

ELECTRICAL SYSTEMS and COMPONENTS

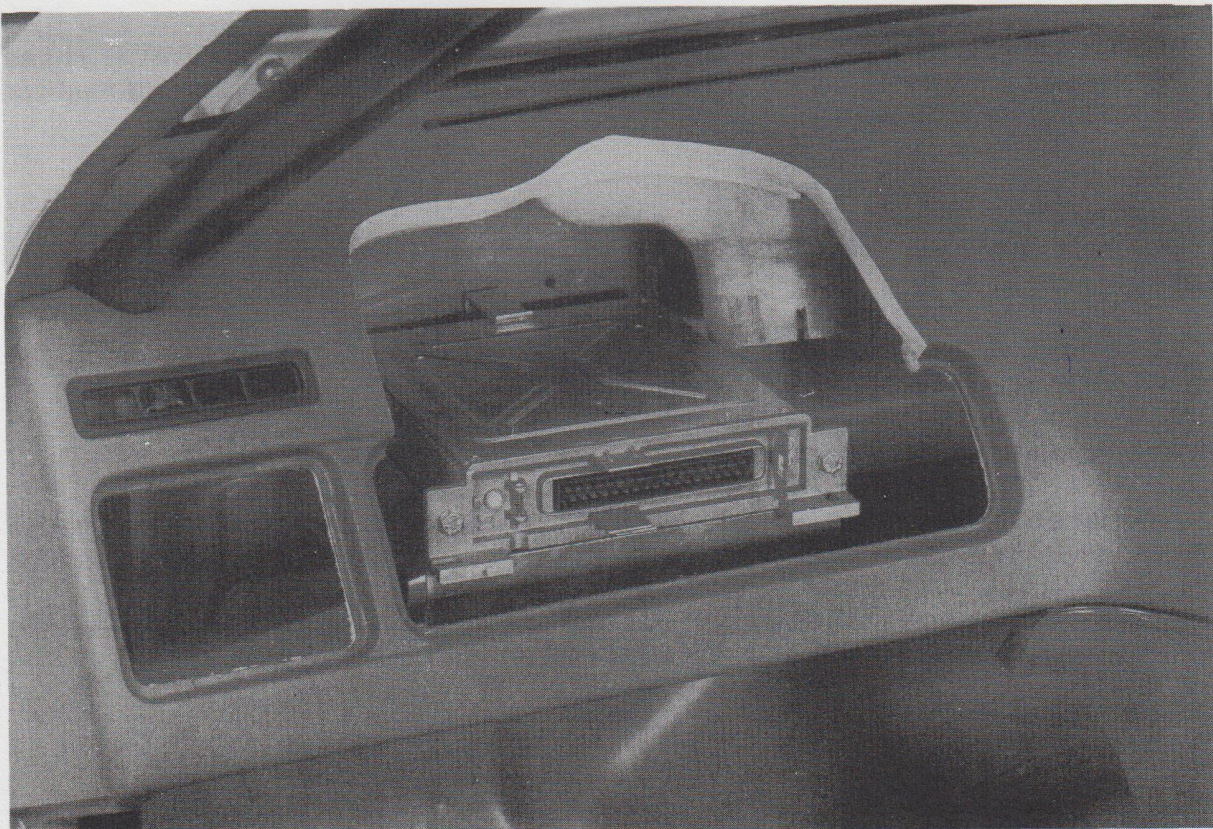
The electrical and electronics systems of SIERRA models are complex, particularly so on the RS/RS500 COSWORTH models. It is strongly recommended that any extensive rewiring of the car should be carried out by qualified personnel.

Before even beginning to prepare the electrical system for use in motorsport, acquire the appropriate SIERRA Workshop Manual material - in the case of the SIERRA RS/RS500 COSWORTH there are special supplements, available from Ford dealers. These contain diagrams of electrical wiring, plus descriptions of the fuel injection system, showing the location of every sensor and describing its function.

Engine Management Systems: Although these are compact, they are extremely advanced and technologically complex installations. As has already been pointed out in the Engine section, a variety of so-called 'tune-up' kits are available from private concerns, but these are not recommended.

In the case of the SIERRA RS/RS500 COSWORTH system from Weber-Marelli, engine management unit controls fuelling and ignition sparking (according to the volume of air being passed into the engine) the manifold pressure and its temperature. To do this accurately, it has to be 'mapped', with additional factors including throttle opening and engine operating temperature, enrichment for start-up and for full-throttle use.

