

## Section C4

# System Test and Adjustment Procedures

Before attempting to test or adjust the automatic air conditioning system, operators are advised to familiarise themselves with the various components of the system and their location on the car. For this purpose (i.e. basic identification and location of components) a separate introduction supplement and a series of wall charts have been compiled.

### Preliminary test procedure

This procedure is of a preliminary nature but it will enable the operator to diagnose if the system is operating correctly without the use of workshop tools or test equipment. If the operation of the system is suspect, the car should be returned to a Dealer, Distributor or Retailer's premises for a thorough check.

1. Firmly apply the parking brake and ensure that the gear range selector lever is in 'P' - Park position. Remove the gear range actuator thermal cut-out.

2. If these checks are to be carried out in a confined space (i.e. a Workshop), fit a length of flexible hose to the exhaust tail pipe to ensure that exhaust gases are vented to atmosphere outside the Workshop or building.

**Important** It is dangerous to inhale exhaust gases. Sitting in the car in a confined space with the engine running and the automatic air conditioning system operating does not eliminate this danger.

3. Start the engine.

4. Turn the automatic air conditioning (function) switch situated on the fascia to the DEF (De-frost) position.

The fan motors should operate at high speed and all air be directed to the windscreen.

5. Switch off the engine.

6. Switch on the ignition.

7. Turn the automatic air conditioning (function) switch to the HIGH position and both temperature selectors, situated below the automatic air conditioning (function) switch, to the minimum temperature settings.

The fan motors should not operate.

8. Start the engine and check to ensure that the electric servos, actuators and fan motors do not operate while the engine is cranking. The fan motors should start and the servos take up their pre-determined positions as the starter motor comes to rest.

**Note** If the interior of the car is cold the fan motors may not start due to the upper system being in the screen mode. In these circumstances the fan motors will not operate until the engine has warmed up.

9. Switch off the engine.

10. Turn both temperature selectors to their maximum temperature settings.

11. Switch on the ignition and wait for the oil pressure warning lamp to illuminate.

The fan motors should not operate.

12. Start the engine and check to ensure that the electric servos, actuators and fan motors do not operate while the engine is cranking.

13. Check to ensure that the lower quantity flap is closed.

14. As the engine warms up and the coolant reaches a temperature of 44°C. (111°F.) the lower quantity flap should open.

15. When the lower quantity flap reaches the fully open position the fan motors should switch on.

If when carrying out operation 13 the lower quantity flap is open it could be that the engine coolant temperature is above 44°C. (111°F.).

Should this prove to be so, short circuit the yellow/brown cable from the switch in the engine thermostat housing to earth. The lower quantity flap should then close.

Detach the yellow/brown cable from the earth point and again fit it to the thermostat housing switch, the lower quantity flap should then open as mentioned in item 14.

16. The automatic air conditioning (function) switch positions must be checked with the engine running and the coolant temperature above 44°C. (111°F.).

**OFF** All systems inoperative. Recirculation flaps in recirculation position.

**LOW** Fan speed low regardless of temperature selector positions.

Servo positions vary as determined by the positions of the temperature selectors.

**AUTO** (A) Turn one of the temperature selectors to its mid position and turn the second temperature selector from minimum to maximum temperature position. The fan motors should progressively change from high speed at either end of the temperature selector travel to low speed at some intermediate position of the temperature selector.

(B) Reverse the positions of the temperature selectors (set the temperature selector which was previously varied and vary the position of the other temperature selector) noting that the fan motors speed changes with the positions of the temperature selector as described in (A).

The recirculation flaps should be in the ambient air position under all but the full cold condition on the upper servo.

**HIGH** Fan motors speed at a fixed maximum regardless of temperature selector positions.  
 Servo positions vary as determined by the positions of the temperature selectors.

**DEF** Fan motors speed at maximum regardless of temperature selector positions. All air (maximum available temperature) should be directed on to the windscreen; this condition still applies if the engine coolant temperature is below the fan motors delay thermostat setting of 44°C. (111°F.).  
 The recirculation flaps should be in the ambient air position.

17. With the engine running turn the automatic air conditioning (function) switch through all positions, noting that the fuel filler door solenoid will only operate when the switch is in the Off position. Check also, that the compressor clutch is engaged in all positions of the automatic air conditioning switch, except OFF.

If the ambient temperature is below 0°C. (32°F.) the compressor solenoid will disengage, check this by removing the blue/yellow lead from the compressor ambient switch situated on the engine compartment face of the evaporator box. Fit the lead to the switch.

