



INTRODUCTION

The 2012 edition of the Atwood Air Conditioner Service Manual is a resource created to help service technicians identify Atwood products by serial number, diagnose service problems, and efficiently and effectively process warranty claims. This manual offers a general overview of the product as well as more specific product information.

For the Air Conditioner product within this manual, you will find model identification, sequence of operation, part identification and troubleshooting guides, warranty procedures, flat rate schedules, and replacement part reference chart.

Additional information is available on our website. Visit www.askforatwood.com to download brochures, review [trouble shooting guides](#), and read the latest [information bulletins](#). All Atwood Authorized Service Centers are listed on our site as well, accessible via an easy-to-use search system.

Service for all Atwood products is handled out of our Elkhart, IN location. Should you have any questions, please contact service toll-free at 1-866-869-3118, or by e-mail at service@atwoodmobile.com. Please be sure to have the Model and Serial Numbers when you call.

Thank you for your business,

Atwood Service Team

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Recommended Tools

Model Number Description

Air Conditioner Sequence of Operation

TECHNICAL MANUAL for CORMORANT ROOFTOP AIRCONDITIONER 115V 60HZ

ERROR CODES & THEIR MEANING:

- E1: Room sensor fault. Usually a faulty connection (plug), damaged lead or a Faulty sensor itself.
Action: Check **White** plug is connected on main board.
Check resistance of thermistor & cable by measuring With a multimeter. 10K ohm @25C. see fig 19 and table 1 C or F.
If open circuit or out of calibration , replace.
- E2: Inside coil sensor fault: Usually a faulty connection (2 plugs) Damaged lead or faulty sensor.
Action: Check **Yellow** plug is connected on the main board.
And
Also plug in bundled wiring near the coil.
Check resistance of thermistor & cable by measuring With a multimeter. 10K ohm @25C. see fig 19 and table 1 C or F.
If open circuit or out of calibration , replace.
When replacing this thermistor, install such that cable is downward from the copper pocket on the coil.
- E3: Outside coil sensor fault Usually a faulty connection (2 plugs), damaged lead or Faulty sensor.
Action: Check **Red** plug on main board and extension plug in Bundled wiring usually located near capillary tube coils.
Check resistance of thermistor & cable by measuring With a multimeter. 10K ohm @25C. see fig 19 and table 1 C or F
If open circuit or out of calibration , replace.
- E4: Indicates lack of refrigerant, or the compressor is not running, or the thermistor is out of calibration.
Action: Check that the compressor is running by listening.
If it is apparent that the compressor is running, then check the temperature difference across the evaporator .
ie. Measure temperature of return air at inlet filters and measure temp. of discharge air at grilles. This temp diff. Should be 14 to 18 C. with fan on hi speed. If temp diff. Is less than this , suspect lack of refrigerant.

Fit a suction gauge to access valve at rear of unit. On a 35C Outside temp. then suction should be 380 to 450Kpa.

If the temp. differential is 14C or more but unit goes out on E4 after approx. 30 minutes, please check the actual Thermistor temperature by the following procedure.

With the inside fan running on Hi.

Press Temp down button followed by the mode button.

Hold them both in for approx 5 seconds. The amber Lock LED illuminates.

Now press the Temp down button and the Sleep button Together for about 1 second. The green Med speed will be Flashing. The display is now reading the temp of the Outside coil. *Now press the Temp up button once. The Green Hi speed will be flashing.* The display is now Reading the temp. of the inside coil.

This temp will usually be from 5 to 12 C. If it is above 24C It is another indication of lack of refrigerant. If on the other hand the air on /air off differential is 14C or greater then suspect the thermistor itself to be out of calibration. check the thermistor as per an E1,E2 or E3 failure by measuring its resistance (see fig 19 and referring to table 1

C or F)

E5 indicates excessive temp of the outside coil if on cooling, OR excessive temp of the inside coil in heat mode. On cooling, the E5 will appear if the outside coil temp exceeds 68C. This is an indication of condenser air flow reduced or non existent. Using the procedure described above it is possible to watch the condenser coil temp using the *Temp down* button and *Medium fan speed* combination to display this temp. NB: if fans etc seem to be OK then measure thermistor resistance and refer to table 12. In case the problem is thermistor calibration.

Action: If unit is in cooling mode, examine condenser fan is Running.

If fan motor and capacitor check out OK then Change the main control board.

Error codes E6 & E7 are not utilized in this system. If either of these codes appear, then change the main control board.

When attempting to diagnose a fault over the phone, please ask the following questions . Also it is usually possible to direct the customer to extract thermistor temp. data as described before. This can make fault finding more accurate.

