

## SECTION K

### COOLING SYSTEM

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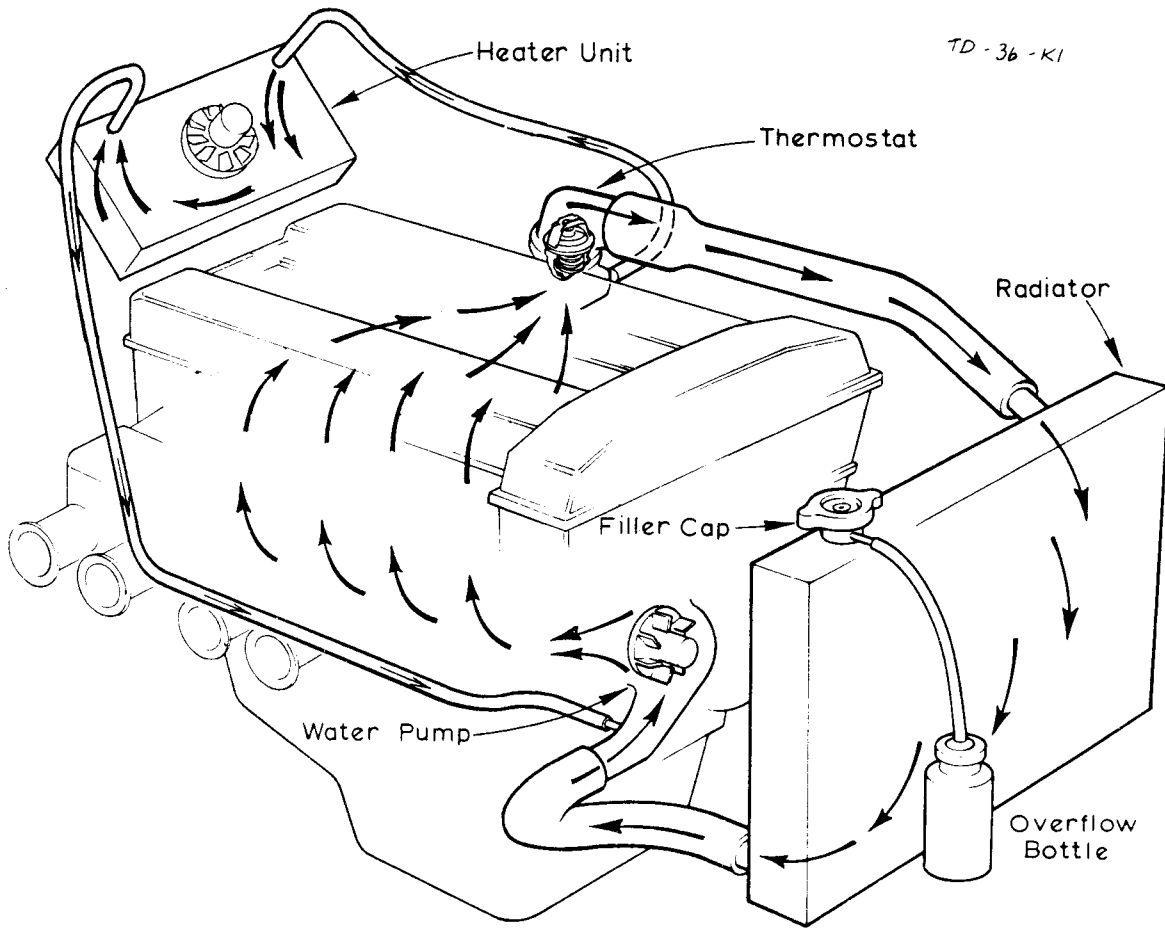


Fig. 1. COOLANT CIRCULATION DIAGRAM

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 SYSTEMTo 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 (where fitted), rinse out and fill with clean coolant to a capacity of at least 1 pint (1.2 US. pints; .57 litres).
3. 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.

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. Before starting to refill the 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.
2. Close radiator and cylinder block drain taps.
3. Set heater temperature control to HOT.
4. 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.
5. 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. - FANTo 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. 36 E 6001. The outer fan may be required if extra cooling is desired.

K. 6. - THERMOSTATTo 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 30° 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.
4. Alternatively to item '2', equipment for testing the thermostat can be obtained from:-

AC - Delco Limited,  
Dunstable, Bedfordshire,  
England.

