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(ref:- Parts list 12.0)

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THE REYNARD 85FF/SF

The Reynard 85FF is a high quality, advanced technology racing machine, designed to set new standards in the late eighties. The 85 model range represents the third concept design in Reynard Racing Cars, Formula Ford history and draws heavily on the 12 years of experience gained since the introduction of the first Reynard in 1973.

The original design concept, and concept 2 (the trend setting 82FF/SF-84FF/SF range) has resulted in the manufacture of 380 cars and over 45 championship victories. This wealth of knowledge has produced the 85FF based on proven technology and incorporating several advanced features to ensure that Reynard maintain their position both as market and race leaders.

ADVANCED FEATURES

AERODYNAMIC EFFICIENCY

Reynard cars have always enjoyed a reputation for excellent aerodynamics. Extensive wind tunnel testing and careful attention to detail has produced our most advanced aerodynamic package yet, giving the 85 series the lowest drag factor in our history.

Wherever possible, we have taken the opportunity to wind tunnel test rival manufacturers products and our cars were never lacking in aerodynamic advantage. This advantage will undoubtedly be increased with the 85 model range representing a giant step forward over previous models.

COCKPIT INTEGRITY

Only the Reynard 85 range cars are designed with F.I.A. safety recommendations in mind with regard to driver safety and footbox protection and positioning. Our car is the first to meet future 1986 S.C.C.A. safety requirements. Our ingenious driver protection panels adjacent to the driver torso provide massive side intrusion resistance. Whilst our competition think only of narrow chassis for performance, we have intergrated this driver protection panel into our design brief from the outset to provide this unique solution.

OPERATIONAL SIMPLICITY

Not only are the 85FF and 85SF designed on common running gear, they also enjoy identical uprights, discs, wheel flanges, wishbones, etc. on all four corners.

Multi-function design has produced a car with less components than ever before, thus keeping spares stocking to a minimum and simplifying maintenance.

1.0 INITIAL INSTRUCTIONS

CHASSIS PREPARATION

- 1.1 All threads on chassis must be tapped out and free from paint after stove enamelling. All threads are UNF - leave lightly greased.
- 1.2 All mount holes on chassis for wishbones, bellcrank pivots, anti roll bar blocks, seat belts, mounting plates etc. should be lightly drilled or reamed out to accept the appropriate bolt so that it is a free sliding fit and then left lightly greased.
- 1.3 Driver protection panels should be fitted to car by drilling 3 off 7/32" holes in the bottom and attached to the side of the bottom chassis rail. Drill 3 off holes in top by drilling back through appropriate mounting lugs on chassis. Panels should be fitted in early stages, but attached later - See Build Order.
- 1.4 Fit spherical gear change bush in roll over hoop bulkhead.
- 1.5 Drill hole in front bulkhead 5/16" for throttle stop bolt.
- 1.6 When fitting battery box, ensure it does not overhang side of chassis by more than 15 mm.
- 1.7 Drill 2 holes on inside of left top chassis rail 5/32" to accept the ty-rap blocks for mounting RARB cable. (Approx. position 9" to rear of Cable Mount and 2nd hole 9" behind first).
- 1.8 All wishbones & droplink threads should be tapped out to a depth of at least 35 mm. After tapping, threads should be thoroughly cleaned of swarf with petrol and blown out with an airline. Generously re-lubricate with grease such as Copperslip. All threads are UNF (except part no. 85F-05-09, which is 3/8" UNC) - See Appendix for all thread sizes.

1.9 BUILD ORDER

Chassis preparation stages 1 - 8, then assemble in following order:-

Skid plates

Seat Belts

Fire Extinguisher System

Dashboard and wiring

Pedal assembly:- Master cylinders, clutch and throttle stops, brake balance bar and adjuster.

Cables:- Clutch, RARB adjuster, throttle and brake line aeroquip

Gear linkage

Driver protection panels

Oil Tank and Cooler Fuel Tank and Filler Neck

Sub assemble steering rack and fit with front shear plate aft

Shear plate (forward)

FARB

Front Suspension and Corners

Steering wheel and column

Battery box and solenoid

Cooling System

Sub assemble gearbox with adaptor plate, top beam, lower wishbone, pick up brackets, bottom beam, clutch cable bracket, and rear steel skid plate.

Bolt engine to gearbox and fit unit into chassis

Rear suspension, corners and drive line

RARB

Oil system and engine ancillaries

Body

Tracking

2.0 FRONT SUSPENSION ASSEMBLY

2.1 Top wishbone (part no 85F-05-05)

Fit DU bushes to top front wishbone using special Reynard tool (part no. 85F-16-01). De-burr barrel nut (part no 85F-05-07). Fit camber adjusting rose joint and lock nut to wishbone and tighten with barrel nut. Press the two identical spacers (part no 85F-03-07) into camber rose joint. Wishbone/bellcrank shaft (part no 85F-05-09) should be tapped out 3/8" UNC and thoroughly de-burred and cleaned before fitting. Fit shaft to wishbone and ensure that it rotates freely, but without any play in the DU bushes. Lubricate with Copperslip. Attach to chassis with appropriate bolts and lockwire.

2.2 Bottom Wishbone (part no 85F-05-06)

Fettle bottom front wishbone spherical housing to accept spherical joint. A slight clearance fit of the joint in the housing can be tolerated by securing with loctite bearing fit. Locate spherical with correct circlip and check that circlip is securely seated. Fit rose joints and lock nuts to inner end of wishbone and adjust to correct length. (see set up data). Fit the two identical spacers (part no 85F-03-07) to the outer spherical.

2.3 Bellcrank (part no 85F-05-10)

Fit DU bushes and wishbone/bellcrank shaft as per top wishbone. Lubricate with Copperslip. Attach bell crank to chassis with appropriate bolts. Check for clearance against rack blocks on full droop and freedom of movement throughout range.

