

## **SECTION R**

### **THE CHASSIS**

General description.

Section No. R.1    *Frame repairs.*

Section No. R.2    *Investigation of damaged chassis.*

Section No. R.3    *A twisted frame.*

Section No. R.4    *Diagonal frame check (complete car).*

### GENERAL DESCRIPTION

This section deals with the repair of the M.G. type of box-sectioned chassis frame damaged in accident, where the facilities as used by frame manufacturers are not available. The manufacturers, naturally, have the benefit of their production equipment, but the methods adopted by them, particularly in regard to the use of assembly jigs and welding equipment, are out of reach of the average repair organization.

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

Repairs carried out in this manner fall into two categories:

- (1) Repair of the frame in position in the vehicle, which may be regarded as an emergency repair, and
- (2) Repair of the frame out of the vehicle, in which complete rectification of the chassis frame is attempted.

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

Damage to a frame is usually a combination of torn and buckled metal, either in side-members or cross-members, and lateral or vertical displacement of side-members, causing misalignment. The resultant repair is concerned with elimination of the local damage by smoothing or renewal of parts—generally both—and the recovery of alignment of the frame as a whole.

In practice this result is achieved by carrying out the local repairs to the metal and applying the necessary corrective loads to the side-members, coupled with the judicious use of heat to the strains to permit the members to recover their natural positions.

## Section R.1

### FRAME REPAIRS

As the heating of the frame plays a vital part in its repair, it is essential that a good gas-welding equipment is available. At certain points spot- and arc-welding are

preferable, but a skilled gas-welder will be able to make effective welds with the use of a gas-welding torch only.

A screw or hydraulic jack is then required, with a few adaptors to make it of universal application. A selection of bending irons, some metal-straightening equipment, such as dolly blocks, spoons, levers, and hammers, will complete the equipment necessary. If a suitable hydraulic press is available, this in conjunction with hardwood reaction blocks would be more preferable than some of the methods detailed later, using jacks.

When the frame is heated for straightening, the area affected should be maintained at a cherry-red throughout the entire straightening 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 frequently check the temperature of the heated metal 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.

An important point to observe here, prior to commencing repairs, is in regard to the front suspension cross-member. Correct alignment of the front suspension is of such vital importance that if there is appreciable distortion of this member it should be renewed, due to the fact that it is a very difficult operation to re-form it to its exact shape.

**NOTE.**—We do not recommend that this operation be carried out by the Distributor or Dealer unless adequate assembly fixtures are available, but that the frame be returned to the Service Department, The M.G. Car Co. Ltd., Abingdon, Berks.

## Section R.2

### INVESTIGATION OF DAMAGED CHASSIS

Although in most cases of accident the resultant 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, and in such cases it may be necessary to carry out a complete check of chassis alignment, including front suspension and 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

