

INSTALLATION OF ENGINE GEARBOX AND COOLING KIT

Although in the past we have not been able to supply engines to Kit car customers, the additional space gained by our move to Crayford has enabled us to produce a range of two engine kits, both based on the Ford 2265E Kent unit. Please refer to section 18 of this manual for specifications and assembly instructions.

Should you intend to fit an engine obtained elsewhere we are in a position to supply spare parts, ancillaries and brackets, nuts and bolts etc , including for example Weber DCOE carburettors, correctly jetted and modified for engines fitted to Sevens. We cannot as a rule undertake specialist machining work on non Caterham supplied engines.

We do supply current specification Sierra XR4i five-speed gearboxes with a full kit of items necessary to complete the installation including a special adaptor in order to fit this to the correct bellhousing for any of our optional engines. Unfortunately Escort Sport gearboxes are no longer available new and therefore not stocked by Caterham. Exchange units should however be available from Ford dealers, and all the minor items needed to complete the installation are held by us.

10.1. Assembly of Gearbox Kit - Five-Speed XR4i

1.1 The 5 Speed Gearbox kit includes all the items necessary to prepare the gearbox for installation in the Seven fitted with any of the recommended engines. It should be noted that several items relating to the gearbox are included in the miscellaneous

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kit such as the speedometer cable, right-angled drive, gearlever, gearbox mounting and clutch cable.

1.2 The Bellhousing and adaptor should be bolted to the front of the gearbox casing using the four special 12mm x 60mm bolts, (metric fine thread) noting that the gasket should be fitted between the gearbox and the adaptor.

These bolts should be torqued to 35 lb ft and loctite should be used to ensure they do not work loose.

1.3 Fit the speedometer drive gear into the rear, nearside of the tailshaft housing and secure into place by gently tapping its locating plate into place with a soft hammer.

The small oil seal fits over the output spindle and should be gently pressed or tapped into place using a suitably sized socket as a drift. It is advisable to lightly lubricate or grease the moving parts before assembly.

1.4 Insert the square section drive pin into the spindle and slot the right angle drive gear over it and into the socket provided for it. Secure using the circlip and check to make sure this is fully home since re-doing this job with the gearbox in the car is very awkward. Attach the speedometer cable.

1.5 Screw the reversing light switch into place on the rear offside of the tailshaft housing.

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1.6 Gently tap the clutch arm pivot pin into the hole provided inside the nearside of the bellhousing capturing the nylon bush. Insert the clutch arm over the first motion shaft with its inner end clipped over the pin and its outer end protruding through the edge of the bellhousing to take the cable. Clip the clutch release bearing into place. Push the clutch cable bush into the hole provided for the clutch cable from the front.

1.7 The clutch cable is threaded through the cable bush in the bellhousing and then through the hole in the gaiter which is held in place by its clip.

1.8 Bolt the metal/rubber/metal gearbox mounting to the underside of the tailshaft housing using the 12mm x 25mm bolt and lockwasher.

10.2. Preparation of Gearbox - Four-Speed Escort Sport

2.1 An exchange gearbox is usually supplied without fittings and therefore the items listed below will need to be sourced and attached before it can be installed in a Seven. It may be necessary to partially grind away the lug underneath this gearbox to avoid contact with the chassis crossmember. (see figure 10.4.4)

- a) Reversing lamp switch
- b) Speedometer drive gear
- c) Speedometer drive oil seal

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- d) Speedometer drive locating plate
- e) Clutch actuating arm
- f) Clutch release bearing
- g) Clutch cable bush
- h) Clutch cable/arm rubber gaiter and clip

All the above items are stocked by Caterham Cars.

2.2 The Miscellaneous kit provides the following:

Speedometer cable and circlip

Clutch cable

Gearbox mounting and necessary bolts

Gear lever, knob, gaiter etc.

Gearbox mounted shortened gear lever and remote linkage

2.3 Fit the gearbox mounting, speedometer drive and reverse gear switch as per five-speed, except that this gearbox does not need the right angle drive gear for its speedometer.

2.4 Similarly, fit the clutch arm and release bearing, though this gearbox does not need a separate clutch arm pivot pin.

2.5 Remove the blanking plate at the rear of the gearbox above the output shaft and carefully lever out the reverse gear stop taking care not to damage the threads into which the gearlever is screwed. Refit the blanking plate.

