Section C7

System test and fault diagnosis

Lower servo test and calibration procedure
Sheet 1 of 2
Fig. C53

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T.S.D. 4200

Ensure that the battery is fully charged

Start

Disconnect the white/brown cable from the oil pressure switch. Disconnect the sensor chain socket and connect the test box into the socket. On the test box set the following:
IND/VOLTS to VOLTS. RUN/SET to RUN
AUTO/CAL to CAL. UPPER/LOWER SERVO to LOWER
CHECK VOLTS to Position 1.
On the car, set the lower temperature selector to the mid-position, the A.C.U. switch to LOW and switch on the ignition.
Is the voltage reading between 8 and 10 volts?

NO → Refer to VOLTAGE STABILISER FLOW CHART

YES ↓

The voltage supply to the servo is satisfactory.

On the test box, set IND/VOLTS to IND and 0%/100% to 0%. Adjust ZERO control until meter reads 0%. Set 0%/100% to 100% Adjust MAX control until meter reads 100%.
Can both readings be obtained?

YES → **The test box is now calibrated and the upper servo operates.** *

NO ↓

If the lower servo does not move and calibration cannot be achieved, refer to SERVO FAULT DIAGNOSIS FLOW CHARTS.

On the test box, set the 0%/100% switch to 0% and wait for the servo to stop at 0%. Switch the RUN/SET switch to SET.
Does the servo run from 0% and stop at a servo position reading of 43% ± 2%?

YES →

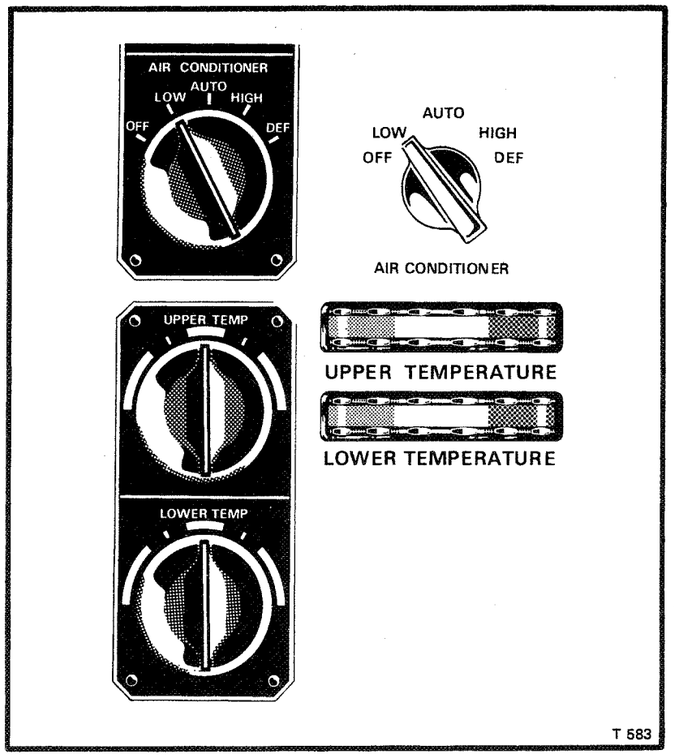
NO ↓

Turn the lower servo trim potentiometer anti-clockwise to a meter reading of 0%. Turn the lower servo trim potentiometer clockwise until a meter reading of 43% ± 2% is obtained. **This setting MUST be approached from the 0% position.**

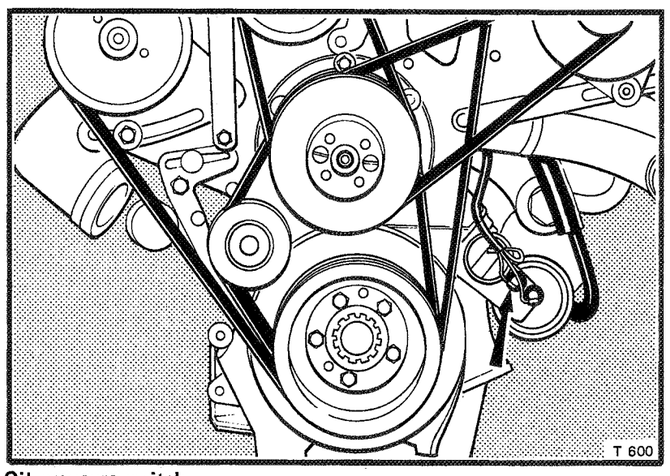
The lower servo is now correctly calibrated.

Go to sheet 2

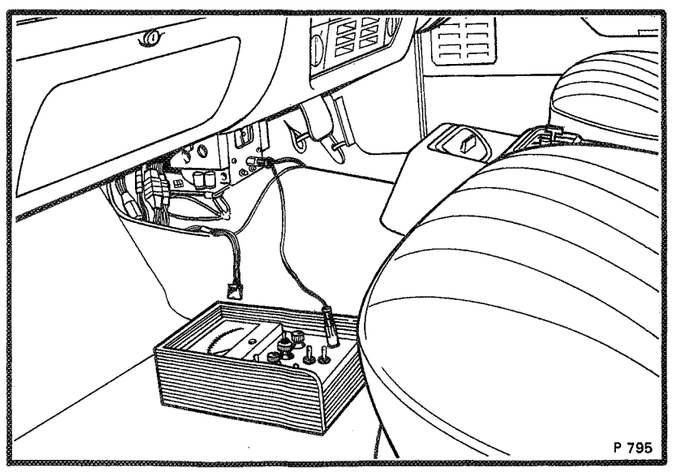
These are landmarks. They show which part of the system has been proved correct.



