



Maintenance Terminal Manual (AMT)

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**ADVANCED MAINTENANCE TERMINAL (AMT)**

**MAINTENANCE TERMINAL USER MANUAL FOR  
WINDOWS 10 OPERATING SYSTEM**

THE TECHNICAL CONTENT OF THIS DOCUMENT IS APPROVED UNDER THE  
AUTHORITY OF:  
DOA NR. EASA 21J.092

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Maintenance Terminal Manual (AMT)

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## Maintenance Terminal Manual (AMT)

### INTRODUCTION

#### 1. General:

This manual provides information on the Advanced Maintenance Terminal supplied by Ultra, Precision Control Systems used to be used with Active Noise and Vibration Control Systems.

The Manual is divided into the following sections:

- Introduction
- Description and Operation
- Advanced Maintenance Terminal Requirements and Installation
- General AMT Operation with ANCU P/N 8-810-01-014/015 & 8-811-01-008/010
- General AMT Operation with ANCU P/N 8-810-01-011 & 8-811-01-006
- Troubleshooting
- Ruggedized Maintenance Terminal

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## Maintenance Terminal Manual (AMT)

### ABBREVIATIONS AND ACRONYMS

#### Abbreviations

#### Definition

AC	Alternating Current
AMT	Advanced Maintenance Terminal
ANVC	Active Noise and Vibration Control
ANCU	Active Noise Control Unit
ATVA	Active Tuned Vibration Attenuator
BIST	Built-In Self-Test
DMM	Digital Multi-Meter
DRAM	Dynamic Random Access Memory
Hz	Hertz
LCD	Liquid Crystal Display
LED	Light Emitting Diode
NiMH	Nickel Metal Hydride
PCMCIA	Personal Computer Memory Card Interface Adaptor
PEC	Panel, Electronic Circuit
PSI	Pounds per Square Inch
ROM	Read Only Memory
SRAM	Static Random Access Memory
WOW	Weight on Wheels

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## Maintenance Terminal Manual (AMT)

### 1. DESCRIPTION AND OPERATION:

#### A. System Description.

- (1) The Active Noise and Vibration Control (ANVC) System reduces the periodic noise in the passenger cabin created by the aircraft's propellers. This is accomplished by creating a cancelling noise field in the cabin, which is in anti-phase with the primary (original) noise field. The primary and secondary noise fields combine destructively resulting in lower noise levels.
- (2) The ANC System consists of the ANCU, Microphones and Actuators distributed around the aircraft cabin and Power Amplifiers to drive the actuators.
  - (a) The Microphones are attached to the trim or in seat backs.
  - (b) The Actuators Are Loudspeakers or Active Tuned Vibration Absorbers (ATVAs). Loudspeakers are attached to the trim and surrounded by enclosures to stop pressure fluctuations from the rear of the actuator driving the trim and ATVAs are mounted on fuselage frames or other structural components such as bulkheads.
  - (c) The Power Amplifiers are mounted with or near the actuators.
- (3) The fundamental frequencies of the noise are measured by the ANCU from inputs taken from the propeller tachometers signals, which provide propeller frequency data. The ANCU processes this information together with the noise levels measured by the Microphones to output noise control signals to the ATVAs via the Power Amplifiers.
- (4) The ANVC System has four modes of operation:
  - (a) Power Up.
  - (b) Standby.
  - (c) Active Control.
  - (d) Maintenance.

On the application of power, the ANVC system enters Power Up mode where system self-tests, system configuration and data initialisation tasks are performed. If successful, the system enters Standby. The system enters Active Control and generates the cancelling noise field when all frequency inputs are within a prescribed frequency range.

During normal operation, the system will only go into Maintenance mode if either an error has occurred or if an AMT has been connected to the system and control is inactive.

The ANCU provides two System Status outputs, to indicate DEGRADED performance and SYSTEM FAULT conditions for connection to external indicator panels. In addition, the ANCU provides a tri-colour LED indicator on its front panel SYSTEM OK is indicated by a green light, DEGRADED performance by an orange light and SYSTEM FAULT by a red light.

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### B. ANCU Description.

- (1) There are two basic types of ANCU, the Type 810, which can accept up to 48 sensor inputs and drive up to 24 actuators and the Type 811 which can accept up to 72 sensor inputs and drive up to 36 actuators.
- (2) Each ANCU type has the following variants, identified by their part numbers. The functionality of the variants are common to each type. The variants are:
  - (a) 8-810-01-011 and 8-811-01-006; these ANCUs are used only in loudspeaker systems and do not allow for different cabin configurations without being re-calibrated.
  - (b) 8-810-01-014 and 8-811-01-008; these ANCUs can be used in both loudspeaker and ATVA systems, can store multiple sets of Calibration Data for installation on aircraft where the cabin configuration may change on a regular basis.
  - (c) 8-810-01-015 and 8-811-01-010; these ANCUs can be used only on loudspeaker systems, can store multiple sets of Calibration Data for installation on aircraft where the cabin configuration may change on a regular basis.

### C. Maintenance Terminal Description.

- (1) Maintenance Terminal Software Part Number 8-800-07-047 Issue 1.
  - (a) The Maintenance Terminal software is supplied on a USB Flash Drive which can be run on a standard Laptop/PC.
- (2) Ruggedized Maintenance Terminal Part Number 8-800-01-001.
  - (a) Ultra Electronics produce a ruggedized Maintenance Terminal specified to MIL-STD\_810E for use in aircraft environments, preloaded with the Maintenance Terminal software. Information on this product and its use can be obtained by calling the Ultra Electronics Sales department on the number provided in the title page.

### D. AMT Functions.

The Advanced Maintenance Terminal (AMT) provides the user with access to the Maintenance Mode of the Active Noise and Vibration Control system. The different functions provided are described in the following paragraphs for systems incorporating type 810 and 811 controllers

- (1) Setting ANCU Configuration.
  - (a) The AMT loads the ANCU with the configuration data file appropriate to the aircraft installation. This operation is performed automatically, the AMT identifying the installation by aircraft wiring loom hardwired inputs to the ANCU which define the specific installation.
- (2) Displaying System Status Data.
  - (a) The AMT reads and displays system failure information stored in non-volatile memory in the ANCU.

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- (3) Actuator and Sensor Testing.
  - (a) The operation of the actuators and sensors installed on the aircraft is tested. This test can be performed automatically by all the ANCU variants or, for ANCU part numbers 8-810-01-014/015 and 8-811-01-008/010, can be stepped through manually by the maintenance personnel.
- (4) Calibration.
  - (a) The AMT initiates the system calibration function. The ANCU calculates and stores the Calibration Data for the actuator/sensor array installed in the aircraft. For some systems calibration must be performed at different air pressures and Calibration Data stored for each pressure setting.
- (5) Reading Calibration Data.
  - (a) The AMT can read the Calibration Data stored in the ANCU's non-volatile memory and store on a Data Card when using a 'Husky' terminal or on disk when using a P.C based MT.
- (6) Loading Calibration Data (ANCU part numbers 8-810-01-014 and 8-811-01-008 operating on aircraft requiring pressure inputs only).
  - (a) The AMT loads a data file stored on a Data Card or on disk containing aircraft specific Calibration Data into the ANCU.
- (7) Control Unit Tests.
  - (a) The AMT, when used in conjunction with the Controller Test Set, part number 8-800-19-005, provides a series of tests for the ANCU for acceptance testing or fault finding.
- (8) System Information.
  - (a) The AMT provides information on the aircraft inputs to the ANCU, the software installed in the ANCU and the number of hours/flights

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### **E. Screen Formats.**

The AMT uses a standard screen format consisting of a header, data panel and footer.

There are 6 types of data panel:

- (1) Information panels inform the user on what function is being implemented.
- (2) Data Entry panels require the user to enter information.
- (3) Menu panels identify the selections which the user can make at that stage.
- (4) Result panels display the data received from the System/ANCU at the completion of a test.
- (5) Warning panels inform the user that the operation requested cannot be reversed and provides the option to cancel the operation.
- (6) Error panels inform the user that the requested operation could not be performed.

The Footer provides instructions to the user.

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### 2. ADVANCED MAINTENANCE TERMINAL REQUIREMENTS AND INSTALLATION:

#### A. General.

- (1) This Section details the Requirements and procedures for installation of the Maintenance Terminal.
  - (a) Maintenance Terminal Requirements (Ref Para B).
  - (b) Maintenance Terminal Software Installation Procedure (Ref Para C).

#### B. Maintenance Terminal Requirements.

- (1) Hardware.
  - (a) Processor: 1 Gigahertz (GHz) or faster compatible processor or system on a Chip (SoC).
  - (b) Ram: 2 Gigabyte (GB) for 64-bit.
  - (c) Hard drive 32 Gigabyte (GB) or larger hard disk.
  - (d) Graphics card: Compatible with DirectX 9 or later with WDDM 1.0 driver.
  - (e) Display: 800x 600.
  - (f) Battery power with a minimum battery life of at least 1.5 hours.
  - (g) USB port.

- (2) Software.

The Advanced Maintenance Terminal (AMT) software is supplied on USB flash drive as part of the Ground Support Software for Active Noise and vibration Control Systems. The Maintenance Terminal software also contains:

- (a) Version 1 of the Ultra, Precision Control Systems Active Noise and Vibration Control System Maintenance Terminal Software.
- (b) Version 1 of the Ultra Precision Control Systems Based Propeller Balance Monitoring System Software.
- (c) Maintenance Terminal Software requires a Database of Aircraft Configuration data, which is different for each Aircraft type. These are also supplied on the Ground Support Software. These can be selected during installation.

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### C. AMT Software Installation Procedure.

- (1) The Advanced Maintenance Terminal (AMT) programme is installed as part of the Ground Support Software. (**See Relevant Operator Service Bulletin for further information**).
- (2) The Advanced Maintenance Terminal (AMT) will be installed as part of the Ground Support Software Installation. It can be installed using the following procedure.
  - (a) Insert the USB Flash Drive (GSS Part No 8-800-07-047 issue 1) in to a suitable USB port..

**Note:** You may need to identify the drive letter for your USB port, Typically E: on most PCs.

- (b) Follow the steps below for installation.
  - Select Start from the Windows Task Bar.
  - Select File Explorer.
  - Select USB Drive Typically E:
  - Select Setup.
- (c) Follow the on-screen prompts to the Licence Agreement (**Ref fig 2-1**).



**Figure 2-1 Licence Agreement**

- (d) Read the Licence Agreement (You must agree to the Licence Terms and Conditions by selecting the I agree box before you can continue with the installation). **Ref Fig 2-1**.
- (e) The setup progress screen will follow (**Ref Fig 2-2**).

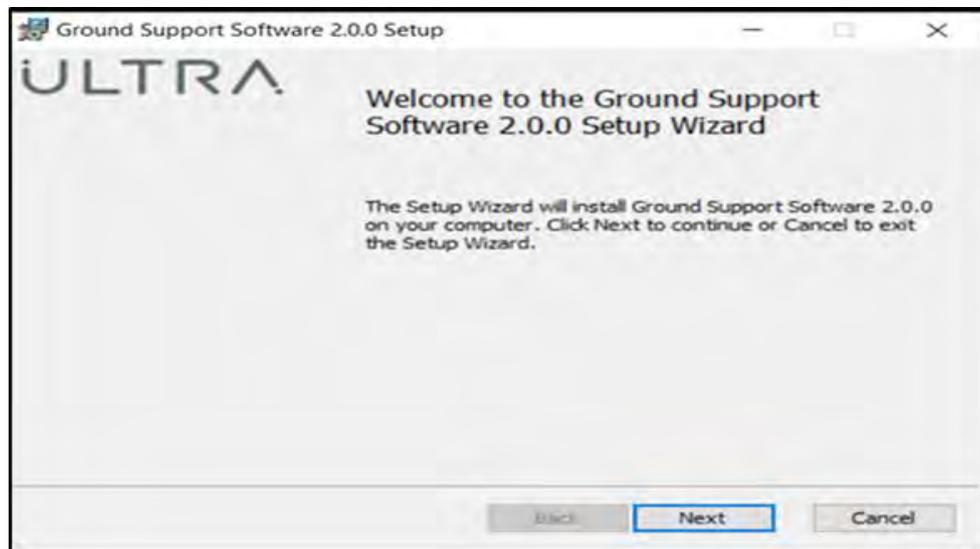
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**Figure 2-2 Setup Progress**

- (f) After the set up progress has finished the Setup wizard will install the Ground Support Software 2.0.0 Press next to continue. **(Ref Fig 2-3).**



**Figure 2-3 Setup Wizard**

- (g) The End User Licence Agreement screen will follow and you will need to accept terms in the Licence Agreement and press next to continue. **(Ref Fig 2-4).**

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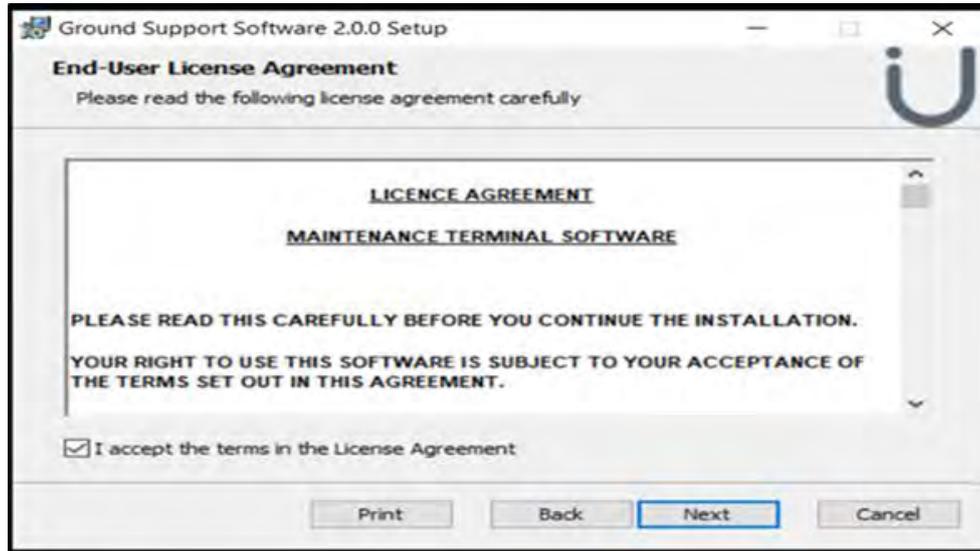


Figure 2-4 End User Licence

- (h) The default directory location where the software will be installed is **C:\MT830**.

**Note:** It is Recommended that this default directory be maintained.

- (i) The **default** settings in the Custom Setup menu are for the De Havilland Dash 8/SAAB series aircraft all variants. Select the Next button (**Ref Fig 2-5**) and follow the onscreen prompts to begin the installation.

**Note:** For your relevant operator Type please refer to the **Applicable Service Bulletin** for Custom Setup information.

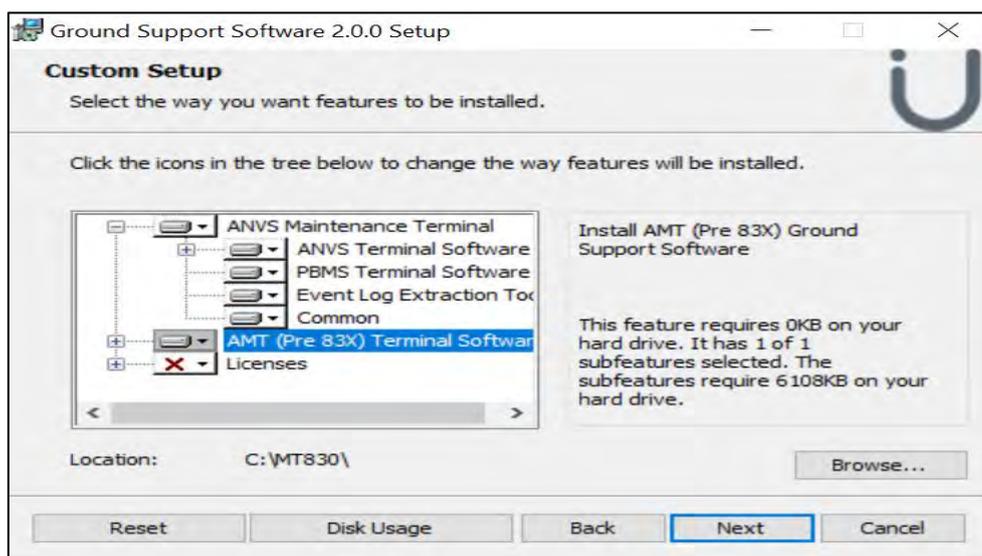


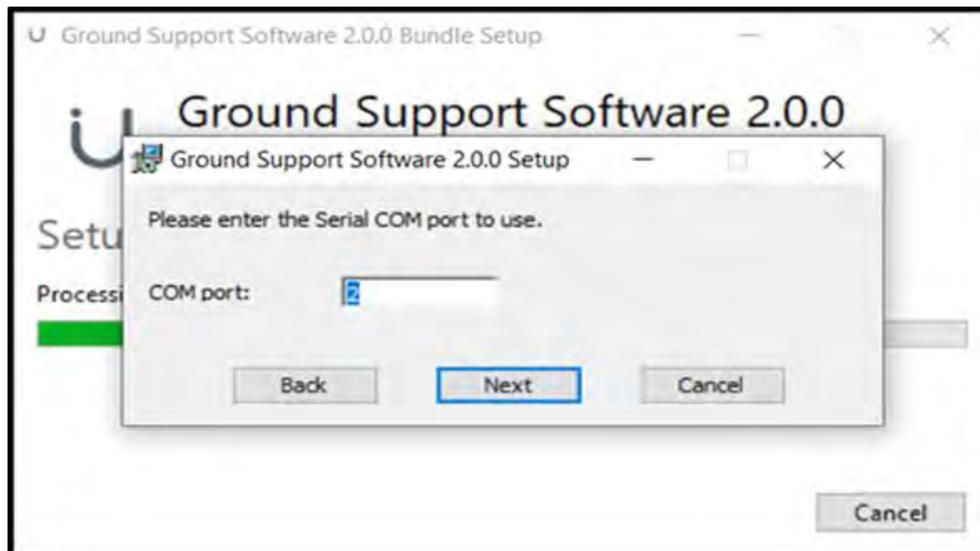
Figure 2-5 Custom Setup

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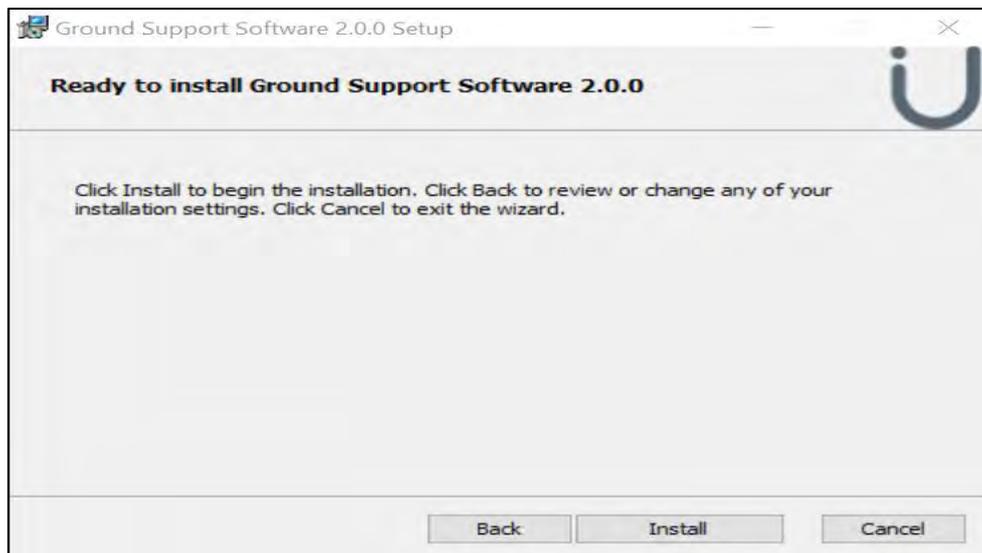
- (j) The Default COM port allocation for the USB to Serial port adapter is COM port 2 (Ref Fig 2-6). Select the next button to continue.

**Note:** Ref Section 3.B for Serial port Allocation change.



**Figure 2-6 Com Port**

- (k) Select Install on the ready to install screen (Ref Fig 2-7)

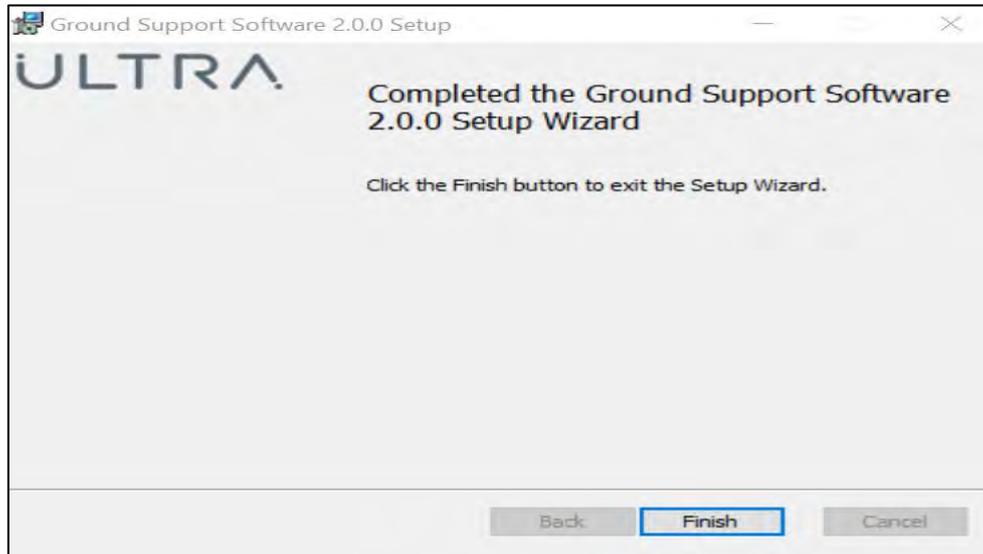


**Figure 2-7 Ready to Install**

- (l) The GSS will now install. Once installed the Finish screen will show, select finish to complete installation. (Ref Fig 2-8)

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**Figure 2-8 Finish**

- (m) The Installation is now complete select close on the Installation Successfully Completed screen (Ref Fig 2-9)

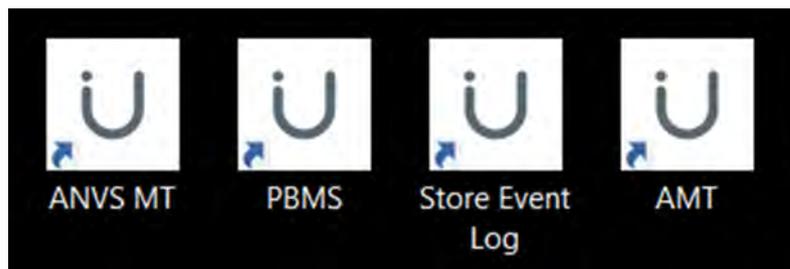


**Figure 2-9 Complete**

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- (n) Four Desktop Icons will be created as part of the installation process these being: **(Ref Fig 2-10)**
- **ANVS MT.**  
ANVS MT is the Active Noise and Vibration Control System Maintenance Terminal Software to be used with 83x type controllers.
  - **PBMS.**  
PBMS is the Propeller balance Monitoring System Software to be used with 832 type controllers on aircraft fitted with PBMS.
  - **Store Event Log.**  
Store Event log is the Event Log Extraction Tool Which can be used to download an event log from 83x type controllers
  - **AMT.**  
AMT is the Advanced Maintenance Terminal Software to be used with a Type 81x controller. If the ANVS MT is used on a Type 81x controller, this will be recognised and the AMT will automatically start.



