PRECISION CONTROL SYSTEMS
417 Bridport Road
Greenford, Middlesex
UB6 8UE, United Kingdom
Telephone +44 208 813 4444 Fax +44 208 813 4351
Email: support@ultra-pcs.com
(Cage: K8081)

PROPELLER BALANCE MONITORING SYSTEM (PBMS)

MAINTENANCE TERMINAL USER MANUAL FOR WINDOWS 10 OPERATING SYSTEM

THE TECHNICAL CONTENT OF THIS DOCUMENT IS APPROVED UNDER THE AUTHORITY OF:
DOA No. EASA 21J.092

Initial Issue.

PRODUCT SUPPORT CENTRE

Ultra, Precision Control Systems
Customer Support Team

Vitrum Building, St Johns Innovation Park
Cowley Road
Cambridge
CB4 0DS
United Kingdom

Telephone +44 208 813 4444 Fax +44 208 813 4351
Email: support@ultra-pcs.com

RECORD OF REVISIONS

Revision No.	Insertion Date	Initial

Revision No.	Insertion Date	Initial

INTENTIONALLY LEFT BLANK

RECORD OF TEMPORARY REVISIONS

Revision No.	Insertion Date	Initial

Revision No.	Insertion Date	Initial

Initial Issue.

INTENTIONALLY LEFT BLANK

Initial Issue.

LIST OF EFFECTIVE PAGES

Title	Page No.	Date
Title Page	1	04 August 2020
	2	04 August 2020
Record of Revisions	1	04 August 2020
	2	Blank
Record of Temporary Revisions	1	04 August 2020
	2	Blank
List of Effective Pages	1	04 August 2020
	2	Blank
Service Bulletin List	1	04 August 2020
	2	Blank
Table of Contents	1	04 August 2020
	2	Blank
List of Illustrations	1	04 August 2020
	2	04 August 2020
	3	Blank
Introduction	1	04 August 2020
	2	Blank
Abbreviations and Acronyms	1	04 August 2020
	2	Blank
Description and Operation	1-1	04 August 2020
	1-2	04 August 2020
	1-3	04 August 2020
PBMS Terminal Requirements, Installation and Registration	2-1	04 August 2020
	2-2	04 August 2020
	2-3	04 August 2020
	2-4	04 August 2020
	2-5	04 August 2020
	2-6	04 August 2020
	2-7	04 August 2020
	2-8	04 August 2020
	2-9	04 August 2020
	2-10	04 August 2020
	2-11	04 August 2020
	2-12	04 August 2020
Obtaining In-Flight Vibration Data	3-1	04 August 2020
	3-2	04 August 2020
	3-3	04 August 2020
	3-4	04 August 2020
	3-5	04 August 2020
	3-6	04 August 2020
	3-7	04 August 2020
Determining Vibration Levels	4-1	04 August 2020
	4-2	04 August 2020
	4-3	04 August 2020
	4-4	04 August 2020
	4-5	04 August 2020
	4-6	04 August 2020
	4-7	04 August 2020
	4-8	04 August 2020
PBMS Terminal Set-up	5-1	04 August 2020
	5-2	04 August 2020
	5-3	04 August 2020
	5-4	04 August 2020
Error Messages	6-1	04 August 2020
	6-2	04 August 2020
	6-3	04 August 2020
	6-4	04 August 2020
	6-5	04 August 2020

INTENTIONALLY LEFT BLANK

SERVICE BULLETIN LIST

Number	Description	Insertion Date	Initial
23-35-116	INTRODUCTION OF WINDOWS 10 BASED GROUND SUPPORT SOFTWARE FOR USE WITH DE HAVILLAND DASH 8 SERIES REGIONAL AIRCRAFT	04 August 2020	

INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

Preliminaries:	Page
Title Page	1
Record of Revisions	1
Record of Temporary Revisions	1
List of Effective Pages	1
Service Bulletin List	1
Table of contents (This Page)	1
List of Illustrations	1
Introduction	1
Abbreviations & Acronyms	1

1. Description and Operation:

A. System Description	1-1
B. ANCU Description	1-1
C. Vibration Sensor Description	1-3
D. PBMS Terminal Description	1-3
E. PBMS Terminal Printer	1-3
F. Balance Procedures	1-3

2. PBMS Terminal Requirements, Installation and Registration:

A. General	2-1
B. PBMS Terminal Requirements	2-1
C. PBMS Terminal Software installation Procedure	2-2
D. Registering the PBMS Terminal	2-8
E. Manual Licence Expiry	2-10

3. Obtaining In-Flight Vibration Data:

A. Connecting to the J5 Remote Maintenance Connector	3-1
B. Serial Port allocation	3-1
C. Start the PBMS Terminal	3-1
D. Read PBMS Data from the Controller	3-3

4. Determining Vibration Levels and Calculate New balance:

A. Read PBMS Data from File	4-1
B. Display Vibration Levels	4-2
C. Calculate New Balance	4-3
D. The Balance Graphical display	4-6

TABLE OF CONTENTS

5. PBMS Terminal Set-up:

A. Set-up Menu 5-1
B. Measured Units 5-1
C. User Default Directories 5-2
D. System information 5-3
E. Production Menu 5-4
F. Exiting the PBMS Terminal 5-4

6. Error Messages: 6-1

A. Error Message Description 6-1
B. Error Message Screen Shots 6-2

INTENTIONALLY LEFT BLANK

LIST OF ILLUSTRATIONS

Figure:		Page:
1-1	Active Noise Control Unit (ANCU	1-2
2-1	Licence Agreement	2-2
2-2	Setup Progress	2-3
2-3	Setup Wizard	2-3
2-4	End User Licence	2-4
2-5	Custom Setup	2-4
2-6	Com Port	2-5
2-7	Ready To Install	2-5
2-8	Finish	2-6
2-9	Complete	2-6
2-10	Desktop icons	2-7
2-11	Welcome	2-8
2-12	Registration	2-9
2-13	Software Registration	2-9
2-14	Accepted Screen	2-10
2-15	GSS 2.0.0	2-11
2-16	Change	2-11
2-17	Custom Setup	2-12
2-18	Remove Licence	2-12
3-1	GSS Change	3-1
3-2	Change	3-2
3-3	Custom Setup	3-2
3-4	Com Port Allocation	3-3
3-5	Ready to change	3-3
3-6	Restart	3-3
3-7	Log File Details	3-4
3-8	Log File Name	3-5
3-9	Main Menu	3-5
3-10	Read from Controller	3-6
3-11	Information	3-6
3-12	Reading Data	3-7
4-1	Data Files	4-1
4-2	Display Vibration Levels	4-2
4-3	Engine selection	4-3
4-4	Log file comment	4-4
4-5	Calculate New Balance	4-4
4-6	Help	4-5
4-7	Flight Condition Selection	4-6
4-8	Proposed Mass	4-6
4-9	Balance Graphical Display (Forward View)	4-7
4-10	View to rear option	4-8
5-1	Set-up Menu	5-1
5-2	Measurement Units	5-1
5-3	User Default Directories	5-2
5-4	System Information	5-3
6-1	Invalid Serial Number	6-2
6-2	Enter Name	6-2
6-3	No Controller	6-3
6-4	No PBMS Data on Controller	6-3
6-5	No Data Files	6-4
6-6	No PBMS Data loaded	6-4
6-7	Serial Port or USB does not Exist	6-5

INTENTIONALLY LEFT BLANK

INTRODUCTION

1. General

This manual provides information on the Propeller Balance Monitoring System (PBMS) supplied by Ultra, Precision Control Systems. The manual is divided into the following sections:

- Introduction.
- PBMS Description and operation.
- PBMS Terminal Requirements, Installation and Registration.
- Obtaining In-Flight Vibration Data.
- Determining Vibration Levels and Calculate New Balance.
- PBMS Terminal Set-up.
- Error Messages.

The PBMS system provided by Ultra, Precision Control Systems is designed to provide balance information taken from data gathered during flight to enable maintenance engineers to best balance their aircraft propellers for the in-flight condition.

NOTE: It may also be used to provide balance information taken from data gathered during ground runs for Maintenance purposes as long as the set-up conditions are within the guidelines described in Section 3.C.4. However, it must be understood that although the resulting balance data will be valid it will not be optimised for the 'In-Flight' condition.

INTENTIONALLY LEFT BLANK

ABBREVIATIONS AND ACRONYMS

Abbreviations	Definition
AC	Alternating Current
ANCU	Active Noise Control Unit
ANVC	Active Noise and Vibration Control
ARINC	Aeronautical Radio, Incorporated
BMP	Bitmap
EPX	EPX Series Rectangular Modular Connector
MCU	Microcontroller Unit
NVM	Non Volatile Memory
PBMS	Propeller Balance Monitoring System
RPM	Revolutions Per Minute
TXT	Text
USB	Universal Serial Bus
VGA	Video Graphics Adaptor

INTENTIONALLY LEFT BLANK

1. DESCRIPTION AND OPERATION:

A. System Description.

(1) The functions of the Propeller Balance Monitoring System (PBMS) are:

(a) To automatically determine and store the data required to calculate the level of propeller unbalance during normal revenue flight operation.

(b) To use this data, during ground maintenance, to define the redistribution of weights in the propeller balance plane necessary to achieve propeller balance within specified limits.

(2) PBMS consists of:

(a) A Vibration Sensor mounted on each propeller gearbox or engine.

(b) A data processing function contained within the Active Noise Control Unit (ANCU).

(c) The PBMS Terminal.

(3) During flight, the ANCU processes the outputs of the Vibration Sensors together with data such as Propeller RPM. The data required to calculate the level of unbalance is recorded and stored automatically.

(4) The unbalance data stored in the ANCU can be retrieved via a serial interface to the PBMS Terminal. The PBMS Terminal interprets the data to display vibration levels and calculate balance solutions. The balance solutions define a distribution of masses necessary to achieve balance within specified limits.

B. ANCU Description.

(1) The ANCU is an ARINC 600 4MCU sized unit, hard mounted to the aircraft on four feet.

(2) Electrical connections to the ANCU are as follows:

(a) Up to five EPX connectors, J1 through J4 and J6, mounted on the rear endplate.

(b) A 9-way D-type connector, J5, mounted on the front endplate.

(c) A MIL-C-38999 connector, J7, mounted on the front endplate.

(3) The majority of the connections to the ANCU relate to its Active Noise and Vibration Control function. The Connectors used for the PBMS function are:

(a) J1, which is the input connector for aircraft + 28V dc power and the frequency reference signals, which define the propeller engine speeds.
.

(b) J7, which is the input connector for the Vibration Transducer signals.

(c) J5 provides the EIA-232 interface to the PBMS Terminal

(4) A Tri-State LED indicator on the front endplate displays the system status.

(5) The Controller (ANCU) stores 1P Vibration Data together with data such as Propeller RPM in the Non Volatile Memory (NVM). This process occurs automatically whenever Propeller speed is above 300 RPM, requiring no Operator action. The Controller (ANCU) will store the last 75 Hours of Vibration Data on the Dash 8 400 series and the last 125 Hours on the Dash 8 100/200/300 series.

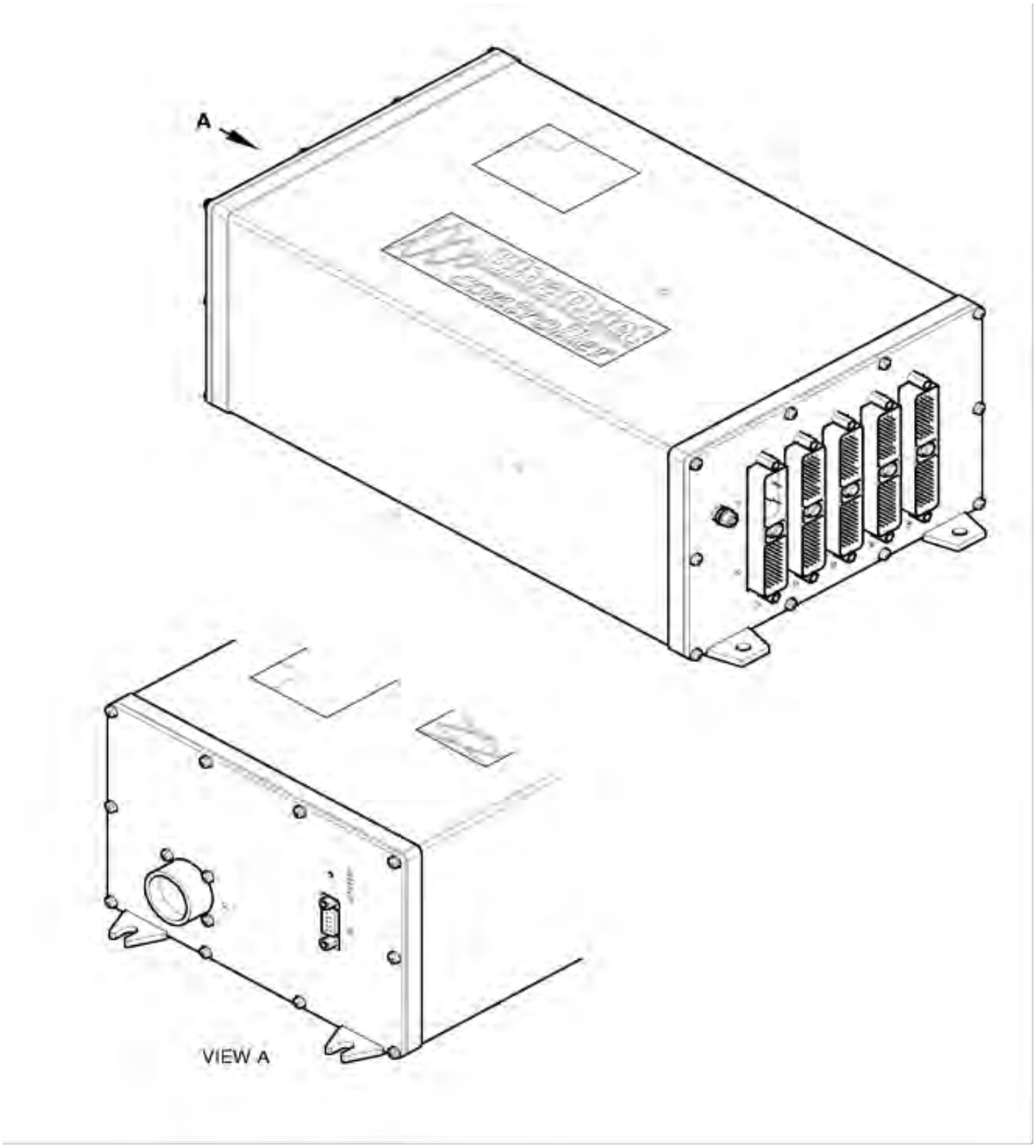

Figure 1-1 Active Noise Control Unit (ANCU)

C. Vibration Sensor Description.

(1) The PBMS Vibration Sensor consists of a miniature sensor element and interface circuit encased within a sealed enclosure. It is attached to the engine gearbox using a single bolt. Power for the Vibration Sensor is provided by the ANCU.

D. PBMS Terminal Description.

(1) The PBMS Terminal consists of Ultra, Precision Control Systems proprietary software running on a Windows laptop PC. The basic functions provided are:

(a) Read data from the ANCU and store it on the PBMS Terminal's hard drive.

(b) Show the vibration levels on the PBMS Terminal display.

(c) Calculate the balance weight installation required to minimise propeller engine vibration.

E. PBMS Terminal Printer.

(1) The PBMS Terminal can print to the file types that follow:

(a)	TXT (text)	These files can be viewed and printed from most word processing packages.
(b)	BMP (graphics)	These files can be viewed, and printed from most graphics packages.

F. Balance Procedures.

(1) Listed Below are the steps to perform a Propeller Balance.

(a) Obtain In-Flight Vibration data. **(Section 3).**

- Connect to Controller.
- Start the PBMS Terminal.
- Read Data from Controller.

(b) Determine Vibration Levels and calculate new balance. **(Section 4).**

- Read PBMS Data from File.
- Display Vibration Levels.
- Calculate New Balance.

2. PBMS TERMINAL REQUIREMENTS, INSTALLATION AND REGISTRATION:

A. General.

(1) This section details the requirements and procedure for installing and registering the PBMS Software:

(a) PBMS Terminal Requirements (Reference Paragraph B).

(b) PBMS Terminal Software Installation Procedure. (Reference Paragraph C).

(c) Registering the PBMS Terminal Software (Reference Paragraph D).

B. PBMS 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: 800x600.

(f) Battery power with a minimum battery life of at least 1.5 hours.

(g) USB port.

(2) Software.

PBMS Terminal Software is supplied on USB Flash Drive as part of the Ground Support Software for Active Noise and Vibration Control Systems. The PBMS Terminal software references the following files:

(a) Pbms.exe (PBMS Terminal executable file).

(b) Aircraft Configuration Databases.

(c) PBMS830.lng.

(d) PBMShelp.Dat.

(e) Ptmenu.lng.

(f) Coure.fon.

(g) smalle.fon.

(h) User830.env.

C. PBMS Terminal Software Installation Procedure.

(1) The PBMS Terminal programme is installed as part of the Ground Support Software (GSS) and is located in the same directory as the Maintenance Terminal Software. C:\MT830 and is called PBMS.EXE:

(2) The PBMS Terminal will be installed as part of the GSS 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 onscreen prompts to the Licence Agreement. **(Ref Fig 2-1)**

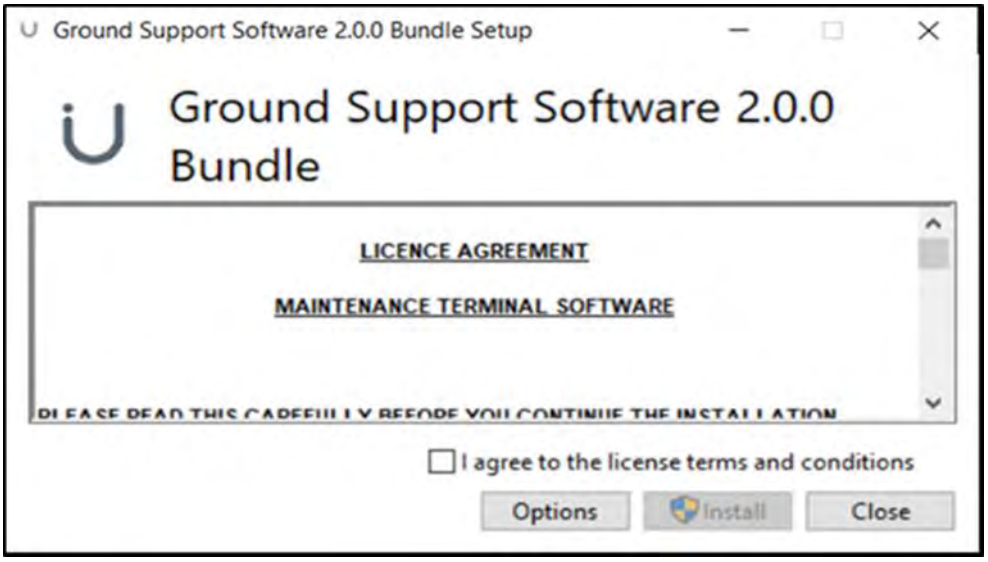

Figure 2-1 Licence Agreement

(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)**

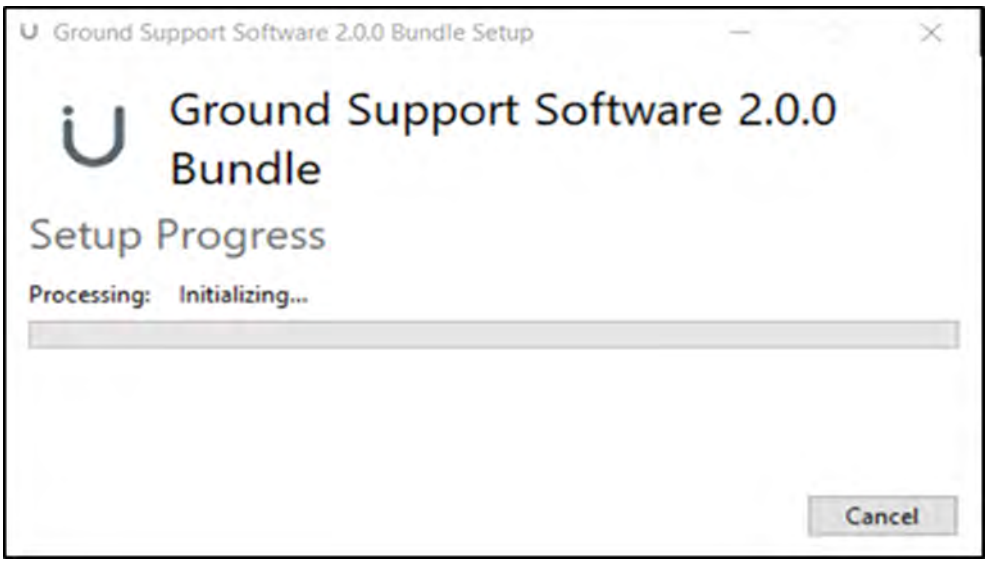

Figure 2-2 Setup Progress

(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)**

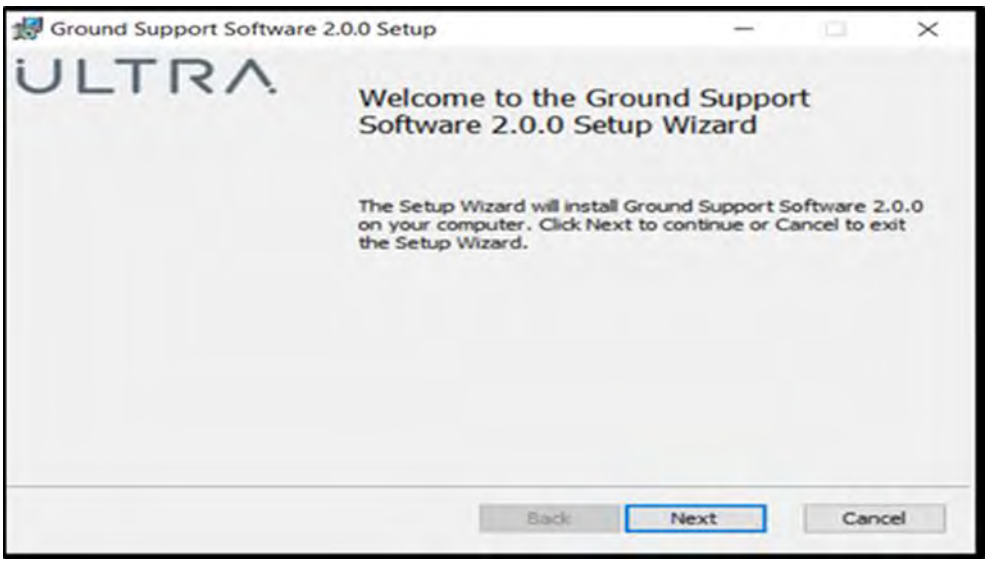

Figure 2-3 Setup Wizard

(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)**

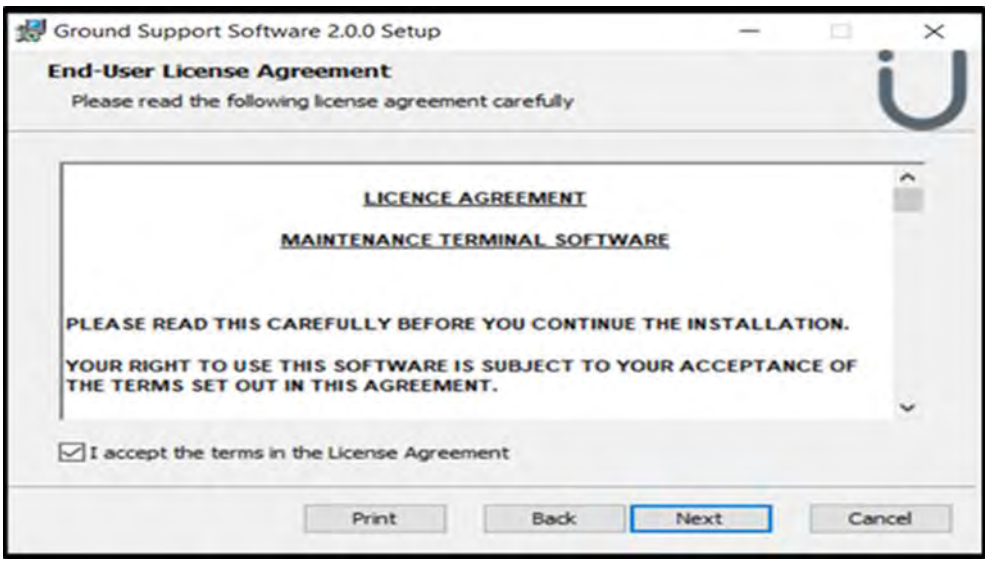

Figure 2-4 End User Licence

(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 PBMS settings in the Custom Setup menu are for PBMS to be installed. 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.

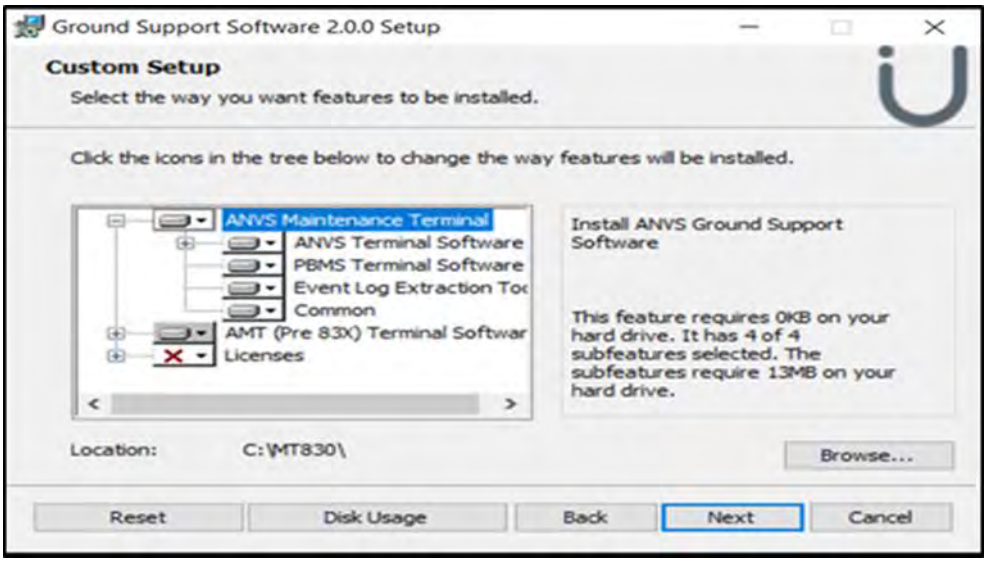

Figure 2-5 Custom Setup

(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

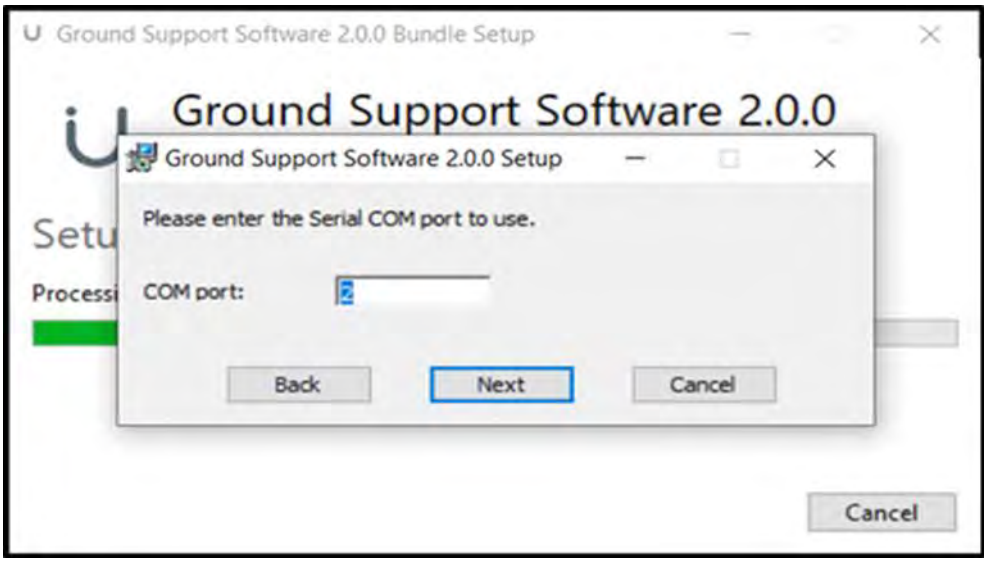

Figure 2-6 Com Port

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

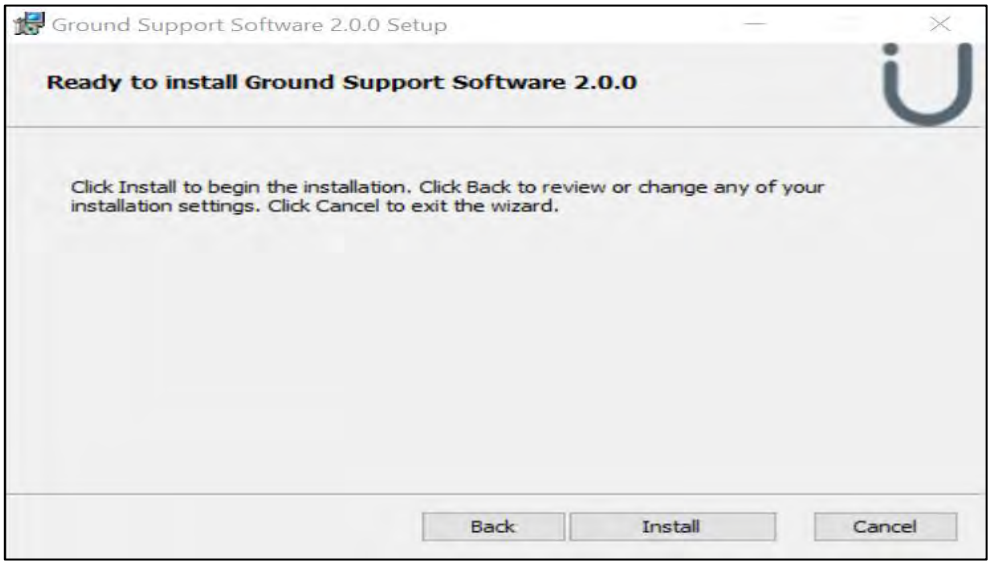

Figure 2-7 Ready to Install

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

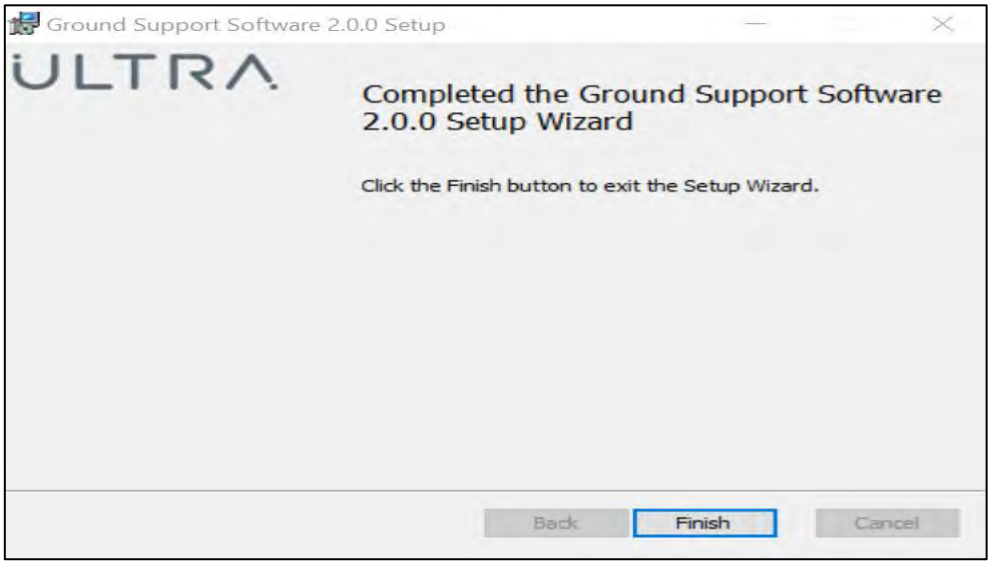

Figure 2-8 Finish

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

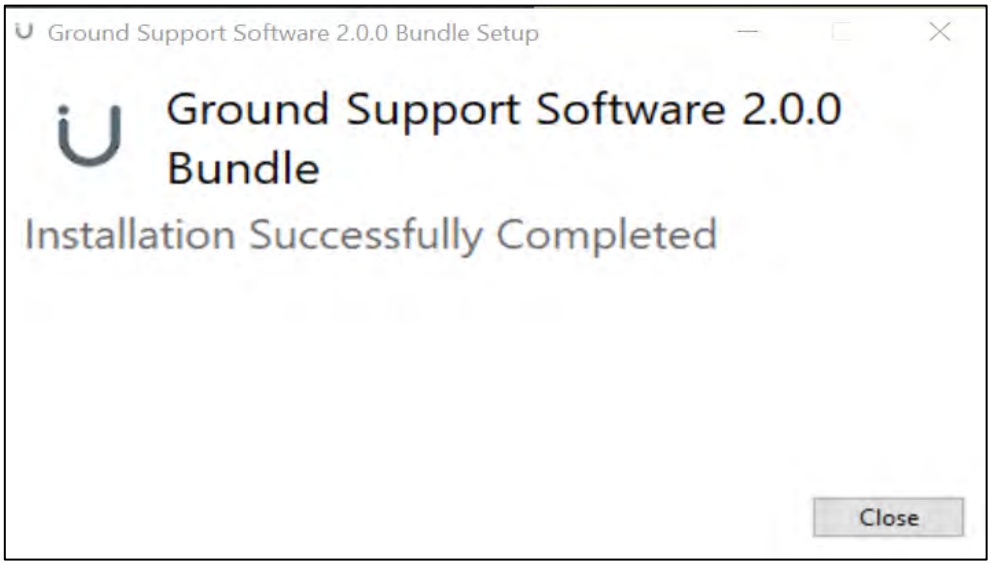

Figure 2-9 Complete

(d) Four Desktop Icons will be created as part of the installation process these being: **(Ref Fig 2-7)**

- **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 811 controller. If the ANVS MT is used on a Type 811 controller, this will be recognised and the AMT will automatically start.

Figure 2-7 Desktop icons

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

D. Registering the PBMS Terminal.

(1) This process is required the first time the PBMS Terminal Software is to used.

Note: You do not have to connect the PBMS terminal to the ANCU for the registration process.

(2) Switch the Windows laptop PC on.

(3) Click from the PBMS Icon created on the Windows 10 Desktop.

(4) After a few seconds the Welcome screen will be shown **(Ref Figure 2-8)** followed by the registration Check Screen (**Ref Fig 2-9).**

(5) E-mail Ultra, Precision Control Systems **support @ultra-pcs.com** for your Authorisation Code. You will need to give the information that follows:

(a) Your Name and Company Name.

(b) The software Licence Number from the USB Key Tag.

(c) The registration Number Generated by the PBMS Terminal (**Ref Fig 2-9).**

(d) A Contact Telephone Number.

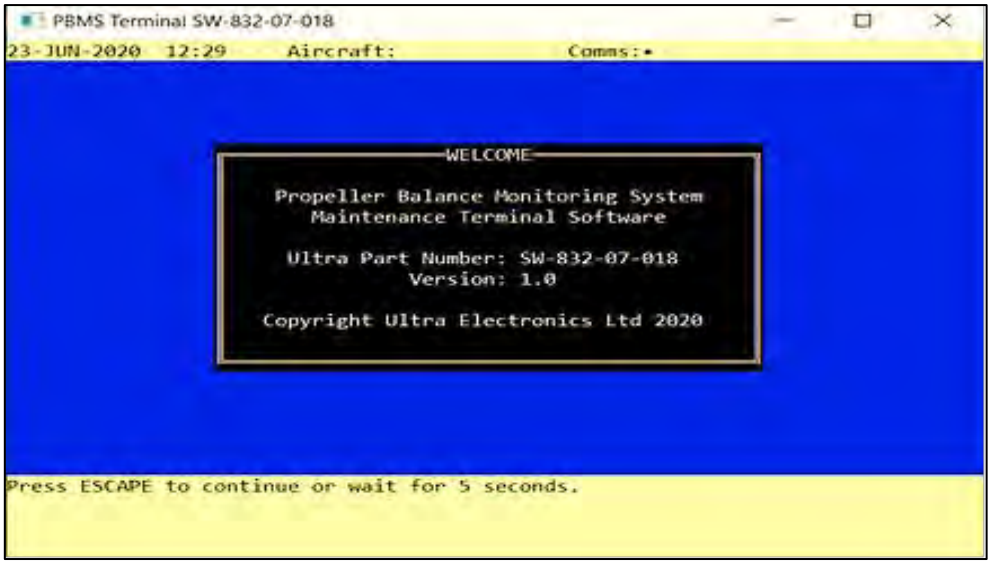

Figure 2-8 Welcome

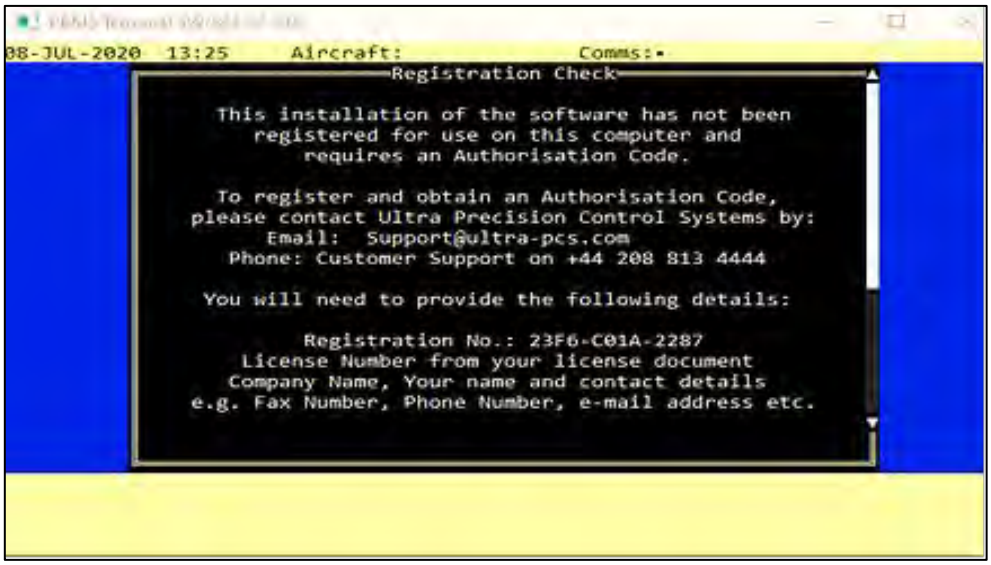

Figure 2-9 Registration

(6) Once you have an Authorisation Code from the registration screen Press <Enter> The Software Registration Screen will be Shown **(Ref Fig 2-10**).

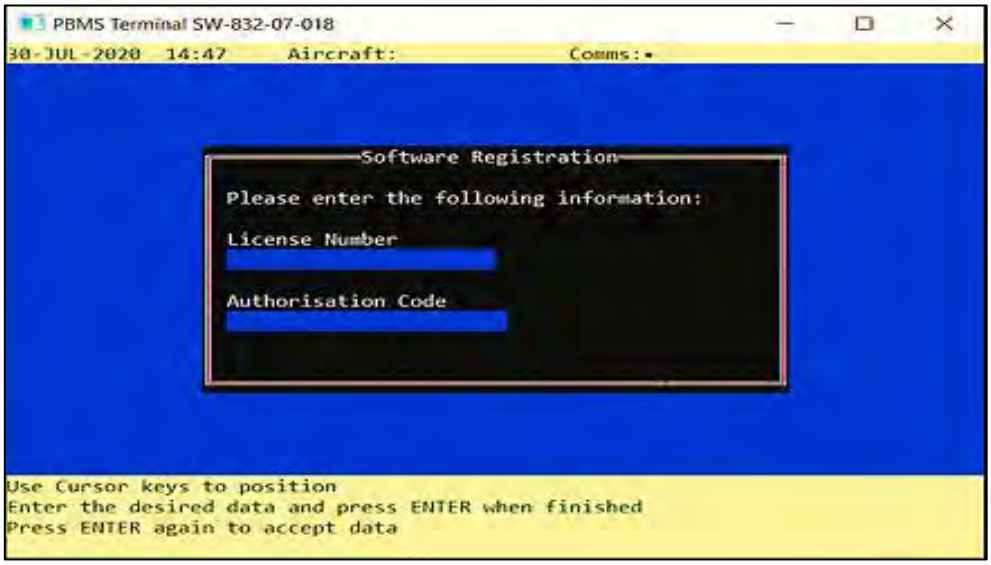

Figure 2-10 Software Registration

(7) Enter your Licence Number on to the Registration Screen.

(8) Enter the Authorisation Code as supplied by Ultra, Precision Control Systems and Press <Enter>.

(9) If the Licence number and the Authorisation Code are entered correctly, the Accepted Screen will show. **(Ref Fig 2-11).**

(10) The Registration Process is required for the first installation of the PBMS Terminal and when your Authorisation Code Expires.

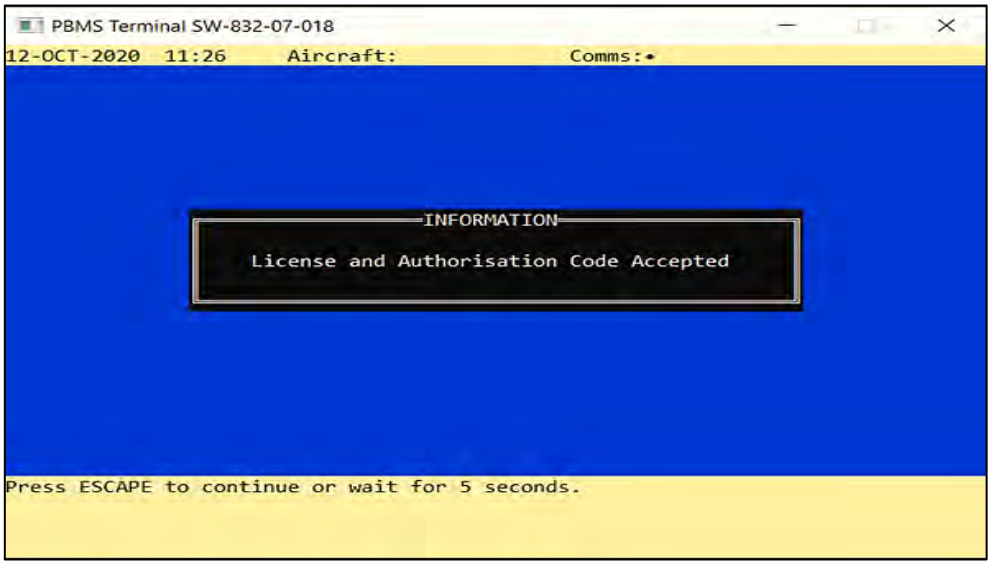

Figure 2-11 Accepted

E. Manual Licence Expiry.

Ultra, Precision Control Systems provides a time limited Authorisation Code so that operators are up to date with any GSS updates. To enable operators to schedule their licence renewals without having to wait for it to expire automatically, a manual licence expiry function has been added. The operator can now manually terminate the licence and request a new authorisation code at their convenience. For example, if maintenance is scheduled for the weekend and the recorded expiry date occurs over this period, the licence can be manually expired at a convenient time prior to the automatic expiry date to prevent any impact on maintenance.

(1) Select the Windows start menu.

(2) Select Windows System from the menu.

(3) Select Control Panel.

(4) Select Programs and features.

(5) Highlight Ground Support Software 2.0.0 and click on change. **(Ref fig 2-12)**

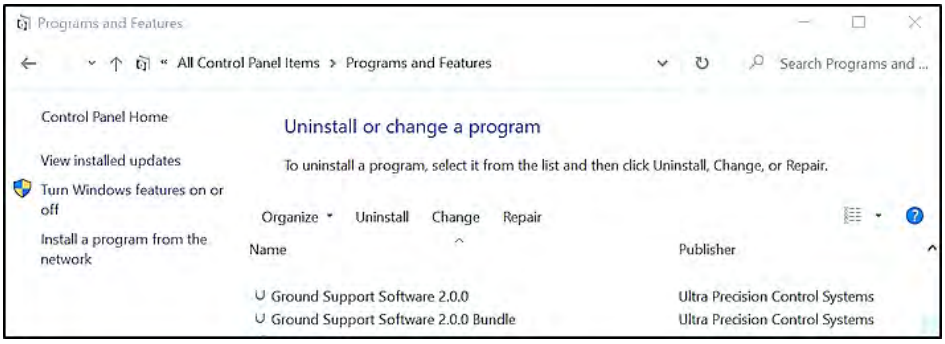

Figure 2-12 GSS 2.0.0

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

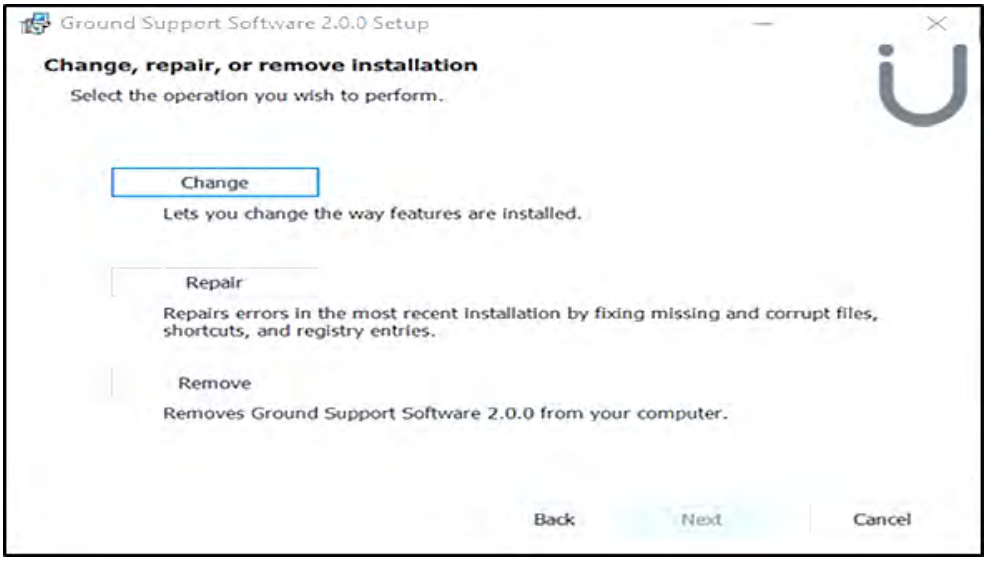

Figure 2-13 Change

(7) Expand the Licences feature. **(Ref Fig 2-14)**

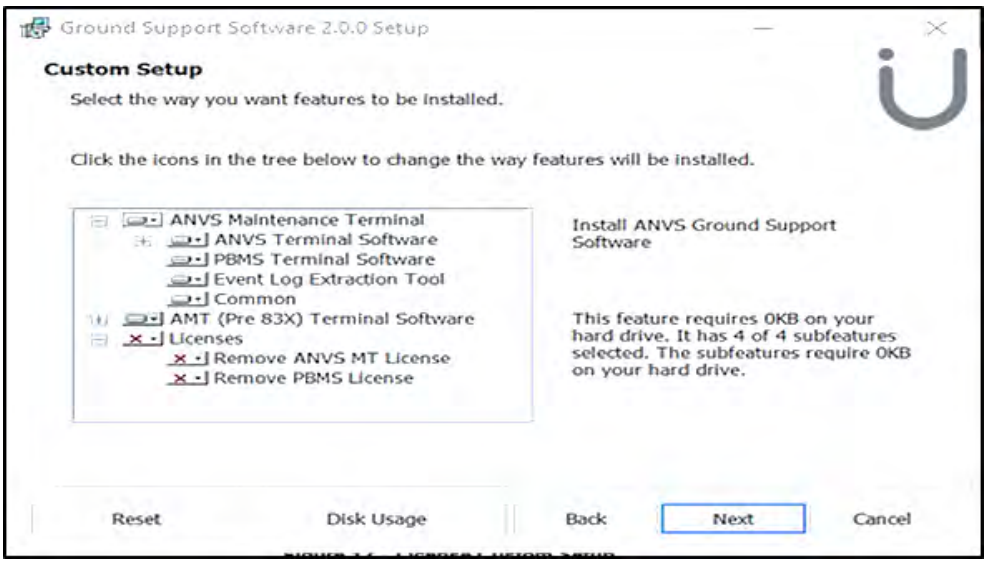

Figure 2-14 Custom Setup

(8) To remove the Licence on the PBMS software click on the drop down menu (Icon X) next to Remove PBMS Licence and select will be installed on local hard drive**.** **(Ref Fig 2-15)**

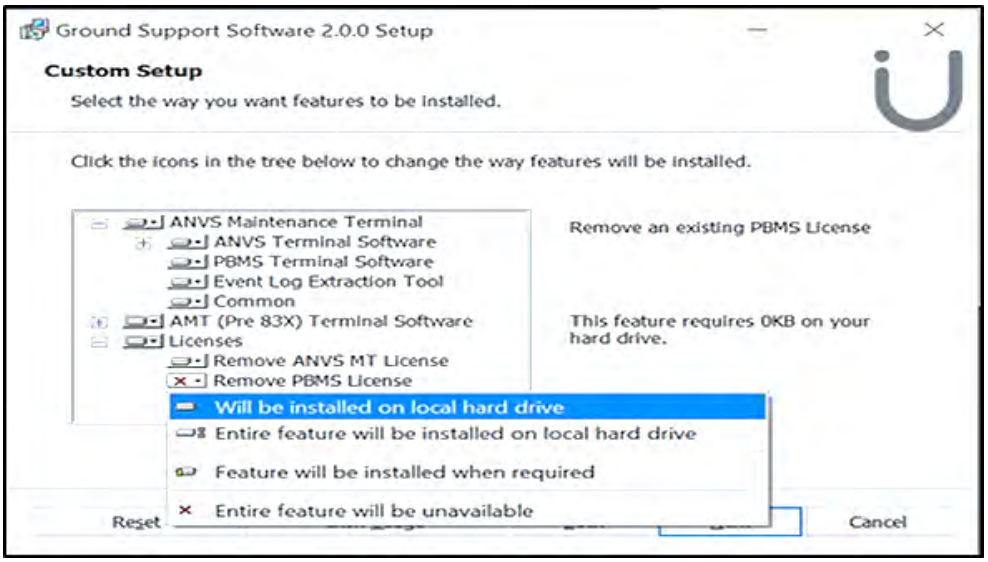

Figure 2-15 Remove Licence

(9) Click on next and follow the on-screen instructions Please restart the laptop for the changes to take effect.

(10) The expired licence/licences will need to be re-authorised. Refer to the Registration instructions in **Section 2.D.**

3. OBTAINING IN–FLIGHT VIBRATION DATA:

A. Connecting to J5 Remote Maintenance connector via Serial Cable.

The PBMS Terminal is designed for use via a Serial port connection. If the Laptop does not have a Serial port, a suitable USB 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 Adaptor

(1) Connect Serial cable (A standard 9 way straight through RS232 serial cable) from the PBMS Terminal to the J5 remote maintenance connector on the Aircraft.

B. 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 **(Ref Fig 3-1).**

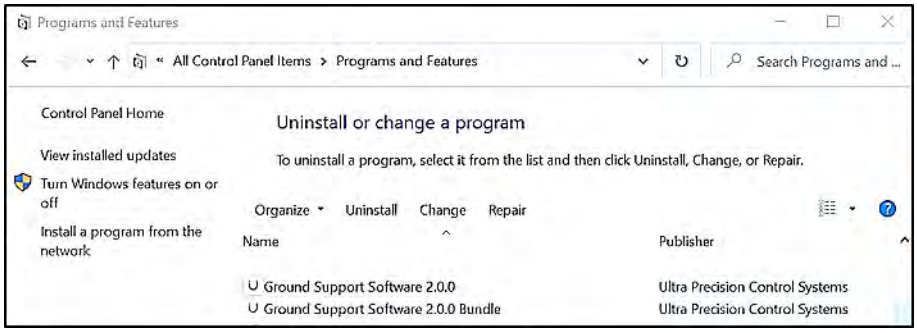

Figure 3-1 GSS Change

(f) Select change in the Ground Support Software 2.0.0 Setup window **(Ref Fig 3-2).**

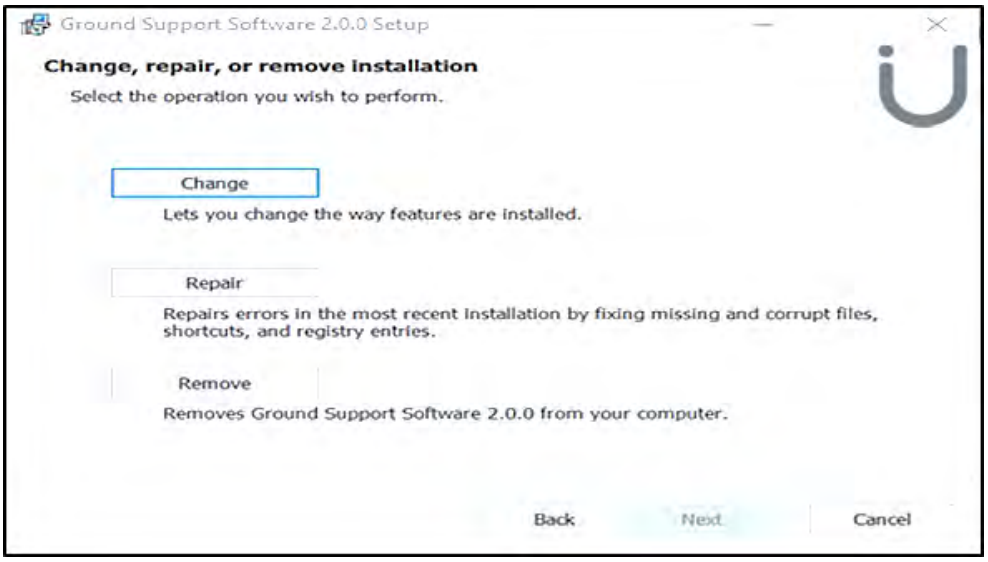

Figure 3-2 Change

(a) Select next on the Custom Setup Screen **(Ref Fig 3-3).**

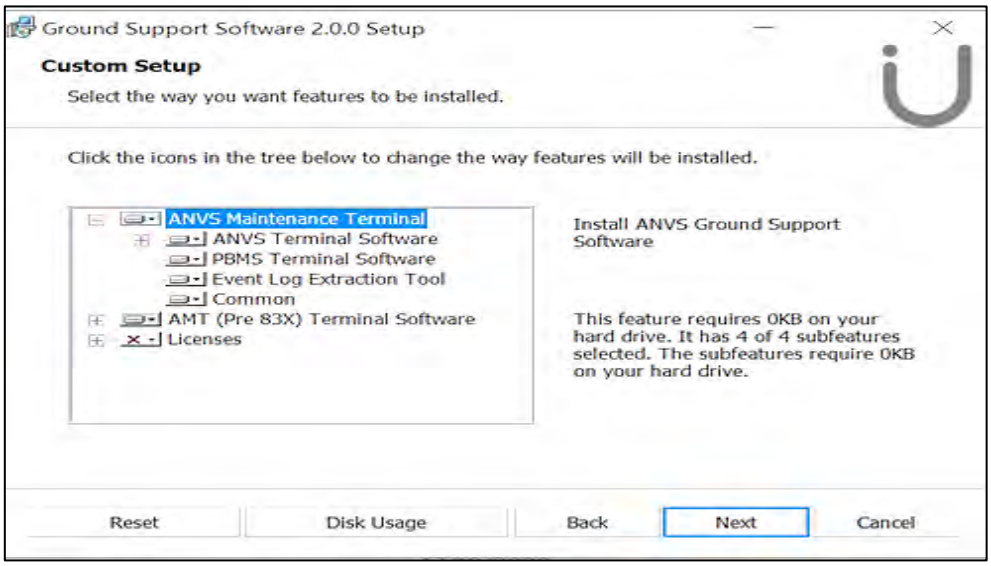

Figure 3-3 Custom Setup

(b) The Com Port Allocation Screen will be shown. Enter the required port number 1-3 and press next. **(Ref Fig 3-4).**

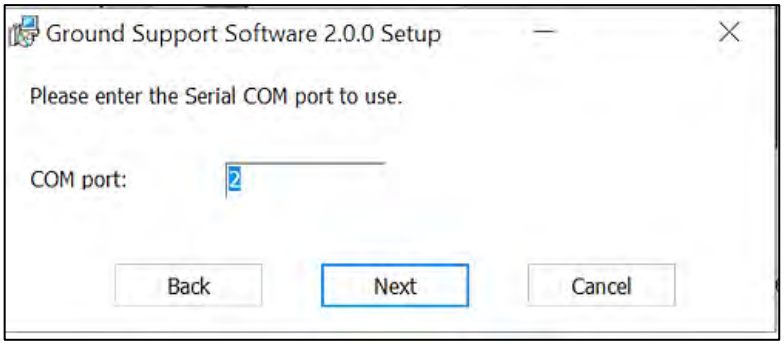

Figure 3-4 Com Port Allocation

(a) Select Change on the Ready to change Screen **(Ref Fig 3-5).**

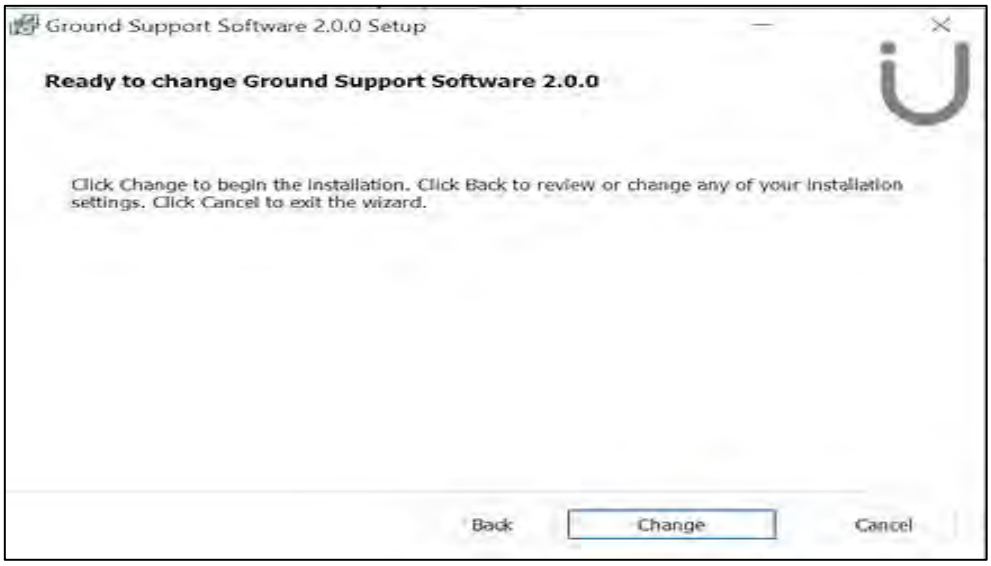

Figure 3-5 Ready to change

(b) The Changes will update and the completed screen will show. Select Finish to continue.

