NATIONAL GUIDELINES FOR THE CONSTRUCTION AND MODIFICATION OF STREET RODS IN AUSTRALIA

SECOND EDITION

NOVEMBER 2013

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NATIONAL GUIDELINES FOR THE CONSTRUCTION AND MODIFICATION OF STREET RODS IN AUSTRALIA

Important Information for Users

This document needs to be used in conjunction with the appropriate administrative requirements of the jurisdiction in which the Street Rod is to be registered. Administrative requirements include, amongst other things, processes for Street Rod registration, types of street rod registration, policies relating to left-hand drive street rods, obtaining exemptions, obtaining modification approvals, Street Rod inspections, preparation and submission of reports and the payment of appropriate fees and charges.

If unsure of any of these requirements, or if more information is needed for any other issue or processes, users should contact the relevant Registration Authority **prior** to commencing any work.

Many of the sections in these Guidelines refer to Sections within Vehicle Standards Bulletin 14, the *National Code of Practice for Light Vehicle Construction and Modification* (VSB 14) for further information or additional requirements. Users must read and apply all relevant Sections.

While these Guidelines present a great deal of information with respect to the construction of Street Rods, builders and modifiers should make themselves familiar with the content of the referenced sections of VSB 14.

Users of these Guidelines and VSB 14 need to ensure that they use the most recent version of the relevant section/s when working on a project. The version is identified by the version number and date on the face page of each section. The version and date is also located in the footer of each page in each section. On the website the version number is specified in the section file name for easy identification.

If a project is taking a long time to complete, check the currency of the version you are using.

Users must be familiar with the provisions stated in the Preface and Introduction. These sections provide the necessary background information to assist users in understanding how these Guidelines are administered by Registration Authorities across Australia. Understanding these requirements is important to ensure that the correct processes are followed thereby reducing the likelihood of having work rejected by Registration Authorities.

If in doubt about any issue concerning or contained in these Guidelines or VSB 14, users should seek clarification from the appropriate State or Territory Registration Authority.

NB: Do not contact Vehicle Safety Standards (VSS) of the Commonwealth Department of Infrastructure and Regional Development in Canberra about These Guidelines or VSB 14. VSS provides the website as a service only.

Revision History

Revision	Comments
First Published	This document was approved at the AMVCB Working Party meeting held on 1/12/2003
Second Edition	This document was approved by the AMVCB on 18/11/2013

PREFACE

This document was first published as the *National Guidelines for the Construction and Modification of Street Rods in Australia* on 1 December 2003. The first edition was prepared in consultation with, and endorsed by, the Australian Street Rod Federation (ASRF). The Guidelines were subsequently endorsed by all Australian State and Territory Registration Authorities responsible for Street Rod standards and the registration of Street Rods for road use in December 2003. However, they were not adopted in a number of jurisdictions.

The first edition of the *National Guidelines for the Construction And Modification of Street Rods in Australia* (the Guidelines) was published before the publication of Vehicle Standards Bulletin 14 *National Code of Practice for Light Vehicle Construction and Modification* (VSB 14). This revision aligns the Guidelines with Version 2.0 of VSB 14. It is intended that this revision will be approved for use in all jurisdictions, making it a truly national document.

Principal changes from the first edition are:

a) It uses more appropriately and consistent terminology to reflect its status as a 'Code'.
b) A new section 'Introduction & Scope' included that gives more detailed advice on status of this document in federal and state legislation, and includes more definitions.
c) It incorporates some of the requirements in the *Registration Requirements and Construction Guidelines for Street Rods in NSW*.
d) It is formatted to align with Vehicles Standards Bulletin 14 *National Code of Practice for Light Vehicle Construction and Modification* in anticipation of it being incorporated into that Code.

ACKNOWLEDGMENT TO SECOND EDITION

This document has been endorsed by the Australian Motor Vehicle Certification Board Single Issue Working Group (AMVCB SIWG) as the second edition of the *Guidelines for the construction and modification of Street Rods in Australia*. It was approved in November 2013 and replaces the first edition released in December 2003.

In finalising this edition, the AMVCB SIWG wishes to acknowledge the key role played by:

- The Australian Street Rod Federation (ASRF) and its many individual state and territory enthusiasts who assisted in the development and subsequent endorsement of the guidelines,
- Mr Mark Saunders, who acted as national coordinator for the ASRF, drawing together and consolidating the views of members to enable the original documentation to be adopted as national guidelines.

Also acknowledged is Mr Larry O'Toole of Graffiti Publications for allowing material from Engineering Street Rods to be reproduced in these Guidelines.

The project was managed by Mr Dan Leavy, Transport for NSW on behalf of the AMVCB SIWG, who signed-off the second edition of the Guidelines on its behalf.

Members of the AMVCB SIWG at the time of Publication were:

Chris Jones	VicRoads
David Black	Transport for NSW
Peter Hunter	Office of Regulatory Services ACT
Rickman Smith	Dept of Planning, Transport and Infrastructure SA
Anant Bellary	Dept Transport & Main Roads QLD
Bill Muirhead	Dept Transport NT
Jeremy Gleeson	DIER TAS
John Marcolina	Dept Transport WA

Mr Barry Hendry, former VicRoads AMVCB SIWG member, was also involved in the process.

ACKNOWLEDGMENTS TO FIRST EDITION

This document has been adopted by the Australian Motor Vehicle Certification Board Working Party (AMVCB WP) as the nationally accepted Guidelines for the construction and modification of Street Rods in Australia. These Guidelines form an integral part of the *National Code of Practice for the Modification of Light Vehicles*. The national code of practice is a major project currently being undertaken by the AMVCB WP.

The AMVCB WP wishes to acknowledge the key role played by:

- The ASRF and its many individual state and territory enthusiasts who assisted in the development and subsequent endorsement of the guidelines,
- Mr Paul Walsh, who acted as national coordinator for the ASRF, drawing together and consolidating the views of members to enable the original documentation to be adopted as national guidelines.

Also acknowledged are:

- Mr Larry O'Toole of Graffiti Publications for allowing material from Engineering Vehicles to be reproduced in these Guidelines.
- Mr Rex Middleton and Mr Reno Marchesi in preparing the documentation for final publication.

The project was managed by Mr John Dombrose on behalf of the AMVCB WP as an integral part of the *National Code of Practice for the Modification of Light Vehicles* project.

Members of the AMVCB WP at the time of endorsement:

Barry Hendry	National Road Transport Commission
Dr Gray Scott	VicRoads, Victoria
Jorge Montano	Roads and Traffic Authority, NSW
Rod Paule	Road Transport, ACT
Roland Earl	Transport SA, SA
Angus Draheim	Queensland Transport, Qld
John Hollins	Department of Transport and Works, NT
Tony Beard	Department of Infrastructure Energy and Resources, Tas
John Dombrose	Department for Planning and Infrastructure, WA

Previous Board members involved in the process included Mr Rickman Smith (SA) and Mr James Hurnall (QLD).

CONTENTS

SECTION 1: INTRODUCTION AND SCOPE

1.1 INTRODUCTION

This document, the *National Guidelines for the Construction and Modification of Street Rods in Australia* (the Guidelines) has been prepared in consultation with the Australian Street Rod Federation (ASRF) and has the Federation's national endorsement.
The Guidelines incorporate simplified outlines of the requirements of the Australian Vehicle Standards Rules 1999 (AVSR) applicable to Street Rods. The Guidelines are intended to provide technical guidance and information that are recognised nationally and have been endorsed by all Australian State and Territory agencies responsible for vehicle standards and the registration of Street Rods for road use.

1.2 SCOPE AND APPLICATION

These Guidelines apply to original pre-1949 vehicles modified as a Street Rod or vehicles constructed as a replica of an original vehicle modified as a Street Rod. They are a nationally accepted guide for persons who intend to build a Street Rod. Their purpose is to help ensure that a vehicle built or modified as Street Rods in accordance with these Guidelines will comply with the applicable requirements of the AVSR. Section 11 contains a detailed checklist to help builders and modifiers ensure they have covered the requirements specified in the other sections.
These Guidelines do not replace the requirements of the AVSR, but they will help to ensure that Street Rod builders are aware of the appropriate references for the design and construction of a safe Street Rod with good driving characteristics.
These Guidelines do not apply to Street Rods built as an individually constructed vehicle (ICV) or to Street Rods that are produced in volume.
These Guidelines do not apply to policies and administrative procedures necessary for registering Street Rods.

Notes:
1. Owners and builders should seek advice from an Examiner when planning their modification or building project to help ensure the Street Rod complies with the Guidelines and applicable standards.
2. Street Rods produced in volume must comply with the provisions of the Commonwealth *Motor Vehicles Standards Act 1989* administered by the Commonwealth Department of Infrastructure and Regional Development.
3. ICVs must comply with the ADRs current at the date they are notified to the Registering Authority. Refer to VSB 14 for guidance on building an ICV.
4. Vehicle Standards and Rules are subject to change at any time which may impact on elements of design or construction. Street Rod builders should check that they have the most recent relevant information.

1.3 DEFINITIONS AND INTERPRETATIONS

For the purpose of these Guidelines, the following definitions and interpretations apply:
Australian Design Rules (ADRs) mean the series of vehicle design standards issued by the Commonwealth Department of Infrastructure and Regional Development under the Commonwealth *Australian Vehicles Standards Act 1989*.
Australian Vehicles Standards Rules 1979 (AVSR) means the vehicle standards that apply to motor vehicles, trailers and combinations on roads and road related areas.
Certification means assessment of a Street Rod by an Examiner for compliance with these Guidelines and applicable standards, and provision of a certificate to this effect.
Chassis means a structural unit that will support the full load of the Street Rod drive train, body and all ancillary components.

Competent person for any task means a person who has acquired through training, qualification or experience, or a combination of them, the knowledge and skills to carry out that task.
Dickey-seat means a folding or hinged seat, fitted to exterior of the vehicle.
Examiner means a person who has been authorised by a Registration Authority to carry out inspections of Street Rods during the construction or modification phase on its behalf. In jurisdictions where Registration Authorities do not employ *Examiners* for this purpose, *Examiner* means a *Signatory* (see below).
Individually constructed Vehicle (ICV) means a vehicle, whether a unique design or a replica, that is built to comply with all the applicable ADRs.
May indicates an option that is permissible and which does not affect compliance with these Guidelines whether or not it is used.
Must indicates something that is mandatory to achieve compliance with these Guidelines.
Number plate is equally applicable to 'licence plate' and 'registration plate'.
Replica means a street rod that is comprised totally of reproduction parts.
Reproduction means a part that is, as close as practicable, identical in appearance and dimensions to the equivalent part in an original, pre-1949 vehicle. A reproduction may differ from an original part in manufacturing process and/or materials.
Rule means any specific vehicle standard specified in the AVSR.
Should indicates something that is recommended, but is not necessary to ensure compliance with these Guidelines.
Signatory means a person authorised by a Registration Authority to assess and certify vehicles under the jurisdiction's modified vehicle scheme.
Note: There are a variety of terms used to describe this entity, including *engineering signatory*, *approved person* and *licensed certifier*'
Street Rod means a vehicle that has a body and frame that were built before 1949, that has been modified for safe road use, or a replica of a vehicle, the body and frame of which were built before 1949.
Note: This definition is the same as that used in the AVSR.
Vehicles manufactured in 1949 or later that are carry over models of a vehicle model manufactured prior to 1949, eg Ford Anglia, are included in the Street Rod classification. A Street Rod must have a separate body and chassis, both of which are of pre-1949 manufacture, or may be recently built replicas of the chassis and body of a pre-1949 vehicle. The Street Rod may be built from the ground up using reproduction parts of a pre-1949 vehicle.

1.4 RELATIONSHIP WITH THE LAWS OF AUSTRALIAN JURISDICTIONS

Subject to Commonwealth laws and the laws of the States and Territories of Australia, this document provides guidance for the design, manufacture and modification of Street Rods. Other procedures may be acceptable subject to adequate technical justification.
Nothing in these Guidelines is to be regarded as in any way limiting the powers and duties of the Minister, the Chief Executive Officer of the jurisdiction in question, or any agent or employee of that Officer, under the appropriate Act/s of that jurisdiction, or subsidiary legislation made there under.
Where an ADR, Rule or Australian Standard is referred to in these Guidelines, the current version of the ADR, Rule or Australian Standard should be read in full to avoid misinterpretation.
Although the AVSR have been incorporated into road transport legislation by all jurisdictions and apply to modified or newly constructed Vehicles, each jurisdiction may have a different heading or title for its adopted version of the AVSR and that there may be a difference in Rule or Clause numbers. It is therefore important to check the equivalent requirements in your local legislation wherever reference is made to a Rule in the AVSR in these Guideline.

The Guidelines do not preclude the use of alternative materials, designs, methods of assembly, procedures, and the like, that do not comply with a specific requirement of the Guidelines, or are not mentioned in it, but which can be shown to give equivalent or superior results to those specified methods, providing the alternatives used achieve compliance with the AVSR as incorporated in the law of the registering jurisdiction and other applicable vehicle standards. Where alternatives are used, the modifier/builder must ensure they can provide evidence of compliance.
It is important that owners or builders seek advice from the appropriate Registration Authority if in doubt about any of the above issues.

1.5 ADMINISTRATION AND REGISTRATION

Building a Street Rod to these Guidelines does not imply any obligation on a registering authority to grant full registration to the Street Rod. Instead, these Guidelines provide a set of technical specifications for the construction and modification of Street Rods. Individual Registration Authorities have their own administrative procedures and requirements for the certification and registration of new and modified Street Rods. Owners and builders must familiarise themselves with the provisions of the Registration Authority in which they reside. Similarly, owners of Street Rods who wish to transfer their Street Rod to another State or Territory need to obtain relevant information from that Registration Authority.

1.6 FUTURE DEVELOPMENTS

It is recognised that a set of Guidelines that covers all eventualities is not feasible. This document is a live document and will need to be revised from time to time to include future developments arising from regulatory changes, improvements in technology, safety concerns and the development of alternative designs.
The document may also be revised to improve its editorial content.

1.7 FUTURE REVISIONS

Future revisions are the responsibility of the Australian Motor Vehicle Certification Board Working Party. Revisions, other than those of a legal or editorial nature, must be processed in consultation with relevant stakeholders, including user groups such as the Australian Street Rod Federation.
The Working Party may consider applications from individuals concerning recommended revisions to the Guidelines. However, these should be submitted after consideration by the appropriate user groups. The Working Party will consult widely before making a final decision on any proposed amendments to the Guidelines.

1.8 DOCUMENT FORMAT

This document will be available for download in electronic format from the Department of Transport and Regional Development website at
www.infrastructure.gov.au/roads/Vehicle_regulation/bulletin/street_rod.aspx
While the Guidelines may be downloaded in sections for the convenience of persons working on a specific aspect of a Street Rod, all referenced sections applicable to the specific work being done should also be downloaded.
VSB 14 may be downloaded from
www.infrastructure.gov.au/roads/Vehicle_regulation/bulletin/vsb_ncop.aspx.

1.9 ROAD SAFETY

The completed Street Rod, whether a modified vehicle or a replica of a modified vehicle, must be certified in its entirety by an Examiner that it is suitable for safe road use.

1.10 RECORDS

Street Rod builders and owners should keep all records of tests, assessments and other means that are used to demonstrate the Street Rod's compliance with the provisions of these Guidelines, AVSR and applicable vehicle standards. The records should include receipts for steering, suspension, braking, other safety and major body components, along with chassis and any significant engineering work done. This will help ensure that any queries can be dealt with easily, and failure to do so may cause delays in obtaining registration, and could be costly if any test or assessment needs to be repeated.

1.11 DATE AT WHICH THE DOCUMENT TAKES EFFECT

This document takes effect at the date of issue.

SECTION 2 ENGINES

2.1 THE ENGINE ASSEMBLY

2.1.1 The maximum cubic capacity for engines is 460 cubic inches (7.6 litres).

2.1.2 Exposed engines must not have dangerous or sharp projections that would be likely to cause injury or restrict the field of view of the driver.

2.1.3 Engines, gearboxes and differentials must have adequate and suitable mountings. In the event of failure of any engine mount, the engine must be capable of being retained so that it cannot interfere with the operation of brakes, steering or suspension.

2.1.4 The use of turbocharged or supercharged engines may require certification.

2.1.5 The maximum boost for turbocharged and supercharged engines is 9 psi (63kPa).

2.2 ANCILLARY COMPONENTS

2.2.1 Engine fans must be shrouded to prevent injury from accidental contact if a bonnet top is not permanently fitted (see Section 9.2).

2.2.2 Alternator fans with radial cooling fins must be shrouded to prevent injury from accidental contact if a bonnet is not permanently fitted (see Section 9.2).

2.2.3 Toothed belt pulley drives must be shrouded if a bonnet is not permanently fitted (see Section 9.2).

2.2.4 Throttle linkages and cables must operate without binding or affecting throttle operation when the engine moves on its mounts. Double return springs should be used.

2.2.5 Fuel lines must be of appropriate material, be mounted clear of areas of excessive heat and be adequately secured every 300mm, and accommodate movement of the engine on its mountings if necessary. All fuel line joints, including those on any return pipes, must be appropriate for the fuel line pressure and the pipe material at each joint.

2.2.6 Engines manufactured after 1972 must be fitted with a positive crankcase ventilation valve (PCV valve) and must not vent fumes to the atmosphere.

2.2.7 Wiring in the engine compartment must be well away from exhaust system parts and be clear of rotating components. All wiring must be insulated and secured every 600mm or less. Wiring to the engine must accommodate movement of the engine on its mountings during use if necessary.

2.2.8 Engine numbers must be permanently stamped or etched, accessible and readable. All engines must be stamped with an identification number. If the engine has no number, a new number must be obtained from the registering authority.

2.3 EXHAUST

2.3.1 Exhaust systems must be secure and mounted in a manner that allows movement of the drive train components without the likelihood of any exhaust system part other than mountings touching the drive train, chassis, or body parts.

2.3.2 Exhaust systems should avoid the area around the brake master cylinder wherever possible. If avoidance is not possible, it must not interfere with the braking function and a suitable shield must be fitted to prevent heat transfer to this area. Care should be taken to ensure heat from the exhaust does not damage wiring, fuel lines, fuel tank, insulation and other flammable materials

2.3.3 Turbochargers must have adequate heat shielding.

2.3.4 Catalytic convertors must be fitted with all original (or equivalent) heat shields fitted to each canister including those fitted over the canister and below it, along with appropriate flame proof materials insulating the exterior of the Street Rod floor above each canister

2.3.5 Exhaust system noise must not exceed 96 dB(A) with the Street Rod stationary and measured in accordance with *National Stationery Noise Test Procedures for In-Service Motor Vehicles* , which can be accessed at http://www.ntc.gov.au/filemedia/Reports/NatStatExhNoiseTestProcApril2000.pdf.

2.3.6 Exhaust systems must be free of leaks.

2.3.7 All Street Rods must have the outlet of the exhaust positioned rearward of the last passenger opening door or window.

2.3.8 Commercial Street Rods may position the exit of the exhaust in front of the rear wheels, or with a closed cab pickup, behind the cab.

2.3.9 The exhaust system must not have sharp edges or protrusions.

2.3.10 If side pipes are fitted, they must have adequate heat shielding at driver/passenger entry/exit points. They must exit towards the rear of the passenger compartment, and face rearwards and slightly downwards.

2.3.11 Street Rods may be fitted with a side-exited exhaust to the rear of the passenger compartment. The exhaust outlet must face rearwards and slightly downwards.

2.4 FIELD OF VIEW

At the completion of all work, including the installation of the engine, bonnet and bonnet scoops, the driver's field of view must comply with the field of view requirements specified in Section 10.2.

SECTION 3: CHASSIS

3.1 GENERAL

3.1.1 All Street Rods must have a chassis. The body and chassis are detachable by means of standard fasteners and the chassis must not rely on the body for strength. A number that identifies the chassis must be permanently stamped or etched on the chassis.

3.1.2 A Street Rod chassis must be a platform that resists twisting. A torsionally rigid chassis will not only be stronger and last longer, but will also provide better handling and allow closer fit-up of body panels.

3.1.3 An assessment of torsional stiffness may be required at the discretion of the Examiners.

3.1.4 Examiners will give consideration to any chassis construction providing sound engineering principles can be shown to have been applied, but have the discretion to seek an engineer's report where;

- there are unique design or construction characteristics, radical chassis alterations;
- independent suspension is to be fitted;
- there are considered to be significant differences in the torsional rigidity of adjacent parts of the chassis; or
- the proposed engine is of a power or mass that raises concerns for any of the above

3.1.5 Examiners may require an engineer's report if there is any concern about any aspect of the design, strength, integrity or torsional characteristics of a chassis.

3.2 WELDING

The chassis must be constructed or modified by a person competent in welding. The welding should comply with the standards specified in the Australian Standard AS 1554.1 *Structural steel welding* Part 1: *Welding of steel structures*. Numerous effects such as twisting and loss of strength can be caused by incorrect penetration, preparation, or timing of weld deposits. Structural chassis welding should be carried out with the chassis fixed in a jig in order to reduce misalignments and twisting during work. An example of a chassis jig is shown in Figure 3(a). Inspection of all welds and the requirement for rework will be at the discretion of the Examiners.

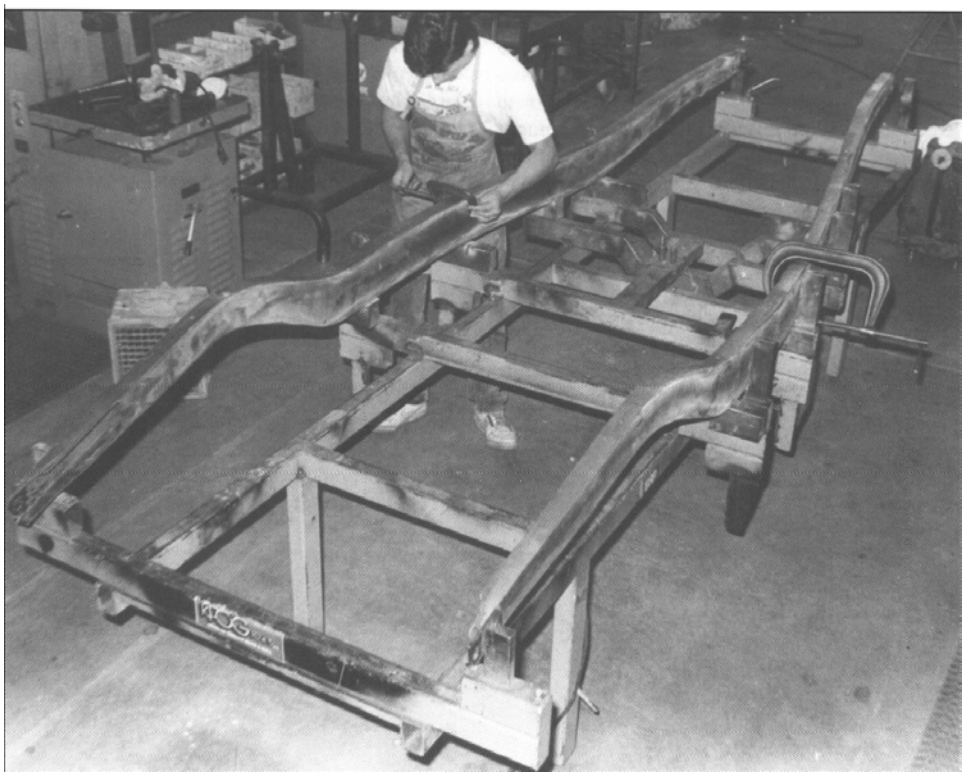

Figure 3(a) Example of a chassis jig.

Note: Those persons who have experience, but do not possess certification, should attend a TAFE or Private Provider Certified welding course to obtain the necessary level of competence.

3.3 EXPLANATION OF PRACTISES USED IN CHASSIS MODIFICATIONS

3.3.1 Boxing

The addition of a 3mm or thicker plate welded into the opening of a C-channel, or "top-hat" section, to form a box section. This section can either be the full length of the side rail, or added to areas requiring extra strength. Boxing plate attachment should be carried out as shown in Figures 3(b) and 3(c).

