Experimental / Lights Sport Flight Instruments

Installation Manual

T3000PSP/NAV-IM

Microair Avionics
ACN 646 664 459
9A/23 Ashtan Place
Banyo QLD 4014
Australia

Phone: +61 7 3040 3840
Email: support@microair.aero
sales@microair.aero
Web: www.microair.aero

About This Document

Welcome to the Microair T3000 Flight Instrument system, the latest innovation in avionics from Microair Avionics. The T3000N2D and T3000BN2D are panel mounted sensor units, the latter providing a battery backup. The T3000PSP system is a digital pitot static probe. All provide comprehensive air data information, (altitude, indicated air speed, true air speed, vertical speed, and outside air temperature) attitude and heading reference (pitch, roll, gyro stabilized magnetic heading) with the PSP also providing Angle of Attack and the N2D and BN2D also providing a GPS position source.

Revision	Description of Change	Approver	Date
0	Initial Issue	DW	22 Nov 25

Contents

1. Introduction

Congratulations on your purchase of the Microair T3000 Flight Instrument system which contains the very latest in avionics technology and has been designed as reliable aircraft instruments. This manual describes how to instal and configure the system. The T3000 Flight Instruments User Manual provides guidance on how to get the most from your system operationally.

a. System Description

The Microair T3000 Flight Instrument system consists of:

i. either or both

   a. a NAV module installed in a T3000 Core with (T3000N2D) or without (T3000N) an integrated display and with (T3000BN2D) or without a battery back up.

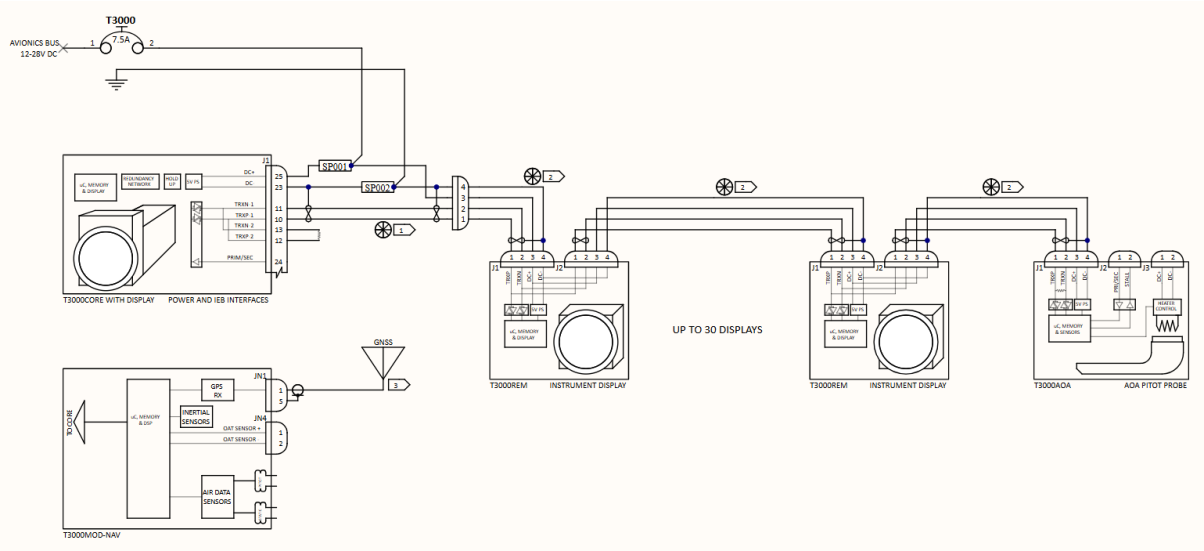
   b. a pitot static probe

ii. and one or more digital cockpit displays.

There is a power harness that takes 10-30V DC from a suitable avionics bus that powers the displays and the probe. Additionally, and optionally, there is a second harness that can be powered from a suitable avionics bus to power the optional probes heaters. The Probe heating is available in both 12/14 and 24/28 volt versions.

