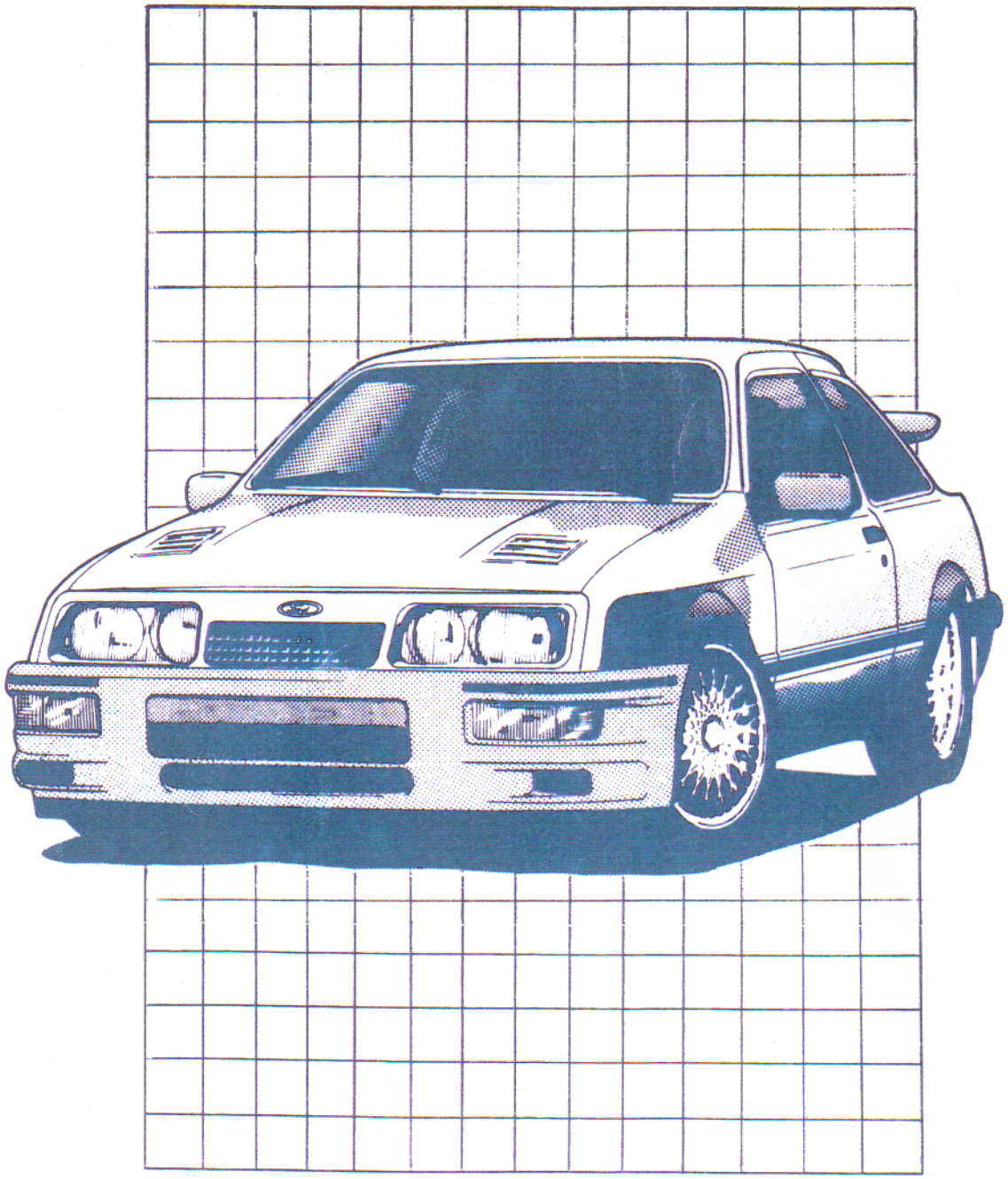
HOW TO

PREPARE THE SIERRA FOR RALLYING



Ford

DISCLAIMER

Some Ford Motorsport Parts, installations, and recommended changes, in this booklet, may not meet National Type Approval laws in certain countries. At all times, it is the responsibility of the customer to ensure compliance in a particular country. The eligibility of any part for use in motor sport must be determined, by the customer, by reference to the relevant up-to-date Homologation Form, and (where applicable) Championship Regulations.

Ford of Europe Inc. cannot accept responsibility for any problems arising from failure to comply with these recommendations.

FORD SIERRA — Competition Preparation

CONTENTS

COMPETITION PREPARATION for FORD SIERRA models

More and more events in motor sport, in Europe, are being organised for cars homologated into Groups N and A.

There are many models in the FORD SIERRA range, but two of those which are on general sale in Europe — the SIERRA XR4×4 and the SIERRA RS COSWORTH — are particularly suitable for use in these categories.

The SIERRA XR4×4 is already homologated in Group N and Group A

The SIERRA RS COSWORTH is to be homologated in Group N and Group A in late 1986.

Although the XR4Ti is also a derivative of the SIERRA, and is raced extensively on European circuits, it is sold principally in the U.S.A., and is not generally available in Europe.

This publication summarises the improvements which can be made to the SIERRA XR4×4, and the SIERRA RS COSWORTH, to make them even more competitive in motor sport. This information covers work which can be done on the cars after delivery from the factory, and also the extra equipment, or homologated extras, which are available, or are being developed.