Alternate Thermostat

The current practice is to fit a thermostat which has an opening temperature of 78° C. However, where climatic conditions dictate, it may be advisable to fit an alternative; a 71° C. thermostat (Part No. 36 E 6003) is available for use in very hot conditions, and a 88° C. (Part No. 36 E 6002) thermostat can be used for very cold conditions, this latter one ensuring that the engine operates at a higher temperature.

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 top and bottom water hoses. Pull off hoses from their locations on the radiator. Pull off the overflow hose between

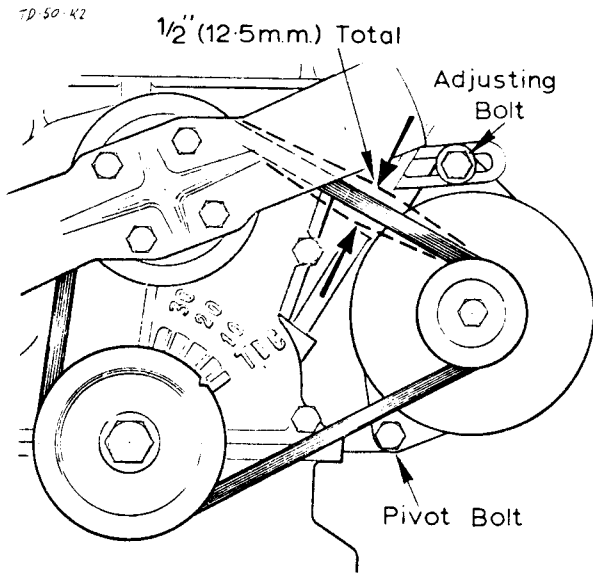


Fig. 2. CORRECT FAN BELT TENSION

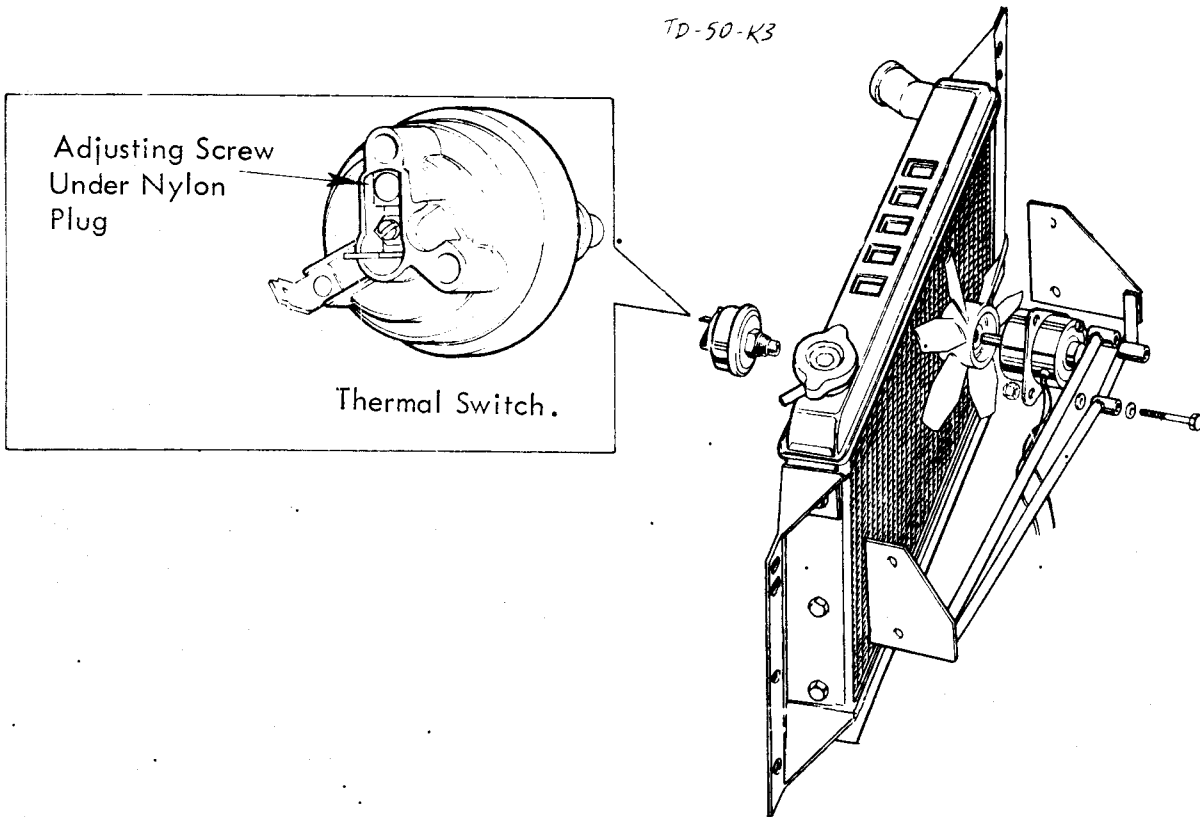


Fig. 3. ELECTRIC FAN COMPONENTS

radiator and expansion bottle (where fitted).

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. On Series 1 and 2 cars, the radiator securing nuts are situated on the underside of the body shell.

#### To Replace

1. Place radiator in position and secure to its mounting brackets. Note that on Series 1 and 2 cars, mounting studs are attached to the underside of the radiator, these in their turn passing through rubber blocks and then through the body shell. Washers and 'Nyloc' nuts are used for the retention of the radiator.
2. Re-attach top and bottom water hoses and secure with their clips. Replace the overflow hose.
3. Check that the fan is between 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').

#### Radiator Mounting

From Chassis No. 8900 the radiator mounting bracket has been repositioned by .25 in. (6.35 mm.) to lower the radiator to provide more clearance between filler cap and bonnet.

#### 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.

Equipment for testing the radiator cap can be obtained from AC - Delco Limited. The radiator cap rubber/asbestos seal (Part No. 36 K 6002) should also be replaced if faulty, or missing.

### K.8. - ELECTRIC COOLING FAN

#### To Remove

The electric cooling fan is fitted to all cars with Zenith-Stromberg carburetters. 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 accessory to existing cars in the following manner:-

#### To Fit

1. Drain the cooling system (Section 'K.3').
2. Attach fan (36 K 6013) to the motor (36 K 6014) with the 2BA grub screws supplied.
3. Bolt fan and motor assembly to the mounting bracket (A50 K 0069) 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) and 1 self-locking nut (LUFN 050F) at each side.
