SECTION K

COOLING SYSTEM

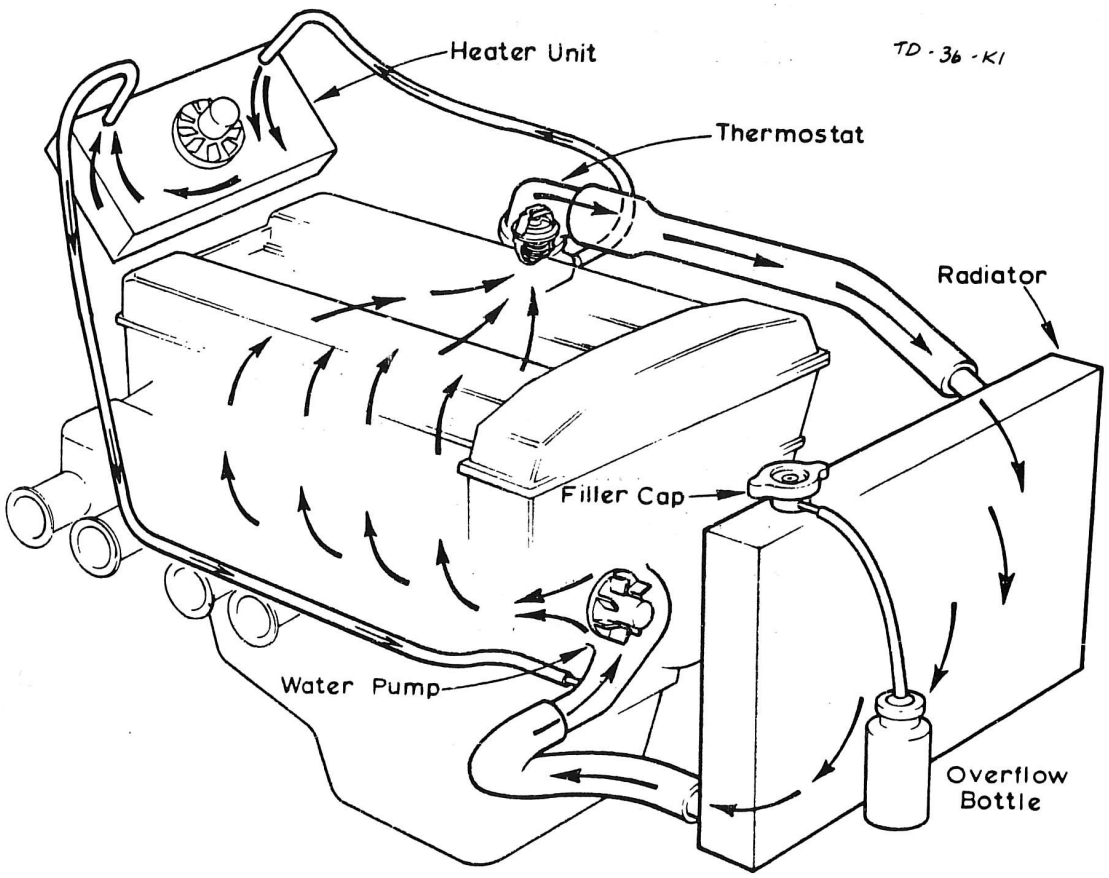

Fig. 1. COOLANT CIRCULATION DIAGRAM

K.1 - GENERAL DESCRIPTION

Coolant is drawn from the radiator through a rubber hose connection situated at the rear right-hand base of the radiator, by the pump, driven by a belt from the crankshaft. After entering the front of the cylinder block from the rear of the pump, the coolant circulates round the cylinders and passes to the cylinder head. It is returned through the outlet elbow situated at the top left-hand side of the cylinder head which also contains the thermostat, to the radiator header tank via the top water hose. Air is drawn through the radiator core by a fan attached to the belt driven pump pulley, or electric fan.

The cooling system when hot is under pressure and it must be emphasised that the filler cap be removed very carefully. The filler spout of the radiator is provided with a specially shaped cam to facilitate the operation.

Unscrew the cap slowly until the retaining tongues are felt to engage the small lobes on the end of the filler spout cam and wait until the pressure in the radiator is fully released before finally removing the cap. It is advisable to protect the hand against escaping steam if removing the cap when the system is hot.