18. With the engine running, turn the automatic air conditioning (function) switch through all positions except OFF and DEF; turn the upper temperature selector switch from minimum temperature. Note that at a certain switch position the air flow will change from the facia outlets to the windscreen outlets.

Check that the rear window demister is operating when air is directed to the windscreen but not when air is directed through the facia outlet ducts.

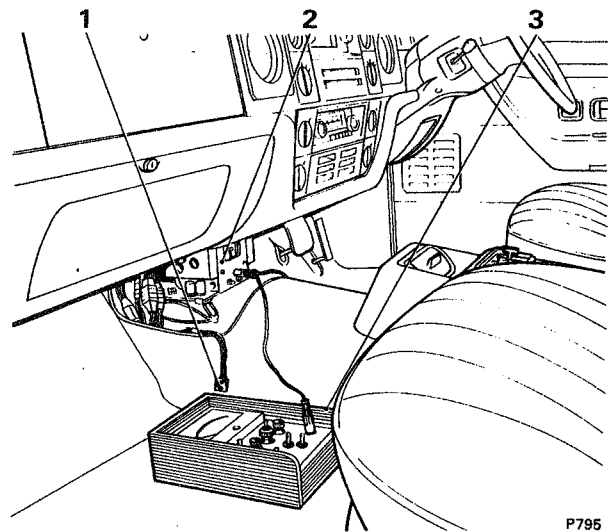
19. Fit the gear range actuator thermal cut-out and remove the flexible hose from the exhaust tail pipe.

#### Test and adjusting procedure

The following details give a comprehensive test and adjusting procedure. The information contained within the brackets is for information purposes only, therefore there is no need to check that actuators are doing as described, because there is a specific test for each within the main text.

It is advisable not to immediately rectify any fault which appears (unless the instructions state that this must be done) but to continue with the checking procedure to obtain an overall picture of the problem and then to diagnose the actual trouble from Section C6 - Fault Diagnosis.

1. Remove the servo trim cover (do not disconnect 5 way socket).
2. Connect the test box (RH 8851) into the servo test socket (see Figs. C2 and C3).
3. Adjust the control switches on the test box as follows.



P795

Fig. C3 Test box in position

- 1 Servo trim cover 5 way socket
- 2 Servo assembly
- 3 Test box RH 8851

- a) IND/VOLTS switch to VOLTS position.
- b) RUN/SET switch to RUN position.
- c) AUTO/CAL switch to AUTO position.
- d) 0%/100% switch to 100% position.

4. Adjust the control switches of the car as follows.

- a) Turn the upper and lower temperature selectors to the mid-position (i.e. 12 o'clock).
- b) Turn the air conditioning (function) switch to LOW.
- c) Turn both the servo trimmers fully anti-clockwise.

5. Disconnect the oil pressure switch (white/brown cable, oil pressure switch is on front left-hand side of engine adjacent to the oil filter head).

6. Switch on the ignition (A number of actuators will now run, but should stop within a few seconds). The fan motors will blow at minimum speed).

7. On the test box move the CHECK VOLTS switch through the following positions and note that the reading should be as follows.

Position 1	Reading 9.1 Volts $\pm$ 0.5 Volts
Position 2	Reading between 1 Volt and 4 Volts
Position 3	Reading between 1 Volt and 4 Volts
Position 4	Reading between 1 Volt and 4 Volts
Position 5	Reading between 1 Volt and 4 Volts

Return the switch to position 1.

If the readings are incorrect proceed as follows.

If readings 1, 2 or 4 are incorrect there is a fault in the servo, stabiliser or looms and this must be rectified before proceeding any further. Refer to

Section C6 - Fault Diagnosis. If readings 3 or 5 are not as specified there is a fault in the temperature sensor networks. However, one can proceed with the setting instructions and the fault can be rectified after Operation 25.

8. Switch off the ignition.

9. Disconnect the 5 way servo trim cover socket (see Fig. C3).

10. Adjust the control switches on the test box as follows.

a) AUTO/CAL switch to CAL

b) IND/VOLTS switch to IND

Adjust the MAX control fully anti-clockwise.

11. Switch on the ignition (both servos will run to their full hot positions. A number of actuators will now run but will stop within a few seconds. The fan motors will not be running).

If the servo fails to move this must be repaired before proceeding.