In almost every case, this expertise has been built up with International Group N (Production Cars) and Group A (Touring Cars) competition in mind. Where a car is to be used in competitions where homologation is not required, further changes may be made.

Issue 1 : June 1986

REGULATIONS —National and Sporting

Before you begin to prepare a SIERRA for use in motor sport, bear these points in mind:

Firstly, any car which uses public roads must be 'road legal' at all times — in other words, it must be registered, licenced, taxed and insured, and it must meet the 'Construction and Use' regulations governing items such as lights, tyres, safety belts, and exhaust systems.

Secondly, if a car is to be built up from a new body shell (but not re-prepared from an existing complete car), you should check with the authorities, to see if it can be registered as a new vehicle, or based on the identity of an existing vehicle. The advantage of converting an existing vehicle is that it offers a ready supply of standard parts.

Thirdly, you should always obtain copies of the Regulations which apply to the events, and the Championships, in which you intend to compete.

In most club events, and some National events, cars do not have to comply with Homologation requirements, but you should always acquire copies of the FIA Year-book, and the National club's Motorsport Yearbook, to ensure that your car complies with general requirements.

For all International, and some National, events, a car must run in one of the homologated groups, and you should obtain the latest copy of the Homologation Form.

For the SIERRA models, the various Homologation Numbers are:

SIERRA XR4×4	Group N : N — 5285
	Group A : A — 5285
SIERRA RS COSWORTH	Group N :
	Group A :
(XR4Ti	Group A : A — 5261)

Copies of these forms are available from the appropriate National organisation controlling motor sport in your country.

IT IS THE RESPONSIBILITY OF THE COMPETITOR TO ENSURE COMPLIANCE WITH THE REGULATIONS — which may change from time to time. This booklet is issued as a guide, but inclusion of items in each section does not necessarily imply that eligibility is assured. Equally, this booklet does not claim to contain all the current requirements as printed in the FIA Yearbook.

Parts available (together with the Ford Finis Code, or Part Number) are listed at the end of each section. Finis Codes starting with the numbers 909.... are available through Ford Rallye Sport dealers, while all other parts are available from any Ford dealer, or as specially noted.

BODY SHELL

The first, and most important, stage in building up a competition car is to prepare the body structure. Ideally you should start with a new and unpainted shell. However, if you start to prepare an already built-up car, we strongly advise that you strip out the shell completely, of all wiring, trim, and mechanical components, to avoid damage (or burning) during welding operations, and to make the shell easier to handle.

If you are planning to competition-prepare a used shell, check carefully for any corrosion which may already have occurred, and eliminate this completely. If necessary, put the shell on a body jig, to check that it is straight and square — this applies particularly to a shell which may once have sustained accident damage.

Some versions of the SIERRA XR4×4 and the SIERRA RS COSWORTH are normally sold from new with a sliding and tilting glass sunroof. For competition purposes, this installation must be removed from the car, and a steel roof panel put in its place.

Strengthening

Extensive welding is forbidden for Group N cars, but is considered to be advisable for Group A tarmac rallying or racing. Where authorised (as in Group A regulations), this will considerably prolong the life of a shell for use in loose-surface special-stage rallying, and reduce handling problems due to chassis flexing.

Group N : No additional welding of any nature is allowed, except :

a) To repair damage or deterioration to the shell

b) To provide strengthening around the spring and damper mounting points. The material used must follow the original contours, and be in contact with it. This strengthening must not be more than 50mm (2 inches) away from the original mounting point.

Group A : Before starting to weld, thoroughly clean out all the sealer, and the sound-deadening panels. If you leave these in place, not only is there a residual risk of fire, but it is often difficult to get a good-quality weld on a 'dirty' seam.

It is advisable to add a limited number of 'patch' pieces, and it is also recommended that you pay attention to every welded seam :

i) Work gradually around the shell, 'stitching' a half-inch run of weld every inch or so, along **every** exposed spot-welded body seam that you can find. Work underneath the car, in the engine bay, inside the car — anywhere that it is possible to see, and to reinforce, a seam.

Apply this technique too, to the spot welded edges such as the windscreen, side-window and door apertures, though if you have access to a portable spot welder it is often tidier to use this to add extra spot welds on such exposed seams.

ii) The following areas of the SIERRA body shell should be plated to improve the rigidity of the structure — i.e., they should be double skinned, for the extra metal must follow the original contour :

The front passenger foot wells

The boot floor/spare wheel area

The junction of the engine bay 'chassis leg' and the inner wing panel, where they are adjacent to the MacPherson strut for the front suspension.

iii) The standard wheel arches, extensions, skirts and spoilers must all be retained, so that the car continues to comply with homologation regulations.

iv) Two external locking devices are compulsory for the bonnet panel, and compliance with this regulation can be fulfilled by using bonnet pins. The existing bonnet lock may be rendered inoperative, if the regulations allow this.

Extra spring fasteners should be fixed to the corners of the tailgate to help hold it down.

v) If the spare wheel mounting is to be changed, and the wheel or wheels are arranged to rest inside a vertical tower, there must be **secure** retention of the spares; it is not considered good enough for expanding rubber straps to be used for this purpose.

vi) When body shell preparation is complete, we recommend the spraying of the engine bay, and of all panels not covered by the exterior colour schemes and sponsor's decals, in white. This aids the tracing of all fluid leaks which might inadvertently occur, at a later date.

