Mini Flight Recorder™
J1850 Version
User's Manual

Detroit Engineering Center

Version 2.0
August 9, 2000

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Detroit Engineering Center
2870 Technology Drive
Rochester Hills, MI 48309

Dear Valued Customer:

Thank you for purchasing DEC's latest J1850 version of the Mini Flight Recorder™ (MFR). We think that you will find this small, but very capable tool, useful for both development and analysis of J1850 modules and vehicle systems.

Please take a moment to verify that your kit includes the following items:

- Palm™ IIIx or IIIxe Personal Digital Assistant (PDA)
- J1850 InterFace (JIF) Module
- J1962 Cable with DB-15 Connector
- RJ-45 Interface Cable
- UniMount Hardware with mating RJ-45 Connector
- Backup copy of the MFR software on either diskettes or a CD-ROM
- User's Manual
- Carrying Case with shoulder strap

IMPORTANT NOTICE: Do Not Use While Driving. If you are going to log data while driving alone in the vehicle, setup the PDA in advance. If interactive dialog is required while driving, always have a second person in the vehicle to operate the MFR system. Please see additional precautions in Appendix B.

The application will initially run in demo mode if it has not been registered or if the password keyed to the PDA's serial number has not been entered. Entering the password will put the PDA into regular mode and disable demo mode. Performing a hard reset of the PDA and reinstalling the J1850 Tool is the only way that demo mode can be re-enabled.

Note: Performing a hard reset will erase all applications and data on the PDA.

Software updates for the MFR will be provided via email for a period of three months at no charge. We recommend that MFR users send an email to support@ceddec.com to register for notification of software updates as they become available.

The hardware is warranted by Detroit Engineering Center for a period of one year. In the case of a warranty issue, all hardware should be returned to Detroit Engineering Center for repair or replacement.

Your comments and suggestions are welcome and can be sent to the above email address. If you need direct assistance, please call (248) 293-1300.

To quickly try out the MFR, see the Quick Start Instructions in Chapter 2. Thanks again for your interest in our products.

Sincerely,

The DEC J1850 Mini Flight Recorder Team

MFR Registration Information

Palm ID Number: __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

Password: __ __ __ __

Table of Contents

1. MINI FLIGHT RECORDER SYSTEM OVERVIEW

1.1 System Components

The J1850 version of the Mini Flight Recorder™ (MFR) is a tool to view, send, and log J1850 bus messages. The kit consists of the items shown in Figure 1.1. These include the Palm™ IIIx or IIIxe Personal Digital Assistant (PDA), the J1850 InterFace (JIF) module, a J1962 to DB-15 cable, a RJ-45 cable and connector, a UniMount™ PDA holder, and a soft carrying case.

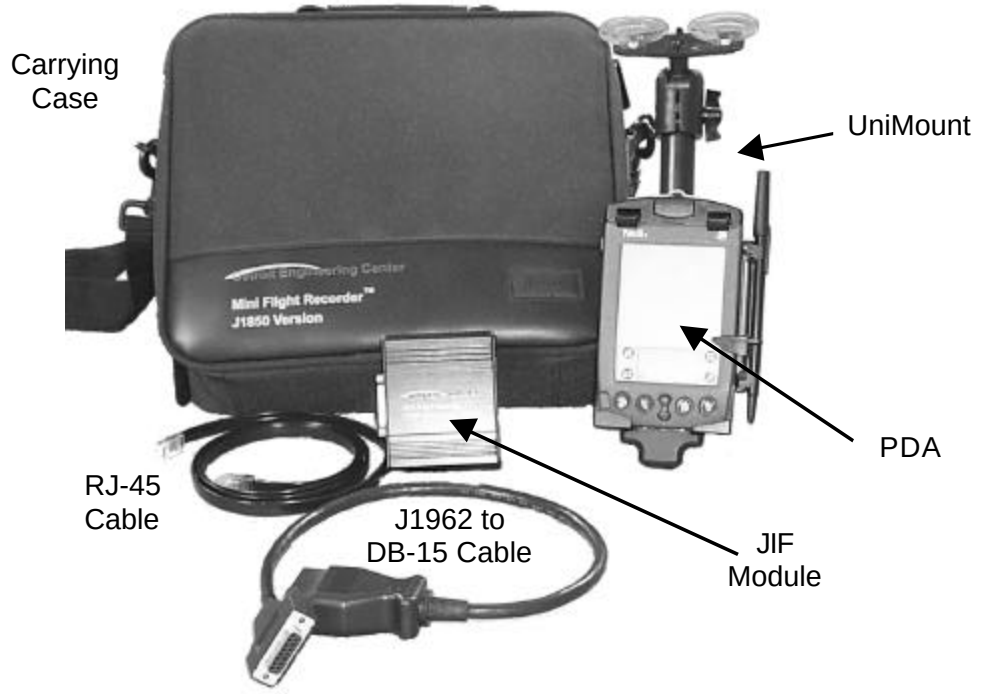


Figure 1.1 Mini Flight Recorder System Components

The PDA has been preloaded with custom software to monitor and control the J1850 data bus to which it is connected via the JIF module. Loading new programs and software updates is discussed in Chapters 5 and 7. We recommend that the user become familiar with the standard features of the PDA by reviewing the information supplied with the PDA.

Data entry, viewing, and storage are accomplished by using the PDA as the interface and data storage medium. Commands are executed by tapping icons on the PDA's touch screen. Data entry fields may be filled by tapping the PDA's graphical keyboard or by writing with a stylus on the touch screen. The built-in "Graffiti" handwriting analysis function recognizes and converts the user's handwriting to text or commands. The memory in the PDA provides approximately two hours of recording time. Logs can be viewed on the PDA with an included document viewer called AportisDoc.

The PDA may be unplugged from the MFR, and the recorded J1850 bus data may be downloaded to any PC through the cradle interface supplied with the PDA and the easy-to-use HotSync software.

The function of each component of the MFR system is described below.

1.2 J1962 to DB-15 Cable

The J1962 cable supplies ground, vehicle battery (+12 volts), and a connection to the vehicle J1850 bus. The ground (chassis) is on pin 4 and the unswitched vehicle positive battery is on pin 16 of the J1962 connector. The J1850 bus signal is connected to pin 2 of the J1962 connector. These pins correspond to pins 4, 15, and 2 of the DB-15 connector. The other pins of the DB-15 are open connections.

1.3 J1850 Interface Box

The JIF box contains J1850 bus interface hardware, a MCU (microcontroller unit), buffer memory, serial communications to the PDA, and LED (light emitting diode) status lights.

Indicator LEDs are located on each end of the JIF box. The LED adjacent to the DB-15 connector indicates the presence of J1850 bus activity. The LED will flash with bus data activity. In the absence of bus activity for a period of ten seconds, the LED will emit a brief flash every two seconds to indicate that the JIF is receiving power from the bus connector and is in a low-power consumption mode. The LED adjacent to the RJ-45 connector indicates the presence of RS-232 serial data traffic between the JIF and the PDA.

When the JIF is powered up, the program memory and data buffer memory is tested. If either fails, both LEDs will flash at a 1Hz, 50% duty cycle indefinitely.

The JIF MCU monitors bus activity and places a relative time stamp on each message as it is received. The relative time stamp indicates the time, in milliseconds, from the end of the last message received from the J1850 bus to the end of the current message.

The JIF applies the filtering specified in the J1850 MFR software's *ID Filter Screen* to the bus traffic and writes all non-filtered messages to JIF memory. Stored messages are continuously sent from the JIF memory to the PDA. Every 200ms, the JIF suspends transmission of its messages and allows the PDA to send any messages it has buffered over that interval. Messages sent between the JIF and PDA include a record number that is used to ensure that no messages are lost. This is invisible to the user.

In the event of a loss of communications between the JIF and PDA, a message will be placed in the log file to inform the user. See page 61 for a description of the messages.

The buffer memory in the JIF has the capacity to store about 60 seconds of bus traffic at 100% bus utilization. Thus, if the PDA is disconnected from the JIF for 60 seconds or less and then reconnected, no messages should be lost. For this feature to work, the user must not switch out of the J1850 Tool program in the PDA. Switching to another PDA application and then restarting the J1850 Tool will close the current log, and data collected by the JIF during the disconnected period will be lost.

1.4 RJ-45/Unimount Cable

The RJ-45 cable, also referred to as the JIF UniMount Cable, is used to connect the serial port of the JIF to the serial port of the PDA. The cable supplied in the kit is a 4-foot cable with a RJ-45 jack on each end in what is called a “reverse” wired mode. Thus, pin 1 on each RJ-45 jack is connected together. The protocol is RS-232 at 38.4 Kbaud.

The user may replace the supplied 4-foot cable with a cable up to 15-feet long for additional mobility.

1.5 UniMount

The UniMount, with its supplied window mounting hardware, provides a convenient in-vehicle mount for the PDA along with serial and power connection. The base unit may be detached from the window mount for hand-usage in or outside the vehicle.

1.6 Personal Digital Assistant (PDA)

The function of the PDA is to set up the conditions for data logging and transferring collected data to a desktop or laptop PC. The PDA sends and receives information over the 38.4 Kbaud serial link. The PDA’s internal time and date function places time stamps on data logs when a new log is initially opened. Data logs may also be viewed directly on the PDA with a document reader called AportisDoc. An overview of AportisDoc is covered in a later chapter.

Note: The amount of total PDA memory will vary depending on the model of the PDA supplied with the MFR kit. The Palm IIIx has 4M of memory, while the Palm IIIxe has 8M.

1.7 Mini Flight Recorder System Software

The J1850 Tool software has been preloaded into the Mini Flight Recorder's PDA. Below is a list of the various main screens, the graffiti hotkeys used to reach them, and the screens' functions.

- **Bus Monitor** **[M]** Provides a real time view of J1850 bus traffic
- **ID Monitor** **[I]** Monitors user-selected message IDs
- **ID Monitor w/ Time** **[J]** Monitors message IDs and displays the time between the monitored messages
- **Send Message Config** **[S]** Allows definition and transmission of single or repetitive messages
- **IFR Message Config** **[R]** Provides an IFR for a user-selected message ID
- **ID Filter** **[V]** Sets filtering of specific message IDs for the Bus Monitor and logging
- **ID Overview** **[N]** Provides a quick overview of all active message IDs
- **Configuration** **[O]** Allows session profiles to be saved and reloaded
- **Log Setup** **[Z]** Sets up logging configuration and turns triggering on or off
- **Logging On/Off** **[L]** Toggles logging on or off

Detailed instructions for using each of the above features are provided in the following sections of this manual.

1.8 J1850 Tool Install Diskettes/CD-ROM

Included with the MFR system is either a set of diskettes or a CD-ROM that installs a special conduit for transferring log files from the PDA to the PC. The install program adds a macro file that, when installed, brings up a custom J1850 Tool toolbar in Excel for opening imported data logs.

The install program also places the following items on the Start Menu:

ADOC Reference.pdb	Doc Reader Manual for PDA
AportisDoc.prc	Doc Reader for PDA
J1850Tool.prc	MFR Software Application for PDA
J1850 Tool Users Manual.pdf	Electronic Version of this Manual
Readme.txt	Installation Instructions

The PRC files are backup copies of AportisDoc and J1850 Tool in case the PDA loses these programs and they need to be reinstalled. ADOC Reference is the AportisDoc user's manual that can be installed onto the PDA.

See Section 5.1 for installation details.

Important Notice: The Palm desktop software supplied with the PDA must be installed onto the PC before beginning installation of the J1850 Tools software.

2. QUICK START INSTRUCTIONS

This section describes a quick and easy process for the user to check out the overall operation of the MFR system.

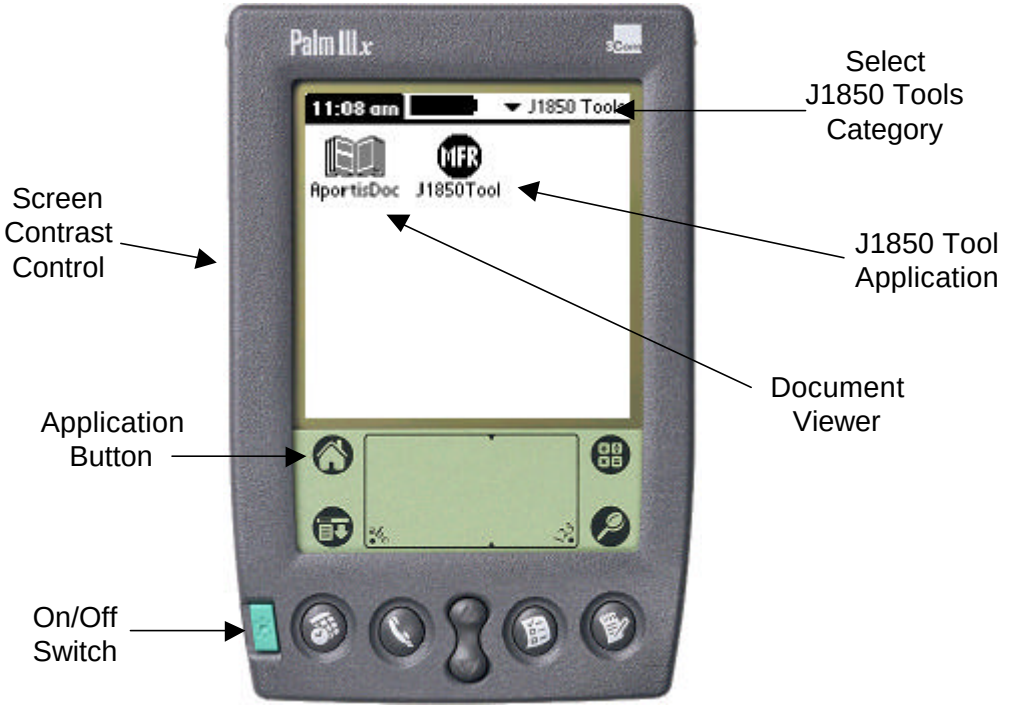


Figure 2.01 J1850 Tools Applications Screen

The major steps are setting up the PDA configuration, interconnecting the hardware, logging J1850 traffic, viewing the data logged on the PDA, and transferring the log data to a PC for further viewing and analysis. To keep this quick start example simplified, the PDA will be setup to name and create a log file and record all bus traffic.

2.1 Setting Up the PDA for a Logging Application

Start by turning on the PDA in a standalone mode (i.e. without the JIF connected), and tap the “Application” button on the top left side of the Graffiti area (see Figure 2.01).

Before starting the J1850 Tool application, always verify that the Modem HotSync function is directed to start the J1850 Tool application as shown in the five-step screen sequence of Figure 2.02. At Step 5, tap the black down arrow and select the J1850 Tool from the pick list.

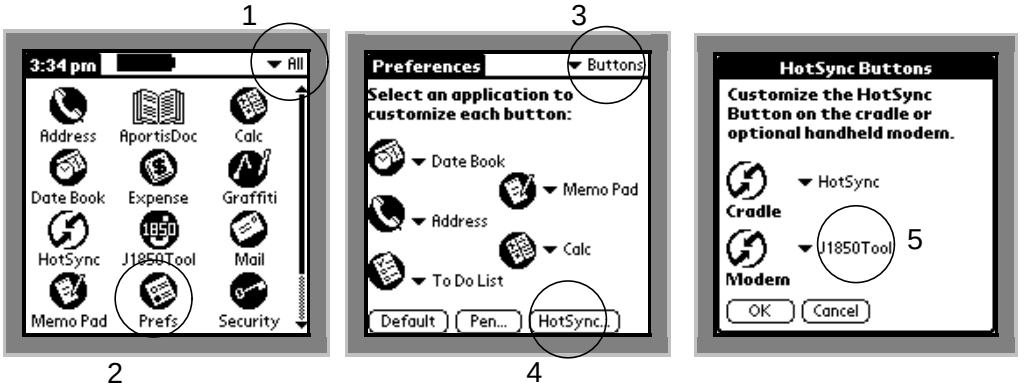


Figure 2.02 Set Modem HotSync to J1850 Tool

A hard reset of the PDA will reset the Modem HotSync back to the HotSync application, thus it is important to check this setting. Tap “OK” when done. Tap the house-shaped “Application” icon in the lower left quadrant of the PDA to exit *Preferences*.

Next, tap the down-arrow in the upper right hand corner of the display, and select the *J1850 Tools* category to view the preloaded *J1850 Applications* screen containing AportisDoc and J1850 Tool as shown back in Figure 2.01.

Figure 2.03 Bus Monitor Screen

Tap the “J1850 Tool” icon to start the application. If the registration key has not been entered, the program will run in demo mode only. In demo mode, the program will open up to the Bus Monitor screen displaying simulated bus traffic as shown in Figure 2.03.

To enter the registration key, tap the “Home” icon in the upper right corner of the display. This opens the Main Menu screen as shown in Figure 2.04.

Figure 2.04 Main Menu Screen

Tap the “i” icon in the upper right corner of the *Main Menu* screen. This will open the *About* screen as shown in Figure 2.05.

Figure 2.05 About Screen

Tap the “Register” button to get to the *Registration* screen.

Figure 2.06 Registration Screen

Enter the registration key provided by DEC upon purchase of the MFR system or the J1850 Tool software upgrade. Hit "OK." When the registration key is accepted, a "Thank you" message will appear. Click "OK" to go to back to the *Main Menu* screen as shown in Figure 2.07.

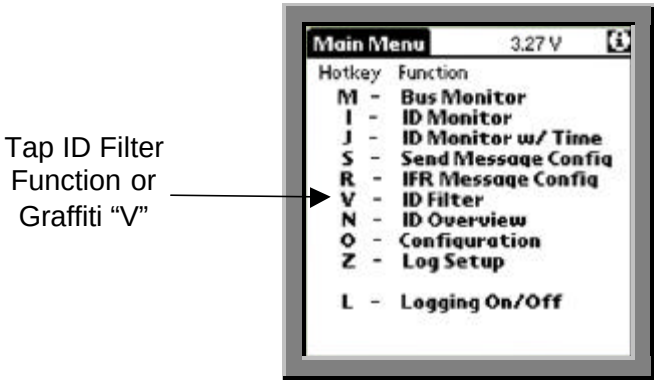


Figure 2.07 Main Menu Screen

The *Main Menu* screen is used to select the function desired for setting up the MFR system for logging and control. To select a function, tap anywhere along a line, or enter the Graffiti letter listed to the left of each function. The slide selector included on the right side of the UniMount can also be used to select a function.

For the quick start example, the first step is to go to the *ID Filter* screen in order to setup all message IDs to be displayed and logged. Tap the message *ID Filter* line or enter a Graffiti letter "V" to go to the ID Filter screen as shown in Figure 2.08.

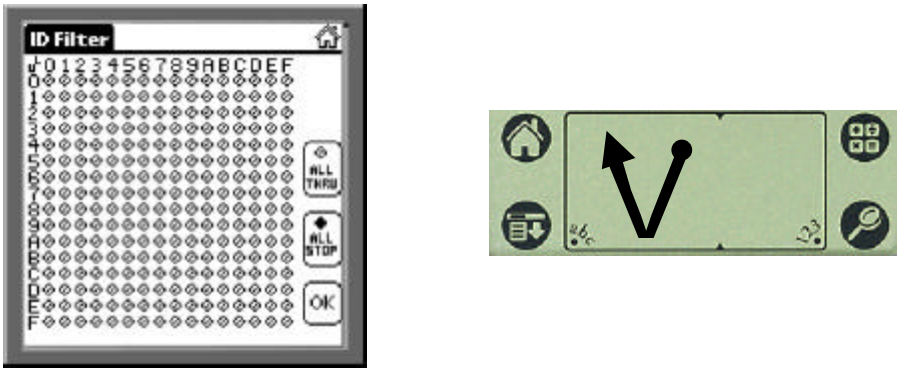


Figure 2.08 ID Filter Screen and Graffiti "V"

On the ID Filter screen, ID messages can be set up to either pass thru or stop. Individual message IDs can be tapped to allow them to pass (pass = light shade) or not pass (stop = dark shade) to the log. For the quick start example, tap the "All Thru" button to ensure that all J1850 bus IDs are monitored and logged.