(c) You will then need to restart your system for changes to take effect. Select **Yes/ No** depending on your requirements**. (Ref Fig 3-6).**

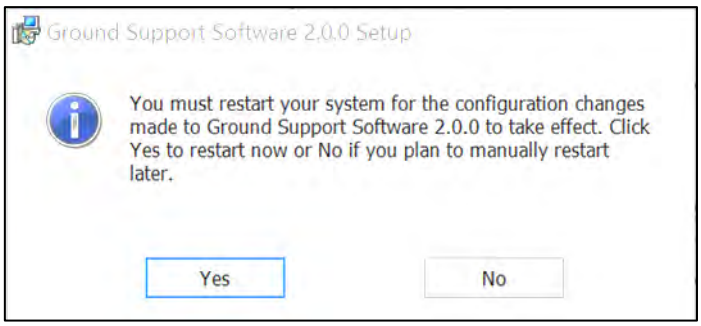

Figure 3-6 Restart

C. Start the PBMS Terminal.

This Process is to followed each time the PBMS Terminal is started:

(1) Switch on the PBMS Terminal (Laptop PC).

(2) Switch on the NVS on the Flight Attendant Panel.

(3) Double click the PBMS icon created on the Windows Desktop.

(4) Wait 30 seconds for the ANCU to initialise.

(5) The Welcome Screen will Display **(Ref Fig 2-1)** after 5 seconds the Log File Details Screen will be shown on the PBMS Terminal Display **(Ref Fig 3-7).**

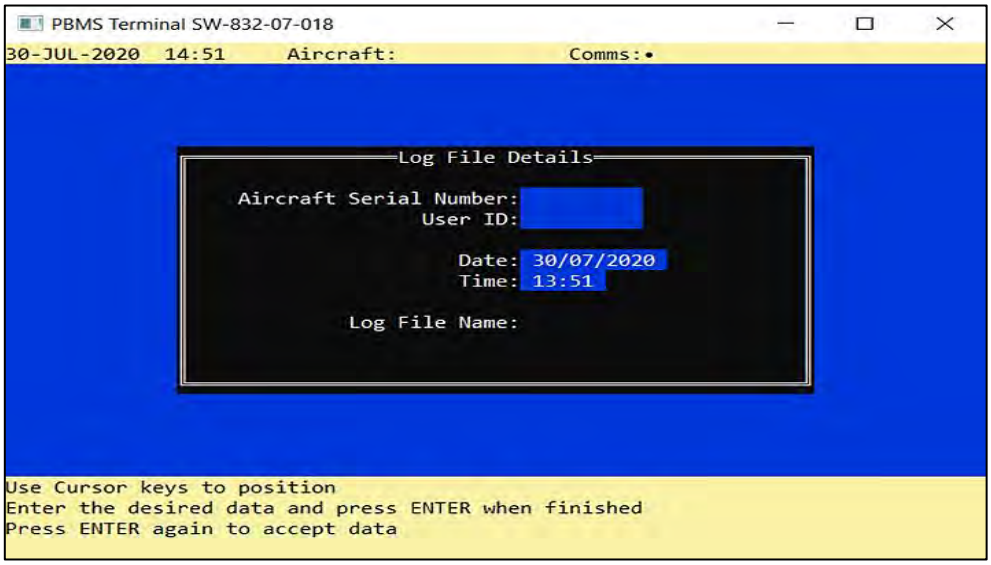

Figure 3-7 Log File Details

(6) Enter the Aircraft Serial Number and the User ID (Your Initials) and press <Enter>.

(7) The PBMS Terminal will show the log file name in which the Maintenance Session Record will be stored **(Ref Fig 3-8**) Press <Enter> to accept the Data.

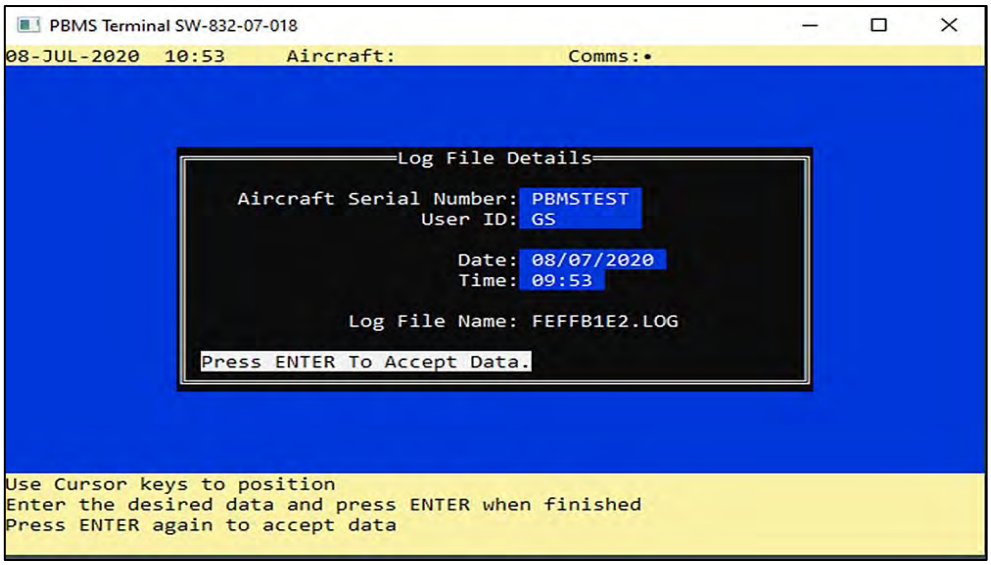

Figure 3-8 Log file name

(8) The Main Menu will be shown on the PBMS Terminal Display **(Ref Fig 3-9).**

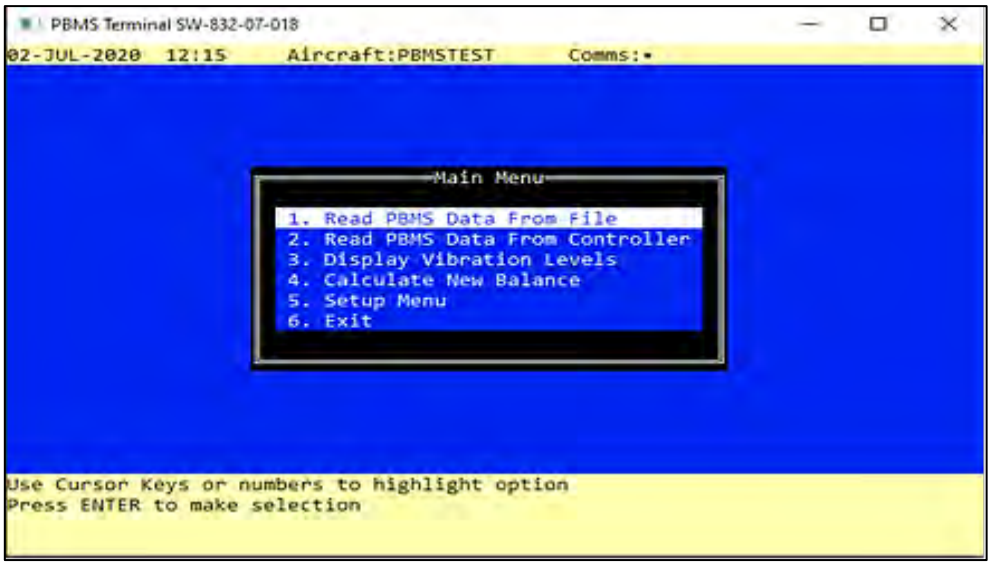

Figure 3-9 Main Menu

D. Read PBMS Data from the Controller.

(1) Ensure Laptop is connected to J5 Remote Maintenance connector as previously described in **Para 3.A. (1).**

Note. If you are unable to communicate with the ANCU via the J5 Remote Maintenance connector, you should use the J5 Connector on the front of the ANCU.

(2) Select Read PBMS data from Controller from the Main Menu and Press <Enter> **(Ref Fig 3-10).**

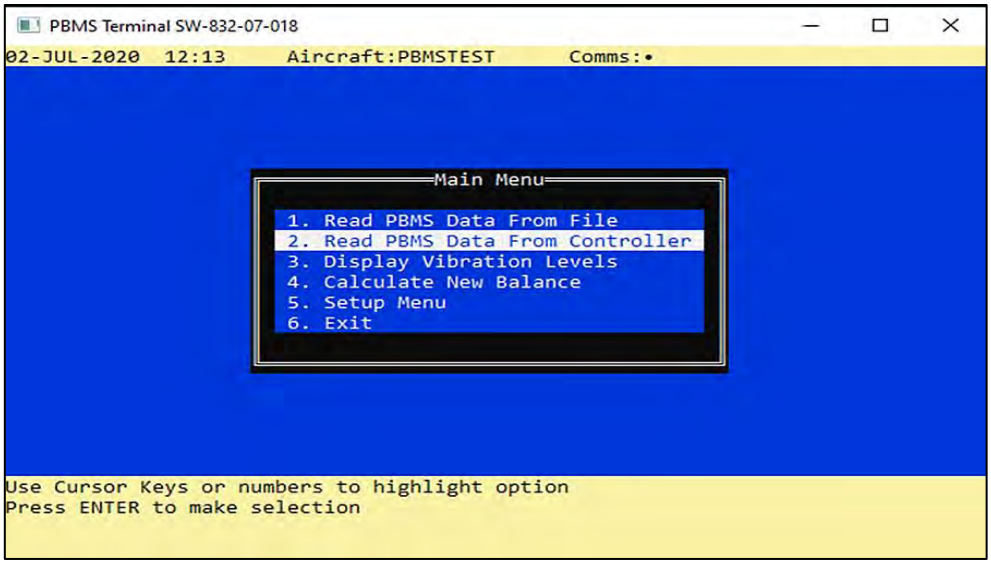

Figure 3-10 Read from the Controller

(3) The Information screen **(Ref Fig 3-11)** will show the Serial Number, Part Number and Mod Strike of the controller that has been successfully attached. Press Escape or wait 5 Seconds to continue.

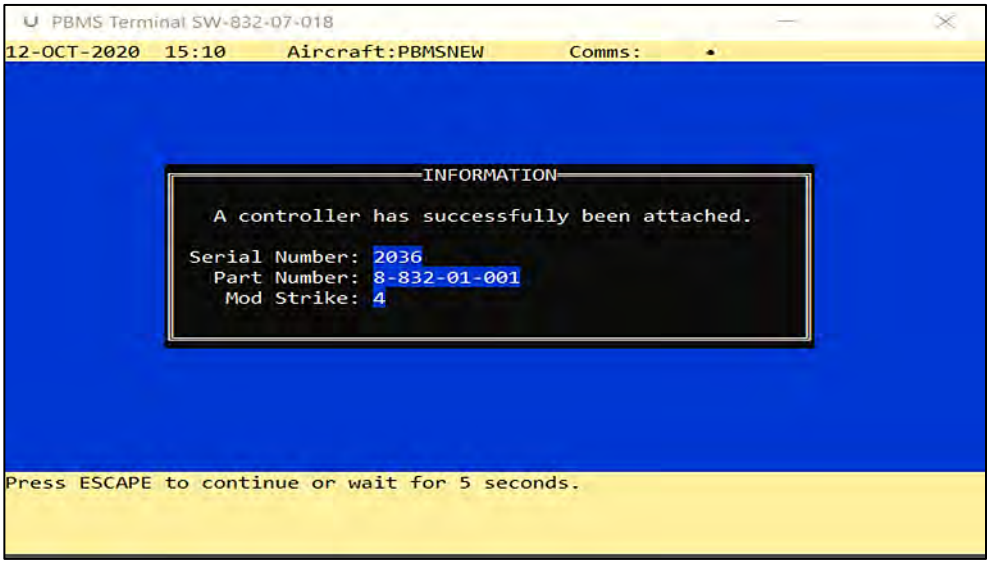

Figure 3-11 Information Screen

Note: During this Sequence, the screen below will be shown **(Ref Fig 3-6)** on the PBMS Terminal Display. On completion, if successful the Main Menu will be displayed **(Ref Fig 3-9).**

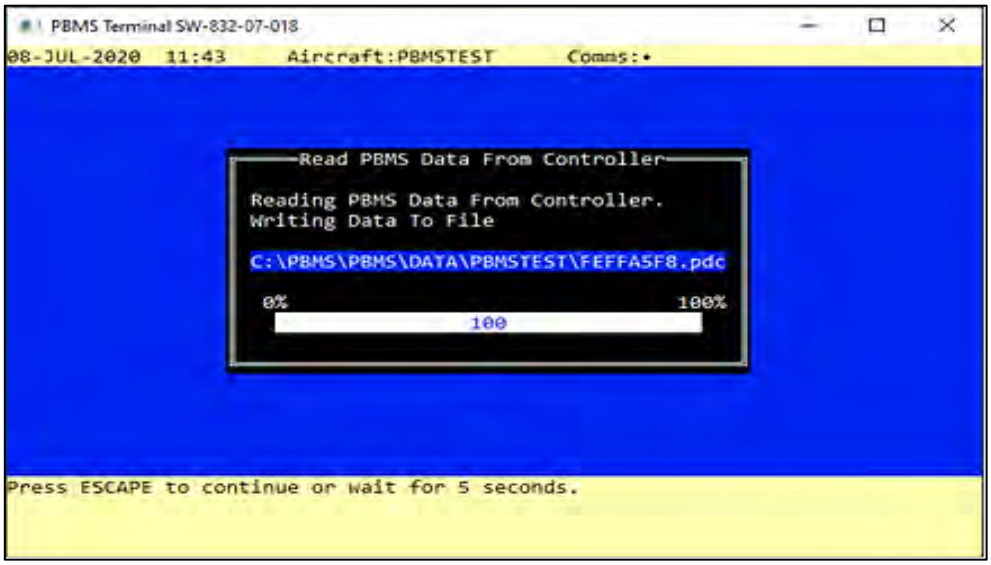

Figure 3-12 Reading Data

(4) The PBMS Terminal will Read Data from the ANCU and Write the Data into a File. (The file location is shown on the screen (**Ref Fig 3-12)** The PBMS Terminal also provides an indication of Progress.(PBMSTEST will be replaced with the Aircraft S/N Entered in section 3.C.6)

Note: Once the PBMS Terminal has read the Data, it will **No Longer Exist** on the ANCU.

(5) The PBMS Terminal will return to the Main Menu on completion of this operation.

(6) The Laptop may now be disconnected to determine vibration levels and calculate a balance solution.

4. DETERMINING VIBRATION LEVELS AND CALCULATE A NEW BALANCE SOLUTION:

A. Read PBMS Data from File.

(1) Select Read PBMS Data from File in the Main Menu and Press <Enter> **(Ref Fig 3-3).**

(2) When you select Read PBMS Data from File a list of the files for that MSN will be shown **(Ref Fig 4-1)** with the most current on the top of the list.

(3) The PBMS Terminal will show the Data files available for the Aircraft Serial Number Entered in the Log files Details Screen. **(Ref Fig 4-1).**

(4) Select the required data file using the cursor keys and press <Enter>.

Note: Where more than one Data File is listed, the File with the most recent Date should be used. The most recent file will be shown at the top of the list.

(5) The PBMS Terminal will show the message **Reading Data Please Wait**, and then return to the Main Menu. The selected Data has now been loaded into the PBMS Terminal and Data from this file will be used in the Display Vibration Levels and Calculate New Balance Functions.

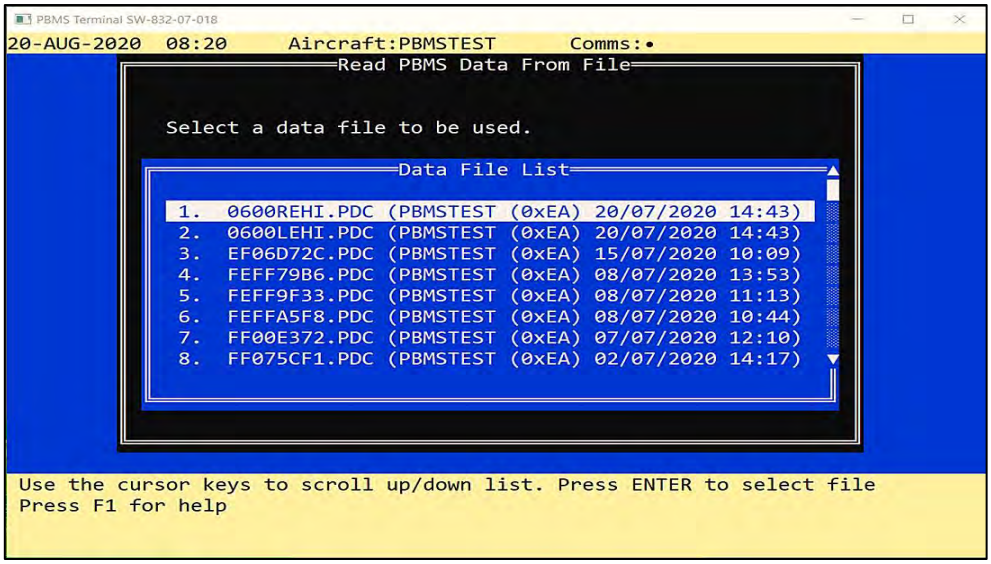

Figure 4-1 Data Files

B. Display Vibration Levels.

(1) The PBMS Terminal processes the Vibration Data from each PBMS sensor into one of the two Pre-defined flight conditions.

DE HAVILLAND DASH 8 400		
Parameter	**Category 1 (Cruise)**	**Category 2 (Climb)**
Propeller 1	840 – 860 rpm	890 to 910 rpm
Propeller 2	840 – 860 rpm	890 to 910 rpm
DE HAVILLAND DASH 8 200/300/S300 Retro-fit		
Parameter	**Category 1 (Cruise)**	**Category 2 (Climb)**
Propeller 1	1044-1064	900-920
Propeller 2	1044-1064	900-920

(2) Select Display Vibration Levels form the Main Menu and press <Enter>. The PBMS Terminal shows the average vibration level for each sensor, on each Engine for each flight condition **(Ref Fig 4-2)** Use the Cursor keys if required to scroll up and down the table**.** The Highest measured vibration level is also displayed.

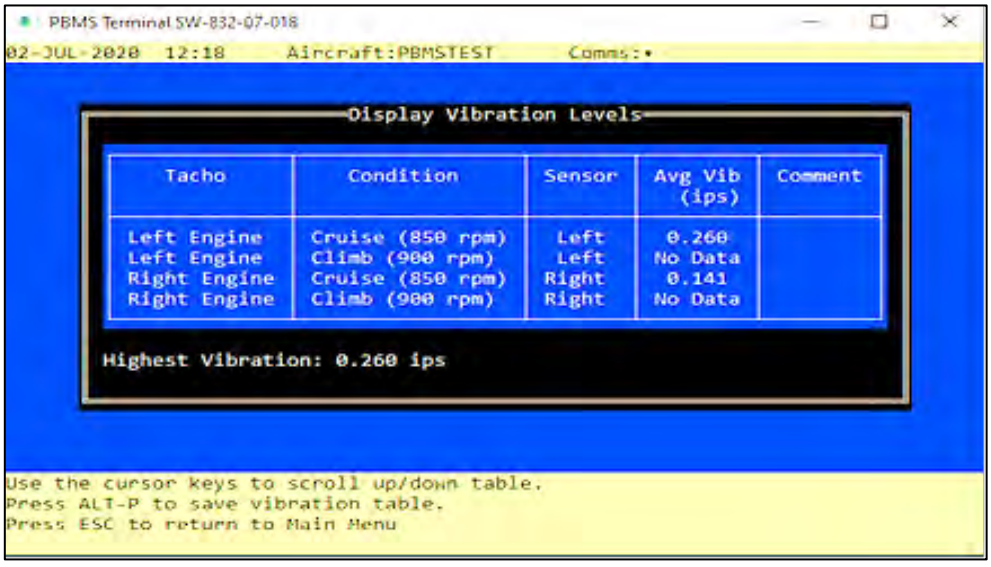

Figure 4-2 Display Vibration Level screen

Note: The Vibration units in this screen can be either Metres per Second, Centimetres per second or **Inches per Second.** Instructions on how to change the units displayed are provided in **Section 5 Para B**.

Note: Inches Per Second (ips) is the Standard measurement.

(3) To obtain a copy of the Vibration Levels Press <Alt><P> on the PBMS terminal. The Vibration Levels will be printed to a file (C:\MT830\PBMS\PRINTER) or the dedicated printer connected to the Laptop.

(4) Press ESC to Return to the Main Menu.

Note: F1 can be pressed at any time for further information with other instructions at the bottom of the screen.

C. Calculate New Balance.

(1) Select Calculate New Balance from the Main Menu and press <Enter>. The PBMS Terminal will ask you to select which Engine requires the new Balance **(Ref Fig 4-3)** Select the required Engine using the cursor keys and press <Enter>.

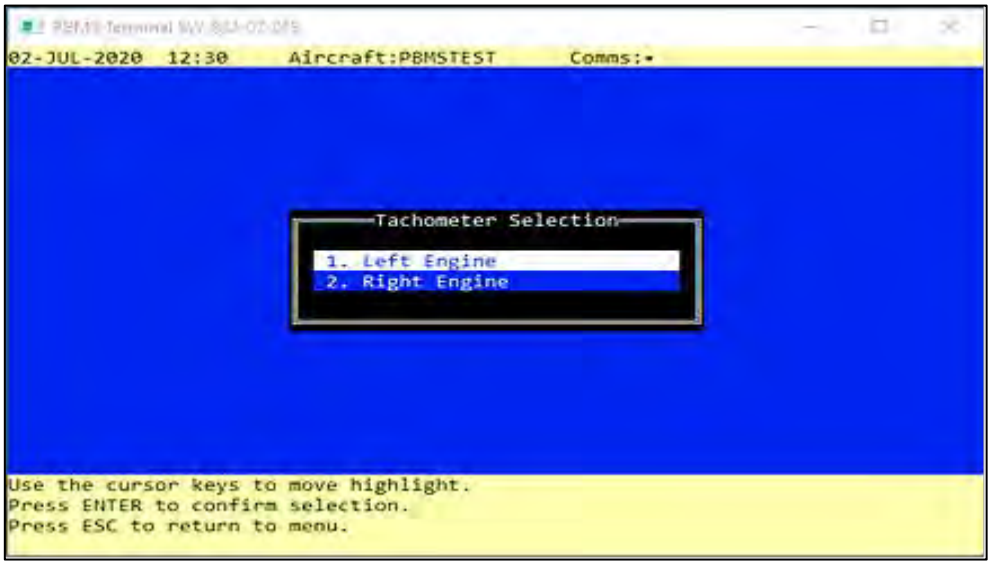

Figure 4-3 Engine Selection

(2) The PBMS Terminal will prompt you to enter an optional comment for the log file. After entering your comment (Blank Comments accepted), press <Enter>. **(Ref Fig 4-4).**

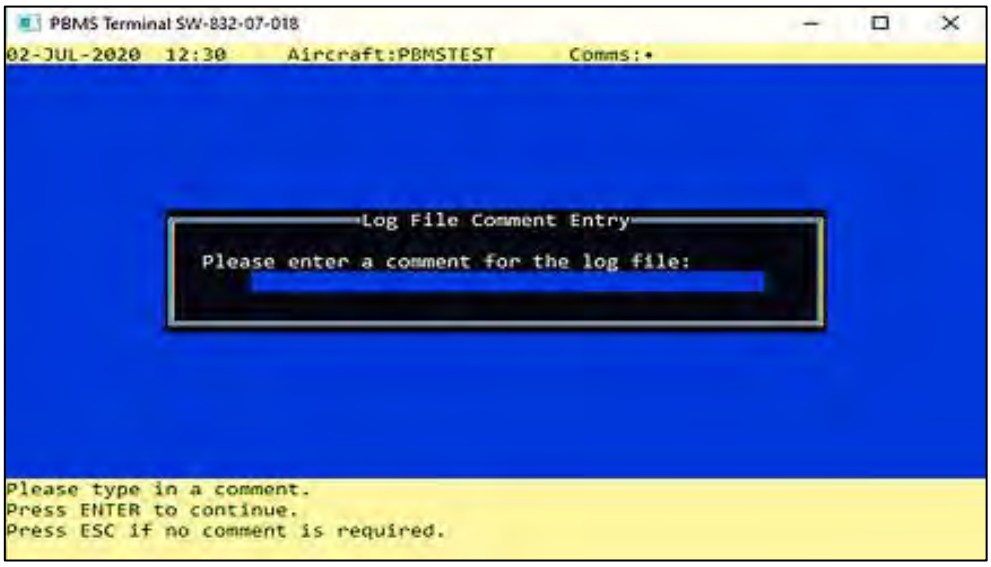

Figure 4-4 Log File comment

(3) The Calculate New Balance screen will be shown on the PBMS Terminal **(Ref Fig 4-5).** At this point the only data displayed on the screen are the vibration levels in the file being used to calculate the new balance.

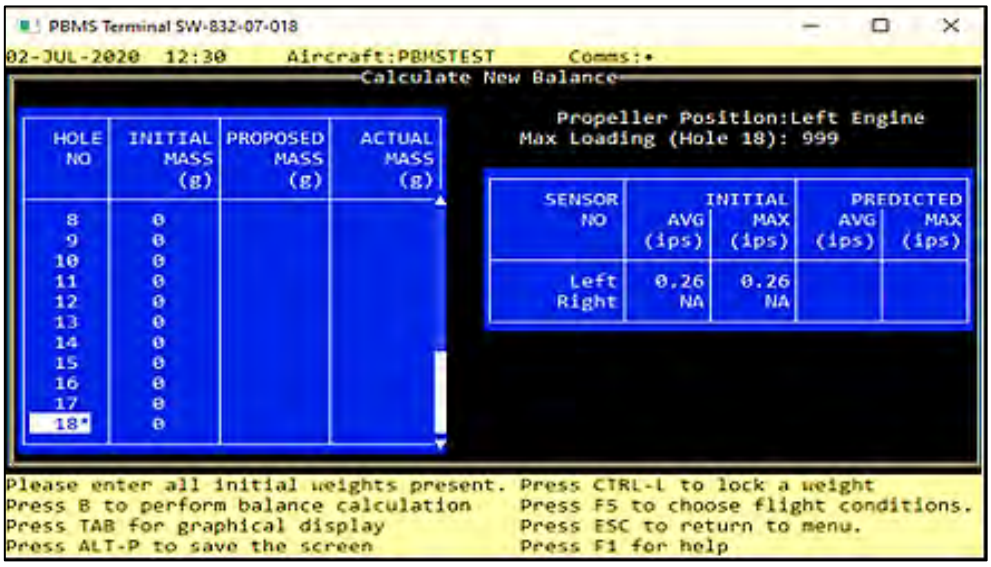

Figure 4-5 Calculate New Balance

(4) The PBMS Terminal needs the following information before it can calculate a new balance.

(a) The Balance Weights currently installed on the Propeller Balance Ring (Initial Mass as per Fig 4-5)

(b) What Flight Condition Categories are to be used to calculate the new Balance? **Ref Para 4.B. (1).**

Note: The Vibration units in this screen **Fig 4-5** can be either Metres per Second, Centimetres per second or Inches per Second. Mass units can be either Kilograms, Grams or Ounces. Instructions on how to change the units displayed are provided in **Section 5 Para B**. Inches per Second (ips) and Grams (g) are the standard measurements.

(5) Pressing F1 on the Calculate New balance screen **(Ref Fig 4-5)** will bring up the Help screen if required **(Ref Fig 4-6).**

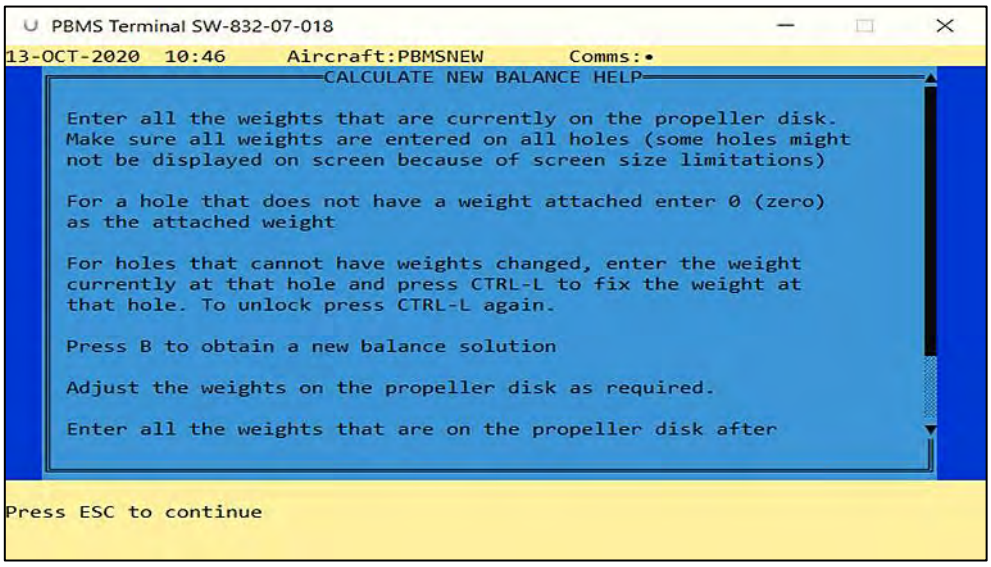

Figure 4-6 Help

(6) On Initial entry to the Calculate New Balance screen, the cursor is positioned ready for the mass of any weight installed at Hole No 1 to be entered in the Initial Mass Column. Type in the weight of the Mass installed and press <Enter>. The cursor will move to the next hole number. If no weight is installed, type 0 and press <Enter>. Repeat until data has been entered for all of the hole positions.

Note: There is a Maximum Balance Weight allowed for each hole and a total combined mass of all installed Balance weights. The Limits are defined by the Aircraft Manufacturer and are contained in the Aircraft Database Configuration Parameters. The PBMS Terminal Software will not let you Exceed these Limits.

(7) If for any reason any installed weights cannot be removed, select the hole position with the cursor keys and press <CTRL> and <L> keys to lock a weight. The PBMS Terminal will mark the hole number with and asterisk **(Ref Fig 4-5 hole 18)** and will include this weight when calculating the new balance weight positions.

(8) Once Data has been entered for all of the hole positions press the F5 Key to bring up the Flight condition Selection **(Ref Fig 4-7)** Use the Cursor key to highlight a Flight Condition with the cruise condition being the standard and use the <Spacebar> key to switch it on or off to the desired condition.

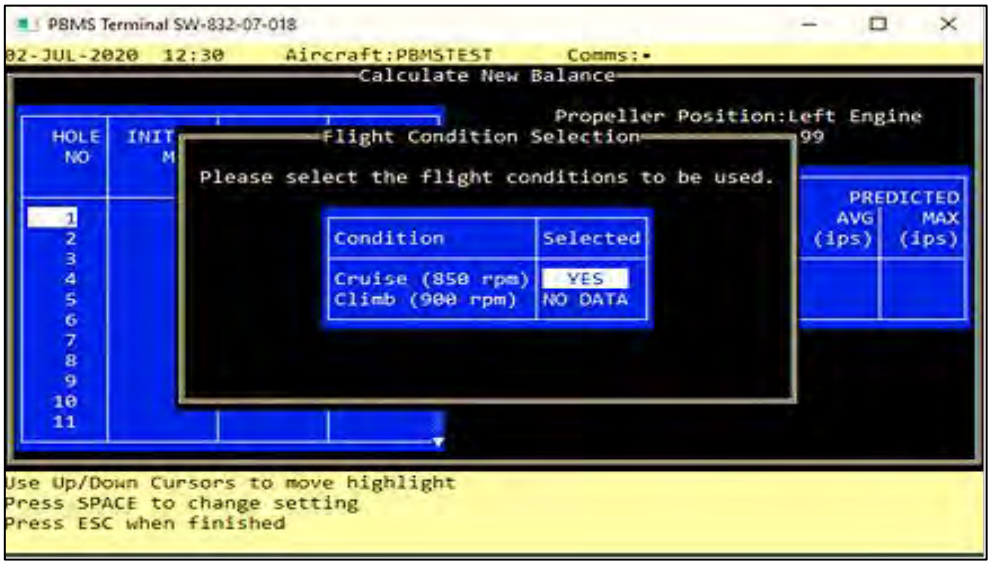

Figure 4-7 Flight Condition Selection

(9) Press <ESC> to return to the Calculate New Balance Screen.

(10) With the current balance weight data and the required flight conditions entered press B to perform the balance calculation. The PBMS Terminal will display the masses required at each hole No to reduce the vibration levels. The PBMS terminal will also display a prediction of the average and maximum vibration levels that would be achieved with the proposed masses installed. (**Ref Fig 4-8).**

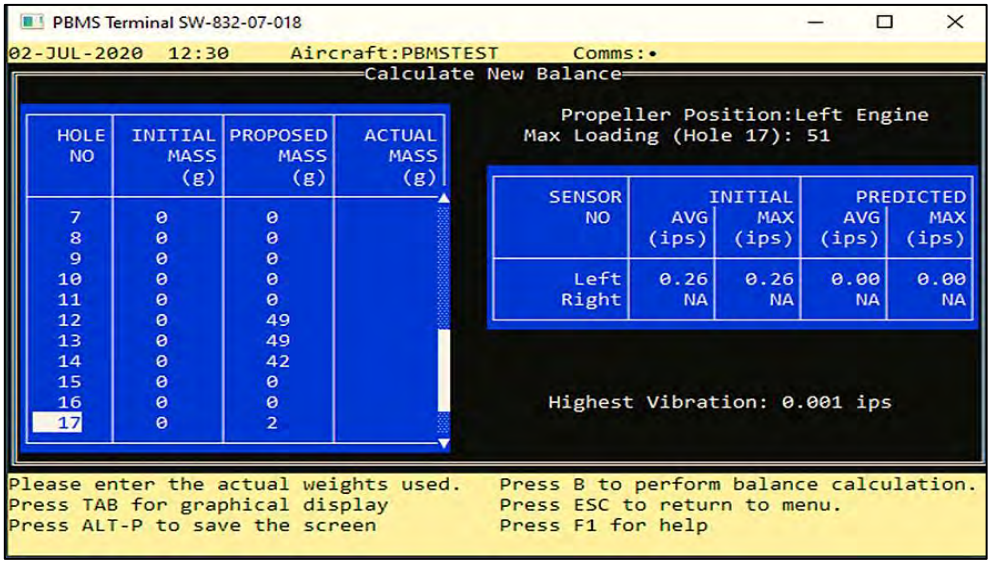

Figure 4-8 Proposed Mass

(11) A Graphical Display of the Balance plane is available by pressing the <TAB> Key. See Para D for more information on the Graphical Display.

D. The Balance Graphical display.

(1) The Graphical display can be accessed from the Calculate New Balance screen by pressing the <TAB> Key as soon as the data on Initial Masses has been entered.

(2) The Balance Graphical display provided the following Data:

- Initial Imbalance (Shown as a Red Dot).
- Hole locations and Numbers.
- Installed Masses.
- Blade positions.
- Predicted Imbalance (After Balance Calculations have been run Shown as a white Dot).
- Proposed Mass installation (After Balance Calculation have been run)
- View looking hole layout (Forward or to the Rear).

(3) **Figure 4-9** shows a typical Balance Graphical display.

Note: Dash 8 400 Aircraft have 18 Holes, Dash 8 100/200/300 have 28 Holes.

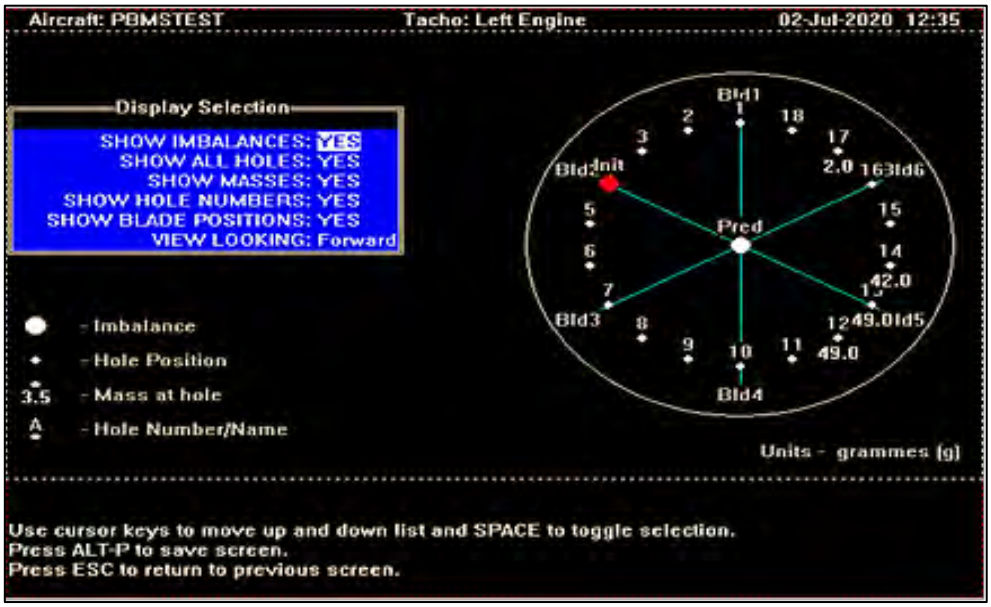

Figure 4-9 Balance Graphical Display (Forward View)

(4) Items in the display Selection can be switched on or off by using the cursor keys to select the item required and press <SPACEBAR> to switch it on or off.

Note: The same Process changes the view between the Forward and to rear view, care should be taken on the **View looking** when using the Graphical Display for mass distribution. When installing mass to hole locations be sure to use the correct view selection to prevent mass being incorrectly positioned**. (Fig 4-10)** Shows View looking rear (Note the different positions with holes being View looking forward).

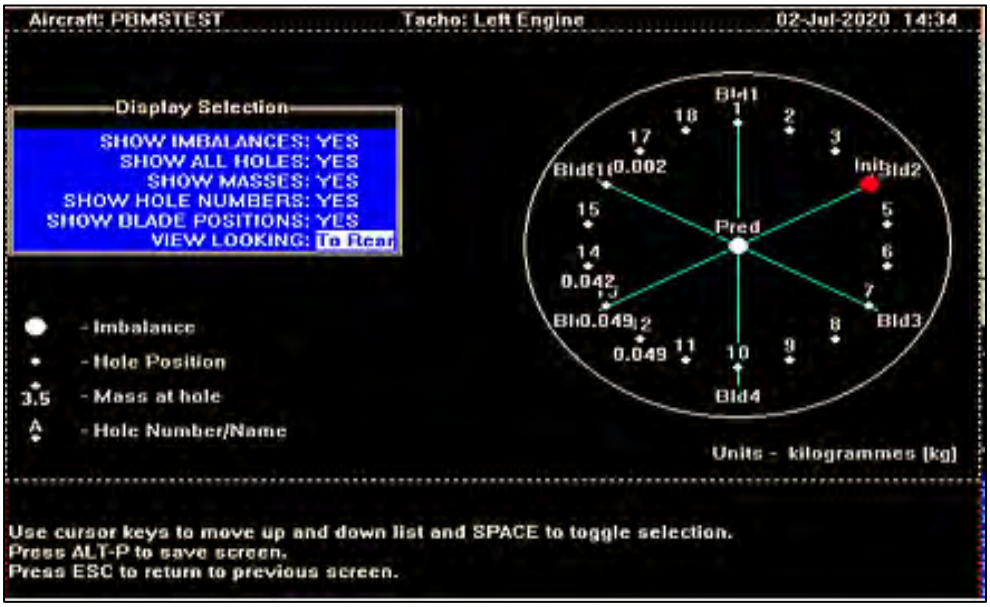

Figure 4-10 View to rear option

(5) To obtain a copy of the Balance Graphical Display press <Alt><P> on the PBMS Terminal. The Balance Graphical display will be printed to a file C:\MT830\PBMS\PRINTER. You can Return to the Calculate New Balance Screen by pressing the <ESC> Key.

5. PBMS TERMINAL SET-UP:

A. Set-up Menu.

(1) Select Set-up Menu from the Main menu and Press <Enter>. The Set-up Menu will be shown on the PBMS Terminal **(Ref Fig 5-1).**

Figure 5-1 Set-up Menu

B. Measurement Units.

(1) Select Measurement Units from the Set-up Menu and press <Enter>. The Measurement units will be shown on the PBMS Terminal **(Ref Fig 5-2).**These are the Standard measurement units.

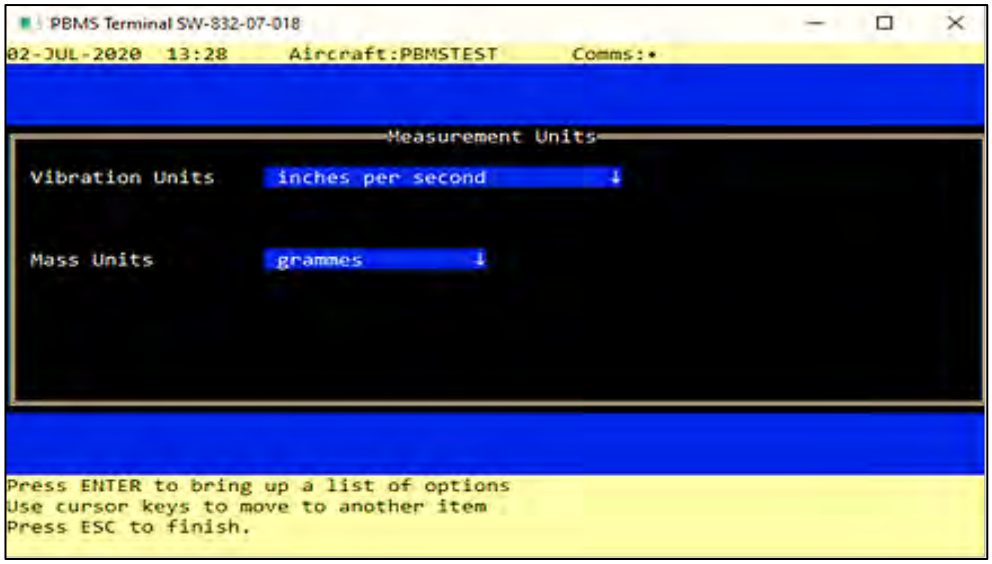

Figure 5-2 Measurement units

(2) Vibration Units can be set to Meters per second, Centimetres per second or Inches per second. **Inches per second being the standard.**

(3) Mass units can be set to Kilograms, Grams or Ounces. **Grams being the standard.**

(4) Use the cursor keys to select the measurement unit to be changed and then press <Enter> to display the options.

(5) Use the cursor keys to select the required measurement unit and press <Enter> to select it.

(6) Press <ESC> to return to the set-up Menu.

C. User Default Directories.

(1) Select User Default Directories from the Set-up Menu and Press <Enter>. The PBMS Terminal will show the list of User Default Directories. **(Ref Fig 5-3).**

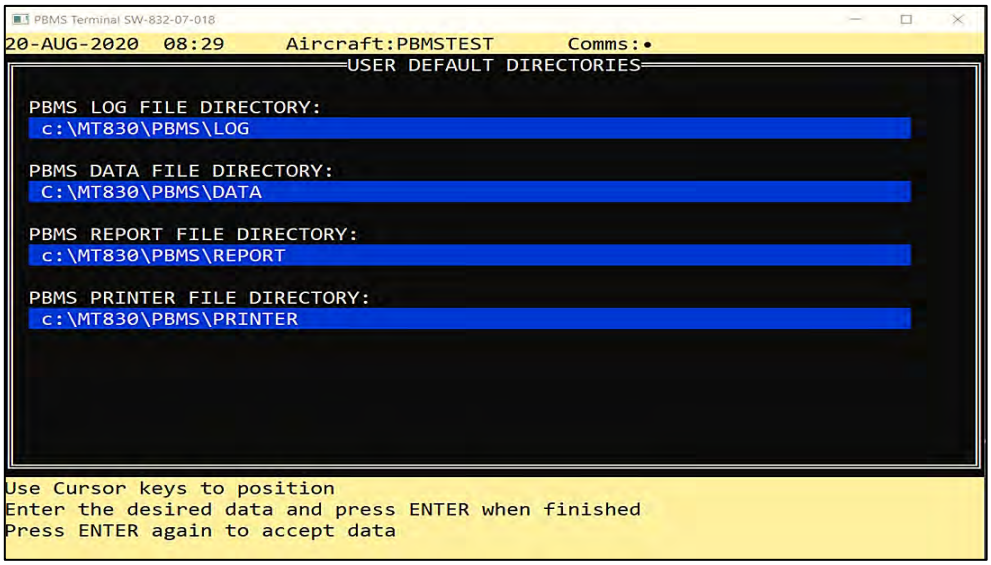

Figure 5-3 User Default Directories

(2) The PBMS Terminal stores data in 4 directories, Below are the main directories.

- The Log File Directory. This stores session log files
- The Data File Directory This stores downloaded data
- The Report File directory. This is for future use
- The Printer File Directory. This stores print files (TXT or BMP)

(3) Use the Cursor keys to select the directory to be changed. Type in the new directory name and press <Enter> when finished. Press <Enter> again to accept the data. This action will take you back to the Set-up Menu.

D. System Information.

(1) Connect Serial cable as per section 3 para 1.

(2) Select System Information from the Set-up Menu and press <Enter>. The PBMS terminal will initialise communications with the ANCU and identify the ANCU.

Note: During this sequence, a number of different screens will be shown on the PBMS terminal display. On completion the PBMS terminal will display the System Information screen.

(3) The Information shown on the PBMS Terminal is as follows **(Ref Fig 5-4).**

- Aircraft ID Setting — Hard wired code on the Aircraft J1 connector used to identify Aircraft type
- Aircraft Type — As Identified by the Aircraft ID
- Interface Aircraft — RS422 Interface to the Controller **Note:** The Fault indication is not a true fault and is to be ignored
- Interface PBMS — PBMS (internal) interface with Controller
- Controller — Serial Number of controller held in memory
- Part Number — Part Number of Controller held in memory
- Mod Strike — Mod Strike number of the Controller held in memory
- Sensor — Left & Right Engine Transducers mounted to each Gearbox housing
- Connected — Sensor detected by the controller
- Status — Sensor reported as OK/Failed to the controller
- Tacho readings — Live RPM indication form Tacho signal wiring on the Aircraft J1 Connector

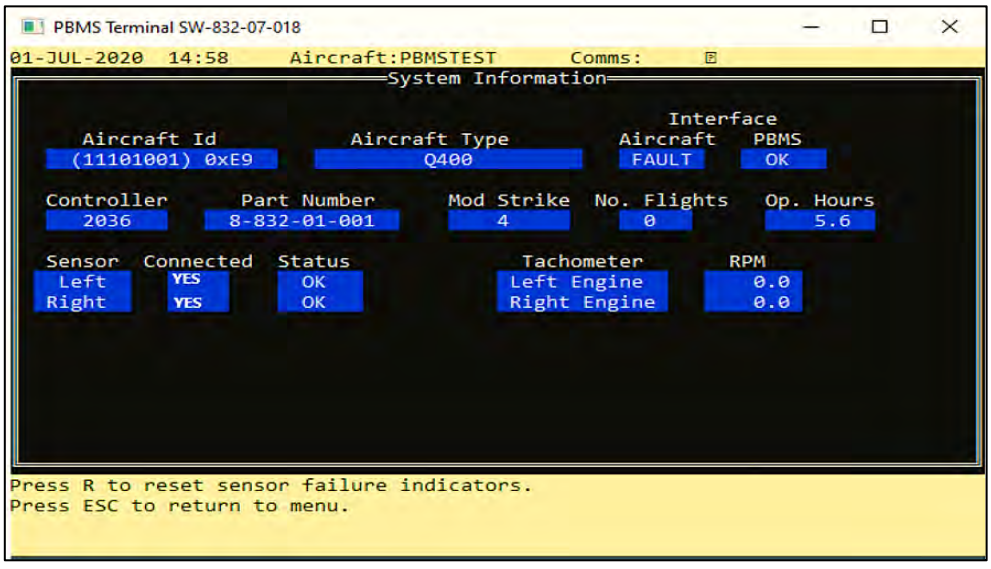

Figure 5-4 System Information

(4) Press <ESC> to return to Set-up Menu.

E. Production Menu.

(1) This section is restricted by password and is not for general use.

F. Exiting the PBMS Terminal.

(1) To Exit the PBMS terminal, select Exit from the Main Menu. The Message Exiting PBMS Terminal Program. Log File Name **C:\MT830\PBMS\LOG\ZZZZZZZZ.log** will be shown on the PBMS Terminal display. The saved log file is a Text file record of the communications between the PBMS Terminal and the Controller during the Maintenance Session.

(a) **PBMS** is a sub directory set in the User Default Directory **(Ref Fig 5-3).**

(b) **LOG** is a sub directory created with the same name as the Aircraft Serial Number entered at the Log File Details Screen (**Ref Fig 3-1).**

(c) **ZZZZZZZZ.log** is the name given to the log file created for the Maintenance Session you have just completed**. (Ref Fig 3-1).**

6. ERROR MESSAGES:

A. The following Error messages may be observed during operation of the PBMS Terminal.

Error Message	Meaning	Recommended Action
Invalid Aircraft Serial Number **(Ref Fig 6-1)**	An Aircraft Serial number of less than 4 digits has been entered	Re-enter the Aircraft Serial number ensuring it is at least 4 digits long
You Must Enter Your Name **(Ref Fig 6-2)**	A Name or Initials has not been entered in the User ID field	Your Name or initials must be Entered into the field in the Log Files Detail Screen (up to 8 characters)
There does not appear to be a controller attached to the PBMS terminal **(Ref Fig 6-3)**	The PBMS Terminal cannot detect a controller	Select Abort and press <Enter> to return to the Main Menu. Check the connection between the Serial port of the PBMS Terminal and the J5 Connector on the controller before reselecting Read PBMS Data from the Controller in the Main Menu
There is no PBMS data on the Controller to be downloaded **(Ref Fig 6-4**)	No Data can be read from the controller	Press <ESC to return to the Main Menu Check the information has not already been downloaded. Check the system information screen that both sensors are connected and status is OK
Some Parameters are missing	The Software has missing parameters	Contact Customer support for assistance **support@ultra-pcs.com**
No Data Files can be found **(Ref Fig 6-5)**	Data files cannot be located on the PBMS Terminal that match the A/C Serial number entered	Check the A/C Serial number entered is correct for the session. Check the User Default Directory's location is correct
No PBMS Data Loaded **(Ref Fig 6-6)**	You have not loaded Data from a data file on the PBMS Terminal or from the Controller before trying to perform a function that uses this data. These functions are Display Vibration Levels Calculate New balance Flight Condition Set-up	Press <ESC> to return to Main Menu and ensure data has been read from the controller or from file before selecting functions that require data
Serial Port does not exist or USB Serial Adaptor not found **(Ref Fig 6-7)**	The Serial port or USB adaptor has not been found or recognised	Check the USB adaptor or Serial port connection is inserted correctly in to the PBMS Terminal

B. Error Screen Shots

Figure 6-1 Invalid Serial Number

Figure 6-2 Enter Name

Figure 6-3 No Controller

Figure 6-4 No PBMS Data

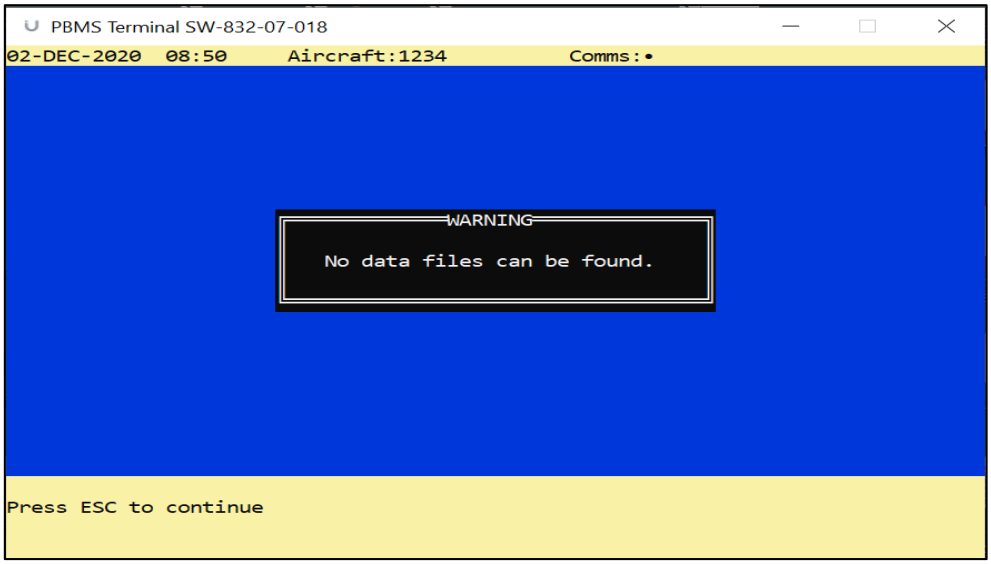

Figure 6-5 No Data files

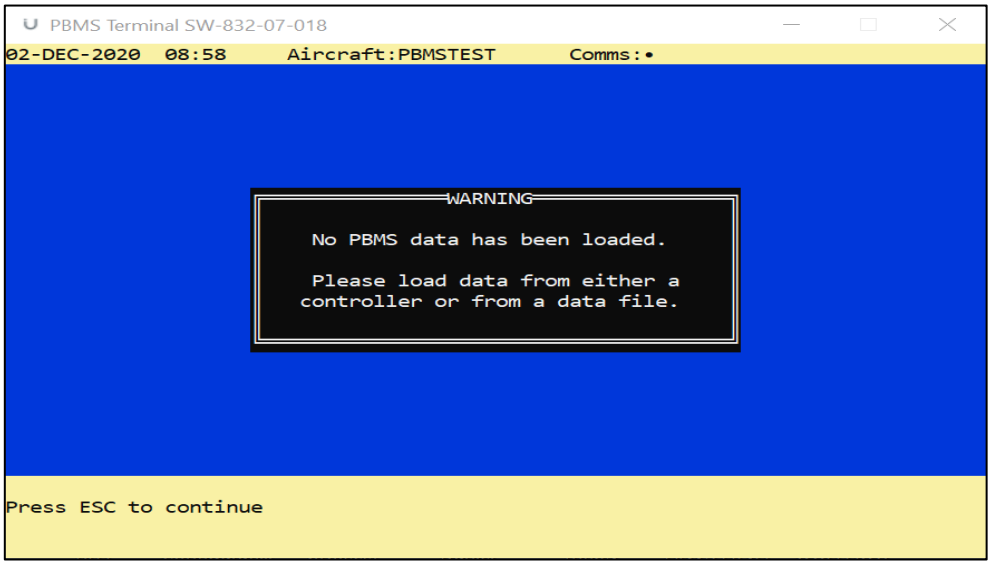

Figure 6-6 No PBMS Data Loaded

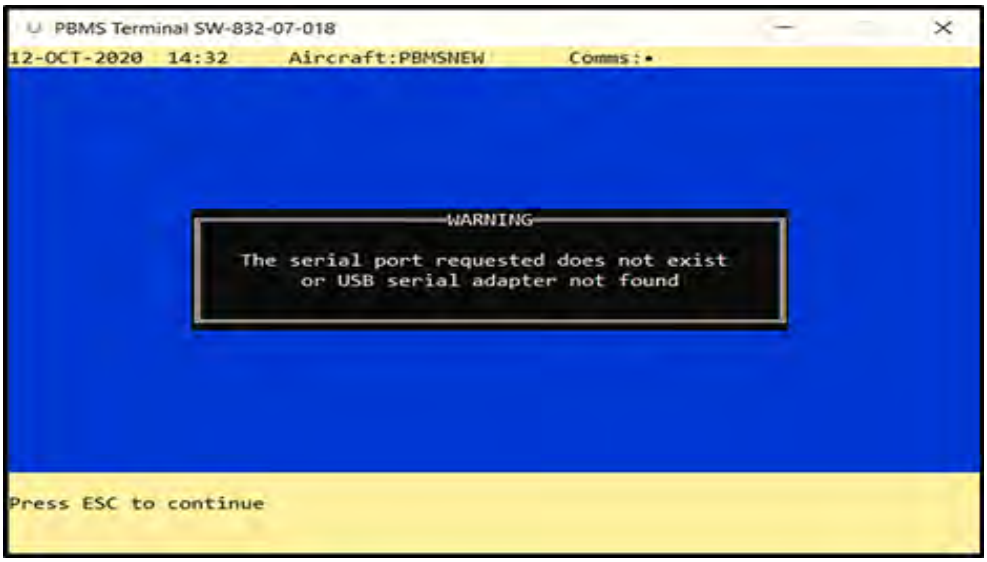

Figure 6-7 Port/ Adaptor Error