K.2 - COLD WEATHER PRECAUTIONS

When cold weather is anticipated it is recommended that a suitable anti-freeze solution (see Section 'O') be added to the cooling system, as frost damage will not be prevented by draining the system because some water will still be left in the car heater.

Before putting anti-freeze into the cooling system ensure that the cylinder head nuts are tightened to the correct torque loadings (see TECHNICAL DATA), as any leakage of anti-freeze into the engine sump may cause serious damage. Inspect hoses, hose connections and all cooling system joints and tighten or renew where necessary.

K.3 COOLING SYSTEM

To Top-up

1) With the engine cold, remove the radiator filler cap and check the coolant level; this should be up to the bottom of the filler neck.
2) Remove the overflow bottle, rinse out and fill with clean coolant to a depth of 1 in. (25 mm) from the bottom.

To Drain

1) Remove the radiator filler cap.
2) Set heater temperature control to HOT.

3) Open drain tap in bottom of radiator.

4) Open drain tap on left-hand side of cylinder block.

CAUTION: If the cooling system is being drained while the engine is hot, take the necessary precautions when removing the filler cap (see Section 'K.1')

To Refill

1) Close radiator and cylinder block drain taps.

2) Set heater temperature control to HOT.

3) Using either clean soft water, or a pre-mixed anti-freeze solution with water, refill the cooling system pinching the radiator top hose between fingers and thumb to expel air while filling.

4) After filling, run engine for a short time and check externally for leaks.

K.4 - Fan Belt Adjustment

The adjustment of the fan belt tension is effected by slackening slightly the two generator mounting bolts and the adjustment locking bolt. Move the generator towards or away from the engine as necessary until the correct belt tension is obtained.

Tighten all bolts after adjustment.

K.5 - FAN

To Remove

1) Release the four bolts, securing the fan to the hub and pull off.

To Replace

Replacing the fan is a direct reversal of the removal procedure.

An outer fan, to convert the existing fan into a 4-bladed type, is available under Part No. 36E 6001. The outer fan may be required if extra cooling is desired.

K.6 - THERMOSTAT

To Remove

1) The thermostat is housed in the outlet on the left-hand side of the cylinder head, and is removed by first draining the cylinder block to below the thermostat level.

2) Release the clip attaching the top water hose to the water outlet, then remove bolts with their washers securing outlet to cylinder head.

3) Lift out thermostat.

To Test

1) Inspect the thermostat for visual signs of deterioration and discard it if the valve is worn, distorted or corroded.
2) If there are no obvious signs of deterioration, check the operation of the thermostat by immersing it in a vessel containing water which is being gradually heated. With a thermometer, read off the temperature at which the valve begins to open. It should start to open within 3°C. of the temperature given in 'TECHNICAL DATA' and continue to rise to the fully open position.
3) If the thermostat fails to pass these simple tests it should be replaced with a new unit.

To Replace

1) Replacing the thermostat is a direct reversal of the removal procedure.

K.7 - RADIATOR

To Remove

1) Remove the bonnet (see Section 'B').
2) Drain the cooling system (Section 'K.3') retaining the coolant if an anti-freeze solution is being used.
3) Release the clips from the forward ends of bottom water hoses. Pull off hoses from their locations on the radiator. Pull off the overflow hose between radiator and expansion bottle.
4) From each side flange of the radiator, remove two bolts with their nuts and washers securing the radiator to its mounting brackets. Lift out radiator from its location.

To Replace

1) Place radiator in position and secure to its mounting brackets.
2) Re-attach top and bottom water hoses and secure with their clips. Replace the overflow hose.
3) Check that the fan is between $\frac{1}{8}$ in. to 3/16 in. (3 to 5 mm.) from the radiator matrix.
4) Close both the radiator and cylinder block drain taps and refill cooling system (Section 'K.3').
5) Replace the bonnet (see Section 'B').