The next step is to set up the type of logging desired. Tap the "Home" icon in the upper right corner to return to the *Main Menu* screen. Select *Log Setup* to go to the *Log Setup* screen shown in Figure 2.09.

Figure 2.09 Log Setup Screen

Enter a log base Name such as “Test,” and select “Push Down Old” and “Stop on Full.”

Note: All log names will have a prefix of “MFR_” added to them by the system. Having “Push Down Old” selected, adds a one-letter postfix to the log name, with the latest log having a postfix of “A.” Thus given this configuration, the latest log will be named MFR_TestA.

Disable all other options as shown in Figure 2.09. Set Max Logs to 10, Blocks/Log to 10, and Trigger% to 50. The maximum possible number of logs is 25. The number of Max Logs multiplied by the number of Blocks/Log must not exceed the Blocks Free value. Dialog boxes will indicate which responses are out of the acceptable range. The number of Blocks Free for a 4M PDA will typically range from 800 to 900. For an 8M PDA, the Blocks Free will range from about 1600 to 1800. Tap “OK” to exit and return to the main menu screen.

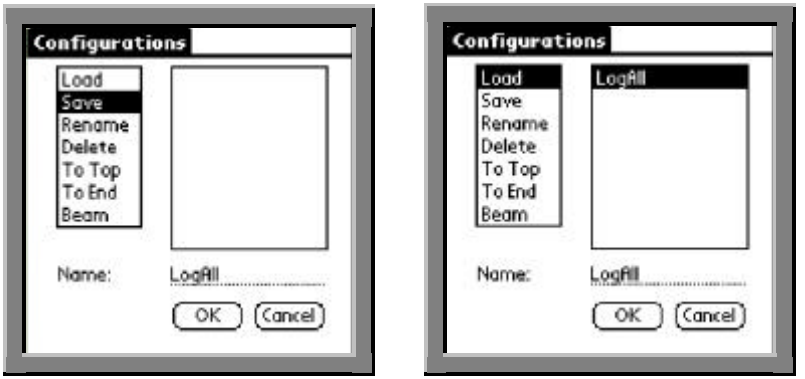


Figure 2.10 Log Setup Screens

Select “Configuration” from the main menu, or enter the Graffiti letter “O.” Enter a new Name such as “LogAll.” Select Save, as shown in the left image of Figure 2.10. Exit and return to the main menu by tapping “OK.” The next time the Configurations screen is entered, the LogAll file name will appear in a scrollable list as shown in the right image of Figure 2.10.

2.2 Connecting the MFR System into a Vehicle

With the PDA now set up, the next step is to connect the MFR system to a source of J1850 bus traffic. First, connect the DB-15 connector to the JIF and secure the locking screws thumb-tight. Connect the RJ-45 cable to the JIF and UniMount. Next, connect the J1962 cable to a source of J1850 bus traffic, such as the vehicle diagnostic connector or the vehicle bus simulator. The LED on the J1850 bus end should illuminate as described in the previous section. When mounting in a vehicle where the J1962 connector points directly down at the floor, a tie wrap can be used to redirect the cable 180 degrees to minimize interference with the operation of the vehicle foot pedals.

Next, place the PDA into the UniMount by inserting the PDA connector end into the matching connector on the UniMount and snapping the top of the PDA securely under the latching mechanism. Verify that the unit is getting power and that *Disconnect* does not appear in the lower left corner of the PDA display. If there is message traffic on the bus, the data will be displayed as scrolling message bytes in the *Bus Monitor* screen. To view this screen at any time, either go to the *Main Menu* screen and select "Bus Monitor," or use the Graffiti "M."

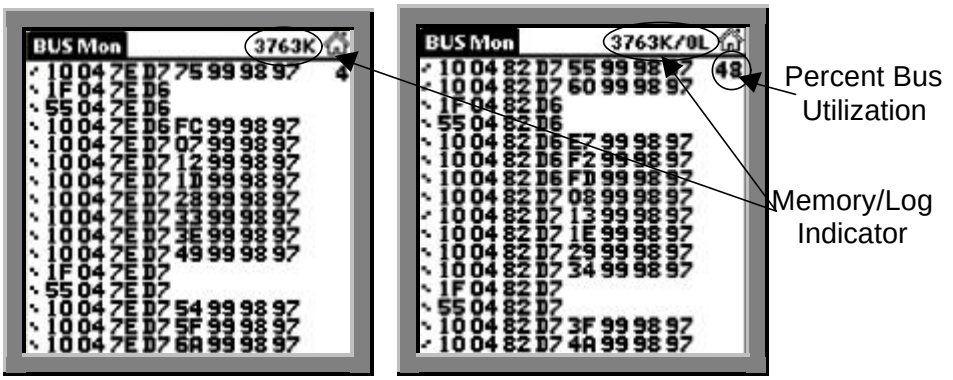


Figure 2.11 Bus Monitor Screen

The "Memory/Log Indicator" at the top of the *Bus Monitor* screen, as shown in the left image of Figure 2.11, specifies the amount of free memory in kilobytes. If

logging is turned on, it also indicates the number of 4K blocks written to the PDA followed by an "L" as shown in the right image of Figure 2.11. With a lightly loaded 4M PDA, free memory will range from 3000 to 4000K. With an 8M PDA, this number will range from 6000 to 8000K.

To begin recording a log, tap the "Memory/Log Indicator." A slash, the number of 4K blocks *completely* written to the PDA, and an "L" will appear to the right of the available memory. This indicates that the unit is logging. The number of 4K blocks will begin at 0, as the first block is in the process of being written. Since "Stop On Full" was selected in the log setup screen, this number will continue to increment until the log becomes full. As it increments, the available kilobytes of memory will decrement by 4K as each new block is logged.

After a few seconds of logging, tap one of the hard buttons at the bottom of the PDA to make a notation in the log. Had triggering been enabled in the *Log Setup* screen, pressing one of these buttons would have sent a trigger and the "L" would have changed to a "T" in order to indicate that a trigger had occurred.

Since "Stop On Full" was selected from the *Log Setup* screen, logging will stop once the log becomes full at 10L. Once logging stops, the slash, the number of 4K blocks written, and the "L" will disappear.

After logging stops, tap the "Memory/Log Indicator" again to begin recording another log.

Note: If "Push Down Old" had not been selected in the *Log Setup* screen, tapping the "Memory/Log Indicator" would result in the new log overwriting the previous one. As "Push Down Old" was selected, the old log will be renamed MFR_TestB, and the new log will become MFR_TestA.

To stop logging before the log is full, tap the "Memory/Log Indicator" again. To simultaneously stop logging *and* exit the program, tap the "Application" button on the PDA. An alert box will indicate that exiting will close the current log. Tap "OK" to continue.

Remove the PDA from the UniMount by pressing the top center latch to eject the PDA. Be careful not to touch the "J1850 Tool" icon, as this could start a new log.

2.3 Viewing a Log File with the PDA Document Reader

The log just created can be viewed with the PDA using the document reader called *AportisDoc*. Return to the *J1850 Tools* applications screen by tapping the house-shaped "Applications" icon on the *lower* part of the PDA. Tap the "AportisDoc" icon to start the document reader.

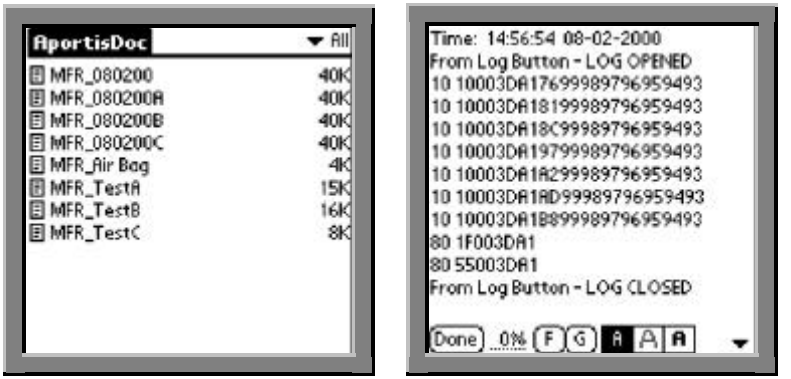


Figure 2.12 AportisDoc Reader and Log File Sample

A list of files will appear as shown in the left image of Figure 2.12. Tap the "*MFR_TestA*" file. Notice that its base name, "Test," is that which was selected during the *Log Setup* procedure. The "*MFR_*" prefix has been added by the system to signify the document type. Because *Push Down Old* was selected in the *Log Setup* procedure, the "A" suffix has been added by the system to signify the sequence in which the log was created. A file with the suffix of "A" is more recent than a file with the suffix of "B," and so on. Suffixes will only be added if "Push Down Old" is selected in the *Log Setup* screen. Otherwise new logs will overwrite old ones.

The right image in Figure 2.12 shows a very short file logged with the MFR.

The “From Log Button – LOG OPEN” indicates that the log was started by tapping the “Memory/Log Indicator” button. The line “ From Log Button -- LOG CLOSED” indicates that the log was closed by tapping on the “Memory/Log Indicator” button.

The quick start example will fill a log with ten 4K blocks of data and will be much longer than what is shown above. To scroll the screen, tap the screen above or below the center point. Tapping *0%* will bring up a screen with the option of either entering the percentage or going directly to the top or bottom of the log file.

The “F” and “G” icons allow the user to “Find” and “Get” specified text, “Get” meaning “find again.” A good example is to enter “Time,” and locate the beginning of each 4K block which starts with a time stamp. Note the percentage with each successive “Get.”

Various font sizes can quickly be set with the |A| |A| and |**A**| option icons. Bookmarks can be set by selecting the black down arrow on the lower right corner of the screen.

The top line of the log contains the *date and time* stamp for the first block of data that was written to the PDA. The log in Figure 2.12 was created on August 2, 2000 at 2:56:54 PM (14:56:54 military time). The remaining lines contain either J1850 message data or status messages. Each J1850 message line begins with a relative time stamp (delta milliseconds from the end of the previous message to the end of the current message). Following the relative time stamp are the message ID and data bytes including an ending CRC byte. To exit the document reader, tap the “Done” and the house-shaped “Applications” icon on the lower left quadrant of the PDA.

2.4 Transferring a Log File to the PC

The data log file is transferred to a PC via a custom J1850 Tool conduit upgrade supplied with the MFR kit. Go to Section 5.1 for detailed instructions on installing this upgrade.

After completing the installation, place the PDA in the cradle and perform a HotSync by pushing the button on the cradle. Log files in the PDA are transferred to the PC as both .pdb files and .dat files and are stored under the <*PDA user name*> in the Palm directory normally on the C: drive. The log files on the PDA are deleted during this process.

The files can be viewed in an Excel spreadsheet by following the steps in Section 5.3. See Figure 5.05 for a resulting log in the Excel format.

3. LOADING AND STARTING MFR APPLICATIONS

The MFR is supplied with two pre-loaded applications, which are accessible by selecting the J1850 Tools menu tab. Turn on the PDA and tap the house-shaped "Applications" icon in the lower left quadrant of the PDA to view the *Applications* screen. Be sure to select the *J1850 Tools* menu tab by tapping the black down arrow on the upper right corner of the display. If the applications cannot be found via this method, tap the category pull down menu in the upper right corner of the display, and select "All." Scroll through the applications. If you still cannot find the applications, use the supplied diskette to load them into the PDA. Instructions for loading software onto the PDA are in Chapters 5 and 7.

- **J1850 Tool:** J1850 Tool is a full-featured bus monitoring and data logging application. It allows for filtering and capturing of J1850 message data. It also allows the user to transmit messages, program IFR to specific messages, and trigger logging with bus and external events.

- **AportisDoc:** AportisDoc is a full-featured document reader for viewing data logs on the PDA. It allows for manual and auto scrolling, quick navigation to the top, bottom, or percentage of a file, and has "find" and "get next" capabilities. It also has features that let you control the font and add bookmarks.

To start an application, tap on the corresponding icon. For additional details, see the beginning of the Chapter 2 describing a Quick Start example.

4. NAVIGATING THE J1850 TOOL

J1850 Tool is a full-featured bus monitoring and data-logging tool for J1850 class vehicle buses. It allows for filtering and capturing of message data. It also allows the user to transmit messages, and program IFR to specific messages.

This application contains the ten functions that are shown on the *Main Menu* screen (see Figure 4.01). Each function of this application is discussed in detail in the following sections.

4.1 Main Menu Screen

Tapping the “Home” icon on the upper right corner of the screen brings up the *Main Menu* screen as shown in Figure 4.01.

Figure 4.01 Main Menu Screen

Each item on the *Menu* screen corresponds to a different data viewing or setup screen. To launch a specific function, tap anywhere along its menu item line. The letters in brackets are Graffiti shortcuts and work on all data display screens. For example, using a Graffiti "M," or a tapping anywhere along the *Bus Monitor* line, will take you to the *Bus Monitor* screen. The Graffiti shortcuts save time and allow the user to go to any screen without going to the menu screen first. The Graffiti shortcuts do not work on data entry screens (e.g., *Set ID Filter*) nor do they work on the setup screens (e.g. *Log Setup* and *Configurations*). The slide selector along the right-hand side of the UniMount holder can also be used to select a function.

4.2 Bus Monitor Screen

Upon start-up, the J1850 Tool's first visible screen is the *Bus Monitor* screen. If there is no data on the bus, this screen will remain blank. If the MFR is not connected to the bus, the message *DISCONNECT* will be displayed at the bottom status line of the display and the screen will remain blank. The PDA will beep if communications to the JIF were lost after being previously established. If properly connected to an active J1850 bus with appropriate ID filters, the bus monitor will display bus data as shown in Figure 4.02.

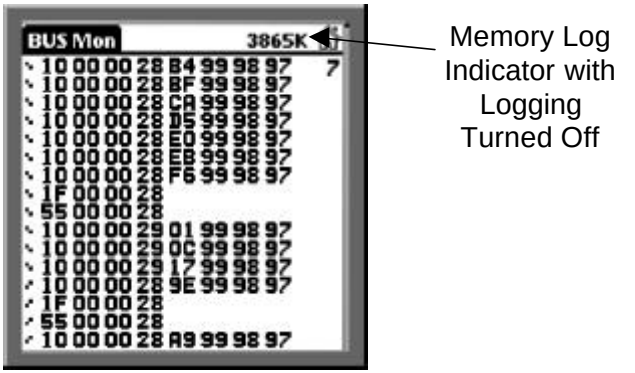


Figure 4.02 Bus Monitor Screen with Logging Turned Off

The display at the very top of the screen, directly to the right of the “Home” icon, is the “Memory/Log Indicator.” The number preceding the “K” represents the total number of free kilobytes of memory, which in the case of Figure 4.02 is 3815.

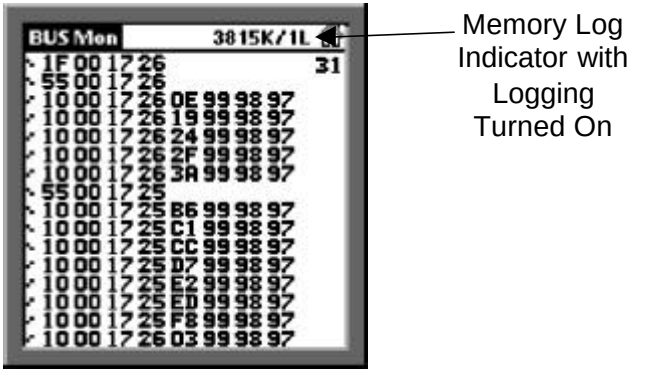


Figure 4.03 Bus Monitor Screen with Logging Turned On

Once logging is turned on, by tapping the “Memory/Log Indicator,” the indicator will begin to display the number of blocks completely logged as shown above in Figure 4.03. Immediately following the block number is either the letter “L” or “T.” In either case, the MFR is logging. The “T” indicates that a trigger has been generated. A trigger happens either when a PDA key is pressed or the PDA receives a message that matches the ID filter setup. See Section 4.4 for more information on the ID filter setup.

If the bus monitor is connected to an active bus and no data is visable, go to the *ID Filter* screen (see Section 4.8). Tap the “All Thru” button to enable all messages to pass to the bus monitor display. Return to the *Bus Monitor* screen. All bus activity should be displayed. Messages overwrite from the top to the bottom of the screen – there is no scrolling.

The double squares to the left of each line of data are spinners that change each time a line is updated. This is useful when bus traffic is slow, or when a message is repeating. Often, the data bytes of a message will not change, and the only indication of a new message is the spinner.

Note that only the first 8 bytes of a message (including the CRC and the IFR) are displayed[1]. All message bytes will appear in the log file.

4.3 ID Overview Screen

Tapping the *ID Overview* menu line or entering the Graffiti letter "N" will bring up the *ID Overview* screen. This screen shows the bus ID number activity from hexadecimal ID "00" in the upper-left corner to "FF" in the lower-right corner. The most significant nibble of the ID number is shown along the left column. The least significant nibble is represented horizontally from 0 to F with 0, 4, 8, and C being highlighted with small open circles. The larger filled or slashed circles will change as IDs are detected by the MFR. In the example screen shown in Figure 4.04, the second row shows activity on multiple IDs of 10 and 1F.

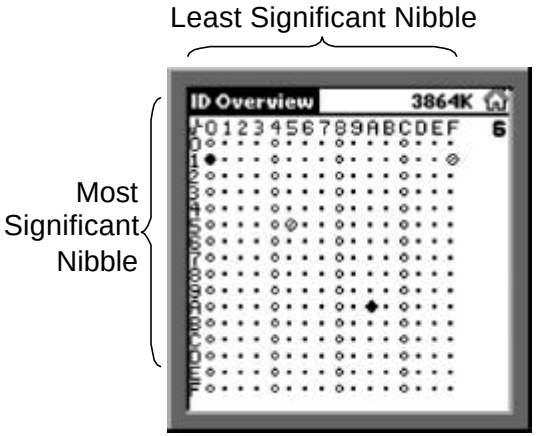


Figure 4.04 ID Overview Screen

The small dots indicate that the J1850 tool is not detecting ID messages with the indicated codes.

[1] The location of the IFR is not indicated in Figure 4.03.

4.4 ID Monitor Screen

Tapping the *ID Monitor* menu line or entering the Graffiti letter “I” will bring up the *ID Monitor* screen as shown in Figure 4.05. This screen allows the user to select up to 16 specific IDs for monitoring or triggering.

Figure 4.05 ID Monitor Screen

Active messages detected by the tool will display a spinner at the left edge of the line. The slash-circle appears for IDs that have not yet been detected by the J1850 tool such as ID 30.

To add or modify an ID, tap anywhere along the line containing it, in this case, the top line or Slot 0 (zero), which corresponds to ID 10. This brings up the *Set ID Filter* dialog screen shown in Figure 4.06.

Figure 4.06 Set ID Filter Screen

The Set ID Filter screen shows the slot number on the top line. The second line labeled "ID" is the list of bytes to match for that line. By entering "10" in this line and tapping "OK," the user has specified the desire to monitor ID number "10." It should be noted that leaving the third or "*Mask*" line blank defaults to a mask of "FF" (hex), which requires that all bits of the ID must match. Therefore, any J1850 bus message starting with a hex "10" will be displayed in Slot 0 as shown in Figure 4.06. Tapping the clear button will instantly clear the contents of both the ID and Mask fields, leaving the cursor poised at the beginning of the ID line for data re-entry.