There are optional interfaces to other aircraft systems via the serial and discrete of the T3000 Core or via the optional Engine and Systems Interface or Remote Systems Interface – refer to the Engine and Systems Instruments Installation Manual for more information.

b. System Diagram



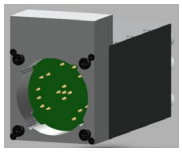
c. Functions

The core functions of the system are:

- Altitude
- Indicated Airspeed
- Vertical Speed
- Outside Air Temperature
- True Airspeed
- Time (GMT, Local and Timer)
- Turn Rate and Balance
- Rate One Turn Bank Angle
- Attitude (pitch and roll)
- Heading
- Angle of Attack
- Altitude Alert
- GPS Position

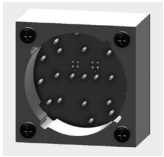
d. Installation Parts

Your installation may contains the following items. Please confirm nothing is missing before proceeding



T3000 Core with NAV

T3000 REM 3.1” Display



T3000 REM Housing

T3000 Pitot Static Probe

PSP Mounting Plate

PSP Mount Mast

Harnesses:

- CORE Power Harness OR REM Power Harness
- xxft IEH Harnesses
- xxft PIH Harness*

PSP Mount Flange

PSP Hardware Kit

- MS24693-S294 screws (6)
- MS16997-19 screws (4)
- MS35335-58 lock washers (4)
- MS51958-27 screws (4)
- Cable ties 4” (20)

* Only required by installation with heated pitot static probes

2. Installation

Remember the Microair Avionics team are here to help either directly or through our network of dealers. Please don't hesitate to reach out if you have any questions during your installation. support@microair.aero *or* https://support.microair.aero/

Refer to AC43.13-1B (or later revision) for guidance on standard practices if relevant aircraft specific standard practices are unavailable.

If the aircraft is used for Flight in Known Icing (FIKI) and a PSP is being installed, please contact Microair Avionics for any additional information that may be required or for any additional requirements for the installation.

There are four aspects to the installation.

a. Probe Installation (if fitted)
b. Core Installation (if fitted)
c. Display installation
d. Wiring between the probe and display and power connections
e. Commissioning and test

a. Probe Installation (if fitted)

In the installation kit is a #14 gauge (1.6mm) aluminium plate 1ft x 1ft (300mm x 300mm) that can be match cut and match drilled as a replacement for an existing inspection panel. It has a cut out for the probe mast and screw holes for the mast flange.

Steps

i. Identify an appropriate inspection panel on the underside of the wing to replace. Ideally it will be positioned so the end of the probe is under and just in front of the wing leading edge, however a few inches either way will make little difference to performance. Ensure there is sufficient space behind the panel for the mounting flange and wiring.

   Note: the mount does not need to be in the middle of the replacement inspection panel if mounting it off centre improves the probe's location.
   Note: the position of an existing pitot probe relative to the leading edge and other structure can be used as a guide as to the optimal location for the new probe.

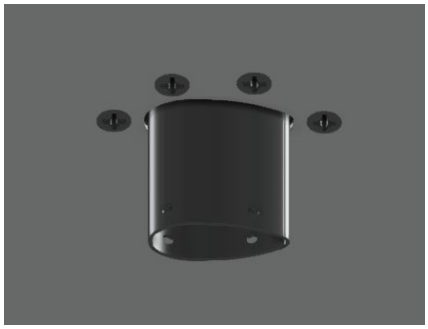
ii. Remove the identified inspection panel IAW the aircraft maintenance manual, retaining the screws. Use the existing inspection panel to mark up the supplied plate. Match cut and match drill. Test fit the panel.

iii. Using the aircrafts standard maintenance practices, corrosion protect and paint the replacement inspection panel. Refer AC43.13-1B for guidance.