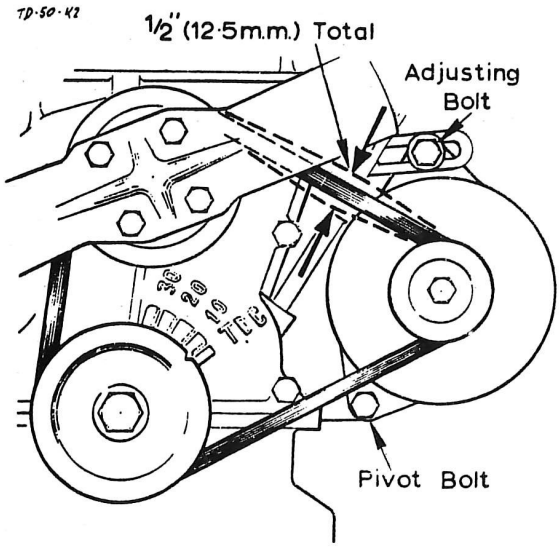

Fig. 2. CORRECT FAN BELT TENSION

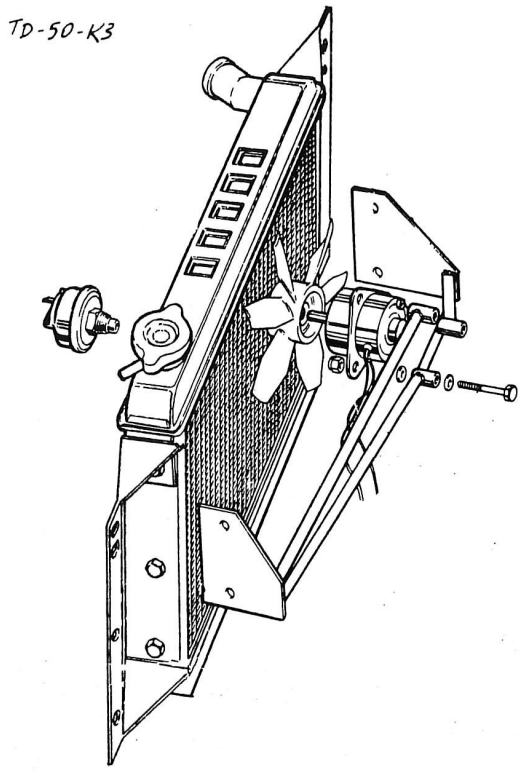

Fig. 3. ELECTRIC FAN COMPONENTS

Radiator Mounting

From Chassis No. 50/1510 the radiator mounting bracket has been repositioned to lower the radiator to provide more clearance between filler cap and bonnet. Remove the 5/16 in. fixings and replace with 1/4 in. fixings, see below:-

XUFS 0409	Setscrew	4 off
AO4W 1606	Plain washer	4 off
YUFN 040F	Nyloc nut	4 off

K.8 - ELECTRIC COOLING FAN

To Remove

The electric cooling fan is fitted to all 'S' type cars and those with Zenith -Stromberg carburettors. It is removed as follows:-

1) Remove the bonnet (see Section 'B')
2) Disconnect the battery and release the two motor cables from their respective locations. (one to fuse unit, one to thermal control switch)
3) Supporting the fan/motor assembly with one hand, release the 3 bolts securing it to its mounting bracket,
4) The bracket is removed by releasing the fixings at each side.

To Replace

1) Replacement is a direct reversal of the removal procedure.

K.9 - ELECTRIC COOLING FAN

The electric cooling fan can be fitted as an accesory to existing cars in the following manner.

To Fit

1) Drain the cooling system (Section 'K.3').
2) Attach fan (36K6013) to the motor (36K 6014) with the 2BA grubscrews supplied.
3) Bolt fan and motor assembly to the mounting bracket (50K 0069 with radiator A50K 001 or A50K 0069 with radiator A26K 001) such that the fan will be adjacent to the radiator, using 3 bolts (XUFB 0424), 6 plain washers (A04W 0905) and 3 self locking nuts. (LUFN 040F)

4) Bolt bracket to radiator using the lower of the two mounting holes with existing fixings. Drill through upper mounting hole and attach to radiator. Flange with 1 bolt (XUFB 0512) 1 plain washer (A50W.1007) add 1 self-locking nut (LUFN 050F) at each side.

