

# Microair Avionics



## T2000SFL TRANSPONDER USER MANUAL



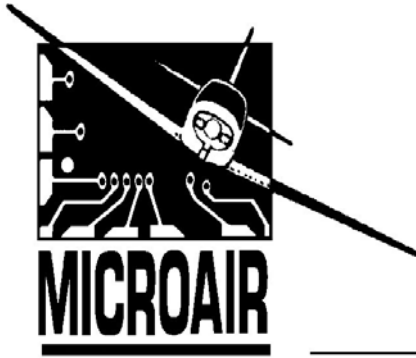
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## About This Document

Microair Avionics has developed a series of transponders for use with OEM applications, and for commercial sale by Microair Avionics. The manual explains the basic functions and elaborates on the more sophisticated features, such as altitude display and alerts.

Revision 01R6 of this manual is to be supplied and used in conjunction with T2000SFL-01-(7) transponders with software version 01R1-6-5.

Microair reserves the right to amend this manual as required, to reflect any enhancements or upgrades to the T2000SFL transponder series.

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### Statement:

The T2000SFL owner accepts all responsibility for obtaining the proper licensing before using the transponder. The coverage you can expect from the T2000SFL is limited to "line of sight". Low altitude or aircraft antenna shielding by the aircraft itself may result in a reduced range. Range can be improved by climbing to a higher altitude. It may be possible to minimize antenna shielding by locating the antenna where dead spots are only noticed during abnormal flight attitudes.

**The T2000SFL should be turned off before starting or shutting down aircraft engine(s).  
Mobile phones must not be turned on during the operation of the T2000SFL.**



## DOCUMENT REVISION STATUS

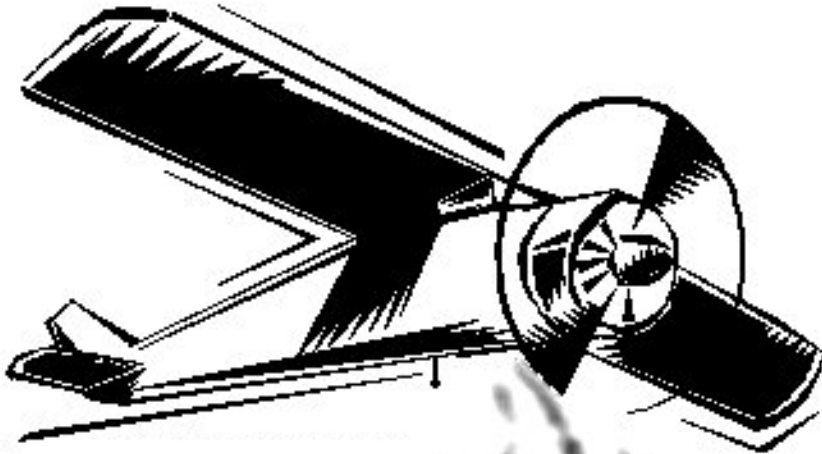
| Revision | Date     | Change  |
|----------|----------|---|
| 1.0      | 11/02/01 | Initial Draft   |
| 2.2      | 11/07/01 | Voltage Monitoring  |
| 2.3      | 22/08/01 | Standby function added  |
| 2.4      | 05/10/01 | Hi / Lo alerts added  |
| 2.5      | 12/10/01 | Mode and Program Mode menu functions amended  |
| 2.6      | 07/11/01 | Deleted SF references   |
| 2.7      | 01/06/02 | Assigned Alt & Buffer Alt input amended, Name/Reg relocated to end of Program Mode            |
| 2.8      | 22/11/03 | ID and VFR key instructions amended   |
| 2.9      | 08/04/05 | Amended for function changes incorporated into software revision 1.6.4                        |
| 01R3     | 11/05/06 | Amended for 1.6.5 software  |
| 01R4     | 27/05/06 | Hardware and software revision references amended<br>Mobile phone to be turned off references |
| 01R5     | 22/11/06 | Display graphics updated  |
| 01R6     | 10/05/07 | VFR and ID key descriptions amended   |

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## 1.0 INTRODUCTION

The Microair T2000SFL Transponder is designed to operate in the environment of a Radar Beacon System. This system interrogates the transponder, which in turn *replies* with an identity code and altitude information. The radar system consists of a network of ground stations, which sweep the horizon like a conventional radar. When the transponder in the aircraft detects the radar sweep (is *illuminated*), the transponder *replies* with a burst transmission giving its identity code and altitude.



The aircraft's transponder receives the ground station signal asking it to transmit. The transponder "replies" with the code, and if operating in mode C, the encoder altitude.

Ground stations sweep the sky with a signal, which asks the transponder in the aircraft to transmit its code and altitude.



The system presents the *replies* from all transponders in range of the ground stations on a single display screen. This allows ATC to easily locate, identify, and see the altitude of all traffic in their airspace.

A transponder's *reply* is termed a *squawk*. Hence the current code being used by the transponder is termed the *squawk code*. At times of high airspace activity, ATC may wish to uniquely identify an individual aircraft with a request to *squawk ident*. The pilot uses the *ident* control on the transponder to make the transponder's *squawk* on the ATC display flash for a short period. The *ident* control should not be used unless ATC request it.

ATC will issue a code to an aircraft requesting entry into its controlled airspace. This code is normally unique for each aircraft, each time that aircraft passes through the airspace. The code is 4 digits long, and each digit can range from 0-7.

### 1.1 T2000SFL CONTROLS

All of the T2000SFL’s functions and features can be accessed from the controls on the front face.

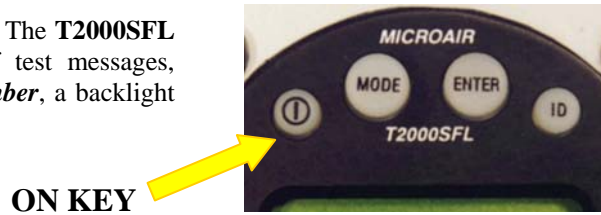
| CONTROL | DESCRIPTION      |
|---------|------------------|
| 1       | ON Key           |
| 2       | MODE Key         |
| 3       | ENTER Key        |
| 4       | IDENT Key        |
| 5       | TOGGLE Key       |
| 6       | CODE SELECT Knob |
| 7       | SELECTMODE Knob  |
| 8       | VFR Key          |



All of the keys are covered in a soft rubberized plastic, which is backlit with the display. When the key is pressed a small click can be discerned. The selected function will operate on the release of the key.

### 1.2 TURNING ON

The T2000SFL is turned on by pressing the **ON** key. The T2000SFL will go through a start up routine displaying self test messages, including the display of the transponder’s *serial number*, a backlight test, and ending with the operational display.