ACU switch settings



Oil pressure switch



Test box connection

From sheet 1

On the test box, set the IND/VOLTS to VOLTS and CHECK VOLTS to Position 2. Record the voltmeter reading.
Is it between 1.7 and 3.3 volts?

NO → Internal fault in servo. Renew servo and repeat the complete test procedure for both upper and lower servos.

YES ↓

On the test box, set CHECK VOLTS to Position 3.
Is the voltmeter reading within ± 0.2 volts of the reading recorded in CHECK VOLTS Position 2?

YES → On the test box, set the IND/VOLTS to IND and the RUN/SET switch to RUN. The lower servo should run from 43% ± 2% to 0%. At the lower servo arm, release the upper nut sufficiently to allow the temperature blend flap rod to be pulled through the servo arm until it stops under light pressure. Hold the rod under light pressure and adjust the lower nut to contact the servo arm, then tighten nuts.

NO ↓

Interchange servo modules and repeat checks at CHECK VOLTS Position 2 and 3.
Are the readings within ± 0.2 volts?

NO → Upper servo module is also faulty. Renew both modules.

YES ↓

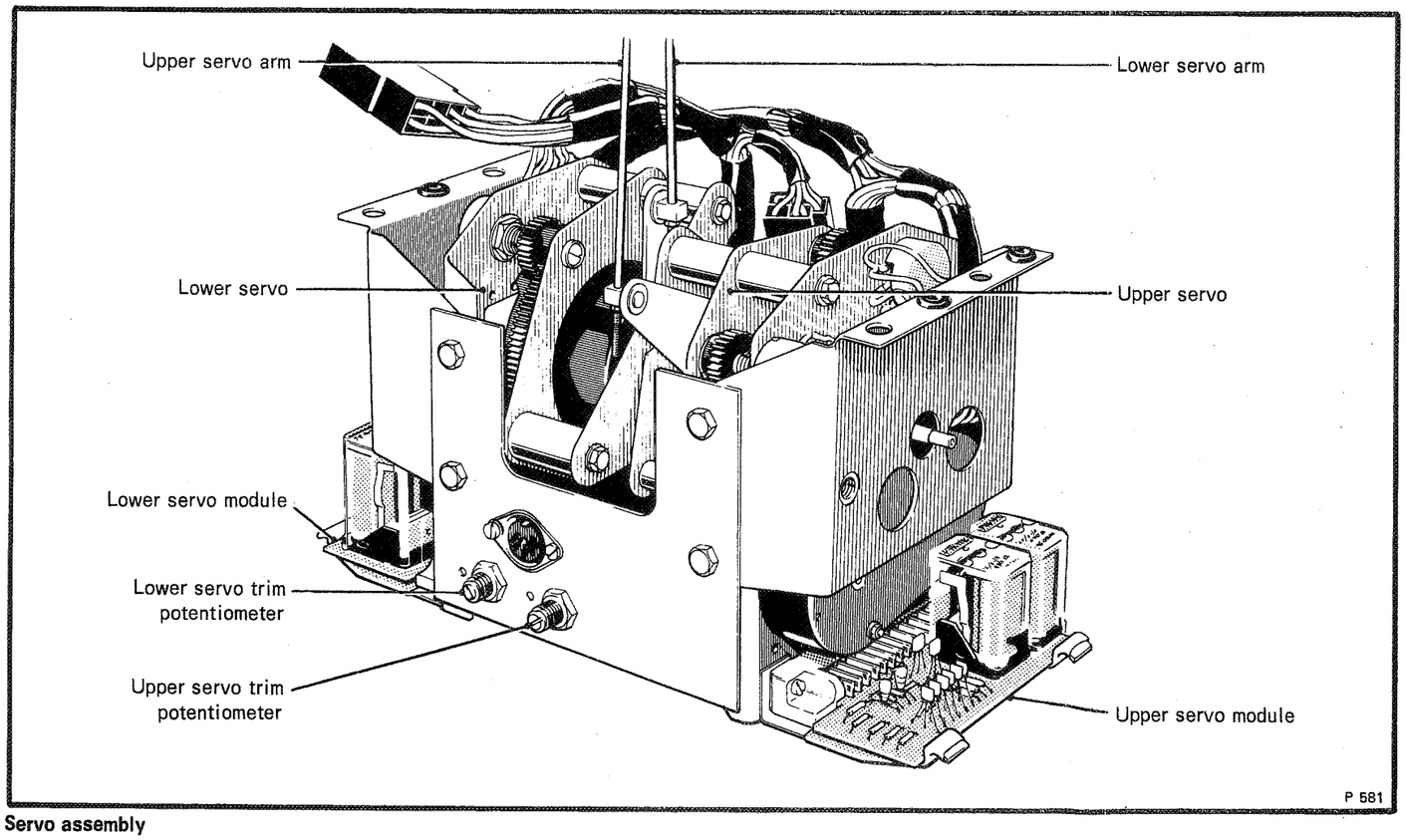
The original servo module is faulty. Renew servo module.