2.6 Screw the dummy (shortened) gear lever into place, assemble the remote shift links onto this (as below) leaving

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connection to the second gear lever until the gearbox is installed in the car. (see diagram 10.2.6.)

Slip the drilled metal bush over the shortened gearlever and attach to it the two gearchange links, with the black plastic inserts clipped into their holes. Bolt together with steel washers on each side using the 3/16" x 1³/₄" caphead bolts and nylocs provided. Assemble the rear, complete gear lever with spacing washers between the lever and the steel links in order to make the strips parallel.

10.3. Fitting Engine/Gearbox to Car - Five-Speed De Dion

3.1 It is possible to fit the gearbox into the car first and attach the engine afterwards but rather easier to bolt the engine and gearbox together first and insert them as a unit. This is because it can be difficult, due to tight tolerances in the engine bay, to align the clutch with the first motion shaft, whereas it is straightforward when out of the car. NB, Bolts into the bellhousing are metric, bolts into the engine are UNC.

3.2 When fitting the dust shield between the engine and gearbox, we advise that you take the precaution of welding up the existing split and cutting it into two separate upper and lower sections along a line roughly corresponding with the bottom of the cylinder block, but retaining the starter motor location on the upper half (see diagram 10.4.4).

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Due to low ground clearance the chances are that the sump pan may be damaged at some time in the car's life and this simple modification allows the pan to be removed without separating the engine and gearbox in the car.

3.3 The engine can be fully kitted with ancillaries - eg. carburettor(s), fuel pump, oil pump and filter, starter etc, but the engine mounting brackets are best left unfitted until the engine/gearbox assembly is in position.

This is because the offside bracket will foul the steering column and there is a danger that due to the width of the engine when its mountings are attached, damage can be done to the aluminium body skin.

The engine mounting rubbers are attached to the chassis using four 5/16" x 1³/₄" UNF bolts, washers and nylocs and for convenience these should be bolted in place before the engine is inserted. The gearbox mounting is held using two 5/16" x 1" UNF bolts, washers and nylocs.

Before fitting the gearbox into the car, remove the transmission tunnel top by removing the 4 screws holding it in position.

An engine crane or block and tackle will be needed to lift the engine gearbox assembly and accurately position it in the chassis, sliding the propshaft into the rear housing of the gearbox as you do so. A trolley jack under the gearbox will be very helpful.

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It will probably be necessary to twist the propshaft in order to get the splines to align. Please note that the forward end of the propshaft is not supposed to go fully home into the gearbox.

Note also that the speedometer right angle drive is very vulnerable and a tight fit into the transmission tunnel.

3.4 If the engine hasn't already been fitted with ancillaries including clutch and accelerator cables then do so now.

Adjust the position of the clutch pedal to suit your individual preference (normally level with the brake pedal) by turning the adjusting screw on the cable end of the clutch pedal, locking in position with the nut when a satisfactory position is achieved.

The clutch cable is adjusted where it feeds into the bellhousing. The "bite" point should again be set according to personal preference but take care that it is not so adjusted as to prevent the clutch from fully engaging or disengaging.

Take care to ensure that the bolt and nyloc nut securing the clutch cable to the pedal is not fully tightened otherwise the stress put on the cable will lead to premature failure.

The speedometer cable should be mounted through the large grommet above the steering column in the front bulkhead and connected to the back of the speedometer. (Please see section 10.7 for electrical connections and 10.6 for the cooling system).

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10.4. Fitting Engine/Gearbox to car - Four-Speed Live Axle

4.1 Attach the engine to the gearbox before fitting into the car. The propshaft must also be slid into the tailshaft housing at this point. You should also remove the transmission tunnel cover from inside the car, held by 4 screws.

4.2 Note our comments relating to the dust shield in 10.3.2 and do not fit the engine mountings to the cylinder block yet, as per item 10.3.3

4.3 Lower the engine/gearbox/propshaft assembly into the car, carefully feeding the propshaft through the transmission tunnel to the rear axle. Watch also that the dummy gear lever complete with links does not foul the underside of the bulkhead. When correctly positioned, attach the engine mountings and bolt the engine and gearbox to the chassis as specified in 10.3.3. A trolley jack under the gearbox will greatly assist with getting the complete assembly eased into position.

