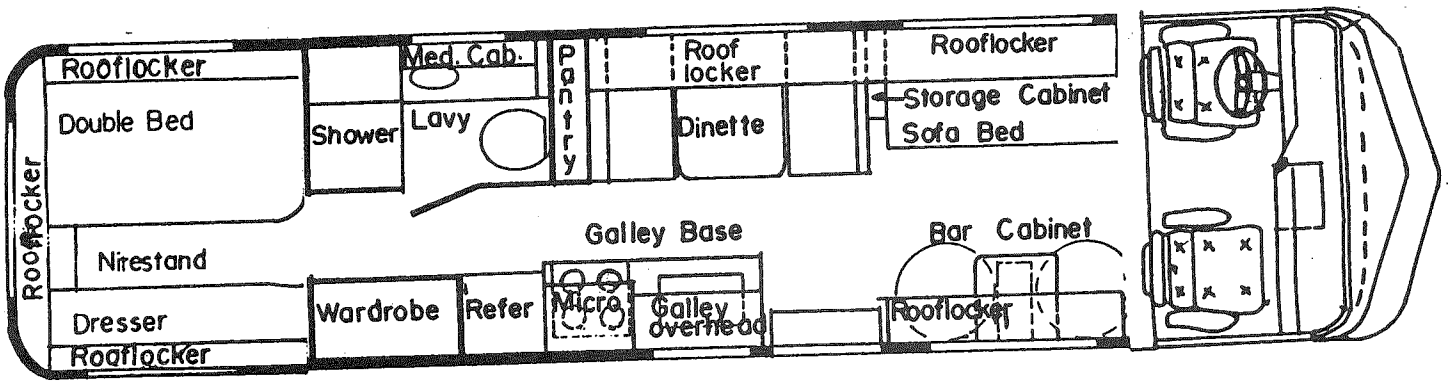
REVCON

33' KING-MIDBATH
FAMILY ROOM

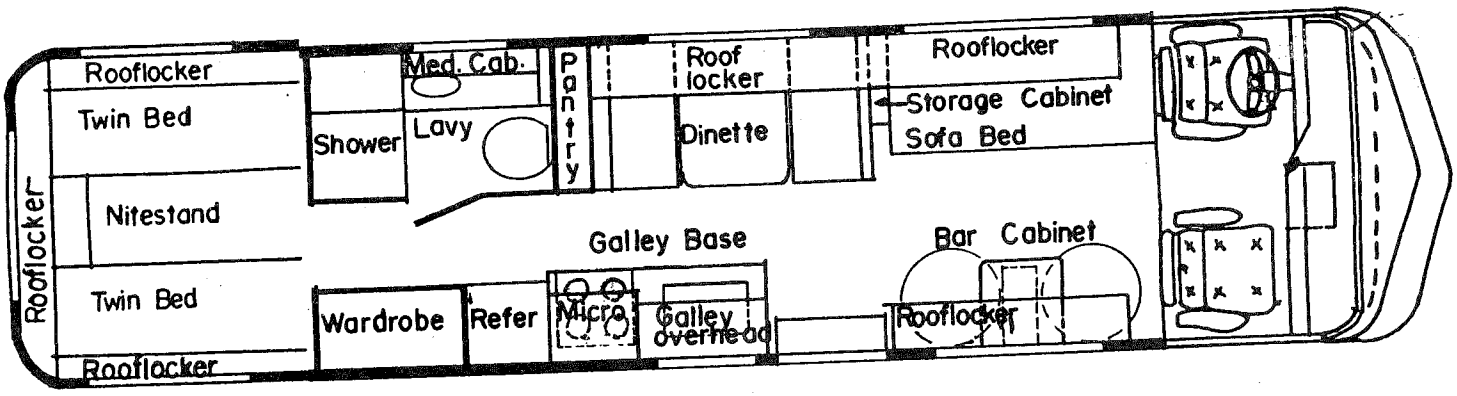
.33C



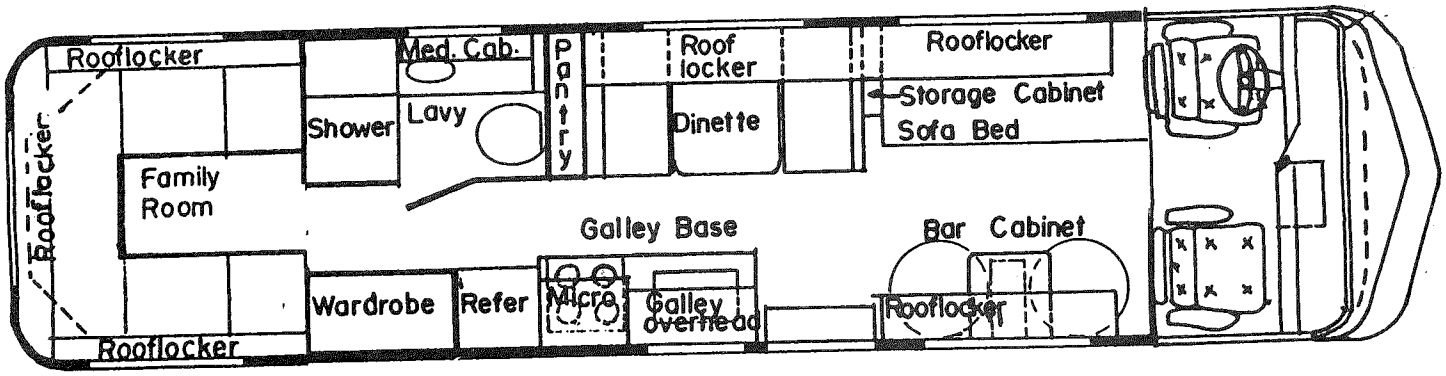
REVCON