Great care indeed must be taken to ensure that all DU Bushes are always free to rotate. They are already pre-lubricated but some water resistant grease can be smeared around each end where they butt up to the thrust washer to prevent the inclusion of water and grit. These noddors (or bellcranks) should be periodically removed, cleaned and re-assembled. Careful attention should be given to the fact that when they are in their fully tightened position they should be very free to rotate, no binding spots at all, if the central alloy spacer has worn or shrunk or if the steel sleeve of the nodder appears to be too long then the sleeve should be shortened with a file carefully or a new alloy sleeve pivot spacer fitted. The end float on the noddors is not too important but it is vital that the end float on the top wishbones front and rear is between 0.002" and 0.005".

2.4 Pushrod (part no 85F-05-16)

Fit rose joints and lock nuts to pushrod and adjust equally to correct length (see set-up data). Fit pushrod to bellcrank and bottom wishbone. Do not attach upright to wishbone before attaching bellcrank as this may cause rose joints to "neck" or foul with consequent damage.

2.5 When attaching upright to wishbones ensure that the correct spacers are used. On no account attempt to overtighten bolts to close up any gaps no matter how small. Use the correct spacers and fit carefully.

2.6 For correct location of all necessary spacers see illustration 85F-03.

2.7 Pushrod Lengths

In any pushrod suspension design the length of the pushrod is very critical. The pushrods must be set exactly as recommended in the set-up sheet and very carefully matched side to side. The pushrod governs the arc of operation of the intermediate bell crank nodders and if these are extended or shortened by more than a millimetre or so then the bell crank nodder will be operating out of its designed arc causing either a much higher suspension rate at the wheel or a much lower rate. It is also possible for the suspension geometry to start working in a very high rising rate situation which should be avoided. The pushrods are thus fitted with right hand threads at both ends which do not facilitate inadvertent adjustment. If it is desired to change tyre diameter (rolling radius) then the pushrod can be shortened or lengthened by the appropriate amount to keep the bell crank in its same geometric sense relative to the chassis and springs. Generally speaking shortening the pushrod length will soften the suspension effect and lengthening the pushrod will harden the suspension effect, but excessive adjustment away from recommended lengths will cause either a lack of droop travel or a lack of bump travel before metal to metal contact occurs.

3.0 REAR SUSPENSION ASSEMBLY

- 3.1 Top wishbone (part no 85F-06-06). Assemble as per top front wishbone plus attach rear track link (part no 85F-06-15).
- 3.2 Bottom wishbone (part no 85F-06-20). Assemble as per bottom front wishbone.
- 3.3 The adaptor casting between the gearbox and the engine is in high tensile heat treated aluminium alloy. It is of robust design but care should be taken when bolting the forward lower rear wishbone pick up between the cast double shear mounting bosses. It is vital that a perfect fit is obtained between the spacers each side of the rose joint to prevent the casting from being distorted when this through bolt is tightened. It is suggested that this area is regularly checked for correct bolt tightness and internal tolerancing.
- 3.4 Bellcrank (part no 85F-06-31). Assemble as per front suspension bellcrank.
- 3.5 Pushrod (part no 85F-06-16). Assemble as per front suspension pushrod.
- 3.6 The top rear beam has a washer between gearbox lugs and beam.
- 3.7 Attach rear wishbones to uprights with appropriate spacers. See illustration 85F-04.
- 3.8 Top rear beam and adaptor plate working faces feature top hat spacers as per front shear plate (aft).
- 3.9 Damper pick-up holes on bellcrank should be reamed and checked for alignment before assembly. Check damper bolt seats correctly and does not foul on weld of ant roll bar mounting bush. Relieve as necessary.
- 3.10 Ensure that aeroquip pipe goes under, not over outboard end of bottom wishbone prior to attaching to caliper. This avoids foul condition between aeroquip, CV joint and bottom wishbone.
- 3.11 Bellcrank and wishbone shaft are identical in length. Wishbone shaft is threaded, bellcrank shaft is unthreaded and takes bellcrank bolt.
- 3.12 Lock wire top wishbone bolts fore and aft and bellcrank bolts.

4.0 FRONT & REAR UPRIGHTS

- 4.1 The uprights are the same basic casting front and rear and are not handed side to side. Similarly the wheel flanges and wheel bearings, discs, wheel spigots and wheel spindles are identical. This facilitates the need to carry only one upright as a universal spare. At the rear there is a different inner bearing retainer which is adapted to bolt onto a CV joint. If a spare is carried of these it is recommended a rear is carried because this will fit on the front, but the front will not be sufficient for the rear.

A front upright differs by way of having a steering arm attached to the top rear face while the rear upright is mounted inverted with respect to the front upright and has two double shear brackets to the top with respect to spacers and a side beam attached to the forward caliper brackets which places the rear lower wishbone outboard pick-up in double shear.

- 4.2 To build an upright, first fit inner bearing circlip and check that it is fully seated.
- 4.3 Warm upright in a domestic oven to 140° C. If a facility for this is not available then the upright can be effectively placed in boiling water and allowed to attain a similar temperature before fitting the bearing. Do not overheat the upright since it will melt the bearing seals when assembled. It may be advantageous to cool the bearing in a domestic deep freeze for approximately half an hour before fitting. The bearing should be pressed gently into the upright, ensuring that it seats fully and is pressed in square. This should require very little pressure. Do not force. The bearing is not handed and may be fitted either way.
- 4.4 Fit outer bearing circlip and check that it is fully seated.
- 4.5 Support outer end of bearing and press in wheel flange retainer (part no 85F-03/04-03). Failure to support the bearing correctly will result in permanent damage to the bearing. Do not apply loctite to the inner bearing diameter.
- 4.6 Fit wheel flange (part no 85F-03/04-03). On FF1600 fit 1 1/2" x 3/8" UNF wheel studs before fitting flange.