The propshaft is attached to the differential by four 3/8" x 1" UNF bolts and nylocs which should be tightened to 25 lb ft.

4.4 Attach the reverse gear stop to the chassis as shown in the diagram 10.4.4 and screw the remote lever into place. Check that all gears can be selected. It is necessary to push downwards for reverse

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10.5. Fitting Engine/Gearbox to car - Four-Speed De Dion

5.1 Follow instructions as in section 10.3 except that the four-speed gearbox uses different mountings in the chassis to the five-speed. All the necessary additional components are included in the miscellaneous kit for this application including an extra aluminium tunnel cover to accomodate the remote linkage and the gearlever which is situated further back in the car than the five-speed.

5.2 Fit the additional crossmember into the chassis to take the gearbox monting. The lower chassis rails within the transmission tunnel are already drilled for this purpose. This is secured with 4 5/16" x 1³/₄" UNF bolts washers and nylocs.

5.3 The kit includes a special bracket assembly incorporating a turret needed to install the remote gearlever. Screw the lever loosely into the turret and attach also the reverse stop before fitting into the transmission tunnel. The bracket locates within the tunnel itself and should be positioned so that the centreline of the gearlever turret is directly over the centreline of the chassis crossmember immediately in front of the seats. Its top edge should touch the underside of the two tubes at the top of the tunnel and the two strengthening plates fit onto the outside of the tunnel with their upper holes positioned so that they can be rivetted directly to these tubes thus preventing the aluminium walls of the transmission tunnel from taking the strains imposed by gearchanging.

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Secure this into place by drilling 6 3/16" holes each side as marked by the strengthening plates and rivetting with the 3/16" integral washer rivets provided, the lower 4 through the tunnel walls and the gearlever mounting bracket and the upper 2 into the tubes.

5.4 Fit the engine gearbox assembly into the car in the same way as detailed in 10.3 and assemble the gear linkage as in 10.4 Place the gearlever into neutral and centralise the new tunnel top around it. Locating existing riv-nuts in the tunnel carefully drill the new cover to fit using the 4 screws.

10.6. Cooling System Kit

6.1 A. Pre May 1987 chassis

The electric cooling fan should be fitted first. This bolts into place using two 3/16" x 3/4" UNF bolts and nylocs onto the steering rack crossmember and is attached to the wiring loom using the matching connectors. The (yellow) fan itself is held onto the motor using the small spring clip.

6.1 B. Post May 1987 chassis

The electric cooling fan assembly is fitted using three 6mm nyloc nuts screwed onto studs which form part of the motor. Check that the fan pulls air through the radiator rather than pushing it towards the radiator. Reverse connections if necessary.

6.2 The radiator (whether standard or increased capacity)

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attaches to the very front of the chassis by four rubber bobbins which are secured with 5/16" UNF nuts and lock washers. It does not matter which way up the radiator is fitted.

6.3 The Caterham cooling system uses a special thermostat housing/header tank arrangement which is supplied with this kit so the normal thermostat housing, if fitted, should be discarded. Drop the Caterham thermostat into place and position a greased or Hermetited gasket before bolting the housing into place using the two 5/16" x 1" UNC bolts and lockwashers.

The neck to which the top hose is attached should point forward and to the nearside. Do not overtighten the cooling fan switch unit in this housing.

6.4 The kit provides two rubber hoses for connecting the radiator to the engine as follows:

TOP HOSE: Radiator to thermostat housing

Ford 2265E OHV engine:	Part No.	594-1
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Cosworth BDR:	Part No.	594-2
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BOTTOM HOSE: Radiator to water pump

Ford 2265E OHV engine:	Part No.	594-3
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Cosworth BDR:	Part No.	594-3
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Both hoses should be a tight fit over the relevant inlet/outlet and the Jubilee clips used to secure the connections will probably need to be slackened before sliding into place.

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All connections should be fully tightened and care will be needed to ensure that hoses are clear of the chassis, cooling fan and steering gear. Remember to retighten the Jubilee clips once the engine has been warmed to prevent leakage of coolant.

6.5 Finally the overflow bottle is attached to the lefthand side of the chassis within the cruciform bracing immediately above the steering rack. (see diagram 10.7)

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The top chassis square tube is drilled and the bracket attached using the large pop rivets provided or self tapping screws. The overflow bottle is a tight fit in this space so accurate positioning of the bracket is important. The bottle cap should be drilled to take the overflow hose (^{5/8"}1/2") the other end of which attaches to the thermostat housing. Secure the overflow hose to the top hose using ty-wraps.