- 1: Is or have there been any error codes displayed?
- 2: does the display board appear normal?
Are temperatures displayed from 16 to 30 C?
- 3:In heating or cooling modes, can the temperatures be altered via the up /down buttons from 16 to 30C ?
- 4: Is the display showing "0" ?
- 5: Is the display showing an unusual figure ?
- 6:When the unit is set to "FAN" only , does the inside fan have 3 speeds?
Does the inside fan blow air?
- 7: Can the compressor be heard running?

Error codes are an important clue . Refer to preceding pages.
Extracting coil temperatures via the display is also vital in many diagnoses.
A broken control cable or displaced plug of the control cable can give the following problems.
Display is blank
Display "0"
If an unusual figure is displayed it may be attributed to an external switch mode power supply (SMPS) out of adjustment. Fig 3 shows an external SMPS.

Typical faults or complaints

- 1: Any complaint accompanied with an error code, see earlier pages.
- 2: Unit will not work and no display is evident.
Check the following:
Main ECB breaker is set to ON
Mains power is OK at output from ECB
Is the 4 core control cable plugged into the receiver in the inside plenum? Fig 23
Faulty mains connection at the underside of unit. See Fig 10
A blown fuse on the main control board.

A blown fuse may be caused by a faulty fan motor

)

Poor connection on main board.

The power supply to the main control board is faulty. This condition can be Diagnosed by checking at the breakaway plug between the control cable and the Display in the plenum. See Diag. 1 & 1A

If the DC voltage is not attainable there

Then suspect a faulty power supply. See onward:

3: Unit drops out the ECB breaker:

Use a 500V megger to check for ground leakage.

It is possible to disconnect the fan motor

Disconnect each until the megger shows at least 10Meg Ω or greater to earth.

Likewise the compressor can be disconnected to isolate it from the system.

In this way any faulty components can be identified.

4: Compressor will not start:

Check that the control board is outputting to the compressor.(yellow wire From compressor relay)

Use a clamp ammeter to check for current to compressor. Continuous current Above 14 Amps indicates a faulty compressor .

Check winding continuity:

Highly compressor: Main Wdg. 0.8 ohms

Start Wdg. 2.1 ohms

Resistance to earth minimum 20 Meg Ω

5: On cooling mode, compressor stops.

Unit ceases to cool but display temp. drops to a low figure. Maybe Less than 10C.

This is typical of an inside coil icing up. The thermistor detects that the coil Is at or below zero and turns off the compressor until temp. rises to 12C, Whereupon the compressor will restart.

This situation is usually associated with the unit running for a prolonged period On low fan speed particularly in high humidity conditions.

This problem is usually overcome by running the unit on a higher speed and not Using 'Auto' fan.

Check also that the return air filters are clean.

In heating mode, the unit stops heating, fan stops, and the red heat LED blinks.

This condition indicates that the unit has entered the deice mode to rid itself of Frost on the outside coils. The unit will restart automatically in 5 to 10 minutes. It may be noted that the display temp drops to a low figure.

On resumption of heating, the blinking red light turns to a steady red, and the Fan will be delayed until the inside coil is warmed to 32C. When the inside fan does start there may be a momentary puff of vapour. This is normal.

- 7: In very cold conditions the compressor can be heard running but the inside fan does not start.

Be patient, in very cold conditions the unit needs time to warm sufficiently to start producing warm air.

- 8: Compressor transmits excessive vibration.
Check that pipe work is not touching other pipes.

- 9: On heating, the unit cycles regularly, the temperature display indicates 24 to 28C with the average temperature in the cabin is very much less.
Disassemble the fascia from the inside plenum (4 screws) and examine carefully The extension duct for leaks, particularly where it joins the horizontal duct.
A leaking duct will short cycle warm air onto the return air sensor causing the compressor to close down prematurely.
Repair any leaks and reassemble. (see Fig 24)

- 10: On cooling, the unit cycles regularly, the temperature display indicates say 22 to 25C but the average temperature in the van is very much more.
Disassemble the fascia from the inside plenum (4 screws) and examine carefully The extension duct for leaks, particularly where it joins the horizontal duct.
A leaking duct will short cycle cold air onto the return air sensor causing the compressor to close down prematurely.
Repair any leaks and reassemble

- 11: Water drips from the inside plenum when the unit is in cooling mode.
Ingress of water on cooling mode may be due to either of four conditions.
1: The unit is installed more than 5° out of level, particularly nose down.
2: The drain holes in the evaporator area are blocked. See Fig 7
3: Condensate that has drained onto the roof, has re entered the installation hole either under the roof seal of the air conditioner or a roof seam near the unit is faulty. If case 3 appears likely, the unit should be reinstalled using a new sealing gasket and following the Aircommand instructions explicitly.
If there is a roof seam involved, clean the seam area thoroughly and reseal with **silicone**, a sealant compatible with your roofing material.
Please Note: If water "pools" around the air conditioner (i.e. the roof has sagged around the air conditioner) then the cabin manufacturer should be Consulted.

