12.0 General

12. 1 SERVICE CARS AND EQUIPMENT

DON'T get carried away by the business of rally servicing. A properly -built and prepared rally car should be capable of lasting the length of a 200 -mile rally in Britain without having to be rebuilt by the side of the road, and the only function of a service-crew should be to keep the thing supplied with fuel (if no allowance is made for the rally crew to do it themselves) and to give them a hand with wheel-changing if need be.

Of course, accidents can happen, and if the rally regulations permit the use of service vehicles (and they don't always do so) it can be a very handy thing to have a couple of mates nearby to bend a wing off a wheel, or replace a front strut.

But if you are going to have a service crew, you might as well do it properly. Almost any car will do, as long as it's strong enough to carry all the tools and bits, and reliable enough to get to its service points on time. This is the first point that needs to be made; bear in mind that the service car, if it's going to be any use at all, will be relied on by the rally crew to be in the right place at the right time, so the car needs to have as much attention paid to its preparation as the rally car. It's no good having the thing stuck with a burst water hose at the side of the road when the rally is fifty miles away. If you plan the service schedule intelligently, the service car shouldn't have to be very fast, but it must be reliable.

The ideal vehicle, of course, is an estate car, and if you can afford to run one just as a service car, you can strip it out and equip it as a mobile workshop - which is what it might need to be. Keep everything neatly stowed and always in the same place so that you can find it quickly. Remember to replace items that get used up, like spark plugs, hoses, fuses, lamp bulbs and so on, and if the service car has a crew of two, make sure you both know where to find everything. If you can't find something, bad-mouthing each other in loud voices won't help, and it isn't appreciated by onlookers, either.

In the same way, make sure the service car is kept neat and tidy, like the rally car should be; don't play boy-racers all round the country at night. While a roof-rack and some extra lights will probably be handy to have, try not to make the service car too obtrusive. Remember a good deal of unpopularity rallying may suffer is undoubtedly due to noisy service cars and spectators.

One other point about the interior of the service car: remember the service crew might be in it for a long time, so try and get some comfortable seats, a map-reading light and plenty of interior light. Once you're on the rally, pick your service points carefully, preferably not on the road but in a lay-by, a field entrance or even, provided you can get permission, on a filling station forecourt. Put a service board well down the road so as to give the rally crew plenty of warning, make sure the rally crew can recognise it and finally, don't pack up and leave the thing behind when you go - it's easily done! When the car arrives, find out exactly what needs to be done, how long you have to do it and then get on with it - quietly. When you leave, your schedule should allow you time to pack the service car properly, including securing any heavy objects, such as a jack, which could do a lot of damage in the event of a swift stop. Take your rubbish with you

- when you've left the service point it should be impossible to tell you've ever been there. No-one should leave a litter of empty oil tins and so on all over the place; keep it with you until you find a proper place to throw it - don't just chuck it out of the window on the way down the A6!

Of course, many people expect, and the work's team has, some of the best equipment there is available. However, it's a strange fact of life that the larger the car you have to provide service facilities, the more unnecessary junk one carries around.

As a guide, here are some of the equipment we carry around in the works Granada Estate cars. The back seat on these cars is completely removed and the main occupier of space once this has been done are the two gas bottles for welding equipment, which are strapped in with both metal and canvas retainers.

Standard Essentials
Water
Petrol
Oil Grease
Crow-Bar
Trolley-Jack
Jumper-Leads
Wire
Spark Plugs Hoses
Tape
Nuts and Bolts
Brake Fluid
Brake Pads and Liners

In addition, we carry the following 'extras':
A complete welding equipment.
Twelve-volt drill, which can be wired in the car's electrical circuit.
Spare battery, which again is wired into the car's electrical circuit so that it is constantly kept charged.
Fire extinguisher.
Complement of spare spot lights.
Halda parts with speedo drive cable.
Chest of small drawers, correctly labelled for holding miscellaneous items - including nuts and bolts!
Two windscreen wiper arms with blades.

Also, depending upon the event, but usually because present international rallies incorporate stage work, we carry the following bits:
Differential.
Exhaust system.
Complete set of front struts.
Rear springs and dampers.
Spare prop shaft.
Gasket set.
Spare master cylinder.
Spare oil filter.

One other item that is absolutely essential is food and drink (non-alcoholic!) for the rally crew. The time saved in doing this can be invaluable as, instead of queueing for food at the next control, they can be catching a few moments of sleep.

Other points about servicing?

Make sure your service is well away from rally controls, remembering that the control extends to the yellow boards and isn't simply centred round the man sitting at the table.
Don't obstruct marshals or policemen, neither of whom will like it.
Be very careful of fires. In many cases regulations prohibit smoking in forests, and at all times make sure that your rally car can't be excluded from the event because of rules that the service crew has broken.

Winter and summer, make sure that the service car is carrying the right tyres both on the road and on its roof.

Take care about driving when you're tired. Stop and change over frequently, so that each man does short stints at the wheel, and don't set too tight a schedule; accidents with service cars are expensive, they can be very dangerous if the occupants get clobbered on the back of the neck by an hydraulic jack.

