SECTION 3

UNDERBODY

INDEX

UNDERBODY ALIGNMENT ALL CORVAIR STYLES

GENERAL BODY CONSTRUCTION

The body design used on the 10000 series is of an integral, all steel, welded construction, commonly known as "unitized" body construction. The over-all rigidity of the body is drawn from each of the individual metal components which, when welded together, comprise the body shell assembly. Panels forming the underbody area incorporate attachment provisions for the power train and the suspension systems. These panels, therefore, contribute the greatest amount of strength to the body assembly.

UNDERBODY GENERAL SERVICE INFORMATION

The underbody assembly is comprised of frame side rails, frame cross rails, floor pan cross bars, inner and outer rocker panels and other floor panel components. The underbody is of all-welded construction. The slightest misalignment in the underbody can affect door, front compartment lid, and engine compartment lid fits. Most important, however, underbody misalignment can influence the suspension system, thereby causing many of the problems that arise from a suspension misalignment. It is essential, therefore, that underbody alignment be exact to within 1/16" of the specified dimensions.

In the event of collision damage it is important that underbody alignment be thoroughly checked and, if necessary, realigned in order to accurately establish suspension, steering and engine mounting locations. There are many classifications of tools that may be employed to correct the average collision damage situation including frame straightening machines, lighter external pulling equipment and standard body jacks.

Frame tools are not considered as essential equipment for average collision repair operations; however, there will be many situations with this unitized type of construction as with other types of frame construction, where frame equipment will be required. There are also areas of repair where, even though not essential, frame equipment may prove beneficial.

IMPORTANT: Since each individual underbody component contributes directly to the over-all strength of the body, it is essential that proper welding, sealing and rust proofing techniques be observed during service operations. Underbody components should be rust-proofed whenever body repair operations, which destroy or damage the original rust-proofing, are completed. Particularly critical are the enclosed box areas. When rust-proofing critical under body components, it is essential that a good quality type of air dry primer be used (such as corrosion resistant zinc chromate). It is not advisable to use combination type of primer surfacers.

To assist in checking alignment of the underbody components, repairing minor underbody damage or locating replacement parts, the following underbody dimensions and alignment checking information is presented.

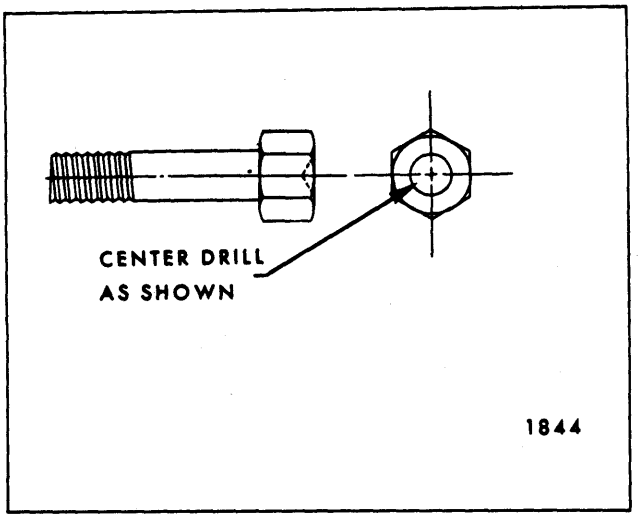

Fig. 3-1—Tram Gage Centering Bolt

ALIGNMENT CHECKING INFORMATION

Body Tram Gage

An accurate method of determining the alignment of the underbody utilizes a measuring tram gage. The tram gage required to perform all recommended measuring checks properly must be capable of extending to a length of 102". At least one of the vertical pointers must be capable of a maximum reach of 18"

Dimensional checks indicated in the upper portion of Figure 3-2 are calculated on a horizontal plane parallel to the plane of the underbody. Precision measurements can be made only if the tram gage is also parallel to the plane of the underbody. This can be controlled by setting the vertical pointers on the tram gage according to the dimensional checks shown in the lower portion of Figure 3-2. For actual dimensions, see charts in text.

A proper tramming tool is essential for analyzing and determining the extent of collision misalignment present in underbody construction.