ROLL CAGE

In each case, specially-designed roll cages have been developed for the SIERRA XR4×4 and the SIERRA RS COSWORTH models. The use of such cages is compulsory in all motor sport events, and the cages illustrated in the appropriate homologation forms are authorised for use in Group N and Group A cars.

The use of the illustrated homologated cages is not compulsory, for different cages, from different manufacturers, are available in individual countries. In all cases, the design of a cage must comply with the requirements of the FIA Yearbook, which specify minimum material specifications, the wall thickness of tubes, and other dimensions.

A typical cage, of the type homologated for these cars, would have up to 18 fixing points to the body structure, not only to the floor, and to the door and windscreen pillars, but to the top of the front suspension strut mountings, and to the rear suspension damper mountings. Such cages are supplied in several major bolt-together sections, with all the fixing brackets, reinforcements, and fixings.

Included in such assemblies should be safety bars across the door apertures, and cross-braces between front and rear suspension damper top mountings. In some cases there will be cross-bracing tubes across the car under the facia/instrument panel, and behind the front passenger seats.

To work out 'what goes where', study the picture in the latest version of the appropriate homologation sheet, and loosely assemble the cage outside the car, before once again breaking it down into sections and beginning assembly to the car.

We recommend that the roll cage be fitted to the body structure of a Group A car **before** any seam-welding is done, for the cage gives valuable support to the shell, and will stop any tendency for it to twist while welding is being carried out. If the body shell to be used is not brand new, or has been in an accident at one time, it should be put on a jig, checked or straightened out, before installation begins.

To install the front section of the cage, and to fix it to the strut towers, it is necessary to provide suitable clearance holes in the front passenger footwells and bulkhead. You will also see that it is necessary to relocate certain components to make space for these forward facing tubes to be run between the passenger side of the bulkhead, and the strut towers. Such relocation is authorised by the regulations for Group A only.

Reinforcing plates have to be welded to the body shell under the feet of the cage, in the footwells, at the base of the door pillars behind the front doors, to the rear damper mountings, and behind the mounting positions of the main loop, and the tubes which run parallel to the windscreen pillars. In each case, it is advisable to offer up the cage **before** welding reinforcing plates into position. Adjust plate thicknesses as necessary, to ensure a snug fit between cage and body shell. There is usually enough adjustment in any roll cage assembly for you to make a satisfactory fit; the holes for mounting the bracket around the front strut towers, for instance, have to be drilled on the spot.

Note : To accomodate such complex cages, it may be necessary to cut away parts of the facia and door trim panels, where they would otherwise foul the tubes. This has been approved by the sporting authorities, and does not affect the car's eligibility.

FRONT SUSPENSION

On Group N cars, the only changes allowed to the suspension are to springs, damper settings, and rubber bush rates. On Group A cars, more radical improvements are allowed.

In each case, special care should be taken to optimise the wheel castor, camber, and toe-in, toe-out settings. The choice of springs is free but minimum height must be retained. For rally cars, always set up the car to have adequate clearance under the sump shields, and other protective plating.

SIERRA XR4×4 :

Group N and Group A: In the coming months, recommended competition spring, damper and anti-roll bar settings are to be developed.

Because the Sierra strut and rear damper designs are very similar to other current, and recently obsolete, Ford models, private owners have already found it possible to adapt competition items from other cars, without having to alter the mounting points on the body shell, or the suspension links.

For Group A cars **only,** experience shows that the articulation of the front suspension can be made even more precise by constructing a 'compression strut' arrangement to add to the location of the TCAs, and to relieve the anti-roll bar of double duty. The use of struts with adjustable spring pan heights allows the height of the car to be precisely trimmed for varying track or road conditions.

SIERRA RS COSWORTH :

Group N: In the coming months, recommended competition spring, damper, and anti-roll settings are to be developed. As with the SIERRA XR4×4, competition items from other Ford models can readily be adapted, where regulations permit.

Group A: New competition components are being developed, which will fit the standard suspension mountings, and will also mate with standard components like hubs. A 'compression strut' modification increases the precision of front wheel movement, and is especially useful on tarmac events. It is also recommended that damper struts with adjustable-height spring pan supports should be fitted. This allows the car to be lowered for hard, smooth surface, events, or raised when it is to be driven over loose, or uneven, surfaces.

Suspension settings should be :

For loose-surface stages :

2 to 3mm steering toe-in
1½ degrees negative wheel camber
3 degrees castor

For tarmac-surface conditions :