5) Cut, the top water hose approximately mid-way along its length and remove 1½ in. (38.mm) of hose. Insert hose adaptor (36K 6016) and secure with two clips (36K 6004). Screw thermal control switch (36K 6015) into adaptor, ensuring a tight fit.

6) It will be noticed that the motor is supplied with two long cables attached. The longer of the two is cut to a length of 24 in. (61.cm) and a ⅜ in. (.9.5mm) ring terminal fitted; attach to main earth bobbin adjacent to front LH suspension mounting upright. The other cable on the motor is fitted with a ¼ in. female 'Lucar' terminal with sleeve (to insulate it), then attached to one terminal on the thermal control switch.

7) The cut piece of cable should be fitted with a ¼" female 'Lucar' terminal and sleeve at each end. One end is attached to the remaining terminal on the thermal control switch, while the other end is fitted to an "ignition live" terminal on the fuse unit.

8) Extract the securing bolts and remove the existing metal fan blade and discard. Replace the bolts to retain the pulley and hub.

9) Check the installation of the electric fan to ensure that it commences to operate at between 81°C. and 89°C.

K.10. - ENGINE COOLING

Where extra cooling is required (in addition to the extra fan blade shown in Section 'K.5'), the following is recommended:-

Cool Conditions - The current practice is to fit a thermostat which has an opening temperature of 78° C. A higher setting thermostat of 88° C. (Part No. 36 E 6002) is available where conditions dictate.

Hot Conditions - It is recommended that a lower setting thermostat of 71° C. (Part No. 36 E 6003) is used.

Thermal Switch

Where an electric fan is fitted, the switch should be checked to ensure that it cuts in at the correct temperature, which is:-

90° C. with either 71° C. or 78° C. thermostat, or
95° C. with 88° C. thermostat.

The switch is adjusted as follows:-

1. Remove the nylon plug from the switch to expose the adjusting screw.
2. Turn the screw clockwise to lower the temperature, or anti-clockwise to raise the temperature.

3. Note that the screw at the centre of the switch is for the air gap at the contacts: the screw must not be altered as this will invalidate the Warranty.

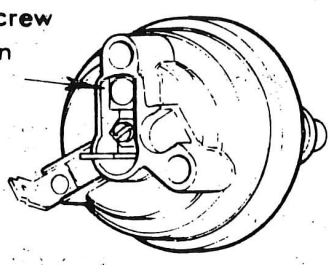

Fig. 4. THERMAL SWITCH

Topping-up the Cooling System

Further to paragraph '2' of Section 'K.3', the radiator overflow bottle should be refilled with at least 1 pint (1.2 US pints· .57 litres) of coolant.

With the bottle refitted, the overflow tube must be an airtight fit on both the bottle and the radiator. The tube must also reach to the bottom of the bottle, but must be cut off at an angle of 45° to allow free passage of the coolant.

Refilling the Cooling System

Before starting to refill the cooling system, the car should be on level ground. Ideally, a 'nose-up' attitude is better to ensure a minimum amount of air being drawn into the system along with the coolant.

Testing the Thermostat

Equipment for testing the thermostat can be obtained from:-

AC- Delco Ltd.,
Dunstable,
Bedfordshire, England.

Radiator Filler Cap

Correct pressurizing of the cooling system is of great importance, this depending on the radiator cap being in good condition. If the rubber sealing gasket (on spring assembly) is damaged, the complete cap should be replaced. Test also that the spring assembly is functioning correctly, or is not fatigued. Again, purpose-designed equipment is available from AC - Delco Ltd.

The radiator cap rubber/asbestos seal (Part No. 36 K 6002) should also be replaced if faulty, or missing.

All cars are now suppled with a 10 lbs.in.sq. (.70 kg.cm.sq.) radiator cap and improved efficiency can be obtained by using this cap, instead of the previously fitted 7 lbs.in.sq. (.49 kg.cm.sq.). Coolant boiling points are given on the following page.

Coolant Boiling Points under Different Conditions

Radiator Cap	Normal Coolant	25% Anti-freeze	30% Anti-freeze	35% Anti-freeze	50% Anti-freeze
7 lbs.in.sq. (.49 kg.cm.sq.)	111.4°C.	113.9°C.	114.6°C.	115.5°C.	118.6°C.
10 lbs.in.sq. (.70 kg.cm.sq.)	115.9°C.	118.4°C.	119.1°C.	120.0°C.	123.1°C.