To facilitate centering the tram gage pointers at the suspension locations, special centering bolts (same size and thread as original attaching bolts) may be prepared as shown in Figure 3-1. Use center of bolt thread diameter for centering drill point. Depth of drilled-out cone should be the same for all centering bolts being used as a "set".

Underbody Alignment Reference Point Dimensions—(Fig. 3-2)

Dimensions to gage holes and other unthreaded holes are measured to dead center of the holes and

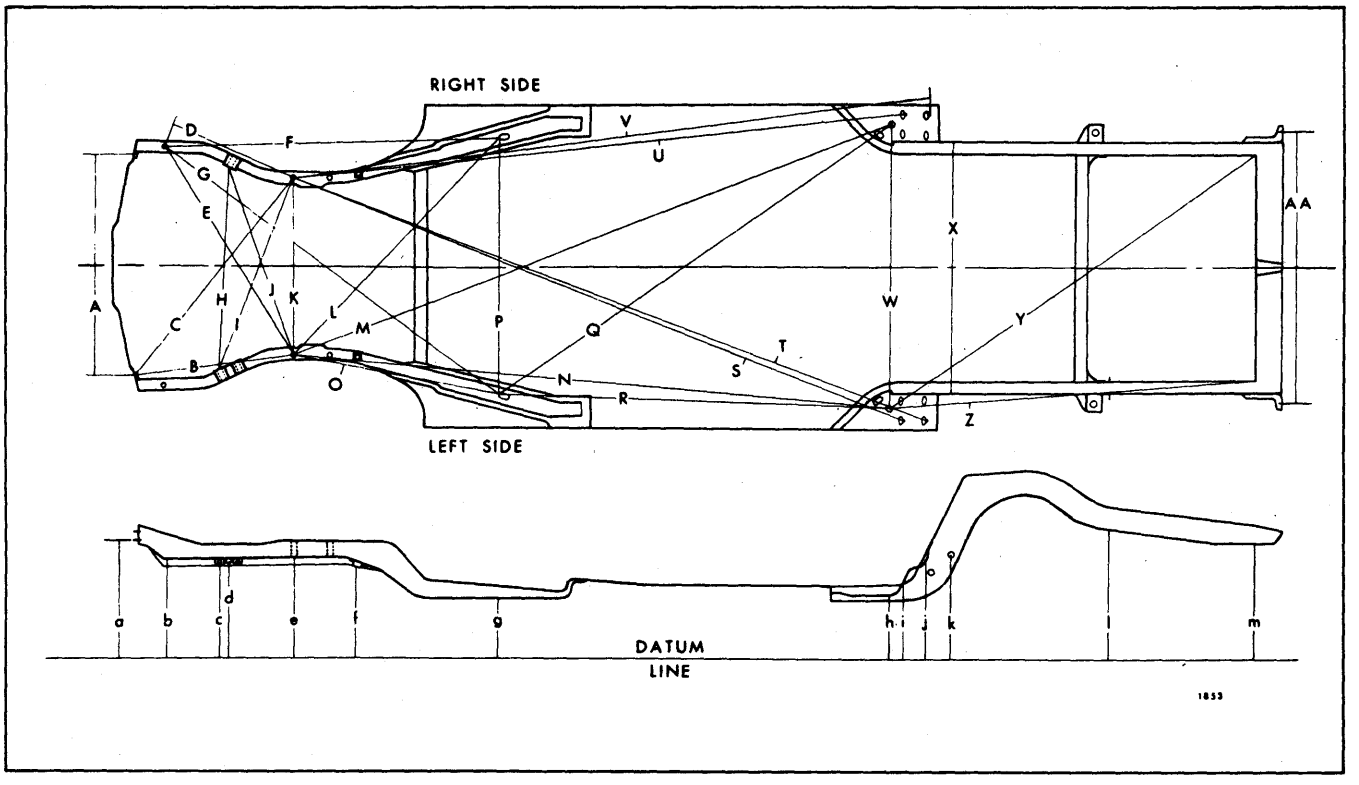

Fig. 3-2—Underbody Vertical Alignment Reference Points

flush to the adjacent surface metal. Dimensions to body front tie down slots are measured to the front centerline edge of the slot (see Fig. 3-3). Dimensions to bolt or bolt hole locations are measured to the dead center of the thread diameter of the bolt or bolt hole, unless specified otherwise.