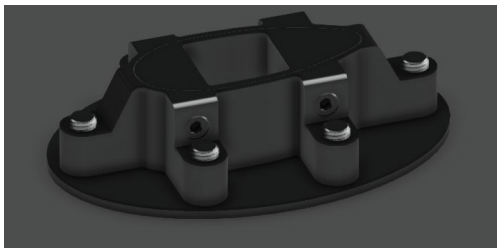
iv. Install the PSP Mount Flange to the prepare replacement inspection panel using the supplied MS24693-S294 screws (6 off)

v. Install the PSP Mount Mast through the replacement inspection panel and into the flange and secure with supplied MS16997-19 screws (4 off). Optionally you can apply threadlock to the threads prior to installation.
   Note: the PSP Mount Mast and Flange are anodised and do not require further treatment or painting however this can be applied at the installers discretion.

   The replace inspection plate should look similar to this at this stage.



Bottom View



Top View

vi. Carefully pass the Pitot Static wiring and tubing through the centre of the mast and secure the probe using the supplied MS35335-58 lock washers and MS24693-S294 screws (4 off)

vii. Check fit the installation then set aside whilst the display(s) and wiring are installed.

b. Core Installation (if fitted)

Your installation could consist of one or more T3000 Cores, with or without a display.

i. Panel Mounted Core

Identify a position that is easily visible to the pilot. Consideration should be given to the pilot's primary field of view and the observability of the pilot of the primary and any secondary instruments.

The panel mounted core uses an industry standard 2-1/4" cut out.
Note: many panels already have 2-1/4" cutouts for existing instruments that can be reused. Microair can supply an adaptor plate for standard 3-1/8" instrument holes).

i. Select the location for your Core(s)

ii. Use a template to mark and cut the panel (there is a template included at appendix A – check it prints in scale!)

iii. Install the display housing(s) into the panel using the 4mm screws supplied (4 off)
Note: The T3000 Core with a NAV module must be installed with the DB25 connector on the top.

iv. Install the Display into the housing by aligning the displays light sensor at the approximately 4 o'clock position, inserting, depressing with the palm of your

hand against the glass, and then rotating clockwise approximately 10 degrees.

ii. Remote Mounted Core

Identify a position that protects the T3000Core from liquids/moisture and allows the core to be installed orientated along the fwd/aft axis of the aircraft and at an attitude that is level in level flight.

i. Select the location for your Core(s)

ii. Install the Core(s) on to the airframe using standard aircraft hardware (4 off not supplied)
Note: The T3000 Core with a NAV module must be installed with the DB25 connector on the top.

c. Display Installation

Your installation could consist of one or more 3.1" displays. These need to be installed in a position that is easily visible to the pilot. Consideration should be given to the pilot's primary field of view and the observability of the pilot of the primary and any secondary instruments.

The displays use an industry standard 2-1/4" cut out.
Note: many panels already have 2-1/4" cutouts for existing non required equipment such as a clock which can be used for the display(s).

iii. Select the location for your display(s)

iv. Use a template to mark and cut the panel (there is a template included at appendix A – check it prints in scale!)

v. Install the display housing(s) into the panel using the 4mm screws supplied (4 off)
Note: Whilst the display can be mounted in any orientation, we recommend installing the display with the cable restraint bracket above the connectors to provide a drip shield.

vi. Install the Display into the housing by aligning the displays light sensor at the approximately 4 o'clock position, inserting, depressing with the palm of your hand against the glass, and then rotating clockwise approximately 10 degrees.

vii. If you are installing more than one display connect the supplied 1ft IEH harness between P1 of one and P2 of the next and use a cable tie to secure the cable to the cable restraint bracket.

d. Wiring Installation

Please refer to the Wiring Diagrams at appendix B.