**Figure 2-10 Desktop icons**

- (o) When installation is complete, disconnect the USB drive safely, remove and store.

### **D. Serial Com Port Allocation.**

- (1) The Default COM port allocation for the USB to Serial port adapter is COM port 2, which is allocated on installation of the GSS. However, this can be changed to use an alternative Port Number. Follow the steps below on how to change the Allocation.

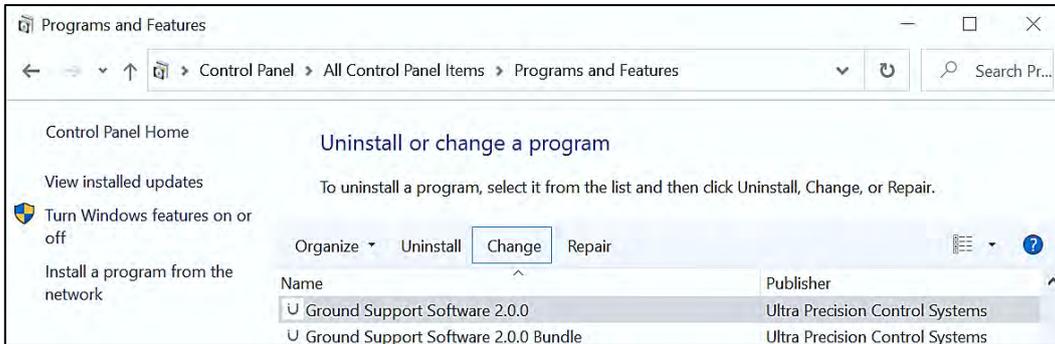
**Note:** Com ports 1 and 3 can be used as an alternative to the default allocation.

- (a) Select the Windows Start Menu.
- (b) Select Windows System from the Menu.
- (c) Select Control Panel.
- (d) Select Programs and Features.
- (e) Highlight Ground Support Software 2.0.0 and select change **(Ref Fig 2-11)**.

**23-35-40**

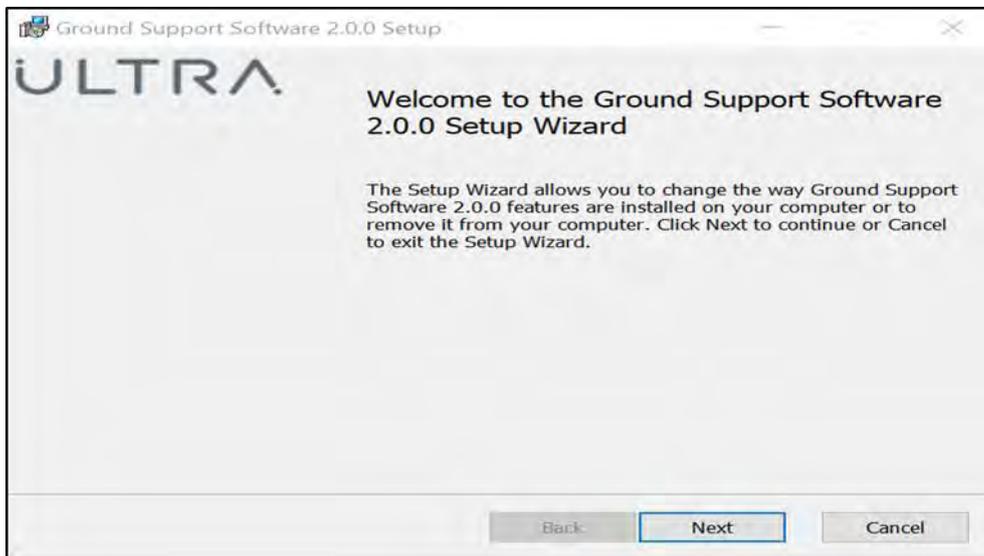
# ULTRA

## Maintenance Terminal Manual (AMT)



**Figure 2-11 GSS Change**

(f) Select next on the Setup Wizard screen (Ref Fig 2-12)

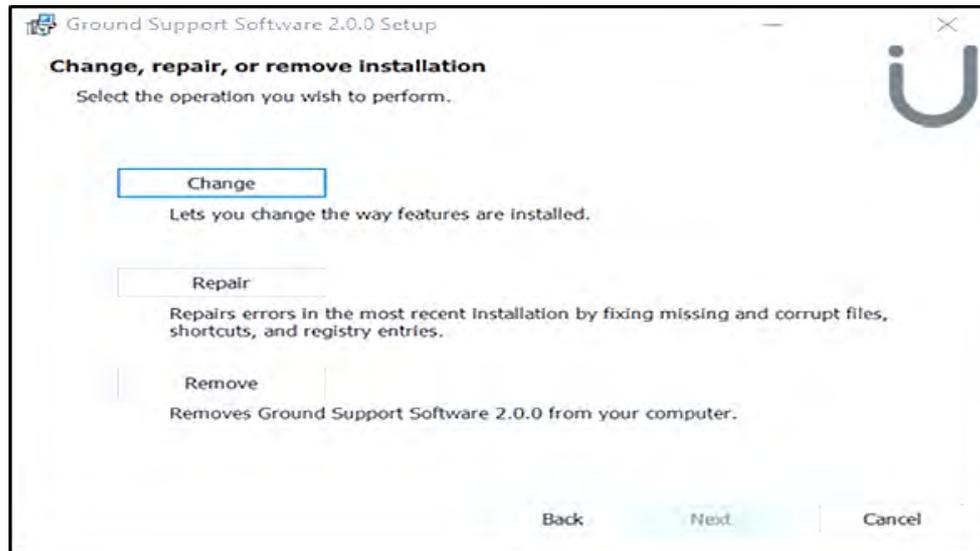


**Figure 2-12 Setup Wizard**

(g) Select change in the Ground Support Software 2.0.0 Setup window (Ref Fig 2-13).

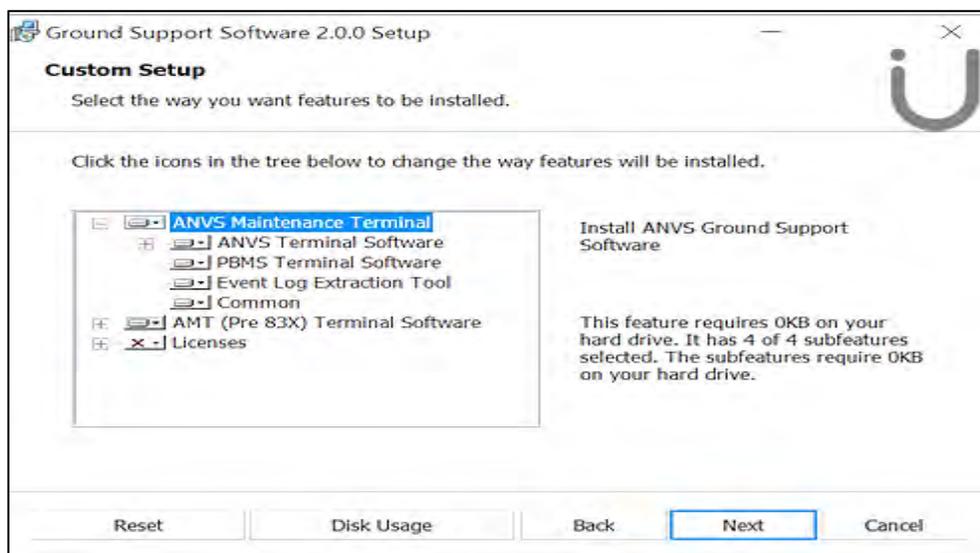
# ULTRA

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**Figure 2-13 Change**

- (h) Select next on the Custom Setup Screen (**Ref Fig 2-14**).

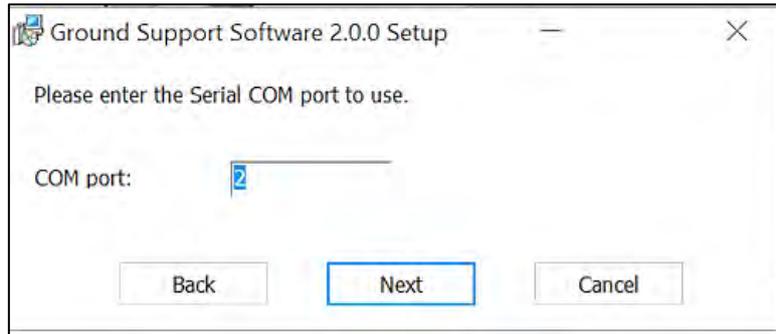


**Figure 2-14 Custom Setup**

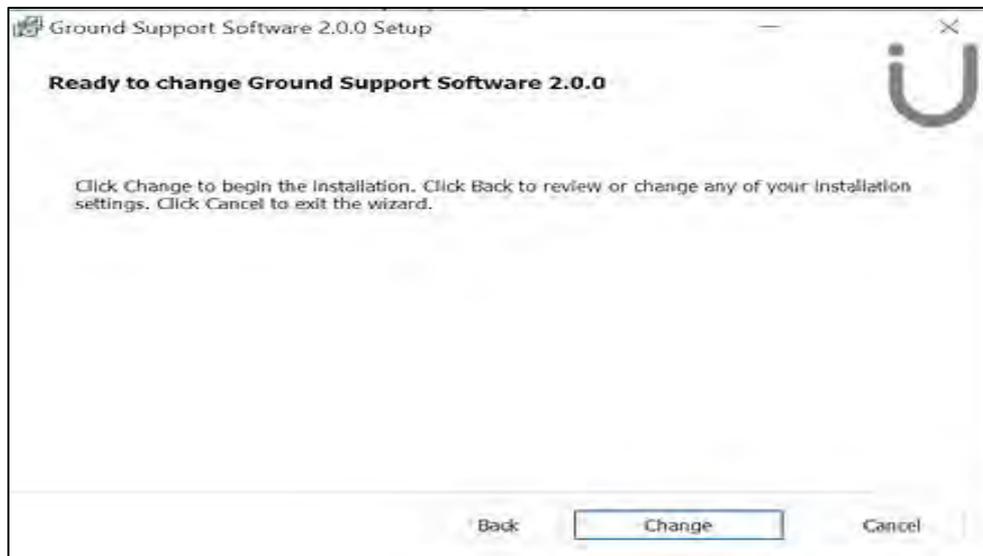
- (i) The Com Port Allocation Screen will be shown. Enter the required port number 1-3 and press next. (**Ref Fig 2-15**).

# ULTRA

## Maintenance Terminal Manual (AMT)



**Figure 2-15 Com Port Allocation**

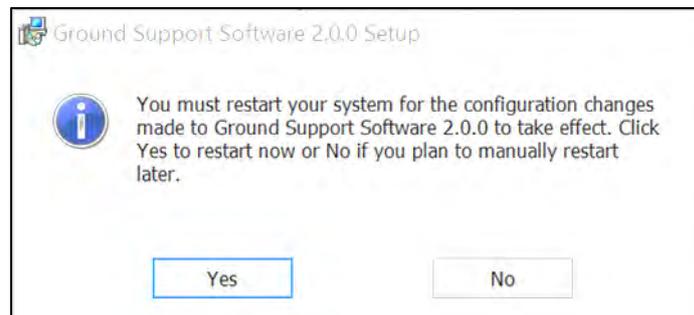


**Figure 2-16 Ready to change**

- (j) Select Change on the Ready to change Screen (**Ref Fig 2-16**).
- (k) The Changes will update and the completed screen will show. Select Finish to continue.
- (l) You will then need to restart your system for changes to take effect. Select **Yes/ No** depending on your requirements. (**Ref Fig 2-17**).

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**Figure 2-17 Restart**

### **E. Connecting to J5 Remote Maintenance Connector via Serial Cable.**

- (1) The ANVS MT is designed for use via a Serial Port connection. If the Laptop does not have a serial port, a suitable Serial Port Adaptor must be used to connect to the ANCU

**Note:** Ultra, Precision Control Systems Recommend the use of the Windows approved Chipi X10 USB Serial Adaptor

- (a) Connect Serial cable (A standard 9 way straight through RS232 serial cable) from the Maintenance Terminal Via the Chipi X 10 USB Serial Adaptor to the J5 Remote Maintenance Connector on the Aircraft.

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### 3. GENERAL AMT OPERATION WITH ANCU PART NUMBERS 8-810-01-014/015 & 8-811-01-008/010

#### A. General

(1) This section details the procedures for using the AMT. The following procedures are described:

- Initialisation.
- Displaying System Status Data.
- Actuator and Sensor Testing.
- Calibration.
- Reading Calibration Data.
- Loading Calibration Data.
- ANCU Testing
- Reading System Information.

If an error message occurs at any time during the Maintenance Terminal session refer to Section 5 for troubleshooting procedures.

#### B. Initialisation

(1) This process is required to be followed each time the AMT is connected to the ANCU.

(a) Connect serial cable with Chipi X10 USB Serial Adaptor on the AMT to connector J5 on the ANCU. Switch the AMT on. The AMT will normally initialise directly into the Maintenance Software.

Apply power to the ANCU.

If this does not happen, it will display the command prompt **C:\**. To initialise the Maintenance Software from the command prompt, type **cd\AMT** and press <ENTER>. Verify that the command line shows **C:\AMT** and then type **AMT** and press <ENTER>.

After a few seconds the Opening screen will be displayed (**Ref Figure 4.1**)

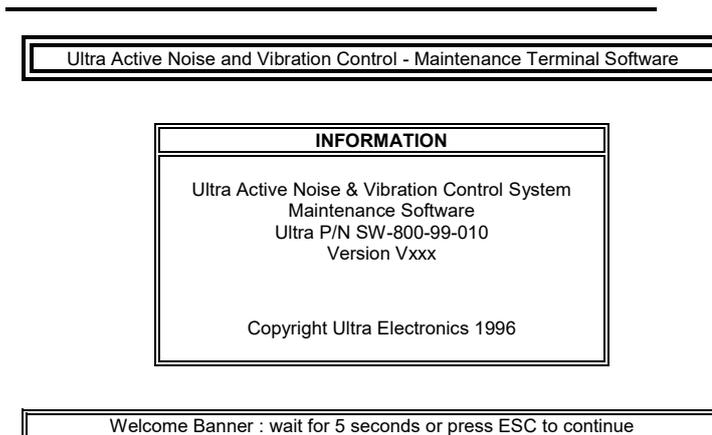
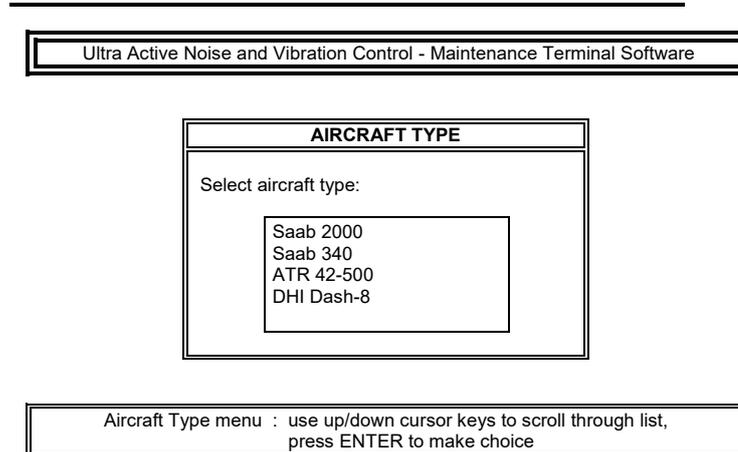


Figure 3.1 - Opening Screen

# ULTRA

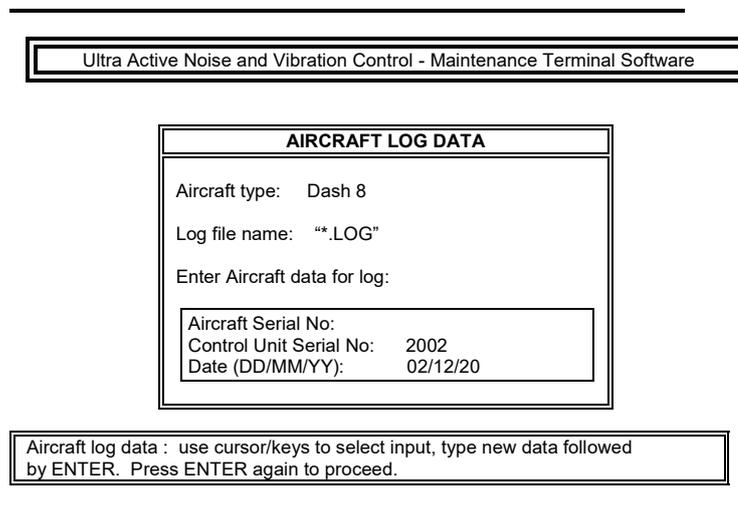
## Maintenance Terminal Manual (AMT)

- (b) After 5 seconds, the AMT will display the message “Initialising communication with Control Unit, Please wait.”
- (c) After communications with the ANCU are successfully established, the Aircraft Type screen will be displayed (**Ref Figure 4.2**).



**Figure 3.2- Example Aircraft Type Selection Screen**

- (d) Using the up/down cursor keys select the aircraft type and press ENTER. The Aircraft Log Data screen will be displayed (**Ref Figure 4.3**).



**Figure 3.3 - Aircraft Log Data Screen**

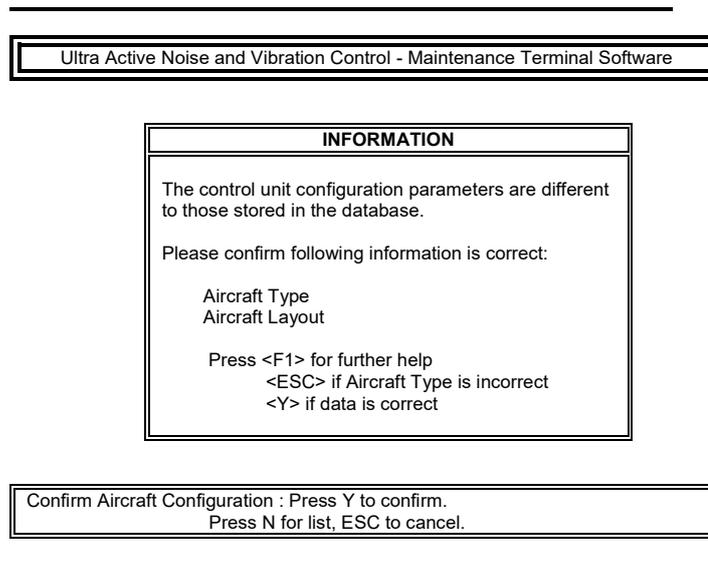
- (e) Enter the Aircraft Serial Number and press <ENTER> to confirm the entry. The AMT will display the log file name in which the maintenance session record will be stored. Press <ENTER> to confirm the data.

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**NOTE:** The AMT will automatically read the Controller serial number from the ANCU and will enter the current date.

- (f) The AMT will display the message “**Validating Configuration Parameters**”. The AMT will read the Configuration Parameters stored in the ANCU and compare them with the data stored in the appropriate file in its database. If the Configuration Parameters are validated, the AMT will display the Main Menu (**Ref Figure 4.5**).
- (g) If the Configuration Parameters are invalid, the AMT will display the following message. (**Ref Figure 3-4**)



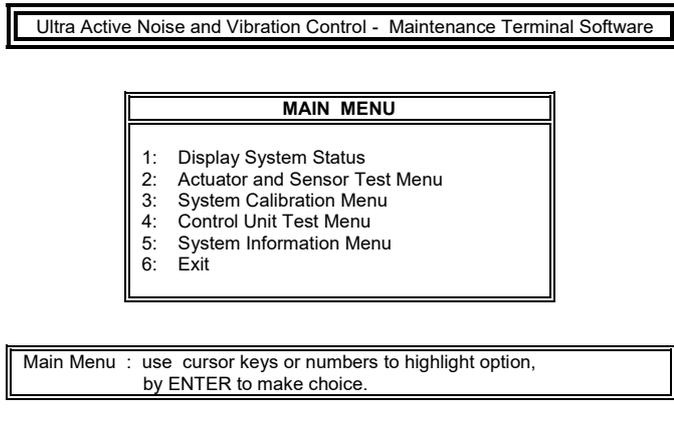
**Figure 3.4: Invalid Configuration Parameters**

- (h) If the aircraft type is incorrect, press <ESC>. The AMT will display the message “**Failed to set Configuration Parameters. This will restrict the maintenance functions which can be performed**”. Press <ESC> again, the Main Menu (**Ref Figure 4.5**) will be displayed. Select “Exit” and press <ENTER> and refer to Section 6 for troubleshooting procedures.
- (i) If the aircraft type and layout are correct, press <Y>. The AMT will display the message “**Setting aircraft configuration parameters**”. The AMT will load the appropriate configuration parameters into the ANCU. When complete, the AMT will display the message “**Validating Configuration Parameters**” and read the configuration parameters back and compare them with the file in its database to verify that they have been correctly loaded. If the Configuration Parameters are validated, the AMT will display the Main Menu (**Ref Figure 4.5**).