The following reference points are key locations and should be used wherever possible as a basis for checking other reference points:

1. Front suspension front attaching bolt holes or bolt heads.
2. 3/4 inch master gage hole in motor compartment side rail-to-rocker-panel brace.
3. Rear suspension control arm lower and upper outer attaching bolt holes (upper edge of holes).

Horizontal Dimensions (Fig. 3-2)

Fig. Ref.	Dimension	Location
A	33-7/8	Center of front bumper lower attaching bolt holes.
B	24-3/8	Directly below center of front bumper lower attaching bolt hole and front suspension front attaching bolt head or bolt hole on same side of body.
C	39-1/16	Directly below center of front bumper lower attaching bolt hole and front suspension front attaching bolt hole or bolt head on opposite side of body.
D	15-7/8	3/4" hole in front compartment side rail and front suspension front attaching bolt hole or bolt head on same side of body.
E	35-9/16	3/4" hole in front compartment side rail and front suspension front attaching bolt hole or bolt head on opposite side of body.
F	46	3/4" hole in front compartment side rail and body tie down slot on same side of body (use front center of slot of side rail metal - See Fig. 3-3).
G	59-29/32	3/4" hole in front compartment side rail and body tie down slot on opposite side of body (use front center of slot of side rail metal - See Fig. 3-3).

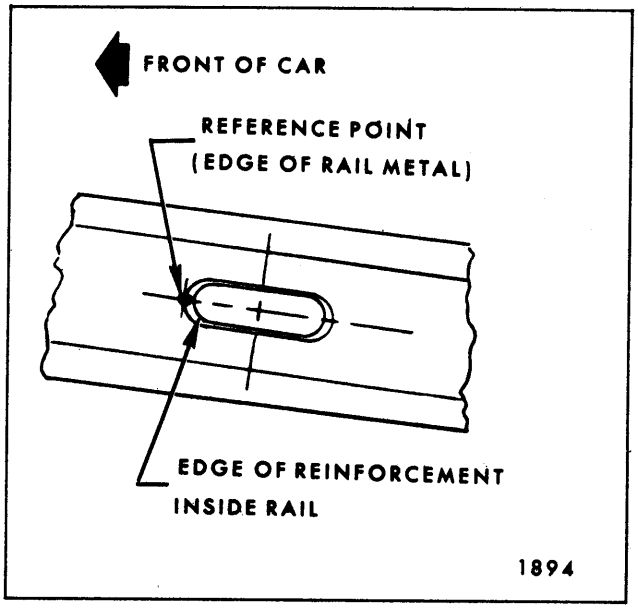

Fig. 3-3—Front Body Tie-Down Slot

H	31-7/8	Lower inner edge of steering gear reinforcement directly below center of steering gear front attaching bolt hole (Fig. 3-4) and lower inner edge of front compartment right side rail directly below center of steering gear idler arm support lower attaching bolt hole (Fig. 3-5).