- 4 : In high humidity areas, condensate may occur on the underside of the evaporator tray above the inside plenum.
This usually associated with running the unit on low speed for a prolonged Period. Under these conditions use the high or medium speeds and avoid

"auto"

As it will cause the inside fan to drop to low speed as the set point temperature

Commented [DH1]:

Commented [jmw2]:

Is approached.

.....
12: Water drips from the inside plenum only when it rains.
Check condition 11 point 3 above.

13: Unit does not turn on. No display lights on the flip down display.

Proceed to check the following in order.

- 1: Check circuit breaker is on and the van has power.
- 2: Unscrew the inside plenum (4 screws) and disconnect plenum from control cable via the 4 pin plug. With a multimeter, check power at inlet junction block. 115V AC. If OK, shift multimeter to 12V DC range.
Check voltage across the control cable conductors. See Diag 1 & 1A
If the correct voltages are detected as per Diag 1, then suspect a break between this plug and the display module. Inspect plug pins. Disassemble the display and check the plug to board is OK. (see fig 23) If the voltages can be detected right up to the display, replace display

3: If the voltages cannot be detected at the breakaway plug, then suspect the problem to be in the main control board enclosure.

Remove the canopy from the unit. Isolate the power to the aircon.

Remove lid of the enclosure (RHS) to gain access to the control board.

See Fig 1. Firstly check the fuse on the board. If this fuse is blown it **may** indicate a fan motor fault. If the fuse is ruptured, replace with a M205 S/Blow 5A 20 x 5. If the fuse blows again, start investigating for a faulty condenser, evaporator motor or R/V.

If the fuse is not an issue,

Then one needs to investigate the SMPS power supply driving the main board.

$$F = (C \times 1.8) + 32$$

Commented [jmw3]:

Recharging in the field:

If the unit has the following deficiencies in cooling mode:

Assuming outside temp. is close to 35C and inside 27C

- 1: The difference in temp. between the inside return air and the discharge air is less than 14C. (inside fan on Hi)
- 2: The inside coil temp (as measured with thermistor (see pp 1&2) is more than 14C
- 3: The suction pressure (measured at access valve see figs 12) is less than 400 Kpa, then it is indicative of a lack of refrigerant charge.

Firstly examine the hermetic system for possible leaks. Check the access valve with an electronic detector.

If any access valves are suspect, then renew the caps with models incorporating a seal. See fig 12d.

Any leak found in solder joints etc. will require the unit to have any remaining refrigerant recovered, the leak repaired and checked and the unit evacuated and recharged. (850 grams)

A unit that may have had a leak at an access valve and this has been rectified, can have refrigerant added. Add refrigerant until a good fit is made with the above parameters. I.e. Suction pressure above 400 Kpa, delta T greater than 14C and the inside coil below 14C. [57.2F]

The use of Independent generators or Inverters:

Failure to start the Aircon:

- 1: check that the Generator or Inverter is rated at 2.8 KW or greater.
- 2: Check that no other accessories are making a demand on the power load.

To check on possible hidden loads, directly wire the aircon.

To the genset. If unit starts OK then advise the client to

Identify and isolate the extra electrical load.

The display panel has an unusual display of numerals. Unit is however OK

On mains power:

- 1: This is a sign of a poor waveform being generated.
Advise client to have generator repaired or replaced with
A better quality unit.

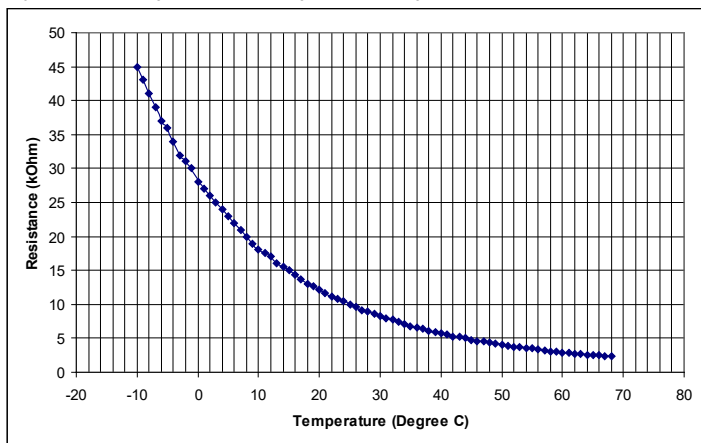
AIRCOMMAND AUSTRALIA
954 PORT ROAD
ALBERT PARK
SOUTH AUSTRALIA 5014
Email reception@aircommand.com.au

