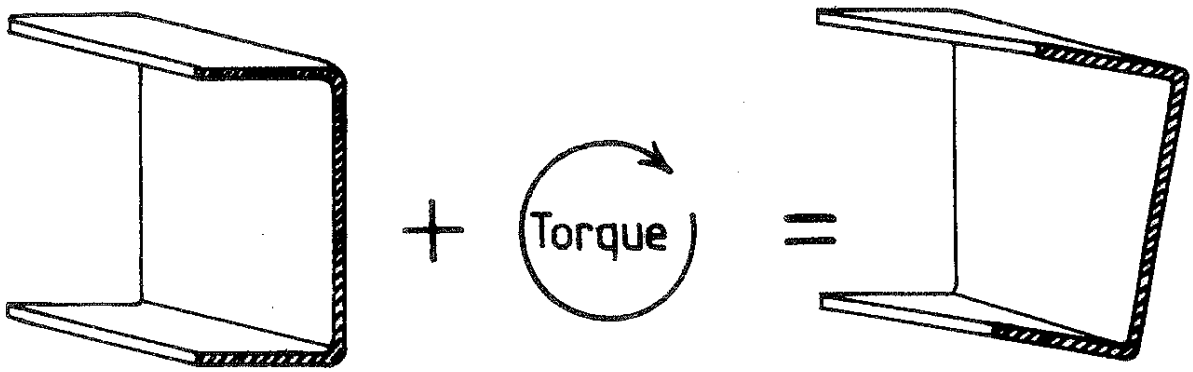
CHASSIS DESIGN

Most early car frames are very flexible and were designed that way as part of the car's suspension system; much the same as a truck chassis of today. In a modern street rod this will have several undesirable effects:-

- Body squeaks and cracks and ill fitting panels.
- Chassis unable to transmit torque of modern V8 or higher using speeds.
- Much of the benefit of improved suspension systems are lost.

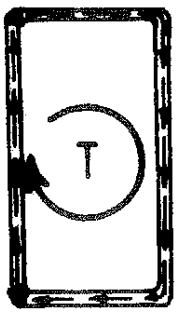
When building a replacement chassis or modifying the original, you will find that the stiffness of the original chassis will have to be increased substantially. Of course, the loads on a chassis at any one time can come from a large number of sources. Probably the simplest way to strengthen the chassis is to think about each mode of deformation separately and what can be done to reduce it.

A) BOXING. Provides much stiffer frame sections because of greatly reduced:-



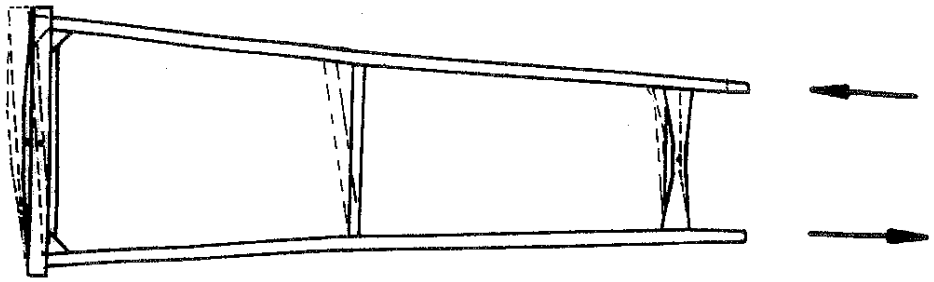
(1) TWISTING OF RAIL:-

This open section has a very low resistance to torsion compared with a box section or boxed channel sectio