- 4.7 Fit wheel spigot (part no 85F-03/04-03) and secure on FF1600 with 6 off M8 x 70 mm bolts at 23 ft/lbs and lockwire. On FF2000 cars or US spec cars where centre bolt fixings are used, then only 3 retaining bolts are necessary due to the extra exertion of the centre bolt spindle to clamp the hub together. These too must be lock wired however.
- 4.8 On front upright press 4 off identical spacers into inside face, top and bottom. Fit steering arm bracket (part no 85F-03-02) and check for clearance on disc, when fitted.
- 4.9 On rear upright assemble as for front but fit CV joint bell (part no 85F-04-01) instead of wheel flange retainer. Fit lower wishbone shoulder stud (part no 85F-04-05A) to front of upright. Fit aluminium shear plates (part no 85F-04-03) and secure with 2 1/2" x 1/4" UNF bolts, with washers and nylocs.
- 4.10 Fit discs (on FF2000, secure with drive pegs) and check alignment and clearance.
- 4.11 Fit calipers and check for alignment and clearance.
- 4.12 Calipers are fitted behind the axle line both front and rear. Bleed nipples are located at the top of the calipers with the left hand caliper featuring a small nipple and the right hand a large nipple.
- 4.13 The machined discs should have a maximum axial runout of 0.004" at the periphery. Careful angular displacement matching of the disc onto the front flange may reduce this runout by rotating the disc at 90° at a time until the runout is minimised. Ensure that the disc mount register and discs are free from swarf and burrs, and tighten the four countersunk allen bolts. Do not loctite.

5.0 PEDAL ASSEMBLY

- 5.1 The pedal pivots and channel in the chassis should be checked for clearance and Copperslipped. The pedals should freely pivot on their inserts. The 1/4" bolts should be tightened using Nylock nuts. Ensure the pedals still pivot freely when the bolts are tight.
- 5.2 Lockwire the 2BA bolt into the throttle pedal holding the throttle cable. Lockwire the 2BA backstop bolt or Loctite against the clamping nut.
- 5.3 Assemble the balance bar so that the trunnions rotate freely in the black anodised clevises and the brake balance bar thread rotates freely in the trunnions. Ensure that the brake pedal freely accepts the balance bar and that the whole assembly is lubricated with Copperslip.
- 5.4 Assemble with the longer thread of the balance bar towards the throttle pedal side and allow a total axial endfloat of 0.125" between the inside of the clevises and the outside of the pedal tube, i.e. 0.062" each side.
- 5.5 Fit throttle stop as supplied and adjust so that the throttle touches the stop as full throttle is reached.
- 5.6 Tap out the pedal pad threads 1/2" UNF and ensure the pads are easy to adjust.
- 5.7 Shorten any pushrod to suit the particular length desired. The thread is 5/16" UNF. Ensure there are at least six threads screwed into the clevises.
- 5.8 To assemble adjustable brake balance, fit control knob into the dashboard. Check cable and fitting for freedom of movement. Pedal-end of cable fits on the right hand side of brake balance bar, locked using 3/8" UNF quarternut supplied. The cable should pass in front of the throttle pedal and be secured to the right hand lower chassis rail with clips provided. Ensure that the cable is free to slide through the clips.
- 5.9 Locate clevis for clutch cable on the top hole from the bottom of clutch pedal. This will give a ratio similar to hydraulic actuation.

6.0 DRIVELINE GEARBOX & GEARLINKAGE

- 6.1 The rear CV joints should be lightly packed with Molybdenum Disulphide based graphite grease. Fit both rubber boots to the shaft before fitting inboard circlip and bellvue washer. Gently tap the C.V. joint onto the splines before fitting second bellvue washer and securing with correct circlip, properly seated.
- 6.2 Apply a sealing compound, e.g. Hermetite Liquid Silicon gasket to both CV outer mating faces before bolting the joints to the CV outer bells and the gearbox drive flanges. This will prevent grease loss through centrifuge.
- 6.3 The CV joints are subject to tremendous heat both from the gearbox and brakes which tends to dissipate the grease into non existence. Inspect the joints regularly and re-pack at least every five races. Do not overpack. Even minor damage to a rubber boot can cause rapid grease loss and consequent CV joint failure.
- 6.4 Torque the outer 8 mm x 1.25 x 45 mm long allen socket bolts into the CV bell flange to 26 ft/lbs. and lock-wire around the periphery. Torque the inner gearbox nuts to the same torque ensuring the CV joint is located accurately on its distance spacer. Check all driveshaft nuts and bolts every race.
- 6.5 When fitting the driveshaft it is best to fit the inboard (i.e. Gearbox) end before attaching the outboard (i.e. upright) end to the outboard CV joint bell.
- 6.6 Check driveshaft plunge movement throughout its full wheel travel. At least 0.25" axial movement should be available at all points of suspension displacement. This movement will be very stiff with new joints.
- 6.7 Should you need to fit a new gearbox, the old V.W starter flange must be part removed with a hacksaw. This must be done carefully to avoid sharp edges, corners, and stress concentrations which can cause the gearbox to crack and throw the handling badly. Use a starter motor mated to the adaptor plate to see where the material must be removed and finish off with a round file and emery.
- 6.8 Ensure that a ten-tooth starter bendix is fitted to the starter pinion.

- 6.9 All gearlinkage threads should be tapped out and Copperslipped. Ensure the reaction bar slides freely in the yoke and assemble well Copperslipped. Nip up the 1/4" UNF gearlever pivot bolt and slacken off half a turn. Drill the head of the nut, and bolt and lockwire to each other.
- 6.10 The rear bent shaft with the two U/J's should be located in a position to provide sufficient angular and for-aft movement without fouling. Locate this near the end of the end of the assembly with all the parts in position. When perfect, drill centrally on diameter, two 3/16" holes, vertically through the Hewland shaft rear U/J and the gear rod shaft - front U/J respectively. Ensure the bolts are easily removable in situ and shorten the bolts to a minimum length to be just nipped by Nylock nuts. Ensure also that gearshift bolts clear damper mountings in all positions.
- 6.11 Lubricate the U/J's with Copperslip. Relubricate every two races, especially after wet races. The forward gear rod can be shortened if need be.
- 6.12 Remove all swarf and fillings from the clutch quillshaft and Copperslip the splines lightly.
- 6.13 Do not forget to fill the gearbox with two pints EP80/90 oil. Use 20/50 in cold weather.