# CHASSIS DIMENSIONAL DRAWING

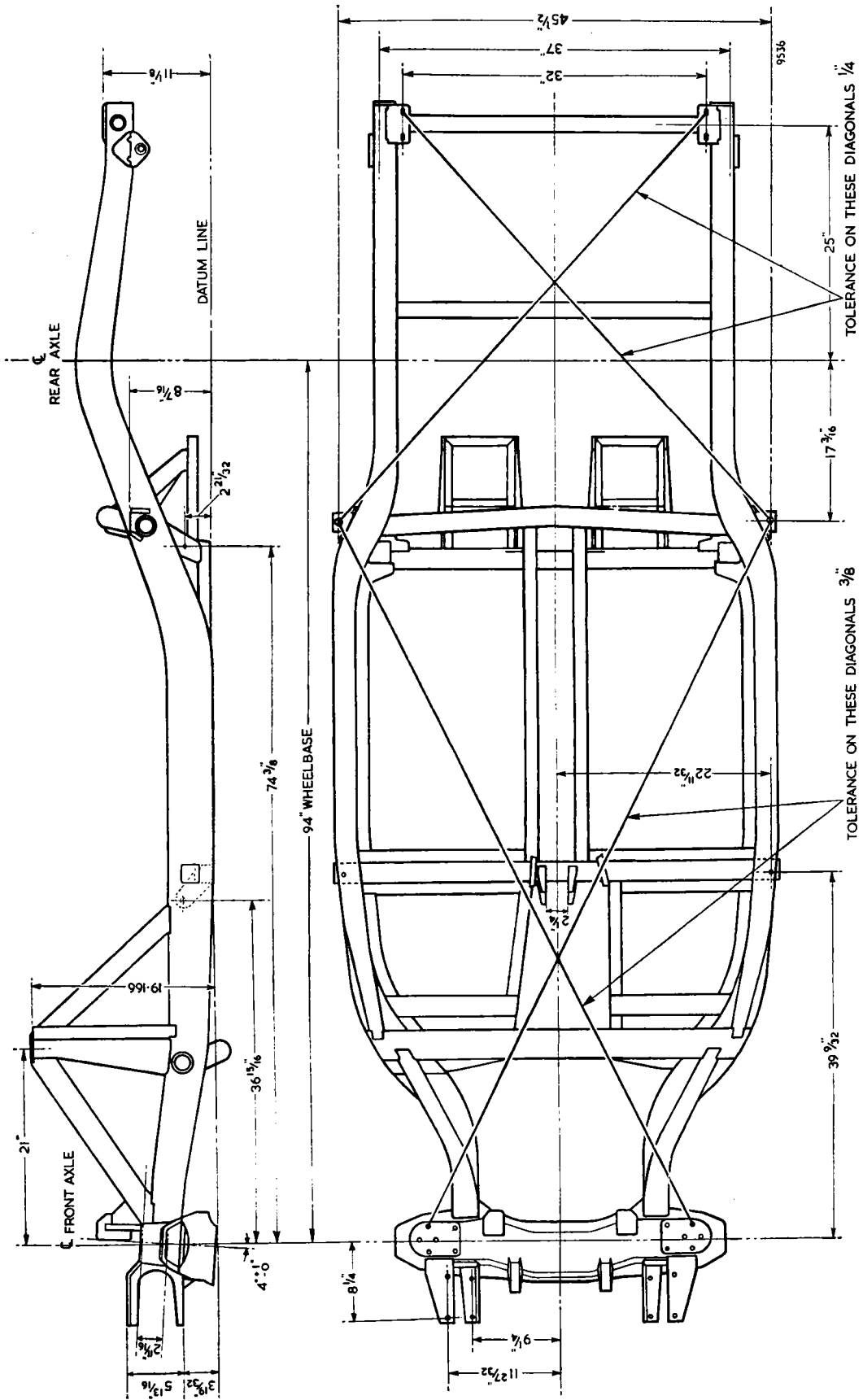


Fig. R.1  
Chassis frame dimensions and the recommended triangulation points for a diagonal check

prepared and hand-surfaced will be suitable. The car may then be directly checked by comparative measurements, or 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.

### Section R.3

#### A TWISTED FRAME

Checking the alignment of the frame bare is relatively a 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 cross, as detailed in chassis dimensional drawing Fig. R.1. The angle of the front cross-member should be  $4^\circ$  but may be given an allowance of  $+1^\circ$  or  $-0^\circ$ . Diagonal measurements quickly determine which section of the frame is bent.

Accuracies of side-members are 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.

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 effort applied at the end of the lever.

If necessary, apply a well-spread heat at the twisted section.

The frame being completely dismantled, it is possible to remove all signs of damage by cutting out holes for access in the inner liner plates with the welding torch, hammering out bulges, dents, or buckled areas, and closing the holes by welding in the piece previously

removed. 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.

Final checking of the frame should be carried out in accordance with the dimensions and diagonals indicated.

Comparative vertical measurements should reveal any frame twist.

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

### Section R.4

#### DIAGONAL FRAME CHECK (Complete Car)

In checking the frame 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 12 in. (30 cm.) high with all tyres properly inflated.

Perform the measuring with accuracy and care.

Suspend the plumb-bob from various corresponding points on the frame, such as indicated by the diagonal lines in Fig. R.1. 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 various points of the frame to be checked diagonally.

Measure the diagonal distance between the points; this distance should agree within  $\frac{1}{4}$  to  $\frac{3}{8}$  in. (6.5 to 10 mm.).

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.