A complex masking example is shown in Figure 4.07. This example requires an exact match on the first three bytes and higher order nibble of the 4th byte. The zero in the lower order nibble of the 4th mask byte specifies a *Don't Care* on the last 4 bits. Thus, only messages starting with 26 18 61 0X will be monitored on the *ID Filter* screen.

Figure 4.07 ID Filter with Masking Example

Any combination of filters and masks is possible. For example, entering the following will detect either $24 16 or $26 16:

ID: 24 16
Mask: FD FF

4.5 Triggering

The Mini Flight Recorder recognizes two types of trigger events: PDA buttons being pressed and messages that match the ID Filter setup being received. Triggers are enabled or disabled on the *Log Setup* screen as described in Section 4.6. The trigger position in a log is also described in that section.

Message based trigger events are set with the trigger selection buttons below the ID mask in the *Set ID Filter* monitor setup screen. ID filter setup is a part of the *ID Monitor* or *ID Monitor with Time* function.

Figure 4.08 Trigger Selection Buttons

The default trigger setting is "*None*." Selecting "*Trig*" will cause a trigger (if enabled on *Log Setup* screen). The PDA will continue acquisition, as specified by *Trigger %* setting on the *Log Setup* screen, and then close the log.

"*Arm*" and "*Disarm*" enable and disable the trigger respectively and, thus, can qualify the trigger. For example, to trigger only when the car is moving, arm triggering if a non-zero vehicle speed is seen, and disarm triggering if a zero vehicle speed message is seen.

If a specific ID is disabled in the *ID Filter* screen (Section 4.8), it will not be displayed nor will it cause a trigger.

A triggered message log will reflect the percentage of messages before and after the trigger, as set in the *Log Setup* screen. A trigger event prompts the system to acquire the specified percentage of data and then closes the log. However, if the log buffer is not full when the trigger occurs (i.e. the trigger occurs shortly after logging is started), the system will continue logging until the buffer is filled, and then closes the log. In this case, the trigger's place in the log will be arbitrary and not necessarily at the set percent point. Refer to "Trigger %" on page 40 for more information.

Hitting an application button on the PDA (there are four application buttons, two on either side of the central scrolling key on the lower portion of the front of the PDA) will cause a special manual trigger to be generated if triggering is enabled. The log file will contain a line of data indicating which button from left to right (1, 2, 3, or 4) was hit and mark the log accordingly. This feature is useful for marking a spot in the log as a method of focusing in on a particular problem.

Log files may be viewed on the PDA with AportisDoc (see Appendix A). The log starts with the date and time the PDA first started the log, unless satisfying the Trigger % has caused the beginning of the log data to roll off or if Stop on Full is not selected. Subsequent lines are either J1850 messages or status messages. A J1850 data line begins with the relative time between the EOF of each message. This is the time from the end of the last message to the end of the current message. To the right of the time stamp is the message ID followed by message data and ending with a CRC byte, assuming no IFR bytes. Time stamps are in milliseconds. Data and CRC values are shown in hexadecimal. For example, in Figure 4.09, message ID 55 ended 80ms after message ID 1F ended.

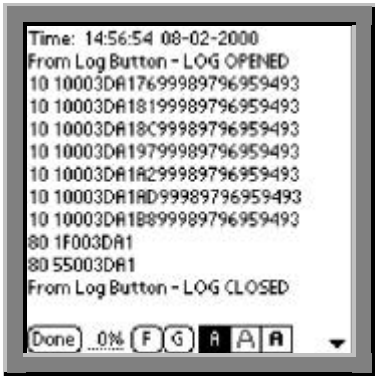


Figure 4.09 View of Logged Data with AportisDoc

4.6 Log Setup Screen

The J1850 Mini Flight Recorder has a very flexible logging system. The *Log Setup* screen is used to setup the logging options. To get to the *Log Setup* screen shown in Figure 4.10, tap the *Log Setup* line on the *Main Menu* screen, or use the Graffiti letter "Z."

Figure 4.10 Log Setup Screen

Name

The *Name* field is used to name the log files that will be collected in the memory of the PDA. The name is always prefixed with "*MFR_*" to provide the HotSync conduit with an identifier. If the logging is setup for multiple files to be created, the system will postfix a letter to successive files starting with the letter "A," then "B," etc.. The maximum number of log files possible with a specific base name is 25. The setup in Figure 4.10 will result in the latest log having the base name of "*MFR_TestA*."

Logging On

The *Logging On* option controls the initial state of the logging process. If logging on startup is desired, this item must be selected. The *Logging On* checkbox can

be toggled (turned off or on) by tapping the “Logging” function on the *Main Menu* screen or by entering the Graffiti letter “L.” Logging may also be turned off and on by taping the “Memory/Log Indicator” on the *Bus Monitor*, *ID Monitor*, and the *ID Monitor with Time* screens.

Each time *Logging On* is turned from off to on, a new log will be opened causing either the base name file to be overwritten or a new log with a postfix letter to be created.

Stop on Full

Selecting *Stop on Full* causes the current log to stop recording bus data when it has reached the setting of *Blocks*/*Log*. At this point, the logging indication on the status line will change over to the diagnostic information. For example, if *Blocks*/*Log* is set to10, the status line will change over when logging goes from “9L” to “10L.” The number preceding “L” increments to 10 when block 10 has been completely stored in the PDA memory.

If *Stop on Full* is not selected, the active log will continue to record data much like an endless tape recorder. The oldest data will be lost as each new block is written into the log. This process will continue indefinitely until it is manually stopped or triggered by a button or trigger match as described in Section 4.5.

Push Down Old

Push Down Old controls whether there will be only one log that gets overwritten each time a new log is opened or multiple logs that get pushed down when a new log is created. If set, new logs will push old logs down. The newest log will have a postfix of "A." The oldest log will have a higher letter in the alphabet. When the number of logs in the push down stack exceeds the number of *Max Logs*, the oldest log will be lost.

For example, assume a setting of 5 *Max Logs* and a *Name* of MFR_Test. When five logs have been recorded, they will be named MFR_TestA, MFR_TestB, MFR_TestC, MFR_TestD, and MFR_TestE, with the newest log being MFR_TestA and the oldest log being MFR_TestE. Opening a 6th log will cause the oldest log, MFR_TestE, to be discarded. The previous logs with the A-D postfixes will be renamed of with B-E postfixes, and the new data will be written into a new MFR_TestA log. This process is shown in Figure 4.11.

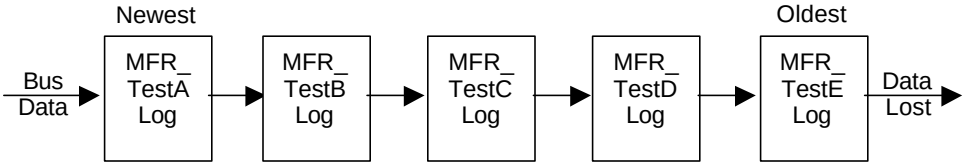


Figure 4.11 Log Push Down Process

If this option is not set, the base name log will be overwritten or lost each time a new log is created.

Caution: Although a warning window pops up when a log file is about to be overwritten, use care to ensure valuable data is not lost. Note that logs created while Push Down Old is not selected will not have a postfix.

New Log on Open

If this function is enabled, a new log will be created each time the application is started. Depending on the options selected, the current log could either be overwritten or pushed down when a new log file is created. If the PDA is turned off or powers down while in the J1850 tool application and then is powered up again (with no other application started), a new log will not be created.

Triggering On

Selecting the Triggering On option enables triggering. If it is not selected, the Trig/Arm/Disarm setting in the *ID Setup* screen will be ignored. When enabled, logs are closed or pushed down based on trigger or PDA button events. The buttons at the bottom of the PDA will not cause a trigger event if triggering is off, but will enter a notation in the log when pressed. See Section 4.5 for a complete description of setting up triggers.

Default Name

If this option is selected, logs will be given default names based on the current date. For instance, the default name of a log taken on May 18, 2000 would be 51800.

Lockout User

The *Lockout User* feature allows the user to keep the log setup settings from being changed and to keep the PDA from being used for any purpose other than logging unless the selected password is entered.

Blocks Free

The number of free 4K blocks of memory that are available for logging is indicated directly to the right of *Blocks Free*. When selecting *Max Logs* (ML) and *Blocks*/*Log* (B/L), the user must make sure that the product of these two numbers is less than *Blocks Free* (BF).

Example Calculation: ML x B/L < BF

If the user tries to exceed free memory available, a warning will be issued, but it is up to the user to set the *Blocks*/*Log* to a smaller value.

Max Logs

Max Logs specifies the maximum number of logs for a specified log base *Name*. The maximum number of logs is 25. If the user enters a number greater than 25, a warning will be issued and the software will reset the value to 25.

If the user entered 25 in the *Max Log* field and allowed the series of logs to be completed, the earliest recorded file would have the letter "Y," the 25th letter of the alphabet, for a postfix.

Blocks/Log

A block refers to a 4K (4096) byte segment of memory. The number of *Blocks*/*Log* sets the maximum number of bytes of memory assigned to an individual log file. If the user sets this in such a way so that the number of *Blocks*/*Log* or the number of logs exceeds the free memory, an alert message will be issued. It is up to the user to correctly set this number so as not to exceed the free memory available. If the user ignores the alert sets the number, the resultant log will not reach the set values before logging is disabled to low memory.

At 30 percent bus utilization, it takes approximately 10 blocks to store 1 minute of bus traffic. This number will vary depending on filtering and message content.

Trigger %

The *Trigger %* sets the percentage of log memory blocks that will be used before a log trigger event has occurred. For example, if the percent is set to 80, 80 percent of the data blocks in the log will be pre-trigger data and 20 percent will post-trigger blocks. With a setting of 10 *Blocks*/*Log*, 8 blocks, or 32KB, will contain pre-trigger data and 2 blocks, or 8KB, will contain post-trigger data.

Note: It is important to remember that the Trigger % refers to data blocks and not individual bytes or kilobytes. Moreover, a block cannot be split apart for calculation purposes. Thus, if you have 10 blocks per log, the Trigger % will round to the next tenth. For instance, if you enter 81 in the Trigger % field, leave the screen, and return; the number will have changed to 90. If 91 percent is entered under the same conditions, the number will round up to 100, and the log will not close.

4.7 ID Monitor with Time

Tapping the *ID Monitor w*/*Time* menu line or entering the Graffiti letter “J” will bring up the *ID Monitor with Time* screen as shown in Figure 4.12. The function of this screen is very similar to that of the *ID Monitor* screen with two exceptions: times from end to end of individual messages are displayed, and only the top eight lines of the *ID Monitor* screen are shown. This screen does show all 12 bytes (continued on the second line) and the time interval in milliseconds between the last two messages received matching the specified monitor byte(s). Again, the times are measured from the end of the previous message to the end of the current message. Referring to the top line of Figure 4.12, the end of message ID 10 was received 87ms after the end of the previous message ID 10.

Figure 4.12 ID Monitor with Time

Tapping one of the eight lines will bring up the same dialog box and settings as previously set on the *ID Monitor* screen. Changing messages here will also change the corresponding messages on the *ID Monitor* screen. Time intervals for message Slots 8 through Slot 15 are not available.

4.8 ID Filter Screen

Filtering specific message IDs is made very easy with the *ID Filter* screen. The high nibble of an ID byte is represented along the vertical axis, and the low nibble is represented along the horizontal axis. A crossed circle indicates a message is not filtered. A black circle indicates a message is filtered.

The left image in Figure 4.13 shows a screen with no filters applied or messages set to *All Thru*. Again, all message IDs are passed through in this example. The right image has message IDs 10 and A8 filtered.

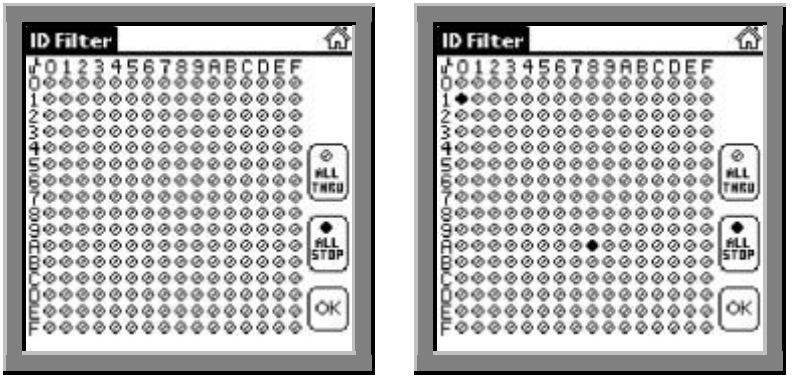


Figure 4.13 Sample ID Filter Screen Settings

Tapping the “All Thru” button on the right center of the screen sets all messages to pass. As an individual ID is tapped, it will toggle between filtered and not filtered.

Tapping “All Stop,” then ID 10 and ID 8A as shown in Figure 4.14, allows only message ID 10 and ID 8A to pass through. All other messages are stopped.

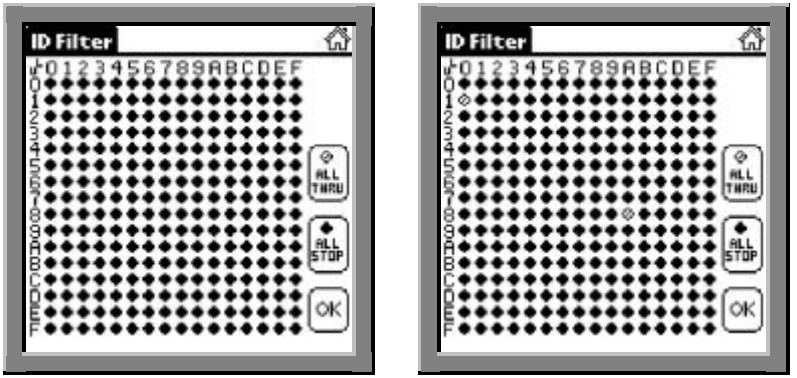


Figure 4.14 ID Filter Screen (All Stop and Except 10 and 8A)

The PDA sends the ID Filter settings to the JIF. The JIF performs the filtering and thus only non-filtered messages will reach the PDA. As an example, if all messages except ID 10 and 8A were filtered, the Bus Monitor screen would appear as shown in Figure 4.15. The data log would also only show message ID 10 and 8A.

Note: At the startup of the J1850 Tool application, a complex filter selection may take several seconds to download into the JIF.

Figure 4.15 Bus Monitor Screen with All IDs Filtered Except for ID $10

4.9 Send Message Config Screen

Tapping the *Main Menu* item *Send Message* or entering the Graffiti letter "S" brings up the *Send Message Config Screen* as shown in Figure 4.16.

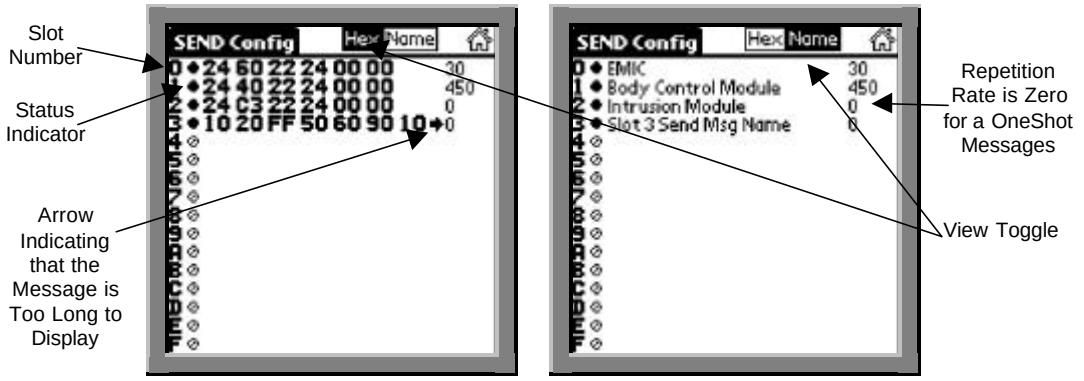


Figure 4.16 Send Message Config Screen

The “Hex/Name” button on the top of the screen changes the view from the hexadecimal message IDs to their user-assigned names. If a hexadecimal message ID has been entered, but no name has been assigned, the default name, Slot X Send Msg Name, will appear when the *Name* view is selected.

In the status column on the left of the screen, the slashed circle indicates that transmission for the message entered is turned off. A filled dot means the message assigned to the respective slot is transmitting at the repetition rate set. Message ID 10 in Slot 0 is sent every 30ms following proper bus arbitration. Tapping a status indicator will toggle the message transmission on or off, or send a OneShot message depending on the repetition rate.

Slot 3 has a message ID of 10 set for a OneShot message. Tapping this indicator will cause the 10 message to be sent once. The status line at the bottom of the screen will indicate “OneShot Message 4” for a brief moment.

The arrow following the message bytes in Slot 3 in the left image of Figure 4.16 indicates that the message is too long to display on this screen. The message will display fully in the Send Message Dialog (Figure 4.17), which can be viewed by tapping on the line’s message bytes.

Figure 4.17 Send Message Dialog

The message can extend into the second line, but only the first eleven message bytes will be transmitted by the JIF. The message can be entered in lower or upper case. Spaces are optional, as the PDA will automatically format the line as shown in Figure 4.17. **Do not enter the CRC value as the JIF will automatically calculate and transmit it when a message is sent.**

The *Rate* is zero for OneShot messages or the number of milliseconds for repetitive messages. Tapping the "Start" button will start a repetitive message or send a single OneShot message. Tapping the "Stop" button will stop a repetitive message. Tapping "Once" will send a message as a OneShot event even if the repetition rate is non-zero (and will stop the message from repeating). "Cancel" will not affect the current transmission, but will only cause the changes made in the screen to be disregarded. The example in Figure 4.17 sends the Slot 0 message once every 30 milliseconds.

Entering a given slot's corresponding hexadecimal graffiti character will send a OneShot message or toggle a repetitive message on and off, depending on the slot's repetition rate. This function works from any non-dialog screen such as the *Bus Monitor* screen, *Send Message Config* screen, or *ID Monitor* screen.

Note: This Graffiti shortcut feature is often overlooked. However, it is particularly useful as it allows the user to send a request message and view the response on a single screen.

When the *Send Message Config* screen in Figure 4.16 is displayed, tapping the extreme left of a line (the slot number or the on/off indicator) will toggle a repetitive message on/off or send a OneShot message.

4.10 IFR Message Config Screen

On the *Main Menu* screen, tap on *IFR Message Config*, or enter the Graffiti letter "R" to bring up the *IFR Config* screen as shown in the left image of Figure 4.18. Up to eight In-Frame Responses can be programmed. The slash or filled circle in the first column indicates which IFRs are on or off. The second column contains the message ID and is followed by the IFR type. The actual IFR message is displayed immediately to the right of IFR type.

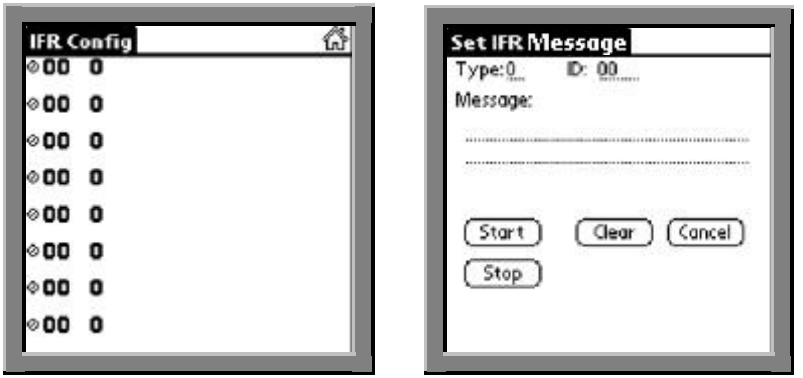


Figure 4.18 IFR Setup Screens

Tapping one of the eight entry lines brings up the *Set IFR Message* dialog shown in the right image above. This screen requires that the user enter the IFR type (1-4), the ID byte, and the message byte(s).