Inside Boreham Service Granada. Rear seats are removed; note accessibility of jack and jack handle.

Back of Granada Service car. Spare wheel recess is used for quick access parts. Wheel goes on the roof.

12.2. WHEELS

The trouble with wheels is that they can come off, and whenever they do it's bound to be embarrassing - it can also be dangerous. Obviously, if they're put on right they won't come off until you want to take them off, and it might surprise some of you to know that there's more to putting wheels on properly than you might think.

Wheels - standard steel wheels - normally come off when you don't want them to because they've been overtightened, stretching the threads or because the wheels themselves are old and there are cracks in the tapered seats for the wheel nuts. Another reason is rusty threads inside the nuts: chrome sports nuts in

particular are prone to rust half-way down, which can deceive you into thinking that the nut is right home when in fact it isn't. So the first thing to make sure of is that the threads inside the nuts are completely free of rust, paint and so on, and before you fit them, give the threads and the back face of the wheels a fair smearing of oil.

Extra care must be taken with Minilite, magnesium and alloy wheels, which are more subject to gunge problems than steel ones: the nuts used for these are normally "blind" nuts, and you can't see how far up the thread you've got. The worst enemies of these wheels are salt and corrosion, and they must be regularly washed and cleaned. When you're tightening the wheel nuts the correct torque is 55 lb ft for both aluminium and steel wheels, and surprisingly enough the normal wheel-brace supplied with the car should give you this torque provided you use it normally without putting your foot on it, or calling on the local muscleman for help.

When you change a wheel, never put the car back on the deck until all four wheel nuts have been registered on the seat of the wheel. Better still, get someone to put his foot on the brake pedal and tighten the nuts right home with the wheel still in the air - but still check them when it's down on the ground.

If a wheel does come off, the car will usually land on the brake back plate, and this could leave you brakeless. Get the car jacked up - the standard jack is made to fit under the car even when it is sitting on the hub - and have a look. If you've lost the wheel because the nuts have come off it is practically certain that the studs are damaged, so just in case they are try the nuts on the threads before you put the new wheel on. Clean the studs as best you can first. If there is damage, all you can do is hope that you've got two opposite studs in good enough condition to accept the nuts properly, and provided you keep the speed down a wheel secured by two opposite nuts will be safe enough to get you to your service crew. While you're inspecting the damage, don't forget the possible loss of brakes: if that has happened, close up the pipe leading to the affected wheel - a good belt with a hammer is the most effective way of doing this, and then watch it because you'll now have brakes on only three corners of the car where the good Lord meant you to have four.

12. 3. JACKS AND JACKING POINTS

If you've had a puncture on a stage at one time or another, and have had to work away at the standard Ford 'winder jack', you'll know how much time it takes to go up and then wind it down again. For a long time now Boreham have used an adaptation of the VW Beetle type jack. This has a pump type lift, and an instant down action to save time, and in fact, is made by Bilstein.

Not much work is needed to convert the jack itself, although our mounts on the car are fairly intricate, and considering you can often find these jacks at scrap dealers, to purchase one and work out your own chassis mounts is not too difficult.

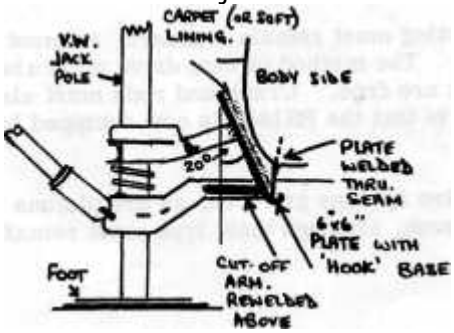
The jack is a single pole type with round foot and climbing mechanism. From the side of the jack protrudes an 'H' section arm, which, on the VW, slots into a square tube under the side of the car. An easy solution, therefore, is to leave the jack as standard and weld to the underside of your machine 4 lengths of 1½" sq tube suitably skidded to accept the standard Bilstein jacking arm. The only problem with this is that the tube tends to get full of muck and all sorts of other unmentionables, so, don't blank off the inner end of the tube, and watch for the 'square tube' becoming an 'oval tube', as it can easily get bent under the car.

Having told you how it works, this is what you do:

The jacking arm is cut off roughly half way along its length. The sawn--off lump is then rewelded onto the jacking mechanism, above the arm, to act as a top mount for a slightly curved 6" x 6" 1/8" plate which has its base rolled through approx 120° to form a hook along its length.

On the vehicle, all that is now needed to make a simple swift jacking system are some 6" wide steel plates hanging vertically from under the car onto which the hooked bottom plate of the jack can mount. We use two such plates either side, one just behind the front wheel and one just in front of the rear wheel. The mounts are 1/8" plate, of 5" (approx) x 6" wide. The seams of the side body pressings are slightly opened up and the mounting plates pushed through to the inside of the shell, just leaving 1" hanging underneath for the jack. Being in the direction of travel, these plates do not get knocked around, are easy to locate, and cannot get filled with mud. The plates are welded inside the car and around the seam.

With the jack plate against the side of the car and the bottom hook lifting, you now have an Al jack.