7.0 STEERING

- 7.1 The rack should be lubricated with a light grease or EP80 oil.
- 7.2 The steering column upper journal should be carefully aligned with the axis of the column. The journals can be reamed out for further clearance if necessary. The column should freely spin when the journal is tight. Lubricate with Copperslip.
- 7.3 Ensure that a set bolt is not fitted in the splined steering column U/J. A bolt with an unthreaded portion should be used to prevent the spline pulling out of the joint through exposed threads.
- 7.4 The steering rack is clamped by an offset steering rack journal that is drilled actually through the rack housing in order to retain its position. If it is desired to drop the steering column at the wheel and thus rotate the steering rack in its clamps, the rack must be removed and the slots filed to allow rotation. Care should be also taken to ensure no fouling occurs of the rack centre boss onto the rearward front suspension top plate at its centre position.
- 7.5 To remove the steering rack the following procedure must be adopted. Firstly, the forward side panels must be removed and the in-board attachments of the track rods must be detached. Both front spring damper units must be removed and also one front nodder and pushrod must be detached. The rack may then be unfastened and withdrawn after removal of the steering column splined fitting. This is probably the least accessible part of the car.

8.0 ANTI ROLL BAR SYSTEM

- 8.1 IMPORTANT: These should be free to rotate in their journals when tightened. The clamps can be bored or reamed out where necessary. Up to 0.020" clearance can be tolerated. Lubricate with copperslip. As a guide the ARB should fall or rotate under its own weight - if it sticks it is too tight.
- 8.2 Adjustment of the FARB (part no 85F-05-34) is provided by 3 predrilled holes. Shortening the lever arm length stiffens the bar and lengthening the lever arm length softens the bar.
- 8.3 Adjustment of the RARB (part no 85F-06-35) is provided by a driver adjustable blade (part no 85F-06-34). When the blade is vertical, the bar is full stiff and when the bar is horizontal, the bar is full soft. Adjust the cable length as necessary to gain the full range of movement.
- 8.4 With ARB of very small diameter there is no adjustable blade since this adjustment would have negligible effect on the ARB stiffness.

9.0 ENGINE INSTALLATION

- 9.1 The engine is best installed and removed as a unit with the gearbox. The gearbox can be installed or removed whilst leaving the engine in place.
- 9.2 If the engine and gearbox are fitted less rear suspension, do not support only on the bellcrank bolt. If necessary, use the same short bolts top and bottom to secure the engine and gearbox prior to the fitment of the rear suspension and bellcrank.
- 9.3 The fitting of the cast sump is straightforward. Due to the fact that certain stresses can be subjected to this casting, it is important that the location to the block is a metal to metal contact. Firstly, discard the cork sump gasket that is used on most tin sump pans and cut the outward turning pieces from the standard Ford sump and seals, ensure that both the sump face and the block face are clean. It is a good idea to have a dummy fit at this stage to ensure that all bolts locate. Rotate the engine to ensure that there are no fouls internally. On some USA engines, when extended big end bolts are used, a small ball pein hammer can be used if interference occurs between con-rod bolts and sump baffle plate. Following a satisfactory fit, clean the sump thoroughly and apply silicon sealer to the mating face. Fit the cut seals and tighten evenly. In some applications in the USA where extra scavenge plates are attached inside, it is necessary to mount these plates off the mating surface because a metal to metal joint will not seat with the small plate in between. These plates must be cut and re-mounted elsewhere in the block. On fitting the engine, do not forget to locate two alloy spacers between the back of the sump and the adaptor plates before tightening the bolts. These alloy spacers may need to be machined to suit particular engine tolerances.
- 9.4 The oil system is very simple. The oil level should not be overfilled and should be dipped immediately after the engine has been run to prevent oil running back into the sump. The correct oil level as measured from the very top of the screwed filler, is 11" - 12". Any attempt to overfill will lead to an excessive amount of oil deposited in the catch tank. The oil system will take approximately 5 litres.
- 9.5 It is good practice to purge all oil lines, cooler and tank prior to fitting, particularly from new. Should the engine run its bearings the oil cooler will have to be replaced as it is impossible to guarantee that it will be free from debris.

- 9.6 When fitting an engine, always 'crank up' oil pressure, prior to starting. To do this, fill the oil tank to the correct level and prime the oil filter. The fuel and water systems can also be partially bled at the same time, so ensure that the water is topped up and that there is at least a gallon of petrol in the fuel tank. Remove the spark plugs from the engine and with the ignition switch off (or the coil wire removed), turn the engine over on the starter motor. As the oil pressure comes up, the engine will slow and the oil pressure gauge will begin to register. If after approx. 15 seconds the oil has failed to circulate, slacken the oil union on the exit side of the oil cooler and the union that returns the oil to the block.

Spin the engine over on the starter motor and as oil seeps from the unions, re-tighten them. Finally, re-check oil level in tank, refit spark plugs and start engine. On starting engine, check oil pressure and make sure all unions are tight. Bleed the water system and with engine at working temperature, re-check all hoses for security.

- 9.7 The water system incorporates a swirl pot with an integrated header tank. The header tank is connected to the swirl pot via a small 1/8" diameter hole under an aluminium capping. The filling of the system is achieved through a 1/2" diameter bore pipe direct into the water pump. This pipe also serves the function of providing the water pump with a head of high pressure water so that at high engine revs, cavitation of the pump will not occur. Since however, this pipe bypasses the radiator system it may be beneficial to reduce the diameter of this by-pass pipe to as little as 3/8" by fitting an orifice or suitable restrictor. If the radiator system is too slow to fill then loosen one of the top hoses to the radiators.
- 9.8 Check the water is circulating and that radiators are fully bled. To bleed system continue filling header tank, with engine running and both top radiator hoses loose until bubbles stop appearing in header tank. Tighten hoses and finally top up header tank and fit cap. As a final check, place your hand on the radiator (if water temp is less than 50°C) and make sure radiators are same temperature top and bottom. If radiator is cooler at the top, repeat bleeding procedure.