The initialisation process is now complete.

# ULTRA

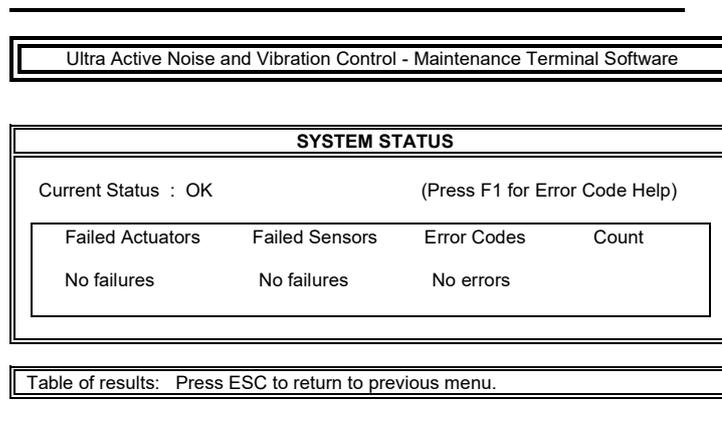
## Maintenance Terminal Manual (AMT)



**Figure 3.5 - Main Menu Screen**

### C. Displaying System Status Data

- (1) Select "Display System Status" in the Main Menu and press <ENTER>. The AMT will display the message "**Reading System Status**" while the data is being read from the ANCU. It will then display the data in the format shown in (Ref Fig 3-6)



**Figure 3.6 - System Status Result Screen (OK)**

- (a) Pressing <F1> brings up a table which describes the error codes. Scrolling through the table is achieved with the up/down cursor keys. Press <ESC> to close the table. Press <ESC> to return to the Main Menu.

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### D. Actuator and Sensor Testing

#### (1) Test Selection

- (a) Select "Actuator and Sensor Test Menu" in the Main Menu and press <ENTER>. The Actuator and Sensor Test Menu will be displayed. (Ref Figure 3.7)

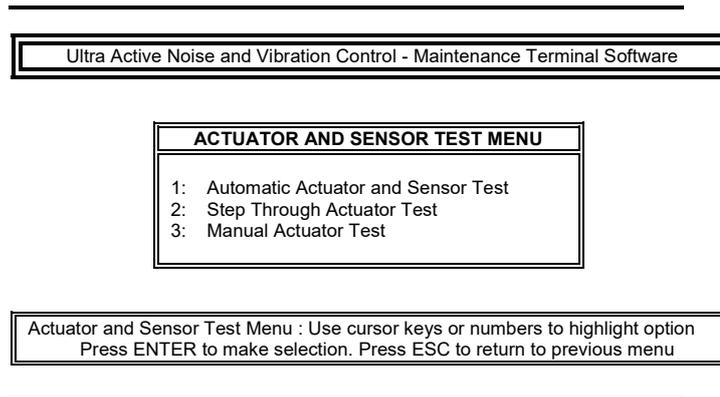


Figure 3.7 - Actuator and Sensor Test Menu

#### (2) Automatic Actuator and Sensor Test

- (a) Select Automatic Actuator and Sensor Test and press <ENTER>. The AMT will display the following message (Ref Figure 4.7).

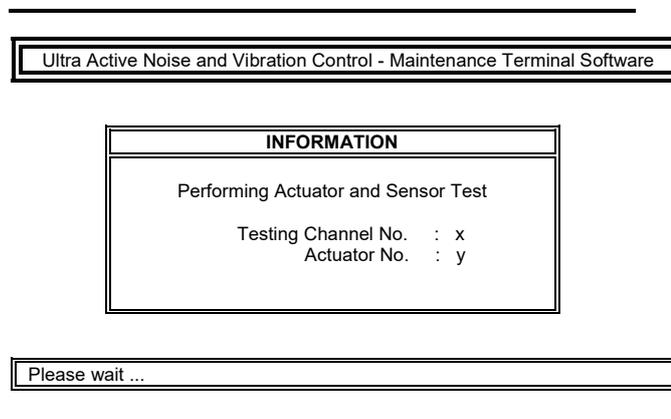


Figure 3.8 - Performing Actuator and Sensor Test Screen

- (b) The ANCU will drive each Actuator in turn. The numbers displayed on the AMT screen correspond to the Controller Channel number and the Actuator reference number respectively. The Actuator reference number defaults to the same number as the Controller Channel number. The databases will map the Actuator reference number to the physical location of the actuator in the aircraft. Subsequently, when an Actuator and Sensor check is performed the actuators will be driven in sequence down the aircraft speeding up the installation checkout process. On completion of the test, the results will be displayed on the AMT screen (Ref Figure 4.8).

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Ultra Active Noise and Vibration Control - Maintenance Terminal Software

Actuator/Sensor Test Results	
Failed Actuators	Failed Sensors
For more information press ENTER ...	

Table of results: Press ESC to return to previous menu.

**Figure 3.9 - Actuator and Sensor Test Result Screen 1**

- (c) Press <ENTER> to display the summary results (Ref Figure 4.9).

Ultra Active Noise and Vibration Control - Maintenance Terminal Software

Actuator/Sensor Test Results			
Actuator	Result	Harmonic	Distortion %
01	pass	1	2
		2	1
02	pass	1	2
		2	1
03	pass	1	1
		2	0
04	pass	1	2
		2	2
05	pass	1	1
To display summary results press ENTER ...			

Table of results : use up/down cursor keys to scroll through table  
Press ESC to return to previous menu

**Figure 3.10 - Actuator and Sensor Test Result Screen 2**

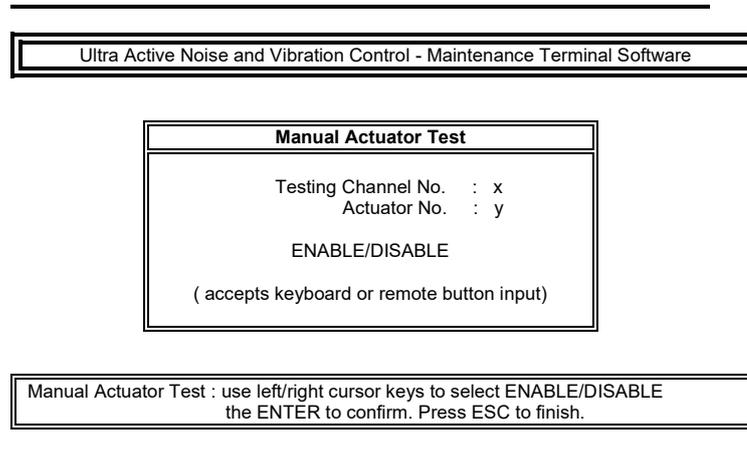
- (d) Press <ENTER> to return to the summary results table (Ref Figure 4.8).
- (e) Press <ESC> to return to the Actuator and Sensor Test Menu (Ref Figure 3.7).

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### (3) Step Through Actuator Test

- (a) From the Actuator and Sensor Test Menu (ref Figure 3.7), select Step Through Actuator Test and press <ENTER>. The AMT will display the following message (**Ref Figure 3.11**).

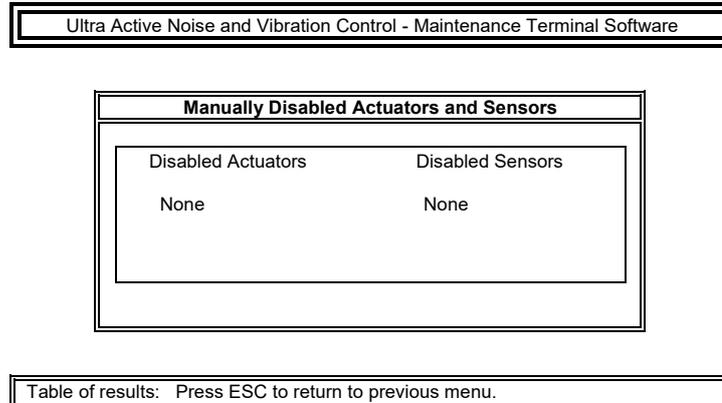


**Figure 3.11 - Manual Actuator Test Screen**

- (b) The ANCU will drive a single Actuator. The operator decides whether to enable or disable the actuator by using the left/right cursor keys on the AMT keyboard or the remote button if connected. Press <ENTER> to confirm the selection.
- (c) The ANCU will drive each Actuator in turn. The numbers displayed on the AMT screen correspond to the Controller Channel number and the Actuator reference number respectively. The Actuator reference number defaults to the same number as the Controller Channel number. The databases will map the Actuator reference number to the physical location of the actuator in the aircraft. Subsequently, when an Actuator and Sensor check is performed the actuators will be driven in sequence down the aircraft speeding up the installation checkout process. On completion of the test, the results will be displayed on the AMT screen. The test can be terminated earlier by pressing <ESC>.
- (d) If any previously disabled channels are enabled, the AMT will perform an Automatic Actuator and Sensor Test unless <ESC> is pressed within 5 seconds.
- (e) If no previously disabled channels have been enabled, or if <ESC> is pressed, the AMT will provide a display of the manually disabled actuators and sensors (**Ref Figure 3.12**).

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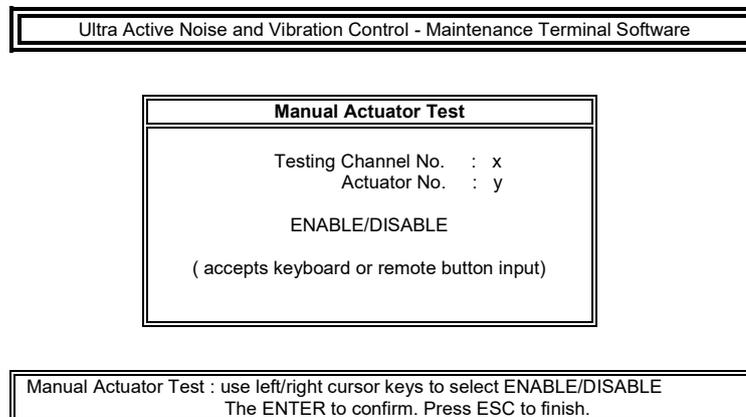
## Maintenance Terminal Manual (AMT)



**Figure 3.12 - Manually Disabled Actuators and Sensors Screen**

(4) Manual Actuator Test

- (a) From the Actuator and Sensor Test Menu (**Ref Figure 3.7**), select Manual Actuator Test and press <ENTER>. The AMT will ask the user to “**Enter the Actuator Channel No.**” Type in the number of the actuator channel to be tested and press <ENTER>. The AMT will display the following message (**Ref Figure 3.13**):



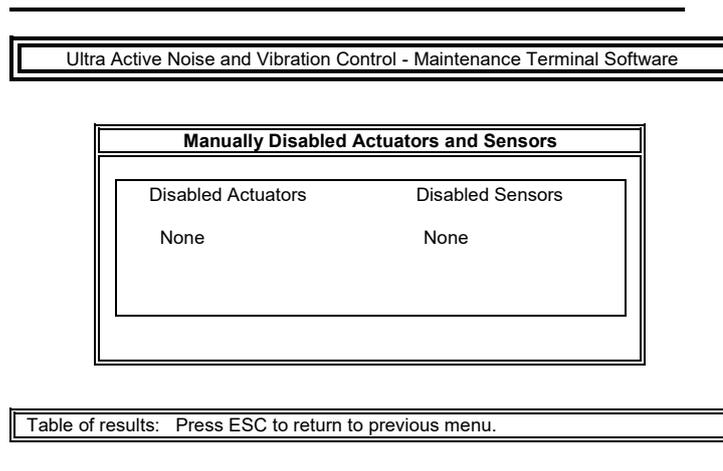
**Figure 3.13 - Manual Actuator Test Screen**

- (b) The ANCU will drive a single Actuator. The operator decides whether to enable or disable the actuator by using the left/right cursor keys on the AMT keyboard or the remote button if connected. Press <ENTER> to confirm the selection.
- (c) The AMT will then prompt the operator for the next channel number. Either enter a new channel number or press <ESC> to terminate the test.

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## Maintenance Terminal Manual (AMT)

- (d) If the operator enters a channel number, which does not exist, on the system under test, the AMT will display the message “**Invalid Channel number. Must be in range xxx. Press ESC to continue**”. Press <ESC> and re-enter the channel number.
- (e) If any previously disabled channels are enabled, the AMT will perform an Automatic Actuator and Sensor Test unless <ESC> is pressed within 5 seconds.
- (f) The numbers displayed on the AMT screen correspond to the Controller Channel number and the Actuator reference number respectively. The Actuator reference number defaults to the same number as the Controller Channel number. The databases map the Actuator reference number to the physical location of the actuator in the aircraft. It is the Actuator reference number which should be entered at the start of this test.
- (g) If no previously disabled channels have been enabled, or <ESC> is pressed, the AMT will provide a display of the manually disabled actuators and sensors (**Ref Figure 3.14**).



**Figure 3.14 - Manually Disabled Actuators and Sensors Screen**

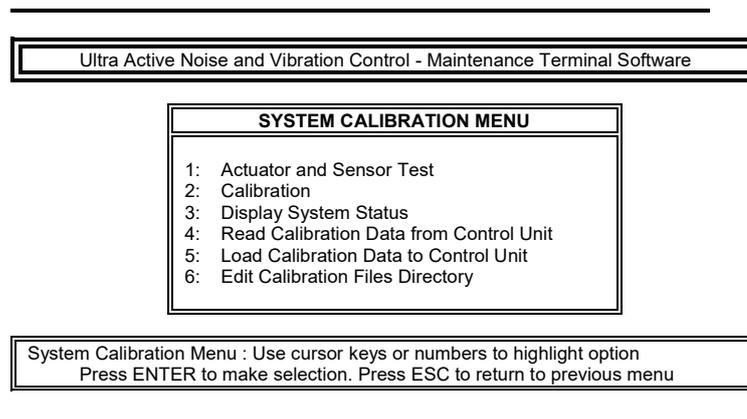
# ULTRA

## Maintenance Terminal Manual (AMT)

### E. System Calibration

#### (1) Test Selection

- (a) Select "System Calibration Menu" in the Main Menu and press <ENTER>. The System Calibration Menu will be displayed. (Ref Figure 4.10)



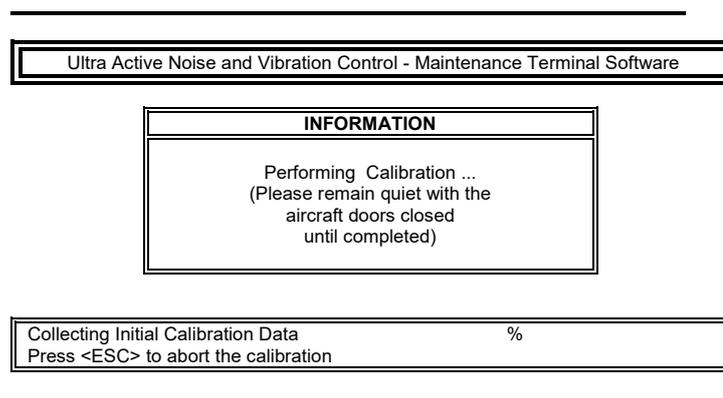
**Figure 3.15 - System Calibration Menu**

#### (2) Actuator and Sensor Tests

- (a) Selecting the Actuator and Sensor Test Menu from the System Calibration Menu will provide access to all the tests described in 3.D

#### (3) Calibrating Loudspeaker Systems

- (a) Select Calibration from the System Calibration Menu and press <ENTER>. The ANCU will automatically drive all Loudspeakers. The Maintenance Terminal will display the following message (Ref Figure 4.11).

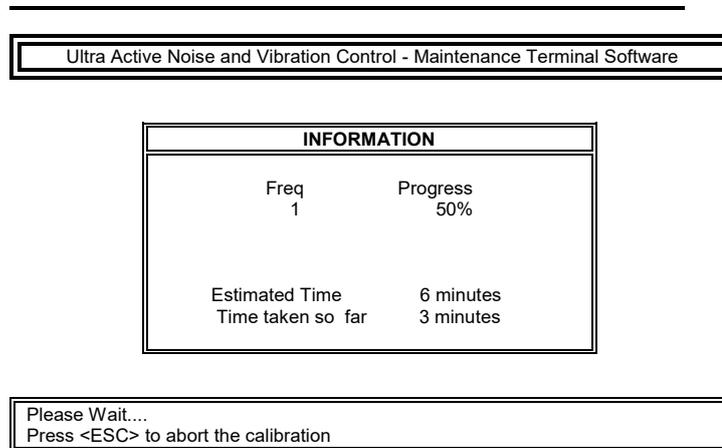


**Figure 3.16 - Performing Calibration Screen**

- (b) When all of the initial data has been collected, the display will change to the following message (Ref Figure 3.17):

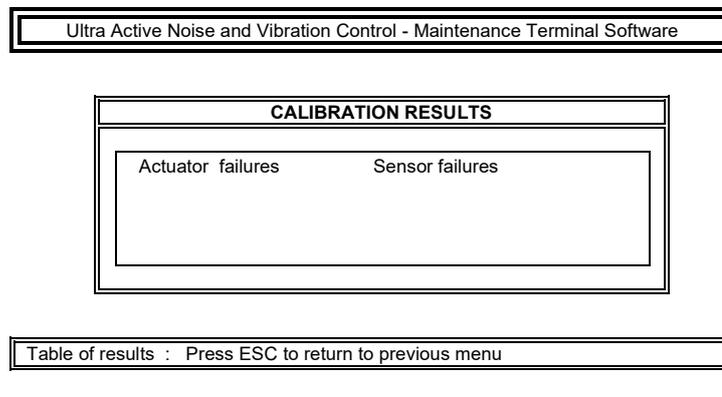
# ULTRA

## Maintenance Terminal Manual (AMT)



**Figure 3.17 - Performing Calibration Screen**

- (c) At the completion of the Calibration, the Maintenance Terminal will display the results (**Ref Figure 4.12**)



**Figure 3.18 - Calibration Test Result Screen**

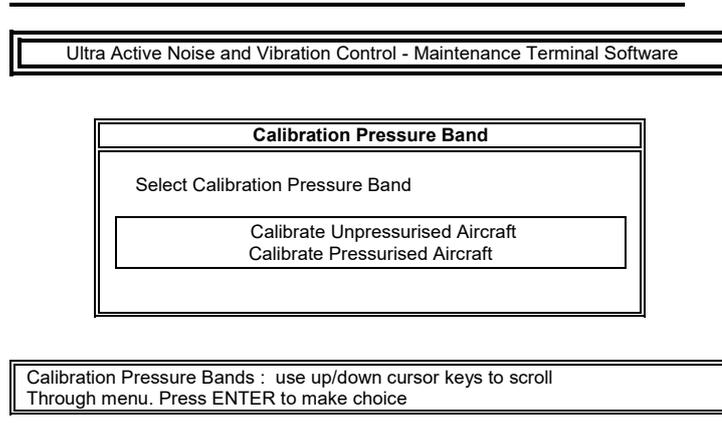
- (d) Press <ESC> to return to the Main Menu.

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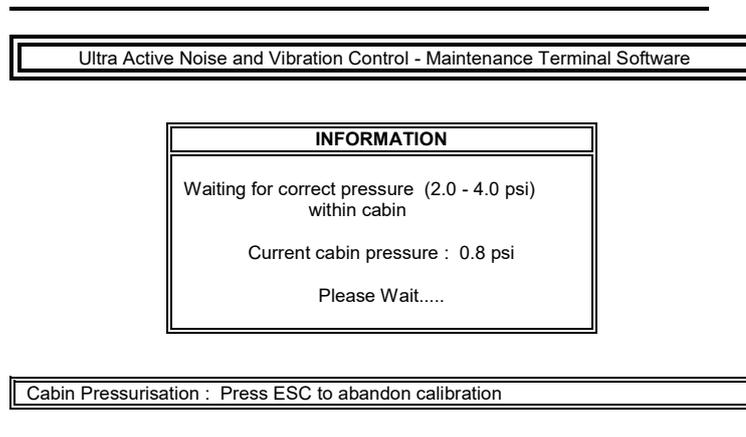
### (4) Calibration of ATVA Systems

- (a) Select Calibration from the System Calibration Menu and press <ENTER>. The option is then provided to perform the calibration on either an unpressurised or a pressurised aircraft (**Ref Figure 3.19**).



**Figure 3.19 - Calibration Pressure Band Screen**

- (b) Select the appropriate pressure band for the calibration to be performed. The Maintenance Terminal will then display information on cabin pressure. If the cabin pressure is outside the range required for the calibration selected, the display will be as shown in (**Ref Figure 3.20**).

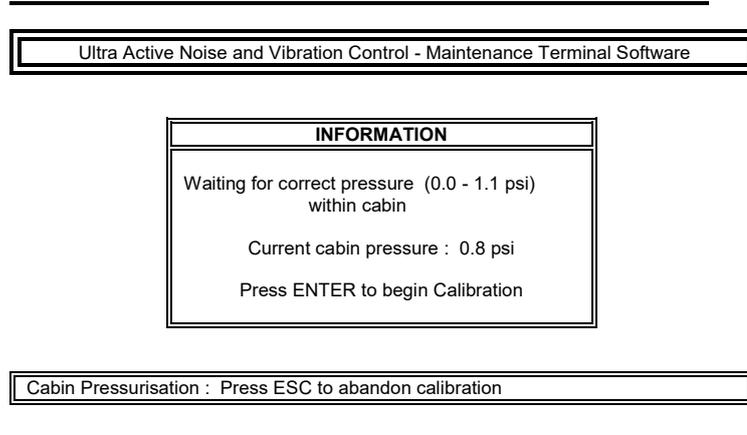


**Figure 3.20 - Cabin Pressure Information**

- (c) Pressing <ESC> will return the Maintenance Terminal to the System Calibration Menu. If the cabin pressure is within the required range, the display will be as shown in (**Ref Figure 3.21**).