12. 4. F.I.A. GROUP 2 REGULATIONS

To be classified as a Group II car, a minimum production of 1000 units in 12 consecutive months has to be achieved, as opposed to 5000 units as per pre-1976 regulations. Thus, all variants of Escort (Sport, Mexico, RS1800 and RS2000) are OK for Group II.

* The actual Group II details:

First off, there is a complete series of weights at which the cars will run, not according to details on the homologation form, but by engine capacity. The weights apply to vehicles as they cross the finishing line, but without fuel. In theory, at least, this new rule should stop some of the weight fiddles that people got up to when it appeared on the homologation form.

Of interest are these:
From 850cc to l000cc = 655 kgs
From 1150cc to 1300cc = 720 kgs
From 1300cc to 1600cc = 775 kgs
From 1600cc to 2000cc = 845 kgs
From 2500cc to 3000cc = 990 kgs

Reading on, there is still a fair amount of freedom left in the section on modifications permitted to original parts. With the express exception of brake calipers, it is still allowed to polish, modify, lighten, balance or machine production parts. However, 'Any adjunction of material in a homogenous way (defined as welding, glueing, electrolysis, etc), is forbidden on the following:

engine, gearbox, transmission, suspension parts'.

Engine
Now then, getting down to the engine, don't go out and buy a full house 2 litre BDA engine. You are only allowed to overbore the standard engine by 0. 6 mm which will bring it to 1866cc, although no overlapping of cylinder capacities is allowed, which means that if you run a 1600 cross- flow, a 1600 or 2000 OHC, you must run standard size pistons, as the first overbore will automatically bring these over their capacity limit. Dry sumping is now permitted, which it was not at inception of Gp II regulations.

The cylinder head casting must remain standard, as must the number of camshafts and valves. The method of cam drive must also remain standard, although cams as such are free. Crank and rods must also be standard (an interesting point here is that the RS 1800 is now equipped in production with a steel crank).

Valves, guides and valve springs are free, as are pistons and gaskets. Bearings are free as such, although their type must remain standard.

The induction method is free (which means that fuel injection is OK), as are fuel pumps which allows you to use electric fuel pumps.

Exhaust systems are free, as are the engine mounts, so World Cup X-members are OK, since the difference between standard X-members and the W/C X-member is in the engine mount brackets. Starter motor and alternator are also free.

Clutch and Gearbox
The clutch is free on condition that it has the same number of discs as the series production clutch and that the original bellhousing and flywheel are retained.

The clutch operating method is free, which means that you can convert to hydraulic operation providing that no addition of material is needed to modify the bellhousing. As an exception to the rule, the release arm can be beefed up.

The gearbox must retain the original casing as well as the original number of gears, which means that the faithful ZF is out. Two other sets of gearbox ratios are allowed, but these must be mentioned in the homologation form.

Gearbox mountings and gear lever are free.

Rear Axle
Final drive ratios are free providing that these are specified in the homologation form. Half shafts are also free, so 'fully floaters' are OK, as are rear discs.

Suspension
Adjustable struts and anti-dive kits are OK, but standard pick-up points must be retained, which rules out turrets plus the existing 4-link set up, sliding roller rear springs and compression struts. Otherwise, springs are free, as are radius arms (again their pick-up points must remain standard).

Coach work
'Any kind of reinforcement is authorized', says the yellow book, so, gussets, brace bars, chassis rail skids, etc are OK.

Unfortunately, the original fibreglass RS arches are too wide (max of 5 cms).