Your wiring installation consists of the following:

i. T3000 Core (if installed), Power and Display Wiring

a. A power harness (supplied) that connects from the T3000 Core or in a PSP only installation, a T3000 Display, to a circuit breaker (sourced separately) that is connected to a suitable avionics bus. We recommend a 2A(min) to 7.5A(max) rated CB.
Note: we recommend keeping the wiring harnesses twisted as far as practical to help reduce any interference. Ground either adjacent to CB (preferred) or adjacent to the Core/Display.

b. An IEH harness (supplied) from the T3000Core (if installed) to a T3000Display and use a cable tie to secure the cable to the cable restraint bracket.

c. If you are installing more than one display connect the supplied 1ft IEH harness between P1 of one and P2 of the next and use a cable tie to secure the cable to the cable restraint bracket.
Note: you may have completed this step when you installed the displays

ii. PSP Wiring (if installed)

a. An IEH harness (supplied) from a T3000 Display to the T3000 Pitot Static Probe (if installed).
Note: The supplied harness is 12ft in length and excess length can be coiled. Alternative you can contact us to exchange your harness, they are available in the following lengths 1', 2', 3', 4', 5', 6', 8', 10', 12',14' & 16'

b. For aircraft installations with probe heaters, A PIH harness (supplied) from the T3000 Pitot Static Probe to a circuit breaker (sourced separately) that is connected to a suitable avionics bus. For 12V aircraft we recommend a 20A CB and for 24V aircraft we recommend a 10A CB.
Note: The supplied harness is 12ft in length and excess length can be trimmed during installation. Alternative you can contact us to exchange your harness, they are available in the following lengths 6', 12'' & 18'

c. For the PSP wiring we recommend that you start at the probe and route your harness(s) towards the cockpit and the displays/avionics bus.

i. Ensure the wiring is installed in accordance with the aircraft standard wiring practice or AC43-13-1B. Avoid running wiring directly beside sensitive systems such as antenna coaxes or strobe wiring.

ii. Ensure all wiring is supported at no more than 18" intervals and that it is protected from aircraft structure and mechanical systems.

iii. On pressurised aircraft, consider using spare pins on an existing connector or exiting penetrations. Refer to the aircraft maintenance manual and if there is any uncertainty seek further advice from the aircraft manufacturer, Microair and the FAA.

d. Connect the harness(s) at the probe end to the probe connectors noting:

i. The white wire is used for pin programming if two probes are installed and should be left capped and stowed for standard installations

ii. The blue wire is used for an optional stall warning light or siren and should be left capped and stowed if an existing stall warning system is installed in the aircraft.
Please contact us for further information if your aircraft does not have a stall warning system included in its certification baseline and you want to use this functionality.

iii. Connect the IEH Harness and heater power harness (if installed) and secure wiring such that it is protected from abrasion and liquids.

e. Carry out an inspection for tooling and any other foreign objects.

f. Install the replacement inspection panel and close up the area in accordance with the aircrafts maintenance manual.

g. At the display end coil and stow excess IEH harness (being careful not to compromise the harness with a bend radii of less than 2").

h. Connect the IEH to a P1 or P2 connection on a display
Note: the P1 and P2 display connections are interchangeable

i. Connect the power harness to the remaining P1 or P2 connection on a display and route to a suitable circuit breaker. Terminate in accordance with your aircrafts standard wiring practices.
Note: we recommend keeping the wiring harnesses twisted as far as practical to help reduce any interference.

j. If a heated probe is installed, route power harness to a suitable circuit breaker, trim and terminate in accordance with your aircrafts standard wiring

practices.
Note: we recommend keeping the wiring harnesses twisted as far as practical to help reduce any interference.

Congratulations your T3000 System is installed!

3. Configuration

The display faces on the T3000DA can be configured to user preferences for customising the different information available.

To navigate to the Settings Menu, open the pop-up Main Menu (Long Press), then select Gear Icon (Settings option) by touching it on screen to access Settings.