The privately-modified Engine Management systems invariably do not have fully redeveloped 'maps' and are unsatisfactory. For competition use, therefore, we strongly recommend **only** the use of Eproms sold by the Motorsport Parts Division. These must always be used in conjunction with the appropriate recommended fuel injectors and air-pressure sensor.



When preparing a Group A SIERRA, the ideal place for a re-positioned ECU (or Electronic Control Unit) is in the glove box, ahead of the passenger. It is also advisable to carry a spare ECU, strapped above the original.

The 'Brain' of the system is situated behind the fascia panel, but in certain conditions (especially when the body shell has suffered damage, or cracking due to old age and distortion) it is possible for water to affect the unit. It is strongly recommended that the unit should be encased in a plastic bag and securely sealed by elastic bands. Make sure this is dry, and that it does not suffer any 'hot-house' effect.

Group N cars must use only one such unit, mounted in its standard position.

For **Group A** preparation, it is recommended that two units should be mounted, double-decker style, in place of the glove box; this enables a quick changeover to be made in case of electronics problems. To avoid vibrations damage, the units should always be mounted on rubber, but there should also be an adequate heat sink and flow of cooling air.

Air Pressure Sensor (SIERRA RS/RS500 COSWORTH): This unit must be mounted close to the inlet manifold, with the sensor pipe connection pointing downwards, to avoid the ingress of dirt and liquid. As this item is sensitive to vibration it should always be rubber-mounted and the screening earth strap should be connected to the engine, or body shell.

The hose length from sensor to manifold should always be in the range of 280 mm plus or minus 20 mm (11 inches, plus or minus 0.8 inches).

The standard unit is rated at 2.0 Bar, and is suitable for use with Group N cars. A modified unit, with a 3.0 Bar rating, is available; this must be used with the increased-flow Group A fuel injectors and Eprom.

Electrical Wiring Loom: Engine

To eliminate, as far as possible, electrical problems in motorsport, please note the following:

- 1) The standard engine loom is generally satisfactory and need only be modified if the coil is re-located.
- 2) Use crimped joints rather than solder joints. This is because crimped joints are less liable to stress fractures and to producing increased electrical resistance.

(Many electronic components now rely on very small electrical signals - measured in Milli-amps - and any variation in electrical resistance is to be avoided.)

- 3) The wire size used must always be correct for the job. A 12 to 20 Amp circuit requires 1 mm² section wire. A 45 Amp current, however, requires a 4 mm² section wire, if operating temperatures are below 50 deg. C.

As a general guide, if higher temperatures are likely to exist, larger-section wire should always be used.

- 4) To prevent moisture affecting the wiring and connections, use shrinkwrap sleeving (ideally a temperature resistant type) in the engine bay. To make the sleeving shrink, merely play the hot air from a domestic hair-dryer on to it, be careful not to overheat and destroy the original insulation.

All terminal pins should be greased (use silicon grease, but **not** normal grease). For use in wet and muddy conditions, all terminals should be thoroughly waterproofed with R.T.V. compound.

- 5) Always use a clear colour-coding system to assist you in servicing and repair operations.
- 6) It is **important** that all electrical wiring should be routed **WELL AWAY** from engine bay heat sources such as the turbocharger and exhaust manifolds/downpipes. Above 100 deg. C. the temperature is likely to damage the wire's insulation. If at all possible, hide electrical wiring behind insulating shields (already mentioned in the Engine section).

7) The ignition coil and amplifier should be mounted as high as possible, to avoid contamination by water or mud, or to avoid submersion in water splashes.

8) When routing electrical wiring avoid any possibility of chafeing and rubbing by using rubber grommets and sleeving. The wiring should always be clipped, along its length, to the body shell. This not only looks tidy, but it avoids the inadvertent setting up of electrical 'loops', which could act as aerials and may pick up interference signals from other electrical components.

Correct earthing of all items is critically important. Every routine check of the competition car should include inspection of earthing connections to reassure yourself that they are tight. Try to retain all existing earth points.

9) Fuel injection systems can be upset (electrically 'confused') by high-powered radio or other electrical systems. For that reason, we recommend that you avoid earthing any electronic components to the same points used by electric motors, for signals could be transmitted back into the electronic system by such a route.

10) Fuses and relays should always be clearly marked. We recommend that on Group A cars, these should be grouped on a panel in the centre of the dashboard/facia panel. This is not authorised for Group N cars.