3mm toe-in
2½ degrees negative camber
3 degrees castor

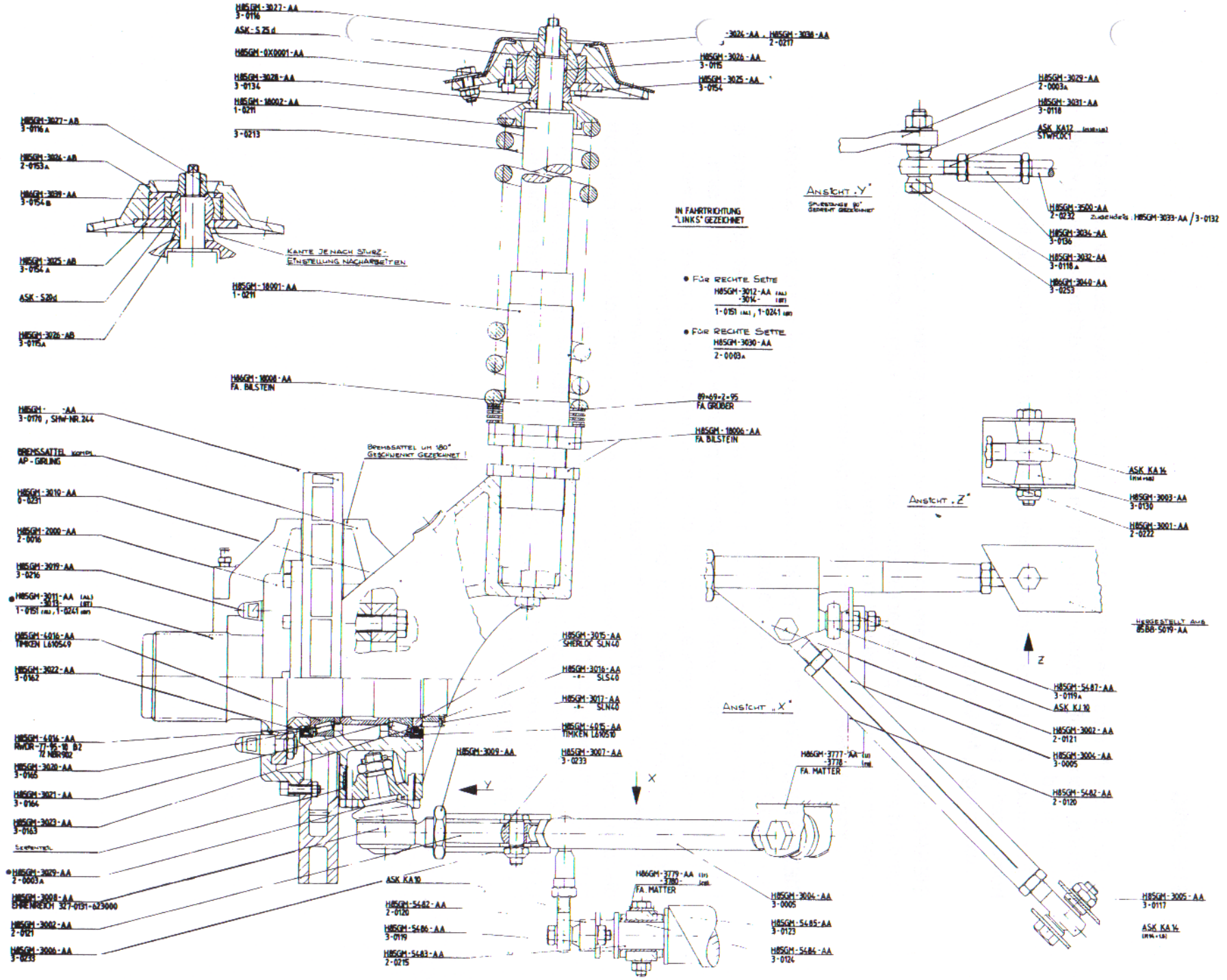
For racing purposes, a specialised suspension assembly, originally developed for the XR4Ti, is available. This incorporates spherical joints in the locating links, a reinforced knuckle at the bottom of the strut, a ball joint pivot at the top of the adjustable height strut, and enlarged stub axle bearings.

This assembly may also be fitted up with larger brakes and discs (suitable for 15in. or 16in. diameter wheels), and centre lock hubs for racing wheels.

Also homologated is an eccentric strut top mounting, and a variety of optional anti-roll bars, of the conventional, or the tubular, type.

Fitment of all the 'XR4Ti' items is recommended for track racing, but experience in use on rally stages has yet to be built up.

Details are :



XR4Ti Front Axle Assembly

STEERING

For Group N cars, the standard steering rack, and power-assistance, must be retained, though stiffer, heavy-duty, rack mountings, and a different steering wheel, may be fitted.

For Group A cars, modifications are allowed, but these must be listed in the homologation papers.

Accordingly, for **Group A :**

SIERRA XR4×4 : There are no alternative steering systems homologated. The standard system, with power-assistance, and a 13.7 : 1 ratio, is considered suitable for the car in its current state of development.

Alternative systems, and ratios, are to be developed.

SIERRA RS COSWORTH : The standard system has power assistance, a variable ratio, and 2.63 turns from lock to lock.

An alternative system, with a 17.0 : 1 ratio, with or without power assistance, is homologated, and specialist suppliers already produce the non-power version.

Functionally, there appears to be no clear advantage in using power-assisted, or manual, steering; the choice must be according to driver preference.

It is **not** recommended that the hydraulic system of the power-assisted steering is disconnected, to produce a manual system, as damage might occur to the quill shaft in the lower steering column, and steering failure might follow.

Although non-power-assisted steering from other SIERRA models could be fitted to this car, it is not considered suitable for competition use, as the ratio is too low — i.e., there are too many turns from lock to lock.

REAR SUSPENSION

On Group N cars, the only changes allowed to the rear suspension are to springs, damper settings, and to the stiffness of the mountings.

On Group A cars, more radical improvements are allowed, and homologated.

In each case, special care should be taken to optimise the wheel camber settings. There is no toe-in adjustment on cars fitted with the standard suspension trailing arms, but if the optional spherical-jointed rear suspension for the SIERRA RS COSWORTH (developed originally for the XR4Ti) is used, the toe-in may be altered to trim the handling.

Group N cars: In the coming months, recommended competition springs, damper settings, and anti-roll bar rates are to be developed. Competition dampers from other Ford models can readily be modified, to be fitted to the rear suspension of the SIERRA XR4×4 or the SIERRA RS COSWORTH, without having to modify the body shell, or the semi-trailing arms.