### 1.3 TURNING OFF

To turn off, press the ON key again, and the unit will immediately turn off.

## 1.4 DISPLAY LAYOUT

The Microair **T2000SFL** is a 57mm diameter face version to fit the standard 2 ¼ inch instrument hole.

The mounting is by 4 x M4 machine screws, located through the panel and screwed into threaded holes in each corner of the transponder's front face.

Clean only with a dry cloth, and do not allow the display face to become wet.

The mode of operation is set using the **SELECT MODE** knob located at the lower left, and the standby code (displayed on the lower line of the display) can be edited with the **CODE SELECT** knob, located at the lower right.



T2000SFL Front Face

## 1.5 Special Codes

There are several special codes, which are used to identify General Aviation aircraft, and some special situations which aircraft could encounter. **Misuse of these codes may result in legal charges against the user.**



### **IMPORTANT NOTE**

**ALWAYS check the standby code, BEFORE transferring it to the ACTIVE position.**

|      |   |
|------|---|
| 0000 | General Purpose code subject to regional agreement  |
| 1200 | Civil VFR Flights OCTA not participating in Radar Information Service (RIS). General Aviation Code (US and other countries) |
| 2000 | Civil IFR Flights OCTA not participating in RIS   |
| 3000 | Civil Flights in Controlled airspace  |
| 7000 | VFR General Aviation Code (Europe)  |
| 7500 | Unlawful Interference Code  |
| 7600 | Radio Communications Failure  |
| 7700 | Emergency Code  |
| 7777 | Military Intercept Code (NEVER USE)   |

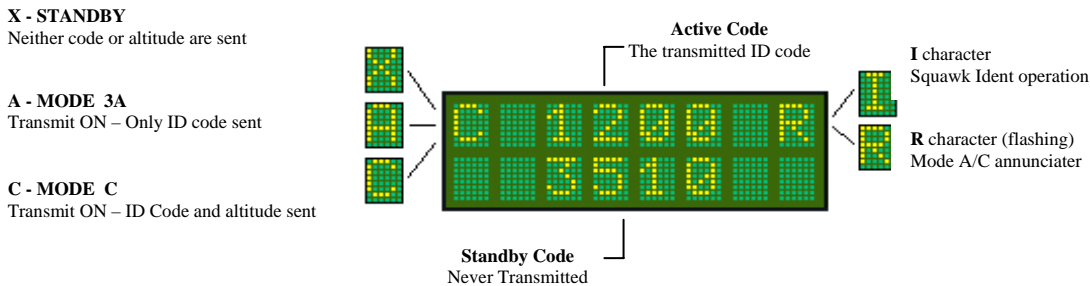
Code 2100 is a test code that can be used by qualified personal to test the transponder to ATC.

The user should check the Civil Aviation Rules/Regulations to determine the VFR General Aviation transponder code for their country.

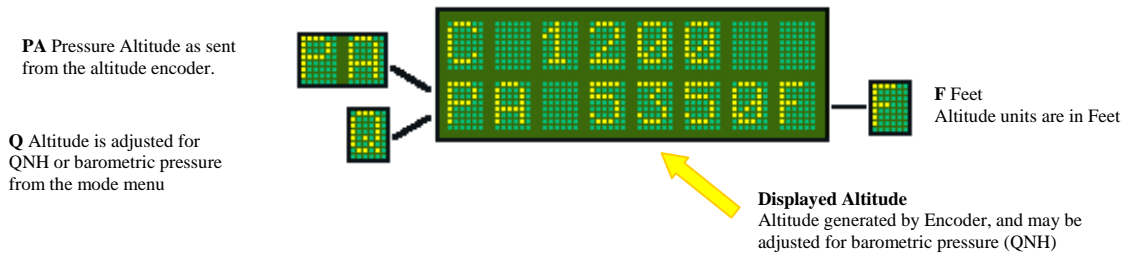
## 2.0 DISPLAY FUNCTION

The **T2000SFL** is a dual line display of 8 characters each, with the active code on the top line, and the standby code on the bottom. With the **SELECTMODE** knob set to either the **ON** or **ALT** positions, the active code is displayed on the top line, and the standby code is displayed on the bottom line.

In the top left corner the operational mode character (**X**, **A**, or **C** character) is displayed. At the top right is the Mode A/C annunciator (**R** character) which also flashes with every transponder reply transmitted. If the **ID** key is pressed to activate the ident function, the **R** character is replaced with an **I** character while the ident function is operating.



With the **SELECT MODE** knob in the **ALT DISPLAY** position, the active code is displayed on the top line, and the encoder altitude is displayed on the bottom line. If the latitude units are set to feet the altitude is followed by the **F** character. If the altitude units are in metres, the altitude is followed by the **M** character. If no **QNH** or **BARO** value has been entered (default 1013mB or 29.92HG), the raw encoder output is displayed as “pressure altitude”, and the characters **PA** appear at the lower left. If a **QNH / BARO** value has been set, the **Q** character appears at the lower left.



If the Encoder is not powered or not fitted, the message **NO ALT** will appear on the display.



The **T2000SFL** will transmit the encoder altitude (pressure altitude) only, in accordance with normal mode **C** operation. The adjusted **QNH / Baro** altitude is *never* transmitted.

### 3.0 CONTROL FUNCTIONS

This section describes the transponder control keys and their functions. Many of the control keys have more than one function, and some keys access multi-option menus, which can be scrolled.

#### 3.1 SELECT MODE KNOB

The **SELECT MODE** knob allows the user to switch the transponder between the 4 operating modes.

Select Mode Knob



|                    |   |
|--------------------|---|
| <b>STANDBY</b>     | In standby the transponder is powered up, but will not transmit.<br><br><i>On the active display line the letter X appears on the left hand side.</i>   |
| <b>ON</b>          | Will reply to Mode <b>A</b> interrogations. Mode <b>C</b> blind encoder is normally powered up in this mode, but can be powered down if encoder power option is set <b>OFF</b> (refer <b>E/C POW</b> in Initialisation and Setup section).<br><br><i>On the active display line the letter A appears on the left hand side.</i>   |
| <b>ALT</b>         | Will reply to Mode <b>A</b> and <b>C</b> interrogations, with the mode <b>C</b> encoder information. In the absence of a valid encoder input, only the <b>C</b> framing pulse will be sent.<br><br><i>On the active display line the letter C appears on the left hand side.</i>  |
| <b>ALT DISPLAY</b> | The standby code is replaced with the encoder altitude. If the pressure has been set via the <b>QNH / Baro</b> option of <b>MODE MENU</b> , the displayed altitude will be adjusted for barometric air pressure. Altitude will be displayed in units set in <b>ALTITUDE</b> option of <b>MODE MENU</b> .<br><br>The <b>DISPLAY ALT</b> only displays altitude if a valid encoder input is being received. When climbing above the transition level/layer, the user must reset the transponder at the same time as the aircraft's altimeter to 1013mb or 29.92HG.<br><br><i>On the active display line the letter C appears on the left hand side.</i> |



Encoder altitude for "pressure altitude"  
(1013mB or 29.92HG)

Adjusted encoder altitude for local  
QNH or BARO setting



### 3.2 CODE SELECT KNOB

The **CODE SELECT** knob can be rotated clockwise to scroll upwards, and counter-clockwise to scroll downwards. Each digit of the code is adjusted separately. The adjust function starts with the left hand digit, and is moved across to the next digit by pushing the **CODE SELECT** knob inwards. After 10 seconds of inactivity the cursor will revert to the left hand digit.