Go back to ✱ on sheet 1

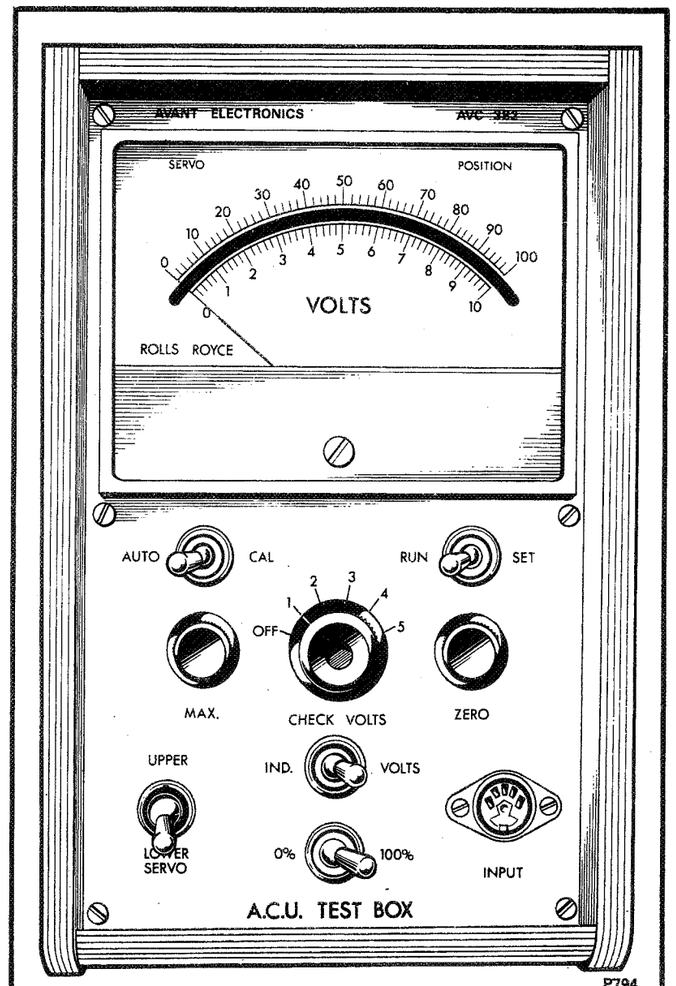
These are landmarks. They show which part of the system has been proved correct.

The lower temperature blend flap is now correctly set

The lower servo and lower servo module are now proven to operate correctly from the test box. If a fault still exists, refer to the LOWER SENSOR CHAIN FAULT DIAGNOSIS



Servo assembly



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Section C7

System test and fault diagnosis

Lower servo test and calibration procedure
Sheet 2 of 2
Fig. C53 continued

Start

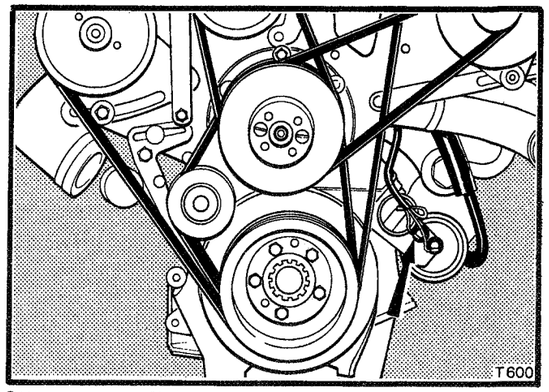
Disconnect the white/brown cable from the oil pressure switch.
Disconnect the sensor chain socket.
Connect the test box into the servo test socket.

On the test box set the following:
IND/VOLTS to IND. RUN/SET to RUN.
AUTO/CAL to CAL. UPPER/LOWER SERVO to UPPER.
CHECK VOLTS to Position 1.

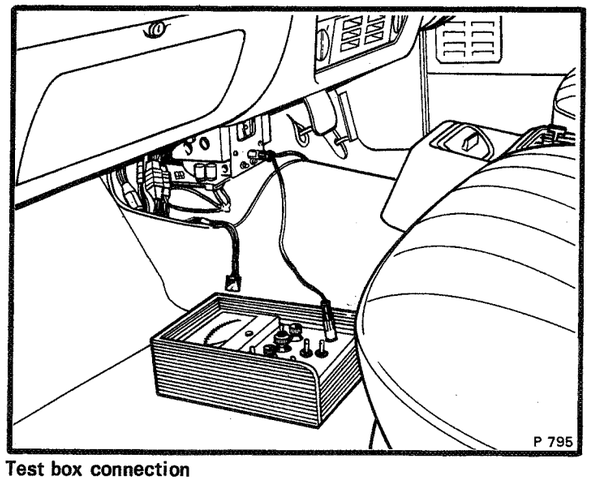
On the car, set the upper temperature switch to the mid-position and the ACU switch to LOW. Switch on the ignition.

On the test box, set the 0%/100% switch to 0% and adjust ZERO control until meter indicates 0%. Set the 0%/100% switch to 100% and adjust MAX control until meter indicates 100%. Repeat both operations until both readings are correct.