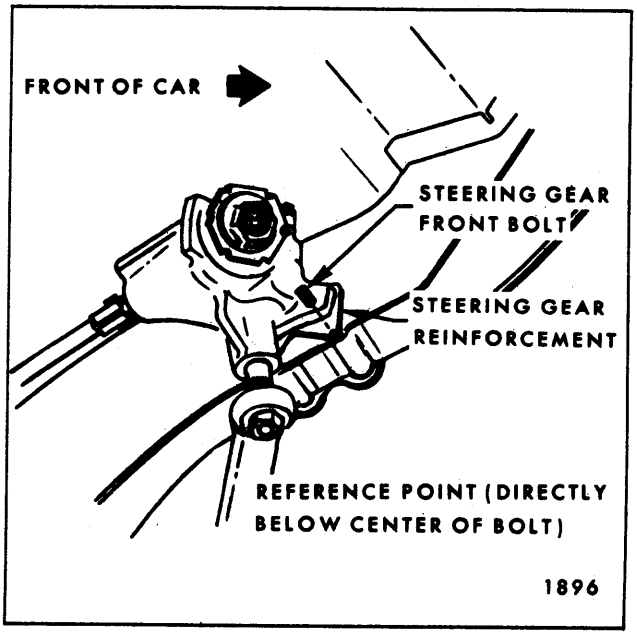

Fig. 3-4—Reference Point at Steering Gear Reinforcement

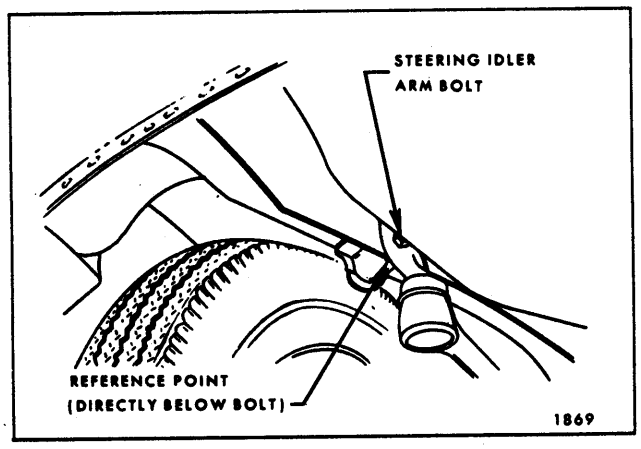

Fig. 3-5—Reference Point at Steering Idler Arm

Fig. Ref.	Dimension	Location
I	31-15/16	Lower inner edge of steering gear reinforcement directly below center of steering gear front attaching bolt hole (Fig. 3-4) and front suspension front attaching bolt hole or bolt head on opposite side of body.
J	31-1/32	Lower inner edge of front compartment right side rail directly below center of steering gear idler arm support lower attaching bolt hole (Fig. 3-5) and front suspension front attaching bolt hole or bolt head on opposite side of body.
K	27-9/16	Front suspension front attaching bolt hole or bolt head.
L	45-23/32	Front suspension front attaching bolt hole or bolt head and body front tie down slot on opposite side of body (use front center of slot of side rail metal - See Fig. 3-3).
M	96-1/8	Front suspension front attaching bolt hole or bolt head on opposite side of body and 3/4" master gage hole in motor compartment side rail-to-rocker panel brace.
N	89-9/16	Front suspension front attaching bolt hole or bolt head and 3/4" master gage hole in motor compartment side rail-to-rocker panel brace on same side of body.
O	31-3/8	Front suspension front attaching bolt hole or bolt head and body front tie down slot on same side of body (use front center of slot of side rail metal - See Fig. 3-3).
P	40-3/16	Body front tie down slot (use front center of slot of side rail metal - See Fig. 3-3).
Q	72	Body front tie down slot (use front center of slot of side rail metal - See Fig. 3-3) and 3/4" master gage hole in motor compartment side rail-to-rocker panel brace on opposite side of body.
R	58-13/32	Body front tie down slot (use front center of slot of side rail metal - See Fig. 3-3) and 3/4" master gage hole in motor compartment side rail-to-rocker panel brace on same side of body.
S	98-1/8	Front suspension front attaching bolt hole or bolt head and rear suspension control arm lower outer attaching bolt hole (upper edge of hole) on opposite side of body.
T	101-3/8	Front suspension front attaching bolt hole or bolt head and rear suspension control arm upper outer attaching bolt hole (upper edge of hole) on opposite side of body.
U	91-3/8	Front suspension front attaching bolt hole or bolt head and rear suspension control arm lower outer attaching bolt hole (upper edge of hole) on same side of body.
V	94-7/8	Front suspension front attaching bolt hole or bolt head and rear suspension control arm upper outer attaching bolt hole (upper edge of hole) on same side of body.
W	44	3/4" master gage hole in motor compartment side rail-to-rocker panel brace.

Fig. Ref.	Dimension	Location
X	38-15/16	Outside edge of motor compartment side rail directly below transmission support upper attaching bolt. **NOTE:** This dimension is constant rearward to motor compartment rear cross rail.
Y	67-1/2	3/4" master gage hole in motor compartment side rail-to-rocker panel brace and lower edge of joint of motor compartment side rail and motor compartment rear cross rail on opposite side of body.
Z	55-1/32	3/4" master gage hole in motor compartment side rail-to-rocker panel brace and lower edge of joint of motor compartment side rail and motor compartment rear cross rail on same side of body.
AA	41-5/32	Rear bumper lower attaching holes.