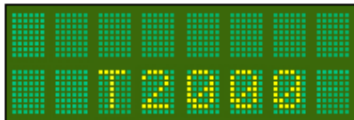
When operating in the Display Alt mode, the actual Gillham 4 digit altitude code can be displayed by pressing and holding the code select knob in.



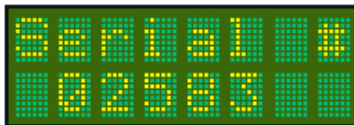
Code Select Knob

### 3.3 ON KEY

The T2000SFL is turned on by pressing the **ON** key.



The T2000SFL will first display the product name, then...



the serial number of the unit, as a security protection.

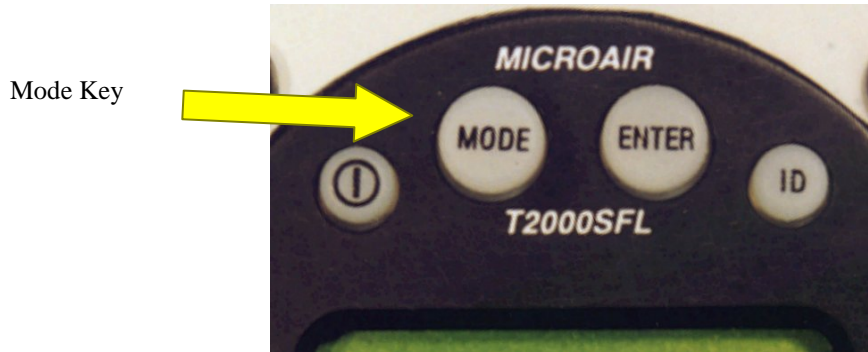


On Key

The T2000SFL then performs a quick self test before moving on to the operational screen, in whatever mode the select mode knob is set to.

### 3.4 MODE KEY

The **MODE** key can be used to access two separate menus:



- If the transponder is turned on, by holding down the **MODE** key, and pressing the **ON** key, the **T2000SFL** will start in **PROGRAM MODE**. The **MODE** key must be held down, until the start-up self-test messages have been displayed.
- If the transponder is **ON** and in normal operation, press the **MODE** key to access the **MODE MENU**. The first item of the **MODE MENU** is displayed. Step through the **MODE MENU** by pressing the **MODE** key. After the last menu item the **T2000SFL** returns to the operational display currently in use.

The **MODE MENU** is designed to allow the operator fast easy access to functions and parameters, which may need to be adjusted in flight.

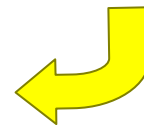
| MODE MENU | QNH or Baro |
|-----------|-------------|
|           | Assigned    |
|           | Buffer Alt  |
|           | Altitude    |
|           | Voltage     |
|           | Backlits    |
|           | Alert Tone  |



**USE MODE KEY TO STEP THROUGH MENU OPTIONS**

**OR**

**USE THE *Toggle* KEY TO RETURN TO THE OPERATIONAL DISPLAY**

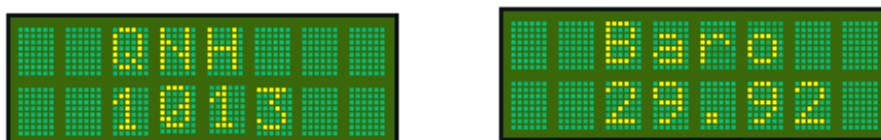


### 3.4.1 QNH or BARO (Barometric Pressure)

The altitude encoder outputs a pressure altitude fixed at an *above mean sea level (AMSL)* pressure of **1013mb** or **29.92Hg**. The aircraft’s altimeter however is normally adjusted for actual surface pressure before take off. This means the encoder altitude may not be the same as the altimeter reading.

The **QNH / Baro** can be entered here to allow the **T2000SFL** to compensate the displayed altitude for surface pressure, and hence read the same as the aircraft’s altimeter. The default **QNH** is **1013mb** or **Baro** is **29.92HG**. If the **QNH / Baro** is set to **1013mb** or **29.92HG**, the altitude displayed will default to the unadjusted pressure altitude direct from the encoder. If the **QNH / Baro** is set to a discrete value (normally provided by ATC), the encoder pressure altitude displayed will be adjusted for that **QNH / Baro** value.

The barometric units are set in the **BARO** option of the **PROGRAM MODE**. When **MB** is selected the **QNH** screen is displayed, and when **HG** is selected the **Baro** screen is displayed.



|                                |  |
|--------------------------------|--|
| Press <b>MODE</b> key (once)   | To select <b>QNH / Baro</b> option                                       |
| Rotate <b>CODE SELECT</b> knob | Scroll lower line to desired pressure.                                   |
| Press <b>ENTER</b> key         | To set default value. The default is <b>1013(mb)</b> or <b>29.92(HG)</b> |
| Press <b>toggle</b> key        | Display returns to current operational display                           |



**IMPORTANT NOTE**

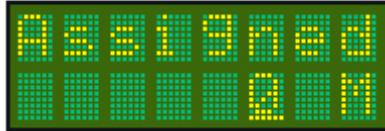
*The T2000SFL will only transmit the encoder pressure altitude. The adjusted QNH / Baro altitude is NEVER transmitted, even when it is selected for display.*

### 3.4.2 ASSIGNED (altitude)

The user can input an assigned altitude given by ATC. When used with the altitude buffer value, an audio alert and display indicator advises when the aircraft has climbed or descended, from the assigned altitude.



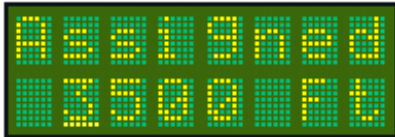
When the **Altitude** option of the mode menu is set to Feet, the **Assigned** altitude is adjusted in feet.