10.7. Engine Compartment Wiring

The wiring loom provided is designed to be used with a Ford 2265E ohv engine with a pre-engaged starter and Bosch distributor. Caterham supplied Ignition Components comply with all statutory requirements as stipulated in EEC Regulation 10 and EEC Directive 72/245.

If your engine differs from this specification the notes provided under 10.7. will help but failing this, contact

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Caterham Cars or an automotive electrician. Before going further, the battery MUST be disconnected. (refer to diagram 10.7 and the wiring diagram at the rear of this manual)

7.1 Alternator

The alternator is connected using the thick brown wires attached to two large spade terminals and a single brown/yellow wire. It does not matter which way round the large spades are connected. The brown/black wire should be connected to the B+ terminal on the alternator. If this terminal is not present (earlier alternators) this wire should be cut at its exit point from the loom taking care to insulate any bare wire.

Note that these wires are close to the exhaust manifold and we therefore recommend that the loom is routed down the diagonal and under the engine mounting to the starter and held in position using ty-wraps.

7.2 Pre-engaged Starter

The red battery lead is connected to the main bolt on (15mm) terminal.

The small white/red wire is connected to the spade terminal immediately underneath this. Do not disturb the solenoid to starter connecting wire.

7.3 Temperature Sensor

This is fitted to the cylinder head on the lefthand side, immediately below the thermostat housing. The sensor provided

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in the kit must be used since this is compatible with the car's VDO temperature gauge. Connect using the Green/Blue wire which fits sideways onto the end button of the sensor trimming its insulating sleeve as necessary.

7.4 Electric Fan Switch

This is connected using the black/green and purple wires. It does not matter which way round these are fitted.

7.5 Oil Pressure Switch

The Seven is wired to use a VDO electric oil pressure gauge and the correct sensor is provided in the miscellaneous kit. Fit this to the cylinder block on the offside above the oil filter housing. Connect this with the black wire which is secured to the switch with the nut provided.

7.6 Distributor

If Lucas transistorised ignition is fitted, the wiring for this is included within the loom and the three pin connector will fit to its equivalent on the distributor. If it is not, the low tension lead connects to the white/black wire on the loom.

7.7 Engine Earth

The engine is earthed from its righthand side top bellhousing bolt to the adjacent bolt securing the three way brake union to the chassis using the strap provided.

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7.8 Live Battery Connection

Immediately above the battery, a thick brown wire and a thin brown/black wire each terminating in an 8mm eyelet emerge from the loom. These connect to the live (+) battery terminal by the clamping bolt attaching the red lead which runs from the battery to the starter. It will be necessary to snip the red terminal cover to incorporate these wires.

This red cable is routed from the battery down to the bottom chassis tube, rearwards around the gearbox crossmember and forward again along the opposite bottom chassis tube to the starter. Secure in place with tywraps.

7.9 Alternate Specifications

a) CENTRIFUGAL STARTER

In order to use one of these (common on older engines), a separate starter solenoid will need to be fitted adjacent to the starter linked together with a suitable thick cable. The red battery lead and brown lead from the alternator should be attached to the opposite terminal to that connected to the starter, with the red and white wire attaching to a suitable spade terminal. This assumes a Lucas type solenoid is used. If not, we suggest you consult an automotive electrician.

This is not a recommended fitment especially for engines with high compression ratios. It should be noted that the ring gear on the flywheel differs according to whether a centrifugal or pre-engaged starter is fitted, these are not compatible.

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b) BDR / BDA ENGINES

The cooling fan switch position is changed and a small extension loom is available from Caterham. Similarly, the temperature sender wire will be too short and an extension is available.

7.10 Final Connection

Only when all other contacts are made should the battery be connected remembering to attach its live (+) terminal first. The earth terminal is connected to the engine mounting.

10.8. Exhaust System

8.1 The exhaust kit includes a full stainless steel exhaust system for the car which you have specified. There may be variations in specification, but all exhausts exit the engine bay at the lefthand side and run along the side of the car, under the rear axle, to the rear. (If a BDR or competition system has been specified see options)

We recommend the use of Holts Firegum or similar to seal the joints between the sections and this should be used fairly liberally during fitting to prevent 'blowing'.