Vertical Dimensions (Fig. 3-2)

Fig. Ref.	Dimension	Location
a	15-3/16	Center of front bumper lower attaching bolt holes.
b	12-9/32	Front edge of 3/4" diameter paint hole.
c	11-19/32	Lower inner edge of steering gear reinforcement directly below center of front attaching bolt hole (Fig. 3-4).
d	11-17/32	Lower inner edge of front compartment right side rail directly below center of steering idler arm support lower attaching bolt hole (Fig. 3-5).
e	12-13/32	Front suspension front attaching hole (front suspension removed).
	11-13/16	Front suspension front attaching bolt (suspension installed).
f	10-1/4	Front suspension rear attaching hole (front suspension removed).
	9-3/4	Front suspension rear attaching bolt (suspension installed).
g	6	Lower surface of front compartment side rail at body front tie down slot (front center of slot). Fig. 3-3.
h	6-13/16	3/4" master gage hole in motor compartment side rail-to-rocker panel brace.
i	8-3/4	Rear suspension control arm lower outer attaching bolt hole (upper edge of hole).
j	12-3/4	Rear suspension control arm upper outer attaching bolt hole (upper edge of hole).
k	13-13/32	Transmission support upper attaching bolt hole or bolt head.
l	18	Lower surface of motor compartment side rail at a point 1 inch rearward of rear edge of motor compartment corner reinforcement.
m	15-3/32	Lower surface of motor compartment side rail adjacent to front edge of motor compartment rear cross rail.

UNDERBODY ALIGNMENT
CAMARO AND FIREBIRD "F" BODIES
CHEVY NOVA AND ACADIAN "X" BODIES

GENERAL BODY CONSTRUCTION

The "F" and "X" series bodies are of unitized construction. A stub frame supports the front end sheet metal, front suspension, engine and other mechanical components. Unitized construction demands that underbody components be properly