When the **Altitude** option of the mode menu is set to Meters, the **Assigned** altitude is adjusted in Meters.

|                                 |  |
|---------------------------------|--|
| Press <b>MODE</b> key (2 times) | To select <b>Assigned</b> option                           |
| Press <b>CODE SELECT</b> knob   | Increment displayed value in units of 500 feet / 100m      |
| Rotate <b>CODE SELECT</b> knob  | Increment displayed value in units of 100 feet / 10m       |
| Press <b>ENTER</b> key          | To set default value. The default is <b>0</b> .            |
| Press <b>toggle</b> key         | To save and display returns to current operational display |

When entering an altitude...



Press the **CODE SELECT** knob to increase the height value in units of 500FT / 100M.



Rotate the **CODE SELECT** knob to increase or decrease the height value in units of 100FT / 10M.

Press the **ENTER** key to return the **ASSIGNED ALTITUDE** to the default value of 0, **or**  
Press the **Toggle** key to save the height value, and return to the operational display.

If **Assigned** is set to **0**, the altitude alert function is disabled. The assigned altitude function is only active when the **SELECTMODE** knob is set to **DISP ALT**.

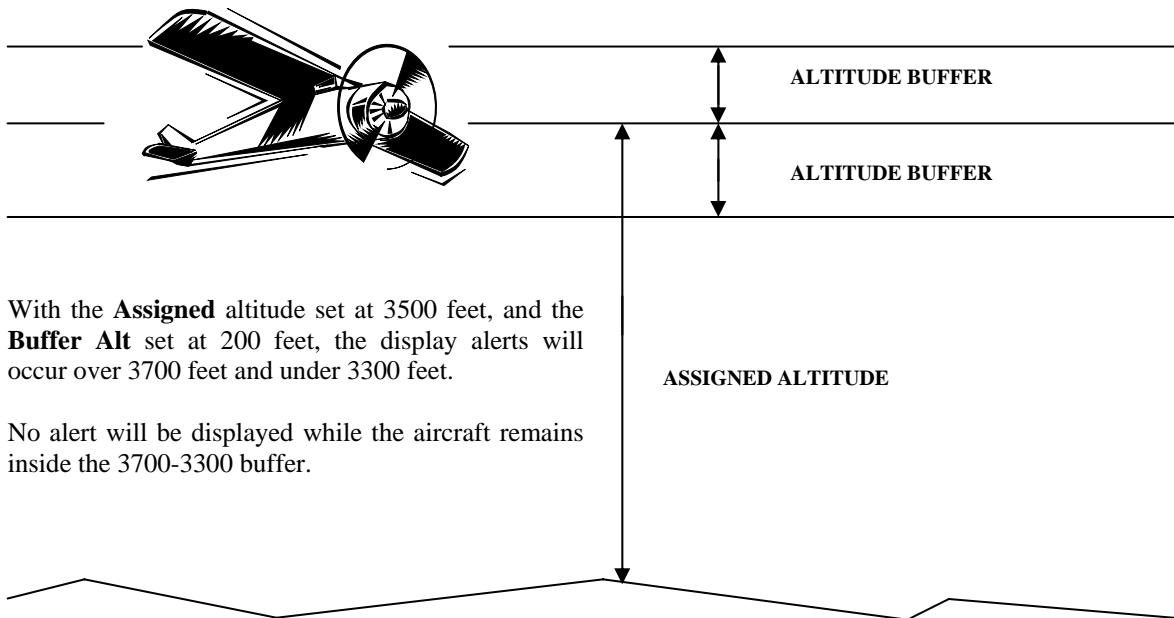
### 3.4.3 BUFFER ALT

The user can input a buffer altitude, above and below the assigned altitude, to define a height band in which to fly. When the aircraft exceeds the upper or lower limit, an indicator alert message will be displayed. The alert message advises the pilot of how far, above or below the assigned altitude the aircraft is. If the **Alert Tone** function is **ON**, an audio tone is heard as well.



If the **ALTITUDE** option in the **PROGRAM MODE** is set to **FEET** the **Buffer Alt** increments are in feet. If **ALTITUDE** is set to **METRES**, the **Buffer Alt** increments are in meters.

|                                 |   |
|---------------------------------|---|
| Press <b>MODE</b> key (3 times) | To select <b>Buffer Alt</b> option                                |
| Press <b>CODE SELECT</b> knob   | Increment displayed value in units of 500 feet / 100m             |
| Rotate <b>CODE SELECT</b> knob  | Increment displayed value in units of 100 feet / 10m              |
| Press <b>ENTER</b> key          | Display returns to current operational display (No default value) |
| Press <b>Toggle</b> key         | Display returns to current operational display                    |



If the aircraft climbs or descends outside the altitude buffer limits, a **Hi / Lo** warning is displayed on the lower line.



**T2000SFL** advises the pilot that the aircraft is 500 feet above the **Assigned** altitude. If the **Alert Tone** function is set on, an audio warning tone is heard.

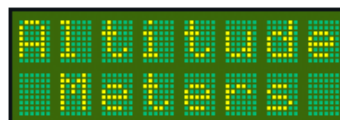


**T2000SFL** advises the pilot that the aircraft is 500 feet below the **Assigned** altitude. If the **Alert Tone** function is set on, an audio warning tone is heard.

### 3.4.4 ALTITUDE (units)

The altitude data can be displayed as feet, flight level, or meters. Once the **Altitude** units are set, all altitude data is displayed in these units.

The options are:            **F = FEET**                                e.g. **15000F**  
                                 **M = METERS**                                e.g. **5000 M**



|                                 |   |
|---------------------------------|---|
| Press <b>MODE</b> key (4 times) | To select <b>Altitude</b> option                            |
| Rotate <b>CODE SELECT</b> knob  | Scroll to select desired units. Options are Feet or Meters. |
| Press <b>ENTER</b> key          | No operation. (No default value)                            |
| Press <b>Toggle</b> key         | Display returns to current operational display              |

In both examples below the **PA** characters displayed at the lower left indicate "*pressure altitude*", where the **QNH / BARO** value has been left at the default value (1013mB or 29.92HG) in the **MODE** menu.



**5300 FEET.** Units in feet are indicated by the **F** character at the right hand end of the lower display line. All altitude data will be displayed in feet.



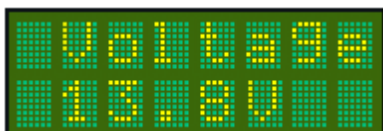
**1250 METERS.** Units in meters are indicated by the **M** character at the right hand end of the lower display line. All altitude data will be displayed in meters.

### 3.4.5 VOLTAGE

The **VOLTAGE** function will display the aircraft’s supply voltage, and by rotating the **CODE SELECT** knob, display the over and under voltage alert levels.

|                                 |   |
|---------------------------------|---|
| Press <b>MODE</b> key (5 times) | To select <b>Voltage</b> option. The supply voltage is display on the lower line. |
| Press <b>ENTER</b> key          | No operation. No default value.   |
| Press <b>Toggle</b> key         | Display returns to current operational display                                    |

When the transponder is operating in normal display operation mode, the over and under input voltage alert message is displayed on the lower line.