Group A cars: New competition springs, dampers and anti-roll bar rates are to be developed.

For the SIERRA RS COSWORTH only, and for racing purposes only, a specialised suspension assembly, originally developed for the XR4Ti, is available, and homologated. This incorporates spherical joints, and a unique method of assembly, for a new type of semi-trailing arm assembly, a heavy-duty rear hub which includes enlarged hub bearings, and the ability to pick up special competition anti-roll bars.

This assembly may also be fitted up with larger brakes and discs (suitable for 15in. or 16in. diameter wheels), and centre lock hubs for racing wheels. It also allows the camber and the rear-suspension toe-in to be adjusted within fine limits. Heavy drive shafts (see TRANSMISSION section) are also available for this installation.

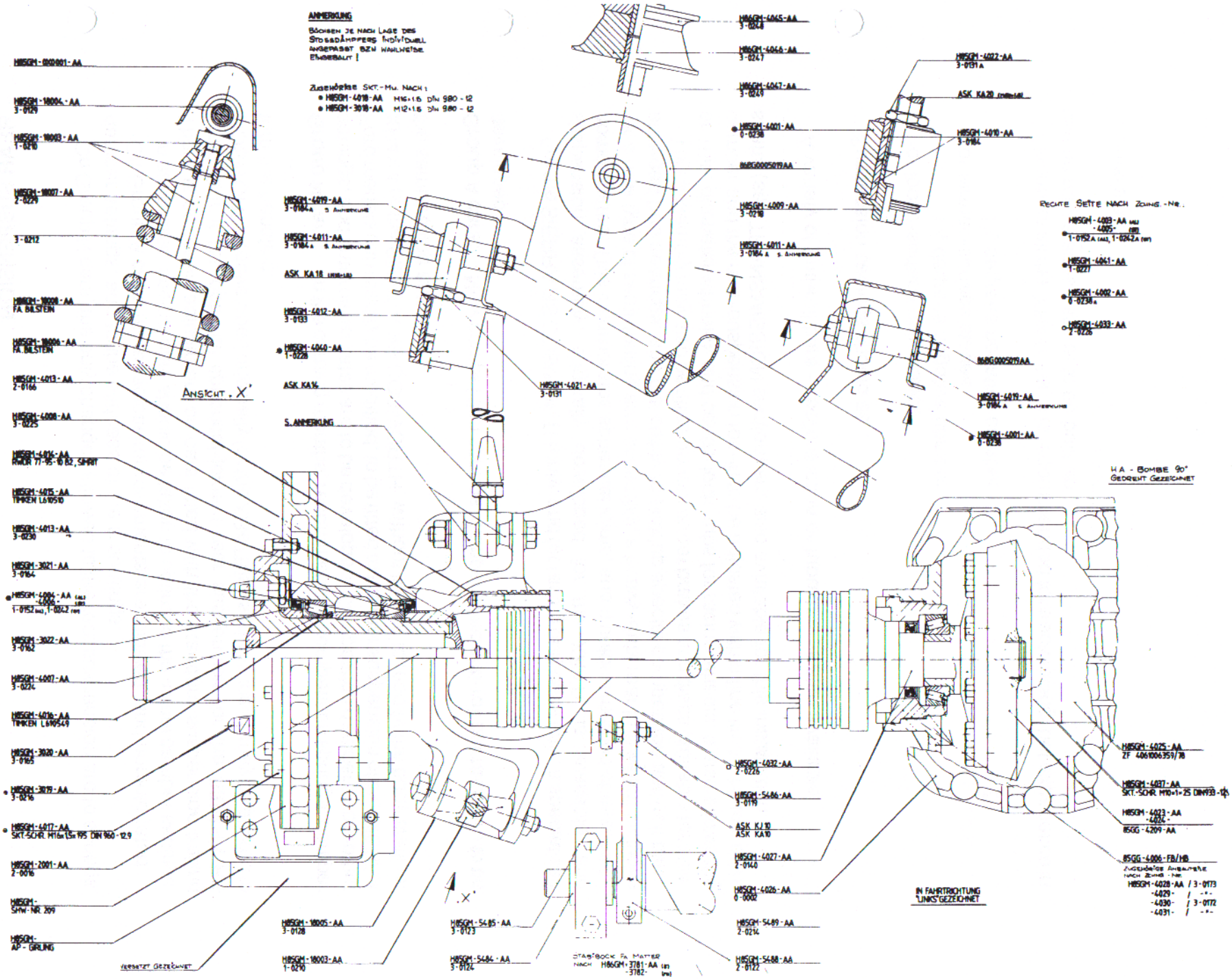
A variety of anti-roll bars — solid section or tubular — is also available.

Suspension settings should be :

For loose-surface rally stages :
1½ degrees negative camber
For tarmac-surface stages
1½ degrees negative camber

Fitment of all the 'XR4Ti' items is recommended for track racing, but experience in use on rally stages has yet to be built up.

Details are :



XR4Ti Rear Axle Assembly

WHEELS and TYRES

On all cars, and in all Groups of competition, the choice of tyres, their construction, and their tread pattern, is free, subject to them always complying with open-road legal requirements for rallies.

On group N cars, no changes to the standard road-car specification wheel wheels are allowed by the regulations, although on the SIERRA XR4×4, wheel studs and nuts can be fitted to the hubs in place of wheel bolts.

