REF TEK®
OPERATIONS TASKS MANUAL
for the
72A SERIES DATA ACQUISITION SYSTEMS

Using Field Set-up Terminal (FST) Software

For FST Software Version 2.57 (PASSCAL Compliant)
Used on an Epson Hand Terminal (EHT-10)

Manual Version A
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About This Manual

This manual provides information to assist you in using REF TEK Field Set-up Terminal (FST) software on an Epson EHT-10 hand terminal for the initial set-up and continued operation of 72A series Data Acquisition Systems.

This operations manual includes pertinent information on the following topics:

* Introduction to using Field Set-up Terminal software
* Selecting data recording parameters
* Implementing the data recording parameters
* Using FST utilities
* Using miscellaneous FST functions

This manual also includes an appendix that provides procedures to fully initialize your EHT-10 hand terminal, if necessary.

Software Version

The information in this manual is accurate for products that use EHT software of any version from that shown on the cover to the version of EHT software that you received with your DAS unit(s).

Complete Documentation Set

This manual is part of the *REF TEK Operations, Peripherals, and Networking Documentation Set*; other REF TEK documentation sets include the following:

* *REF TEK Technical Reference documentation Set*
* *REF TEK Data Acquisition System (DAS) Software Documentation Set*
* *REF TEK Peripheral Processors Software Documentation Set*

This manual is maintained at Refraction Technology, Inc.
It is located under the pathname *f:\wpdata\docsets\operate\fst\fst_mas*

Manual Version

The information in this manual and previous versions (as noted) is accurate for REF TEK 72A series Data Acquisition Systems with the following serial numbers:

Version	Product:	72A-02	72A-06	72A-07	72A-08
Version A		614+	6165+	7159+	614+

The serial numbers shown above apply for standard units only; for custom units with serial numbers within the ranges noted above, the version of FST and particular FST operations may deviate somewhat from the information in this standard manual. With custom units, Refraction Technology provides customized documentation that addresses any differences from the information in the standard documentation. The *Manual Version* or *Document Version* section in the front of each custom manual or document provides the serial numbers of units for which that documentation applies.

If you have further considerations on the applicability of this manual to your particular DAS unit(s), please contact Refraction Technology, Inc. Our address and phone numbers are on the inside cover of this manual.

Contents

Figures List

1 Introduction to Field Set-up Terminal (FST) Software

The REF TEK Field Set-up Terminal (FST) is a program used to set up and control 72A series Data Acquisition Systems (DAS units). The Field Set-up Terminal software is menu-driven, displaying a new set of fields and keys for each menu and entry screen. The specific procedures for using the FST menus are outlined in this manual.

In all cases, the FST software is designed to run specifically from an Epson EHT-10 hand terminal, a hand-held computer with an interactive LCD graphics display area and a pressure-sensitive keyboard. You can manually enter system parameters for your 72A DAS, or you can download parameters from a DAS to the EHT-10. When you receive your EHT-10, it already includes the erasable, programmable read only memory (EPROM) that contains the latest version of FST software.

Some general, useful features of the EHT-10 hand terminal include the following:

* Eight hour continuous battery power
* 84 x 154 dot-addressable LCD display with 70 (5 x 14) touch-sensitive positions
* CPU compatible with Z80 architecture
* 12 kilobytes of RAM
* 64 kilobytes of EPROM
* 256 kilobytes of non-volatile system RAM, with a CP/M operating system and BASIC interpreter
* Clock/timer
* Audible tone generator

This section, explaining how to operate FST on the EHT-10, addresses the following general procedures:

* Starting the EHT-10 and FST program
* Using the FST Main menu functions
* Using basic FST operations
* Using other EHT-10 features

Starting the EHT-10 and FST Program

To begin using the FST program, connect the EHT-10 to the 72A series DAS unit and start the hand terminal, as follows:

* Secure the U229/U connector on the REF TEK 72-8053 Hand Terminal-to-72A DAS cable to the terminal connector on the DAS unit's faceplate. Figure 4 provides a schematic of the 72-8053 cable.

