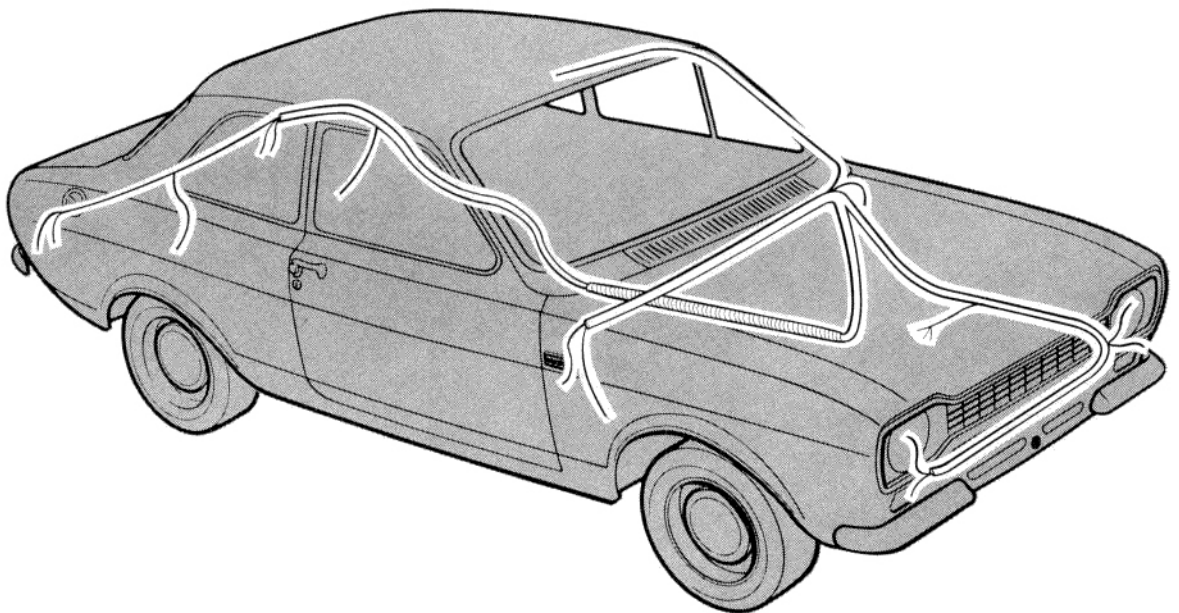


10

ELECTRICAL SYSTEM



ESCORT TWIN CAM

SECTION INDEX

GENERAL DESCRIPTION

This section of the manual only contains information relevant to the Twin Cam Escort which is different from that for the remainder of the Escort range.

CHARGING SYSTEM

SERVICE AND REPAIR OPERATIONS

OPERATION 10001-M CHARGING CIRCUIT – TEST AND ADJUST

IGNITION SYSTEM

SERVICE AND REPAIR OPERATIONS

OPERATION 12100-A DISTRIBUTOR ASSEMBLY – REMOVE AND INSTALL

„ 12100-A1 Extra: distributor cap – remove and install (distributor removed)

„ 12100-A2 Extra: condenser – renew (distributor cap removed)

„ 12100-A3 Extra: points – renew (distributor cap removed)

„ 12100-A4 Extra: distributor breaker plate assembly – remove and install (distributor cap removed)

„ 12100-A5 Extra: distributor breaker plate assembly – overhaul (breaker plate removed)

„ 12100-A6 Extra: governor weights and springs – renew (breaker plate removed)

„ 12100-A7 Extra: vacuum unit – renew (breaker plate removed)

„ 12100-A8 Extra: distributor – overhaul (governor weights and vacuum unit removed)

„ 12100-B **GOVERNOR WEIGHTS AND SPRINGS – RENEW**
(Includes OPS 12100-A, A1, A4 and A6)

„ 12100-C **VACUUM UNIT – RENEW**
(Includes OPS 12100-A, A1, A4 and A7)

„ 12100-D **DISTRIBUTOR – OVERHAUL**
(Includes OPS 12100-A, A1, A2, A3, A4, A5, A6, A7 and A8)

„ 12100-E DISTRIBUTOR ASSEMBLY – TEST AND ADJUST

„ 12199-A CONTACT BREAKER POINTS – RENEW
(DISTRIBUTOR IN SITU)

WIRING SYSTEM

COLOUR CODES

WIRING DIAGRAMS

GENERAL DESCRIPTION

The electrical system is of 12 volts with a negatively earthed battery, in line with latest practice. The lead-acid battery, of either 38 or 57 amp. hour capacity, is mounted on a tray in the luggage compartment. A conventional generator, of either 22 amp. or 25 amp. maximum output, is used to charge the battery. This is mounted on a bracket at the left-hand side of the engine, and is driven at $1\frac{1}{2}$ times engine speed by the fan belt. A three-bobbin regulator controls the generator output by inserting a resistance in the field coil circuit. The three bobbins are the cut-out, the voltage regulator and the current regulator.

The inertia starter motor is fitted on the lower right-hand side of the engine. It engages with the ring gear shrunk onto the engine flywheel. Current is supplied to the motor by a solenoid switch controlled by the ignition switch on the steering column shroud.

The ignition system consists of a Lucas distributor, an oil filled coil and Autolite Powertip spark plugs. The distributor is mounted on the right-hand side of the engine, and driven by a skew gear from the camshaft.

The ignition advance is controlled according to engine speed by governor weights within the distributor body. The oil filled coil is used in conjunction with a special starter solenoid, and a ballast resistor wire. This arrangement ensures that during starting, full battery voltage is applied to the coil to facilitate engine firing. All high tension leads are of the suppressor type.

The two main instruments comprise a speedometer, incorporating a main beam warning light, and a tachometer. Separate fuel, coolant temperature gauges, a battery gauge, and an oil pressure gauge are mounted to the right of the main instrument cluster. The generator and direction indicator warning lights are mounted between the two main instruments.

Headlamp dipping and flashing, together with direction indicator and horn controls are combined in a single steering column lever. The driving light switch is mounted to the left of the steering column, and the fan boost switch is located to the left of the heater controls. The ignition switch is located on the right of the steering column shroud.

The windscreen wiper switch is mounted directly below the driving light switch and to the left of the cigar lighter. A separate washer button is located on the floor to the left of the clutch.

The wiring loom is in four sections. The main loom connects all the instruments, controls and warning lights, stop light switch and interior light. The left-hand loom connects the left-hand front lights, horn, temperature sender unit, generator and regulator. The right-hand front lights, battery, oil pressure warning light switch, ignition and starting systems are connected by the right-hand loom. The rear lights, number plate light and fuel tank gauge unit are connected by the rear loom.

ESCORT TWIN CAM

CHARGING SYSTEM

SERVICE AND REPAIR OPERATIONS

OP 10001-M CHARGING CIRCUIT - TEST AND ADJUST

To isolate the source of any charging system fault, the following checks should be carried out:—

The following gives all the information required to check and adjust all parts of the charging system. Normally, the area of the fault will be pin-pointed with diagnosis equipment, and only that part of the system will require attention. For this reason, this operation should not be considered as a basic repair operation.

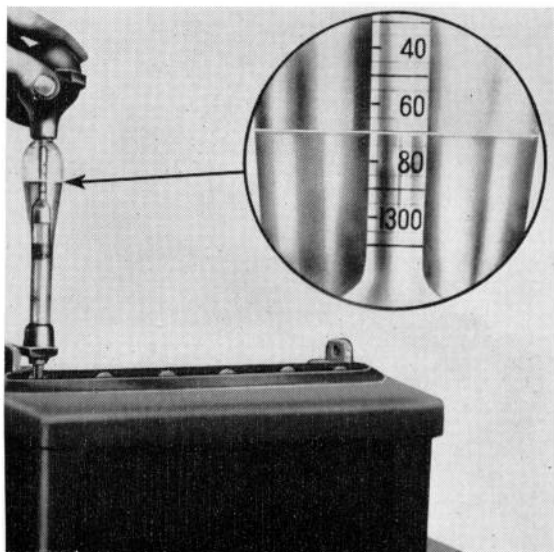
1. Fan belt tension

Check, and if necessary adjust, the fan belt to give $\frac{1}{2}$ in. (13 mm.) total free movement at a point mid-way between the generator and water pump pulleys. Tighten the mounting bolts and adjusting strap screw to the specified torque.

2. Battery condition

(a) Ensure that the battery exterior is clean and free from cracks and corrosion particularly around the terminals.

(b) Check the specific gravity with a hydrometer. If the electrolyte level is less than $\frac{1}{4}$ in. (7 mm.) above the plates, distilled water should be added and the battery bench charged for at least one hour before carrying out the check. Draw enough electrolyte into the hydrometer to make the scale float. Repeat the test for each cell.