11) **DO NOT WELD** on the car unless the microprocessor and the battery have been disconnected. **THIS IS IMPORTANT.**

Battery:

The 'works' rally team has found that the Ford Motorcraft Superstart Ultra has provided good service, for it weighs only 11kg/24lb and has a 420 Amp capacity rating. This type of battery uses a jelly, not fluid, electrolyte; this means that it will not readily leak if the casing becomes cracked.

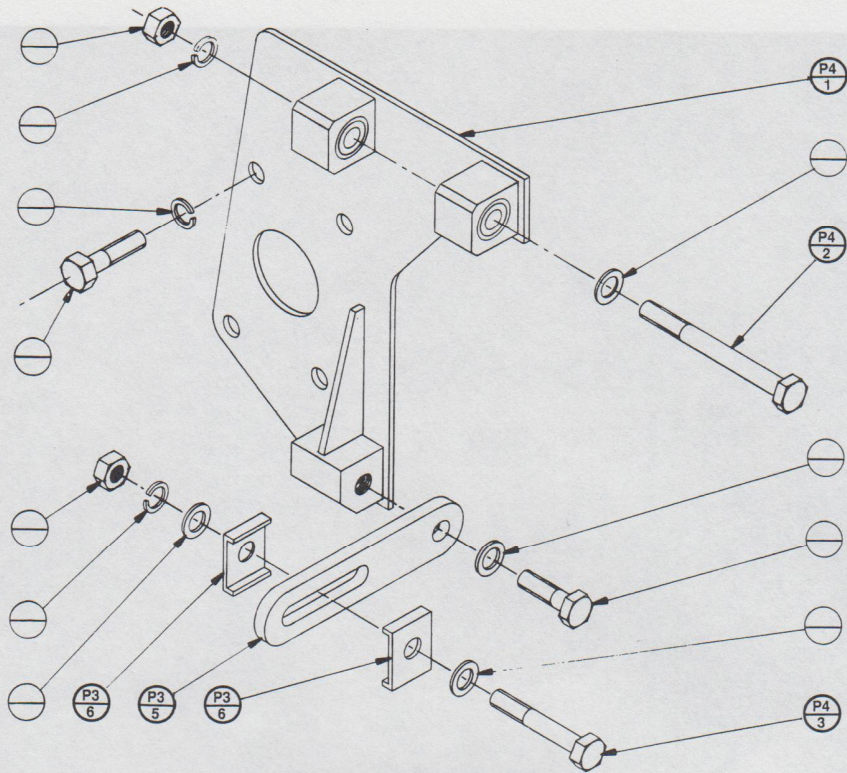
Early-build 'works' rally cars used batteries in the normal production-car position, but on the 1000 Lakes rally the battery position was moved to the rear (a small Gates/Varley Model 40 was used). The battery, if moved into the rear of the car, must be sealed off from the passenger compartment and must be ventilated to the exterior of the car; FIA regulations on this are explicit. The Gates/Varley battery is too small to cope with cold weather starts, or the use of up to eight forward facing lights.

Alternator:

If a competition SIERRA is fitted with many extra electrical fittings - such as extra driving lamps, recognition lamps, a two-way radio, heated front screen and navigational equipment - we strongly recommend fitment of a more powerful Alternator.

'Works' cars normally use a 150 Amp Bosch unit, but for daylight rallying, or for National/Club level events, the standard 70 Amp unit is adequate. A competition engine mounting bracket is available for the 70 Amp unit.