8.2 Attach the exhaust manifold, which is in two pieces, to the engine using suitable gaskets and 5/16" UNC bolts.

8.3 Slide two small exhaust clamps over the bottom of the pipes and slide on the 'Y' piece which turns the system through

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the hole in the body side.

8.4 Bolt the small metal bracket to the lower nearside of the car immediately in front of the rear wheel arch using the 1" x 5/16" bolt taking care that the threaded bush is clear. The aluminium panelling may need to be relieved slightly in order to reveal the threaded bush on the chassis. The bracket when fitted should point downwards with its longer side outwards.

Attach the rubber bobbin to the top of this and tighten using a 5/16" UNF nut and lockwasher.

8.5 The main silencer is supported on this bracket and slides onto the 'Y' piece where it is secured with one of the larger clamps. The rear bracket attaches to the bobbin using a 5/16" nut and lockwasher. NB. The silencer bracket sits on top of the rubber bobbin mounted on the exhaust bracket.

8.6 Fit a further exhaust clamp over the pipe emerging from the back of the silencer and slide on the tailpipe. This should be adjusted by twisting so as to ensure it does not foul the underside of the chassis or the inside face of the rear tyre

8.7 The rear exhaust strap hangs from the bracket protruding from the chassis immediately behind the axle and this should be drilled to suit a 5/16" bolt and nyloc.

The top of the strap is secured to this bracket and the bottom should be hooked by a jubilee clip around the tailpipe.

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8.8 Finally the aluminium exhaust guard can be fitted after sliding the long jubilee clips through the channels provided in its underside. This is positioned to protect the passenger from inadvertently touching the hot silencer although care should be taken to ensure that it does not touch the bodywork.

8.9 Before the exhaust clamps are fully tightened, we suggest that you check carefully the alignment of the system to ensure that it neither lays too low, nor contacts the bodywork or the inside of the left hand rear tyre at any point.