33' KING
SIDE ISLAND BED
33D



REVCON
33'DELUXE LOUNGE
DOUBLE BED
DL 33-A



REVCON
33'DELUXE
LOUNGE
TWIN BED
DL33-B

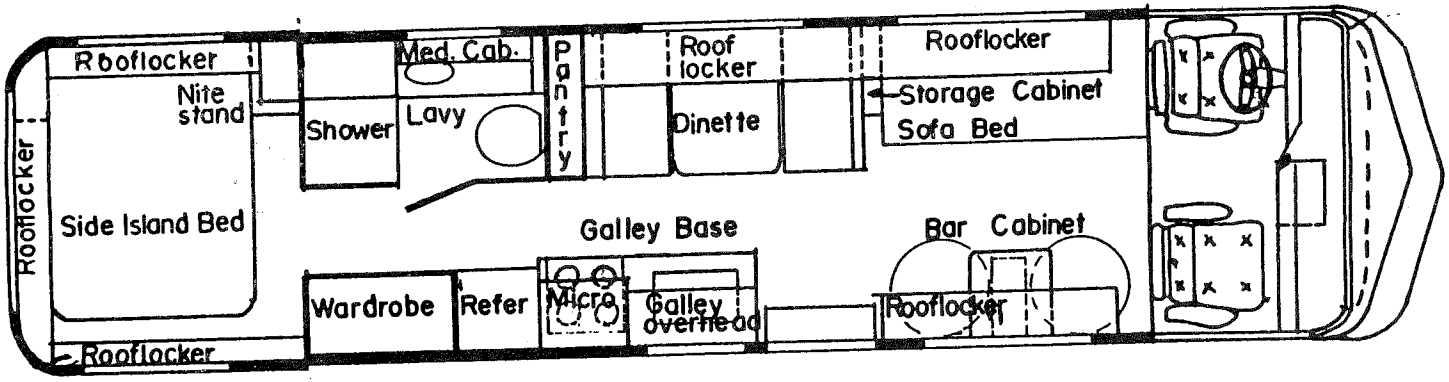


REVCON