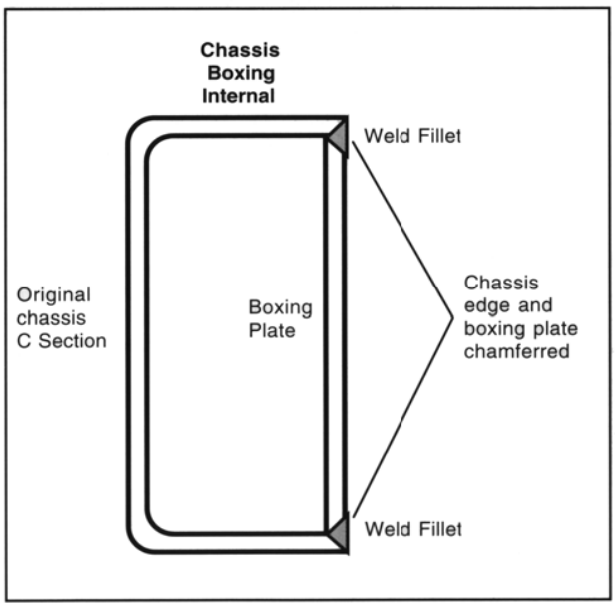

Figure 3(b) Internal Boxing of a C-channel

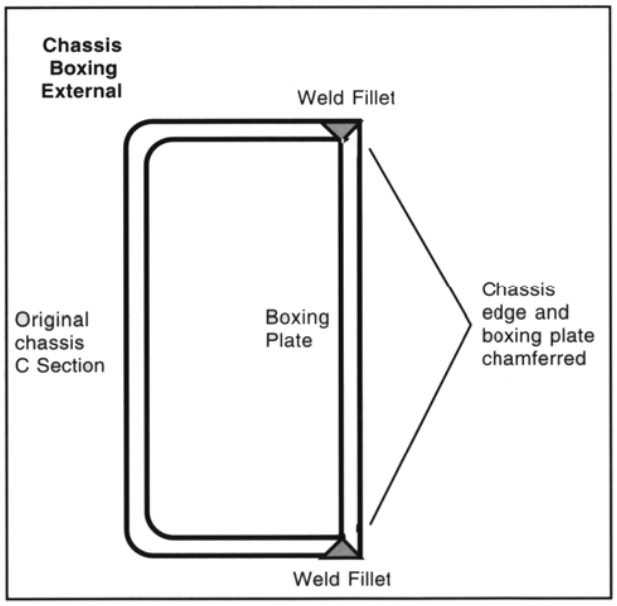

Figure 3(c) External Boxing of a C-channel

3.3.2 Laminating

The attaching of an additional 3mm or thicker plate to a chassis side rail. Large lamination plates may require the addition of regularly spaced plug welds to ensure full contact with side rails.

3.3.3 Gusseting

Gussets are plates used to strengthen butt-welded chassis joints. An example of gusseting is given in Figure 3(d).

3.3.4 Fish-Plates

Similar to a lamination plate, and is affixed when a gusset cannot be easily utilised, or a vertical slice, pie cut or section has been removed and the parts are butt welded together. Fish-plates should be at least twice as long as the chassis vertical height with triangular extensions to increase weld length and purchase area. An example of a fish-plate is shown in Figure 3(e).

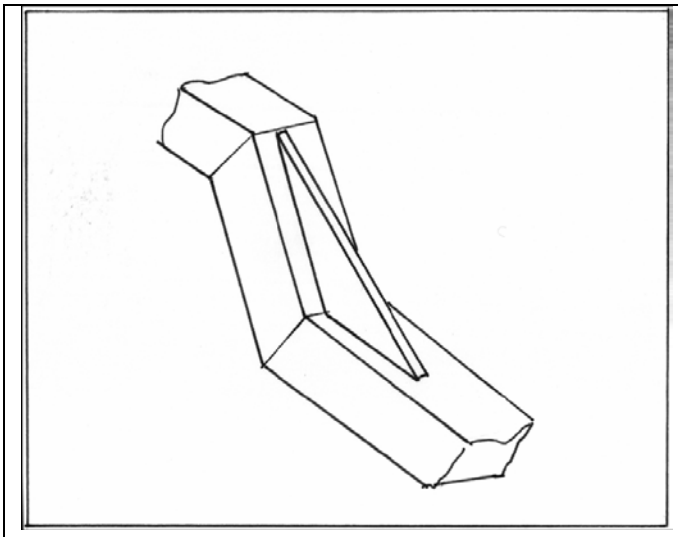

Figure 3(d) Example of Gusseting

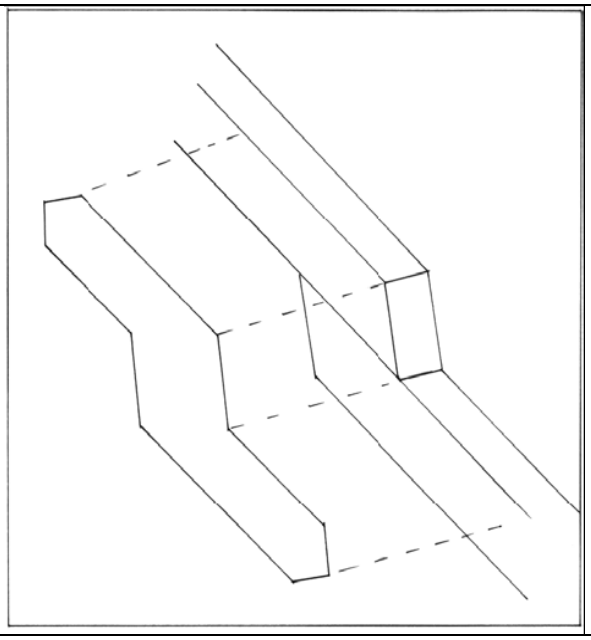

Figure 3(e) Example of a Fish Plate

3.4 CHASSIS TYPES

3.4.1 General

Chassis must comply with these Guidelines and the stated criteria. The chassis should either be built before 1949 or be a replica of one was built before 1949

3.4.1.1 *Original Pre-1949 Manufactured - Modified*

These chassis represent the bulk of street rod foundations, and specific recommendations for strength enhancement are detailed in Clause 3.6 of this section.

3.4.1.2 *Reproduction - Australian Professional Rod Shop*

Most reproduction chassis made by Australian Manufacturers are able to comply with the requirements of these guidelines. All chassis must be presented for a first build inspection by the Examiners if the chassis is not of a standard type or build.

3.4.1.3 *Reproduction - Overseas Rod Shop*

US or NZ manufacturers may not be aware of the Australian requirements, for example the chassis cross member must be a minimum thickness of 3mm, and should be checked thoroughly prior to purchase. All overseas built chassis must be presented for a first inspection by the Examiner.

3.4.1.4 *Owner Built Reproduction*

An owner built chassis may require an engineer's report for components such as independent front suspensions and any radical chassis alterations.

3.5 CHASSIS FRAME CONSTRUCTION

3.5.1 The minimum profile for a chassis that will support a light bodied Street Rod (T-Bucket, Anglia etc) is 75 x 50 x 3mm rectangular hollow section (RHS) mild steel.

3.5.2 The minimum profile for a chassis that will support heavier Street Rods, such as an A model or later Ford, is 100 x 50 x 3mm RHS steel tubing, or tubing of a cross section no less than the original production chassis.

3.5.3 All Street Rods must be fitted with a tailshaft loop to contain the tailshaft in the event of front yoke failure. The tailshaft loop should be positioned no more than 150mm from the front yoke, and be constructed to accommodate engine and gearbox movement on the mountings during acceleration and deceleration, and resulting from suspension movements. The tailshaft loop may be formed as part of the centre cross member.

3.5.4 Chassis must not be stepped in at the rear to accommodate wheel rims wider than 10".

3.6 CHASSIS STRENGTHENING AND CROSSMEMBERS

3.6.1 The addition of partial or full boxing, lamination of side rails, and the addition of space frame attachments may be used for chassis side rail strength improvement. Full length boxing should be used on all open chassis section chassis. An Engineer's report may be required if a C-section chassis is not boxed.

3.6.2 Cross members

3.6.2.1 The modification of an early model chassis often includes the full or partial removal of original cross members. As a minimum, after removing any original cross member, a "K" member must be installed. The desired layout of a "K" member and other cross member types and alterations are depicted in Figures 3(f) and 3(g) below.

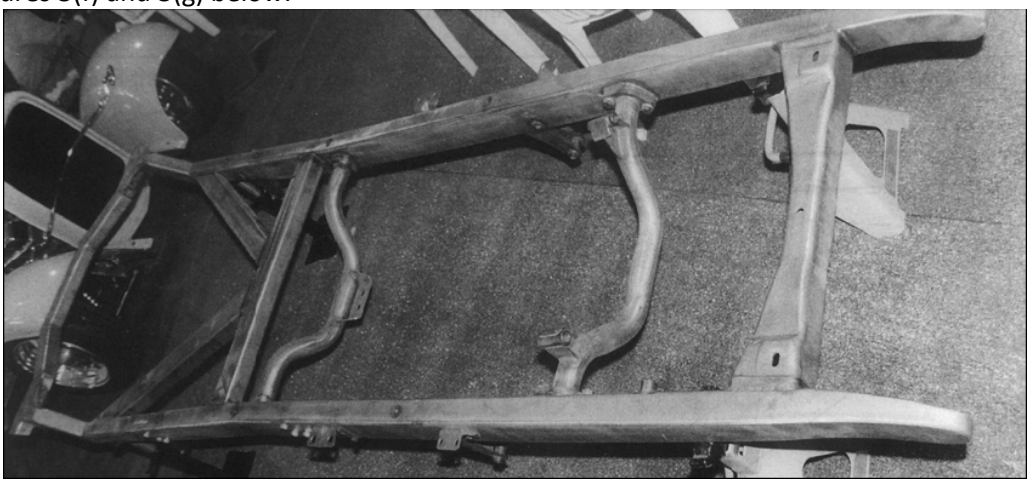

Figure 3(f) Example of "K" member

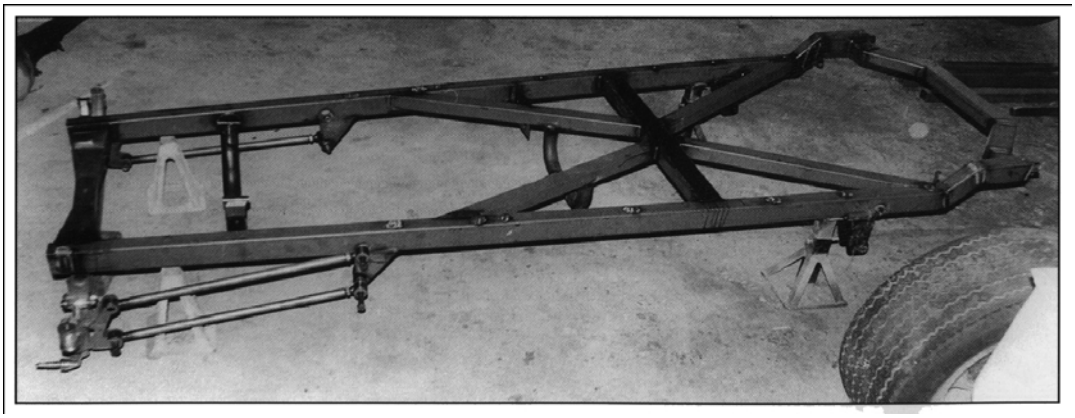

Figure 3(g) Example of "X" member

3.6.2.2 All cross members must have a minimum wall thickness of 3mm with an appropriate cross-section. The cross member should be of 75 x 50mm RHS, if one layer is used; and 50 x 25mm RHS or round tube of at least 34mm diameter if two layers are used with ties between the upper and lower layer in appropriate locations.

3.6.2.3 The Examiner may consider alternatives that are supported by an engineer's report.

3.6.3 Chassis cross members for engine and drivetrain location may be designed to be removed for maintenance purposes. In such cases, the flange plates and bolts used must be suitably sized, and that nuts or threaded bosses must have enough thread depth for the application.

3.6.4 A centre cross member must tie together both side rails to ensure torsional rigidity. Figures 3(g) above and 3(h) below provide guidance to help ensure that a chassis will be sufficiently rigid.
Note: Many vintage chassis were not designed as a rigid platform and allowed the chassis and body to flex independently. This is undesirable in a street rod.

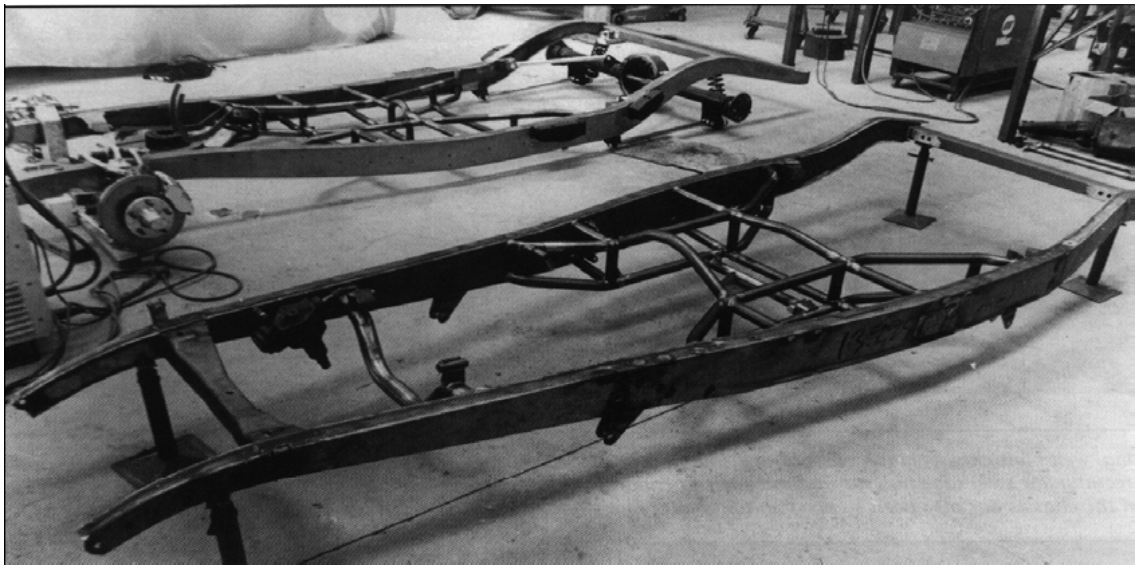

Figure 3(h) Example of a Tubular "X" member

3.6.5 Spacer tubes, crush tubes, or bolts of an appropriate length and section must be used wherever a bolt passes through a hollow section of the chassis. The tube should be 3mm or larger wall thickness and welded in position. Figure 3(i) shows examples of spacer tubes.

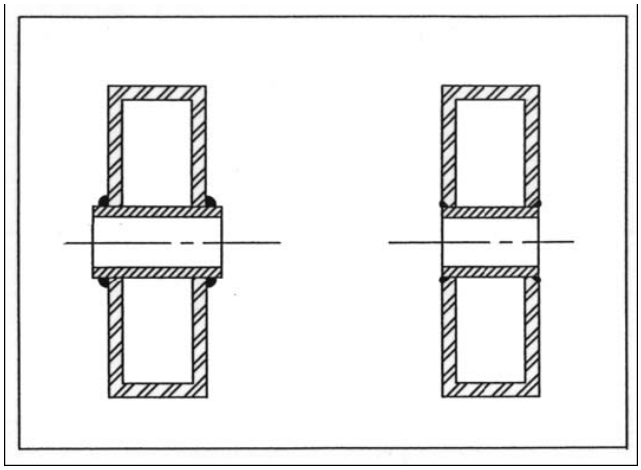

Figure 3(i) Examples of spacer tubes

3.7 NUTS, BOLTS AND FASTENERS

3.7.1 Table 3.1 below lists the minimum standards that apply to nuts and bolts used in Street Rods.
Note: Refer to Appendix A to Section LZ of VSB 14 for guidance on the use of fasteners.

Ungraded bolts	Panel fixing, floor panel fixing, and lightly loaded brackets.
Grade 3 bolts	Seat belts.
Grade 5 bolts	Moderately loaded members, suspension mounts, cross members and tail shafts.
Grade 8 bolts	Brake callipers, master and slave cylinder mounts, steering arms and all heavily loaded assemblies.

Table 3.1 Bolts used in Street Rod applications

High grade bolts must not be used as seat belt bolts. Bolts designed specifically for seat belts be must be used in this application. See also Section 9.5.

3.7.2 Stainless steel bolts must not be used in high load or stressed situations unless they are certified as high tensile steel. Uncertified bolts should only be used in locations where the use of ungraded bolts is permitted.

3.7.3 Bolts or fasteners should be long enough to ensure that at least one clear turn of thread is visible. This applies to all nuts, including nyloc and other locking or torque to yield type nuts, and any captive or permanently inserted nuts or bosses where the threaded end of the bolt is not visible when in place.

3.7.4 Locking devices must be fitted to all fasteners. These devices include:

- Spring anshake proof of washers.
- Nyloc nuts.
- Deformed thread locknuts or Huck nuts.
- Castellated nuts with split or roll pins.
- Lockwire.
- Split pins.
- Locking Tabs, and staking.

3.7.5 Care must be taken to torque lock nuts correctly. Deformed thread lock nuts or stretch bolts (torque to yield) should not be re-used once they have been torqued to the manufacturer's specifications.

3.7.6 Nyloc nuts must only be reused once, and only if the nylon locking area is in good condition.

SECTION 4: BRAKES

4.1 MINIMUM REQUIREMENTS OF BRAKING SYSTEMS

4.1.1 All components of the braking system must be in a serviceable condition. The type and size of the braking system must be at least equal to the braking system of a vehicle of similar size, weight and performance. Hydraulic brakes must be fitted on all wheels.

4.1.2 Dual circuit or split systems must be used. These systems may utilise either integral tandem master cylinders or dual individual master cylinders.

4.1.3 The street rod's brake must be tested in accordance with the procedures below.
Note: These are the tests specified in Section LG, VSB 14.

4.1.3.1 Tests should be conducted on fully laden Street Rods and they should meet the following stopping distances and decelerations outlined in Table 4.1. The tests and performance levels specified in Table LG4 are contained in the AVSR.

4.1.3.2 The tests should be conducted on a smooth dry level road surface free from loose material. The Street Rod must not move outside a 3.7 metre wide straight path centred on the longitudinal axis of the Street Rod when the brakes are initially applied.

Brake Type	GVM (tonnes)	Max. stopping distance (m) from 35 km/hr	Min. average deceleration (ms^{-2}) from any speed	Min. peak deceleration (ms^{-2}) from any speed
Service Brakes	Under 2.5 tonnes	12.5	3.8	5.8
	2.5 tonnes and over	16.5	2.8	4.4
Emergency Brakes	Under 2.5 tonnes	30	1.6	1.9
	2.5 tonnes and over	40.5	1.1	1.5

Table 4.1 Minimum Braking Performance Requirements for Street Rods

4.1.3.3 The service brakes and emergency brakes must be capable of stopping the Street Rod with one sustained application from a speed of 35 km/hr in no more than the respective distances listed in Table 4.1.

4.1.3.4 The service brakes and emergency brakes must also be capable of stopping the Street Rod with one sustained application from any speed at which the Street Rod can travel, at no more than the respective average and peak deceleration rates listed in Table 4.1.

4.1.3.5 The braking system must incorporate a parking brake that is applied only by direct mechanical means, can be locked in the applied position, and can be operated from the normal driving position The parking brake must be capable of holding the Street Rod on a 12% gradient.

4.2 DISC BRAKES

Where disc brakes are fitted to the front axle, they should be of the ventilated type.

4.3 BRAKE BALANCE

The brake system must provide the correct balance between front and rear to help avoid premature lock up during braking. Whenever possible, the entire braking system of a vehicle of similar size and performance to the Street Rod under construction should be used. Street Rods will often have a mix-and-match brake system due to availability of parts. When this is the case, the builder must ensure that the master cylinder is capable of

delivering the required volume of fluid to each circuit, and that the bore diameter, booster and pedal ratio are matched, without excessive pedal travel. Any mix-and-match proposal should be referred to an Examiner, as documentation for the proposed combination of components may already be held on file.

4.4 MASTER CYLINDERS

4.4.1 Master cylinders must be sized to correct braking to the front and rear wheel at all likely stages of brake wear without excessive travel.

4.4.2 Master cylinders must have a displacement volume sufficient to actuate both circuits without excessive pedal travel. Street Rods fitted with four wheel discs or aftermarket discs and callipers must be fitted with a master cylinder that displaces a volume of fluid compatible with the size and number of the calliper pistons.

4.4.3 Master cylinders must be securely mounted on either the firewall or the chassis. All mounting bolts or studs provided for by the component manufacturer must be used to secure the master cylinder and booster. Flexing of brake component mountings may reduce the effectiveness of the brakes during an emergency stop and must be kept to a minimum.

4.5 BOOSTING

Boosters should be used. If a brake booster is not fitted a brake certificate certifying compliance to VSB 14, Section LG may be required.

4.6 BRAKE PEDALS

4.6.1 There should be no distortion or flex in the brake pedal, the pedal box or mounting brackets, or the bulkhead when the brake pedal is depressed. Any flex or distortion must be minimised and not affect the performance of the brakes.

4.6.2 Brake pedal leverage ratio should closely resemble the pedal ratio of the vehicle from which the master cylinder was sourced. Generally ratios are in the order of 5:1 to 7:1:refer to Figure 4(a) to calculate the ratio.

4.6.3 Brake pedals must be mounted so that during operation, no part of the brake pedal makes contact with any other component or otherwise restricts the operation of the brake system in any way. Sufficient clearance must be provided to ensure that in an emergency braking situation, the brake pedal is readily accessible without any interference from any other components. The brake pedal must be located to allow free access without obstruction by the steering column.

4.6.4 Pedal pads are to have non-slip surfaces.

4.6.5 The brake pedals should be constructed in such a manner that welds between the actuating arm(s) and the pedal shaft completely encircle the shaft. Alterations to cast or forged brake pedals must be carried out by a competent tradesperson able to certify the work.

4.6.6 Pushrods between the master cylinder and the pedal arm must be straight and must act through the centreline of the master cylinder bore. If a straight pushrod cannot be used alone, additional leverage systems such as a bell crank should be used provided that the system is endorsed by an Examiner.

4.6.7 Manufactured pushrods used in braking systems must have a diameter not less than that specified in the Table 4.2.

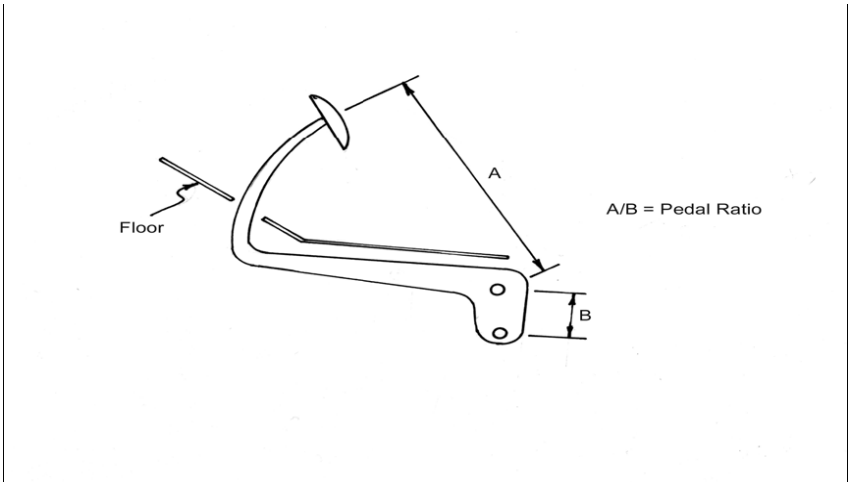

Figure 4(a) Brake pedal leverage ratio

Note: If the pedal contacts the floor of the Street Rod before the master cylinder piston has reached the end of the primary piston travel, a single circuit failure will render the brakes inoperable.

Pushrod Length	Pushrod Diameter (min)
Up to 250mm	10mm
250 to 400mm	12mm
400 to 600mm	14mm
600 to 800mm	16mm

Table 4.2 Pushrod diameters

4.7 FLUID LINES AND HOSES

4.7.1 Rigid brake pipes must be made from tubing designed for use with automotive brake systems. Connections must be flared in a manner suitable for the chosen fittings and the tubing is to be supported with a rigid mount at intervals of no more than 300mm. Brake pipes must not be joined by welding or brazing.

4.7.2 Only flexible brake lines and hoses marked as complying with SAE J1401 or equivalent must be used. Flexible braided hoses must not be forced into a radius tighter than the manufacturer's specified minimum radius for each hose diameter.

4.7.3 Brake lines that are passed under the chassis rail or below cross members must be protected. Brake lines must be installed without sharp bends. Radius of bends must not be tighter than the manufacturer's specified minimum radius for each line diameter.

4.8 BRAKE FLUIDS

4.8.1 Brake fluid compatible with the braking system must be used.

4.8.2 Silicone brake fluid must only be used if all seals and other components are compatible with silicone fluid. Incompatible compounds react with silicone-based fluid causing swelling of the seals in the master cylinder, blocking off the compensating port and thereby locking the brakes on or off.

4.8.3 DOT 3, DOT 4 and DOT 5.1 poly-gycol based fluids are all compatible despite any differing colour dyes used, and these can be used in most road going brake systems. The brake fluid used should be a minimum DOT3.

4.8.4 DOT 5 silicone based fluid is not compatible with the more commonly found poly-glycol based fluids or the seals used in most road going and commonly found braking systems.

4.8.5 Further advice should be obtained from a brake specialist.

SECTION 5: STEERING

5.1 STEERING MODIFICATION REQUIREMENTS

5.1.1 Steering boxes and components from various donor vehicles may be used. The steering components must be of adequate strength for the intended Street Rod and the steering ratio must be suitable to permit safe manoeuvring and Street Rod control. The steering box ratio and steering arm length must be compatible so that excessive force is not required to operate the steering.

5.1.2 Steering components must all be compatible. This should be achieved by selecting a single donor vehicle. A clear record should be kept of the make, model, year and identifier to enable parts to be sourced in the future.

Note: Steering components should not be lightened; the donor vehicle should be of at least the same size and mass as the Street Rod under construction

5.1.3 At least 10mm clearance must be maintained around all steering components throughout the operational range of the steering and suspension.

5.1.4 Lock stops must be fitted to prevent over-lock and maintain steering component clearances if they are not integral to the rack or steering box design. These may be fixed or adjustable and locked.

5.1.5 Fabric steering joints shall be heat shielded if less than 50mm from the exhaust

5.1.6 The street rod must be able to turn in a circle not over 25 metres in diameter, measured by the outer edge of the tyre track at ground level, whether it turns to the left or to the right.

5.1.7 Examiners may require an engineer's report if there is any concern about any aspect of the design, strength, integrity operation of the steering.

5.2 HEAT TREATMENT AND CHROME PLATING

5.2.1 It is critically important that the strength and fatigue resistance of all steering components is maintained, therefore forged or cast steering components must not be reworked by welding or heating unless the component has subsequently been appropriately treated and approved in accordance with Appendix C to Section LZ of VSB 14.

5.2.2 Due to the risk of hydrogen embrittlement, stub axles and other critical steering components must not be chrome plated.

Note: Hydrogen embrittlement is a potential side effect of chrome plating. It occurs when the hydrogen produced as a result of the plating process causes weak spots in the base metal. It is undetectable as embrittlement occurs under the surface of the chrome plating.

5.2.3 Heat treated suspension components should not be polished, sand, or bead blasted except by a skilled and experienced supplier. Stainless steel suspension components may be supplied in a coarse matt or polished finish, and should only be polished by the manufacturer or a competent person. Evidence may be sought to confirm the material, and the supplied finish of any suspension component; e.g.. Original invoices or receipts and manufacturer's specifications

Note: Refer to Appendix C to Section LZ of VSB 14 for guidance on welding techniques and procedures and to Appendix D to Section LZ of VSB 14.

5.3 STEERING RACK SHORTENING

5.3.1 If steering racks are shortened, the modification must be carried out without any welding of the critical components.

5.3.2 The rack assembly may be shortened by removal of material on the near (kerb) side of the rack and the subsequent remanufacture of the cut end to duplicate the original manufacturers' design.

5.3.3 Cutting of additional teeth is not permitted unless the modifier can prove that no strength has been lost and that the heat treatment is still intact or has subsequently been treated appropriately.

5.3.4 If it is intended to modify outer housings with welding, a suitable jig must be used to ensure alignment of bushes is unaffected.

5.3.5 The welded area should be reinforced with a sleeve or suitable reinforcement. The shortening should be done by a competent machine shop.

5.3.6 Persons not familiar with determining rack length as described in Appendix 1 must consult an Examiner or an experienced Street Rod builder before shortening the rack.

5.4 MANUFACTURED STEERING LINKAGES

5.4.1 Components must be of an appropriate design, material and dimension for the size and mass of the Street Rod and for the steering loads likely on components. Persons not familiar with construction of such components must consult an Examiner or experienced constructor for guidance.

5.4.2 Fabricated steering pitman arms must have a minimum plate thickness of 19mm. Fabricated spindle steering arms must have a minimum plate size of 12.5mm.

5.4.3 Correct toe-out on turns must be maintained with the use of Ackerman's Principle.
Ackerman's Principle states - "A line drawn through the centre of the steering axis and the steering pivot on each wheel should intersect at a point in line with the centre of the rear axle". This means that steering arms positioned rearward of the front axle centreline must angle inwards and steering arms positioned forward of the axle centreline must angle outwards; refer to Figure 5.1 (see overleaf).
Consideration should be given to the position of steering components and the effects of the full range of suspension travel to introduce bump steer; refer to Section 6.10.

5.4.4 If tie rods or drag links are bent or cranked to clear components, the tie rods or drag links must satisfy the strength requirement of the task it is intended for. In many cases original equipment manufacturer (OEM) tie rods or drag links which feature increased wall thickness may be used.

5.4.5 Table 5.1 lists the minimum sizes required for mild steel seamless tubing steering linkages:

Length	Diameter	Wall Thickness
Up to 1200mm	22mm	3mm
1200mm to 1800mm	32mm	3mm
1800mm is the recommended maximum length for any steering linkage tubing.		

Table 5.1: Minimum sizes for mild steel seamless tubing steering linkages.

5.5 CHECKING THE TRACKING OF ALL FOUR WHEELS

Prior to checking the tracking, the street rod must be checked to verify that the wheelbase is symmetrical about its centreline, and that the front and rear axles are installed perpendicular.
For safe handling and appropriate tyre wear, all four wheels should track in the same line. Drawing TAC-5 illustrates how this can be achieved. Commence by disconnecting one tie rod end then fixing a cord at the first cord position, fix the free end of the cord to a moveable object and move the object until the cord just touches point "N". Straighten the front wheel until distances "X" and "X1" are equal. Fix a second cord in the same way and repeat the procedure applied to the first cord. The measurements of "Y" and "Y1" should be equal to "X" and "X1".

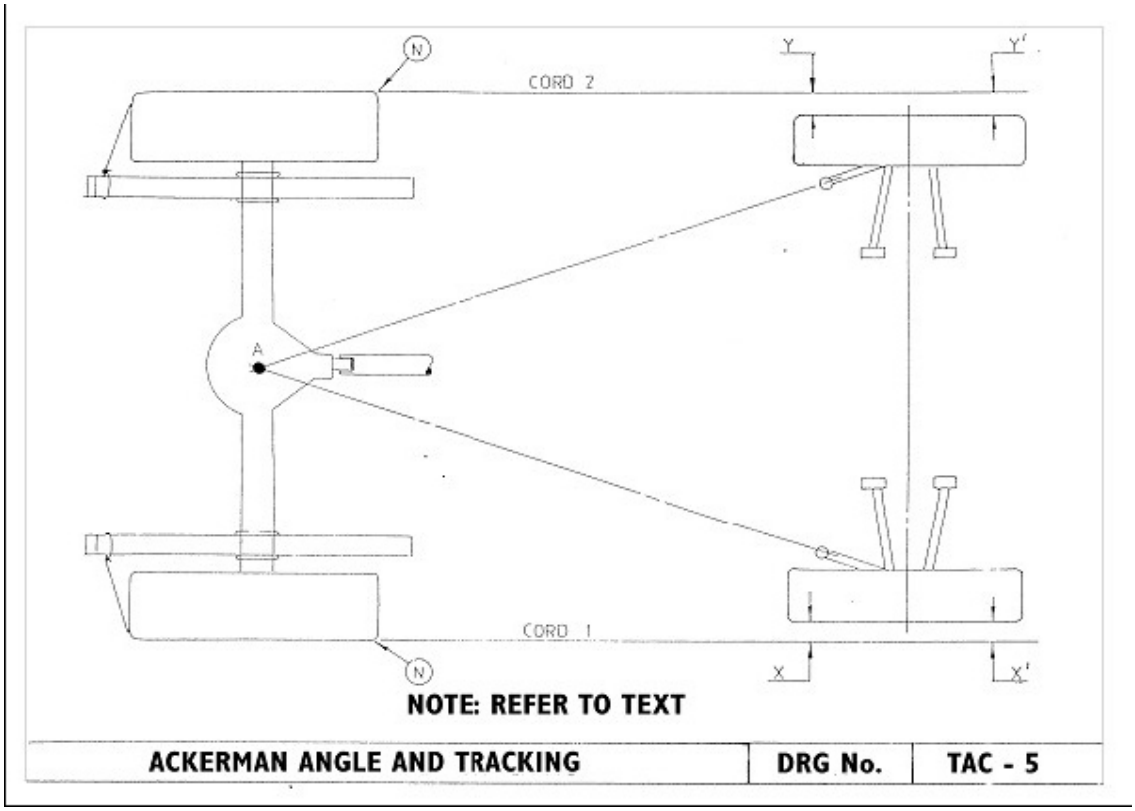

Figure 5.1 Ackerman Angle and Tracking (TAC–5)

5.6 STEERING COLUMNS

5.6.1 The following applies to all replica Street Rods and to other Street Rods if the steering column is modified or replaced. Either:

(a) Collapsible steering columns must be fitted. Vertical columns must not be fitted, and the steering column angle must not be less than 30º from the vertical.
or

(b) Universals sections and a section of intermediate shaft between the bottom of the steering column and the steering box or rack must be fitted. The intermediate shaft/s must be designed to ensure the rearward displacement of the steering column is minimised relative to the driver in a frontal collision.

5.6.2 The steering column must not impede access to any of the foot controls

5.7 STEERING UNIVERSAL JOINTS AND COUPLINGS

5.7.1 All steering universal joints and couplings must be of an automotive type. Industrial and agricultural joints must not be used. The number of joints used must be consistent with safe and smooth operation and all shafts must be supported where required. For example, a system with more than two universal joints must have at least one self-aligning support bearing on the lower shaft.

5.7.2 Flexible fabric or rubber disc universal couplings are not designed to operate through a greater change of angle than 5 degrees and must be installed with a supporting self-aligning bearing to prevent any out of fixed line movement. These couplings must also be fitted with a device that prevents coupling separation in the event of failure of the fabric.

5.7.3 Ball joints (ball and cup couplings) as used on HQ Holden steering column ends must be installed with an operating angle of no more than 5 degrees.

5.7.4 Where universal joints are installed in pairs they must be installed at right angles (phased) to allow smooth operation and to prevent binding. The angle of steering universal joints must be such that the universal joints move freely with no binding.

5.7.5 Steering universal joints must be installed with the minimum operating angle to ensure that they rotate smoothly without binding.

5.8. LOCKING OF STEERING COMPONENTS

5.8.1 Castellated nuts used for steering components must be locked with split pins.

5.8.2 If nyloc or deformed thread nuts are used, the thread must protrude at least one clear turn beyond the end of the nut.

5.8.3 Other means of locking may be used provided that the application is appropriate.

Note: Refer to Appendix A to Section LZ of VSB 14 for guidance on the use of fasteners.

5.9 STEERING WHEELS

5.9.1 A steering wheel manufactured for automotive use must be used. Novelty steering wheels – e.g. one manufactured from welded chain – must not be used.

5.9.2 The diameter of a steering wheel, measured from centre to centre of the rim, must be at least 13 inches or 330mm.

5.10 STEERING POSITION

Street Rods must be configured as right-hand drive vehicles.

5.11 ILLUSTRATIONS/DIAGRAMS

Other steering illustrations and diagrams are included as part of Section 6, Suspension.

SECTION 6: SUSPENSION

6.1 SUSPENSION MOUNTING

6.1.1 Suspension removed from a donor vehicle must be mounted so that the original strength of the mounting is not reduced. The best practice is to install the suspension by the same method that was used in the donor vehicle, using with the same size and number of fasteners.

6.1.2 Bolted-in suspension units that originally have brake reaction tongues forward of the cross member to prevent rotation, must be mounted with suitable side rail mounts and with bolts sized so that no loss of strength occurs. If required by the Examiner, gusset plates must also be fitted. An example of this type of suspension mounting is shown in Appendix 1.

6.1.3 Welded-in suspension members must be installed by a competent welder. Welded suspension cross members should first be tacked into place then examined prior to finish welding to ensure that all components are correctly located.

6.1.4 Radius arm mounts should be in line with the pivot line of the control arms. Original type compliance bushes should be used in this case. Where ties – ie forward-facing members originally installed in tension – are reversed to form struts – ie rear-facing members in compression – an increase in the member's diameter may be required to prevent buckling under load. An example of an L300 Front Suspension Unit is shown in Appendix 1.

6.1.5 Heat treated suspension components should not be polished, sand, or bead blasted except by a skilled and experienced supplier. Stainless steel suspension components may be supplied in a coarse matt or polished finish, and should only be polished by the manufacturer or a competent person. Evidence may be sought to confirm the material, and the supplied finish of any suspension component; for example, original invoices or receipts and manufacturer's specifications.

6.2 BEAM AXLES

6.2.1 The axle selected must be suitable for the load and application.
Note the minimum king pin diameter is 19mm (¾").
Five types of beam axles are normally used in Street Rod construction and they are:

Type 1	OEM unmodified.
Type 2	OEM modified or dropped.
Type 3	Aftermarket manufacturer or specialist supplier one piece I-beam.
Type 4	Tube axle commercially manufactured by inserting and welding cast steel ends into a mild steel tube.
Type 5	Tube axle manufactured from formed mild steel with end bosses and locater welded in position.

Homemade axles must not be used.

6.2.2 The following minimum standards of inspection should be used for all Types of axles:

New Axles	New axles require a visual check for obvious faults or damage.
Second-hand Axles	A visual check for obvious faults or damage, of the roundness of the kingpin holes and spring perch bosses; and a check to ensure the axle is not bent out of alignment.

In addition, any fabrication or modifications which involve the strength or integrity of a new or second-hand axle must be supported by the appropriate certification or engineer's report.

6.2.3 Type-5 axles must comply with the following:

Construction	Welded professionally, including appropriate heat treatment in accordance with engineer's instructions and in a jig designed for the purpose.
Certifying	Certified by an engineer's report. Certification must include a non-destructive inspection in accordance with the Australian Standard AS/NZS 1554.1 *Structural steel welding* Part 1 *Welding of steel structures* by a recognised non-destructive testing organisation.

Note: Care should be taken when purchasing second hand Type-5 axles privately or at markets such as swap meets as the axles may not meet the requirements specified above.

6.2.4 Beam axles may be welded or dropped provided that this operation is carried out by a welder certified to carry out the process. This process requires certification.

6.2.5 Axles that have been drilled by the axle manufacturer during the manufacturing process may be used. Beam axles must not be drilled for non-essential purposes such as reducing weight or for aesthetic purposes.

6.2.6 The lowest point of a beam axle must not be less than 100mm from the ground - refer to Section 6.4 for further details concerning ground clearance.
Note: No axle is exempt from the requirements specified above. Safety is a paramount consideration and must not be bypassed under any circumstance.

6.2.7 Evidence must be available to show that beam or tube axles fitted to a Street Rod have been inspected and certified.

6.3 SPRINGS

6.3.1 Where fitted, coil springs should be shortened by resetting, rather than by cutting.

6.3.2 Coil springs must not be heated to lower a Street Rod.

6.3.3 If a transverse spring is mounted behind a beam front axle, a positive limiting device must be fitted above the axle to prevent any part of the Street Rod, other than a wheel, making contact with the ground in the event of a spring failure.

6.4 GROUND CLEARANCE

6.4.1 Ground clearance must be at least 100mm at any point within 1 metre of an axle, and at any other point must be at least one thirtieth of the distance between the centres of the axles (wheel base), in accordance with Rule 73 of the AVSR. Where the wheelbase is less than 3000mm, the Street Rod should have 100mm minimum ground clearance under its full length; refer to Figure 6.1.

6.4.2 In addition to the requirements of 6.4.1, in the event of a tyre failure no part of the Street Rod other than the wheel rim must be able to come in contact with the road surface.

6.5 SUSPENSION SHACKLES

Spring shackles must be designed for automotive usage and not exceed 125mm measured from pin entre to pin centre.

6.6 LOCKING OF SUSPENSION NUTS

6.6.1 Castellated nuts used for suspension components must be locked with split pins.

6.6.2 If nyloc or deformed thread nuts are used, the thread must protrude at least one clear turn beyond the end of the nut.

6.6.3 Other means of locking may be used provided that the application is appropriate.

Note: Refer to Appendix A to Section LZ of VSB 14 for guidance on the use of fasteners.

6.7 LOWERING BLOCKS

6.7.1 The thickness of a lowering block must not exceed 50mm.

6.7.2 Lowering blocks must be made of steel or solid alloy.

Note: Refer to Section 4.11 to Section S of VSB 14 for more information on lowering blocks.

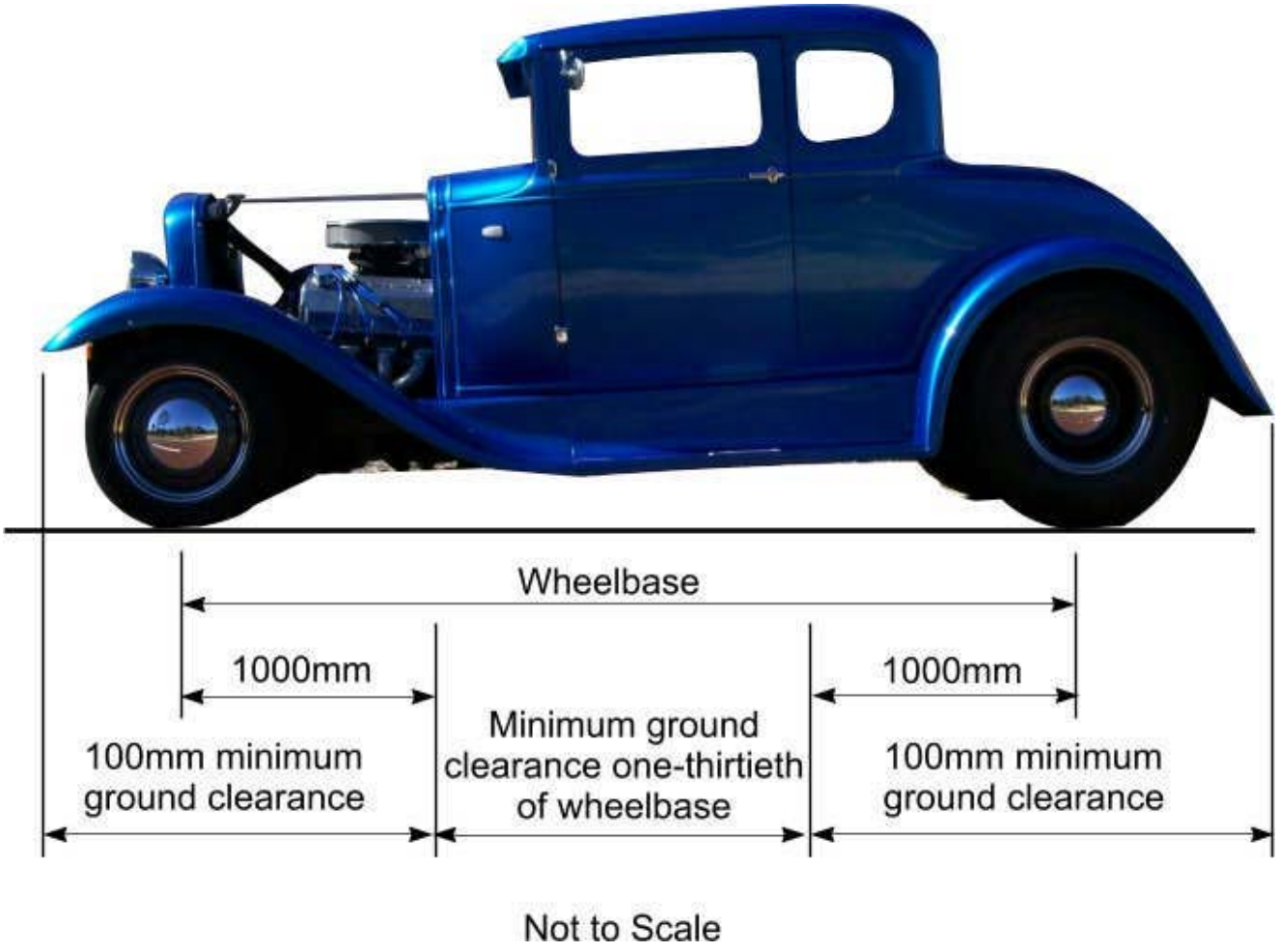

Figure 6.1 Ground Clearance Requirements

6.8 RADIUS RODS

6.8.1 Examiners may seek an engineer's report where there is any concern about any aspect of the design, strength, integrity or torsional characteristics of any aspect of the Street Rod suspension. Adjustments such as bending any suspension component to align for fitting must only be done by a competent person and appropriate heat treatment must be reinstated in accordance with the original manufactured specification, or the engineer's instructions. If in doubt consult the Examiner or component supplier before proceeding. All chassis welding and appropriate strengthening must have been completed and any necessary examination and assessment of the chassis completed according to Section 3 of this Guide before mounting suspension components

6.8.2 Early Ford-type rear radius rods may be split to obtain clearance provided that the distance between the locating ends of the split rods is no more than 300mm. If a transverse rear spring is used the spring end of the radius rods may need to be bent to realign the spring shackle hole. This procedure must be carried out by a competent person and certified by a Signatory.

6.8.3 Early Ford-type front radius rods or front wishbone type control arms may be split to obtain clearance and to position the ends on the chassis rails for I-beam axles only. The distance between the ends of split radius rods for tube axles must not exceed 300mm (see diagram 6(b)). The spring end of the radius rods may need to be bent to realign the spring shackle hole. This procedure must be carried out by a competent person and certified by a Signatory.

6.8.4 Ladder bar rear suspension locators must not be used, except where used as radius rods with the distance between the locating ends being less than 300mm. Ladder bar style radius rods must be of sufficient length to ensure full suspension travel without binding of any suspension components.

6.8.5 Locators for independent type rear axles should resemble the OEM installation wherever possible; refer to Appendix 3.
Note: There is a wide range of aftermarket and specialist manufactured fittings appropriate for the securely locating an IRS. Examiners may seek evidence to confirm the fittings used are appropriate for the IRS, the location, and the likely loading. Consult an Examiner or an experienced or specialist supplier for further information.

6.8.6 Original style radius rods used on the rear may require reinforcement at the rear of the mounting frame. Further advice may be obtained from an engineer or specialist supplier

6.8.7 Hairpin radius rods must only be used on front beam axles and must have engineering certification.

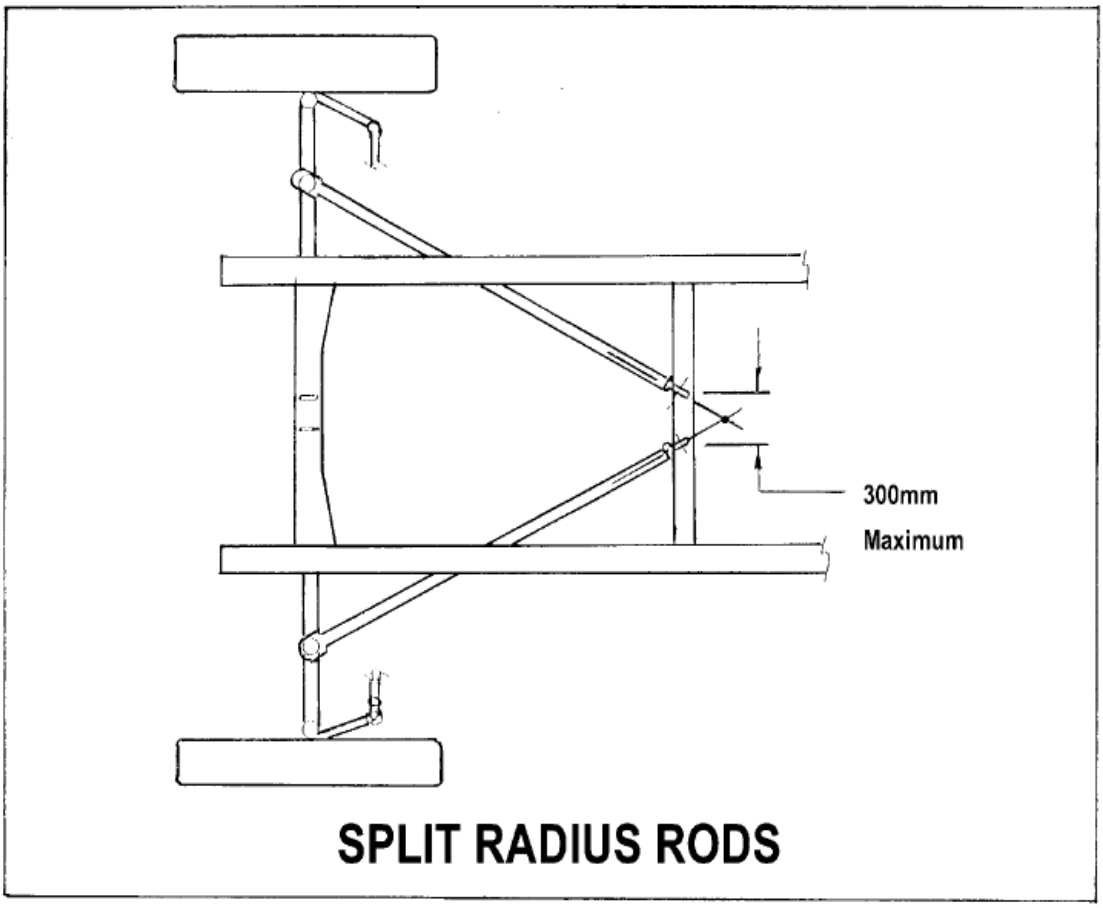

Figure 6(b) Maximum separation for split radius rods with Tube Axles

6.9 FOUR-BAR SUSPENSION LOCATERS

6.9.1 Table 6.1set out the minimum requirements for fabricated four-bars.
Note: The diagrams at the end of this section provide examples of parallel and triangulated four-bar suspensions.

Front Four-Bars
Maximum Length – 900mm
Outside diameter of Tube – 22mm
Wall Thickness – 3mm
Thread – 5/8 UNF or 16mm fine metric

Table 6.1.1 Minimum requirements for Front Four-Bars

Rear Four-Bars: Normal duty application
Maximum Length – 900mm
Outside diameter of Tube – 22mm
Wall Thickness – 3mm
Thread – 5/8 UNF or 16mm fine metric

Table 6.1.2 Minimum requirements for Rear Four-Bars for normal duty application

Rear Four-Bars: Heavy duty application
Maximum Length – 900mm
Outside diameter of Tube – 25mm
Wall Thickness – 3mm
Thread – 3/4 UNF or 19mm fine metric

Table 6.1.3 Minimum requirements for Rear Four-Bars for heavy duty application

The wall thickness of 3mm tube must not be reduced by threading directly into the end of it. If threaded ends are used with 3mm wall thickness tubing, a bush must be welded into the end of the tube to accommodate the thread.

6.9.2 Rod end bushes fitted in a cantilever style application, ie mounted on the outside of the mounting bracket, must be fitted with a washer or retainer of a diameter at least as large as the diameter of the outer tube sleeve section as shown in Figure 6(c), must not be more than 10 degrees out of alignment.

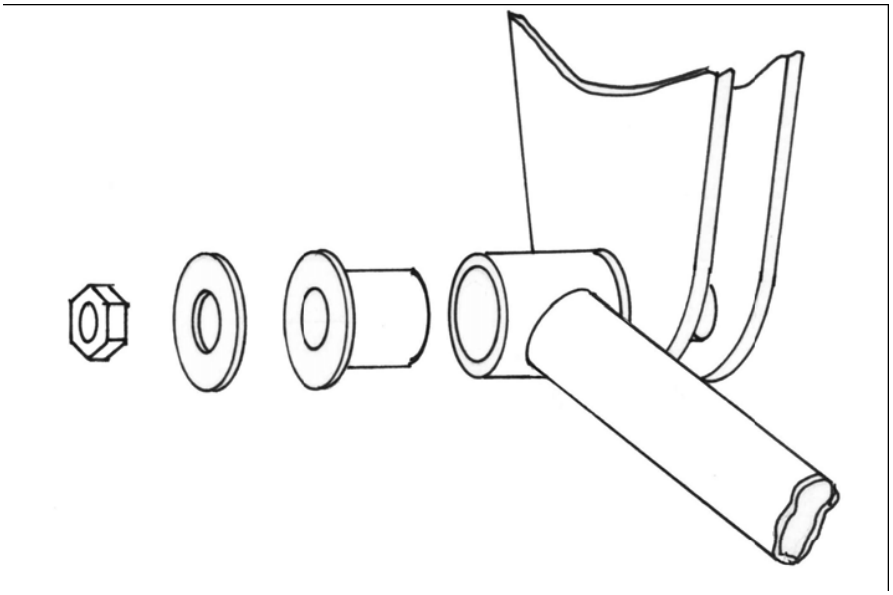

Figure 6(c) Rod End Bushes Fitted in a Cantilever Style Application

6.9.3 Spherical rod ends, sometimes known as' Heim joints', and 'Rose joints', are rod end bearings that may be used on the end of control rods, steering links, tie rods, or anywhere a precision articulating joint is required. They comprise a ball swivel with an opening through which a bolt or other attaching hardware may pass that is pressed into a circular casing with a threaded shaft attached. The threaded portion may be either male or female.
Spherical rod ends are made to a variety of standards in terms of strength and durability, and can be prone to poor durability or failure if used inappropriately. Early versions were prone to failure and had a poor durability history. As a result spherical rod ends must only be used in critical applications such as steering and suspension if they meet all of the following criteria:

(a) The movement of the rod/component to which the joint is attached does not exceed the allowable articulation angle of the spherical rod ends as specified by the spherical rod ends' manufacturer;

(b) The spherical rod ends do not hang-up on existing components; and

(c) A Signatory confirms that the spherical rod ends used have sufficient durability and strength in all directions for their intended purpose.

(d) Spherical rod ends must be protected by suitably designed dust covers to reduce the risk of premature wear.

6.9.4 Where possible, the top and bottom arms of parallel rear four-bars, should be of equal length. If this cannot be achieved, one parallel arm should be at least 50 percent of the length of its counterpart. (eg: Bottom arm - 800mm minimum, Top arm - 400mm minimum).

6.9.5 Four-bars fitted to the front axle should be at least 116mm (4 ½ inches) between centres, equal at both front and rear to ensure that the axle does not rock as a result of normal suspension and steering operation. See diagram 6(d) below.

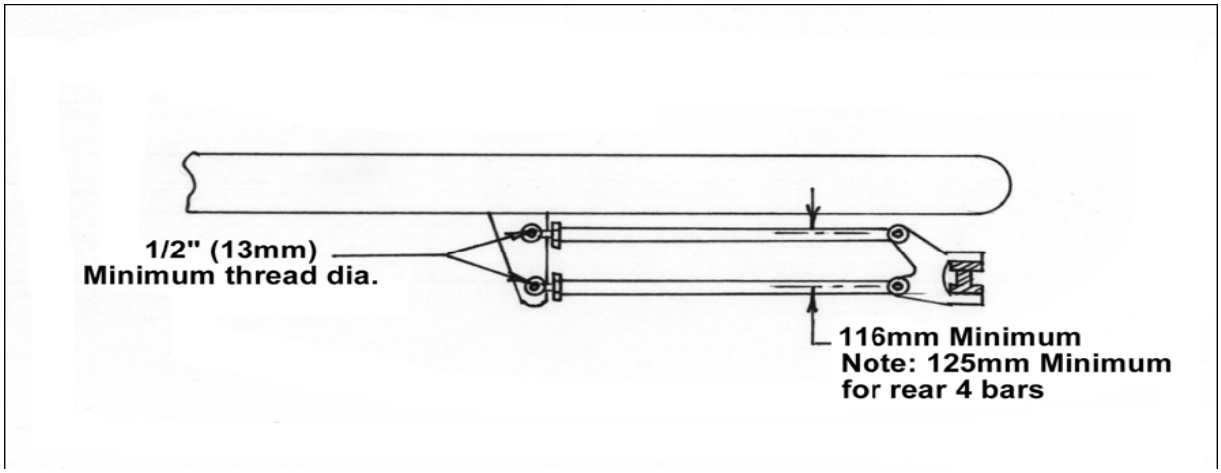

Figure 6(d) Installation of *Four-bars* to Front Axle

6.9.6 Four-bars fitted to the rear axle should be at least 127mm (5 inches) between centres to prevent excessive loads on the four-bar assembly.

6.9.7 Mounting points for rear four-bars should be of the double shear type (two side plates with the bush/bar end in between) and located on the chassis rail. Where lateral loads are likely to be encountered mounting points must be boxed or gusseted.

6.9.8 Parallel four-bars must be straight. If the front and rear locations are offset; then either: the axle batwing and chassis mount must be aligned, or either or both bush ends must be equally offset.

6.9.9 If batwings are used for front four-bar location do not compensate for perch bolt angle, suitable flexible rod ends must be used. See Figures 6(e) to 6(h) for examples of "four-bar" front and rear suspensions.

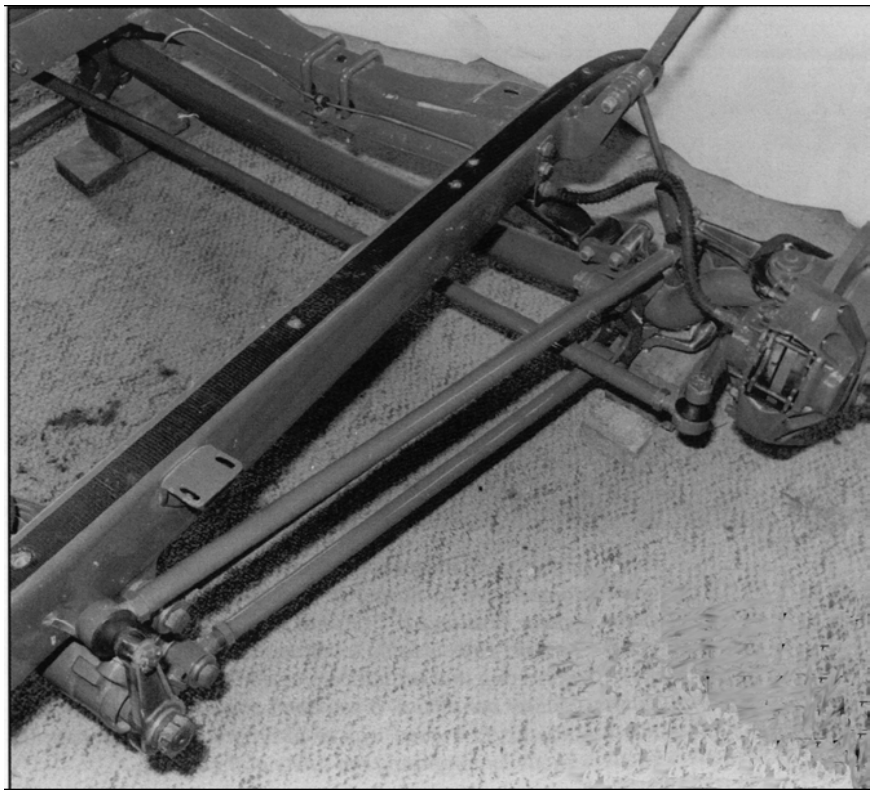

Figure 6(e) Example of four-bar front suspension with side steering.

Note that the steering drag link runs parallel to, and is close to the same length as the suspension four-bars.

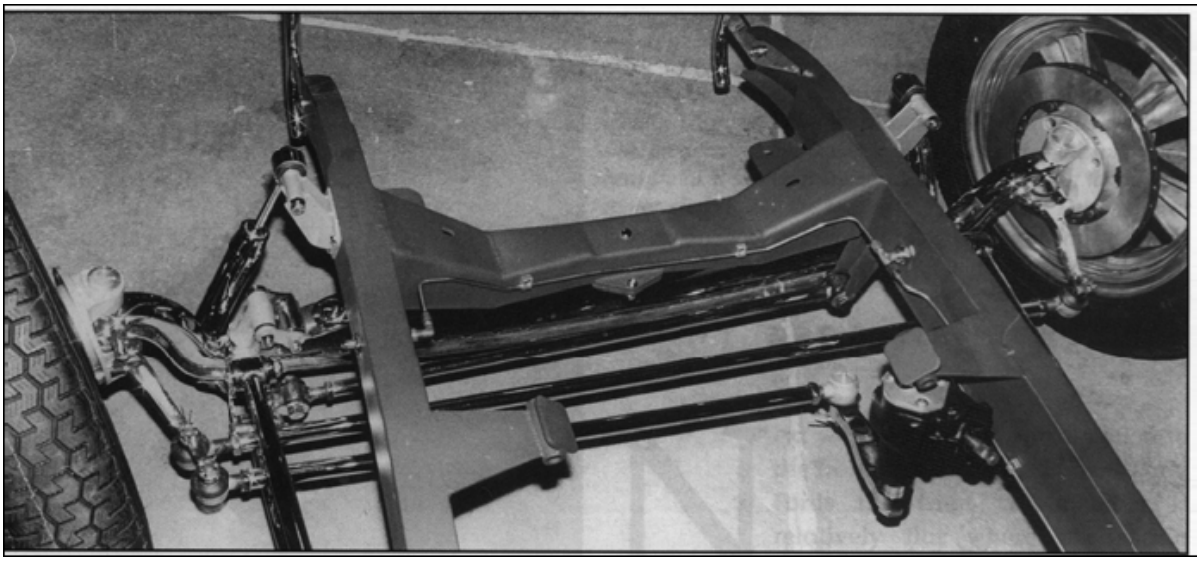

Figure 6(f) Example of four-bar front suspension with cross steering.

Note the panhard bar, which is fixed to the chassis on the steering box side. It is as long as possible, and parallel to the drag link and tie rod.

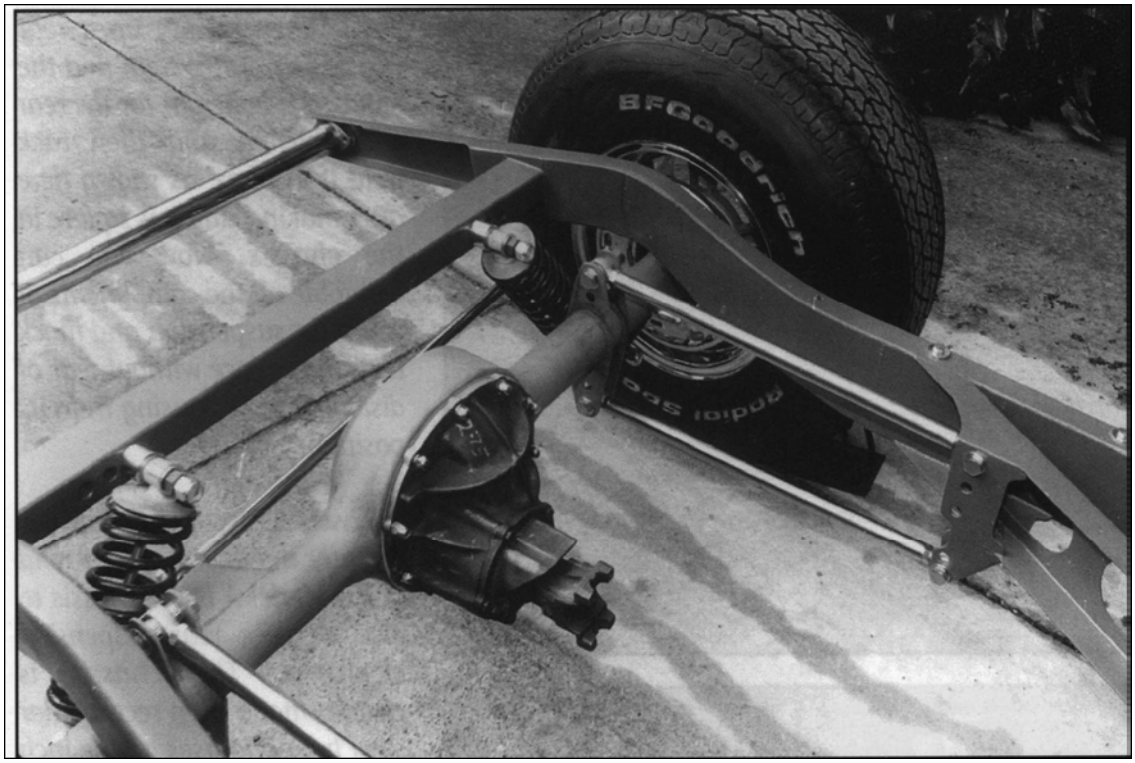

Figure 6(g) Example of parallel four-bar rear suspension.

Figure 6(h) Example of triangulated four-bar rear suspension.

6.10 STEERING CONSIDERATIONS WITH BEAM AXLES AND TRANSVERSE SPRING SUSPENSION

Significant steering problems can result with incorrect steering geometry on transverse spring beam axles, whether they are located by parallel four-bars or radius rods.
Figures, 6(i) to 6(l) illustrate the potential problems, and also the principles for the correct setting up of beam axle steering to minimise the effect of axle movement on steering.
Bump steer is where the wheel alignment alters as the axle moves through its normal range of suspension travel, taking steering control away from the driver.
It will occur, for instance, if the drag link is not set up correctly for side steer, or in the case of cross steer, if a dead perch or panhard bar is not used. A dead perch, shown in Figure 6(m) is a fixed spring mount rather than a shackle mount, and is used on the passenger side of the spring.

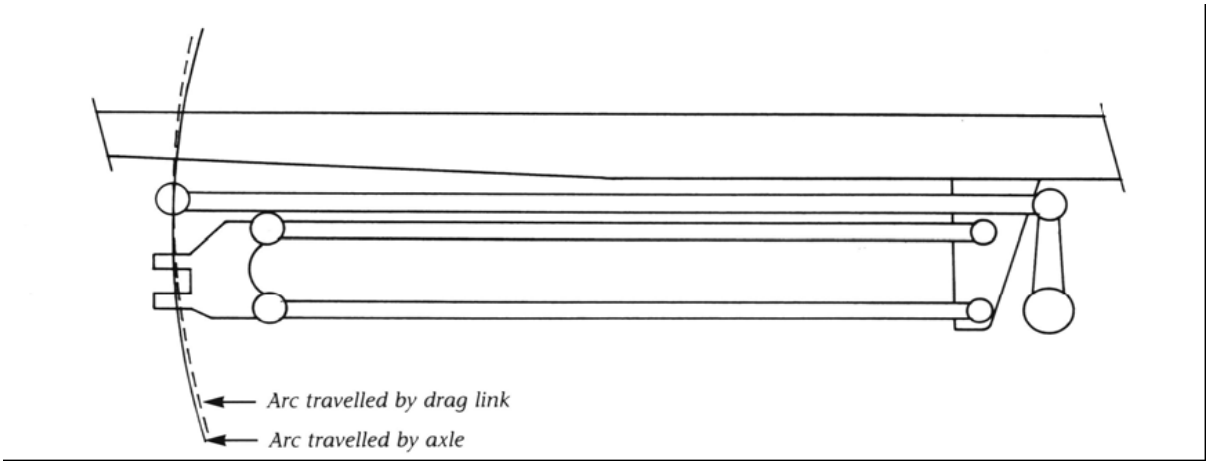

Figure 6(i) Arcs for Side Steering Installations

When side steering is used with a four-bar front suspension, the steering box must be mounted such that the drag link is as close as possible to the same length as the four-bars, and parallel to them, as

shown in Figure 6(i). This will ensure that the arc travelled by the drag link is very close to the arc travelled by the axle during normal suspension travel.

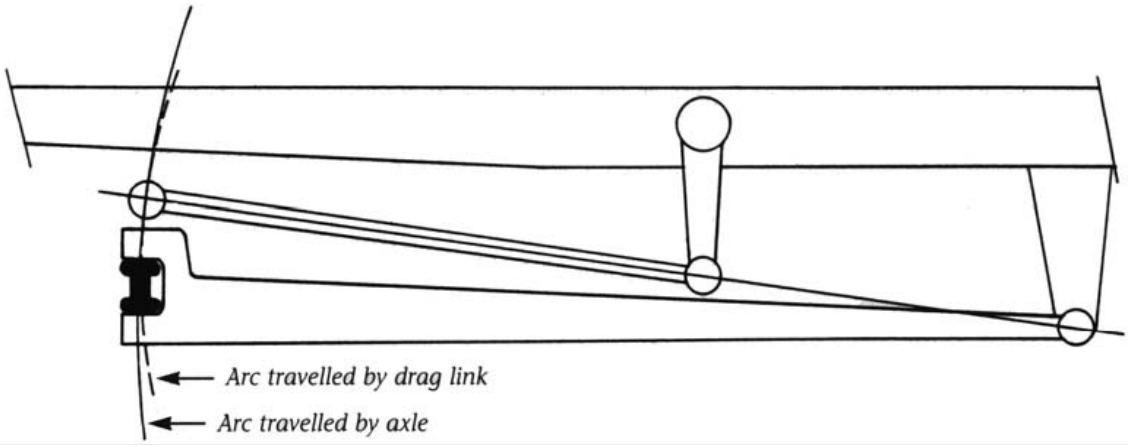

Figure 6(j) Arcs for Split Radius Rods or Ford Wishbone Installations

Where split radius rods, or original Ford wishbone style radius rods are used, the Pitman arm and steering arm pivots must lie on a line that passes through the radius rod pivot to ensure similar arcs are travelled, as shown in diagram 6(j).

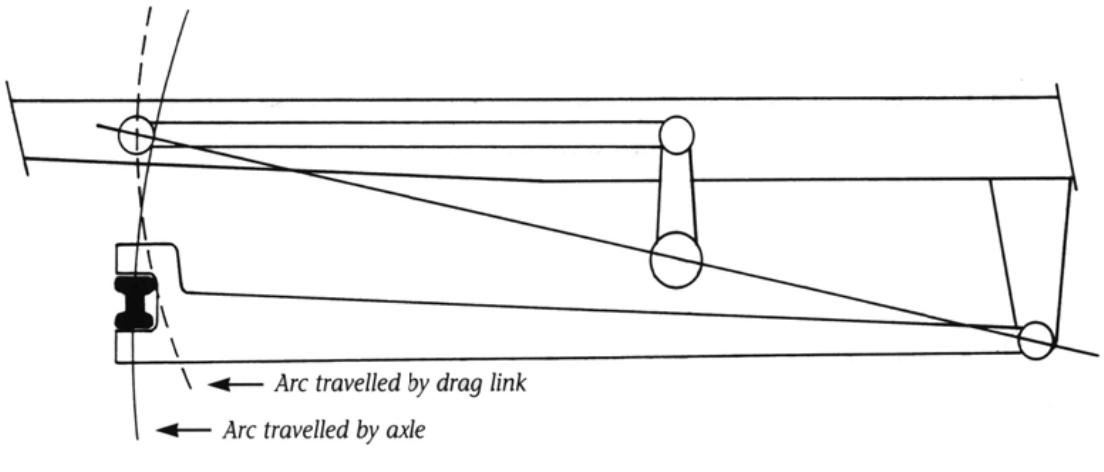

Figure 6(k) Arcs resulting from incorrect installation

If drag links are not set up correctly, the drag link and axle as shown in diagram 6(k) will travel different arcs. This will result in movement at the steering wheel, and the Street Rod wandering as the suspension moves through its normal travel. This is known as *bump steer*.

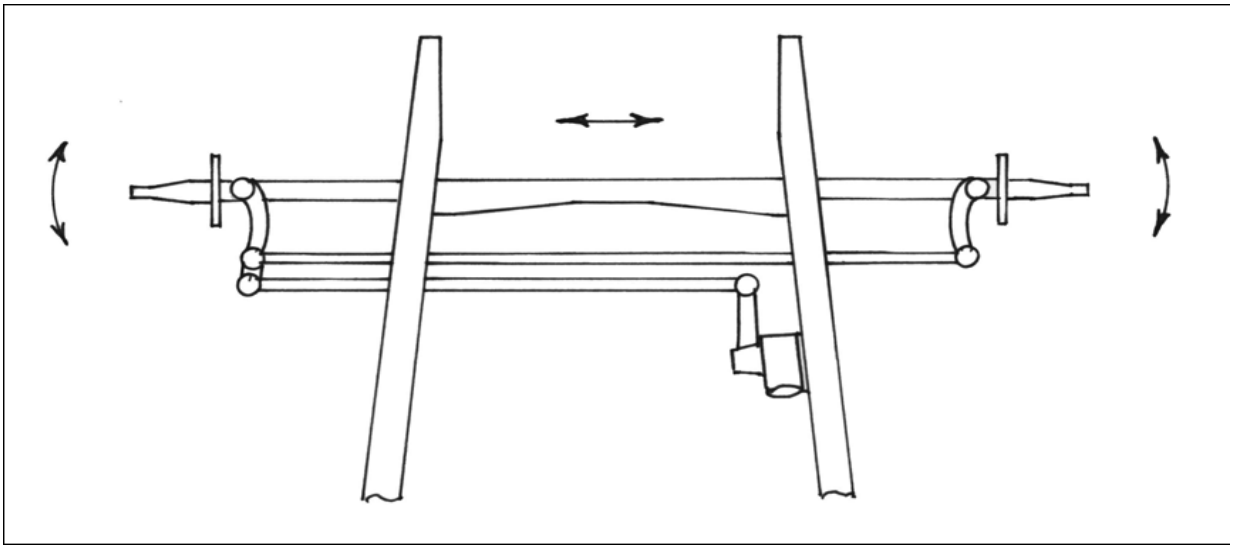

Figure 6(l) Beam axle bump steer

A chassis using a transverse mounted front spring such as an early Ford may be able to swing side to side on the shackles. If the axle can move side to side, and the steering box and drag link are secure, the movement will be transmitted to the spindle via the steering arm, so without moving the steering wheel the Street Rod will sway from side to side. Use a panhard bar fixed to the chassis on the steering box side of the axle or a dead perch on the passenger side of the axle to prevent axle sway. If a modifier or builder is unsure of the nature or meaning of any part of this section, they should seek expert advice and input should before fitting a beam axle or finalising the location of any steering components.

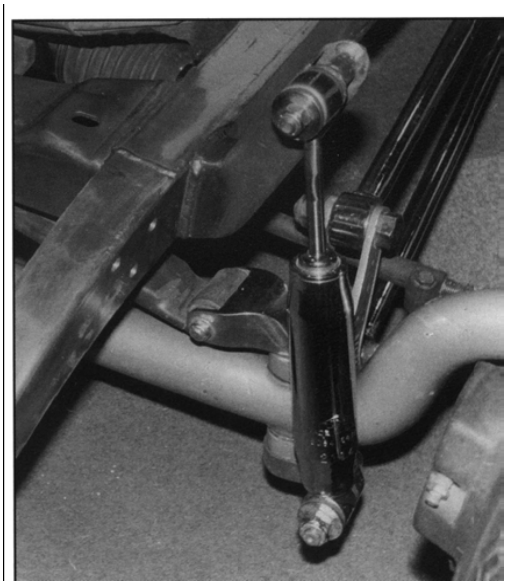

Figure 6(m) Example of dead perch

6.11 PANHARD BARS AND WATTS LINKAGES

6.11.1 A rear parallel four-bar system must have either a watts linkage or panhard bar to control side movement. Panhard bars should be mounted as near to horizontal as possible, and be as long as possible. Refer to diagrams 6(n) and 6(o) for examples of panhard bars and watts linkage, and Table 6.2 sets out the minimum requirements for these

6.11.2 Triangulated “four-bar” systems do not require a “watts linkage” or panhard bar.

6.11.3 A dead perch on the passenger side of a front transverse spring may be used, however a panhard bar fitted to the chassis on the steering box side and connected to the axle on the passenger should be used.

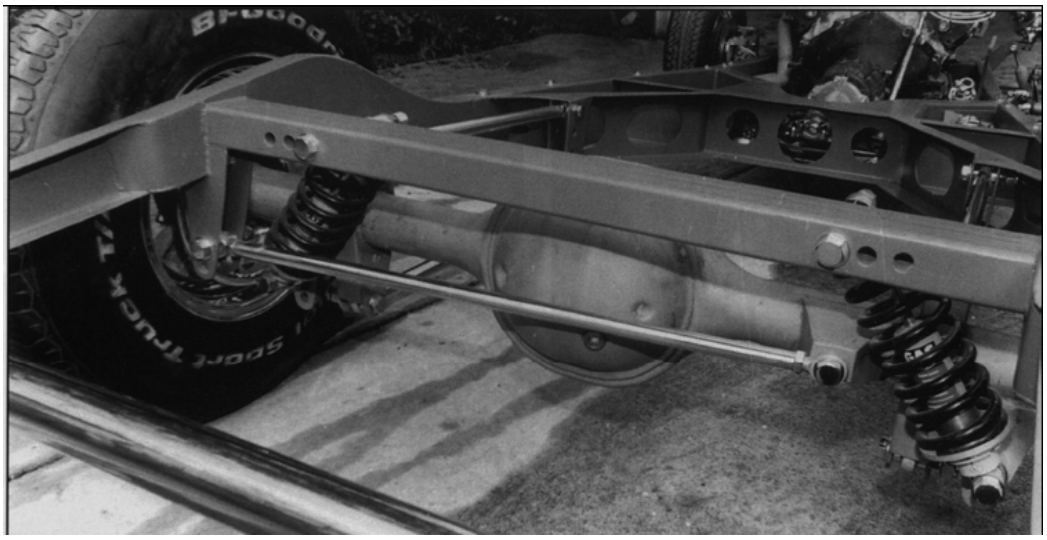

Figure 6(n) Example of Rear Panhard Bar

Note that the bar is as long as possible, and level with the rear axle housing. It is also adjustable at one end to ensure accurate location of the differential.

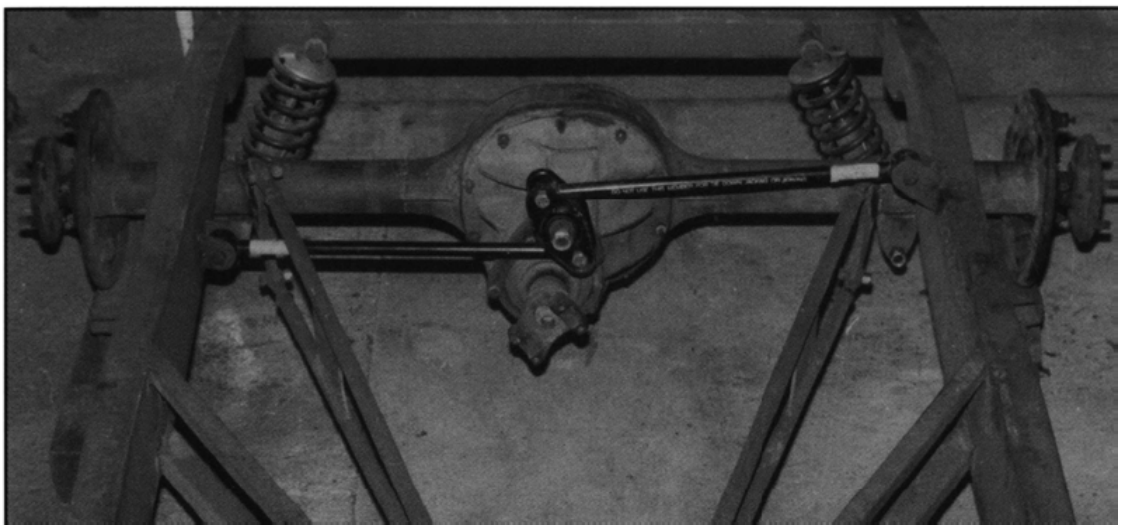

Figure 6(o) Example of Watts linkage.

Note: This particular linkage is from a Ford Falcon.

Front Panhard Bars/Watts Linkage
Outside diameter of Tube – 22mm
Wall Thickness – 3mm
Thread – 5/8 UNF or 16mm fine metric

Table 6.2.1 Minimum requirements for Front Four-Bars

Rear Panhard Bars/Watts Linkage: Normal duty application
Outside diameter of Tube – 22mm
Wall Thickness – 3mm
Thread – 5/8 UNF or 16mm fine metric

Table 6.2.2 Minimum requirements for Rear Four-Bars for normal duty application

Rear Four-Bars: Heavy duty application
Outside diameter of Tube – 25mm
Wall Thickness – 3mm
Thread – 3/4 UNF or 19mm fine metric

Table 6.2.3 Minimum requirements for Rear Four-Bars for heavy duty application

6.12 TRACK RODS AND TRACTION BARS

6.12.1 If track rods are fitted to limit axle movement on acceleration, they must not impede the function of the suspension system and must not reduce the ground clearance below the specified limits.

6.12.2 Traction or slapper bars must not be used as the front portion of the bar will tilt downwards under deceleration and braking thereby reducing ground clearance and compromising safety. These devices are also known to limit suspension movement under cornering resulting in poor handling.

6.13 CUSTOM MADE SUSPENSIONS

6.13.1 If custom made suspensions are used, an engineer's certification for the suspension components as fabricated must be obtained.

Notes:

1. Scratch building a front or rear suspension requires experience in suspension geometry as well as above average fabrication skills. Do not embark on such a task unless you can qualify your methods. There are already several custom installations available which pass the requirements. Ensure that the custom suspension you wish to install will meet the criteria for your particular application.
2. The manufacturer should record and retain details of the manufactured front end and components. You should ensure that a traceable identification mark and number is permanently etched or attached to the component or components. Examiners may seek evidence to confirm that components used are appropriate for the Street Rod, the location, and the likely loading (e.g. original invoices or receipts and manufacturers' specifications).

6.13.2 All welding must be in accordance with Australian Standard AS/NZS 1554.1 *Structural steel welding* Part 1 *Welding of steel structures*.

6.13.3 Owner built suspensions must be certified in accordance with the above requirements.

6.14 WHEEL ALIGNMENT

6.14.1 The wheel alignment specification for the donor vehicle should be maintained when fitting a production car suspension assembly, whenever possible.

6.14.2 Extremes of caster whether positive or negative should be avoided. Zero or slightly negative camber should be used. Steering Axis Inclination may be affected when swapping spindles and a trial of the swap should be carried out to ensure that the correct scrub radius is maintained whenever possible. Refer to Drawing 6(p).

6.14.3 Fitting of wheels with large offset (either positive or negative) can adversely increase the bearing loads and affect scrub radius. Such changes will require significant alterations to wheel alignment specifications. Advice should be obtained from an Examiner or a reputable wheel alignment specialist.

6.14.4 Toe-in normally amounts to 3mm total when narrow front tyres are used.

6.14.5 When using a beam front axle, the nominal caster is 7 degrees positive at nominal ride height with sufficient adjustment available to allow variations of three degrees in either direction. Advice should be obtained from an Examiner or a reputable alignment specialist for further information.

6.15 JAGUAR INDEPENDENT REAR SUSPENSION

6.15.1 Drawing 6(r) depicts the problem with fitting wheels of different offset and diameter to Jaguar independent rear suspensions, and Table 6.3 lists the standard Jaguar track dimensions. Dimension "A" is critical and must be carefully checked when selecting wheels for this suspension.

6.15.2 The XK-E type, S type, XJ series 1 to 3 and Mark 10 Jaguar feature nearly identical independent rear suspension assemblies, with the only difference being track width variation between the various models. Drawing 6(r) depicts a lug type wheel flange rather than a splined hub as used on the E Type. Mark 10 and XJ series Jaguar accept Chevrolet and HQ - WB Holden bolt pattern wheels.

6.15.3 Welding of half shafts and lower control arms should be performed in accordance with Appendix C to Section LZ of VSB 14. Welding must be done to the satisfaction of the Examiner.

6.15.3.1 Each component used must have been stamped with an identifying serial number, or a certificate of authenticity provided by the firm carrying out the alterations.

6.15.3.2 A non-destructive inspection across the welded or heated areas, and certification must be obtained for the component.
Note: The modifier should obtain information on the process used to modify the component, including heat treatment and preparation, and made available to the Examiner if requested.

6.15.4 *Jaguar Track Measurements*

Track widths are a problem with Jaguar Independent Rear Suspensions when using 14" wheels. A maximum rim width of 7" with no greater distance than 25mm between rim lip and bottom of hub carrier are the established dimensions (dimension "A" on Drawing TAC-3). With 15" rims, track should be able to comply with normal track requirements, being standard plus 50mm.

Note: These are standard track measurements.

Model	Series	Front track	Rear track	Comments
MARK II:	1959-1968, 240 Series, S-type: 1963-1968, 340 Series	1397mm (4'7")	1381mm (4'63/8")	
MARK 10	1962-1967, 420 and 4200 Series	1473mm (4'10")	1473mm (4'10")	
E TYPE	1962-1965 (Series 1) 1965-1970 (Series 2)	1276mm (4'2¼")	1276mm (4'2¼")	
E TYPE	1970-1975 (Series 3)	1346mm (4'5")	1346mm (4'5")	Same track for steel and wire wheels
XJ6	1968-1976 (Series 1 and 2)	1489mm (4'105/8")	1489mm (4'105/8")	Same track for steel and wire wheels
XJI2	Series 2 (including Daimler all models)	1489mm (4'105/8")	1489mm (4'105/8")	Same track for steel and wire wheels

Table 6.3 Jaguar track dimensions

6.16 SHOCK ABSORBERS

6.16.1 Shock absorbers dampen spring oscillations and are essential for good driving characteristics and to retain control of the Street Rod. With the exception of coil over shock absorbers, they are not a supporting device and must not be used as such. The Street Rod spring may be supplemented by the addition of air adjustable shock absorbers to maintain ride height when loaded, but they must not be used to attain unladen ride height. The suspension must contact and compress the relevant bump stop before the shock absorber reaches maximum extension or compression. Such bump stops may be inside the shock absorber. If the springs are not sufficient to maintain a stable platform and ride height, the spring rates should be upgraded.

6.16.2 There must be at least one shock absorber per wheel.

6.16.3 The shock absorber used must be suitable for the weight and application intended.

6.16.4 Shock absorbers should be no more than one third compressed when the Street Rod is stationary and in a fully trimmed state and with all fluid reservoirs (including fuel) filled to nominal capacity.

6.16.5 Shock absorbers are at their most efficient when mounted vertically, but may offer some improvement to lateral stability when fitted angled in at the top. Fitting shock absorbers at an angle reduces their effectiveness, expected life and compliance bush life. See Drawing 6(r) for indications of shock absorber efficiency versus angle of installation.

6.16.6 The lower shock mount should be positioned as close to the wheel as possible. On independent suspensions, the shock absorber may be mounted midway between the inner pivot and the wheel, and as such will move less and require more dampening strength.

6.16.7 Shock absorber mounts must be of suitable strength.

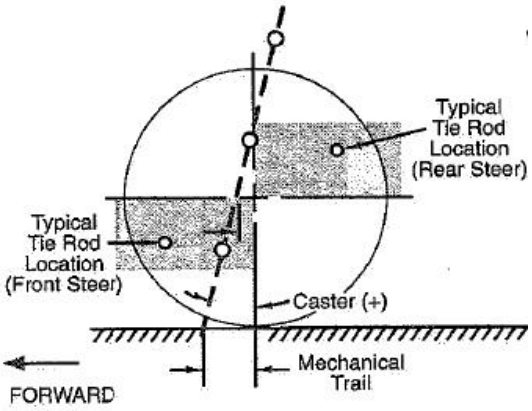

Figure 6(p) Castor Angles (TAC-6)

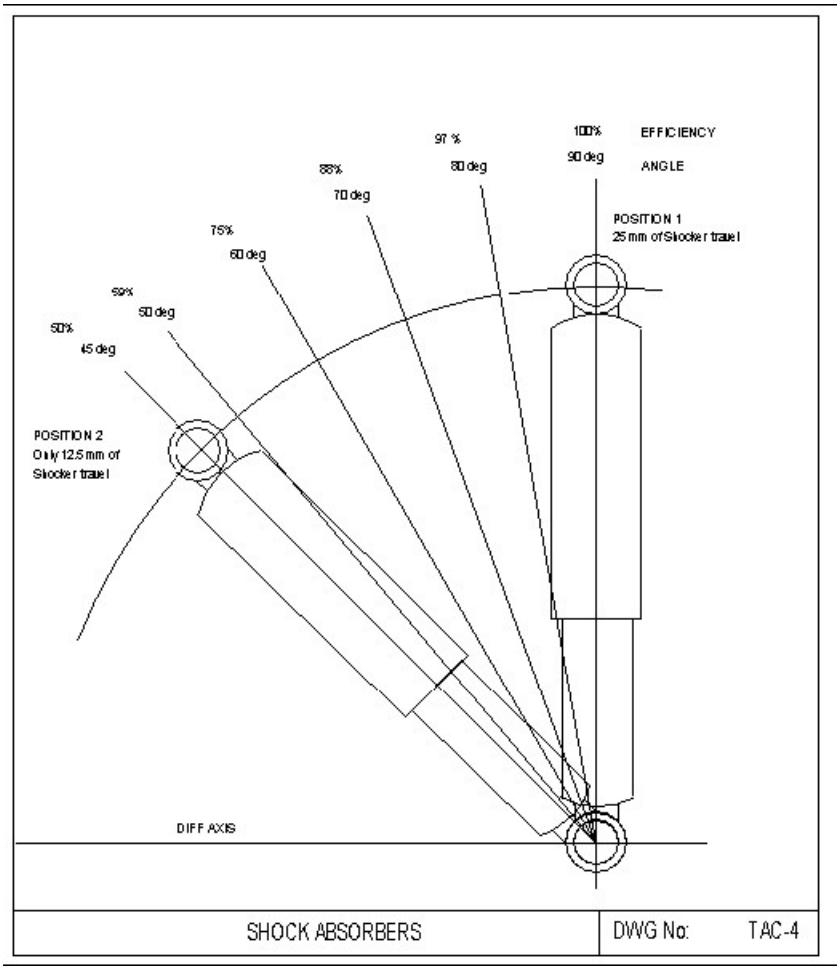

Figure 6(q) Shock Absorber Efficiency Verses Installation Angles (TAC-4)

A positive castor helps return the front wheels back to the straight-ahead position after cornering.
In practice, only a small amount of castor is required to be effective. For example, as little as half a degree of castor angle can produce positive self-centring in steering.

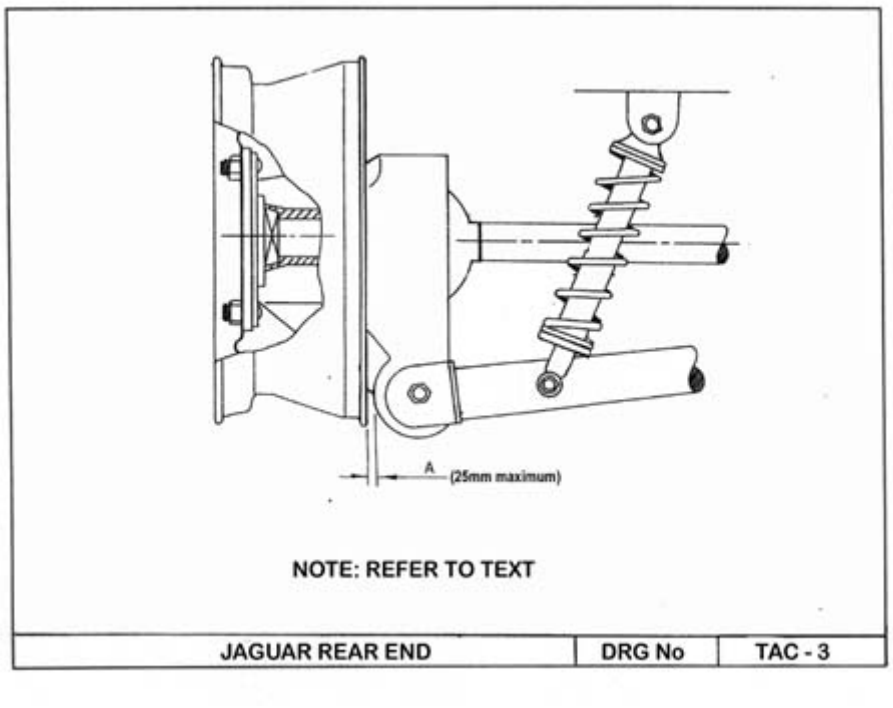

Figure 6(r) Jaguar Rear End (TAC-3)

6.17 CHROME PLATING

Due to the risk of hydrogen embrittlement, suspension components must not be chrome plated. Refer to Clause 5.2 for more information. Heat treated components should not be polished, sand, or bead blasted except by a skilled and experienced supplier. Stainless steel components may be supplied in a coarse matt or polished finish, and should only be polished by the manufacturer or a skilled and experienced supplier. Evidence may be sought to confirm the material properties, and the supplied finish, of any component

SECTION 7: RIMS AND TYRES

7.1 RIMS

7.1.1 Double-sided safety rims must be used on Street Rods intended for road use.
7.1.2 Wheel rims must be not less than 5” wide.
7.1.3 Wheel rims must not be more than 10” wide.
7.1.4 Modifications to wheel rims must only be carried out by a competent person.
7.1.5 Steel wheels shall not be widened by having inserts welded.
7.1.6 Slotted stud type multi-fit wheels must not be used.
7.1.7 The front wheel rim width must be at least 60% of the width of the rear wheel rim. For 5” front rims the maximum rear rim width is therefore 8”, and if 9” or 10” rear rims are to be fitted, the front rim width must be at least 6”.

7.2 WHEEL STUDS, BOLTS AND NUTS

7.2.1 Only the correct nut must be used for both the wheel and the stud or bolt size (ie 1/2” studs use 1/2” nuts) and the outer diameter of an alloy rim nut must correspond to the inner diameter of the corresponding hole for the nut in the rim.
7.2.2 Only nuts specified for use as wheel nuts must be used.
7.2.3 The taper on a wheel nut must correspond to the taper recessed into the wheel for the two faces to create a secure fixing. Taper nuts must not be used on a wheel without taper recesses.
7.2.4 The nut or stud or bolt must be neither too short nor too long for the application. The hollow type of nut used in early alloy rims must end no more than 3mm from the inner surface of the wheel.
7.2.5 Wheel nuts for alloy rims must be fitted with a steel washer between the wheel and the nut, unless the wheels are designed for a tapered nut.
7.2.6 Where rims are sourced from a particular model vehicle, the length of the studs or bolts used must be at least as long as those fitted to the parent vehicle, and all studs or bolts must be fitted with a nut.
7.2.7 Bolts and nuts must be tightened so that they clamp onto the wheel and never to the hub face.
7.2.8 Studs passing through from the inside of a brake drum, or bolts through the wheel and threaded into the brake drum, must not touch or interfere with the operation or action of any rotating or brake component

7.3 TYRES

7.3.1 Tyres manufactured for road use must be fitted to Street Rods used on public roads. Racing tyres and slicks must not be used.
7.3.2 Tyres must be fitted to rims in accordance with the Tyre and Rim Association Standards Manual. Guidelines for 5” to 10” rims are included in Appendix 2.
Note: If in doubt about the proposed rim and tyre combination, consult an Examiner, or refer to the *Tyre and Rim Association Standards Manual*.
7.3.3 Tyres must not contact any part of the Street Rod through full suspension and steering travel. No part of any tyre tread shall protrude beyond the body of the Street Rod when viewed from above and the steering wheels are set in the straight ahead position.
7.3.4 Radial tyres should be used. For safety reasons, radial tyres must not be mixed with bias construction tyres on the same axle. Tyres should be of similar construction on all wheels.
7.3.5 Tyre speed rating must match Street Rod performance. Tyres should have at least a S-rating (180km/h).
7.3.6 For safety reasons, dummy or false whitewalls must not be fitted to radial tyres.

7.4 TRACK

7.4.1 Axles may be widened or narrowed providing the change in track remains within the dimensions specified in Clause 7.4.3 and 7.4.4. The track following the axle modifications is called the *revised track*. The *revised track* may be determined by either of the two following methods.

(a) Where the original track dimensions of the vehicle are known, add or subtract the amount the axle has been modified from the original track dimension to calculate the *revised track*, or

(b) Where the either the original track dimension is not known, or by how much the length of the axle has been modified is not known, fit the original manufacturer's wheels to the modified unit and measure the track. This measurement is the *revised track*.

7.4.2 A differential may be shortened for the purposes of enabling the tyres to fit inside the Street Rod mudguards. Differentials that have been narrowed for the purpose of accommodating rims wider than 10" must not be used.

7.4.3 Suspension unit or axle track measurements may be increased or decreased from the original manufacturer's specified track, or the *revised track* as determined in Clause 7.4.1, by up to 50mm provided the alteration is within the design tolerances of the bearings.

7.4.4 The difference between front and rear track must not exceed 75mm.

SECTION 8: LIGHTING & ELECTRICAL

8.1 LIGHTS

8.1.1 Headlights

8.1.1.1 Two headlights of equal strength, equidistant from the centre line of the Street Rod must be fitted.

8.1.1.2 The minimum centre distance between these lights must be 600mm.

8.1.1.3 The centre of the headlight must be between 500mm and 1400mm above the ground.

8.1.1.4 Headlights must have high and low beam settings, with a control operable from the normal seating position that permits the driver to dip the headlights for approaching traffic.

8.1.1.5 Headlight performance must comply with Rule 81 of the AVSR; for example, they must only emit white light.

8.1.1.6 The range of the light produced by the headlights must comply with Rule 82 of the AVSR.

8.1.1.7 It must be possible to change the headlights from high-beam to low-beam in accordance with Rule 83 of the AVSR.

8.1.1.8 A blue warning light to indicate high beam operations must be fitted on the dash where it is visible to the Street Rod driver from the normal seating position.

8.1.1.9 HID headlights must not be used for low beam application.

8.1.1.10 Vintage headlights may be upgraded with the installation of halogen inserts, or the fitting of halogen bulbs.

Note: As the focal point of halogen bulbs differs greatly from vintage incandescent bulbs, some trialling of the bulb position may be needed. Fitting motorcycle headlights or semi sealed beams into the vintage headlight shells may provide a solution.

8.1.1.11 Hidden headlights must automatically rotate to the operative position when the headlight switch is engaged.

8.1.2 Brake Lights

8.1.2.1 Two brake lights must be fitted to the rear of the Street Rod, one on either side, with centres between 350mm and 1500mm above ground, and equidistant from the centre line of the Street Rod

8.1.2.2 The brake lights must emit a red colour that is visible at least 30m to the rear of the Street Rod whenever the service brakes are applied.

8.1.2.3 The brake lights may incorporate a blue lens, not exceed 20mm in diameter, that produces a crimson light when the brake is applied.

8.1.3 Parking Lights

8.1.3.1 A pair of parking light must be fitted to the front of the Street Rod.

8.1.3.2 The parking lights must be positioned, with centres no more than 510mm inboard from the Street Rod extremity on both sides and at least 600mm apart, equidistant from the centre line of the Street Rod.

8.1.3.3 The parking lights must show white to the front.

8.1.3.4 The power must not exceed seven watts and they are to be visible at 200 metres.

8.1.3.5 The parking lights may be positioned in the headlight assembly.

8.1.4 Tail Lights

8.1.4.1 A pair of tail lights must be fitted at the rear of the Street Rod.

8.1.4.2 The tail lights must be positioned, with centres no more than 510mm inboard from the Street Rod extremity on either side and at least 600mm apart, equidistant from the centre line of the Street Rod.