The type 1 IFR is a single byte response from a single responder (short normalization bit). The JIF does not retransmit the single IFR byte if it loses arbitration.

The type 2 IFR is a single byte response from multiple responders (short normalization bit). The JIF will attempt to transmit the single IFR byte until it is successful (i.e. wins arbitration).

The type 3 IFR is a multiple byte response from a single responder with CRC (long normalization bit). The JIF will automatically calculate and transmit the CRC. If the JIF loses arbitration while transmitting, it will halt and not retransmit later.

The type 4 IFR is a multiple byte response from a single responder without CRC (short normalization bit). This special type of IFR can be used to simulate type 2 IFRs. If the JIF loses arbitration while transmitting, it will halt and not retransmit later.

Note: When the JIF transmits an IFR, the maximum J1850 message length of 12 bytes is not enforced, so that the user can intentionally create a J1850 message with an IFR that exceeds the 12 byte limit.

When a message with the specified ID byte is seen, the IFR message bytes will be transmitted in response.

Note: The JIF can transmit in response to its own messages. With this capability, the JIF can simulate multiple modules on the bus by transmitting messages with IFRs.

The IFR message byte(s) are entered in the blank lines under *Message.* Only the first IFR message byte is used for type 1 and type 2 IFRs. Up to five IFR message bytes are used for type 3 and type 4 IFRs.

Tapping “Start” enables the transmission of the IFR message when a J1850 message with the specified *ID* is seen. Tapping “Stop” disables the IFR. Tapping “Cancel” causes the changes made in this screen to be disregarded.

4.11 Configurations Screen

The *Configurations* screen is used to save, reload, and beam *ID Filter*, *ID Monitor*, *Send Message*, and *IFR Message Config* screen settings. Tap the *Configuration* function on the *Main Menu* screen, or enter the Graffiti letter "O" to enter the screen shown in Figure 4.19.

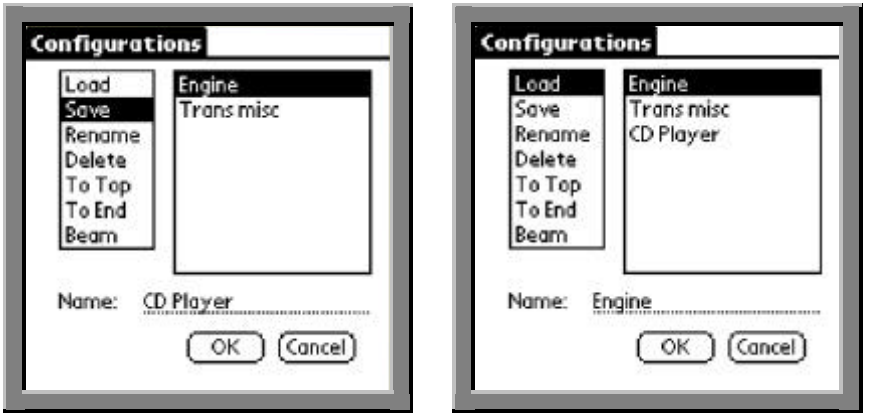


Figure 4.19 Configurations Screen

The menu on the left depicts possible operations, and the area on the right is a scrollable list of user-defined and named configurations. Enter a file name, such as *CD Player,* then select *Save,* then tap "OK" to store the current settings. Select a file name, such as *Engine,* and tap *Load* to restore the Engine settings.

Detailed descriptions of the menu items on the *Configurations* screen follow:

Load: Retrieve and setup the selected configuration

Save: Save the current configuration as named in the Name field

Rename: Rename the configuration to the entry in the Name field

Delete: Delete the selected configuration

To Top: Move the selected configuration to the top of the list

To End: Move the selected configuration to the bottom of the list

Beam: Beam the configuration to another PDA[2]

If a configuration is beamed to a PDA containing a duplicate configuration name, the receiving PDA will rename the file by adding a “00” to the end of the name. A second duplicate will have a “01” added to the end, etc..

Upon HotSyncing, saved configurations will be backed up in the PDA backup directory on the PC.

[2] This function requires that the recipient have the same version of the J1850 MFR Tool installed and have the main *Application* screen displayed on PDA. The receiving PDA cannot be in the J1850 Tool application when configurations are beamed.

5 TRANSFERRING AND UNDERSTANDING DATA LOGS

This section describes the process for transferring the logs collected with the PDA to a personal computer.

5.1 J1850 Tool Support Software Install Process

The MFR system includes PC support software on diskette(s) or a CD-ROM that installs onto a PC via an install wizard. The wizard installs a special conduit for importing MFR data logs to the PC, adds a toolbar macro file for Excel, and puts backup copies of PDA applications onto the PC.

Note: Before starting the J1850 Tool installation process, make sure that the Palm Desktop software is installed on the PC. See the instructions and the CD-ROM supplied with the PDA. After completing this process, proceed with the J1850 Tool installation.

Insert the J1850 Tool Install Diskette 1 or CD-ROM that comes packaged with the MFR into the appropriate PC drive. Follow the instructions on the label of the medium, or open the drive and double click on Setup.exe. Follow the InstallShield™[3] wizard's on-screen instructions to complete the installation.

The install program places the following files onto the Start Menu:

- J1850 MFR Users Manual.pdf
- J1850Tool.prc
- AportisDoc.prc
- ADOC Reference.pdb
- Readme.txt

The PRC files are backup copies of AportisDoc and J1850 Tool in case the PDA loses these programs, and they need to be replaced. ADOC Reference is a backup copy of the AportisDoc user's manual that is installed on the PDA. The J1850 MFR User's manual is an electronic copy of this manual.

[3] InstallShield is a registered trademark of InstallShield Software Corporation.

To install a .pdb or .prc file or to open a .pdf or .txt file, click the “Start Menu” button and select the item desired as shown in Figure 5.01.

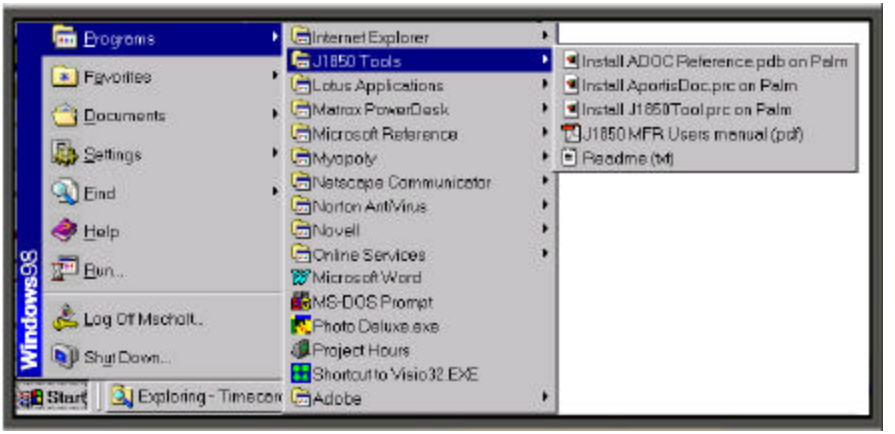


Figure 5.01 Downloading or Opening the J1850 Tool

5.2 PDA to PC Log Transfer HotSync Process

During the install process, a new conduit for synchronizing files between the PDA and the PC was added to the *HotSync* program. The user can change the *HotSync* settings by clicking on the red and blue circular “HotSync” icon in the System Tray and selecting the *Custom* menu item. The image shown in Figure 5.02 will appear. Click on the down arrow to select a <*PDA user*> (DEC in this case), and select the *J1850 Tool Conduit* line item.

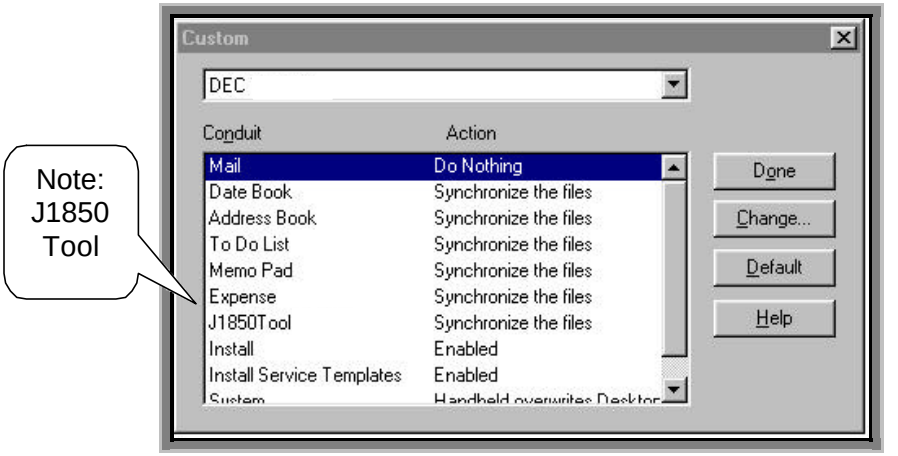


Figure 5.02 HotSync Conduits

Clicking on *Change* will bring up the *MFR J1850Tool* dialog window shown in Figure 5.03. Clicking on one of the radio buttons then clicking *OK* will change your HotSync action on the next HotSync only. If you want to change the default action for the conduit, click the appropriate radio button, the click the "Set as default" checkbox, then click the "OK" button.

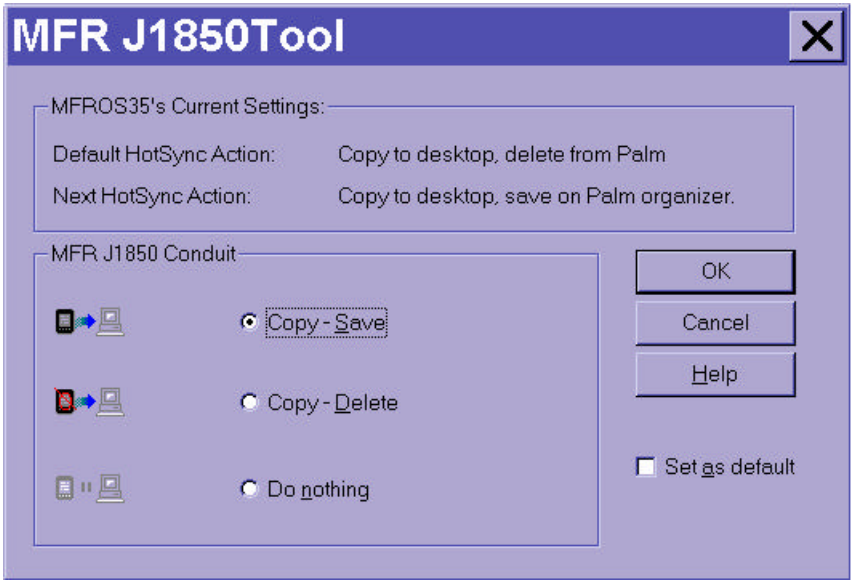


Figure 5.03 MFR Conduit Settings

Selecting the “Copy – Save” radio button will cause the conduit to copy and process logs to the PC, then leave them on the handheld device. This will result in the log being copied and processed each time you perform a HotSync. This option will display as “Synchronize the files” in the *Custom* dialog box.

The “Copy – Delete” radio button is the initial default setting for the J1850Tool conduit. Selecting it will cause the conduit to copy and process the log files to the PC, then delete them from the handheld device after successfully copying and processing them. This option will display as “Desktop overwrites handheld” in the *Custom* dialog box.

Selecting the “Do nothing” radio button will cause the J1850Tool conduit to exit without copying or processing any files. This option is useful when performing a quick HotSync that does not have to include the J1850Tool files. This option will display as “Do Nothing” in the *Custom* dialog box.

To begin transferring data log files from the PDA to the PC, place the PDA into its cradle and press the “HotSync” button. The reformatted log files are stored on the drive where PDA HotSync was originally installed. Log files are placed in the *J1850Tool* folder, and PDB backups are placed in the backup directory located under the <*PDA User Name*> folder in the Palm directory.

The <*PDA User Name*> is based on the *User Name* used when the PDA was first HotSync’d with the PC. It is usually constructed by taking the first 6 characters of the last name used plus the first letter of the first name. For example, if a PDA is initialized with “DEC” as a user name, the <*PDA User Name*> folder would be *dec.* Whereas if the PDA was initialized with “John Hancock,” the <*PDA User Name*> folder would be *HancocJ.*

The reformatted log files stored in the *J1850 Tools* folder have been converted to comma separated variable format (CSV) by the J1850Tool conduit to allow easy import into an Excel spreadsheet. After each log file has successfully transferred to the PC during the HotSync process, the log file may or may not be deleted from the PDA, depending on the J1850 Tool Conduit settings.

The processed log files, with the .dat extension, are placed in the Palm/<PDA User Name>/J1850 Tool folder along with their .pdb backups.

5.3 Using Excel to View .dat Log Files

The install wizard added a custom *J1850 Log Tools* toolbar file to Program Files\J1850 Tools. The toolbar contains one-click macro functions for opening, saving, printing, and previewing .dat log files. In order to use this toolbar, distributed as an Excel Add-in, it must first be installed in Excel. To install it, open Excel and select the *Add-Ins* button under the *Tools* item in the main menu. Click *Browse* and navigate to the *Program Files*\ *J1850 Tools*\ subdirectory, and select the *J1850LogUtils.xla* file. Click “OK." Confirm that the “J1850 Log Tools” selection is checked and click “OK” again. This process only needs to be performed once. After this addition, the custom *J1850 Log Tools* toolbar will appear whenever Excel is started.

The toolbar is initially floating, but may be docked like any other Excel toolbar. See Figure 5.04.

To toggle the toolbar off or on go to Tools menu, and select Add-Ins. Uncheck or check the box next to J1850 Log Tools, and click "OK."

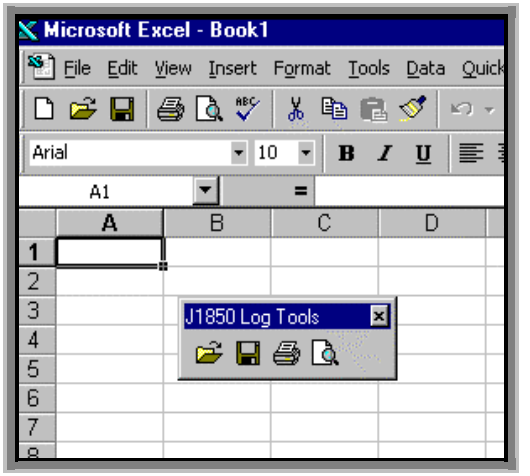


Figure 5.04 Excel Spreadsheet with J1850 Log Toolbox

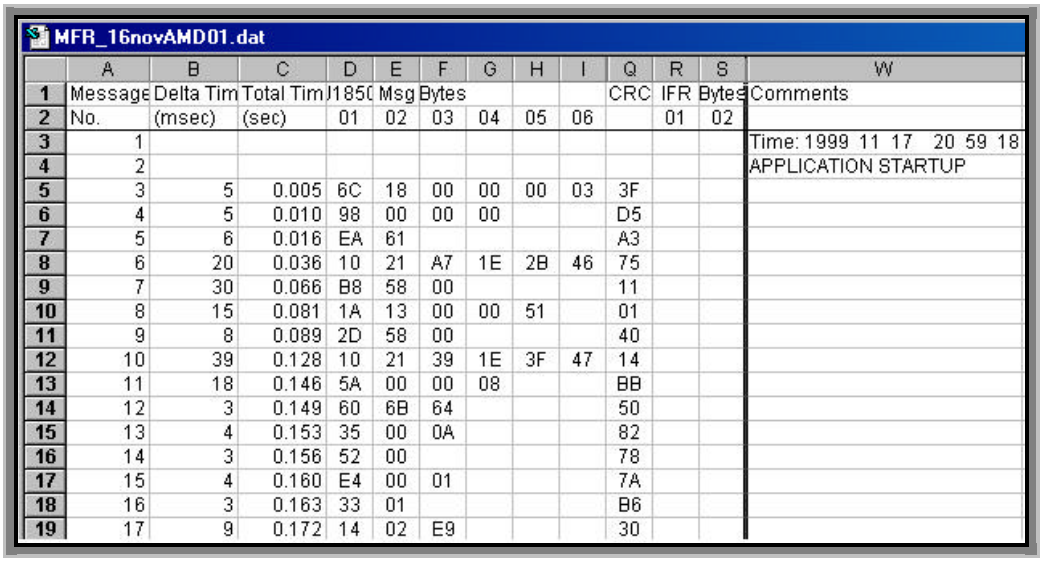
To open an Excel .dat log file, click on the Open File Folder button of the custom toolbar and navigate to the proper folder. This *J1850Tool* folder will be located under the <*PDA User Name*> folder where the PDA HotSync was installed. Usually it will be as follows:

C:\Palm\<PDA User Name>\J1850Tool

Select a file, click on *Open,* and Excel will import the log data into a file looking similar to that of Figure 5.05.

Due to a limitation in the Excel program, each worksheet can contain a maximum of 65536 rows. Log files longer than 65536 rows are automatically segmented into multiple worksheets within a single workbook by the J1850Tool Conduit Excel macro.

Some columns in Figure 5.05 have been hidden to reduce the width of the spreadsheet and give an overview of the log data. Messages are sequentially numbered with all comment and error messages moved to the far right (Column W). The delta time between the end of the previous message and the end of the current message is shown in Column B. Column C shows the accumulated time in seconds for each block of log data. The accumulated time will be reset each time an error occurs or an MFR comment, such as Application Startup, is inserted in the log. The first message byte in Column D is the message ID and is followed by columns for up to 13 remaining message bytes. The first six are shown in Figure 5.05. Column Q contains the CRC byte. The CRC byte is followed by five columns for IFR bytes, although only two columns are shown in Figure 5.05.



MFR_16novAMD01.dat

	A	B	C	D	E	F	G	H	I	Q	R	S	W
1	Message	Delta Tim	Total Tim	J1850	Msg Bytes					CRC	IFR	Bytes	Comments
2	No.	(msec)	(sec)	01	02	03	04	05	06		01	02	
3	1												Time: 1999 11 17 20 59 18
4	2												APPLICATION STARTUP
5	3	5	0.005	6C	18	00	00	00	03	3F			
6	4	5	0.010	98	00	00	00			D5			
7	5	6	0.016	EA	61					A3			
8	6	20	0.036	10	21	A7	1E	2B	46	75			
9	7	30	0.066	B8	58	00				11			
10	8	15	0.081	1A	13	00	00	51		01			
11	9	8	0.089	2D	58	00				40			
12	10	39	0.128	10	21	39	1E	3F	47	14			
13	11	18	0.146	5A	00	00	08			BB			
14	12	3	0.149	60	6B	64				50			
15	13	4	0.153	35	00	0A				82			
16	14	3	0.156	52	00					78			
17	15	4	0.160	E4	00	01				7A			
18	16	3	0.163	33	01					B6			
19	17	9	0.172	14	02	E9				30			

Figure 5.05 Example Excel Log File

To close an Excel log, click on the J1850 Log Tools *Save As* or diskette button on the J1850 Log Tools toolbar. This will automatically save the file to .xls (Normal Excel) format of the same base name, if the currently open workbook starts with *MFR_* prefix, and ends with .dat extension. It will be saved in the

same folder where the .dat file was located, usually the *Palm\<PDA User Name>\J1850Tool* folder, but with a .xls extension.