Checking Battery Specific Gravity

(c) The following table relates the specific gravity to the battery condition at 16°C (60°F):—

<i>Hydrometer Reading</i>	<i>Battery Condition</i>
1.280	Fully charged
1.240	75% charged
1.200	50% charged
1.160	25% charged
1.120	Discharged

If the electrolyte temperature varies from 16°C (60°F), adjust the reading obtained as follows:—

Add 0.004 for every 5½°C (10°F) above 16°C (60°F)

Subtract 0.004 for every 5½°C (10°F) below 16°C (60°F)

For example:—

1.272 specific gravity at 27°C (80°F)
 = 1.272 + 0.008
 = 1.280 at 16°C (60°F), i.e. battery fully charged.

1.204 specific gravity at 10°C (50°F)
 = 1.204 - 0.004
 = 1.200 at 16°C (60°F), i.e. battery 50% charged.

(d) If one cell is about 0.003 lower than the rest it is possibly failing. An extended bench charge may revive it.

If the readings are irregular, with one or more cells 0.050 lower than the rest, the battery is not fit for further use.

If the readings are reasonably uniform, the battery is probably healthy, although low readings indicate a bench charge is required.

(e) Take a high rate discharge test across the battery terminals.

If a hand test instrument is used, push the probes onto the battery terminals and hold for 10 seconds. Note the voltmeter reading for the 10 seconds.

If a test set (such as Crypton, Ford and Sun) is used, connect the ammeter and voltmeter to the battery terminals: negative to negative and positive to positive. Turn the control knob to give an ammeter reading of 150 amps. Note the voltmeter reading for 10 seconds.

In both tests there should be virtually no voltage fall-off and the reading should be approximately 7.2 to 9.5 volts.

Any appreciable drop-off or a voltage of less than 5 volts indicates that the battery has reached the end of its useful life.

DIAGNOSIS CHART OF TEST RESULTS

Specific Gravity Readings	High Rate Discharge Test Readings	Battery Condition
Readings uniform and within Range 1.260-1.280	Readings High and Steady	Healthy and in reasonable State of Charge
Readings uniform but lower than 1.260	Readings Low and Steady	Healthy but requires Charging
One cell about 0.030 lower than remainder	Reading shows Falling Voltage	Probable Failing Cell
Irregular Readings more than one cell 0.050 lower than remainder	Reading Low and showing rapid fall	Battery at End of life
Very Low Readings	Very Low Voltage	Battery has internal fault or is in deeply sulphated condition

The High Rate Discharge Test and the Specific Gravity Test are complementary, no advantage will be gained by performing one test and not the other.

3. Generator Output Test

- (a) Disconnect the wires from the "D" and "F" regulator terminals and join them together.
- (b) Connect a 0-30 voltmeter between this junction and earth.
- (c) Run the engine at approximately 1,000 rev./min.
NOTE - Do not exceed this speed or the generator may be damaged.
- (d) The voltmeter reading should rise rapidly without fluctuation to more than 24 volts.
- (e) Should the reading be incorrect, connect a jumper wire between the "D" and "F" terminals on the generator, and connect the voltmeter between this wire and earth.
- (f) If the reading is now more than 20 volts, the continuity of the "D" or "F" leads is suspect. If the reading is still incorrect, there is a fault in the generator.

4. Test and Reset if Necessary the Regulator Open Circuit

- (a) Remove the connecting block from the regulator.
- (b) Insert the blade of a small screwdriver between the block and the terminal, depress the spring clip, and remove each terminal in turn.
- (c) Replace each wire onto the regulator, with the exception of the wire(s) on the terminal "B".
- (d) If two wires have been removed from the "B" terminal, these should be connected together.
- (e) Connect a voltmeter between the "WL" terminal and the regulator base.
- (f) Start the engine and increase its speed to 2,000 rev./min.
- (g) Note the voltmeter reading which should be steady and between the limits shown in column 2.

In this case the unit will require no further attention.

(h) Should the voltage lie outside the values shown in column 3 this will indicate a constructional fault in the unit, and it should be replaced.

(i) If the voltage values lie outside those given in column 2, but within those given in column 4, the unit should be reset as follows to the values given in column 5.

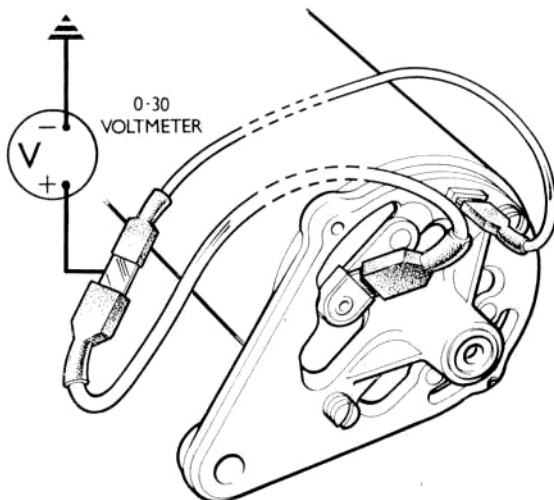
(j) Drill out the plastic rivets and remove the cover.

NOTE — The top cover must not be removed during the Warranty Period.

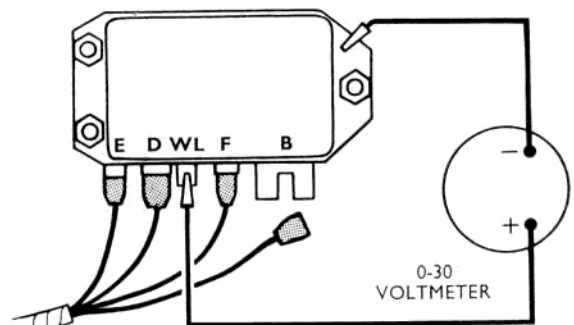
(k) With the engine speed as quoted above, turn the adjustment cam with the Lucas Tool No. 54381742; clockwise to raise the voltage setting and anti-clockwise to lower the voltage setting.

Column 1	Column 2	Column 3	Column 4	Column 5
<i>Ambient Temperature</i>	<i>Voltage Checking Limits</i>	<i>Voltage Failure Limits</i>	<i>If between</i>	<i>Reset to</i>
10°C (50°F)	14.5 to 15.8	14.1 to 16.3	14.0 to 14.5	14.5
			15.8 to 16.3	15.8
20°C (68°F)	14.4 to 15.6	14.0 to 16.0	14.0 to 14.5	14.5
			15.5 to 16.0	15.5
30°C (86°F)	14.3 to 15.3	13.8 to 15.8	13.8 to 14.3	14.3
			15.3 to 15.8	15.3
40°C (104°F)	14.2 to 15.1	13.6 to 15.6	13.8 to 14.3	14.3
			15.0 to 15.5	15.0

NOTE — The figures given above are the "cold" setting values, i.e. the unit should be allowed to cool to the ambient temperature shown in column 1. The readings obtained will be incorrect if this procedure is not followed.



Generator Output Test



Open Circuit Voltage Test

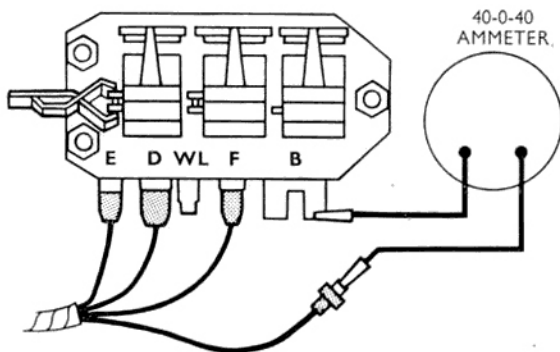
- (l) Reduce the engine speed and then raise it to the previously stated speed to check the setting.
- (m) If the voltage continues to rise with engine speed, check the regulator to body earth, then replace the regulator.
- (n) Refit the cover using spire clips and self-tapping screws.
- (o) Remove the voltmeter, refit the terminals into the connecting block and replace the block.

5. Test and Reset if Necessary the Current Regulator Bobbin

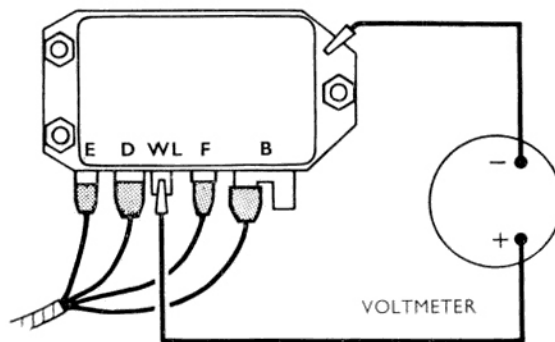
- (a) The voltage regulator bobbin must be rendered inoperative by holding the points together with a spring clip (if the vehicle warranty has expired), or by earthing the terminal "WL", through a $\frac{1}{2}$ ohm resistor capable of carrying 30 amps, to the regulator base.
- (b) Remove the connecting block from the regulator.
- (c) Insert the blade of a small screwdriver between the block and the terminal, depress the spring clip, and remove each terminal in turn.
- (d) Replace each wire onto the regulator, with the exception of the wire(s) on the terminal "B".
- (e) Connect the "B" terminal wires to the load side of an ammeter. Connect the other side of the ammeter to the "B" terminal.
- (f) Switch on the vehicle's headlamps to place a load on the battery.
- (g) Start the engine and increase its speed to approximately 3,000 r.p.m.
- (h) The ammeter should indicate the rated generator output ± 1 amp.
- (i) Adjust the setting as required by turning the adjustment cam. Anti-clockwise to lower the setting; clockwise to raise it.
- (j) Decrease and then increase engine speed to the figure specified before and recheck settings.
- (k) Switch off engine, refit the terminals into the connecting block, and replace the block.