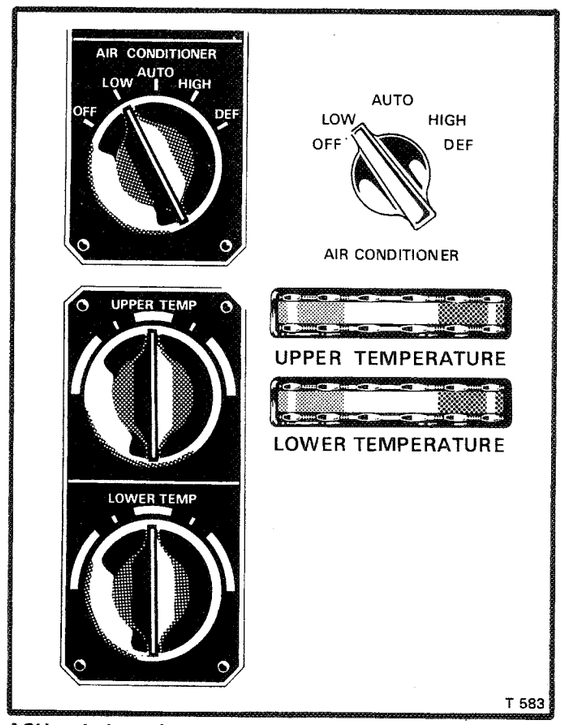
On the test box, set the RUN/SET switch to SET and the 0%/100% switch to 0%. Turn the upper servo trim potentiometer fully anti-clockwise and wait for the servo to stop. If the meter reading is not 0%, turn the upper temperature selector towards the minimum temperature position until 0% is obtained.



Oil pressure switch



Test box connection



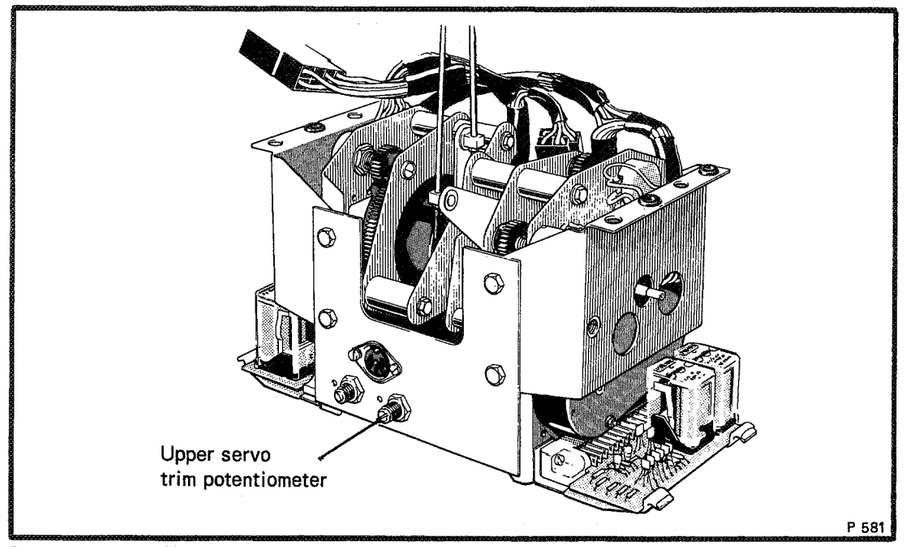
ACU switch settings

Checking the Recirculation Actuators → Go to sheet 2

Checking the Lower Quantity Actuator → Go to sheet 3

Checking the Mode Flap Actuator and Rear Window Demist → Go to sheet 4

Checking the Fans Inhibit Circuit. → Go to sheet 6



Servo assembly

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Section C7

System test and fault diagnosis

Test procedure for recirculation,
lower quantity, mode change,
fan inhibit and rear window demist circuits.
Sheet 1 of 7
Fig. C54

From sheet 1
Recirculation actuators

Turn the upper servo trim potentiometer clockwise until the meter indicates approximately 5%.
Have both recirculation actuators moved to the 'Fresh Air' position?

NO → Refer to RECIRCULATION ACTUATOR FAULT FLOW CHART

YES

Turn the upper servo trim potentiometer anti-clockwise until meter indicates 0%.
Have both actuators moved to the 'Recirculation' position?

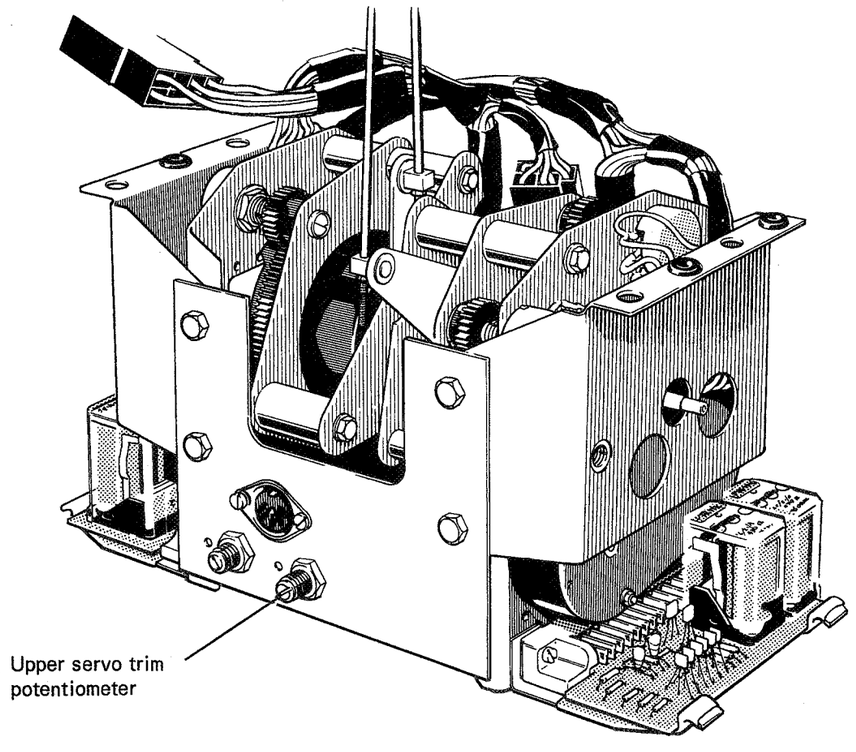
YES

NO → Refer to RECIRCULATION ACTUATOR FAULT FLOW CHART

The recirculation actuators are now satisfactory

Recalibrate the upper servo to 51% ± 2%

These are landmarks. They show which part of the system has been proved correct.



