Section 1
CHASSIS

INSTRUMENT PANEL

For removal and replacement of speedometer, gages, ammeter, ignition switch, panel lights, refer to Dodge or Chevrolet service manuals.

INSTRUMENT CLUSTER ASSEMBLY

Instrument cluster assembly is installed as a complete assembly. Assembly can be removed by disconnecting wires and speedometer cable from rear of cluster and removing fasteners attaching cluster to instrument panel. For removal and replacement of cluster components, refer to chassis manufacturer's service manuals.

FUEL TANKS

FUEL TANKS

Refer to Figures 1-1 and 1-2.

Removal

1. Disconnect battery ground cable.
2. Remove pressure-vacuum filler cap prior to moving or installing any fuel or vent lines. Tank could be under very slight pressure.
3. Pump all fuel from fuel tank into an approved portable holding tank. If this equipment is not available, disconnect fuel line from the inlet side of the fuel pump and connect a siphon hose to it. Drain fuel tank dry into a properly identified "Gasoline" safety container.
4. Disconnect fuel tank gauge unit wire (if so equipped).
5. Disconnect hose from ECS dome (if so equipped.
6. Disconnect fuel line.
7. Disconnect and remove filler neck extension.
8. Remove support strap nuts and studs. Remove tank from brackets.
9. Remove fuel tank gauge unit.

Installation

1. Install fuel tank gauge unit.
2. Position tank in brackets, install support strap, studs, and nuts.
3. Connect fuel line.
4. Connect hose to ECS dome (if so equipped).
5. Reinstall filler neck extension.
6. Connect gauge wire (if so equipped).
7. Connect fuel line to fuel pump if removed.
8. Fill tank and inspect for leaks. If no leaks, connect battery cable.

NOTE: **For removal and installation of auxiliary fuel tanks see Section 7 or manufacturer's literature.**

4-WHEEL DRIVE SYSTEM

The 4-wheel drive system on this vehicle was designed and installed by Champion Motor Home Division, 5573 E. North Street, Dryden, Michigan 48428.
Refer to Figure 1-3.

The safe and reliable operation of this vehicle depends on proper repair procedures. This service section describes the recommended methods for removal and installation of the 4-wheel drive system when repairs are required. Use of procedures other than those recommended in this service section could be detrimental to the vehicles safe operation as well as the safety of the person or persons servicing the vehicle.

The front driving axle is mounted on a yoke assembly. This assembly in turn is mounted to a power train mounting frame. Some service operations or replacement parts on such components as axle shaft, outer drive assemblies, wheel bearings, oil seals, universal joints or brake components can be made without complete removal of the front axle and yoke assembly. However,

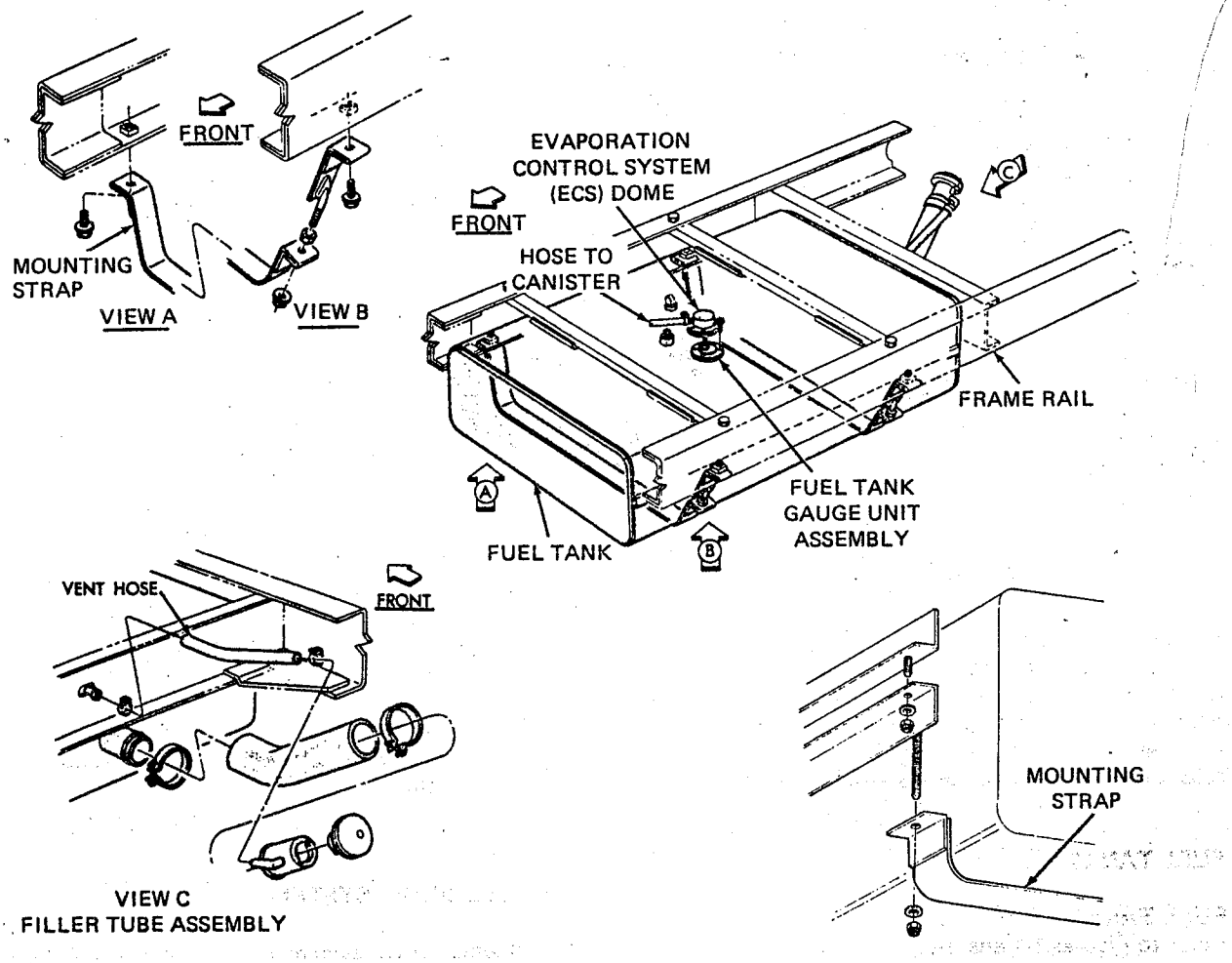


FIGURE 1-1 Auxiliary fuel tank mounting

it is recommended that this assembly be removed when major disassembly and inspection in connection with any major repairs is required.

When the transmission and transfer case must be removed for service, the front axle and yoke assembly must be removed from the power train mounting frame. When the engine must be removed, the front axle and the power train mounting frame must be removed from the chassis frame.

The following procedure is for the removal and replacement of the 4-wheel drive front axle and yoke assembly and for the removal of the power train mounting frame and the engine and power train assembly.

NOTE: Refer to illustration (Figures 1-4 through 1-9).

For information on the repair and service of other components such as axle, wheels, brakes, engine and power train, refer to the Dodge Ram Charger Service Manual available from Chrysler Corporation, Service Department, P.O. Box 40, Detroit, Michigan, 48231.

A. REMOVAL OF FRONT AXLE AND YOKE ASSEMBLY

1. Raise front end of vehicle from floor, with mechanical or hydraulic jacks placed under the chassis frame. Jacks must be placed in suitable jack stands. For added protection place blocks under frame near jacks.
2. Leave the wheels and tires on the axle. This will facilitate later removal of the front axle and yoke assembly.

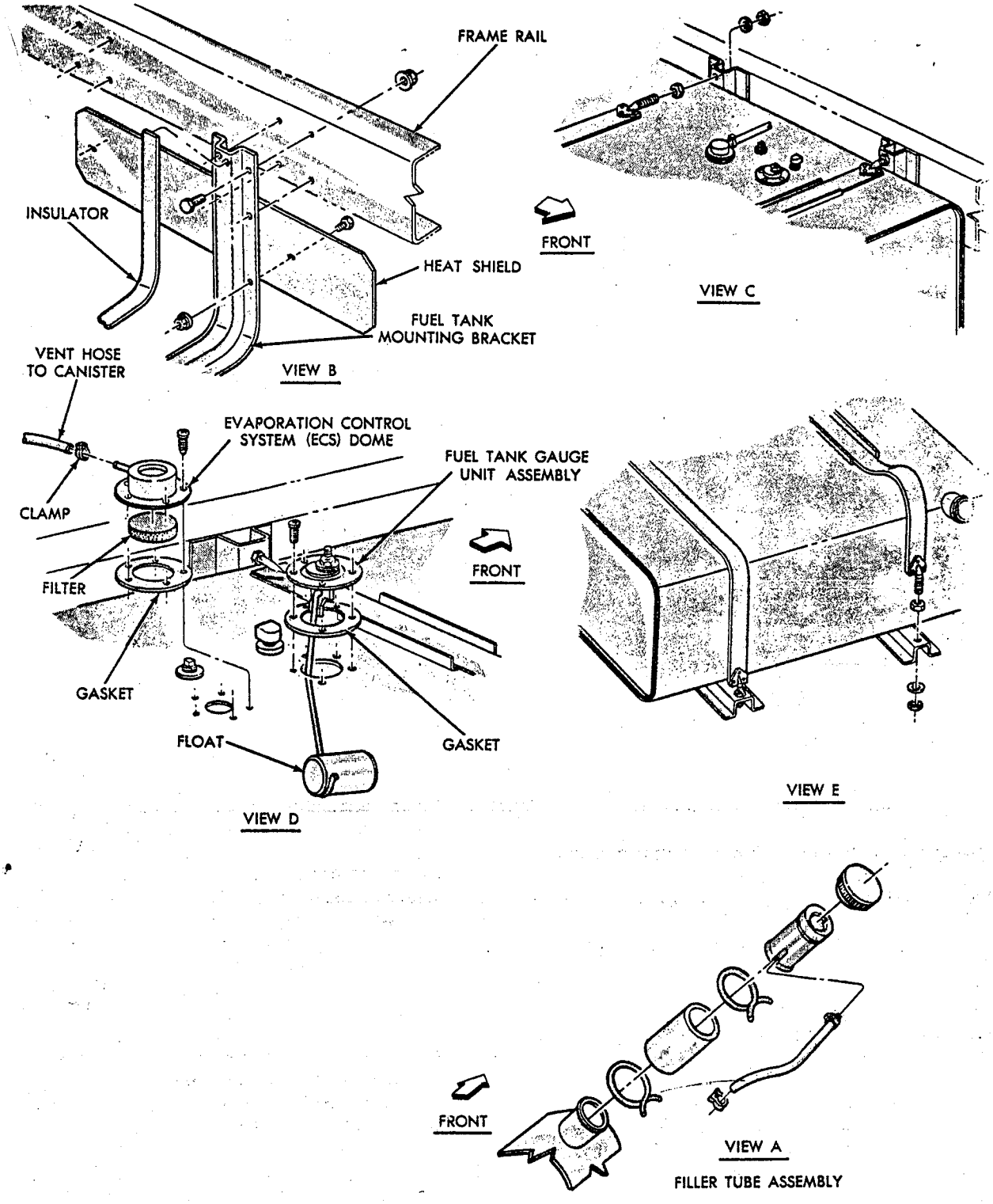
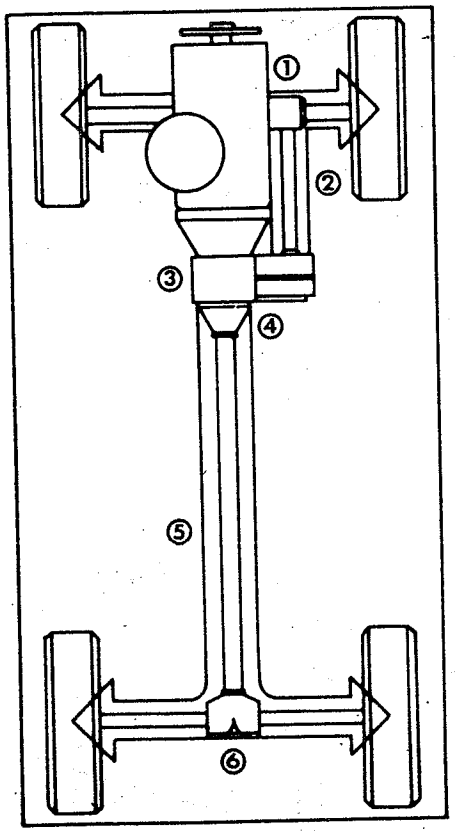


FIGURE 1-2 Filler tube assembly



1 **The Front end differential** varies the amount of power to each front wheel to prevent wheel drag and tire wear.