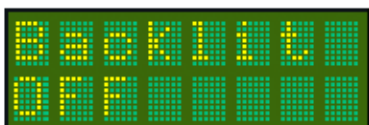


#### Aircraft Voltage

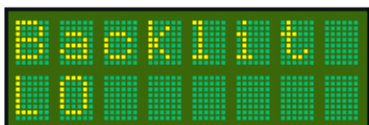
This parameter is set in **PROGRAM MODE**, as the nominal aircraft voltage. The T2000SFL can accept input voltages from 10-33 volts, but the voltage monitoring has to be told what the nominal supply voltage is.

### 3.4.6 BACKLITS

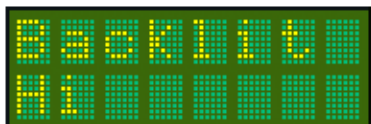
The T2000SFL display is backlit by a series of LEDS. The level of backlight can be selected from three options:



Backlighting is **OFF**  
When the T2000SFL is turned on the backlighting will default to OFF.



Backlighting is **LO**  
When the T2000SFL is turned on the backlighting will default to the LO or 50% level.



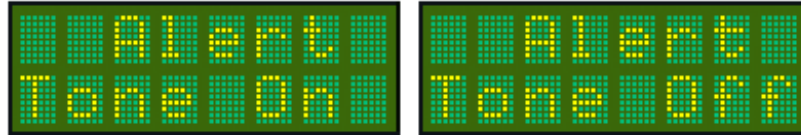
Backlighting is **HI**  
When the T2000SFL is turned on the backlighting will default to the HI or 100% level.

|                                 |   |
|---------------------------------|---|
| Press <b>MODE</b> key (6 times) | To select <b>Backlits</b> option. The current setting is displayed. |
| Rotate <b>CODE SELECT</b> knob  | To select from <b>OFF / LO / HI</b>                                 |
| Rotate <b>ENTER</b> key         | To save backlist level  |
| Press <b>Toggle</b> key         | Display returns to current operational display                      |

### 3.4.7 ALERT TONE

The **Alert Tone** function is used by the **T2000SFL**'s altitude alert function. When set **ON**, the **Alert** can be heard through the headphones, when connected to the headphone circuit.

|                                 |  |
|---------------------------------|--|
| Press <b>MODE</b> key (7 times) | To select <b>Alert Tone</b> option   |
| Rotate <b>CODE SELECT</b> knob  | Scroll lower line to select <b>ON</b> or <b>OFF</b> . The default is <b>ON</b> |
| Press <b>ENTER</b> key          | No operation. No default value.  |
| Press <b>Toggle</b> key         | Display returns to current operational display                                 |



#### **IMPORTANT NOTE**

*Pressing the **MODE** key again returns the display to the operational screen.  
The user can press the toggle key at any point in the **MODE** menu to return to the operational screen.*



### 3.5 ENTER KEY

The **ENTER** key is a confirmation key used to confirm information the user has inputted. After pressing the **ENTER** key, the display will typically give the message **SAVED**, for a short period.

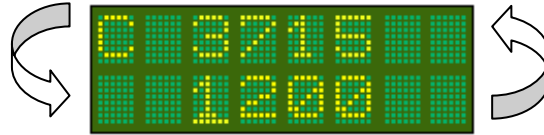
The **ENTER** key is also used to quick-set a parameter to a default value.



Enter Key

### 3.6 TOGGLE KEY

This key acts as a **toggle** switch, exchanging the active and standby codes.



When the transponder is operating in **DISPLAY ALT** the bottom line displays the encoder altitude instead of the standby code. The standby code is stored in memory. To toggle the active and standby codes in this mode, push the **toggle** key once to display the standby code on the bottom line. The standby code is displayed for 10 seconds. Push the **toggle** key again to exchange the active and standby codes. Once the codes have been exchanged, the display will revert back after 10 seconds, to displaying the altitude on the bottom line.

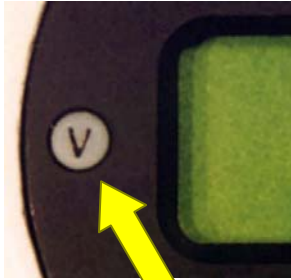


Toggle Key

**In all modes of operation, only the active code is transmitted.**

The **toggle** key is also used to return to the operational screen from the **MODE** and **PROGRAM MODE** menus.

### 3.7 VFR – HOT KEY



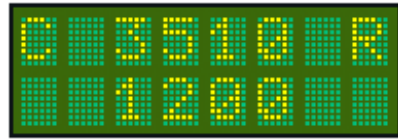
VFR Key

The **VFR** key will default the standby code immediately to the stored **VFR** code. Typically this code will be **1200** for a General Aviation aircraft. The **VFR** key calls the value set in the **VFR** option of the **PROGRAM MODE** menu.

To transfer the **VFR** code to the active position, press the **toggle** key. If no code is entered, after 10 seconds idle the standby position will revert back to the original **VFR** code.

To make the **VFR** code the **active** code, press the toggle key to bring **VFR** to the top line

Press **VFR** key to bring the stored **VFR** code to the *standby* line. In this case **VFR** = 1200



### 3.8 ID KEY

The **ID** key ( Ident ) when pressed, adds additional code information to the transmission for **ATC**. The code will flash on the **ATC** display as a means of uniquely identifying the aircraft's code from any other. The **T2000SFL** has the option of a remote **ID** switch (pin 16).

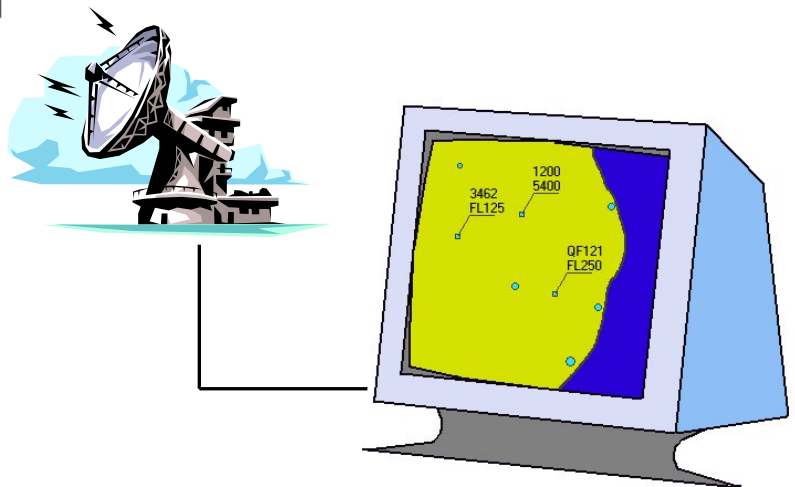
The external switch should be a momentary-ON type. The switch or **ID** key only need to be pressed briefly to activate the *Ident* function.