5.4 Log File Format

The first line of the log (shown in Figure 5.06) starts with the time and date that the data was stored. Then, each following line of the log represents either a J1850 message, a date and time indicator, a trigger indication, or an error status message.

Figure 5.06 View of Logged Data in Aportis Doc

The J1850 message lines begin with a relative time stamp (in milliseconds). Specifically, this is the time between the end of frame (EOF) of the previous message and the EOF of the current message.

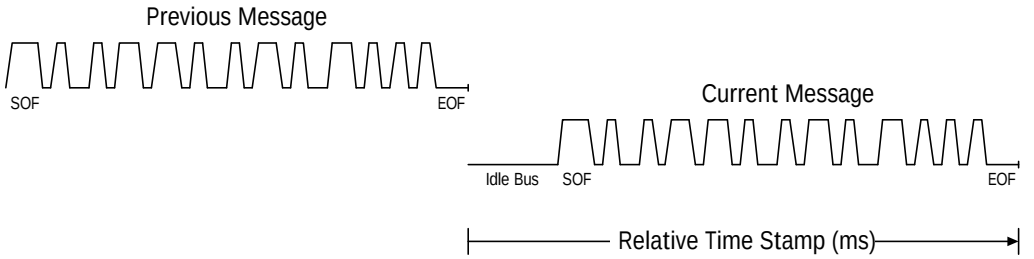


Figure 5.07 Relative Time Stamping

An optional status byte and the original J1850 message follow the relative time stamp. The optional status byte appears in brackets [ ]. The bit definitions follow:

Status Byte:

Bit 7: Invalid symbol detected ($80)
Bit 6: CRC error detected ($40)
Bit 5: Excessive message length > 12 bytes ($20)
Bit 4: Not used

Bit 3, 2, 1, 0 ($02 - $0F): The location of the first IFR byte relative to 0

Example 1: Normal J1850 Message

6 B0800000C3	Relative time stamp = 6ms, ID = B0, CRC = C3, No errors detected.

Example 2: Invalid Symbol Detected

4 [80] 2D583M	Relative time stamp = 4ms. Invalid symbol occurred at the third byte. Any byte(s) after and including the invalid symbol are ignored.
2 [80]	Relative time stamp = 2ms. Invalid symbol occurred at the first byte. No bytes are displayed.

Example 3: CRC Error Detected

3 [40] DD036F	Relative time stamp = 3ms. <6F> is not a valid CRC byte for the message DD 03

Example 4: Excessive Message Length

14 [20] 010203040506 0708090A0B0C0D0E0F00	Relative time stamp = 14ms. Message is too long.

Example 5: J1850 message with IFR Byte

7 [05] B0800000C360	Relative time stamp = 7ms. C3 is the CRC byte. 60 is the IFR byte.

5.5 Log File Status Messages

Below is a listing of messages that can appear within a data log collected by the MFR system.

Log Open

This is written when logs are manually opened. If *Stop on Full* is not set and the buffer wraps, this message will not appear.

Log Closed

If a log is closed manually this will appear at the end of the log.

Rotate Continuation

When a log becomes full and is pushed down, this is written to indicate this is a continuation from where the old log left off, making it easier to concatenate logs. If *Stop on Full* is not set and this buffer wraps, this message will not appear.

Application Startup

When the application is set to open a log upon startup, this message is written at the top of the log. If *Stop on Full* is not set and this buffer wraps, this message will not appear.

Application Exit

If the log is open when an action closes the J1850 Tool application, this will be written as the last line of the log.

Powerdown

This indicates that the JIF told the PDA to go to sleep.

Trigger from ID <n>

If triggering is enabled on the *Log Setup* screen and the triggering condition is met, this will be written to the log adjacent to the message that met the condition.

Trigger from KEY <n>

This message will appear in the log if an application key is pressed when triggering is enabled in the *Log Setup* screen. The number <n> corresponds to the four application keys from bottom left to right of the PDA.

Notation from KEY <n>

This message will appear in the log if an application key is pressed and triggering is not enabled in the *Log Setup* screen. The number <n> corresponds to the four application keys from bottom left to right of the PDA.

Error: <xx>

Error 00 indicates a transmit overflow (unknown amount of data lost).
Error 10 indicates a JIF Reset.
Other values indicate a hardware or software failure.

JIF Info: <xxxxxxxxxxxx>

This gives the version number of the JIF micro-controller software.

JIF Status: <xxxxxxxxxxxxxxxxxxxxxxxxxxxx>

This shows internal state information used by DEC to diagnosis and repair JIF hardware or software problems.

5.6 JIF Communication Messages

The status line at the bottom of most screens in the J1850 Tool application is used to display instantaneous messages related to the communications between the JIF and the PDA. Below is a description of these status messages:

Checksum Error

A packet was received from the JIF with an invalid CRC (checksum).

Resync Request

Some condition occurred, e.g. powering up the JIF or starting the PDA application, that caused the data logging to be reset. Data in the JIF before the resync request was lost.

Sequence Error

A data packet from the JIF was received out of order. This could occur because of a communications problem such as a loose connection or other fault. No data is lost, but frequent errors will cause a resync.

Display Overrun

Too much data is coming in to display all (but all is logged).

Send Overrun

The PDA could not transmit setup information to the JIF and has caused the input queue where the setup info is stored to overflow. Normally this means the PDA is not attached to the JIF.

Packet Type Invalid

The PDA has received a data packet from the JIF that it does not recognize or know how to handle it. This should not occur unless there is an undetected software or hardware version mismatch. Please report such messages to DEC.

Unknown

These messages should not occur and represent a problem in the JIF or PDA. Please report such messages to DEC.

Insufficient Memory

There is not enough memory to continue logging.

Error

The one-byte error code is displayed as described in the previous section.

5.7 Restoring Data Logs and Configuration Settings to the PDA

Upon HotSyncing, backup copies of log files and saved configurations are saved in the Palm user's backup directory on the PC. This is especially useful if the PDA loses power and these files are lost, or if they are accidentally deleted.

To restore a lost data file to the PDA, open the Palm desktop software on the PC. Click the "Install" button on the bottom left side of the screen. A dialogue box will open. Browse to the PDA user's Archive directory, usually located at *C:\Palm\<PDA User Name>\Archive* or *C:\Program Files\<PDA User Name>\Archive*. Select the desired log file. Click on "Open." If additional files are required, click on "Add" and repeat the selection process. Otherwise, click on "Done," and perform a HotSync.

To restore lost MFR configurations, open the Palm desktop software on the PC. Click the "Install" button on the bottom left side of the screen. A dialogue box will open. Browse to the Palm user's backup directory, usually located at *C:\Palm\<PDA User Name>\Backup* or *C:\Program Files\<PDA User Name>\Backup*. Select "J1850ToolConfig.pdb." Click on "Open." Click on "Done." Perform a HotSync. Configurations saved before the next to last HotSync will be restored.

Important Caution: Installing "J1850ToolConfig.pdb" on the PDA will replace all configurations in the PDA with those in "J1850ToolConfig.pdb."

6. MFR SOFTWARE UPDATES AND PROBLEM REPORTING

Users of the MFR system are encouraged to give feedback to DEC on their use of the J1850 as a bus data logging tool. Please report any problems encountered during the use of the tool and suggested improvements or features to the following:

Email: support@ceddec.com
Phone: (248) 293-1300

Email is very helpful in leaving a paper trail and clearly defining the problem. It is also recommended that MFR users send an email to support@ceddec.com to register for notification of software updates as they become available.

7. DOWNLOADING GENERAL PURPOSE SOFTWARE

To install the Palm Desktop software onto the PC, insert the CD-ROM that comes packaged with the PDA unit into the PC's CD drive. Wait for the setup dialog, and choose install. Follow the instructions in the setup program.

Use the Palm Install Tool, accessible from the Palm Desktop, to add programs and/or synchronize data between the PC and the PDA. Programs and data files that appear in the Palm Install Tool list box will be updated the next time the PDA unit is placed in the cradle and its HotSync button is pressed.

Many commercial, freeware, and shareware programs exist for the Palm unit. Though most of these are small, be careful not to use up too much of the unit's memory storing these programs. Keep enough space available for the data logs.

It is wise to check on the reliability of software before downloading, as some applications cause fatal errors. If this happens, valuable data could be lost. Many download sites accept feedback. Palm also has a Platinum program that recognizes high quality software packages.

8. JIF AND PDA SPECIFICATIONS

I_{OD} Operational (Typical): (V_{BATT} = 13.5V and 30% bus utilization)	72mA	J1850 Interface Module alone
	145mA	J1850 Interface Module and Palm IIIx or IIIxe
	176mA	J1850 Interface module and Palm IIIx or IIIxe with backlight illuminated
I_{OD} Sleep Mode (Typical): (V_{BATT} = 13.5V)	11mA	J1850 Interface Module alone
	11mA	J1850 Interface Module and Palm IIIx or IIIxe
JIF Size:	6.69in x 3.35in x 0.87in (170mm x 85mm x 22mm)	
JIF Weight:	8.1oz (230g)	
J1962 Diagnostic Connector:	Pin 2	J1850 bus signal
	Pin 4	Chassis ground
	Pin 16	Battery
JIF DB-15 Connector:	Pin 2	J1850 bus signal
	Pin 4	Chassis ground
	Pin 15	Battery
JIF Operating Range:	-40°C to +85°C	
Palm IIIx LCD Display:	+4°C to +45°C	
PDA Memory:	4MB standard on the Palm IIIx 8MB standard on the Palm IIIxe	
PDA AAA batteries:	The PDA is powered from the vehicle battery via the JIF when running the J1850 Tool application and there is J1850 data bus activity. Otherwise, PDA batteries are used.	

9. LEGAL

Warranty and Software Update Policy

DEC warrants the J1850 Mini Flight Recorder (MFR) hardware for a period of one year from the date of purchase. Software updates for the MFR will be provided via email for a period of three months at no charge.

Disclaimers

APPENDIX A

APORTISDOC MOBILE EDITION

APPENDIX A: APORTISDOC MOBILE EDITION

AportisDoc is a third-party text viewer that DEC pre-installs on the J1850 Mini Flight Recorder PDA. Unlike the Memo Pad application, which limits file size to a maximum of 4K, AportisDoc has no limit on file size and can compress data. It is used to view logged data files on the PDA.

AportisDoc Mobile Edition contains all the features of the standard edition plus the ability to find text, copy text, create categories, control preferences, add bookmarks, use extra fonts, and more. AportisDoc Mobile Edition does not expire and has no functional limitations. Though it normally requires payment within 60 days after installation, DEC has prepaid the required amount and has pre-installed AportisDoc on each J1850 Mini Flight Recorder PDA unit.

A.1 AportisDoc Mobile Edition Installation

AportisDoc Mobile Edition will come pre-installed on the supplied PDA. However, the following instructions have been included in case the program ever needs to be reinstalled.

Upon reinstalling AportisDoc Mobile Edition, all previous versions of AportisDoc software (AportisDoc Mobile Edition, AportisDoc Trialware, AportisDoc Reader, or an old version of Doc or Doc+) will be automatically overwritten. Any AportisDoc documents that you have previously created will remain unchanged.

Note: *Deleting*, as opposed to installing over, any previous version will result in the loss of all AportisDoc documents previously created.

To Install AportisDoc Mobile Edition for Windows 95/98

1. Make sure that you have unzipped AportisDoc to your desktop.

2. Locate and open the Palm Desktop Program Group.

3. Select the install tool.

4. Choose the user name that corresponds to your handheld device.

5. Click the “Browse” button. Click the “Up One Level” icon until you are at desktop level.

6. Now locate the **AportisDoc.prc** file and double-click on it.

7. Click the “Install Another File” button to install another document such as **ADocReference.pdb.**

8. When finished, click the “Exit” button, and perform a local HotSync operation in the usual manner. The files will be installed during the course of the HotSync operation.

If you experience any problems or have questions, please contact Customer Care at Aportis by either e-mailing them at custcare@aportis.com or by calling (503) 736-3240 between 9:00am and 5:00pm PST.

A.2 AportisDoc Registration

AportisDoc Mobile Edition has been registered by DEC. If you need the registration code, contact DEC at (248) 293-1300. Once received, your registration code should be kept in a safe place – both for use within the software and if you need to contact Customer Care.

Have your registration code available before starting the registration process. Activate AportisDoc by tapping the AportisDoc icon on the Application picker.

Next tap the Options Menu in the lower left hand side of the Graffiti area and choose the About AportisDoc command as shown in the left image of Figure A.01.

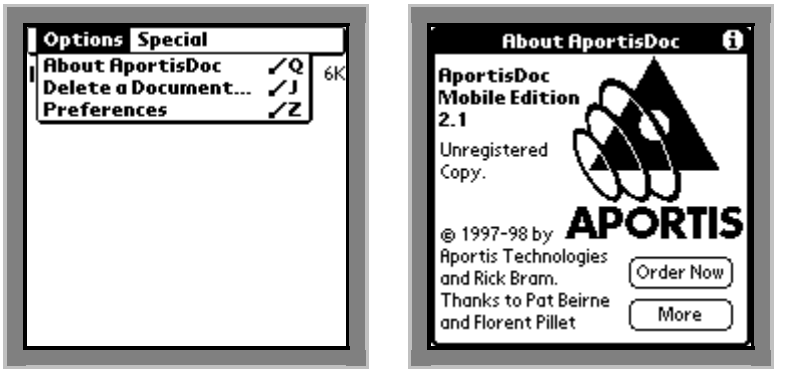


Figure A.01 Aportis Options Menu

The *About AportisDoc* screen appears as is shown in the right image of Figure A.01. Tap the "Order Now" button on the *About AportisDoc* screen and the *Order Now* screen appears. Tap the "Order Now" button and the *Register AportisDoc* screen appears as shown in Figure A.02.

Figure A.02 Register Aportis Doc

Use Graffiti to enter your registration code in the *Enter Code* area (the Registration Code is not case sensitive). Tap the “Register” button. The *Documents List* screen reappears. This completes the registration process and entitles the user to free technical support from Aportis.

A.3 About AportisDoc Documents

The main purpose of AportisDoc is to read log files captured with the MFR. AportisDoc also makes it possible to read a book (or a carry a service manual or a reference guide) on the PDA. Since every company needs an efficient method for distributing written information, AportisDoc provides the solution. AportisDoc documents can be of any length, from a single page to hundreds, and can originate as text, Microsoft Word, or HTML documents. Thousands of electronic books, magazine articles and columns, and other useful materials are available today in AportisDoc format.

Documents List Screen

The *Documents List* screen displays the list of available AportisDoc documents you have installed. It appears when you launch the AportisDoc application from the Applications menu. If you are reading a document, tap the “Done” button to return to the *Documents List* screen. If you have yet to install any documents, the screen will appear empty. Without any AportisDoc documents installed, there will be no entries on this screen. In Figure A.03, two documents are shown. One is the text version of the Aportis Users Manual from Aportis and the other is a J1850 Tool data log titled “MFR_Untitled.” Normally, the user would create a title for a log file that would be preceded by the “MFR_” prefix.

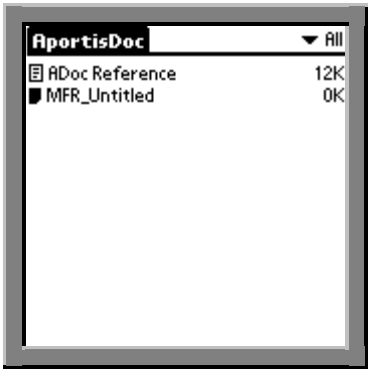


Figure A.03 Documents List Screen

When a document has been read and then closed, it appears on the *Documents List* screen with a black icon indicating it is the document most recently opened.

Reading a Document

Open the document you want to read by tapping on its name in the list of available documents on the *Documents List* screen. If this is the first time the document is being opened, the message “Scanning for Bookmarks” appears (a bookmark is a pre-designated location within a document).

Note: Scanning for bookmarks on a very large log file may take several seconds, during which time Aportis Doc reader will not appear to being doing anything. You may wish to disable bookmark scanning under Aportis preferences as log files have no preset bookmarks.

When the scanning is finished, the document will display on the screen.

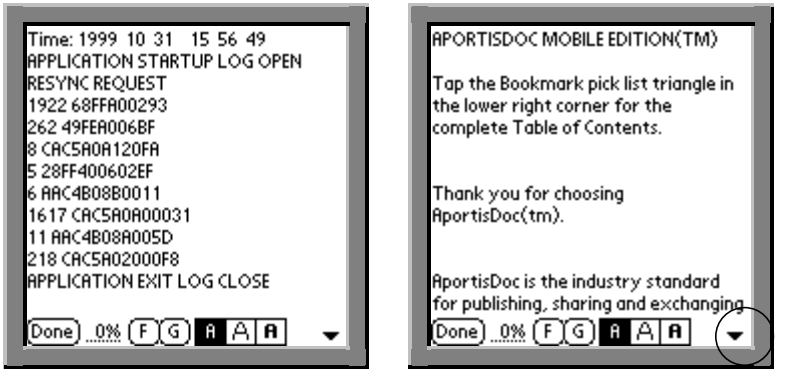


Figure A.04 Viewing a Log and AportisDoc Manual

If there are any Bookmarks in the document, they will appear in the Bookmarks pick list (available by tapping on black down arrow) in the lower right corner.

When you are finished reading a document (or if you want to read a different document), tap the “Done” button or choose the Close Document command from the Options Menu. You will return to the *Document List* screen. The icon next to the file name will be black to remind you that this was the last document opened. When you reopen a document, it will return to the page last opened.

Scrolling Through a Document

A document can be scrolled through by tapping on the screen or via the Scroll Buttons on the front panel of the PDA. Tap the bottom half of the text screen, or press the “Bottom Scroll” button to scroll down. Tap in the top half of the text screen, or press the “Top Scroll” button to scroll up. You can also set the text to scroll automatically by selecting Set Up Prompter from the Display Menu. You may also configure the program to scroll only downwards. See “Tapping Only Scrolls Down” in the Preferences section of the Options Menu.

A.4 AportisDoc Options Menu

The following three selections are available within the Options Menu:

- About AportisDoc
- Delete a Document
- Preferences.

About AportisDoc

Choose the *"About AportisDoc"* command from the Options Menu to register your copy of AportisDoc Mobile Edition as described at the beginning of this appendix.

Delete a Document

Select this option if you want to delete an AportisDoc document or a log file. First, close any open document by tapping the "Done" button or by choosing the *"Close Document"* command from the Options Menu. You will then be at the *Documents List* screen.

Choose the *"Delete a Document"* command from the Options Menu.

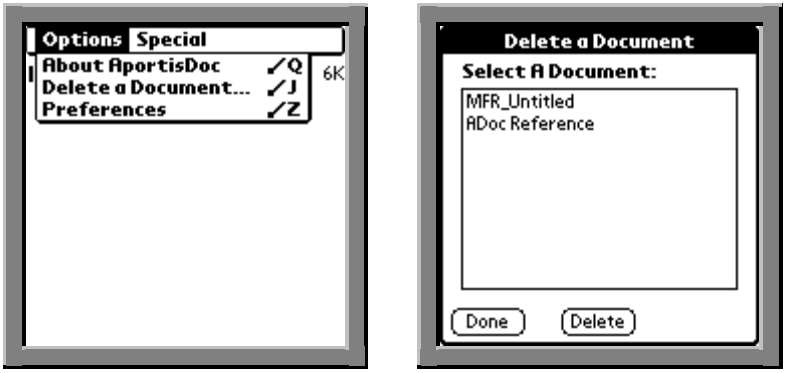


Figure A.05 Options & Delete a Document Menus

A list of all AportisDoc-compatible documents on your PDA appears. If you have many documents, you may have to scroll down to find the desired document by tapping the down arrow. Select the document to be deleted by tapping on it. It will become highlighted. Tap the “Delete” button, and the selected document will be deleted. Repeat this process to delete other documents. Tap the “Done” button and you will be returned to the *Documents List* screen.