2 **The front axle drive shaft** carries the power from the inter-axle differential to the front axle.

3 **The transfer case** directs power to both front and rear axles for better traction.

4 **The inter-axle differential** equalizes the driving power to both front and rear axles, allowing their respective wheels to travel at different speeds for added performance under varying conditions.

5 **The rear axle drive shaft** carries the power from the inter-axle differential to the rear axle.

6 **The rear axle differential** varies the amount of power to each rear wheel to prevent wheel drag and tire wear.

FIGURE 1-3 4-Wheel drive top view

3. Place a floor type jack under and in contact with the front axle differential case.
4. Disassemble and remove front drive shaft from differential case and transfer case by disconnecting universal joints. (Refer to Dodge Service Manual).
5. Disconnect and drain front brake lines from brake cylinders.
6. Disconnect shock absorbers.
7. Disconnect the lower spring clips that hold the coil springs to the axle.
8. Disconnect track bar bolts and remove track bar.
9. Remove steering drag link from steering arm.
10. Lower front wheels to floor and remove jacks.
11. Entire front axle and yoke assembly can now be removed by rolling from under van on front wheels.
12. Reassemble in reverse order.

NOTE: When reassembling check all parts for wear and replace worn parts where necessary.

NOTE: When replacing brake hoses care must be taken to insure that the hose does not contact any frame, suspension or wheel component when wheels are in full jounce, rebound or full right and left turns. This can be checked with the coil spring removed and with shock absorbers installed in place.

NOTE For spare parts information on shock absorbers, track and yoke bushings and other front yoke assembly components contact Champion Motor Home Division.

NOTE: For all axle, wheels, brake, etc. servicing work refer to Dodge Ram Charger Service Manual.

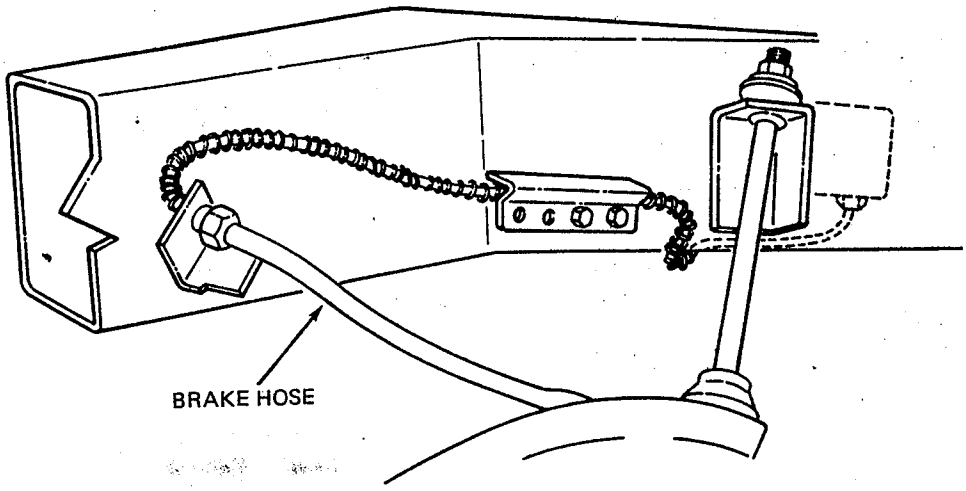


FIGURE 1-4 4-Wheel drive brake hose

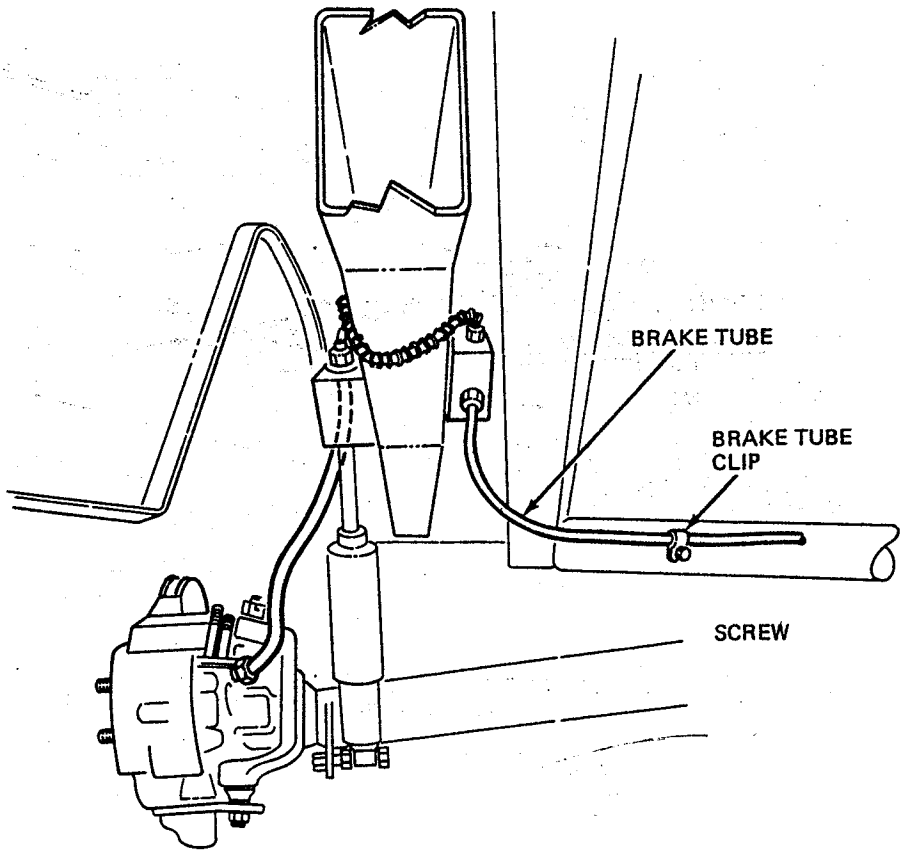


FIGURE 1-5 Brake tube (4 wheel drive)