Ident Key



I character replaces the **R**, while the **IDENT** function is in operation



## 4.0 INITIALISATION AND SETUP

The **T2000SFL** will operate as a conventional transponder when first installed and powered up. You will be able to turn the transponder **ON/OFF**, adjust the standby code, and transfer the standby and active codes.

The **T2000SFL** has many other features, which can be programmed. Microair recommends that the full setup procedure be carried out prior to first flight. This section provides detailed procedures on the various parameters and functions that can be setup from the front panel.

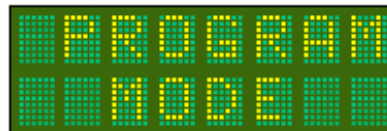
The following procedures provide step by step instructions to program the transponder options.

| <b>PROGRAM MODE</b> | <b>VOLT MON</b>     |
|---------------------|---------------------|
|                     | <b>A/C VOLT</b>     |
|                     | <b>O/V Set</b>      |
|                     | <b>U/V Set</b>      |
|                     | <b>E/C POW</b>      |
|                     | <b>VFR CODE</b>     |
|                     | <b>BARO</b>         |
|                     | <b>REM STBY</b>     |
|                     | <b>EXIT PROGRAM</b> |

### 4.1 PROGRAM MODE

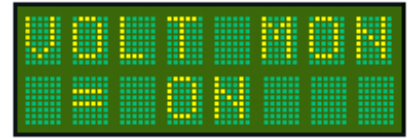
To start the **T2000SFL** in **PROGRAM MODE**, hold down the **MODE** key, and then press the **ON** key. Keep the **MODE** key held down until the start up self test messages have been displayed.

Each item can be adjusted to the desired value or option by scrolling the **CODE ADJUST** knob. The selected value or option can be saved by pressing the **ENTER** key. **PROGRAM MODE** then moves to the next menu item.



### 4.1.1 VOLT MON

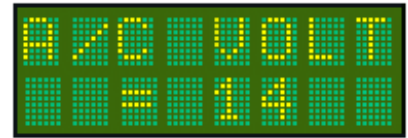
The **T2000SFL** can monitor aircraft voltage, and alert the pilot to the aircraft electrical system over or under voltage conditions. This is the aircraft supply voltage not just the transponder voltage, and is very useful for troubleshooting aircraft electrical problems.



|                                |   |
|--------------------------------|---|
| Press <b>ENTER</b> key         | Until <b>VOLT MON</b> message appears                   |
| Rotate <b>CODE SELECT</b> knob | Set <b>VOLT MON = ON/OFF</b> The default is <b>ON</b>   |
| Press the <b>ENTER</b> key     | The message <b>SAVED</b> appears briefly on the display |
|                                | The display moves to <b>A/C VOLT</b> menu item          |

### 4.1.2 A/C VOLT

The **T2000SFL**'s voltage monitoring system must be told what the nominal input voltage is. Most aircraft have either 14V or 28V electrical systems.

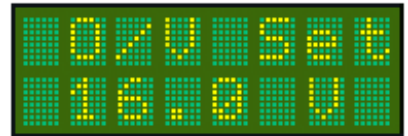


If you are operating from a 12V battery, select the 14V option.

|                                |   |
|--------------------------------|---|
| Press <b>ENTER</b> key         | Until <b>A/C VOLT</b> message appears                   |
| Rotate <b>CODE SELECT</b> knob | Set <b>A/C VOLT = 14/28</b> The default is 14           |
| Press <b>ENTER</b> key         | The message <b>SAVED</b> appears briefly on the display |
|                                | The display moves to <b>O/V Set</b> menu item           |

### 4.1.3 O/V SET

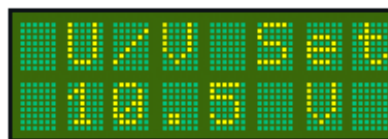
This menu item sets the **OVER** voltage alert level, for the voltage monitoring system. The maximum input voltage for the **T2000SFL** is 33V, but we suggest that the alert level be set much lower, perhaps 2 volts over the nominal supply voltage: e.g. **O/V = 16V** for 14V aircraft.



|                                |   |
|--------------------------------|---|
| Press <b>ENTER</b> key         | Until <b>O/V Set</b> message appears                    |
| Rotate <b>CODE SELECT</b> knob | Scroll to set the required <b>O/V Set</b> value         |
| Press <b>ENTER</b> key         | The message <b>SAVED</b> appears briefly on the display |
|                                | The display moves to <b>U/V Set</b> menu item           |

### 4.1.4 U/V SET

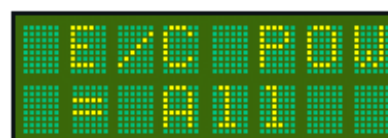
This menu item sets the **UNDER** voltage alert level, for the voltage monitoring system. The minimum input voltage for the **T2000SFL** is 10V, but we suggest that the alert level be set higher, perhaps 3 volts below the nominal supply voltage: eg **U/V = 11V** for 14V aircraft.



|                                |   |
|--------------------------------|---|
| Press <b>ENTER</b> key         | Until <b>U/V Set</b> message appears                    |
| Rotate <b>CODE SELECT</b> knob | Scroll to set the required <b>U/V Set</b> value         |
| Press <b>ENTER</b> key         | The message <b>SAVED</b> appears briefly on the display |
|                                | The display moves to <b>E/C POW</b> menu item           |

### 4.1.5 E/C POW

This item controls the output volts for an external encoder if required. The power supplied for the encoder can be turned **OFF** when the transponder **SELECTMODE** knob is in the **ON** position (mode **A**). Power is only supplied when operating in the **ALT** position (mode **C**). This function is provided to save power when operating solely from a battery supply.



|                                |   |
|--------------------------------|---|
| Press <b>ENTER</b> key         | Until <b>E/C POW</b> message appears                    |
| Rotate <b>CODE SELECT</b> knob | Set <b>E/C POW = All/Alt</b> The default is <b>All</b>  |
| Press <b>ENTER</b> key         | The message <b>SAVED</b> appears briefly on the display |
|                                | The display moves to <b>VFR CODE</b> menu item          |

- ALT** Encoder power is on in **ALT** and **DISP ALT** modes only.
- ALL** Encoder power is on in all modes.