12. Adjust the control switches on the test box as follows.

a) Switch the UPPER/LOWER servo switch to the LOWER servo position and the 0%/100% switch to 0% (the lower servo will run to the full cold position and close the water tap).

b) Adjust the ZERO control so that the meter reads 0.

c) Switch the 0%/100% switch to the 100% position and wait for the servo to stop. The lower servo will run to the full hot position, opening the water tap as it moves).

d) Adjust the MAX control so that the meter reads 100.

e) Repeat operations 12a to 12d until both readings are correct. Finish this procedure with the 0%/100% switch in the 0% position.

Operation 12 has now calibrated the meter as a servo position indicator, 0 being the full cold position and 100 the full hot position. The meter has a linear response (i.e. 50 is the mid-servo position).

13. Adjust the RUN/SET switch to the SET position (the servo may now run and then stop, this is irrelevant).

14. Adjust the lower servo trim pot clockwise to move the servo until the meter reading is 43 (approach this setting from 0 not 100). If the servo overshoots the required setting repeat Operation 14 again. This has set the lower servo to calibrate the lower temperature selector knob. Thus the reading of 43 must be set very carefully.

15. Adjust the control switches on the test box as follows.

**Note** If the upper servo fails to move in Operation 15 this must be repaired before proceeding.

a) Switch the RUN/SET switch to the RUN position (the lower servo will run to full cold).

b) Switch the UPPER/LOWER switch to the UPPER position (the lower servo will run to the full hot position and the upper servo

will run to the full cold position. The fan motors will start to run at minimum speed; all the air conditioning system actuators will run and then stop, the positions of these will be checked later).

c) With the 0%/100% switch in the 0% position adjust the ZERO control so that the meter reads 0.

d) Switch the 0%/100% switch to the 100% position and wait for the servo to stop. (Throughout Operations 15a to 15e the air conditioning system actuators will run at random and the fan motors will be switched off and on, this is normal).

e) Adjust the MAX control so that the meter reads 100.

f) Repeat Operations 15c to 15e until both readings are correct. (The meter is now calibrated as a servo position indicator for the upper servo, 0 being full cold and 100 full hot. The meter has a linear response (i.e. 50 is mid-servo position).

16. Adjust the RUN/SET switch to the SET position and wait for the servo to stop. (The upper servo will run to full cold unless it is already at full cold).

17. Check that the following conditions now apply.

a) The fan motors are running at minimum speed.

b) The recirculation actuators are open (i.e. full recirculation).

c) The lower quantity flap actuator is closed.

d) The mode flap actuator is in the fascia position.

If the positions are different from above, note the positions and proceed.

18. Checking the recirculation flap actuators.

a) Turn the upper servo trim pot clockwise until the meter reads approximately 5.

b) Check that both recirculation actuators move to the closed position (i.e. full fresh air) to stop.

c) Turn the upper servo trim pot anti-clockwise until the meter reads 0.

d) Check that both recirculation actuators move to the open position (i.e. recirculation) and stop.

If the positions of the actuators are the reverse of Operations 18b and 18d adjust the cranks on actuators. If one or both actuators do not move from Operation 17b there is an electrical fault.

19. Checking the lower quantity flap actuator.

a) Disconnect the fan delay thermostat (yellow/brown cable, the thermostat is situated at the front of the engine).

b) Turn the upper servo trim pot clockwise very slowly until the lower quantity flap actuator runs, this should occur at a meter reading of 10 plus or minus 2. (The recirculation actuators will also run, but this can be ignored). The servo should stop with the flap in the open position.

c) Turn the trim pot anti-clockwise and the actuator should run again.

d) Check to ensure that the lower quantity flap is closed when the actuator stops. If these flap positions are the reverse of the above and Operation 17c, adjust the crank

- on the actuator. If the actuator does not move from 17c there is an electrical fault.
20. Checking the mode flap actuator.
    - a) Ensure that the fan delay thermostat cable (yellow/brown) is connected.
    - b) Slowly turn the upper servo trim pot in a clockwise direction until the mode flap actuator runs and ensure that the following conditions apply.
      - i) The fan motors have stopped.
      - ii) The mode flap actuator has stopped in the screen position.
      - iii) There is 12 volts at the heated rear window cable. The feed is the blue/grey cable situated in the luggage compartment.
      - iv) Ensure that the meter reading is 25 plus or minus 2.
    - c) Disconnect the yellow/brown fan delay thermostat cable, (the thermostat is situated at the front of the engine). Ensure that the following conditions apply.
      - i) The lower quantity flap opens.
      - ii) When the lower quantity flap is fully open the fan motors start.
      - iii) The air flow is to the windscreen.
    - d) Turn the trim pot in an anti-clockwise direction to a meter reading of approximately 15, the actuator should run. When the actuator stops ensure that the following conditions apply.
      - i) The mode flap is in the fascia position.
      - ii) The air flow is from the fascia.
      - iii) There is 0 Volts at the heated rear window. The feed is the blue/grey cable situated in the luggage compartment.
      - iv) That air flow is from the lower outlets.