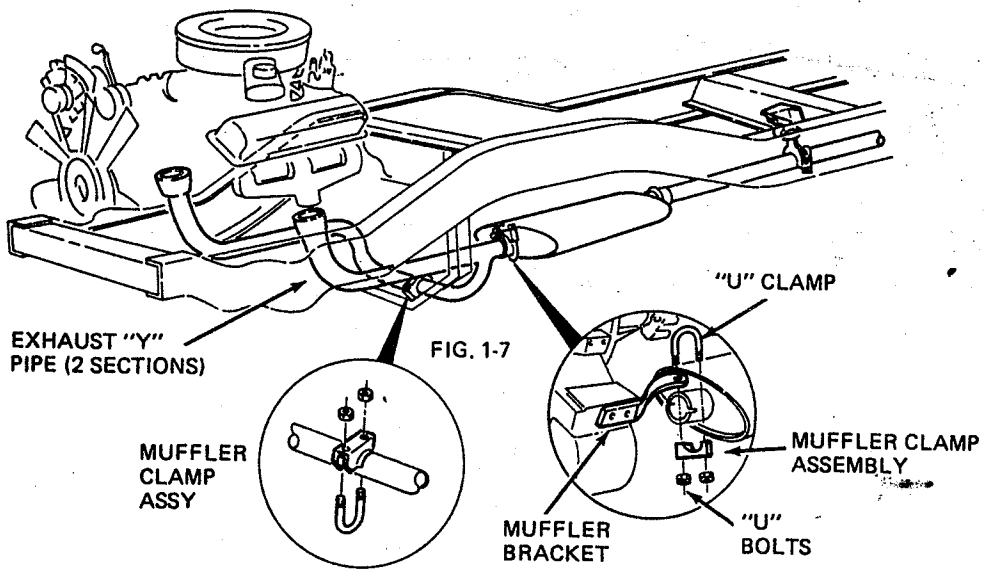


FIGURE 1-6 Muffler and "Y" pipe assembly

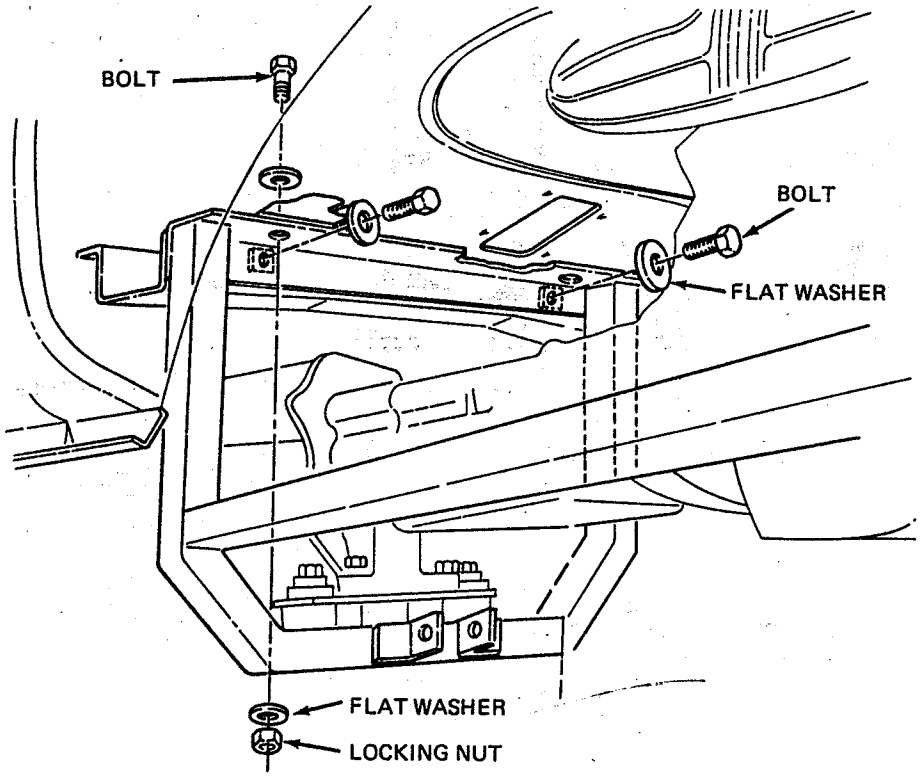
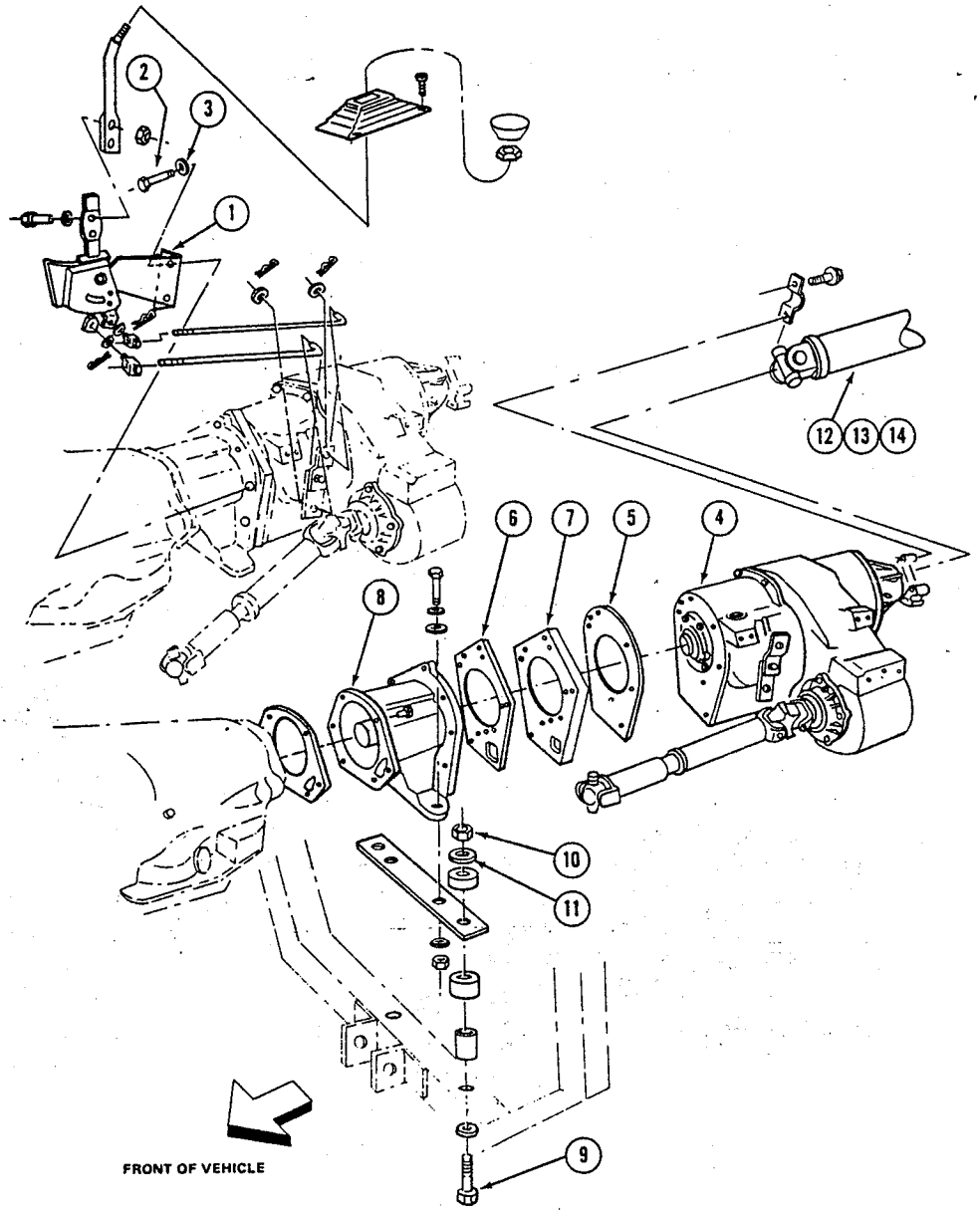
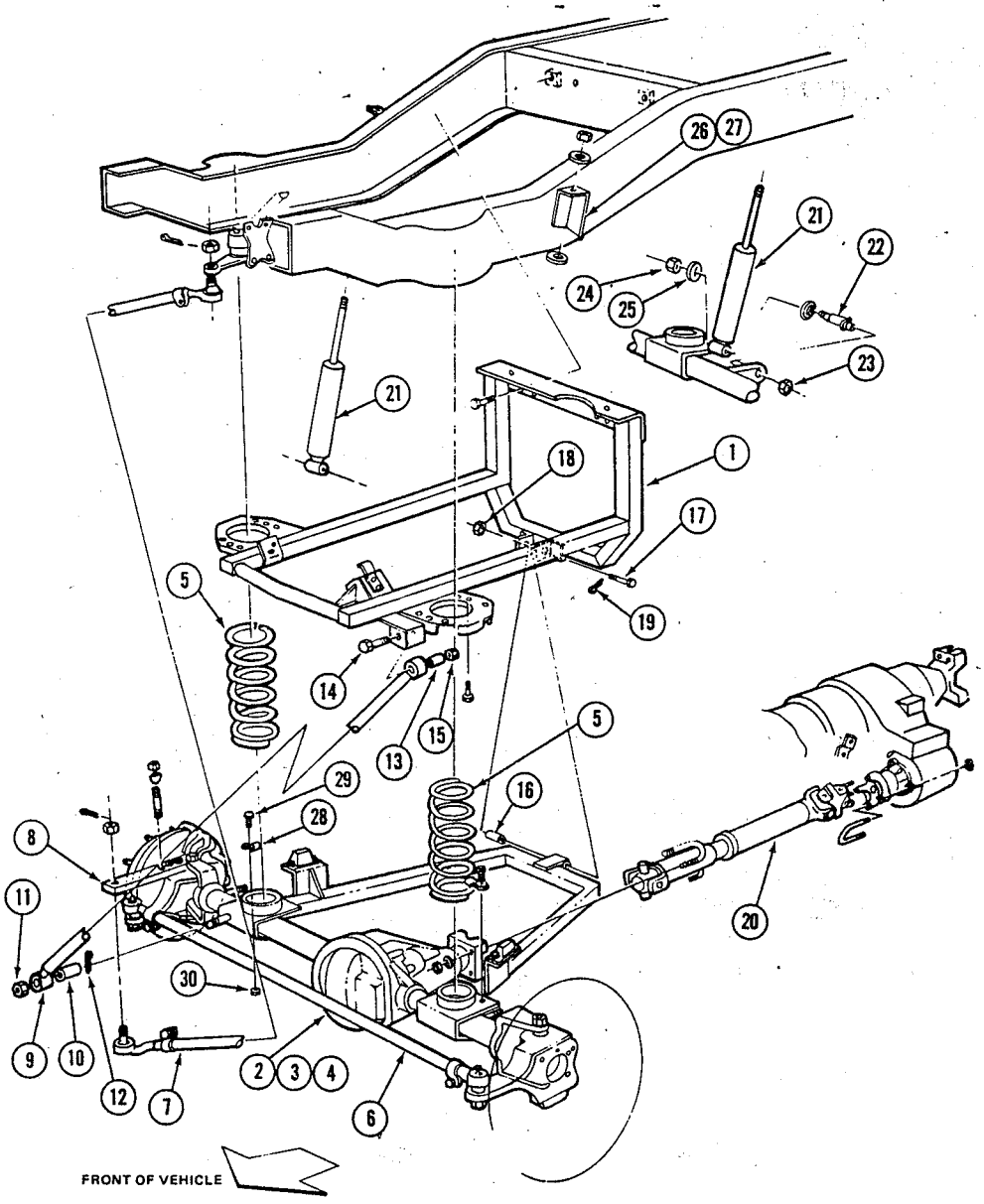


FIGURE 1-7 Power train mounting frame



ITEM NO.	DESCRIPTION	QUANTITY
1	SHIFTER ASS'Y	1
2	BOLT 3/8"-16x1-1/4"	2
3	FLAT WASHER - 3/8"	2
4	TRANSFER CASE ASS'Y N.P.G.203	1
5	GASKET - TRANSFER CASE	1
6	GASKET - ADAPTER	1
7	ADAPTER PLATE	1
8	ADAPTER HOUSING	1
9	BOLT 5/8"	2
10	NUT 5/8" - 18 LOCKING	2
11	FLAT WASHER 5/8"	2
12	DRIVE SHAFT (B-1, B-2, B-3, 109"W.B.)	1
13	DRIVE SHAFT (B-1, B-2, 127"W.B.)	1
14	DRIVE SHAFT (B-3 127"W.B.)	1

FIGURE 1-8 Power train



ITEM NO.	DESCRIPTION	QUANTITY	ITEM NO.	DESCRIPTION	QUANTITY
1	POWER TRAIN MOUNTING FRAME	1	16	BUSHING - YOKE	1
2	FRONT AXLE ASS'Y. (B-1, B-2, 3.2:1 Ratio)	1	17	BOLT 3/4" - 16 x 4.00"	1
3	FRONT AXLE ASS'Y (B-3 3.5 Ratio)	1	18	NUT 3/4" - 16 CASTLE	1
4	FRONT AXLE ASS'Y (B-3 4.1 Ratio)	1	19	COTTER KEY 1/8 x 1-1/2"	1
5	COIL SPRING	2	20	DRIVE SHAFT - FRONT	1
6	TIE ROD ASS'Y	1	21	SHOCK ABSORBER - FRONT	2
7	DRAG LINK	1	22	STUD - SHOCK MOUNTING	2
8	STEERING ARM	1	23	NUT 3/4" - 16 LOCKING	2
9	TRACK BAR	1	24	NUT 1/2" - 20 LOCKING	2
10	BUSHING - AXLE	1	25	FLAT WASHER 1/2"	2
11	NUT 3/4" - 16 CASTLE	1	26	SHOCK MOUNT - UPPER L.H.	1
12	COTTER KEY 1/8" x 1-1/2"	1	27	SHOCK MOUNT - UPPER R.H.	1
13	BUSHING - FRAME	1	28	CLAMP - COIL SPRING	2
14	BOLT - 5/8" 18 x 3.00"	1	29	BOLT 1/4" - 20 x 1.00"	2
15	NUT 5/8" - 18 LOCKING	1	30	NUT 1/4" - 20 - LOCKING	2

FIGURE 1-9 4 wheel drive, front drive train

B. REMOVAL OF ENGINE AND POWER TRAIN

1. Remove front axle and yoke assembly as described in Section A.
2. Raise vehicle a minimum of 36-in. above floor. Make sure vehicle is securely held in this position.
3. Disconnect all engine attachments including: exhaust system, radiator and fan shroud assembly, speedometer cables, fuel lines, etc. (Refer to Dodge Service Manual).
4. Remove rear drive shaft by disconnecting universal joints. (Refer to Dodge Service Manual.)
5. Remove 4-wheel drive shaft linkage mechanism. (Refer to Dodge Service Manual).
6. Place suitable jack type lowering mechanism in contact with engine and transmission assembly.
7. Remove 4 bolts on each side of cross member plate of the power train mounting frame.
8. Remove 4 bolts from rear cross member of power train mounting frame.
9. Lower power train mounting frame containing engine and transmission assemblies to floor with jack.
10. Reassemble in reverse order.

NOTE: **When reassembling check all parts for wear and replace worn parts where necessary.**

NOTE: **After installation make sure to bleed all brake lines, align front end, adjust shift linkage, and fill engine, transmission and transfer case and differential with correct type and amount of lubricant. (Refer to Dodge Service Manual).**

GENERAL MAINTENANCE

COOLING SYSTEM

Conventional and Coolant Reserve:
Every 12 months or 12,000 miles (19,000 km) inspect the entire cooling system for leaks.

Maintain coolant level in reserve tank between the maintain fluid level marks with engine idling at normal operating temperature. Add coolant only through reserve tank. Be sure reserve tank hose is always immersed in coolant. Insure that overflow hose from reserve tank is not kinked or twisted.