- 9.9 The cooling system intake duct may be improved by the owner spending time sealing all possible leaks of air pressure that could find access around the radiator and cooler. Typical leaks are the gap all around the radiator and side panels and the split line between the inner NACA duct wall and the alloy side panel to the cockpit. This car has been designed to run with water temperatures between 80 - 100°C. Oil temperatures should run between 80 - 120°C. If the temperatures are not high enough then the NACA duct can be effectively blanked and blanking panels are available from the factory for this purpose.
- 9.10 Check for full throttle and that the throttle returns fully and smoothly.
- 9.11 Check clutch adjustment whenever refitting an engine. A cable clutch is used on this car and there are various holes in the clutch pedal to alter the mechanical advantage. The higher the hole the heavier the clutch. A clutch pedal stop is necessary and should be adjusted to prevent excessive loading on the clutch cable and excessive deflection of the pressure plate. There should be a small amount of slack in the cable at its fall back rest position and this can be taken up by the adjustable back stop screw.
- 9.12 Some owners may wish to insulate the carburettor plenum chamber that is bonded inside the bodywork with extra insulation to prevent the passage of hot air coming from the exhaust. It is also possible to partially seal the bottom of this plenum if the engine and carburettor set-up work effectively with a sealed ducted air intake system.
- 9.13 The rev counter is fitted with a red "tell tale" needle, On no account reset this below 5000 rpm or permanent damage to the rev counter will result.

10.0 BODYWORK

- 10.1 Build order:-
- 1) Fit side panels
 - 2) Fit engine panels
 - 3) Fit cockpit
 - 4) Fit Nose
 - 5) Fit tail

Offer panels up to car in this order, taking care to ensure that you mount the body square to the chassis and with adequate clearance on all moving parts, e.g.: suspension pushrods, gear linkage etc. Fix the panels to each other and the chassis with race tape and check alignment of body as a whole before fitting any Dzus fasteners, body clips etc.

- 10.2 Locate pre-drilled side panels on bottom and top chassis rails. Check fit and adjust as necessary. Check clearance on front pushrods. To remove each forward side panel, the rearward inboard pick-up of the front lower wishbone must be detached. Once this is detached and pulled away from the chassis, the side panel can be removed by undoing the attachments on the top rail each side and then lifting the front suspension to alleviate removal of the side panel underneath the forward wishbone attachment.
- 10.3 Locate pre-drilled engine side panels on pins provided. During final fitting a Dzus fastener is located on the flange between the engine side panel and main side panel approximately midway between the mounting dowels.
- 10.4 Fit cockpit and drill bottom flange to take locating dowels by drilling back through dowel plates on chassis prior to fitment of dowels.
- 10.5 Fit tail and check clearance on gearlinkage.
- 10.6 Tape body together when satisfied with fit then fit mounting clips as necessary.
- 10.7 Nosebox is predrilled and jigged at factory. Replacement is a simple matter of removing the old one and rivetting on the new one.

11.0 APPENDIX

11.1 Sphericals, Rod Ends & Bearings

<u>LOCATION</u>	<u>QTY</u>	<u>PART NO</u>	<u>BORE</u>	<u>THREAD/HAND</u>
Front Lower Wishbone/Chassis	4	ARHT5ECR	5/16"	3/8 UNF RH
Rear Lower Wishbone/Chassis	4	ARHT5ECR	"-"	"-" "-"
Front Lower Wishbone/Upright	2	ABWTB	1/2"	
Rear Lower Wishbone/Upright	2	ABWTB	"-"	
Front Top Wishbone/Upright	2	ARTBECR	1/2"	1/2" UNF RH
Rear Top Wishbone/Upright	2	ARTBECR	"-"	"-" "-"
Front & Track Links	2	ARHT5ECR	5/16	3/8 UNF RH
Front & Rear Track Links	4	ARHTL5ECR	5/16	3/8 UNF LH
Rear Track Links	2	ART6ECR	3/8	3/8 UNF RH
Front and Rear Pushrods	8	ARHT5ECR	5/16	3/8 UNF RH
Front/Anti Roll Bar Links	4	AMR4	1/4"	1/4 UNF R
Rear/Anti Roll Bar Links	2	ART4ECR/ARBM4	1/4"	5/16 UNF RH
Rear Anti Roll Bar Links	2	ARHT4	1/4"	5/16 UNF RH female
Gear Lever Mount	1	AMR6	3/8	3/8 UNF RH
Gear Shift Support	2	1243(AMPEP)	7/16	
Clutch Cable	1	AFR3	10/32	2BA
Throttle Cable	1	AFR3	"-"	"-"
Anti Roll Bar Cable	1	AFR3	"-"	"-"
Wheel Bearings	4	SKF633007C		
Du Bush		100DU14	5/8	

TOTALS

<u>JOINT</u>	<u>QTY</u>	<u>JOINT</u>	<u>QTY</u>
ARHT5ECR	18	AMR4	4
ABWTB	4	ART4ECR	2
ART8ECR	4	ARHT4	2
ARHTL5ECR	4	AMR6	1
ART6ECR	2	1234P	2
AFR3	3		

11.2 FF1600 OIL SYSTEM

(Reference - Drawing 85F 11B)

The FF1600 features a 5 port oil pump comprising two sections - pressure and scavenge. The pressure section is located nearest the block and has 3 ports: -

The top left port (A) is the main feed from the bottom of the oil tank (F) to the pump. This oil pipe is 5/8" x 19" and has one 90° union, the other end being open and connected to the bottom of the oil tank (F) with a jubilee clip.