Note: To delete all documents, use the *“Erase All Documents”* command from the Special Menu.

A.5 AportisDoc Preferences

A number of settings and features in AportisDoc are controllable from the *Preferences* setup screen. Choose *“Preferences”* from the Options Menu to navigate the preference setup screen as shown in Figure A.06. Tap any checkbox to turn the option on and tap again to uncheck it. Tap the “OK” button when done to return to the *Documents List* screen.

Figure A.06 AportisDoc Preferences Setup Screen

Allow Text Selection

By default, you cannot select text in an AportisDoc document. This is because tapping on the screen is used to scroll up or down. When you want to copy some text in order to paste into another application, tap this checkbox to be able to select text for copying. This should normally be left unchecked.

Strip Linefeeds

Tap this checkbox, and AportisDoc will try to fit more of the AportisDoc document onto the PDA screen. This setting does not display single line feed/carriage returns, but retains double ones that usually signify a new paragraph. Deselecting this option will return the document to the original format.

Overlap Screens

Check this box to keep the bottom line of the previous screen as the top line of the next screen as you scroll. There will be no overlapping of text from screen to screen if this item is left unchecked.

Tap Scroll One Line Only

When checked, tapping on the screen only scrolls one line at a time, instead of a whole screen. In addition, the speed of scrolling depends upon how far from the mid-screen that you tap. The closer you tap to the bottom or top, the faster you scroll.

Tapping Only Scrolls Down

If unchecked, scroll up by tapping the top half of the screen, and scroll down by tapping the lower half. If checked, tapping scrolls down only. This is useful if you just want to sit back and read a document.

Allow Global Find (Slow!)

When Allow Global Find is checked, tapping the magnifying “Find” button will search through all AportisDoc documents for the selected text. This could take a long time, depending on the number of large AportisDoc in the PDA. To cancel a search, press the hardware “Down” button.

Show Search Progress (Slower!)

This makes the global search display the name of the particular AportisDoc document being searched. As a Search Progress indicator is being displayed, you can skip the current document by pressing the hardware “Up” button, and AportisDoc will skip to the next document.

Show File Sizes

This displays the size of each AportisDoc in the *Documents List* screen.

Alphabetize Names

This item controls whether or not documents are listed in alphabetical order or in the order in which they were installed.

Scan For Bookmarks

This enables the Auto Bookmarking feature.

A.6 AportisDoc Special Menu

This menu contains the following commands: Set Categories, Read Documents, Erase All Documents, and Backup Everything. These options are shown in Figure A.07.

Figure A.07 Special Menu Options

Set Categories

Choosing *"Set Categories"* menu item will allow you to choose the categories for documents.

Note: You *cannot* read (open) documents while in this mode. Tapping on a document name opens a pick list of the available categories. Tap on any category to assign a document to it.

Category names may be edited. For example, you might create a category called J1850 Docs to save reference documents to ensure they are not accidentally erased when erasing log files.

To Create a New Category

Tap the “New” button and use Graffiti to enter the name for the new category. Tap the “OK” button when done. The new category will appear in the list.

To Delete a Category

Tap to select the category to be deleted. Tap the “Delete” button, and the category will be deleted.

Note: If you delete a category name, the documents filed under it will be assigned to the Unfiled category.

To Merge Documents from Different Categories

Rename one category to another existing category name by tapping to select the category to be merged, then tap the “Rename” button. Use Graffiti to change the name to the exact name of another category. Tap the “OK” button when done. The category you renamed will disappear from the list. Tap the “OK” button when finished and changes (deletes, renames) will be performed. When finished setting categories, choose the *“Read Documents”* command from the Special Menu (see next topic).

Note: Categories may also be set via the Category pick list, located in the upper right corner of the screen.

Read Documents

Choose the *“Read Documents”* menu item when you are through setting categories. The menu bar will change from Set Categories to AportisDoc. You can now read documents.

Erase All Documents

The *"Erase All Documents"* command clears all documents in the currently active category. Choose *"Erase All Documents,"* and the confirmation message appears as shown in Figure A.08. Tap the "Delete" button and all documents will be erased. Tap the "Cancel" button to leave them unchanged. Select *"Delete a Document"* from the Options Menu, to selectively delete documents.

Note: This command only deletes the files in the current category. It is recommended that Log files be stored under a different category from general documents that the user does not want deleted.

Note: Use Erase All with extreme caution to prevent accidental erasing of documents.

Figure A.08 Special Erase All Documents Option

Backup Everything

Choose the Backup Everything command, and when you perform the next HotSync, and all of the AportisDoc documents currently loaded will be copied to the Backup directory on your computer. To override this feature once it has been set, uncheck the Backup checkbox in the individual document's Details dialog (see Options Menu in a Document).

A.7 AportisDoc Button Bar

Open a document by tapping on the file name in the *Documents List* screen. When you are reading a document, some functions are available at the bottom of the screen as shown in Figure A.09. This area of the screen is called the Button Bar. It may be hidden by choosing the Larger Text Window command from the Display Menu. If it is not displayed, choose the Smaller Text Window command from the Display Menu, and the Button Bar will appear. To view these menu items, tap the “Menu” button on the lower left area of the Graffiti screen.

Figure A.09 Button Bar in Open Document Screen

“Done” Button

Tap the “Done” button to close the current document. Aportis returns to the *Document List* screen. When the document is later opened, it will return to the last viewed page.

Percentage Read/Jump To

The number displayed on screen indicates the approximate current position in the document. You can move instantly to any portion of the document. Tap the percentage area and the Jump To dialog screen appears as shown in Figure A.10.

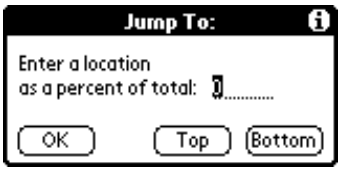


Figure A.10 Percentage or Jump To Dialog Screen

The current percentage is displayed. Use Graffiti to enter a percentage, and tap the “OK” button. AportisDoc will go to that portion of the document. Tap the Top or Bottom button to instantly go to the top or to the bottom of the document.

F/G (Find/Get Again) Buttons

Use the Find or Get buttons to search for a word or phrase. Tap the “F” Button and the screen shown in Figure A.11 appears as shown below:

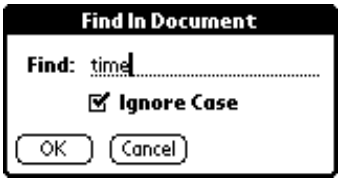


Figure A.11 Find and Get Screens

Use Graffiti to enter a search word or phrase such as “time.” Check the Ignore Case checkbox to make the search case-insensitive, and tap the “OK” button to begin the search. If a match is found, the word (or phrase) will appear highlighted. If AportisDoc cannot find any, or any more, occurrences of the selected word or phrase, it will beep.

Note: Searches begin from the current page, go forward through the document, and stop at the end. To search from the beginning of a document, first tap the “Top” button on the Jump To dialog (see above), and then tap the “F” button.

Tap the “G” button (Get Again) to search for the same word or phrase as the last Find. This allows the user to skip the Find dialog before searching again. The “F” and “G” buttons perform the same functions as the Find and Find Again commands in the Go Menu.

Font Buttons

These three characters represent the three fonts available - Regular, Big, Bold. Tap on one of the font icons and all the text will change immediately to the new font. Experiment with each, and choose the one best suited for your eyes and reading conditions.

A fourth Mono-spaced font is referenced in AportisDoc, but is not available on the Palm IIIx. Mono-spaced is actually named Profont, a special font created by Rick Bram that is represented by a "P." The font buttons are equivalent to the font commands in the Display Menu.

Bookmark Triangle

A Bookmark is a pre-designated location within a document. Tap on the down pointing black triangle and a pick list of all bookmarks in the current document (if there are any) is displayed. Tap an item from the pick list to immediately jump to the marked part of the document.

The last item in the Bookmark pick list (or the only item if there are no bookmarks) is Add a Bookmark. Tap “Add a Bookmark,” and the current top of screen position in the document is set as a bookmark.

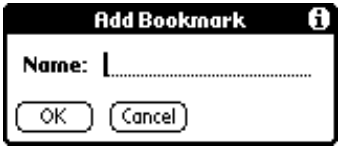


Figure A.12 Add Bookmark Dialog Screen

Use Graffiti to enter a name for the bookmark in the *Add Bookmark* dialog screen. Bookmark names must be 15 characters or less. Tap “OK” and the bookmark name will appear in the Bookmark pick list. The Add Bookmark command is also available in the Go Menu.

A.8 Option Menu Items

When reading a document, there are three menu pull down lists available as shown in Figure A.13.

Figure A.13 Menus Available

Options Menu

The Options Menu is available when reading a document. It allows access to the About AportisDoc and Preferences commands described previously, plus three additional commands - Copy, Close Document, and Details.

Copy

Choose the Copy Command to place selected text in the clipboard for pasting into another application.

Note: The Preferences item, *Allow Text Selection*, **must** be checked prior to selecting this command, or text will not be selected or copied.

Close Document

Choose the Close Document command to close the current document and return to the *Document List* screen. Tapping the “Done” button at the bottom of the screen performs the same function.

Details

The Details command allows you to set specific characteristics for each document, including Privacy, Categories, whether to back it up, and how it should be searched. Choose the Details command, and the Details dialog box appears as shown in Figure A14.

Figure A.14 Document Details Dialog Screen

Set the Category for the document by tapping, then selecting a category from the Category pick list (see also Set Category).

Check the Private checkbox for security. This will ensure that confidential AportisDoc documents will not appear if you choose to hide records in the built-in Security Application.

Check the Backup This Document checkbox to configure the document so that it will be copied back to your desktop computer the next time you perform a HotSync. This is useful when you have set a large number of bookmarks and want to keep them for the next time you use the document.

Note: The backup attribute stays set until you manually uncheck it. Otherwise, every time you HotSync, each specified document will be copied.

Check the Always Search checkbox to specify that a document can be searched with the Global Search. This overrides the Preference setting, even if it is set to not allow Global Searches. Using this option, one or more documents can always be globally searched, while others are ignored.

Tap the “OK” button when you are finished.

A.9 Go Menu Items

The commands listed in the Go Menu shown in the center screen of Figure A.13 enables quick navigation within a document.

Find

Use this command to search for a word or phrase in a document. The process is the same as described previously in Figure A.11.

Get Again

Choose the Get/Find Again command to search for the same word or phrase as the last Find (or tap the “G” button in the Button Bar).

Go To Bookmark

Use this command to display the list of bookmarks in the open document. Choose the Go To Bookmark command and a pick list all bookmarks in the current document is displayed. Tap an item from the pick list to immediately jump to the marked part of the document. The Go To Bookmark command performs the same function as tapping the Bookmark Triangle.

Add Bookmark

Use this command to set the current top of screen position as a bookmark. Choose the Add Bookmark command and Figure A.12 appears. Use Graffiti to enter a name for the bookmark. Names must be 15 characters or less. T.ap OK when done and the bookmark name will appear in the Bookmark pick list. This is the same as selecting the last item in the Bookmark pick list. In the case of a long list of bookmarks, this is a quick method to obtain the Add Bookmark dialog screen.

Delete Bookmark

Choose the Delete Bookmark command and the bookmark pick list appears. Tap on a bookmark to delete it.

Note: Use with caution as no confirmation dialog appears and the bookmark is instantly deleted.

The last item in the bookmark list is “DELETE ALL!!.” Select this item and a *Confirmation* dialog screen appears.

Figure A.15 Delete All Confirmation Dialog Screen

Tap the “Delete” button and all bookmarks will be erased. Tap the “Cancel” button to leave them unchanged.

Auto Bookmark

Select the Auto Bookmark command to create bookmarks automatically, and the dialog screen shown in Figure A.16 will appear. Use Graffiti to enter specific text to be found and bookmarked throughout a document. Check the Ignore Case checkbox, if desired.

For example, you could search for the word “Chapter,” followed by 5 characters. Use Graffiti to enter a name to appear in the Bookmark pick list, like “Chap.” Tap OK and at each occurrence of “Chapter,” a Bookmark will be created and will appear in the Bookmarks pick list. Following the same example, if Chapter 1 was found, the Bookmark will read Chap 1. If Chapter 4 was found, the Bookmark will read Chap 4. The settings for this example are shown in Figure A.16.

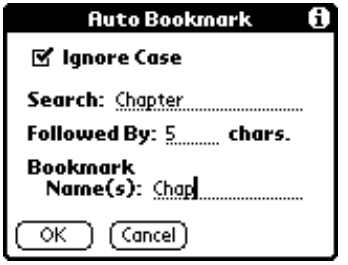


Figure A.16 Auto Bookmark Example

Go To Top or To Bottom

Select the To Top or To Bottom command to either take you all the way to the beginning or to the end of the current document. Identical functions are available from the Percentage/Jump To dialog in the Button Bar.

A.10 Display Menu Items

The commands in the Display Menu determine if text is scrolled automatically, set the screen size, and set the font size.

Start, Stop, and Set Up Prompter

These three commands control the teleprompting or auto scroll feature of AportisDoc. Use this function to have AportisDoc scroll a document automatically without interaction from the user.

Figure A.17 Automatic Document Scrolling

To setup automatic scrolling, choose the Set Up Prompter command as shown in Figure A.17. Select the amount you would like to scroll at a time, either one page or one line. Select the speed at which you'd like to scroll. Check the "Use Hardware Buttons" to control scrolling with the PDA push buttons. The "Date Book" and "Address Book" buttons start and stop the prompter. The "To Do List" and "Memo Pad" buttons slow down or speed up the rate of scrolling.

Use Graffiti to enter an exact time between scrolls in seconds and ticks (tenths of seconds).

Check the Never Sleep checkbox to prevent the PDA from going to sleep even if long intervals between scrolling are set.

Choose the Start Prompter command to begin automatic scrolling and the Stop Prompter command to halt scrolling. Tap the "OK" button when done with your settings.

Larger or Smaller Text Window

These commands hide or display the Button Bar at the bottom of the screen. The “Larger Text Window” option maximizes the number of lines of text that can be displayed on the PDA screen.

Regular, Big, Bold, and Mono-spaced Font

The four Font commands correspond to the font buttons on the Button Bar at the bottom of the screen. As previously noted the Mono-spaced font is not available on the Palm IIIx.

Screen Width

Use the Screen Width command to use a virtual screen that is wider than the PDA’s 160 x 160 pixel screen. Choose the Screen Width command to display the dialog screen shown in Figure A.18. All numbers shown are pixel counts, not the number of characters. The minimum pixel width that can be set is 158.

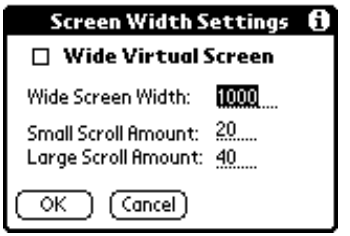


Figure A.18 Screen Width Setup

To enable the wide screen capability, check the Wide Virtual Screen checkbox. Using Graffiti, enter the Screen Width and Scroll amounts desired and tap “OK.” Once the Prompter function and the Start Prompter command is chosen, scroll left and right by tapping on the edges of the screen.

The “Date Book” and “Address Book” buttons scroll left in the large and small amounts as set in Figure A.18. The “To Do List” and “Memo Pad” buttons scroll right in small and large amounts respectively.

To turn off the Virtual Screen, select the Screen Width command, and uncheck the Wide Virtual Screen checkbox. Tap “OK,” and the screen will return to its normal width.

A.11 Aportis Customer Care

For up-to-date information, check the Aportis web site. Aportis will provide free technical support to all registered users. Before contacting Aportis Customer Care, please take a few minutes to review the User's Guide, check the On-line Tips, and read the FAQ’s on the Aportis web site. Your feedback and suggestions for future enhancements are very much appreciated. Their preferred method of contact is by e-mail or fax.

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PO Box 86336,
Portland, OR 97286-0336

Web: www.aportis.com
Email: custcare@aportis.com
Voice: (503) 736-3240 (Monday-Friday: 9:00 AM to 5:00 PM PST)
Fax: (503) 736-3239

APPENDIX B

IN-VEHICLE UNIMOUNT HARDWARE

APPENDIX B: IN-VEHICLE UNIMOUNT HARDWARE

B.1 IMPORTANT SAFETY PRECAUTION WARNING

Safe driving requires that you concentrate and keep your eyes on the road. Failure to pay full attention to the operation of your vehicle could result in death, serious injury, or property damage. You assume total responsibility and risk for using this device in a moving vehicle. To prevent a possible incident, it is recommended that a minimum of two persons be in the vehicle while using the Mini Flight Recorder, one person to operate the vehicle and at least one other person to operate the MFR system.

Do not mount the UniMount System on or near an airbag cover plate or within an airbag inflation zone.

B.2 Vehicle Mounting Instructions

The Mini Flight Recorder is supplied with mounting hardware to ensure a reliable serial connection between the JIF and the PDA and to provide convenient and stable mounting in a vehicle. The mounting hardware consists of two major components. The base unit and universal pedestal mounting hardware as shown Figure B.01 below.

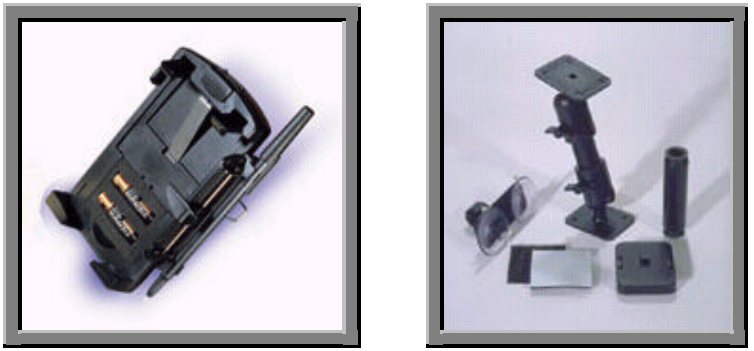


Figure B.01 UniMount Base Unit and Universal Pedestal Hardware

The PDA snaps into the base unit shown in Figure B.02 and connects to the serial RJ-45 housing block at the bottom of the holder. To remove the PDA, press the release button at the top center of the base unit.

A selector system along the right edge of the holder is useful for navigating through the J1850 Tool screens or picking a name from the address/phone list. Slide the selector up or down to the desired function and press the selector to open the desired item. A combination ink pen and stylus with snap in holder is also attached to the slide selector base. The selector and penholder may be removed from the base unit. Loosen the two screws on the back of the unit and remove the assembly.