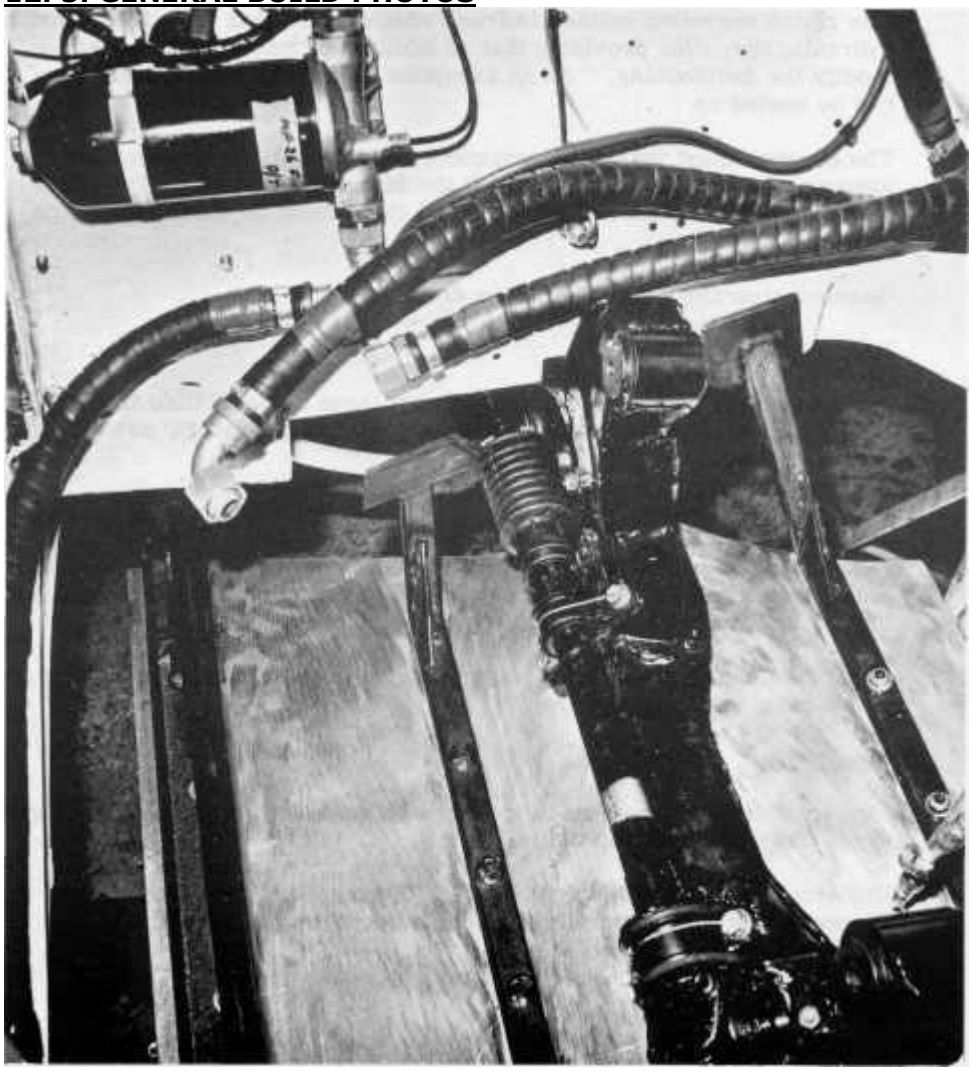
However, the new polyurethene arches meet Group II regs.

Seats may be changed, rear seats may be removed.

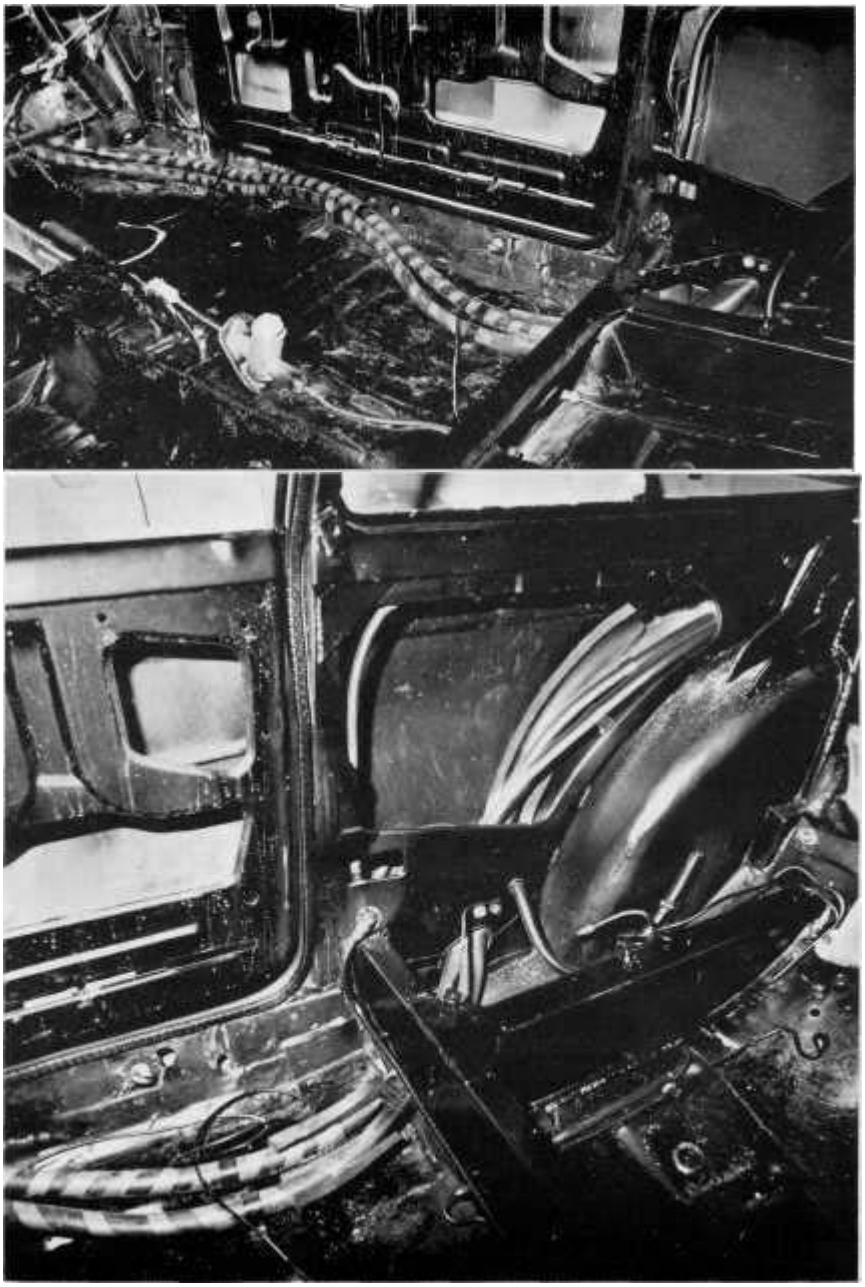
Roll cages can be welded in, dashboard and fuel tanks may be replaced by alternatives providing they are specified in the recognition form.