WARNING: **Use caution in removing the radiator cap to avoid contact with hot coolant or steam! Place a cloth over the cap, turn left to first stop, pause to allow any pressure to release through overflow tube, than press down and turn left to remove cap.**

Check radiator cap for proper vacuum sealing and operation.

Check face of radiator for any accumulation of bugs, leaves, or other foreign matter.

Check reserve tank tube (if so equipped) for condition and tightness of connections at reserve tank and radiator.

Check anti-freeze coolant. If below 44% (-20°F.; -29°C.), add anti-freeze to bring concentration to 50% or more but not to exceed 70%. Maintain concentration at a minimum of 50% but not more than 70% for year-round protection against corrosion, boiling, or freezing. If coolant is rusty or dirty, discard and refill as recommended.

NOTE: **Failure to follow the anti-freeze concentration recommendations and annual replacement or failure to use anti-freeze formulated to prevent corrosion of all cooling system metals may result in radiator plugging and consequent engine overheating or in cooling system leaks such as in core hole plugs and consequent loss of coolant. Do not use plain water or alcohol-based anti-freeze products.**

DRIVE BELTS

Inspect all drive belts for evidence of cuts and cracks and replace if necessary. Check routing to make sure that there is no interference between the belts and other engine components. Check belts for proper tension and adjust, if necessary, according to the procedure and specifications outlined in the appropriate manufacturer's Service Manual.

RUBBER AND PLASTIC COMPONENTS – EMISSION HOSES

At the intervals specified, inspect hoses for evidence of heat or mechanical damage. Hard and brittle rubber, cracking, checking, tears, cuts, abrasions, and excessive swelling indicate deterioration of the rubber. Particular attention should be paid to examining those hose surfaces nearest to high heat sources, such as the exhaust manifold.

Inspect hose routing to insure hoses do not come into contact with any heat source or moving component which will cause heat damage or mechanical wear.

CAUTION: **Hoses should be replaced immediately if there is any evidence of degradation that could result in failure.**

WHEEL STUD NUTS, SPRING CLIP NUTS, & STEERING LINKAGE NUTS

Every 6,000 miles (9,600 km) or every 6 months, check torque on wheel stud nuts, spring clip nuts, and steering linkage nuts. Retighten to manufacturers specifications if necessary.

STORAGE RECOMMENDATIONS

Motor Homes should be driven a minimum of 25 highway miles per month after the engine has reached normal operating temperatures to protect against the accumulation of condensation and the formation of rust on internal engine components such as cylinder bores. Maintain the fuel level in the main gas tank at 3/4 to full, to reduce the possibility of gasoline deterioration which could cause starting problems. If driving the vehicle is impossible or inconvenient, refer to the storage procedure. Normal maintenance services should be conducted at the time or mileage intervals specified.

STORAGE FOR 1-3 MONTHS

Vehicles inoperative for 1-3 months require the following maintenance:

Add one quart of special rust preventative oil, for each five gallons of gasoline in the fuel tank. Run the engine until normal operating temperature is reached.

Remove spark plugs and pour 2 ounces of special rust preventative oil into each cylinder through the plug opening. Crank the engine. Replace plugs and tighten to 30 foot pounds.

Check cooling system for leaks and proper anti-freeze protection.

STORAGE FOR MORE THAN 3 MONTHS

Vehicles inoperative for more than 3 months require the following maintenance in addition to those described previously.

Drain fuel tank and operate engine until carburetor runs dry. Follow step one in 1-3 month storage. Place the vehicle on blocks or jackstand to remove weight from tires. Inflate tires to recommended pressure.

Check the transmission, rear axle, and steering system for proper lubricant level.

Disconnect battery cables. Clean and coat cable terminals with grease. Remove battery and store at room temperature to prevent freeze damage and keep battery at a full charge to prevent sulphation.

WHEELS AND TIRES

GENERAL INFORMATION

Motor Home vehicle wheels, rims and tires are designed to give maximum durability and performance when maintained properly.

Since tires as specified in this manual require special tools for proper stud tightening, operators are advised to change tires themselves only when proper facilities are not immediately available.

Proper wheel/tire balance and front end alignment must be maintained for extended tire life.

Inflation pressures as associated with tire sizes are specified in the tire charts.

THE TIRE-PRESSURE INFLATION CHART

TIRES USED AS SINGLES	30 psi	35 psi	40 psi	45 psi	50 psi	55 psi	60 psi	65 psi	70 psi	75 psi
E-78-14 Lt Load Range D	1140	1240	1340	1440	1530	1620	1710			
7.50-16 Lt Load Range D	1620	1770	1930	2060	2190	2310	2440			
8.00-16.5 Lt Load Range C	1380	1490	1610	1730						
8.00-16.5 Lt Load Range D	1380	1490	1610	1730	1840	1945	2045			
8.00-16.5 Lt Load Range E	1360	1490	1610	1730	1840	1945	2045	2145	2240	2330
8.75-16.5 Lt Load Range D	1570	1720	1850	1990	2110	2240	2350			
8.75-16.5 Lt Load Range E	1570	1720	1850	1990	2110	2240	2350	2470	2570	2680
9-17.5 Lt Load Range C	1640	1780	1940	2075						
9-17.5 Lt Load Range D	1640	1780	1940	2075	2205	2335	2455			
9-19.5 Load Range D					2110	2270	2410	2540	2680	2800
9R19.5 Load Range F						2110	2270	2410	2540	2680
				80 psi	85 psi	90 psi	95 psi	100 psi	105 psi	110 psi
9R19.5 Load Range F –Cont.				2800	2930	3060	3170	3280	3400	3500

TIRES USED AS DUALS	30 psi	35 psi	40 psi	45 psi	50 psi	55 psi	60 psi	65 psi	70 psi	75 psi
7.50-16 Lt Load Range D	1430	1565	1690	1815	1930	2040	2140			
8.00-16.5 Lt Load Range C	1195	1310	1415	1520						
8.00-16.5 Lt Load Range D	1195	1310	1415	1520	1620	1710	1800			
8.00-16.5 Lt Load Range E	1195	1310	1415	1520	1620	1710	1800	1885	1970	2050
8.75-16.5 Lt Load Range D	1380	1515	1630	1750	1855	1970	2070			
8.75-16.5 Lt Load Range E	1380	1515	1630	1750	1855	1970	2070	2175	2260	2360
9-17.5 Lt Load Range C	1445	1575	1700	1820						
9.17.5 Lt Load Range D	1445	1575	1700	1820	1935	2050	2155			
9-19.5 Load Range D			1850	1990	2110	2230	2350	2480		
9R19.5 Load Range F				1850	1990	2110	2230	2350	2480	2570
						80 psi	85 psi	90 psi	95 psi	100 psi
9R19.5 Load Range F –Cont.						2680	2780	2880	2980	3070

TIRES USED AS SINGLES	24 psi	26 psi	28 psi	30 psi	32 psi	34 psi	36 psi
7.50-14 Load Range C *	1280	1340	1390	1450	1500	1550	1600

* PLEASE NOTE SPECIAL INFLATION PRESSURE FOR THIS TIRE.

To maintain the quality of rims and wheels with which Motor Home chassis are equipped, a continuous inspection program is recommended. These procedures should be carried out both during routine tire inspection and at the time of tire change.

ROTATION OF TIRES (CONVENTIONAL)

When all tires on the vehicle are of the same size and type, it is recommended that under normal operating conditions rotation occur no later than every second oil change. Tire inspection at every oil change is recommended and should irregular tread wear be evident, rotation is suggested at that time. Be sure to always adjust tire pressure properly after rotation. Proper tire rotation at the recommended intervals reduces the possibility of tire noise and equalizes tire wear.

Figure 1-10 for similar size tires indicates the recommended sequence for rotation. Under conditions of severe service as in trailer towing, tires should be rotated more frequently.

ROTATION OF TIRES (RADIAL)

Rotation is recommended only when abnormal wear appears and all the tires on the vehicle are of the same size and type. If irregular wear becomes apparent the tires should be rotated.

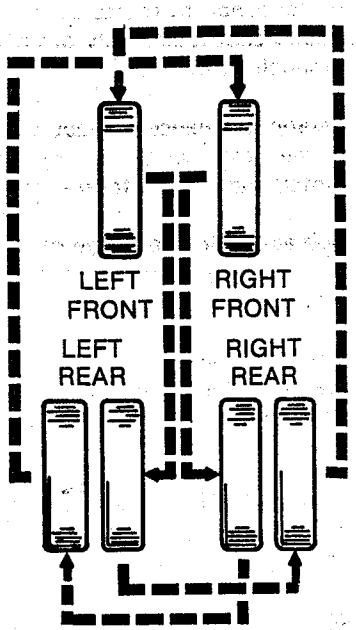


FIGURE 1-10 Tire rotation diagram (conventional)

Figure 1-11 indicates the recommended sequence for rotation. Tires should be kept rotating in the same direction on the vehicle.

TIRE WEAR PATTERNS

An inspection of the tires, together with information as to locality of vehicle operation will usually indicate abnormal wear due to operating conditions or mechanical faults and should be corrected. Various types of abnormal tire wear with their causes and corrective actions are shown in Figure 1-12.

UNDERINFLATION

For the maximum results in stability and handling, ride quality and tire life, tire inflation pressures should not be allowed to go below the recommended inflation pressures. Underinflation results in much faster wear of the shoulders than the center of tread.

OVERINFLATION

By maintaining specified tire inflation pressure, even wear will take place over the entire road surface. Overinflation causes faster wear at the center of the tread and the possibility of cuts and punctures.

CRACKED TREADS

This is the result of alternate under and over inflation, exceeding the recommended full rated load, high temperature and high speed driving.

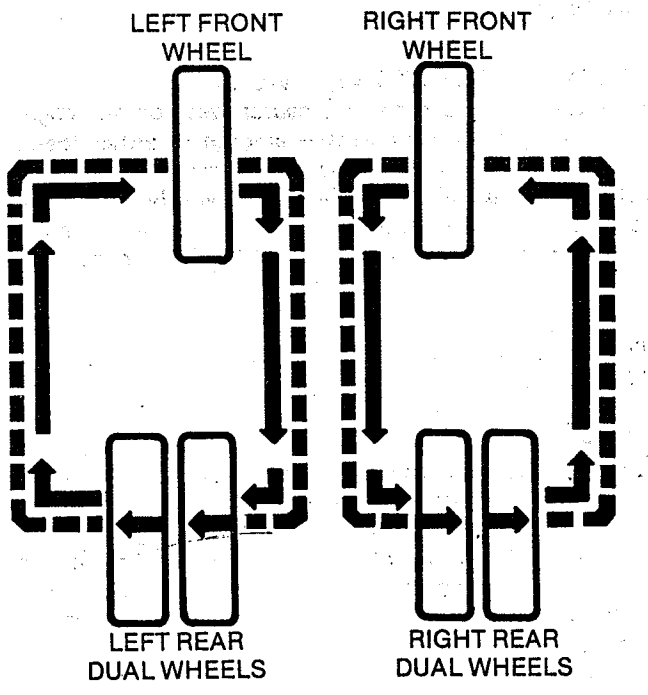


FIGURE 1-11 Tire rotation diagram (radial)

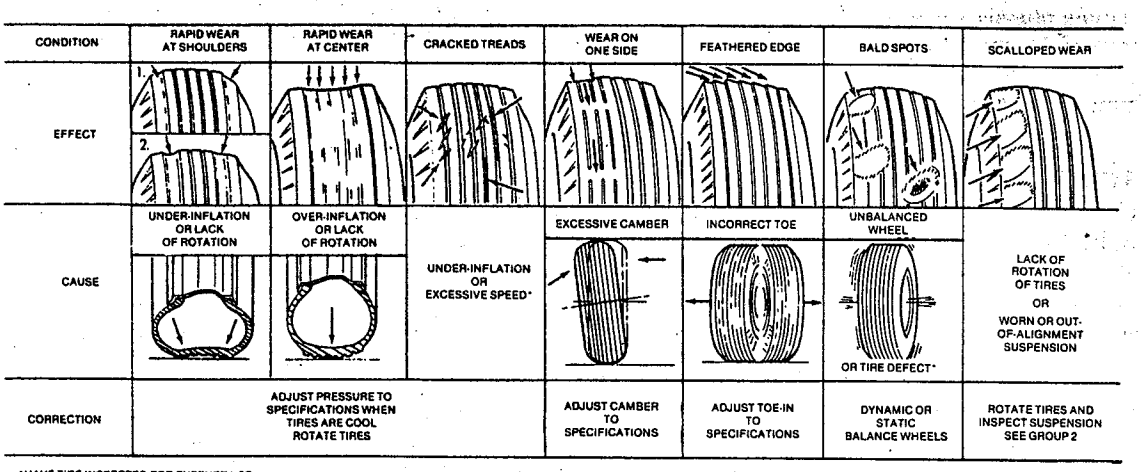


FIGURE 1-12 Tire wear patterns

EXCESSIVE CAMBER WEAR

Excessive wheel camber, either positive or negative causes the tire to run at an angle to the road. One side of the tread wears more than the other. For best corrective results have the front wheel camber adjusted to specifications.

