Chapter C

Automatic Air Conditioning System

Contents

Section

..l T.Q.I.s
..o:-

FRM
Ar
Mr
Wil
Hth
Arm
RJS
MP
HLJ/FL
JBA
When
applicable
to:-
Sms
Aly/Bty
Aly/HED
~~RJS/ZKZ~~
RJS/GAL
~~RJS/Ptsx~~
RB
McF - Cars only
GHK - "
~~WS~~
GAW - Materials & Processes
~~K~~
PJR - Hythe Rd.
WT - Hythe Rd.
Lom - MPW
EH - MPW

TITLE	EMISSION RELATED
Change of Adhesive for bonding ACU Flap Seals	-
PRODUCT: All Cars	SERIAL NO. T622
TITLE OF PART: ACU Flap Seal PART No. UD 18326, UD 18328, UD 19036	DATE ISSUED: 30 6 77
LOCATION OF PART WHEN ASSEMBLED: ACU	ASSOCIATED A.R.S No. Date.
EFFECT ON INTERCHANGEABILITY: None	WORK CHARGEABL

REASON FOR INSTRUCTION

To give improved ease of adhesive application.

ACTION REQUIRED

Use Dunlop 1127 Adhesive in accordance with CWP 73 in place of Bostik 1261 to bond foam seals to ACU Flaps.

COMMENCEMENT - CANCELLATION OF T.Q.I.

Immediate - An ARS will be issued as soon as trials with a spray adhesive system have been completed.

MATERIAL DISPOSAL

This will be instructed by the approval of the ARS quoted above which calls material to be used UP/MODIFIED/SCRAPPED, until approval of this A.R.S. mat is to be used UP/MODIFIED/BONDED.

EMISSION CERTIFICATION AUTHORITY CQ

INITIATOR CQ Approved RP

703383

1. SCOPE

This process specification covers the bonding of interior trir materials to various substrates where a high bond strength is required.

TRIM MATERIALS	SUBSTRATES
Upholstery Leather	Primed/Painted Metal Surfaces
Supported P.V.C Sheet e.g. 'Ambla'	Aluminium
Silentium	Wood, Chipboard, Hardboard
West of England Cloth	High Modulus Foam Padding
Neoprene Rubber Seals	G.R.P Laminates

Where a low bond strength only is required, for positioning then C.W.P.91 shall be used.

2. ASSOCIATED SPECIFICATIONS

C.W.P.91 Low Strength Bonding of Interior Car Trim

3. MATERIALS

3.1 Adhesive : Dunlop S.1127, R-R Code G1/244, supplied by Dunlop Chemical Products Division, Chester Road Factory, Erdington, Birmingham. 24.

This adhesive is based on neoprene rubber.

3.2 Cleaner : Bostik Cleaner 6001, R-R Code G1/143, supplied by Bostik Ltd.,Ulverscroft Road, Leicester

PRECAUTIONS

(1) Both Adhesive 3.1, and Cleaner 3.2 are classified as Highly Inflammable.

(2) Lids must be replaced on tins immediately after use to prevent solvent evaporation.

4. PREPARATION OF SURFACES

4.1 Non-porous surfaces, including rubbers, shall be cleaned by lightly rubbing the surface with a clean, lint-free cloth moistened with Bostik Cleaner 6001 (see 3.2), until all traces of grease, wax and other contaminants are removed.

4.2 G.R.P Laminates : All traces of mould release agent must be removed by rubbing surfaces with a cloth wetted with water containing about 0.5% Teepol or similar detergent.

5. APPLICATION

5.1 Adhesive : Dunlop S 1127 (3.1) shall be evenly applied to both surfaces using a brush or sleaker. After 5-20 minutes open time the two surfaces shall be mated and maximum pressure applied.

5.2 Cleaning Surplus Adhesive

Any surplus adhesive shall be removed by wiping with a cloth moistened with Bostik Cleaner 6001 (see 3.2).

Section C1

Basic operation

Introduction

The air conditioning system is complex, therefore Chapter C has been written to try and build up a picture of how the system operates, from a simple component description and location to a detailed circuit description.
The content of each section is as follows:

Section C1 - Basic operation
Briefly describes what the air conditioning system does and how it does it. A diagram is included showing the flow of air within the system and how the temperature and direction of the air is controlled.

Section C2 - Refrigeration unit
Describes the refrigeration cycle, precautions to take when handling the refrigerant and servicing the refrigeration system.

Section C3 - Component description
The function of each major component is described and the location shown.