On Group A cars, there is no restriction as to what make, style, and type of wheel is fitted. However, for the SIERRA XR4×4 and the SIERRA RS COSWORTH, FIA Regulations set a **maximum** limit of 10in./25cm. width on the tyre and/or wheel rim which can be used.

Before committing yourself to the purchase of quantities of wheels and tyres, carry out a fitting check of fitted units, correctly inflated to ensure :

a) Clearance for the tyres to move between full bump and full rebound without fouling the body.

b) Clearance for the front wheels, on full lock and full bump.

c) That the units do not protrude outside the line of the body, when viewed from above — for protrusion would mean that the car did not comply with sporting regulations.

In the case of the SIERRA RS COSWORTH, the car has been specially modified so that ultra-low-profile, wide-section tyres can be used for competition purposes, and if suitable wheels are chosen it should be possible to use rim widths of up to 9in., allied to tyres of up to 10in. width.

On this model, special composite material wheel arch extensions surround the front and rear wheel arches. These slightly cut down the available clearance for the use of high-profile/off-road treaded tyres. Where the regulations allow, it may be advisable to locally modify, and re-shape, the outline of the wheel arch extensions, to increase the available clearance. Normal appearance must be retained.

Tyres

In the case of Group N, no choice of different wheel diameters or rims is authorised.

In the case of Group A, the choice of wheel **diameters** is free, within plus or minus 2in. of the standard specification. This means that the SIERRA XR4×4 could have wheels as large as 16in. rim diameter fitted, and the SIERRA RS COSWORTH could have wheels as large as 17in. rim diameter.

However, before making a wheel choice, remember that:

a) There is a very restricted choice of 14in. diameter race or rally tyres.

b) There is a good overall choice of 15in. competition tyres.

c) There is a very good choice of 16in. diameter racing tyres.

For that reason, we recommend that a SIERRA XR4×4 should use 15in. diameter wheels when running in Group A form. However, we also recommend that the SIERRA RS COSWORTH should retain 15in. diameter wheels for rallying, but that a change to 16in. diameter wheels with ultra-low profile racing tyres should be considered for racing.

Alternative wheels

Several designs of alternative road wheels are available from specialist manufacturers to fit the sierra models. Note that the standard SIERRA XR4×4 has 14in. diameter wheels with 5.5in. rim width, and that the SIERRA RS COSWORTH has 15in. diameter wheels with 7.0in. rim width.

Before purchasing a quantity of proprietary wheels, please ensure that these provide adequate clearance over the disc brake calipers and their associated pipework and linkages. Particular cases are :

If the SIERRA XR4×4 is fitted with the alternative (enlarged) heavy-duty disc/caliper kit which is homologated, these must be used in conjunction with 15in. road wheels of SIERRA RS COSWORTH type.

If the SIERRA RS COSWORTH is fitted with any of the various homologated disc/caliper kits **where the disc diameter is greater than 12in./305mm diameter,** 16in. diameter road wheels must be fitted.

With racing, and high-speed pit stops, in mind, a centre-lock wheel kit is homologated. The wheels are of 16in. diameter, and it is necessary to use the homologated centre-lock hubs and fixing nuts which have been developed for this purpose. This kit was originally developed for the XR4Ti.

Recommended rim widths, and settings :

Group N : No deviations from standard road-car specification are authorised.

Group A : Development of settings for the SIERRA XR4×4 is under way, but is not yet established.

For the SIERRA RS COSWORTH in rallying, the following choice is recommended :

For firm loose-surface stages 6in. F rims, 7in. R rims
For soft loose-surface stages 6in. F rims, 6in. R rims
For tarmac surface stages 8in. F rims, 9in. R rims

For loose-surface stages :

Front : 2 to 3mm toe-in
1½ degrees negative camber
3 degrees castor

Rear : standard toe-in settings
1½ degrees negative camber

For tarmac-surface stages :

As above, except for the use of :

Front : 3mm toe-in
2½ degrees negative camber.

BRAKES

Both the SIERRA XR4×4 and the SIERRA RS COSWORTH models have front and rear disc brakes as standard.

On Group N cars, the standard installation must be retained, although the pad material, and the brake fluid itself may be changed.

On Group A cars, a complete change of system is authorised, if displayed on the homologation form. Alternative installations are available for the SIERRA XR4×4 and the SIERRA RS COSWORTH. Also available are dual master cylinder/balance bar kits (to replace the ABS, or single master cylinder installations, as appropriate), and handbrake kits offering hydraulic actuation.

Group N cars :

It is not considered necessary to change the standard brake fluid, though competition fluids are available from the specialist manufacturers.

Group A Cars :

SIERRA XR4×4 :

As from 1 July 1986, an extra-heavy-duty brakes kit has been homologated. This, in fact, is the same kit as detailed below for the SIERRA RS COSWORTH model, and it cannot be fitted inside the standard SIERRA XR4×4 14in. road wheels. It can **only** be used if suitable wheels of 15in., or even 16in. diameter are fitted at the same time.

The kit includes larger ventilated front and rear discs (cross-drilled, or undrilled, to choice), new disc bells, larger brake calipers, a choice of hydraulic or new style mechanical handbrake assemblies, and a choice of two versions of an adjustable balance bar brake pedal box.

