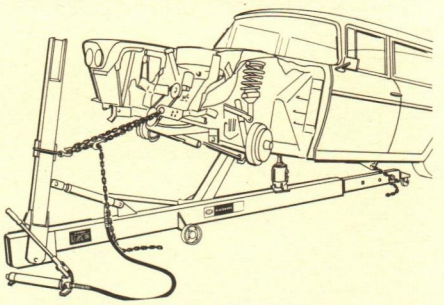
Porto-Power®
AUTO REPAIR GUIDE



PUBLISHED BY BLACKHAWK MFG. CO., MILWAUKEE, WISCONSIN DM-301-FC

REPAIRING the FORD FALCON and COMET

This guide book to collision-damage repair of the Ford Falcon and Comet is designed as a general description of how to correct front end and cowl side damage, utilizing Blackhawk's complete system of body and frame straightening tools — portable external pulling machines, Porto-Power, gages, clamps and accessories. Reference should be made to Blackhawk DM-301 Manual, "Repairing Frames and Unitized Body Construction", for additional auto repair information, that will help work proceed simply and smoothly.

The Ford Falcon and Comet do not employ a conventional frame to which the front suspension, engine and power train are normally attached. The underbody contributes strength to the vehicle through the use of box sections which consist of sheets of steel welded together. The front suspension member assembly is an integral part of the body, while the rear suspension member assembly is similar to the frame-type assembly. Galvanizing acts as a rust preventative.

Since many body parts in the Falcon and Comet are structural or load-bearing members, they must be returned to the *equivalent* of their *original condition* when repaired. This can be accomplished in a number of ways: replacing a member with a new part if the damage is severe; cutting out a strip of the floor forming the top of the member and replacing it with a smooth patch, if the wrinkles cannot be removed; welding on a reinforcing strip if necessary. All members must be returned to their original shape without wrinkles or excess thinning of the metal.

The following members in the Falcon and Comet have important structural requirements and should be repaired with care: rear cross members; the cross member near the rear wheel center line; rear frame side members; the sill rocker panel section; the front of the body sill; the cowl side and top panels; upper flange of the front fender apron; engine support cross members; all underbody cross members and floor pan areas that form a part of them; front frame cross member; suspension mounting parts and the front frame side rails. Welding of these members is particularly important.

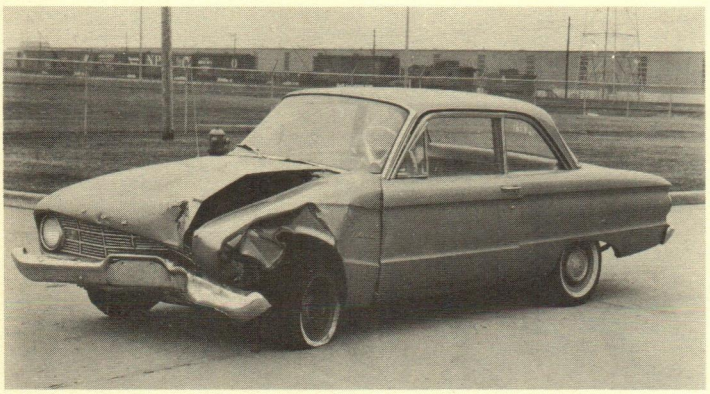


Figure 1



Figure 2

FRONT END DAMAGE

To illustrate repair techniques, a 1960 Falcon was used. Similar techniques apply to the Comet. Figure 1 shows severe front end damage caused by collision with a utility pole. The left door hinge pillar was driven back, causing poor door fit and a crease in the front edge of the door. The suspension system was driven into the cowl. Separation between the right door and front fender is pointed out in Figure 2 and was caused by the direction, location and force of impact. Figure 3 illustrates the results of impact. It is suggested that a rough sketch of this type be made to help analyze damage and plan repairs.

There are two types of collision damage repair to be considered: *Replacement* of damaged parts and *repair* of damaged parts. These are emphasized because the choice of whether to *repair* or *replace* and to what *extent*, should be based on more than the economy of repair. Safety and strength must also be considered.

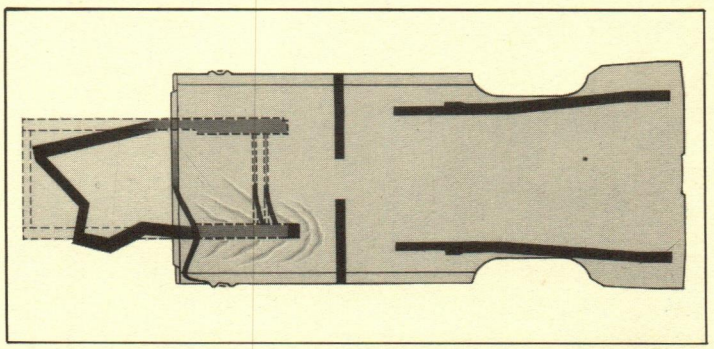


Figure 3

Copyright Blackhawk, 1961

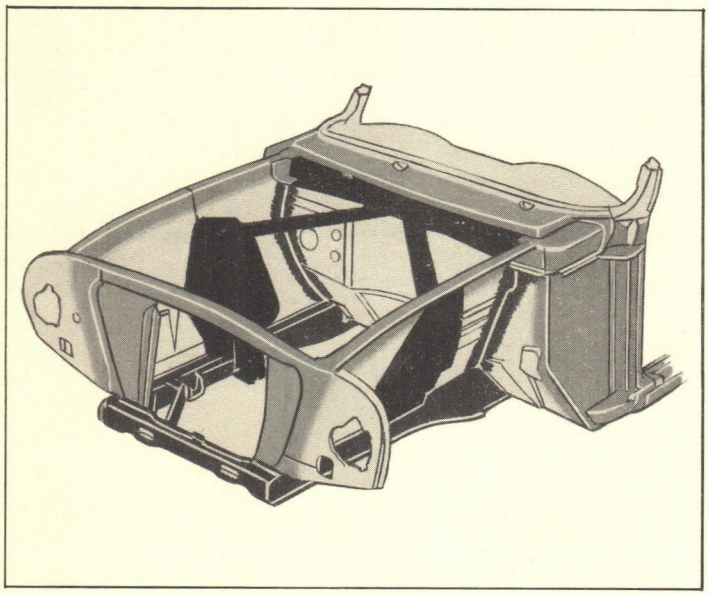


Figure 4

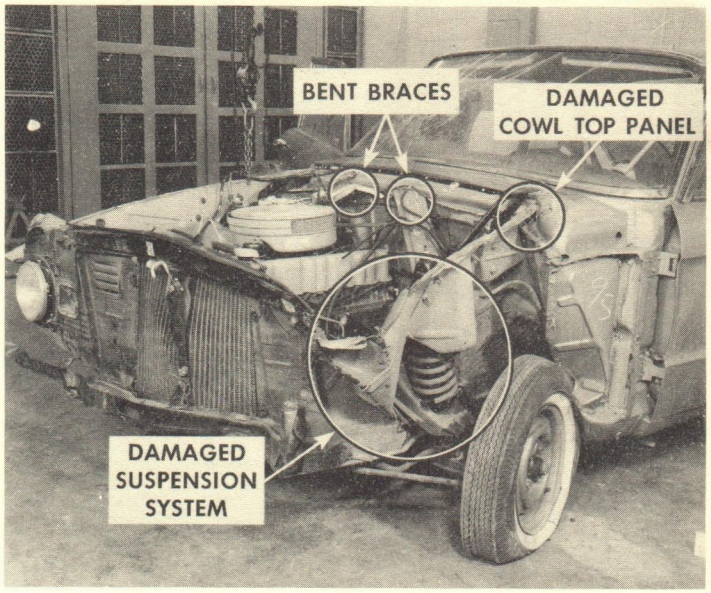


Figure 5

In Figure 4 strength requirements are approximated by the darkness of color. The lightly shaded areas should be given more than normal attention in repair and the darker shaded areas should be put in *very good* condition.

Figure 5 shows the left-front wheelhouse panel driven back into the cowl top panel; the left-front frame rail was forced into the cross member under the seat. The lower dash panel was severely distorted by the frame rail. Both fender braces to the dash were bent and must be properly repaired or replaced.

The left-front frame side member with the inner fender skirt will have to be replaced; however, it will be used to pull out the damage done to the cowl-dash panel. The radiator core support assembly will have to be replaced, as well as the front cross member for safety, economy, and strength factors. The front suspension lower arm mounting bracket adaptor and gusset on the left-front side will have to be completely replaced — both for safety and alignment.

The results of the frame rail being driven back into the floor pan and cross member are illustrated in Figure 6. Note the deep wrinkles and buckles and the condition of the floor pan that forms the top half of the cross member. This area must be brought back to nearly original condition. Also note the damage in the glove box area of the instrument panel. This is typical of front-end collisions.

Figure 7 shows the set-up using a Blackhawk Damage-Dozer portable body and frame straightener for pulling the left-front frame rail forward and up to help straighten the cowl panel. The Damage-Dozer is anchored by using a pair of Blackhawk EK-130 Underbody Clamps connected by a cross tube, which the Damage-Dozer anchor post pushes against. The Damage-Dozer is chained to the left-front frame rail. *All* measurements must be checked and *all* damage inspected before pulling, so that any correcting will not cause further damage. The front section was brought back into general alignment by using this hook-up to pull the left-front frame rail forward and up. A similar hook-up pulled the right-front frame rail forward.

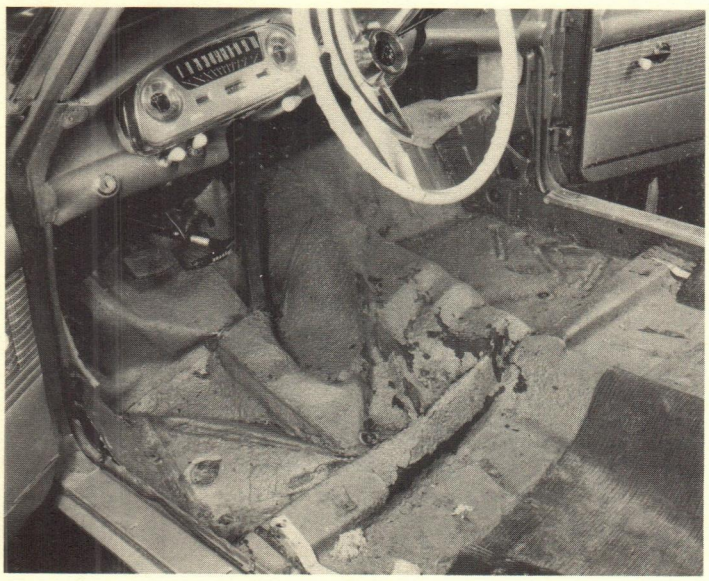


Figure 6

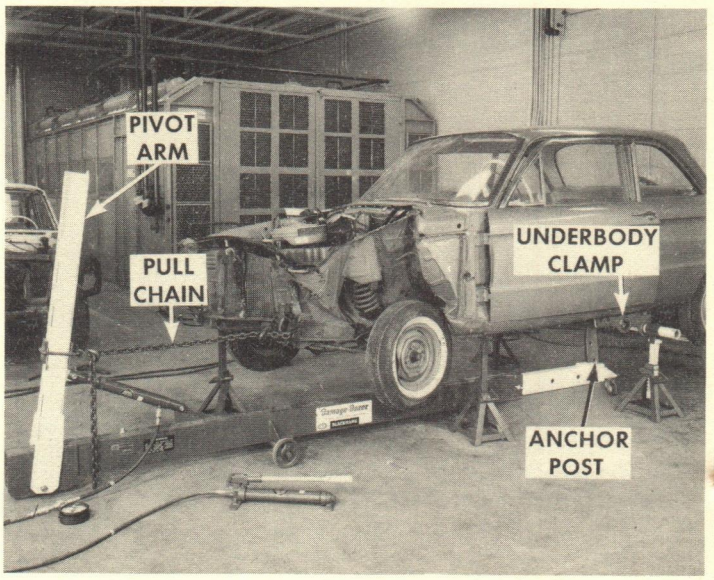


Figure 7

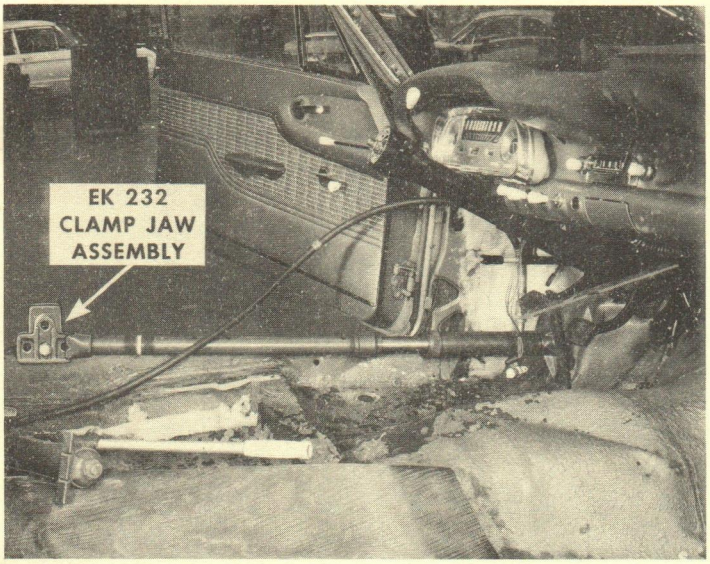


Figure 8

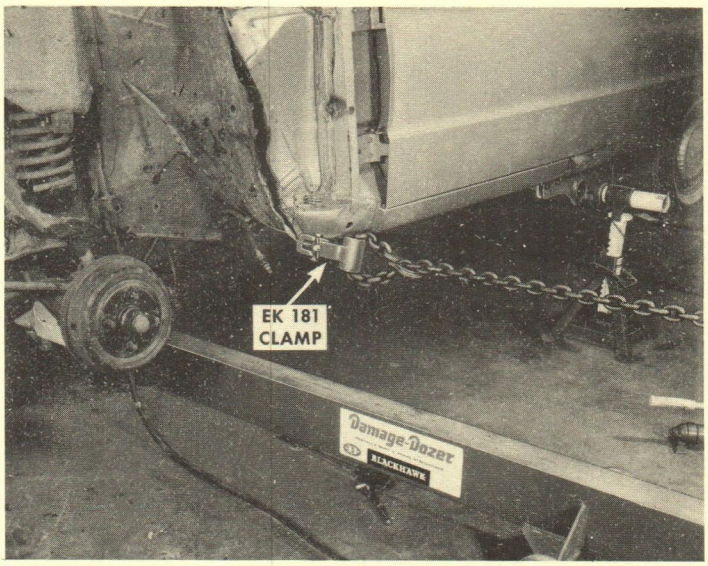


Figure 9

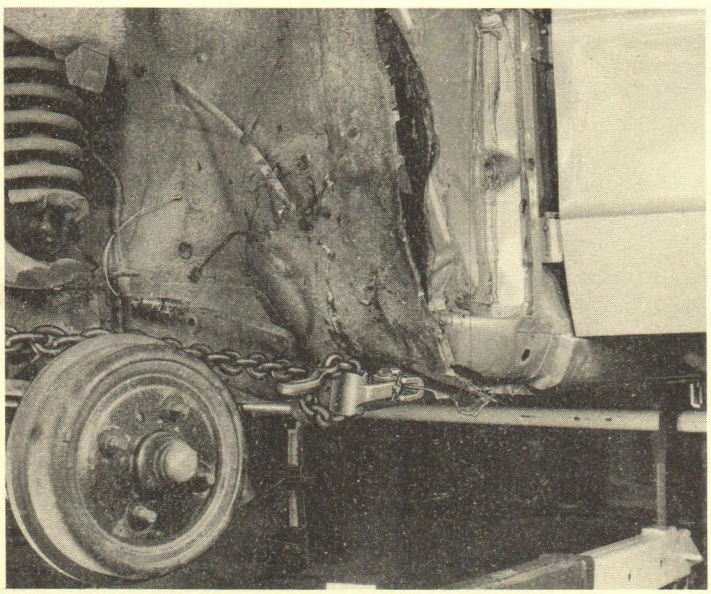


Figure 10

While pulling with the hook-up shown in Figure 7, a Porto-Power Ram was used to assist pushing the cowl-dash panel forward to help straighten out the wrinkles in the floor pan. An EK-232 Blackhawk Clamp was used as an anchor for the Porto-Power (Figure 8).

The Damage Dozer was then used in a side hook-up (Figure 9). An EK-181 Blackhawk Clamp helped pull the floor pan back into original condition. The Damage-Dozer was anchored on the right-front frame support. After this panel has been sufficiently straightened, it will be welded back together to come as close as possible to the original condition. This is for structural and safety purposes.

Figure 10 shows the Damage-Dozer connected to an EK-181 Clamp on the floor pan, using a chain around the pivot arm. The anchor post of the Dozer is pushing against the support tube connecting the EK-130 Underbody Clamps.

The clamp in Figure 11 is pulling on the floor pan. This view from the inside of the automobile demonstrates the pulling action needed to remove wrinkles in the floor pan and cross member.

In Figure 12 the Damage-Dozer, used in conjunction with the EK-181 clamp, pulled the top section of the cowl-panel forward. This panel was damaged when the front fender skirt assembly was driven back into it. Note the position of the yoke in the EK-181 clamp. This is the position that will cause a self-tightening action as the yoke is pulled.

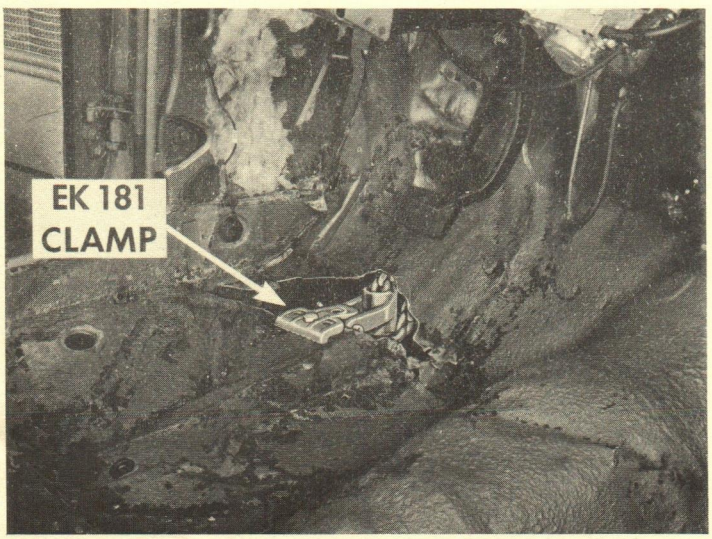


Figure 11

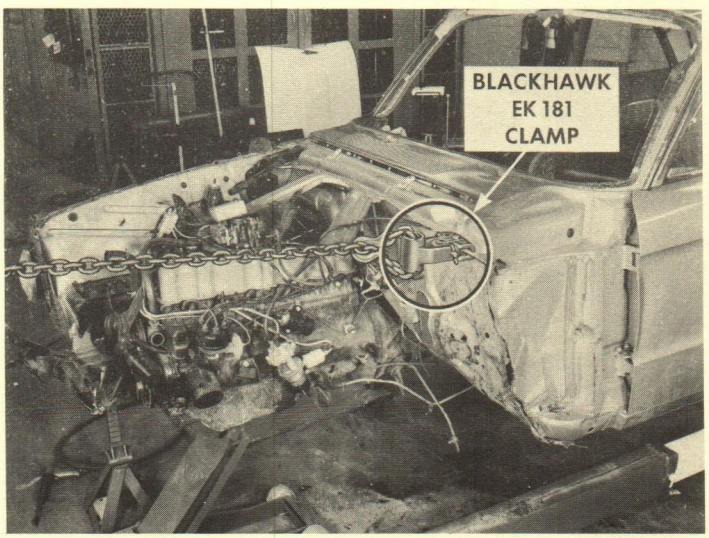


Figure 12

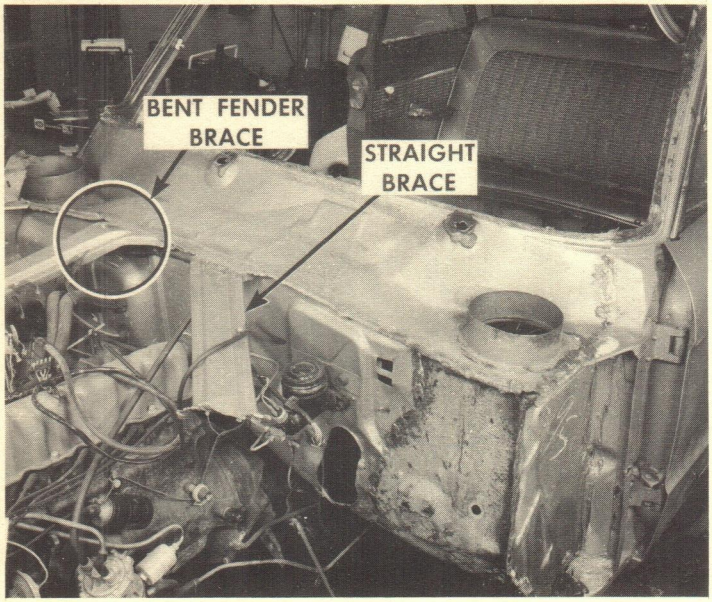


Figure 13

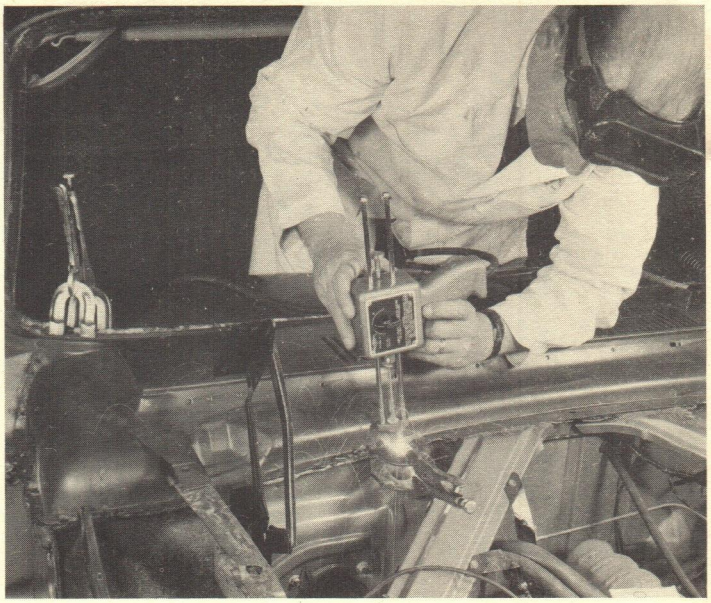


Figure 14

In Figure 13 the cowl top panel has been removed since it cannot be economically repaired. The cowl side panel and front section of the cowl dash panel have been restored to their original condition and welded securely. (Note: It is important that these welds are structurally sound.) Note that the brace between the fender and dash is still bent and will have to be straightened. However, the left fender-to-dash brace has already been properly straightened and will help to locate the front suspension arm mounting bracket.

A new cowl top panel is being spot welded into place in Figure 14. Spot welding is employed to prevent unwanted damage due to warping of the metal from excessive heat which could be caused by other welding methods.

The radiator core support assembly is clamped securely to the fender skirt panels prior to final welding assembly (Figure 15). In addition, the left fender skirt panel is clamped to the cowl top panel in preparation for tack welding.

The next repair step is shown in Figure 16 where the fender skirt and the frame side member have been welded to the cowl dash panel in preparation for final alignment. This assembly is tack welded together, not completely finish welded, to permit any necessary alignment. Again, clamping pliers are used to hold the inner and outer frame side members in position.

Blackhawk EK-304 Frame Gages are then hung in the proper locating positions to determine alignment of the front frame members in relation to the rest of the automobile. A new hood has been installed to facilitate proper alignment. A new hood was used since the original was damaged beyond economical repair.

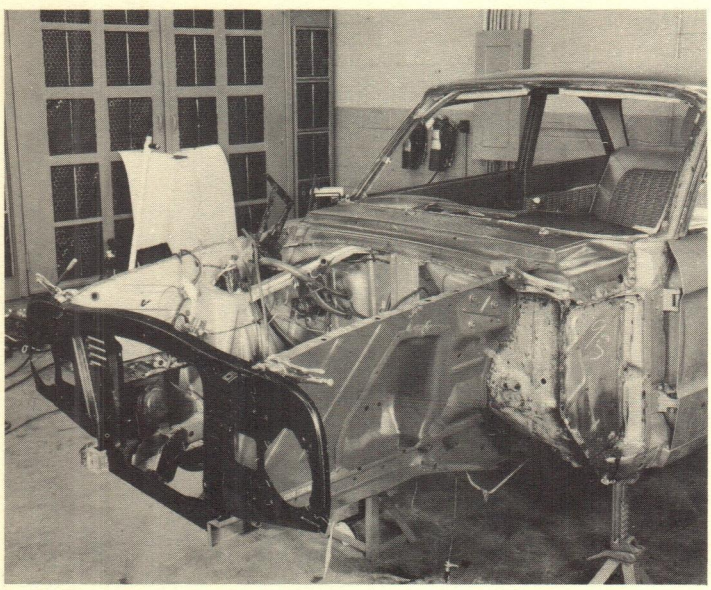


Figure 15

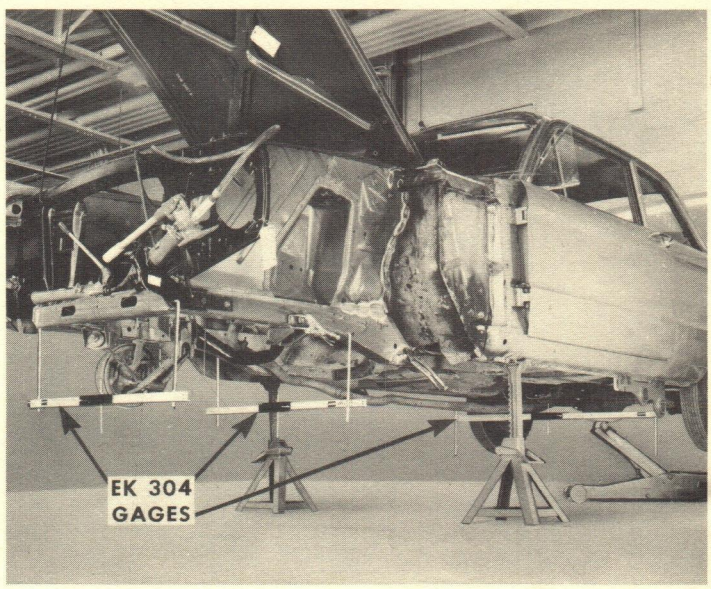


Figure 16

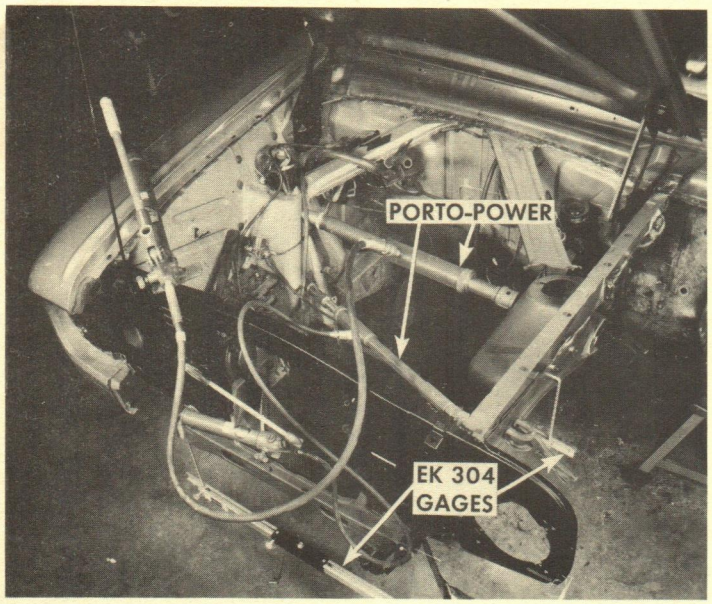


Figure 17

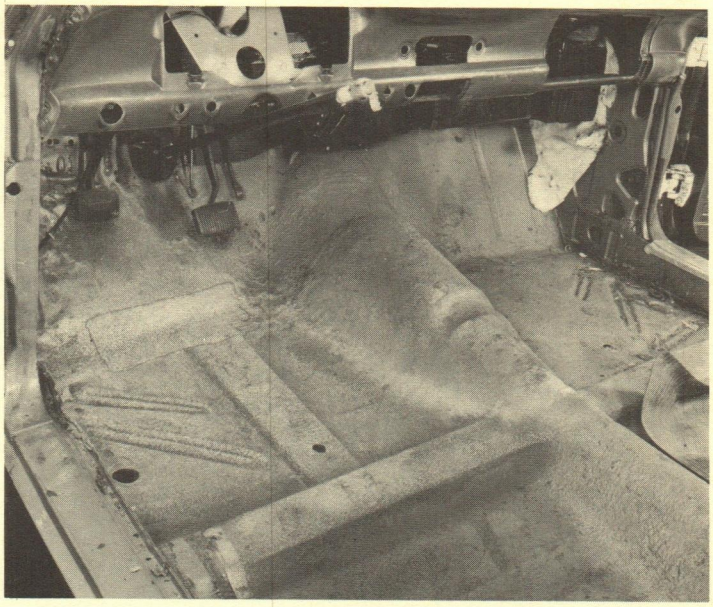


Figure 18

Figure 17 shows Porto-Power being used to assist in the alignment of the left-front suspension arm mounting bracket and the frame side member so that when the final welding is done, these units will be in their proper *alignment* relationship with the rest of the automobile body. Note that Porto-Power was used for both straight-across and diagonal adjustments. The front frame cross member was also installed at this stage, since it is an important part of the proper alignment of the front section.

Figure 18 points out results of the straightening operation on the floor pan and the bottom part of the cowl dash panel. Note that all the deep buckles, dents and wrinkles have been removed. Below the brake pedal, a steel plate was welded to the floor pan and the cowl dash panel for reinforcement. The part of the floor pan that forms the top half of the cross member has been brought back to the equivalent of original condition for structural and safety purposes.

This completed the major straightening operations. The next operation was to install such sheet metal as fenders, gravel deflector, hood and front suspension. The finished repair job is shown in Figure 19, except for painting, installation of the motor, radiator, grille and headlight assemblies.

Compare Figure 19 with Figure 1. Note the excellent fit of the hood and fenders even before the final minor adjustments were made.

Figure 20 shows the excellent fit of the right door and the front fender and hood assembly. Compare this to Figure 2 which shows the gap between the front fender and the door, as well as hood and other damage.



Figure 19



Figure 20



Figure 21

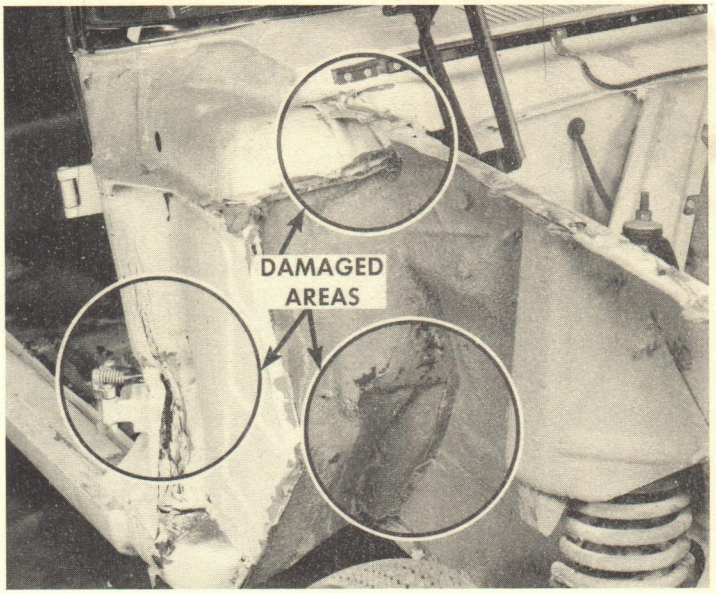


Figure 22

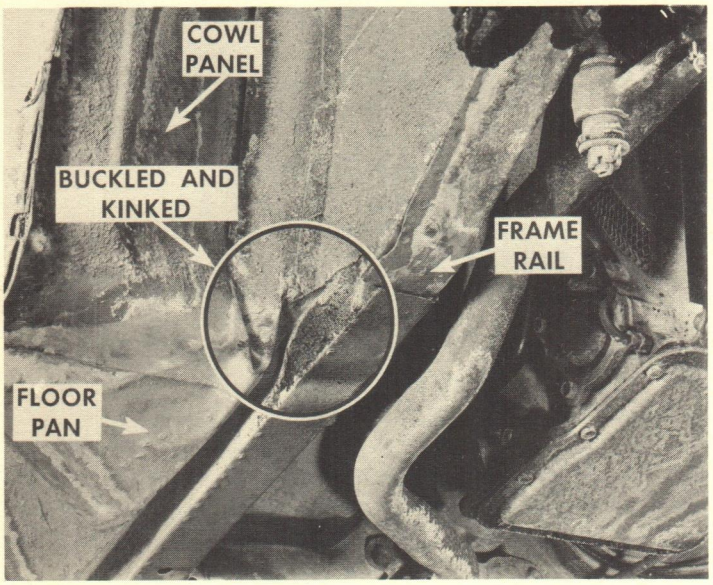


Figure 23

FRONT END AND SIDE COWL DAMAGE REPAIR

The 1960 Falcon used in this section to illustrate repair techniques has two types of related damage: front end and side cowl (Figure 21). Sheet metal parts such as the hood, right fender, door, grillwork and the front bumper were beyond economical repair and had to be replaced. Most of this sheet metal was removed and the hidden damage became readily visible. Figure 22 shows damage to the cowl top panel, cowl dash panel and cowl side panel.

The direction of damage flow is illustrated in Figure 23. The worst buckles occurred where the cowl panel, floor pan and frame rail intersect. This damage was removed by a combined use of Blackhawk Porto-Power and pulls made with the Damage-Dozer, as will be described later.

Figure 24 shows the damage to the instrument panel, door hinge pillar and floor pan. Note the deep crease in the floor pan. The set-up in Figure 25 was used to straighten the door hinge pillar and the floor pan simultaneously. The metal was worked with a hammer while under tension, allowing the floor pan to be straightened without excess thinning of the metal. At the same time, a pull was made on the frame rail.

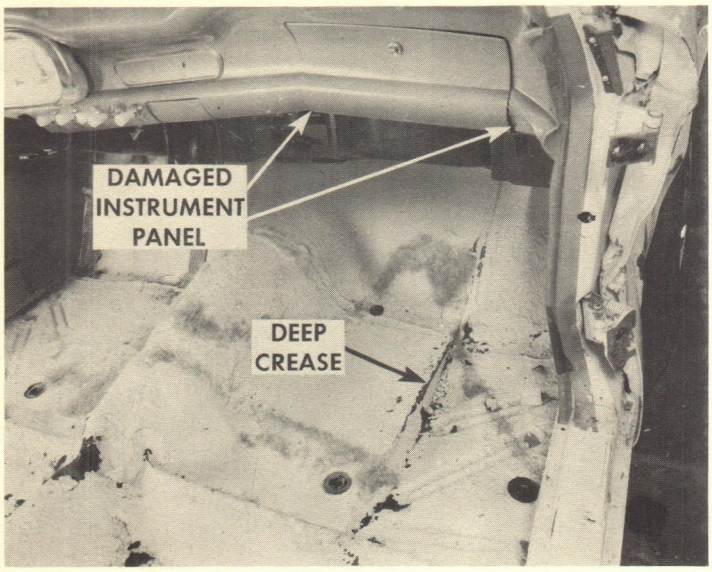


Figure 24

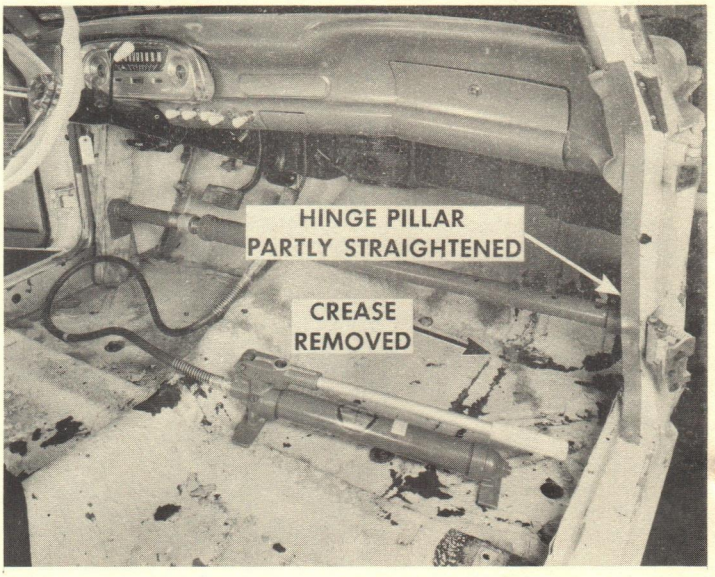


Figure 25

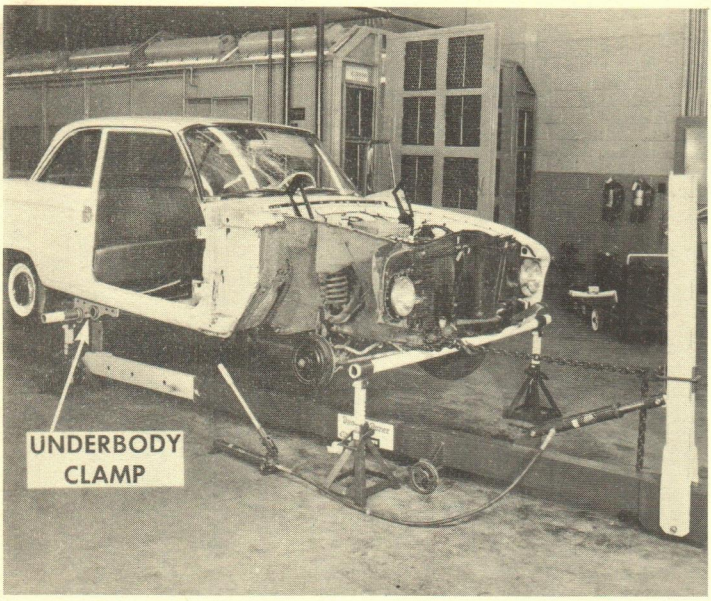


Figure 26

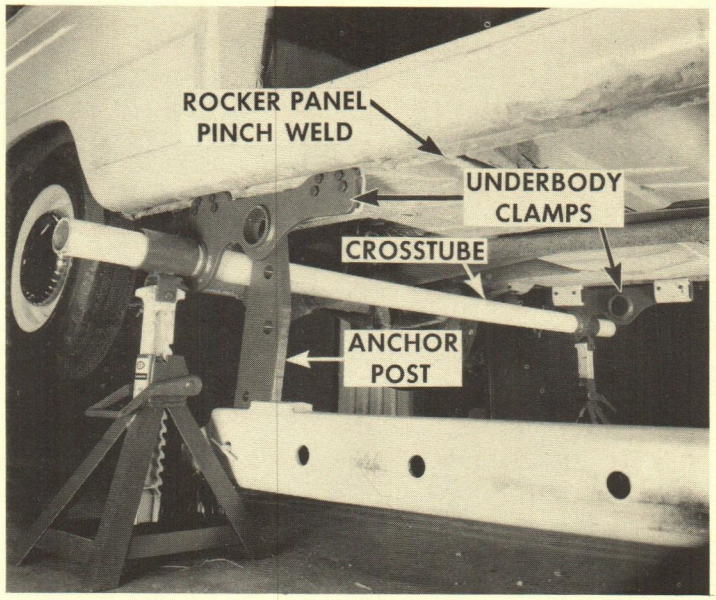


Figure 27

The Damage-Dozer was set up as shown in Figure 26, with Blackhawk EK-130 Underbody Clamps and a cross tube providing the anchor point. The clamps were secured tightly onto the pinchweld of the rocker sill panel; specially designed teeth prevent slipping and provide a *positive* anchor point for straightening the front frame rail and removing the damage shown in Figures 22, 23, and 24. A chain was connected to the front of the frame rail around the bumper back bars. Some damage to the back bars will occur; this is not important, however, since they are to be replaced.

Figure 27 is a close-up of the underbody clamps, cross tube, stands and anchor post. The stands were set close to the underbody clamps to provide a solid support; clamps were located where the rocker sill panel has its greater strength. The anchor post of the Damage-Dozer was positioned so that the pull was in direct line with the frame rail. Whenever a pull of this type is made, care must be taken not to cause additional damage.

The damage shown in Figure 28 is typical of front frame rail damage. When this type is repaired, it must be returned to the equivalent of original condition by straightening, use of reinforcing plates and sound welding. This is also the type of hidden damage to watch for when making the original damage survey.

Figure 29 shows the proper Porto-Power set-up: the chain was wrapped around the frame rail and the bumper back bars, over the V-block on the Porto-Power Ram and then under the frame rail to the frame cross member. A flat base was used on the ram to prevent frame rail damage. Care was then taken to bring the frame rail back to the specifications outlined in a Blackhawk Body and Frame Dimension Book.

Diagonal measurements will next be made using a Blackhawk EK-326 Tram-Track Gage. This gage may be used either as a short gage for measurements in close areas (such as the front suspension) or extended for longer diagonal measurements.

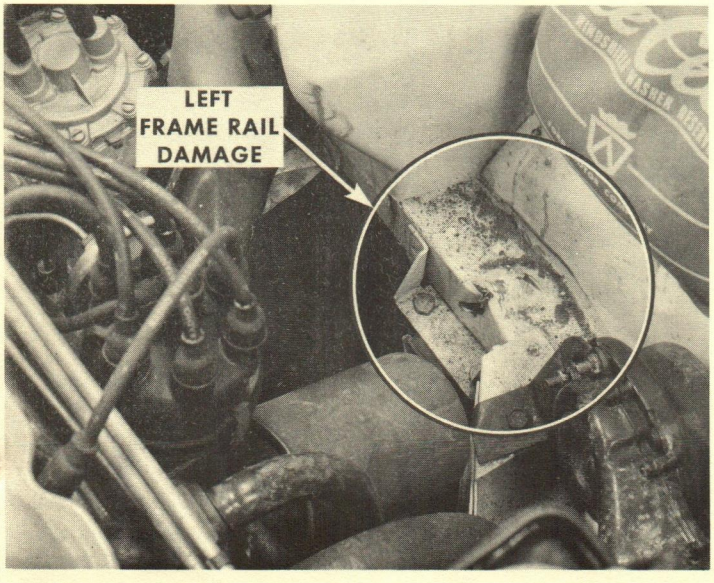


Figure 28

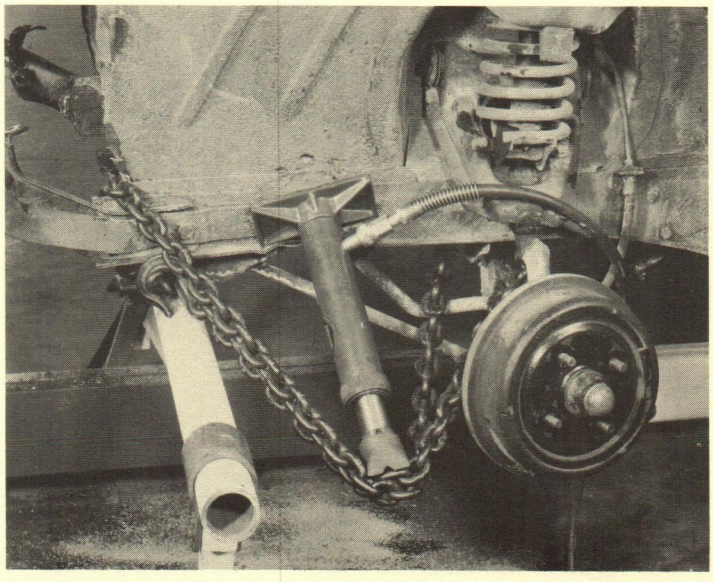


Figure 29

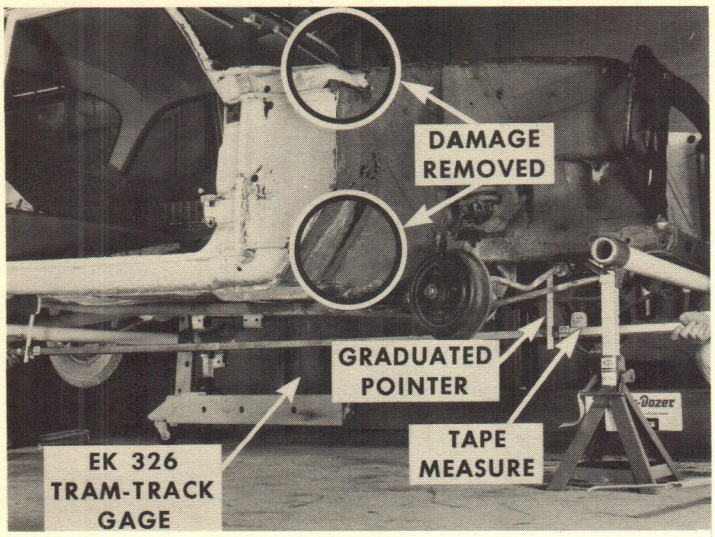


Figure 30

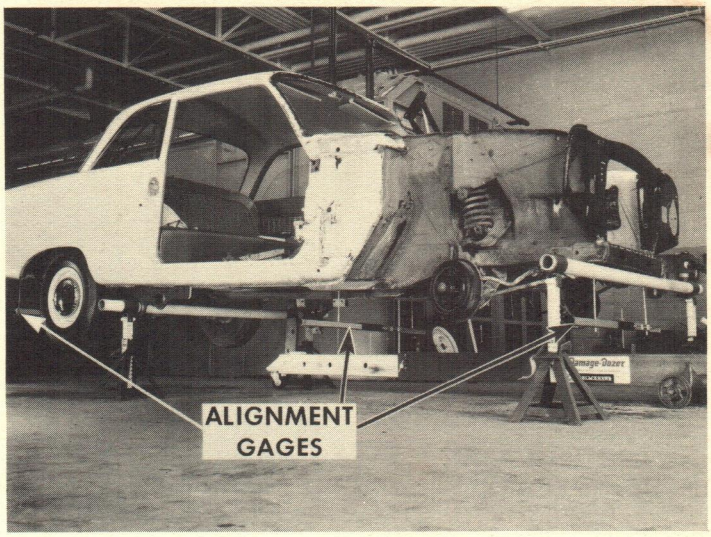


Figure 31

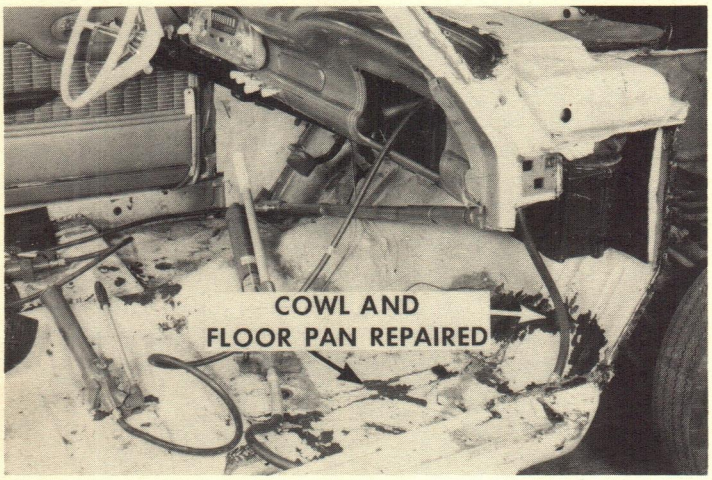


Figure 32

Figure 30 shows the Tram-Track Gage used for checking dimensions of certain locating points on the front suspension. A tape measure is connected to the gage by special, patented clips to permit reading length dimensions directly from the tape. Note the graduated pointers for easy datum line measurements.

The Damage-Dozer hook-up in Figure 31 was used to adjust the frame rail to proper specifications. Blackhawk EK-304 Frame Gages assured proper alignment during and after the pull.

After the basic dimensions had been obtained, the side cowl panel was removed (Figure 32). Porto-Power held the windshield pillar in place until the new panel was installed (Figure 33). Some of the welding was done with a torch and the rest with a spot welding gun. The replacement door was installed to assist in locating the cowl side panel.

Assembly of the new fender, hood, door and related parts is highlighted in Figure 34. This high degree of alignment was obtained even before final adjustment and assembly.



Figure 33

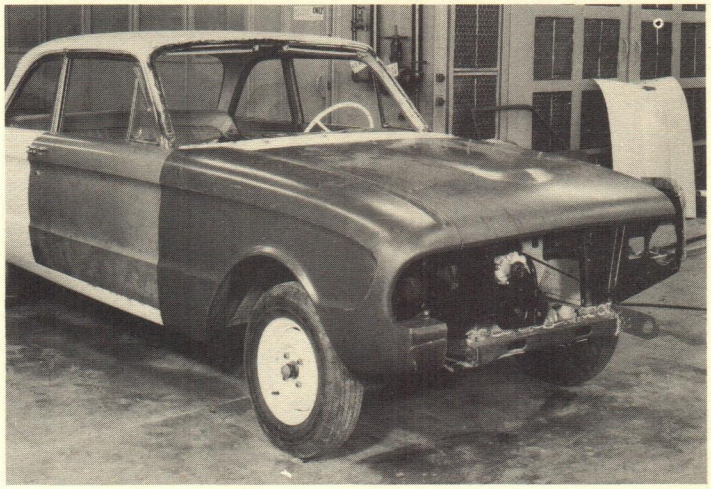


Figure 34

BLACKHAWK®

BLACKHAWK MANUFACTURING CO.
MILWAUKEE 46, WISCONSIN, U.S.A.

Printed In U.S.A.

H-798—DM301FC—35M—561—8