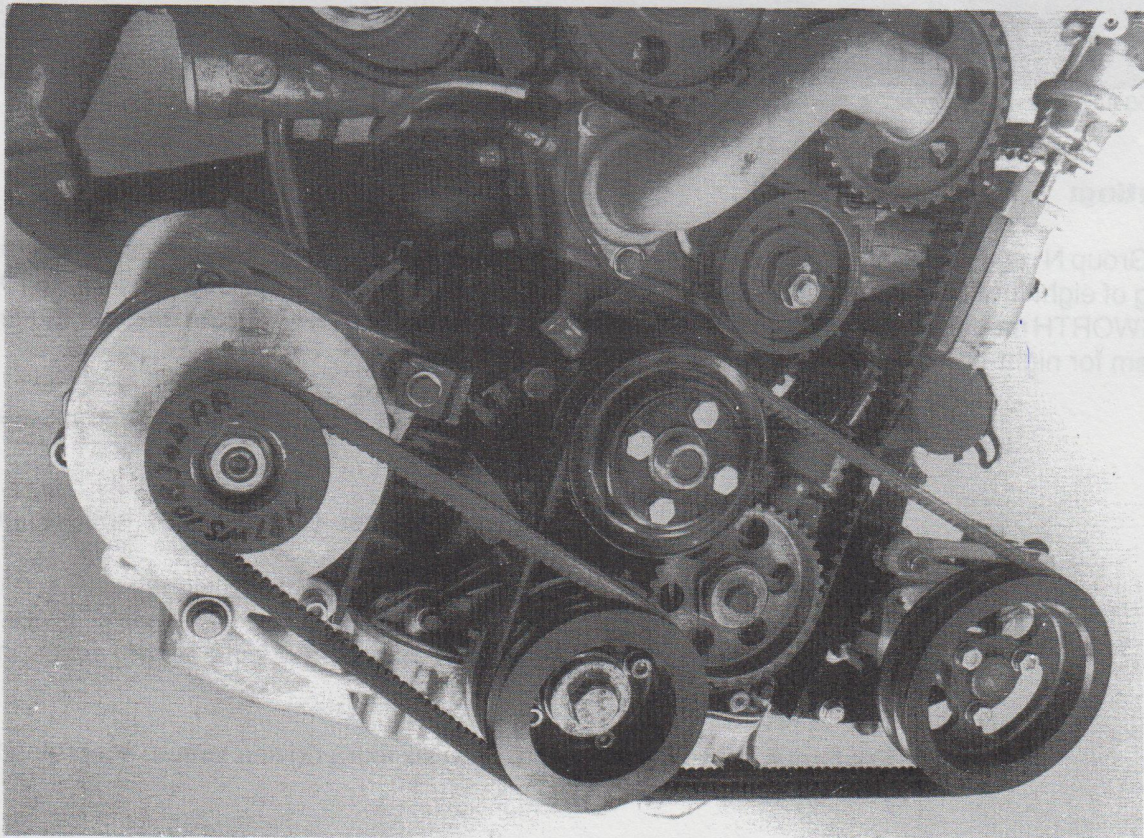
The 150 Amp Bosch alternator is sold as a complete kit. This includes heavy duty brackets and suitable heatshields for SIERRA RS/RS500 COSWORTH models.