6. Test the Cut-in Voltage

- (a) Remove the connecting block from the regulator.



Current Regulator On-load Test

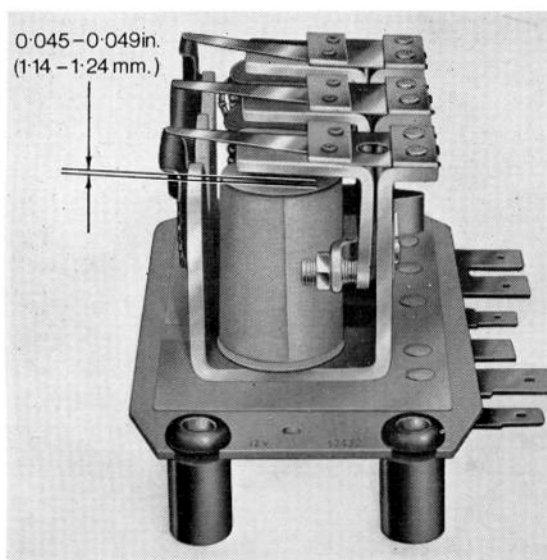


Cut-in Voltage Test

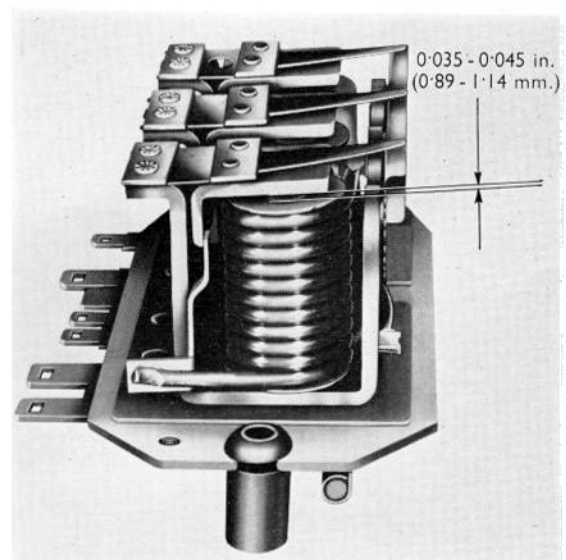
- (b) Insert the blade of a small screwdriver between the block and the terminal, depress the spring clip and remove each terminal in turn.
- (c) Replace each wire onto the regulator.
- (d) Connect a voltmeter between the "WL" terminal and the regulator base.
- (e) Switch on the vehicle's headlamps.
- (f) Start the engine and gradually increase its speed, observing the voltmeter needle which should climb steadily to 12.6—13.4 volts and then drop slightly as the points close.
- (g) If the closure occurs outside the limits quoted, decrease the engine speed and rotate the cam slightly:—
Clockwise to raise the setting and anti-clockwise to lower it.
Increase the engine speed and recheck the setting.

7. **Adjust the Air Gap Settings** (if required)

- (a) Remove the regulator from the car.
- (b) Turn voltage regulator adjustment cam to the position giving minimum lift.
- (c) Slacken the adjustable contact locknut and screw the contact out a few turns.
- (d) Insert a 0.045 to 0.049 in. (1.14 to 1.24 mm.) feeler blade for Lucas regulators or a 0.24 to 0.28 in. (0.61 to 0.71 mm.) feeler blade for Autolite regulators between the armature and the copper coloured shim on top of the core face. Position the feeler blade as far back as the rivet heads will allow.
- (e) Screw in the adjustable contact or bend the contact arm, as applicable, until it just traps the feeler blade. Retighten the locknut. (Lucas regulators only.)
- (f) Recheck the gap.



Voltage Regulator Air-gap Setting (Lucas)



Cut-out Air-gap Setting (Lucas)

(g) Repeat the operation (items *b, c, d, e* and *f*) for the current regulator cam to obtain an air-gap of 0.045 to 0.049 in. (1.14 to 1.25 mm.) for Lucas regulators or 0.014 to 0.019 in. (0.36 to 0.48 mm.) for Autolite regulators.

(h) Insert a 0.015 in. (0.4 mm.) feeler blade for Lucas regulators or 0.020 in. (0.5 mm.) feeler blade for Autolite regulators between the top of the cut-out relay core and the armature. Press the armature onto the feeler blade to trap it. The contacts, which are between the cut-out and current relays, should just touch. If necessary, bend the fixed contact.

(i) The cut-out air-gap is 0.035 to 0.045 in. (0.9 to 1.1 mm.), for Lucas regulators or 0.025 to 0.37 in. (0.64 to 0.94 mm.) for Autolite regulators measured with a feeler gauge in the same way as for the current and voltage regulators. Adjustment is carried out by carefully bending the back stop as required.

(j) After setting the air-gaps replace the regulator in the car and carry out the electrical settings.

IGNITION SYSTEM

IGNITION TIMING

- (a) Establish that the correct distributor is fitted. (Lucas Ref. 23D4.)
- (b) Check the octane rating of the fuel that is to be used with the engine, as this can affect the initial advance.
- (c) The initial advance is "built-in" to the engine and when one of the marks on the crankshaft pulley aligns with the appropriate mark on the front cover timing pointer the initial advance setting is correct and no further adjustment is required at this stage.

Distributor Number	...	...	...	...	...	...	...	...	...	...	...	23D4
<i>Compression Ratio</i>												
		<i>Octane Number</i>				<i>Star Rating</i>						<i>Initial Advance (Crankshaft Degrees)</i>
9.5 : 1		100				5						12° B.T.D.C.

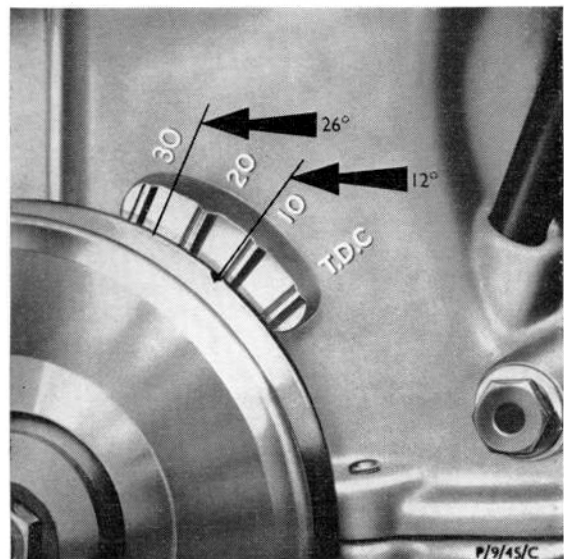
NOTE - If the car is normally operated at a high altitude the distributor setting may be **advanced** by 4° for each 2,000 ft. (600 m.) above sea level. Where the car is operated at varying altitudes the initial advance must, at all times, be set for the lowest altitude at which the car is operated.

OP 12100-A DISTRIBUTOR ASSEMBLY - REMOVE AND INSTALL

To Remove

1. Disconnect the high tension leads from the spark plugs.
2. Disconnect the high tension lead and the low tension lead from the coil.
3. Remove distributor cap.
4. Turn the engine crankshaft until the timing mark on the crankshaft pulley is in alignment with the 12° position on the front cover timing scale as No. 1 piston comes up on the compression stroke. The rotor should now point towards No. 1 spark plug.

Ignition Advance Settings



5. Unscrew the bolt retaining the distributor clamp on the engine and carefully withdraw the distributor.

To Install

6. Fit the distributor with the low tension terminal adjacent to the cylinder block. Position the rotor, with the electrode towards the distributor cap rear clip, prior to inserting the distributor into the cylinder block. As the gears mesh the rotor will rotate clockwise into alignment with No. 1 H.T. electrode in the distributor cap.
7. Insert the distributor and, as the gears mesh, the rotor should rotate slightly. If necessary re-position the clamp, without turning the distributor, so that the hole is in line with the one in the cylinder block. Fit the retaining bolt and tighten.

A. To Adjust the Timing without the use of a Timing Light

- (a) Slightly turn the distributor body as necessary until the contact breaker points are just opening when the rotor is adjacent to No. 1 H.T. electrode in the distributor cap.

NOTE – Excessive movement from the specified position would indicate that the gears are meshing one or more teeth out. Remove the distributor and refit if this occurs.

- (b) Tighten the distributor body clamp bolt sufficiently to hold the distributor in position. **Do not over-tighten.**

8. Replace the distributor cap.
9. Reconnect the spark plug leads (firing order 1, 3, 4, 2 anti-clockwise rotation) and connect the grommet to the rocker cover bracket.
10. Reconnect the low tension lead to the coil.