8.1.4.3 The centre of the tail lights must not be over 1500mm above the ground.

8.1.4.4 The tail lights must show red to the rear.

8.1.4.5 The tail lights may be incorporated in the rear light assemblies.

8.1.4.6 The power must not exceed seven watts and they are to be visible at 200 metres.

8.1.4.7 The tail lights may incorporate a blue lens not over 20mm in diameter.

8.1.5 Direction Indicator Lights

8.1.5.1 The Street Rod must have a pair of direction indicator lights fitted to both its front and rear.

8.1.5.2 The centre height of the lamps in the direction indicator lights must be between 350mm and 1500mm above ground level.

8.1.5.3 The centres of the direction indicator lights must be no less than 600mm apart and equidistant from the centre line of the Street Rod.

8.1.5.4 The direction indicator lights must display an amber colour.

8.1.5.5 Direction indicator lights indicators must flash at between 60 and 120 times per minute.

8.1.5.6 The direction indicator lights must be located so that other road users will have an indication of the directional change intended.

8.1.5.7 If flashing direction indicator lights are incorporated into the headlight assembly, the flashing indicator must be clearly visible when the headlight is illuminated; and in daylight from 30m for modified vehicles and from 200m for replicas.

8.1.5.8 A warning light visible from the normal driving position must illuminate whenever the flashing direction indicator lights are in operation.

8.1.5.9 Semaphore indicator lights must only be used in conjunction with standard direction indicator lights, and must only be capable of being raised when the indicators are operated.

8.1.6 Number-Plate Light

8.1.6.1 A white light of seven watts or less, must be fitted to the rear to illuminate the rear number-plate when the parking lights or headlights are switched on.

8.1.6.2 All letters and numbers on the number-plate must be clearly visible when viewed 20m from the rear of the Street Rod when the number-plate light is illuminated.

8.1.6.3 No part of the number-plate light's illuminating surface must be visible to the rear or sides of the Street Rod.

8.1.6.4 The number-plate light must not flash or pulse.

8.2 REFLECTORS

8.2.1 Street Rods must have a rear facing red reflector on either side of the rear of the Street Rod. Many contemporary light assemblies have reflective glass as part of the red lens, however most vintage and reproduction vintage lights do not incorporate this, and separate red reflectors must be fitted.

8.2.2 Reflectors should be positioned at equal heights less than 1500mm above ground level, not more than 400mm from the side of the Street Rod.

8.3 AUTOMATIC TRANSMISSION SAFETY SWITCH

All Street Rods fitted with automatic transmissions (manual valve bodies included) must be fitted with a neutral/park safety switch. The switch must prevent operation of the starter motor when a forward or reverse gear has been selected.

8.4 WIRING

8.4.1 All sections of the wiring loom must be insulated and regularly secured at a minimum every 300mm.

8.4.2 Wiring must only be secured to either brake or fuel lines by means of approved automotive insulating clips. In all other cases wiring must be secured away from fuel lines.

8.4.3 Wiring must be adequately secured and clear of exhaust and moving parts.

8.4.4 All wiring must be neat and tidy, and any wiring passing through metal sections must be adequately protected from chafing, e.g. by the use of rubber grommets.

8.5 BATTERIES

8.5.1 Batteries must be secured and placed in a container or tray suitable for the purpose of holding a battery. Wet-type batteries must be positioned outside the passenger compartment unless it is in an enclosure that is vented to the outside of the passenger compartment, or is a fully sealed typed. A dry type battery may be installed inside the passenger compartment.

8.5.2 Battery terminals and wiring must be positioned and/or insulated so that there can be no accidental shorting to ground of the live terminal. The battery leads must be secure and kept away from rotating components, fuel system components, and exhaust systems.

8.5.3 Fusible links between the battery and powered components should be used.

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SECTION 9: BODY HARDWARE

9.1 MUDGUARDS

9.1.1 Mudguards must be fitted on the front and rear wheels except for wheels/tyres that are enclosed by the body.

9.1.2 A mudguard must effectively cover the width of the tread surface and at least one third of the circumference of the tyre, and must extend 15° forward of the vertical axle centreline and 15° below the horizontal axle centreline at the rear of the axle.

9.1.3 Rear inner guards must not be "tubbed" to accommodate wheel rims wider than 10".

9.1.4 The forward edge of the front mudguards must have a minimum radius of 2.5mm, and have no sharp edges or protrusions likely to injure any person.

9.2 BONNETS

9.2.1 Where a bonnet is fitted, it must provide protection against accidental contact with moving pulleys and belts, cooling and alternator fan as required by Clauses 2.2.2 and 2.2.3.
Note: Street Rods should be presented for registration in the configuration they are intended to be used – if it is intended to be driven with the bonnet fitted, it should be fitted; if it is intended to be driven with the bonnet removed, it should be removed.

9.2.2 All bonnets must be securely mounted and fitted with a latching device that will prevent opening while moving. Bonnets that open from the front should have a secondary latching device.

9.2.3 Air cleaners, scoops etc may protrude through the bonnet or past the bonnet line where no bonnet is fitted, provided that their edges are radiused to reduce the likelihood of injury.

9.2.4 Protrusions through the bonnet must not obstruct the driver's line of view – refer to Clause 10.2.

9.3 WINDOWS GLASS

9.3.1 All glass used in windscreens, windows and transparent wind deflectors must be safety glass suitable for automotive use. Information and guidance on this is provided in Appendix G of Section LZ Appendices of VSB 14. All non-glass materials used for these items must be shatterproof.

9.3.2 Windscreens must have a minimum light transmittance of 70%; other windows must have a minimum light transmittance of 35% or the value specified by the law of the jurisdiction.

9.4 MIRRORS

9.4.1 All Street Rods must be fitted with at least one rear vision mirror on the right side, and at least one rear vision mirror on the left side or inside.

9.4.2 Internal mirrors should be mounted centrally and have a flat profile. The profile of external mirrors may be flat or curved (convex) with a minimum radius of 1.2 metres, or a combination of flat and curved.

9.4.3 Left-hand drive Street Rods must be fitted with a rear vision mirror on its left side.

9.5 SEATBELTS AND MOUNTS

9.5.1 Seatbelts must be provided for all seating positions.

9.5.2 Except where otherwise permitted, inertia reel lap-and-sash belts must be provided for all outboard seating positions and lap belts for centre positions. Where the construction of the Street Rod cannot provide adequate mounting points for lap/sash belts, lap belts may be used.

9.5.3 All seatbelts fitted must be unused and in pristine condition, and comply with AS 2596 *Seat belt assemblies for motor vehicles*.

9.5.4 When full harness seatbelts are fitted, they must comply with ADR 4/05 *Seatbelts* or Confederation of Australian Motor Sport Inc specifications. Full harness seatbelts must not be installed where there are rear passenger seats unless approval is obtained from the registering authority.

9.5.5 Seatbelt anchorage points must be installed in accordance with ADR 5/05 *Anchorages for seat belts*.

9.5.6 Seatbelts belts must be installed using the hardware (bolts, nuts anchor plates, washers, spacers etc) provided by the seat belt manufacturer for that purpose. Typically they must be connected to the seat belt anchorage with 7/16" or 11mm seat belt bolts or, where required, harness

connectors that comply with ADR4/00 and designed only for this purpose. A locking device or a nyloc nut must retain each bolt that attaches to a non-captive nut.

9.5.7 Seatbelts must be mounted in a fashion that avoids the likelihood of chafing or damage to the webbing. Where appropriate, seat belt anchor plates must be able to pivot.

9.5.8 Seatbelts are designed to bear upon the bony structure of the body. Lap belts must be mounted so that they can be worn low across the front of the pelvis. Lap/sash belts must be mounted so that lap portion of the belt supports the pelvis while the upper portion of the belt supports the chest and shoulders, without chafing the wearer's neck.

9.5.9 Figures 9(a) and 9(b) (Drawings TAC-11 and TAC-12) illustrate the location and correct mounting of seat belt anchorages.

9.5.10 Child restraints anchorages must be installed in replica Street Rods.
Note: A child restraint anchorage is necessary to properly secure a child restraint in a Street Rod. Australian Road Rules, as incorporated in the laws of every jurisdiction, prohibit a child to travel in a vehicle unless restrained in a suitable child restraint.

9.5.11 Seatbelts and their anchorages, and child restraints and their anchorages should be installed in accordance with Section LK Seating and Occupant Protection of VSB 14. Seat belts, child restraints and their respective anchorages so installed are deemed to comply with the abovementioned ADR requirements.

9.6 SEATING

9.6.1 Seats must be securely fitted and must not release under extreme deceleration.

9.6.2 Seat width determines the maximum number of seating positions. If unsure, an Examiner should be contacted for verification. The minimum seat width should be 410mm per occupant.

9.6.3 Sliding seat mounts must have a minimum of two bolts per side, of a minimum 8mm or 5/16" diameter.

9.6.4 Fixed seats must have a minimum of two bolts per side, of a minimum 8mm or 5/16" diameter.

9.6.5 Folding or hinged seats that tilt forward to gain access to rear seats or to luggage areas must be positively locked in the upright position.

9.6.6 If dickey-seats are fitted, there must be a positive means of locking the seat lid in both the open and closed positions.

9.6.7 Seats and their anchorages should be installed in accordance with Section LK Seating and Occupant Protection of VSB 14.

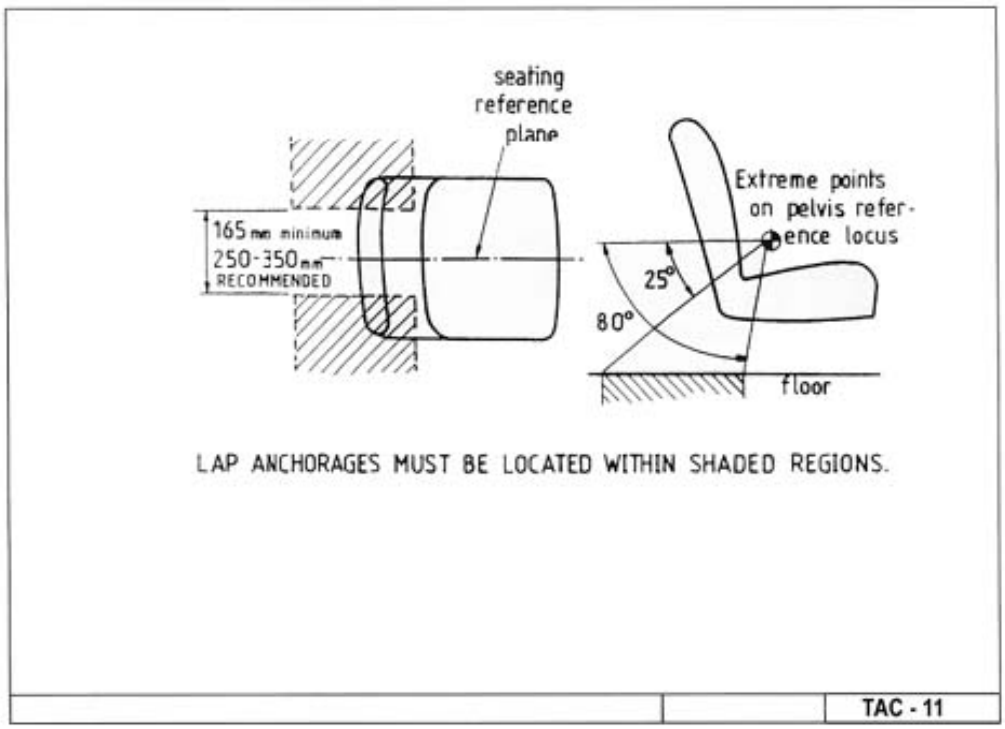

Figure 9(a) Location of seat belt anchorage (Drawing TAC-11)

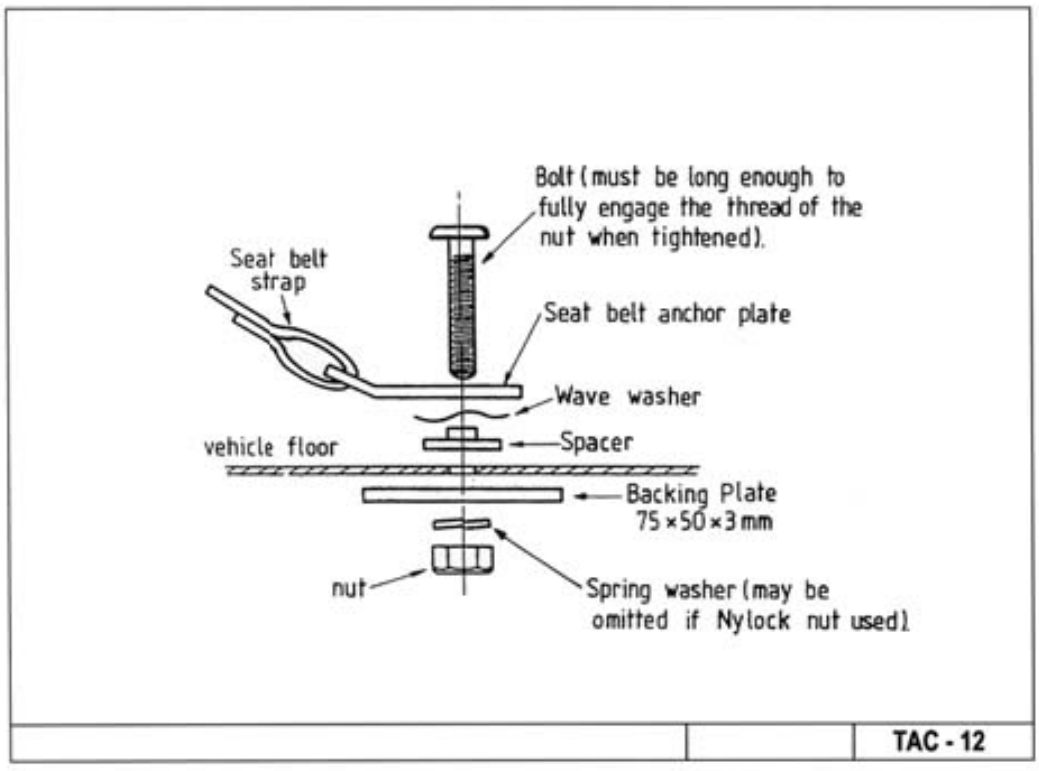

Figure 9(b) Detail of seat belt anchorage (Drawing TAC-12)

9.7 FUEL TANK SYSTEMS

9.7.1 Fuel tanks must be mounted in a position that prevents spillage of fuel or entry of fuel vapours into the passenger compartment. Fuel tank system components must be located clear of electrical components and exhaust systems.

9.7.2 Fuel tanks must be fitted with a safety vent that discharges outside the Street Rod away from any ignition source, or must have a closed evaporative emission control system such as a carbon or a charcoal canister.

9.7.3 Fuel tanks must be manufactured from corrosion resisting material to a thickness appropriate for the capacity of the tank with baffles or other methods fitted to prevent unnecessary movement of fuel. Fuel-proof plastic may be used. Aluminium tanks must have a minimum radius of 6mm on any bends, and must have a stamp that identifies the manufacturer with the fuel tank must be installed in accordance with the manufacturer's specifications.

9.7.4 Fuel lines must be secured at intervals of no more than 300mm. Rigid fuel lines must have a flexible connection where the fuel line passes between the chassis and a moving component.

9.7.5 Unprotected fuel lines must not pass under chassis rails.

9.7.6 Fuel tanks mounted higher than the carburettor float bowl must be fitted with a shut-off solenoid that automatically prevents fuel siphoning when the ignition is off.

9.7.7 All electrical components, battery and wiring, must be kept clear of the fuel tank and lines to prevent accidental combustion of spilled fuel or its vapours.

9.7.8 Street Rods that are to be fuelled by Liquefied Petroleum Gas or Natural Gas should be built to comply with the relevant installation codes of Section LM Fuel System of VSB 14, or in accordance with the Australian Standard AS/NZS 1425 *LP Gas fuel systems for vehicle engines* or AS/NZS 2739 *Natural Gas (NG) fuel systems for vehicle engines* as applicable.

9.8 DOOR LATCHES

Door latches must be of the double-catch type. Burst-proof door latches should be used.

9.9 AUTOMATIC TRANSMISSION SELECTORS

9.9.1 Transmission selectors must be designed so that there can be no accidental engagement of drive or reverse gear.

9.9.2 All replica Street Rods fitted with an automatic transmission must have an indicator in the driver's compartment showing the transmission control positions.

9.10 NUMBER PLATES

9.10.1 Front and rear number plates must be securely attached to the Street Rod no higher than 1.3 metres above the ground, and must be clearly visible and not obstructed in any way.

9.10.2 The front number plate must be mounted parallel to the front axle and be in the centre or the right hand side of the Street Rod.

9.10.3 The rear number plate must be mounted parallel to the rear axle.

9.10.4 The identification characters on a number plate must be legible from a distance of 20 metres and within the area described by a 45° arc, at any point above or to either side of the surface of the number plate, as shown in Figure 9(c) below.

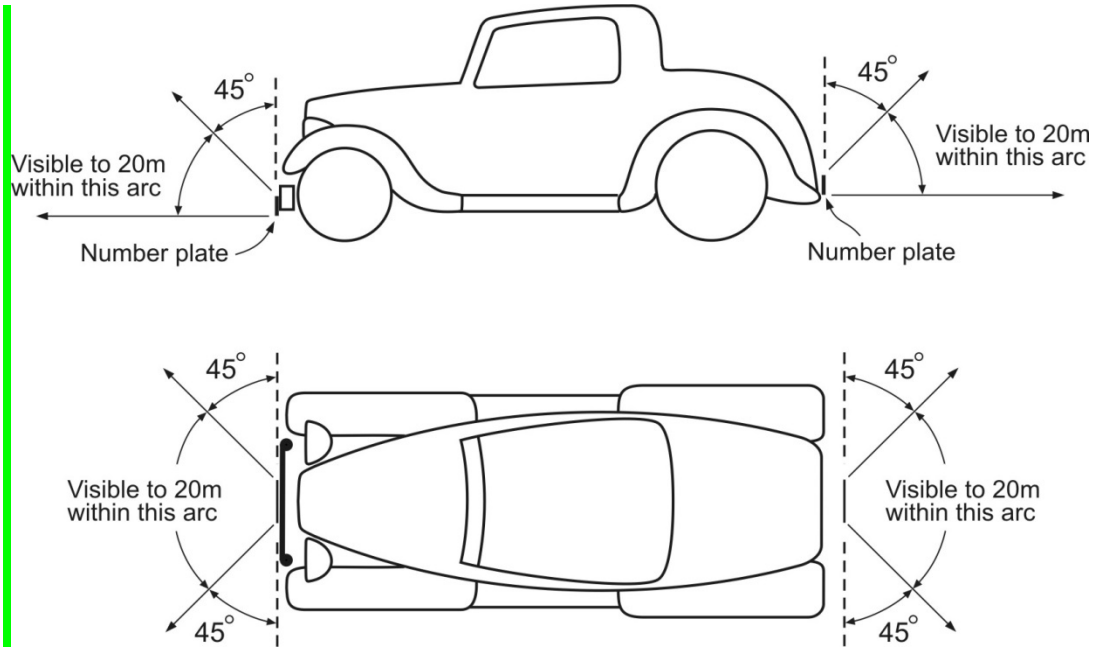

Figure 9(c) Position of number plates

9.11 CHOP-TOPS

9.11.1 For Street Rods converted or manufactured with a reduced roof line, to prevent injury to the occupants in the event of their head contacting the roof during normal driving conditions, the interior roof must either have a full headlining or energy absorbing material must be attached locally above the occupants' positions.

9.11.2 Driver forward vision must not be impaired and must meet the requirements specified in Section 10.2. Windscreen wiper(s) must comply with Section 8.4. The mirrors must comply with Section 9.4; if necessary, external rear view mirrors must be fitted to both sides of the Street Rod.

9.12 VEHICLE IDENTIFICATION

9.12.1 All Street Rods must have a unique identification number.

9.12.2 For modified vehicles or replicas built before 1 January 1989, the identification number may be a chassis or frame number; refer to Section 3.1.

9.12.3 For replica vehicles built after 1 January 1989, the identification number must be a vehicle identification number (VIN) issued by a registering authority.

9.12.4 The VIN must be attached to the vehicle so that that its characters are legible, durable and not easily altered. The VIN must be attached by one of the following ways:

(a) The VIN is marked directly on an integral part of the vehicle, such as the frame or a part of the body that is not easily removable.

(b) The VIN is marked on a separate plate that is permanently affixed to the vehicle in accordance with (a) above.

(c) A combination of (a) and (b) above.

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SECTION 10:MISCELLANEOUS

10.1 Speedometer
10.2 Driver's Field of View
10.3 Warning Device (Horn)
10.4 Windscreen Wipers

10.1 SPEEDOMETER

All Street Rods must be fitted with a speedometer. Speedometers in replica Street Rods must indicate the speed in kilometres per hour.

10.2 DRIVER'S FIELD OF VIEW

At the completion of all work, including the installation of the engine, bonnet and bonnet scoops, a person sitting in the driver's seat at its rearmost position must have: an unobstructed view of either the road 11 metres beyond their eye point on a flat, level surface, or the front edge of the original body, including when looking across the top of the bonnet scoop if fitted; and an unobstructed view above the horizontal plane. These requirements are illustrated in Figure 10. For the purposes of these requirements, the driver's eye position is taken as being a point 730mm above and 270mm forward of the junction of the seat cushion and squab (back) with the seat in its lowest and rearmost position.

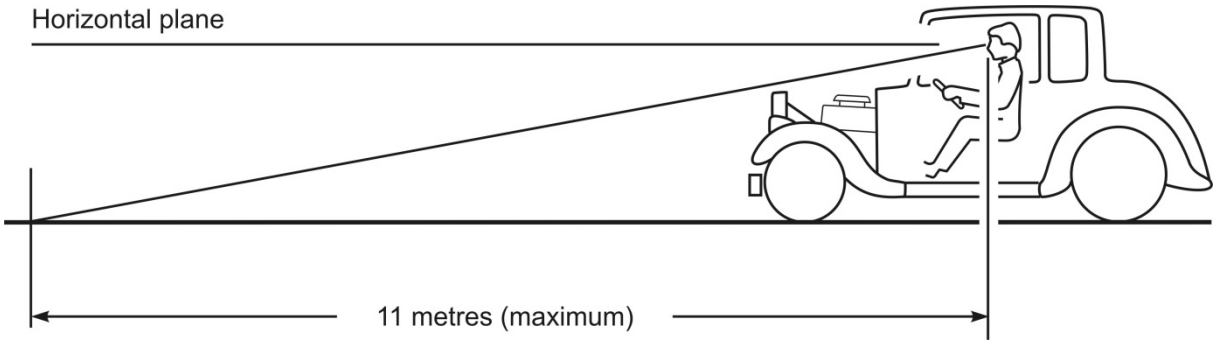


Figure 10 Requirements for the driver's forward field of view

10.3 WARNING DEVICE (HORN)

10.3.1 All Street Rods must be fitted with a horn or other warning device.

10.3.2 The device must not sound like a siren, exhaust whistle, compressions whistle or repeater horn. A klaxon or non-musical horn may be used.

10.3.3 The warning device must be capable of being operated from the normal driving position by a dedicated button or self-releasing switch.

10.4 WINDSCREEN WIPERS

10.4.1 With the exception of those Street Rods described in Paragraph 10.4.2, windscreen wipers must be fitted to all Street Rods. Both driver and passenger sides of the windscreen must be wiped.

10.4.2 Windscreen wipers are not required on open cars such as T-Buckets and Roadsters where the top of the windscreen is below the driver's normal line of vision in accordance with Rule 45 of the AVSR.

10.4.3 Open cars that require windscreen wipers may have removable wiper assemblies, providing they are carried in the Street Rod at all times.

10.4.4 The driver must be able to control the operation of the windscreen wipers from the normal driving position.

10.4.5 The wipers must be capable of continuous operation once they are switched on.

SECTION 11:CHECKLIST

This checklist applies to vehicles modified to, or constructed as, Street Rods in accordance with these Guidelines.

(N/A= Not Applicable, Y=Yes, N=No)

SECTION	ITEM	N/A	Y	N
2.	**ENGINE**			
2.1.1	Is the swept volume of the engine less than 461 cid (7.6 litres)?		Y	N
2.1.3	Are the engine mounts suitable and adequate?		Y	N
2.1.3	Will the engine remain supported in the event of mounting failure?		Y	N
	If the engine is supercharged or turbocharged :	N/A		
2.1.5	Is the maximum boost limited to 9 psi (63 kPa) or less		Y	N
10.2	Is the supercharger installed so that it does not adversely affect the driver's field of view?	N/A	Y	N
2.3.3	Does the turbocharger have adequate heat shielding?	N/A	Y	N
2.2	**Engine accessories**	**N/A**		
2.2.1	If the engine does not have a permanent bonnet is it free of protrusions likely to cause injury?		Y	N
2.2.2	Are the engine fan and alternator fan shrouded?	N/A	Y	N
2.2.3	Are any toothed belt drives shrouded?	N/A	Y	N
2.2.4	Are throttle linkages and/or cables free from binding		Y	N
	Is throttle opening unaffected by engine movement on its mounts?		Y	N
	Are return springs adequate and securely attached?		Y	N
2.2.5	Are fuel lines:			
	Made of material appropriate for the fuel being used?		Y	N
	Secured every 300 mm and routed through areas away from excessive heat?		Y	N
	Adequately clamped at their ends?		Y	N
	Free of leaks?		Y	N
2.2.7	Is any wiring in the engine bay:			
	Routed away from areas of excessive heat and away from rotating parts?		Y	N
	Neat and secured every 600mm or less?		Y	N
2.3	**Exhaust:**			
2.3.1	Is the exhaust securely mounted with adequate clearance to		Y	N

	allow for movement of the engine on its mounts?			
2.3.5	In compliance with the limit of 96 dB(A) when the Street Rod is subjected to the stationary noise test procedure prescribed by Rule 150 of the AVSR?		Y	N
2.3.6	Free of leaks?		Y	N
2.3.10	Provided with adequate heat shielding in any areas likely to be contacted by a person?		Y	N
3.5	**Chassis Frame Construction**			
3.5.1 & 3.5.2	Are the main chassis members of adequate size – at least 75 x 50x 3 RHS for a light bodied Street Rod or at least 100 x 50 x 3 RHS for a heavier Street Rod?		Y	N
3.5.3	Does the chassis incorporate a tail shaft loop positioned no more than 150 mm from the front yoke?		Y	N
3.5.4	Has the chassis been stepped for wheel rims greater than ten inches?		Y	N
3.6	**Chassis Strengthening and Cross members**	**N/A**		
	If the chassis has been strengthened by, for example, boxing, lamination of side rails, additional or replacement cross-members, X-frames and/or K-frames:			
	Does the work comply with the requirements of Section 3.6?		Y	N
	Is the quality of the workmanship and welding of an acceptable standard?		Y	N
3.6.5	Is a spacer tube/crush tube provided wherever a bolt passes through the hollow section of a chassis?		Y	N
3.7	**Nuts, Bolts and Fasteners:**			
3.7.1	Are all fasteners of an appropriate strength grade (eg grade 5 or grade 8 etc) considering their application?		Y	N
	Are all bolts securing seat belts specifically designed for that purpose?		Y	N
3.7.3	Are all bolt of sufficient length to ensure full engagement of the threads of the nut?		Y	N
3.7.4	Are all fasteners fitted with a locking device?		Y	N
4	**BRAKES**			
4.1	**Braking System**			
4.1.1.1	Are all components of the braking system in a serviceable condition?		Y	N
4.1.1.1	Are hydraulically actuated brakes system fitted to all four wheels?		Y	N

4.1.3	Brake System Performance			
	Does the Street Rod remain within a 3.7 m wide lane initially centred on the Street Rod when the brakes are applied?		Y	N
	Under heavy braking do the front wheels lock up before the rear wheels?		Y	N
	Is the Street Rod capable of stopping from an initial speed of 35 km/h in 12.5 m when the service brakes are applied and within 30 m when the emergency or parking brake is applied?		Y	N
4.1.3.5	Does the braking system incorporate a parking brake which is applied only by direct mechanical means, can be locked in the applied position, and can be operated by the driver from the normal driving position?		Y	N
4.4	**Master Cylinder(s)**			
4.4.2	Do the master cylinders have sufficient displacement volume to actuate the wheel cylinders/calliper pistons without excessive pedal travel?		Y	N
	Do master cylinder reservoirs hold enough fluid to not require replenishment for the full life of the pads/linings?		Y	N
4.4.3	Are the master cylinder(s) securely mounted to a suitably strong part of the Street Rod's structure that exhibits only minimal flexing under full pedal pressure?		Y	N
4.6.6	If the master cylinder push rods have been fabricated do they meet the size requirements of Table 4.2?	N/A	Y	N
4.6	**Brake Pedal**			
4.6.1	Does the brake pedal, the pedal box or mounting brackets, or the bulkhead remain rigid when the brake pedal is depressed?		Y	N
4.6.2	Does the brake pedal leverage ratio equate to that of the vehicle from which the brake pedal was sourced?		Y	N
	Is there sufficient clearance to prevent the brake pedal from being snagged with any component when operating, and to allow ready access to the brake pedal in an emergency?		Y	N
	Is the brake pedal pad fitted with a non-slip surface?		Y	N
4.6.3	If the brake pedal has been fabricated or is a production pedal that has been modified, is the design and workmanship of the fabrication/modification acceptable?	N/A	Y	N
4.6.4	Does the pedal pad have a non-slip surface?		Y	N
4.6.5	Are pushrods straight and do they act through the centreline of the master cylinder bore?		Y	N
	If not, is there an additional leverage system that has been approved by an Examiner?		Y	N

4.7	**Fluid Lines and Hoses**			
4.7.1	Are all rigid brake pipes made from material suitable for use in automotive braking systems (copper is not acceptable)?		Y	N
	Are all pipes adequately supported?		Y	N
4.7.2	Do all flexible hoses (including braided hoses) comply with a recognised standard such as SAE J1401?		Y	N
4.7.3	Are all pipes and flexible hoses routed away from areas of excessive heat and potential mechanical damage or otherwise suitably protected?		Y	N
5.1	**Steering Modification Requirements**			
5.1.1 5.1.2	Are steering components sourced from a Street Rod of similar size and mass?		Y	N
5.1.1	Is the steering box ratio and steering arm length compatible so as to allow safe manoeuvring and Street Rod control without the use of excessive force?		Y	N
5.1.3	Has adequate clearance around all steering components been provided for the full range of steering and suspension movement?		Y	N
5.2	**Heat Treatment and Chrome Plating**	**N/A**		
5.2.1	Have any cast or forged steering components that have been reworked by welding or heating also heat treated and non-destructively tested in accordance with Appendix C to Section LZ of VSB 14?		Y	N
5.2.2	Are all critical steering components including stub axles free from any chrome plating?		Y	N
5.2.3	Have heat-treated components only been polished by their manufacturer of a competent person?			
5.3	**Steering rack shortening**	**N/A**		
5.3.1	If rack and pinion steering is fitted:	N/A		
	If the rack has been shortened, has the shortening been carried out in accordance with Section 5.3.1?		Y	N
	Has the steering rack been fitted in accordance with Appendix 1?		Y	N
5.4	**Manufactured Steering Linkages**			
5.4.2	If the steering arms have been fabricated do they have a minimum thickness of 12.5 mm?	N/A	Y	N
	If the Pitman arm has been fabricated does it have a minimum thickness of 19 mm?	N/A	Y	N
5.4.3	Do the steering arms provide correct toe-out on turns?	N/A	Y	N

5.5	**Checking the Tracking of All Four Wheels**			
	Has the correct tracking of all four wheels been verified?		Y	N
5.6	**Steering Columns**			
5.6.1	Is the steering column angle more than 30 degrees from the vertical?		Y	N
5.6.2	Does the steering column obstruct any of the pedals?		Y	N
5.7	**Steering Universal Joints And Couplings**			
5.7.1	Are all steering universal joints and couplings of the automotive type?		Y	N
5.7.3	Are any couplings that are not universal joints arranged to operate at shaft intersection angles no greater than 5 degrees?	N/A	Y	N
5.7.4	Are universal joints phased and operate smoothly with no binding?	N/A	Y	N
5.8	**Locking of Steering Components**			
	Are all nuts used in the steering system positively locked?		Y	N
5.9	**Steering Wheels**			
5.9.1	Is the steering wheel of a design and construction similar to that of a mass production road vehicle?		Y	N
5.9.2	Is the diameter of the steering wheel measured from centre to centre of the rim at least 330 mm?		Y	N
6.1	**Suspension Mounting**			
	If suspension from a donor vehicle has been fitted:	N/A		
6.1.1	Has it been mounted in a comparable way so that its as-designed strength is preserved?		Y	N
6.1.2	Has adequate provision been made for resisting brake torque reaction?		Y	N
6.1.4	Are radius arm end anchorages, if fitted, positioned in line with the lower control arm inner pivot?	N/A	Y	N
6.2	**Beam Axles**			
6.2.1	If a beam axle has been fitted, is the king pin diameter at least 19 mm?	N/A	Y	N
6.2.3	If the axle has been fabricated or has been modified by bending or welding, has acceptable engineering certification been supplied?	N/A	Y	N
6.2.5	Is the axle free of drilling for non-essential purposes such as weight reduction or aesthetics?		Y	N

6.3	**Springs**			
6.3.1 6.3.2	If coil springs are fitted, was the Street Rod lowered by resetting and not by other means (e.g. cutting or heating)?	N/A	Y	N
6.3.3	If a transverse spring is mounted behind a beam front axle, has a positive limiter been fitted above the axle to prevent any part of the Street Rod, other than a wheel, making contact with the ground in the event of a spring failure?			
6.5	**Suspension Shackles**			
	Is the length (centre to centre of pins) of any spring shackles fitted less than 126 mm?	N/A	Y	N
6.6	**Locking of Suspension Nuts**			
6.6.1 6.6.2 6.6.3	Have any castellated nuts used to secure suspension components been locked with a split pin and any other nuts fitted of the self-locking type or by other means appropriately locked?		Y	N
6.7	**Lowering Blocks**			
	If lowering blocks have been fitted to lower the Street Rod:	N/A		
6.7.1	Are they less than 51 mm thick?		Y	N
6.7.2	Are they made of steel or solid aluminium?		Y	N
6.8	**Radius rods**			
6.8.2	If split Ford type wishbone radius rods are fitted with a tube axle, is the distance between the locating ends of the split rods less than 301 mm?	N/A	Y	N
6.8.3	If split Ford type wishbone radius rods or front wishbone type radius rods are fitted and the ends mounted on the chassis rails, is the Street Rod fitted with a beam axle?	N/A	Y	N
6.8.4	If ladder bars are fitted to locate the rear axle:	N/A		
	Are they of sufficient length to allow full suspension travel without binding?		Y	N
	Are the points of attachment of the ladder bars (if fitted) to the axle 300 mm or less apart?		Y	N
6.8.7	If hairpin radius rods are fitted:	N/A		
	Are they fitted only to the front axle?		Y	N
	Has engineering certification been supplied for any hairpin radius rods fitted?		Y	N
6.8 6.10	If radius rods are fitted to locate the front axle, having regard to the geometry of the steering linkage are the chassis end anchorages of the bars located so as to minimise bump steer?	N/A	Y	N

6.9 & 6.11	**Four-Bar Suspension Locaters**			
6.9.1	If parallel or triangulated four bar axle locaters are fitted, do the bars conform to the maximum length, outside diameter, wall thickness and thread size:	N/A	Y	N
6.9.2	If any bar ends are mounted in cantilever mode are they fitted with a washer or retainer at least as large in diameter as that of the outer tube being attached?	N/A		
6.9.3	Are there any spherical bar ends that an Examiner must confirm are sufficient durability and strength in all directions for its intended purpose?	N/A		
	If a parallel four-bar rear axle location system is fitted:	N/A		
6.9.4	is the top bar at least 50 % of the length of the bottom bar?		Y	N
6.9.6	are the bars straight and at least 127 mm (centre to centre) apart		Y	N
6.11	Is the lateral movement of the rear axle controlled by a Panhard rod or by a Watt's linkage?		Y	N
	If a triangulated four-bar rear axle location system is fitted:	N/A		
6.9.4	is the top bar at least 50 % of the length of the bottom bar?		Y	N
6.9.6	are the bars straight and at least 127 mm (centre to centre) apart?		Y	N
6.9.5	If a four-bar front axle location system is fitted:	N/A		
	are the bars straight, parallel, of equal length and at least 116 mm (centre to centre) apart?		Y	N
6.10	Having regard to the geometry of the steering linkage are the chassis end anchorages of the bars located so as to minimise bump steer?		Y	N
6.13.1	If any suspension components have been sourced from a recognised production vehicle but have been modified; or have not been sourced from a recognised production vehicle,			
	has appropriate engineering certification been provided?	N/A	Y	N
7.	**RIMS AND TYRES**			
7.1.1	Do all four wheels incorporate safety rims?		Y	N
7.1.2	Are the rims more than five inches wide?		Y	N
7.1.3	Are the rims more than ten inches wide?		Y	N
7.1.5	If steel wheels are fitted do they have no more than one circumferential weld?	N/A	Y	N
7.1.7	Is the width of the front wheel rims at least 60 % of the width		Y	N

	of the rear wheel rims?			
7.2	**Wheel Studs, Nuts and Bolts**			
7.2.1	Are all wheel nuts the correct size and shape for the wheels fitted and engage a sufficient length of thread?		Y	N
7.3	**Tyres**			
7.3.1	Are all tyres manufactured for road use?		Y	N
7.3.2	Are all tyres of a diameter width and profile permitted by the *Tyre and Rim Association Standards Manual* to be fitted to the rims concerned?		Y	N
7.4	**Track**			
7.4.3	Is any increase in track resulting from fitting rims of different offset from the original rims less than 50 mm?	N/A	Y	N
7.4.4	Is the difference between front and rear track less than 75 mm?		Y	N
8	**LIGHTING & ELECTRICAL**			
8.1	**Lights**			
8.1.1	Headlights			
8.1.1.18.1.1.2	Are two correctly aimed dipping headlights fitted to the front of the Street Rod, equidistant from its longitudinal centreline and at least 600 mm centre to centre apart?		Y	N
8.1.1.3	Are the heights of the centres of the headlamps equal and between 500 mm and 1400 mm above the ground?		Y	N
8.1.1.5	Do the headlamps emit only white light?		Y	N
8.1.1.7	Is the control for selecting high or low beam within easy reach of the driver from the normal seated position?		Y	N
8.1.1.8	Is an operational blue high beam tell-tale lamp visible to the driver from the normal seated position provided?		Y	N
8.1.2	Brake Lights			
8.1.2.1	Are two red brake lamps fitted to the rear of the Street Rod, equidistant from its longitudinal centreline that illuminate only when the service brake is applied?		Y	N
	Are the heights of the stop lamps equal and between 350 mm and 1500 mm above the ground?		Y	N
8.1.2.2	When lit, are the brake lamps visible for at least 30 m in daylight?		Y	N
	Do the brake lights emit red light?		Y	N
8.1.2.3	Does any blue dot lens, if fitted, exceed 20 mm in diameter?	N/A	Y	N
8.1.3	Parking lights			

8.1.3.1	Are two white parking lamps fitted to the front of the Street Rod, equidistant from its longitudinal centreline?		Y	N
8.1.3.2	Do the parking lights illuminate whenever the headlamps or tail lamps are switched on		Y	N
8.1.3.2	Are the centres of the parking lamps no less than 600 mm apart and no more than 510 mm from the nearer side of the Street Rod?		Y	N
8.1.3.4	Are the parking lamps when lit visible for at least 200 m at night and use no more than seven watts of power?		Y	N
8.1.4	Tail lights			
8.1.4.1 8.1.4.2 8.1.4.4	Are two red tail lamps fitted to the rear of the Street Rod, equidistant from its longitudinal centreline that illuminate whenever the headlamps or parking lamps are switched on?		Y	N
8.1.4.3	Are the heights of the tail lamps equal and not more than 1500 mm above the ground?		Y	N
8.1.4.6	Are the tail lamps when lit visible for at least 200 m at night and use no more than seven watts of power?		Y	N
8.1.4.7	If fitted, does any blue dot lens, if fitted, not exceed 20 mm in diameter?	N/A	Y	N
8.1.5	Direction indicator lights			
8.1.5.18.1.5.3	Is a pair of amber direction indicator lamps fitted to the front and to the rear of the Street Rod equidistant from its longitudinal centreline and at least 600 mm centre to centre apart?		Y	N
8.1.5.2	Is the centre of each direction indicator lamp at least 350 mm and no more than 1500 mm above the ground?		Y	N
8.1.6	Number plate light			
8.1.6.1	Is at least one number plate lamp emitting only white light fitted to the rear of the Street Rod to illuminate the rear number plate?		Y	N
	Does the number plate lamp come on and stay on whenever the parking lamps, tail lamps or headlamps are switched on?		Y	N
8.1.6.2	Does the number plate lamp when lit allow the characters displayed on the number plate to be read at a distance of 20metres at night?		Y	N
8.2.1 8.2.2	Reflectors Are two red reflectors fitted to the rear of the Street Rod equidistant from the longitudinal centreline, not more than 400 mm from the nearer side if the Street Rod and not more than 1500 mm above the ground?		Y	N

8.3	**Automatic Transmission Safety Switch**			
	If the Street Rod has automatic transmission:	N/A		
	Is the Street Rod fitted with a safety switch which prevents the operation of the starter motor when a forward or reverse gear has been selected?		Y	N
8.5	**Wiring**			
8.5.1	Is all wiring appropriately insulated, protected from mechanical damage and secure?		Y	N
8.5.2 8.5.3	Is all wiring routed to avoid fuel lines, sources of heat and rotating parts?		Y	N
8.6	**Battery**			
8.6.1	Is the battery securely retained?		Y	N
	If the battery is located within the passenger compartment is it secured within a suitable sealed enclosure that is vented to the outside of the Street Rod or is it a totally sealed dry type of battery?	N/A	Y	N
8.6.2	Are battery terminals and wiring so positioned that there can be no accidental shorting to ground of the live terminal?		Y	N
	Are battery leads secure and kept away from rotating parts, fuel system components and exhaust systems?		Y	N
9	**BODY HARDWARE**			
9.1	**Mudguards**			
9.1.1	Are all four wheels fitted with mudguards or otherwise protected by the Street Rod's body?		Y	N
9.1.2	Does each mudguard cover the full tread width of the tyre when viewed in plan (front wheels in the straight ahead position)?		Y	N
9.1.2	Does each mudguard cover at least one third of the circumference of the tyre commencing 15 degrees below the axle centreline at the rear of the tyre?		Y	N
9.1.3	Have the rear inner guards been tubbed to take wheel rims greater than 10 inches?			
9.1.4	Is the leading edge of the front mudguard radiused, rolled or otherwise formed to eliminate sharp edges or protrusions likely to injure any person?		Y	N
9.2	**Bonnets**			
9.2.1	If the engine fan or alternator fan is unprotected is a bonnet fitted?	N/A	Y	N
9.2.2	If a bonnet is fitted, is it securely attached and fitted with a	N/A	Y	N

	latch that prevents it opening when the Street Rod is in motion?			
9.2.2	If the bonnet opens from the front is it fitted with a secondary safety latch?	N/A	Y	N
9.2.3	Has any protrusion above the bonnet line have radiussed edges or is otherwise designed to minimise the risk of injury to any person?	N/A	Y	N
9.2.4	If an air cleaner, scoop, supercharger etc is mounted above or protrudes through the bonnet if fitted, or through the bonnet line if no bonnet is fitted, does the driver have an adequate field of view?	N/A	Y	N
9.3	**Glazing**			
9.3.1	Is the windscreen and other windows and transparent wind deflectors, if fitted, safety glass suitable for automotive use?	N/A	Y	N
9.3.2	Does the windscreen have at least 70% light transmittance?	N/A	Y	N
9.3.2	Do other windows have a light transmittance of at least 35% or as otherwise specified by a law of the jurisdiction?	N/A	Y	N
9.4	**Rear vision mirrors**			
9.4.1 9.4.3	Is the Street Rod fitted with an externally mounted mirror on the driver's side and an internal mirror or another external mirror on the opposite side?		Y	N
9.4.2	Are the internal mirror centrally mounted of flat glass and the external mirror(s) flat or convex?		Y	N
9.5	**Seat belts and seat belt anchorages**			
9.5.2	Are all outboard seating positions fitted with a lap/sash seat belt incorporating an emergency locking retractor?	N/A	Y	N
	Are all inboard seating positions fitted with at least a lap belt?		Y	N
9.5.3	Are all seat belts fitted new and marked as complying with AS 2596?		Y	N
9.5.6	Have all seat belts been installed using the hardware (bolts, nuts anchor plates, washers, spacers etc) provided by the seat belt manufacturer for that purpose?		Y	N
9.5.9	Are all seat belt anchorages located and installed in accordance with drawings TAC-11 and TAC-12		Y	N
9.5.10	Have child restraint anchors been installed?	N/A	Y	N
9.6	**Seating**			
9.6.1	Are all seats securely attached to the Street Rod?		Y	N
9.6.3 9.6.4	If a seat is bolted to the Street Rod are at least four (two per side) M8 or 5/16" bolts used?	N/A	Y	N

9.6.5	Are all hinged seats and hinged seat backs capable of being securely locked in the upright (travel) position?	N/A	Y	N
9.6.6	If a dickey-seat is fitted is there a means of positively locking the seat lid in the open position?		Y	N
9.7	**Fuel Tanks and lines**			
9.7.1	Is the fuel filler located in a position that prevents spillage of fuel or entry of fumes into the passenger compartment?		Y	N
9.7.2	Is the fuel tank either fitted with a safety vent discharging outside the Street Rod or fitted with a closed evaporative emission control system?		Y	N
9.7.3	Is the fuel tank made of a suitable material, appropriately baffled, protected from corrosion and securely mounted to the Street Rod?		Y	N
	If a custom made fuel tank is fitted has it been permanently marked with the name of its manufacturer?	N/A	Y	N
9.7.4	Are any rigid fuel lines fitted with a flexible connection where the fuel line passes from the chassis to a component mounted to the chassis?		Y	N
	Are fuel lines supported at intervals of no more than 300 mm?		Y	N
9.7.5	If any fuel line passes under a chassis rail is it suitably protected?	N/A	Y	N
9.7.6	If the fuel tank is mounted higher than the carburettor is it fitted with a shut-off solenoid that automatically prevents fuel syphoning when the ignition is off?	N/A	Y	N
9.7.7	Are all electrical components, battery and wiring clear of the fuel tank and fuel lines?		Y	N
9.8	**Door latches**			
	Are all door latches of the double catch type?		Y	N
9.9	**Automatic Transmission Selectors**			
	If the Street Rod has automatic transmission:	N/A		
9.9.1	Is the Street Rod fitted with a safety switch which prevents the operation of the starter motor when a forward or reverse gear has been selected?		Y	N
9.9.2	Is there an indicator in the driver's compartment showing the transmission control positions?		Y	N
9.10	**Number Plates**			
9.10.1	Are number plates fitted, or are there provisions for fitting number plates, to the front and rear of the Street Rod?		Y	N
9.10.2	Are the number plates mounted parallel to the respective		Y	N

9.10.3	axles?			
9.10.4	Can the number plates be clearly viewed within the area described by a 45° arc, at any point above or to either side of them?		Y	N
9.11	**Chop-tops**			
9.11.1	If the Street Rod is a 'chop-top', is there head protection for the occupants?	N/A	Y	N
9.12	**Vehicle Identification**			
9.12.1	Has the Street Rod a unique identification number?		Y	N
9.12.3	If the Street Rod has a VIN, has it been properly affixed to the vehicle?	N/A	Y	N
10.1	**Speedometer**			
	Is the Street Rod fitted with a speedometer?		Y	N
	Is the speedometer graduated in km/h	N/A		
10.2	**Driver's Field of View**			
	Does the driver have a clear, unobstructed view of the road from at least 11m in front of the Street Rod when seated in the normal driving position?		Y	N
	Does the driver have a clear, unobstructed view above the horizontal longitudinal plane when seated in the normal driving position?		Y	N
10.3	**Warning device (horn)**			
10.3.1 10.3.2	Is the Street Rod fitted with at least one horn or other device that is not a repeater horn, bell, whistle or siren, that can warn other road users of the presence and position of the Street Rod?		Y	N
10.3.3	Can the device be operated by the driver from the normal driving position?		Y	N
10.4	**Windscreen Wipers**			
10.4.1	Other than Street Rods where the top of the windscreen is below the driver's normal line of vision (e.g. a roadster) is the Street Rod fitted with windscreen wipers that wipe both the driver and passenger sides of the windscreen?	N/A	Y	N
10.4.4	Is the wiper system able to be controlled by the driver from the normal seated position?	N/A	Y	N
10.4.5	Is the wiper system capable of continuous operation once switched on by the driver?	N/A	Y	N

X	**INSPECTION**			
X.1	Have interim inspection(s) been carried out on all modified areas of the Street Rod structure and found to be satisfactory?		Y	N
X.2	Has a final inspection been carried out on all modified areas of the Street Rod structure and found to be satisfactory?		Y	N
X.3	Has the Street Rod been test driven and an assessment made of its stability and handling characteristics?		Y	N
Y.	**RECORDS**			
Y.1	Have colour digital photographs been taken, sufficient in quantity, detail and angle of view to verify the description of the Street Rod provided in this Street Rod inspection report, including photographs of all major components and the chassis and engine numbers?		Y	N
Y.2	Have complete records of the Street Rod, including details of all modifications, the photographs referred to above and any supporting documentation required by this checklist, been retained, stored securely and able to be readily retrieved for auditing purposes?		Y	N

NOTE: If the answer to any question is **N** the Street Rod does not comply with these Guidelines and must not be certified.