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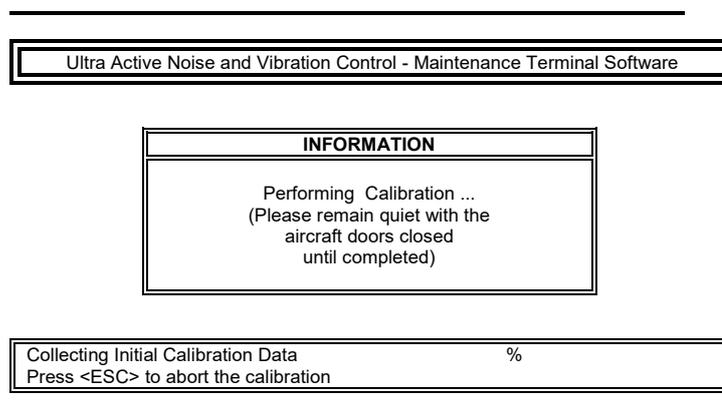
## Maintenance Terminal Manual (AMT)



**Figure 3.21 - Cabin Pressure Information**

**Note:** The pressure ranges shown in Figure 3.20 and Figure 3.21 are examples only. The Maintenance Terminal displays pressure range information read from the ANCU.

- (d) When the pressure is in range, press <ENTER>. The ANCU will automatically drive all ATVAs. The Maintenance Terminal will initially display the following message (**Ref Figure 3.22**).

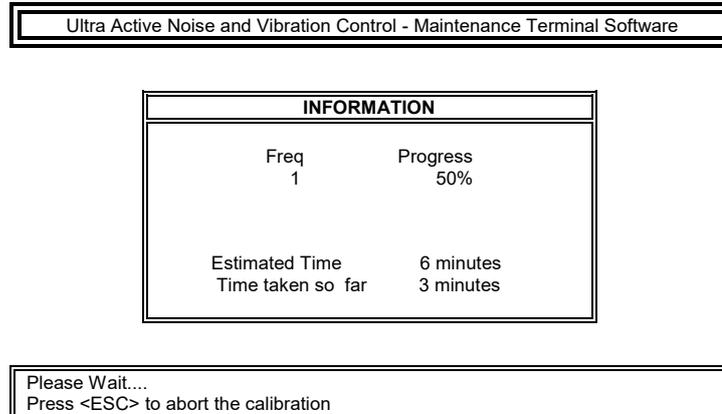


**Figure 3.22 - Performing Calibration Screen**

- (e) When all of the initial data has been collected, the display will change to the following message (**Ref Figure 3.23**):

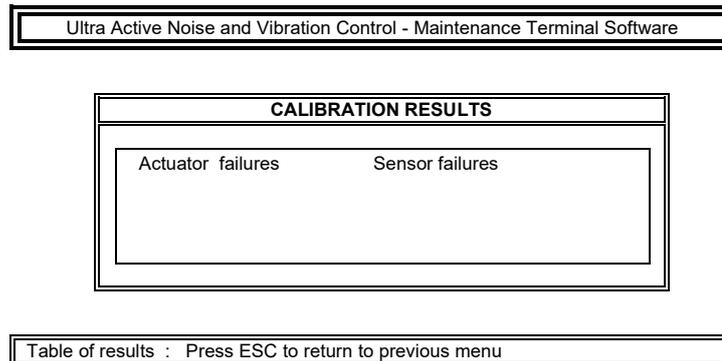
# ULTRA

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**Figure 3.23 - Performing Calibration Screen**

- (f) At the completion of the Calibration, the Maintenance Terminal will display the results (**Ref Figure 3.24**)



**Figure 3.24 - Calibration Test Result Screen**

- (g) Press <ESC> to return to the Main Menu.
- (5) Display System Status
- (a) Selecting the Display System Status from the System Calibration Menu will provide system status information as described in 3.C.
- (6) Reading Calibration Data from ATVA Systems

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- (a) Select “Read Calibration Data from Control Unit” from the System Calibration Menu. The AMT will provide the option to read Both Calibration Data, the Unpressurised Calibration Data or the Pressurised Calibration Data (**Ref Figure 3.25**).

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Transfer Function Pressure Band
Select Calibration Data
Both Calibration Data
Unpressurised Aircraft TF Only
Pressurised Aircraft TF Only

Transfer Function Choice: use up/down cursor keys to highlight line Press ENTER to make choice, press ESC to return to previous menu
---

---

**Figure 3.25 - Transfer Function Pressure band Screen**

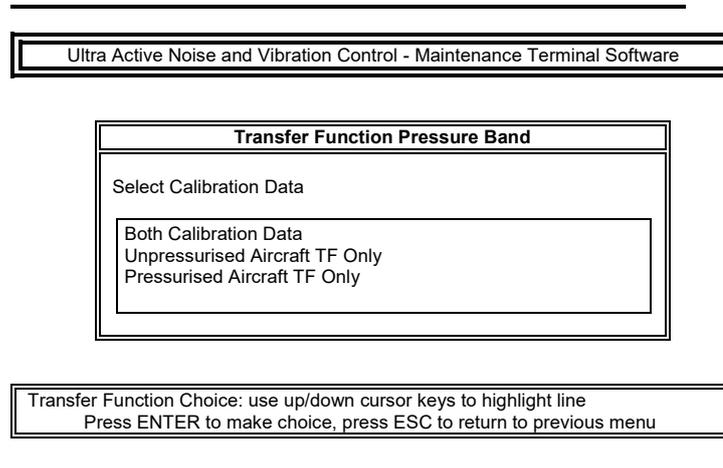
- (b) Select the required option and press <ENTER>. The AMT will display the message “**Reading Calibration Data from Control Unit.**”.
- (c) At the completion of the operation, the AMT will display the message “**Calibration Data Read Complete**”. Press <ESC> or wait 5 seconds to return to the System Calibration Menu.
- (7) Reading Calibration Data from Loudspeaker Systems
- (a) Select “Read Calibration Data from Control Unit” from the System Calibration Menu and press <ENTER>. The AMT will display the message “**Reading Calibration Data from Control Unit.**”.
- (b) At the completion of the operation, the AMT will display the message “**Calibration Data Read Complete**”. Press <ESC> or wait 5 seconds to return to the System Calibration Menu.

- (8) Loading Calibration Data onto ATVA Systems

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- (a) Select "Load Calibration Data onto Control Unit" from the System Calibration Menu. The AMT will provide the option to load Both Calibration Data, the Unpressurised Aircraft Calibration Data or the Pressurised Aircraft Calibration Data (**Ref Figure 3.26**).



**Figure 3.26 - Transfer Function Pressure band Screen**

- (b) Select the required option and press <ENTER>. The AMT will display the message "**Loading Calibration Data onto Control Unit.**"
- (c) At the completion of the operation, the AMT will display the message "**Calibration Data Load Complete**". Press <ESC> or wait 5 seconds to return to the System Calibration Menu.
- (9) Loading Calibration Data onto Loudspeaker Systems
- (a) Select "Load Calibration Data onto Control Unit" from the System Calibration Menu and press <ENTER>. The AMT will display the message "**Loading Calibration Data onto Control Unit.**"
- (b) At the completion of the operation, the AMT will display the message "**Calibration Data Load Complete**". Press <ESC> or wait 5 seconds to return to the System Calibration Menu.
- (10) Edit Calibration Files Directory
- (a) Select "Edit Calibration Files Directory" from the System Calibration Menu to define the directory in which Calibration Data is stored. Type in the required directory name, which can have no more than 8 characters and must consist of alphanumeric characters. Press <ENTER> to confirm the directory name or <ESC> to cancel the entry. The AMT will return to the System Calibration Menu.

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### F. Control Unit Tests

#### (1) Test Selection

- (a) Select "Control Unit Test Menu" in the Main Menu and press <ENTER>. The Control Unit Test Menu will be displayed. (Ref Figure 4.13).

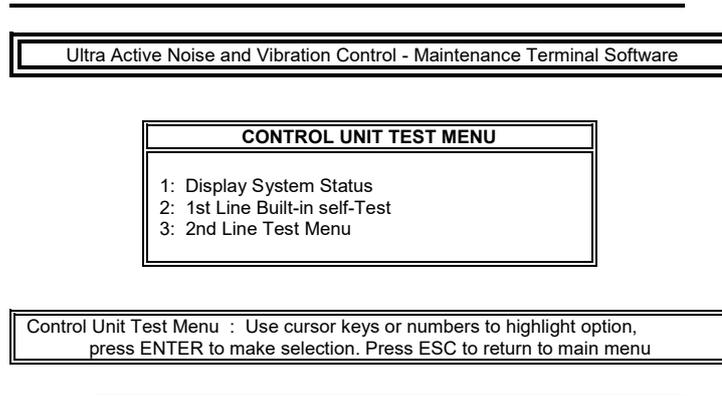


Figure 3.27 - Control Unit Test Menu

#### (2) Display System Status

- (a) Selecting Display System Status from the Control Unit Test Menu will provide system status information as described in 3.C.

#### (3) 1st Line Built-in Self-Test

- (a) Select 1st Line Built-in Self-Test. The AMT will display the message "Performing Built-In Self Tests". At completion of the operation, the AMT will display the results of the tests (Ref Figure 4.14).

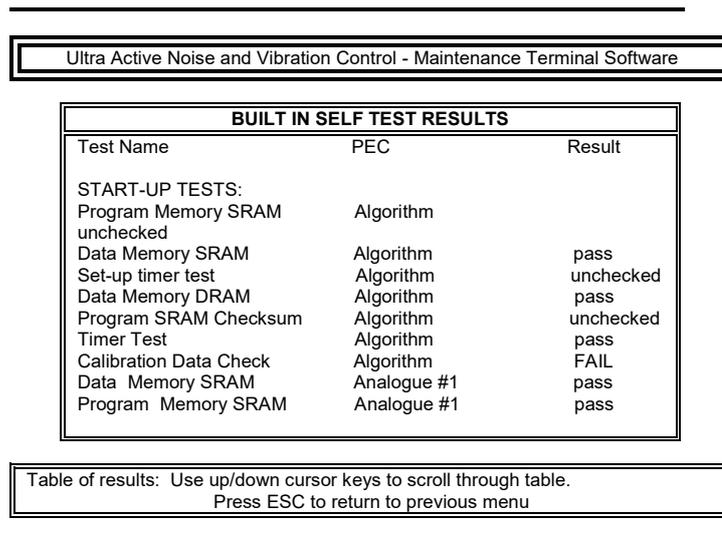
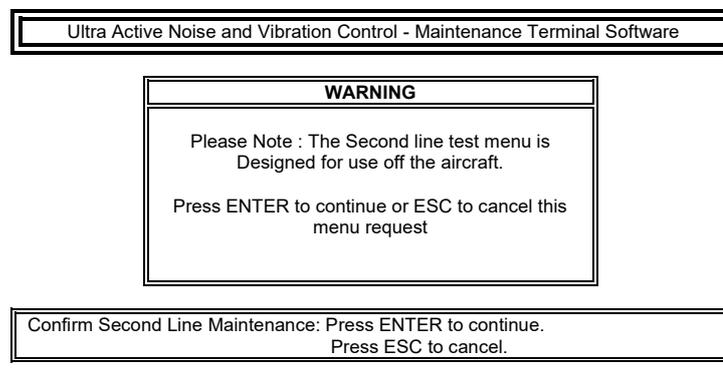


Figure 3.28 - Built-In Self-Test Results

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- (b) The table is divided into 2 segments, START-UP TESTS and COMMANDED BIST TESTS.
  - (c) The statement “unchecked” in the results column means that this test is not performed in that form of BIST. .
  - (d) Press <ESC> to return to the Control Unit Test Menu (**Ref Figure 4.13**).
- (4) 2nd Line Test Menu
- (a) Select 2nd Line Test. The AMT will display the following message (**Ref Figure 4.15**)



**Figure 3.29 - 2nd Line Test Warning Screen**

- (b) Press <ENTER> to access the Control Unit 2nd Line Test Menu. Press <ESC> to return to the Control Unit Test Menu.
- (c) Details of the Control Unit 2nd Line Tests are given in 3.G.

### G. Control Unit Second Line Test

**Note:** These tests are designed to be performed with the ANCU under test connected to a Control Unit 2nd Line Test Set, part no. 8-800-19-005, as shown in (**Ref Figure 4.17**). However, they can also be used on an aircraft to help pinpoint faults in the ANC installation.

- (1) Test Selection
  - (a) From the Control Unit Test Menu (**Ref Figure 4.13**) select 2nd Line Test and when the 2nd Line Test Warning Screen (**Ref Figure 4.15**) is displayed, press <ENTER>. The Control Unit 2nd Line Test Menu (**Ref Figure 4.16**) will be displayed.

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## Maintenance Terminal Manual (AMT)

Ultra Active Noise and Vibration Control - Maintenance Terminal Software

CONTROL UNIT 2nd LINE TEST MENU	
1:	Display Control Unit Status
2:	Load Configuration Data onto Control Unit
3:	Built-In Self-Test
4:	Input/output Channel Test
5:	Aircraft Input Signals Test
6:	Calibrate Control Unit
7:	Read Calibration Data from Control Unit
8:	Load Calibration Data onto Control Unit
9:	Clear Control Unit Status
10:	Engineering Menu
11:	Exit

Confirm Second Line Maintenance: Press ENTER to continue.  
Press ESC to cancel.

**Figure 3.30 - Control Unit 2nd Line Test Menu**

- (2) Display Control Unit Status
  - (a) Selecting Display Control Unit Status from the Control Unit 2nd Line Test Menu will provide the status information as described in 3.C.

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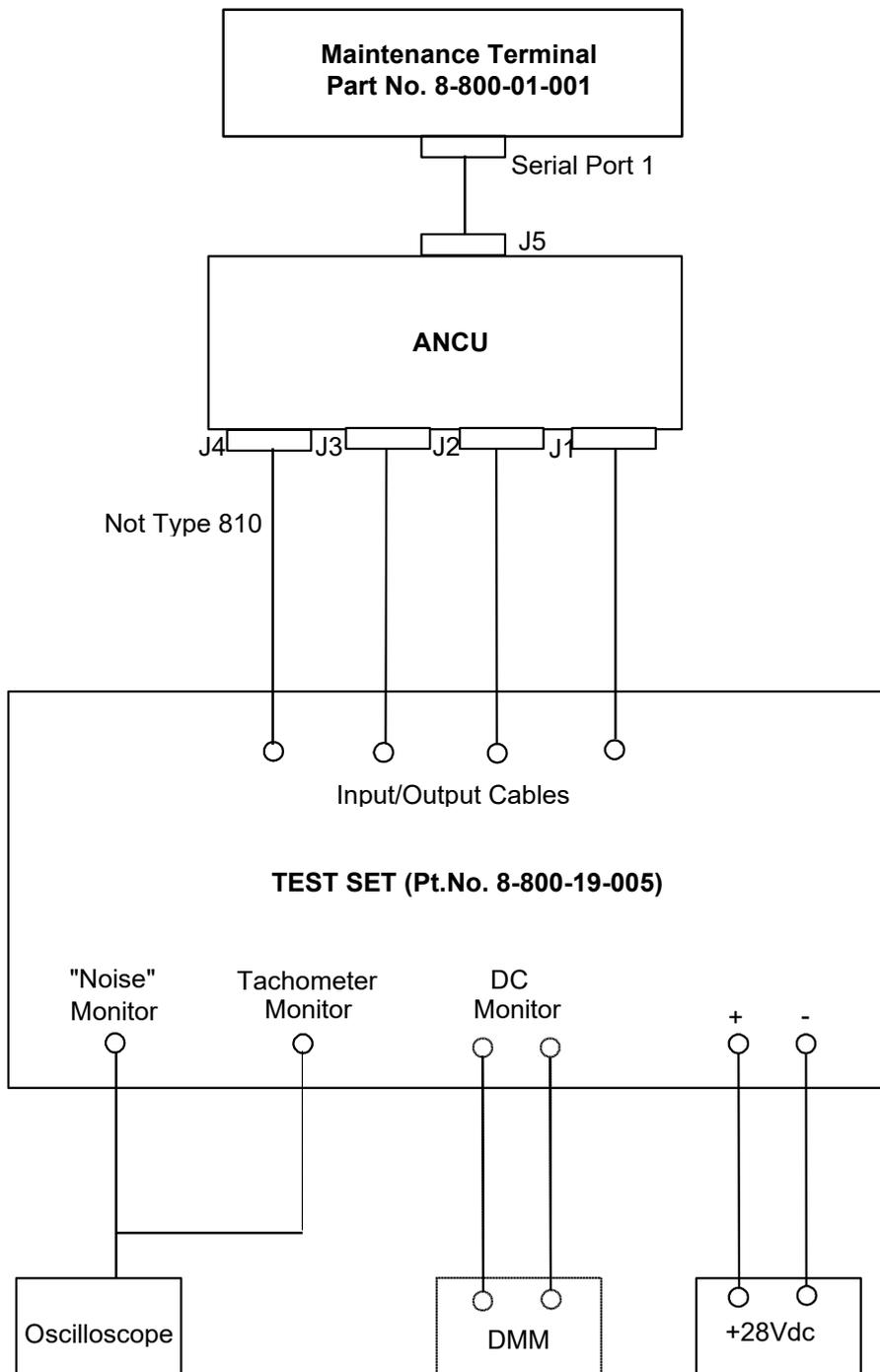


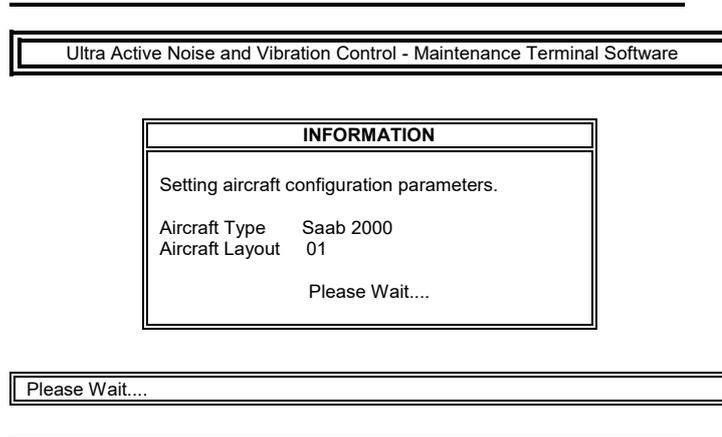
Figure 3.31 - ANCU 2nd Line Test Set Up

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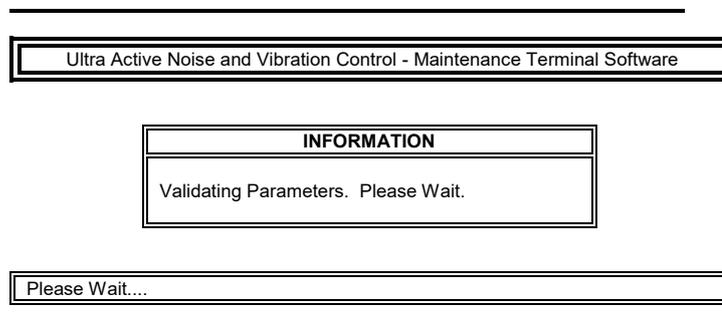
- (3) Load Configuration Parameters onto Control Unit (Warning: This command should only be used on the bench).

- (a) Select Load Configuration Parameters onto Control Unit and press <ENTER>. The following message will be displayed. **(Ref Figure 4.18)**



**Figure 3.32 - Setting Configuration Parameters**

- (b) The AMT will then validate that the Configuration Parameters have been successfully loaded and will display the following message. **(Ref Figure 4.19)**



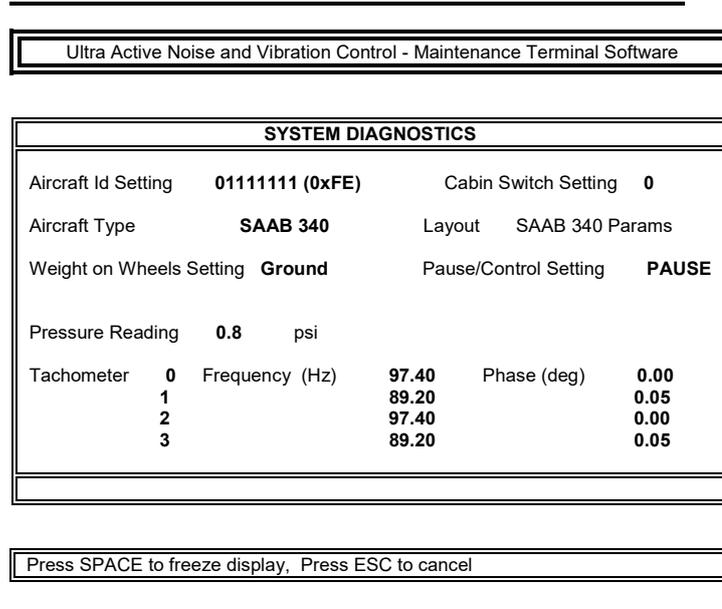
**Figure 3.33 - Validating Parameters**

- (c) The AMT will return to the Control Unit 2nd Line Test Menu on successful validation of the Configuration Parameters.

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- (4) Built-In Self-Test
  - (a) Selecting Built-In Self-Test from the Control Unit 2nd Line Test Menu will cause the ANCU under test to perform its Built-In Self Tests as described in 3.F.3
- (5) Input/output Channel Test
  - (a) Selecting Input/output Channel Test from the 2nd Line Test Menu provides access to the Actuator and Sensor Test Menu as described in 3.D All of the tests described in 3.D can be performed and in addition, sensor channels can be enabled or disabled.
- (6) Aircraft Input Signals Test
  - (a) Select Aircraft Input Signals Test from the 2nd Line Test Menu and press <ENTER>. The System Diagnostics Screen will be displayed (**Ref Figure 3.34**).



**Figure 3.34 - System Diagnostics Display**

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(b) The information displayed on the screen is:

Aircraft Id Setting	From switches on the Test Set or the Aircraft Id wiring on the aircraft wiring harness J1 connector
Cabin Switch Setting	From switches on the Test Set or the Cabin Switch wiring on the aircraft wiring harness J1 connector
Aircraft Type	As entered on Aircraft Type Screen (ref Figure 4.2)
Layout	Taken from configuration parameters being used.
Weight on Wheels Setting	From a switch on the Test Set or as a direct input from the aircraft wiring harness J1 connector
Pause/Control Setting	From switch on the Test Set or as a direct input from the aircraft wiring harness J1 connector where fitted
Pressure Reading	Input from Test Set or as a direct input from the aircraft wiring harness J1 connector where fitted
Tachometer Readings	From the Signal Generator input or the Tachometer signal wiring on the aircraft wiring harness J1 connector

(c) The ANCU tests the Cabin Switch Setting, the Weight on Wheels Setting and the Pressure Reading, as part of its Built-in Self-Test. If any of these parameters fails its built in test, the System Diagnostics screen will display **FAIL** against that parameter. The sensors (where applicable) and wiring associated with the failed parameter(s) must be checked out. When this has been done press 'T' to retest the parameters and clear the fault.