Section C4 - Interlock and Inhibit systems
The interlock and inhibit systems prevent the ACU from operating under certain circumstances. What these circumstances are and how the systems operate is fully described. The location of the relays and other components used in the systems are shown.

Two schematic wiring diagrams are included, one for the interlock system and one for the inhibit system.

Section C5 - Component removal and assembly
The removal and assembly of the major components is described with illustrations showing how they are fitted to the car.

Section C6 - ACU test box
The function of the box is described with instructions for using the box as a servo position indicator and how to calibrate the temperature selectors.

Section C7 - System test and fault diagnosis
Describes the procedure for testing the system and correct faults.

Section C8 - Detailed circuit description
The operation of the ACU is fully described to enable the reader to understand the system and therefore to eventually make fault diagnosis easier. A theoretical wiring diagram of the full ACU is included.

Basic A.C.U. operation

Within the limitations of the system, the air conditioning unit (A.C.U.) will automatically maintain any pre-selected in-car temperature in both the upper part and lower part of the car.

The required temperatures for both the upper part and lower part of the car are independently selected by two dials and the in-car temperatures are measured by sensors located in the upper and lower part of the car. Sensors also measure the outside air temperature. The required temperature and actual temperature are compared by a servo module which signal actuators and fans to operate accordingly.

Air entering the A.C.U. can either be fresh from outside the car or recirculated from inside the car dependent upon the position of two flaps which are controlled by a servo. All air, fresh or recirculated, is dried and cooled by blowing it through a refrigeration evaporator.

A proportion of the cooled air passes through a heater matrix and is subsequently mixed with the remaining cool air which has by-passed the heater matrix. The proportion is determined by two infinitely variable temperature flaps which are controlled by two servos, one for the upper system air and one for the lower system air.

The upper air passes to either the facia or the windscreen, depending on the position of a mode flap. The lower air passes to front and rear footwells when the lower control flap is in open position.

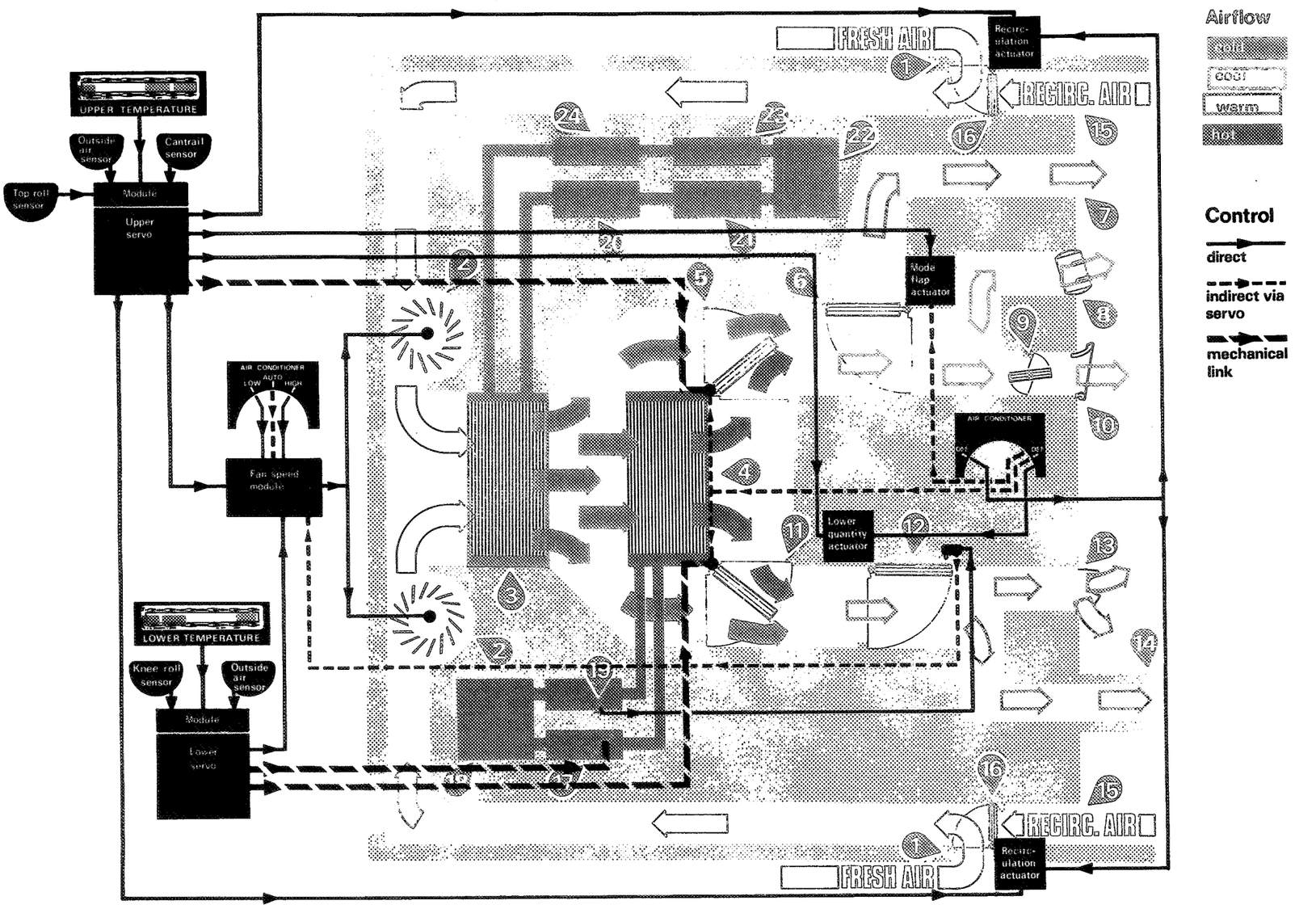
An interlock system prevents the A.C.U. from operating until the car engine is running and an inhibit system prevents the fans operating under certain circumstances.