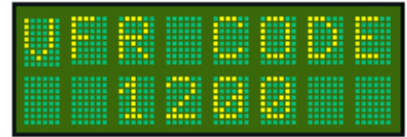
**IMPORTANT NOTE**

*Some encoders can take up to 10 minutes to warm up. NO ALT is displayed until altitude data is received from the encoder.*

*Shorting the encoder power supply pins at the rear of the T2000SFL, will result in internal damage and void the warranty (refer to Installation Manual)*

### 4.1.6 VFR CODE

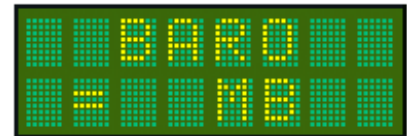
This item sets the default **VFR** code which can be hot key accessed from the **V** (VFR) key. For most countries the default general aviation code is **1200**. We recommend that this code be used.



|                                |   |
|--------------------------------|---|
| Press <b>ENTER</b> key         | Until <b>VFR CODE</b> message appears                   |
| Rotate <b>CODE SELECT</b> knob | Scroll to adjust first digit of voltage                 |
| Press <b>CODE SELECT</b> knob  | Moves the digit to the right                            |
| Press <b>ENTER</b> key         | The message <b>SAVED</b> appears briefly on the display |
|                                | The display moves to <b>BARO</b> menu item              |

### 4.1.7 BARO

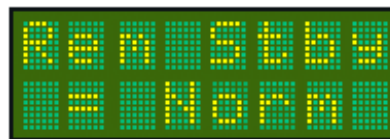
This item sets the barometric pressure units used by the **T2000SFL**. The user can select from **MB** = millibars, or **HG** = inches Mercury. We recommend that the user selects the same units as those used in the sub-scale of the aircraft's altimeter.



|                                |   |
|--------------------------------|---|
| Press <b>ENTER</b> key         | Until <b>BARO</b> message appears                       |
| Rotate <b>CODE SELECT</b> knob | Set <b>BARO = MB/HG</b> The default is <b>MB</b>        |
| Press <b>ENTER</b> key         | The message <b>SAVED</b> appears briefly on the display |
|                                | The display moves to <b>Rem Sthy</b> menu item          |

### 4.1.8 REM STBY

For aircraft using the remote standby line (pin 15), the operation of the switch can be changed by the **T2000SFL** software. The remote switch holds the **T2000SFL** in standby (**S**) regardless of what position the **SELECTMODE** knob is in.



If the remote switch releases the **T2000SFL** from standby by closing, the operation is **NORM** (normal).

If the remote switch releases the **T2000SFL** from standby by opening, the operation is **REV** (reverse).

|                                |  |
|--------------------------------|--|
| Press <b>ENTER</b> key         | Until <b>Rem Stby</b> message appears  |
| Rotate <b>CODE SELECT</b> knob | Set <b>Rem Stby = Norm/Rev</b> The default is <b>Norm</b>  |
| Press <b>ENTER</b> key         | The message <b>SAVED</b> appears briefly on the display  |
|                                | The display moves to the <b>SEC CODE</b> menu item,<br>or if the <b>SEC CODE</b> has been previously set....<br>the display moves to <b>EXIT PROGRAM</b> menu item |

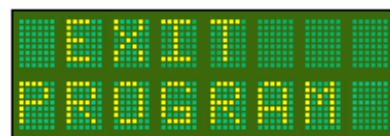


**IMPORTANT NOTE**

*If a remote switch is fitted, and it becomes faulty, the operation of the switch can be changed with this feature. If the T2000SFL will not change from standby, go to PROGRAM MODE and change the Rem Stby. This may release the T2000SFL.*

### 4.1.9 EXIT PROGRAM

This is the end of the **PROGRAM MODE** menu. The user can exit by pressing the **ENTER** key. The **T2000SFL** will restart in the operational mode.



The user can exit the **PROGRAM MODE** menu at any time, from any menu item, by pressing the **toggle** key.

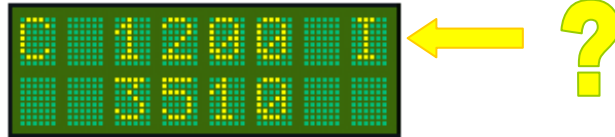
To re-enter the **PROGRAM MODE** menu the **T2000SFL** must be turned off, and re-started using the **ON** and **MODE** keys (refer **PROGRAM MODE** section).



## 5.0 FREQUENTLY ASKED QUESTIONS:

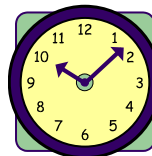
The following questions are common to most users and may help you understand the operation of the T2000SFL, some of these are explained in the user manual but may have been missed by the reader:

- Q. When I am asked to *Squawk Ident* ( **ID** ) the **I** indicator stays on for a long time. Why ???



- A. The **I** or ident character, is used to denote that the transponder reply now includes the ident information, to make the return flash on the ATC display. The ident will stay on for 18 seconds before returning to normal operation.

- Q. When asked to go to mode C from mode A, the altitude does not appear on the ground station for some time, usually after 8 minutes, is this normal ?



**Warm up  
time**

- A. Yes, if the encoder has the option for mode C only power on (see setup), then when in mode A it will have no power applied to it, in mode C the power is applied for the first time. Some encoders have a warm up period of up to 10 minutes, and the encoder information will be missing for this period. One way to overcome this is to have the encoder power on selected to **ALL** (in the options, setup). This means that as soon as the unit is turned on, the encoder will be running. For power conservation (Gliders etc) we recommend power on mode C only.

- Q. I have turned the **SELECTMODE** knob to **ALT** to select mode C, but when I am taxiing an **X** (standby) appears instead of C. What is going on ?



- A. The unit has probably had the *external standby switch* wired to an air-switch. When the aircraft lands, and slows down, the airflow over the switch is unable to hold back the spring operation of the air-switch. The **T2000SFL** will switch from the operating mode from the **SELECTMODE** knob, to standby and the **X** appears on the display. When the aircraft takes off again, the airflow increases, and operates the external standby switch and the **T2000SFL** reverts back to the **SELECTMODE** setting.

The external standby can be wired as a stick mounted switch. Be aware of this switch when flying, as the **T2000SFL** will operate outside standby, until the switch is operated.

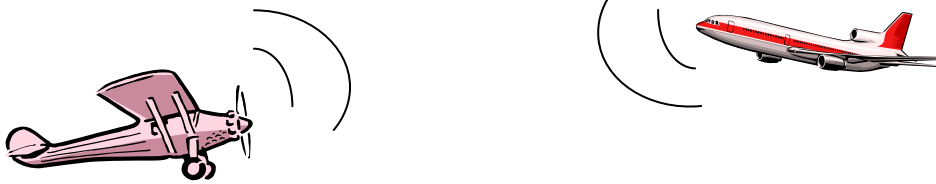
Check the **Rem Stdby** function in the **PROGRAM MODE** menu to ensure the switch is operating the correct way.