From Menu Settings, press Instrument option to proceed with display control and calibration.

a. FACES

Configure the following settings according to your installation and desired functionality:

SOURCE	**SingleSrc** – Configures the display as a single source unit (no primary or secondary sources). **Primary** – Configures the display as the primary source unit (used when multiple source units are available). **Secondary** – Configures the display as the co-pilot/secondary source unit (used when multiple source units are available).
STARTUP FACE	Select the display face to show on startup of the system.
SECOND FACE	Select the display face to alternate between on long press of the display face.
POWER LOSS FACE	Selects the display face to show if aircraft power is lost and the battery is being used to power that display. Only applicable to displays installed in a T3000 core with the battery option.
ENABLE SWIPE	**Toggle switch ON –** Faces can be changed on screen by touching and swiping across the display. **Toggle switch OFF –** Faces can only be changed by using the push button bezel and rotating it to switch between Primary and Secondary Face. *Refer to the section "FACE NAVIGATION" of the User Manual for further details of how display navigation works*.

b. AH

The following setting are available for the Artificial Horizon (AH)

Setting	Options	Outcome
ASI Tape	Yes	Always Display the Airspeed tape on the AH
	No	Do not display the Airspeed tape on the AH
	Pwr Loss	Display the Airspeed tape only when powered by the optional battery
Altimeter Tape	Yes	Always Display the Altimeter tape on the AH
	No	Do not display the Altimeter tape on the AH
	Pwr Loss	Display the Altimeter tape only when powered by the optional battery
Heading Tape	Yes	Always Display the Heading tape on the AH
	No	Do not display the Heading tape on the AH
	Pwr Loss	Display the Heading tape only when powered by the optional battery
Installation Pitch Adj	+/- 10°	Adjust the horizon to compensate for instrument panel offset to horizontal.

c. ALT

The following setting are available for the Altimeter (ALT)

Setting	Options	Outcome
Altitude Unit	Feet	Use feet for altitude display
	Meters	Use meters for altitude display
Ref Pres Unit	hPa	Use metric hectopascals (hPa) which is the same a millibars for the reference altitude. ISA sea level is 1013 hPa..
	inHg	Use American Inches of Mercury (inHg) for the reference altitude. ISA sea level is 29.92 inHg
Static Source Error Correction	+/- 5%	Calibrates the static port for inaccuracies with changes in airspeed

d. ASI

The following settings are available for the Air Speed Indicator (ASI)

Setting	Options	Outcome
Vs_0	10+ knots	Flaps extended stall speed – bottom of white arc

Vs_1	10+ knots	Clean stall speed – bottom of green arc
V_{FE}	10+ knots	Maximum speed for operations with flaps extended – top of white arc
V_{NO}	10+ knots	Normal Operating maximum speed – top of green arc, start of yellow arc
V_{NE}	10+ knots	Never Exceed speed – top of yellow, red line
V_{YSE}	10+ knots	Single Engine Best rate of climb speed – blue line
Temperature Unit	°C	Temperature is displayed in degrees Celsius (also known as centigrade)
	°F	Temperature is displayed in degrees Fahrenheit
Pitot Position Correction	+/- 5%	Calibrates the pitot port for errors related to local disturbances to airflow.

e. HSI

The following setting are available for the Horizontal Situation Indicator (HSI)

Setting	**Options**	**Outcome**
Course Deviation Indicator	Yes	Always Display the CDI on the HSI
	No	Do not display the CDI on the HSI
	Pwr Loss	Display the CDI only when powered by the optional battery
Radio Bearing Indicators	Yes	Always Display the Radio Bearing pointers on the HSI
	No	Do not display the Radio Bearing pointers on the HSI
	Pwr Loss	Display the Radio Bearing pointers only when powered by the optional battery
Magnetic Heading Offset Correction	+/- 20°	Allows any residual heading error unable to be removed by automatic compass calibration to be adjusted out.
Magnetic Variation	Automatic	Available between +/- 55° Latitude the local magnetic variance is calculated and used to convert between true and magnetic directions. If Automatic is selected when outside these latitudes a heading fail flag will be shown.
	Manual	When selected the Manual Magnetic Variation setting appears (see below)
Manual Magnetic Variation	+/- 180°	Allows the entry of the local magnetic variation, usually used when outside the automatic range but may be used when operating in a limited geographic area for a more accurate variation than the model can provide.

