

# Microair Avionics



## T2000 SFL TRANSPONDER INSTALLATION MANUAL



### Microair Avionics Pty Ltd

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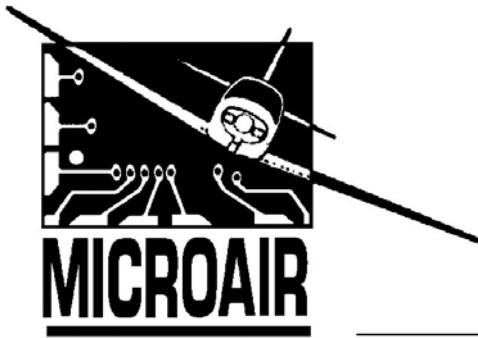
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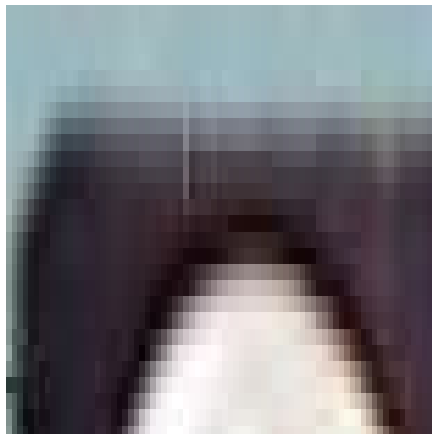


## About This Document

This manual describes the various installation configurations available for the Microair T2000SFL Transponder, including connection to a separate altitude encoder.

Microair reserve the right to amend this manual as required, to reflect any enhancements or upgrades to the T2000 Transponder series.

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## MICROAIR DOCUMENTS

Microair T2000 Users Manual	T2000-DOC-001
Microair T2000 Installation Manual	T2000-DOC-002
Microair T2000 Flight Manual Supplement	T2000-DOC-003
Microair T2000 Service Manual	T2000-DOC-004

## CURRENT REVISION STATUS – T2000-DOC-002

Revision	Date	Change
1.0	11/02/01	Initial Draft
1.1	25/05/01	Remote display references removed
2.0	11/07/01	Part Identification Revision
2.1	07/11/01	Deleted SF references
2.2	01/06/02	Pin assignments and wiring diagram updated
2.3	13/08/03	Coaxial loss data updated

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## 1.0 MOUNTING OPTIONS (SFL)

It would be a really good idea if you read through this section of the manual **BEFORE** you start installing your Microair T2000 Transponder. If it is too late, and you are reading this message after the fact, perhaps the information that follows can help you sort things out.



### IMPORTANT NOTE

*Installation of this transponder should be carried out or inspected by a qualified installer. Microair's warranty does not cover the installation of this transponder by non qualified installers.*

## 1.1 PART IDENTIFICATION & UNPACKING

Your **T2000 SFL** transponder is supplied with the following:

*P/N T2000-DOC-001  
P/N T2000-DOC-002  
P/N T2000-DB25-001*

*Microair User & Installation Manual  
Flight Manual Supplement  
DB-25 male connector with backshell*

Optional parts which can be ordered in addition to the Transponder:

*P/N T2000-WHS-001  
P/N T2000-ACK-001*

*T2000 Wiring Harness  
T2000 Antenna Coax Kit*

## 1.2 MOUNTING OPTIONS (SFL)

The T2000 Transponder series has a number of mounting options. The **SFL** round face unit can have:

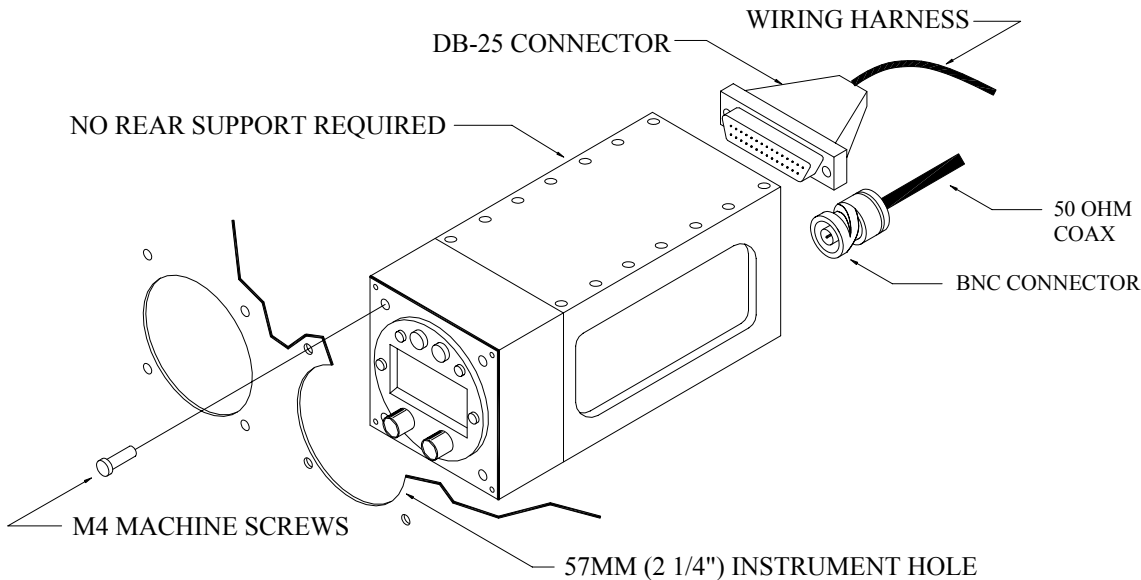
Panel mounting	
Remote display mounting	(future option)
Panel mounting with second remote display	(future option)
Remote mounting of both first and second display units	(future option)

## 1.3 INSTALLATION REFERENCES

The Microair T2000 Transponder should be installed in accordance with the instructions and information of this manual and FAA AC 43.13-1A Chapter 11.

## 2.0 PANEL MOUNTING (SFL)

If standard mounting is desired (no remote display unit), determine a suitable location in the instrument panel in full view of both pilots. Cut a 57mm diameter (2 1/4 inch) hole with 4 x 4mm holes for the mounting screws. Dimensions for this are provided on the panel template. Allow a minimum of 63mm (2 1/2 inch) square, behind the cut out, to allow clearance from other instruments. A depth of 180mm (7 inches) is recommended to accommodate the transponder and electrical connectors.



MICROAIR T2000 SFL  
PANEL INSTALLATION

## 3.0 MODE C ENCODER

Mount the mode C blind encoder as per the manufacturer's installation instructions. All wiring can be run back to the T2000 for connection (refer wiring diagram). The power for the encoder is supplied from the T2000, and is equal to the aircraft supply voltage. This power is switched when the T2000 is turned on.

If the encoder is to be powered separately, it is recommended that the ground wire is run to the T2000, to ensure correct switching of the data lines.



### IMPORTANT NOTE

*Most encoder manufacturers advise of a warm up period for their product before altitude data is supplied. The period can typically be up to 10 minutes.*

The T2000 software offers the option of leaving the encoder unpowered until mode C operation is selected. This option is useful for operators using battery power only. A power saving of approx 200mA can be made.