If the flap positions are the reverse of Operation 17d adjust the crank on the actuator. If the actuator does not move at Operation 17d or comply with the conditions of 20d, there is an electrical fault.

21. Adjust the upper servo trim pot in a clockwise direction to move the servo until the meter reading is 51 (approach this setting from 0 not 100). If the servo overshoots the required setting repeat Operation 21 again. When this setting is achieved, the upper servo is set to calibrate the upper temperature selector. Thus the reading of 51 must be set very carefully.

22. Switch the air conditioning (function) switch to the OFF position.

Ensure that the following conditions apply.

- a) The recirculation flaps have opened (i.e. full recirculation position).
- b) The fans have stopped.

23. Switch the air conditioning (function) switch to the LOW position.

Ensure that the following conditions apply.

- a) The recirculation flaps have closed (i.e. ambient air position).
- b) The fans have started.

24. Switch off the ignition.

25. Connect the 5 way servo trim cover socket and switch off the test box, remove the test box.

26. Switch on the ignition and wait for the servos and actuators to stop.

27. Warm the lower (knee roll) sensor with heat from the fingers.

Ensure that the lower servo moves colder (i.e. the lever moves downwards). Ignore any reaction from the other actuators.

28. Warm the upper cantrail sensor with heat from the fingers.

Ensure that the upper servo moves colder (i.e. the lever moves upwards). Ignore any reactions from the other actuators or lower servo.

29. Switch the air conditioning (function) switch to the AUTO position.

Ensure that there is an increase in fan speed.

30. Switch the air conditioning (function) switch to the HIGH position.

Ensure that there is an increase in the fan speed.

31. Switch the air conditioning (function) switch to the DEF position.

Ensure that

- a) Both servos travel to their respective full hot positions.
- b) The air flow is directed to the screen.
- c) The lower quantity actuator is closed and there is no air flow from the lower ducts.
- d) Fan speed should be at maximum.

32. Fit the yellow/brown cable to the fan delay thermostat ensuring that there is no change and that the fans are still running.

33. Switch off the air conditioning (function) switch.

34. Switch off the ignition.

35. Fit the oil pressure switch connection (white/brown cable).

36. Fit the servo trim cover.

SOME CARS HAVE W/N + W/U CABLES  
CROSSED  
AT THE A/C DIODE BOARD

35 CHECKING OPERATION OF (A) SERVO ISOLATION RELAY  
(B) FAN SWITCH OFF RELAY

A SWITCH ON IGNITION

Ensure oil warning light is illuminated.

B TURN A.C.U. SELECTOR SWITCH TO HIGH POSITION

Check (1) Servo's do not run  
(2) Fans do not operate

Ignore operation of recirc actuators.

C TURN BOTH TEMPERATURE SELECTORS TO FULL COLD

Check (1) Servo's do not run  
(2) Fans do not operate

D TURN BOTH TEMPERATURE SELECTORS TO FULL HOT

Check (1) Servo's do not run  
(2) Fans do not operate

E CHECK THAT PETROL FILLER DOOR SOLENOID DOES NOT OPERATE WHEN ITS  
RELEASE SWITCH IS PRESSED

F TURN A.C.U. SELECTOR SWITCH TO THE OFF POSITION

Check Petrol Filler Door Solenoid operates when its release switch  
is operated.

G SWITCH OFF IGNITION

14 ADD NOTES TO CHECK 14 DELETE ALL PRESENT NOTES

This setting has calibrated (1) Lower Servo  
(2) Lower Servo Module  
(3) Lower Temperature Selector

Note if any of the above are replaced after the system has been  
calibrated, then the calibration will be incorrect and must be  
recalibrated.

21 ADD NOTES TO CHECK 21 DELETE ALL PRESENT NOTES

This setting has calibrated (1) Upper Servo  
(2) Upper Servo Module  
(3) Upper Temperature Selector.

Note if any of the above are replaced after the system has been  
calibrated, then the calibration will be incorrect and must be  
recalibrated.