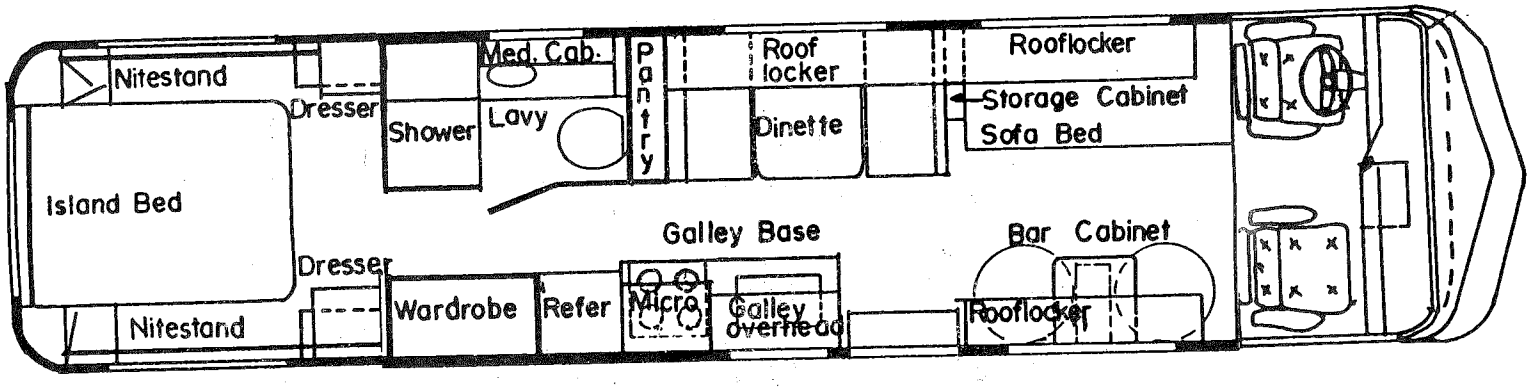
33' DELUXE LOUNGE

FAMILY ROOM

DL33-C



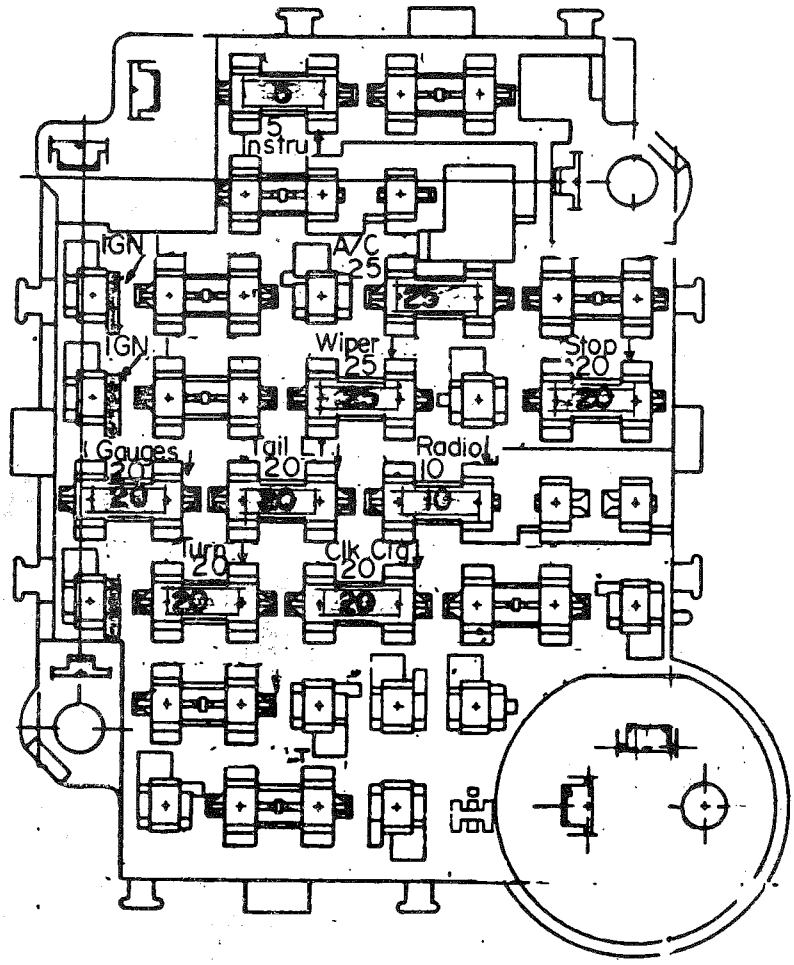
REVCON
33' DELUXE LOUNGE
SIDE ISLAND BED
DL33-D