The bottom right port (B) carries the oil now under pressure, to the oil filter (G) entry port. This oil pipe is 1/2" x 23" and has one 90° and one 45° union.

Oil from the filter exit port (H) is returned to the engine via the top right pump port (C). This oil pipe is 1/2" x 25" and has one 90° and one 45° union.

The second section of the pump is responsible for scavenging the oil from the sump pan and returning it to the oil tank via cooler. The scavenge pump has 2 ports:-

The bottom left port (D) is the scavenge from the sump (K) to the pump. This oil pipe is ready fitted by the engine builder.

The right hand port (E) carries the oil from the pump to the bottom of the oil cooler (L). This oil pipe is 1/2" x 42" and carries one 90° and one straight union. The pipe from the top of the oil cooler (M) to the top of the oil tank (N) is 1/2" x 19" and has one 90° union with the other (open) end being attached to the lower of the two unions at the top of the oil tank (N) with a jubilee clip.

The oil pressure may be adjusted by rotating the adjusting screw (P) clockwise to increase and anticlockwise to decrease.

11.3 FF2000 OIL SYSTEM

(Reference - Drawing 85F 11C)

The FF2000 features a 6 port, twin scavenge oil pump located at the front left hand side of the sump. The pump is divided into three sections, one pressure (A/B) and two scavenge (C/D & E/F).

The two scavenge pick up ports (C & E) are fed from the front (Q) and rear (R) of the sump and come ready fitted by the engine builder.

The oil is returned from port (D) to the top of the oil tank using the middle of the top three oil tank unions (K). This oil pipe is 1/2" x 29" and carries one 90° union. The other end being open and attached to the oil tank (K) with a jubilee clip.

The oil is also returned to the top of the tank (N) from port F, but via the oil cooler. The oil pipe from port F, to the bottom of the oil cooler (M) is 1/2" x 23 1/4" and carries two 90° oil unions.

The pipe from the top of the oil cooler (L) to the top of the oil tank (N) is 1/2" x 52 1/2" and carries one 90° union, the other end being open and attached to the lowest one of the 3 top oil tank unions (N) with a jubilee clip.

The pressure side of the pump (port A) is fed by a 5/8" x 14 1/2" pipe which carries one 45° union, with the other end being open and connected to the bottom of the oil tank (union G) with a jubilee clip.

The oil is then fed from part B, under pressure to the oil filter entry port (H) via a 1/2" x 11 1/4" pipe carrying one 90° and one straight union.

The oil is passed through the oil filter and out of the filter exit port (J) back into the engine block (P) via a 1/2" x 3 1/8" pipe which carries one 90° and one straight union.

11.0 APPENDIX

11.4 FF 1600 Breathers

Fuel pipe (bottom of fuel tank to fuel pump)	3/8" x 30"
Header tank to waterpump bleed	1/2" x 18"
Rocker cover to oil tank breather	1/2" x 11"
Oil tank to catch tank breather	1/2" x 27"

11.5 FF2000 BREATHERS

Fuel pipe (bottom of fuel tank to fuel pump)	3/8" x 56"
Fuel tank breather	3/8" x 36"
Water overflow	3/8" x 36"
Header tank to water pump bleed	1/2" x 19"
Cam cover to oil tank breather	1/2" x 11"
Oil tank to catch tank breather	1/2" x 27"

11.0 APPENDIX

11.6 Torque Settings

Thread Size	Torque ft/lbs (half nut)	Torque ft/lbs (full nut)
1/4 UNF	approx 5-6 ft/lbs	approx 8-10 ft/lbs
5/16 "	" 10-12 "	" 18-20 "
3/8 "	" 20-22 "	" 32-34 "
7/16 "	" 40-42 "	" 68-72 "
1/2 "	" 50-54 "	" 78-82 "
3/4 "	" 80-85 "	" 110-120 "
7/8 "	" 100-115 "	
CV joint drive shaft bolts		26 "
Wheel flange retainer bolts		26 "
FF2000 centre bolt wheel fixing		110-120 "
FF1600 Wheels		30-35 "

11.7 Special Tools Required

DU Bush fitting Mandrel (part no. 85F-16-01)

Torque - wrench 20 - 120 ft/lbs

Lockwire soft 0.8 mm

Copperslip

Bearing housing and thread loctite

5/8" and 3/4" adjustable reamer or equivalent .

Taps: - 2BA, 1/4", 5/16", 3/8", & 1/2" UNF right hand. 3/8" UNF left hand

Set drills: 1/16", to 1/2"

Wheel socket (FF2000) 1 1/8" (available from Sabre).

Rack stops (tracking) (part no 85F16-25)

Front dummy dampers (part no 85F-16-26)

Rear dummy dampers (part no 85F-16-27)

Reynard Racing Cars Limited
Reynard Centre
Telford Road
BICESTER
Oxon

REYNARD RACING CARS LIMITED
Telford Road
Bicester
Oxon

Tel: (0869) 242615/244397

PARTS LIST 85FF & SF

<u>DESCRIPTION</u>	<u>SECTION NUMBER</u>
CHASSIS	85 - 01
BODY-WORK	85 - 02
FRONT UPRIGHT	85 - 03
REAR UPRIGHT	85 - 04
FRONT SUSPENSION	85 - 05
REAR SUSPENSION	85 - 06
SPHERICAL, ROD END JOINTS & BEARINGS	85 - 07
STEERING	85 - 08
PEDALS	85 - 09
FUEL & WATER	85 - 10
OIL, AEROQUIP & HYDRAULICS	85 - 11
WHEELS, TYRES, DAMPERS & SPRINGS	85 - 12
WINGS	85 - 13
DRIVELINE & GEARBOX	85 - 14
GEARLINKAGE	85 - 15
MOUNTS, BRACKETS & MISCELLANEOUS	85 - 16
SPACERS	85 - 17
DU BUSHES & WASHERS & CIRCLIPS	85 - 18
ELECTRICAL & INSTRUMENTS	85 - 19