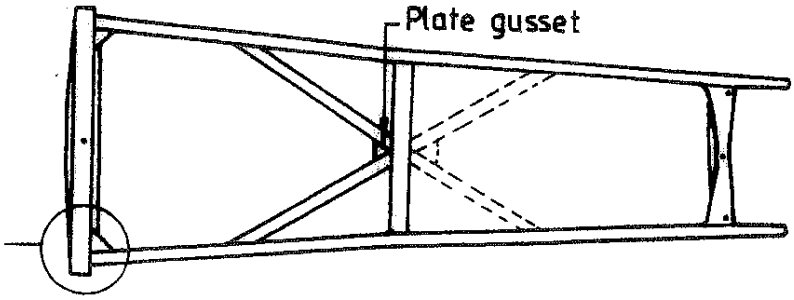


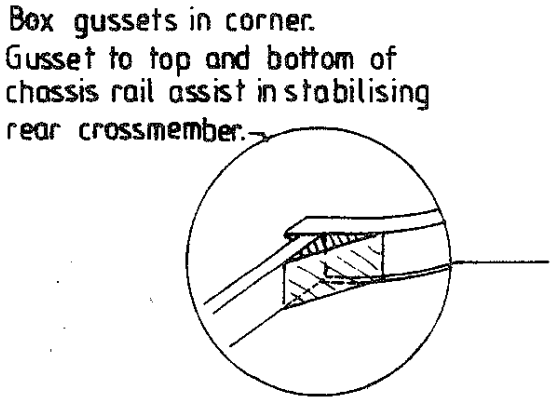
LATERAL DEFORMATION

In the early ladder type frame very little resistance to this type of deformation is offered.



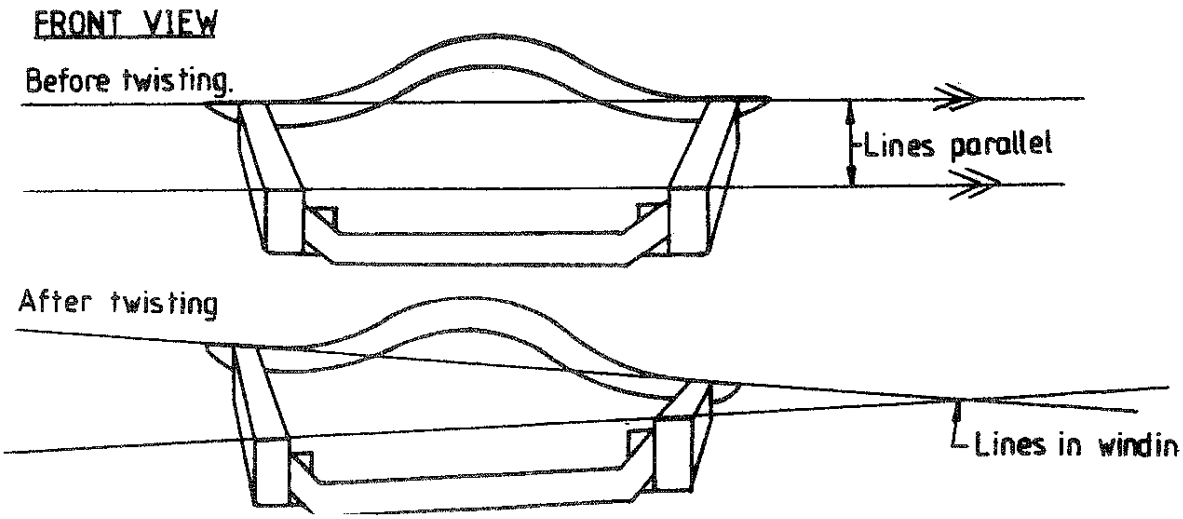
The solution here is to brace the frame much the same as the ledge and brace door on the outhouse. One possible system is shown here which is widely used called the "X" MEMBER. (Also "X" MEMBER - many variations).

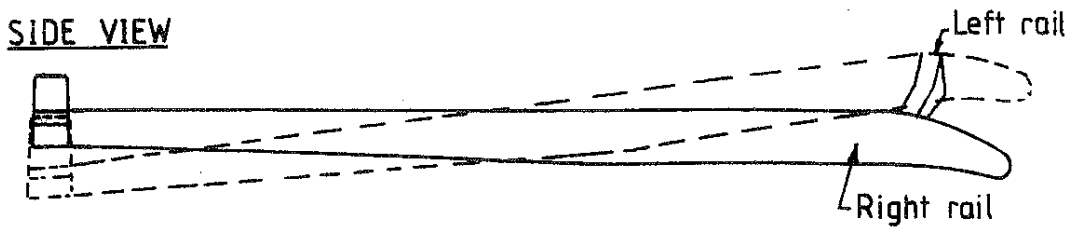




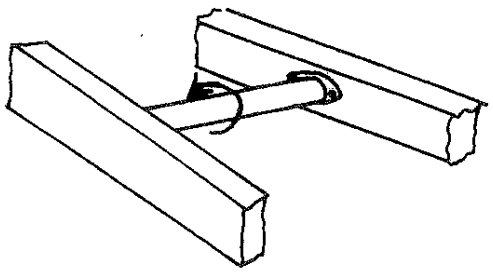
TWISTING OF ENTIRE CHASSIS

This type of deformation occurs under hard acceleration or when one wheel hits a bump, etc.