CROSS-SECTION THROUGH TWO MODIFIED GEAR LEVERS

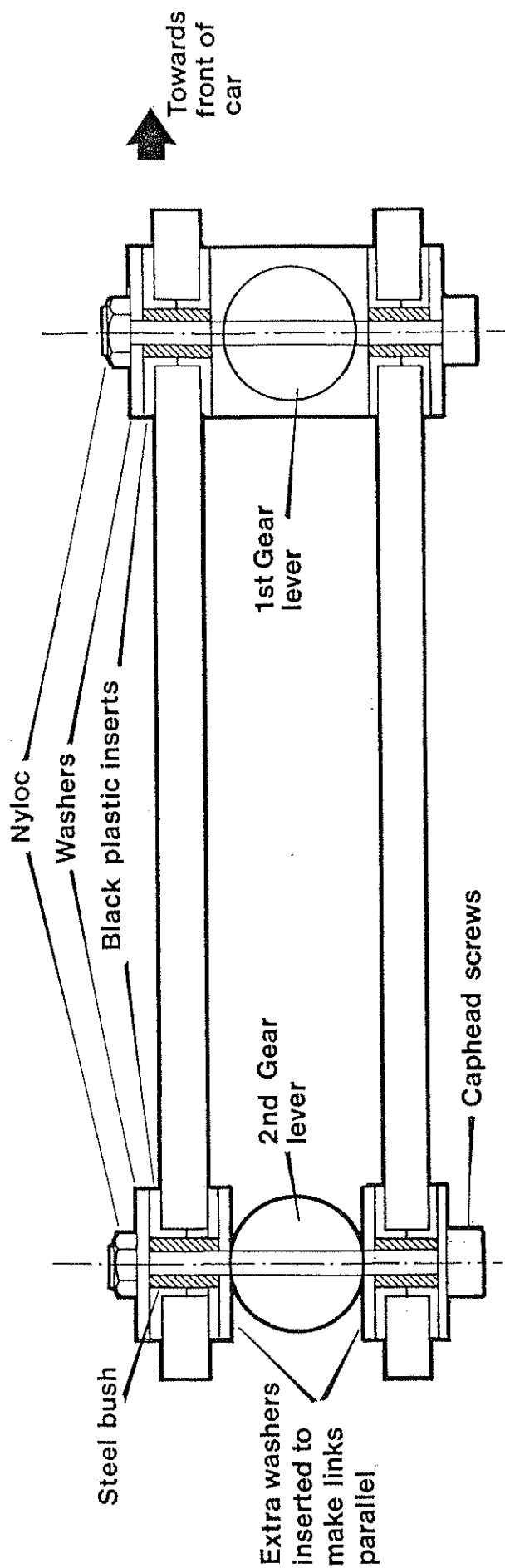


Fig. 10.2.6

Wiring Connections Under Bonnet

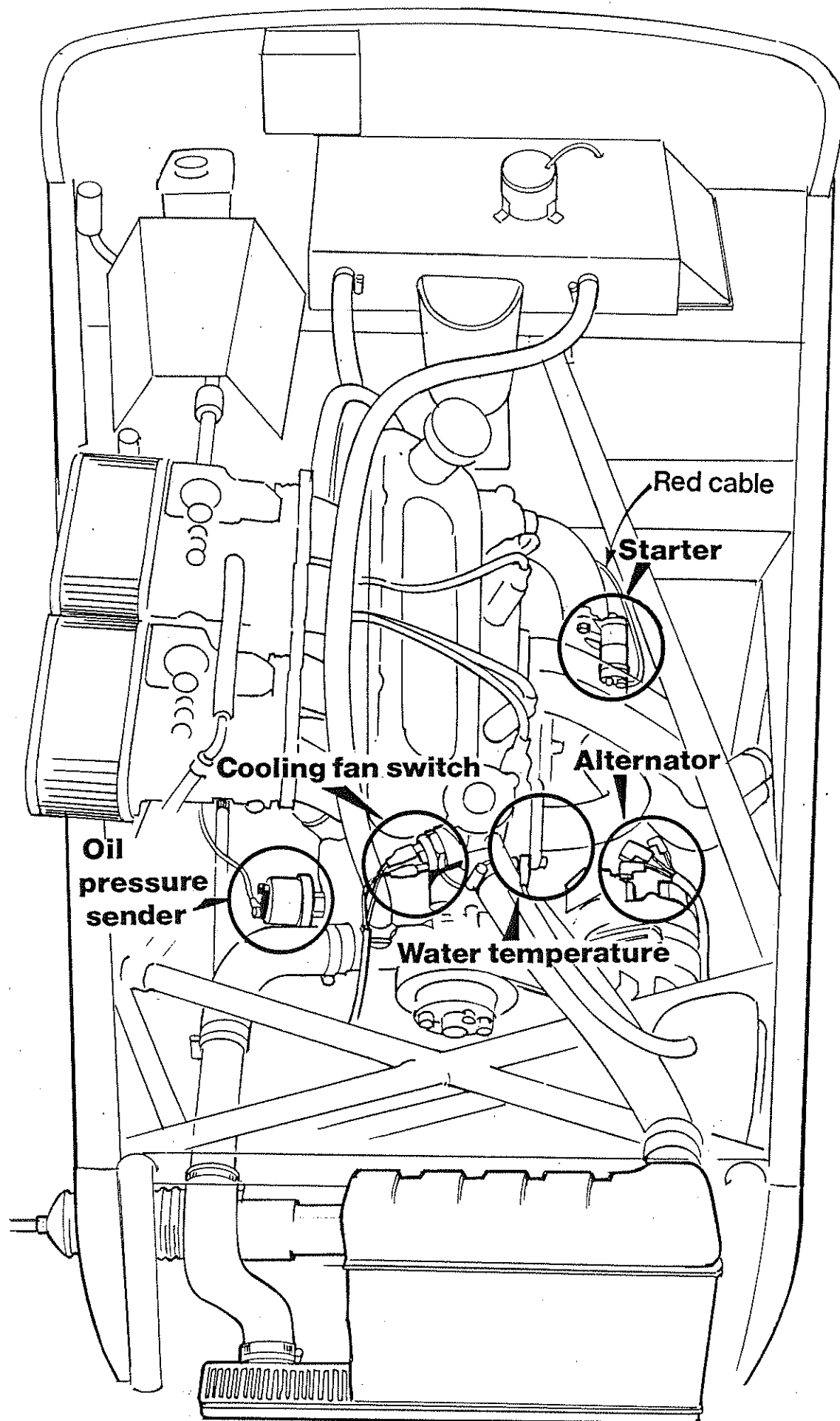


Fig. 10.7