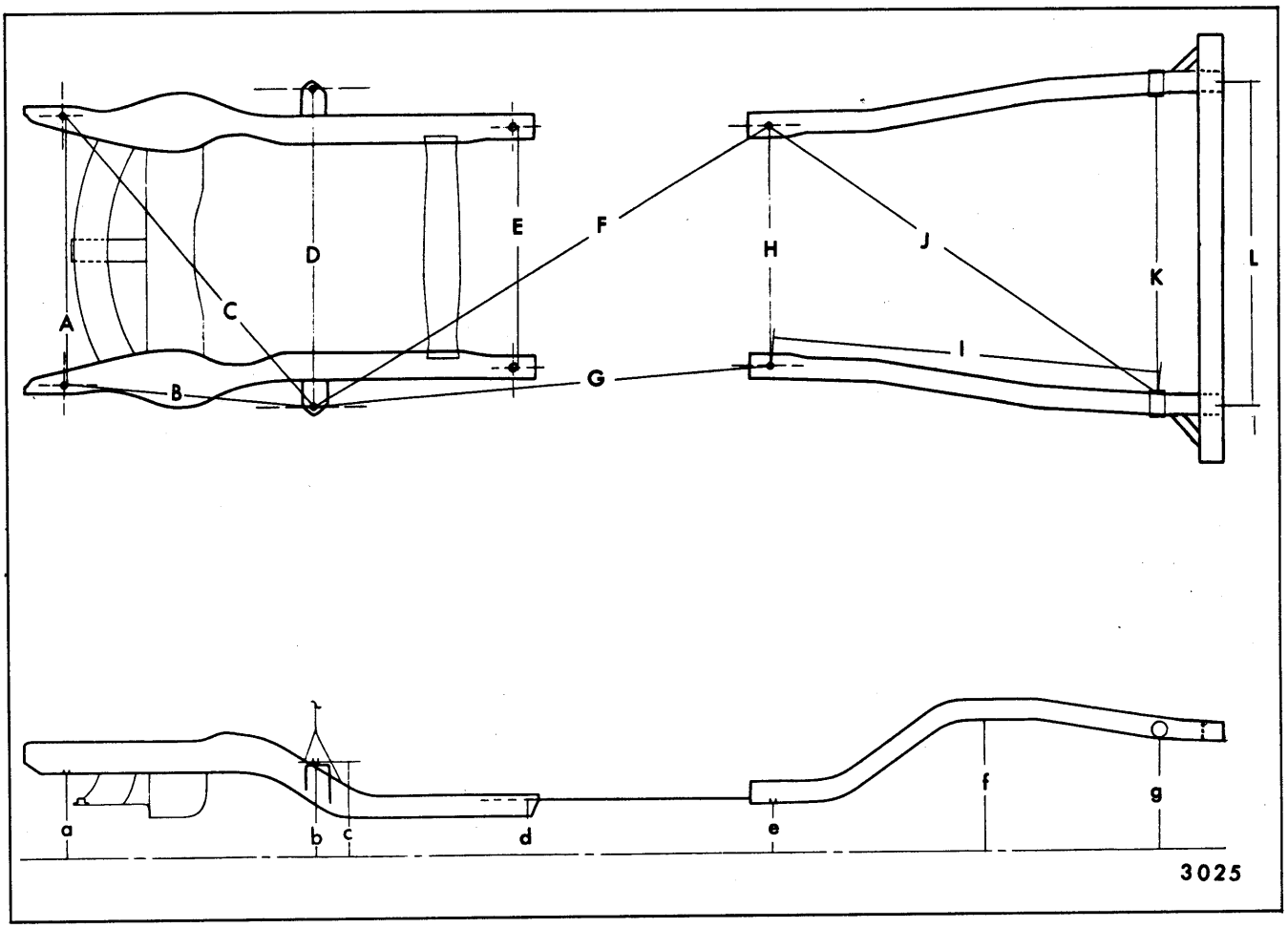

Fig. 3-6—Horizontal & Vertical Checking Dimensions (Chevy Nova & Acadian "X" Bodies)

aligned to assure correct suspension location. In the event of collision damage, it is important that the underbody be thoroughly checked and, if necessary, realigned in order to accurately establish proper dimensions.

Since each individual underbody component contributes directly to the over-all strength of the body, it is essential that proper welding, sealing and rust-proofing techniques be observed during service operations. Underbody components should be rust-proofed whenever body repair operations, which destroy or damage the original rust-proofing, are completed. When rust-proofing critical underbody components, it is essential that a good quality type of air dry primer be used (such as corrosion resistant zinc chromate). It is not advisable to use combination type primer-surfacers.

The tools and materials needed to check alignment and repair collision damage are described in the preceding Corvair Underbody Alignment section.

To assist in checking alignment of the underbody components, repairing minor underbody damage or locating replacement parts, the following underbody dimensions and alignment checking information is presented.

Underbody Alignment Reference Point Dimensions—(Fig. 3-6 for Chevy Nova and Acadian "X" Bodies) (Fig. 3-8 for Camaro & Firebird "F" Bodies)

Dimensions to gage holes are measured to dead center of the holes and flush to adjacent surface metal unless otherwise specified. The master gage holes, adjacent to the #1 body mount and in the side rails near the rear spring front attachment, are key locations and should be used wherever possible as a basis for checking other reference points.

Horizontal Dimensions— Chevy Nova & Acadian "X" Bodies (Fig. 3-6)

Fig. Ref.	Dimension	Location
A	38-1/4	Rear edge at centerline of 7/8" hole in lower surface of rail approximately 2" rearward of lower front edge of rail.