APPENDICES

APPENDIX 1 PRINCIPLES INVOLVED IN FITTING RACK & PINION STEERING

Figures App 1(a) (Drawing TAC-7) shows the basic suspension geometry of a Holden front end with its unequal A-arms and coil springs acting on the lower A-arms.
A rack and pinion set-up is shown (in broken lines) in its normal position for an unaltered front end. For a Holden front end with its original spindle steering arms, the rack must be positioned as shown with the pivot points of the rack lining up exactly with the pivot points of the front suspension at A and B.
However, if construction requirements deem that the rack be mounted higher or lower for the rack or steering shaft to avoid some obstacle (e.g. sump, engine mount, exhaust manifold etc) this may be done providing geometry is maintained.
Firstly, the pivot points on the rack must stay on the lines A'A' and B'B' respectively. For example, if the rack were to be raised 75mm from its normal position, the rack must be widened so that the pivots remain on the lines A'A' and B'B'.
Secondly, the spindle steering arms must be raised or lowered the appropriate amount to maintain parallelism of all arms. In the case above, the steering arms would need to be raised a corresponding 75mm.
Similarly, if the rack were to be lowered it must be narrowed and the spindle steering arms dropped the correct amount. However, lowering of the rack should be avoided since the rack becomes too narrow to be mounted securely.
While Figures App (1)(a) and (b) (Drawings TAC-7 and TAC-8) illustrate rack and pinion steering on a Holden front end, the same principles apply to the installation of a steering rack to any independent front suspension unit.

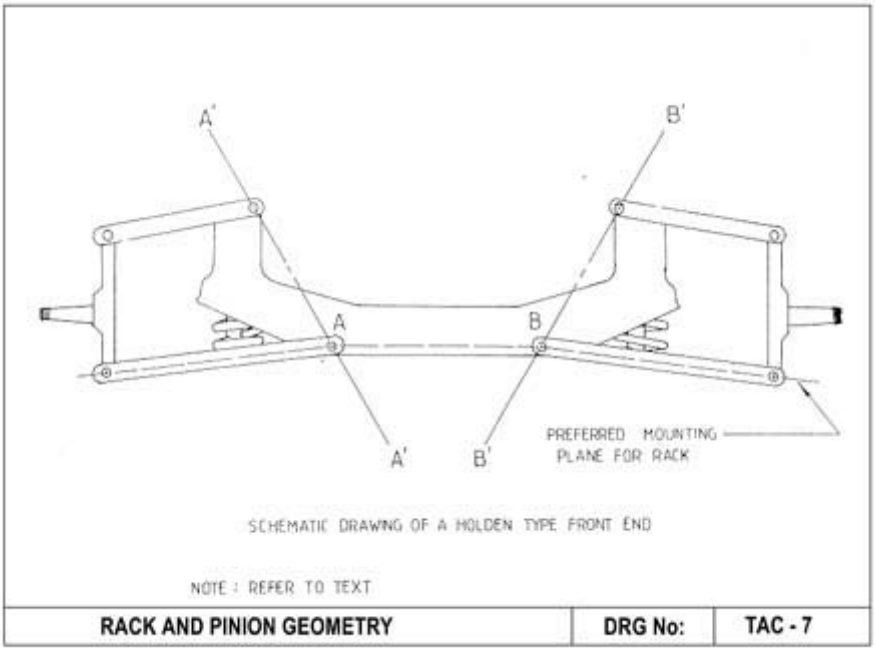


Figure App 1(a) Rack and pinion geometry (Drawing TAC-7)

ADAPTING RACK AND PINION STEERING TO HOLDEN SUSPENSION

Drawing TAC-8 shows the correct installation of a rack and pinion steering to an independent front suspension unit. There are three critical dimensions required to position the rack for correct operation.

Dimension "X"

This dimension is measured from the bottom edge of the cross member to the rack centreline of the rack tube. The parallelism of the front end must be checked once this dimension is obtained.

Dimension "Y"

This dimension is measured from the bottom edge of the front end to the rack centreline, and ensures vertical alignment of the rack pivots and suspension pivots. Any large deviation from "Y" will affect steering geometry and may require the rack to be altered. Parallelism is to be maintained.

Dimension "Z"

This dimension positions the rack housing so that equal lock can be achieved in either direction. This dimension is measured from the centre of the front end to the end of the rack housing.

Note: Dimensions may vary from Street Rod to Street Rod - all measurements should therefore be checked thoroughly.

Two commonly used racks on Holden HK to HG front suspensions are the Austin 1800 and the Holden Commodore. As a guide the following dimensions should be used:

Dimension	Austin 1800	Commodore
X	125mm	125mm
Y	37mm	37mm
Z	200mm	200mm
Shorten rack:	225mm	70mm
Shorten housing:	225mm	95mm

Rack mounts must be made to withstand lateral steering forces and vertical bump loads although their construction is an individual matter. Adapting rack and pinion steering correctly will permit standard wheel alignment settings and reduce toe change. An acceptable turning circle must be provided.

Figure App 1(c) shows a photograph of a Holden front end ready for welding, and Figure App 1(d) a photograph of a Mitsubishi front suspension unit ready for mounting.

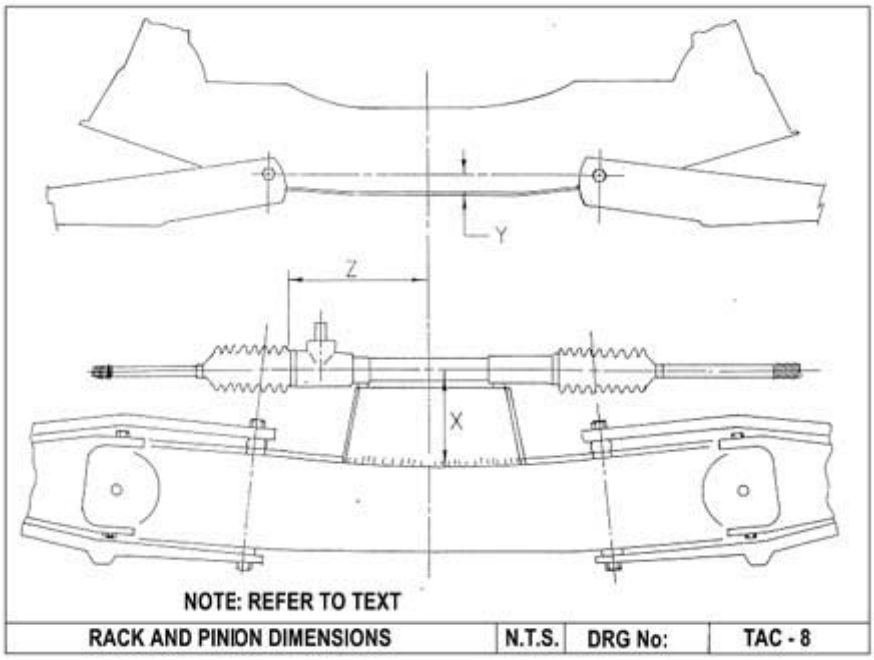


Figure App 1(b) Rack and pinion dimensions (Drawing TAC-8)

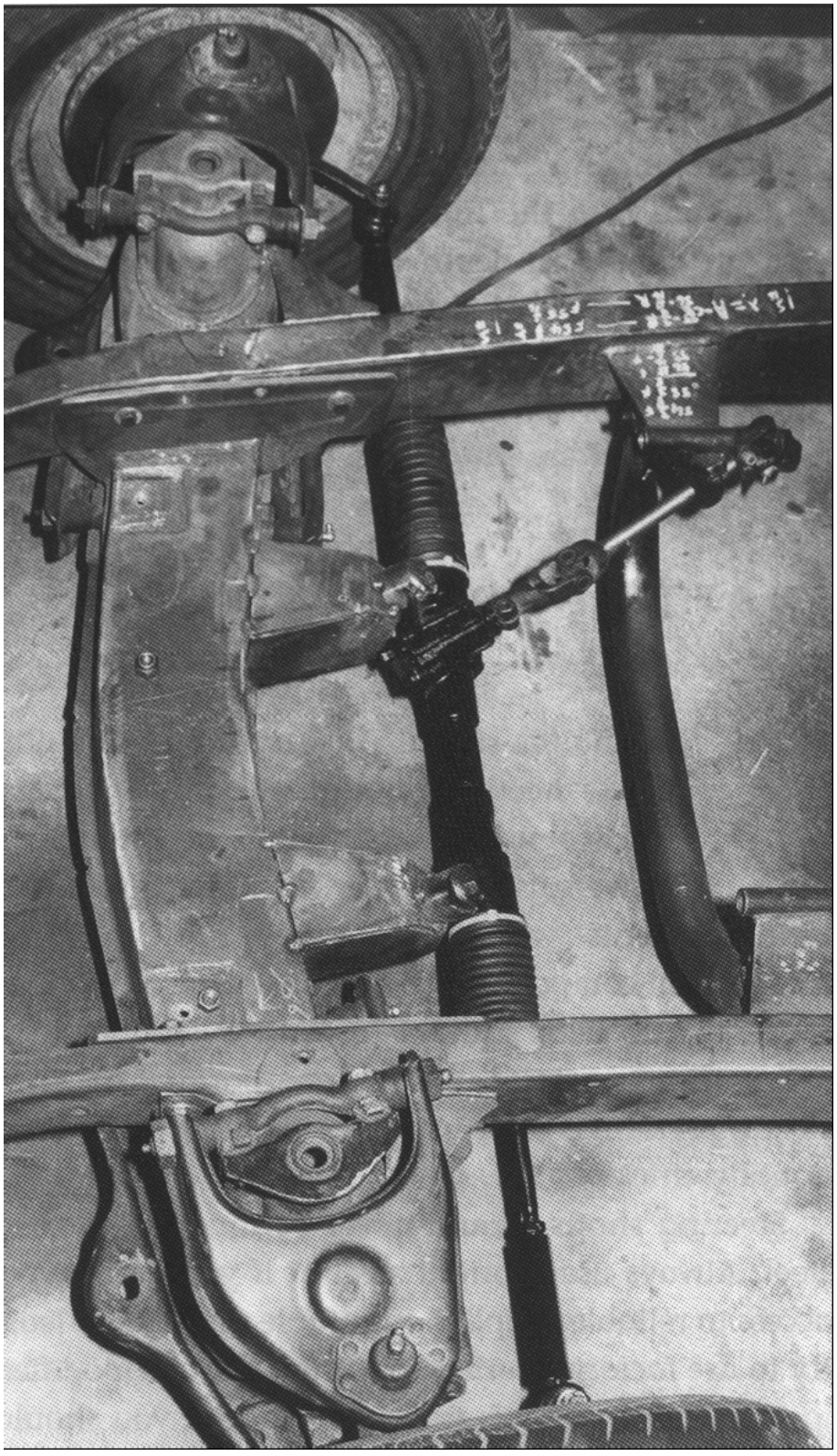


Figure App 1(c) An example of a Holden front end ready for final welding.

The front end has been braced and mounted to the chassis in a manner that will withstand torsional forces well. Rack and pinion mounts are also well-designed and look part of the overall package.

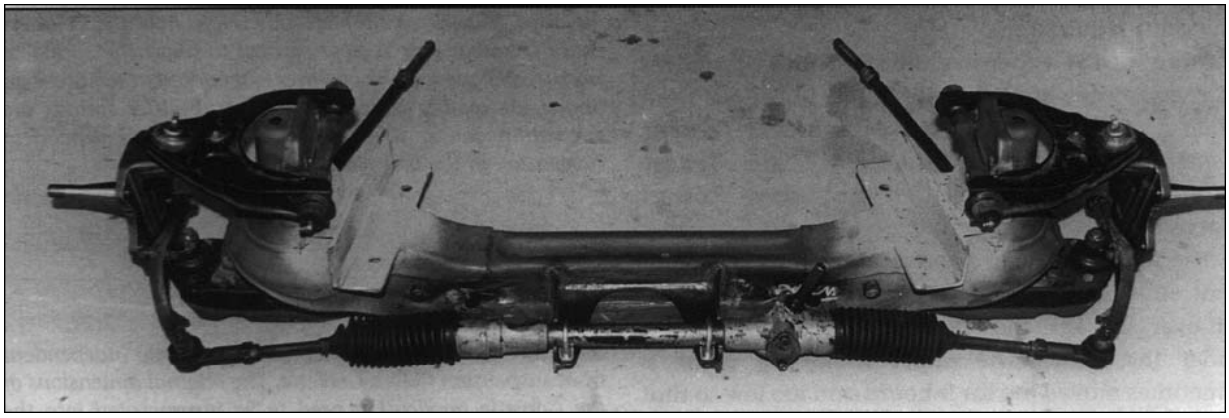


Figure App 1(d) An example of a Mitsubishi L300 Front suspension unit ready for mounting into an early chassis.

Note the simple but strong mounting brackets, and the forward facing radius rods. This unit has been modified to accommodate a rear mounted steering rack (Steering arms have been changed to maintain Ackerman geometry), and has been fitted with lowered Holden stub axles.

APPENDIX 2 TYRE AND RIM GUIDELINES

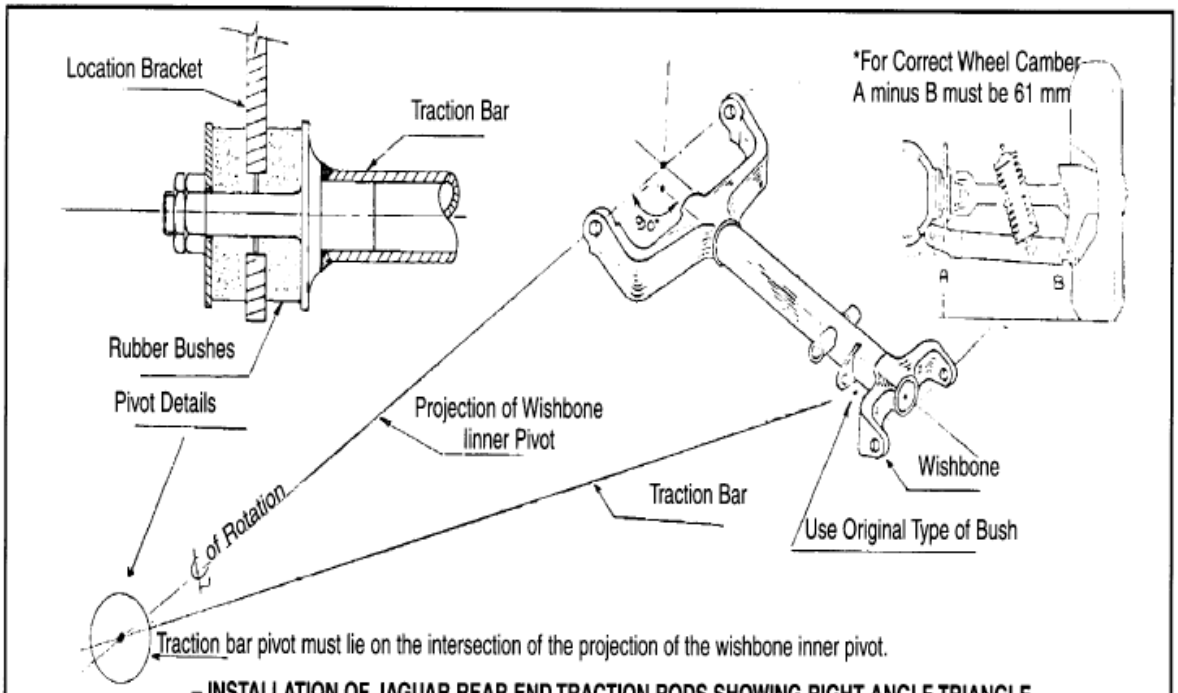
Tyre and rim combinations must meet the requirements of the Tyre and Rim Association of Australia Standards Manual.
The tyre size that can be safely fitted to a rim is dependent on the width of the rim, the load on the wheel and the tyre inflation pressure.

5” Rims	P155 to P205 for 70/75 Series P175 to P185 for 60/65 Series
6” rims	P165 to P235 for 70/75 Series P175 to P225 for 60/65 Series
7” rims	P215 to P275 for 70/75 Series P205 to P255 for 60/65 Series
8” rims	P255 to P275 for 70/75 Series P235 to P295 for 60/65 Series
9” and 10” rims	The Tyre and Rim Association Manual should be referenced or the tyre manufacturer should be contacted for details of the allowable tyre to rim fitment for these rims.

Table App 2.1 Recommended Tyre Sizes

The tyre and rim combinations shown in Table App 2.1 do not cover the full range of sizes recommended by the Tyre and Rim Association of Australia. Check the reference copy of the *Tyre and Rim Association of Australia Standards Manual* for any tyre and rim combination not listed above.
Street Rod weight must be taken into account. For example, a P175/60R14 at an inflation pressure of 180kPa has a load limit of 400kg, while a P175/75R14 at the same pressure is rated at 460kg. Similarly a P265/60R15 at 180kPa is rated at 790kg, while a P265/75R15 is rated at 980kg.
Consideration must be given to the fully laden weight of the Street Rod in selection of tyre size, particularly for the front axle where traditionally smaller tyres are fitted than the rear. The load rating of the tyre must be appropriate for the Street Rod to which it is fitted. Load ratings are generally marked on the tyre sidewall. Tyres without marked load ratings must not be used unless evidence from the tyre manufacturer is available to confirm that the tyres have the necessary load carrying capacity.

APPENDIX 3 MOUNTING JAGUAR INDEPENDENT REAR SUSPENSION



– INSTALLATION OF JAGUAR REAR END TRACTION RODS SHOWING RIGHT ANGLE TRIANGLE.

MOUNTING JAGUAR INDEPENDENT REAR SUSPENSION

RADIUS RODS:

Radius rods should always be installed to support the lower control arms of the Jaguar IRS.

There is only one geometrically correct position for them to be mounted. The radius rods must be installed with the forward end located on the axis of the lower control arm pivot. (The center line of the shaft that connects the lower control arm to the differential housing). This axis and the radius rod combine to make a right angle triangle with the lower control arm. This allows full suspension travel without bind. (See diagram). Mounting the forward end of the radius rod anywhere else other than on this axis line causes partial or total bind and undue stress on lower pivot bracket bolts which can break.

The recommended minimum size of tubing for radius rod fabrication is 1-1/8" O.D. The type of pivot used on radius rod ends should be of such design to allow adequate twist under full suspension travel, such as stock Jaguar rubbers on control arm ends and independent suspension strut rubbers on the forward end.

The other method of fitting radius rods is where the radius rods cannot be fitted in the same axis as the lower control axles, and the rods are mounted directly forward of the lower control arm connecting point, (as with stock Jaguar). If this type of system is used, the rubbers both for and aft should have sufficient movement to allow full travel without bind.

TIE BARS:

Tie bars or plates should be fitted between the lower control arm pivots; both front and back. Also a tie plate should be fitted underneath between pivot brackets.

TORQUE REACTION STRUTS:

These must be fitted between lower control axles and chassis to prevent the differential from twisting.

SHOCK ABSORBERS AND SPRINGS:

Mounting points for shocks should be the same dimensions as they were in the parent car. If this cannot be done for clearance reasons a minimum distance between top mounts would be 21". A correctly installed Jaguar IRS would have shock centers of 11-1/2" and horizontal half shafts. Car height under normal load, should be altered by changing springs, not relocating shock mounts. Chroming of springs is not recommmended, but if they are, they should be heat treated or sagging and/or breakage will result.

CAMBER:

Camber is adjusted by the use of shims between drive flange and half-shaft, and bottom pivot bracket and differential case. Correct camber is 3/4° plus or minus 1/4° negative.

WHEEL BEARINGS:

It is very important to adjust bearings correctly. This is done with varying size shims to accomplish an end float of .002" to .006". These bearings are not preloaded. If they are, severe damage to the hubs will result.

Figure App 3 (a) Installation of Jaguar independent rear suspension

Examples of Jaguar independent rear suspension are given in Figures Appendix 3(b) and (c).

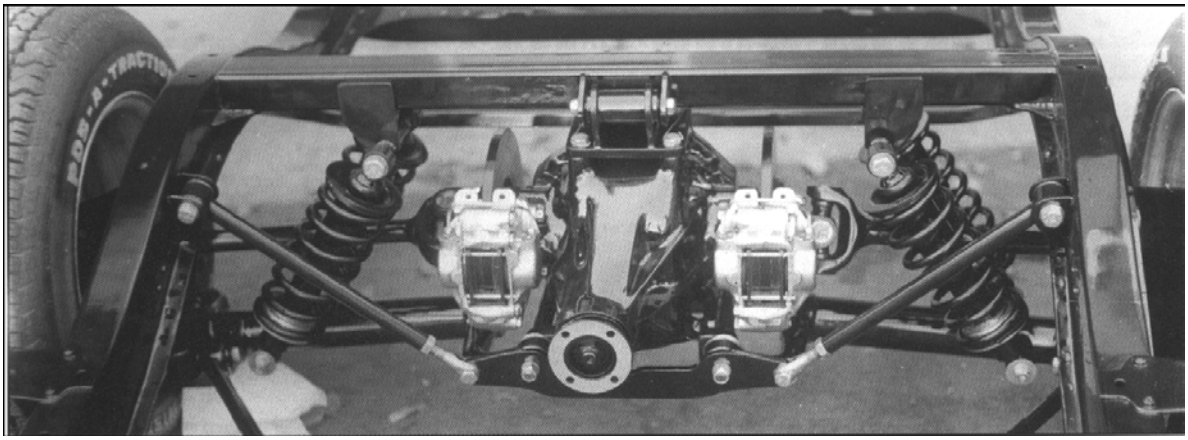


Figure App 3 (b) Jaguar rear suspension

Figure App 3(b) shows a Jaguar rear suspension in a Chevrolet chassis that closely duplicates the original Jaguar mounting in that the centre section is mounted on insulated bushes. This will help minimise noise transmission into the chassis. Strut rods at the front control the rear end's tendency to *wind-up* under hard acceleration.

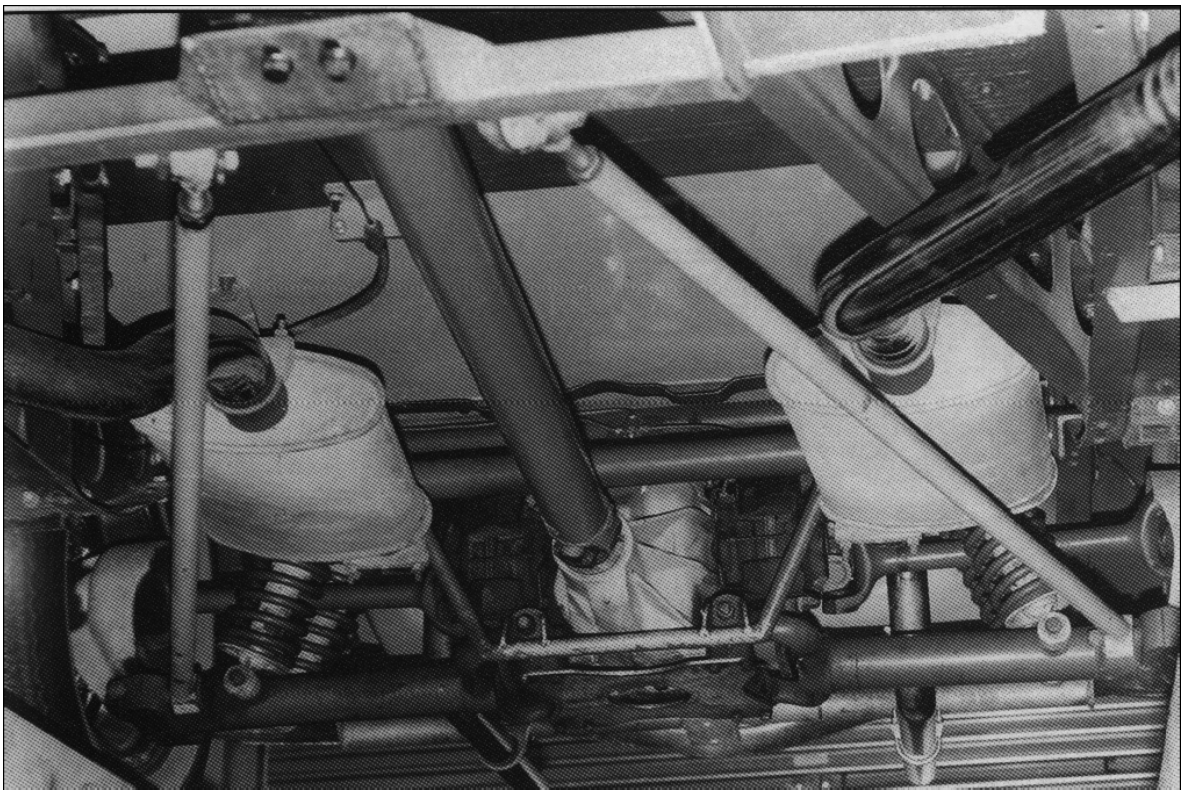


Figure App 3(c) Jaguar rear suspension radius rod

Figure 3(c) illustrates a Jaguar independent rear suspension installed in a 1933 Ford. It shows how the forward ends of the outer radius rods should be mounted so that they align with the lower pivot points of the rear suspension. This allows them to operate without binding. They must not be mounted straight along the chassis unless original Jaguar mounting bushes are used.