(d) Press <ESC> to return to the 2nd Line Test Menu.

(7) Calibrate Control Unit

(a) Selecting Calibrate Control Unit from the 2nd Line Test Menu accesses the calibration tests described in 3.E.3 or 3.E.5 The test accessed depends on whether the ANCU is configured for an ATVA system or a Loudspeaker system.

(8) Read Calibration Data from Control Unit

(a) Selecting Read Calibration Data from Control Unit from the 2nd Line Test Menu accesses the Read Calibration Data feature described in 3.E.6/7

(9) Load Calibration Data onto Control Unit

(a) Selecting Load Calibration Data onto Control Unit from the 2nd Line Test Menu accesses the Load Calibration Data feature described in 3.E.8/9

(10) Clear Control Unit Status

(a) Select Clear System Status from the 2nd Line Test Menu and press <ENTER>. The following warning will be displayed. (**Ref Fig 3-35**)

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WARNING
Clearing system status will clear the current failure data stored in the Control Unit. This action should only be taken after faults have been repaired. Do you wish to proceed? <Y/N>

Confirm Status clear: Press Y to proceed or N to cancel.

---

**Figure 3.35 - Clear System Status Warning**

- (b) Press <Y> to proceed and <N> to return to the 2nd Line Test Menu. After pressing <Y>, the AMT will display the message “**Clearing System Status**”.
- (c) When the ANCU has completed the Clear System Status, the AMT will display the message “System Status Cleared. System Status data is incomplete until the start of a new maintenance session”.
- (d) Press <ESC> or wait 5 seconds to return to the 2nd Line Test Menu.

### (11) Engineering Menu

- (a) The Engineering Menu is for use of Ultra Electronics Service Engineers only and is therefore not described in this manual. Access to this function is password protected.

### (12) Exit

- (a) Selecting Exit causes the AMT to close the maintenance session. See 3.1.

## H. System Information

### (1) Test Selection

- (a) From the Main Menu (Figure 4.5) select System Information Menu press <ENTER>. The System Information Menu (**Ref Figure 4.21**) will be displayed.

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SYSTEM INFORMATION MENU

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- 1: Display System Diagnostics Screen
- 2: Display Control Unit Software Versions
- 3: Display Control Unit Operating Hours and Flights

System Information Menu : Use cursor keys or numbers to highlight option, press ENTER to make selection. Press ESC to return to main menu.

**Figure 3.36 - System Information Menu**

- (2) Display System Diagnostics Screen
  - (a) Select Display System Diagnostics Screen from the System Information Menu and press <ENTER>. The System Diagnostics Screen will be displayed (**Ref Figure 3.37**).

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SYSTEM DIAGNOSTICS					
Aircraft Id Setting	01111111 (0x7F)	Cabin Switch Setting	0		
Aircraft Type Configuration	Test 811D	Layout	No		
Weight on Wheels Setting	Ground	Pause/Control Setting	PAUSE		
Pressure Reading	0.8	psi			
Tachometer	0	Frequency (Hz)	97.40	Phase (deg)	0.00
	1		89.20		0.05
	2		97.40		0.00
	3		89.20		0.05

Press SPACE to freeze display, Press ESC to cancel

**Figure 3.37 - System Diagnostics Display**

- (b) The information displayed on the screen is:

Aircraft Id Setting	From the Aircraft Id wiring on the aircraft wiring harness J1 connector
Cabin Switch Setting	From the Cabin Switch wiring on the aircraft wiring harness J1 connector
Aircraft Type	As entered on the Aircraft Type Screen (ref Figure 4.2)
Layout	Taken from configuration parameters being used.
Weight on Wheels Setting	From the Weight on Wheels input from the aircraft wiring harness J1 connector

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Pause/Control Setting	From Pause/Control input from the aircraft wiring harness J1 connector where fitted
Pressure Reading	From the Pressure input from the aircraft wiring harness J1 connector where fitted
Tachometer Readings	From the Tachometer signal wiring on the aircraft wiring harness J1 connector

- (c) The ANCU tests the Cabin Switch Setting, the Weight on Wheels Setting and the Pressure Reading as part of its Built-in Self-Test. If any of these parameters fails its built in test, the System Diagnostics screen will display **FAIL** against that parameter. The sensors (where applicable) and wiring associated with the failed parameter(s) must be checked out. When this has been done press 'T' to retest the parameters and clear the fault.
- (d) Press <ESC> to return to the System Information Menu.

### (3) Display Control Unit Software Versions

- (a) Select Display Control Unit Software Versions from the menu and press <ENTER>. The AMT will provide a display giving details of the software installed in the ANCU (**Ref Figure 4.22**). Press <ESC> to return to the System Information Menu.

Ultra Active Noise and Vibration Control - Maintenance Terminal Software		
SOFTWARE VERSIONS		
Hardware	Software	Ultra P/N & Ver
Algorithm DSP PEC	application	800-93-017 0201
	download	800-93-001 0200
	configuration	002-000-00
Analogue PEC #1	application	800-94-002 0100
	download	800-94-001 0100
Analogue PEC #2	application	800-94-002 0100
	download	800-94-001 0100
Analogue PEC #3	application	800-94-002 0100
	download	800-94-001 0100

Table of results : Press ESC to return to previous menu

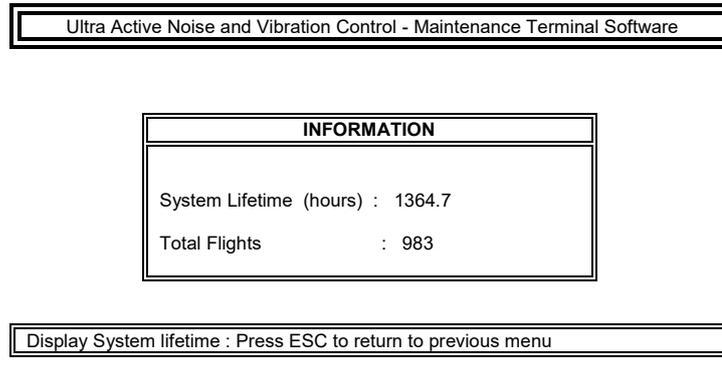
**Figure 3.38 - Software Versions Display**

### (4) Display Control Unit Operating Hours and Flights

- (a) Select Display Control Unit Operating Hours and Flights from the menu and press <ENTER>. The AMT will provide a display giving information on the System Lifetime and the Total Flights (**Ref Figure 3.39**). Press <ESC> to return to the System Information Menu.

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**Figure 3.39 - Lifetime and Flights Display**

### I. Exiting the Maintenance Session

- (a) To exit a Maintenance Session, select Option 6 from the Main Menu or Option 11 from the Control Unit 2nd Line Test Menu. The AMT will display the message '**Exiting Maintenance Program. Log File Name c:\AMT\xxx\yyy.**
- (b) The Log File is a record of the communications between the AMT and the ANCU for the maintenance session. This record is stored on the AMT's internal disk drive C. The data is stored in a directory, created automatically, whose name is taken from the Aircraft Serial Number entered during Initialisation. The file name is generated from the date and time of the maintenance session.

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### 4. GENERAL AMT OPERATION WITH ANCU PART NUMBERS 8-810-01-011 & 8-811-01-006

#### A. General

(1) This section details the procedures for using the AMT with Type 810(01) and Type 811(01) ANCU's. The following procedures are described:

- Initialisation.
- Displaying System Status Data.
- Actuator and Sensor Testing.
- Calibration.
- Reading Calibration Data.
- Loading Calibration Data.
- ANCU Testing.
- Reading System Information.

If an error message occurs at any time during the Maintenance Terminal session refer to Section 5 for troubleshooting procedures.

#### B. Initialisation

- (1) This process is required to be followed each time the AMT is connected to the ANCU.
- (a) Connect serial cable with Chipi X10 USB Serial Adaptor on the AMT to the ANCU. Switch the AMT on. The AMT will normally initialise directly into the Maintenance Software. Apply power to the ANCU. If this does not happen, it will display the command prompt **C:\**. To initialise the Maintenance Software from the command prompt, type **cd\AMT** and press <ENTER>. Verify that the command line shows **C:\AMT** and then type **AMT** and p<ENTER>. After a few seconds the Opening screen will be displayed (ref
- (b) Figure 4.1 ).

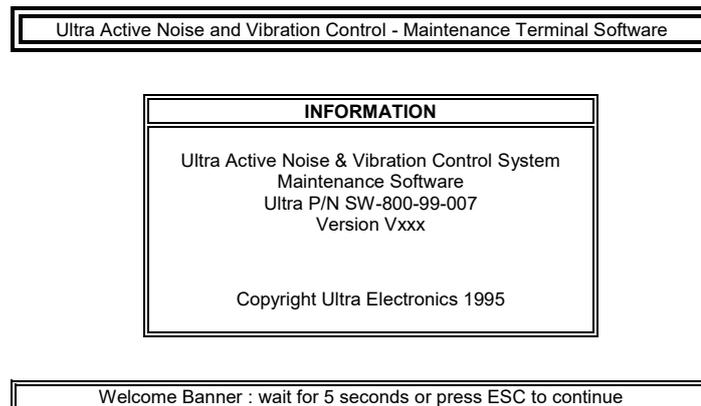
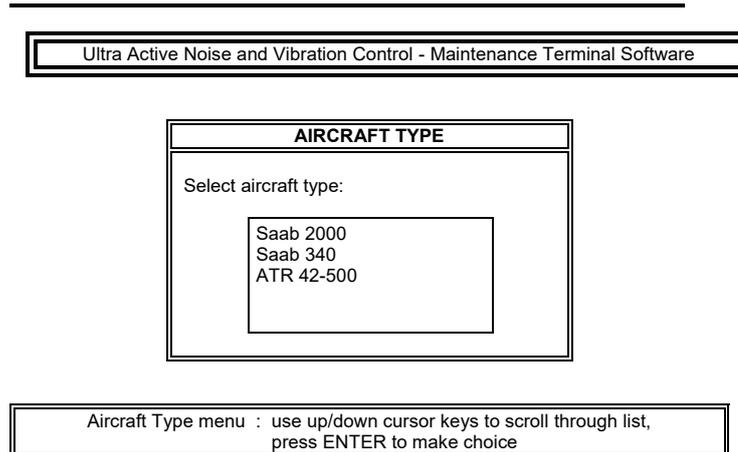


Figure 4.1 - Opening Screen

# ULTRA

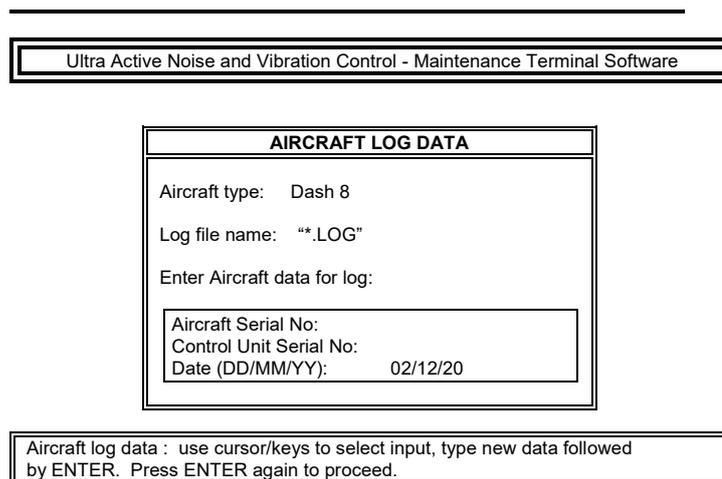
## Maintenance Terminal Manual (AMT)

- (c) After 5 seconds the AMT will display the message “Initialising communication with Control Unit, Please wait.”
- (d) After communications with the ANCU are successfully established, the Aircraft Type screen will be displayed (**Ref Figure 4.2**).



**Figure 4.2- Example Aircraft Type Selection Screen**

- (e) Using the up/down cursor keys highlight the aircraft type and press ENTER. The Aircraft Log Data screen will be displayed (**Ref Figure 4.3**).



**Figure 4.3 - Aircraft Log Data Screen**

- (f) Enter the Aircraft Serial Number and the Control Unit Serial Number and press <ENTER> to confirm each entry. The AMT will display the log file

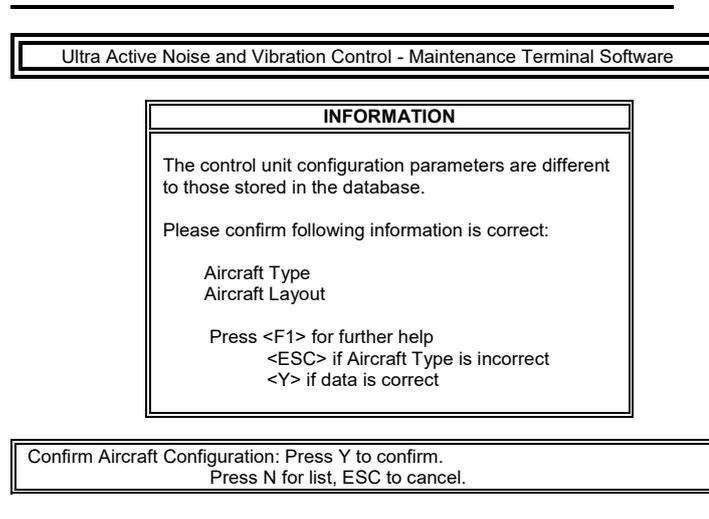
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name in which the maintenance session record will be stored. Press <ENTER> to confirm the data.

**NOTE:** The AMT will automatically enter the current date.

- (g) The AMT will display the message “**Validating Configuration Parameters**”. The AMT will read the Configuration Parameters stored in the ANCU and compare them with the data stored in the appropriate file in its database. If the Configuration Parameters are validated, the AMT will display the Main Menu (**Ref Figure 4.5**).
- (h) If the Configuration Parameters are invalid, the AMT will display the following message. (**Ref Figure 4.4**).



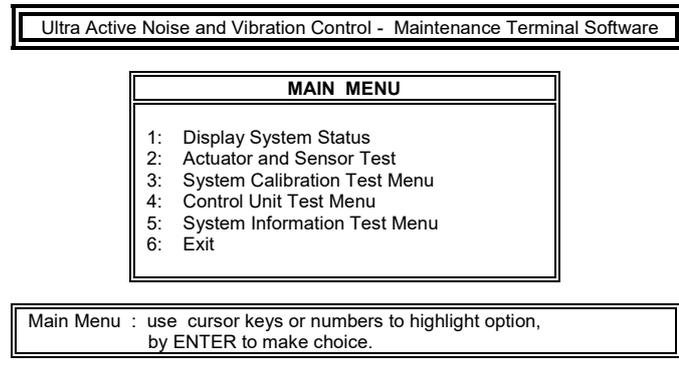
**Figure 4.4: Invalid Configuration Parameters**

- (i) If the aircraft type is incorrect, press <ESC>. The AMT will display the message “**Failed to set Configuration Parameters. This will restrict the maintenance functions which can be performed**”. Press <ESC> again, the Main Menu (**Ref Figure 4.5**) will be displayed. Select “Exit” and press <ENTER> and refer to Section 5 for troubleshooting procedures.
- (j) If the aircraft type and layout are correct, press <Y>. The AMT will display the message “**Setting aircraft configuration parameters**”. The AMT will load the appropriate configuration parameters into the ANCU. When complete, the AMT will display the message “**Validating Configuration Parameters**” and read the configuration parameters back and compare them with the file in its database to verify that they have been correctly loaded. If the Configuration Parameters are validated, the AMT will display the Main Menu (**Ref Figure 4.5**).

The initialisation process is now complete.

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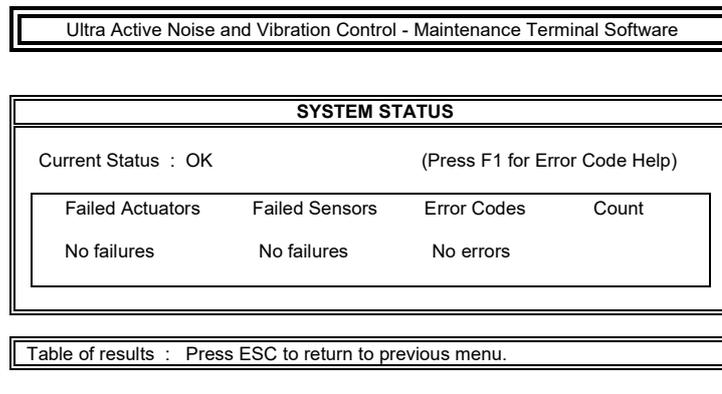
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**Figure 4.5 - Main Menu Screen**

### C. Displaying System Status Data

- (1) Select “Display System Status” in the Main Menu and press <ENTER>. The AMT will display the message “**Reading System Status**” while the data is being read from the ANCU. It will then display the data in the format shown below (**Ref Figure 4.6**)



**Figure 4.6 - System Status Result Screen (OK)**

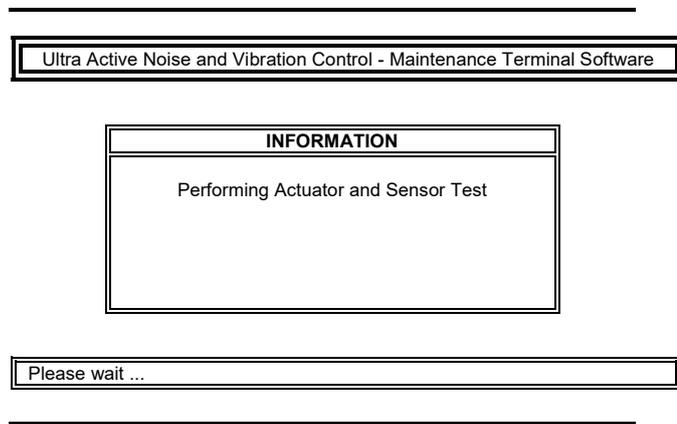
- (a) Pressing <F1> brings up a table which describes the error codes. Scrolling through the table is achieved with the up/down cursor keys. Press <ESC> to close the table. Press <ESC> to return to the Main Menu.

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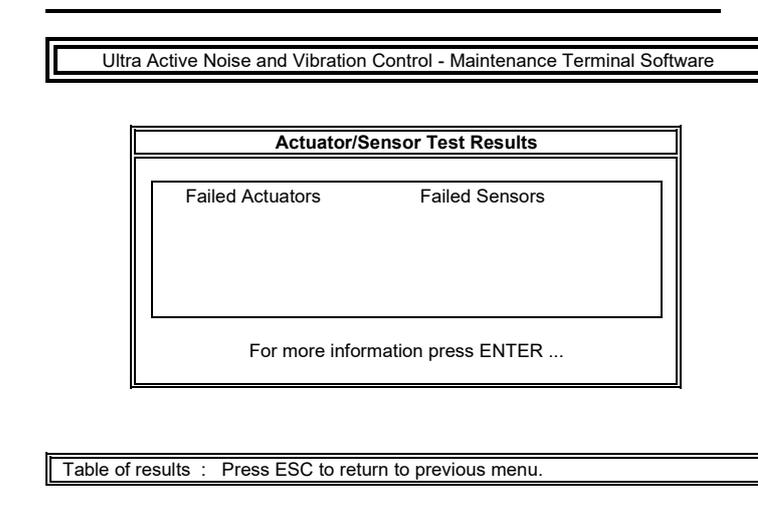
### D. Actuator and Sensor Testing

- (1) Select Automatic Actuator and Sensor Test and press <ENTER>. The AMT will display the following message (**Ref Figure 4.7**).



**Figure 4.7 - Performing Actuator and Sensor Test Screen**

- (a) The ANCU will drive each Actuator in turn. At the completion of the test, the results will be displayed on the AMT screen (**Ref Figure 4.8**).



**Figure 4.8 - Actuator and Sensor Test Result Screen 1**

- (b) Press <ENTER> to display the summary results (**Ref Figure 4.9**).

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Actuator/Sensor Test Results			
Actuator	Result	Harmonic	Distortion %
01	pass	1	2
		2	1
02	pass	1	2
		2	1
03	pass	1	1
		2	0
04	pass	1	2
		2	2
05	pass	1	1

To display summary results press ENTER ...

Table of results : use up/down cursor keys to scroll through table  
Press ESC to return to previous menu

**Figure 4.9 - Actuator and Sensor Test Result Screen 2**

- (c) Press <ENTER> to return to the summary results table (Ref Figure 4.8).
- (d) Press <ESC> to return to the Main Menu (Ref Figure 4.5).

### E. System Calibration

#### (1) Test Selection

- (a) Select "System Calibration Menu" in the Main Menu and press <ENTER>. The System Calibration Menu will be displayed. (Ref Figure 4.10)

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SYSTEM CALIBRATION MENU
1: Actuator and Sensor Test
2: Calibrate System
3: Display System Status
4: Read Calibration Data from Control Unit
5: Load Calibration Data to Control Unit
6: Edit Calibration Files Directory

System Calibration Menu : Use cursor keys or numbers to highlight option  
press ENTER to make selection. Press ESC to return to previous menu

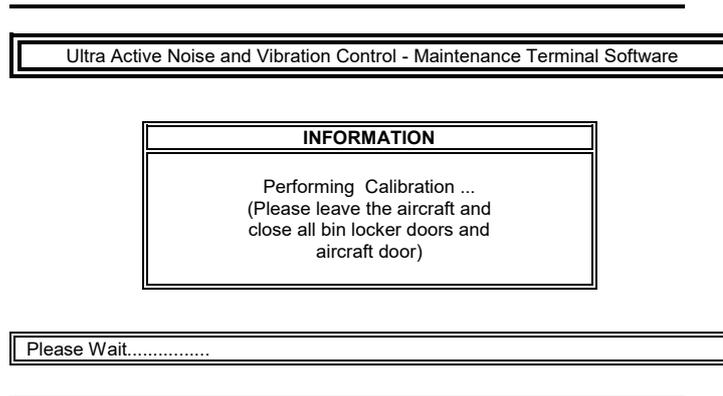
**Figure 4.10 - System Calibration Menu**

- (2) Actuator and Sensor Test

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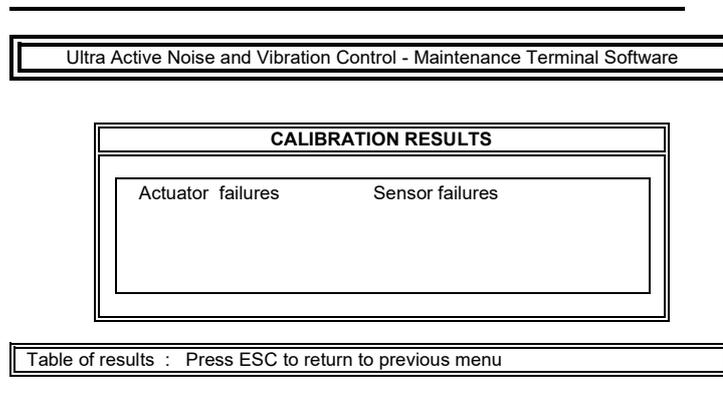
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- (a) Selecting Actuator and Sensor Test from the System Calibration Menu will implement the test described in 4.D
- (3) Calibrate System
  - (a) Select Calibrate System from the System Calibration Menu and press <ENTER>. The ANCU will automatically drive all Loudspeakers. The Maintenance Terminal will display the following message (**Ref Figure 4.11**).