Brakes
As said earlier, rear discs are OK. Discs are free as are calipers, so the current 10½" front vented discs and 4 pot calipers are in. The same applies to balance bar pedal boxes and twin servos, although these must not be in the passenger compartment.

12. 5. GENERAL BUILD PHOTOS

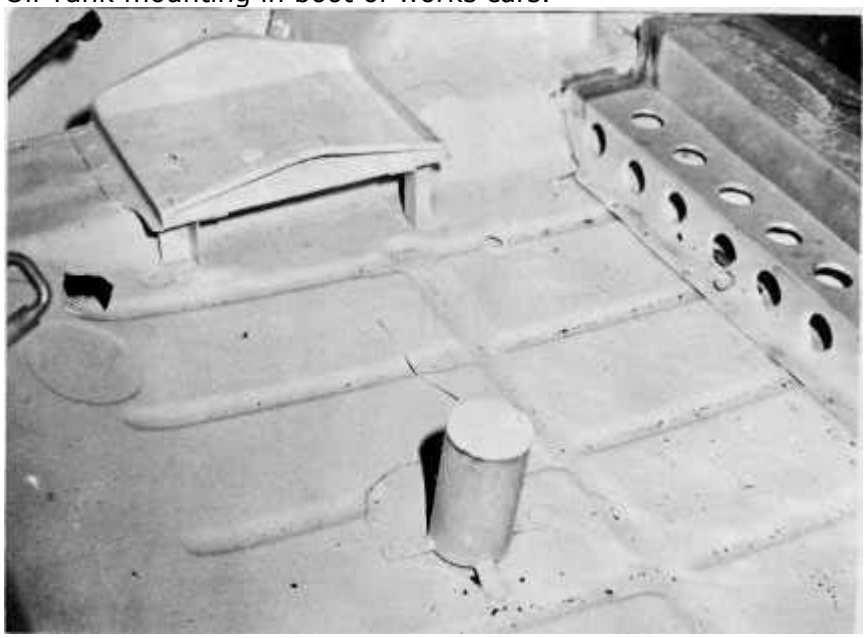


Engine bay. Sump guard is resting on floor at front. Note wire locking on rack bolts. Engine bay is painted white irrespective of exterior colour.