TOE-IN OR TOE-OUT TREAD WEAR

Excessive toe-in and toe-out causes wear on the edges of the front tires. An excessive amount of either toe-in or toe-out actually drags the tire instead of letting tire roll true. This wear condition will usually produce a tapered or feathered edge on the outside ribs. Have the toe-in or toe-out adjusted to specifications to correct.

THIN SPOT, CUPPED OR SCALLOPED TIRE TREAD WEAR

Cupping, scalloping and spotting of tires is associated with wear on a vehicle driven mostly at highway speeds without the recommended tire rotation and with unbalanced conditions. Regardless of the cause of cupped wear on either front tire, no alignment or balance job can prevent future excessive wear of the spots. Once a front tire acquires flat or cupped spots additional wear will continue at a rapid rate. To correct this condition, tire rotation and wheel balance are necessary. A cupped tire will partially true itself up on a rear wheel.

TIRE – WHEEL BALANCE

The need for tire and wheel assembly balancing is indicated by heavy vibration of the steering wheel when driving at speeds above 40 miles an hour.

Static (still) balance is equal distribution of the weight of the wheel and tire around the spindle, so that the assembly has no tendency to rotate by itself. An assembly that has a heavy spot is statically out of balance and can produce a bouncing motion.

Correction for static unbalance is made by first finding the location of the heavy spot, then adding sufficient weight to counterbalance it (follow the equipment manufacturer's recommendations). Half the balance weight should be added to the inside of the wheel and the other half to the outside to prevent excessive dynamic unbalance.

A wheel and tire, to be in dynamic balance, must first be in static balance and also be in balance from inside to outside. A wheel not in dynamic balance can produce wobble or shimmy.

Off-the-vehicle tire and wheel balancing is the preferred method. Balancing tires on the vehicle essentially balances the tire, wheel and brake drum or rotor. This balance condition is lost when tires are removed for any reason and not reinstalled in the same position and indexed on the studs exactly as before removal. When

wheel and tire balance is required on vehicles equipped with dual rear wheels, it is absolutely necessary that the wheel and tire assemblies be removed from the vehicle for balancing.

WARNING: When on-the-vehicle rear tire balance is attempted, both front wheels must be securely blocked to prevent any vehicle movement.

WHEEL AND TIRE RUN-OUT

The general practice of checking a wheel for run-out is to measure radial and lateral movement of tire. It should be remembered that such run-out is only an indication and not a proof that the wheel may be at fault. Where measurements indicate that the wheel and the assembly exceed run-out limits listed, the tire should be removed from the wheel and the wheel itself checked.

Figure 1-13 shows wheel and tire run-out checking points.

The radial run-out at each point indicated by "A" and lateral run-out at each point indicated by "B" should not exceed the specifications shown in the chart:

CAUTION: Under no circumstances should points indicated by "C" be used for checking run-out as this metal has been sheared in the manufacturing process and as a result is not an even surface.

When checking the wheel for run-out, it should be attached to a hub that is free to rotate but tight enough to prevent any wobble, likewise, the dial indicator should be known to be accurate and attached to a firm surface to assure that it will be held steady while taking run-out readings.

TUBELESS WHEELS	"A" RADIAL RUN-OUT	"B" LATERAL RUN-OUT
17.5 x 5.25	.050	.050
19.5 x 6	.060	.060

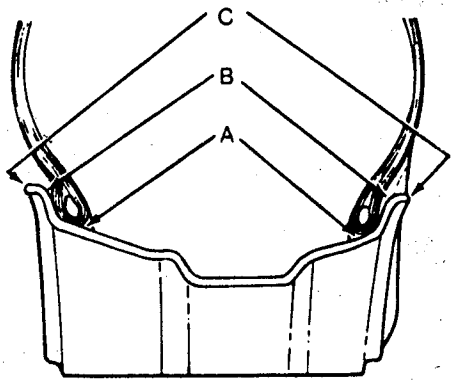


FIGURE 1-13 Run-out checking area

DISC WHEELS

All Motor Home chassis are equipped with disc wheels. Rear axle has dual disc wheels. Chassis use an 8-stud in-out coined disc wheel, 5-stud disc wheels and 6-stud disc wheels. Different methods of securing the dual wheels to the rear axle are utilized.

8-STUD DISC WHEEL MOUNTING

Wheels are supplied with four (4) equally-spaced stud holes which are coined inward and four (4) equally-spaced stud holes which are coined outward. The outer wheel must be installed so the coined stud holes match the coined stud holes of the inner wheel. Line up wheels with locating pin (Figure 1-14 and 1-15).

A locating pin in the hub will assist in properly orienting inner and outer wheels. The tires of both dual wheels must be completely off the ground when tightening to insure centering and maximum wheel clamping.

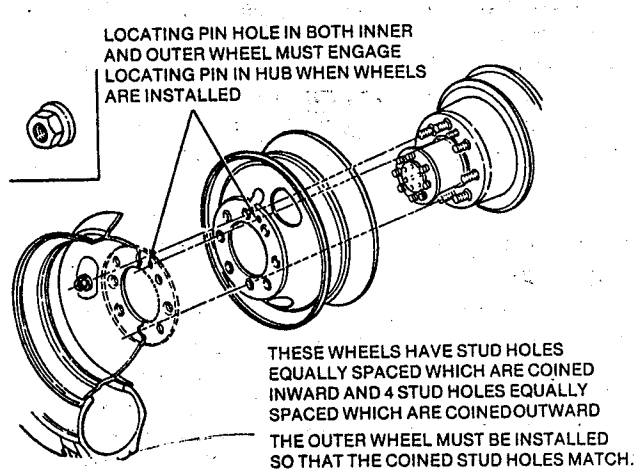


FIGURE 1-14 Dual wheel mounting

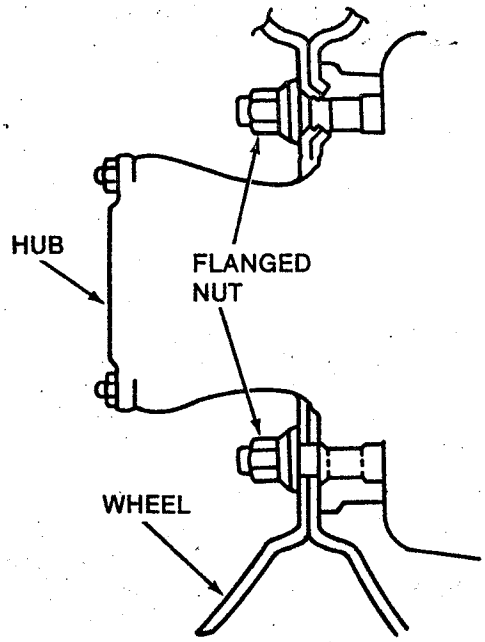


FIGURE 1-15 Flanged wheel nut

NUT TIGHTENING

Tighten the dual rear wheel nuts in the numbered sequence as shown in Figure 1-16. Retighten the wheel nuts in the same sequence again but this time to a torque of 325 foot-pounds. Go through the sequence again to verify specified torque has been achieved.

It is recommended that wheel stud nuts be torqued as specified at every lubrication interval (2000 miles) thereafter. Also, when changing a wheel, that wheel should be retightened at 100 miles and 500 miles thereafter.

5 AND 6 STUD DISC WHEEL MOUNTING

5-stud disc wheel and 6-stud disc wheels both have double lock nuts. Wheels are supplied with equally-spaced studs. The inner wheel lock nut secures the inner wheel only and the outer securing the outer wheel only (Figure 1-17).

Note from the illustration in Figure 1-17 that the outer wheel nut secures the outer wheel only. Accordingly, in the event the inner wheel lock nut is not tightened to proper specification and may loosen, then when the outer lock nut is tightened, only that wheel will be secure.

In the event the inner lock nuts are loose enough to move on the mounting studs, severe wear will occur around the stud holes in the inner wheel with possible wheel fracture or stud breakage.

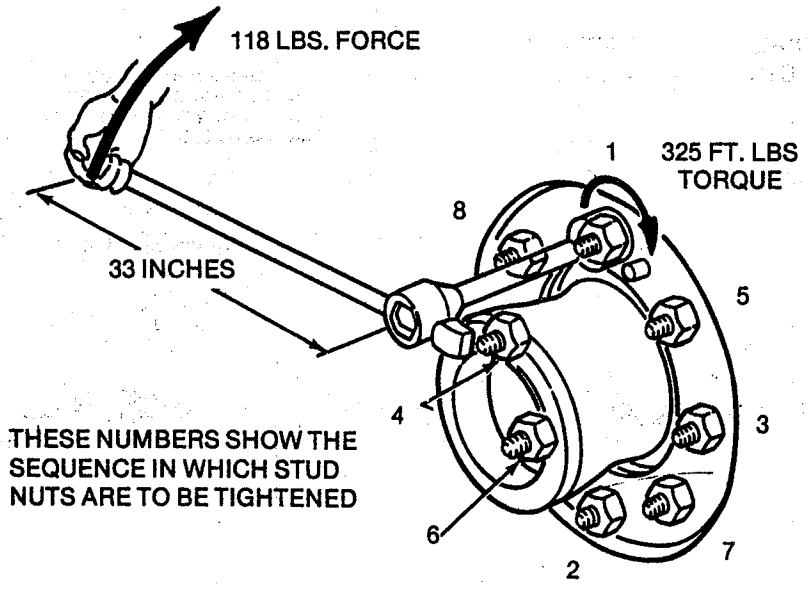


FIGURE 1-16 Flanged wheel nut tightening method

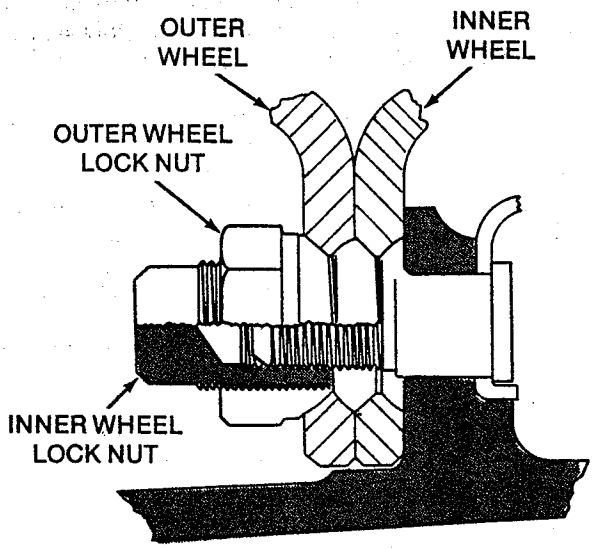


FIGURE 1-17 Dual disk wheel mounting

NUT TIGHTENING

Tighten inner lock nuts to 475 foot-pounds to secure inner wheel only. Tighten outer lock nuts to 475 foot-pounds to secure outer wheel to inner wheel. To facilitate wheel removal, torque inner lock nuts more tightly than outer lock nuts to assure that the inner lock nuts do not loosen when the outer lock nuts are removed (Figure 1-18 and 1-19).

(TUBELESS) TIRE REMOVAL

Before removing tire rim assembly from truck, deflate tire completely by removing valve core. Loosen both beads from rim by driving the flat end of the tire tool between the tire bead and rim flange, straighten tool to a vertical position and hammer downward on the neck to force tire from rim. Repeat at about eight-inch intervals around flanges until beads are free from rim.

Place wide side of rim down. Lubricate tire bead and rim. Insert curved end of both tools, and step on tire opposite valve to direct first bead into the well. Hold one tool in position with foot and pull second tool toward center of rim. Progressively work first bead off rim.

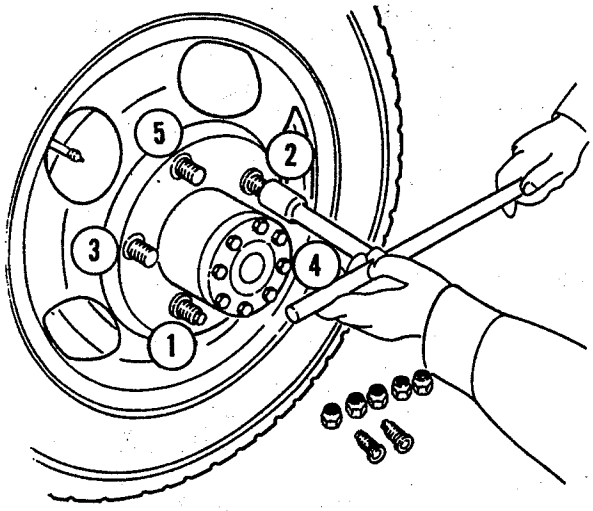


FIGURE 1-18 Removing or installing inner dual wheel

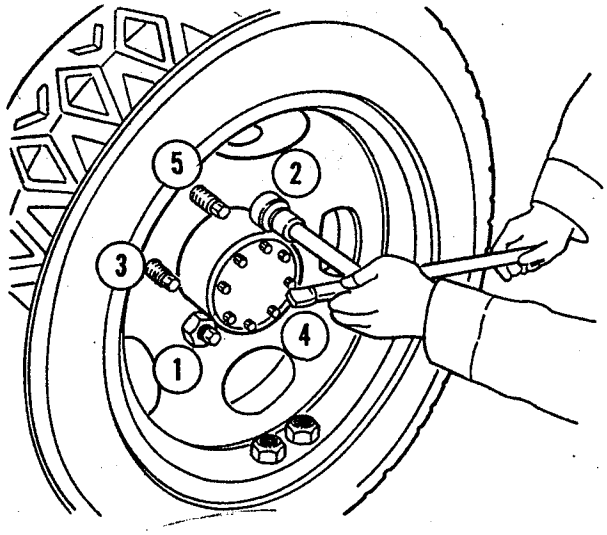


FIGURE 1-19 Removing or installing outer dual wheel

Stand assembly in vertical position with valve near top. Lubricate second bead and rim. Insert straight end of tool between tire bead and the back rim flange, hooking the tool over the second flange. Lean tire assembly toward tool and provide a rocking or bouncing action to pry the rim out of the assembly. Be sure opposite side of second bead is in well.

FRONT END ALIGNMENT

Front end alignment information is available from chassis manufacturer.

BATTERY

BATTERY INSTALLATIONS

Storage batteries shall be securely attached to the vehicle and installed in an area vaportight to the interior and ventilated directly to the exterior of the vehicle. When batteries are installed in a compartment, the compartment shall be ventilated with openings having a minimum area of 1.7 square inches (11 cm^2) at both the top and at the bottom. Batteries shall not be installed in a compartment containing spark or flame producing equipment except that they shall be permitted to be installed in the engine generator compartment if the only charging source is from the engine generator. See Figures 1-20 through 1-24 for battery installations.

NON-MAINTENANCE FREE BATTERY

The battery is normally located on the left side frame rail. However, refer to the illustration in the event the battery has been relocated.

The battery is the heart of the vehicle's electrical system. It is very important that it is capable of delivering the necessary electricity when called for and capable of accepting electricity when it is in a low state of charge.

Another important feature of the battery is that it acts as a giant capacitor (shock absorber) in the vehicle's electrical system. It absorbs many abnormal and transient voltages that are created by the various electrical components of the system.

If a battery is not up to specifications it will not deliver the necessary electricity, it will not accept electricity and it will not act as a capacitor. Consequently, the vehicle's entire electrical system will be affected when this happens.

An optional dual battery system is available featuring a second battery which can be used to operate some appliances.

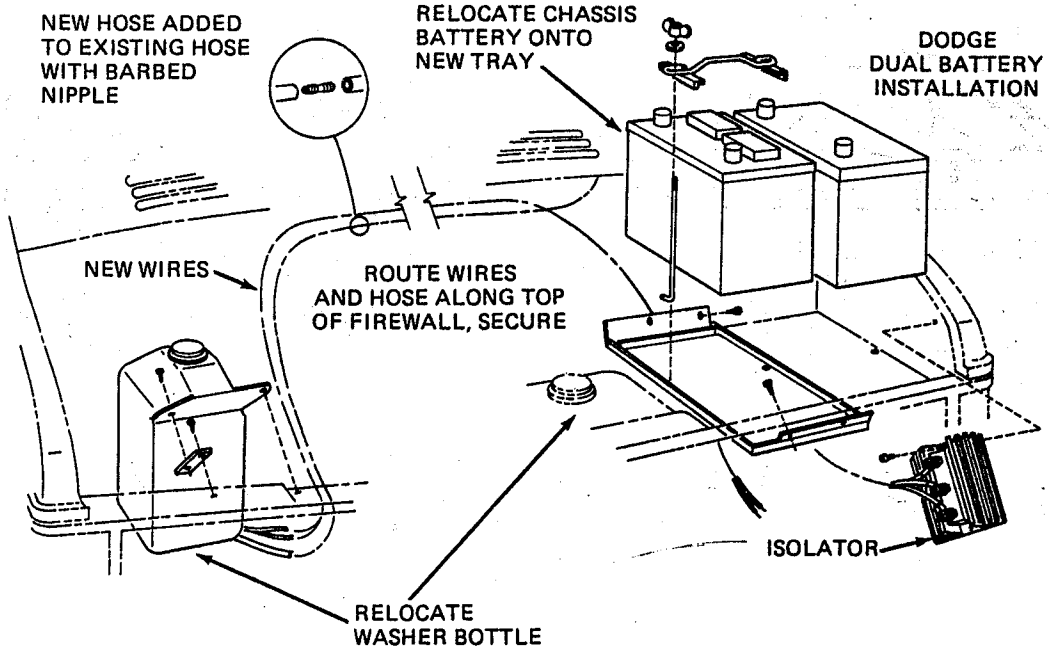


FIGURE 1-20 Dodge dual battery

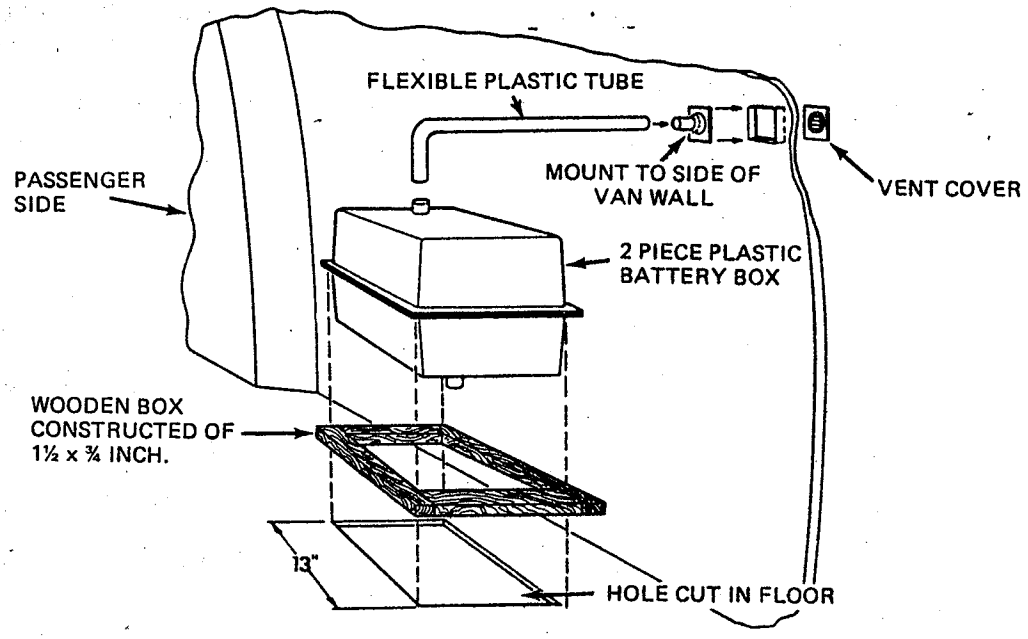


FIGURE 1-21 Aux battery box

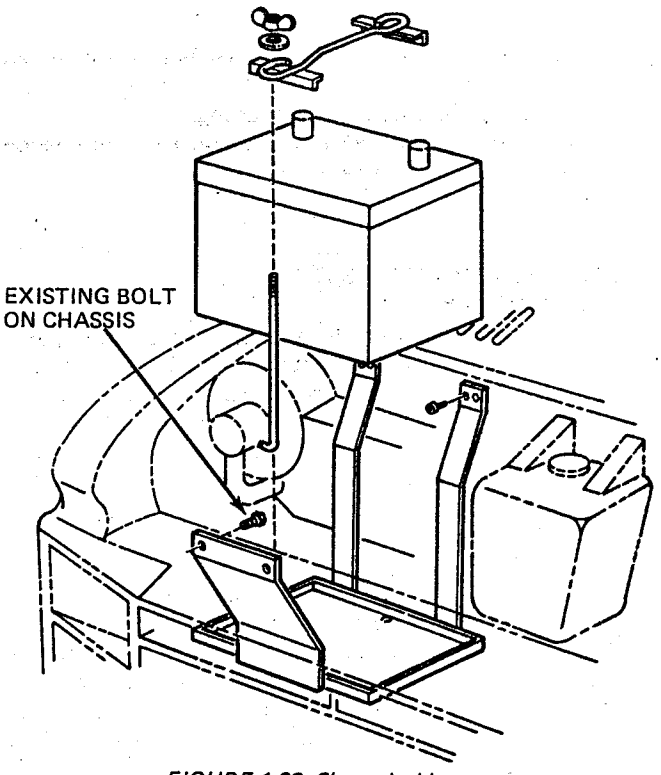


FIGURE 1-22 Chevy dual battery

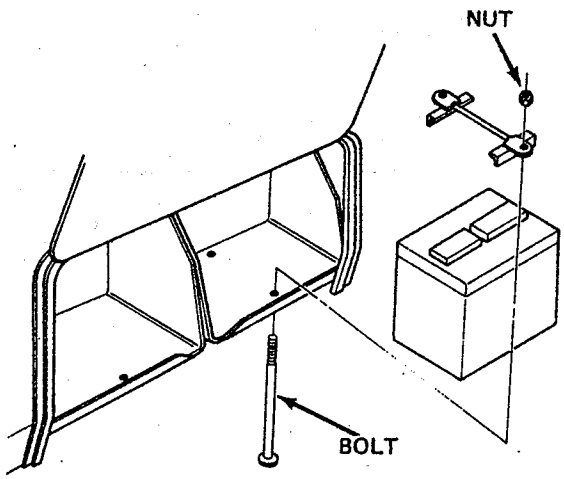


FIGURE 1-23 Dual battery (side stowage)

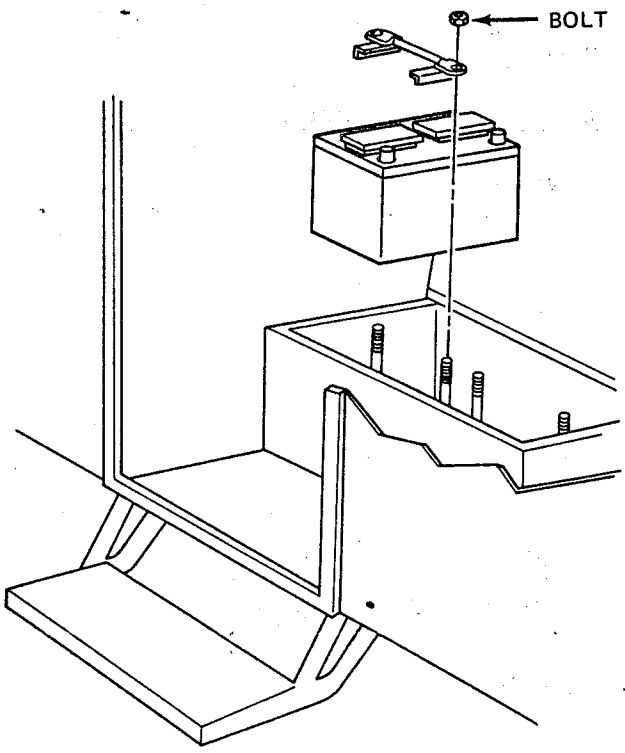


FIGURE 1-24 Dual battery (step stowage)

The dual battery system includes a solid state battery isolator that prevents auxiliary battery use from draining the engine battery. Both batteries are charged from the engine charging system.

BATTERY VISUAL INSPECTION

1. Disconnect battery cables at battery
2. Remove battery hold-down clamp and remove battery from vehicle.

WARNING: Care should be taken, in the event battery case is cracked or leaking, to protect hands from the electrolyte. A suitable pair of rubber gloves (not the household type) should be worn when removing the battery by hand. It is recommended that a battery carrying strap be used whenever the battery is to be removed from the vehicle.

3. Inspect battery carrier for damage caused by loss of acid from battery. If acid damage is present it will be necessary to clean area with a solution of clean warm water and baking soda. Scrub area with a stiff bristle brush and wipe off with a cloth moistened with ammonia or baking soda in water.
4. Clean top of battery with same solutions as described in Step 3.

CAUTION: Keep cleaning solution out of battery cells for it will weaken the electrolyte.

5. Inspect battery case and cover for cracks. If cracks are present battery must be replaced.
6. Clean battery post with a suitable battery post cleaning tool.
7. Clean the inside surfaces of the terminal clamps with a suitable battery terminal cleaning tool. Replace damaged or frayed cables and broken terminal clamps.
8. Install battery in vehicle making sure that positive and negative posts are in line with their respective cables.
9. Tighten hold-down clamp nuts to 3 foot-pounds torque.

CAUTION: Do not over tighten for damage to battery case and/or cover will occur.

10. Connect cable clamps to battery post and tighten securely. Coat all connections with light mineral grease after tightening.
11. If electrolyte level is low, fill to recommended level with distilled water.

SPECIFIC GRAVITY TEST HYDROMETER

The hydrometer is used to measure the specific gravity of the electrolyte in the battery cells. This will give an indication of how much unused sulphuric acid remains in the solution, which determines the state of charge of the battery. A hydrometer should be graduated to read from 1.160 to 1.320 in graduations of .005 specific gravity. Graduated markings should be accurate to within .002 specific gravity.

In reading a hydrometer, the gauge barrel must be held vertically and just the right amount of fluid be drawn up into gauge barrel, with pressure bulb fully expanded, to lift float freely so it does not touch the sides, top or bottom of the barrel. Take a reading with eye on level with liquid level in the gauge barrel. DO NOT TILT hydrometer.

ELECTROLYTE

NOTE: Liquid level of each battery cell should be up to the bottom of each vent plug hole.

Add distilled water when necessary, to obtain proper electrolyte level. Electrolyte should be thoroughly mixed with any water which may have just been added to the battery by charging the battery before taking hydrometer readings.

Specific gravity of battery electrolyte strength or density varies not only with the quantity of the acid in solution but also with temperature. As temperature increases, the density of the electrolyte decreases and specific gravity decreases. As temperature decreases the density of the electrolyte increases and the specific gravity increases.

Specific gravity variations caused by temperatures must be considered and corrected to 80°F. in the analysis of the battery, otherwise specific gravity readings will not give a true indication of state of charge.

TEST

Draw electrolyte in and out of the hydrometer barrel several times to bring the temperature of the hydrometer float to that of the acid in the cell and then measure the electrolyte temperature in the cell.

If the hydrometer is equipped with a thermometer, electrolyte temperature may be read from it. If the hydrometer is not equipped with a thermometer, use a battery immersion type thermometer of the mercury-in-glass type, having a scale reading as high as 125°F, or if not available a suitable dairy type thermometer may be used to obtain the electrolyte temperature.

The electrolyte temperature correction in specific gravity reading at 80°F. is zero. Add .004 specific gravity points for every 10 degrees over 80°F. and subtract .004 specific gravity points for every 10 degrees under 80°F. All readings must be corrected to 80°F.

TEST CONCLUSIONS

(a) Battery specific gravity is less than 1.220, battery should be recharged. Make a high discharge test for capacity. If battery cells test O.K., recharge and adjust gravity of all cells uniformly. Thoroughly test the electrical system for short circuits, loose connections and corroded terminals.

(b) Cells show more than 25 points (.025 Specific Gravity) Variation — Short circuit, low cell, or loss of electrolyte by leakage or excessive overcharge; try to recharge battery. See "Charging the Battery." See "Adjustment of Acid Gravity".

(c) Battery specific gravity is above 1.220 and all cells are even. Battery state of charge may be satisfactory. Test by making "High Rate Discharge Test of Battery Capacity". Make sure all electrical connections are clean and tight.

HIGH RATE DISCHARGE TEST OF BATTERY CAPACITY

Satisfactory capacity tests can be made only when battery equals or exceeds 1.220 specific gravity temperature corrected. If the reading is below 1.220, the battery should be slow charged until fully charged in order to obtain proper test results. If charging fails to bring the specific gravity up in any one or all of the cells, the battery is defective and must be replaced. Also before proceeding with test battery electrolyte should be at room temperature 70° ± 10°F.

TEST PROCEDURE

1. Turn control knob of Battery-Starter-Tester to OFF position.
2. Turn Voltmeter Selector Switch to the 10 Volt position on test units so equipped.
3. Connect test ammeter and voltmeter positive leads to battery positive terminal. Connect ammeter and voltmeter negative leads to battery negative terminal. Voltmeter clips must contact battery posts or cable clamps and not ammeter lead clips.
4. Turn control knob clockwise until ammeter reading is equal to three times ampere hour rating of battery.
5. Maintain the load for 15 seconds and note reading of the voltmeter.

TEST RESULTS

(a) If the voltmeter reading is 9.5 volts or more and the specific gravity was 1.220 or more before testing, the battery is in good condition and can be placed back into service. However, if it was necessary to charge the battery before testing thoroughly check the electrical system for short circuits, loose connections and corroded terminals.

(b) If the voltmeter reading is less than 9.5 volts, this indicates a possible defective condition and the battery should be given the three minute charge test.

THREE MINUTE CHARGE TEST

This test should not be used if battery temperature is below 60°F.

NOTE: Do not perform this test on the battery unless it has failed the capacity test.

1. Connect Battery Charger positive lead to battery positive terminal and negative lead to battery negative terminal. IMPORTANT.

CAUTION: Be sure of correct polarity during this test.

2. Turn the Battery Charger Power Switch to ON position. Turn timer switch past three minute mark then back to the three minute mark.
3. Adjust Battery Charger Switch to highest possible rate not exceeding 40 amperes.
4. When timer switch cuts off at the end of 3 minutes, turn timer switch back to Fast Charge.
5. Use the 16 Volt scale of the Battery Starter Tester and measure total voltage of battery posts while battery is being fast charged, and note the voltmeter reading.

TEST RESULTS

If total voltage during charge exceeds 15.5 volts, battery is sulphated and should be cycled and slow-charged until specific gravity reaches 1.270 (see "Slow Charging").

NOTE: A slow charge is preferable to bring the battery up to a full charge.

If specific gravity remains constant after testing battery at one hour intervals for three hours, battery is at its highest state of charge.

6. Make another capacity test. If capacity test does not meet specifications, replace battery.

CHARGING THE BATTERY

WARNING: When batteries are being charged an explosive gas mixture forms beneath the cover of each cell. Do not smoke near batteries on charge or which have recently been charged. Do not break live circuits at the terminals of the batteries on charge. A spark will occur where the live circuit is broken. Keep all open flames away from the battery.

SLOW CHARGING BATTERIES

If adequate time is available, the slow charging method should be used in recharging a discharged battery.

There are many types of battery charging equipment available. Be sure to follow the instruction of the equipment manufacturer for the necessary preparations and precautions. However, the following items should be observed when slow charging the battery with any type of equipment:

1. If the battery is to remain in the vehicle, disconnect the cables at the battery, to prevent damage to the electrical system, during charging.
2. Thoroughly clean the battery. Refer to "Battery Visual Inspection".
3. Make sure the electrolyte level is at the normal level. Refer to "Testing Specific Gravity".
4. The battery is to be charged at a rate (amps) of 1/20 of its ampere hour capacity.
5. The average length of time necessary to charge a battery by the slow charge method at normal rates is from 12 to 16 hours. However, when a battery continues to show an increase in specific gravity, battery charge should be continued even if it takes 24 hours or more. Watch the temperature of the electrolyte and if the temperature of the cells reaches 110°F., lower the charging rate.

Battery will be fully charged when it is gassing freely and when there is no further rise in specific gravity after three successive readings taken at hourly intervals. Make sure hydrometer readings are corrected for temperature.

SULPHATED BATTERIES

Many sulphated batteries can be brought back to good condition by slow charging.

The rate of charge for a sulphated battery should be no more than 1/2 the normal charge rate and the charging time should be from 60 to 100 hours. This long charging cycle is necessary to reconvert crystalline lead sulphate into active materials.

FAST CHARGING BATTERY

If adequate time for a slow charge is not available a high rate (FAST) charge is permissible and will give a sufficient charge in one hour enabling the battery and alternator to continue to carry the electrical load. If the battery is to remain in the vehicle, disconnect the cables at the battery to prevent damage to the electrical system during charging. The manufacturers of high rate charging equipment generally outline the necessary precautions and some models have thermostatic temperature limiting and time limiting controls. Make sure their instructions are followed.

CAUTION: The battery can be damaged beyond repair unless the following precautions are taken.

1. Make sure electrolyte level is at normal level. Refer to "Testing Specific Gravity".
2. Battery electrolyte temperature must NEVER exceed 125°F.

If this temperature is reached, battery should be cooled by reducing charging rate or remove battery from the circuit.

3. As battery approaches full charge electrolyte in each cell will begin to gas or bubble. Excessive gassing must not be allowed.
4. Do not fast charge longer than one hour. If battery does not show a significant change in specific gravity after one hour of "FAST" charge, the slow charge method should be used.

Remember to use temperature correction when checking specific gravity.

ADJUSTMENT OF ACID GRAVITY

Hydrometer floats usually are not calibrated below 1.160 specific gravity and cannot indicate the condition of a battery in a very low state of charge. Therefore, it may be necessary to give the battery several hours charge before a hydrometer reading will indicate that the battery is taking a charge.

If the specific gravity of all cells are not within .015 points of specified value, corrected to 80°F., at the end of a full charge, remove some of the electrolyte with a hydrometer and add a like amount of distilled water to reduce the gravity if too high, or add 1.400 Specific Gravity acid to raise specific gravity, if too low. Continue the charge so as to give the electrolyte a chance to mix and then read the gravity after another hour of charge to note the effect of the additions. Continue this adjusting procedure until gravity is brought to the desired value by charging for one hour after each adjustment.

ASSIST (JUMP) STARTING WITH A BOOSTER BATTERY

If it becomes necessary to use a booster battery, with jumper cables, to start a vehicle's engine because its battery is discharged, the following procedure should be followed:

WARNING: To prevent personal injury or damage to clothing, do not allow battery fluid to contact eyes, skin or fabrics. Do not lean over battery when connecting jumper cables or allow cable clamps to touch each other. Keep open flames or sparks away from battery filler holes. Always wear eye protection when working with batteries.

1. Turn ignition switch and headlights off.
2. Remove vent caps of both booster battery and discharged battery.
3. Make sure electrolyte is at proper level.

WARNING: During cold weather when temperatures are below freezing point, electrolyte in a discharged battery may freeze. If electrolyte is not visible in battery or it appears frozen, do not attempt jump starting because battery could rupture or explode. Battery temperature must be brought up above freezing point and water added (if necessary) before attempting jump starting.

4. Cover vent cap openings of both batteries with a cloth.
5. Connect one jumper cable between POSITIVE (+) POST of both batteries.
6. Connect ONE end of other jumper cable to NEGATIVE (-) POST of booster battery. Connect OTHER end of cable to alternator mounting bracket of vehicle with discharged battery, making sure a good connection is made.

WARNING: Do not connect to negative post of discharged battery.

7. After engine is started or if engine fails to start, cables must be disconnected in following order:
   (a) negative cable at alternator bracket
   (b) negative cable at negative post on booster battery
   (c) cable between positive post of both batteries.
8. Remove cloths from both batteries.

WARNING: Cloths have been exposed to sulfuric acid fumes and should be thrown away.

9. Install vent caps on batteries.

ASSIST (JUMP) STARTING WITH PORTABLE STARTING UNIT

There are many types of these units available. Follow instructions of their manufacturer for necessary precautions and operation. However, it is very important

that their operating voltage does not exceed 16 volts because damage to battery, starter motor, alternator or electrical systems may occur.

BATTERY – MAINTENANCE FREE

A new, smaller physical size, 430 amp (cold crank rating), maintenance-free battery replaces the previously-used 440 ampere-hour battery. The maintenance-free battery is, as the name implies, totally maintenance free and has no removable battery cell caps. WATER NEVER NEEDS TO BE ADDED TO THE MAINTENANCE-FREE BATTERY. There are no vent plugs in the cover. The battery is completely sealed, except for a small vent hole in the side. This vent hole allows what small amount of gasses are produced in the battery to escape. The special chemical composition inside the battery reduces the production of gas to an extremely small amount at normal charging voltages. The battery contains a visual test indicator which signals when an adequate charge level exists (green indicator), when charging is required (black), or when replacement is required (yellow). The battery is of polypropylene construction. It is 1-3/4 inches shorter and approximately 4 lb. lighter than the previous battery. The maintenance-free battery has a strong ability to withstand damaging effects of overcharge.

TEST INDICATOR

The test indicator is to be used with accepted diagnostic procedures ONLY. It should not be used to determine if the battery is good or bad, or charged or discharged. The test indicator is a built-in hydrometer in one cell and provides visual information for battery testing.

It is important when observing the test indicator that the battery be relatively level and have a clean top to see the correct indication. A light may be required to view the indicator.

Under normal operation conditions, two indications can be observed.

1. GREEN DOT VISIBLE IN VIEWING PORT
   Any green appearance is interpreted as a "green dot" and the battery is ready for testing. On rare occasions following prolonged cranking, the green dot may still be visible. Should this occur, charge battery as described in "Battery Charging Procedures".
2. DARK OR GREEN DOT NOT VISIBLE IN VIEWING PORT
   If there is a cranking complaint, battery should be tested as described in "Testing Maintenance Free Battery" section, and the Vehicle's Charging System should be checked as covered in the Service Manual.

WARNING: On rare occasions, test indicator may turn light yellow. In this case, the vehicle's charging system should be checked as covered in the applicable section of this service manual. Although the battery may be capable of further service, replace the battery if a cranking complaint has been reported. Do not charge, test, or jump start!!!

BATTERY VISUAL INSPECTION

1. Make sure ignition switch is in "OFF" position and all battery feed accessories are OFF.
2. Disconnect battery cables at battery (negative first).
3. Remove battery hold down clamp and remove battery from vehicle.

WARNING: Care should be taken, in the event battery case is cracked or leaking, to protect hands from the electrolyte. A suitable pair of rubber gloves (not the household type) should be worn when removing battery by hand.

4. Inspect battery carrier for damage caused by loss of acid from battery. If acid damage is present it will be necessary to clean area with a solution of clean warm water and baking soda. Scrub area with a stiff bristle brush and wipe off with a cloth moistened with ammonia or baking soda in water.
5. Clean top of battery with same solutions as described in Step 3 of Non-Maintenance Free Battery.
6. Inspect battery case and cover for cracks. If cracks are present battery must be replaced.
7. Clean battery post with a suitable battery post cleaning tool.
8. Clean the inside surfaces of the terminal clamps with a suitable battery terminal cleaning tool. Replace damaged or frayed cables and broken terminal clamps.
9. Install battery in vehicle.
10. Install hold down clamp assembly.
11. Connect cable clamps to battery post making sure top of clamp is flush with top of post.
12. Tighten clamp nut securely.
13. Coat all connections with light mineral grease after tightening.

BUILT-IN TEST INDICATOR (HYDROMETER)

The sealed battery has a built-in temperature compensated hydrometer in the top of the battery. This hydrometer is to be used with the following diagnostic procedure.

It is important when observing the hydrometer that the battery has a clean top to see the correct indication. A light may be required in some poorly lit areas.

Under normal operation, two indications can be observed.

GREEN DOT VISIBLE

Any green appearance is interpreted as a "green dot" and the battery is ready for testing.

DARK (GREEN DOT NOT VISIBLE)

If there is a cranking complaint, the battery should be LOAD TESTED. The charging and electrical systems should also be checked at this time.

CLEAR OR LIGHT YELLOW (occasionally, this third condition may appear).
On rare occasions, the hydrometer will turn clear or light yellow. Normally, a battery with this indication is capable of further service; however, when a cranking complaint has been reported, replace the battery. Do not charge, test or jump start.

LOAD TEST

1. Observing polarity, connect a voltmeter and a battery load tester across battery terminals.
2. Apply a 300 ampere load for 15 seconds to remove surface charge from the battery. Remove the load.
3. Wait 15 seconds to let battery recover and apply 210 amp load.
4. Read voltage after 15 seconds with specified load applied, then disconnect load.
5. If voltage does not drop below the minimum listed in the Load Test Chart, the battery is good and should be returned to service. (The battery temperature must be estimated by feel and by the temperature the battery has been exposed to for the preceding few hours.)
6. If the voltage drops below the minimum listed, replace the battery.

LOAD TEST CHART

Minimum Voltage	Temperature F°	Temperature C°
9.6	70	21
9.6	60	16
9.4	50	10

CHARGING PROCEDURES

When it is necessary to charge a sealed battery, the following safety precautions must be followed.

1. Do not charge the battery if the hydrometer (test indicator) is clear or light yellow. Replace battery.

2. If the battery feels hot (150°F/52°C), or if violent gassing or spewing of electrolyte through the vent hole occurs, discontinue charging or reduce charging rate.

Charge the battery until the green ball appears. Tipping or shaking the battery may be necessary to make the green ball appear. Temperature of the battery will affect the charging rate, and most charging equipment will not charge at a constant rate. For example, if the charger starts at 30 amperes and drops off to 10 amperes after 1 hour, the average current for that hour was 20 amperes. The actual boost charge was 20 ampere hours. The sealed battery can be fast charged or slow charged with ordinary chargers in the same manner as conventional batteries. Either method will restore the battery to full charge.

CHARGE RATE CHART

Battery	Slow Charging			
A-25	5 amps 10 hrs.		10 amps 5 hrs.	
	Fast Charging			
	20 amps 3.75 hrs.	30 amps 2.5 hrs.	40 amps 2 hrs.	

ASSIST (JUMP STARTING WITH A BOOSTER BATTERY)

If it becomes necessary to use a booster battery, with jumper cables, to start a vehicle's engine because its battery is discharged, the following procedure should be followed:

CAUTION: To prevent personal injury or damage to clothing, do not allow battery fluid to contact eyes, skin or fabrics. Do not lean over battery when connecting jumper cables or allow cable clamps to touch each other. Keep open flames or sparks away from battery vent holes. Always wear eye protection when working with batteries.

1. Set parking brake and place automatic transmission in "PARK" (neutral for manual transmission). Turn off lights, heater and other electrical loads. Observe charge indicator. If indicator is light or yellow, replace battery. DO NOT attempt jump starting when indicator is light or yellow. If charge indicator is dark and has a green dot in the center, failure to start is not due to a discharged battery and the cranking system should be checked. If charge indicator is dark but green dot does not appear in center, proceed as follows.
2. Attach one end of one jumper cable to the positive terminal of the booster battery and the other end of same cable to positive terminal of discharged battery. DO NOT PERMIT vehicles to touch each other as this could establish a ground connection and counteract the benefits of this procedure.
3. Attach one end of the remaining negative cable to the negative terminal of the booster battery, and the other end to a ground at least 12 inches from the battery of the vehicle being started. (DO NOT CONNECT DIRECTLY TO THE NEGATIVE POST OF THE DEAD BATTERY.)
4. Take care that the clamps from one cable do not inadvertently touch the clamps on the other cable. Do not lean over the battery when making connections. The ground connection must provide good electrical conductivity and current carrying capacity. Avoid moving, hot or electrical hazards such as fans, manifolds and spark plug terminals.
5. Reverse this sequence exactly when removing the jumper cables.

WARNING: Any procedure other than the above could result in: (1) personal injury caused by electrolyte squirting out the battery vent, (2) personal injury or property damage due to battery explosion, (3) damage to the charging system of the booster vehicle or of the immobilized vehicle.