Servo assembly

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Section C7

System test and fault diagnosis

Test procedure for recirculation,
lower quantity, mode change,
fan inhibit and rear window demist circuits.
Sheet 2 of 7
Fig. C54 continued

From sheet 1
Lower quantity actuator

Turn the upper servo trim potentiometer very slowly clockwise.
Does the lower quantity actuator operate and the flap open?

YES

NO

Refer to the LOWER QUANTITY ACTUATOR FAULT FLOW CHART

Does the meter indicate 10%±4%?

NO

Renew servo and set-up as in Servo Test and Calibration chart.

YES

Turn the upper servo trim potentiometer anti-clockwise until the lower quantity actuator operates.
Does the lower quantity flap close?

NO

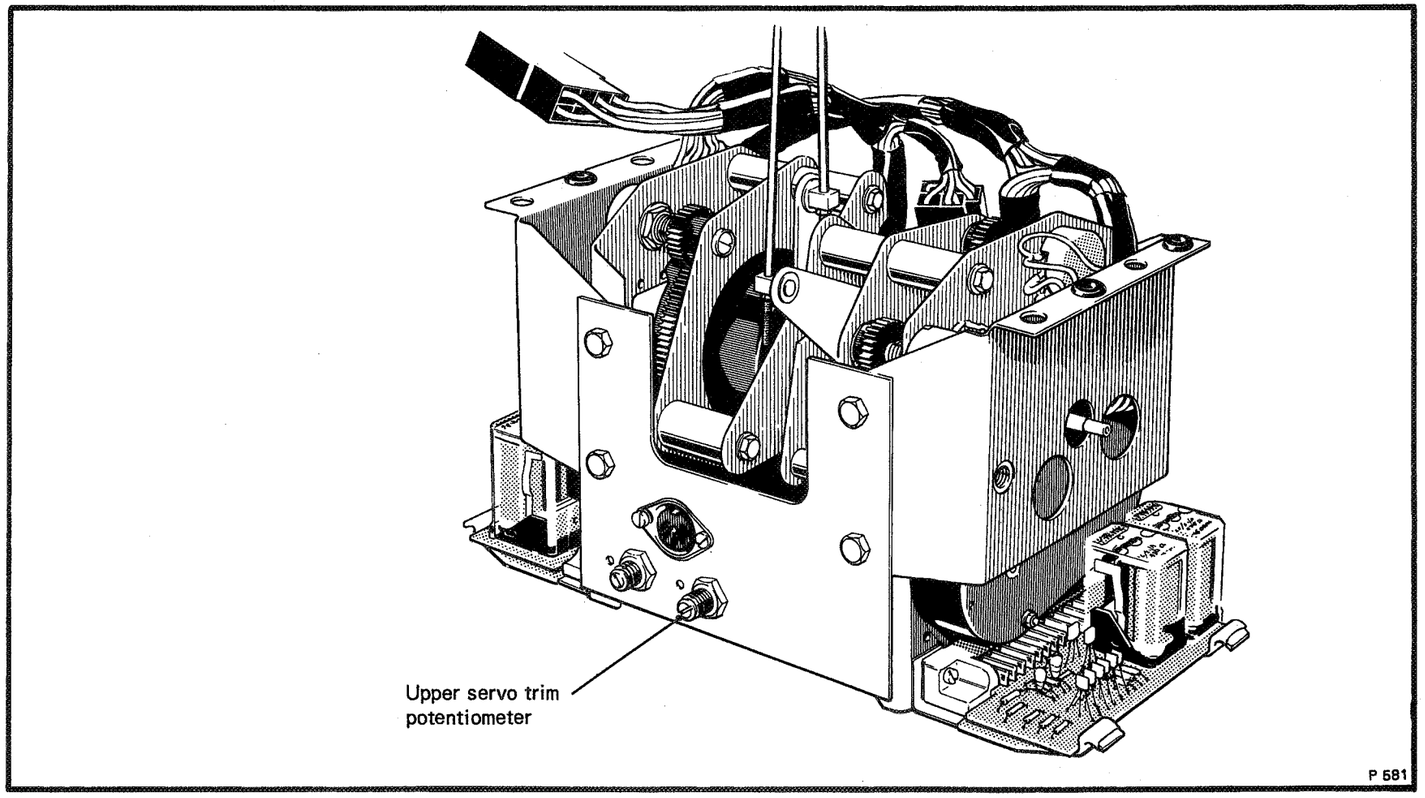
Refer to LOWER QUANTITY ACTUATOR FAULT FLOW CHART

YES

These are landmarks. They show which part of the system has been proved correct

The lower quantity flap and actuator are now correct

Recalibrate the upper servo to 51%±2%



Servo assembly

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Section C7

System test and fault diagnosis

Test procedure for recirculation,
lower quantity, mode change,
fan inhibit and rear window demist circuits.
Sheet 3 of 7
Fig. C54 continued

Section C7

System test and fault diagnosis

Test procedure for recirculation, lower quantity, mode change, fan inhibit and rear window demist circuits.
Sheet 4 of 7
Fig. C54 continued

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From sheet 1

Turn the upper servo trim potentiometer slowly clockwise.
Does the mode flap actuator operate and is the mode flap in the 'Screen' position?