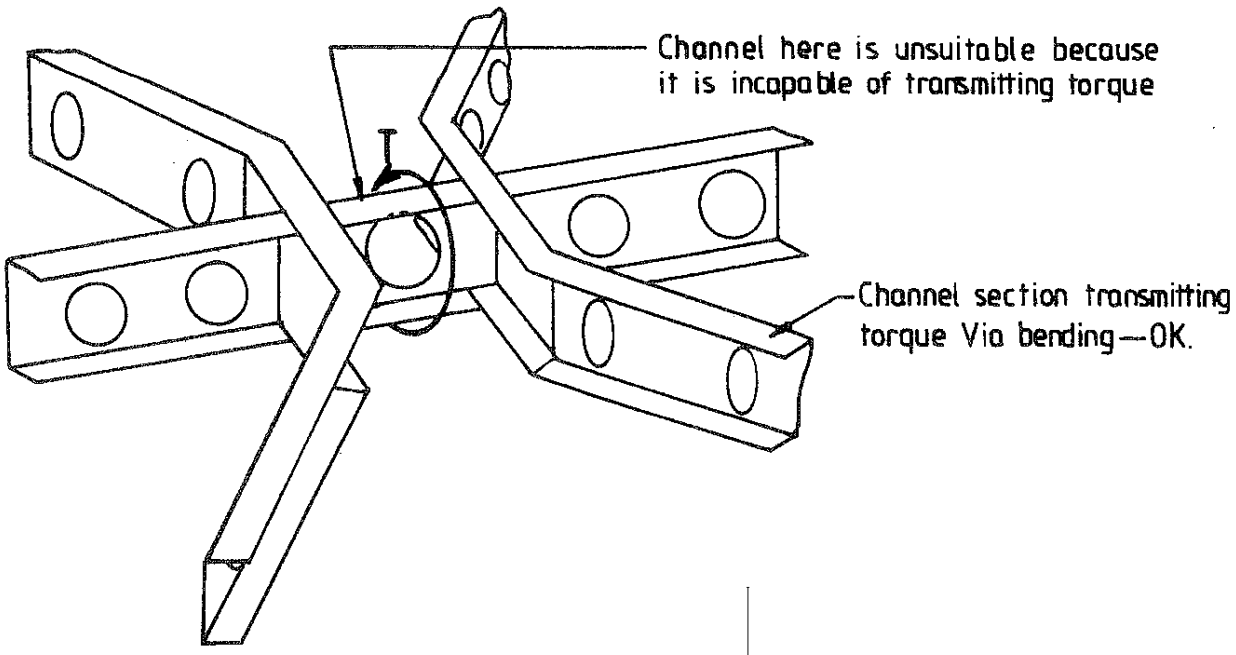




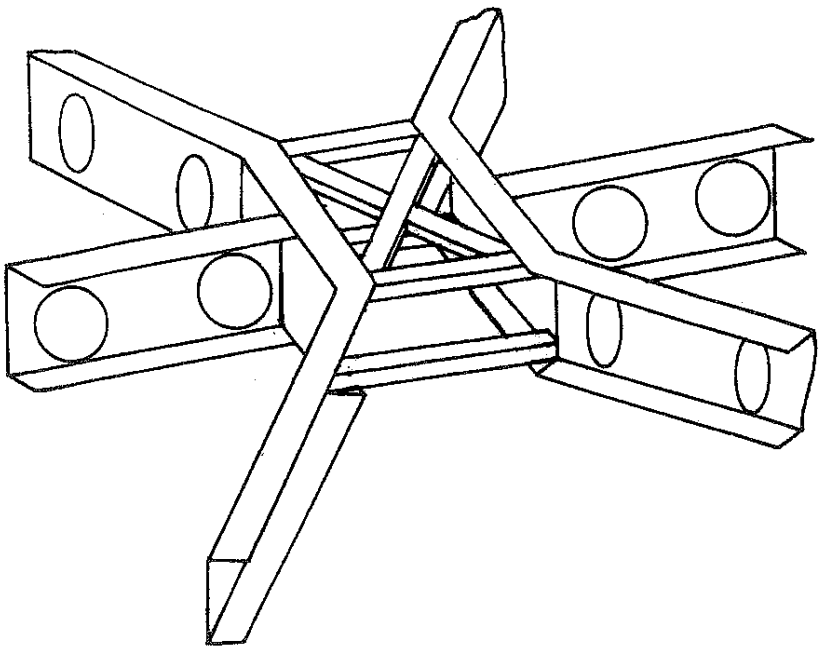
This is probably the most common fault in most chassis design. There needs to be cross-members of sufficient stiffness to transfer this torque from one chassis rail to the other. Take for example the simple tubular cross-member. This will act as a torsion bar and if not sufficiently strong it will simply twist.



This is where the 'K' or 'X' members are very useful. As the chassis tries to twist the legs of the 'X' act in bending, thus transferring the torque. Remember also that the centre of the 'X' is very important to this transfer of torque. You often see a very strong 'X' member rendered useless by lack of connection.

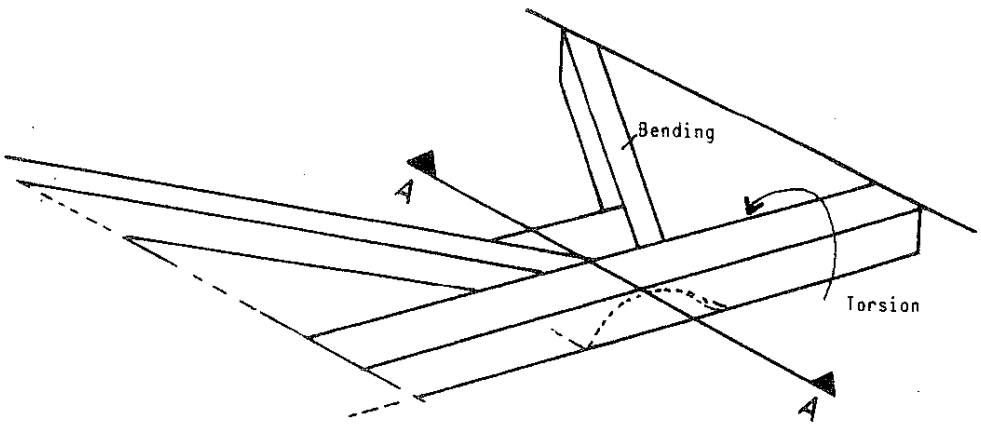


A better system would be to use short pieces of box tubing top and bottom to connect legs of 'X'.



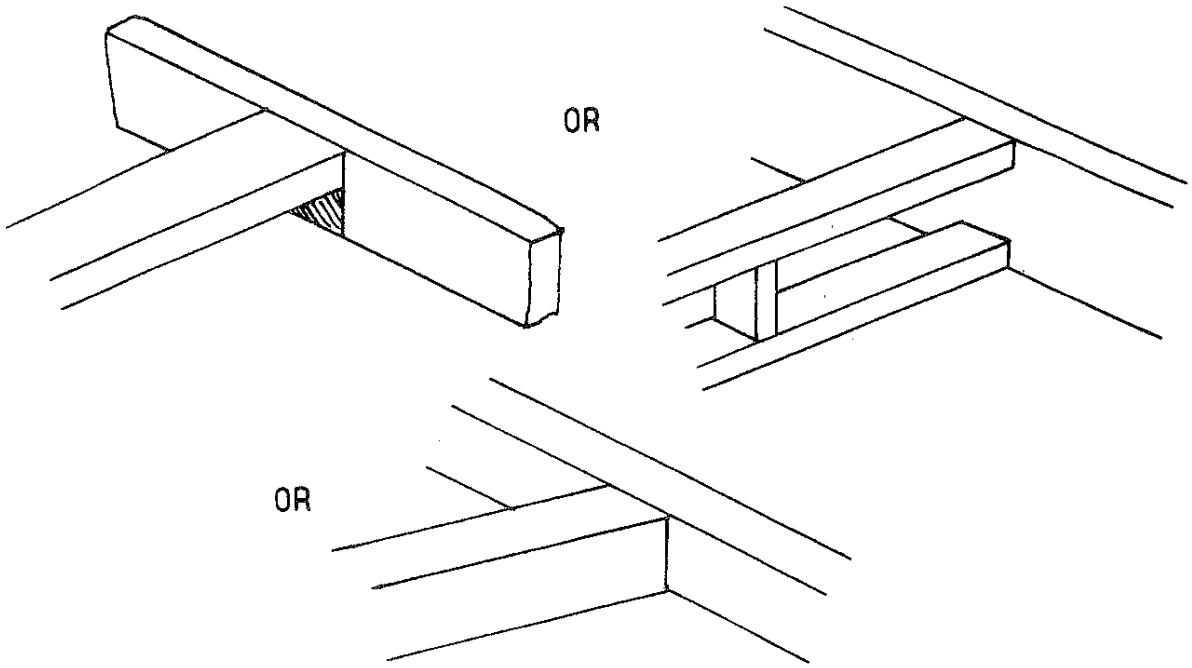
This also applies to modified 'X' members, such as 34 Fords, etc.

Similarly with 'K' members. The cross-member acts as torsion and the legs in bending.



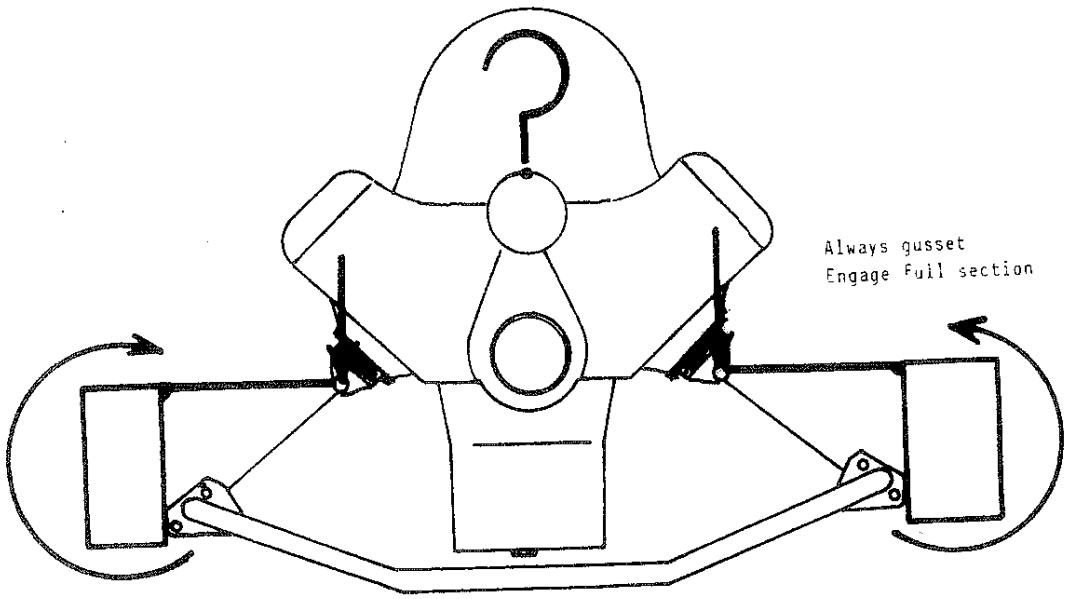
Section A-A must carry the combination of loads and is the section most often butchered for gearbox and shifter clearance - make this section strong.

When joining in a 'K' or 'X' member, remember to be effective it should be on the same plane as chassis rails or at least engage the full seciton, eg:



LOCAL EFFECTS:

The principle is the same here; think about what deformation will tend to occur and brace to resist the deformation, eg:

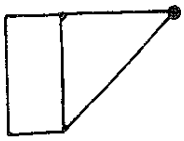


RESULTANT TORSION APPLIED TO CHASSIS WILL TEND TO SPREAD BOTTOM OF CHASSIS APART IF CONSIDERABLE DISTANCE TO NEAREST CROSS-MEMBER. ∴ PLACE THE BAR BETWEEN BOTTOM OF RAILS.

A similar situation arises when torsion bars are mounted parallel to chassis. Unless an 'X' member leg, etc., is new, a tie bar will probably be necessary.

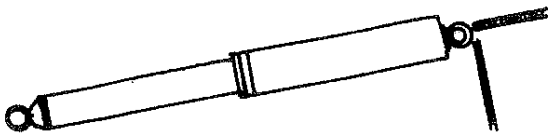
Often you will find that with a bit of thought on planning, each chassis brace etc., can be used for more than one purpose, eg: the engine mount tie bar may be able to be used to mount a rack and pinion.

GUSSETTING



When gussetting to chassis, always attempt to engage full depth of section.

Consider the line of action of the force and gusset to counteract. eg: Shock absorber.



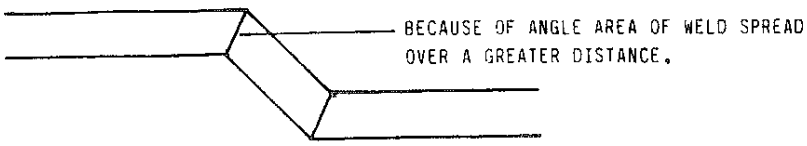
Gusset on this line.

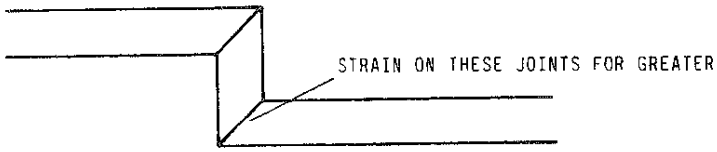
Gusset out here of very little benefit.

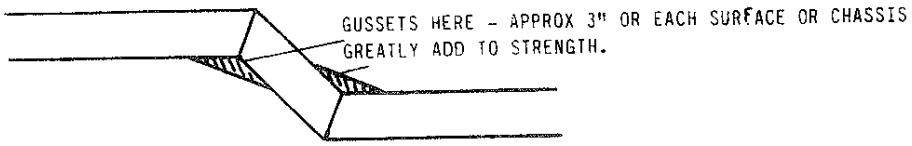
MATERIALS 3 x 2 x 3/16 wall suitable for most V8 applications.

Where chassis change height of move from one plane to another, do this at an angle wherever possible. If the angle is too great gussets would have to be added for strength.

EG:



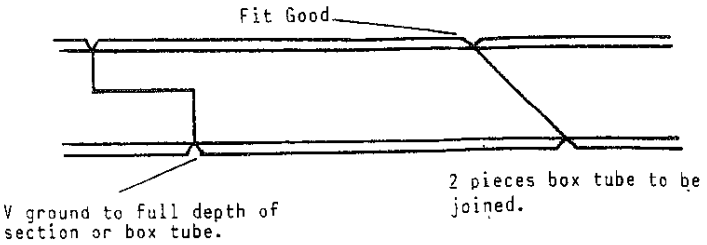




WELDING ON BRACKETS AND JOINING BOX TUBE SECTION:

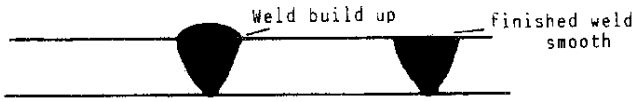
Make sure all pieces fit well. Take the extra time to ensure brackets are ground or filed to fit exactly.

Ensure weld preparation carried out before welding.

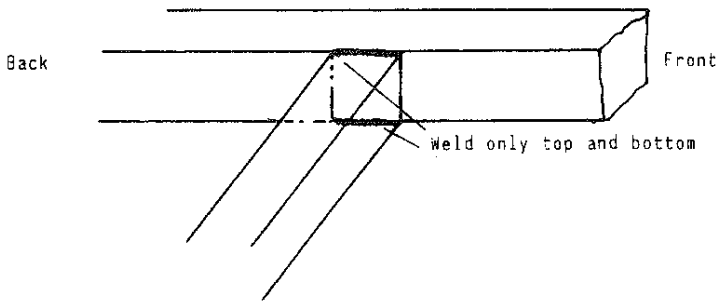


Run good penetrating weld - if you can't handle it yourself take it to someone who can.

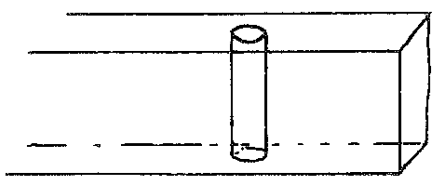
Finish by grinding weld smooth - this relieves pressure point of weld.



When welding onto chassis, wherever possible only weld along the chassis and as close as possible outside edge of chassis section.



When fastening by bolting through tube sections, place in a tube through section to be bolted to prevent crushing the tube section.



Chassis reinforcement for bolts