f. AoA

The following setting are available for the Angle of Attack Indicator (AoA)

Setting	Options	Outcome
Stall	1-99	Alignment of AoA Stall indication
Approach	1-99	Alignment of AoA Approach indication

4. Calibration

a. Validation of Installation

Carry out a ground or flight test and compare the indications of the following to confirm the probe is correctly installed to the aircraft owners and operators satisfaction.

a. Airspeed
b. Altitude
c. Heading
d. Attitude (pitch and roll)
e. Outside Air Temperature

Note: There may be discrepancies between the primary and standby instruments from various sources most prominently the different location of the sensors and the difference in sensitivity and accuracy of newer technology. The standby instruments exist to provide an additional layer of safety in the event of a failure of a primary instrument. It is the pilot's responsibility to validate the accuracy and availability of the standby instruments by comparison to the primary instruments <u>every</u> flight.

Carry out a ground or flight test and confirm the correct operation of the following aircraft systems (if fitted) to the aircraft owners and operators satisfaction.

a. All radios (VHF, HF etc)
b. All radio navigation systems (ADF, VOR, ILS etc)
c. Audio panel and intercom
d. GPS
e. Engine instruments

Note: Some older intercoms and radios can be sensitive to interference. If noise is heard on the audio system following installation you may attach a clamp on ferrite (supplied) near the connector on the IEH harnesses.

b. Magnetic Heading

The PSP contains three magnetic sensors that are factory calibrated for both soft and hard iron effects from within the PSP. A compass swing, in accordance with the aircraft maintenance manual, should be carried out after installation.

Should errors exist then slowly rotating the aircraft through 360 degrees a few times will allow the continuous calibration of the compass system to remove errors introduced by iron surrounding the PSP installation.

c. Calculation of PSP Airspeed and Altimeter calibration factors

The PSP can be corrected for pitot position errors and static source errors (errors in static pressure from changes in aircraft speed). In most installations this will not be required.

To perform the calculation of the corrections you will twice fly a 4 leg pattern at a constant altitude and airspeed (once at maximum cruise speed and once at approach speed in the landing configuration). You will need a GPS to record the ground speed and GPS altitude on each leg. You will also record the outside air temperature (OAT).

Microair can provide a excel spreadsheet to capture the flight test data and to calculate the correction factors. Please contact us at support@microair.aero to request the spreadsheet.

The calibration factors are only as accurate as the test data collected. Accurately fly the altitudes and speeds captured. Ensure the QNH is set and checked against field elevation prior to flight. We recommend using an observer to capture and monitor terrain and traffic clearance the data whilst the pilot focusses on flying the aircraft.

Enter the calculated correction factors in the settings and repeat the flight to confirm the measured parameters are correct.

d. Angle of Attack Calibration

THERE IS NO REQUIREMENT TO STALL THE AIRCRAFT DURING THIS CALIBRATION.

There are two adjustments to configure the AoA indicators. The first aligns the normal approach configuration and the second the approach to stall.

1. At an altitude with sufficient terrain and traffic clearance configure the aircraft for approach. On the AoA settings page select Approach and press “Set Current”.

Selecting "Set Current" *will align the displayed AoA to half green and half yellow*.
You can also adjust the calibration factor for the desired indication.

2. At an altitude with sufficient terrain and traffic clearance configure the aircraft for approach and lift the nose until the stall buffet is felt
   DO NOT STALL THE AIRCRAFT
   On the AoA settings page select Stall and press "Set Current"
   Selecting "Set Current" *will align the displayed AoA to half yellow and half red*.
   You can also adjust the calibration factor for the desired indication.