**Figure 4.11 - Performing Calibration Screen**

- (b) At the completion of the Calibration the Maintenance Terminal will display the results (**Ref Figure 4.12**)



**Figure 4.12 - Calibration Test Result Screen**

- (c) Press <ESC> to return to the Main Menu.
- (4) Display System Status
  - (a) Selecting the Display System Status from the System Calibration Menu will provide system status information as described in 4.C

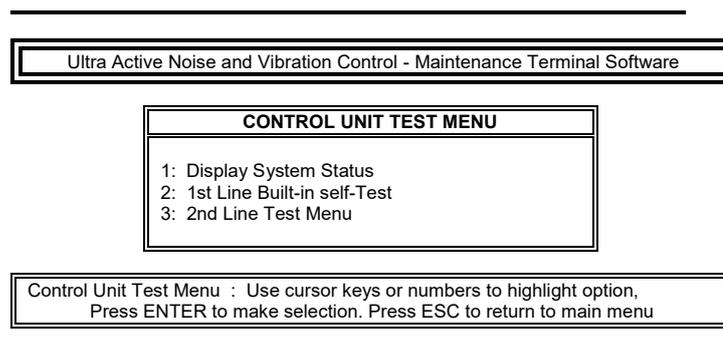
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- (5) Reading Calibration Data
  - (a) Select "Read Calibration Data from Control Unit" from the System Calibration Menu and press <ENTER>. The AMT will display the message **"Reading Calibration Data from Control Unit. Press CTRL-X to cancel operation"**
  - (b) At the completion of the operation, the AMT will display the message **"Calibration Data Read Complete"**. Press <ESC> or wait 5 seconds to return to the System Calibration Menu.
- (6) Loading Calibration Data to Loudspeaker Systems
  - (a) This function is not implemented in the Type 810(011) and Type 811(06) ANCUs. If "Load Calibration Data onto Control Unit" is selected from the System Calibration Menu, the AMT will display the message **"Load Calibration Data is not supported on this version of Control Unit software"**.
- (7) Edit Calibration Files Directory
  - (a) Select "Edit Calibration Files Directory" from the System Calibration Menu to define the directory in which Calibration Data are stored. Type in the required directory name, which can have no more than 8 characters and must consist of alphanumeric characters. Press <ENTER> to confirm the directory name or <ESC> to cancel the entry. The AMT will return to the System Calibration Menu.

### F. Control Unit Tests

- (1) Test Selection
  - (a) Select "Control Unit Test Menu" in the Main Menu and press <ENTER>. The Control Unit Test Menu will be displayed. (Ref Figure 4.13).



**Figure 4.13 - Control Unit Test Menu**

- (2) Display System Status
  - (a) Selecting Display System Status from the Control Unit Test Menu will provide system status information as described in 4.C
- (3) 1st Line Built-in Self-Test

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- (a) Select 1st Line Built-in Self-Test. The AMT will display the message “**Performing Built-In Self Tests**”. At completion of the operation, the AMT will display the results of the tests (**Ref Figure 4.14**).

---

Ultra Active Noise and Vibration Control - Maintenance Terminal Software		
BUILT IN SELF TEST RESULTS		
Test Name	PEC	Result
START-UP TESTS:		
Program Memory SRAM unchecked	Algorithm	
Data Memory SRAM	Algorithm	pass
Set-up timer test	Algorithm	unchecked
Data Memory DRAM	Algorithm	pass
Program SRAM Checksum	Algorithm	unchecked
Timer Test	Algorithm	pass
Calibration Data Check	Algorithm	FAIL
Data Memory SRAM	Analogue #1	pass
Program Memory SRAM	Analogue #1	pass

---

Table of results : Use up/down cursor keys to scroll through table. Press ESC to return to previous menu
---

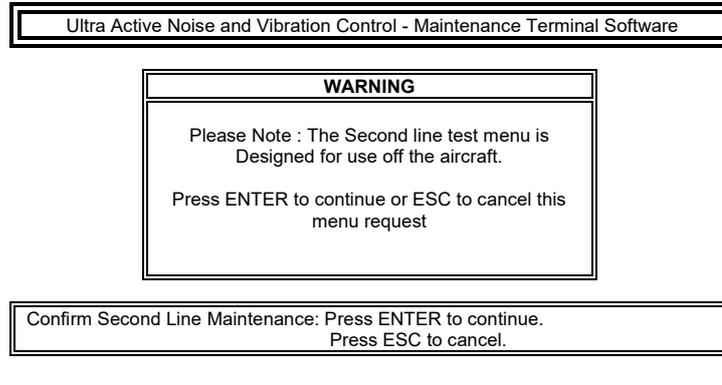
---

**Figure 4.14 - Built-In Self-Test Results**

- (b) The table is divided into 2 segments, START-UP TESTS and COMMANDED BIST TESTS.
- (c) The statement “unchecked” in the results column means that this test is not performed in that form of BIST. .
- (d) Press <ESC> to return to the Control Unit Test Menu (**Ref Figure 4.13**).
- (4) 2nd Line Test Menu
- (a) Select 2nd Line Test. The AMT will display the following message (**Ref Figure 4.15**)

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**Figure 4.15 - 2nd Line Test Warning Screen**

- (b) Press <ENTER> to access the Control Unit 2nd Line Test Menu. Press <ESC> to return to the Control Unit Test Menu.
- (c) Details of the Control Unit 2nd Line Tests are given in 4.G

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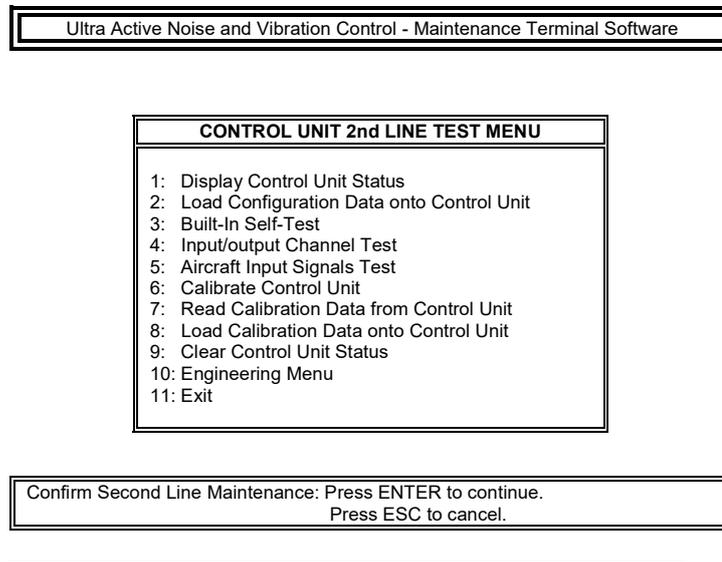
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### G. Control Unit Second Line Test

**Note:** These tests can only be performed if the ANCU under test is connected to a Control Unit 2nd Line Test Set, part no. 8-800-19-005, as shown (**Ref Figure 4.17**)

(1) Test Selection

- (a) From the Control Unit Test Menu (**Ref Figure 4.13**) select 2nd Line Test and when the 2nd Line Test Warning Screen (**Ref Figure 4.15**) is displayed, press <ENTER>. The Control Unit 2nd Line Test Menu (**Ref Figure 4.16**) will be displayed.



**Figure 4.16 - Control Unit 2nd Line Test Menu**

(2) Display Control Unit Status

- (a) Selecting Display Control Unit Status from the Control Unit 2nd Line Test Menu will provide the status information as described in 4.C

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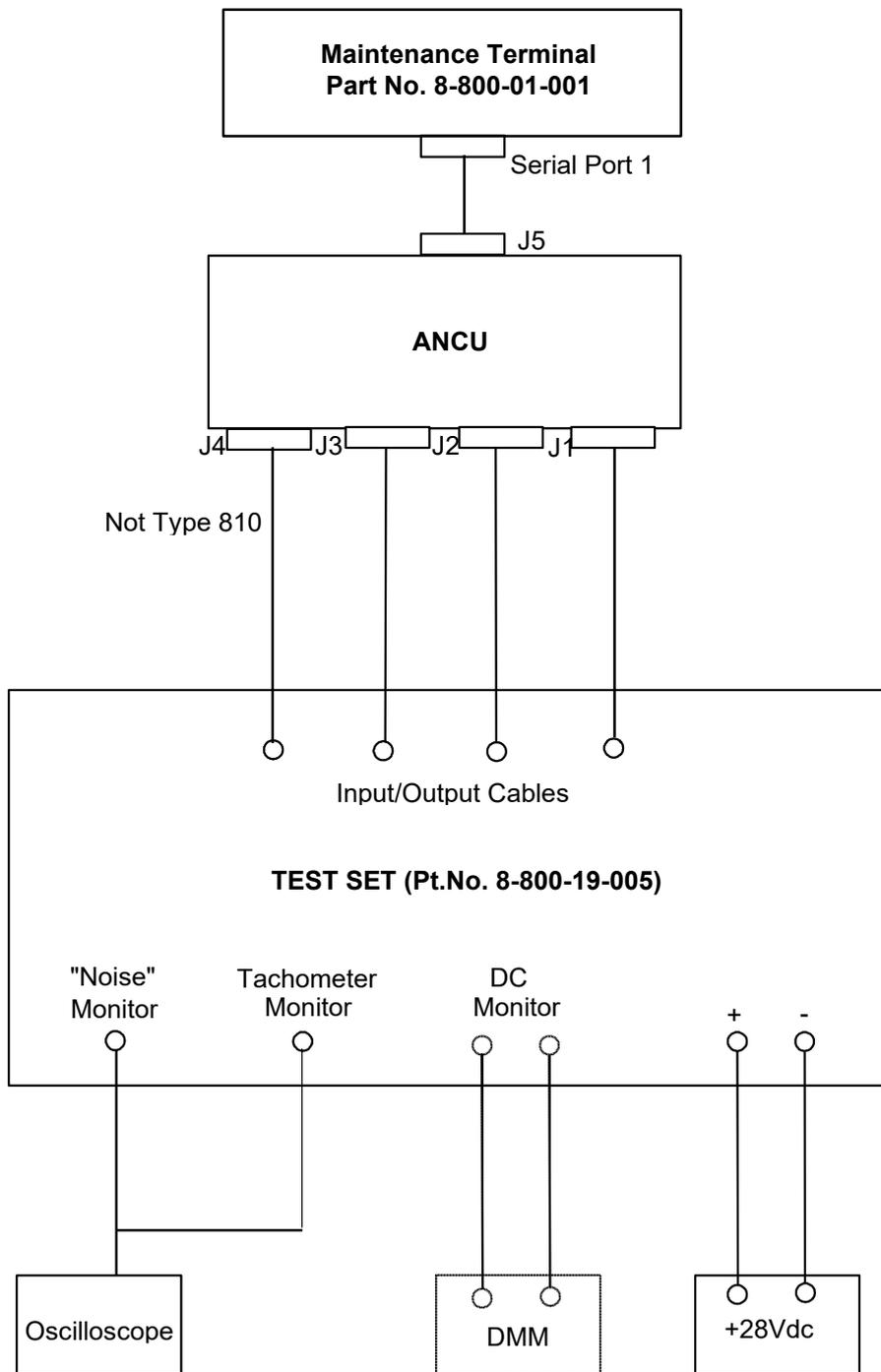


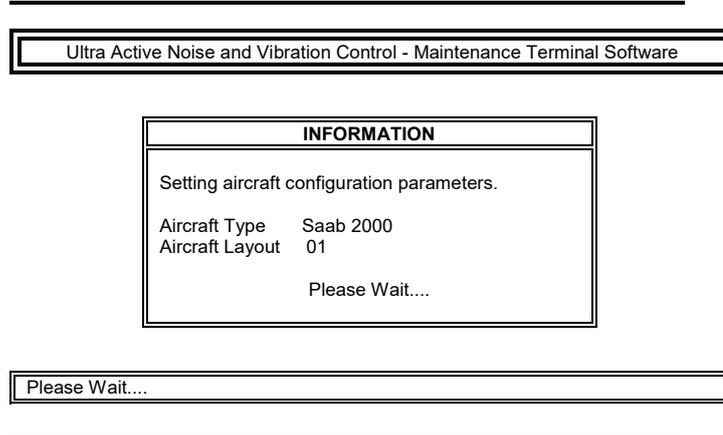
Figure 4.17 - ANCUs 2nd Line Test Set Up

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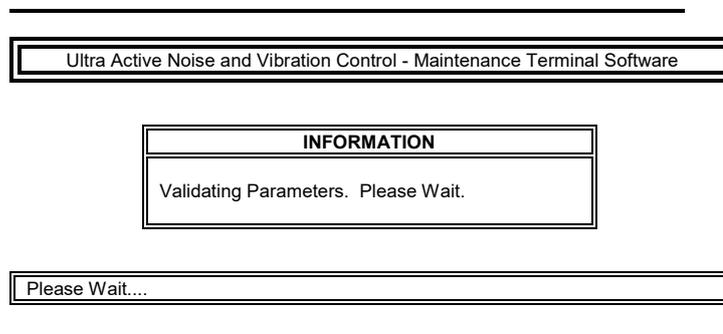
(3) Load Configuration Parameters onto Control Unit

- (a) Select Load Configuration Parameters onto Control Unit and press <ENTER>. The following message will be displayed. **(Ref Figure 4.18)**



**Figure 4.18 - Setting Configuration Parameters**

- (b) The AMT will then validate that the Configuration Parameters have been successfully loaded and will display the following message. **(Ref Figure 4.19)**



**Figure 4.19 - Validating Parameters**

- (c) The AMT will return to the Control Unit 2nd Line Test Menu on successful validation of the Configuration Parameters.

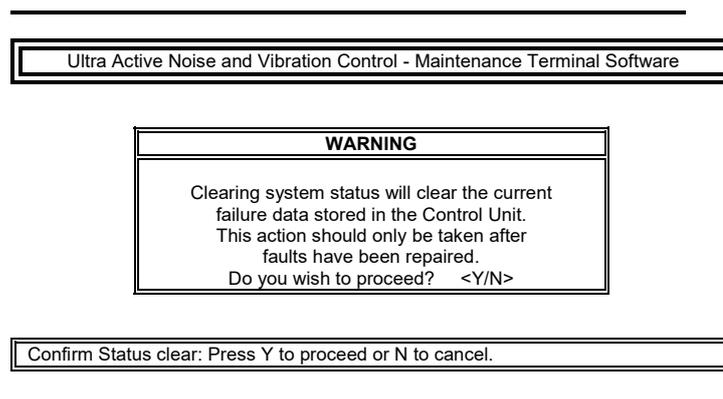
(4) Built-In Self-Test

- (a) Selecting Built-In Self-Test from the Control Unit 2nd Line Test Menu will cause the ANCU under test to perform its Built-In Self Tests as described in 4.3

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- (5) Input/output Channel Test
  - (a) Selecting Input/output Channel Test from the 2nd Line Test Menu will implement the Actuator and Sensor Test as described in 4.D
- (6) Aircraft Input Signals Test
  - (a) This function is not implemented in the Type 810(011) and Type 811(06) ANCU's. If "Aircraft Input Signals Test" is selected from the System Information Menu, the AMT will display the message "**System Diagnostics Screen not supported on this version of Control Unit software**".
- (7) Calibrate Control Unit
  - (a) Selecting Calibrate Control Unit from the 2nd Line Test Menu accesses the calibration tests described in 4.E.3
- (8) Read Calibration Data from Control Unit
  - (a) Selecting Read Calibration Data from Control Unit from the 2nd Line Test Menu accesses the Read Calibration Data feature described in 4.E.5
- (9) Load Calibration Data onto Control Unit
  - (a) This function is not implemented in the Type 810(011) and Type 811(06) ANCU's. If "Load Calibration Data onto Control Unit" is selected from the System Calibration Menu, the AMT will display the message "**Load Calibration Data not supported on this version of Control Unit software**".
- (10) Clear Control Unit Status
  - (a) Select Clear System Status from the 2nd Line Test Menu and press <ENTER>. The following warning will be displayed. (Ref Figure 4.20).



**Figure 4.20 - Clear System Status Warning**

- (b) Press <Y> to proceed and <N> to return to the 2nd Line Test Menu. After pressing <Y>, the AMT will display the message "**Clearing System Status**".

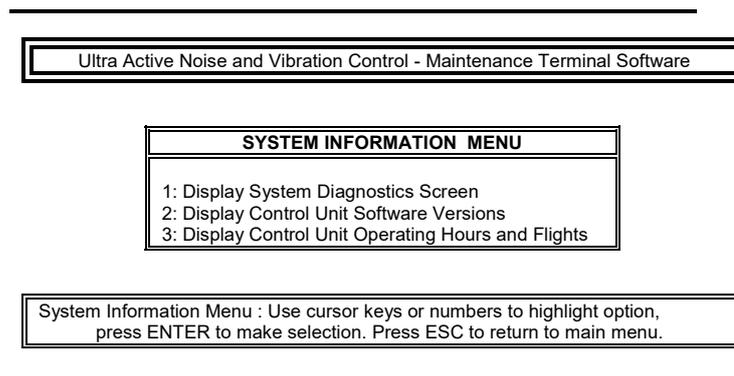
# ULTRA

## Maintenance Terminal Manual (AMT)

- (c) When the ANCU has completed the Clear System Status, the AMT will display the message "System Status Cleared. System Status data is incomplete until the start of a new maintenance session".
  - (d) Press <ESC> or wait 5 seconds to return to the 2nd Line Test Menu.
- (11) Engineering Menu
- (a) The Engineering Menu is for use of Ultra Electronics Service Engineers only and is therefore not described in this manual. Access to this function is password protected.
- (12) Exit
- (a) Selecting Exit causes the AMT to close the maintenance session. See 4.1.

### H. System Information

- (1) Test Selection
  - (a) From the Main Menu (**Ref Figure 4.5**) select System Information Menu press <ENTER>. The System Information Menu (**Ref Figure 4.21**) will be displayed.



**Figure 4.21 - System Information Menu**

- (2) Display System Diagnostics Screen
  - (a) This function is not implemented in the Type 810(011) and Type 811(06) ANCUs. If "Display System Diagnostics Screen" is selected from the System Information Menu, the AMT will display the message "**System Diagnostics Screen not supported on this version of Control Unit software**".

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- (3) Display Control Unit Software Versions
- (a) Select Display Control Unit Software Versions from the menu and press <ENTER>. The AMT will provide a display giving details of the software installed in the ANCU (Ref Figure 4.22). Press <ESC> to return to the System Information Menu.

---

Ultra Active Noise and Vibration Control - Maintenance Terminal Software		
<b>SOFTWARE VERSIONS</b>		
Hardware	Software	Ultra P/N & Ver
Algorithm DSP PEC	application download	800-93-017 0201 800-93-001 0200
Analogue PEC #1	application download	800-94-002 0100 800-94-001 0100
Analogue PEC #2	application download	800-94-002 0100 800-94-001 0100
Analogue PEC #3	application download	800-94-002 0100 800-94-001 0100

---

Table of results : Press ESC to return to previous menu
---

---

**Figure 4.22 - Software Versions Display**

- (4) Display Control Unit Operating Hours and Flights
- (a) This function is not implemented in the Type 810(01) and Type 811(01) ANCUs. If "Display Control Unit Operating Hours and Flights" is selected from the System Information Menu, the AMT will display the message "**Read System Lifetime not supported on this version of Control Unit software.**".

### I. Exiting the Maintenance Session

- (a) To exit a Maintenance Session, select Option 6 from the Main Menu or Option 11 from the Control Unit 2nd Line Test Menu. The AMT will display the message '**Exiting Maintenance Program. Log File Name c:\AMT\xxx\yyy.**'
- (b) The Log File is a record of the communications between the AMT and the ANCU for the maintenance session. This record is stored on the AMT's disk drive C. The data is stored in a directory, created automatically, whose name is taken from the Aircraft Serial Number entered during Initialisation. The file name is generated from the date and time of the maintenance session.

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### 5. TROUBLESHOOTING

#### A. General

- (1) The following list provides troubleshooting procedures for error messages reported during Maintenance Terminal sessions undertaken in Sections 3 and 4 of this document.

#### B. Error Messages

- (1) Calibration Aborted. Cabin Pressure is outside the specified calibration range (ANVC systems only).
  - (a) Cause: - pressure has gone out of range for the specified calibration.
  - (b) Action: - adjust the pressure so that it is back within the required range and recalibrate.
- (2) Calibration failed
  - (a) Cause: - Communications failure  
- Controller not configured.  
- Data Write error
  - (b) Action: - power down and repeat the initialisation procedure  
- check the interface cable and connections  
- configure the Controller prior to calibration  
- read system status to see if a write error has occurred
- (3) Calibration Failed". The controller unit has rebooted.Re-establishing Communications
  - (a) Cause: - The Controller rebooted and resynchronised with the MT due to an error during calibration.
  - (b) Action: - power down and repeat the initialisation procedure. If the Problem reoccurs then replace the Controller.
- (4) Clear system status operation failed
  - (a) Cause: - Communications failure
  - (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections
- (5) Control Unit Communication Initialisation failed
  - (a) Cause: - The MT couldn't initialise it's communications port or set the baud rate.
  - (b) Action: - Reset the MT and try again. If it still fails, there is a fault With the MT. replace and try again
- (6) Control unit FAILED to erase None Volatile Memory data
  - (a) Cause: - Communications failure  
- Failed Flash device
  - (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections  
- Read status errors to determine if there is a fault in the Controller. Power down and re-synchronise. If the failure persists replace the Controller.