5. Cut the top water hose approximately mid-way along its length and remove  $1\frac{1}{2}$  in. (38 mm.) of hose. Insert hose adaptor (36 K 6016) and secure with two clips (36 K 6004). Screw thermal control switch (36 K 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  $\frac{3}{8}$  in. (9.5 mm.) 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  $\frac{1}{4}$  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  $\frac{1}{4}$  in. 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. - WATER TEMPERATURE SENDER UNIT

The water temperature sender unit is of the bulb type which is attached by a capillary to the combined water temperature/oil pressure gauge. If either the sender unit or the gauge is suspected of being faulty, then the whole assembly must be replaced.

To Remove

1. Release the union nut retaining the capillary into the thermostat housing.
2. Release the clips securing the capillary to both the heater water valve and to the body foot well.
3. From behind the facia panel, pull out the instrument lighting bulb. Release the union nut securing the oil pressure pipe to the gauge. Remove the knurled nuts securing the instrument retaining strap.
4. Pull out the sender unit bulb from the thermostat housing, straighten coils in the capillary, push rubber grommet from its location in the bulkhead (to enable the sender bulb to pass through).
5. From the front of the facia panel, pull out the combined gauge with capillary and sender bulb attached.

To Replace

1. Ensure that the rubber grommet is on the capillary before fitting new gauge. Secure gauge in facia panel by reversing the removal procedure. Replace oil pressure pipe and instrument lighting bulb. Fit grommet into bulkhead.
2. Insert sender unit bulb into its location in the thermostat housing and secure with its union nut.
3. Using a suitable can of 2.5 in. (6.3 cm.) diameter, add two or three coils to the capillary as an anti-vibration measure. Clip the capillary to the heater water valve and to the body foot well.

K.11. - ENGINE COOLING

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

A plate (Part No. 36 B 1145) is available to blank off the steering unit aperture

behind the radiator, its purpose being to deflect air on to the radiator rather than below it. Additionally, a higher setting thermostat of 88° C. (Part No. 36 E 6002) is also available.