ADDITIONAL INFORMATION

Thermal Switch

In addition to the information published on page 'K.8', the following will be of further assistance when adjusting the thermal switch:

To adjust for a LATER (Higher) temperature:

1. Allow the engine temperature to rise by leaving the engine idling until the fan cuts 'in'.
2. Only then, turn the adjusting screw (see Fig. 4 on page 9) anti (counter)-clockwise until the fan cuts 'out', using no undue pressure either in a downwards or sideways direction.
3. The fan should be left to cut 'in' at a slightly higher temperature and once this occurs, the same adjustment should be made to cut the fan 'out'. Once this has been achieved, immediately stop turning the adjustment screw and again wait for the fan to cut 'in'. It may be necessary to complete a series of 'trial and error' operations until the required cut 'in' temperature is achieved.
4. If the adjusting screw has been turned beyond two full 360° turns it may be necessary to turn the screw in a clockwise direction, thus re-calibrating the differential (time between cut 'in' and cut 'out'). It will only be necessary to turn it one half of the last turn made in an anti (counter)-clockwise direction.

To adjust for an EARLIER (Lower) temperature:

1. Allow the engine temperature to rise by leaving the engine idling. When the temperature gauge reaches the temperature at which the fan is required to operate, the adjusting screw should be turned clockwise until the fan starts, using no undue pressure in a downwards or sideways direction.
2. If more than one full turn has been necessary to enable the fan to operate, the differential may have been extended by the adjustment carried out. To counteract this, the screw should be turned anti (counter)-clockwise, one third of the turn last

turned clockwise. It therefore follows that each adjustment of the screw should be noted so that any adjustment of the differential may be carried out at a later date if required.

3. It is not advisable to turn the adjusting screw BEYOND three full turns.

K.11. - RADIATOR RECUPERATOR BOTTLE

On current production cars, the radiator recuperator bottle has been repositioned as a contribution towards improved grouping of the components on the right-hand side of the engine compartment.

To modify existing cars to the new condition, the following procedure is recommended.

1. Detach the trunking between air box and air cleaner (see Section 'L') to improve access.
2. Disconnect the recuperator bottle tube from the radiator overflow pipe and lift bottle from its bracket. Remove the bracket by releasing the securing bolts.
3. Using the bracket as a template, drill two .1875 in. (4.763 mm.) holes in the R/H side flange of the radiator (see Fig.5), so that the bracket can be mounted vertically on the rear face of the side flange. Secure the bracket with the original fixings.
4. Refit the recuperator bottle, ensuring that there is sufficient coolant in it and that the tube is an airtight fit on both the bottle and the radiator (see also Section 'K.10'). The rubber tube may be shortened as necessary.
5. Replace the air trunking at the air box.