March 1978

T.S.D. 4200

Basic operation

Airflow and control lines
Fig.C1



1 Scuttle air intake
2 Fans
3 Refrigeration evaporator
4 Heater matrix
5 Upper air temperature blend flap
6 Mode flap
7 Windscreen outlet
8 Swivelling facia outlet
9 Rectangular outlet flap
10 Rectangular outlet
11 Lower air temperature blend flap
12 Lower quantity flap
13 Front footwell outlet
14 Rear footwell outlet
15 Recirculated air inlets
16 Recirculation flaps
17 Water tap
18 Engine cooling system
19 Fan inhibit switch
20 Suction throttling valve
21 Refrigeration compressor
22 Condenser matrix
23 Receiver/drier
24 Expansion valve

Airflow

Air entering the A.C.U. can be either fresh from outside the car or recirculated from inside the car dependent upon the position of the recirculation flaps which is determined by the upper servo. However, this control by the upper servo is overridden when the A.C.U. is set to OFF, the recirculation flaps then move to the recirculation position.

All air, fresh or recirculated, is dried and cooled by blowing it through a refrigeration evaporator. A proportion of the cold air passes through a heater matrix which is connected to the engine cooling system, the temperature in the matrix is controlled by a water tap which is connected to the lower servo. The remaining cold air by-passes the heater matrix and is subsequently blended with the air from the matrix, this blend of hot and cold air is determined by two temperature blend flaps, one for the upper system air and one for the lower system air. The temperature of the air from the blend flaps depends upon the temperature required inside the car, the actual temperature inside the car, the outside air temperature and the position of the flaps.

The air from the upper blend flap passes to either the facia or the windscreen depending upon the position of the mode flap. This flap directs the air to the facia outlets whenever the upper servo is between the 'full cold' position and 25% towards the 'full hot' position. When the servo is between 25% of 'full hot' and the 'full hot' position, the air is directed to the windscreen outlets. Servo position is sensed by a microswitch on the servo. In this way, the air from the facia outlets will generally be cooler than the air from the windscreen.

Air from the lower blend flap passes to the front and rear footwells via the lower quantity flap which is closed until the upper servo has moved 15% of its travel from the 'full cold' position, this position is sensed by a microswitch on the servo.

Control

The required temperatures for both the upper part and lower part of the car can be independently selected by two dials. The actual temperatures for each part are measured by two sets of sensors (called sensor chains), the upper sensor chain has 3 sensors and the lower sensor chain has 2 sensors. The required temperature and actual temperature for each part of the car are compared by servo modules which signal the actuators to operate accordingly.

The upper servo controls the upper blend flap, mode flap and lower quantity flap. The lower servo controls the lower blend flap and water tap. Both servos control the fan speed module, the fan speed is the average of that required by each servo.

The AIR CONDITIONER switch closes the recirculation flap to allow recirculation in the OFF position, directly controls the fan speed module in the LOW position and the lower quantity flap in the DEF position. In addition to these directly controlled functions, the switch indirectly controls (via the servos) the blend flaps, mode flap and fan speed module in the DEF position and also the fan speed module in the AUTO position.

Note

The airflow temperatures shown in the diagram are for a car in a temperate climate with the temperature settings in the 'preferred' position.