* Secure the other end of the 72-8053 cable to the RS232C connector on the side of the EHT-10. Be sure that you can see the arrow on the MMDC 8P13 connector while you look at the hand terminal's display screen.

* Flip the EHT-10 unit's power switch to turn the unit on. It should immediately display the FST Main menu, as shown in figure 1.

Note: If the FST Main menu is not immediately visible, see the *Resetting the EHT-10* subsection in Appendix A, *Initializing the EHT-10*.

Main Menu for FST

All FST operations originate from the Main menu, shown in figure 1. The Main menu provides top-level access to all the FST commands.

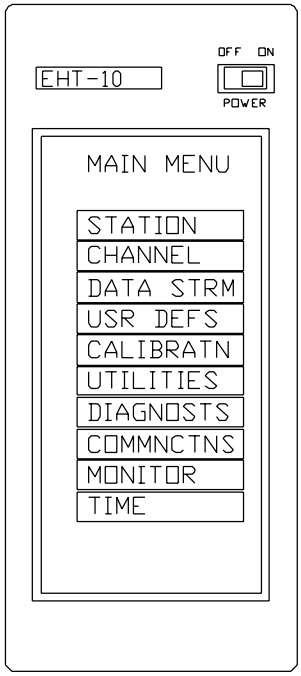

Figure 1 FST Main Menu on the EHT-10

Main Menu Selections

This subsection presents a list of the selections on the FST Main menu and a description of their function and use:

* Station — Opens the Station Definition menu, which provides FST commands to define station parameters for the DAS. See section two, *Selecting Data Recording Parameters*, for procedures for using the Station Definition menu.

* Channel — Opens the Select Channels menu, which provides FST commands to define channel parameters for the DAS. See section two, *Selecting Data Recording Parameters*, for procedures for using the Select Channels menu.

* Data Strm — Opens the Data Stream Definition menu, which provides FST commands to define channel parameters for the DAS. See section two, *Selecting Data Recording Parameters*, for procedures for using the Data Stream Definition menu.

*	Usr Defs	This function is not implemented in the current version of FST.
*	Calibratn	Opens the Calibration Definition menu, which provides FST commands to define calibration parameters for the DAS. See section two, *Selecting Data Recording Parameters*, for procedures for using the Calibration Definition menu.
*	Utilities	Opens the Utility Functions menu, which provides miscellaneous FST commands to control DAS operations and data files. See section four, *Using FST Utilities*, for procedures for using the Utility Functions menu.
*	Diagnostics	Opens the Diagnostics Functions menu, which provides miscellaneous FST commands to test and control DAS operations. See section five, *Using Miscellaneous FST Functions*, for procedures.
*	Commnctns	Opens the Communications Functions menu, which provides FST commands to implement parameters and start data acquisition. See section three, *Implementing the Data Recording Parameters*, for procedures.
*	Monitor	Causes FST to display a raw trace from data in the DAS. See section five, *Using Miscellaneous FST Functions*, for procedures.
*	Time	Opens the Time menu, which displays the DAS unit's current time and allows you to make changes, as desired. See section five, *Using Miscellaneous FST Functions*, for procedures.

Using Basic FST Operations

This subsection provides general operating procedures for using FST menus and panels.

Using FST Menus

Any time you press an FST menu selection on the EHT-10, the FST software performs one of the following actions:

* Sets a parameter
* Performs a function
* Displays another menu
* Displays a screen for either alphanumeric entry or numeric entry

From most menus, you can return to the previous (parent) menu by pressing the selection at the very bottom of the EHT-10 display area.

Using FST Panels

The FST program provides entry screens whenever it requires user input that is not specified on a menu. The alphanumeric entry screen, shown in figure 2, allows you to enter letters, symbols, and numbers. You use the FST alphanumeric entry screen to enter descriptive information, such as station names and locations. When FST requires values for DAS control and data recording parameters, it provides the numeric entry screen, shown in figure 3.

Some of the special controls on the entry screens are as follows:

Control	Description
BS	Backspace key
↵	Enter key
↑, ↓, →, or ←	Cursor movement keys
SP	Spacebar key

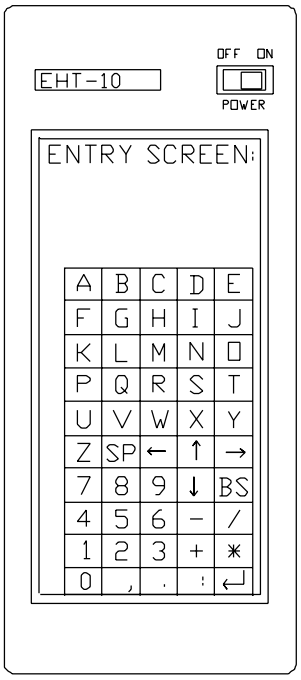

Figure 2 FST Alphanumeric Entry Screen

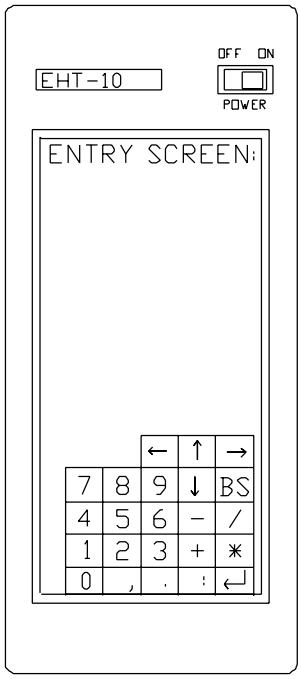

Figure 3 FST Numeric Entry Screen

Using Other EHT-10 Features

This subsection, providing information to help you become familiar with operating the hand terminal, describes the primary features of the EHT-10 itself, as follows:

EHT-10 Feature	Description
Power	For field use, the terminal is powered by internal, rechargeable batteries. After you have not touched the unit's control panel for three minutes, the terminal powers off. Even when the unit is turned off, it continually provides a small amount of power to its non-volatile memory to prevent it from losing stored parameters. To resume EHT-10 operations, turn its power switch off, wait one second, then turn it on again. After a few seconds, the hand terminal will beep to indicate readiness.
AC Adapter Plug	You can recharge the EHT-10 terminal's batteries by plugging it into a 6 volt, AC-to-DC adapter. One charge provides about eight hours of continuous EHT-10 operation.

EHT-10 Feature	Description
LCD Display/Keypad	The terminal's display area is dynamic and touch-sensitive. See *Using Basic FST Functions*, above, for a complete explanation.
Reset Button	If the EHT-10 stops operating, press the reset button to restart it. To prevent accidental reset, this button is recessed into the unit's side. To press the button, use a stylus or pointed object. **Caution:** To avoid risking damage to the EHT-10, do not use a pencil lead to press the reset button. See Appendix A, *Initializing the EHT-10*, for assistance in resetting the hand terminal.
RS232C Connector	The EHT-10 provides an RS232C connector to which you attach the REF TEK 72-8053 Hand Terminal-to-72A DAS communications cable.
Contrast Adjustment	By rotating the small wheel on the left-hand corner of the EHT-10 unit's bottom panel, you can adjust the display screen's contrast.