B. To Adjust the Timing using a Timing Light

- (a) Connect the leads of the timing light, using the clips provided, in accordance with the manufacturer's instructions.
- (b) Check that the timing marks on the crankshaft pulley and front cover are visible and mark with chalk or paint if necessary.
- (c) Start the engine and allow it to idle.
- (d) Point the timing light at the timing pointer. Check that the mark on the crankshaft pulley is adjacent to the appropriate mark on the front cover timing pointer.

If the mark on the pulley is above and to the left of the correct timing mark, the engine is too far advanced. Slacken the distributor body clamp and turn body anti-clockwise slightly to retard the ignition.

Should the mark be below and to the right of the correct timing mark, the distributor body should be turned clockwise slightly to advance the ignition.

- (e) After making an adjustment, tighten the clamp sufficiently to hold the distributor in position. **Do not over-tighten.**

The operation of the governor weights may be checked by opening and closing the throttle. As the throttle is gradually opened, the mark should move away from the indicator upwards; and as the throttle is closed the notch will move down in line with the indicator. Any tendency for erratic advance shown by the mark jumping suddenly away from the indicator shows that the governor weights are binding, or that the springs are weak.

11. A slight readjustment to the distributor may be necessary and should be carried out on the road in the following manner:—
 - (i) Warm up the engine to normal operating temperature.
 - (ii) Accelerate in top gear on wide throttle opening from 20 m.p.h. (32 k.p.h.) to 40 m.p.h. (64 k.p.h.).
 - (ii) If heavy pinking occurs, **retard** the ignition until a trace pink can just be heard under these conditions of acceleration.

NOTE – It is not necessary to advance the ignition beyond the initial setting (except under high altitude operating conditions previously detailed). Also, there is no need to use a fuel of a higher octane rating than that specified.

OP 12100-A1 EXTRA: DISTRIBUTOR CAP – REMOVE AND INSTALL

To Remove

1. Release the two spring clips and remove the cap and leads.
2. Remove the lead retaining screws, from within the cap, to release the leads.

To Install

3. Locate the leads in their correct aperture in the cap and secure with retaining screws.
4. Replace the cap and retain with the two spring clips.

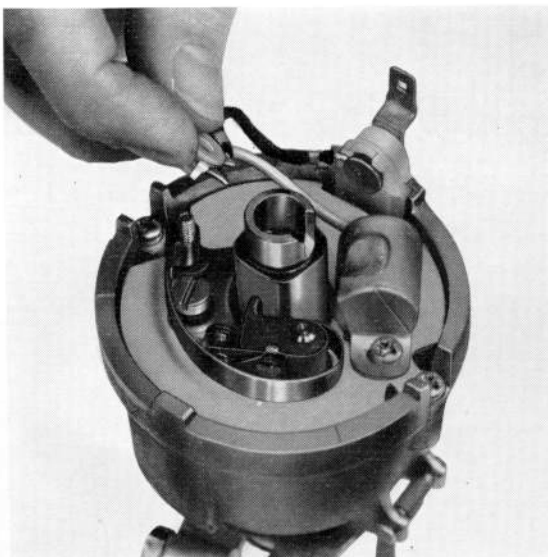
OP 12100-A2 EXTRA: CONDENSER – RENEW (DISTRIBUTOR CAP REMOVED)

To Remove

1. Remove rotor.
2. Unscrew the condenser lead, and the condenser retaining screw.

To Install

3. Replace the condenser, retain in position and replace the wire.
4. Replace rotor.

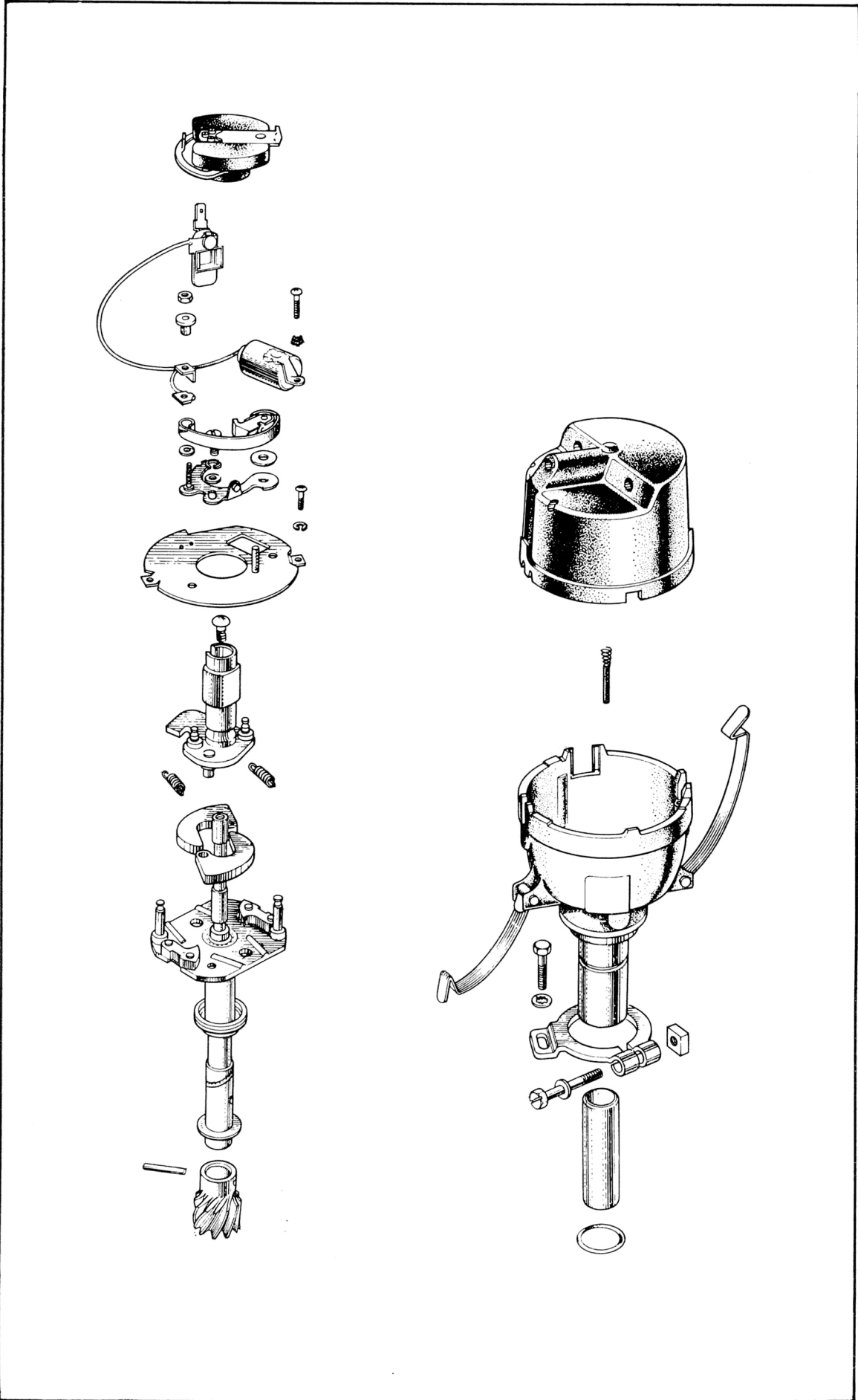


Replacing the Low Tension and Condenser Wires



Replacing the Breaker Plate Assembly

ESCORT TWIN CAM



Distributor Assembly

OP 12100-A3 EXTRA: POINTS - RENEW (DISTRIBUTOR CAP REMOVED)

To Remove

1. Loosen the retaining screw, and remove the low tension and condenser wires from the points.
2. Unscrew the retaining and adjusting screw, and remove the points.

To Install

3. Replace the points and lightly retain in position.
4. Adjust the points to give a points gap of 0.014 to 0.016 in. (0.36 to 0.41 mm.).
5. Tighten the adjusting screw.
6. Replace the two wires and retain in position.

OP 12100-A4 EXTRA: DISTRIBUTOR BREAKER PLATE ASSEMBLY - REMOVE AND INSTALL (DISTRIBUTOR CAP REMOVED)

To Remove

1. Remove the two screws securing the breaker plate assembly to the distributor body.
2. Remove the breaker plate assembly.

To Install

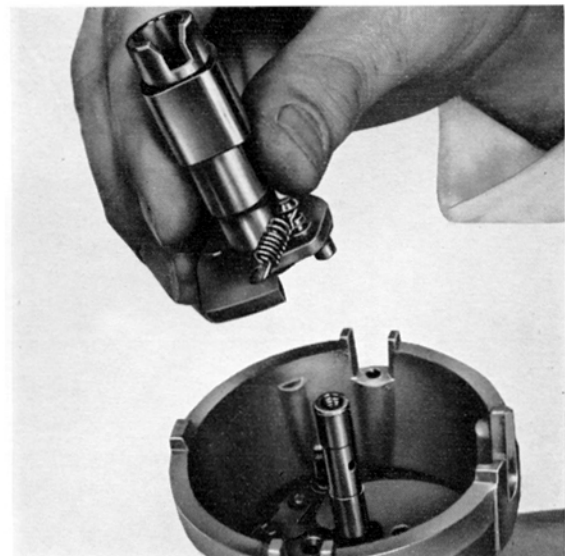
3. Replace the breaker plate assembly and secure it with the two screws.