CHASSIS 85 - 01

<u>PART NO</u>	<u>QTY</u>	<u>DESCRIPTION</u>
85F-01-01	1	CHASSIS PAINTED
85F-01-20R/L	1/1	DRIVER PROTECTION PANEL
85F-01-11	4	FRONT AND SIDES SKID BLOCKS
85F-01-12	1	REAR SKID PLATE (STEEL)
85F-01-23	1	FLOORPAN (1 PIECE) (STEEL)
85F-01-24	1	FF1600 FRONT ENGINE MOUNT PLATE (TOP)
85F-01-25	2	FF1600 FRONT ENGINE MOUNT PLATE (BOTTOM)
85F-01-28	1	FF2000 FRONT ENGINE MOUNT PLATE (TOP)
85F-01-29	1R/H 1L/H	FF2000 FRONT ENGINE MOUNT STRUT FF2000 FRONT ENGINE MOUNT PLATE
85F-01-35R/L	1/1	INNER RADIATOR DUCT PANEL
85F-01-19	1	ONE PIECE FRONT SKID PLATE

BODY-WORK 85 - 02

<u>PART NO</u>	<u>QTY</u>	<u>DESCRIPTION</u>
85F-02-11R/L	1/1	MIRROR RH/LH
85F-02-12	1	SEAT
85F-02-07	1	AIRBOX FF1600
85F-02-06	1	NOSE (UK & USA 1600)
85F-02-04	1	NOSE (FF 2000)
85F-02-09	1	TOP SECTION FF1600
85F-02-10	1	TOP SECTION FF2000
85F-02-02	1	TAIL SECTION FF1600 UK
85F-02-03	1	TAIL SECTION FF1600 USA
85F-02-05	1	TAIL SECTION FF2000
85F-02-08	1	AIRBOX F2000
85F-02-13R/L	1/1	MID SIDE PANEL/RADIATOR INTAKE (U.K. & U.S.A. 1600)
85F-02-14R/L	1/1	REAR SIDE PANEL (U.K. & U.S.A. 1600)
85F-02-15	1	BATTERY COVER
85F-16-06	1	DASH PANEL
85F-02-18RL	1/1	MIDSIDE PANEL/ RADIATOR INTAKE (UK 2000)
85F-02-19RL	1/1	REAR SIDE PANEL (UK 2000)

FRONT UPRIGHT 85 - 03

<u>PART NO</u>	<u>QTY</u>	<u>DESCRIPTION</u>
85F-03/04-01	2	FRONT UPRIGHT
85F-03-10	2	STEERING ARM BRACKET
85F-03/04-03	2	WHEEL FLANGE
85F-03/04-04	2	WHEEL SPIGOT
85F-03/04-05	2	WHEEL STUD (UK 2000 & USA 1600)
85F-03-06	2	WHEEL FLANGE RETAINER
85F-03-07	8	UPRIGHT/WISHBONE JOINT SPACER
85F-03-08	8	UPRIGHT SPACER (THICK)
85F-07-02	2	BRAKE DISC
84F-03/04-13/R/L	1/1	BRAKE CALIPER
84F-03-12	4	BRAKE PADS M121/DS11
	2	WHEEL BEARING

REAR UPRIGHT 85 - 04

<u>PART NO</u>	<u>QTY</u>	<u>DESCRIPTION</u>	!
85F-03/04-01	2	REAR UPRIGHT	
85F-04-01	2	C.V JOINT BELL	
85F-03/04-03	2	WHEEL FLANGE	
85F-03/04-04	2	WHEEL SPIGOT	
85F-03/04-05	2	WHEEL STUD (UK 2000 & USA 1600)	
85F-04-02	2	LOWER UPRIGHT BRACING BUSH	
85F-04-03	4	REAR UPRIGHT TOP DOUBLE SHEAR PLATE	
85F-04-04	2	REAR UPRIGHT LOWER DOUBLE SHEAR BRACKET	
85F-04-05	2	UPRIGHT/LOWER WISHBONE SHOULDER STUD	
85F-04-06	2	UPRIGHT/LOWER WISHBONE SHOULDER STUD SPACER	
85F-07-02	2	BRAKE DISC	
84F-03-13	1/1	BRAKE CALIPER RH/LH	
84F-03-12	4	BRAKE PADS M121/DS11	
85F-12-05	6	DAMPER SPACER	
85F-03-08	2	UPRIGHT SPACER (THICK)	
	2	WHEEL BEARING	
85F-04-07	2	UPRIGHT SPACER (THIN)	

FRONT SUSPENSION 85 - 05

<u>PART NO</u>	<u>QTY</u>	<u>DESCRIPTION</u>
85F-05-01	1	FRONT SHEAR PLATE (FORWARD)
85F-05-02	1	FRONT SHEAR PLATE (AFT)
85F-05-03	2	FRONT DIAGONAL STAY
85F-05-05	2	FRONT TOP WISHBONE
85F-05-06RL	1/1	FRONT LOWER WISHBONE
85F-05/06-07	2	CAMBER NUT
85F-05-10	2	FRONT BELLCRANK
85F-05/06-09	2	WISHBONE & BELLCRANK SHAFT
85F-05-34	2prs	ANTI ROLL BAR MOUNTING BLOCKS
85F-05-16	2	FRONT PUSHROD
85F-05-34	1	FIXED ANTI ROLL BAR
85F-05/06-32	2	WISHBONE & BELLCRANK FLANGED THRUST WASHER
85F-05-35	2	FRONT ANTI ROLL BAR DROPLINK