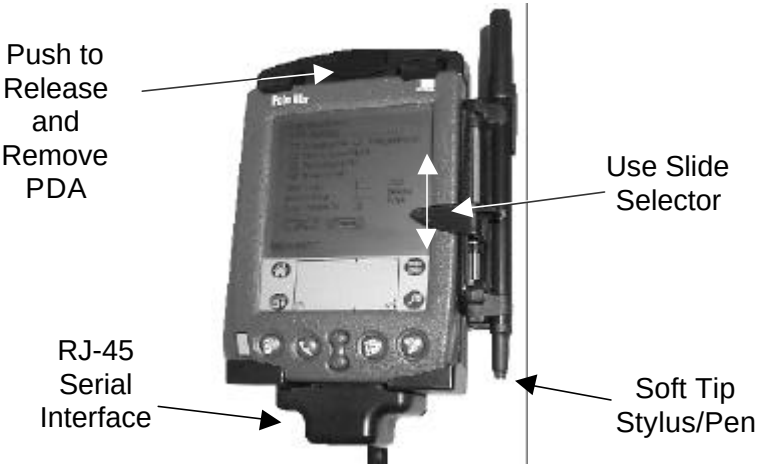


Figure B.02 Base Unit with Slide Selector

The pedestal mounting hardware can be configured for a variety of mounting methods in a vehicle or at the bench. Attach the flange with snap over male keyway to one joint and long or short extension tube. This end of the mount mates with the back of the base unit using a keyway system. When assembling the rotational joint, a ratchet or smooth adjustment is possible depending on the orientation of socket pieces.

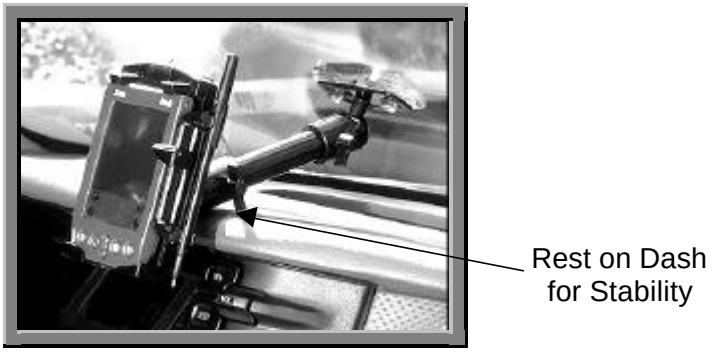


Figure B.03 Window Mounting Example

There are multiple options for attachment in the vehicle. The second mounting flange can be screwed in place or attached with the supplied Velcro pads. The most convenient attachment method for a vehicle is the dual suction cup mounting shown in Figure B.03. For stability, rest the pedestal arm on the dashboard of the vehicle. When attaching the suction cups to the window, place the removal pull tabs up so they are easily accessible.

The easy release keyway allows the base unit to be quickly removed from the mount for hand held usage by a passenger in or around the vehicle. The suction cups and mounting arm can remain attached to the windshield.

APPENDIX C

J1850 Tool Software Suite Version 2.0 Enhancements

APPENDIX C: J1850 TOOL SOFTWARE SUITE VERSION 2.0 ENHANCEMENTS

J1850 Tool Software

A “Memory/Log Indicator” button was added to the *Bus Monitor, ID Monitor,* and *ID Monitor with Time* screens. This button allows logging to be turned off and on with a single tap of the stylus. This same button also displays the available memory and the number of blocks that have been completely logged.

A Lock Out User option was added. When this setting is selected, users cannot alter the Mini Flight Recorder’s setup configurations or leave the J1850 Tool application without entering a password. This allows the MFR to be used for customer ride-along tests for intermittent problem diagnostics.

With the new version, specific Send Message IDs can be assigned names. These messages can be displayed in hexidecimal or by name on the Send Configuration screen for quick and easy reference.

A default name feature was added. When this feature is selected, the software assigns a default log name based on the date and time of the log’s creation.

A pop up warning window was added to notify users when they enter an invalid message ID. A warning window also pops up, if Push Down Old is selected, when a log file is about to be overwritten.

A Beam function was added to allow users to share configurations with other users of the same version of software.

Titles were added to the tops of all screens for easy identification.

A “Clear” button was added to all setup dialogue screens for quick removal of unwanted entries.

An *About* screen was added, which now displays the software’s summary information and version number.

Conduit Software

Synchronization of data logs to a PC during the HotSync process is now twice as fast as with previous versions of J1850 Conduit software.

Data files and configurations saved prior to the last HotSync may now be quickly restored to the PDA.

Log File Excel Macro

The new excel macro now handles large files by creating multiple worksheets in a single workbook.

APPENDIX D

ERRATA

APPENDIX D: ERRATA

JIF Errata

The JIF can be programmed to saturate the bus. On a saturated bus, messages might not be able to get out from the JIF and other modules may be prevented from sending. Performance is not guaranteed or specified if the bus is saturated (100% effective utilization).

Performance is also not guaranteed if the configuration violates the SAE J1850 specification for normal messages. An IFR to a message that exceeds 12-bytes is an example of a configuration in violation of the SAE specification. In this case, the JIF will not respond and will send the excess bytes.

If the JIF transmits a Type 2 IFR, any Type 2 responses from other modules after the JIF responds will be flagged with an invalid symbol error. This is due to the Motorola HC12 BDLC J1850 interface in the JIF. This problem has no simple resolution. If the JIF is NOT sending a Type 2 IFR and only logging other responses, there is no problem. Thus two MFRs could be used, one for logging, one sending an IFR.

If a CRC error occurs while receiving a message, an IFR transmission to that message can still occur due to a BDLC error on the HC12 microcontroller.

An “Error 13” or “Error 14” message may be displayed, especially when the user is entering information into the PDA. These errors are due to bugs within the Revision 0.2 of the JIF software. The errors indicate that a reset has occurred on the JIF and some J1850 messages were lost.

PDA Errata

DEC recommends that J1850 Tool 2.0 software be installed on black and white PDAs running Palm OS 3.1 or 3.5 only. J1850 Tool 2.0 will not work on color PDAs.

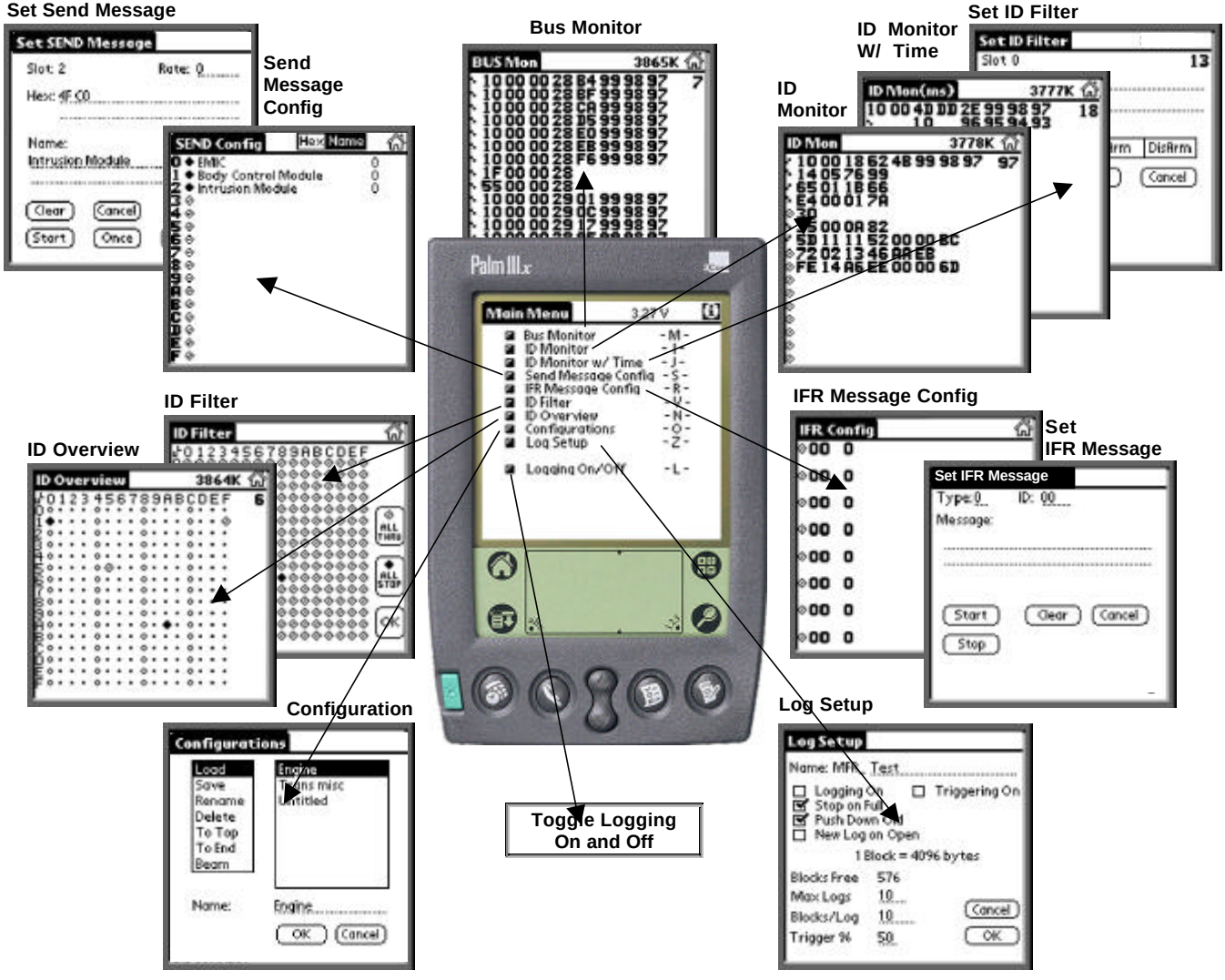
J1850 Conduit

Due to the way the Palm backup conduit functions, occasionally PDBs associated with the J1850 MFR will be placed in the *Palm\<PDA User Name>\Archive* directory instead of the *Palm\<PDA User Name>backup* directory. In these instances, a notation will occur in the log erroneously indicating that these files have been deleted from the PDA.

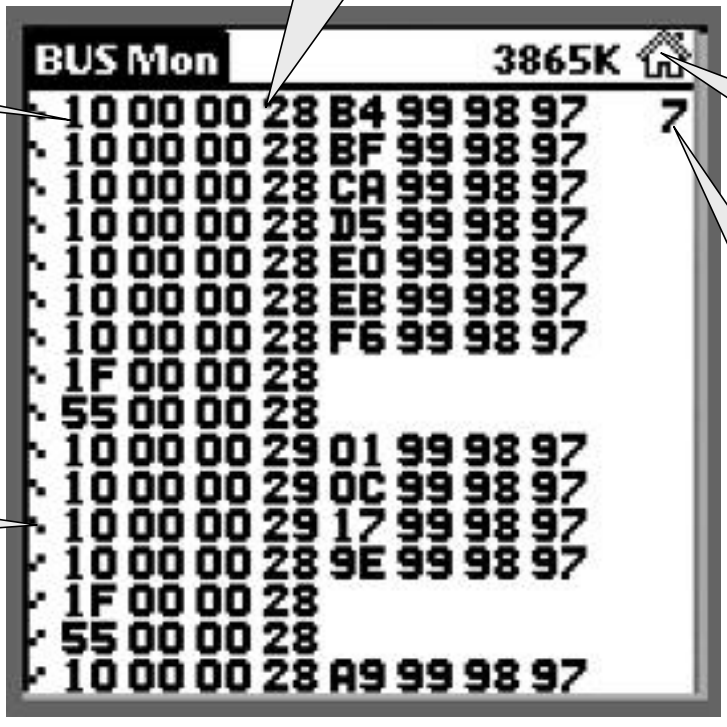
APPENDIX E

QUICK REFERENCE

Main Menu - Central Navigation Screen



Bus Monitor Screen



Remaining Bytes Message Data

1st Byte Message ID

Tap Here to Return to Main Menu

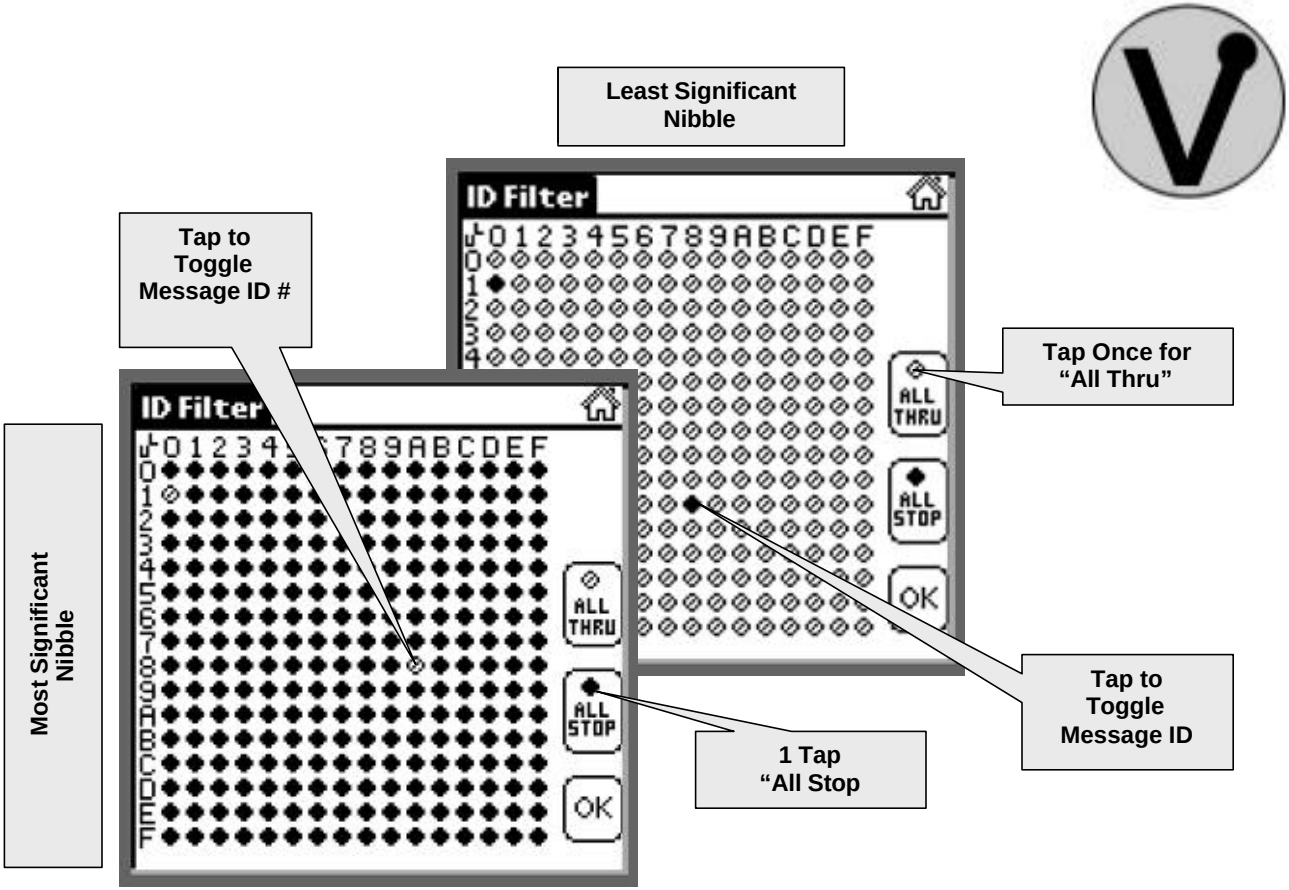
Percent Bus Utilization

Notes

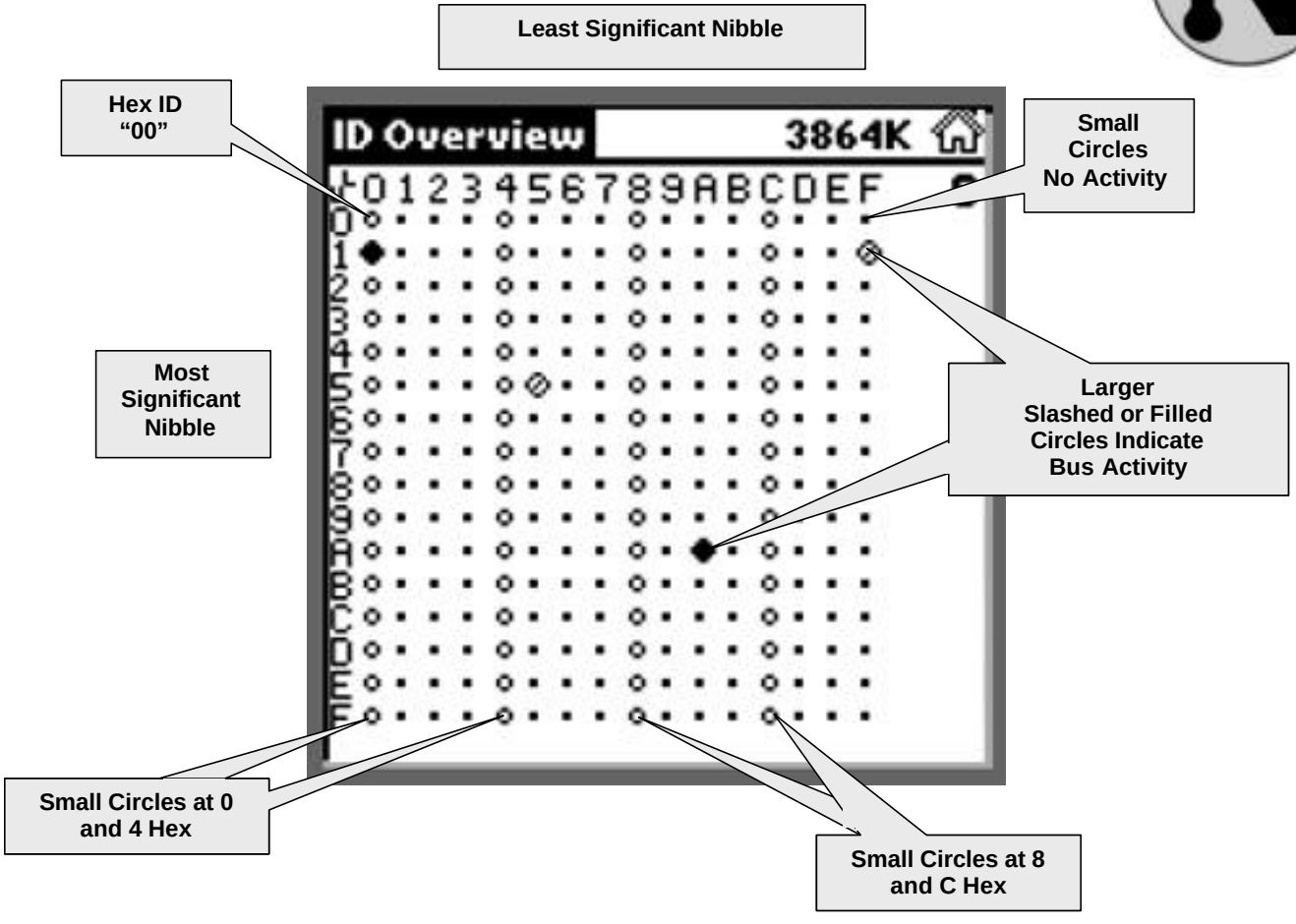
1. **Only the first 8 bytes are shown including the CRC byte.**
2. **IFRs are not specifically displayed, but their presence is indicated.**

Spinners Rotate as Data Changes

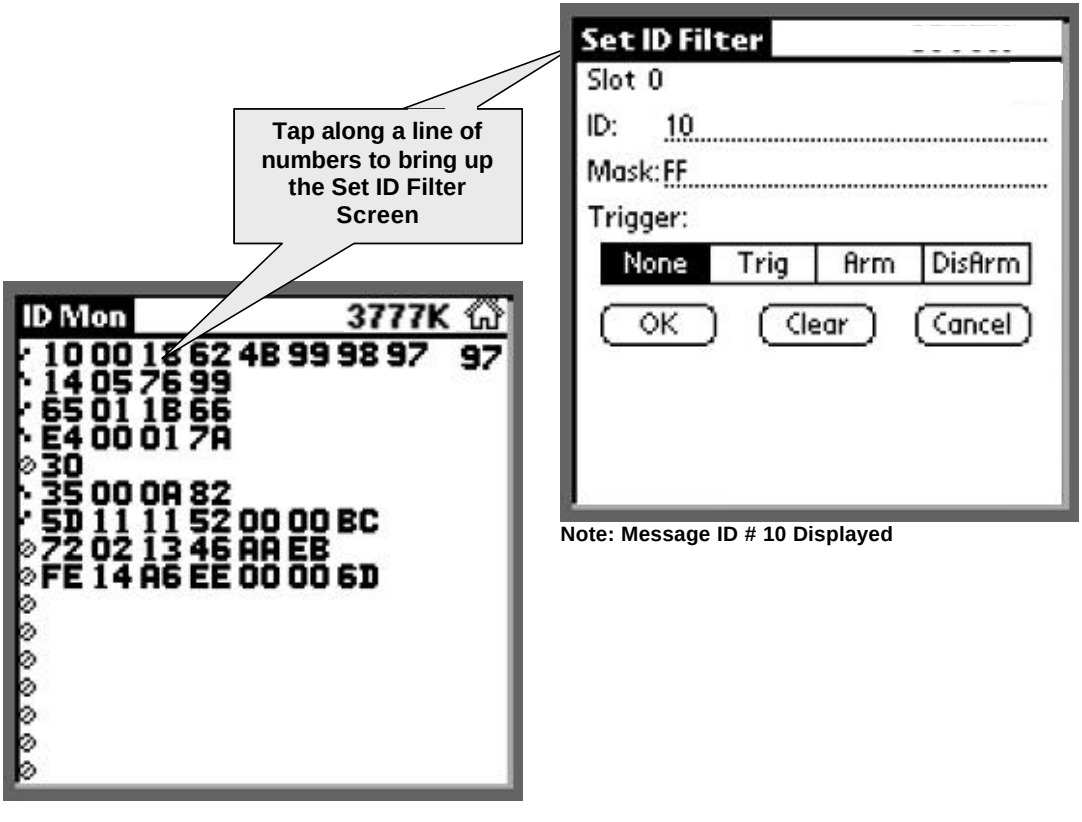
ID Filter Screen



ID Overview Screen

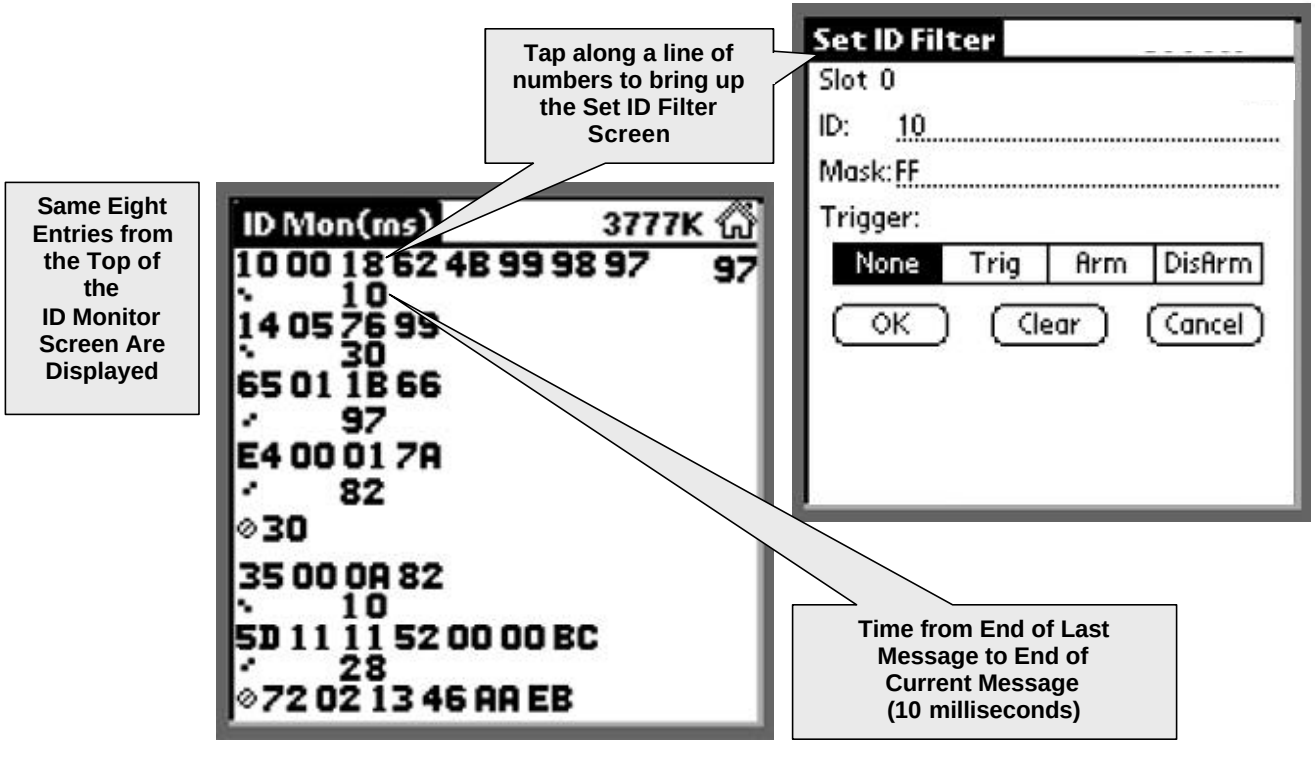


ID Monitor Screen

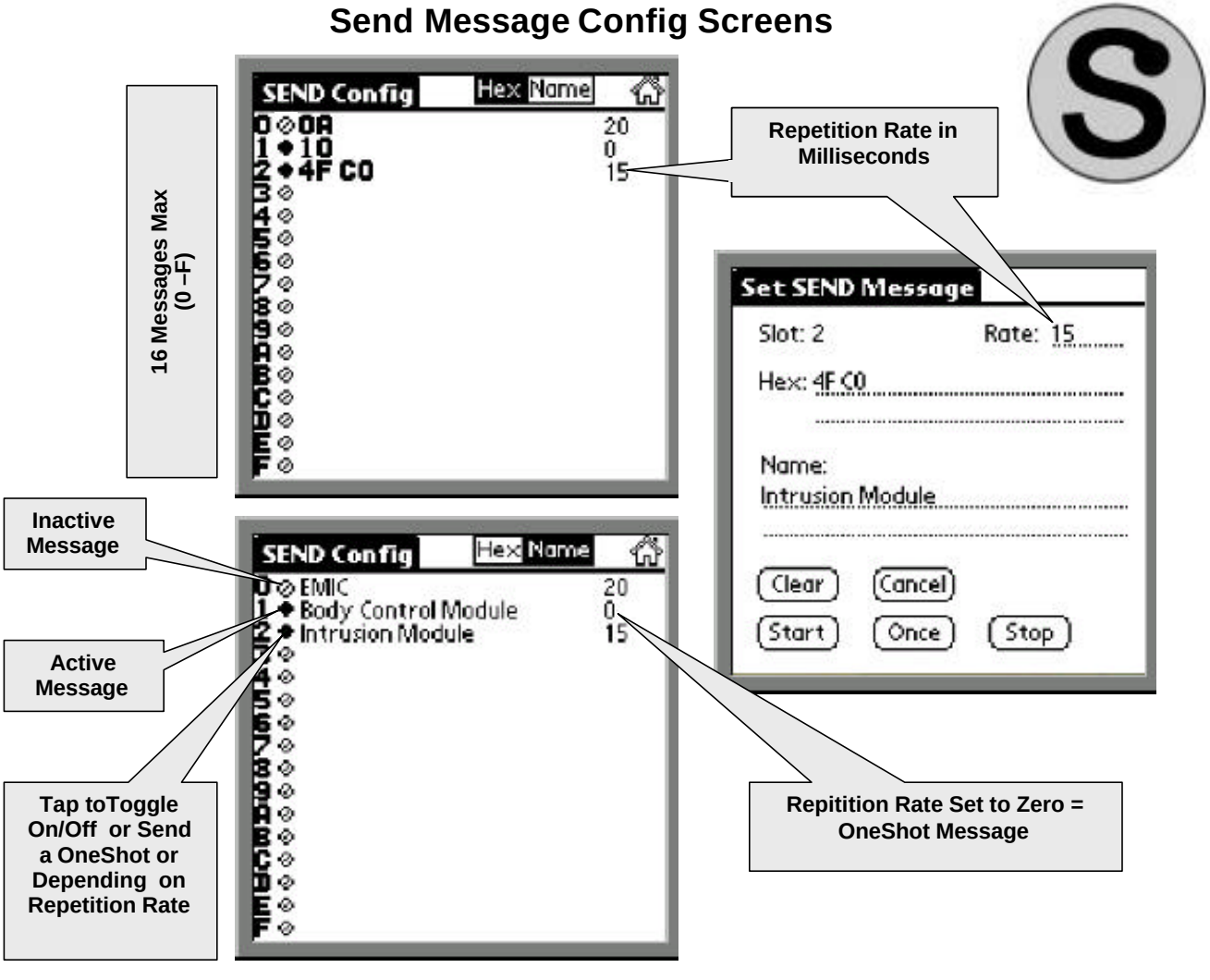


Note: Message ID # 10 Displayed

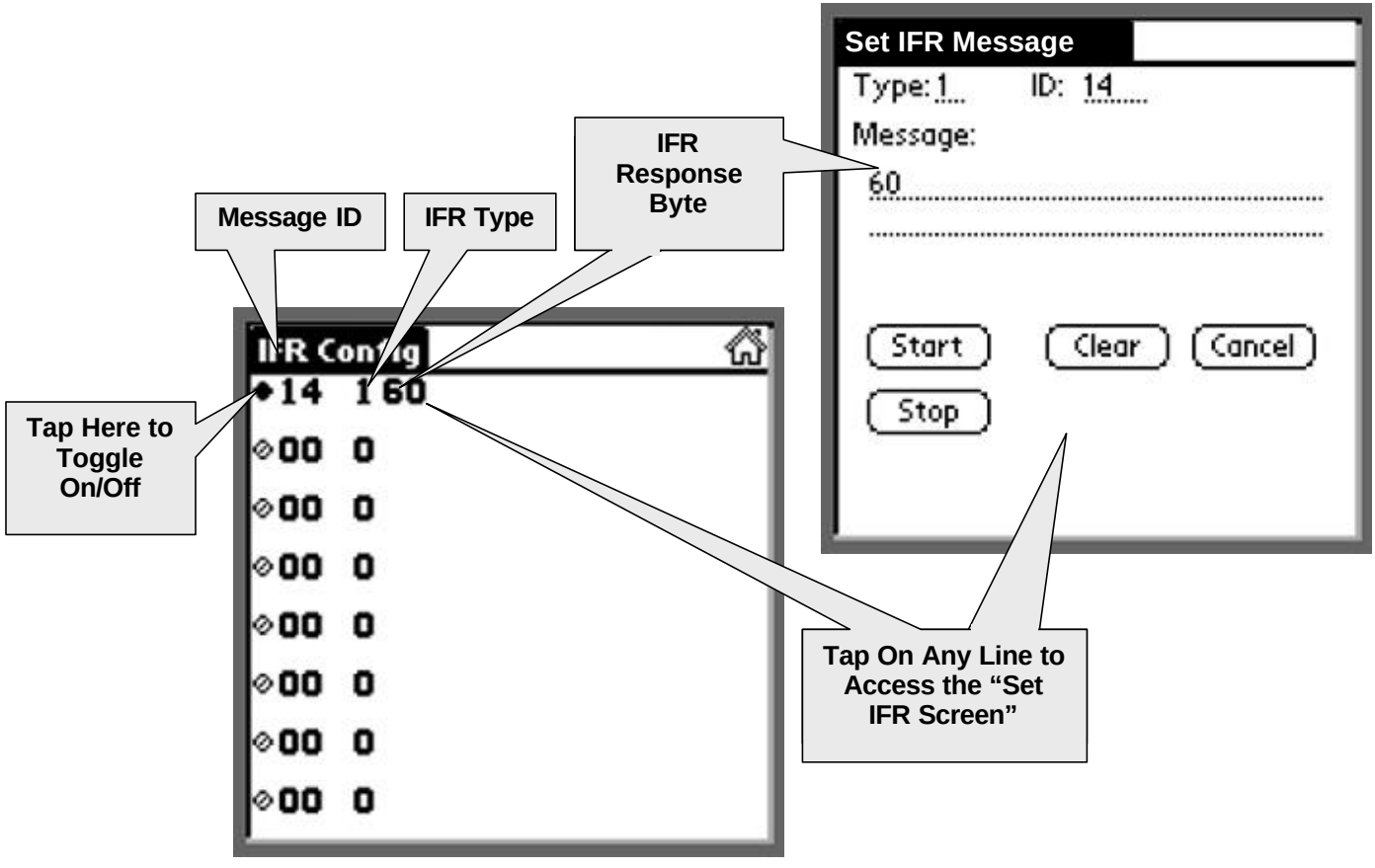
ID Monitor with Time Screen



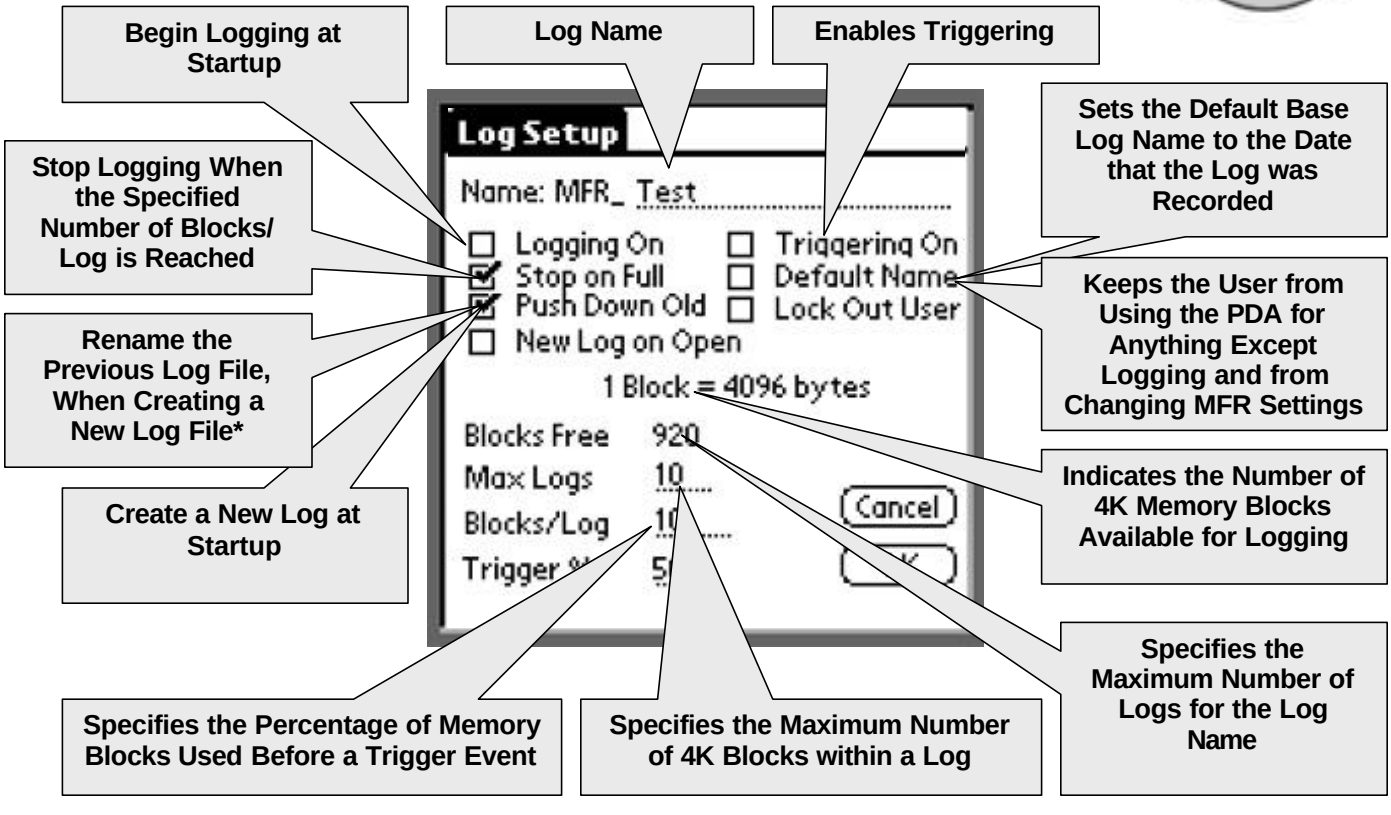
Send Message Config Screens



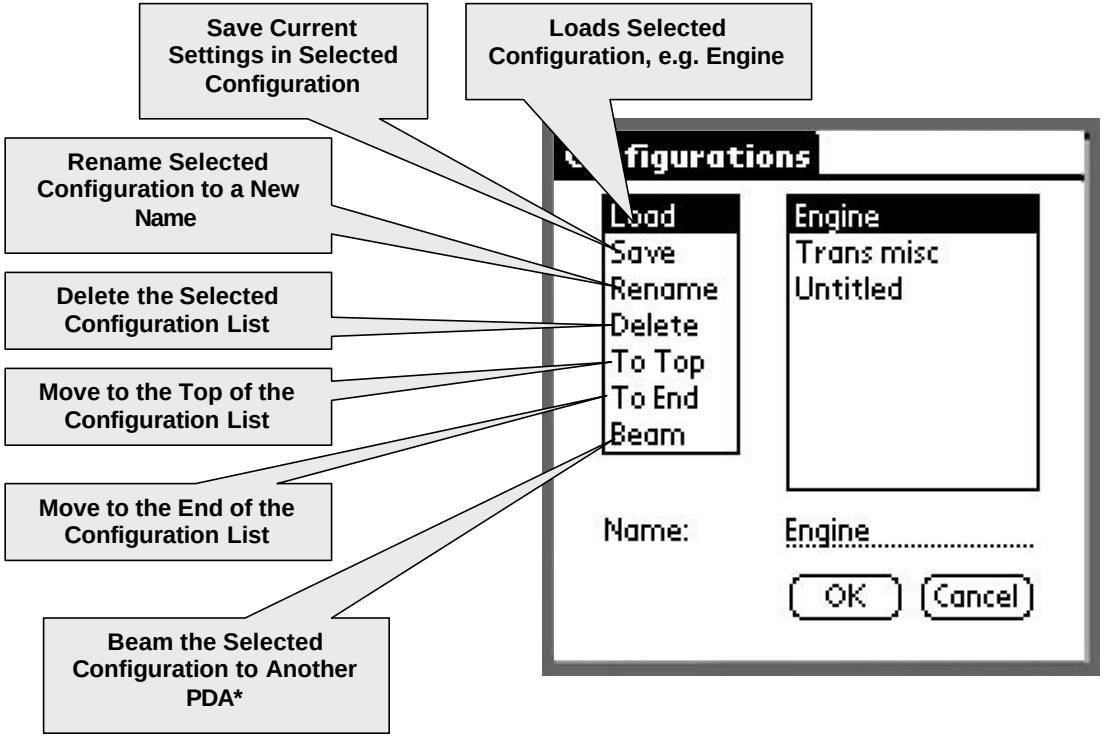
IFR Config Screen



Log Setup Screen



Configurations



* Receiving PDA must have the same version of the J1850 Tool software installed and must be on the *Application* screen.