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- (7) Database is not compatible with this Maintenance Terminal
- (a) Cause: - Not all the files have been correctly copied from installation disk or have been overwritten
  - (b) Action: - Check that there is enough space on destination drive for all the files. Reinstall the files. If the problem persists replace the disk.
- (8) Error: cannot open database
- (a) Cause: - Database.dat file has been corrupted, or has not been installed correctly from disk.
  - (b) Action: - Re-install MT software and database.
- (9) Error cannot open file DATABASE.DAT
- (a) Cause: - database.dat file has been corrupted, or has not been installed correctly from disk.
  - (b) Action: - Re-install MT software and database.
- (10) Error creating log file. Press ENTER to exit Maintenance Terminal
- (a) Cause: - Incorrect directory/location for log file specified  
- Incorrect access rights.  
- Not enough space on the disk/drive
  - (b) Action: - Check that the directory specified is correct  
- Check access rights and amend as required  
- Make more space available on the disk/drive
- (11) Error Part Number mismatch in database
- (a) Cause: - Not all the files have been correctly copied from installation disk or have been overwritten
  - (b) Action: - Check that there is enough space on destination drive for all the files. Reinstall the files If the problem persists replace the disk.
- (12) Error reading database file
- (a) Cause: - Not able to read database file  
- Database file has been corrupted, or has not been installed correctly from disk.
  - (b) Action: - Check access rights and amend if required  
- Re-install MT software and database
- (13) Error reading file Database.dat
- (a) Cause: - not able to read database.dat file  
- Database.dat file has been corrupted, or has not been installed correctly from disk.
  - (b) Action: - Check access rights and amend as required  
- Re-install MT software and database.

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(14) 'Error saving user.env file' 'Press ENTER to continue.'

- (a) Cause:
  - Access rights' problem
  - Not enough disk space available to store the user.env file
- (b) Action:
  - Check and correct the 'access rights'
  - Make more space available on the disk or specify an alternative destination.

(15) Error version mismatch in database

- (a) Cause:
  - Not all the files have been correctly copied from installation disk or have been overwritten
- (b) Action:
  - Check that there is enough space on destination drive for all the files. Reinstall the files If the problem persists replace the disk.

(16) Failed to clear cabin switch errors

- (a) Cause:
  - The Cabin switch error was set during diagnostics checking by the Controller and an attempt to clear it failed.
- (b) Action:
  - Power down and repeat session

(17) Failed to clear Control Unit System Status

- (a) Cause:
  - Communications failure
- (b) Action:
  - power down and repeat the initialisation procedure
  - check the interface cable and connections.

(18) Failed to get Channel Data

- (a) Cause:
  - Controller not configured or communications error
- (b) Action:
  - Power down and repeat the initialisation procedure
  - Check the interface cable and connections
  - Reconfigure the Controller

(19) Failed to load Calibration Data from data file.

The current system calibration data may be corrupt.

- (a) Cause:
  - Communications failure
  - The data was corrupt
  - There was a Controller memory error
- (b) Action:
  - Power down and repeat the initialisation procedure
  - Check the interface cable and connections
  - Retry communicating, if the problem happens again, recalibrate or download the calibration data (ANVC systems only)
  - Controller memory error
  - Display system status on the Controller. If there is a fault replace the Controller. If not retry communicating, if the problem happens again, recalibrate or download the calibration data (ANVC systems only)

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- (20) Failed to perform actuator and sensor check
- (a) Cause:
    - Communications failure
    - Controller not configured
    - Pressure difference is not zero
  - (b) Action:
    - Power down and repeat the initialisation procedure
    - Check the interface cable and connections
    - configure the Controller prior to calibration
    - Reduce the pressure difference to zero
- (21) Failed to perform Actuator and Sensor Check". The Control Unit has rebooted re-establishing communications
- (a) Cause:
    - The Controller rebooted and resynchronized with the MT Due to a Controller error during the check.
  - (b) Action:
    - Redo the test. If the problem reoccurs then replace the Controller.
- (22) Failed to perform Actuator Test
- (a) Cause:
    - Controller not configured
    - Communications error
    - Aircraft pressurised (ANVC system only)
  - (b) Action:
    - reconfigure the Controller
    - Power down and repeat the initialisation procedure
    - Check the interface cable and connections
    - Reduce pressure prior to the sensor and actuator check being performed
- (23) Failed to read aircraft Id list from database
- (a) Cause:
    - The Maintenance Terminal couldn't read the file section of the database
  - (b) Action:
    - Power down and reload the Maintenance Terminal software from the source disks. Repeat the MT Session. If the problem persists the source disks may be corrupted. Replace them.
- (24) Failed to read aircraft Id setting
- (a) Cause:
    - Communications failure
  - (b) Action:
    - Power down and repeat the initialisation procedure
    - Check the interface cable and connections
- (25) Failed to read Aircraft Variant Id from Control Unit
- (a) Cause:
    - Controller reboot or communications breakdown
  - (b) Action:
    - Restart the Maintenance Terminal and Controller.
- (26) Failed to read cabin switch setting Unable to check current cabin configuration
- (a) Cause:
    - Communications have failed during reading of the cabin switch settings
  - (b) Action:
    - Reboot the Maintenance Terminal and the Controller

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## Maintenance Terminal Manual (AMT)

(27) Failed to clear pressure errors Press ESC to continue

NOTE: This applies to ANVC systems only

- (a) Cause: - Pressure switch test clear failed. This will only clear if the pressure is within its specified operating range.
- (b) Action: - Check the pressure switch operation and wiring.  
- Power down and repeat the initialisation procedure. If this fails replace the Controller.

(28) Failed to clear weight-on-wheel switch errors Press ESC to continue

- (a) Cause: - Aircraft not landing' switch test clear failed.
- (b) Action: - Power down and repeat the initialisation procedure. If this fails replace the Controller.

(29) Failed to read cabin switch state

- (a) Cause: - Communications failure
- (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections

(30) Failed to read Calibration Data consistency status from Control Unit

- (a) Cause: - Communications Failure
- (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections

(31) Failed to read number of Analogue Interface PECs installed

- (a) Cause: - Controller not configured or communications error
- (b) Action: - Power down and repeat the initialisation procedure - check the interface cable and connections  
- Reconfigure the Controller

(32) Failed to read Pause-Control switch setting Press ESC to continue.

- (a) Cause: - Communications failure
- (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections

(33) Failed to read pressure from the Controller

- (a) Cause: - Communications failure
- (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections

(34) Failed to read system data from Control Unit

- (a) Cause: - Controller not configured or communications error
- (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections  
- Reconfigure the Controller

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- (35) Failed to read system lifetime data from control unit Press ESC to continue
- (a) Cause: - Communications failure
  - (b) Action: - power down and repeat the initialisation procedure  
- Check the interface cable and connections
- (36) Failed to read version data
- (a) Cause: - Communications failure
  - (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections
- (37) Failed to read weight on wheels state Press ESC to continue
- (a) Cause: - Communications failure
  - (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections
- (38) Failed to set a/c configuration
- (a) Cause: - invalid cabin switch setting.  
- Breakdown in communication.
  - (b) Action: - Use 'view-db' (as described in the Maintenance Terminal manual) to check that the cabin switch settings are supported by the database and check the a/c wiring.  
- Power down and repeat the initialisation procedure  
- Check serial cable, the cable screen must be correctly grounded to minimise noise interference during the data transfer.  
- Use read version Id to check that the correct configuration has been loaded.
- (39) Failed to set calibration data baud rate
- (a) Cause: - The baud rate specified was invalid.  
- Communications failure
  - (b) Action: - The Controller supports baud rates of 9600, 19200 and 38400. Repeat the Maintenance Terminal session specifying one of the values above(default is 9600 baud).  
- Power down and repeat the initialisation procedure  
- Check the interface cable and connections
- (40) Failed to set Configuration Parameters
- This will restrict the maintenance functions, which can be performed.
- (a) Cause: - The configuration download failed due to communications or flash problems, or an invalid cabin switch setting.
  - (b) Action: - Check the Controller status. This will indicate if no configuration parameters are loaded or if there are any memory problems. Power down and repeat the initialisation procedure  
- Check the cabin switch settings.

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- (41) Invalid Aircraft Variant ID. The database does not recognise the Aircraft Variant ID setting
- (a) Cause: - The wrong a/c type selected or incorrect ID in the Controller or the ID not supported by the database.
  - (b) Action: - Use 'view-db' (as described in the Maintenance Terminal manual) to check the database to see the list of a/c types and associated Id's.  
- Check the aircraft Id wiring
- (42) Invalid Aircraft Variant Id Parity
- (a) Cause: - The Maintenance Terminal has read a wrong aircraft Id.
  - (b) Action: - Check the Controller Aircraft Id wiring.  
- Power down the system and repeat the initialisation Procedure
- (43) Invalid Pressure Reading. Actuator and sensor check not performed (ATVA Systems only).
- (a) Cause: - The check can only be performed in the unpressurised Aircraft
  - (b) Action: - Reduce the pressure prior to an actuator and sensor check being performed
- (44) No configuration layouts found in database for this aircraft type
- (a) Cause: - There are no configuration parameters for this a/c type in the database. The database may have been corrupted.
  - (b) Action: - Reinstall the Maintenance Terminal software from the source disk
- (45) No further entries will be made to the log file
- You are advised to end the current Maintenance Session and start again.
- (a) Cause: - There is an 'access rights' problem to the disk or there is not enough disk space available to store the log file
  - (b) Action: - Check and correct the disk 'access rights' as required or make more space available on the disk or specify an alternative destination.
- (46) Open communications failed
- (a) Cause: - The Maintenance Terminal is not able to open a log file
  - (b) Action: - Check the access rights to the disk and amend as required
- (47) Read System Status failed
- (a) Cause: - Communications failure
  - (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections
- (48) Set terminal type failed
- (a) Cause: - Communications failure
  - (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections

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- (49) Some of the selected Calibration Data files are not available. Do you wish to proceed? Press ENTER to proceed Press ESC to return to previous menu
- (a) Cause: - The Maintenance Terminal cannot find all the calibration files in the directory specified. Either they are not there or they have been corrupted
  - (b) Action: - Recalibrate to generate a new set of calibration data.  
- Reload the calibration data (ANVC Systems only)
- (50) Some or all of the Calibration Data selected is not compatible with the current configuration data, and will not be read Press ESC to proceed
- (a) Cause: - The calibration data stored in the Controller does not match the configuration parameters in the Maintenance Terminal and will not be stored.
  - (b) Action: - Download up to date configuration parameters and recalibrate the system
- (51) Tacho test failed Press ESC to continue
- (a) Cause: - Communications failure
  - (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections
- (52) The Aircraft Variant Id wiring is incorrect and must be changed from \$\$\$\$ to \$\$\$\$ for future Maintenance sessions
- (a) Cause: - The aircraft Id read from the Controller does not agree with that specified by the user.
  - (b) Action: - Check the aircraft Id wiring  
- Reselect the correct Id on the Maintenance Terminal
- (53) The system data read from the Control Unit is invalid
- Press ENTER to read this data from the Control Unit and proceed with operation or Press ESC to cancel the current operation
- (a) Cause: - Controller has not been configured or there has been a communications error
  - (b) Action: - Power down and repeat the initialisation procedure  
- Check the interface cable and connections  
- Configure the Controller
- (54) There is no configuration data for the current cabin switch setting. Current Switch Setting: \$\$ you should check this setting is correct
- (a) Cause: -The configuration data has not been loaded or does not match that in the database  
- The cabin switch settings are wrong
  - (b) Action: - Power down and repeat the initialisation procedure. Load the correct configuration data  
- Check the aircraft wiring

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(55) There is no valid configuration data in the database for this aircraft and Id setting.

- (a) Cause: - There are no Configuration Parameters in the database for the specified aircraft type and Id.
- (b) Action: - Power down and reinstall the Maintenance Terminal software and database from the source disk.

(56) There is not enough disk space to run the Maintenance session

Drive            \$\$  
Free Space    \$\$\$\$\$\$ Kbytes  
Space Needed \$\$\$\$\$\$ Kbytes

- (a) Cause: - There is not enough free disk space to continue the Maintenance session.
- (b) Action: - Free more disk space or choose an alternative destination for the file

(57) There is not enough disk space to store the Calibration Data.

Drive            \$\$  
Free Space    \$\$\$\$\$\$ Kbytes  
Space Needed \$\$\$\$\$\$ Kbytes

- (a) Cause: - There is not enough disk space to store the calibration data.
- (b) Action: - Free more disk space or choose an alternative destination for the calibration data

(58) There was a problem writing to the log file Press ENTER to retry or press ESC to ignore log file for the remainder of this Maintenance session

- (a) Cause: - There is a disk 'access rights' problem  
- There is not enough disk space available to store the log File
- (b) Action: - Check and correct the disk 'access rights'  
- Make more space available on the disk or specify an alternative destination.

(59) There was a problem writing to the log file on drive \$\$ Please ensure that the correct disk is in the drive Press ENTER to retry or press ESC to ignore log file for the remainder of this Maintenance session

- (a) Cause: - There is a disk 'access rights' problem or there is not enough disk space available to store the log file
- (b) Action: - Check and correct the disk 'access rights' problem or make more space available or specify an alternative destination.

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- (60) The selected Calibration Data files are not available. Press ESC to continue
- (a) Cause:
    - The Maintenance Terminal cannot find the calibration files in the directory specified. Either they are not there, they are corrupt, they have invalid names (named according to a/c type), or the directory specified is wrong
  - (b) Action:
    - Recalibrate to generate a new set of calibration data
    - Reload the calibration data (ANVC Systems only)
    - Check that the aircraft type has been entered properly
    - Ensure that the directory that the calibration data is stored in has not been renamed or moved.
- (61) There are no valid Calibration Data files in the specified directory
- (a) Cause:
    - The Maintenance Terminal cannot find the calibration data files in the directory specified. Either they are not there, they are corrupt, they have invalid names (named according to a/c type), or the directory specified is wrong.
  - (b) Action:
    - Recalibrate to generate a new set of calibration data
    - Reload the calibration data (ANVC Systems only)
    - Check that the aircraft type has been entered properly
    - Ensure that the directory that the calibration data is stored in has not been renamed or moved.
- (62) Unknown Control Unit Software part number
- (a) Cause:
    - The Controller part number cannot be recognised.
    - Communications failure
  - (b) Action:
    - Power down and repeat the initialisation procedure.
    - Check the interface cable and connections
    - If the error persists replace the Controller
- (63) WARNING - calibration has exceeded its estimated convergence time. Do you wish to abort the calibration? (Y/N)
- (a) Cause:
    - This message is displayed if the calibration exceeds the estimated time to completion. It is usually due to high noise levels in the proximity of the aircraft.
  - (b) Action:
    - Recalibrate the system in a quieter environment.
    - if the time to complete is reducing when the message is displayed continue the calibration and wait until it has converged.
- (64) WARNING: this database is for testing/trial purposes only
- (a) Cause:
    - A test configuration is about to be loaded onto the Controller.
  - (b) Action:
    - Before installation into or use on the aircraft the correct production release of configuration must be re-installed onto the Controller.

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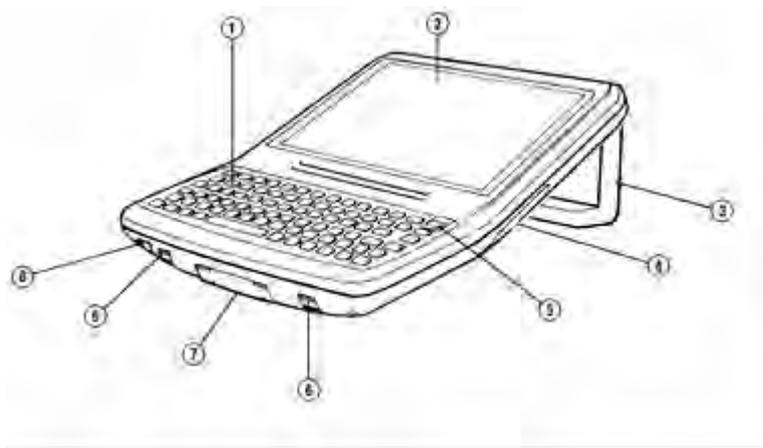
### 6. RUGGEDIZED MAINTENANCE TERMINAL (OPTIONAL)

#### A. Introduction

- (1) The AMT is a portable, rugged IBM compatible computer which uses the Microsoft MS-DOS operating system. The operating system and AMT software are loaded permanently in ROM for fast access and to prevent accidental deletion of these crucial programs.

#### B. Main Features

- (1) Front Panel (**Ref Fig 6-1**)



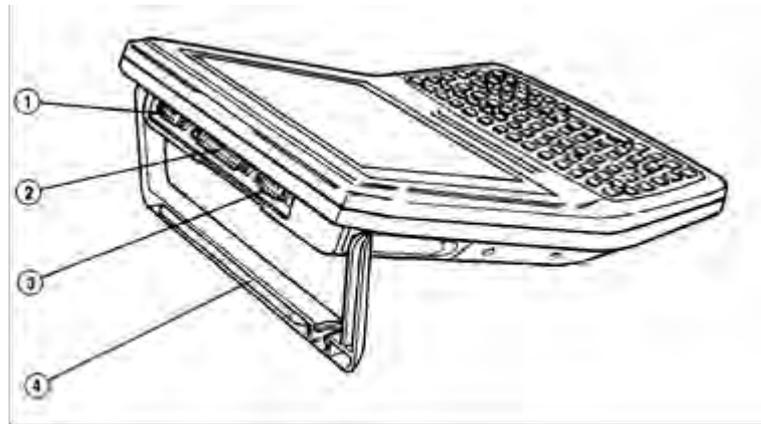
**Figure 6-1 Front Panel**

- (a) 1. Keyboard - an 81 key keyboard in QWERTY layout providing easy access to all normal typing keys and additional controls
- (b) 2. Screen - a monochrome VGA screen, with 16 grey scales and 640 x 480 pixels and an optional backlight.
- (c) 3. Handle - used to carry the AMT and a support for desktop use.
- (d) 4. PCMCIA hatch - provides access to the two external PCMCIA sockets for fitting or removing PCMCIA cards e.g. Flash Memory Cards. Watertight when closed.
- (e) 5. The PWR (Power) key used to turn the AMT on or off.
- (f) 6. Locating slots for the AMT carry strap.
- (g) 7. Battery hatch catch - provides access to the main battery. Watertight when closed.
- (h) 8. Power socket - used to connect the AMT AC Adaptor to charge the main battery pack

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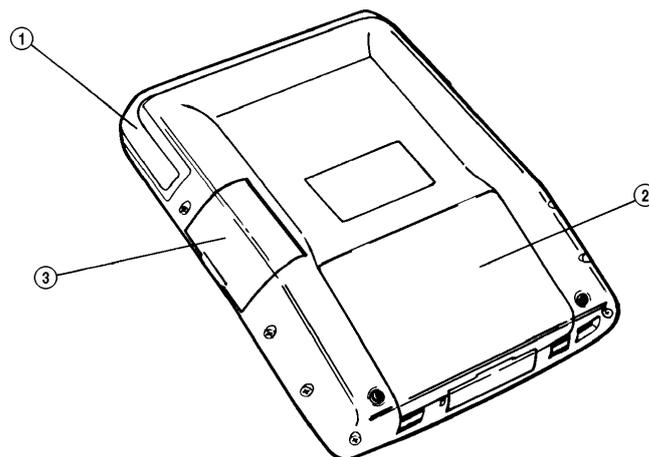
### (2) Connectors (Ref Fig 6-2)



**Figure 6-2 Connectors**

- (a) 1. Main serial port (COM 1) - used to connect external serial devices.
- (b) 2. Parallel printer port (LPT 1) - used to connect to devices with a parallel interface.
- (c) 3. Secondary serial port (COM 2) - used to connect external serial devices.
- (d) 4. Storage for digitiser pen (not supplied with AMT).

### (3) Back Panel (Ref Fig 6-3)



**Figure 6-3 Back Panel**

- (a) 1. Handle - used to carry the AMT and a support for desktop use. (Shown here retracted).

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## Maintenance Terminal Manual (AMT)

- (b) 2. Battery hatch - provides access to the main battery. Watertight when closed.
  - (c) 3. PCMCIA Hatch - provides access to the two external PCMCIA sockets for fitting and removing PCMCIA Cards.
- (4) Internal Disk Drive
- (a) Programs and data are stored on a rugged internal disk, drive C. This consists of ROM, for permanent files such as the operating system, and non-volatile memory for application software and data
- (5) Keyboard (**Ref Fig 6-4**)



**Figure 6-4 Keyboard**

- (a) Main Keys

The keyboard works like a normal PC keyboard, with a few special features as outlined in this section.

The function that each key performs is shown by symbols on its top and on the keyboard overlay behind it.

The letter keys ( A, B, C etc) normally type small letters (a, b, c). To type a CAPITAL, hold down either of the  keys and type the letter required. If you want to type lots of capitals, press (and release) the 'Caps Lock' key to select "caps lock mode" and the letter keys will type capitals; use either of the  keys to type small letters. Press the 'Caps Lock' key again to return to normal typing.

Many of the keys have two or even three different symbols on them:

- The larger symbol, bottom left, is what the key types normally;
- The symbol in the top right is produced if you hold down either of the shift keys and the key at the same time;
- The symbol in the bottom right is produced if you hold down the 'Alt Gr' key and the key at the same time.

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### (b) Shift Keys

The shift, 'Ctrl', 'Alt' and 'Alt Gr' shift keys modify operation as normal for a PC keyboard.

The shift keys produce the character shown in the top right of the keytop (as described above).

The 'Alt Gr' key produces the character shown in the bottom right of the keytop ( as described above).

The 'Ctrl' key produces "control codes" which may be used to control your application.

The 'Alt' key may be used to type characters by typing their ASCII code on the numeric keypad ( see The Numeric Keypad later in this section).