Thermistor temperatures / resistance relationship - Table 1 - °F

Temperature °F	Resistance kΩ	Temperature °F	Resistance kΩ	Temperature °F	Resistance kΩ
14	45	62.6	13.7	111.2	5
15.8	43	64.4	13	113	4.8
17.6	41	66.2	12.6	114.8	4.6
19.4	39	68	12.2	116.6	4.5
21.2	37	69.8	11.7	118.4	4.4
23	36	71.6	11.2	120.2	4.2
24.8	34	73.4	10.8	122	4.1
26.6	32	75.2	10.4	123.8	3.9
28.4	31	77	10	125.6	3.8
30.2	30	78.8	9.6	127.4	3.7
32	28	80.6	9.2	129.2	3.6
33.8	27	82.4	8.9	131	3.5
35.6	26	84.2	8.6	132.8	3.3
37.4	25	86	8.3	134.6	3.25
39.2	24	87.8	8	136.4	3.1
41	23	89.6	7.7	138.2	3
42.8	22	91.4	7.4	140	2.9
44.6	21	93.2	7.1	141.8	2.8
46.4	20	95	6.8	143.6	2.75
48.2	19	96.8	6.6	145.4	2.7
50	18	98.6	6.4	147.2	2.6
51.8	17.5	100.4	6.1	149	2.5
53.6	17	102.2	5.9	150.8	2.45
55.4	16	104	5.7	152.6	2.4
57.2	15.5	105.8	5.5	154.4	2.3
59	15	107.6	5.3		
60.8	14.3	109.4	5.2		

Thermistor temperatures / resistance relationship - Table 1- °C

Temperature °C	Resistance kΩ	Temperature °C	Resistance kΩ	Temperature °C	Resistance kΩ
-10	45	17	13.7	44	5
-9	43	18	13	45	4.8
-8	41	19	12.6	46	4.6
-7	39	20	12.2	47	4.5
-6	37	21	11.7	48	4.4
-5	36	22	11.2	49	4.2
-4	34	23	10.8	50	4.1
-3	32	24	10.4	51	3.9
-2	31	25	10	52	3.8
-1	30	26	9.6	53	3.7
0	28	27	9.2	54	3.6
1	27	28	8.9	55	3.5
2	26	29	8.6	56	3.3
3	25	30	8.3	57	3.25
4	24	31	8	58	3.1
5	23	32	7.7	59	3
6	22	33	7.4	60	2.9
7	21	34	7.1	61	2.8
8	20	35	6.8	62	2.75
9	19	36	6.6	63	2.7
10	18	37	6.4	64	2.6
11	17.5	38	6.1	65	2.5
12	17	39	5.9	66	2.45
13	16	40	5.7	67	2.4
14	15.5	41	5.5	68	2.3
15	15	42	5.3		
16	14.3	43	5.2		



SPECIFICATIONS CORMORANT 115V 60HZ [Update with US specifications](#)

Commented [jmw4]:

Electrical rating: 115V 60HZ
 Nom. Cooling capacity 3.5 KW
 Input watts cooling 1220 W
 Nom. Heating capacity 3.5KW
 Max. Rated current cooling 11.2A
 Max. Rated current heating 14.8A
 L/R Amps 50 A
 Inside air delivery 150 l/s
 Installed weight 48Kg [~106 lbs]

Overall height 346mm
 Overall width 715 mm
 Overall length 1050mm

Inside plenum height 65mm
 Inside plenum width 535 mm
 Inside plenum length 555 mm
 Plenum weight 2.4 Kg
 Refrigerant charge 850 grms R22 or use Dupont Isceon MO59 (R417A) R-410A

Commented [jmw5]:

Compressor: HIGHLY SG653PB1-A
 Run wdg. 0.8 Ohms
 Start wdg. 2.1 ohms
 Run capacitor 60 Uf 240 V

Fan motor: YSK140-180-4A5
 180 watt 1.95 Amps
 Hi speed wdg. Yellow/Red 10.4 ohms
 Med speed Yellow /blue 13 ohms
 Lo speed Yellow/ black 19 ohms
 Running Capacitor: 8uf x 240 V

Electronic control board: Saturn type: C115CTTDB0
 Exterior power supply Saturn 115v / 12v DC
 Inside electronic Display Saturn