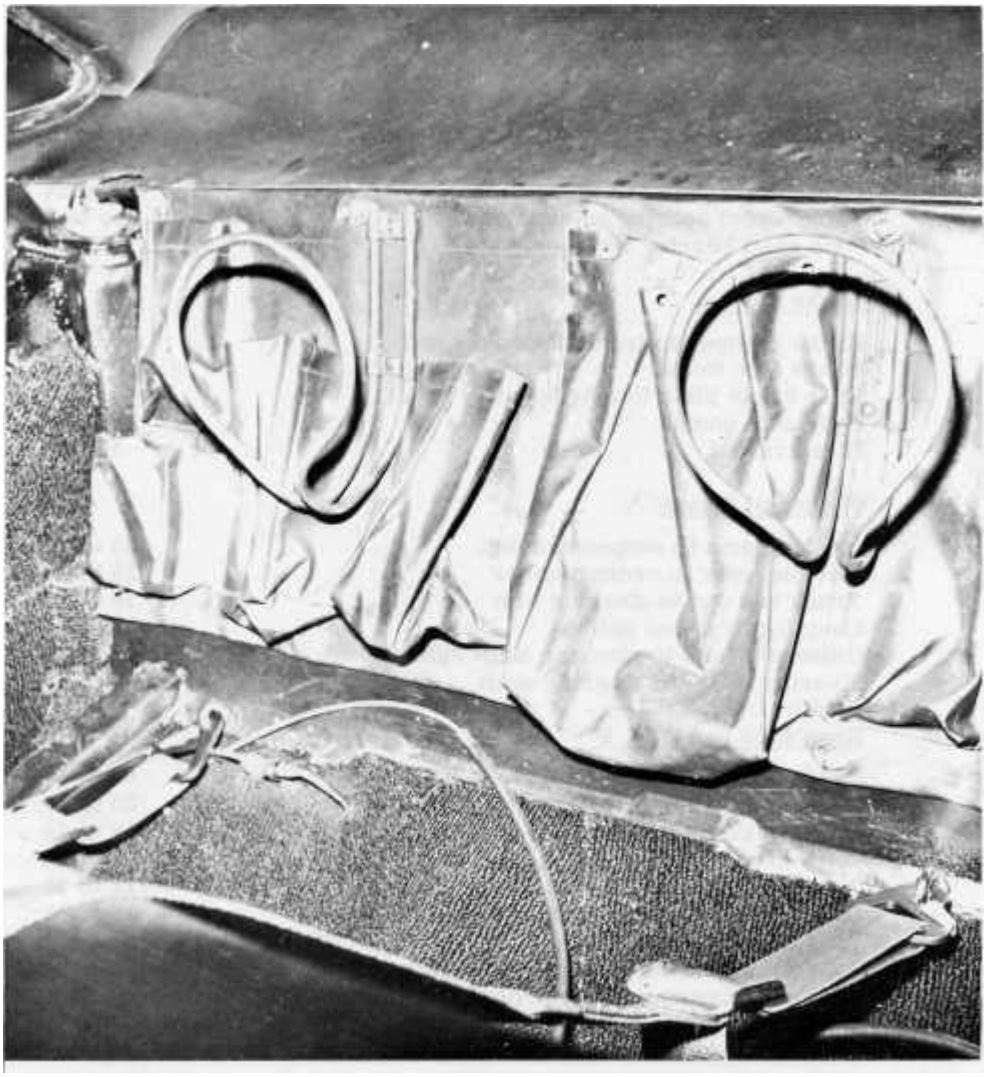


Top. Oil pipes passing through cockpit. Below.Oil pipes passing through rear bulkhead.

Oil Tank mounting in boot of works cars.



Battery tray, bag tank support and simple post fixing for spare wheel (held down by 2 'bungees').



Rear seat tool pouch. Neat quick fastening tool and emergencies pouch on rear bulkhead. Helmet clips have now been replaced by simple aluminium boxes on floor lined with foam,

a) MEXICO (KENT ENGINE)	lb. ft.
Wheels and Suspension	
Wheel nuts	50 to 55
Brake calliper to front suspension unit	45 to 50
Front brake disc to hub	30 to 34
Front wheel bearing adjusting nut	See text
Axle shaft bearing retainer bolts	15 to 18
Brake System	
Brake calliper to front suspension unit	45 to 50
Brake disc to hub	30 to 34
Rear brake plate to axle housing	15 to 18
Hydraulic unions	5 to 7
Bleed valves	5 to 7
Steering Linkage	
Steering arm to suspension unit	30 to 34
Steering gear to crossmember	15 to 18

Track rod end to steering arm	18 to 22
Coupling to pinion spline	12 to 15
Universal joint to steering shaft spline	12 to 15
Steering wheel to steering shaft	20 to 25
Rear Axle and C. W. P	
Crown wheel to differential case bolts	50 to 55
Differential carrier to axle housing nuts	25 to 30
Differential bearing locking plate bolts	12 to 15
Differential bearing cap bolts	45 to 50
Axle shaft bearing retainer bolts	15 to 18
Universal joint flange to pinion flange	15 to 18
Rear axle filler plug	25 to 30
Axle shaft bearing assembly pressure (minimum)	1, 200 lb
Axle shaft bearing retainer pressure (minimum)	2, 400 lb
Front Suspension Assembly (note * markings)	
Suspension unit upper mounting bolts	15 to 18
**Spindles to top mount assembly	28 to 34
Track control arm ball stud nut	30 to 34
*Stabiliser bar attachment clamps	15 to 18
*Stabiliser bar to track control arm nut	25 to 30
* Track control arm inner bushing	22 to 28
Front suspension crossmember to body sidemember	25 to 30
*These to be tightened with the weight of the car resting on its wheels.	
**These to be tightened with wheels in straight-ahead position.	
Rear Suspension Assembly (note * markings)	
*Radius arm to axle	25 to 30
*Radius arm to body	25 to 30
Shock absorber to body	15 to 20
Shock absorber to axle	40 to 45
*Rear spring plate 'U' bolts	18 to 26
*Rear spring front hanger	25 to 30
*Rear spring axle shackle nuts	8 to 10
*These items to be tightened with the vehicle resting on its wheels.	
**This torque to be applied to the bolt head.	

Engine 1600 GT

Cylinder head	7/16" - 14 UNC	65 to 70
Main bearing cap	7/16" - 14 UNC	65 to 70
Connecting rod big end	3/8" - 24 UNF	30 to 35
Flywheel (Bi-hexagonal only)	3/8" - 24 UNF	50 to 55
Flywheel (Hexagonal only)	3/8" - 24 UNF	50 to 54
Oil filter centre bolt	3/8" - 24 UNF	12 to 15
Rocker shaft	3/8" - 16 UNC	17 to 22
Manifolds - bolts	5/16" - 18 UNC	15 to 18
nuts	5/16" - 24 UNC	15 to 18
Front cover	1/4" - 20 UNC	5 to 7
Sump	1/4" - 20 UNC	6 to 8
Rear oil seal retainer	5/16" - 18 UNC	12 to 15
Crankshaft pulley	7/16" - 20 UNF	24 to 28
Oil pump	5/16" - 18 UNC	12 to 15
Camshaft thrust plate	1 /4" - 20 UNC	2. 5 to 3. 5
Camshaft sprocket	5/16" - 18 UNC	12 to 15
Rocker cover	1/4" - 20 UNC	2. 5 to 3. 5 Chain tensioner to
cylinder block	1/4" - 20 UNF	5 to 7
Sump drain plug	1/2" - 20 UNF	20 to 25 Tappet adjusting screw
locknut	5/16" - 24 UNF	8 to 12