Q I have noticed that sometimes when I switch on the Avionics Master, the **T2000SFL** turns on by itself, without pressing the **ON** key. Why ?

A The **T2000SFL**'s **ON** key is software controlled. The **T2000SFL** will remember if it was on or off at the time the avionics master was last switched off. When the power is turned on again, the **T2000SFL** will revert to its last operational condition, and turn on. The **T2000SFL** can be turned ON/OFF via the avionics master or the **ON** key, either method is OK.

Q Whilst flying outside normal radar coverage I have noticed that the reply symbol still flashes from time to time – what causes this ?



A Other aircraft fitted with **TCAS** systems can still interrogate transponder equipped aircraft like yours. This then lets them know where you are, and your contact information is displayed on their **TCAS** screens. The **TCAS** aircraft could be 100+ miles away and at altitudes +30,000ft!

Q I have tried to power up my **T2000SFL** on the bench from a dc power supply, but it won't start up properly. What is going on ?

A The **T2000SFL** has a number of large capacitors fitted, and at the moment of turn on they will try to charge up. When this happens, an "*in rush*" of current occurs. If the power supply cannot cope with this "*in rush*" the supply voltage will dip to the point where the **T2000SFL** will detect a power failure, and reboot. The answer is to connect a battery across the power supply to cushion the "*in rush*" and allow the **T2000SFL** to get past this point.

Prolonged operation with the **T2000SFL** in reboot may result in a **NO COMM** error on the display. If this message appears, the communications between the microprocessor has been disturbed, and will require factory service.

Q Are there any problems with altitude encoders to be aware of ?

A The **T2000SFL** is designed to work with **ANY** TSO-C88a approved encoder. The **T2000SFL** has the provision to supply the aircraft power to the encoder. There are several things to watch for here:

Firstly the voltage received by the **T2000SFL** will be the voltage out to the encoder. Be careful with 28V aircraft that you select an encoder which is rated to 28V!

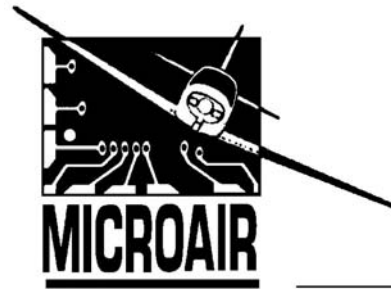
Secondly it is very important to wire a connecting ground wire between the encoder and the **T2000SFL**, even if you are **NOT** taking the power from the **T2000SFL**. This will ensure that the data line signals are at best performance.

Thirdly **NEVER** allow the output voltage from the **T2000SFL** to the encoder to be shorted. This will always result in internal damage to the **T2000SFL**, and is **NOT** covered by the warranty! Do **NOT** do this.

- Q Do I need to get my Transponder calibrated ?
- A Yes. In most countries, transponder installations, regardless of the type of aircraft it is installed in, must be calibrated at the time of installation, and every two years thereafter. The calibration will include the aircraft's altitude encoder, and primary altimeter. The test must be carried out with the equipment installed in the aircraft, by a qualified avionics service centre.
- Q Is there anything inside the T2000SFL transponder I can adjust to get better performance ?
- A No. Do not open the T2000SFL, or attempt to adjust any internal components. Service should only be carried out by Microair Avionics or a certified avionics service centre which holds the T2000SFL Service Manual. Refer to the Microair Avionics website for details of a service centre near you, or for instruction on how to return your transponder to Microair Avionics.
- Q Occasionally the message NO COMM will appear on the display, particularly when I turn the transponder on. What does this message mean?
- A No COMM is a loss of communications between microprocessors inside the transponder. This can occur if the one of the microprocessors begins a task before the other is ready to respond. This can happen if the transponder is turned on with the selectmode knob in the ON, ALT or ALT DISPLAY positions. It is possible that the transponder may be interrogated and asked to respond before the start up sequence is complete, and hence cause a conflict. Recycle the transponder's power to clear the error message. If the error message recurs often, send the transponder to a Microair service centre for adjustment.
- Q I often pass through class E airspace, but I do not want to stray into the class C airspace above. Can I use the altitude alert function to warn me if I go above a certain level?
- A Yes. You can use the altitude alert function in the following way to give you a too HI alert at a given altitude. An example of airspace low limit might be 4500 feet. To remain clear of this airspace you must remain below 4500 feet. Go to the mode menu, and select altitude. Set the altitude to 100 feet. Move on to the Buffer value and set this to 4400 feet (4500-100). The HI alert message and tone will now occur at 4500 feet, to warn you of the airspace.

## 6.0 LIMITED WARRANTY

Microair Avionics Pty Ltd warrants this product to be free from defects in materials and workmanship for 1 year from the date of purchase. Microair Avionics will, at its sole discretion, repair or replace any components, which fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labour. The customer shall be responsible for any transportation costs for return of this product to Microair Pty Ltd.



This warranty does not cover failures due to abuse, misuse, accident, unauthorized alteration, or repairs carried out by parties other than Microair or an approved Microair service centre. This warranty does not cover failures where the product has not been installed or operated, in accordance with the provisions of the User and Installation manual(s).

It shall be at Microair Pty Ltd's sole discretion to decide if a defect is a result of material or workmanship failure.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING ANY LIABILITY ARISING UNDER WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUARY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE, AND COUNTRY TO COUNTRY.

IN NO EVENT SHALL MICROAIR AVIONICS PTY LTD BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT.

To obtain warranty service, CALL the Microair Avionics Support line in Australia:

Phone: ++ 61 7 41 553048  
 Fax: ++ 61 7 41 553049  
 Email: [support@microair.com.au](mailto:support@microair.com.au)

**Contact Microair Avionics for instruction on the return of product for service or repair.** Please ensure that you are able to supply the date of purchase, product type reference, serial number, method of return and date of return. All product returning to Microair Avionics should be marked clearly:

“PRODUCT RETURNING TO COUNTRY OF ORIGIN,  
 FOR WARRANTY SERVICE / REPAIR,  
 AND WILL BE RE-EXPORTED”

Address to either:

|                           |                           |
|---------------------------|---------------------------|
| Microair Avionics Pty Ltd | Microair Avionics Pty Ltd |
| P O Box 5532              | Airport Drive             |
| Bundaberg West            | Bundaberg West            |
| Queensland 4670           | Queensland 4670           |
| Australia                 | Australia                 |

Microair may at its discretion, refer product returns for repair or service, to a service facility closest to you. Microair Avionics Pty Ltd reserves the right to repair or replace the unit or software or offer a full refund of the purchase price at its sole discretion.

SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

Supplied by: