



COMPUTER CONTROLLED AIR DATA TEST SET Type D60340MK

Operating Manual

PIM415-O

November 2019



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CCADTS 2**Type D60340MK**

Operating Manual

NOTE: Before installing, operating or performing any of the required maintenance tasks using this equipment, please ensure that you are using the latest (current) version of this manual. Check the revision status of the manual by accessing the following link:
<https://www.curtisswrightds.com/support/technical/christchurch.html>

You will be able to view the Technical Publications Registers and if necessary request a copy of the current revision.

This manual is provided for information and guidance only. It does not supersede the Aircraft Maintenance Manual (AMM), which remains the prime reference source for any work to be done on aircraft systems.

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The operating procedures given in this manual have been written on the assumption that personnel performing the procedures have received training of a standard adequate to enable them to do so, and are qualified in the appropriate operating techniques. Such personnel are deemed also to be competent to act at all times with due regard to the safety of themselves and of the equipment.

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AMENDMENT RECORD

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PREFACE

About this manual

This Operation manual relates to the Computer Controlled Air Data Test Set Type 2 P/N D60340MK.

Who should read this manual?

First time users of CCADTS 2 equipment should read this manual.

It introduces the features of the CCADTS 2 equipment interface and operation that you need to understand to become competent in the use of these products.

How to use this manual

Each chapter in the manual builds on concepts introduced in previous chapters, so work through the chapters sequentially.

Conventions used in this manual

Convention

Arial Bold

Verdana

Verdana Bold

Margin notes

Usage

Headings

Normal text

Strings you should type, field names you should type into and dialog buttons you should click on of the Windows recovery and replay software.

Example: Enter **Filename** in the **Save As** field.

Click **OK**

To show and name tools that are described in adjacent body text.

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Mouse operations used in this manual are defined below:

Operation	PC
Click	Click the left mouse button
Double click	Click the left mouse button twice
Right Click	Click the right mouse button
Drag	Click and hold down whilst moving the mouse

What do I need before I begin?

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The operating procedures given in this manual have been written on the assumption that personnel performing the procedures have received training of a standard adequate to enable them to do so, and are qualified in the appropriate operating techniques. Such personnel are deemed also to be competent to act at all times with due regard to the safety of themselves and of the equipment.

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Curtiss-Wright (P & G) Website

The Curtiss-Wright website at www.curtisswrightds.com contains information relating to the company product range, services and contact information.

INTRODUCTION

This document fulfils the requirement called for in the introduction to ATA iSpec. 2200, by providing a description of the Penny & Giles Aerospace Ltd, CCADTS 2 equipment and detailing the operating and maintenance procedures required supporting the equipment in service.

This Instruction Manual contains information on the operational features available on the Computer Controlled Air Data Test Set 2 (CCADTS 2), part number D60340MK.

The CCADTS 2 has been designed to be sufficiently rugged for 1st line at-aircraft applications, with accuracy suitable for 2nd and 3rd line workshop use. It is a totally self-contained unit providing the vacuum and pressure sources required for 1st line use.

The CCADTS 2 comprises a main Calibrator/Control Unit (CCU), which houses the pneumatic controls, sensors and computer, and a Remote Control and Display Unit (RCDU). The RCDU is connected to the CCU by a 25m cable (detachable at the CCU) and can be either hand held during use, or mounted in its stowage position on the front of the CCU. Communication between the CCU and the RCDU is via the RS485 serial data protocol.

The control and measurement system is based on a multi-processor architecture, utilizing 16-bit digital control, and circuitry developed from airborne primary air data computers. The pressure sensors employed for measurement in the CCADTS 2 are of the vibrating cylinder type designed for air data applications. There are two such sensors used; one per channel. Solid-state silicon piezo-resistive pressure sensors are employed for controlling rates and pressure/vacuum demands.

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If any difficulty is experienced in the use of this manual, contact the following for assistance:

Customer Support

Penny & Giles Aerospace Limited

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E-mail: CS_Technical_Services@curtisswright.com

DESCRIPTION, OPERATION AND SPECIFICATION

1. INTRODUCTION

The front panel of the CCADTS 2 Calibration Control Unit (CCU) is shown in Fig. 1. The Remote Control Display Unit (RCDU) is shown in its stowage position and the positions of all controls and interface connectors are clearly identified.

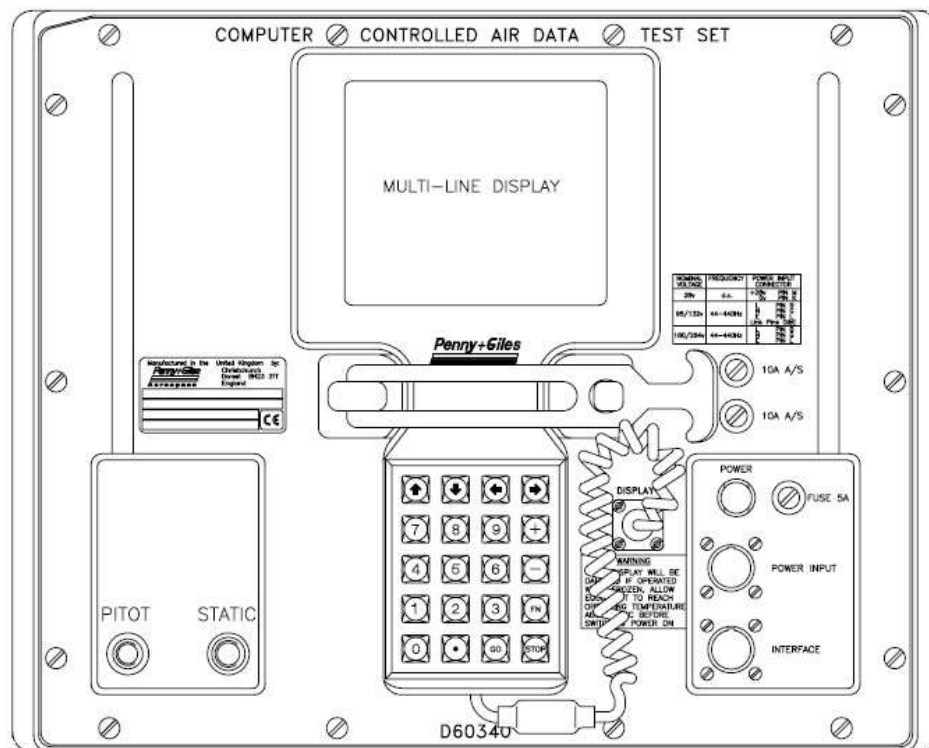


Figure 1 CCU Front Panel Layout

2 CALIBRATOR/CONTROL UNIT

Power is applied to the CCADTS 2 via a multi-way power input connector on the right-hand console of the CCU front panel. Two leads are provided, one for a.c. and the other for d.c. Any one of four power options may be used. For further details, refer to the System Specification.

The CCADTS 2 has integral vacuum and pressure supplies generated via a multi-headed dry diaphragm pump. The pump operates only when pressure is demanded and hence runs intermittently during operation of the CCADTS 2.

Two fuses are provided; one for the control electronics and one for the pump.

RCDU Extension Cable P/N SA48739MK5 can be supplied with this unit. Please contact Penny & Giles for details on cost and lead-time.

3 REMOTE CONTROL AND DISPLAY UNIT

Various operational modes may be selected and controlled from the menus presented on the RCDU liquid crystal display. The layout of the RCDU is shown in Fig. 2. Reference to this figure will be of assistance when reading the operating instructions.

The RCDU keyboard comprises a 5 by 4 key array with numbers 0 to 9, plus (+), minus (-) and decimal point (.). The four arrow keys (⬅️➡️⬆️⬆️) on the top line of the keyboard are all cursor control keys. In addition to its basic function of negating any input values, the minus sign is used, together with the plus sign, to change the displayed units. The plus key is only used for inputting a positive number if the previous number entered was a negative number. The GO key is used for entering parameters and also to start pressurization during control procedures. The FN key is used to access a number of Function options, such as Screen Contrast. The STOP key is used to exit from any mode and return to the previous menu page or, with multiple key presses, to the main menu. Any pressures within the system at that time will be held until another mode of operation is selected.

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All the CCADTS 2 functions can be accessed and controlled from the RCDU main menu, either directly or via its sub-menus. The standard format for the menus and operational displays is to present information on the screen in three sections. The top section comprises the header and includes the function/menu title. The second is the main body of the text and comprises the function/menu information, including data if applicable. The third, and final, section comprises prompt information and any system status or error messages. Status and error messages are displayed in reverse video format. Menu/sub-menu options can be accessed by direct keying of the associated numeral or, alternatively, by positioning the cursor and pressing GO.		
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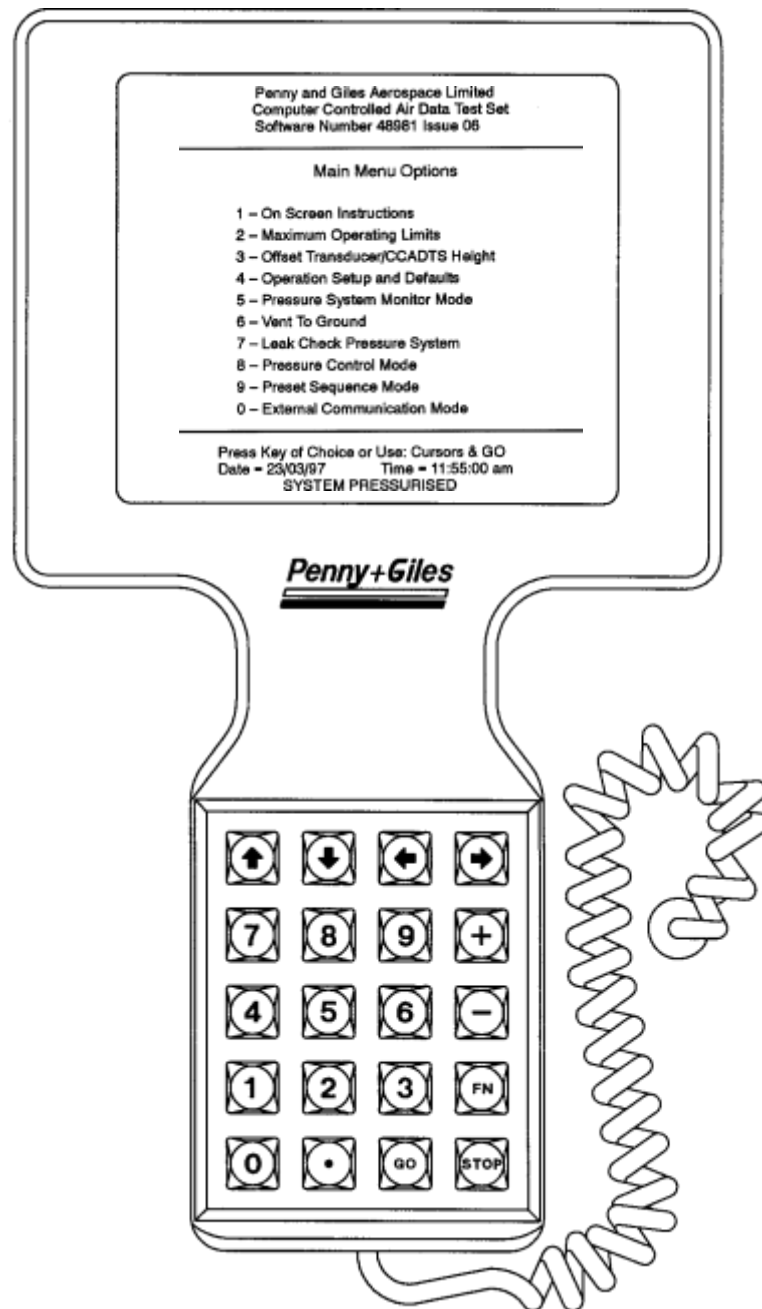


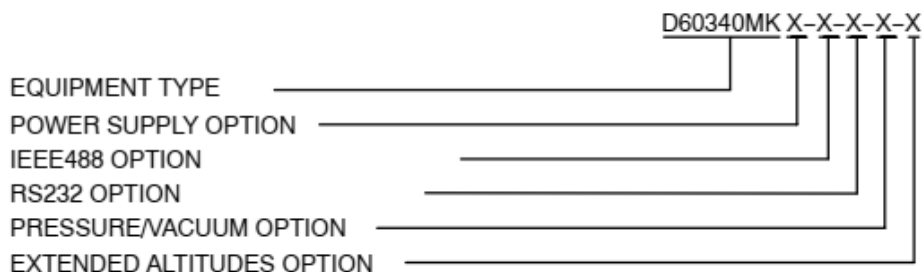
Figure 2 RCDU Layout

CCADTS 2
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The CCADTS 2 has been designed for optional configuration as a fully-automated test and calibration system using either the RS232 Serial Communication Protocol or the IEEE488 General Purpose Interface Bus (GPIB) Protocol, together with an IBM-compatible PC.

The incorporation of these facilities within CCADTS 2 is an option rather than a standard feature (refer to the System Specification) and this is reflected in the RCDU menu. Unless specifically requested by the Customer at the time of purchase, the RCDU screen at present only calls up the RS232 protocol for use with Preset Sequence Software (PSS) package SA130434MK1, where supplied.

For further information on the PSS package, refer to the Penny & Giles Installation and Operating Manual PIM411-I.

5 SYSTEM SPECIFICATION**A. Part Numbering Code****B Physical and Other Characteristics**

Dimensions (Nominal):	No. 23S/3 RAE Box Housing 443 x 354 x 455mm (17.4 x 13.8 x 18.3in)
Weight:	31.8kg max. (70 lb max.)
Operating Temperature:	-5°C to +45°C
Storage Temperature:	-30°C to +65°C
Power Options: (See part numbering code)	21V to 32V d.c., 200W) 240V 50Hz a.c., 250VA) Code = 0 110V 60Hz a.c., 250VA) 115V 400Hz a.c., 250VA)

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Interfaces: Parallel Communication IEEE488 (not available) = 1
(See part numbering code) Not installed = 0
Serial Communication RS232 (not available) = 2
Pre-set sequence capability (optional) = 1
Not installed = 0

Pressure/Vacuum Sources: Internal Pump = 1
(See Part numbering code) External Input (not available) = 0

Extended Altitude Range: Yes = 1, No = 0

C Functional Characteristics

NOTE: Accuracy includes all measure and control errors, but is subject to displayed resolution. Linear interpolation applies for intermediate values.

1. Altitude/Static Pressure (S)

Maximum Calibrate Range

(Actual ranges factory set prior to delivery) -3kft to 55kft (80kft optional)

Ambient Temperature (+15°C to +30°C) ±5ft @ -3kft
±5ft @ 0ft
±12ft @ 30kft
±20ft @ 55kft (±50ft @ 80kft)

Temperature Coefficient (-5°C to +45°C) 0.09ft/°C @ -3kft
0.10ft/°C @ 0ft
0.19ft/°C @ 30kft
0.28ft/°C @ 55kft
(0.34ft/°C @ 80kft)

Displayed Resolution 1ft

Units mbar (millibar)
ft (feet)
inHg (inches of Mercury) psi
(pounds/square inch)
m (metre)

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2. Airspeed/Dynamic Pressure (P-S)

Maximum Calibrate Range (Actual ranges factory set prior to delivery)	60kts to 500kts (20kts to 1000kts optional)
Ambient Temperature (+15°C to +30°C)	±0.8kts @ 20kts (20kts accuracy applies to measure only) ±0.5kts @ 240kts ±0.3kts @ 500kts (±0.2kts @ 1000kts)
Temperature Coefficient (-5°C to +45°C)	0.14kts/°C @ 20kts 0.124kts/°C @ 240kts 0.011kts/°C @ 500kts (0.007kts/°C @ 1000kts)
Displayed Resolution	0.1kts
Units	mbar (millibar) kts (knots) km/h (kilometres/hour) inHg (inches of Mercury) psi (pounds per/square inch)

3. True Airspeed

Maximum Calibrate Range (Actual ranges factory set prior to delivery)	60kts to 600kts (20kts to 1250kts optional)
Ambient Temperature (+15°C to +30°C)	±3.0kts
Temperature Coefficient (-5°C to +45°C)	0.03kts/°C
Displayed Resolution	0.1kts
Units	kts(knots)

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4. Mach

Maximum Calibrate Range (Actual ranges factory set prior to delivery)	0.1 to 1.0 (4 optional)
Ambient Temperature (+15°C to +30°C)	±0.005
Temperature Coefficient (–5°C to +45°C)	0.0002/°C
Displayed Resolution	0.001
Units	N/A

5. Altitude Rate (Static volume 0.2 to 15 litres)

Maximum Calibrate Range (Actual ranges factory set prior to delivery)	0 to 5kft/min (up to 15 litres) 0 to 15kft/min (up to 5 litres)
Ambient Temperature (+15°C to +30°C)	±25ft/min or +/-1% of command (whichever is greater)
Coefficient (–5°C to +45°C) Temperature	1.2ft/min/°C
Displayed Resolution	1ft/min
Units	ft/min (feet/minute) m/min (metres/minute)

6. Engine Pressure Ratio (EPR)

Maximum Calibrate Range (Actual ranges factory set prior to delivery)	1 to 2.5
Ambient Temperature (+15°C to +30°C)	±0.006 @ 1.0 ±0.013 @ 2.5
Temperature Coefficient (–5°C to +45°C)	0.00002/°C @ 1.0 0.000008/°C @ 2.5
Displayed Resolution	0.001
Units	N/A

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Maximum Calibrate Range (Actual ranges factory set prior to delivery)	50 to 1000kts/min
Ambient Temperature (+15°C to +30°C)	±2kts/min or ±2% of command (whichever is greater)
Temperature Coefficient (−5°C to +45°C)	0.02kts/min/°C Displayed
Resolution	1kts/min
Units	kts/min (knots/minute) km/hr/min (kilometres/hour/minute).

D. Packing and Storage

CAUTION: IF THE EQUIPMENT HAS BEEN SUBJECT TO VERY LOW TEMPERATURES, FOR EXAMPLE DURING TRANSIT IN THE HOLD OF AN AIRCRAFT, THERE MAY BE A RISK THAT THE LIQUID CRYSTAL DISPLAY WITHIN THE RCDU HAS FROZEN. CARE MUST BE TAKEN TO ENSURE THAT THE EQUIPMENT IS GIVEN TIME TO RECOVER TO NORMAL OPERATING TEMPERATURES BEFORE ATTEMPTING TO APPLY POWER TO THE EQUIPMENT.

CCADTS 2 is packaged for transit in a standard Penny & Giles Aerospace trade container. If stored undisturbed within this container its storage life is 12 months, provided it is stored at an ambient temperature of −30°C to +65°C and a relative



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INSTALLATION

1 INTRODUCTION

The CCADTS 2 has been specifically designed for ease of use, minimizing connections and controls. The CCU is intended to remain out of the way on the hangar floor, whilst the RCDU may be taken into the aircraft cockpit and connected by means of its detachable cable through a window. During installation, reference should be made to Fig. 1 for locations of all controls and interface connectors.

2 ELECTRICAL CONNECTIONS

A. Power Input

NOTE: As an alternative to this section, the document should state:

The following cables will be supplied as complete (this will negate the need to make-up a power lead):

- P/N SA48061MK28 power input lead 28V
- P/N SA48061MK115 Mains lead 115V
- P/N SA48061MK240 Mains lead 240V

CCADTS 2 is provided with the appropriate power lead for operation within either Europe or the USA. However, CCADTS 2 can be powered from alternative sources by means of purpose-made leads (see Table 1).

All power connections should be made via the multi-way power input socket on the right hand console of the CCU.

NOTES: 1. Power leads are supplied without fitted plugs.

2. When CCADTS 2 is installed in a truck the power input should be made via the Cooling Fan unit P/N D60305MK11100, not directly to CCADTS 2.

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Table 1 Power Input

NOMINAL VOLTAGE	POWER INPUT CONNECTOR
21 - 32V d.c.	+28V - Pin M 0V - Pin K
110/115Va.c.	L - Pin B N - Pin G E - Pin L Link Pins D & E
240Va.c.	L - Pin B N - Pin G E - Pin L

B. RS232 and IEEE488

An option exists for the CCADTS 2 to be operated within an ATE environment. The RS232 connector and the IEEE488 connector are located on the right-hand side of the CCU electrical console. To connect the CCADTS 2 for either IEEE or RS operation, the IEEE or RS232 cable from the controller (typically an IBM-compatible PC) is simply plugged into the CCU connector. At present, however, the standard CCADTS 2 software does not cater for this feature, with the exception of using an RS232 protocol for downloading Preset Sequence data (where supplied) from a PC.

C. Peripheral Interface

This connector is provided to interface with a range of optional accessories. The Electronic Pressure Distribution/Isolation Unit Type 060371, where supplied, should be connected using the special lead provided with the unit.

3. PIPE CONNECTIONS**A. External Pressure/Vacuum Inputs**

Although the CCADTS 2 has an integral pump for pressure/vacuum generation, an option exists for external sources to be connected via the threaded ports in the pneumatic console on the front face of the CCU. At present, however, the standard CCADTS 2 software does not cater for this feature. It must be requested by the Customer at time of ordering.

B. Pitot/Static Pressure Outputs

The Pitot and Static threaded ports are located in the pneumatic console on the front face of the CCU. Connections should be made using the colour-coded hoses (Blue for Static; Red for Pitot) and self-sealing adaptors provided.

C. Aircraft Connections

To ensure full protection of the aircraft pitot/static system under test, the Pitot and Static lines should always be connected to a common system (i.e. with the Pitot and Static ports corresponding to the same system). A full range of adaptors is available to suit most pitot probes and static ports.

D. Airspeed Indicator Connections

For accurate results when testing airspeed indicators, both the Pitot and the Static lines must be connected to ensure that true differential pressures are applied.

E. Altimeter Connections

When testing altimeters, it is only necessary to connect the Static pipe. However, it is essential that the Pitot port remains sealed; i.e. the mating hose connector from the Pitot self-sealing adaptor must be disconnected.

F. Vertical Speed Indicator Connections

Vertical speed indicators should be connected in the same manner as altimeters.

G. Engine Pressure Ratio Connections

When conducting Engine Pressure Ratio (EPR) tests, the CCADTS 2 Pitot line must be connected to the engine PT 2 port and the Static line connected to the PT 7 port.

4. DISCONNECTION

Although disconnecting the RCDU whilst powered will not cause damage to either the RCDU or CCU circuitry, as a precaution, power should be switched off from the CCU before doing so. This prevents the risk of arcing at the connector pins.

NOTE: The CCU will continue to control to the last demanded pressure with or without the RCDU connected. Reconnection of the RCDU to the CCU whilst switched on, will stop the control of the CCU until recommended.



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OPERATION

1 POWER UP

With all connections made, power is applied to CCADTS 2 via the POWER button located on the right-hand console of the CCU. This starts up the internal cooling fan, illuminates the green 'Power On' signal lamp, and provides illumination to the RCDU screen. From this point on, the CCU can be ignored as all operations are controlled from either the RCDU or, if the IEEE488 or RS232 options are fitted, a remote PC. Upon switching on, the display in Fig. 3 appears on the RCDU video screen.

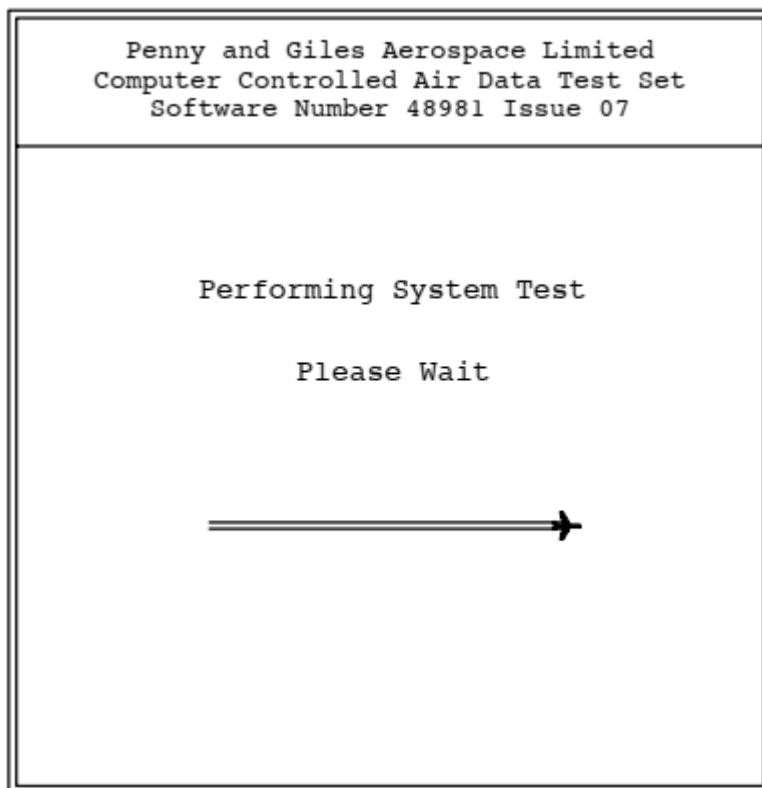


Figure 3 RCDU Opening Screen

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After approximately 15 seconds, during which time the system performs a check on internal circuitry and memory, the display changes to display a screen for entering the maximum operating limits (Fig. 4). Should the display not change, then the self-test routine has detected a fault and the user should contact the Customer Support Department of Penny & Giles Aerospace at the address given on page 1 of this manual. In addition to the part number, the software number (including issue) and the serial number of the equipment should be quoted in any correspondence.

If, when CCADTS 2 is powered up, the pressures are in excess of the maximum operating limits, the system is vented to atmosphere at the maximum operating rates. The message 'LIMITS EXCEEDED - VENTING SYSTEM' is shown. If the user presses GO or STOP (from a pressure control page) then once the pressures are back within range the vent is halted and the message cleared. Control can then be resumed.

Should the power fail, at any time, the CCADTS 2 automatically vents the system down to atmosphere, at a safe rate (approximately 6,000 ft/min at 50,000 ft). This is achieved by allowing two solenoid operated valves to open; one equalizing pitot and static pressures, whilst the other simultaneously vents the static channel via a factory set restrictor. When power is restored, the default values of operating limits are reinstated and the user must re-enter the required values for the tests being performed if they differ from these defaults.

Should power be restored at pressures in excess of the default values of maximum operating limits, i.e. before the system is totally vented, then CCADTS 2 inhibits operation until pressures are below the default values.

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Entry of Maximum Operating Limits

Maximum Altitude = 45000 feet
(limit : 80000 feet)

Maximum Airspeed = 500.0 knots
(limit : 1000.0 knots)

Maximum Mach Number = 0.890
(limit : 4.000)

Maximum Altitude Rate = 5000 feet/min
(limit : 20000 feet/min)

Maximum Airspeed Rate = 300 knots/min
(limit : 2000 knots/min)

Use cursor buttons to edit limits
Press STOP to return to main menu

Figure 4 Maximum Operating Limits

2 MAXIMUM OPERATING LIMITS

CAUTION: INCORRECT USE OF THE CCADTS 2 CAN CAUSE DAMAGE TO EQUIPMENT UNDER TEST.

The CCADTS 2 is supplied with a set of power-on default maximum limits which have been pre-programmed by PGAL to suit the Customer's requirements. These default values, which can be redefined by the user, provide an operating envelope which prevents inadvertent entry of incorrect pressure values; thereby protecting the equipment under test. Prior to using CCADTS 2 for any pressure control or measurement operations, they must be reviewed and, if required, amended for the tests to be performed subsequently. In addition to appearing after the system is initialized, the 'Entry of Maximum Operating Limits' page (Fig. 4) can be accessed via Option 2 on the RCDU main menu.

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The CCADTS 2 will not accept an entered value which is outside the maximum operating limits as defined via Option 2 on the RCDU main menu. If an attempt is made to enter an out-of-range value, an appropriate error message is displayed in reverse video at the bottom of the screen.

The cursor can be moved from line to line by use of the UP and DOWN arrow keys to enable the desired value for each parameter to be re-entered using the numerical keys. Individual digits can be altered by positioning the cursor with the LEFT and RIGHT arrow keys. Once all parameters are correctly entered, they are accepted by pressing the STOP key, which action also pulls up the RCDU main menu page for display.

On power-down the user-defined limits will not be retained. It is therefore important to review the default values every time the CCADTS 2 is powered up. Furthermore, after Preset Sequence operation, the limits are automatically reset to those that were in use prior to the Preset Sequence mode being entered and the limits must therefore also be reviewed on exit from the Preset Sequence Mode.

3 FUNCTION UTILITIES

When the FN key is pressed, various supplementary utility options are accessed, subject to the current mode of operation. Should no further key be pressed within 5 seconds of pressing FN, the display reverts to the previous screen.

A. Display Contrast

If FN is pressed while the RCDU displays the main menu, the UP and DOWN arrow keys adjust the display contrast. Holding one of these keys depressed changes the contrast either up or down successively.

B. Parameter Nudge

When FN is pressed in any control mode, the set parameters can be nudged up or down by moving the cursor onto the desired digit of the parameter value and pressing the +/- keys accordingly. Holding these keys depressed nudges the parameter up or down in successive increments.

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C. Password Entry

When FN is pressed in Main Menu Option 4 – Operation Setup & Defaults, a prompt for a password is displayed. This allows control of access to extra options, preventing possible corruption.

4 OPERATING MODES (RCDU MAIN MENU)

CAUTION: NO HOSES SHOULD BE DISCONNECTED FROM THE CCADTS 2 UNTIL 'SYSTEM VENTED' IS DISPLAYED ON THE STATUS LINE.

All the CCADTS 2 functions can be accessed and controlled from the RCDU main menu (Fig. 5).

Penny and Giles Aerospace Limited Computer Controlled Air Data Test Set Software Number 48981 Issue 07	
Main Menu Options	
1	On Screen Instructions
2	Maximum Operating Limits
3	Offset Transducer/CCADTS Height
4	Operation Setup and Defaults
5	Pressure System Monitor Mode
6	Vent To Ground
7	Leak Check Pressure System
8	Pressure Control Mode
9	Preset Sequence Mode
0	External Communication Mode
Press Key of Choice or Use: Cursors & GO Date = 04/06/98 Time = 12:55:00 SYSTEM PRESSURISED	

Figure 5 RCDU Main Menu

All menu/sub-menu options can be accessed by direct keying of the associated numeral or, alternatively, by positioning the cursor over the

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menu number and pressing GO.

Where parameter values are to be entered, the numerical keys are used. Once all parameters have been input correctly, the STOP key is depressed to accept the values and exit to the main menu page.

The lines at the bottom of the screen provide information for the user. A status message is present on the bottom line of the display whenever the main menu is on the screen. This indicates current status information such as whether the system is pressurized or vented. A list of status messages follows:

COARSE LEAK PASS NO LEAKS DETECTED ALREADY AT THE END
ALREADY AT THE BEGINNING SYSTEM PRESSURISED SYSTEM
VENTED
PLEASE WAIT – VENTING SYSTEM TEST DATA RX RETRY
ALREADY AT THE FIRST TEST AT THE END OF THE SEQUENCE
PLEASE WAIT – DOWNLOADING DATA PSS DOWNLOAD
DESELECTED
PSS DOWNLOAD – CCADTS READY PSS REMOTE DOWNLOAD
PASSED
PITOT PRESSURE ACHIEVED (In control airspeed mode only)
STOPPED
PRESS GO TO RESTART THE TEST.

In pressure controlling modes, the bottom line displays not only status information but also reports any error conditions. Above the status line are two user-prompt lines. The messages displayed in these two lines provide information to aid the user in operating the CCADTS 2.

At all times during the operation of the CCADTS 2, Altitude and Airspeed pressures and Mach number are constantly monitored to ensure that they are within the maximum operating limits previously selected. Should these be exceeded for any reason, the system detects this, displays an error message, removes control from the keypad, and proceeds to vent the system safely to ambient conditions.

The internal sensor output signals are also monitored and if, at any time, these are considered to be outside tolerances, then a SYSTEM FAULT message is displayed, indicating which sensor is out of limits. A full list of fault messages follows:

LEAK DETECTED IN PITOT AND STATIC LEAK DETECTED IN STATIC

COARSE LEAK FAIL IN PITOT AND STATIC COARSE LEAK FAIL IN
PITOT LINE COARSE LEAK FAIL IN STATIC LINE ALTITUDE OUT OF
RANGE ERROR AIRSPEED OUT OF RANGE ERROR MEASURED
OAT OUT OF RANGE

STATIC PRESSURE OUT OF RANGE DYNAMIC PRESSURE OUT OF
RANGE MACH NUMBER OUT OF RANGE ALTITUDE RATE OUT OF
RANGE

PEED RATE OUT OF RANGE

ALTITUDE OUT OF RANGE ERROR (when nudging in PSS mode)
AIRSPEED OUT OF RANGE ERROR (when nudging in PSS mode)
RESULTING MACH NUMBER OUT OF RANGE

CALIBRATE SOON 'GO' TO CONTINUE CALIBRATION EXPIRED 'GO'
TO CONTINUE CANNOT CHANGE DATE 'GO' TO CONTINUE LIMITS
EXCEEDED - VENTING SYSTEM MONTH OUT OF RANGE

YEAR OUT OF RANGE DATE OUT OF RANGE MINUTES OUT OF
RANGE SECONDS OUT OF RANGE 12 HOURS OUT OF RANGE
HOURS OUT OF RANGE OFFSET OUT OF RANGE

VOLUME TIME OUT OF RANGE LEAK TIME OUT OF RANGE STATIC
RATE OUT OF RANGE PITOT RANGE OUT OF RANGE

A. Main Menu Option 1 - On Screen Instructions

Selecting Option 1 provides access to the on screen operating instructions which consist of a number of pages of text (Fig. 6).

The user can select information regarding each mode of operation by pressing the key number adjacent to the required topic. For example, selecting Option 1 displays the screen shown in Fig. 7.

Multiple pages can be accessed via the + and - keys. When ready to exit this mode, pressing the STOP key returns the display to the main menu.

On Screen Instructions provide a 'ready reference' should the user experience problems during operation.

NOTE: These pages may be displayed without affecting any functional test: any pressures within the system will be held constant for the duration they are displayed.

B. Main Menu Option 2 - Maximum Operating Limits



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Option 2 from the main menu calls up the same 'Entry of Maximum Operating Limits' page (Fig.4) which is displayed following a system power-up. As before, the user may change the maximum operating limits of the test set for a particular test. It is essential that the limits are configured correctly for the aircraft or system under test. To change values, the cursor is moved to the value to be changed using the four cursor control keys. The desired value is then entered via the numerical keys. Once the values have been set, the STOP key is pressed to accept them and return to the main menu.

- NOTES:**
1. The limits set here will be lost on power down and the default limits restored.
 2. In the Leak Check and Vent To Ground modes, the CCADTS 2 will control to the default Rates of Climb rather than those set via this option. If required the default limits can be modified (refer to paragraph 4.D. (5))

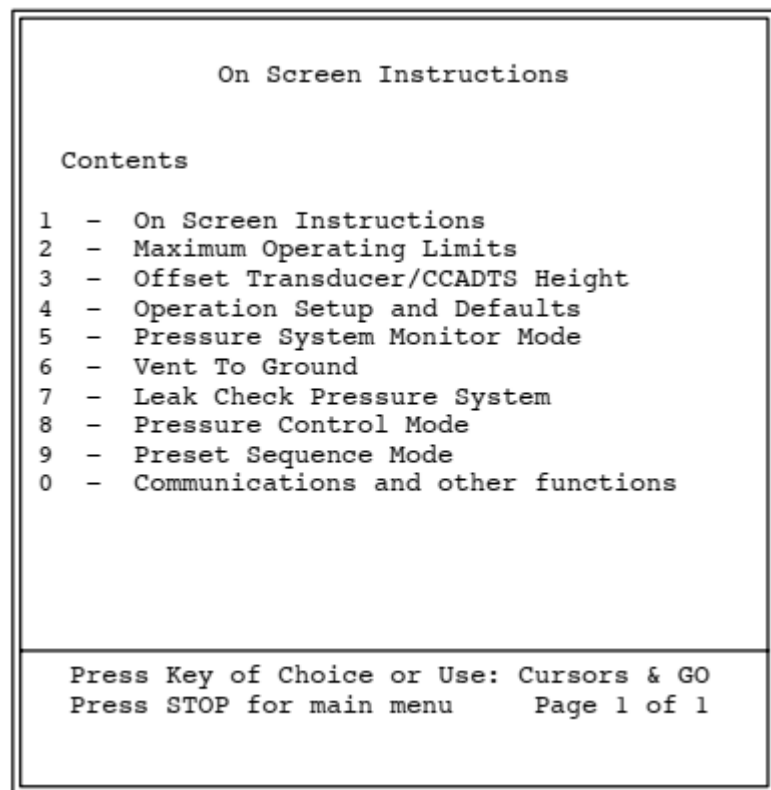


Figure 6 On Screen Instructions

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On screen instructions are available for all functions of the computer controlled air data test set. Instructions are accessed via the main menu and submenus. Menu selections are made by pressing the corresponding number key. Subject pages are changed by pressing + to access the next page or - to access the previous page. Pressing STOP at any point will exit and return to the instruction menu. Subject pages are available for on screen instructions (this page), and all other main menu functions.

Press + for next page, or STOP to Exit
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Figure 7 On Screen Instructions

C. Main Menu Option 3 – Offset Transducer/CCADTS Height (Fig. 8)

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2 - Offset Transducer/CCADTS Height

Enter offset height from transducer
line on CCADTS to transducer level
in altimeter or air data computer

Offset = 0 FEET
Limit = 0 to 50 FEET

Enter Value and press STOP for menu

Figure 8 Offset Transducer/CCADTS Height Display

Option 3 enables an offset height to be entered from the transducer line on the CCADTS 2 to the transducer level in the aircraft or air data computer. This enables a positive barometric correction to be applied to compensate for the difference in altitude between the aircraft and equipment under test. It may be that the air data computers are located many feet above the height of the CCADTS 2 which is on the hangar floor. A negative correction cannot be applied. The user can enter the required offset and change the displayed units by pressing the +/- keys.

D. Main Menu Option 4 – Operation Setup and Defaults

Selecting Option 4 enables the setup and default values to be edited. On entry to this mode, a sub-menu is displayed (Fig. 9)

Pressing FN whilst the sub-menu is displayed will give rise to a prompt for a password. This precaution is intended to prevent inadvertent corruption of certain setups, in particular Calibration. It is therefore recommended that access to the password should be restricted to maintenance personnel only. When the password is entered and Go pressed, extra options will appear on the sub-menu as shown in Fig. 10.

For information on the password, contact Penny & Giles Customer

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Support at the address given on page 1 of this manual.

When the setups are complete, pressing the STOP key will return the display to the main menu.

(1) Sub-Menu Option 1 – Internal/External Pressure Source

The Internal/External Pressure Source option is intended to allow an external pressure source to be selected. However, this option is not available at the present time.

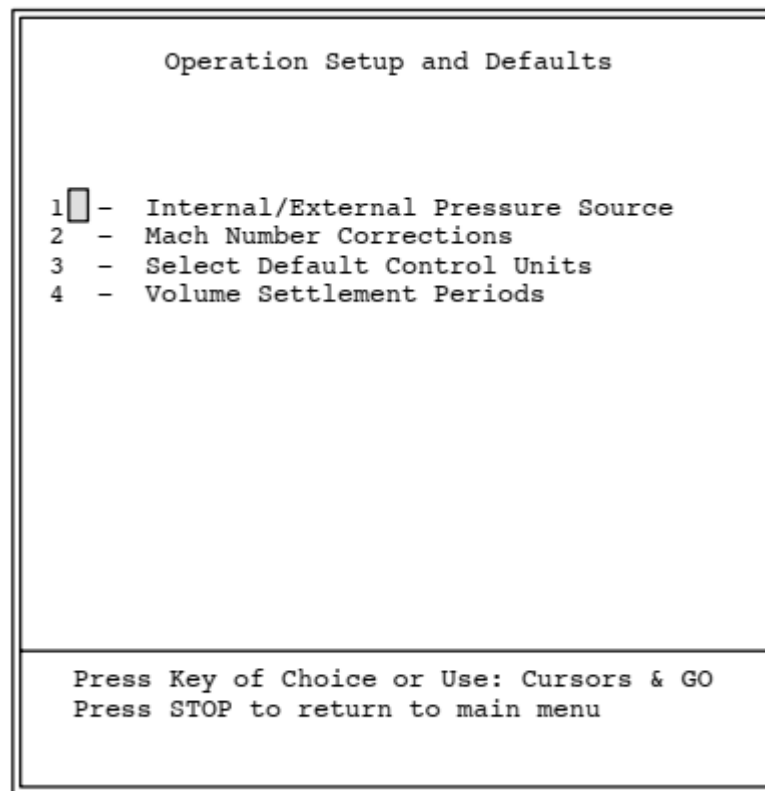


Figure 9 Operation Setup and Defaults Sub-Menu

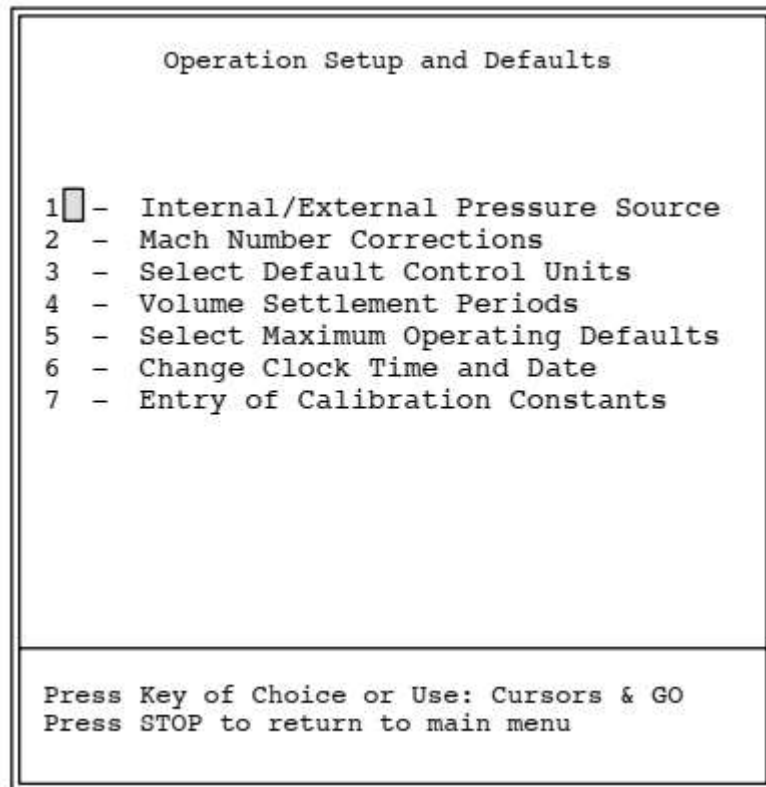
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Figure 10 Password Controlled Sub-Menu

(2) Sub-Menu Option 2 – Mach Number Correction

The Mach Number Correction option is intended to allow pre-programmed pressure error curves to be assumed for particular aircraft when the Mach Number is displayed. However, this option is not available at the present time.

(3) Sub-Menu Option 3 – Select Default Control Units

The Select Default Control Units option allows default units for Altitude/Static Pressure and Indicated Airspeed/Differential Pressure to be selected for individual test sequences (Fig. 11).

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3 - Select Default Control Units

Default Altitude Units = FEET
 Default Airspeed Units = KNOTS

Use + and - to change units
 Use cursor UP or DOWN and STOP for menu

Figure 11 Select Default Control Units

The cursor keys are used to select the parameter and the +/- keys to toggle the default units between those shown in Table 2.

Table 2 Default Control Units

ALTITUDE UNITS	AIRSPEED UNITS
Feet (ft)	Knots (Kn)
Metres (m)	Kilometres/Hour (km/hr)
Millibar (mbar)	Millibar (mbar)
Inches of Mercury (inHg)	Inches of Mercury (inHg)
Pounds/Square Inch (psi)	Pounds/Square Inch (psi)

NOTE: The factory settings are 'feet' and 'knots'.

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When selection is complete, pressing the STOP key accepts the change and returns the display to the previous menu.

(4) Sub-Menu Option 4 – Volume Settlement Periods (Fig. 12).

4 - Volume Settlement Periods

Volume Settlement Period	=	3 Minute/s
Leak Check Period	=	1 Minute/s
Maximum Allowable Leak Rates		
Leak Rate Static	=	0 FEET
Leak Rate Pitot	=	0.0 KNOTS

Use + and - to change units
Use cursor UP or DOWN and STOP for menu

Figure 12 Setting Volume Settlement Periods

The Volume Settlement Periods option enables user-defined volume settlement periods and permissible leak check rates to be entered. Changing these parameters allows the user to profile the test schedule to suit the equipment under test. For example, if the test system is of a significantly smaller volume, such as an instrument on bench test, the periods can be reduced. Similarly, when testing aircraft with very large system volumes, this period may be increased. Values set within this option provide the limiting value above which a leak is flagged as having been detected.

NOTE: These periods and leak rates should be set in accordance with the Aircraft Maintenance Manual or Acceptance Test Procedure.

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(5) Sub-Menu Option 5 – Select Maximum Operating Defaults

**CAUTION: INCORRECT USE OF THE CCADTS CAN CAUSE
DAMAGE TO EQUIPMENT UNDER TEST.**

The Select Maximum Operating Defaults option allows re-setting of the default Maximum Operating Limits. The screen displayed is similar to that displayed on power-up (Fig. 4), but any values set via this option will be retained when the CCADTS 2 is powered down.

(6) Sub-Menu Option 6 – Change Clock Time and Date

The Change Clock Time and Date option allows the CCADTS 2 date and time settings to be reset as per Fig. 13.

With the cursor positioned adjacent to the Date Format, the +/- keys toggle the format between 'dd/mm/yy' and 'mm/dd/yy'.

6 - Change Clock Time & Date Formats

Date Format = dd/mm/yy ☐

Time Format = 12 hour

Enter Date 03/03/97

Enter Time 12:00:00AM

Use + and - to change units
Use cursor to change and STOP for menu

Figure 13 Change Clock Time & Date Formats Display

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With the cursor adjacent to the Time Format, the +/- keys toggle the format between '12 hour' and '24 hour'. When setting time in the 12-hour format, the +/- keys toggle between 'AM' and 'PM'.

When the changes are complete, the STOP key is used to accept the values and return to the sub-menu. Pressing the STOP key a second time returns the display to the main menu.

(7) Sub-Menu Option 7 – Entry of Calibration Constants

CAUTION: THIS OPTION IS FOR USE DURING MAINTENANCE ONLY. UNDER NO CIRCUMSTANCES MUST AN ATTEMPT BE MADE TO ENTER THIS OPTION DURING OPERATION. TO DO SO RISKS CALIBRATION DATA BEING CORRUPTED. IF ACCESS IS GAINED AND DATA IS CORRUPTED AS A RESULT, ANY PENNY & GILES WARRANTY WILL BE VOID.

Calibration corrections appropriate to each individual CCADTS 2 equipment are entered by Penny & Giles Aerospace prior to delivery of the equipment. These corrections are entered for the purpose of setting up the CCADTS 2 pressure measurement transducers and once entered, the information is retained by the unit until the next due calibration date when either new data is entered, or the same data re-entered.

A month prior to the next scheduled calibration date a warning will appear on screen 'CALIBRATE SOON "GO" TO CONTINUE' whenever a pressure control sequence is about to be performed. This warning continues until the date of next calibration when the warning 'CALIBRATION EXPIRED "GO" TO CONTINUE' is displayed.

For further information on calibration refer to the CCADTS 2 Calibration Reference Manual, PIM 415-R.

E. Main Menu Option 5 – Pressure System Monitor Mode

Option 5 switches CCADTS 2 from pressure control to a pressure monitoring role (refer to Fig. 14). In this mode it monitors pressures within the system thereby enabling calibration checks of other pressure generating equipment. As it also displays pressure rates, this mode can be used to carry out brief leak checks. When the External Pressure option has been supplied, any pressures and rates applied to the test set from the external source will be displayed. However, the test set will only allow application of pressures within its current maximum operating limits. Should these limits be exceeded, the test set will display the message LIMITS EXCEEDED – VENTING SYSTEM whilst taking control and attempting to return the equipment under test to ambient pressure at the current maximum rates.

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Pressure System Monitor Mode		
STATIC PRESSURE	0	☐ MBAR
DYNAMIC PRESSURE	0.0	MBAR
MACH	0.000	
ALTITUDE RATE	0	FEET/MIN
AIRSPEED RATE	0.0	KNOTS/MIN
Use Cursors and +/- to change units Press STOP to return to main menu		

Figure 14 Pressure System Monitor Mode

NOTE: To prevent pneumatic leakage resulting in a reverse pressure condition, which could damage equipment under test, CCADTS 2 automatically balances the pitot to the static line if the airspeed falls below 19 knots. Prior to use in this mode, it will therefore be necessary to drive the balance valves closed by controlling (ref. Main Menu Option 8 – Pressure Control Mode) to an airspeed pressure in excess of 20 knots.

By positioning the cursor adjacent to the units of measure, they can be toggled at any time between those shown in Table 2 using the +/- keys. Depending on the units selected, the Static Pressure and Dynamic Pressure captions will toggle to Altitude and Airspeed, respectively.

F. Main Menu Option 6 – Vent To Ground (Fig. 15)

(1) System Venting

CAUTION: DO NOT DISCONNECT ANY HOSES UNTIL THE SYSTEM HAS FULLY VENTED.

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Option 6 returns the CCADTS 2 and the equipment under test to ambient pressure at the default maximum rates. It should be noted that, due to the relative difference in range between the Altitude and Airspeed channels, the Airspeed channel is likely to reach zero before the Altitude channel is vented. This condition is normal and is safe provided that both pitot and static hoses remain connected. However, no attempt must be made to disconnect either hose before the system has fully vented. Failure to comply will not only risk damaging the equipment under test but will also isolate the equipment from CCADTS 2, thereby rendering its protection ineffective

Vent To Ground		
ALTITUDE	37500	☐ FEET
AIRSPEED	250.0	KNOTS
MACH	0.781	
ALTITUDE RATE	-5000	FEET/MIN
AIRSPEED RATE	-300.0	KNOTS/MIN
Please wait, venting system Press STOP to return to main menu		

Figure 15 Vent to Ground Option

The value of the last vent level is stored within the CCADTS 2 to enable it to locate ambient pressure faster. This is particularly useful if the equipment is located either much higher or lower than mean sea level. The system first controls to the last recorded figure at the current maximum rates. If the new reading is different from the stored value, the CCADTS 2 will slowly alter the pressures in the lines until internal and external pressures are matched, and the system is vented. By positioning the cursor adjacent to the units of measure, they can be toggled at any time between those shown in Table 2 using the +/- keys.

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If the vent routine needs to be aborted for any reason, pressing the STOP key suspends operation and returns the RCDU to the main menu.

When the system is vented, SYSTEM VENTED appears at the bottom of the screen (Fig. 16). If required, the pitot and static hoses may now be disconnected. Under no circumstances must they be disconnected until this message is displayed. Failure to observe this precaution could result in damage to the equipment under test.

(2) QFE Reading

The QFE is a method of setting the altimeter reading to compensate for changes in barometric pressure at any particular elevation above sea level. To obtain a reading of QFE, the equipment must be switched on and if the main menu display shows SYSTEM PRESSURISED in reverse video, then a system vent must be performed until the SYSTEM VENTED message is displayed.

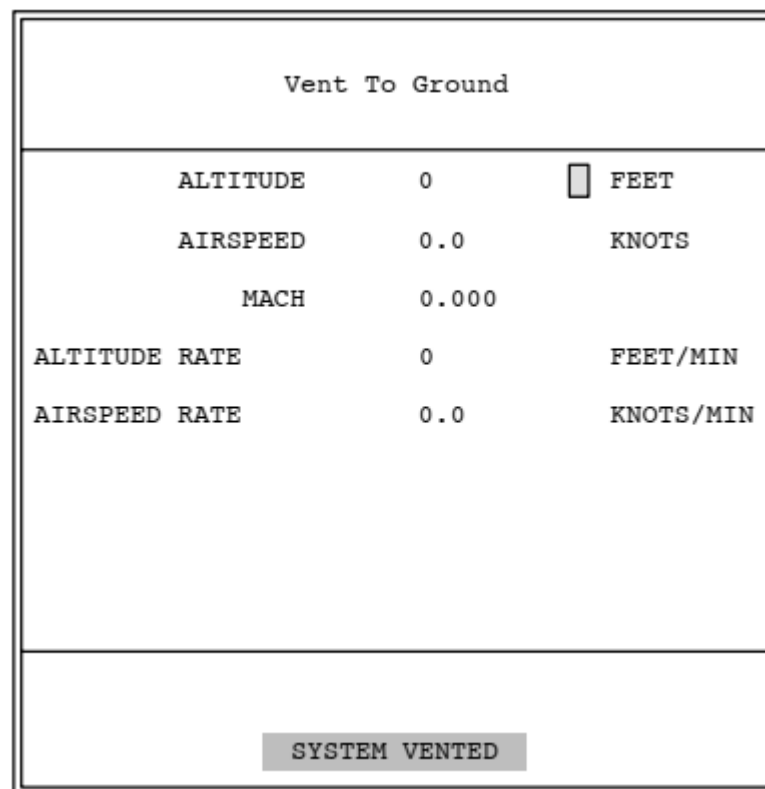


Figure 16 System Vented Display

The Vent To Ground option will then display static pressure of the day, in whatever units have been previously selected.

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Leak checks may be performed at any time and at any pressure within the current maximum operating limits. If the altitude is more than 1000 feet from the set point, or the airspeed more than 100 knots, the system first performs a coarse leak check to identify whether there are major leaks in the system. Preset rates are used to avoid damage to any aircraft instruments. The main check is then performed using finer tolerances on each parameter. If the altitude and airspeed are within 1000 feet or 100 knots, respectively, of the set point then the coarse leak check will not be performed. Within the main check routine, the Volume Settlement and Leak Check Periods are defined as part of the Operation Setup and Defaults option (Option 4 in the main menu) and as factory set are appropriate to allow most aircraft with average pitot and static system volumes sufficient time to stabilize. If the system under test is of a significantly smaller volume, i.e. a stand-alone flight deck instrument, this period can be reduced. Likewise, while testing aircraft of very large system volume, the period may be increased.

The units of pressure displayed within the leak check routine are selected by using the

+/- keys as normal. Dependent upon the units selected, the displayed leak rate units are as shown in Table 3.

Upon entry to this routine the pressures currently in the system are displayed under the ACTUAL heading with the cursor under the SET heading alongside the parameter to be entered (refer to Fig. 17). The Set value may be accepted by moving the cursor to the next parameter line, or pressing GO to accept all values. It may be changed by pressing the appropriate numerical keys or, alternatively, individual digits may be changed after positioning the cursor on each one at a time. Pressing STOP aborts the check and returns the display to the main menu.

Table 3 Leak Rate Units

ALTITUDE UNITS SELECTED	ALTITUDE LEAK RATE UNITS	AIRSPED UNITS SELECTED	AIRSPED LEAK RATE UNITS
feet	feet/min	knots	knots/min
metres	metres/min	km/hr	km/hr/min
mbar	mbar/min	mbar	mbar/min
inHg	inHg/min	inHg	inHg/min
psi	psi/min	psi	psi/min

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Leak Check Pressure System			
PARAMETER	SET	ACTUAL	UNITS
ALTITUDE	0	0	FEET
AIRSPPEED	0.0	0.0	KNOTS
LEAK RATE IN STATIC			FEET/MIN
LEAK RATE IN PITOT			KNOTS/MIN
VOLUME SETTLEMENT PERIOD		-	
LEAK CHECK PERIOD		-	

Use cursors to SET parameters & Press GO
With Cursor on Units use +/- to Change

PRESSURE ACHIEVED

Figure 17 Leak Check Display

When the desired values have been entered, the GO key is pressed to start the leak check routine. It will then continue to completion without further key presses. During the coarse check the CCADTS 2 applies pressure to the system for a period of 45 seconds at a slow rate and then carries out a leak check for 15 seconds. The display does not indicate which stage of the routine has been reached, it simply displays a Pass or Fail message on completion. Provided the equipment has passed the coarse check, CCADTS 2 will enter the Volume Settlement Period.

During the Volume Settlement Period the screen displays the elapsed time (Fig. 18). CCADTS 2 also monitors the Leak Rate. Should this be in excess of 5 mbar/min, the test will be aborted. If less than this the test will continue. If a system leak is detected, a message is displayed indicating which line is affected. When the Volume Settlement period is completed the main leak check commences, during which a real time average leak rate is displayed (Fig 19).

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Leak Check Pressure System			
PARAMETER	SET	ACTUAL	UNITS
ALTITUDE	20000	20000	FEET
AIRSPEED	200.0	200.0	KNOTS
LEAK RATE IN STATIC			FEET/MIN
LEAK RATE IN PITOT			KNOTS/MIN
VOLUME SETTLEMENT PERIOD		-2:17	
LEAK CHECK PERIOD		-	

Please wait: 3 minute volume settlement
Press '0' to skip to leak check

PRESSURE ACHIEVED

Figure 18 Volume Settlement

If the leak check is completed successfully, the message NO LEAKS DETECTED is displayed. If required, the check may be repeated by pressing GO again. Alternatively, pressing STOP returns the display to the main menu.

NOTES: 1. In the leak checking mode, prior to the start of the Volume Settlement and Leak Check Periods, the test units may be changed, but during these periods the units remain fixed.

2. A rapid indication of the presence of a leak may be obtained by selecting Option 5, Pressure System Monitor Mode, from the main menu.

Special routines for leak checking may be stored within the CCADTS 2 via the External Communication Mode using Preset Sequence Software.

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H. Main Menu Option 8 – Pressure Control Mode

The Pressure Control Mode option enables the user to pressurize the system and to control to a specified Altitude and Airspeed. Upon selection of this mode, a sub-menu is displayed (Fig. 20).

Note that the display includes a pressure source caption which is always set to Internal for the standard CCADTS 2 variant.

(1) Sub-Menu Option 1 – Control Output Isolation Valves

CAUTION: EXTREME CARE MUST BE EXERCISED WHEN CHANGING VALVE STATES TO PREVENT DAMAGE TO EQUIPMENT UNDER TEST. ENSURE THAT BOTH SIDES OF THE VALVE ARE AT A SIMILAR PRESSURE BEFORE OPENING.

When used in conjunction with the optional Electronic Pressure Distribution/Isolation Unit Type D60371, the Control Output Isolation Valves Mode enables individual systems to be isolated from CCADTS 2 (Fig. 21).

Leak Check Pressure System			
PARAMETER	SET	ACTUAL	UNITS
ALTITUDE	20000 ☐	19984	FEET
AIRSPPEED	200.0	198.7	KNOTS
LEAK RATE IN STATIC	30		FEET/MIN
LEAK RATE IN PITOT	2.5		KNOTS/MIN
VOLUME SETTLEMENT PERIOD		-3:00	
LEAK CHECK PERIOD		-0:31	
Please wait: 1 minute leak check period			

Figure 19 Main Leak Check

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Pressure Control Mode 1 ☐ - Control Output Isolation Valves 2 - Control Pressures 3 - Control Mach and TAS 4 - Control EPR 5 - Control Airspeed Only Internal Pressure Selected
Press Key of Choice or Use: Cursors & GO

Figure 20 Pressure Control Mode

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Output Isolation Valve Control Mode		
PORT	VALVE	STATUS
STATIC	S1	☐ CLOSED
	S2	CLOSED
	S3	CLOSED
	S4	CLOSED
PITOT	P1	CLOSED
	P2	CLOSED
	P3	CLOSED
	P4	CLOSED
Use: Cursor UP/DOWN and '+' to Toggle Press STOP to Exit and Set Valves		

Figure 21 Setting Output Isolation Valves

The status of any valve may be toggled between Open and Closed using the + key. Once all valve settings have been established, the STOP key must be pressed to execute any change. When STOP is pressed, the message WRONG VALVE SETTINGS MAY CAUSE DAMAGE appears on the screen in reverse video. LED on the Distribution/Isolation Unit indicate when the valves are closed. An illuminated LED indicates that the associated valve is closed and the system therefore isolated.

(2) Sub-Menu Option 2 – Control Pressures

The Control Pressures Mode uses the same screen format for all operating modes. The screen displays all parameters and rates simultaneously (Fig. 22).

The user can change the displayed units for Static, Dynamic, and Total Pressures by pressing the +/- keys with the cursor positioned on the desired unit (refer to Table 4 for the list of alternative units). Depending on which units are selected, the Static and Dynamic Pressure captions are replaced by Altitude and Airspeed, respectively.

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The units for the Altitude Rate are metres/min if the user selected altitude units are metres and feet/min if the user selected units are anything else. The units for Airspeed Rates are km/hr/min if the user selected airspeed units are km/hr and knots/min if the user selected altitude units are anything else.

NOTE: If units of pressure are changed after editing parameter values, but before accepting them with the GO key, values will revert to those previously entered. Values which are out of range give rise to an error message to that effect.

A nudge facility using the +/- keys to increment/decrement values by one is provided so that parameter values and pressure units can be changed whilst the CCADTS 2 is controlling; however control continues to the previous values until the new ones are accepted by pressing GO. In order to avoid any overshoot, the CCADTS 2 reduces the pressure rates proportionally as it approaches the target pressures. When the pressures are achieved a PRESSURE ACHIEVED message appears at the bottom of the screen.

Pressure Control Mode			
PARAMETER	SET	ACTUAL	UNITS
ALTITUDE	0	0	FEET
AIRSPEED	0.0	0.0	KNOTS
TOTAL PRESS	1013.25	1013.25	MBAR
ALT RATE	4998	0	FEET/MIN
ASI RATE	300.0	0.0	KNOTS/MIN
Use Cursors to SET Parameters & Press GO With Cursor on Units use +/- to Change			
PRESSURE ACHIEVED			

Figure 22 Control Pressures Display

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Table 4 Pressure Control Units

ALTITUDE UNITS	AIRSPEED UNITS	TOTAL PRESSURE UNITS
Feet	Knots	Millibar (mbar)
Metres	Kilometres/Hour (km/hr)	Millibar (mbar)
Millibar (mbar)	Millibar (mbar)	Millibar (mbar)
Inches of Mercury (inHg)	Inches of Mercury (inHg)	Inches of Mercury (inHg)
Pounds/Square Inch (psi)	Pounds/Square Inch (psi)	Pounds/Square Inch (psi)

On completion of pressure control, the STOP key is used to return to the sub-menu and then, if required, used again to return to the main menu.

NOTE: If STOP is pressed whilst the system is controlling or when it has just entered this mode, the message STOPPED is displayed. If STOP is pressed again the system returns to the pressure control sub-menu. If GO is pressed after the pressure control has been stopped by using the STOP key, the pressure control will restart. This allows the user to pause without leaving the pressure control option

(3) Sub-Menu Option 3 – Control Mach and TAS (Fig. 23)

In the Control Mach and TAS (True Airspeed) option, SET values can be edited and pressure units selected in the normal manner. If the Mach Number is edited, then the corresponding airspeed will be calculated when GO is pressed; otherwise the SET Mach Number will be calculated from the SET Airspeed. Adjusting the Measured Outside Air Temperature (MOAT) and the Static Outside Air Temperature (SOAT) enables the corresponding True Airspeed calculations to be completed in conjunction with the current Altitude and Airspeed giving an Actual result. As the Actual Airspeed increases, the Actual SOAT displayed will decrease due to the increased correction factor applied. This feature provides a check on the correction being applied by the flight deck instruments. Changing any value causes it to be highlighted on the display, showing that the new point has not been accepted. When GO is pressed, CCADTS 2 will control to the new values.

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The STOP key suspends pressure control and returns the user to the Pressure Control sub-menu.

Pressure Control Mode			
PARAMETER	SET	ACTUAL	UNITS
ALTITUDE	0	0	FEET
AIRSPPEED	0.0	0.0	KNOTS
MACH	0.000	0.000	
MOAT/SOAT	15.0	15.0	DEG C
TRUE ASI	-1.3	0.0	KNOTS
ALT RATE	4998	0	FEET/MIN
ASI RATE	300.0	0.0	KNOTS/MIN
Use Cursors to SET Parameters & Press GO With Cursor on Units Use +/- to Change			
PRESSURE ACHIEVED			

Figure 23 Mach and TAS Control

NOTE: If STOP is pressed whilst the system is controlling or when it has just entered this mode, the message STOPPED is displayed. If STOP is pressed again the system returns to the pressure control sub-menu. If GO is pressed after the pressure control has been stopped by using the STOP key, the pressure control will restart. This allows the user to pause without leaving the pressure control option.

(4) Sub-Menu Option 4 – Control EPR (Fig. 24)

This option enables the engine pneumatic systems to be tested. EPR (Engine Pressure Ratio) is calculated from both the Altitude and Airspeed variables. Alternatively, if a value is entered for the EPR, the corresponding Airspeed value is calculated for any given Altitude. Due to the high differential pressures involved in EPR testing, it may be necessary to increase the Maximum Airspeed and Mach Number limits, which can be accomplished via the Maximum Operating Limits Mode.

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Pressure Control Mode			
PARAMETER	SET	ACTUAL	UNITS
ALTITUDE	0	0	FEET
AIRSPEED	0.0	0.0	KNOTS
EPR	1.000	1.000	
ALT RATE	4998	0	FEET/MIN
ASI RATE	300.0	0.0	KNOTS/MIN
Use Cursors to SET Parameters & Press GO With Cursor on Units Use +/- to Change			

Figure 24 Control EPR Display

- NOTES:**
1. It is not essential to connect both PT 1 and PT 2 hoses. The PT 2 port may be left open to atmosphere and the QFE reading (paragraph 4.F. (2)) used as the Static/PT 2 reference pressure. However, this method makes no allowance for fluctuations in pressure of the day and may result in errors.
 2. If STOP is pressed whilst the system is controlling or when it has just entered this mode, the message STOPPED is displayed. If STOP is pressed again the system returns to the pressure control sub-menu. If GO is pressed after the pressure control has been stopped by using the STOP key, the pressure control will restart. This allows the user to pause without leaving the pressure control option.

(5) Sub-Menu Option 5 – Control Airspeed Only

This function enables airspeed instruments to be tested and calibrated on their own, without reference to altimeter readings.

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The system is first vented to atmosphere (ambient pressure) as described in paragraph 4.F. (1). With the CCADTS 2 Static channel set Open, the airspeed is then calculated as an independent value. When Option 5 is selected from the sub-menu, the screen in Fig. 25 is displayed.

NOTES: 1. **Whilst the system is being vented, CCADTS 2 will not accept any control set points.**

2. **After venting the set point altitude and the actual altitude will be at the pressure of the day and both will read the same value. Altitude set points will not be accepted.**

As with other displays, the STAT PRESS and DYNAM PRESS captions toggle with ALTITUDE and AIRSPEED, respectively, depending upon which units are selected. Selection of units is via the +/- keys. When the STOP key is depressed, the message STOPPED appears at the bottom of the screen. Pressing STOP a second time returns the display to the pressure control sub-menu (Fig.20).

NOTE: If STOP is pressed whilst the system is controlling or when it has just entered this mode, the message STOPPED is displayed. If STOP is pressed again the system returns to the pressure control sub-menu. If GO is pressed after the pressure control has been stopped by using the STOP key, the pressure control will restart. This allows the user to pause without leaving the pressure control option.

J. Main Menu Option 9 – Preset Sequence Mode

CCADTS 2 is capable of being pre-programmed from a remote PC, prior to at-aircraft testing, using the optional Penny & Giles Aerospace software package, Type SA130434MK1. The PC-based Preset Sequence Generator Software enables the test sequences produced to be more easily tailored for customer-specific requirements, whilst for the user it has the advantage of reducing at-aircraft test time since the test sequences can simply be 'stepped' through on the RCDU at a press of a key. The tests produced using the software package are known collectively as Preset Sequences.

When the software is provided as an option with CCADTS 2, it is used to download PSS data from a PC as described in paragraph 4.K., External Communication Mode. The Preset Sequences are then accessed via Option 9 on the RCDU main menu. If no Preset Sequences have been downloaded, the RCDU displays the screen in Fig. 26.

NOTE: If no Preset Sequences are available, pressing STOP will return the screen to the Main Menu.

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Pressure Control Mode			
PARAMETER	SET	ACTUAL	UNITS
ALTITUDE	0	0	FEET
AIRSPED	0.0	0.0	KNOTS
TOTAL PRESS	822.86	1013.25	MBAR
ALT RATE	4998	0	FEET/MIN
ASI RATE	300.0	0.0	KNOTS/MIN
Use Cursors to SET Parameters & Press GO With Cursor on Units Use +/- to Change			
PLEASE WAIT - VENTING SYSTEM			

Figure 25 Airspeed Only Control

If Preset Sequences have been downloaded, the screen displays a list of all test sequence titles available, up to a maximum of 250 (Fig. 27). The user can select which sequence is required by means of the cursor keys and the GO key. Following the on-screen prompts enables the user to execute each sequence, as desired. At each test point, CCADTS 2 will wait indefinitely for the user to record any readings. It will only continue when the user presses the GO key. To pause at any time, the STOP key is depressed. Additionally, keys '1' and '0' will halt the current test: key '1' taking the user forward to the next test in the sequence, while key '0' takes the user back to the previous test executed. For further details of the Preset Sequence software, refer to PIM 411-I.

NOTE: The maximum operating limits previously set are automatically overridden by those associated with the preset sequence to be performed. When the Preset Sequence Mode is exited the original operating limits are restored.

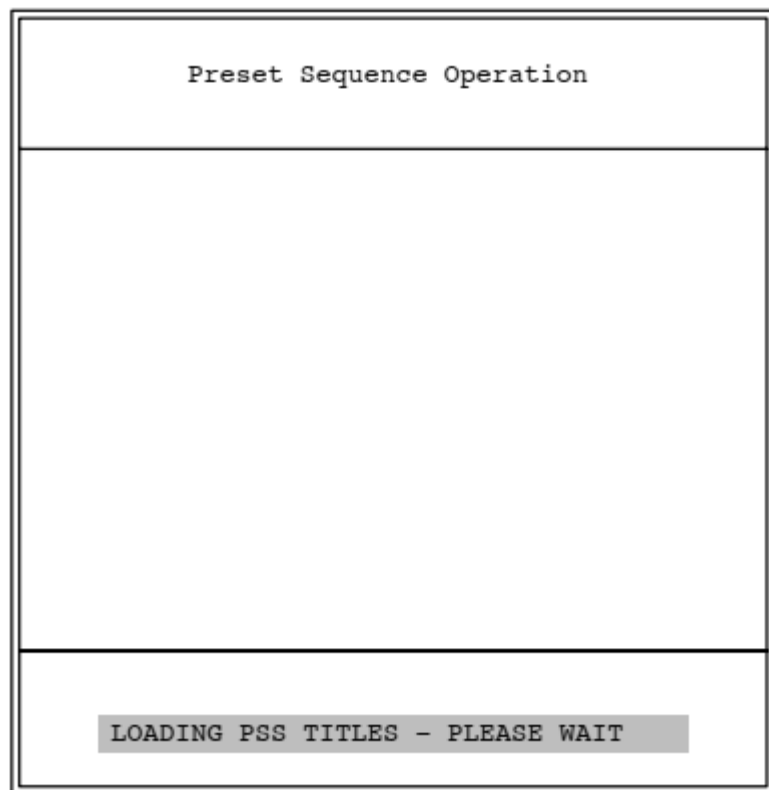
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Figure 26 Pressure Sequence Operation

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Preset Sequence Operation	
Number	Title
1 - ☐	B747 Leak Test
2 - ☐	B767 Leak Test
3 - ☐	L1011 Leak Test
4 - ☐	B747 Function Test
5 - ☐	B767 Function Test
6 - ☐	L1011 Function Test

Press STOP to return to menu
Press + for next page of titles
Press - for last page of titles

Figure 27 Preset Sequence Selection

K. Main Menu Option 0 – External Communication Mode

As one of the optional features of CCADTS 2, it is intended that the equipment can function as part of a fully-automated test and calibration system. However, when supplied without this option, the standard CCADTS 2 software permits this mode to be used solely with the optional Preset Sequence software package, Type SA130434MK1.

When Option 0 is selected from the main menu, the RCDU displays the sub-menu shown in Fig. 28.

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External Communication Mode

RS232 Operation

1 - ☐ Baud Rate Selection

2 - Download Preset Sequence

Press Key of Choice or Use: Cursors & GO

Figure 28 External Communications Sub Menu

(1) Sub-Menu Option 1 – Baud Rate Selection

This option allows CCADTS 2 to be configured for RS232 communications. The screen displays the default values for Baud Rate, the size of the Serial Transfer Character, the number of Stop Bits, and the Parity value (refer to Fig. 29), which should be used for Preset Sequence download. The user should not change any of these settings prior to the start of the Preset Sequence download from a PC.

(2) Sub-Menu Option 2 – Download Preset Sequence

This mode initializes the CCADTS 2 in readiness to receive Preset Sequence data via RS232 connector (Fig. 30).

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Figure 28 External Communications Sub Menu

(1) Sub-Menu Option 1 – Baud Rate Selection

This option allows CCADTS 2 to be configured for RS232 communications. The screen displays the default values for Baud Rate, the size of the Serial Transfer Character, the number of Stop Bits, and the Parity value (refer to Fig. 29), which should be used for Preset Sequence download. The user should not change any of these settings prior to the start of the Preset Sequence download from a PC.

(2) Sub-Menu Option 2 – Download Preset Sequence

This mode initializes the CCADTS 2 in readiness to receive Preset Sequence data via RS232 connector (Fig. 30).

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1 - Baud Rate Selection

Baud Rate : 9600

Data Bits : 8

Stop Bits : 1

Parity : NONE

Use + and - to change parameters
Use cursor UP or DOWN and STOP for menu

Figure 29 RS232 Setup Configuration

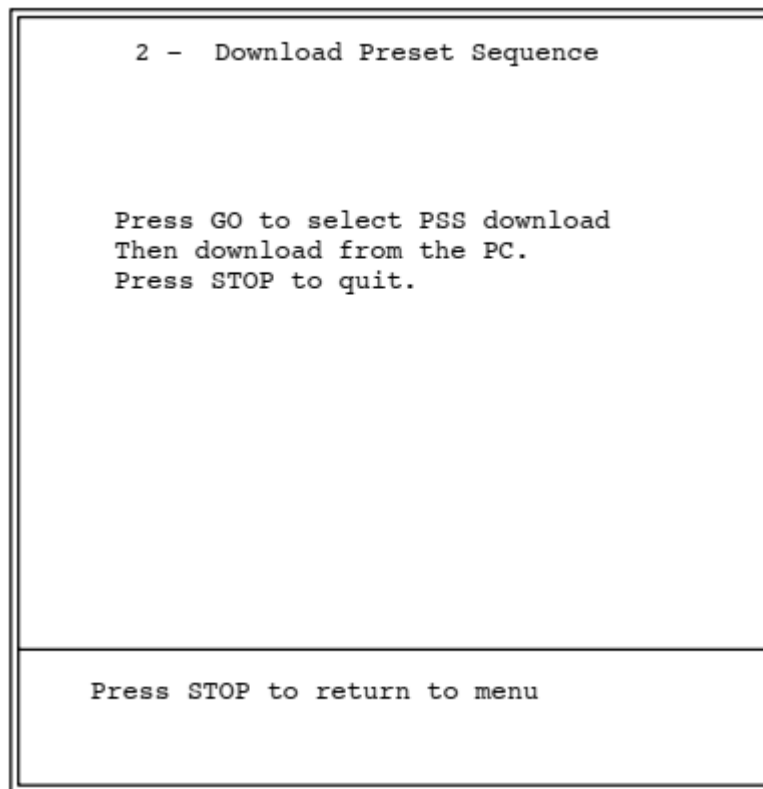
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Figure 30 RS232 Data Download

When the GO key is pressed, the CCADTS 2 indicates it is ready for the download to begin by displaying PSS DOWNLOAD CCADTS READY until the sequence has been downloaded. (If the RCDU displays the message PSS DOWNLOAD DESELECTED, the user should check the RS232 connection to the equipment, and if correctly connected, CCADTS 2 should be rebooted. If this fails to clear the problem the user should contact the Customer Support Department at the address given at the front of this manual.) The download cannot be aborted at any time. If the STOP key is pressed whilst the download is in progress the RCDU displays PLEASE WAIT - DOWNLOADING DATA. This stops the user from aborting the PSS download. The PC displays which page is being downloaded.

Once the Preset Sequences have been installed in the CCADTS 2, they can be accessed via the RCDU main menu Option 9 (refer to paragraph 4.J.).

2. RS232 CONTROL

CAUTION: IT IS ESSENTIAL THAT THE MAXIMUM CONTROL ENVELOPE IS MAINTAINED AT THE CORRECT VALUES FOR THE UNIT UNDER TEST. FAILURE TO DO SO COULD CAUSE DAMAGE BY INCORRECT PROGRAMMING OR A FAULT OCCURRENCE.

When this option is provided with the CCADTS 2, total control of its operation can be performed via RS232 communications from a remote PC in the same fashion as if being controlled from the RCDU, including the control of pressures and rates, and the setting of isolation valves. This enables test sequences to be generated without the need for complex programming of command structures: only operating knowledge of CCADTS 2 is required.

A. Input Commands

The RS232 command set recognised by CCADTS 2 uses the ASCII character set to define a packet of data in the form of a string comprising a command character followed by a numerical data value. Valid command characters are listed in Table 5. There are three types of data format: Real, Integer and Control. Real data is a true value which may include a fractional part (e.g. a Static Pressure value of 1013.25). Integer data is a whole number which defines a state (e.g. a Valve position of '0' for close or '1' for open). Control data signifies a command character with no numerical component. The data formats associated with the CCADTS 2 command characters are also listed in Table 5. Commands **G**, **VNT**, **STOP**, **EXTERN** and **INTERN** are all control commands having the functions defined in Table 5, and have no associated numerical data values. If at any time during RS232 remote operation a **G** character, or the word **STOP**, is sent to the CCADTS 2, it will suspend the current control operation. This command is equivalent to the keyboard action of pressing the STOP key. Commands **K** to **S**, inclusive, all have numerical data values associated with them. All pressure data values should be in millibars as per Table 6. Pressure rate data values should be in the units listed in Table 7. It is not necessary to specify the units of pressure, or rate, as CCADTS 2 will automatically interpret all the relevant data values in this manner. Command **X** has five separate numerical data values associated with it, again without units, as defined in Table 8. The values are arranged in a single string in the order indicated. Tables 9 to 11 define the data values for those command packets with integer formats (refer to Table 5). Values are arranged in the orders shown.

B. Output Messages

The RS232 output messages from CCADTS 2 are structured in exactly the same manner as the input commands, with the exception that the Control data is replaced by Status data of the same format. Valid message characters, together with their associated data formats, are listed in Table 12. Messages **P** to **S**, inclusive, all have numerical data values associated with them. Their units are as defined in Tables 6 and 7. Message **T** is also accompanied by numerical data, as defined in Table 10 for the corresponding input command.

Messages **G1** and **G0** are status outputs which convey the information defined in Table 12 and which have no associated numerical data values. Tables 13 to 15 define the data values for the remaining output packets with integer formats (refer to Table 12). Values are arranged in the order shown.

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Table 5 CCADTS 2 Input Command Characters (RS232 Control)

CHARACTER		DATA FORMAT	DATA PACKET DEFINITION
A		Integer	RS232 Interface Configuration
G		Control	Stop
K		Real	Maximum Altitude Rate
L		Real	Maximum Airspeed Rate
M		Real	Minimum Static Pressure (Max Alt)
N		Real	Maximum Dynamic Pressure
O		Real	Maximum Mach Number
P		Real	Airspeed Rate
Q		Real	Dynamic Pressure
R		Real	Altitude Rate
S		Real	Static Pressure
T		Integer	Time and Date Setting
X		Real	Default Operating Limits
Z		Integer	Isolation Valve Settings
vnt		Control	Vent System
stop		Control	Stop (as 'G' above)
extern		Control	Transmit to ext device (RS232)
intern		Control	Transmit to RCDU (RS485)
a		Real	Volume Settlement Period
f		Real	Leak Check Period
b1			Control Airspeed Only
b0			Cancel Control Airspeed
c		Byte	Default Units (Static and Pitot)
m			Maxima Request

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Table 6 Pressure Data Units (RS232)

PARAMETER	UNITS
Dynamic Pressure	mbar differential
Static Pressure	mbar absolute

Table 7 Data Rate Units (RS232)

PARAMETER	UNITS
Airspeed Rate	knots per minute
Altitude Rate	feet per minute

Table 8 Default Operating Limits (X) Data Values

ORDER	DESCRIPTION	VALUE	UNITS
1	Minimum Static Pressure (Maximum Altitude)	Real	mbar absolute
2	Maximum Dynamic Pressure	Real	mbar differential
3	Maximum Mach Number	Real	–
4	Maximum Altitude Rate	Real	feet per minute
5	Maximum Airspeed Rate	Real	knots per minute

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Table 9 RS232 Interface Configuration (A) Data Values

ORDER	DESCRIPTION	VALUE	UNITS
1	Baud Rate	0	300 baud
		1	600 baud
		2	1200 baud
		3	2400 baud
		4	4800 baud
		5	9600 baud
		6	19200 baud
2	Data Byte	0	7 bits
		1	8 bits
3	Stop Bits	0	1 bits
		1	2 bits
4	Parity	0	None
		1	Even
		2	Odd

Table 10 Time and Date Setting (T) Data Values

ORDER	DESCRIPTION	VALUE	MEANING
1	Day	2 digits	dd
2	Month	2 digits	mm
3	Year	2 digits	yy
4	Hours	2 digits	hh
5	Minutes	2 digits	mm
6	Seconds	2 digits	ss
7	12/24 Hour Clock	0	24 Hour Clock
		1	12 Hour Clock
8	AM/PM	0	AM
		1	PM

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Table 11 Isolation Valve Settings (Z) Data Values

ORDER	DESCRIPTION	VALUE	MEANING
1	Valve P2 State	0 1	Close Open
2	Valve P1 State	0 1	Close Open
3	Not Applicable	0	Null
4	Valve S4 State	0 1	Close Open
5	Valve S3 State	0 1	Close Open
6	Valve S2 State	0 1	Close Open
7	Valve S1 State	0 1	Close Open
8	Not Applicable	0	Null
9	Not Applicable	0	Null
10	Not Applicable	0	Null
11	Not Applicable	0	Null
12	Not Applicable	0	Null
13	Valve P4 State	0 1	Close Open
14	Valve P3 State	0 1	Close Open

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Table 12 CCADTS 2 Output Message Characters (RS323 Control)

CHARACTER	DATA FORMAT	DATA PACKET DEFINITION
P	Real	Airspeed rate
Q	Real	Dynamic Pressure
R	Real	Altitude Rate
S	Real	Static Pressure
T	Integer	Time and Date Setting
G1	Status	System Vented
G0	Status	System Pressurised
E1	Integer	Communication Processor Errors
E2	Integer	Pressure Controller Status
E3	Integer	FDC Processor Errors

Table 13 Communication Processor Error (E1) Data Values (RS232)

ORDER	VALUE	MEANING
1	0	Null
2	0	Null
3	0	Null
4	0	Null
5	0	Null
6	0	Null
7	0	Null
8	1 2	Communications DPRAM access failure error Real Time Clock battery failure

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Table 14 Pressure Controller Status (E2) Data Values (RS232)

ORDER	VALUE	MEANING
1	0	Null
2	0	Null
3	0	Null
4	0 1	Null Valve Control failure Digital-Digital
5	0 1 2 4 8	Null Not Used Pressure Control DPRAM error Valve Control failure Digital-Digital Valve Control failure Analogue-Digital
6	0 1 2 4 8	Null Static Volts out of range Not Used Pitot Servo Pot out of range Static Servo Pot out of range
7	0 1 2 4 8	Null Mach Number out of range Not Used Not Used Pitot Volts out of range
8	0 1 2 4 8	Null Static Pressure out of range Pitot Pressure out of range Altitude Rate out of range Airspeed Rate out of range

3. IEEE488 CONTROL

CAUTION: IT IS ESSENTIAL THAT THE MAXIMUM CONTROL ENVELOPE IS MAINTAINED AT THE CORRECT VALUES FOR THE UNIT UNDER TEST. FAILURE TO DO SO COULD CAUSE DAMAGE BY INCORRECT PROGRAMMING OR A FAULT OCCURRENCE.

When this option is provided with the CCADTS 2, the equipment always powers-up with a default IEEE488 address of 5, unless changed via an option provided on a sub-menu under the external Communications mode. (This sub-menu is not provided as part of the software for standard CCADTS 2), IEEE488 operation is invoked by sending the remote enable command to address 5.

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The unit can be operated via the IEEE488 General Purpose Interface Bus (GPIB) even if the RCDU is left disconnected.

A. Input Commands

As with RS232 control, total control of CCADTS 2 operation can be performed via IEEE488 from a remote PC in the same fashion as if being controlled from the RCDU, including the control of pressures and rates, and the setting of isolation valves. This enables test sequences to be generated without the need for complex programming of command structures: only operating knowledge of CCADTS 2 is required.

Table 15 FDC Processor Error (E3) Data Values (RS232)

ORDER	VALUE	MEANING
1	0	Null
2	0	Null
3	0	Null
4	0 1 2 4	Null Not Used Not Used FDC DPRAM access error
5	0 1 2 4 8	Null Not Used Not Used Not Used Not Used
6	0 1 2 4 8	Null Static Sensor Humidity out of range Static Diode Volts out of range Static Counts out of range Static Pressure out of range
7	0 1 2 4 8	Null Pitot Counts out of range Pitot Pressure out of range Static Humidity warning Static Sensor Temperature out of range
8	0 1 2 4 8	Null Pitot Humidity warning Pitot Sensor Temperature out of range Pitot Sensor Humidity out of range Pitot Diode Volts out of range

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The command set recognised by CCADTS 2 uses the ASCII character set to define a packet of data, in the form of a string comprising a command character followed by a numerical data value, in accordance with IEEE488.2. The valid input commands are listed in Table 16. There are three types of data format: Real, Integer and Control. Real data is a true value which may include a fractional part (e.g. an Airspeed value of 140.5). Integer data is a whole number which defines a state (e.g. a Valve position of '0' for close or '1' for open). Control data signifies a command character with no numerical component. The data formats associated with the CCADTS 2 command characters are also listed in Table 16. Commands are separated by using a semicolon (;) or can be terminated with an End of Instruction (EOI) line set.

Commands **G**, **H** and **V** are all control commands having the functions defined in Table 16, and have no associated numerical data values.

NOTE: All control commands are inhibited during the leak check.

If at any time during IEEE488 remote operation a **G** character, or the word **STOP**, is sent to CCADTS 2, it will suspend the current control operation. This command enables the equipment to be used in a pressure monitoring role. Commands **K** to **S**, inclusive, all have numerical data values associated with them. All pressure data values should be as per Table 17. Pressure rate data values should be in the units listed in Table 18. It is not necessary to specify the units of pressure, or rate as CCADTS 2 will automatically interpret all the relevant data values in this manner.

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Table 16 CCADTS 2 Input Command Characters (IEEE 488 Control)

CHARACTER	DATA FORMAT	DATA PACKET DEFINITION
G	Control	Stop
H	Control	Commence Leak Check
K	Real	Maximum Altitude Rate
L	Real	Maximum Airspeed Rate
M	Real	Maximum Altitude
N	Real	Maximum Airspeed
O	Real	Maximum Mach Number
P	Real	Airspeed Rate
Q	Real	Airspeed
R	Real	Altitude Rate
S	Real	Altitude
T	Integer	Time and Date Setting
V	Control	Vent System

Table 17 Pressure Data Units (IEEE 488)

PARAMETER	UNITS
Airspeed	Knots
Altitude	Feet
Maximum Airspeed	Knots
Maximum Altitude	Feet
Maximum Mach Number	Not Applicable

The data values for the Time and Date Setting command packet (which has an integer format) are identical to the values listed in Table 10 and should be arranged in the order shown.

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Type D60340MK
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CCADTS 2 uses the Serial Poll function to flag status changes to the controller. If a status change occurs, the SQR (Serial Requests) line is set True, if enabled by the relevant mask bits in the Service Request Enable register. The controller responds by reading the CCADTS 2 Serial Poll register. This register indicates the reason behind the request (refer to Table 19). All error and status messages are flagged via the Serial Poll register.

The Serial Poll service requests are set under the following conditions:

- (1) Pressure Achieved is flagged the first time the set pressures are reached.
- (2) Rate Achieved is flagged the first time the set rates are attained

Table 18 Data Rate (IEEE 488)

PARAMETER	UNITS
Airspeed Rate	Knots/Minute
Altitude Rate	Feet/Minute
Maximum Airspeed Rate	Knots/Minute
Maximum Altitude Rate	Feet/Minute

Table 19 Serial Poll Register Settings

S R Bit: 7Q543210	HEX	DEFINITION
00000000	00	No SQR
01000001	41	Pressure Achieved
01000010	42	Rate Achieved
01000100	44	System Vented
01001000	48	Error
01010000	50	Message Available (MAV)
01100000	60	Standard Event Status Summary (ESB)
11000000	C0	Leak Check Completed

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- (3) System Vented is flagged at the end of a vent routine. This signifies that the pressure lines are at atmospheric pressure and can safely be disconnected from the unit under test.
- (4) Error is flagged if any errors occur.
- (5) MAV and ESB are set in accordance with IEEE488.2.
- (6) Leak Check Completed is flagged at the end of a leak check routine. This signals to the controller that the leak rates can be requested from the CCADTS 2.

E. Output Messages

Data is requested, and is stored in the IEEE488 output buffer, when CCADTS 2 receives the corresponding command query as listed in Table 20.

Messages **HS** to **S**, inclusive, all have numerical data values associated with them. Their units are as defined in Tables 17 and 18. Message **T** is also accompanied by numerical data, as defined in Table 10 for the corresponding input command. Values are arranged in the order shown.

Messages **G0** and **G1** are status outputs which convey the information defined in Table 20 and which have no associated numerical data values. Tables 21 to 23 define the data values for the remaining output packets with integer formats (refer to Table 20). Values are arranged in the order shown.

F. Interface Messages

CCADTS 2 implements the following IEEE488.2 interface commands:

- ***IDN** – Output name and part number.
- ***CLS** – Reset Status Byte Register and Event Status Register bits.
- ***RST** – Reset IEEE488 chip set.
- ***ESE** – Set enable bits in Standard Event Status Register mask.
- ***ESE?** – Output Standard Event Status Register mask bit settings.
- ***ESR?** – Output Standard Event Status Register.
- ***SRE** – Set enable bits in Service Request Register mask.
- ***SRE?** – Output Service Request Register mask bit settings.
- ***STB?** – Output Status Byte Register.
- ***OPC** – Set bits in ESR when operation completed.
- ***OPC?** – Output ASCII '1' when operation completed.
- ***WAI** – Delay action of next command.

The interface messages sent by the controller and which are understood by CCADTS 2 are classified into three main groups as defined by the IEEE488.1 standard. These are Universal Commands, Addressed Commands, and Addressed Messages.

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Table 20 CCADTS 2 Output Message Characters (IEEE 488 Control)

COMMAND QUERY	OUTPUT CHARACTER	DATA FORMAT	DATA PACKET DEFINITION
E?	E1	Integer	Communication Processor Errors
	E2	Integer	Pressure Controller Status
	E3	Integer	FDC Processor Errors
G?	G1	Status	System Pressurised
	G0	Status	System Vented
HS?	HS	Real	Static Leak Rate (ft/min)
HT?	HT	Real	Pitot Leak Rate (kts/min)
O?	O	Real	Mach Number
P?	P	Real	Airspeed Rate
Q?	Q	Real	Airspeed
R?	R	Real	Altitude Rate
S?	S	Real	Altitude
T?	T	Integer	Time and Date Reading

Table 21 Communications Processor Error (E1) Data Values (IEEE 488)

ORDER	VALUE	MEANING
1	0	Null
2	0	Null
3	0	Null
4	0	Null
5	0	Null
6	0	Null
7	0 1 2 4 8	Null Not Used Not Used CCU Failure RCDU Failure
8	0 1 2 4	Null Communications DPRAM Access Error Real Time Clock Battery Failure Pressure Controller Connection Error

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Table 22 Pressure Controller Status (E2) Data Values (IEEE 488)

ORDER	VALUE	MEANING
1	0	Null
2	0	Null
3	0 1 2 4	Null Not Used Not Used Not Used
4	0	Null
5	0 1 2	Null Not Used Pressure Control DPRAM error
6	0 1 2 4 8	Null Static Volts out of range Not Used Pitot Servo Pot out of range Static Servo Pot out of range
7	0 1 2 4 8	Null Mach Number out of range Not Used Not Used Pitot Volts out of range
8	0 1 2 4 8	Null Static Pressure out of range Pitot Pressure out of range Altitude Rate out of range Airspeed Rate out of range

(1) Universal Commands

ATN (Attention) – A uniline command which causes CCADTS 2 to interpret multiline messages as interface messages. When False, multiline commands are interpreted as device-dependent commands.

DCL (Device Clear) – A multiline command which resets CCADTS 2 to its power-up state. This resets all parameters to their default values, i.e. the maximum operating limits (control envelope) is reset to the power-on default limits, the units are set to the power-on default settings, the mach number correction (where applicable) is reset to No Correction Applied, and the system returns to local control

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Table 23 FDC Processor Error (E3) Data Values (IEEE 488)

ORDER	VALUE	MEANING
1	0	Null
2	0	Null
3	0	Null
4	0 1 2 4	Null Not Used Not Used FDC DPRAM access error
5	0	Null
6	0 1 2 4 8	Null Static Sensor Humidity out of range Static Diode Volts out of range Static Counts out of range Static Pressure out of range
7	0 1 2 4 8	Null Pitot Counts out of range Pitot Pressure out of range Static Humidity warning Static Sensor Temperature out of range
8	0 1 2 4 8	Null Pitot Humidity warning Pitot Sensor Temperature out of range Pitot Sensor Humidity out of range Pitot Diode Volts out of range

IFC (Interface Clear) – A uniline command which clears the CCADTS 2 interface.

REN (Remote Enable) – A uniline command which, when received with **MLA** (My Listen Address), switches CCADTS 2 to remote control. When REN is set False, CCADTS 2 switches to local control.

SPE (Serial Poll Enable) – A multiline command which causes the serial poll word (rather than the output buffer data) to be output to the bus once **ATN** becomes False.

SPD (Serial Poll Disable) – A multiline command which removes the serial poll enable state.

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GTL (Go To Local) – A multiline command which is received only while CCADTS 2 is addressed to listen, and which switches CCADTS 2 to local control.

SDC (Selected Device Clear) – A multiline command identical to **DCL**, but received only while CCADTS 2 is addressed to listen.

(3) Addressed Messages

MLA (My Listen Address) – Addresses CCADTS 2 to listen.

MTA (My Talk Address) – Addresses CCADTS 2 to talk.

UNL (Unlisten) – Addresses all listeners to unlisten.

UNT (Untalk) – Addresses all talkers to untalk.



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APPENDIX

1. ELECTRICAL PITOT STATIC DISTRIBUTION KIT

1.1 Description

The Electrical Pitot Static Distribution Kit Type D60371MK is a means of testing a number of aircraft inputs together, or in isolation, using a single CCADTS as a source. It consists of Pitot and Static inputs from the CCADTS which go to four sets of outputs, which can be enabled or disabled separately via the CCADTS Display Unit. Operation of the Distribution Kit in conjunction with the CCADTS is shown in Section 4. OPERATING MODES (RCDU MAIN MENU subsection H. Main Menu Option 8 - Pressure Control Mode on p. 27 onwards).

The Distribution Kit is to be used in conjunction with the Computer Controlled Air Data Test Set (CCADTS2).

The Distribution Kit D60371MK comprises a Pitot Static Electrical Distribution Unit (GA48959.E), a Hydraflow Pitot Hose Assembly (SA48036MK1) for connection to CCADTS2, a Hydraflow Static Hose Assembly (SA48037MK1) for connection to CCADTS2, four Pitot Hose Assemblies (SA48029MK), four Static Hose Assemblies (SA48030MK) and a Loom Assembly (SA48977.E) between the CCADTS2 and the Distribution Kit.

The Electrical Pitot Static Distribution Unit is shown in Figure 31.

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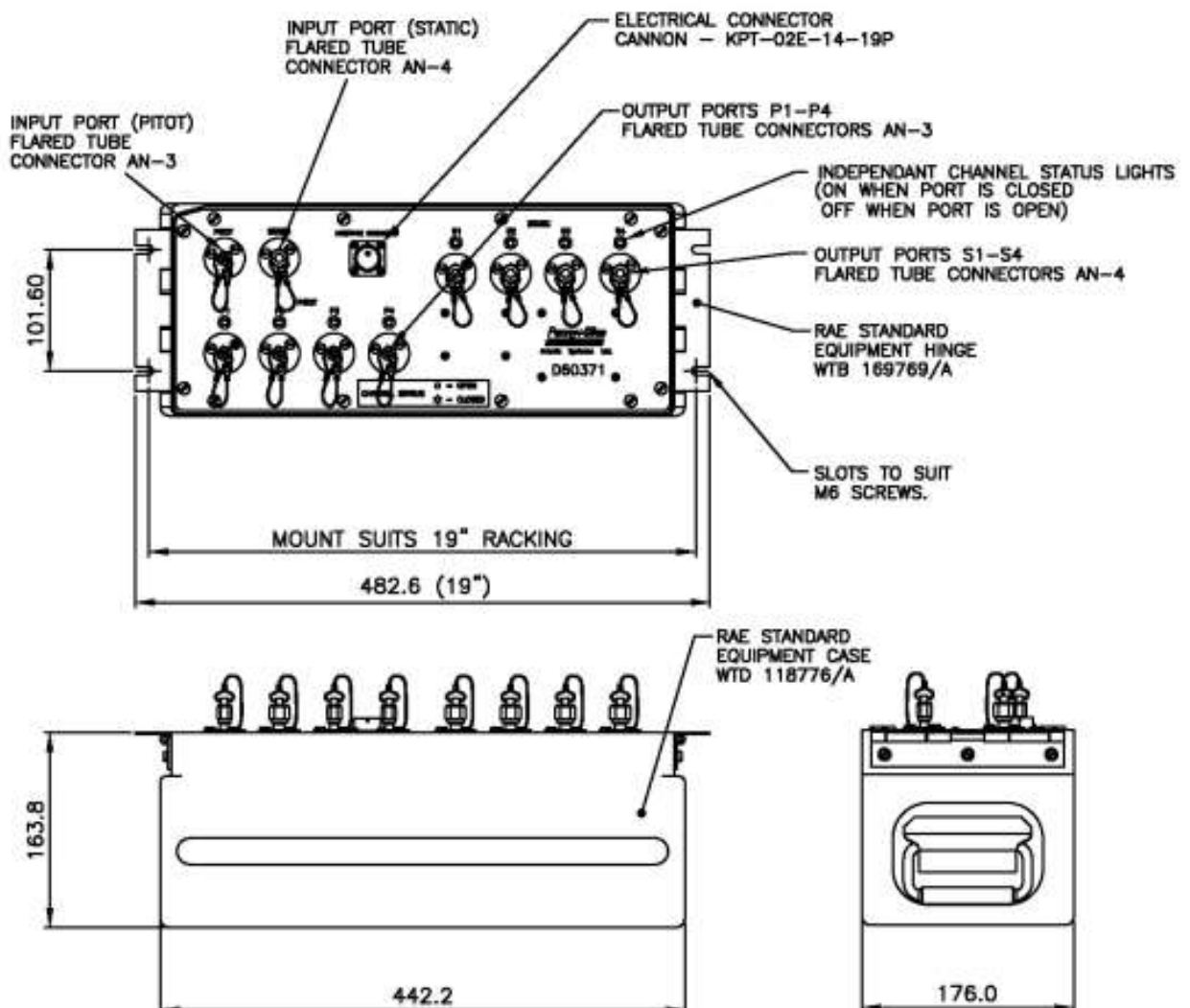


Figure 31 Electrical Pitot Static Distribution Unit GA48959 E

1.2 Physical and Other Characteristics

A. Mass

5 kg (nominal weight)

B. Dimensional Limits

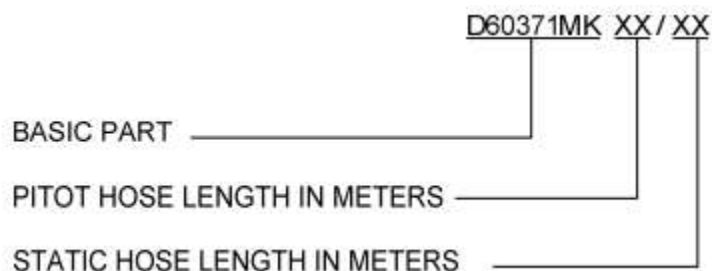
L 482.7mm x W 176.1 mm x H 163.9 mm (height excludes I/O connectors)

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Aluminium Alloy Enclosure with Light Admiralty Grey Finish
to DEF STAN 1059 BS381C, Tint 679

D. Part Numbering

The Distribution Kit part numbering convention is as follows



The pitot/static hose lengths are 5, 10, 15, 20 and 25 metres.

E. Power Requirements

28 VDC

F. Operating Temperature

-5°C to +45°C

G. Storage Temperature

-30°C to +65°C

H. Connectors

The connectors are listed in Table 24.

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Table 24 Distribution Unit's Connectors

INPUT/OUTPUT	CONNECTOR	QTY
Input Port (Pitot) RED	Flared Tube Connector AN-3	1
Input Port (Static) BLUE	Flared Tube Connector AN-4	1
Power In	Electrical Connector Cannon - KPT-02E-14-19P	1
Output Ports P1-P4 (Pitot)	Flared Tube Connector AN-3	4
Output Ports S1-S4 (Static)	Flared Tube Connector AN-4	4

I. Pin Allocations

The pin allocations and functions of the electrical connectors are shown in Table 25.

Table 25 Pin Allocations

ELECTRICAL CONNECTOR				
PIN	INPUTS	FUNCTION	VOLTS	POWER
D		Static S1 Close	5 VDC	TTL
R		Static S2 Close	5 VDC	TTL
V		Static S3 Close	5 VDC	TTL
U		Static S4 Close	5 VDC	TTL
C		Pitot P1 Close	5 VDC	TTL
P		Pitot P2 Close	5 VDC	TTL
N		Pitot P3 Close	5 VDC	TTL
L		Pitot P4 Close	5 VDC	TTL
B		0V - Common	0 VDC	-
M		28V Supply	28 VDC	20 W

TTL = Transistor Transistor Logic

J. Connections and Assemblies

Figure 23 shows the connections between the CCADTS 2 and the Distribution Kit.

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Figure 32 Connections between CCADTS 2 and Distribution Kit

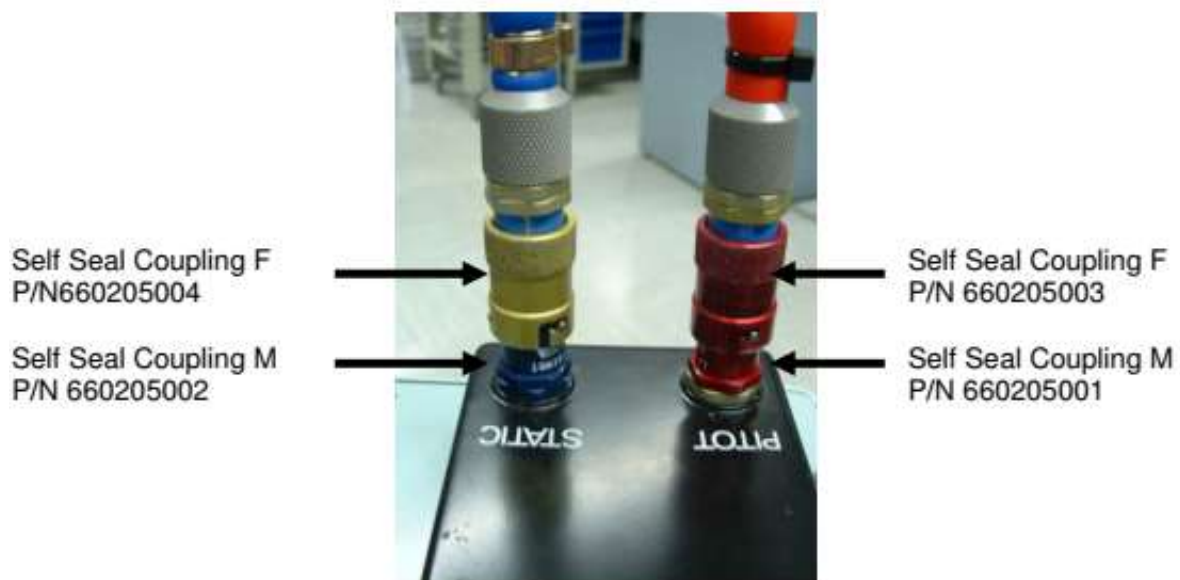


Figure 33 CCADTS 2 Hydraulic Connections

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Figure 34 Distribution Unit's Input Connections and Inlets



Figure 35 Hydraflow Pitot Hose assembly SA48036MK1 (RED) and Hydraflow Static Hose Assembly Sa48037MK1 (BLUE)

NOTE: Couplings are not included in the Hose Assemblies.

Figure 36 shows the hose assemblies that are supplied in lengths of 5, 10, 15, 20 or 25 metres as required.

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Figure 36 Pitot Hose Assembly SA48029MK (RED) and Static Hose Assembly SA48030MK (BLUE) –
Supplied in lengths of 5, 10, 15, 20 and 25 Metres (As Required)



Figure 37 Loom Assembly SA48977.E

ABBREVIATIONS AND ACRONYMS

A	Amperes
AAM	Aircraft Maintenance Manual
AC	Alternating Current
AF	Audio Frequency
AIR	Airborne Image Recorder
ARINC	Air Radio INCorporated
ATA	Air Transport of America
ATR	Air Transport Racking
BIT	Built In Test
BITE	Built In Test Equipment
BS	British Standards
CAA	Civil Aviation Authority
CAM	Cockpit Area Microphone
CMM	Component Maintenance Manual
CSMM	Crash Survivable Memory Module
CVR	Cockpit Voice Recorder
dB	Decibel
DC	Direct Current
DDP	Declaration of Design and Performance
DLR	Data Link Recorder
FDR	Flight Data Recorder
DSP	Digital Signal Processor
ED	EUROCAE Document
ESD	Electrostatic Sensitive Device
EUROCAE	European Organisation for Civil Aviation Electronics
FAA	Federal Aviation Agency
FDAU	Flight Data Acquisition Unit
FDR	Flight Data Recorder
GMT	Greenwich Mean Time

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GND	Ground
GSI	Ground Support Interface
HUMS	Health & Usage Monitoring System
Hz	Hertz
ISO	International Standards Organisation
in	inches
in/s	inches per second
IP	Internet Protocol
ISO	International Standards Organisation
JAA	Joint Aviation Authority
JAR	Joint Aviation Requirements
k	kilo
kN	kilo Newton
Max	Maximum
Min	Minimum
MKS	Metre-kilogram-second
M	Mega
m	milli
mm	millimetres
MTBF	Mean Time Between Failures
MTBO	Mean Time Between Overhauls
MTI	Manufacturers Test Interface
mtr	metre
n	nano
N/A	Not applicable
NC	Not Connected
OC	On Condition
OMS	On-board Maintenance System
P&G	Penny and Giles
PCB	Printed Circuit Board
PEC	Panel Electronic Circuit
PRE	Portable Replay Equipment
PSU	Power Supply Unit
RAM	Random Access Memory

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REQ	Required
RF	Radio Frequency
RFI	Radio Frequency Interference
RIPS	Recorder Independent Power Supply
RMS	Root Mean Square
ROM	Read Only Memory
RTCA	Radio Technical Commission for Aeronautics
s	Second
SFI	Supplementary Flight Information
SINAD	Signal to Noise and Distortion Ratio
SK	Socket
SPL	Sound Pressure Level
TBA	To Be Allocated
THD	Total Harmonic Distortion
TSO	Technical Standing Order
ULB	Underwater Locator Beacon
V	Volts
V _{pk-pk}	Volts Peak to Peak
W	Watts
wps	Words per Second

SYMBOLS

°	Degree(s) Temperature
±	Plus or minus
<	Less than
≤	Less than or equal to
>	Greater than
≥	Greater than or equal to

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