Engine Accessories

Water pump	1/4" - 20 UNC	5 to 7
Thermostat housing	5/16" - 18 UNC	12 to 15
Fan blade	1/4" - 20 UNC	5 to 7
Fuel pump	5/16" - 18 UNC	12 to 15
Manifold - nuts	5/16" - 24 UNF	15 to 18
- bolts	5/16" - 18 UNC	15 to 18
Air cleaner (except GT)	1/4" - 20 UNC	3 to 5
Air cleaner (GT only)	5mm x 0. 8mm	2. 5 to 3
Air cleaner cover (GT only)	5/16" - 24 UNF	5 to 7
Spark plug	14 x 1. 25mm	24 to 28 Starter motor retaining
bolts	3/8" - 16 UNC	20 to 25
Generator pulley	7/16" - 20 UNF	14 to 17
Generator mounting bolts	5/16" - 24 UNF	15 to 18
Generator mounting bracket	3 /8" - 16 UNC	20 to 25

Transmission

Clutch pressure plate to flywheel	12 to 15
Clutch housing to transmission case	40 to 45
Transmission case drain and filler plugs	25 to 30
Transmission extension to transmission case	30 to 35

b) RS 2000 (PINTO ENGINE)

Tightening Torques		(lb/ft)
Main bearing caps		(64. 5-74. 5)
Connecting rod big end		30-35 lbs/ft
Crankshaft sprocket		
Camshaft sprocket		
Flywheel		(46.5-50.9)
Oil pump	(12-15)	
Oil pump cover	(1) (0.7-1.4)	
	(2) (4.3-5.7)	
after 20 mins running re-tighten	(3) (4.3-5.7)	
Oil drain plug	(15-20)	
Cylinder head	(1) (28. 5-39. 5)	
	(2) (39. 5-50)	
after 20 mins running re-tighten	(3) (64. 5-79)	
Rocker cover	(1) (1st to 6th bolt) (3. 5-5.0)	
	(2) (7th & 8th bolt) (14. 3-17. 9)	
	(3) (9th & 10th bolt)(35. 8-50)	
	(4) (7th & 8th bolt) (35. 8-50)	
Inlet pipe		
Sparkplugs	(14.3-20)	

Brake System

Front brakes	244. 6mm	244. 6mm
Disc diameter	0.05mm TIR	0.05mm TIR
Disc run-out (maximum)	Ferodo 2441F	Don 227 Pad material
Rear brakes		
Drum diameter and width	229x44. 5mm	203x37. 1mm
Shoe material	Don 242	Mintex M79
Shoe swept area (total)	639 sq. cm.	639 sq.cm.
Wheel cylinder diameter	17.8mm	19.0mm
Braking ratio	67. 9% front	72. 5% front

	32. 1% rear	24. 5% rear
Brake fluid	ESEA-M6C-1001-A	ESEA-M6C-1001-A

Steering Gear and Linkage

Wheel alignment (unladen)	
Castor	2 18' positive
Camber	0 50' negative
King pin inclination	8°50'
Toe-in	1.00 to 3. 00mm
Type	Rack and pinion
Lubricant capacity	0. 13 litre
Lubricant type	SAE 90E P

Rear Axle

Axle ratio (Standard)	3 54:1
Crown wheel & pinion backlash	0.13 to 0.17mm
*Pinion bearing pre-load	0. 23 to 0. 29 kg. m.
excluding oil seal drag	
*Differential carrier spread	0. 20 to 0. 25mm
Differential pinion thrust washer thickness	0. 762 to 0. 813mm
Differential pinion inside diameter	15. 953 to 16. 004mm
Oil capacity	1.1 litres
Grade of oil	SAE 90 Hypoid
'Initial fill' lubricant	SQM -2C -9003-A
Service topping up lubricant	SQM -2C -9002-A

*These specifications apply when fitting new bearings.
When rebuilding differential assemblies with the original bearings the pre-loads should be set to 0.14 to 0. 21 kg.m.

Front Suspension

Springs	Coil
Type	255kg
Load (Mean)	255kg
Rate (Mean)	23. lkg/cm
Wire diameter	11.9mm

Rear Suspension

Spring length (between eye centres)	1144mm	
Width of leaves	51mm	
Rate	14. 25 to 15.00	kg/cm

Engine Details

Cylinder block	2.0 litre HC
Cast identification marks	20
Number of main bearings	5
Cylinder bore dia mm grades	
Standard grade	
1	90.800-90.810
2	90.810-90.820
3	90.820-90.830
4	90.830-90.840
Oversize Amm	91. 310-91. 320
Oversize Bmm	91. 320-91. 330
Oversize Cmm	91. 330-91. 340
Spigot bearing length mm	27. 22-27. 17
Main bearing liners fitted	
Inner diameter	
Standard REDmm	57. 014-57. 038
BLUEmm	57.004-57.028
Crankshaft	
Undersize 0. 25 REDmm	56. 764-56. 788
BLUEmm	56.754-56.778
0. 50mm	56. 514-56. 548
0.75mm	56.264-56.298
1.00mm	56.014-56.048
Main bearing parent bore dia	
REDmm	60.620-60.630
BLUEmm	60. 630-60. 640
Crankshaft	
End float mm	0. 08-0. 28
Main bearing journal dias	
Standard REDmm	57. 000 -56. 990
BLUEmm	56. 990-56, 980
Undersize 0. 25mm	56. 740-56. 730
0.50mm	56.500-56.490
0.75mm	56.250-56.240
1.00mm	56.000-55.990 Thrust washer thickness
Standard mm	2. 3-2. 35
Undersize mm	2. 5-2. 55
Main bearing clearance mm	0. 014-0. 048
Crankpin journal diameter	
Standard RED mm	52. 000 - 51. 990
BLUE mm	51. 990-51. 980
Undersize 0. 25 RED mm	51. 750-51. 740

