GROUP 12

FRAME AND SHEET METAL

CONTENTS OF GROUP 12

12-1 CHECKING ALIGNMENT OF FRAME

a. Checking Alignment of Frame and Suspension Members

When a frame has been damaged by accident the following procedure may be used to check alignment of the frame, and the alignment of the chassis suspension members with the frame. This procedure should also be used to check alignment after repairs to frame have been completed.

Checks are to be made with frame assembled with power plant, body, etc. and car resting on wheels. The car should be placed on a clean floor that is reasonably level. Both sides of the front ends of the frame must be the same distance from the floor; the same condition must exist at rear end of frame. Where points are to be extended to floor by use of a plumb bob, it is desirable to attach clean pieces of paper to floor with tacks or tape so that the points can be clearly marked. *Apply brakes or block wheels so that car cannot move.*

1. Using a plumb bob, extend the following points to the floor and mark where point of plum bob touches floor, as shown in figure 12-1.

A and A¹ at center of grease fitting holes in front ends of control arm shaft bushings.

B and B¹ at center of head of outer bolts holding lower ball joints to control arms.

X at center of rivet in front flange of frame front cross member, on centerline of frame.

E and E¹ at center of corner rivets attaching rear bumper cross member to side rails.

F and F¹ on side rails just rearward of rear axle housing, *holding plumb line flat against side rails.*

G and G¹ at each side of torque tube flange.

2. Move car out of the way. Using a chalked line, draw lines on the floor through the following points: A and A¹, B and B¹, F and F¹.

3. Divide the distance between F and F¹ and mark the center point Y on line F-F¹. Draw frame centerline through points X and Y.

4. Measure diagonal distances A to E¹ and A¹ to E. If these diagonals are not equal within 3/16" the frame is bent.

5. Measure the distances J and J¹. If these are not equal within 1/4" a lower control arm is bent.

6. Measure the distances K and K¹, which will be equal within 3/16" if rear axle is not bent and is properly aligned with frame. Points G and G¹ should be equally distant from vehicle centerline X-Y. If distances K and K¹ are not equal within 3/16" and points G and G¹ are equally distant from centerline, a bent rear axle housing or torque tube is indicated. If points G and G¹ are not equally distant from centerline, look for misalignment of engine in the frame.

b. Checking Alignment of Frame Only

When a frame has been damaged by accident and the power plant, body, etc., are removed, the measurements shown in figure 12-2 or 12-3 may be used to check for alignment of frame members. The procedure should also be used to check alignment after repairs to frame have been completed.

The frame must be solidly supported on suitable stands so that the pilot holes in both side rails are exactly at distance indicated from a straight and level work surface. Note that alternate pilot holes of different size and location may be found.

12-2 FRAME REPAIRS

a. Straightening and Welding

In case of frame distortion resulting from an accident it is permissible to straighten or weld the frame if the distortion is not excessive.

Heat can be applied without materially weakening the steel, provided this is kept below 1200°F. This is a deep cherry red when viewed in subdued daylight, as in an average shop. Heat in excess of 1200°F. will weaken the metal structure and lead to eventual failure in service.

b. Replacement of Frame Members

If a frame front cross member is very badly distorted as a result of a front end collision, replacement is advisable because its rigid box construction makes proper straightening very difficult. Since the front suspension members are mounted on the frame front cross member, front end alignment will be affected if the cross member is not in perfect alignment.

The front end and rear cross members, rear spring support cross member, and a number of braces and brackets are available for service replacement. The old members may be removed from the frame by cutting the attaching rivets and welds, after removing other parts or assemblies to allow working space.

When installing new frame members use hot rivets since they can be properly driven with hand tools. Cold driven rivets are not recommended because they cannot be securely driven with hand riveting tools. In places where hot rivets cannot be installed it is permissible to use finished bolts snugly fitted in reamed holes. Use lockwasher with bolts and draw nuts up tight. Weld a new member to adjacent members in the same manner that the replaced member was welded.

After installation of any new frame member check the frame for proper alignment as described in paragraph 12-1. After any repairs or replacements in front end of frame be sure to check front wheel alignment (par. 7-17).

12-3 BODY MOUNTINGS

At each *closed body* mounting point a rubber shim is placed between the body and frame, a rubber insulator washer is placed under the frame side rail flange or hanger, and flat steel washers and a tubular spacer limit compression of the rubber parts to a predetermined amount as the body bolt is tightened. See figure 12-4. This form of mounting eliminates metal-to-metal transmission of road and chassis noise into the body.

At each *convertible coupe* mounting point a solid composition shim is placed between the body and the frame, and a flat washer and bolt anchors the body to the frame. See figure 12-5.

In addition to the parts shown in figures 12-4 and 5, steel shims are added as required at individual mountings to compensate for variations in body and frame in order to insure a firm mounting without distortion of body. Whenever it becomes necessary to remove body mountings, care must be taken to reinstall all of the mounting parts and steel shims in their exact original positions.

Closed bodies should not be re-shimmed to correct distortion of door openings. These openings should be shaped as required by the use of body jacks. The body should rest firmly on all mountings before bolts are tightened and steel shims should be added where body does not contact a mounting. Shims for this purpose are furnished under group 9.023.

Convertible bodies may be re-shimmed in cases where door locks do not latch securely after door is properly adjusted in body opening. In such cases, shims placed under the ends of body will close in the body door opening sufficiently to insure proper latching of door locks.

When body bolts are tightened use a torque wrench to tighten all bolts uniformly to 25-30 ft. lbs. torque. The specified torque is very necessary to insure proper compression of convertible body mounting shims, and to insure tightening against the spacers in closed body mountings. Excessive tightening must be avoided as distortion of mountings will result.