SIERRA RS COSWORTH :

The homologation sheet shows that several alternative heavy-duty braking installations are available for the SIERRA RS COSWORTH model. Some of these brakes were specially developed for the XR4Ti model, and are intended for racing purposes. Some of the calipers authorised have also been used on Mk II Escort Rs models.

The AP Racing kit developed especially for the SIERRA RS COSWORTH incorporates calipers from the RS200 competition model, and comprises :

301.5mm/11.87in. diameter ventilated discs, cross-drilled, or undrilled, to choice
Disc bells to suit
Four-spot hydraulic brake calipers for front and rear brakes
Mechanical handbrake calipers (if required)

Handbrake kit with hydraulic actuation (if required)
Two versions of an adjustable balance bar brake pedal box, to use twin master cylinders

In addition, an adjustable pressure limiting device is available for the rear hydraulic circuits.

Note : Also shown in the homologation form are disc brake kits with even larger discs. These were all originally developed for the XR4Ti model. If a kit including discs with an outside diameter exceeding 305mm/12.0in. is chosen, this can **only** be used with 16in. diameter road wheels; the standard 15in. wheels will not fit over the enlarged brakes.

ENGINE

For Group N cars, the engine must be left almost entirely standard, though optimisation, and 'blueprinting' is authorised.

For Group A cars, more substantial changes are authorised.

Engine Mountings : In each case, and for both models, it is recommended that stiffer engine and transmission mountings should be fitted, where available, to support the engine/transmission assembly more firmly in the structure.

For a Group A (but **not** a Group N) SIERRA RS COSWORTH model, it is recommended that new front engine mounting brackets should be constructed. These should be built up as extensions to the front suspension cross-member, and should be arranged to mate up with concentric-bush type 'World-Cup'/Escort BDA engine mounts should be fixed to the cylinder block.

Engine tuning :

Group N : The make and type of spark plugs and ignition H/T leads may be changed, and the rev-limiter removed, the settings in the fuel injection system may be changed, but apart from this the only authorised improvements are those produced by the 'blueprinting' of the engine. The 'blueprinting' process involves the selective assembly of engine parts, and careful choice of tolerances, to produce the best possible power and torque figures. This is best done by an experienced engine builder; advice is available from Ford Motorsport staff, about the builders with the most expertise and tuning knowledge of the vee-6 (SIERRA XR4×4) and RS Cosworth (SIERRA RS COSWORTH) engines.

'Blueprinting' is a labour-intensive, expensive, business, and brings only a limited return, with about 10 per cent improvement from nominal figures to be gained.

In the case of the SIERRA XR4×4, please note that only the Bosch K—Jetronic fuel injection system is homologated. Cars sold in Sweden and Switzerland are normally equipped with Bosch L-Jetronic injection, which is **not** homologated; such cars have to be re-equipped before they can take part in Group N competition.

Group A : Ford does not supply Group A engines, but can recommend sources of tuning equipment, or can advise regarding the engine builders with the most experience of the engines, and of Group A preparation.

No special equipment has been developed for the 2.8-litre vee-6 engine of the SIERRA XR4×4. As modified for Group A by specialist engine builders, approximately 200bhp is available.

The 16-valve turbocharged engine of the SIERRA RS COSWORTH model has been designed with competition in mind, and is equipped with a steel crankshaft and connecting rods as standard.

Group A-tune engines are available from Cosworth Engineering Ltd. With attention only to the cylinder head breathing, the turbocharger settings, and the fuel injection systems, a minimum of 285/300bhp is available. Neither the camshaft profiles, nor the valve gear is modified for this rating.

Later developments, to become available in the coming months, with more power and torque available, will involve new camshaft profiles, and attention to the valve gear.

To maximise the breathing efficiency of the engine, an enlarged Intercooler kit has been developed; this component is intended to be mounted ahead of the water-cooling radiator. Its part number is

GEARBOX

If the SIERRA models are to be used in Group N events, no gearbox changes of any type are allowed. If the cars are to be used in Group A specification, an alternative gearbox and final drive ratios (as homologated) may be used.

Group N : The standard gearbox assembly, and final drive ratios, must be retained.

In the case of the SIERRA RS COSWORTH, it is recommended that shot-peened differential bevel gears should be used; this increases their endurance to shock loading, especially for a car to be used on loose-surface rally stages which have rapidly changing levels of wheel grip.

We recommend that the viscous coupling limited-slip differentials (VCs) — one in the SIERRA RS COSWORTH, and two (centre and rear) in the SIERRA XR4×4 — should be removed, and sent back to the manufacturer, or his competitions representative, for optimisation.

Where Group N regulations are not strictly to be applied, note that uprated (Group A) drive shafts, as developed for the XR4Ti, are available.

Clutch : The standard clutch must be retained. However, the type of linings, and the method of fixing the lining to the driven plate, is free.

Group A : If more powerful engines are to be used, it is recommended that specially-developed competition clutches should be fitted. In the U.K., for instance, there is a well-proven AP Racing clutch, fully capable of withstanding SIERRA RS COSWORTH Group A engine torque, which may also be fitted to the SIERRA XR4×4.

SIERRA XR4×4 : In the coming months it is intended to offer :

Close-ratio main gearbox ratios
3.92 : 1 and 4.33 : 1 final drive ratios

The viscous couplings — centre and rear — should be removed, and returned to the competitions department of the VC manufacturer, for their stiffness rating to be increased. Note that there is no VC in the front differential.

Heavy-duty drive shafts (Part Number H8 5GM-4032-AA), as homologated for the XR4Ti, may also be used, though this fitment is not necessary to withstand the torque which the vee-6 engine can develop.

SIERRA RS COSWORTH :

The following alternative final drive ratios, for the Scorpio-type 7½in. differential, are already available :

4.63 : 1 and 5.1 : 1

— other ratios used in any form of this differential, are thought to be too high (or too 'long') for use in competition cars.

The following competition items are to be homologated in the coming months :

Alternative close ratio gearbox
Alternative final drive ratios, as listed in the homologation form
Alternative heavy-duty viscous-coupling limited-slip differential, with 4-bevel-gear differential
Alternative heavy-duty ZF plate-type limited-slip differential, with 4-bevel-gear differential.

The standard car's VC, if retained, should be retuned to the maker for optimisation, and for its stiffness setting to be increased to their recommended competition level.

The heavy-duty final drive rear cover which is homologated, should also be used. This carries part number H8 5GM-4026-AA.

The heavy-duty drive shafts from the racing XR4Ti (Part Number H8 5GM-4032-AA) may also be fitted, but our experience is that this is not strictly necessary to withstand the torque of the RS COSWORTH engine in Group A trim.

EXHAUST

On Group N cars, no changes to the standard car's exhaust system are allowed, while for Group A cars new, larger diameter, and re-aligned heavy-duty systems may be fitted, to suit the increased engine power available, and to deal with the extra exhaust gas through-put.

Group N : The standard system must be used. Be sure to check, however, that any exposed sections (particularly those passing close to the drive shafts, wheels, and the semi-trailing arms of the rear suspension) have been provided with shielding and suitable skid plates to protect them against damage from flying stones, debris, or damage from rough tracks, and that all the mountings are in good condition.

Group A : Be sure that the system used is compatible with the extra volume through-put of exhaust gas produced by an engine which develops much more power than standard. If the engine has been prepared by an experienced builder, take his advice on the minimum down-pipe cross section needed; this is critical in the case of the Sierra RS Cosworth, for excessive back pressure will affect the performance of the exhaust driven turbocharger itself, which in turn will reduce the power which the engine can develop.

The exhaust system may be completely re-aligned, if necessary, but please note that the car's floor pan may not be cut or remodelled to allow the exhaust system to be carried higher from the ground. It is permissible, in Group A cars, for the pipe run to be re-aligned, but wherever situated the tail pipe must not protrude outside the perimeter of the car when viewed from above.

SUMP, TRANSMISSION AND TANK SHIELDS

Undershielding may be fitted to cars complying with Group N and Group A regulations, so the shielding described below may be used in all cases, according to the conditions encountered. Remember that the engine bay must pass cooling air through the radiator (and intercooler, in the case of the RS COSWORTH), and that this cooling flow is impaired by the fitment of a comprehensive and close fitting sump shield. In hot weather, therefore, the engine's cooling water temperature should be watched carefully at all times.

In every case, before beginning assembly of the shielding to the car (this applies especially where welded brackets are provided for the shields to be bolted up), loosely assemble everything, complete with all necessary cross members and brackets, and be sure that you understand the assembly sequence, and the exact location of brackets.

For the SIERRA XR4×4 :

It is advisable to fit a complete underside skid shield kit, which should be in three parts. A typical kit would be as follows :

Front engine sump guard : To fix this, six mounting brackets should be welded to the 'chassis rails' which run alongside the engine and main transmission units. The front pair of brackets should be at the front of the engine bay, the centre pair about 12in./30cm. rearward of this, and the rear pair should be positioned on each side of the clutch/bellhousing area.

The aluminium sheet shield, which is upswept at the front to protect the water cooling radiator, then bolts up to these mounting brackets.

Central transmission guard : This should be arranged to cover the transmission, from the underside of the main gearbox, to the underside of the rear differential. Two bolt-on brackets should be provided under the rear seat footwell area.

At its front, the guard should be arranged to clamp up between the chassis rails and the main engine sump guard, and it is fastened to the car at the footwell brackets already mentioned.

Fuel tank/fuel pump guard : Two brackets should be welded to the underside of the car, immediately forward of the rear bumper area, and one bracket should be bolted up through the spare wheel well panel.

The tank/pump guard should be arranged to overlap the central transmission guard. When bolted into place, it protects the fuel tank, and also the fuel pump which has to be retained in the standard position on Group N cars.

For a Group A car, if the fuel pump is relocated to a position inside the car, and the standard fuel tank is discarded in favour of a bag tank inside the car, it is not necessary to fit this guard, but a final drive guard should be used instead.

Rear final drive guard : This should be made so as to be mounted on existing final drive casing fixings.

For the SIERRA RS COSWORTH :

For a Group N car, we recommend fitting a main engine sump/transmission guard, and a fuel tank/fuel pump guard, but it is not necessary to fit a centre guard to this model. For a Group A car, where the fuel pump and fuel tank are relocated inside the car, and above the floorpan, it is not necessary to fit the rear guard, but in its place a final-drive guard should be fitted instead.

Group N : A typical engine sump/transmission guard is very similar in fixings and layout to that described for the SIERRA XR4×4 model,but should be slightly longer and more upswept at the front (to protect the cooling radiator), and slightly longer at the rear (to give added protection under the main gearbox).

The fuel tank/fuel pump guard at the rear is like that fitted to SIERRA XR4×4 models.

Group A : Use the sump guard already described, and if the fuel tank and pump is relocated inside the car, use a final drive guard.