NO → Refer to MODE FLAP and ACTUATOR FAULT DIAGNOSIS

YES

Does the meter indicate 25% ± 4%?

NO → Renew servo and set-up as in Servo test and calibration chart.

YES

Turn the upper servo trim potentiometer anti-clockwise.
Does the mode flap actuator operate and is the mode flap in the 'Facia' position?

NO → Refer to MODE FLAP and ACTUATOR FAULT DIAGNOSIS

YES

The mode flap actuator is satisfactory.

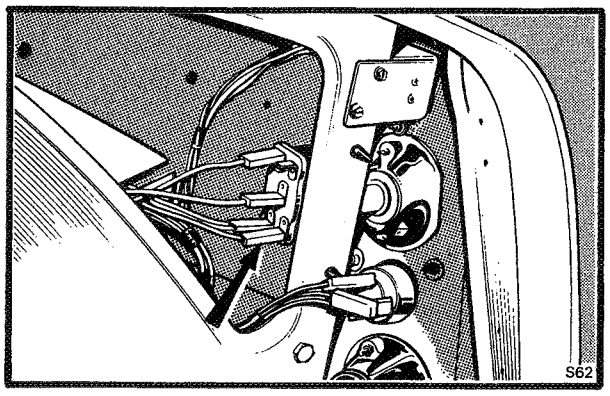
Turn the upper servo trim potentiometer slowly clockwise until the mode flap operates into the 'Screen' mode. With the engine running, disconnect the blue/slate wire from terminal C2 of the rear window demist relay and connect a suitable ammeter between the blue/slate wire and terminal C2.
Does the ammeter indicate between 8.5 and 13.5 amps?

NO → **Go to sheet 5**

YES

The rear window demister is satisfactory.

Recalibrate the upper servo to 51% 2%.



Window demist relay

These are landmarks. They show which part of the system has been proved correct.

From sheet 4

Is there 12 volts on the blue/slate wire at the rear window demist relay?

YES → **Is there 12 volts on the blue/slate wire at the rear window demist connections?** (Right-hand side)

NO → Open circuit in blue/slate wire between relay and rear window demister. Check the soundness of the rear window demist plug and socket.

YES → Disconnect the black wire from the blue wire at the rear window demist panel and connect a test lamp between the blue/slate wire (right-hand side) to the black wire on the left-hand side.
Does the lamp light?

NO → Open circuit in black wire between demister and earth or faulty left-hand boot earth.

YES → The rear window demister is faulty. Replace demister panel.

Rear window demister should now operate correctly. → Recalibrate the upper servo to 51% ± 2%.

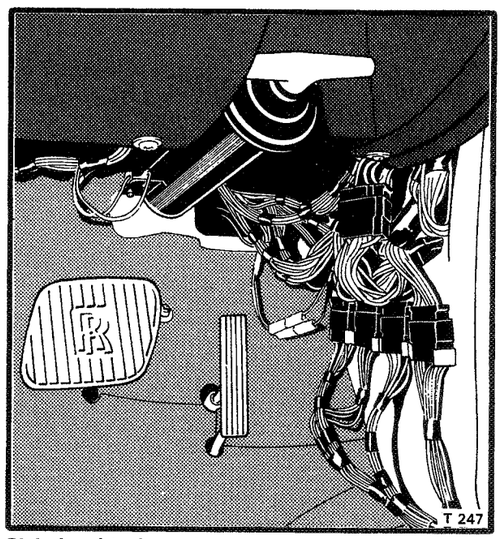
NO → **Is there 12 volts on the brown/slate wire at the rear window demist relay?**

YES → **Is there 12 volts on the orange/blue wire at the relay?**

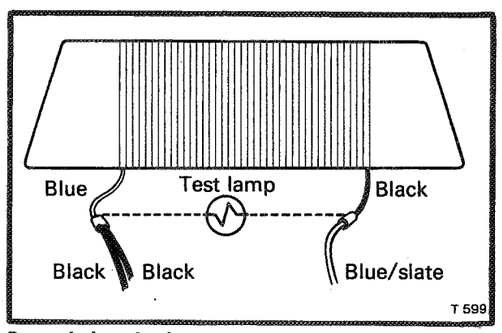
NO → Check fuse 8 and the continuity of the brown/slate wire from fuse 8 to the rear window demist relay.

YES → Check the black wire from W2 of the relay to earth. The wire is connected to the stoplamp failure relay and from there to the right-hand boot earth. If the wire and earth point are sound, the relay is faulty.