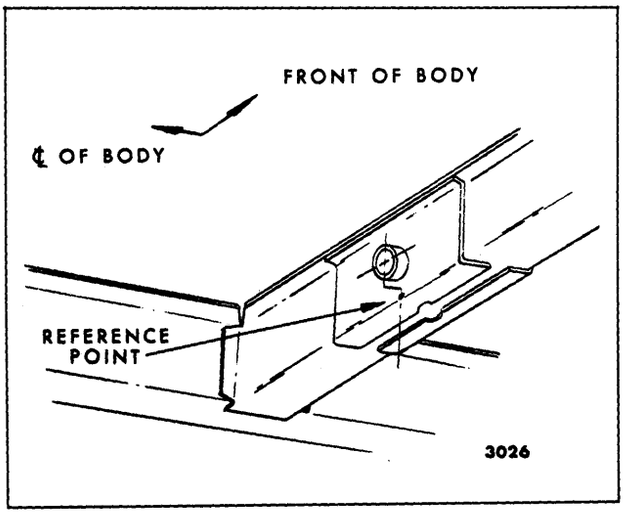

Fig. 3-7—Side Rail at Rear Spring Rear Shackle Bushing (Chevy Nova & Acadian "X" Bodies)

Fig. Ref.	Dimension	Location
B	35-1/4	Rear edge at centerline of 7/8" hole in lower surface of rail approximately 2" rearward of lower front edge of rail and center of master gage hole adjacent to #1 body mount on same side of body.
C	54-3/16	Rear edge at centerline of 7/8" hole in lower surface of rail approximately 2" rearward of lower front edge of rail and center of master gage hole adjacent to #1 body mount on opposite side of body.
D	44-9/16	Center of master gage hole adjacent to #1 body mount.
E	33-3/4	Rear edge at centerline of #2 body mount bolt hole.
F	79-1/16	Center of master gage hole adjacent to #1 body mount and center of master gage hole in side rail on opposite side of body.
G	69	Center of master gage hole adjacent to #1 body mount and center of master gage hole in side rail on same side of body.
H	33-3/16	Center of master gage hole in side rail.
I	54-11/16	Center of master gage hole in side rail and a point at inboard edge of same side rail at centerline of shackle bolt hole (See Fig. 3-7).
J	66-3/8	Center of master gage hole in side rail and a point at inboard edge of opposite side rail at centerline of shackle bolt hole (See Fig. 3-7).
K	42-5/8	Inboard edge of side rail at centerline of shackle bolt hole (See Fig. 3-7).
L	41-15/16	Center of rear bumper lower attaching bolts.

Vertical Dimensions— Chevy Nova & Acadian "X" Bodies (Fig. 3-6)

Fig. Ref.	Dimension	Location
a	10-1/8	7/8" hole in lower surface of rail approximately 2" rearward of lower front edge of rail.
b	10-15/16	Master gage hole adjacent to #1 body mount in frame.
c	11-13/16	Master gage hole adjacent to #1 body mount on body.
d	6-21/32	Floor pan adjacent to #2 body mount bolt cage nut.
e	6-7/16	Master gage hole in side rail.
f	12-7/32	Lower surface of side rail at kick up either side of rear axle housing.
g	10-5/16	Lower surface of side rail at centerline of shackle bolt hole.

Horizontal Dimensions— Camaro & Firebird "F" Bodies (Fig. 3-8)

Fig. Ref.	Dimension	Location
A	38-1/4	Rear edge at centerline of 7/8" hole in lower surface of rail approximately 2" rearward of lower front edge of rail.
B	35-1/4	Rear edge at centerline of 7/8" hole in lower surface of rail approximately 2" rearward of lower front edge of rail and