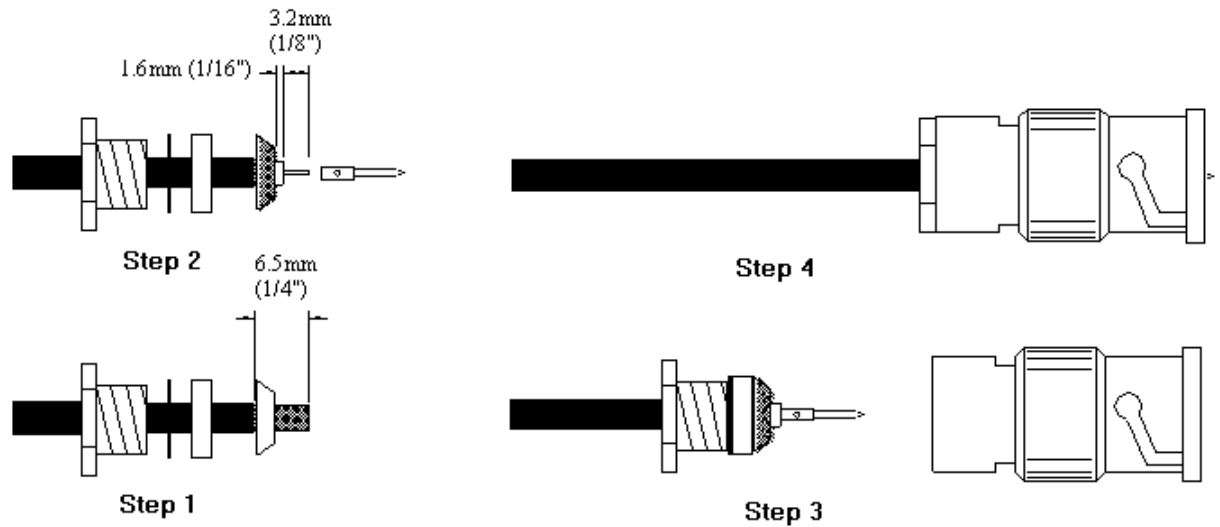
### IMPORTANT NOTE

*If the aircraft voltage is 28V and the encoder is 14V only, a 28/14V converter should be installed between the T2000 and the encoder.*

*Please ensure that the voltage supply line to power the encoder is NOT shorted to any data line or ground. The T2000 will incur internal faults if a short occurs. This type of damage is NOT covered by Microair's warranty.*

## 4.0 COAXIAL CABLE

The T2000SFL allows for 1.5dB cable loss from the unit to the antenna. The installer should consider carefully what type of coaxial cable is to be used, so that this loss limit is not exceeded. The cable should be terminated with silver plated BNC connectors where possible.



Microair recommends the following:

Cable	Bending Radius	Loss @ 1Ghz dB/m	Max Length	TX Power	RX Sensitivity
RG58/C/U (Mil Spec)	50mm (2")	0.76dB/m 0.21dB/ft	2.0m 7ft	142W	-70dBm
RG213/A/U (Mil Spec)	125mm (5")	0.26dB/m 0.08dB/ft	5.75m 19ft	142W	-70dBm
RG223/U (Mil Spec)	100mm 4"	0.47dB/m 0.14dB/ft	3.2m 10ft	142W	-70dBm
RG400 (Mil Spec)	50mm 2"	0.60dB/m 0.18dB/ft	2.5m 8ft	142W	-70dBm
Belden 8262	50mm 2"	0.68dB/m 0.21dB/ft	2.2m 7ft	142W	-70dBm



### IMPORTANT NOTE

*Do not exceed the minimum bending radius. Tight bends will introduce losses in the cable, which may affect the performance of the transponder.*

## 5.0 ANTENNA

Mount the transponder antenna as per the manufacturer's installation instructions. Try and keep the cable runs as short as possible. In a composite aircraft a suitable ground plane will be required. The ground plane should have a disc area with a radius equal to the height of the antenna. The ground plane does not have to be circular however, but the area should be approx the same size. Avoid mounting the antenna inside a fuselage that is all metal or carbon fibre.

To avoid possible interference the antenna must be mounted a minimum of 0.3m (12 inches) from the **T2000**. The transponder antenna should be mounted 2metres (78 inches) from the **DME** antenna, 1.5 metres (58 inches) from the **ADF** sense antenna, and 1metre (39 inches) from **TCAS** antennas.

On pressurised aircraft, the antenna should be sealed using RTV-3145 or equivalent, to seal around the connector and mounting hardware. All antenna mounts should be sealed around the outside for moisture protection, using RTV-3145 or equivalent.

## 6.0 WIRING

The **T2000** Transponder receives primary power (14V or 28V dc) from the aircraft's power source. Power connections, voltage, and circuit breaker requirements are shown on the wiring diagram. The length of the power supply wires to parallel pins should be approximately the same length, so that the best distribution of current can be effected.

Microair recommends that the encoder be installed and wired in accordance with the manufacturer's installation instructions.

It is very important to secure all D series plugs via their security screws before operation. Aircraft vibration may disconnect a D series plug if it not secured.