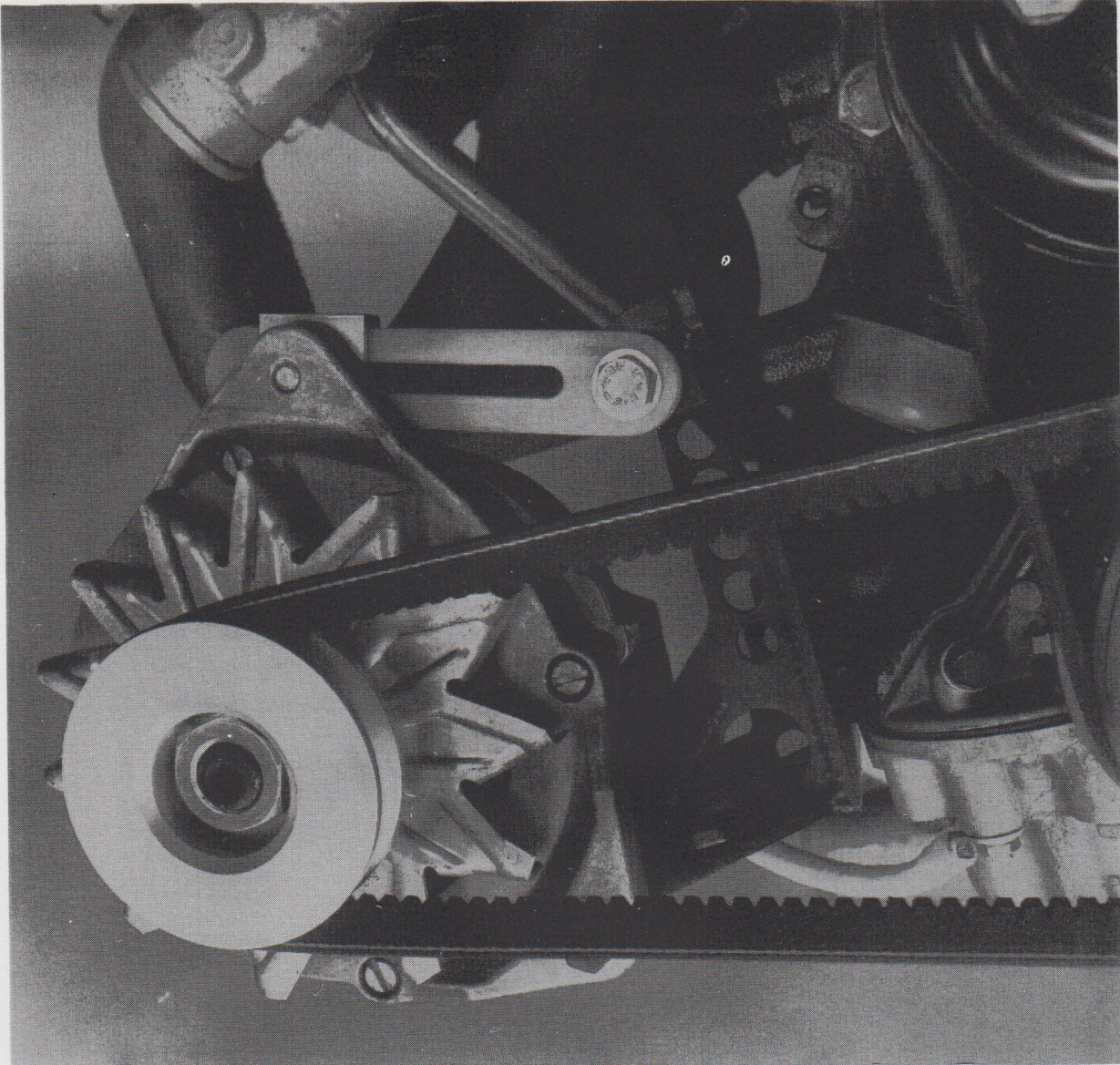
Details of the 150 Amp alternator mounting bracket, as used in Group A SIERRA RS/RS500 COSWORTH model.

Alternator Bracket - 150 amp, SIERRA RS COSWORTH

Drawing Reference	Component	Part No	Finis Code
P4/1	Alternator bracket	H87WS10A313AE	9092583
P4/2	Bolt	—	6003017
P2/3	Bolt	—	1516792
P3/5	Strap	H85CS10145AA	9092600
P3/6	Clamp	H82MS10248AA	9091941



A fully-dressed Group A SIERRA RS COSWORTH engine, showing the belt and accessory drives.



The 150 Amp alternator, as mounted to a Group A SIERRA RS COSWORTH rally car engine.

Lighting:

Group N regulations allow the fitting of six forward facing lights; Group A regulations allow the fitting of eight forward facing lamps. In the case of the SIERRA XR4 × 4 and SIERRA RS/RS500 COSWORTH models, the Homologation papers were clarified during 1987. To get the best lighting system for night-time events:

Blank off (but do not remove) the standard fog-lamps which are mounted low-down in the front apron.

Blank off (but do not remove) the inner (main beam) headlamps.

(In each case, remove the bulbs and disconnect the wiring)

For Group N competition, add up to four extra driving lamps, according to your choice.

For Group A competition, add up to six extra driving lamps, according to your choice.

Radiator Cooling Fans:

Even in full Group A tune, the 'works' cars use the standard units, modified as necessary to fit the different cooling radiator. We recommend wiring the cooling fans through a relay and a 30 Amp fuse.

Fuse Link in Main Supply Cable:

In some cases, the fuse link in the supply cable from the battery to the car's electrical systems has been known to overheat and fail. We recommend that you mount such a fuse link, in parallel (not in series) with the original; this carries the Ford Finis Code 1524780.

Troubleshooting:

The most common electrical faults in SIERRAs are caused by wiring faults i.e. breakage of wires or connectors, electrical shorting, poor or intermittent connections, or contamination by water or mud, rather than by component failure.

On the SIERRA RS/RS500 COSWORTH, the Weber-Marelli management system will operate a flashing bulb if a fault is detected in any of the sensors. The code identifying different flashing sequences is printed in the Owners' Manual and will point out faults in the distributor, crank sensor, air temperature sensor, air pressure sensor, or water temperature sensor. It is also programmed to 'remember' any intermittent fault until the ignition has been turned off.