REAR SUSPENSION 85 - 06

<u>PART NO</u>	<u>QTY</u>	<u>DESCRIPTION</u>
85F-06-37	1	REAR TOP BEAM
85F-06-06	2	REAR TOP WISHBONE
85F-06-20 R/L	1/1	REAR LOWER WISHBONE
85F-05/06-07	2	CAMBER NUT
85F-06-31R/L	1/1	REAR BELLCRANK
85F-05/06-09	2	WISHBONE SHAFT
85F-06-34	1	ADJUSTABLE ANTI ROLL BAR BLADE
85F-06-14	1	ADJUSTABLE ANTI ROLL BAR
85F-06-10	1	REAR ANTI ROLL BAR CABLE
85F-06-35	2	ANTI ROLL BAR MOUNTING BLOCKS
85F-06-16	2	REAR PUSHROD
85F-06-22	4	REAR LOWER WISHBONE/GEARBOX P/UPPLATE
85F-06-23	2	REAR LOWER WISHBONE/GEARBOX P/UPBLOCK
85F-05/06-26	1	ANTI ROLL BAR LEVER
85F-05/06-17	2	ANTI ROLL BAR COCKPIT LEVER KNOB
85F-06-19	1	ANTI ROLL BAR COCKPIT LEVER ARM
85F-06-15	2	REAR TRACKLINK
85F-06-25R/L	1/1	REAR BEAM ANGLE BRACKET
85F-06-32	2	REAR BELLCRANK JOURNAL SPACER
85F-06-33	2	REAR BELLCRANK BOLT
85F-06-36	1	REAR DAMPER LOWER CROSS MEMBER
85F-05/06-32	4	WISHBONE & FLANGED THRUST WASHER

SPHERICAL & ROD END JOINTS & BEARINGS 85 - 07

<u>LOCATION</u>	<u>QTY</u>	<u>PART NO</u>
FRONT LOWER WISHBONE/CHASSIS	4	ARHT5ECR
REAR LOWER WISHBONE/CHASSIS	4	ARHT5ECR
FRONT LOWER WISHBONE/UPRIGHT	2	ABWT8
REAR LOWER WISHBONE/UPRIGHT	2	ABWT8
FRONT TOP WISHBONE/UPRIGHT	2	ART8ECR
REAR TOP WISHBONE/UPRIGHT	2	ART8ECR
FRONT & TRACK LINKS	2	ARHT5ECR
FRONT & REAR TRACK LINKS	4	ARHTL5ECR
REAR TRACK LINKS	2	ART6ECR
FRONT AND REAR PUSHRODS	8	ARHT5ECR
FRONT/ANTI ROLL BAR LINKS	4	AMR4
REAR/ANTI ROLL BAR LINKS	2	ART4ECR/ARBM4
REAR ANTI ROLL BAR LINKS	2	ARHT4
GEAR LEVER MOUNT	1	AMR6
GEAR SHIFT SUPPORT	2	1243 (AMPEP)
CLUTCH CABLE	1	AFR3
THROTTLE CABLE	1	AFR3
ANTI ROLL BAR CABLE	1	AFR3
WHEEL BEARINGS	4	SKF633007C

TOTALS

<u>JOINT</u>	<u>QTY</u>	<u>JOINT</u>	<u>QTY</u>
ARHT5ECR	18	AMR4	4
ABWT8	4	ART4ECR	2
ART8ECR	4	ARHT4	2
ARHTL5ECR	4	AMR6	1
ART6ECR	2	1243P	2
AFR3	3		

STEERING 85 - 08

<u>PART NO</u>	<u>QTY</u>	<u>DESCRIPTION</u>
85F-08-01	1	STEERING RACK
85F-08-02	2	TRACKROD
85F-08-03	2	RACK MOUNTING BLOCK
85F-08-04	1	ADJUSTABLE STEERING COLUMN
85F-08-05	2	RACK CLEVIS
84F-16-02	1pr	STEERING COLUMN MOUNTING BLOCKS
84F-08-05	1	STEERING WHEEL - MOTA LITA/PERS/MOMO

PEDALS 85 - 09

<u>PART NO</u>	<u>QTY</u>	<u>DESCRIPTION</u>
85F-09-02	1	THROTTLE PEDAL
84F-07-02	1	BRAKE PEDAL
84F-07-03	1	CLUTCH PEDAL
84F-07-06	3	PEDAL PIVOTS
84F-07-09	2	PEDAL PADS
84F-07-10	1	THROTTLE CABLE - 1600 or 2000
84F-07-11	1	CLUTCH CABLE
85F-09-03	1	CLUTCH CABLE CLEVIS (FELSTED PRT NO 71071)
84F-07-12	1	COCKPIT CONTROLLED BRAKE BALANCE CABLE
84F-07-13	1	BRAKE BALANCE BAR
84F-07-14	2	BRAKE BALANCE CLEVIS
84F-07-15	2	BRAKE BALANCE TRUNIONS
84F-07-16	1	BRAKE BALANCE BAR LOCKNUT
85F-09-04	1	PEDAL STOP THROTTLE
85F-09-05	1	PEDAL STOP CLUTCH
85F-09-06	1	FOOT REST
85F-09-07	1	CLUTCH CABLE BALL JOINT (FELSTED PRT NO QR 71046)

FUEL & WATER 85 - 10

<u>PART NO</u>	<u>QTY</u>	<u>DESCRIPTION</u>
85F-10-01	1	FUEL TANK (ALLOY)
85F-10-08	1	FUEL TANK (BAG TANK)
85F-10-02	2	WATER RADIATOR
85F-10-09	1	SWIRLPOT (1600)
85F-10-14	2	WATER SPLITTER PIPE (1600)
85F-10-07	1	FUEL FILLER NECK
85F-10-12	1	WATER OUTLET (1600)
85F-10-11	1	CAST WATER OUTLET (2000)
84F-09-03	ft	PETROL PIPE (PER FT)
84F-09-07	1	PRESSURE CAP
85F-10-13	1	FUEL FILLER NECK CAP
85F-10-15	1	SWIRLPOT (2000)
85F-10-16	1	WATER SPLITTER PIPE (2000)