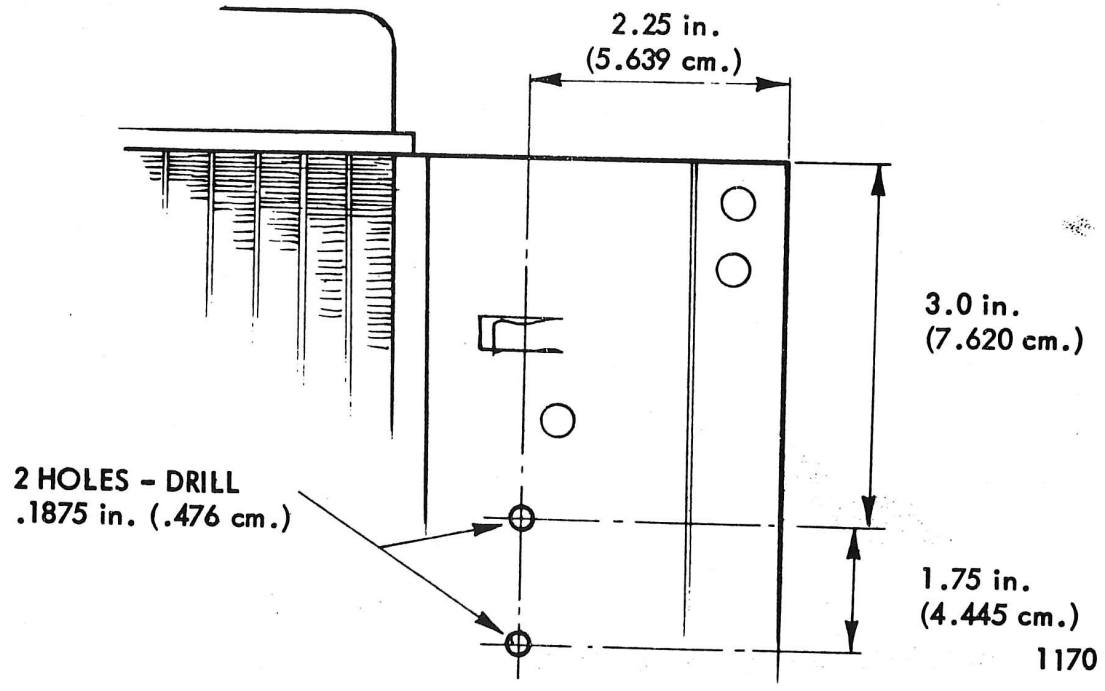

Fig. 5. RECUPERATOR BOTTLE MOUNTING

K.12 - RADIATOR BLANKING PANELS

To further improve the cooling system, 'S130' models are fitted with a blanking panel (Part No. A050 K 0081) below the radiator, and panels at each side of the radiator (Part No. A050 K 0082 R/H; A050 K 0083 L/H).

In conjunction with the blanking panels, foam rubber strips (Part No. A050 K 0084 L/H; A050 K 0085 R/H), are attached to the underside of the bonnet.

K.12 - THERMAL SWITCH, ELECTRIC COOLING FAN

The existing thermal switch (Kenlowe) is no longer available as a service replacement part, therefore if the switch becomes faulty, it should be replaced with a new switch manufacturered by 'Otter'. The new 'Otter' switch is being fitted in current production. Fitting procedure is as follows:-

a. Drain the radiator.

b. Disconnect the battery (see Section M).

c. Using a hole-saw, cut a 27/32in. diameter hole in the front left-hand corner of the top of the radiator (see Fig. 6).

d. Insert the grommet (Part No. A036 K 6027) into the hole, followed by the 'Otter' switch (Part No. A036 K 6026). NOTE WELL THAT A DRY JOINT MUST BE USED.

e. Shorten the existing switch cable to reach the new switch location. Slide the terminal cover (Part No. A036 M 6414) onto the cable, attach the terminals (Part No. A036 M 6415) one to each lead, fit terminals to switch and slide cover into position.

f. Remove faulty 'Kenlowe' switch and seal hole in radiator with plug (Part No. A036 K 0090).

g. Refill cooling system and re-connect the battery.

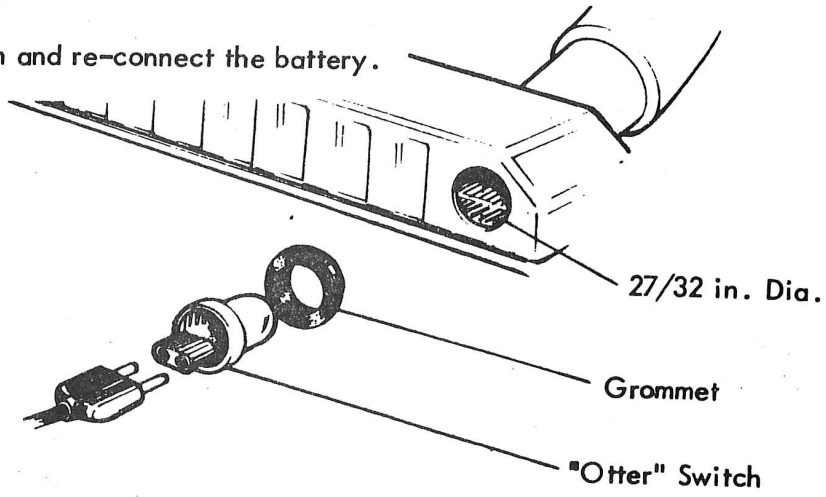

Fig. 6 "OTTER" TERMINAL SWITCH