For hot conditions it is recommended that a 71° C. thermostat (Part No. 36 E 6003) is used. Additionally, the air flow behind the radiator can be improved by cutting two holes of 2.5 in. (6.35 cm.) diameter in the LH wheel arch, then covering with a wire mesh (Part No. 36 B 1525), to prevent stones, etc., being flung into the engine compartment by the road wheel. Use 6 'pop' rivets of .125 in. (3.17 mm.) diameter and .5 in. (12.7 mm.) long for the retention of the wire mesh. A plain washer of .125 in. (3.17 mm.) internal diameter should be used on either side of the mesh, in conjunction with the rivets.

### Electric Fan

Where an electric fan is fitted, the raising of the fan on its mounting will also lead to an improvement in cooling.

1. Remove the bolts securing fan bracket to the radiator. Raise the bracket by the distance between the two mounting holes (2.25 in.; 5.7 cm.), then replace bolts in lower mounting holes.
2. To eliminate the possibility of the bracket tipping forwards, drill a .1875 in. (4.76 mm.) hole from the inside flange of the radiator and fan mounting bracket on the LH side and secure with a 2BA bolt and Nyloc nut.

### Thermal Switch

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

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

Note that there are two screws on the head of the switch, the centre one being for the air gap at the contacts; the screw **MUST NOT** be altered as this will invalidate the Warranty. The adjusting screw is concealed beneath the nylon plug.

To adjust for a LATER 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. 3 on page 6) 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 on the last turn made in an anti(counter)-clockwise direction.

To adjust for an EARLIER 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 either 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 necessary 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.12 - RADIATOR BLANKING PANEL

To further improve the cooling system, 'Sprint' models are fitted with a blanking panel (Part No. B036 K 0076) below the radiator.

#### K.13 - 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 manufactured 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 27/32 in. 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.

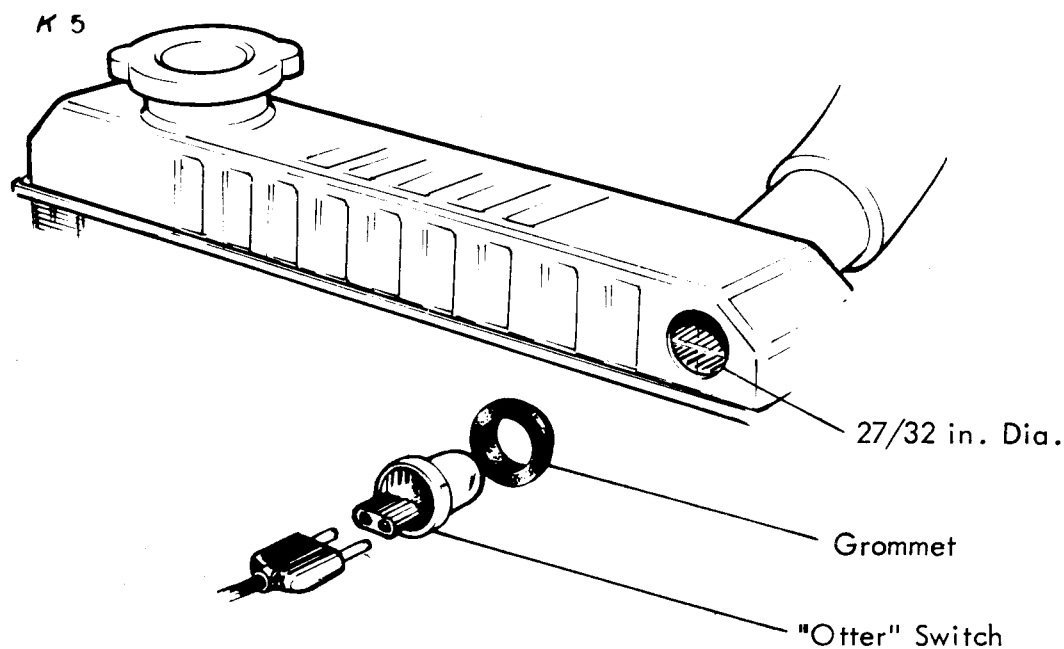


Fig. 6 "OTTER" THERMAL SWITCH