SECTION N

CHASSIS FRAME REPAIRS

GENERAL DESCRIPTION.

This section deals with the repair of the MG type box sectioned chassis frame, damaged in accident, where the facilities used by the frame manufacturers are not available. The manufacturers, naturally, have the benefit of the their production equipment, but the methods adopted by them, particularly where the use of assembly jigs and welding equipment is concerned are outside the scope of the average repair organisation.

These instructions will, therefore, deal mainly with methods of repairing damage to chassis frames without dismantling the component parts, i.e., breaking down welds, more than is absolutely necessary to eliminate torn or badly buckled metal or deformed cross-members which are damaged beyond economic repair.

Repairs carried out in this manner fall into two categories:—

(a) Repair of the frame in position in the vehicle, which may be regarded as an emergency repair, and

(b) Repair of the frame out of the vehicle, in which complete rectification of the chassis frame is undertaken.

In general, chassis frames with considerable damage may be restored into serviceable units, but the skill and experience of the repairer and the extent of the equipment available will, naturally, determine whether any particular frame is repairable. Bearing in mind that certain fundamental accuracies must be restored, also that the cost of labour and material involved in effecting a complete repair is not economically justified if it exceeds the cost to the user of replacing the entire frame assembly.

Checking Chassis Frame Alignment.

Although in most cases of accident the resulting primary damage to the frame is readily apparent. There are cases where the damage may only be slight and is masked by the wings and body structure. In such cases it may be necessary to carry out a complete check of the chassis alignment, including the front suspension and the rear axle, to determine the full extent of the damage.

When checking cars damaged in accident, it is most essential to do the checking on a flat surface large enough to receive the complete car. It is preferable to use a large iron slab, but a concrete slab, carefully prepared and hand-surfaced will be suitable. The car may then be checked directly by comparative measurements or the chassis may be suitably blocked up and a centre line dropped down from the front and rear centre of the frame and parallel track lines laid out. From these lines the squareness of the car may easily be checked.

In a further check for distortion, diagonal measurements may be taken without removing the body from the chassis, by using a plumb-bob as follows:—

Place the car on a level surface and block up the car equally at each wheel approximately 1 foot high with all tyres properly inflated.

Perform the measuring with accuracy and care.

Suspend the plumb-bob from various corresponding points on the frame. The plumb-bob should be suspended slightly above the floor. When the plumb-bob comes to rest, mark the floor directly underneath it. The marks made on the floor will represent the various points of the frame to be checked diagonally.