The AMT also includes an additional shift key in the bottom left corner of the keyboard, the 'Paw' key. Hold this key down to use the additional characters and control functions shown in grey on the keyboard, namely:

'Paw' Key + Produces

'Esc' Pause

'F1' Decrease screen contrast

'F2' Increase screen contrast

'F3' Speaker on

'F4' Speaker off

'F5' Backlight on

'F6' Backlight off

'F7' (Reserved)

'F8' Country-specific characters

'F9' F11

'F10' F12

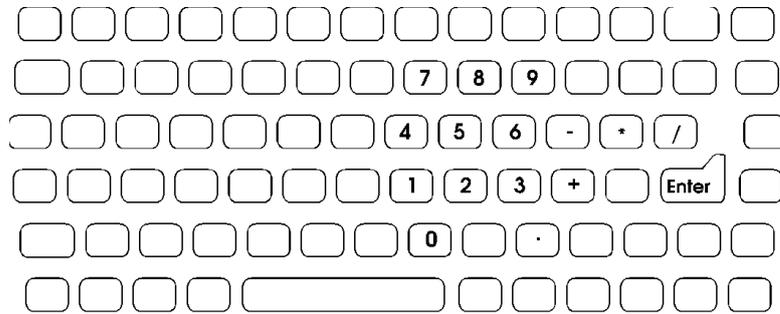
'PrtSc' Scroll Lock

These control functions are described in more detail in *Controls and Switches* later in this section.

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## Maintenance Terminal Manual (AMT)

(c) Numeric Keypad (Ref Fig 6-5)



**Figure 6-5 Numeric Keypad**

The keyboard also has an embedded numeric keypad, shown by the blue/green symbols on the keyboard overlay. To use it, enter 'Num Lock' mode by pressing the Paw key and 'Caps Lock'.

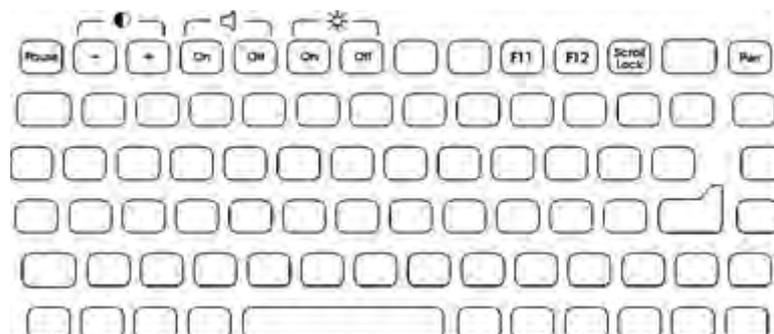
To return to normal keyboard operation, repeat the above key press.

(d) Typing Extended Characters

When used in 'Num Lock' mode, the 'Alt' key can be used to type characters that are not on the keyboard as follows:

- Select 'Num Lock' mode;
- Hold down the 'Alt' key and type the character's ANSI code using the numeric keypad keys (NOT the number keys along the back row of the keyboard). the ANSI codes are listed in DOS guides
- Release the 'Alt' key to type the character.

(e) Controls and Switches (Ref Fig 6-6)



**Figure 6-6 Controls and Switch's**

The AMT's controls and switches are all provided by keys and key combinations as follows:

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- To turn on or off press the 'PWR key. (The AMT may turn itself off to conserve power if inactive for a period.)
- To adjust the screen contrast (viewing angle), hold down the 'Paw' key and press 'F1' to decrease contrast, or 'F2' to increase contrast. release both keys when the contrast setting is best.
- To turn the screen backlight on, press the 'Paw' key and 'F5'. To turn the screen backlight off, press the 'Paw' key and 'F6'. To conserve battery power, the backlight will also turn off automatically after a short time (usually 5 minutes, but this period may be changed by your application).
- The AMT can produce a number of sounds via its speaker. To turn the speaker off, press the 'Paw' key and 'F4'; to turn it on, press the 'Paw' key and 'F3'. Turning off the speaker prevents all sound output, including:
  - Key clicks;
  - Low power warning beeps;
  - Tones to confirm PCMCIA Card insertion, removal and configuration;
  - Beeps, tones and other sounds produced by applications.

### C. Operation

#### (1) Turning the AMT On and Off

##### (a) Turning On

To turn the AMT on, press the 'Pwr' key in the top right of the keyboard.

When It turns on, the AMT will automatically start up in the maintenance Terminal programme.

##### (b) Turning Off

To turn the AMT off, press the 'Pwr' key.

To get the maximum working time from the batteries, turn the AMT off when you are not going to use it, even if only for a few minutes.

##### (c) Re-booting

Occasionally, you may need to reboot the AMT. For example, after changing the CONFIG.SYS or AUTOEXEC.BAT to bring changes into effect. Turning off and on again will not do this.

To reboot, hold down both the 'Ctrl' and 'PAW' keys and press the 'Pwr' key for a minimum of 3 seconds. You will see a series of messages that end either with your application running or the DOS command.

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### (2) PCMCIA Cards

#### (a) Using PCMCIA Cards

PCMCIA Cards are small credit-card size devices that can be used to add options to the AMT such as modems, memory, hard disk drives or network adaptors. In particular, the AMT uses Flash Memory PCMCIA cards for storing Calibration Data specific to each aircraft.

To install a PCMCIA Card, insert it into the top slot of the AMT's two external PCMCIA sockets accessed via a waterproof hatch on the right hand side of the case. (Note: PCMCIA Cards come in three thicknesses from Type 1 (thinnest) to Type 3 (thickest). You can fit two Type 1 or Type 2 Cards or a single Type 3 Card. The top slot is automatically designated as the 'F:' drive

#### (b) Fitting a PCMCIA Card

NOTE: This section assumes that the AMT has been set up to automatically recognise and configure PCMCIA cards when they are inserted by using the supplied Card Ware software. The AMT as supplied is set up to automatically recognise and configure Flash Cards.

NOTE: If any other fitting or preparation instructions are provided with the Card, read these too.

To insert a Card:

- I. Turn the AMT on;
- II. Open the PCMCIA hatch.
- III. Turn the AMT over and insert a fingernail under the catch;

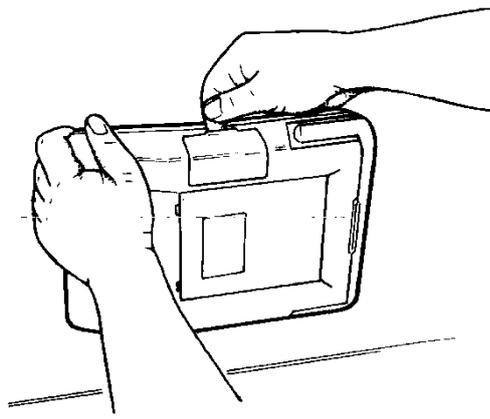
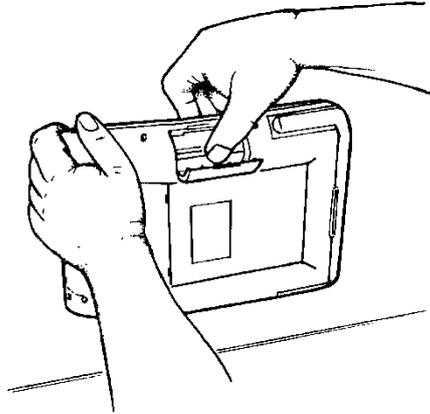


Figure 6-7 Opening PCMCIA Hatch - 1

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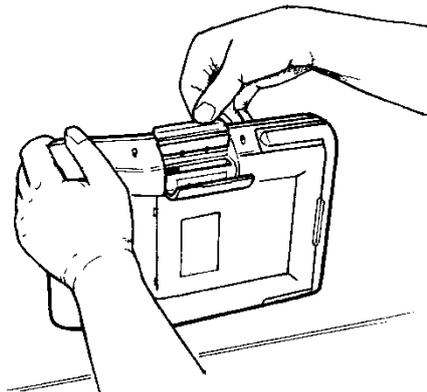
## Maintenance Terminal Manual (AMT)

Pull the catch towards you to open it, you can now grip the door (e.g. with your thumb);



**Figure 6-8 Opening PCMCIA Hatch - 2**

- IV. Rotate the door upwards to open it.

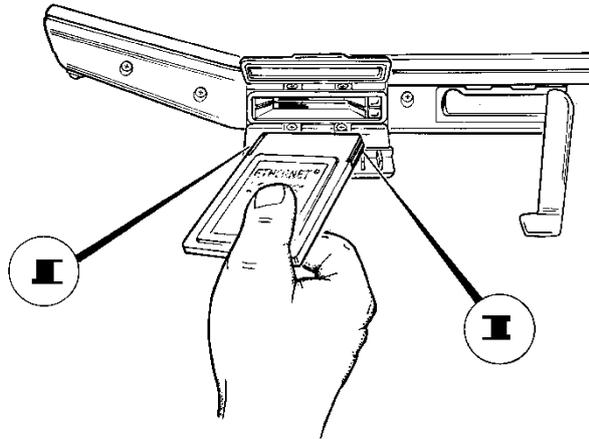


**Figure 6-9 Opening PCMCIA Hatch - 3**

- V. Remove the Card from its protective case. Be careful not to damage or contaminate the contacts.
- VI. Insert the Card, connector end first, the right way up. Most Cards are labelled with the correct orientation, but the best way is to check the ridges down each side of the Card; make sure that the double ones are to the right as shown in Figure 10. Remember that there are two sockets. If you are fitting a Type 1 or Type 2 Card, you can use either socket. If you are fitting a Type 3 Card, remove any other Cards first and use the lower socket.

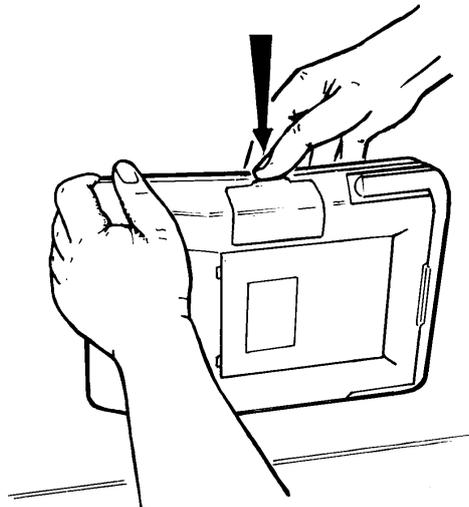
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**Figure 6-10 Inserting PCMCIA Card**

- VII. Press the Card home until the ejector pops up (you will meet some resistance first). If sound is enabled, you should hear a beep when the Card is fully inserted and recognised, and another (higher) beep when it has been configured.
- VIII. To check that the Card is fully inserted, make sure that the ejector has popped up so it is above the top of the card.
- IX. Close the hatch.



**Figure 6-11 Closing PCMCIA hatch**

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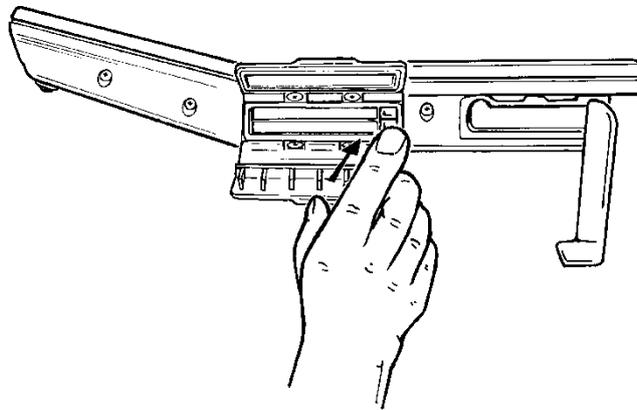
### (a) Using a PCMCIA Card

Once a PCMCIA Card has been installed and auto-configured, it should operate correctly. Refer to Section 5, Troubleshooting, if a PCMCIA Card does not operate correctly.

### (b) Removing a PCMCIA Card.

To remove a PCMCIA Card:

- I. Press the ejector button next to the Card until the Card pops out. You will meet some resistance first.



**Figure 6-12 Removing PCMCIA Card**

- II. Pull the Card from the socket and put it back in its protective case.

### (3) Batteries and Power

#### (a) Introduction

The AMT uses two types of battery.

There is a removable, rechargeable main battery pack. This is normally the main power source for mobile operation. The battery pack is a Duracell DR30 NiMH (Nickel Metal Hydride) and can be charged internally by using the AC Adaptor.

There is a fixed internal backup battery, trickle charged from the main power source. This provides sufficient power to maintain all the information stored on the AMT for at least 72 hours even if the main power source fails.

The AC Adaptor can be used to power the AMT for desktop operation and to recharge the main battery pack.

#### (b) The Main Battery

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The NiMH battery pack is reliable and has a long life. In normal operation, you simply need to recharge it when it runs down and replace it at the end of its useful life. In standard operation, with full power saving facilities enabled, a full charge will last up to 10 hours.

If you have a spare battery pack, you can swap batteries at any time to extend operating time.

If you follow the few simple instructions and cautions in this manual, each battery pack should last for approximately 500 charge/discharge cycles.

### (c) Maximising Operating Time

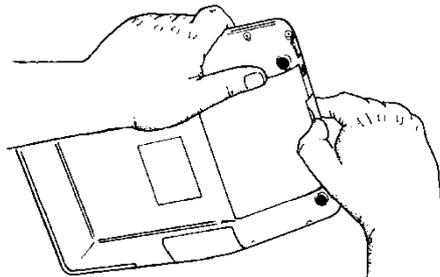
The AMT has a range of power-conservation facilities that help get the maximum operating time from the battery pack. For best results, you simply need to:

- I. Make sure it is fully charged.
- II. Always turn the AMT off when not using it.
- III. Use the backlight sparingly.

### (d) Checking/Swapping the Battery Pack

You should check the battery pack visually at least twice a year.

- I. Turn off
- II. Turn the AMT over and insert a finger or thumb nail under the catch.

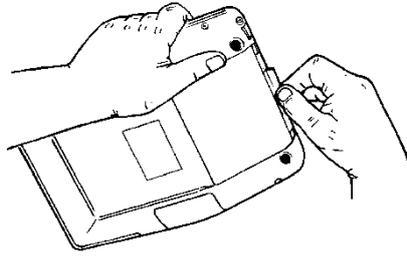


**Figure 6-13 Opening Battery Hatch - 1**

- III. Lever the catch away from you to open it. You can now grip the door.

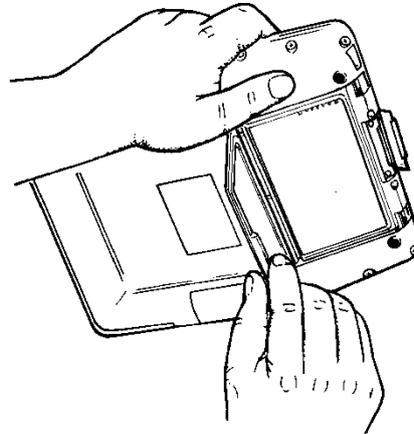
# ULTRA

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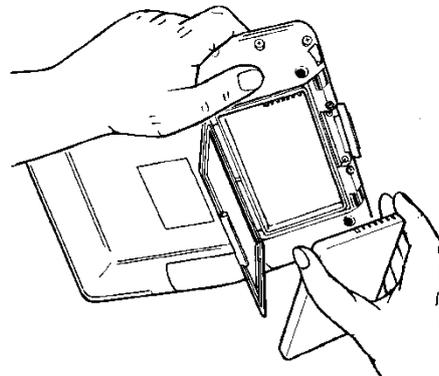
**Figure 6-14 Opening Battery Hatch - 2**

- IV. Rotate the door towards you to open it.



**Figure 6-15 Opening Battery Hatch - 3**

- V. Tilt or turn the AMT over and the battery pack will drop down so that you can remove it.



**Figure 6-16 - Removing Battery Pack**

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- VI. Examine the battery pack for leaks or cracks. If you see any, remove it and replace it with a new battery pack immediately. See *Swapping Battery Packs* later in this section.

CAUTION: BATTERY LEAKAGE IS CORROSIVE. In the unlikely event of battery leakage, do not touch. In case of accidental contact, rinse immediately with running water.

- VII. Examine the compartment for signs of ingress of water, such as white deposits or corrosion of contacts. If you see any, clean them as well as you can and check the battery hatch seals and closure mechanism. If these are damaged, return the unit to Ultra Electronics Ltd.
- VIII. Fit the battery again and close the battery hatch. Make sure that it is fully closed (flush) to ensure a good fit.

### (e) Swapping Battery Packs

If you have a spare charged battery pack, you can swap it at any time with the one fitted to the AMT to double operating time. If you are responsible for your own routine maintenance, you may also replace the main battery when it reaches the end of its useful life (typically 500 charge/discharge cycles).

NOTE: Only use the Duracell DR30 (or compatible) battery pack specifically designed for use with the AMT.

- I. Fit the new battery pack by dropping it into the battery compartment so that it fits over the charging contacts and lies flat. (It will only fit the correct way round.)
- II. Close the hatch. Make sure it is fully closed (flush) to ensure a good fit.
- III. Fully charge the battery pack (see *Charging* later in this section.) A new battery pack should have no charge.
- IV. If you are simply swapping battery packs, charge the one you have removed so it is ready when you need it. (See *Battery Disposal* later in this section.)

### (f) Charging

To maintain a battery pack's capacity and prolong its working life, you should ideally only recharge it when it is almost fully discharged (i.e. when the AMT is displaying battery low warnings). This is the recommended procedure if you can conveniently recharge during your working day or can carry a spare (charged) battery pack. If not, simply remember to recharge the battery pack if it does not have enough charge to see you through the day.

NOTE: Only use the AMT AC Adaptor to charge the AMT.

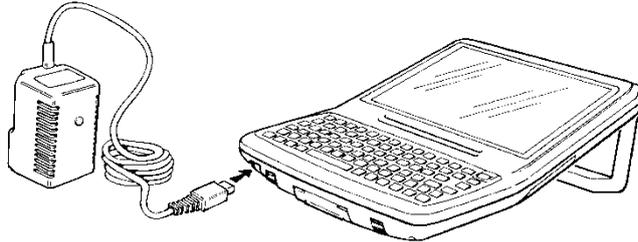
To recharge the battery:

- I. Turn the unit off.

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- II. Plug the AC Adaptor into the power socket on the front of the AMT.



**Figure 6-17 Recharging Battery Pack**

- III. Plug the AC Adaptor into an AC socket and turn on the AC supply (if switched). The Adaptor has a red indicator to show charging.
- IV. Leave the battery to charge. This may take up to 10 hours for a fully discharged battery providing the AMT is turned off while charging.
- V. When charging has finished, turn off the AC supply and then disconnect the AC Adaptor from the AMT and the AC supply.

You may turn the AMT on and use it while charging the battery but this will increase the charging time considerably. In an extreme case, with high current peripherals attached and in constant use, this may even prevent charging entirely.

### (g) The AC Adaptor

The AC Adaptor can be used as the main power source when conditions permit. A battery pack must still be fitted to the AMT to use the AC Adaptor.

NOTE: The AC Adaptor is for indoor use only.

- I. Turn the unit off.
- II. Plug the AC Adaptor into the power socket on the front of the AMT.
- III. Plug the AC Adaptor into an AC socket and turn on the AC supply (if switched). The Adaptor has a red indicator to show charging.
- IV. You can now use the AMT exactly as if operating from the main battery pack. Note that the usual power-saving function still operate even though power is not being drawn from the battery pack. The main battery pack will also charge automatically.
- V. You can turn the AMT off or on as normal, using the 'Pwr' key.
- VI. When you have finished operating the AMT from the AC Adaptor, turn off the AC Supply (if switched) and then disconnect the Adaptor from the AMT and the AC supply.

### (h) Backup Battery

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The internal backup battery is charged automatically from the main AMT power source (battery pack, AC Adaptor). If fully charged, it provides sufficient power to maintain all information stored in the AMT for at least 72 hours if all other power sources are lost. It does NOT provide sufficient power to operate the AMT or any peripherals.

If the backup battery is exhausted, it may take up to a week to fully recharge once main power is restored.

The backup battery is designed to last for the lifetime of the AMT and is not user replaceable. If you consider that the backup battery is failing or faulty, contact Ultra Electronics Ltd.

### (i) Battery Disposal

The batteries contained in the AMT are recyclable. At the end of their useful life, depending on applicable local and national law, it may be illegal to dispose of the batteries through the municipal waste system. Check with your local solid waste officials for details of the recycling and disposal options in your area,

### (4) Storage

If you need to store the AMT for more than a few days, carry out the following:

- (a) Fully charge the battery pack.
- (b) Exit any applications that are running.
- (c) Store any data files on non-volatile storage to avoid the possibility of data loss.
- (d) Disconnect any peripherals or cables.
- (e) Make sure that the 'Pwr' key cannot be pressed accidentally.
- (f) Recharge the battery pack fully at least once a month.

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### D. Specification

Feature	Specification
Construction	Die cast magnesium alloy case with integral handle
Size	280mm x 214mm x 43mm (11" x 8.4" x 1.7")
Weight	2 Kg (4.4 lb)
Environmental Standards	Meets IEC 68, MIL-STD-810E, BS2011 standards for temperature, moisture and immersion, dust and sand, drop test, shock, vibration and altitude.
Temperature range	
- Operating	-20°C to +60°C (-4°F to +140°F)
- Storage	-30°C to +60°C (-22°F to +140°F)
Sealing	Waterproof against accidental immersion (IP67)
Shock	Designed to withstand 2m (6' 6") drop onto hard surface
Electromagnetic compatibility (EMC)	EN55022 and FCC part 15 class B
Electrostatic discharge (ESD)	15 kV (non-contact) and 8 kV (contact) : EN55101
Screen	
Type	Passive VGA STN LCD display
Resolution	640 x 480 pixels
Backlight	Integral electroluminescent panel
Protection	Replaceable polycarbonate shield
Keyboard	81 tactile double shot keys arranged in a QWERTY configuration PC-AT compatible All keys software programmable
Microprocessor	25 MHz 80486slc
Operating system	MS-DOS v 6.22 in ROM
Memory	
Types	Low power RAM and Flash EPROM
Data retention	Automatic, battery-backed
RAM	2MB
Flash	-
Calendar clock	PC compatible
Communications	COM 1: 16550 RS232/V24 via DB9 COM 2: 16550 RS223/V24 via DB9 LPT 1: Bi-directional enhanced parallel port via male DB25
PCMCIA	
Standard	PC card Specification 2.1
Connections	2 user accessible slots housing two Type 1, Type II or a single Type III card
Battery	
Type	Standard Duracell DR30 NiMH pack
Rating	2.4 Ahr at 7.2V
Charge life	10 hours typical
Charging	Batteries in unit or external
Charge time	10 hours or 1 hour with optional fast charger