Where possible, wiring is to be run separately to the coaxial cable.

### 1.4 Audio Beep

The T2000 beep function when set to ON, will emit a beep tone on this line. Audio beep should be taken to the Auxiliary input of the aircraft's radio or Audio Panel. This will permit the pilot to hear the beep tone when the altitude alerts are given.

### 1.5 Suppression IN

The suppression IN line is used by the primary transponder in the aircraft to "suppress" the T2000SFL, to prevent dual transmissions, and interference. When the primary transponder transmits, it will send a positive voltage to the suppression IN, which prevents the T2000SSFL from transmitting.

### 1.6 Suppression OUT

Where the T2000SFL is the primary transponder, the suppression OUT line is used to prevent other transponder equipment and DME equipment installed in the aircraft, from interfering. When the T2000SFL transmits, it raises a positive voltage on the suppression OUT line, which prevents the other equipment from transmitting.

## 1.7 External Standby

The external standby can be wired to a remote switch. When the line is taken to ground the T2000 will return to standby mode, and stay there regardless of the position of the Selectmode knob. The REM STBY function can reverse this operation to make the T2000 go to standby, when the external standby is not grounded.

This line is typically taken to an air-switch, which will remain grounded while the airspeed is typically below 30 knots. Hence the transponder will not come out of standby mode until the aircraft has taken off. If the external Standby Switch is to be taken to an air-switch, Microair recommends that an ON/OFF switch be put in series to disable the air-switch operation if required.

Where the external standby line is to be operated by an air-switch, Microair recommend that a placard be fitted on the panel.

**AIR-SWITCH FITTED TO EXTERNAL STANDBY  
TRANSPONDER WILL REMAIN IN STANDBY  
WHILE AIRCRAFT IS ON THE GROUND**

(example)

This placard is to advise the pilot that the transponder will remain in standby operation while on the ground. It may be appropriate to fit an enable/disable switch on the external standby line, between the transponder and the air-switch, to bypass this mode of operation.

## 1.8 External Ident

This line is typically wired to a momentary-ON switch, in a position more easily reached by the pilot / co-pilot (eg control column). When this line is taken to ground *briefly*, the T2000 will go through its Ident function.



### **IMPORTANT NOTE**

*If any of the above wiring functions are not required, they can simply be left not wired. Where these functions have been wired, simply coil up the wiring and secure. Ensure however that the wire ends are insulated.*

## 7.0 CABLING

Microair recommends that wiring for all of the T2000's functions and connections be run at the time of installation, even though they may not be required at this stage. Adding additional wiring to the loom at a later stage may be very difficult. All wiring should be installed in accordance with FAA AC43.13-1A Chapter 11 or equivalent.

Microair recommends the following cable types for connection of the T2000:

Power Input	18 AWG TEFZEL 22759/16-16	Red and Black Wire
External Connections	22 AWG TEFZEL 22759/16-22 22 AWG TEFZEL 27500-22TG1T14	Wire or Single core shielded
Encoder Power	22 AWG TEFZEL 22759/16-22	Red and Black Wire
Encoder Data	22 AWG TEFZEL 22759/16-22	White Wire

## 8.0 CALIBRATION OF INSTALLATION

Please refer to the Civil Aviation rules or regulations for your country to determine the calibration requirements for a transponder installation. Most countries will require a test of the installation to be carried out by a qualified test centre, along with a calibration of the encoder and altimeter in the aircraft. Microair Avionics recommends the use of certified altimeters for operation with transponders and encoders.

This test or inspection is usually required every two years.

If the installation is in a non-certified aircraft, the test and calibration is *not* exempt. The installation must be proven compatible with the ATC SSR system before operation, regardless of the aircraft type.