BLUEmm	51.740-51.730
0. 50mm	51. 500-51.490
0.75mm	51.250-51.240
Connecting Rod	
Big end bore RED mm	55. 00-55. 01
BLUE mm	55.01-55.02
Small end bush diameter mm	23. 964-23. 976 Inside diameter
Standard RED mm	52. 014-52. 038
BLUE mm	52. 004-52. 028

12. 7. ENGINES

Whilst comprehensively covering the other areas of rally Escort preparation, it seems a good idea to quickly explain the different engines you might find lurking under the bonnet.

There are three basic types of engine which you could come across:

1. The 'Kent' engine 4 cylinder pushrod unit ranging from ll00cc to 1600cc in standard form. this term is no longer strictly true, but in this country refer to the 4 cylinder SOHC units in 1600cc and 2000cc form. now obsolete, Lotus developed 4 cylinder, 8 valve engine. Cosworth developed, 4 cylinder, 16 valve engine.

2. The TPinto' engine

3a. The Twin Cam b. The BDA

Kent Engine A mainstream production engine which over the years has been developed from an original 997cc, 3 bearing crank form found in 105E Anglias, to the final 1600cc, 5 bearing form found in Cortinas and Escorts. Competition successes for this engine are many and varied- from early l000cc Formula 3 race engines through to the highly successful World Cup and London to Sydney Rally cars - so there is a wealth of information and parts available.

The standard bore size for the Kent block is 80. 96mm, and the largest overbore you can make is 83. 5mm, which gives a capacity of 1700cc using the standard 77. 62 crank. The old square, or siameses, bore blocks which allowed overboring to 85 and even 86mm are no longer available. Turning to crankshafts, it is possible to run 80mm and even 81mm throw crankshafts, but care must be taken to ensure the con rods do not foul the bores, and cap bolts foul the camshaft.

With 2 45 DCOE Webers and a World Cup type big bore exhaust system, it is quite possible to obtain a reliable 140bhp DIN (DIN means as installed in the car, with fan, air-cleaner and exhaust fitted) in Rally tune - indeed, it's possible to extract considerably more, but it's best to contact a reputed engine builder for advice before going too far.

SOHC Engine The 1600cc unit is found in the current production Mexico, but in this form the Kent is a better bet - having a lighter unit weight for the same power. In 2 litre form, this engine is very attractive to the Gp 1 competitors, as with the high performance valves and twin downdraught Weber carb kit it is possible to obtain 150bhp DIN.

For those of you who want the biggest possible engine,it is possible to bore selected blocks to 93. 6mm with care, fitted with an 80mm crankshaft this gives 2. 2 litres.

These engines are very strong and reliable if treated with reasonable respect. In particular, you must not rev the engine until the valves float as this quickly causes cam failure. In the gears 6500 and 7000 in top is the successful formula applied to the works Gp 1 cars. In Gp 2 form, over 160bhp is possible using sidedraught Webers and free flow exhaust - this represents an excellent set-up for the majority of club drivers for forest stages.

Twin Cam This engine has not been fitted to the production Escort since 1970, so first of all it's out of homologation. But the engine has become a favourite with clubmen due to its reliability and good power to weight ratio. Basically 1580cc, many engines were taken out to 1700 and even 1800cc using the old siamesed blocks. Spare parts for this engine are still available from the Daventry Parts Centre through your local Ford Dealer.

BDA BDA means Belt Drive 'A' series and represents the design of engine which Ford commissioned Cosworth to design. This came about as a result of the never ending quest for power, when the faithful Twin Cam engine hit a ceiling around the 180bhp mark. So, the 16 valve BDA series was conceived - in fact, BDA was the original 1601cc version, Cosworth now manufacture kits for BDC - 1800cc, BDG - 2 litre, and BDH - 1300cc. Original BDA engines were built onto 1600cc Kent blocks, but later production units used purpose made aluminium blocks - though you can't use this block for the push rod engine as there is no provision for push rods, etc.

Current Boreham rally engines have stretched the standard bore from 81mm to 90. 4mm, which with the standard 77. 62mm stroke gives a capacity just under 2 litres. When built up with Cosworth steel crank, rods, forged pistons, BD3 exhaust and LI inlet cams the engine can give a genuine, reliable 240bhp at 9000rpm.

These engines are now very specialised and expensive to build, so it's really best to leave this job to one of the established experts in the field who have all the experience of getting things right first time.