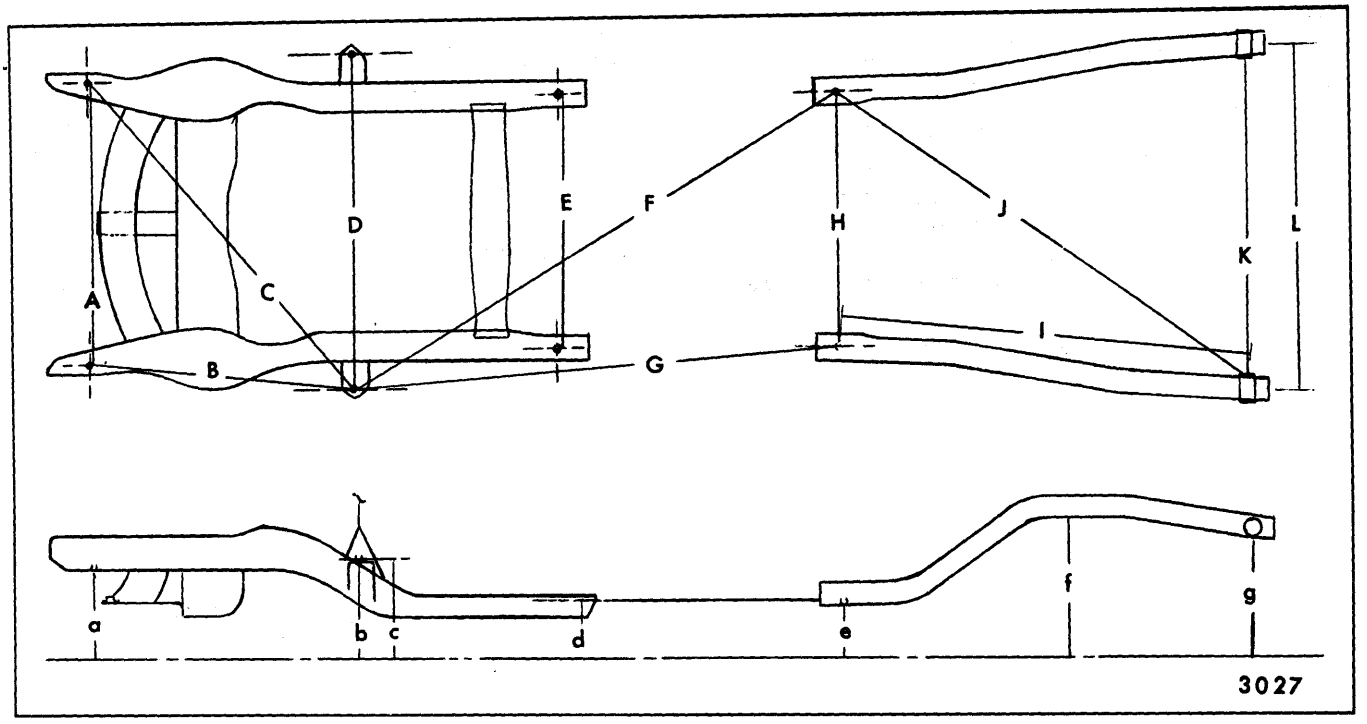

Fig. 3-8—Horizontal & Vertical Checking Dimensions (Camaro & Firebird "F" Bodies)

Fig. Ref.	Dimension	Location
		center at master gage hole adjacent to #1 body mount on same side of body.
C	54-3/16	Rear edge at centerline of 7/8" hole in lower surface of rail approximately 2" rearward of lower front edge of rail and center of master gage hole adjacent to #1 body mount on opposite side of body.
D	44-9/16	Center of master gage hole adjacent to #1 body mount.
E	33-3/4	Rear edge at centerline of #2 body mount bolt hole.
F	76"	Center of master gage hole adjacent to #1 body mount and center of master gage hole in side rail on opposite side of body.
G	65-1/4	Center of master gage hole adjacent to #1 body mount and center of master gage hole in side rail on same side of body.
H	33-1/2	Center of master gage hole in side rail.
I	55-3/16	Center of master gage hole in side rail and a point at inboard edge of same side rail at centerline of shackle bolt hole (See Fig. 3-7).
J	66-11/16	Center of master gage hole in side rail and a point at inboard edge of opposite side rail at centerline of shackle bolt hole (See Fig. 3-7).
K	42-7/8	Inboard edge of side rail at centerline of shackle bolt hole (See Fig. 3-7).
L	44-7/8	Center of rear bumper lower attaching bolts.

Vertical Dimensions— Camaro & Firebird "F" Bodies (Fig. 3-8)

Fig. Ref.	Dimension	Location
a	11-15/16	7/8" hole in lower surface of rail approximately 2" rearward of lower front edge of rail.
b	12-9/16	Master gage hole adjacent to #1 body mount in frame.

Fig. Ref.	Dimension	Location
c	13-13/16	Master gage hole adjacent to #1 body mount on body.
d	9-1/8	Floor pan adjacent to #2 body mount bolt cage nut.
e	6-15/16	Master gage hole in side rail.
f	18-7/16	Lower surface of side rail at kick up either side of rear axle housing.
g	15-11/16	Lower surface of side rail at centerline of shackle bolt hole.