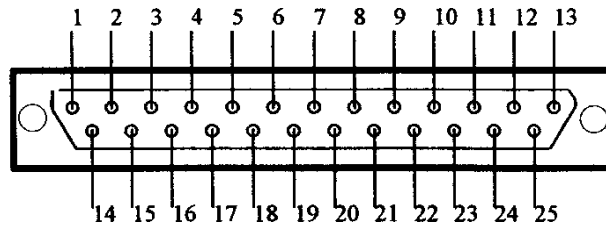
## 9.0 WARRANTY CARD

Please complete and return the yellow warranty card to Microair Avionics. The warranty period is 12 months from the date of sale, however Microair Avionics will honour the warranty as twelve months from the date of installation where the installation was carried out by an approved installer (avionics shop), and the card is dated and signed by the installer.

If you have misplaced the card, please use the warranty registration form on the Microair Avionics website [www.microair.com.au](http://www.microair.com.au).

For full details of the warranty please refer to the T2000 User Manual (inside rear cover).

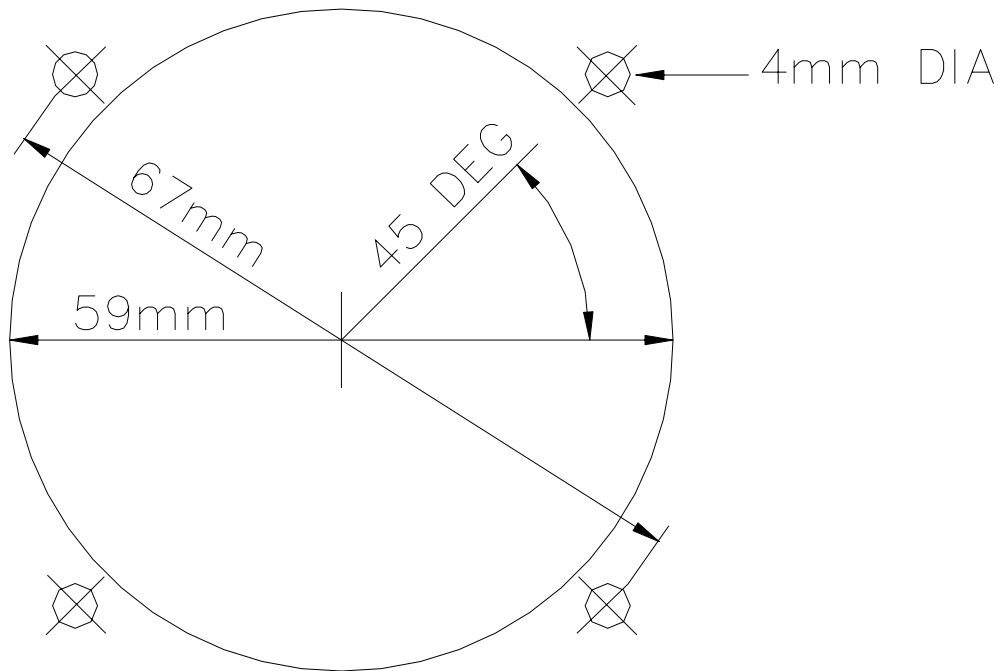