REVCON
33' ISLAND BED

33KIB

TITLE	ENG./SERVICE	DATE	REV.	SECTION NO.	INDEX
DASH FUSE BLOCK					



REVCON INC.

10870 KALAMA RIVER RD., FOUNTAIN VALLEY, CA. 92708 PHONE (714) 968-3348

REVCON SPECIFICATIONS

DIMENSIONS:	T-28	T-31	T-33
Length Overall	28'	31'	33'7"
Width Overall	95'	95'	95'
Height Overall	101¼"	101¼"	101¼"
Interior Width	91"	91"	91"
Interior Height	77"	77"	77"
Floor Height (Loaded)	22"	22"	22"
First Step Height	12"	12"	12"
Step Riser	10"	10"	10"
Wheel Base	174"	202"	225"
Turning Radius	36'	38'	40'
Front Wheel Tread Width	76"	76"	76"
Rear Wheel Tread Width	80"	80"	80"

CAPACITIES:			
Main Fuel Tank	58 gal	63 gal	63 gal
Auxiliary Fuel Tank		37 gal	37 gal
Fresh Water	50 gal	50 gal	50 gal
Hot Water Heater	10 gal	10 gal	10 gal
Holding Tank - Sewage	20 gal	20 gal	20 gal
Holding Tank - Gray Water	30 gal	30 gal	30 gal
Vehicle Curb Weight (Dry)	12,650	13,000	13,200
Gross Vehicle Weight Rating	14,500	14,500	14,500

SPECIFICATIONS

CHASSIS SPECIFICATIONS:
(Body and Chassis are integral)

REVCONS front wheel drive sub-frame with bolted interface to Revcon Main Frame (integral with body).

CHASSIS: (Main Frame)

Built by Revcon, Inc.
3" x 6" tubular rails electrically welded tool die stamped 14 gauge cross members and outriggers.

CHASSIS DATA:

Wheel Base	Front Tread Width	Rear Tread Width
28' 174"	76"	80"
31' 202"	76"	80"
33' 225"	76"	80"

AXLES:

Front, Capacity 5,000 lbs.
Rear, Capacity 10,000 lbs.

SUSPENSION SYSTEM:

Front: Revcon independent with HD control arms featuring anti-dive, low camber change geometry Torsion bars anti-sway stabilizer bar and heavy duty gas/oil shock absorbers.

Rear: Free rolling tandem axles. Walking Beam with Hendrickson suspension and heavy duty shocks.

WHEELS:

Budd 16.5 dia x 8.25 Rim Width (all)
8 studs on 6.5 dia. bolt circle.
Front and rear and spare tire/wheel are all interchangeable for easy tire rotation in service.

TIRES:

Front and Rear - 10.00 x 16.5 load range D.

BRAKE SYSTEM:

Power assisted by Bendix Hydraboost booster with dual (split) master cylinder to give separate front and rear systems and incorporation a proportioning valve for correct front/rear application.

BRAKES:

REVCON front, disc type 12.25" dia x 1.25" thick, Total front swept area 257.76 sq. inches
Dexter oil filled rear, drum type 12' dia x 3" width.

Total rear swept area = 452.0 sq. inches.
Total swept area of front and rear brakes = 709.76 sq. inches.

STEERING: Heavy Duty integral power assisted steering gear, through a bellcrank and idler arm via tie rods, to wheel ends. Tilt wheels on column.

ENGINE: GASOLINE: GM Chevrolet V8 454 cu. in. displacement, EMISSIONS certified for heavy duty use in California.

