

MD EXPLORER

(902 Configuration Equipped With P&WC 207E Engines)

Ground Based Maintenance Computer (GBMC) User Guide



For use with:

**GBMC Software, Part Number 900G9720005
IIDS Interface Cable, Part Number 900G8930003-101**

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This manual is prepared and supplied by the Technical Publications Department, and is intended for use by personnel who have approval for maintenance of MD Helicopters Inc. rotorcraft. Regular revisions of this manual will be made to include current data. If, in the opinion of the reader, data is not clear or needs necessary clarification, please make your comments to this office through this form (or a copy). Necessary efforts will be made to include such data in future revisions.

Attention:

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User Guide**

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IIDS Functions

The Integrated Instrumentation Display System (IIDS) provides for the monitoring and display of aircraft system parameters along with the caution and warning annunciation requirements to meet FAR Part 27 certification requirements. Additionally, the IIDS, in conjunction with the Electronic Engine Controller (EEC), has access to information about aircraft system parameters and retains this data in non-volatile memory.

The Aircraft Systems Condition Monitoring (ASCM) function collects data about the operation of the aircraft and makes this data available to the operator for direct display viewing or downloads to the GBMC for maintenance recording and trend analysis. Specifically, engine parameters can be monitored during any engine operating condition and used for computerized tracking of engine hours and cycles. The decision to monitor any of these additional conditions is based on the operator's economic evaluation and experience. Engine parameter data is used by the Helicopter Engine Condition and Trend Monitoring (HECTM™) program within the GBMC.

The Balance Monitoring System (BMS) function within the IIDS provides for input signal conditioning, computations, data storage, and communication with ground based computer systems for main rotor and NOTAR® fan balance monitoring. The primary purpose of the BMS is to provide the helicopter user with a simple and convenient means of acquiring the information needed to minimize cabin vibration caused by mass and aerodynamic imbalance in the main rotor and NOTAR® fan system.

Philosophy for Use of IIDS/GBMC for Maintenance and Records Keeping

A philosophy for using the aircraft system data from the IIDS ASCM and BMS functions to support helicopter maintenance and records keeping is described below.

CAUTION: The GBMC program is provided to assist the Owner/Operator in maintaining the MD Explorer. It is not intended as a substitute for the maintenance of Rotorcraft and Engine records nor for the performance of procedures as outlined in the operator or maintenance manuals for the rotorcraft, engines or other installed equipment.

1. The IIDS does not take on the function of the "Electronic Log Book"; the Engine and Aircraft Log Books are the primary records of the aircraft. The engine operational analysis data that the IIDS provides will help the operator in maintaining his engine and aircraft log books with a minimum of effort.
2. Exceedance events as recorded and annunciated by the IIDS will alert the operator, at which time the operator will log the exceedance in the log books and reference the maintenance manual for the appropriate maintenance action.
3. The IIDS assists in meeting the FAR requirement for providing a means to perform power assurance checks (if required by an



operating rule) on the aircraft engines by providing for the data collection, calculation, and display of power assurance margins. The results can then be recorded in the engine log book.

4. The IIDS provides engine component life accounting by providing for the data collection, calculation, and display of engine component cycle counts. The Maintenance Manual and/or the Service Bulletin will outline the appropriate maintenance action.
5. The IIDS BMS functions assist in Main Rotor and NOTAR[®] smoothing by providing for the data collection, calculation, and display of balance corrective action adjustments and vibration alerts. The results can then be recorded in the aircraft log book.
6. The use of the IIDS to perform ASCM and BMS functions is not essential to aircraft operation since these functions can be performed manually as per the Aircraft and/or Engine Maintenance Manuals. The aircraft can be dispatched with out these functions operating. In this case, all essential functions will have to be performed per procedures in the Aircraft and Engine Maintenance Manuals. The IIDS data base should then be updated with the current aircraft operational data when the IIDS function is repaired. The essential functions that can be performed by the IIDS or manually are the following maintenance practices:
 - a. Engine parameter exceedance reporting
 - b. Engine power assurance checks
 - c. Component life usage assessment
 - d. Engine and Aircraft Log Book entries
 - e. Transmission parameter exceedance reporting
 - f. Rotor parameter exceedance reporting
 - g. Rotor/NOTAR vibration alerts
7. The use of this data collected by the IIDS is at the discretion of the operator. No requirement is imposed on the operator to view this data on the IIDS display or download it to a ground based computer. The ground based computer system contains the Helicopter Engine Condition Trend Monitoring (HECTM[™]) program that is developed by the engine manufacturer. Therefore, any download requirement for the ASCM data to support the HECTM[™] function is determined by the engine manufacturer.
8. Initialization of the IIDS Setup Data is not required for aircraft operation. The IIDS can perform its systems monitoring and display functions without being initialized. However, if not initialized, various engine related ASCM functions (exceedance, fault, and power assurance) will be disabled. This is to provide IIDS replacement and aircraft dispatchability in remote locations. The IIDS can be initialized (setup) at a later date when a ground based computer becomes available.

Ground Based Maintenance Computer Functions

The GBMC program provides Owner/Operators with the ability to upload, download, display, and archive Integrated Instrument Display System (IIDS) data logs. In addition, the Setup Log and the Cumulative Log are editable by persons with Full User or System Administrator access to allow uploading of initialization and configuration data.

ASCM Log Files

Setup Log and Cumulative Log contents are covered in more detail in the Creating Or Modifying Uploadable Setup Or Cumulative Data Files paragraphs.

There are six types of data records maintained by the ASCM: 1) Data Log, 2) Exceedance Log, 3) Fault Log, 4) Trend Log, 5) Cumulative Log, and 6) Setup Log. The content of these records can be downloaded to a PC through an RS-232C interface, using the GBMC program. A subset of these records can be displayed on the alphanumeric display on the IIDS (Ref. Rotorcraft Maintenance Manual)

Data Log

This type of record provides one and a half (1.5) minutes of data collection. The data is recorded in a continuous memory buffer "loop" and will be continuously overwritten unless an exceedance occurs, or when a discrete signal from the crew (REC key on IIDS) requests a record of an event. This record is meant to provide a "window" in time by allowing a more detailed look at events around an exceedance or other incident. The capability is provided to store up to five of these Data Logs. A description of this log can be found in the Appendix.

Exceedance Log

An Exceedance Log provides a "snapshot" record of the parameter data at a particular moment in time. This type of record occurs whenever a parameter exceedance is detected. The capability is provided to store up to 100 of these Exceedance Logs. A description of this log can be found in the Appendix.

Fault Log

This Fault Log contains data associated with the fault discrete data from the EECs and a BIT failure that was detected in the IIDS, BMS, or aircraft transducers/sensors. This type of log is recorded whenever an IIDS or EEC fault is detected. The capability is provided to store up to 100 of these Fault Logs. A description of this log can be found in the Appendix.

Trend Log

The Trend Log is another "snapshot" type record that records certain aircraft data under given operational conditions and is generated by a Power Assurance check request. After the aircraft has reached the specific operational condition, data is taken for 30 seconds (Pratt and Whitney), averaged over 15 seconds, and placed in the Trend Log. The data sample rate during this one minute collection period is one per second. This data serves



three purposes: data for ground based trending of aircraft parameters, engine performance analysis, and vibration spectrums. Trend spectrums are generated by the BMS via a request to perform a Power Assurance check. These spectrums are linked to the Trend Logs and become part of the trending data used by the ground-based computer. The capability is provided to store up to 100 of these Trend Logs (excluding the trend Spectrum Logs). A description of this log can be found in the Appendix.

Cumulative Log

The Cumulative Log contains data associated with the aircraft configuration and operational analysis. A description of this log can be found in the Appendix.

Setup Log

The IIDS is initialized by entering information through the RS-232C Maintenance Computer interface, J1. Initialization parameters and their ranges of values described in the Appendix. A copy of the Setup Data information can be downloaded, but will not be overwritten except when specifically updated or erased. Suitable password protection and/or queries requesting confirmation are provided in the GBMC software to prevent accidental deletion or modification of data.

BMS Data Files

There are seven types of data files maintained by the BMS: 1) Advisory Log, 2) Spectrum Log, 3) BMS Version/Fault Log, 4) Main Rotor Balance Log, 5) NOTAR Balance Log, and 6) two setup files, the BMS Setup Log and Vibration/Balance Model Log. All logs can be transferred to the Ground based Maintenance Computer (GBMC) via the IIDS RS-232C serial link, while a subset of these records can be displayed on the alphanumeric display on the IIDS (Ref. CSP-900RMM-3, Rotorcraft Maintenance Manual) All data records are time and date stamped.

Advisory Log

The Advisory Log contains alert messages for vibration levels that have been exceeded.

Spectrum Log

The Spectrum Log contains two types of spectrum data.

1. 400 line spectra (random) recorded by pressing the REC key while in the RANDOM SPECTRUM menu selection on the IIDS.
2. Reduced set of FFT frequencies (trend) recorded by a Power Assurance check request. This log is "linked" to the Trend Log generated by the Maintenance Processor when a Power Assurance check is performed.
3. Trend spectra based upon set flight conditions recorded by pressing the REC key (on the IIDS) while in the IIDS TREND SPECTRUM menu selection.

BMS Version/Fault Log

The BMS Version/Fault Log contains failure messages/codes from the BMS BIT and BMS hardware, software versions and part numbers.

Main Rotor Balance Log

The Main Rotor Balance Log contains the main rotor configuration, balance measurements, adjustments, and options.

NOTAR[®] Balance Log

The NOTAR[®] Balance Log contains the NOTAR[®] fan configuration, balance measurements, and adjustments.

BMS Setup Files

Two types of setup files can be uploaded to the BMS: (1) The Vibration/Balance Model Log, which resides in Flash ROM memory, and (2) The BMS Setup Log, which resides in battery-backed RAM memory.

BMS setup files can only be transferred to the IIDS via the GBMC (System Administrator level password access required). The integrity of this upload operation is verified by the overall memory checksum, which is always zero. The BMS VERSION LOG menu is accessed through the IIDS front panel keys and/or the BMS Version/Fault Log (which contains all system configuration versions), which can be downloaded and inspected for the correct part numbers, version numbers and checksums.

BMS Setup Log

Definition of the spectrum data acquisition (Trend, Random and PA spectrums) can be changed by uploading a BMS Setup Log into battery-backed RAM. Once uploaded, these operations become the default unless the RAM data is lost. In this case, the operations revert back to the defaults that were stored in Flash ROM. A description of this log can be found in the Appendix.

GBMC User Levels

Limited User Functions

Functions are provided at three different levels. The base level of functionality provides for download only (Limited User level). This allows maintenance personnel to extract all the available (downloadable data) into the GBMC to assist in logbook management and rotorcraft/engine maintenance. Users at this level are not allowed to upload any data to the IIDS from the GBMC.

Full User Functions

This level of functionality provides the Owner /Operator with all the limited user functions, plus the ability to modify or create Setup Data files and upload this data into the IIDS. This level user can also perform file archive and restore operations.



System Administrator Functions

IMPORTANT: This function can only be performed by MD Helicopters Inc. authorized personnel.

This level of functionality is reserved for authorized MD Helicopters Inc. personnel only. It is intended to provide the capability of uploading BMS balance models used by the IIDS to perform Main Rotor/NOTAR Fan balance calculations.

Program Installation Requirements

This software is designed to run on a computer running the Windows® 95, Windows® 98, or Windows® NT Operating System. The computer must have a hard disk drive with a minimum of 20 megabytes of free disk space and a minimum of 32 megabytes of RAM. While the program is designed to be used with either a keyboard or mouse, a mouse is strongly recommended.

NOTE: The Balance Monitoring System (BMS) application may not function under Windows95™.

Installation

Insert the disk or CD-ROM containing the Ground Based Maintenance Computer (GBMC) program in the appropriate drive and select the “Run” command from the windows File Manager (refer to [Figure 1](#)). In the dialog box, type “SETUP.EXE” and press ENTER.

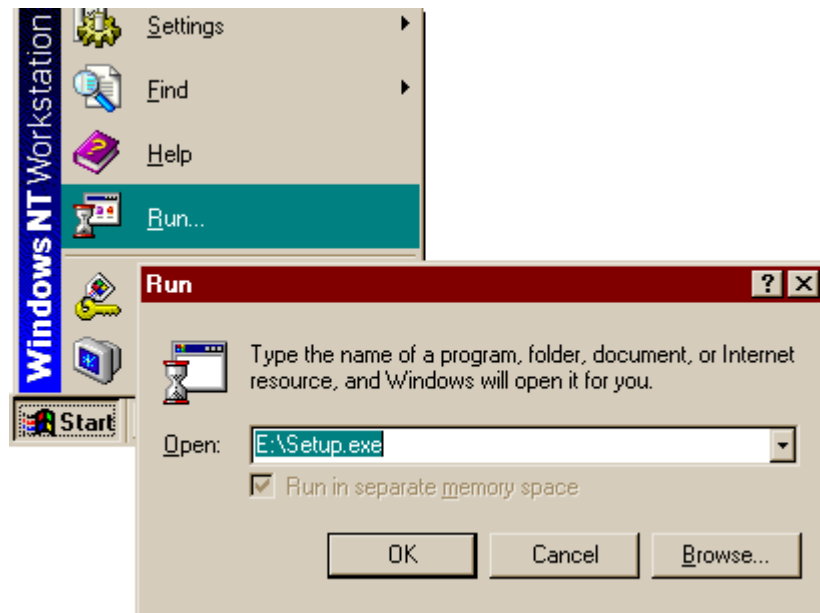


Figure 1. Start Program Setup

TIP: .. If you do not know where to install the program, follow the directions on the screen and accept the default settings

The program will begin to install and a dialog box will prompt you for the directory name you wish to install the program to. If you do not have a specific location to install to, accept the default directory and press the continue button (refer [to Figure 2](#)). The “Setup” program will create an “IDSGP207E” directory on your hard disk.

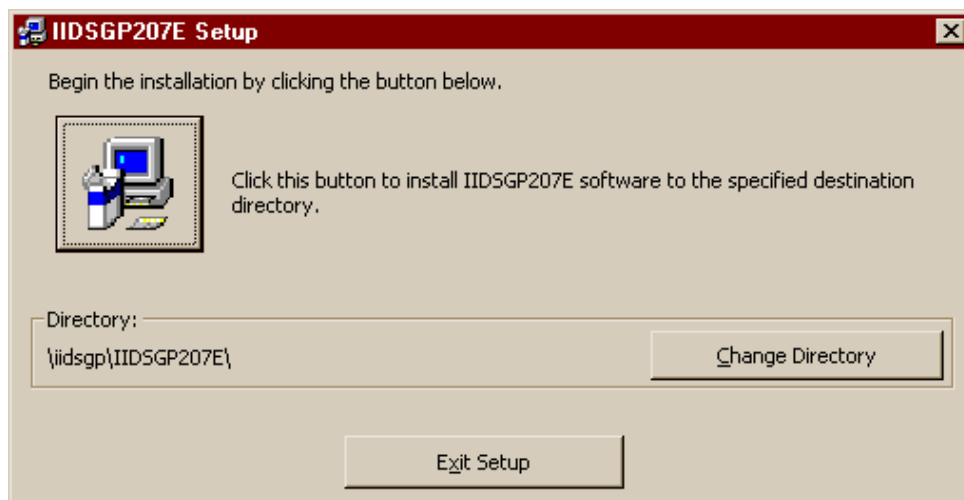


Figure 2. GBMC Installation Directory Selection

If you have an existing GBMC installation on your computer and wish to preserve this installation, you must install this software in a new directory. Type the location for the new directory in the dialog box and press the “Ok” button. A new directory will be created if one does not currently exist (refer to [Figure 3](#)).

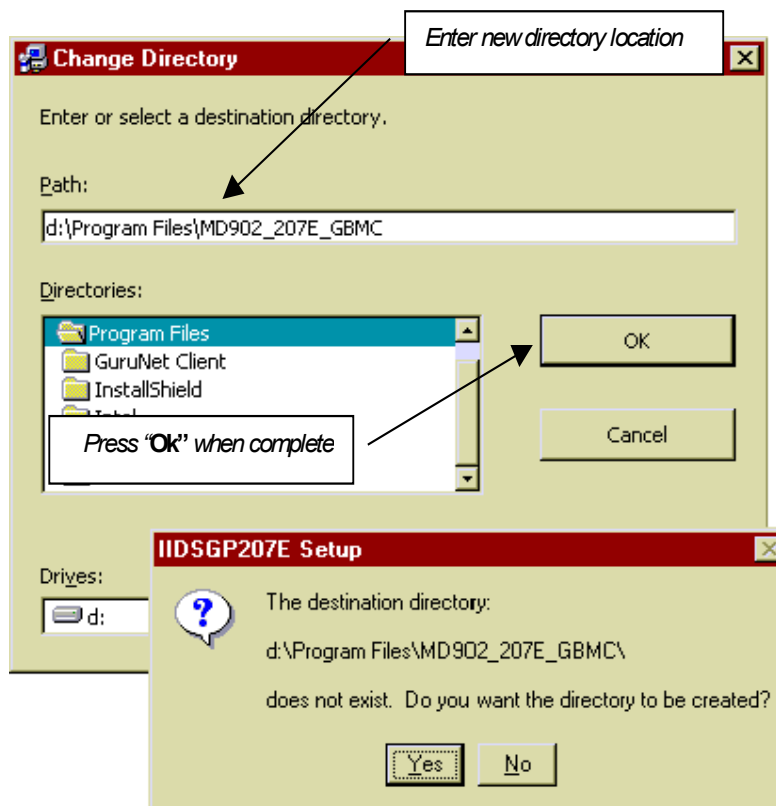


Figure 3. New Installation Directory

As the installation program copies files to the destination directory, you may get a dialog box that states “A file being copied is older than the file currently on your system. It is recommended that you keep your existing file.” Press “Yes” each time this dialog box appears (refer to [Figure 4](#)).