## 10.0 PIN ASSIGNMENTS

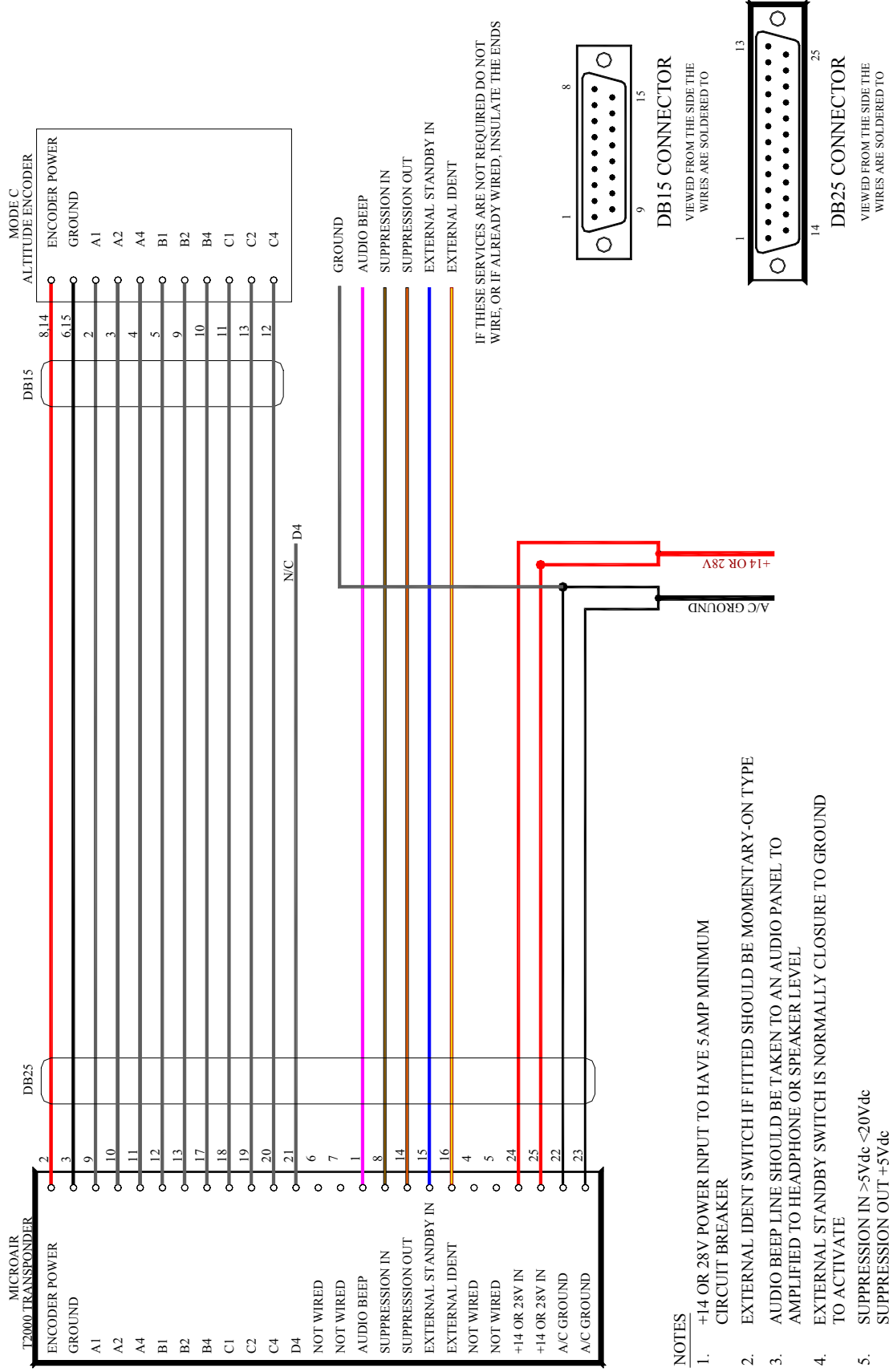


Viewed from rear

PIN 1	AUDIO BEEP
PIN 2	SWITCHED MODE C ENCODER POWER OUTPUT
PIN 3	GROUND
PIN 4	NOT WIRED
PIN 5	NOT WIRED
PIN 6	NOT WIRED
PIN 7	NOT WIRED
PIN 8	SUPPRESSION IN
PIN 9	GILLHAM ALTITUDE A1
PIN 10	GILLHAM ALTITUDE A2
PIN 11	GILLHAM ALTITUDE A4
PIN 12	GILLHAM ALTITUDE B1
PIN 13	GILLHAM ALTITUDE B2
PIN 14	SUPPRESSION OUT
PIN 15	EXTERNAL STANDBY IN
PIN 16	EXTERNAL IDENT
PIN 17	GILLHAM ALTITUDE B4
PIN 18	GILLHAM ALTITUDE C1
PIN 19	GILLHAM ALTITUDE C2
PIN 20	GILLHAM ALTITUDE C4
PIN 21	GILLHAM ALTITUDE D4
PIN 22	POWER GROUND
PIN 23	POWER GROUND
PIN 24	POWER 14 OR 28 VOLTS DC (10-33 VOLTS)
PIN 25	POWER 14 OR 28 VOLTS DC (10-33 VOLTS)

# 11.0 PANEL TEMPLATE





# MICROAIR T2000 - WIRING DIAGRAM