OP 12100-A6 EXTRA: GOVERNOR WEIGHTS AND SPRINGS - RENEW (BREAKER PLATE REMOVED)

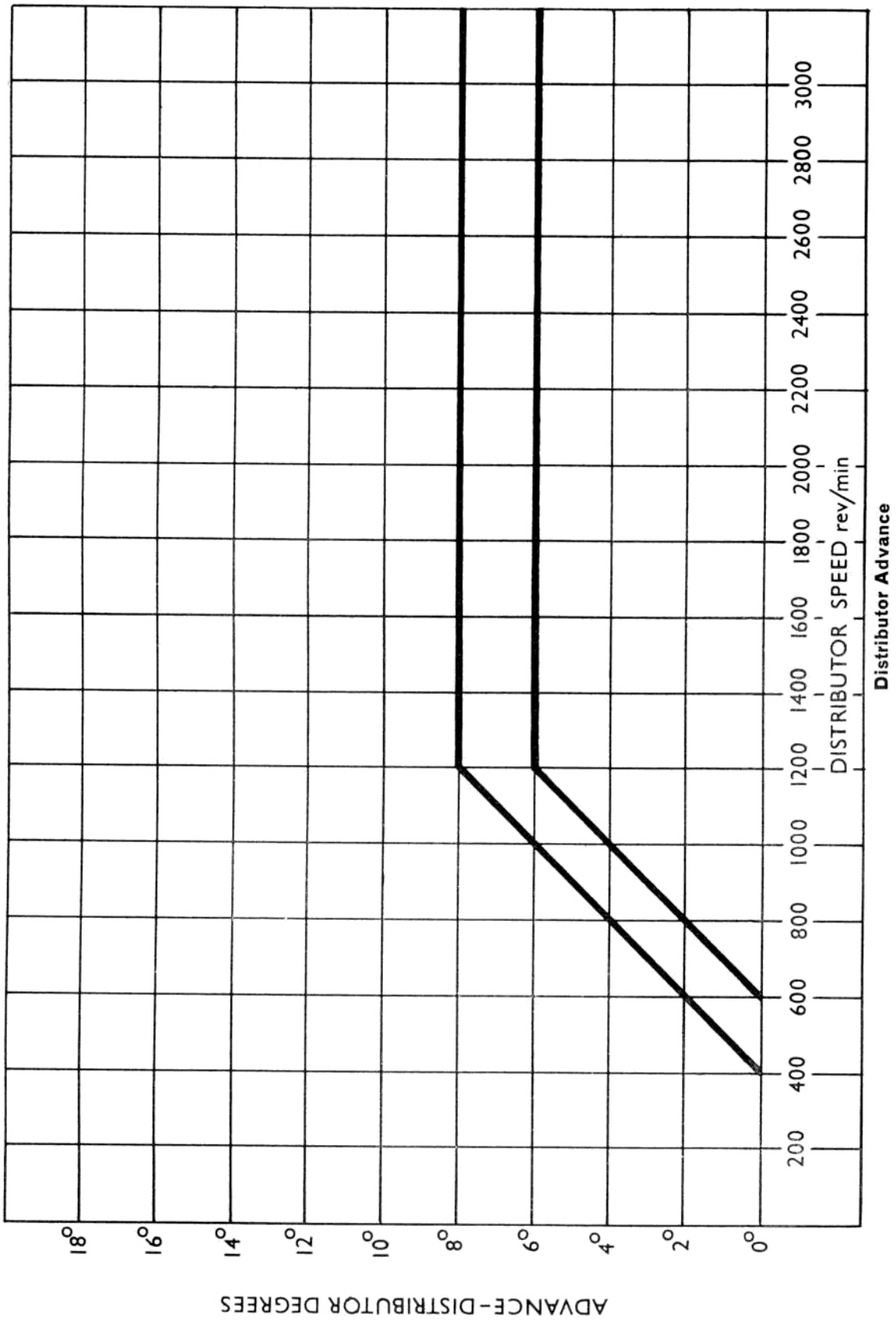
To Remove

1. Note the location of the advance springs then disconnect and remove.
2. Unscrew the centre screw and withdraw the cam.
3. Remove the advance weights.

Replacing the Cam



ESCORT TWIN CAM



To Install

4. Locate the advance weights in the action plate, and fit springs.
5. Fit the cam, engaging the pivot pins in the weights. Secure the cam with the centre screw.
6. Fit the advance springs taking care not to stretch them while connecting them to the pegs on the action plate and the cam assembly.

OP 12100-A8 DISTRIBUTOR – OVERHAUL (GOVERNOR WEIGHTS REMOVED)

To Dismantle

1. Remove the skew gear and thrust washer after driving out the retaining pin.
2. Withdraw the distributor shaft from the distributor body.
3. Remove the spacer washer.
4. Using a suitable mandrel located at the body end, drive out the bush.

To Reassemble

5. Insert the small diameter end of the bush into the distributor body from the drive end and press fully home using a suitable mandrel. Drill the oil hole in bush, using the hole in the distributor body spigot as a guide.

NOTE – The new bush should be soaked in engine oil for 24 hours prior to assembly.

6. Locate the spacer washer on the new distributor shaft.
7. Insert the distributor shaft into the body.
8. Locate a new thrust washer on the shaft with the pips towards the gear.
9. Press the new gear onto the distributor shaft until it nips the thrust washer.
10. With the assembly held tightly together drill the shaft with a No. 16 (0.177 in. (4.5 mm.)) drill using the hole in the skew gear as a guide. Fit the retaining pin and peen over the ends. Tap the end of the shaft with a hide mallet to flatten the thrust washer pips to establish the correct end-float.

OP 12100-B GOVERNOR WEIGHTS AND SPRINGS – RENEW
(Includes OPS 12100-A, A1, A2, A3, A4 and A6)

OP 12100-D DISTRIBUTOR – OVERHAUL
(Includes OPS 12100-A, A1, A2, A3, A4, A6 and A8)

OP 12100-E DISTRIBUTOR ASSEMBLY – TEST AND ADJUST

Tools Required

Proprietary distributor tester.

The following instructions indicate the general principles to be followed for testing the distributor on a tester. The method of testing, however, may vary for machines of different manufacture: for specific instructions refer to the equipment manufacturer's handbook.

1. Mount the distributor on the tester, using an adaptor shaft, where necessary, to connect the drive from the machine to the distributor gear. Check that the distributor is free to rotate and that the adaptor shaft has the correct end-float, usually $\frac{1}{16}$ in. (1.59 mm.).
2. Make the necessary electrical connections and zero the instrument if required.

3. Dwell Angle

- (a) Turn the cylinder selector to the figure corresponding to the number of lobes on the cam of the distributor; in this case four.
- (b) Turn the test selector switch to the cam angle position and operate the distributor at approximately 1,000 rev./min. (crankshaft).
- (c) Adjust the distributor breaker point gap to a dwell angle of 57° to 63°.
- (d) Increase the speed up to a maximum of 5,000 rev./min. (crankshaft) and check the dwell reading, which must again be between 57° to 63°. If the reading changes more than 3° check for a worn distributor shaft or worn bushings.

4. Mechanical operation

- (a) Make the necessary connections for the stroboscopic timing light or sparking protractor, refer to equipment manufacturer's handbook.
- (b) Adjust the speed control to vary the distributor speed between 400 and 5,000 rev./min. (crankshaft). Erratic or thin faint flashes of light preceding the regular flashes as the speed of rotation is increased can be due to weak breaker arm spring tension.
- (c) Operate the distributor at approximately 2,500 rev./min. (crankshaft).
- (d) Move the protractor scale with the adjustment control so that the zero degree mark on the scale is opposite one of the neon flashes. The balance of all the flashes should come within plus or minus 1°, evenly spaced around the protractor scale. A larger variation than 1° or erratic or wandering flashes may be caused by a worn cam or distributor shaft or a bent distributor shaft.

5. Distributor spark advance

The spark advance is checked to determine if the ignition timing advances in proper relation to engine speed and load.

Normally, this should not require adjustment as it is pre-set during manufacture. However, incorrect assembly, weakening of the advance springs or wear will change the advance curves and rectification will be necessary if engine performance is not to be affected.

- (a) Operate the distributor in the direction of rotation (anti-clockwise) and adjust the speed to 300 rev./min. (distributor). Move the protractor scale so that one of the flashes lines up with the zero degree mark.
- (b) Slowly increase the speed and check the advance at the other speeds quoted in the specification. Operate the distributor both up and down the speed range.

OP 12199-A CONTACT BREAKER ASSEMBLY – RENEW AND ADJUST

Tools Required

Dwell meter

NOTE – The distributor contact breaker points should only be changed if they are worn, badly burnt, or if excessive metal transfer has occurred or have a "high resistance". Contacts showing a greyish colour and only slight signs of pitting need not be renewed. Metal transfer is considered excessive when it equals or exceeds the gap setting of 0.014 to 0.016 in. (0.36 to 0.41 mm.). The resistance is considered "high" when the voltage drop across the points exceeds 0.25 volts.

To Remove

1. Remove the distributor cap.
2. Remove the rotor arm.
3. Remove the breaker arm.
4. Remove the adjustable contact.

To Install

5. Locate a new adjustable contact on the pivot pin and loosely fit the retaining screw.
6. Locate fibre washers on the terminal post and the pivot pin and fit the breaker arm. Thread the insulating bush into the low tension and condenser lead eyelets before locating it on the terminal post with the end inside the spring eye.
7. Adjust the dwell angle to 57° to 63°, alternatively adjust the point gap to 0.014 to 0.016 in. (0.36 to 0.41 mm.). Use a screwdriver in the adjustable contact "V" notch to adjust the gap. Re-check the adjustment after tightening the retaining screw.

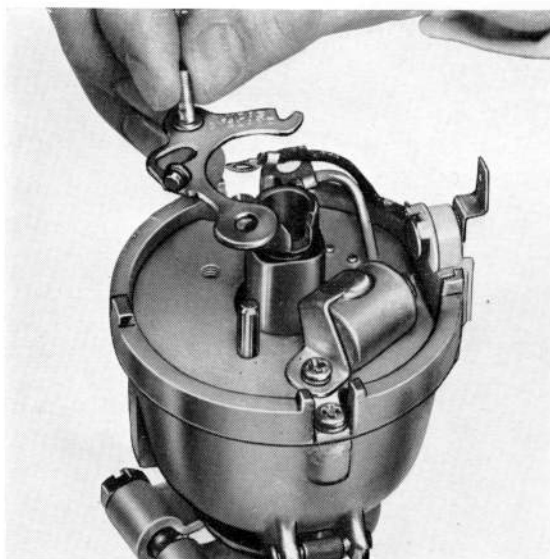
Lubricate the distributor cam spindle with two drops of engine oil.

Lubricate the distributor cam with lithium base grease or grease obtainable in sachet form Part No. 68AB-19D533-AA.

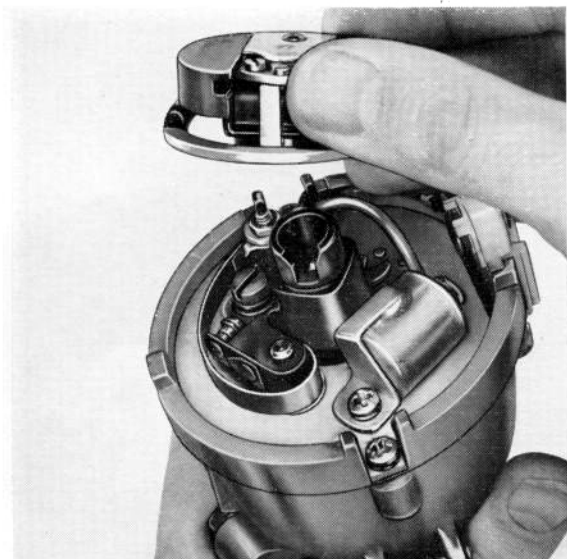
Clean the distributor cap, H.T. leads and coil.

CAUTION – To avoid excess or insufficient cam lubrication coat the entire periphery of the cam profile with the specified grease such that when the shaft is rotated a fillet of $\frac{1}{16}$ in. (1.59 mm.) is built up on the back of the point set shoe. Points which have become dirty or contaminated with oil or grease should be cleaned with a stiff brush and a suitable grease solvent.

8. Fit the rotor and the distributor cap.



Replacing the Adjustable Contact



Fitting the Rotor

This seemed an appropriate place to insert my thoughts on this document as there was a blank page in the original manual.

This PDF document has been copied from an original Ford Escort Twin Cam Supplementary Workshop Manual by David Williams from Hertfordshire, England UK.

However you come by it please appreciate the work it took to produce.

All pages were scanned by hand on a desktop scanner and special care was taken in Photoshop to remove marks and blemishes.

The exploded diagrams and wiring diagrams were scanned at 300dpi so that all the detail would be preserved.

I do not mind how many people it is distributed to.

What I will be VERY ANNOYED ABOUT IS IF I SEE IT APPEAR ON eBay.

You have been warned !!!

This is my car – a 1969 Twin Cam with quite a long – if not very illustrious rallying history.



If you are into all things Ford, and especially fast Fords then come over to www.Turbosport.co.uk and www.avoclub.com for lots of advice and info.

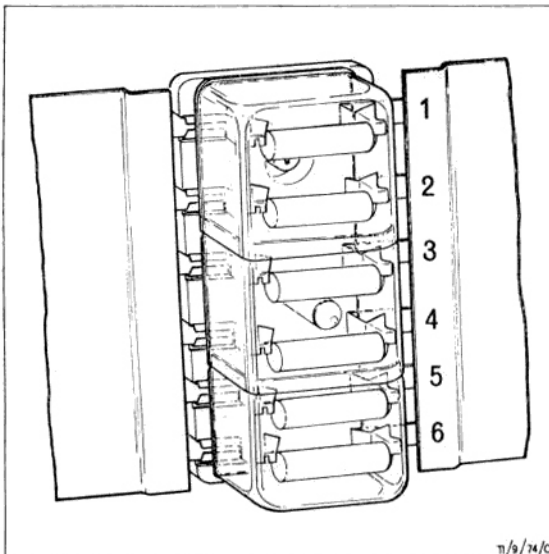
ELECTRICAL WIRING

The fully fused wiring loom is broken into sections, the rear loom running from the rear lamps up to the fascia.

The main instrument loom runs behind the fascia panel and connects with the rear loom and the engine compartment loom(s).

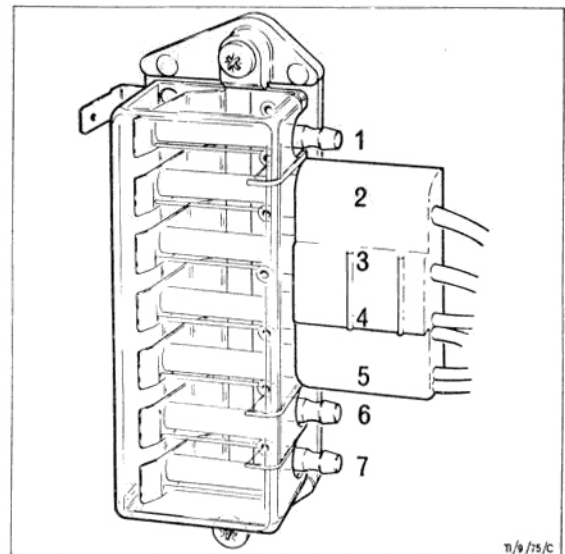
All the loom connections to the various electrical components are fitted with non-reversible plugs. This system ensures that the loom can only be fitted to a component the right way round, thus avoiding "blowing" a fuse.

On pre-September '69 vehicles six fuses protect all the exterior lighting circuits except the direction indicators. On later vehicles a fuse box containing seven fuses is fitted protecting heater motor, wiper motor and cigar lighter circuits in addition to all lighting circuits. Provision is also made for connecting accessories if required.



Pre-September '69 Fuse Block

- 1 R.H. Main Beam
- 2 L.H. Main Beam
- 3 R.H. Dipped Beam
- 4 L.H. Dipped Beam
- 5 R.H. Side and Tail Lamps
- 6 L.H. Side and Tail Lamps



Later Fuse Block

- 1 Interior Lamp, Cigar Lighter
- 2 L.H. Side and Tail Lamp, Licence Plate Lamp
- 3 R.H. Side and Tail Lamp, Instrument Illumination
- 4 Main Beam
- 5 Dipped Beam
- 6 Direction Indicators, Stop Lamps, Heater Motor, Reversing Lamps
- 7 Wiper Motor

ESCORT TWIN CAM

Pre-September '69 Vehicles

The wiring in these cars conforms to the established British colour coding system, identified by the symbolic letters in the chart below.

The individual components in the wiring diagram are identified by a numerical code for ease of reference.

Wiring Colour Code

Code	Colour	Code	Colour
R	Red	Y	Yellow
Bk	Black	LG	Light Green
Bl	Blue	P	Purple
W	White	O	Orange
Br	Brown	Pk	Pink
G	Green	S	Slate

Component Codes

Code	Component	Code	Component
1	R.H. Headlamp	37	Main Beam Indicator Light
2	L.H. Headlamp	38	Oil pressure Warning Light
3	R.H. Headlamp Connector	39	Instrument Voltage Stabilizer
4	L.H. Headlamp Connector	40	Instrument Earth
5	R.H. Side Lamp (Front)	41	Ignition Switch
6	L.H. Side Lamp (Front)	42	Oil Pressure Gauge
7	R.H. Direction Indicator Lamp (Front)	43	Heater Motor Switch
8	L.H. Direction Indicator Lamp (Front)	44	Windscreen Wiper Switch
9	R.H. Lighting Connector (Front)	45	Head/Side Light Switch
10	Starter Solenoid	46	Flasher Unit
11	Battery	47	Rear Loom Connector
12	Body Earth	48	R.H. Courtesy Light Switch
13	Oil Pressure Sender Unit	49	L.H. Courtesy Light Switch
14	Engine Earth	50	Interior Light
15	Distributor	51	Headlamp Flasher/Direction Indicator, Horn Switch Connector
16	Ignition Coil	52	Headlamp Flasher Switch
17	Starter Motor	53	Direction Indicator Switch
18	Spark Plugs	54	Horn Switch
19	Generator	55	Fuel Gauge Sender Unit
20	Regulator	56	R.H. Direction Indicator Lamp
21	L.H. to R.H. Loom Connector	57	L.H. Direction Indicator Lamp
22	Horn	58	R.H. Stop/Side Lamp (Rear)
23	Brake Light Switch	59	L.H. Stop/Side Lamp (Rear)
24	L.H. Lighting Connector (Front)	60	Rear Number Plate Light
25	R.H. Bulkhead Multi-way Connector	61	Body Earth
26	L.H. Bulkhead Multi-way Connector	62	Ignition Lock
27	Fuse Block	63	Cigar Lighter
28	Heater Motor	64	Cigar Lighter Illumination Lamp
29	Windscreen Wiper Motor	65	Heater Motor Resistor (two-speed)
30	Heater Motor Connector	66	Water Temperature Sender Unit
31	Windscreen Wiper Motor Connector	67	Battery Condition Indicator
32	Fuel Gauge	68	Tachometer
33	Panel Light	69	Water Temperature Gauge
34	Temperature Gauge	70	Automatic Transmission Illuminating Lamp
35	Generator Warning Light		
36	Direction Indicator Light		

Post-September '69 Vehicles

The wiring in these cars conforms to the new European continental colour coding standard. This is shown in the table below.

In the wiring diagram, individual components are identified by a number in a circle. The component chart gives the relevant coding.

Actual wiring can be traced and is coded by both letters and/or numbers, e.g. 15—3 or R2.1. See pages 26 to 29 for codes.

If the wire code is prefixed by a letter and a number, e.g. A7 31—26.3, then this wire is only used for certain applications. The particular application can be determined by reference to the table on page 30.

Wiring Colour Code

Code	Wiring Colour	Code	Wiring Colour
Bk	Black	P	Purple
Bl	Blue	Pk	Pink
Br	Brown	R	Red
G	Green	W	White
L G	Light Green	Y	Yellow
O	Orange	S	Slate

Component Codes

Code	Component	Code	Component
1	R.H. Turn Signal Lamp (Front)	31	Regulator
2	L.H. Turn Signal Lamp (Front)	32	Fuse Block
3	R.H. Side Light (Front)	33	Not Applicable
4	L.H. Side Light (Front)	34	L.H. Bulkhead Wiring Connectors
5	R.H. Headlamp	35	Stop Switch Lamp
6	L.H. Headlamp	36	Brake Fluid Low Pressure Switch (R.P.O.)
7	R.H. Headlamp Connector	36a	Brake Fluid Low Pressure Warning Lamp Test Switch (R.P.O.)
8	L.H. Headlamp Connector	37	Windscreen Wiper Motor
9	R.H. Side Flasher (R.P.O.)	38	Windscreen Wiper Motor 2 Speed
10	L.H. Side Flasher (R.P.O.)	39	Heater Motor
11	Not Applicable	40	Not Applicable
12	" "	41	Reversing Lamp Switch — Manual Transmission (R.P.O.)
13	Horn	42	Reversing Lamp and Park Inhibitor Switch — Automatic Transmission (R.P.O.)
14	Not Applicable	43	Turn Signal Warning Lamp
15	" "	44	Instrument Voltage Regulator
16	" "	45	Instrument Panel Earth
17	" "	46	Brake Fluid Low Pressure Warning Lamp (R.P.O.)
18	Battery	47	R.H. Courtesy Switch
19	Ignition Coil	48	L.H. Courtesy Switch
20	Distributor	49	Side/Head Lamp Switch
21	Oil Pressure Switch	50	Fuel Gauge
22	Temperature Sender Unit	51	Temperature Gauge
23	Generator	52	Instrument Illumination Lamp
24	Not Applicable	53	Speedometer
25	Starter Solenoid (Automatic Transmission)	54	Tachometer
26	Starter Solenoid (Manual Transmission)	55	Speedometer Illumination Lamp
27	Not Applicable		
28	" "		
29	Inertia Starter Motor		
30	Pre-Engaged Starter Motor		

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Component Codes—continued

Code	Component	Code	Component
56	Tachometer Illumination Lamp	83	Not Applicable
57	Battery Condition Indicator	84	" "
58	Oil Pressure Gauge	85	Horn Switch
59	Generator Warning Lamp	86	Direction Indicator Switch
60	Oil Pressure Warning Lamp	87	Column Dip Switch
61	Main Beam Warning Lamp	88	Headlamp Flasher Switch
62	Turn Signal Flasher Unit	89	Interior Light
63	Not Applicable	90	Fuel Gauge Sender Unit
64	" "	91	Not Applicable
65	" "	92	R.H. Turn Signal Lamp (Rear)
66	Windscreen Wiper Switch	93	L.H. Turn Signal Lamp (Rear)
67	Heater Switch	94	R.H. Stop Lamp
68	Not Applicable	95	L.H. Stop Lamp
69	Radio (R.P.O.)	96	R.H. Side Lamp (Rear)
70	Not Applicable	97	L.H. Side Lamp (Rear)
71	Accessory Connector	98	R.H. Reversing Lamp
72	Ignition Switch	99	L.H. Reversing Lamp
73	Rear Wiring Loom Connector	100	Licence Plate Lamp
74	Emergency Flasher Unit (R.P.O.)	101	Not Applicable
75	Emergency Flasher Indicator Lamp (R.P.O.)	102	Cigar lighter
76	Steering Column Connector	103	Not Applicable
77	Not Applicable	104	" "
78	Emergency Flasher Switch (R.P.O.)	105	" "
79	Not Applicable	106	" "
80	" "	107	" "
81	" "	108	" "
82	" "	109	Connector

Wiring Codes

INDEX NO.	WIRE NO.	FROM CONNECTION/TERMINAL	TO CONNECTION/TERMINAL
	15	72	Soldered joint 22
	15	Soldered joint 22	104
	15	104	34
	15	34	Soldered joint 20
	15-3	Soldered joint 22	76
	15-3	76	86
	15-3.1	76	86
	15-4	Soldered joint 22	32/15/54
	15-5	86/H	76
	15-5	76	34
	15-5	34	13
	15a	Soldered joint 20	19/15
	16	26/16	19/15
F3	16	30/16	19/15
	30	26/30	29
	30	18/+ve	26/30/51
F3	30	18/+ve	30/30/51
	30-1	31	34
	30-1	34	72
	30-2	Soldered joint 2	32/30

Wiring Codes—continued

INDEX NO.	WIRE NO.	FROM CONNECTION|TERMINAL	TO CONNECTION|TERMINAL
	30—3	Soldered joint 2	49
	30—4	32/1	71
	30—4	71	89
D3	30—4.1	71	89
D7	30—5	71	102
B7	30—9	71	74
B7	30—9.1	74	75
B7	30—9.2	7	Wire 30—10
D2	30—10	Wire 30—9.2	46
	31	Car earth	Engine earth
	31	Car earth	18/—ve
	31—2	7	Earth
	31—3	8	Earth
	31—7	89	Wire 31-7.1 & 31-7.2
	31—7.1	Wire 31-7	61
	31—7.2	Wire 31-7	47
	31—12	37	Wire 31-12.3 & 31-23
	31—12.1	Wire 31-12.2	37
	31—12.2	66	Wire 31-12.1
F1	31—12.2	68/4	Wire 31-12.1
	31—12.3	Wire 31-12	Casing earth
	31—13	45	Casing earth
D7	31—14	102	Wire 31-25
D7	31—14.1	Wire 31-14	Wire 31-25
D2	31—16	36	46
D2	31—17	36	36a
	31—19	39	67
	31—23	Wire 31-12.3	67
B9	31—23	67	Wire 31-12
	31—24	67	40
	31—25	89	Wire 31-25.1
	31—25.1	Wire 31-25	Casing earth
D3	31—25.2	89	41
	31—26	99	73
	31—26	73	Wire 31-26.1
D5	31—26.1	Wire 31-26	41
	31—26.2	98	Wire 31-26
A7	31—26.3	Wire 31-26	42
A7	31—30	42	Casing earth
D2	31—31	36a	Casing earth
F7	31—32	Wire 31-33	93
F7	31—33	Wire 31-32	Casing earth
F7	31—34	Wire 31-35	92
A7	31—35	Wire 31-34	Casing earth
	31—40	80	Casing earth
	31b2	37	Wire 31b2
	31b2	Wire 31b1	66/2
F1	31b2	Wire 31b1	68/2
	49	Wire 54-5	62/49
B7	49	Wire 54-5	Wire 49-1
B7	49—1	Wire 49	78/1
B7	49—2	78/4	62

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Wiring Codes—continued

INDEX NO.	WIRE NO.	FROM CONNECTION/TERMINAL	TO CONNECTION/TERMINAL
	49a	62	76
	49a	76	86/49a
B7	49a1	74	78/3
B7	49a1.1	74	75
	50	72	26
F3	50	34	30/50
A7	50—1	Wire 50	42
A7	50—2	42	26/50
	51	31/B+	26/30/51
F3	51	31/B+	30/30/51
	53	37	66
F1	53	37	68/6
F1	53b	68/8	37
	54—1	32/6	39
	54—3	32/7	Wire 54—3.3
F1	54—3	Wire 54-3.3	37
	54—3.1	Wire 54-3	37
	54—3.3	Wire 54-3	37
	54—4	Wire 54-3	44/IGN
	54—4.1	Soldered joint 4	59
	54—9.2	Soldered joint 4	60
E9	54—4.2	Soldered joint 4	10
E9	54—4.3	Soldered joint 4	57
	54—5	32/6	35
	54—6	35	73
	54—6	73	95
	54—6.1	Wire 54-6	94
F8	54—6.1	95	94
	54—8	35	73
	54—8	73	99
	54—8.1	99	98
	54—9	44	51
	54—9.1	44	50
	54—10	60	34
	54—10	34	21
	54—11	50	73
	54—11	73	90
E9	54—11	50	73
F8	54—11	73	90
E8	54—11.1	Wire 54-11	90
	54—12	51	34
	54—12	34	22
E9	54—12	51	34
	56	49	76
	56	76	86/56
	56a	86/56a	76
	56a	76	32/56a
	56a	32/4	7
	56a1	32/4	8
	56a2	32/4	61
	56b	86/56b	76
	56b	76	32/56b

Wiring Codes—continued

INDEX NO.	WIRE NO.	FROM CONNECTION|TERMINAL	TO CONNECTION|TERMINAL
	56b	32/5	7
	56b1	32/5	8
	58	49	32/58
	58—2	32/3	73
	58—2	73	96
E8	58—2	73	Wire 58-2.1
E8	58—2.1	Wire 58-2	96
	58—3	32/2	73
	58—3	73	97
F8	58—3	73	97
	58—4	32/3	3
	58—5	32/2	4
	58—6	32/3	Wire 58-8
	58—8	Wire 58-6	52
	58—8.1	Soldered joint 3	102
E9	58—8.1	Soldered joint 3	52
	58—8.2	Soldered joint 3	52
	58—8.3	Soldered joint 3	52
A7	58—16	80	Wire 58-6
A7	58—16.1	Wire 58-16	102
	61	31/D+	34
	61	34	59
	75	72	69
	D+	31/D+	23/D+
	D—	31/D—	23/D—
	DF	31/DF	23/DF
	L	86/L	76
	L	76	34
	L	34	2
W	L	L	10
	L1	34	73
	L1	73	93
	L2	76	Wire L2.1
	L2.1	Wire L2	43
B7	L4	78/6	Wire L2
	R	86/R	76
	R	76	34
	R	34	1
W	R	Wire R	9
	R1	34	73
	R1	73	92
	R2	76	Wire R2.1
	R2.1	Wire R2	43
B7	R4	78/5	Wire R2

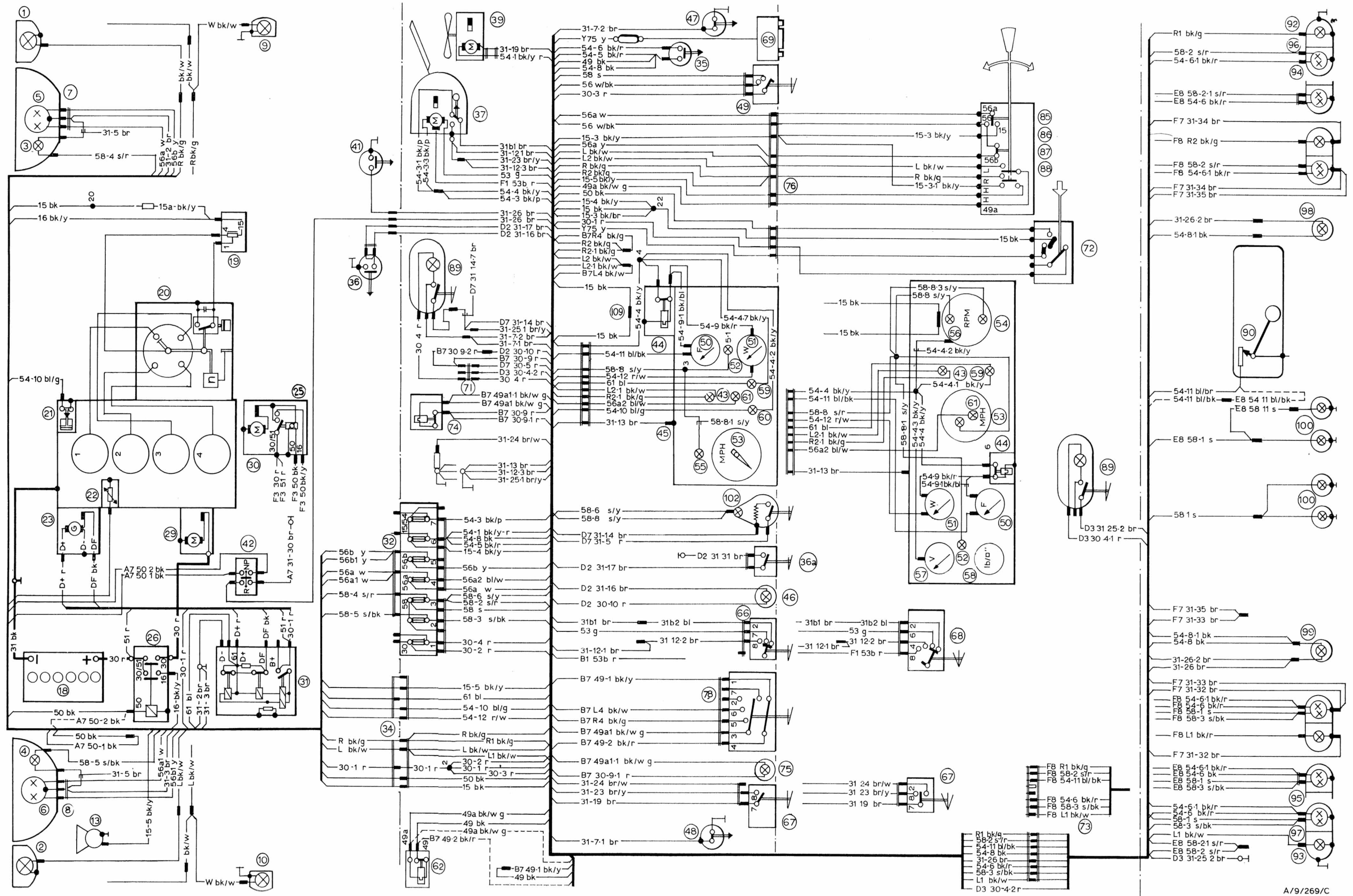
ESCORT TWIN CAM

Wiring Codes—continued

INDEX NO.	APPLICATION
A7	ONLY IN COMBINATION WITH INHIBITOR SWITCH— AUTOMATIC TRANSMISSION
B7	RPO ONLY
B9	FOR MODELS S ^{Sup} E ^{Sup} G.T. T.C. ONLY
D2	WARNING LIGHT—DUAL LINE BRAKING SYSTEM— EXPORT RPO
D3	FOR MODEL E ^{Sup} ONLY
D4	NOT FOR MODELS S ^{Std} 6 cwt. VAN 8 cwt. VAN
D5	EXPORT RPO FOR MODELS S ^{Std} SD/L S ^{Sup} ED/L E ^{Sup} G.T. T.C.
D7	ONLY FOR MODELS S ^{Sup} E ^{Sup} G.T. T.C. AND EXPORT RPO FOR MODEL S ^{Std} SD/L ED/L
D9	NOT FOR MODEL 6 cwt. VAN
E8	ONLY FOR MODEL E ^{Sup}
E9	ONLY FOR MODEL G.T. T.C.
F1	ONLY FOR MODEL G.T. T.C.
F2	NOT FOR MODEL G.T. T.C.
F3	RPO ONLY
F7	ONLY FOR MODELS WITH TWIN LICENCE PLATE LAMPS
F8	ONLY FOR MODELS 6 cwt. VAN 8 cwt. VAN
W	EXPORT ONLY
Y	ONLY IN COMBINATION WITH RADIO

**MODEL
CODE**

S	...	...	...	...	...	...	...	SALOON
E	...	...	...	...	...	...	...	ESTATE
Std	...	...	...	...	...	...	...	STANDARD
D/L	...	...	...	...	...	...	...	DeLUXE
Sup	...	...	...	...	...	...	...	SUPER
G.T.	...	...	...	...	...	...	...	G.T.
T.C.	...	...	...	...	...	...	...	TWIN CAM



Wiring Diagram — All Escort Models — Post-September '69