H.P.	215 @ 3,400 PPM
Torque	332 ft. lbs. @ 3,400 RPM

DIESEL: Isuzu 6 Cylinder Diesel 353 cu. in displacement.

H.P.	130 @ 3,200 RPM
Torque	289 ft. lbs. @ 2,000 RPM

TRANSMISSIONS: 3 speed turbo hydramatic with transmission oil cooler.

Ratios:	1st gear 2.48 to 1
	2nd gear 1.48 to 1
	3rd gear 1.0 to 1
	Reverse 2.08 to 1

TRANSFER CASE: Morse Borg-Warner (with 1:1.11) ratio.

FINAL DRIVE: Dana Model: 70 Axle, with 3.73: 1 ratio.

NOTE: With engine and trans in high gear, final ratio is 3.35.

FUEL TANK: Certified to CA Air Resources Board for Emissions Compliance.

RADIATOR: Heavy duty. Cross flow, with integral engine and transmission intercoolers.

ELECTRICAL SYSTEM: 12 Volt negative ground systems.
Wiring: Heavy duty, all wiring is modern vinyl insulated stranded copper, run in loom or as cable to prevent chafing. Combination circuit breaker system and fuse system.

ALTERNATOR: 60 AMP (as supplied with GM engine)

BATTERIES: Automotive: Long Life 90 AMP Delco Freedom maintenance free.

Coach: Dual 6 Volt golf cart batteries producing a 12 Volt system of 180 AMPS.

GENERATOR: 6,500 watt Onan on slide out tray.

FIXTURES: 110 and 12 volt lighting fixtures.

INSTRUMENTS: Non glare reflective. Includes the following:

A. Speedometer
B. Odometer
C. Fuel Gauge
D. Water Temperature Gauge
E. Ampere Gauge
F. Oil Pressure Gauge
G. Vacuum Gauge

WARNING SYSTEMS INCLUDE:

A. Parking Brake Warning Light
B. Brake Failure Sentinel Light
C. Turn Signal Indicators
D. High Beam Indicators
E. Emergency Flashers

BODY SPECIFICATIONS:

BODY SHELL: Monocoque riveted aircraft aluminum structure.

FRAME AND STRINGERS: Heat-treated, stretch-formed aluminum (.075" 6063)

INSULATION: 2" high density, temperature resistant, made of fiberglass, impervious to flame, vermin or settling.

WEATHER PROOFING: All Joints are sealed with non-hardening waterproof caulking.

FLOOR: 3/4" exterior 5 ply fir, grade A-C. Sealed and waterproofed on the bottom and edges.

EXTERIOR SKIN: Heat-treated, high-tensil strength, load bearing aircraft aluminum.

WHEEL WELLS: Rear wheel wells are fiberglass reinforced formed panels.

EXTERIOR FINISH: Epoxy Acrylic Enamel.

EXTERIOR TRIM: Polished, anodized aluminum, stainless steel and chrome.

SEATS:

DRIVER SEAT: A custom engineered and built driver seat is optional. Also a passenger seat to match is optional.

HEATING SYSTEM:	Automotive type rated at 16,000 BTU's dual speed fan.
BUMPERS:	Front and rear wrap-around bumpers at 20" height.
WINDSHIELD:	1/4 laminated safety plate glass meeting SAE standards.
WINDSHIELD WIPERS:	Two (2) heavy duty variable speed synchronized electric windshield wipers.
WINDOWS:	Sliding, tinted safety glass anodized aluminum frames with removable screens.
DOORS:	All flush to the exterior. Main entry of contoured aluminum with flush lock and handle to federal safety specifications.
ENGINE SERVICE ACCESS:	There is a service hatch over the engine, next to driver that is detachable for engine service and a front engine access hood for checking fluid levels and minor service items.
HORN:	Dual 12 volt, circuit breaker protected.
EXTERIOR LIGHTING:	Includes headlights, clearance lights, tail lights, stop lights, marker lights, back up lights, emergency flashers, turn signal lights and reflectors.
MIRRORS:	All mirrors meet federal and SAE specifications A convex high visability mirror for additional safety.