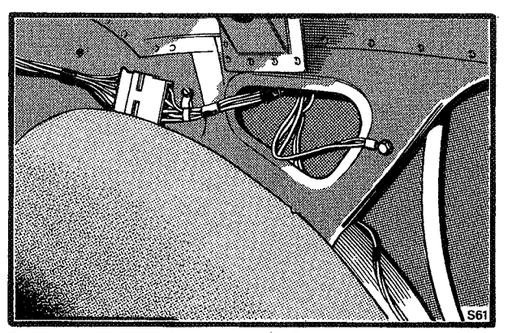
NO → Check the continuity of the orange/blue wire between the relay and servo plug and socket. Ensure that the right-hand body socket is sound.



Right-hand body sockets



Rear window demist



Rear window demist socket & Right-hand boot earth

These are landmarks. They show which part of the system has been proved correct.

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Section C7

System test and fault diagnosis

Test procedure for recirculation,
lower quantity, mode change,
fan inhibit and rear window demist circuits.
Sheet 5 of 7
Fig. C54 continued

Section C7

System test and fault diagnosis

Test procedure for recirculation,
lower quantity, mode change,
fan inhibit and rear window demist circuits.
Sheet 6 of 7
Fig. C54 continued

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From sheet 1
Fans inhibit circuit

Disconnect the fan delay thermostat.
Do the fans operate?
NO → Refer to FANS INOPERATIVE IN ALL SITUATIONS fault diagnosis.

YES

Turn the upper servo trim potentiometer clockwise until the mode flap operate to the 'Screen' position.
Do the fans continue to operate?
NO → Refer to FANS INOPERATIVE IN LOW, AUTO and HIGH fault diagnosis.

YES

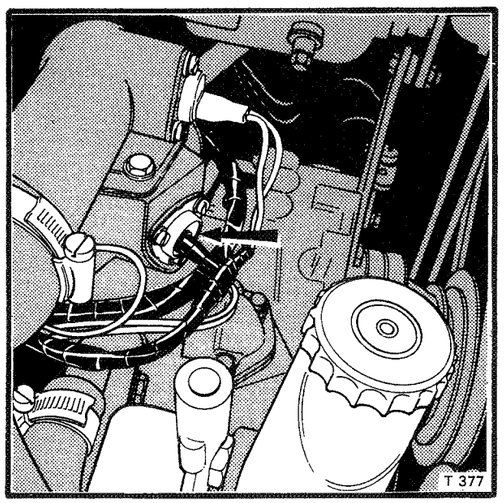
Switch off the ignition and immediately restart the engine.
Are the fans inoperative for approximately 13 seconds?
YES → **Go to sheet 7**

NO

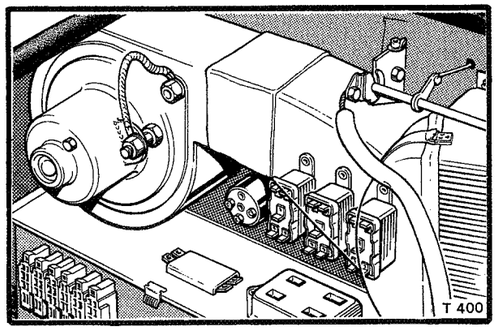
At the fan speed module plug is there 12 volts on the brown/blue wire when the engine is cranking?
NO → Open circuit on brown/blue wire between fan speed module plug and starter motor. Correct the fault and restart the engine.
Are the fans inoperative for 13 seconds?
YES → **Go to sheet 7**
NO → Check for an earth fault on the blue/black wire between the fan speed module and fan switch-off relay. Restart the engine.
Are the fans inoperative for 13 seconds?
YES → **Go to sheet 7**
NO → **At the fan speed module plug is there 12 volts on the orange/purple wire?**
NO → Open circuit on orange/purple wire between fan speed module and servo. Correct the fault and restart the engine.
Are the fans inoperative for approximately 13 seconds?
YES → **Go to sheet 7**
NO → Renew fan speed module. Restart the engine.
Are the fans inoperative for approximately 13 seconds?
YES → **Go to sheet 7**
NO → Two faults or incorrect diagnosis

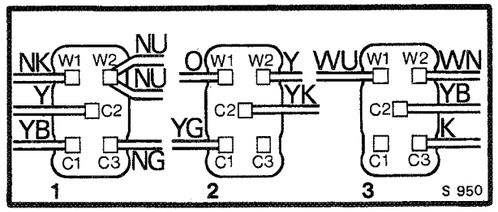
YES (from Open circuit on brown/blue wire) → **Go to sheet 7**

YES (from At the fan speed module plug is there 12 volts on the orange/purple wire?) → **Go to sheet 7**

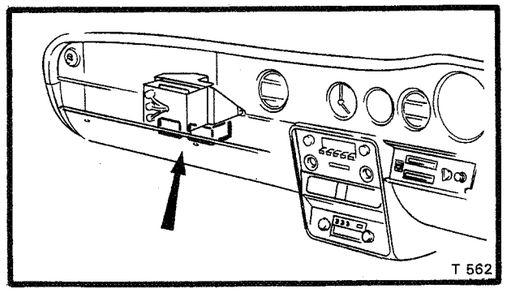


Fan delay thermostat

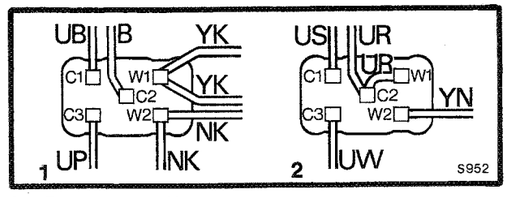




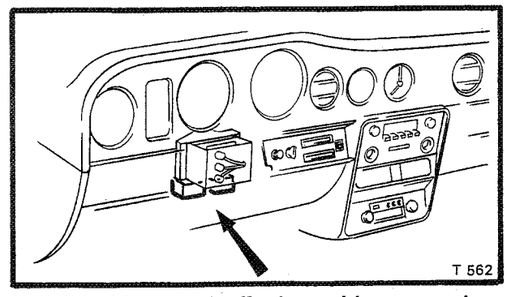
1. Fan and compressor relay
2. Fan delay relay
3. Servo isolation relay



Location of fan switch-off relay and lower quantity relay right-hand drive cars



1. Fan switch-off relay
2. Lower quantity relay



Location of fan switch-off relay and lower quantity relay left-hand drive cars

From sheet 6

These are landmarks. They show which part of the system has been proved correct.

Short circuit the yellow/brown wire of the fan delay thermostat to earth.
Do the fans stop and has the lower quantity flap closed?

NO → Check the yellow/brown wire for continuity and also the fan delay relay and lower quantity micro-switch for correct operation.

YES

Disconnect the yellow/brown wire from earth.
Do the fans only restart when the lower quantity flap is fully open?

YES

NO → Refer to LOWER QUANTITY ACTUATOR FLOW CHART.

Turn the upper servo trim potentiometer anti-clockwise until the mode flap operates to the 'Facia' position.
Do the fans restart?

NO → Refer to FANS INOPERATIVE IN LOW, AUTO and HIGH fault diagnosis

YES

Switch off the ignition and immediately restart the engine.
Do the fans start immediately?
(i.e. no 13 second delay)

NO → Check the diodes between the orange/purple and orange/red wires and also between the orange/purple and yellow wires at the ACU diode board.

YES

The 13 second delay circuit is satisfactory

Pull gently downwards on the lower quantity flap microswitch operating rod.
Do the fans continue to operate?

YES → Remove the yellow/brown wire from earth and reconnect the fan delay thermostat. Turn the upper servo trim potentiometer clockwise until the mode flap operates to the 'Screen' position. Verify that the fans stop.

NO

Readjust microswitch setting
Do the fans operate?

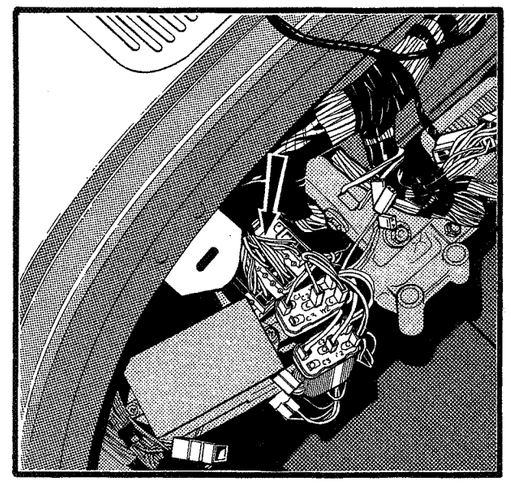
YES → Remove the yellow/brown wire from earth and reconnect the fan delay thermostat. Turn the upper servo trim potentiometer clockwise until the mode flap operates to the 'Screen' position. Verify that the fans stop.

NO

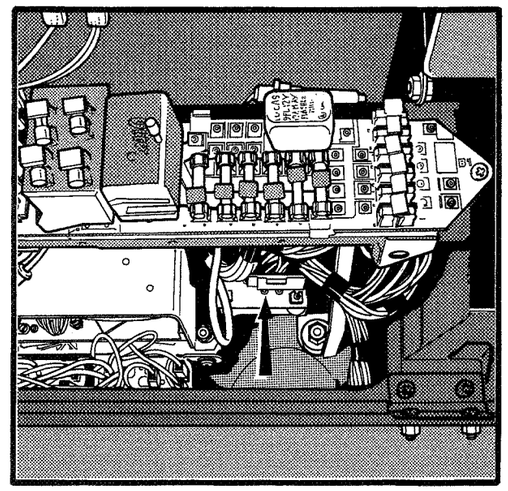
Two or more faults or incorrect diagnosis

The fans inhibit circuit is satisfactory.

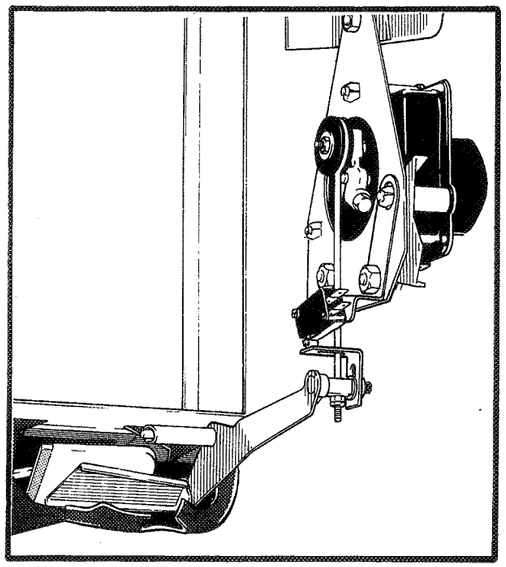
Recalibrate the upper servo to 51% ± 2%.



Diode board left-hand drive cars



Diode board right-hand drive cars



Lower quantity flap microswitch operating rod

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Section C7

System test and fault diagnosis

Test procedure for recirculation,
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Fig. C54 continued