5. Limited Warranty

The warranty period for any Microair Avionics manufactured article is dependent on Condition of the article at time of sale and the Purchase Date.

For **New Articles** the warranty period commences from Date of Purchase and is valid for 12 months or the minimum period defined by applicable consumer law, whichever is the longer. In the absence of original Proof of Purchase, the warranty will be valid for 12 months from Date of Factory Shipment as determined by Microair Avionics.

For **Factory Reconditioned Articles** offered for sale, the warranty period commences from Date of Purchase and is valid for 12 months.

For **Factory Exchanged Articles** the warranty period commences from the Date of Purchase of the original article and is valid for the remainder of the original warranty period.

For **Repaired Articles** the warranty period commences from the date of Factory Shipment and is valid for 6 months for the original defect only.

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 or an approved Microair Service Centre.

This warranty does not cover failures due to abuse, misuse, accident, unauthorised alteration, or repairs carried out by parties other than Microair Avionics or an approved Microair Avionics 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 Avionics 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.

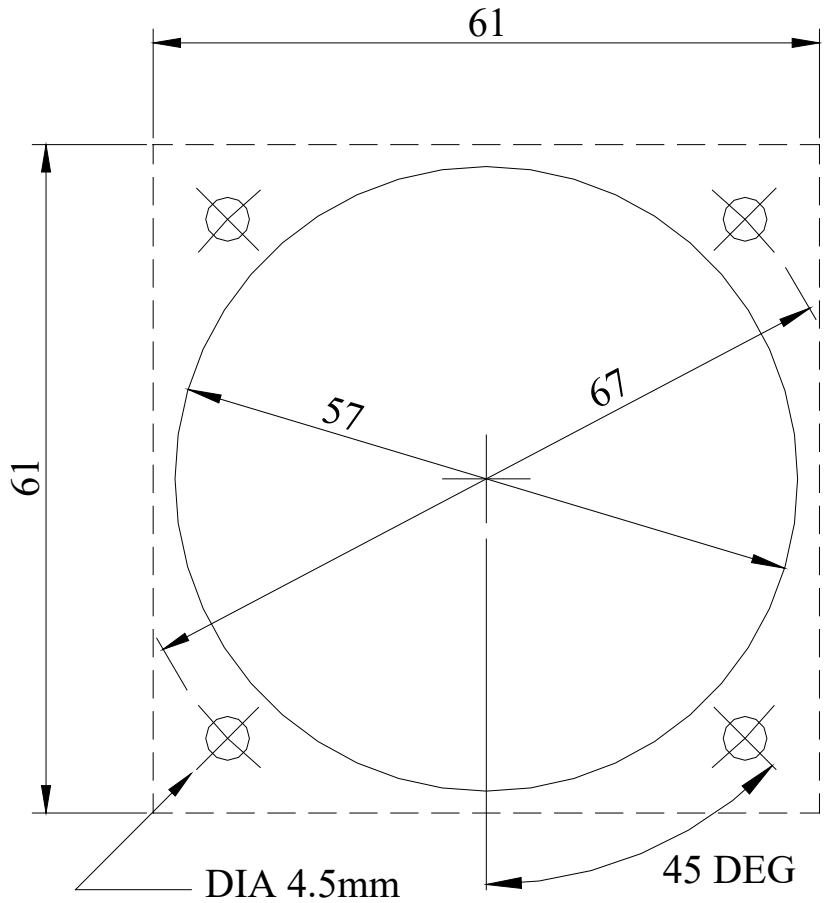
IN NO EVENT SHALL MICROAIR AVIONICS, INC. BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT.

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

To obtain warranty service, please email or call Microair Avionics in Australia. Domestic or International Return instructions are available on our website. Please follow these instructions carefully.

Phone: +61 7 3040 3840 Email: support@microair.aero Website: support.microair.aero

Appendix A – Standard 2-1/4” Cut Out



All dimension in mm

Appendix B – Wiring Diagrams

Appendix C – Component Outline Drawings