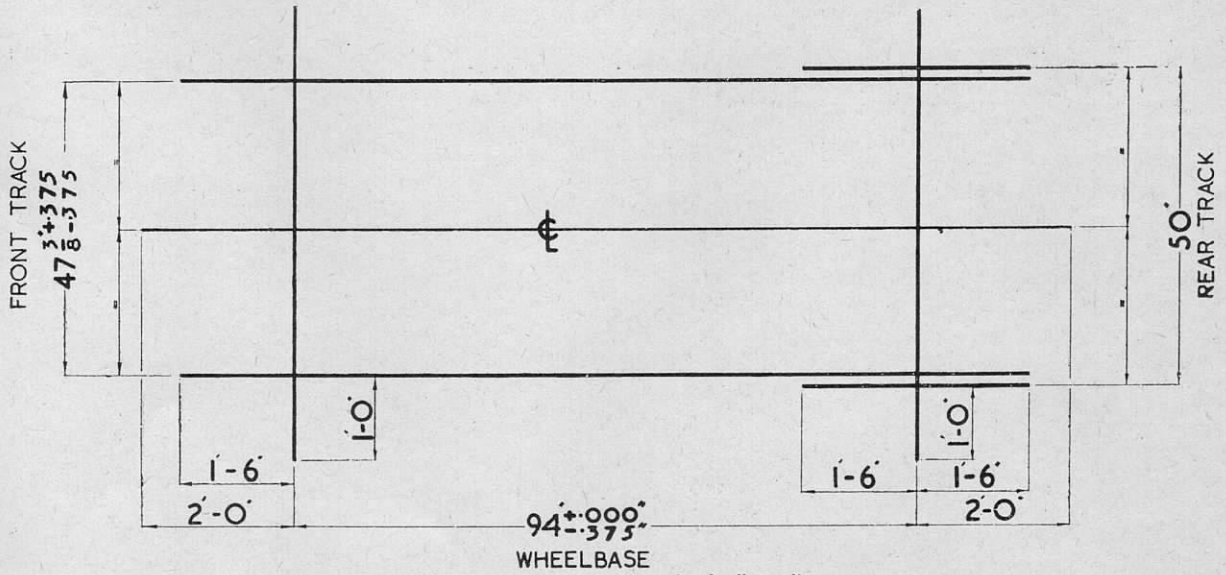

FIG. 48.—Layout for track and wheelbase lines.

Measure the diagonal distance between the points; this distance should agree within $\frac{1}{4}$ or 3/8.

Care must be taken to see that any two diagonals compared represent exactly corresponding points on each side of the frame.

Upon the result of this preliminary investigation a decision can be taken whether the frame can be repaired in position or whether the frame must be stripped out completely. When repairs are undertaken with the frame in position, the damage should be confined to forward of the front engine bulkhead plate.

Damage rearwards of the engine bulkhead plate involves the stripping out of the frame. This also applies to any damage to the rear end of the frame.

Alignment.

Checking the alignment of the bare frame is a relative simple matter, especially if the frame can be set up on a large flat surface or face plate. It involves establishing a datum or centre line, from which all measurements can be taken. Diagonals are checked from suitable fixed locating points, which can be cross-checked at the centre line on which the diagonals should also cross. The angle of the front cross-member should be 2° but may be given an allowance of $\pm\frac{1}{2}°$. Diagonal measurements quickly determine which section of the frame is bent.

The accuracy of the side members is usually checked with suitable straight-edges, and squareness of side rails is checked with straight-edge and square. Twist is checked visually against straight-edges laid transversely across the frame at suitable points.

Straightening with Heat.

When the frame is heated for straightening, the area affected should be maintained at a cherry-red throughout the entire operation.

When an acetylene torch is used for heating, a "neutral" flame should be employed and played over the entire area to be heated until the metal has reached a uniform cherry-red. Never heat the metal beyond a cherry-red as it will seriously weaken the steel. It is good practice to check the temperature of the heated metal frequently with a dry pine stick, while it is being worked, to maintain it at the proper state of ductility and avoid burning. Touching a dry pine stick to metal that has been heated to a cherry-red will cause the stick to glow and char, but not to ignite. The heated area of the frame should be protected from draughts to prevent sudden cooling of the metal.

Checking the Front Cross-member.

When a car has sustained damage to the front suspension, necessitating the dismantling of the assemblies, it is essential that the chassis frame should be checked for correct alignment, especially at the front cross-member. This will avoid excessive tyre wear, steering wander, and other defects.

Place the car on a flat surface.

Remove the front suspension and the rear wheels.

Lower the frame on the three blocks having the dimensions shown in Fig. 50. These locate the frame in such a position that the front cross-member should run parallel to the ground if not distorted.

Bolt on to the front cross-member the four bars, Tool No. T.120.

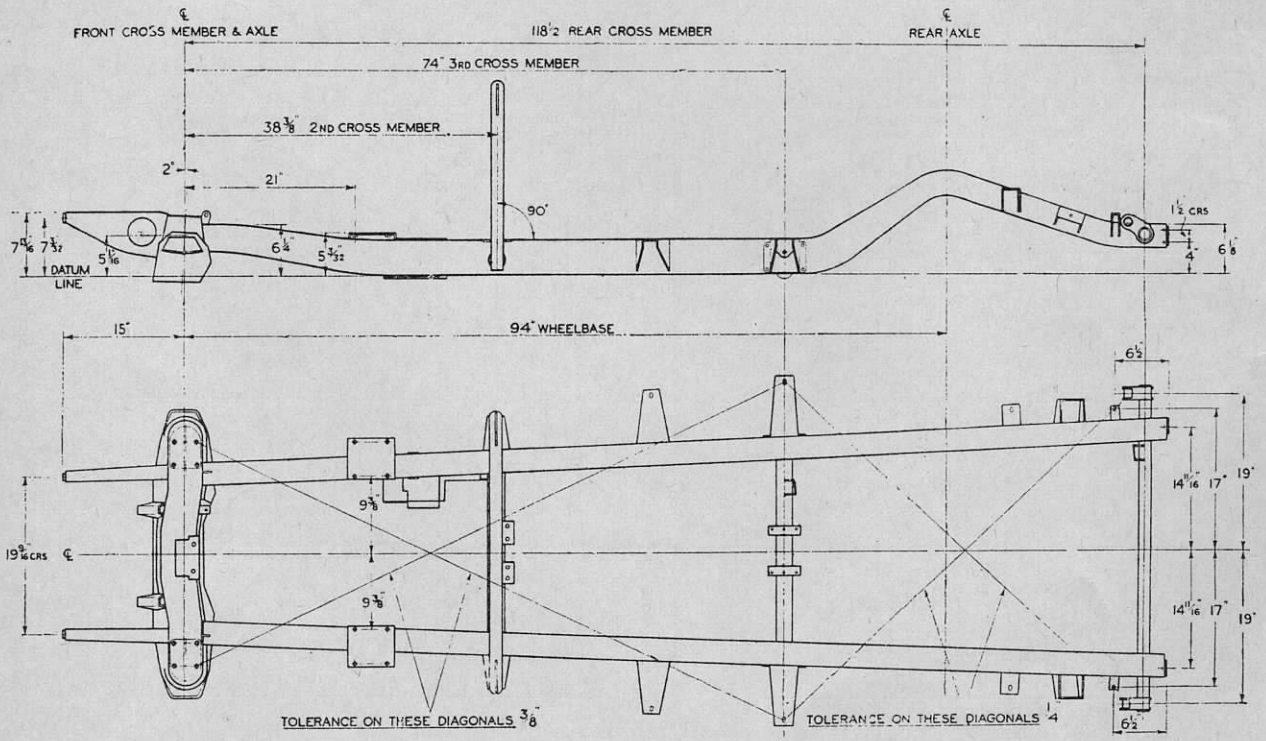

FIG. 49.—Chassis dimensional diagram.

Parallelism and alignment of these bars can then be checked by measurement and by sighting one rod to the other.

When measured at the points "A", "B", "C", "D" from the flat surface on which the car or frame is placed, all the bars should run parellel to it within a tolerance of 3/16.

If a fore and aft plumb-bob centre line is dropped down from the front and rear centre of the frame and points also dropped down from the bars at each end, the points "L", "M", "N", "P", may be checked to the centre line to ensure the alignment of the bars fore and aft.

If misalignment is found in the top bars only, it may be that this can be corrected by removing the top bar and bolting a similar but stiffer bar to the cross-member, which can be used as a lever to twist slightly the outer end of the cross-member in to its correct alignment with the lower bars.

Correcting a Twisted Frame.

In the event of the frame being twisted, this condition can be corrected by anchoring the frame to a fixed trestle and by using a suitable lever, or a stout beam of timber, the frame can then be sprung back with sufficient effort applied at the end of the lever.

If necessary apply well spread heat at the twisted section.

As the frame is completely dismantled, it is possible to remove all signs of damage by cutting out holes for access, with the welding torch, in the inner liner plates, hammering out bulges, dents or buckled areas, and closing the holes by welding in the piece previously removed. The holes should be cut on the centre line of the inner liner plate and be kept as small as possible. The welds can be cleaned up and the repair is then invisible.

When any adjustment to the frame is carried out do not forget the light gauge of the material and treat it accordingly.

Final checking of the frame should be carried out as indicated in Fig. 50.

Comparative vertical measurements should reveal any frame twist.

Check the wheel camber, castor angle, king-pin angle and front wheel alignment as detailed.

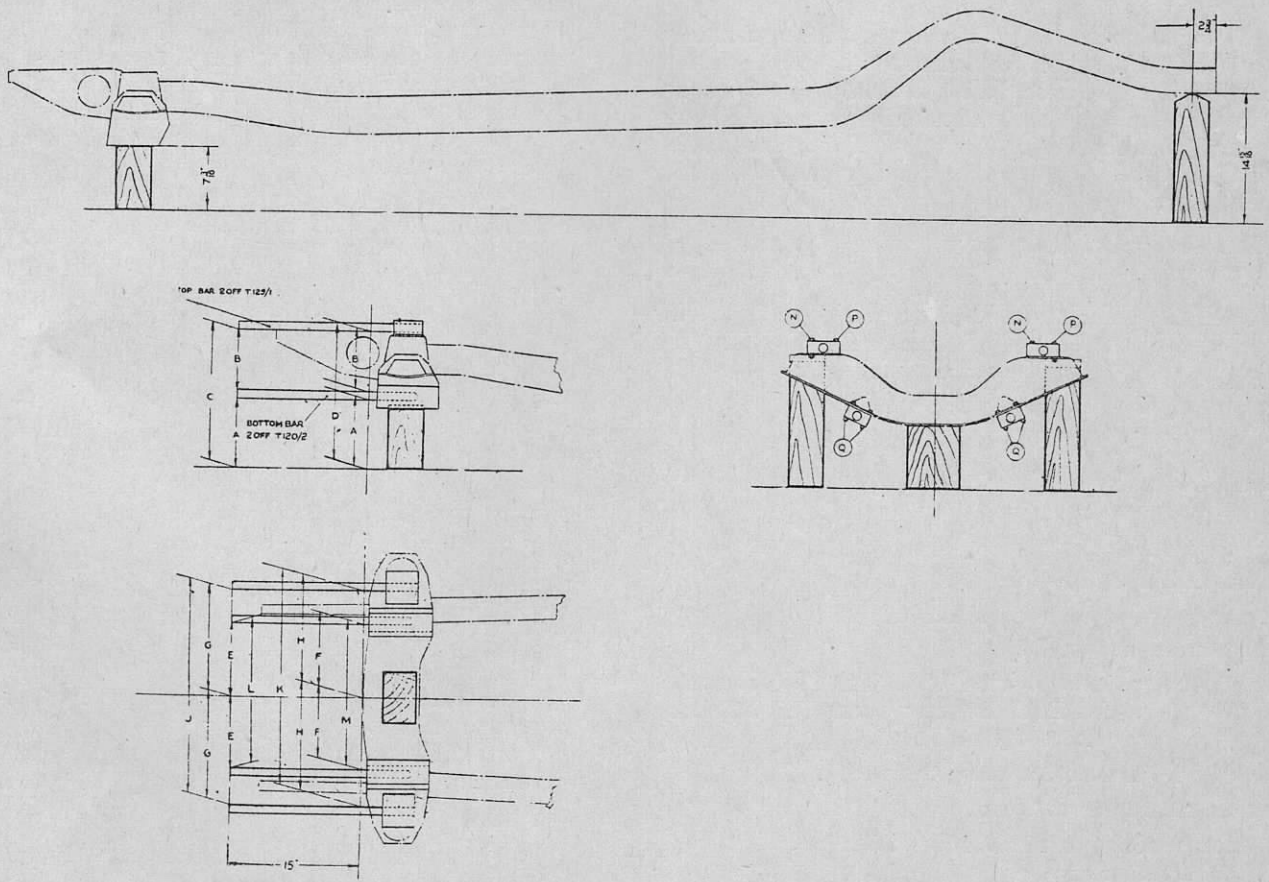

FIG. 50.—The special bars for checking alignment of the front suspension cross-member are shown in position on the left.