CAUTION: It is important to keep the newer files on your system as these may effect other application you may have installed.

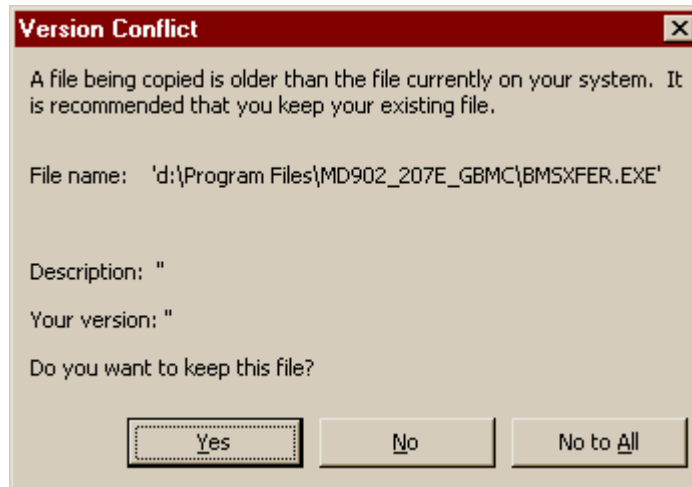


Figure 4. Version Conflict Dialog Box

When the installation program has finished, a “Setup was completed” dialog box will appear and, there will be a new “group” in the Program Manager window titled IIDSGP207E (refer to [Figure 5](#)). This group will contain the GBMC program icon.

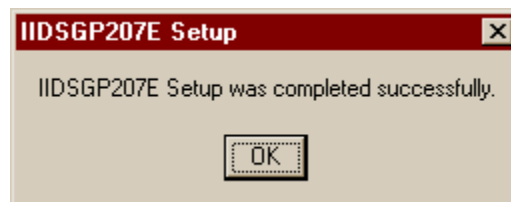


Figure 5. Setup Complete Dialog Box

Setup Initial Users Parameters

When you select the IIDSGP207E from the program menu, a splash screen will be displayed. This screen indicates that this version of the Ground Based Maintenance Computer GBMC application is designed to be used with the MD Explorer equipped with Pratt & Whitney Canada Model PW207E engines (refer to [Figure 6](#)). While basic functions and use of the GBMC application is similar to prior versions, this version has been revised to accommodate additional parameters and functions not found in earlier versions of the software.

CAUTION: This Application must not be used with MDExplorers equipped with engines other than the PW 207E.



Figure 6. Launching GBMC Application

TIP: .. Use the generic "operator" (ID) and "password" (Password) for the initial login.

Initial Login Screen

When the log dialog box appears (refer to [Figure 7](#)), enter "operator" for the "User ID" and "password" for the "Password". These are the basic user ID and Passwords provided for system setup. After login, please refer to the Password Utilities section for detailed instructions on creating a user's ID and password.

NOTE: If the User ID or Password is entered incorrectly, the "Invalid Login Sequence" message will appear. Reenter the ID and password correctly. If you enter this information incorrectly three (3) times, the application will terminate. You will need to restart the application to try the login sequence again.

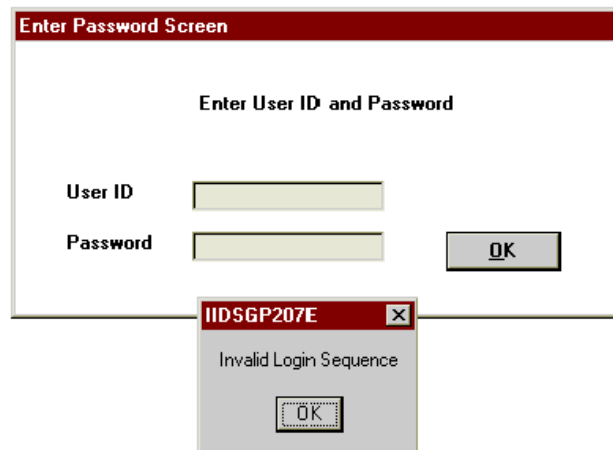


Figure 7. Initial Setup Login

User Setup Strategy

After installing the software and first login, you should establish a “Full User” account that will be used for administrative purposes and then remove the Generic user account that uses the “operator” User ID. This will prevent the unauthorized use of the GBMC application. The administrator account can then be used to establish all other user accounts.

GBMC Main Menu Screen

When logon is successful, the GBMC main menu is visible (refer to Figure 8). From here you can select all the function available in the application. The menu consists of buttons for accessing the:

BMS Menus, **E**CTM Menus, **A**SCM Menus, Password Utils and **E**xit

The BMS Menus and ECTM Menus buttons provide the ability to launch the Chadwick-Helmuth BMS program and the Pratt & Whitney programs respectively. The ASCM Menu button accesses the IIDS maintenance functions.

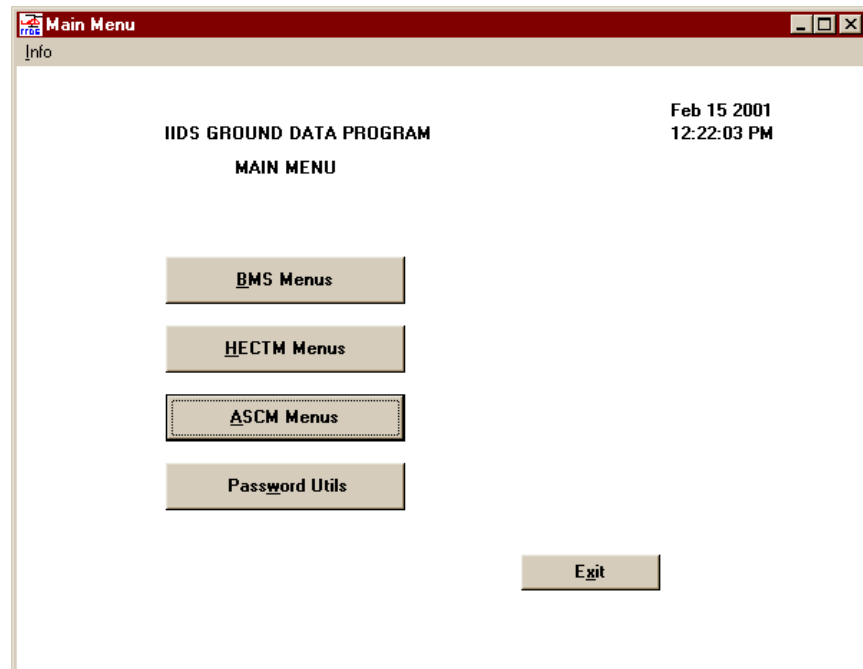


Figure 8. GBMC Main Menu Screen

Password Utilities

Change Passwords

This function is used to allow established users (logon privileges already assigned) to change their existing passwords to new passwords (refer to [Figure 9](#)).

1. Click on the "Password Utils" control button.
2. Click on the "Change Password" control button.
3. Use TAB key (or mouse) to select User ID field (refer to [Figure 10](#))
4. Enter User ID
5. Use TAB key (or mouse) to select Old Password field

6. Enter current password
7. Use TAB key (or mouse) to select New Password field
8. Enter new password
9. Use TAB key (or mouse) to select Re-type New Password field
10. Enter new password
11. click on the "Ok" control button
12. A status message will be displayed, indicating the success of the password change.

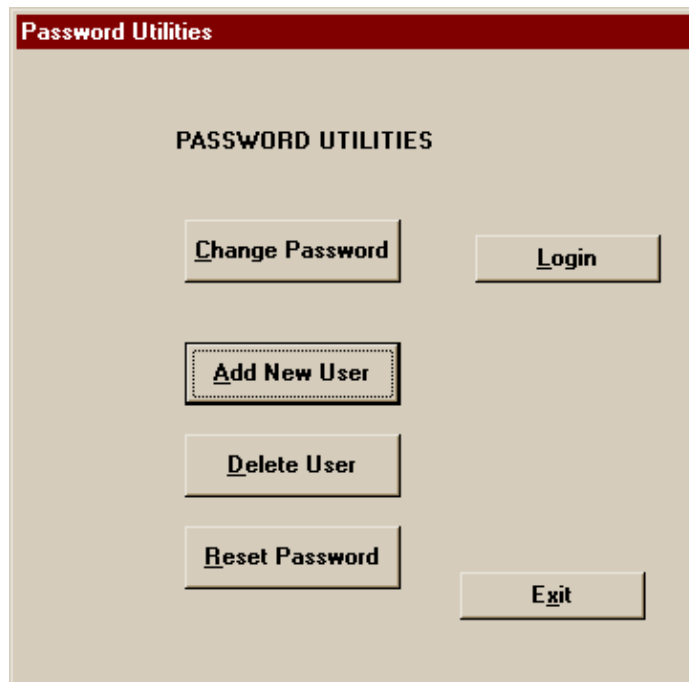


Figure 9. Password Utilities Screen

The screenshot shows a window titled "CHANGE PASSWORD" with a red header bar. The main area is light beige and contains the text "Enter User ID and New Password" in bold. Below this text are four input fields: "User ID", "Old Password", "New Password", and "Re-type New Password". To the right of the input fields are two buttons: "Ok" and "Cancel".

Figure 10. Change Password Screen

Add New Users

TIP: .. The operator must be logged in as either a Full User or System Administrator to access to this function.

This function allows the system administrator to authorize personnel as Limited Users, Full Users or System Administrators. Personnel that have Full User authorization can establish others as Limited Users or Full Users.

NOTE: The "Sys Admin" user level will not appear in the User Level pulldown if the current logged user is not a system administrator. Only System Administrators can create another "Sys Admin".

1. Click on the "Password Utils" control button (refer to [Figure 8](#)).
2. Click on the "Add New User" control button (refer to [Figure 9](#)).

Figure 11. Add New User Screen

3. Use TAB key (or mouse) to select User ID field (refer to [Figure 11](#))
4. Type in new user's ID
5. Use TAB key (or mouse) to select User Level field
6. Use (↑ ↓) arrows keys to select user level (Limited User, Full User, or System Administrator)
7. Click on the "Ok" control button.
8. A status message will be displayed, indicating the success of the addition of the user.

Note: The user will have the default password, "password".

Delete Users

TIP: .. The operator must be logged in as either a Full User or System Administrator to have access to this function.

This function allows the System Administrator to delete "all levels of users" from the access authorization list. Personnel that have Full User authorization can delete "Limited User" or "Full Users" from the access authorization list.

1. Click on the "Password Utils" control button (refer to [Figure 8](#)).
2. Click on the "Delete User" control button.
3. Use TAB key (or mouse) to select User ID field (refer to [Figure 12](#)).

4. Use (↑ ↓) arrows keys to select user ID that is to be deleted.
5. Click on the "Ok" control button. A status message will be displayed, indicating the success of the deletion of the use user.

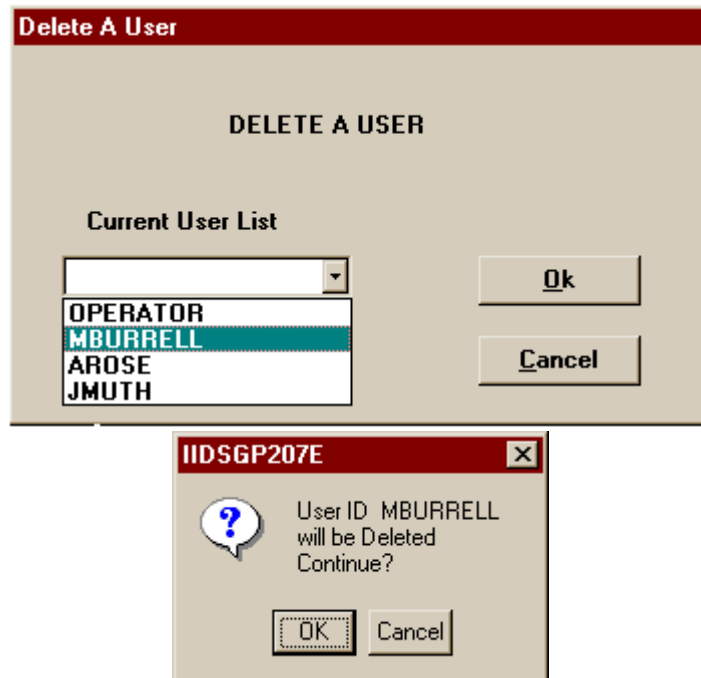


Figure 12. Delete User Screen

Reset Passwords

TIP: . The operator must be logged in as either a Full User or System Administrator to have access to this function.

This function allows the System Administrator to reset "all levels of user passwords". Personnel that have Full User authorization can reset "Limited User" or "Full Users" passwords. The default password will be "password". After resetting the password, the user should change his or her password to something other than the default "password".

1. From the GBMC Main Menu, Click on the "Password Utils" control button (refer to Figure 8).
2. Click on the "Reset Password" control button (refer to [Figure 9](#)).
3. Use TAB key (or mouse) to select User ID field (refer to [Figure 13](#)).
4. Use (↑ ↓) arrows keys to select user ID that is to have their password reset.
5. Click on the "Ok" control button.
6. A status message will be displayed, indicating the success of the password resetting.

NOTE: The default password after being reset is "password".

7. The user whose password has been reset to the default "password" should now enter a new password by following the steps in the Change Passwords paragraph above.



Figure 13. Reset User Password Screen

Connecting the GBMC Computer to the IIDS

The GBMC must be connected to the IIDS using the IIDS Interface Cable (Part Number 900G8930003-101), to perform upload and download functions. Refer to the checklist in Appendix B for the proper sequence for IIDS replacement

CAUTION: Turn off aircraft power before attempting to connect GBMC to the IIDS. Aircraft power to the IIDS must remain off until “login” on the GBMC is complete (password entered and confirmed), to assure a successful connection to the IIDS can be established.

Make sure the aircraft battery is fully charged and/or the aircraft is connected to an external power source that will provide the required 28 VDC. Also check the GBMC (laptop computer) battery is fully charged or the GBMC is connected to an external power source. Low battery voltage to either the IIDS or the GBMC can prevent a successful communications link between the IIDS and the GBMC from being established.

To connect the GBMC:

1. Connect the 9 Pin connector to the back of the computer at serial port “1” (refer to [Figure 14](#)).

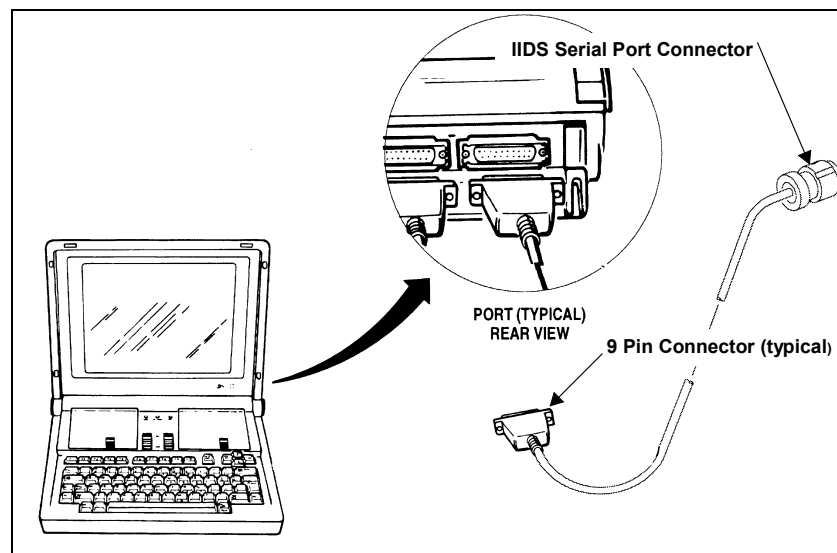


Figure 14. IIDS Serial Cable Connections

2. Connect the special round serial port cable connector to the J1 port on the front of the IIDS display (refer to [Figure 15](#)).
3. Apply power to the IIDS.
4. Press the CLR button (refer to [Figure 15](#)) on the IIDS and hold for approximately 2 seconds to clear the IIDS alpha-numeric display. This will allow the upload, download and connect messages to be properly displayed on the IIDS alpha-numeric display when performing these procedures with the GBMC.

NOTE: Refer to the appropriate sections of this guide for procedures on uploading and downloading files.

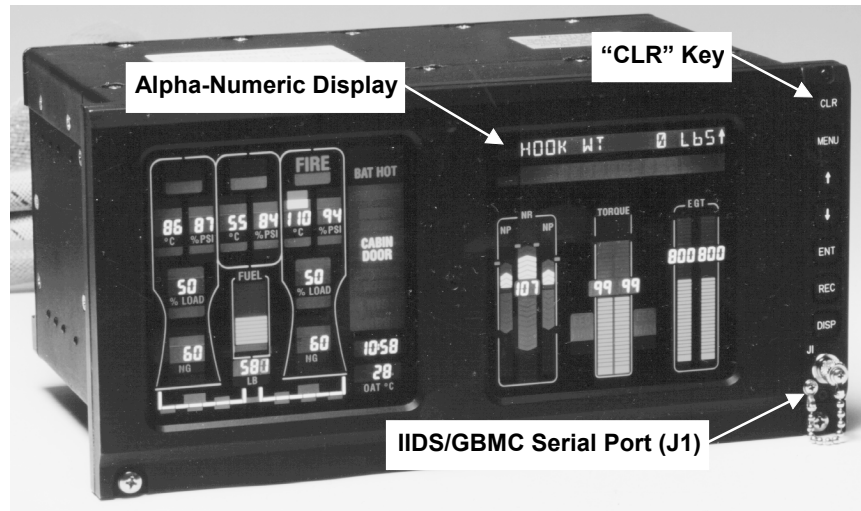


Figure 15. Integrated Instrument Display System (IIDS)

Aircraft Systems Condition Monitor (ASCM) Menu

TIP: ..The Upload Logs and Modify / Create Logs menu selections will be disabled for users logged on as "Limited Users".

The ASCM menu provides functions to download, upload, modify/create, display and archive logs.

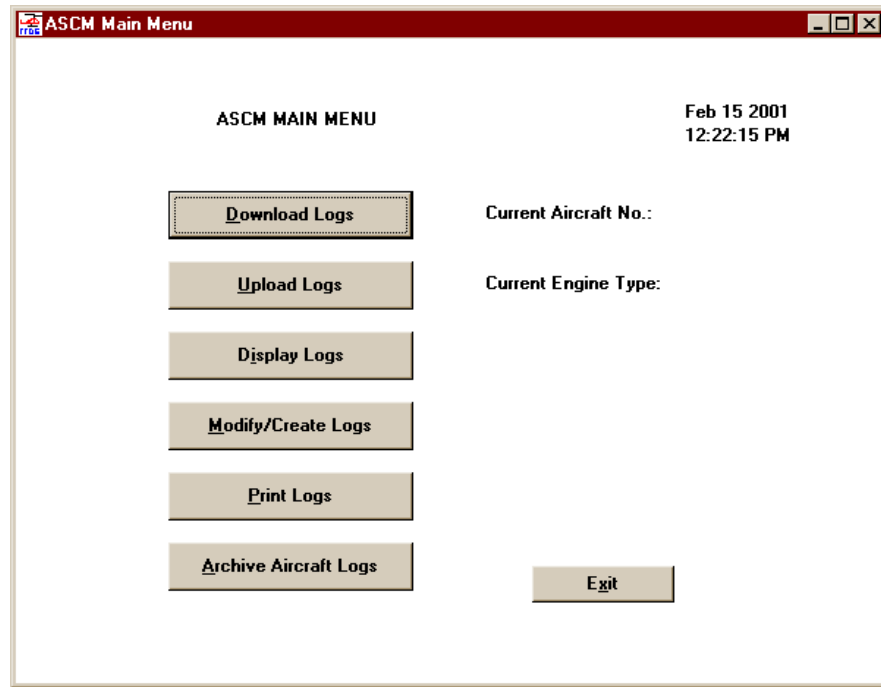


Figure 16. ASCM Main Menu Screen

Downloading Files from The IIDS

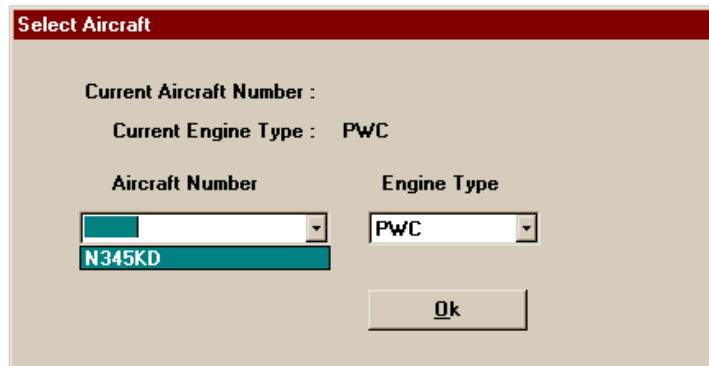
This procedure provides functions for downloading Data Logs, Exceedance Logs, Fault Logs, Trend Logs, Cumulative Logs and Setup Logs from the IIDS. To download BMS logs, refer to the BMS Menu Paragraphs.

CAUTION: You must perform the download procedures for the Setup Log or Cumulative Log before you can perform an upload. Each time a download is performed, a file is generated for the downloaded log with the "<log name>.dn" extension. If a file already exists with this name, a backup file with the "<log name>.bak" file name extension is generated for the existing "<log file>.dn". *If a "<log name>.bak" file already exists, it will be overwritten!* To prevent the inadvertent loss of a downloaded log file, you should archive the files after each download.

1. Connect the GBMC to the IIDS (Ref. [Connecting the GBMC Computer To The IIDS](#)).
2. Click on the "ASCM Menus" control button (refer to [Figure 8](#)).
3. Click on the "Download Logs" control button (refer to [Figure 16](#)).
4. In the Select Aircraft Screen, use TAB key (or mouse) to select the Aircraft Number field (refer to [Figure 17](#)).



5. Either type in a new aircraft number or select one from the the drop down list.
6. Press Ok.

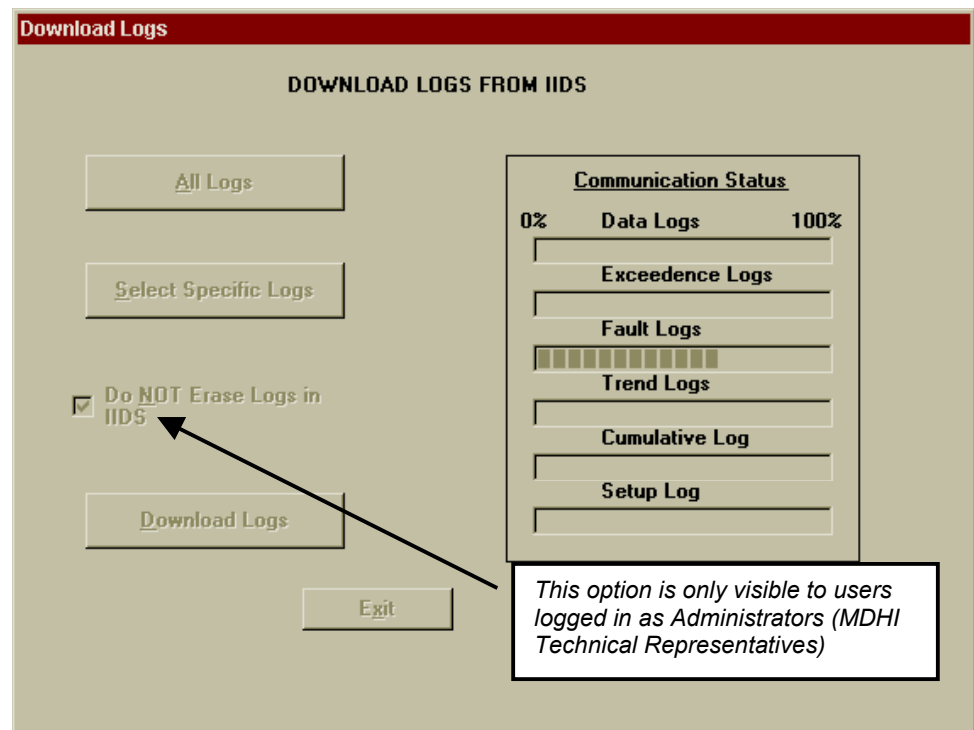


The "Select Aircraft" screen has a title bar "Select Aircraft". Below it, the text "Current Aircraft Number :" is followed by a text field containing "N345KD". Below that, "Current Engine Type : PWC" is followed by a dropdown menu showing "PWC". There are two more dropdown menus: "Aircraft Number" (showing "N345KD") and "Engine Type" (showing "PWC"). At the bottom right is an "Ok" button.

Figure 17. Select Aircraft Screen

TIP: .. When logged in as a System Administrator, click on the "Do Not Erase Logs In IIDS" control button if you DO NOT want to erase the logs in the IIDS. By default all Data, Exceedence, Fault and Trend Logs will be erased from IIDS memory after they are downloaded.

7. In the Download ASCM Logs Screen (refer to [Figure 18](#)), either:
 - a. Click on the "All Logs" control button to download all logs of all log types from the IIDS or Click on the "Select Specific Logs" control button to download logs of a specific type:
 - c. Select the type of file to download; Data, Exceedence, Fault, Trend, Cumulative or Setup, and click on the "Ok" control button (refer to [Figure 19](#)).



The "Download Logs" screen has a title bar "Download Logs". Below it, the text "DOWNLOAD LOGS FROM IIDS" is centered. There are two main buttons: "All Logs" and "Select Specific Logs". Below these is a checkbox labeled "Do NOT Erase Logs in IIDS" which is checked. Below the checkbox is a "Download Logs" button. At the bottom right is an "Exit" button. On the right side, there is a "Communication Status" section with a progress bar from 0% to 100%. Below the progress bar are several log type buttons: "Data Logs", "Exceedence Logs", "Fault Logs", "Trend Logs", "Cumulative Log", and "Setup Log". A callout box with an arrow pointing to the "Do NOT Erase Logs in IIDS" checkbox contains the text: "This option is only visible to users logged in as Administrators (MDHI Technical Representatives)".

Figure 18. Download Aircraft Logs Screen

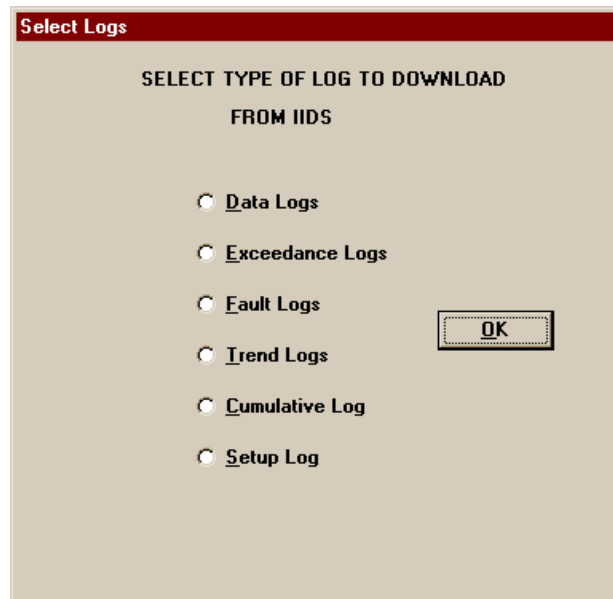


Figure 19. Select Specific Log Type Screen

- d. Click on the "Download Logs" control button. The Download Logs screen will reappear and the Communications Status bars will indicate the progress of the download (refer to [Figure 18](#)). When complete a message box will appear confirming successful completion.
8. After the files have transferred the IIDS alpha-numeric display will show the message "DATA XFER CMPL". Press Exit to return to the ASCM Main Menu.
9. Disconnect the GBMC from the IIDS.

Uploading Files to the IIDS

TIP: .. The operator must be logged in as either Full User or System Administrator to have access to this function. The Start Upload button will be disabled until a log has been selected to upload.

File upload is used to initialize a new or replacement IIDS with the basic rotorcraft and engine parameters and installed components data. This function is also used when an engine or other installed equipment is changed.

CAUTION: You must perform the download procedures for the Setup Log or Cumulative Log before you can perform an upload. Each time a download is performed, a file is generated for the downloaded log with the "<log name>.dn" extension. If a file already exists with this name, a backup file with the "<log name>.bak" file name extension is generated for the existing "<log file>.dn". *If a "<log name>.bak" file already exists, it will be overwritten!* To prevent the inadvertent loss of a downloaded log file, you should archive the files after each download.

1. Connect the GBMC to the IIDS (Ref. [Connecting the GBMC Computer To The IIDS](#)).



2. Click on the "ASCM Menu" control button (refer to [Figure 8](#)) then click on the "Upload Logs" control button (refer to [Figure 16](#)).
4. In the Select Aircraft Screen, user TAB key (or mouse) to select the Aircraft Number field (refer to [Figure 17](#)) and press Ok.
5. Either type in a new aircraft number or select one by using the (↑ ↓) arrow keys (or use mouse to select via the drop down list).
6. Click on the "Select Log to Upload" control button (refer to [Figure 20](#)).
7. Select the type of file to upload (Cumulative or Setup log) and click on the "Ok" control button.
8. Click on the "Start Upload" control button. Click on "Ok" in the "About to upload" warning dialog box (refer to [Figure 21](#)) and wait for the indication that the communications has been completed successfully. When file transfer is complete the message "DATA XFER CMPL" will appear on the IIDS alpha-numeric display (refer to [Figure 22](#)).

TIP: .. By default, all uploadable logs are named " *.up " in the aircraft database. Refer to the Modify/Create Log paragraphs for procedures on generating a setup or cumulative log to upload.

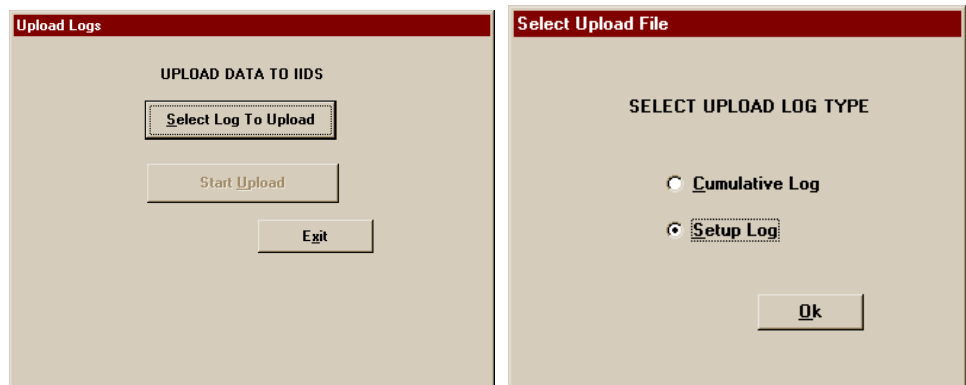


Figure 20. Select Log Type Screens

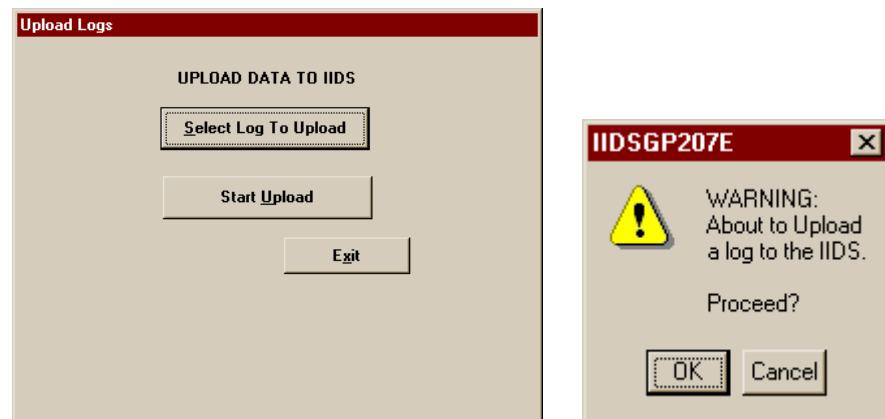


Figure 21. Start Upload Screens

CAUTION: The IIDS must be rebooted to allow any changed parameters in the newly uploaded Setup or Cumulative logs to become effective. Turn electrical power off then on again to reboot the IIDS processor.

9. Disconnect the GBMC from the IIDS.

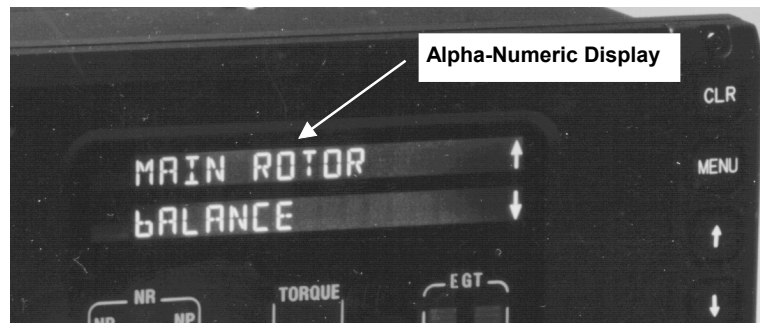


Figure 22. IIDS Alpha-numeric Display

Displaying Log Files

The Display Logs option on the ASCM menu allows you to view the Data, Exceedance, Fault, Trend, Cumulative and Setup logs on the GBMC screen. This is a view only capability. A copy of the current log entry being viewed can be printed from this function. The file can also be converted from its native binary format to an ASCII format for export. Converting the log to ASCII allows the Owner/Operator to incorporate the log data into other applications that support ASCII file formats. For a description of each log file type, refer to the Introduction section and the Appendix of this guide.

1. Click on the "ASCM Menu" control button (refer to [Figure 8](#)).
2. Click on the "Display Logs" control button (refer to [Figure 16](#)).
3. In the Select Aircraft Screen, use TAB key (or mouse) to select the Aircraft Number field (refer to [Figure 23](#)).
4. Either type in a new aircraft number or select one by using the (↑↓) arrow keys (or use mouse to select via the drop down list).

TIP: .. For the Setup and Cumulative log types two screens are required to display the complete log. Select the "Sheet 2" control button in the case of the "Setup Log" and the "Right Engine" control button in the case of the "Cumulative Log" to get to the second page.

Figure 23. Select Aircraft Screen

5. In the Select the "Type Of Log To Display" screen, select the log type to display, Data, Exceedance, Fault, Trend, Cumulative or Setup and

click the "Ok" control button to continue. The Select File To Display Screen will become visible (refer to [Figure 24](#)).

6. Either select the desired file with the mouse or :

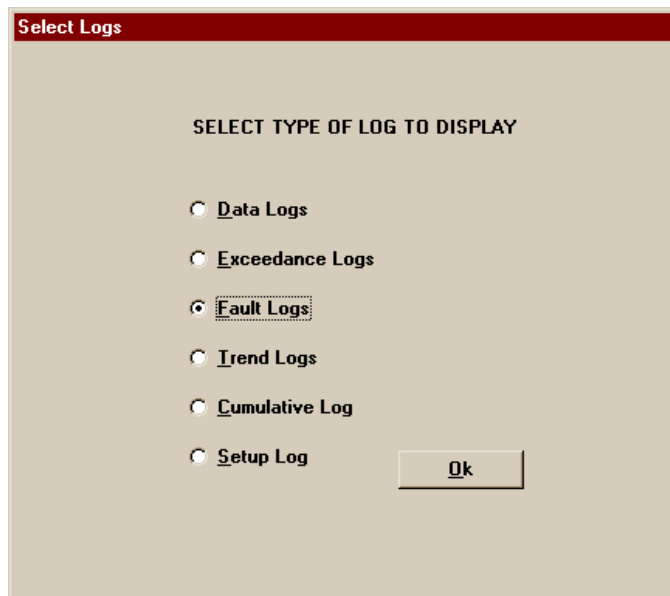
Use TAB key to select the file list control.

Use (↑ ↓) arrow keys to select the desired file to edit then click on the "Ok" control button to begin viewing logs.

A display screen will appear containing the current data for each parameter (refer to [Figure 25](#) through [35](#)).

7. Displayed log maybe printed by pressing the <ctrl>+P keys.
8. An ASCII file may be generated for the displayed log by typing <ctrl>+F.
9. Click the on the "Exit" control button to complete the log viewing function.

TIP: .. Printing or ASCII conversion of logs being viewed applies only to the specific log displayed. For example, the Fault log can contain as many as 100 "logs" (entries). To print the entire contents of these types of logs, use the ASCM Print Logs menu selection



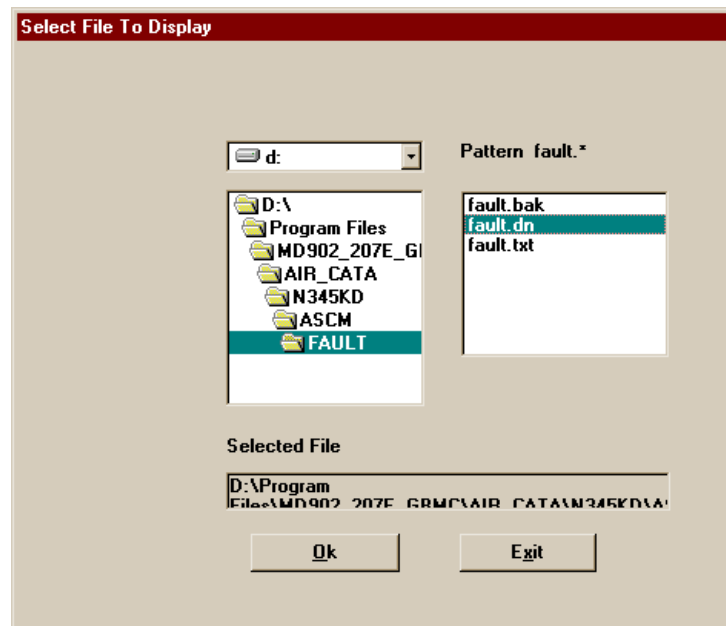


Figure 24. Select Log Type / Select Log To Display Screens

Setup Log Displays

Display Setup Log (Sheet 1)		
File Print		
Aircraft		
Engine Installation	PWC	
IPS Installation	1	
Heat/Defog Instalation	1	
Rotor Brake Installation	1	
Fwd Fuel Probe Calibration Code	0	
Aft Fuel Probe Calibration Code	0	
Hook Weight Calibration Code	6667	
Aircraft No.	N900MH	
Setup ID		
SETUP Config Change Time	13 : 26 : 59	
SETUP Config Change Date	Jun 15 2000	
Top Level Software Part Number	169663590004	Sheet 2
Operational Software Part Number	169663591004	
Maintenance Software Part Number	169663592004	Sheet 3
BMSOP Software Part Number	169663597002	
BMSBP Software Part Number	169613594003	
BMSBM Software Part Number	169663904002	Exit

Figure 25. Setup Log Display Screen (1 of 3)

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Display Setup Log (Sheet 2)

File Print

	Engine Left	Engine Right
Max Ng Norm (K2)	91.10	91.10
Ng Cor Factor (K3)	0.0	0.0
Max EGT Norm (K5)	721.2	721.2
EGT Cor Factor (K6)	0.0	0.0
Ng Gain Flt Cor (K8)	-0.0100	-0.0100
EGT Gain Flt Cor (K9)	-0.1037	-0.1037
SCQBI	-2.2	-4.0
SCQGI	0.9480	0.9570
SCMGTT	99.0	111.0

Sheet 1

Sheet 3

Exit

Figure 26. Setup Log Display Screen (2 of 2)

Display Setup Log (Sheet 3)

File Print

	Engine Left	Engine Right
ALT EGT Const (A1)	1150.00000000	1150.00000000
ALT EGT Const (A2)	-46.60400000	-46.60400000
ALT EGT Const (A3)	0.61333000	0.61333000
ALT EGT Const (A4)	-0.00229670	-0.00229670
ALT EGT Const (B1)	10.50200000	10.50200000
ALT EGT Const (B2)	-0.72932000	-0.72932000
ALT EGT Const (B3)	0.00205250	0.00205250
ALT EGT Const (B4)	-0.00000706	-0.00000706
ALT EGT Const (C1)	0.00000000	0.00000000
ALT EGT Const (C2)	0.00000000	0.00000000
ALT EGT Const (C3)	0.00000000	0.00000000
ALT EGT Const (C4)	0.00000000	0.00000000
ALT EGT Const (D1)	-5.55560000	-5.55560000
ALT EGT Const (D2)	10.89100000	10.89100000
ALT EGT Const (D3)	-0.22256000	-0.22256000
ALT EGT Const (D4)	0.00114410	0.00114410
ALT QIND Const (Q1)	0.00328350	0.00328350
ALT QIND Const (Q2)	6.31757200	6.31757200
ALT QIND Const (Q3)	0.00000000	0.00000000

Sheet 1

Sheet 2

Exit

Figure 27. Setup Log Display Screen (3 of 3)

Cumulative Log Displays

Cumulative Log Display (Left Engine)

File Print

Date Jun 16 2000
Time 16 : 04 : 54
Aircraft No. N900MH
Number of Flights 2256
Total Flight Time 269.96
Last Flight Time 0.18
Xmsn Chip Burn Cnts 0

Left Engine: Serial Number PCE-008023

Gear Box Module:

Serial Number	Accum SSO	Accum FSO	Accum TSO	Accum TSN
RGB-008933	4	9	1.86	1.86

Power Module:

Serial Number	Accum SSO	Accum FSO	Accum TSO	Accum TSN
TM-008023	4	9	1.86	1.86

2.5 OEI Excruns 35
Total Time 2.5 OEI 61.3

	Serial No.	Total Cycles Accum'd	Total Hours Accum'd
Impeller, Centrfgl	XXXXXXXXXXXX	129	55.28
Disk Comp Turb	XXXXXXXXXXXX	163	55.28
Disk Power Turb	XXXXXXXXXXXX	183	55.28

Right Engine

Exit

Figure 28. Cumulative Log Display Screen (Left Engine)

Cumulative Log Display (Right Engine)

File Print

Date Jun 16 2000
Time 16 : 04 : 54
Aircraft No. N900MH
Number of Flights 2256
Total Flight Time 269.96
Last Flight Time 0.18
Xmsn Chip Burn Cnts 0

Right Engine: Serial Number PCE-008021

Gear Box Module:

Serial Number	Accum SSO	Accum FSO	Accum TSO	Accum TSN
RGB-008021	4	9	1.77	1.77

Power Module:

Serial Number	Accum SSO	Accum FSO	Accum TSO	Accum TSN
TM-008021	4	9	1.77	1.77

2.5 OEI Excruns 31
Total Time 2.5 OEI 53.4

	Serial No.	Total Cycles Accum'd	Total Hours Accum'd
Impeller, Centrfgl	XXXXXXXXXXXX	111	54.89
Disk Comp Turb	XXXXXXXXXXXX	144	54.89
Disk Power Turb	XXXXXXXXXXXX	155	54.89

Left Engine

Exit

Figure 29. Cumulative Log Display Screen (Right Engine)

Data Log Displays

TIP: .. For the Data, Fault, Trend and Exceedance Log types there is a possibility of having more than a single log to be displayed. There is a drop down list control in the upper right hand corner of the screen that is used to select a new log number to be displayed. This maybe accessed using the mouse or (↑ ↓) arrow keys.

Display Data Logs (Sheet 1)
File Print

Window 1 15 : 41 : 19 Jun 16 2000

	LENG	RENG	LENG	RENG		LENG	RENG	LENG	RENG	
	Ng (%)	Ng (%)	Np (%)	Np (%)	Nr (%)	QI (%)	QI (%)	Egt (C)	Egt (C)	CLP (%)
1	86.7	87.2	100.0	100.0	100	34.0	33.1	663	662	53
2	86.7	87.4	100.0	100.0	100	33.1	33.4	662	659	53
3	86.8	87.4	100.0	99.9	99	33.6	34.3	660	659	53
4	87.2	86.8	99.7	99.9	99	34.0	33.9	660	660	53
5	87.2	85.4	99.3	99.3	99	35.3	28.5	661	658	53
6	87.9	83.8	98.7	98.8	99	36.3	23.1	663	649	53
7	88.7	82.5	98.5	98.4	98	38.1	19.0	664	632	53
8	89.9	81.6	98.1	98.1	98	45.8	16.6	675	618	53

Window 2 15 : 42 : 04 Jun 16 2000

	LENG	RENG	LENG	RENG		LENG	RENG	LENG	RENG	
	Ng (%)	Ng (%)	Np (%)	Np (%)	Nr (%)	QI (%)	QI (%)	Egt (C)	Egt (C)	CLP (%)
1	102.3	62.2	99.5	86.0	99	101.5	0.0	967	519	67
2	102.0	62.2	99.7	86.0	99	101.3	0.0	969	515	67
3	102.0	62.2	99.9	86.0	99	100.3	0.0	967	519	67
4	102.0	62.2	99.9	86.0	100	100.6	0.0	969	516	67
5	101.9	62.2	99.9	86.0	100	99.9	0.0	967	519	67
6	101.9	62.2	99.9	86.0	100	99.8	0.0	966	516	67
7	101.9	62.2	99.9	86.0	100	100.0	0.0	964	519	67
8	101.8	62.2	99.9	86.0	100	99.9	0.0	965	515	67

Select Log Number
2

4Hz Data 1 Hz Data (1) 1Hz Data (2) Exit

Figure 30. Data Log Display Screen (1 of 3)

Display Data Logs (Sheet 2)
File Print

Window 1 15 : 41 : 19 Jun 16 2000

	L-EOT	R-EOT	L-EOP	R-EOP	XOT	XOP	LENG	RENG	HOP1	HOP2
	(C)	(C)	(%psi)	(%psi)	(C)	(%psi)	GEN(%)	GEN(%)	(psig)	(psig)
1	84	84	94	95	70	82	16	16	555	525
2	84	84	94	94	70	82	10	10	554	526
3	84	84	92	95	70	81	9	10	556	523
4	84	84	97	95	70	81	9	10	555	530
5	85	84	94	94	70	81	9	10	553	525
6	84	84	94	93	70	82	9	10	553	520
7	84	84	95	93	70	82	9	10	554	523
8	84	83	92	94	70	82	9	10	556	523

Window 2 15 : 42 : 04 Jun 16 2000

	L-EOT	R-EOT	L-EOP	R-EOP	XOT	XOP	LENG	RENG	HOP1	HOP2
	(C)	(C)	(%psi)	(%psi)	(C)	(%psi)	GEN(%)	GEN(%)	(psig)	(psig)
1	87	73	95	92	70	83	9	11	554	523
2	87	73	98	91	69	81	9	10	553	524
3	87	73	97	93	70	82	9	10	555	524
4	87	72	95	92	70	82	9	10	552	517
5	87	72	98	92	69	82	9	10	552	524
6	87	72	94	92	69	83	9	11	553	526
7	87	72	93	92	69	81	9	10	554	518
8	88	72	98	92	69	82	9	11	553	527

Select Log Number
2

4Hz Data 1Hz Data (1) 1Hz Data (2) Exit

Figure 31. Data Log Display Screen (2 of 3)

Display Data Logs (Sheet 3)

File Print

Window 1 15 : 41 : 19 Jun 16 2000

	BATT VDC	OAT (C)	PRESS ALT(ft)	PDLPOS (%)						
1	28	36	2450	49						
2	28	36	2450	49						
3	28	36	2450	49						
4	28	36	2450	49						
5	28	36	2450	49						
6	28	36	2300	49						
7	28	36	2300	49						

Window 2 15 : 42 : 04 Jun 16 2000

	BATT VDC	OAT (C)	PRESS ALT(ft)	PDLPOS (%)						
1	28	36	2550	46						
2	28	36	2550	46						
3	28	36	2450	46						
4	28	36	2450	46						
5	28	36	2450	46						
6	28	36	2550	46						
7	28	36	2550	46						

Select Log Number

4 Hz Data 1 Hz Data (1) 1Hz Data (2) 2 Exit

Figure 32. Data Log Display Screen (3 of 3)

Fault Log Displays

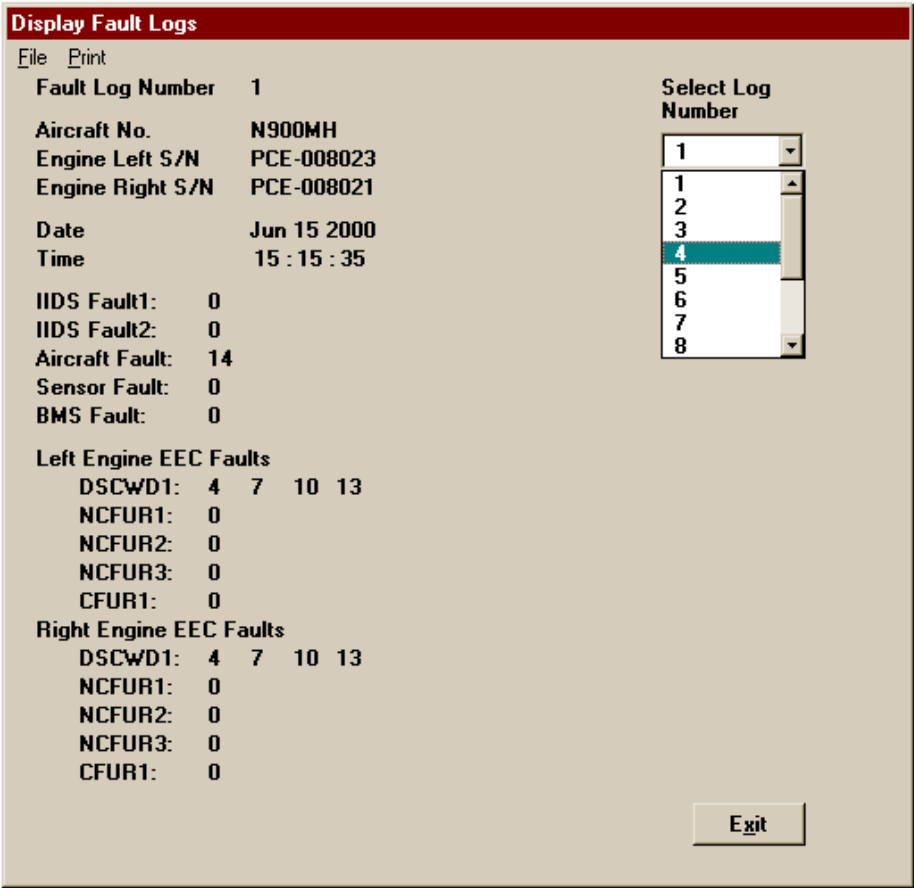


Figure 33. Fault Log Display Screen



Trend Log Displays

Display Trend Logs
File Print

Trend Log Number	2	Select Log Number
Date	Jun 16 2000	2
Time	14 : 36 : 35	1
Engine Left or Right	RIGHT	2
Engine Serial Number	PCE-008021	
Engine TSO	1.18	
Np (Power Turbine Speed)	99.9	
T1 (Inlet Power)	39.1	
Torque (Qt)	74.1	
Ng (Gas Generator)	93.2	
EGT (Exhaust Gas Temperature)	776.3	
EOP (Engine Oil Pressure)	97	
EOT (Engine Oil Temperature)	73	
Nr (Rotor Speed)	99	
XOP (Transmission Oil Pressure)	83	
XOT (Transmission Oil Temperature)	58	
HOP 1 (Hydraulic Oil Pressure 1)	554	
HOP 2 (Hydraulic Oil Pressure 2)	525	
PO (Pressure Altitude in Feet)	1650	
OAT (Outside Air Temperature)	39	
Ng Performance Margin	1.8	
EGT Performance Margin	27.5	
Ng Correction Factor from Initial Calibration (K3)	0.0	
EGT Correction Factor from Initial Calibration (K6)	0.0	

Exit

Figure 34. Trend Log Display Screen

Exceedance Log Displays

Display Exceedance Logs
File Print

Exceedance Log Number	1	Select Log Number
Exceedance Parameter Type	LT ENG EGT	1
Aircraft No.	N900MH	2
Left Engine S/N	PCE-008023	3
Right Engine S/N	NOT APPLICABLE	
Date	Jun 15 2000	
Time	16 : 07 : 24	
Peak Value	884.00	DEG C
Time To Peak	66	
Time Above	850.00	DEG C 303
Time To	900.00	DEG C 0
Time Above	900.00	DEG C 0
Time To	970.00	DEG C 0
Time Above	970.00	DEG C 0
Time To	1000.00	DEG C 0
Time Above	1000.00	DEG C 0
Data Log File Number	1	

Exit

Figure 35. Exceedance Log Display Screen



Creating or Modifying Uploadable Setup or Cumulative Data Files

The Menu option allows you to create a new log file or to edit an existing log file for upload to the IIDS. This function will be typically used when replacing components that have data elements in the setup or cumulative logs. When updates to the IIDS setup to cumulative log are performed for component replacements, it may be faster to perform the download procedures for the affected log and edit the appropriate component information than to create a new log.

TIP: .. The operator must be logged in as either Full User or System Administrator to have access to this function

1. From the GBMC Main Menu, Click on the "ASCM Menus" control button (refer to [Figure 8](#)).
2. Click on the "Modify/Create Logs" control button (refer to [Figure 16](#)).
3. In the Select Aircraft Screen (refer to [Figure 36](#)), use TAB key (or mouse) to select the Aircraft Number field.
4. Either type in a new aircraft number or select one by using the (↑ or ↓) arrow keys or:
use mouse to select from the drop down list.
5. Click Ok button

Figure 36. Select Aircraft Screen

Create New Setup or Cumulative Data File

To create a new "Setup Data" file or "Cumulative Data" file containing default values (refer to [Figure 37](#)):

1. Click the "Create New Log" option check box and select the log type to be generated (Cumulative or Setup).
2. Click "Ok" to continue.

A screen for the log type selected will appear allowing you to enter the required values (refer to [Figures 31](#) through [34](#)).

NOTE: Shaded values indicate the field is editable only by the personnel authorized as System Administrators. Both log types contain multiple screens of information that make up the complete log. Select the "Sheet 2" or "Sheet 3" control button in the

TIP: .. In many cases it is faster and more accurate to edit an existing log than to create a new log from scratch. Existing logs can be restored from an archive for this purpose

case of the "Setup Log" and the "Right Engine" control button in the case of the "Cumulative Log" to get to the next page.

3. Enter the appropriate values into the boxes next to the data field names (Ref. Editing an Existing Setup or Cumulative Data File to see the data fields).

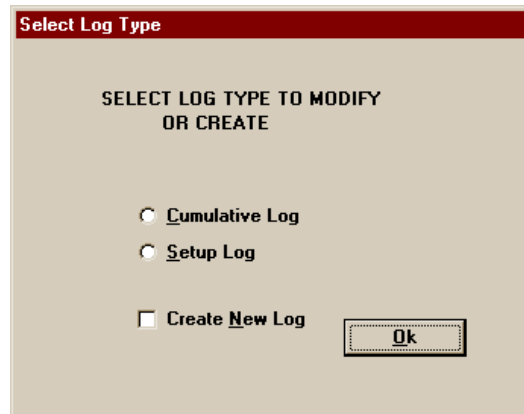


Figure 37. Select Log Type Screen

To select a parameter to enter either select with mouse or use the TAB or SHIFT+TAB keys to cycle through the field until reaching the desired field. When all data entry has been completed click on the "Exit" control button. If any field has been changed, the operator will be given the option to either save the file as "*.up" (Ok), discard file (No), or cancel and return to editing file. If no data has been entered, then an dialog box will prompt you that the file will not be saved.

Editing an Existing Setup or Cumulative Data File

The two editable logs are the Setup and Cumulative logs. To modify an existing "Setup Data" file (either setup.dn, setup.up or setup.bak) or "Cumulative Data" file (cum.dn, cum.up or cum.bak):

NOTE: Only the file types with the ".dn", ".up", or ".bak" extensions can be used for editing purposes.

1. Select the log type (Cumulative or Setup) and DO NOT click the "Create New Log" option check box (refer to [Figure 37](#)).
2. Click "Ok" to continue.
3. Select the log to be modified by clicking on the log name.
4. The Select File To Display Screen will become visible (refer to [Figure 38](#)).
5. Select the desired file with the mouse or:
 - a. Use TAB key to select the rectangle displaying possible files.
 - b. Use (↑ or ↓) arrow keys to select the desired file to edit.
6. Click on the "Ok" control button to begin editing.

TIP: .. To create an upload file for the Setup Data Log, select a file from the file list in the "Select File To Display" screen titled "setup.dn", "setup.up" or "setup.bak"

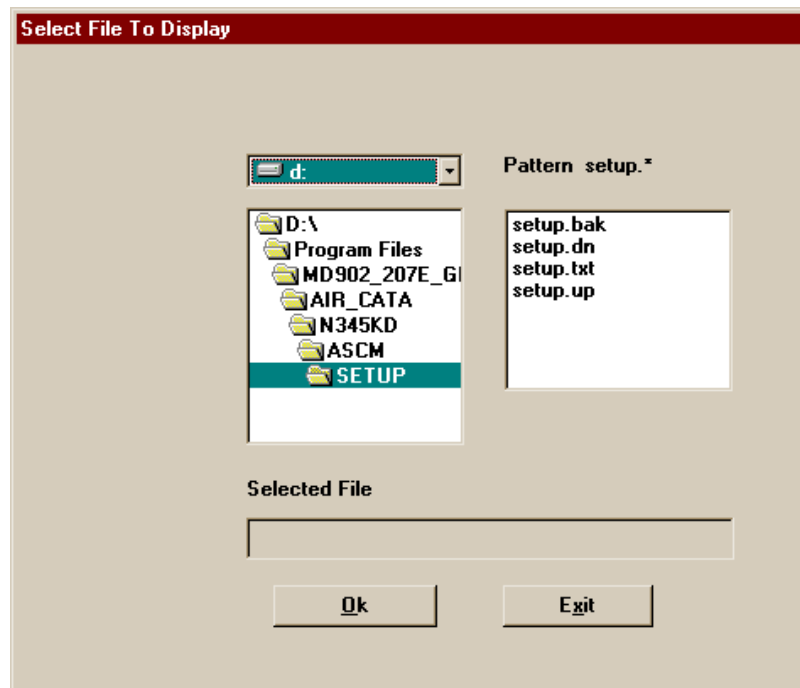


Figure 38. Select File To Display Screen

A display screen will appear containing the current data for each parameter. Any parameter that *is contained in a bordered field*, maybe edited or new values inserted. Non-bordered field parameters are only available for editing at the System Administrator security level.

Note: Both log types contain multiple screens of information that make up the complete log. Select the "Sheet 2" or "Sheet 3" control button in the case of the "Setup Log" and the "Right Engine" control button in the case of the "Cumulative Log" to get to the next page.

To select a parameter to edit either select with mouse or use the TAB or SHIFT+TAB keys to cycle through the field until reaching the desired field. When all editing has been completed click on the "Exit" control button.

If the field has been changed, the operator will be given the option to either save the file as "*.up" (Ok), discard file (No), or Cancel and return to editing file. If there has been no changes, then an dialog box will prompt you that the file will not be saved.

Setup Log Screens

Edit Setup Log (Sheet 1)
File Print

Aircraft

Engine Installation	PWC
IPS Installation	1
Heat/Defog Instalation	1
Rotor Brake Installation	1
Fwd Fuel Probe Calibration Code	0
Aft Fuel Probe Calibration Code	0
Hook Weight Calibration Code	6667
Aircraft No.	N900MH

Setup ID: UNIT 008

SETUP Config Change Time: 13 : 26 : 59

SETUP Config Change Date (Mo, Da, Yr): 06 / 15 / 00

Top Level Software Part Number: 169663590004

Operational Software Part Number: 169663591004

Maintenance Software Part Number: 169663592004

BMSOP Software Part Number: 169663597002

BMSBP Software Part Number: 169613594003

BMSBM Software Part Number: 169663904002

Sheet 2

Sheet 3

Exit

Editable fields (enabled) are indicated by a black outline around the field

Figure 39. Create / Edit Setup Log Screen (1 of 3)

Edit Setup Log (Sheet 2)
File Print

	Engine Left	Engine Right
Max Ng Norm (K2)	91.100	91.100
Ng Cor Factor (K3)	0.0000	0.0000
Max EGT Norm (K5)	721.20	721.20
EGT Cor Factor (K6)	0.0000	0.0000
Ng Gain Flt Cor (K8)	-0.0100	-0.0100
EGT Gain Flt Cor (K9)	-0.1037	-1.1037
SCQBI	-2.200	-4.000
SCQGI	0.9480	0.9570
SCMGTT	99.000	111.00

Sheet 1

Sheet 3

Exit

Non-editable fields (disabled) display text as shaded. These fields require Sys Admin permissions).

Figure 40. Create / Edit Setup Log Screen (2 of 3)

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Edit Setup Log (Sheet 3)
File Print

	Engine Left	Engine Right
ALT EGT Const (A1)	1150.00000000	1150.00000000
ALT EGT Const (A2)	-46.60400000	-46.60400000
ALT EGT Const (A3)	0.61333000	0.61333000
ALT EGT Const (A4)	-0.00229670	-0.00229670
ALT EGT Const (B1)	10.50200000	10.50200000
ALT EGT Const (B2)	-0.72932000	-0.72932000
ALT EGT Const (B3)	0.00205250	0.00205250
ALT EGT Const (B4)	-0.00000706	-0.00000706
ALT EGT Const (C1)	0.00000000	0.00000000
ALT EGT Const (C2)	0.00000000	0.00000000
ALT EGT Const (C3)	0.00000000	0.00000000
ALT EGT Const (C4)	0.00000000	0.00000000
ALT EGT Const (D1)	-5.55560000	-5.55560000
ALT EGT Const (D2)	10.89100000	10.89100000
ALT EGT Const (D3)	-0.22256000	-0.22256000
ALT EGT Const (D4)	0.00114410	0.00114410
ALT QIND Const (Q1)	0.00328350	0.00328350
ALT QIND Const (Q2)	6.31757200	6.31757200
ALT QIND Const (Q3)	0.00000000	0.00000000

Sheet 1
Sheet 2
Exit

Figure 41. Create / Edit Setup Log Screen (3 of 3)

Cumulative Logs

Cumulative Log Edit Screen (Left Engine)
File Print

Date (mon/day/yr) 06 / 16 / 00
Time (hr:min:sec) 16 : 04 : 54
Aircraft No. N900MH
Number of Flights 2256
Total Flight Time 269.96
Last Flight Time 0.18
Xmsn Chip Burn Cnts 0

Left Engine: Serial Number PCE-008023

Gear Box Module:

Serial Number	Accum SSO	Accum FSO	Accum TSO	Accum TSN
RGB-008933	4	9	1.86	1.86

Power Module:

Serial Number	Accum SSO	Accum FSO	Accum TSO	Accum TSN
TM-008023	4	9	1.86	1.86

2.5 OEI Excruns 35
Total Time 2.5 OEI 61.3

Serial No.	Total Cycles Accum'd	Total Hours Accum'd
Impeller, Centrfgl	129	55.28
Disk Comp Turb	163	55.28
Disk Power Turb	183	55.28

Right Engine
Exit

Figure 42. Edit Cumulative Log Screen (Left Engine)

Cumulative Log Edit Screen (Right Engine)

File Print

Date (mon/day/yr) 06 / 16 / 00
 Time (hr:min:sec) 16 : 04 : 54
 Aircraft No. N900MH
 Number of Flights 2256
 Total Flight Time 269.96
 Last Flight Time 0.18
 Xmsn Chip Burn Cnts 0

Right Engine: Serial Number PCE-008021

Gear Box Module:

Serial Number	Accum SSO	Accum FSO	Accum TSO	Accum TSN
RGB-008021	4	9	1.77	1.77

Power Module:

Serial Number	Accum SSO	Accum FSO	Accum TSO	Accum TSN
TM-008021	4	9	1.77	1.77

2.5 OEI Excruns 31

Total Time 2.5 OEI 53.4

Serial No.	Total Cycles Accum'd	Total Hours Accum'd
Impeller, Centrgl	111	54.89
Disk Comp Turb	144	54.89
Disk Power Turb	155	54.89

Left Engine

Exit

Figure 43. Edit Cumulative Log Screen (Right Engine)

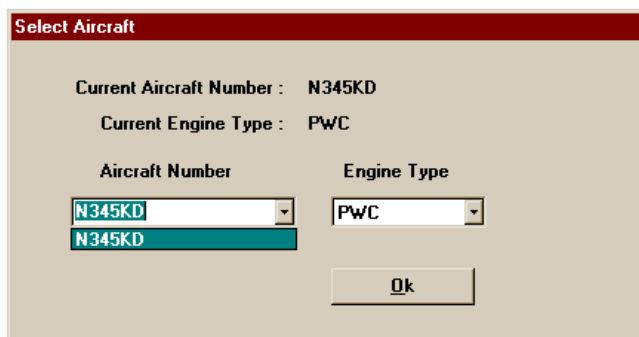
Printing Log Files

The Menu option allows you to print log files. You may select individual logs or select the Print All Logs option box to print all the logs for a specific aircraft. All logs are printed using the window printer drivers. The drive for your printer MUST be selected in the Print Driver Section of the Windows Control Panel. Refer to the Windows 3.1 or Windows 95 manual for instructions on configuring a printer.

To use the Print Menu follow:

1. Click on the "ASCM Menus" control button (refer to [Figure 8](#)).
2. Click on the "Print Logs" control button (refer to [Figure 16](#)).
3. In the Select Aircraft Screen, use TAB key (or mouse) to select the Aircraft Number field. Type in a new aircraft number or select one by using the (↑ ↓) arrow keys or use mouse to select from the drop down list (refer to [Figure 44](#)).

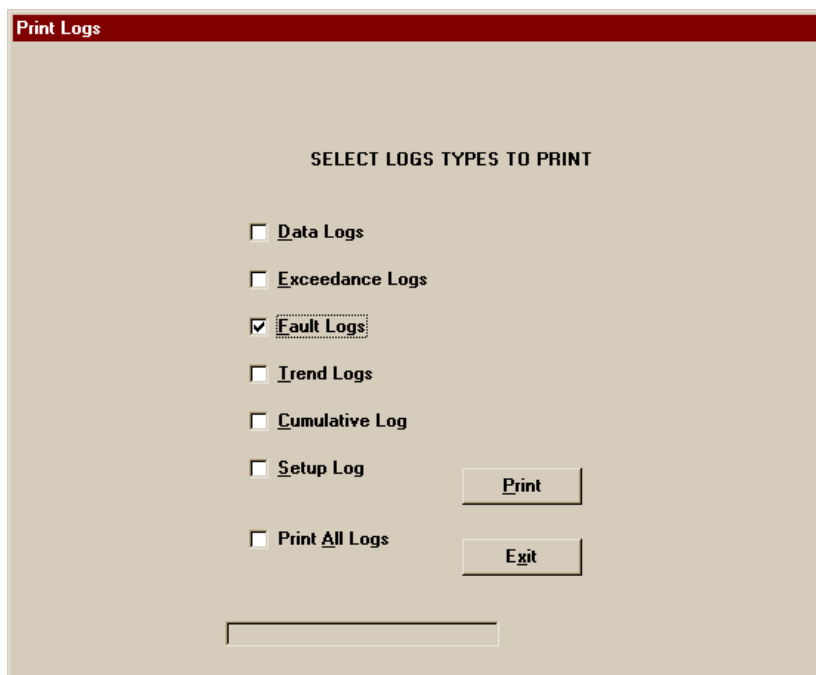
TIP: .. Log files can be printed individually while displaying a log from the Display Logs Menu (refer to previous section). To print all the logs of a given type you must selecting the Print Log option on the ASCM main menu.



The 'Select Aircraft' screen has a title bar 'Select Aircraft'. It displays 'Current Aircraft Number : N345KD' and 'Current Engine Type : PWC'. Below these are two dropdown menus: 'Aircraft Number' and 'Engine Type'. The 'Aircraft Number' dropdown shows 'N345KD' selected, with a list of options below it, also showing 'N345KD'. The 'Engine Type' dropdown shows 'PWC' selected. An 'Ok' button is at the bottom right.

Figure 44. Select Aircraft Screen

4. In the Select the Log Type To Print screen, select the log type to print Data, Exceedance, Fault, Trend, Cumulative, Setup or Print All Logs, and click the "Ok" control button to continue (refer to [Figure 45](#)).



The 'Print Logs' screen has a title bar 'Print Logs'. It contains the text 'SELECT LOGS TYPES TO PRINT'. Below this are seven checkboxes: 'Data Logs', 'Exceedance Logs', 'Fault Logs' (checked), 'Trend Logs', 'Cumulative Log', 'Setup Log', and 'Print All Logs'. To the right of the checkboxes are two buttons: 'Print' and 'Exit'. At the bottom, there is an empty rectangular box.

Figure 45. Select Log Types To Print Screen

5. Selecting a log type will print out all logs of that given type. Selecting All Logs will print all logs of all types.

NOTE: The Exceedance, Fault and Trend Logs may contain as many as 100 individual log entries each. The Data log may contain up to five (5) entries.

6. If no logs of the type selected are found, a dialog box will be displayed (refer to [Figure 46](#)).



Figure 46. No Logs Found Dialog Box

7. If log of the type indicated were found, a dialog box will be displayed indicating the status of the print job (refer to [Figure 47](#)).

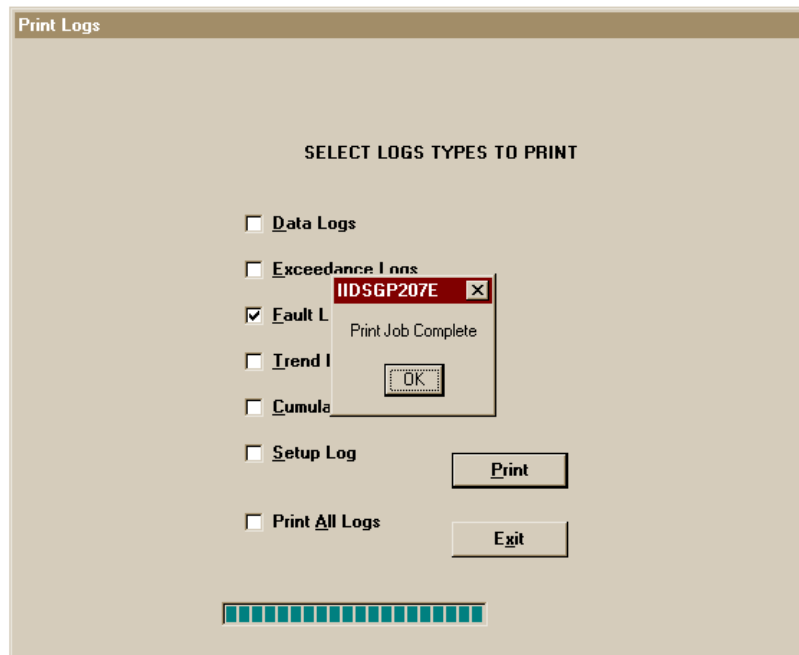


Figure 47. Printing Complete Dialog Box

Archive/Restore Log Files

This menu option allows you to archive downloaded aircraft records for historical purposes. The archives are a snapshot of the existing aircraft logs in individual folders (by aircraft number) and stored in a top level aircraft folder under “D:\Program Files\MD902_207E_GBMC\air_cata\” as pictured in [Figure 48](#) (or the directory you chose to install the GBMC application in).

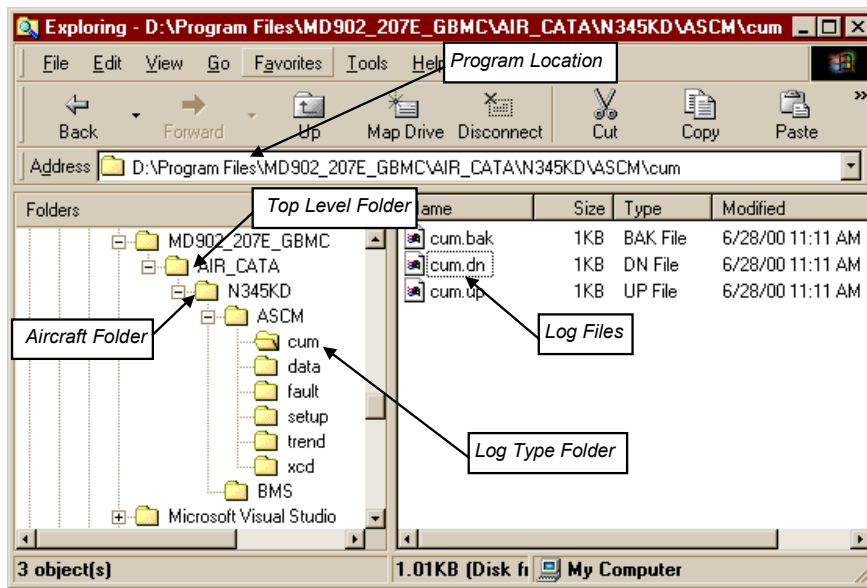


Figure 48. GBMC Aircraft Folders

Each “aircraft” folder contains several folders in which different types of log files are stored. When you “archive” files for a particular aircraft, the complete set of folders (the aircraft’s folder and all sub folders and files are copied to the “target” archive disk. If a top-level folder named “AIR_CATA” does not exist on the target disk, it will be created and the individual aircraft folders and sub folders/files will be placed under this folder. If different aircraft are archived to the same target disk, each aircraft will have a folder under the “AIR_CATA” top level folder on the archive disk.

Floppy Disk Historical Archives





Each time an aircraft is archived, the contents of the aircraft directories and files on the “target” disk are replaced. To maintain a historical archive on floppy disks, it will be necessary to use a new disk each time an aircraft archive is created. This will prevent the loss of historical data. Labeling disks using the method described in Hard Disk Historical Archives below will make it easier to identify the archived files

Hard Disk Historical Archives

TIP:... For the Restore archive function to work, the historical files must be copied back to the “AIRCRAFT” root directory folder so that the restore function can locate the files

Saving historical data on a hard disk will require you to create your own directory structure into which the archived records can be stored. If you create a directory structure as pictured below, you can create a folder for each instance of an aircraft’s archive. Labeling sub-folders in this archive by date/instance will allow you to locate historical data more quickly.

The method pictured in [Figure 49](#) uses the following code to establish sub-directory names:

-  The first two digits of the directory name represent the year.
-  The forth and fifth digits represent the day of the month.
-  The sixth and seventh digits represent the day.
-  Add an extension (“.001, .002, etc.”) sequentially, to identify each instance.

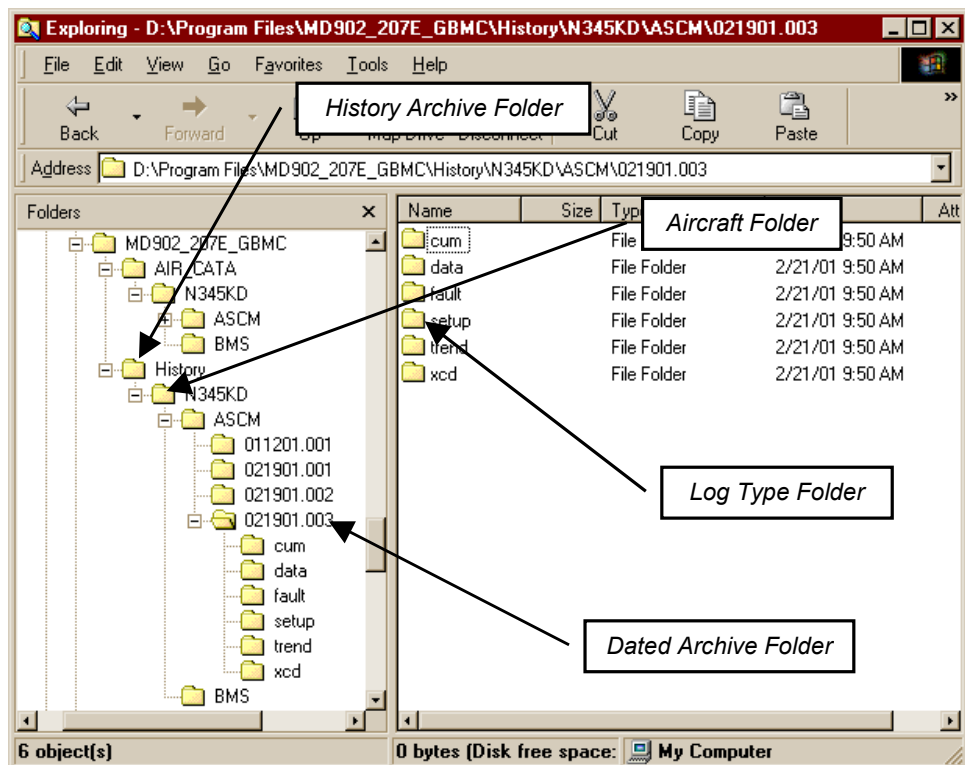


Figure 49. History Archive Folder On Hard Disk Drive

CAUTION: The archive function allows you to select the *target disk to archive to only!* This will create the “AIRCRAFT” folder in the root directory of this disk. Each time the archive is performed, the contents of the “AIRCRAFT” folder in this root directory will be replaced with the new archive files.

After creating the “HISTORY” directory structure, “copy” the aircraft’s folder from the “AIRCRAFT” archive folder in the root directory to the historical folder you just created for this archive instance.

To Archive Files:

TIP: .. The operator must be logged in as either Full User or System Administrator to have access to this function.

1. Click on the "ASCM Menus" control button (refer to [Figure 8](#)).
2. Click on the "Archive Aircraft Logs" control button (refer to [Figure 16](#)).
3. In the Archive Or Restore Aircraft Logs Screen (refer to [Figure 50](#)) select to "Archive".
4. Using the TAB key (or mouse) select the Drive field. Use the (↑ ↓) arrow keys to select drive to either store data or retrieve data.

CAUTION: The archive function allows you to select the *target disk to archive to only!* This will create the "AIRCRAFT" folder in the root directory of this disk. Each time the archive is performed, the contents of the "AIRCRAFT" folder in this root directory will be replaced with the new archive files.

5. Using the TAB key (or mouse) select the Aircraft No. field. Use the (↑ ↓) arrow keys to select the aircraft number to archive. Click "Ok"

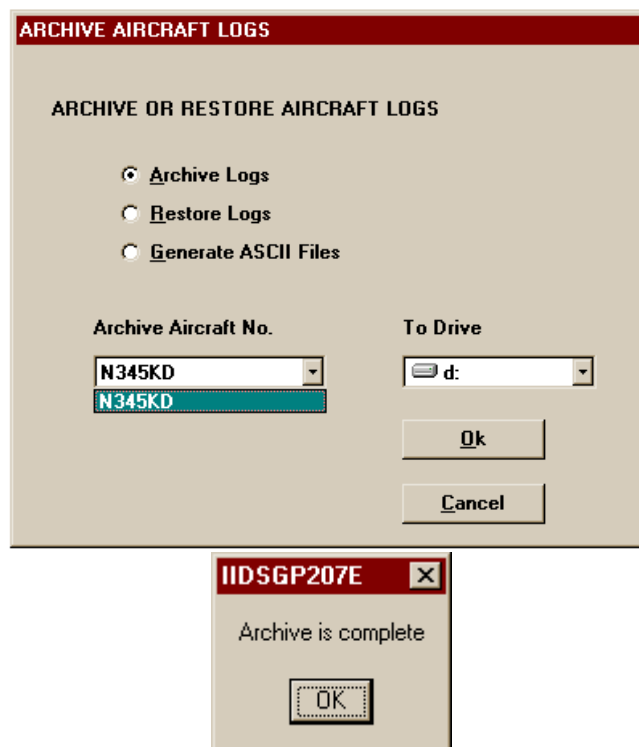


Figure 50. Archive /Restore Aircraft Logs Screen

To Restore Files:

The archive function allows you to select the *target disk to restore archives from only!*. If you are restoring files from a historical archive (on a hard disk) as described above, you must copy the required aircraft folder back into the "AIRCRAFT" folder in the root directory in order to make it accessible to the restore function. The restored aircraft's files will replace those presently in

directory chosen to install the GBMC application) *If the files (logs for the selected aircraft) presently on the GBMC hard disk have not yet been archived they will be lost!*

CAUTION: Be sure the log files presently on the GBMC hard drive, for the aircraft being restored, are archived first. *They will be overwritten by the restore process.*

TIP: .. The operator must be logged in as either Full User or System Administrator to have access to this function.

1. Click on the "ASCM Menus" control button (refer to [Figure 8](#)).
2. Click on the "Archive Aircraft Logs" control button (refer to [Figure 16](#)).
3. In the Archive Or Restore Aircraft Logs Screen select "Restore" (refer to [Figure 50](#)).
4. Using the TAB key (or mouse) select the Drive field. Use the (↑ ↓) arrow keys to select drive to retrieve archive data from.
5. Using the TAB key (or mouse) select the Aircraft No. field. Use the (↑ ↓) arrow keys to select the aircraft number to restore.
6. Click "Ok"

Generating ASCII Files Overview

This function allows you to generate ASCII files of a specific aircraft's logs. These files can then be utilized in other programs for analysis or documentation. For example, data in the Cumulative log could be imported into a spreadsheet or database application to produce reports or graphs on flight times vs. engine cycle counts to help project cost based on mission profiles. Engine/airframe usage data could be collected and used to produce maintenance projection reports based on usage information such as cycle counting. Other uses might be to produce computer-generated logbooks. This function is provided to allow owners/operators to easily incorporate the collected data into their own systems.

Generate ASCII Files:

TIP: .. The operator must be logged in as either Full User or System Administrator to have access to this function.

1. Click on the "ASCM Menus" control button (refer to [Figure 8](#)).
2. Click on the "Archive Aircraft Logs" control button. (refer to [Figure 16](#))
3. In the Archive Or Restore Aircraft Logs Screen select "Generate ASCII Files" (refer to [Figure 51](#)). .. The generated ASCII files will be written to the target disk in the following directory(refer to [Figure 52](#)): D:\air_cata\N345KD where "D:\\" is the target drive.

CAUTION: The "Generate ASCII Files" function allows you to select the target disk to write the ASCII files to. *The generated ASCII files, for the selected aircraft will replace those presently on the selected disk.*

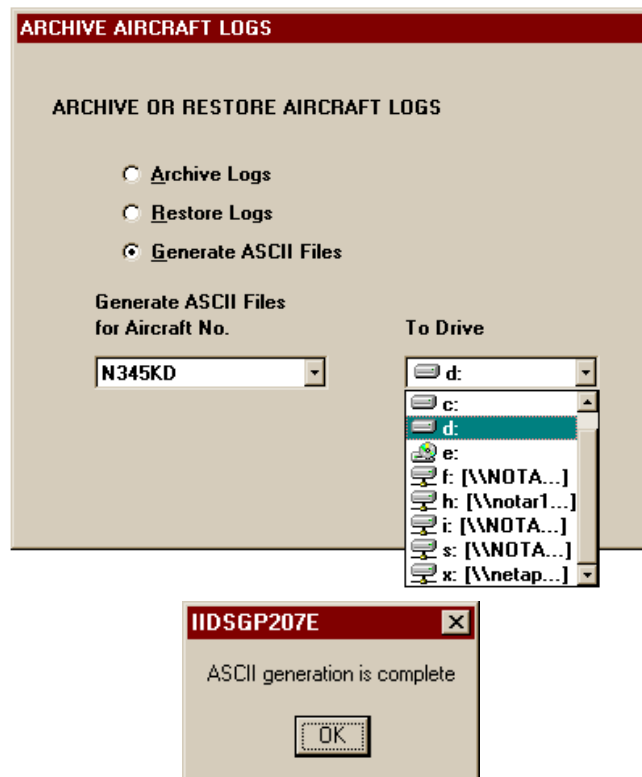


Figure 51. Generate ASCII Aircraft Logs Screens

4. Using the TAB key (or mouse) select the Drive field. Use the (↑ ↓) arrow keys to select drive to write ASCII data files to.
5. Using the TAB key (or mouse) select the Aircraft No. field. Use the (↑ ↓) arrow keys to select the aircraft number to identify the files to convert to ASCII. Click "Ok"

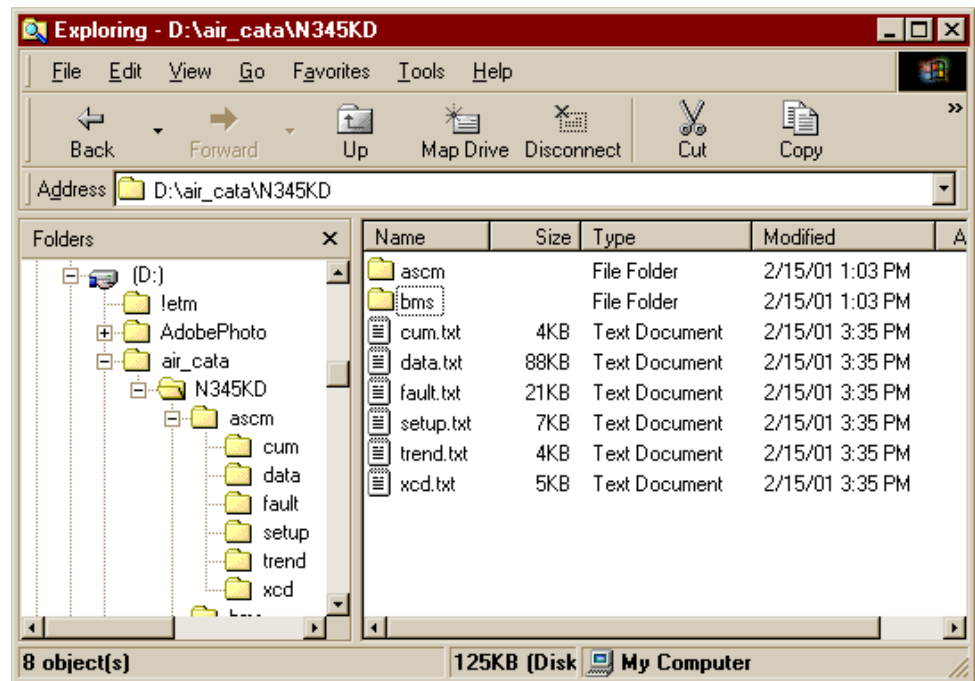


Figure 52. Generated ASCII Files Location

HECTM Menu

Ref. Pratt & Whitney user guide and reference manual for the Helicopter Engine Condition and Trend Monitor (HECTM™) program (Version 1.00) for instructions.

This Menu option generates an HECTM™ standard file format for a selected aircraft from the downloaded Trend Log file. The program will then launch the HECTM™ application using the standard file that was just generated.

1. Select HECTM Menu from the GBMC Main Menu (refer to [Figure 53](#)).

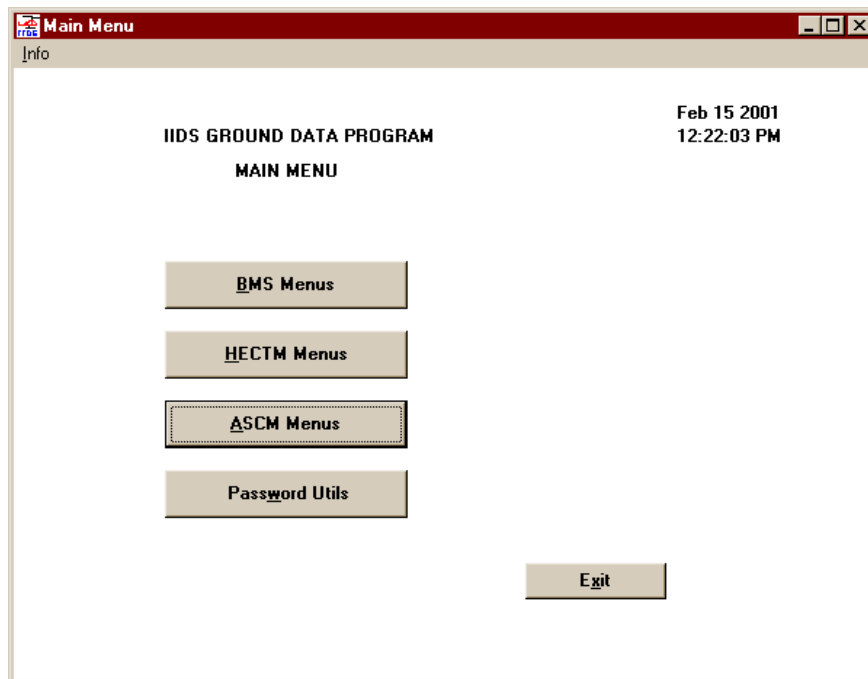


Figure 53. GBMC Main Menu

2. In the Select Aircraft Screen, use TAB key (or mouse) to select the Aircraft Number field (refer to [Figure 54](#)).
 - a. Type in an aircraft number or;
 - b. Select one by using the (↑ ↓) arrow keys (or use mouse to select from the drop down list).

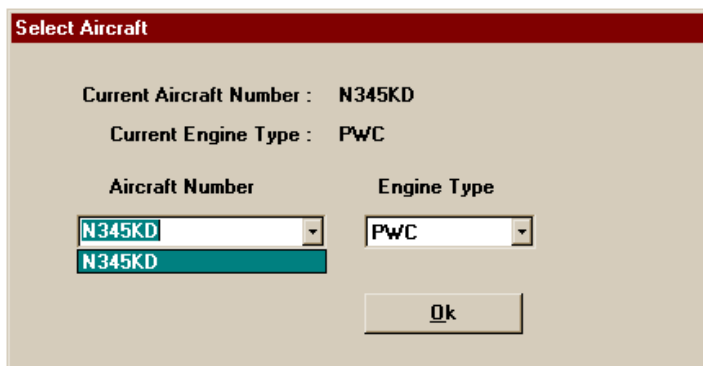


Figure 54. Select Aircraft Screen

3. Press OK. The HECTM™ Menu screen will appear (refer to [Figure 55](#)).

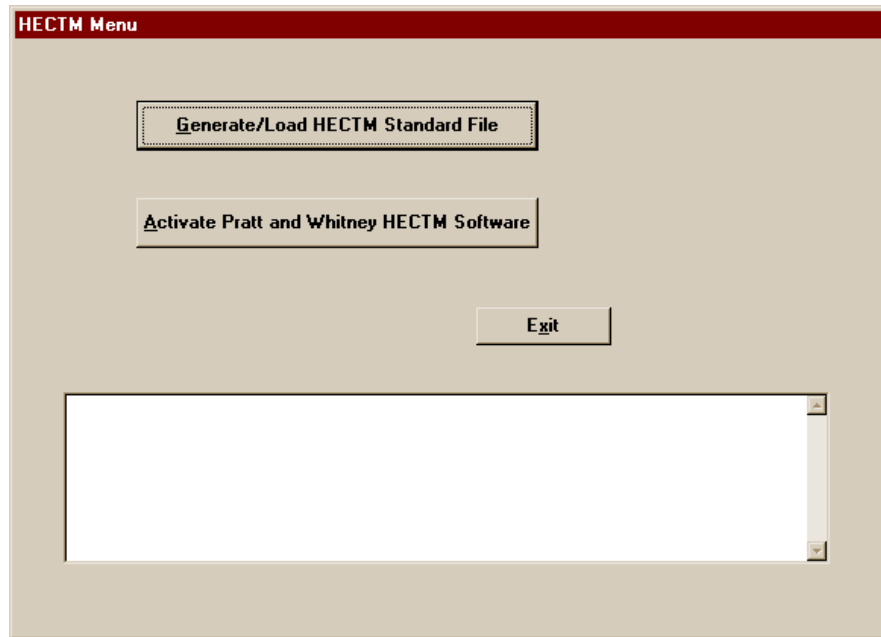


Figure 55. Generate/load HECTM Standard File Screen

4. Select the Generate/Load HECTM Standard File button.
5. The GBMC program will automatically select the aircraft Trend Log directory based on the aircraft you selected. Select the trend log file you wish to use (typically "<log file>.dn") and press OK (refer to [Figure 56](#)).

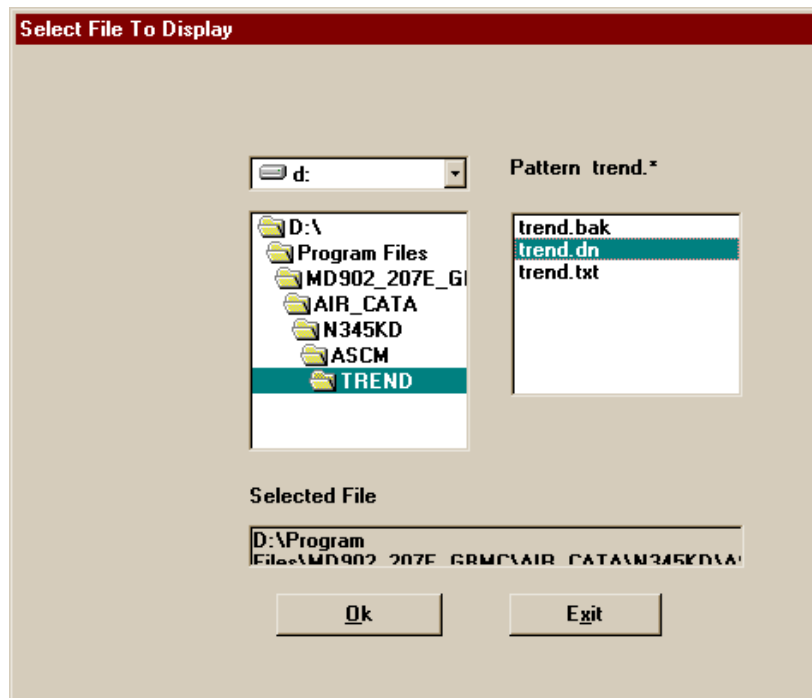


Figure 56. Select Trend Log Screen

6. The GBMC program will generate a standard file format compatible with the Pratt & Whitney HECTM™ application. A dialog box will be displayed indicating the standard file has been created (refer to [Figure 57](#)).

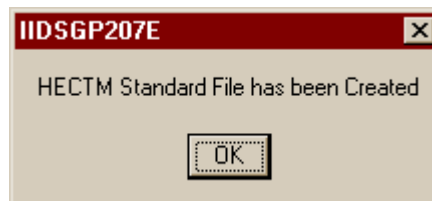


Figure 57. HECTM Standard File Created Dialog

7. Press OK. The HECTM™ Menu screen will reappear (refer to [Figure 58](#)).
8. Select Activate Pratt and Whitney HECTM Software button. The HECTM™ application will be launched. Refer to the HECTM™ user manual for further instructions.

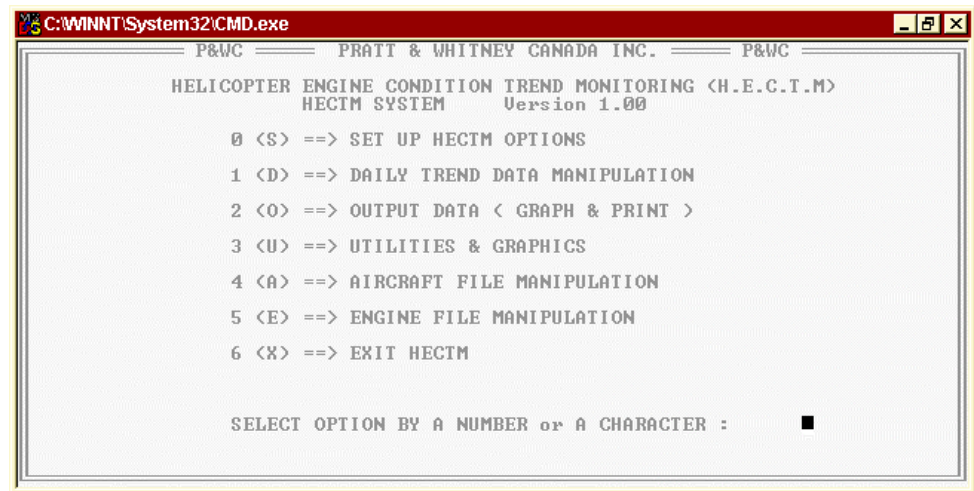


Figure 58. HECTM Application Main Menu Screen

Balance Monitor System (BMS) Menu

The Chadwick-Helmuth BMS Transfer program is a DOS based program. Selecting this option will change the display mode of your computer to “character mode”. This program is used to Download Logs from BMS, Clear BMS Logs, Run VibraLog for Windows, and Upload to BMS.

1. To start the BMS Program, select BMS Menu from the GBMC main menu screen.
2. Select the helicopter to use for this BMS session (refer to [Figure 59](#)).

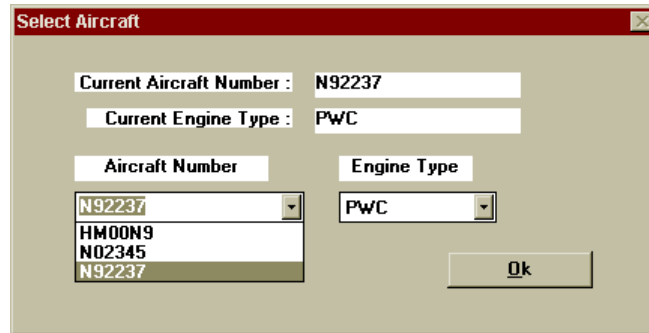


Figure 59. Select Aircraft Screen

3. The following dialog box will appear. Select OK to launch the BMS program (refer to [Figure 60](#)).

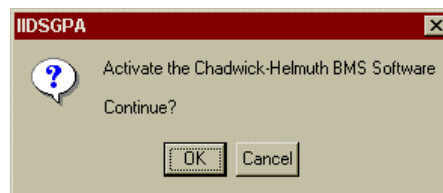


Figure 60. Activate BMS Software Dialog

The screen will now switch to character mode for the BMS program and the BMS menu will appear (refer to [Figure 61](#)).

Downloading BMS Logs

This menu option allows you to download BMS logs. These logs are the BMS Fault Log, Spectrum Log, Main Rotor Balance Log, NOTAR Balance Log, and the Advisory Log. Refer to the Introduction paragraphs for a description of these logs.

This procedure is for downloading individual logs or all logs from the BMS system.

1. Connect the GBMC to the IIDS (Ref. [Connecting the GBMC Computer To The IIDS](#)).
2. Select DownLoad Log from BMS option bar using the (↑ ↓) arrow keys and press the ENTER key or, press the number “1” and press ENTER (refer to [Figure 61](#)).
3. Select log to download using the (↑ ↓) arrow keys, or press the menu option number(1, 2, 3, etc.), and press the ENTER key.

TIP: .. This screen is shown, as it appears when the user is logged on as System Administrator. Menu item "4. Upload to BMS", is only available at the System Administrator level. If you are logged on as a Full User or Limited User, this menu item will not appear.

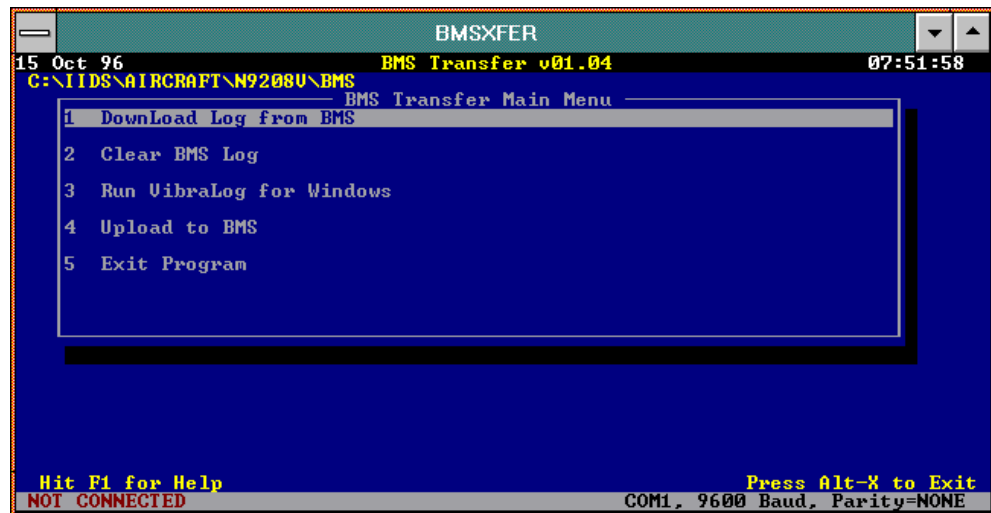


Figure 61. BMS Application Main Menu Screen

4. A status screen will appear indicating the download progress of each log being transferred. Verify that "OK" appear after each log file name when "Download Complete" flashes at the bottom of the screen (refer [to Figure 62](#)).
5. Press the Escape key (Esc) twice to return to the main BMS menu.
6. Disconnect the GBMC from the IIDS.

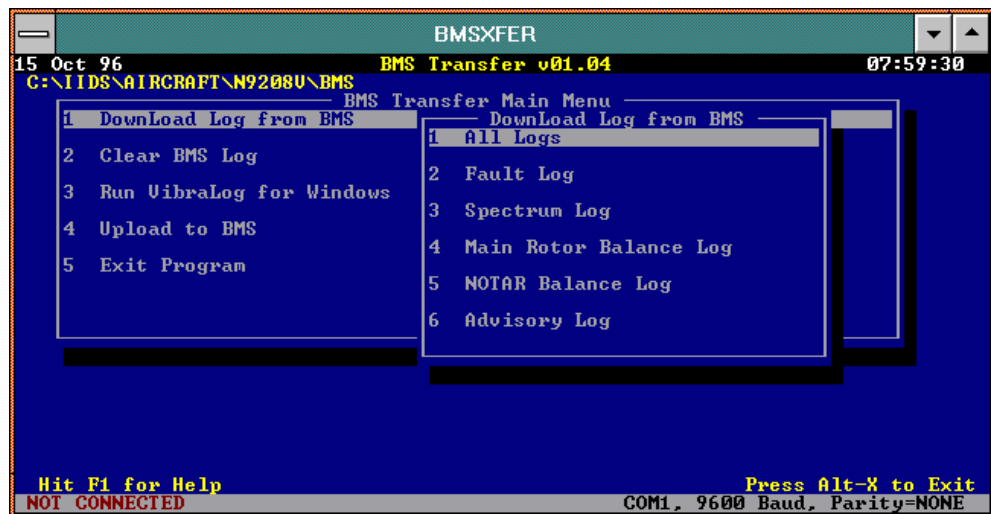


Figure 62. BMS Download Logs Menu Screen

Clearing BMS Logs

This procedure is for clearing individual logs or all logs from the BMS system (memory in IIDS).

1. Connect the GBMC to the IIDS (Ref. [Connecting the GBMC Computer To The IIDS](#)).

2. Select Clear BMS Log option bar using the (↑ ↓) arrow keys and press the ENTER key or pressing the number “2” and press ENTER (refer to [Figure 61](#)).
3. Select log to clear using the (↑ ↓) arrow keys, or press the menu option number (1, 2, 3, etc.), and press the ENTER key (refer to [Figure 63](#)).
4. A dialog box will indicate the log clearing status. When complete, the message “DATA XFER CMPL” is displayed on the IIDS alpha-numeric display, the logs have been cleared.
5. Pressing the CLR button on the IIDS will Clear the message from the alpha-numeric display.
6. Disconnect the GBMC from the IIDS.

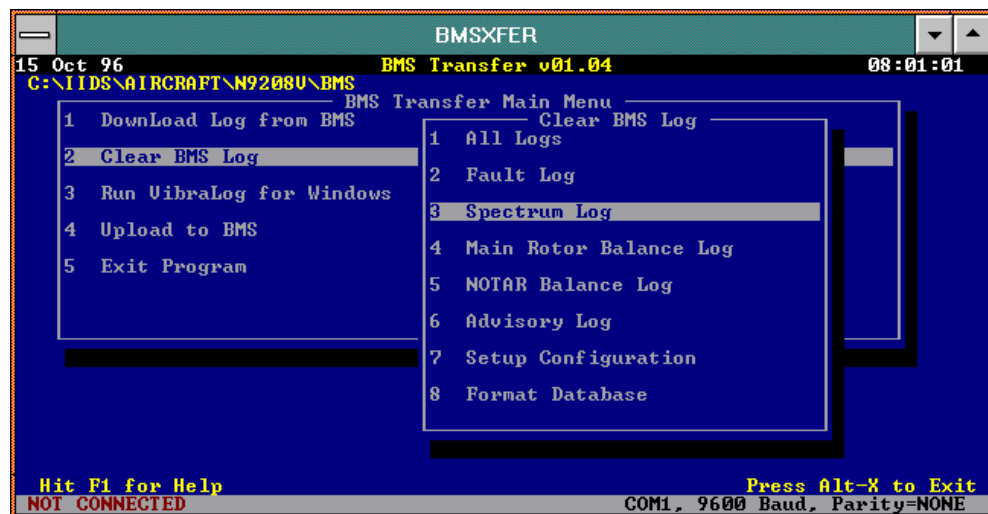


Figure 63. BMS Clear Logs Menu Screen

Uploading BMS Model or Setup Configuration

This menu option is used to upload the balance model used to perform Main Rotor and NOTAR Fan balance calculation or the BMS Setup configuration file. This option is restricted to MD Helicopters Inc. authorized personnel only and requires a special *System Administrator* password to complete the operation. Contact your MD Helicopters Inc. Field Service Representative for assistance in performing this function.

This procedure applies to uploading either a BMS balance model or new/changed BMS configuration data.

TIP: .. The operator must be logged in as System Administrator to have access to this function.

1. Connect the GBMC to the IIDS (Ref. [Connecting the GBMC Computer To The IIDS](#)).
2. Select Upload to BMS option bar using the (↑ ↓) arrow keys and press the ENTER key or pressing the number “4” and press ENTER. (refer to [Figure 61](#))
3. Select BMS Balance Model or Setup Configuration to upload using the (↑ ↓) arrow keys, or press the menu option number (1, 2, 3, etc.), and press the ENTER key (refer to [Figure 64](#)).

4. If you are uploading a Setup Configuration file, the following screen will appear and prompt you to enter the name of the file to upload. This defaults to "BMSSETUP.CFG". Press ENTER to confirm(refer to [Figure 65](#)).
5. A dialog box will display a message "Overwrite Existing File?". Press ENTER to confirm.

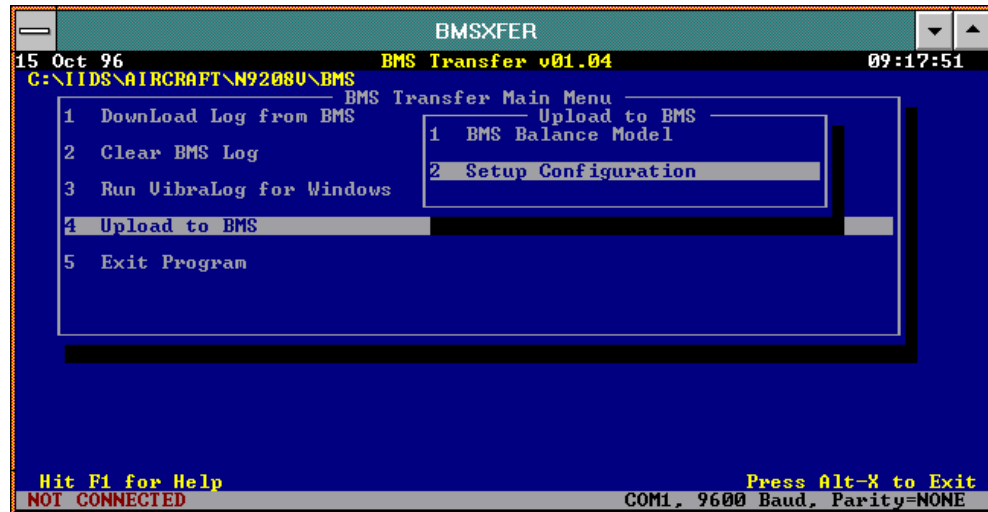


Figure 64. BMS Upload Screen

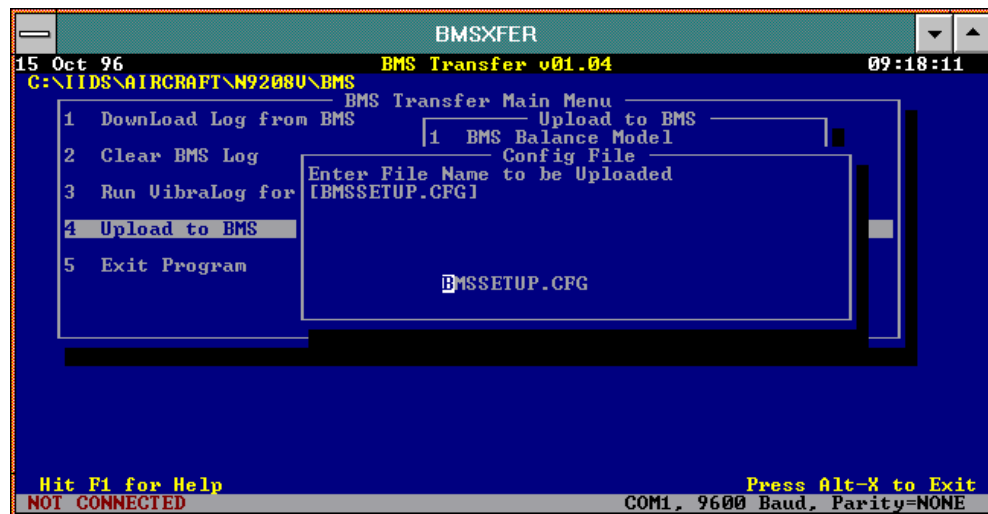


Figure 65. Select Upload File Screen

6. The BMS Upload Status screen will appear and ask you to enter your ID. Enter your ID and press ENTER (refer to [Figure 66](#)).
7. You will then be prompted to enter you password. Enter your password and press ENTER (refer to [Figure 67](#)).

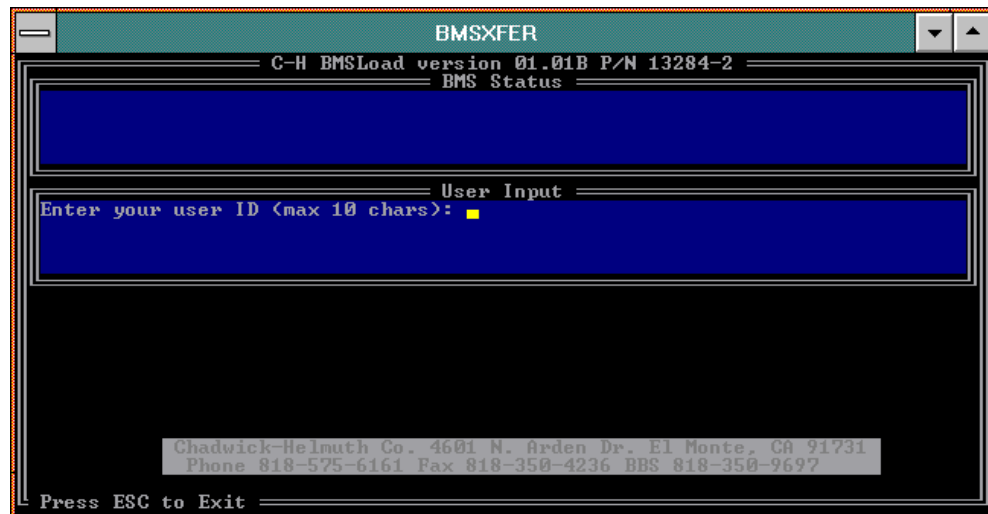


Figure 66. Upload Status Screen (User I.D.)

The BMS Status portion of the screen will display the upload progress.

8. At the “Upload Done OK” prompt, press ENTER then ESC. A Warning message will appear stating “Upload Aborted OK”. This is normal. Press ESC to return to the main menu.

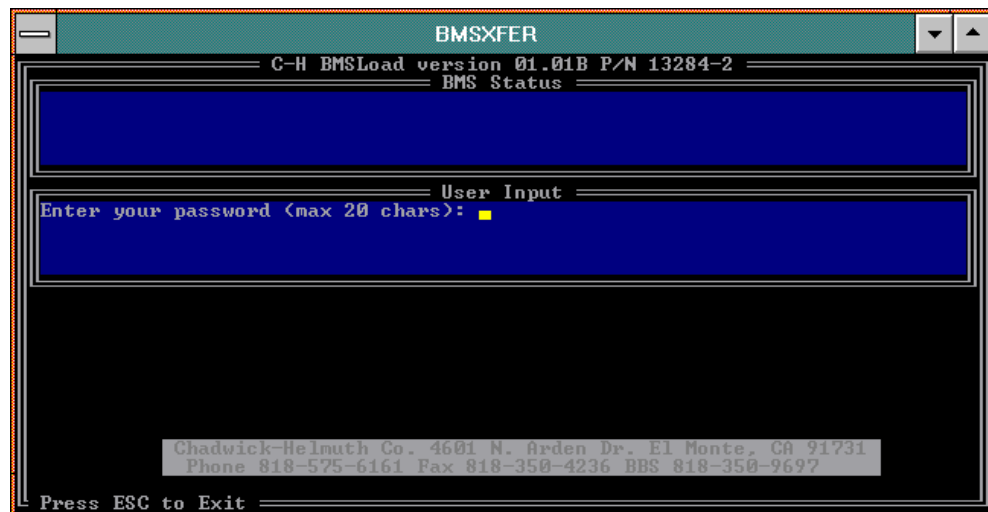


Figure 67. Upload Status Screen (User Password)

9. Verify that the message “DATA XFER CMPL” is displayed on the IIDS alpha-numeric display.

Pressing the CLR button on the IIDS will Clear the message from the alpha-numeric display.

10. Disconnect the GBMC from the IIDS.

Appendix A

IIDS Replacement Checklist

The following checklist is provided to assist in the process of replacing one IIDS unit with another. Instructions for removal and installation of the IIDS can be found in the Rotorcraft Maintenance Manual (RMM) CSP-900RMM-2, Section 95-30-00.

The steps in this checklist are performed prior to removal of the IIDS and after installation of the new/repaired IIDS.

All procedures in this checklist are contained in this guide unless a specific reference is provided. Please refer to the appropriate sections of this User's Guide for detailed instructions.

Before IIDS Removal

IF IIDS to Be Removed Is "NOT" Operational

Collect the following "airframe" related information from the rotorcraft logbook:

1.	Aft and Forward Fuel Sensor Calibration Codes	
2.	**Hook Weight Calibration Code (if installed)	
3.	IIDS Part Number	
4.	IIDS Serial Number	
5.	IIDS Software Part Number	

****CAUTION:** If provisions for the Cargo Hook are installed and the Hook is not installed, the default Hook Weight Calibration Code is "6667". Shorting plugs must be installed when the hook is not present to prevent the Sensor Fault 15 error from being recorded by the IIDS

6. Record Main Rotor Balance data. If this information is not available in the logbook, you will have to examine each main rotor blade to determine the tab position and the balance weights installed so this data may be entered into the new IIDS.

Blade Number	Hub Weight(g.)	Trim Tab(mil)	Pitch Case Weight(g.)
Blade 1**			
Blade 2			
Blade 3			
Blade 4			
Blade 5			

****NOTE** When the interrupter on the rotating swashplate is positioned over the azimuth sensor, the forward blade is number 1.



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7. Record NOTAR[®] Balance data. If this information is not available in the logbook, you will have to examine each fan blade balance stud to determine the balance weights installed so this data may be entered into the new IDS.

Stud #	1	2	3	4	5	6	7	8	9	10	11	12	13
Weight(g.)													





NOTE: The number 1 stud is the first stud to pass the magnetic pickup after the interrupter. Each fan balance stud has one washer under the nut that is not counted as a balance weight.

Collect the following “engine” related information from the rotorcraft logbook:

1. Setup Data Log Left and Right Engines:




Engines		Left	Right
	SCQBI # (T/M Trim Datum)		
	SCQGI# (T/M Trim Slope)		
	SCMGTT# (MGT Trim Bias)		

2. Cumulative Log Data for Airframe:

	Aircraft Serial Number	
	Number of Flights	
	Total Flight Time	
	Last Flight Time	

3. Cumulative Log Data for Left and Right Engines:

Engines		Left	Right
	Engine Serial Number		
	Gerbox Module Serial Number		
	Accumulated SSO (Starts Since Overhaul)		
	Accumulated FSO (Flights Since Overhaul)		
	Accumulated TSO (Time Since Overhaul)		
	Accumulated TSN (Time Since New)		
	Power Module Serial Number		
	Accumulated SSO (Starts Since Overhaul)		
	Accumulated FSO (Flights Since Overhaul)		
	Accumulated TSO (Time Since Overhaul)		
	Accumulated TSN (Time Since New)		
	2.5 Minute OEI (One Engine Inoperative) Excursions		
	Total Time 2.5 Minute OEI		
	Impeller Serial Number		
	Impeller Total Cycles Accumulated		
	Impeller Total Hours Accumulated		
	Compressor Turbine Disk Serial Number		
	Compressor Turbine Disk Total Cycles Accumulated		
	Compressor Turbine Disk Total Hours Accumulated		

Continued		Engines	Left	Right
	Power Turbine Disk Serial Number			
	Power Turbine Disk Total Cycles Accumulated			
	Power Turbine Disk Total Hours Accumulated			

IF IIDS To Be Removed Is Operational

1. Connect the GBMC to the IIDS

CAUTION: Make sure the aircraft battery is fully charged and/or the aircraft is connected to an external power source that will provide the required 28 VDC. Also check the GBMC (laptop computer) battery is fully charged or the GBMC is connected to an external power source. Low battery voltage to either the IIDS or the GBMC can prevent a successful communications link between the IIDS and the GBMC from being established.

2. Run the GBMC program.
3. After logon is complete (GBMC Main Menu screen is visible), apply power to the IIDS.
4. Perform the “Downloading All Files From The IIDS” procedure in this manual for both the ACSM and BMS menus.

NOTE The downloaded files will be edited and used to initialize the newly installed IIDS.

5. Record the Main Rotor and Notar® balance data in the tables provided in steps 6 and 7. Refer to CSP-900RMM-3 Rotorcraft Maintenance Manual, ATA Section 95-30-00, Main Rotor Configuration Menu and NOTAR® Balance Weight Configuration Menu for detailed procedures.

Before IIDS Installation

Create or Edit the Setup and Cumulative logs to be loaded into the replacement IIDS using the GBMC application and the procedures in this guide.

NOTE: If the IIDS being replaced was not operational but a previous set of logs exists for this IIDS, it is easier to edit the existing logs than to create a new log.

After Replacement IIDS Has Been Installed

1. Connect the GBMC to the IIDS

CAUTION: Make sure the aircraft battery is fully charged and/or the aircraft is connected to an external power source that will provide the required 28 VDC. Also check the GBMC (laptop computer) battery is fully charged or the GBMC is connected to an external power source. Low battery voltage to either the IIDS or the GBMC can prevent a successful communications link between the IIDS and the GBMC from being established.

2. Run the GBMC program.



3. After logon is complete (GBMC Main Menu screen is visible), apply power to the IIDS.
4. Press and hold the “CLR” key on the IIDS Key panel until the alpha-numeric display clears then exit all menu operations.
5. Perform the “Download Files From The IIDS” procedure in this guide selecting the All Logs button.

CAUTION: The “Do Not Erase Logs in IIDS” check box should not be selected (checked). This option is only available under a system administrator login.

NOTE: You must perform the download procedures for the Setup Log or Cumulative Log before you can perform an upload. Each time a download is performed, a file is generated for the downloaded log with the “<log name>.dn” extension. If a file already exists with this name, a backup file with the “<log name>.bak” file name extension is generated for the existing “<log file>.dn”. *If a “<log name>.bak” file already exists, it will be overwritten!* To prevent the inadvertent loss of a downloaded log file, you should archive the files after each download.

When the “Communications Successful” message box is displayed on the GBMC screen and the “DATA XFER COMP” is displayed on the IIDS alpha-numeric display, transfer is complete.

6. Press the “CLR” key on the IIDS Key panel to clear the alpha-numeric display.
7. Perform the “Upload Files To The IIDS” procedure in this guide. Upload the Cumulative Log. When the “Communications Successful” message box is displayed on the GBMC screen and the “DATA XFER COMP” is displayed on the IIDS alpha-numeric display, transfer is complete.
8. Press the “CLR” key on the IIDS Key panel to clear the alpha-numeric display.
9. Perform the “Upload Files To The IIDS” procedure in this guide. Upload the Setup Log. When the “Communications Successful” message box is displayed on the GBMC screen and the “DATA XFER COMP” is displayed on the IIDS alpha-numeric display, transfer is complete.
10. Perform the “Download Files From The IIDS” procedure in this guide selecting the All Logs button.

CAUTION: The “Do Not Erase Logs in IIDS” check box should not be selected (checked). This option is only available under a system administrator login.

11. Remove power to the IIDS for at least 30 seconds.
12. Apply power to the IIDS.
13. Press the “CLR” key on the IIDS Key panel to clear the alpha-numeric display.

CAUTION: Cumulative logs must be uploaded twice. The Cumulative log uploaded the second time is the same “cum.up” file loaded the first time.

14. The Cumulative log must be downloaded and uploaded one more time to complete the initialization process. Perform steps 1 through 8, and 11 through 13 to upload the “cum.up” file.
15. Enter the Main Rotor and NOTAR® balance information into the IIDS (Refer to CSP-900RMM-3 Rotorcraft Maintenance Manual, ATA Section 95-30-00, Main Rotor

Configuration Menu and NOTAR[®] Balance Weight Configuration Menu for detailed procedures in entering the data recorded above).