12-4 DESCRIPTION OF SHEET METAL

a. Front End Sheet Metal Assembly

The front end sheet metal assembly consists of both fender skirts and tie bar, hood latch mounting panel, radiator grill, radiator pan, radiator core and mounting strap, fan shroud, horns and brackets, and lower gravel deflector. See figure 12-6.

All parts are joined together in an assembly that may be removed and installed as one unit, or the separate parts may be replaced without difficulty. The front end of the sheet metal assembly is supported and stabilized by attachment of the fender skirts to the frame side rails by means of bolts provided with rubber shims similar to body mountings. See figure 12-7. The rear ends of front fenders are attached directly to the body cowl.

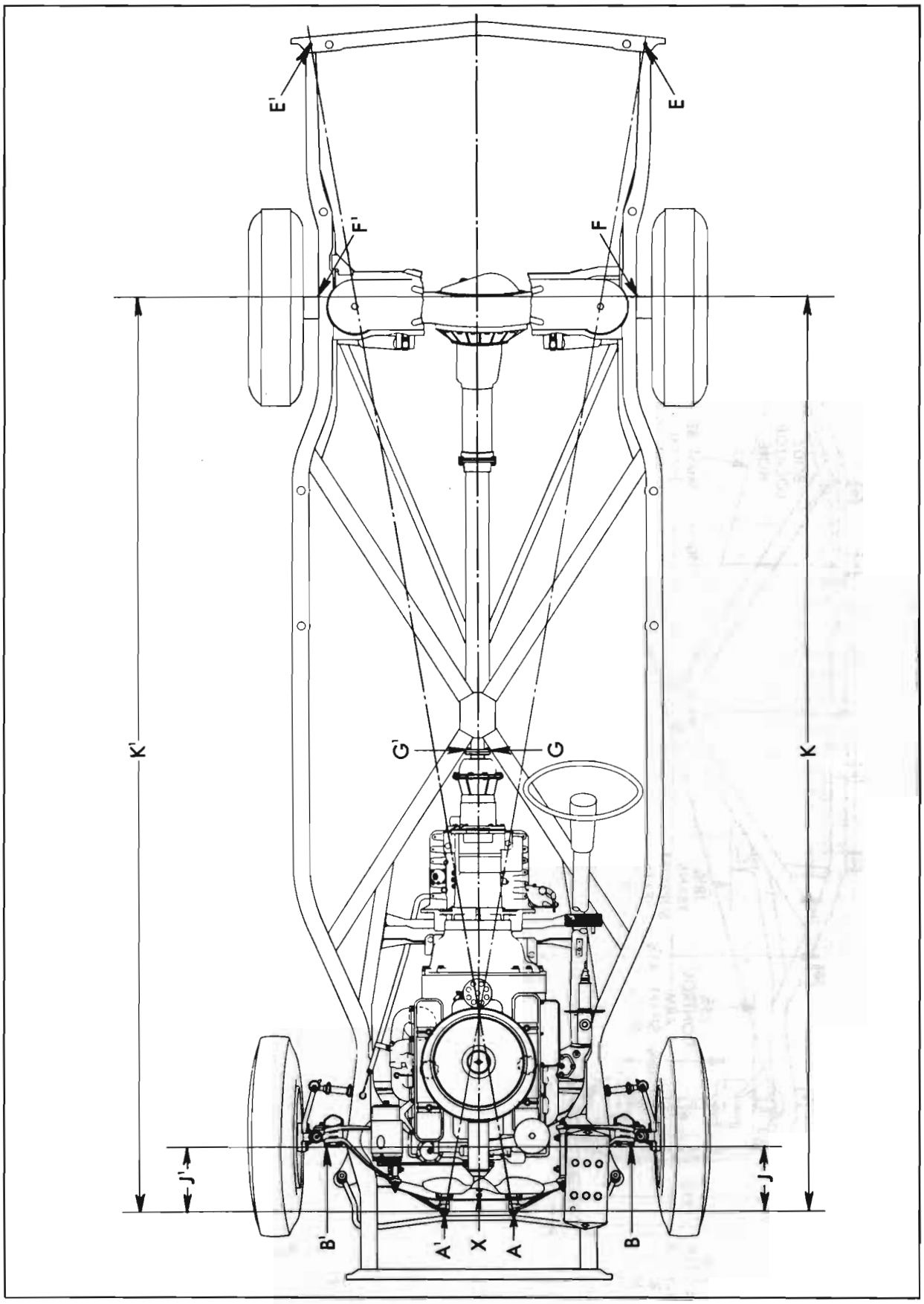

Figure 12-1—Checking Frame and Suspension Alignment

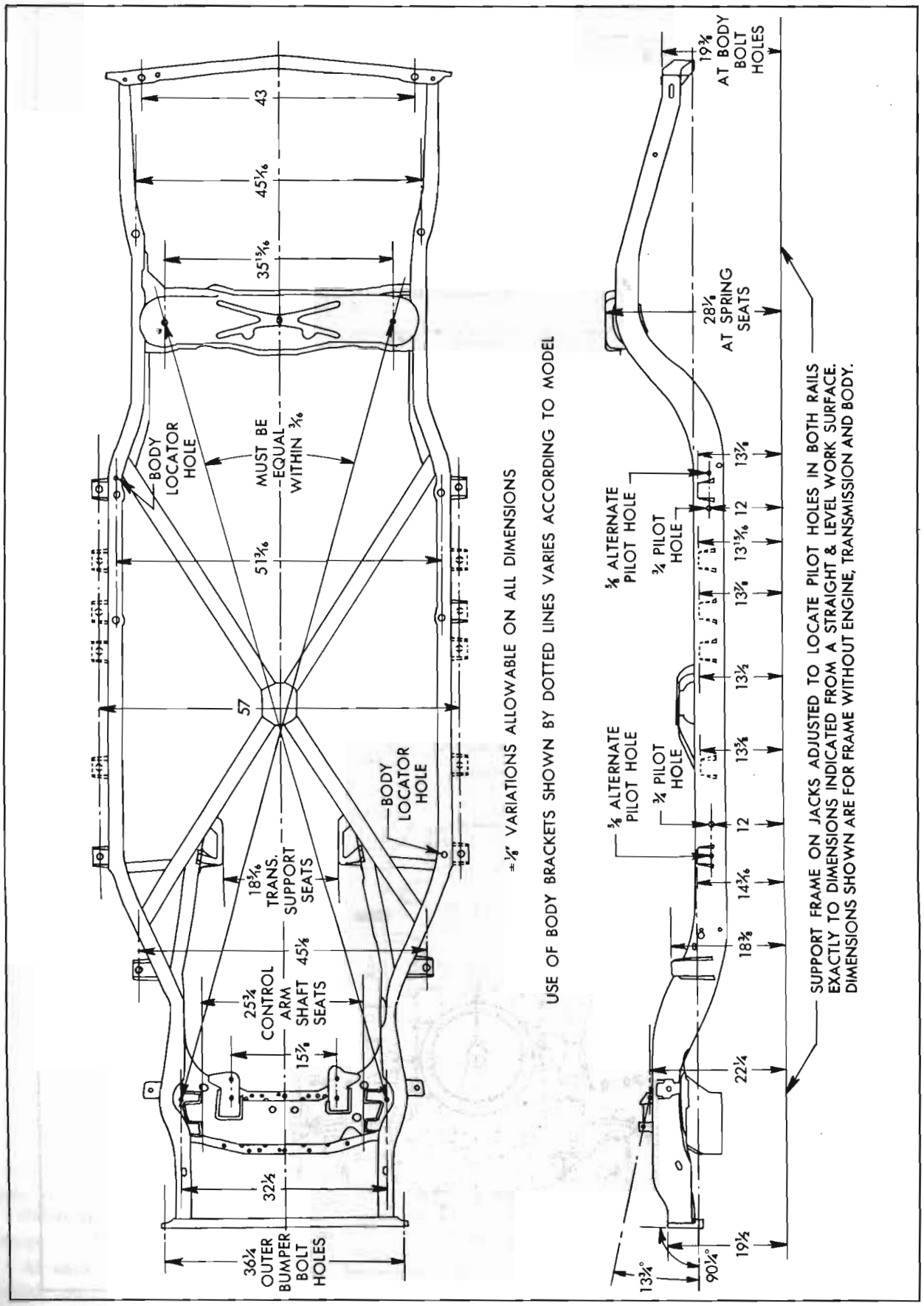

Figure 12-2—Frame Checking Dimensions—Series 40-60

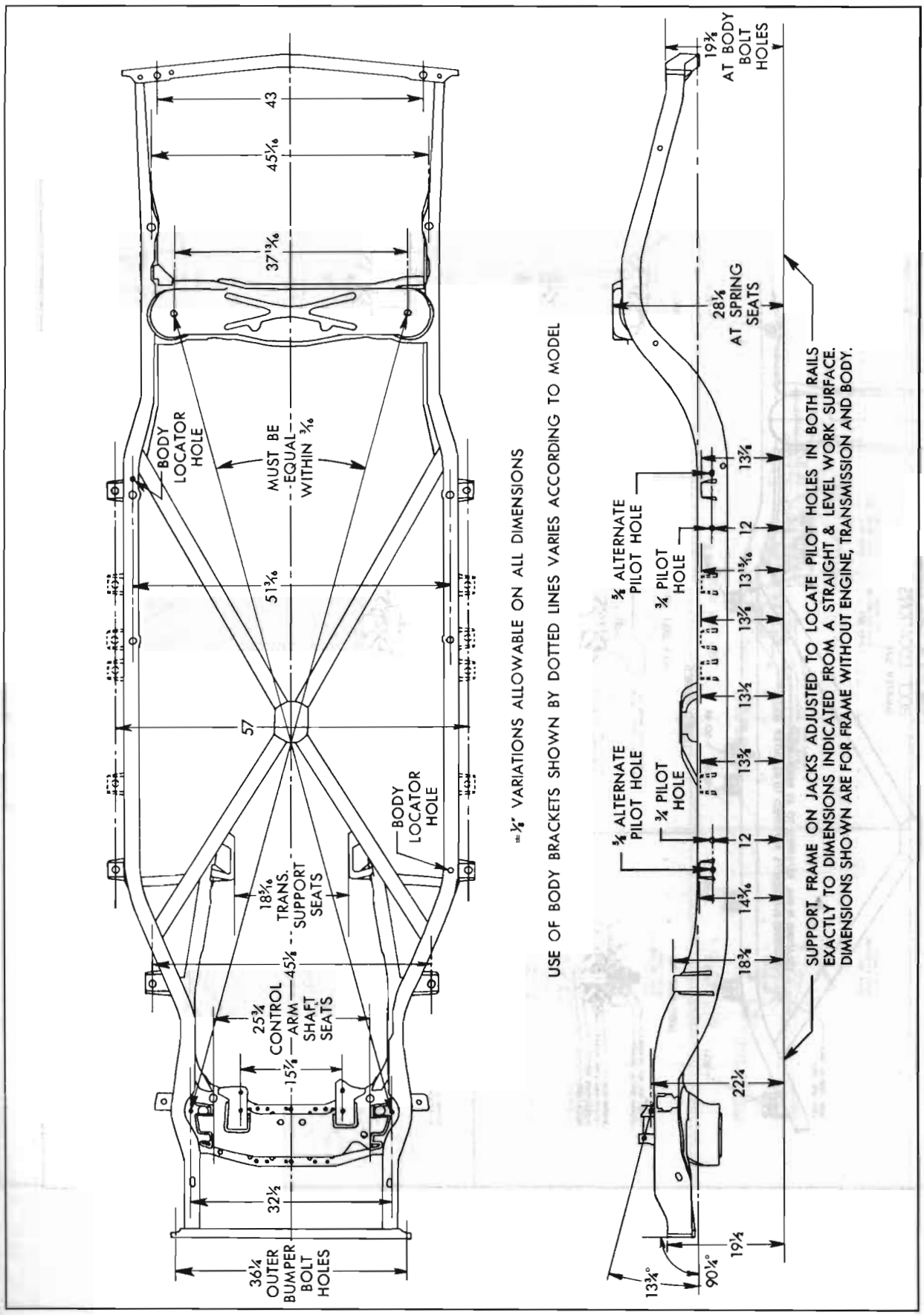

Figure 12-3—Frame Checking Dimensions—Series 50-70

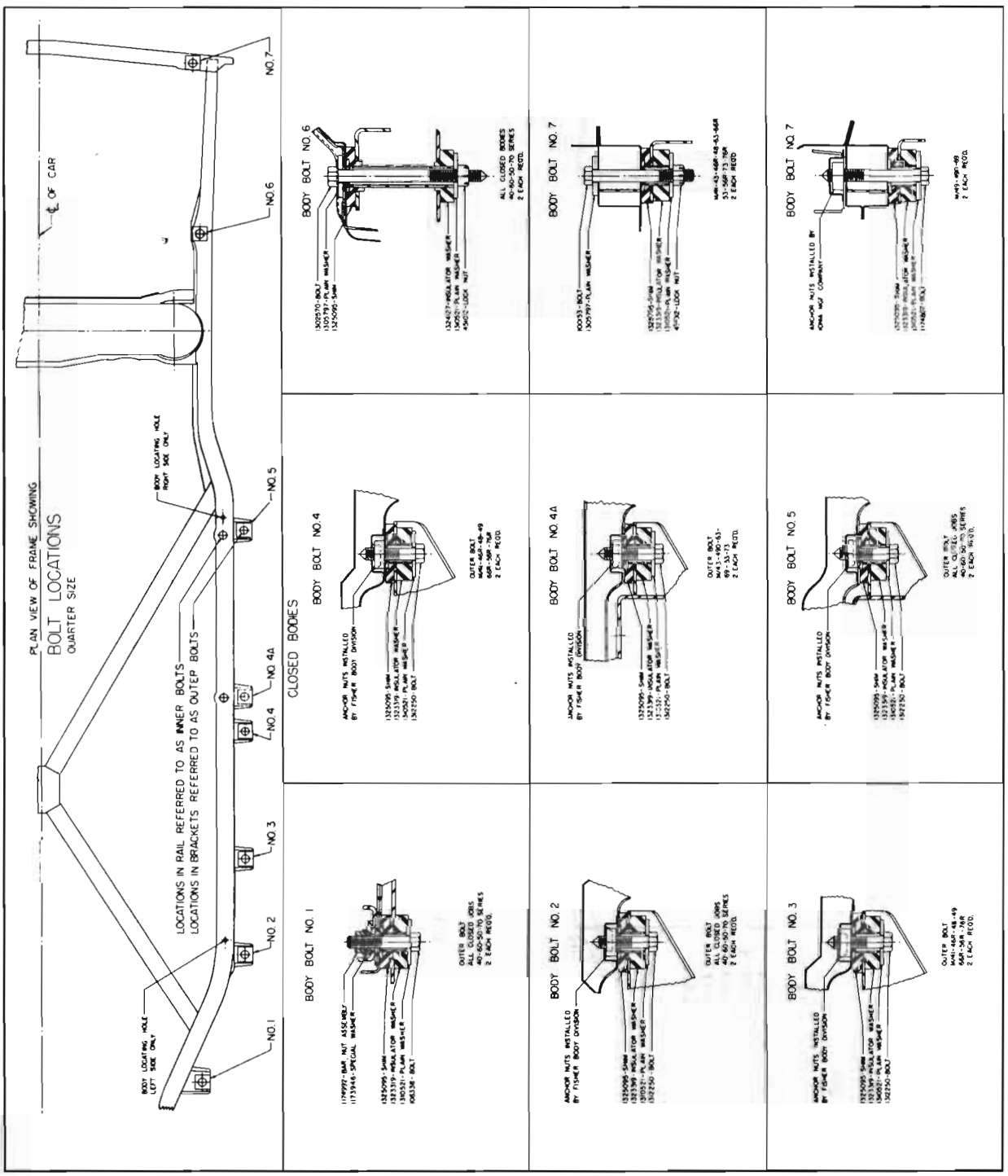

Figure 12-4—Body Mountings—Closed Bodies

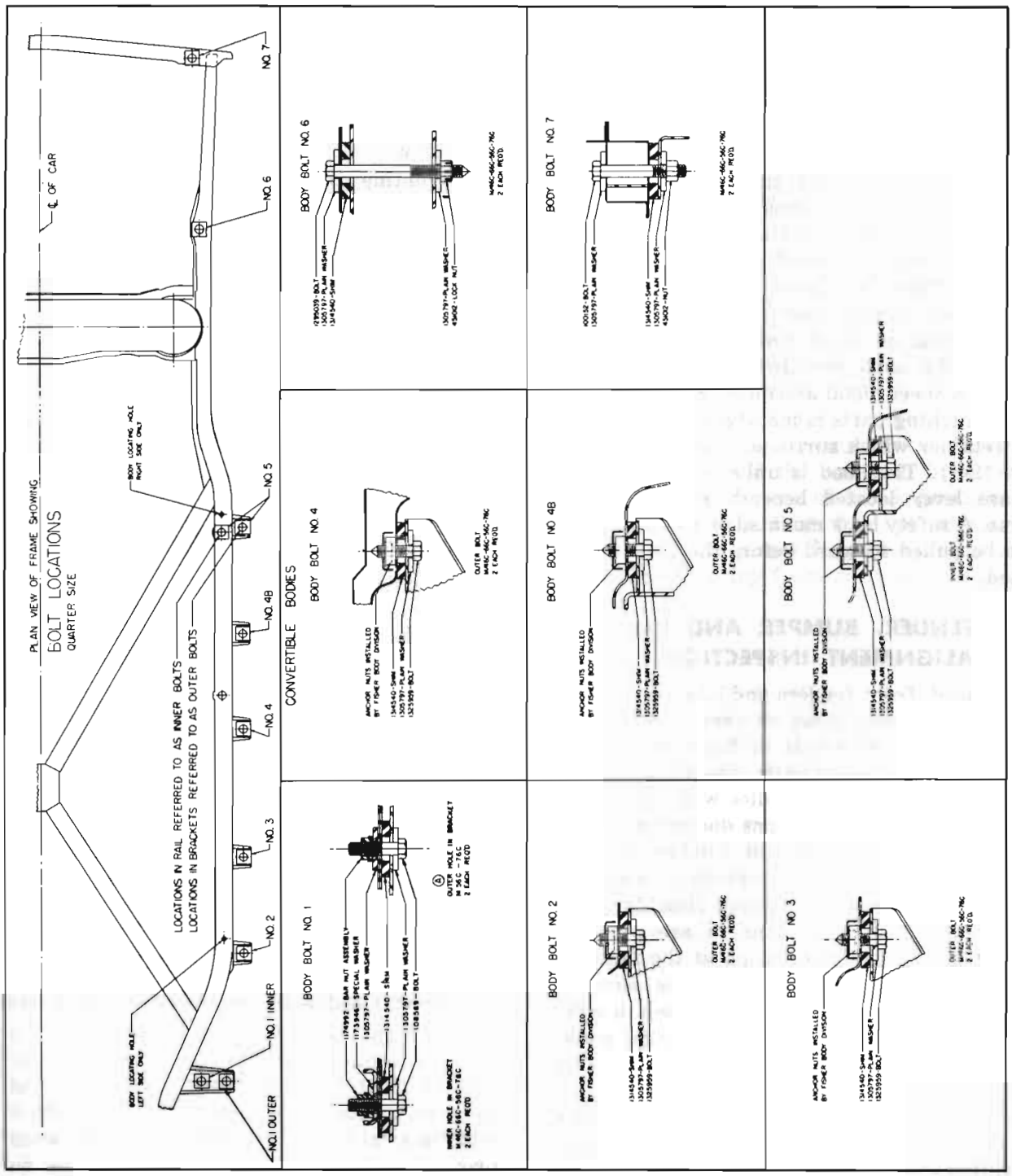

Figure 12-5—Body Mountings—Convertible Bodies

b. Hood, Hinges, and Latch Mechanism

The hood panel is of one-piece construction which is strengthened and held to shape by front and rear transverse reinforcements of stamped sheet steel. The front end is also strengthened by a brace attached to the panel under the hood ornament to the center of the front reinforcement.

The rear end of the hood is attached to the body cowl on each side by hinge assemblies which permit the front end of hood to be raised, alligator type. A heavy coil spring connected between each hinge assembly assists in raising the hood, and holds it in the open position. The springs exert a downward pull when hood is in closed position. See figure 12-8.

The front end of hood is locked down by a dovetail bolt on hood which engages a lock lever in the latch mounted on a panel of the front end sheet metal assembly. Proper tension on the latching parts is maintained by a spring and retainer which surrounds the dovetail bolt (fig. 12-8). The hood is unlocked by lifting a release lever located beneath radiator grille frame. A safety hook mounted on the hood must then be pulled forward before the hood can be raised.

12-5 FENDER, BUMPER AND HOOD ALIGNMENT INSPECTION

The hood, front fenders and bumper must be aligned with each other on every car to take care of slight variations in form and dimensions of the individual parts. Sheet metal parts stamped in a given set of dies will vary somewhat in form and dimensions due to variations in the hardness of different batches of sheet metal, which cause the stampings to spring in varying amounts when released from the dies.

The hood and front fenders are properly aligned during the installation at the factory; however, some readjustment may be required after a car has been shipped or has been in service for some time. This is because sheet metal parts may take a different "set" as a result of vibration and shock incident to shipping or operation during the break-in period. In judging the need for readjustment it must be understood that exactly uniform fit and spacing cannot be obtained on all cars of a given model.

a. Hood Noises or Panel Flutter

Squeaks or grunting noises in the hood when driving over rough roads do not necessarily indicate misalignment of hood and fenders. These noises may be caused by metal contact at some point where clearance should exist or by worn or dry hood bumpers.

If the hood squeaks, check with $\frac{1}{16}$" thick feeler all around the hood for clearance at radiator grille frame, fenders and cowl. If an edge of metal is making contact at any point where clearance should exist a bright metal spot will usually be found. Such spots may be depressed by spring hammering to provide clearance.

A grunting noise in the hood is usually caused by dry rubber bumpers or cowl ledge lacing. Lubricate all rubber bumpers on fender rails and cowl with Lubriplate. To correct a persistent case of squeaking or grunting where hood top panel contacts ledge lacing, even when lubricated, cement a $\frac{1}{16}$" thick strip of felt to panel where the lacing makes contact.

To prevent hood panel flutter, the rear end of hood panel must have firm contact with the rubber lacing attached to cowl ledge. The hood may be raised or lowered by adjustment at hinges. See figure 12-8.

b. Preliminary Tightening

Before deciding upon any adjustment to correct hood or fender misalignment it is advisable to check tightness of all attaching screws and bolts, since a true picture of correction requirements cannot be obtained when the sheet metal is loose and free to shift.

fter all parts are properly tightened inspect fender and hood alignment (subpar. *c*) and hood alignment (subpar. *d*). Make all inspections before performing any adjustments because an adjustment at one point will usually alter alignment at other points. The preliminary inspection should determine the adjustments that will produce the best overall alignment of hood and fenders at all points.

c. Fender and Hood Alignment at Front Doors

With front doors closed there should be no metal-to-metal contact between doors and rear ends of front fenders. Check for clearance at frequent points, using a strip of fibre or other soft material $\frac{1}{32}$" thick. The spacing between rear end of front fenders and the shoulder on front edge of doors should be approximately $\frac{1}{8}$", and fairly uniform from top to bottom.

Before making any adjustment of sheet metal to provide necessary clearance at points mentioned, first make sure that front doors

are properly aligned in the body openings. If fender and door panel surfaces are not reasonably flush, correction may be made by adding or removing shims between the fender and the cowl panel.

Where spacing between rear end of front fender and edge of door is objectionably uneven from top to bottom it may be necessary to adjust the shims between frame rails and the sheet metal supports on front fender skirts. See figure 12-7.

d. Hood Alignment Inspection

When closed and locked, the hood should bear firmly against the rubber bumpers on lower hood latch mounting panel and the rubber lacing attached to the cowl ledge.

A clearance of approximately 1/8" should exist between each side of hood and the fender, and the spacing should be fairly uniform from front to rear. Along the sides, the hood and fender contours should be in reasonably close horizontal alignment.

A clearance of approximately 1/8" should exist between the rear edge of hood and the shoulder of cowl panel, and the spacing should be fairly uniform from side to side.

Raise and lower the front end of hood slowly several times to check for proper alignment between the dovetail bolt in hood and the latch on sheet metal panel. Dovetail bolt should enter the opening in latch without any side strain or other interference. See figure 12-8.

12-6 FENDER, BUMPER AND HOOD ADJUSTMENT AND REPLACEMENT

a. Front Fender and Bumper Adjustment

If the front end of the sheet metal assembly is too high or too low, resulting in objectionably unequal vertical spacing between front fenders and doors, it will be necessary to change the shims located under the supports on front fender skirts. Adjustment of shims also may be required if the front end of the sheet metal assembly is tilted to right or left so that proper alignment of hood and fenders cannot be obtained by hood adjustment.

At the point where each front fender skirt support is attached to frame rail a rubber shim is placed on each side of the frame rail top flange, with a steel washer 1/8" steel shim and tubular spacer placed to control compression of the rubber shims as the bolt is tightened. Two steelbestos shims are placed between the 1/8" steel shim and the fender skirt. When additional shimming is required one or more extra steel shims .060" thick are placed between the steelbestos shims and the fender skirt. See figure 12-7.

The front bumper attaching bolt holes in frame front cross member are slotted vertically to permit raising or lowering either end of the bumper for proper alignment with adjacent parts. Special shims are available for insertion between the bumper back bar and frame cross member to move bumper forward as may be required for proper alignment with adjacent parts.

b. Removal and Installation of Hood Springs

1. Support hood in extreme "up" position, preferably by chain fall if available.

2. To remove hood spring, insert Remover and Installer J-6325 through loop in forward end of spring with bend of tool approximately one inch from loop. Push tool toward rear of car, using inside corner formed by hinge as a pivot. Unseat spring from notch and move tool into notch.

3. Then push tool *forward,* causing hood spring to slide clear of hinge.

4. To replace hood spring, insert Remover and Installer J-6325 through loop in forward end of spring. Push tool *rearward,* using hinge as a pivot, and seat spring into notch.

c. Removal and Installation of Hood Assembly

1. Support hood in extreme "up" position.

2. Place folded rags under rear corners of hood to prevent possible damage to fenders.

3. Scribe a reference line along edge of each hinge flange so hood can be replaced in same position.

4. Remove four hood hinge to hood bolts.

5. Lift hood from car.

6. To install, reverse above procedure.

d. Hood Adjustments

1. *Rear Height.* This is determined by two adjustable bumpers. The rear of the hood will always pull down to these bumpers. However, rear hood tension may also need adjusting as described in step 2.

2. *Rear Tension.* Too little tension is indicated if the rear hood area flutters. To increase tension, add shims between the hood and the hinges at the front bolts.

Too much tension is indicated if the rear area of the hood bends as it is closed. To decrease tension, add shims between the hood and the hinges at the rear bolts.

3. *Fore and Aft.* The slotted bolt holes in the hinges allow the hood to be moved fore and aft. Before adjusting, scribe a reference line along the edge of each hinge flange. Then loosen the hinge to hood bolts and shift the hood from this line as required. To adjust the front end of the hood sideways, shift the hood at one hinge only.

4. *Front Height.* This is determined by two adjustable bumpers. However, the front of the hood may not contact these bumpers unless the hood latch is correctly adjusted as described below.

5. *Latch Alignment.* The hood upper latch position cannot be shifted appreciably, therefore any adjustment must be made at the lower latch. Make sure that the hood is properly adjusted as described above, then loosen the six lower latch and guide mounting bolts. Close the hood, thereby causing the lower parts to shift into alignment with the upper parts. Open the hood and tighten the bolts, being careful not to disturb the lower latch and guide.

6. *Latch Tension.* This is determined by the length of the latch bolt. If the front of the closed hood is not held tight against the bumpers, the latch bolt is adjusted too long. If the hood can't be closed or is hard to close, the latch bolt may be adjusted too short.

To adjust the latch bolt, loosen the jam nut on the upper end and turn the bolt by means of the screwdriver slot in the lower end. Then tighten the jam nut and close the hood to recheck latch tension.

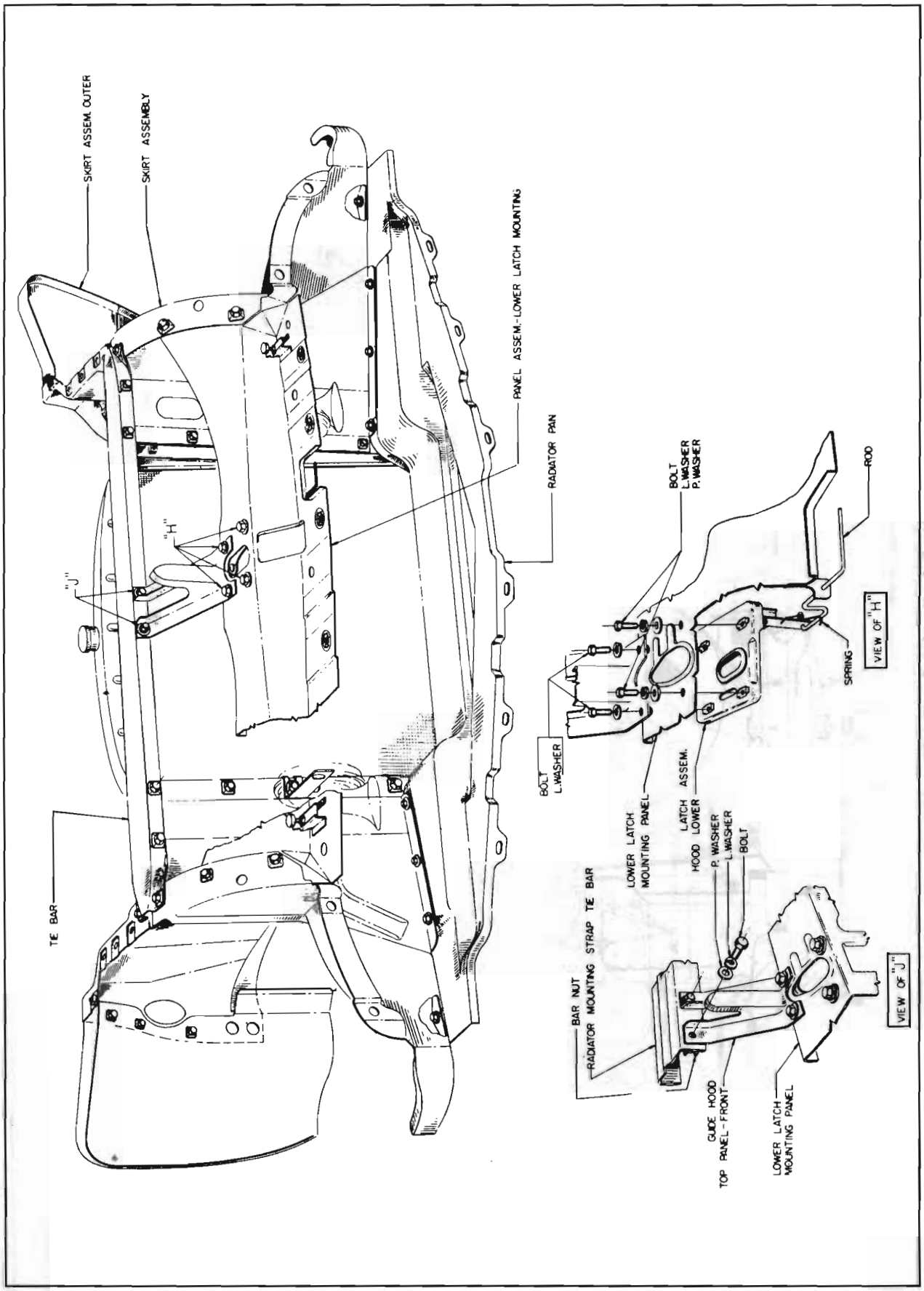

Figure 12-6—Front End Sheet Metal—Front View

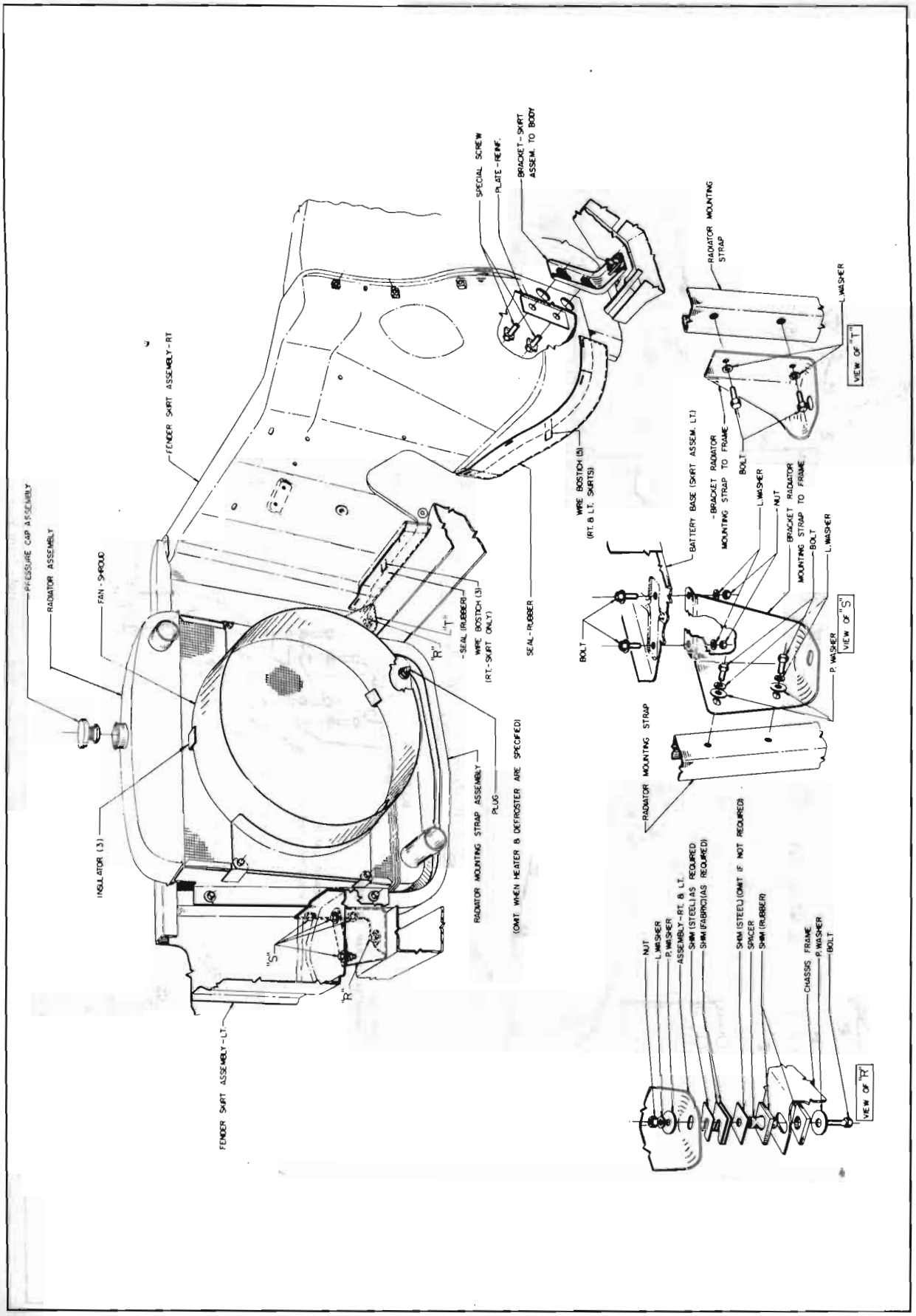

Figure 12-7—Front End Sheet Metal—Rear View

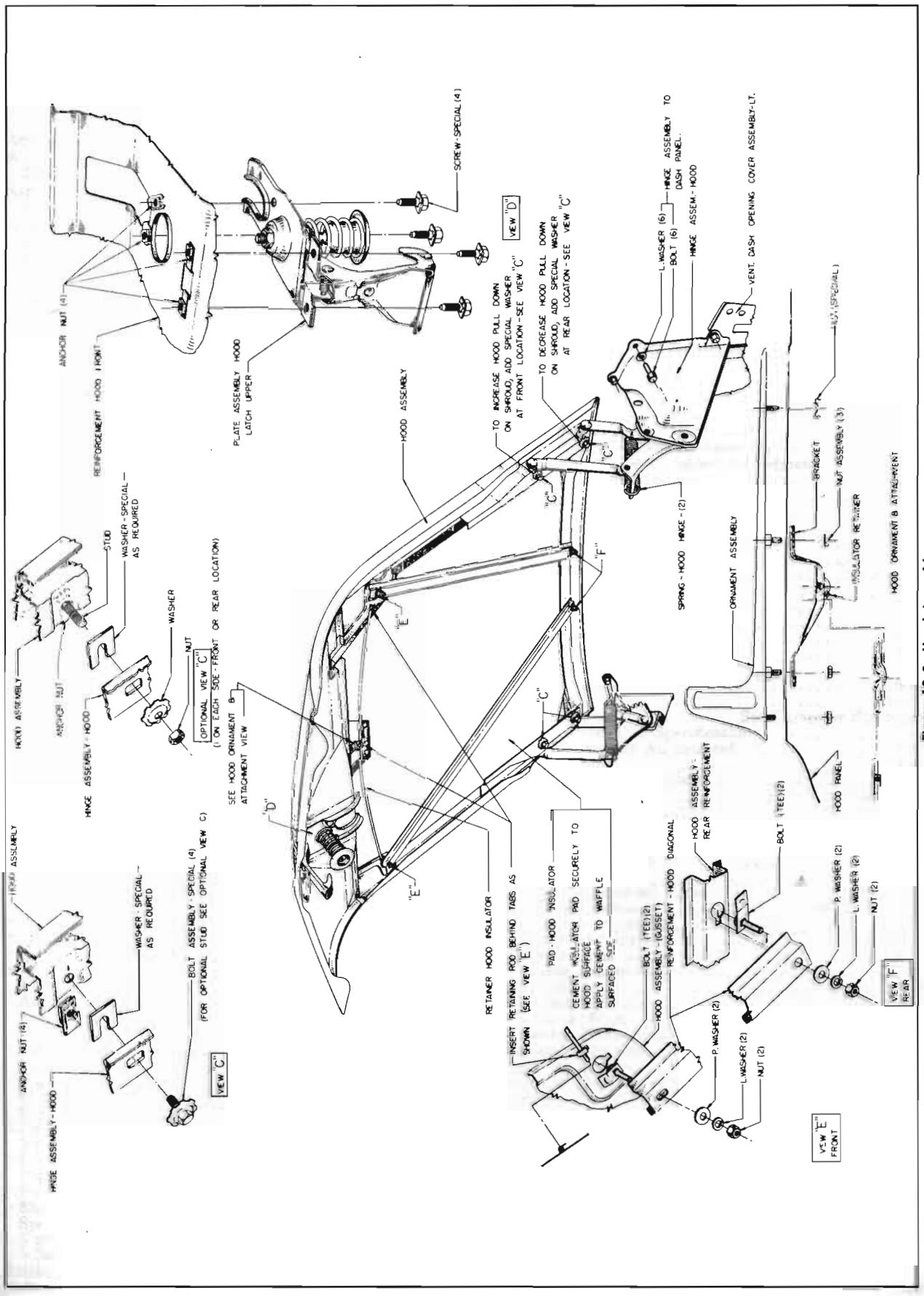

Figure 12-8—Hood Assembly