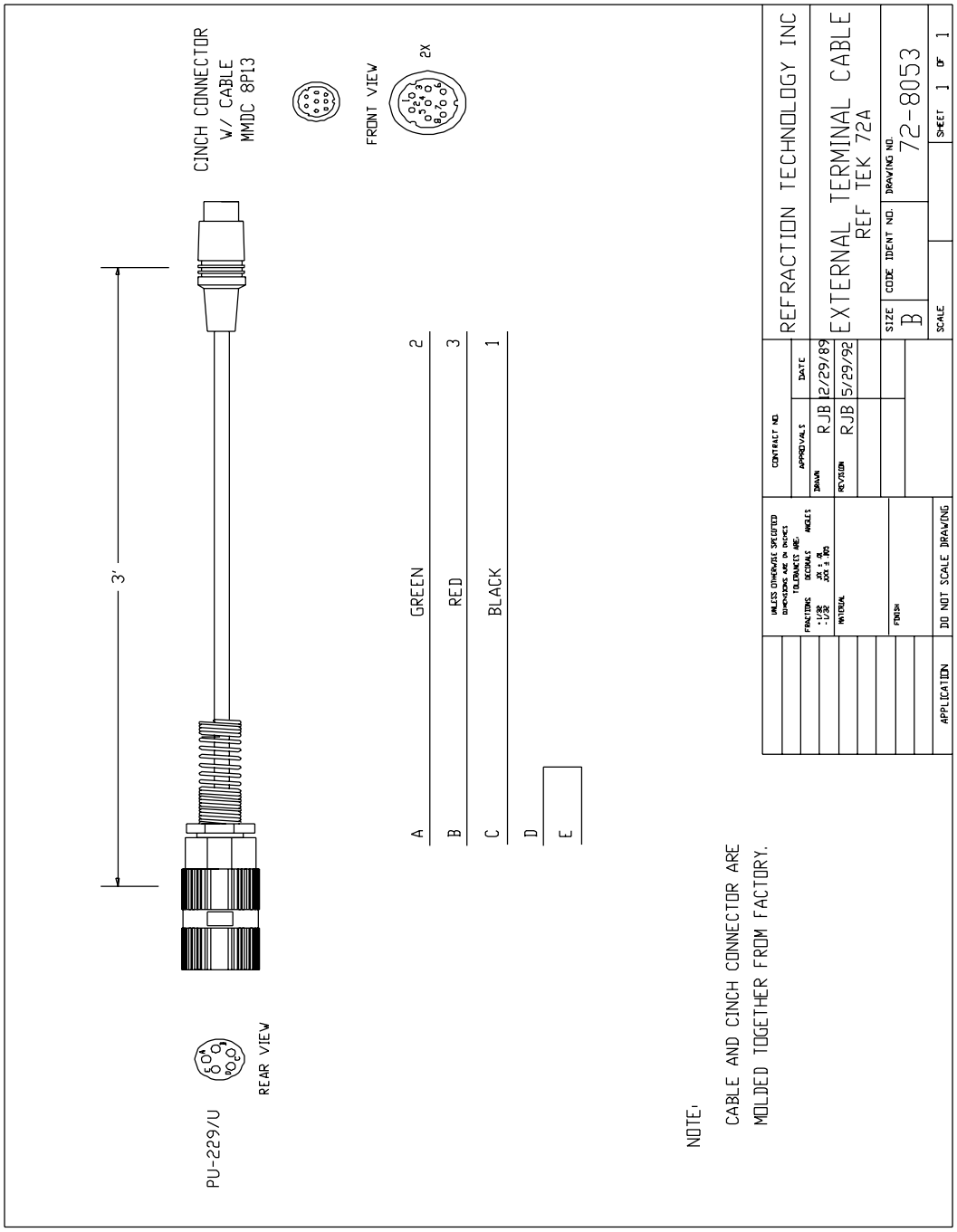

Figure 4 REF TEK 72-8053 Hand Terminal-to-72A DAS Cable

2 Selecting Data Recording Parameters

Before the 72A series DAS unit can begin collecting and recording data, you must send parameters from the EHT-10 using FST to the DAS. You can either load existing parameters from a DAS into the EHT-10 or select the parameters directly with the Field Set-up Terminal (FST) software. This section describes the general procedures for using FST to select data recording and system parameters for the DAS, as follows:

* Selecting station parameters
* Selecting operation mode parameters
* Selecting wake-up parameters
* Selecting channel parameters
* Selecting data stream parameters
* Selecting calibration parameters
* Selecting external clock (Omega) parameters

Selecting Station Parameters

To select the station parameters, perform the following actions:

* Press **Station** on the FST Main menu. The hand terminal displays the Station Definition menu, as shown in figure 5.

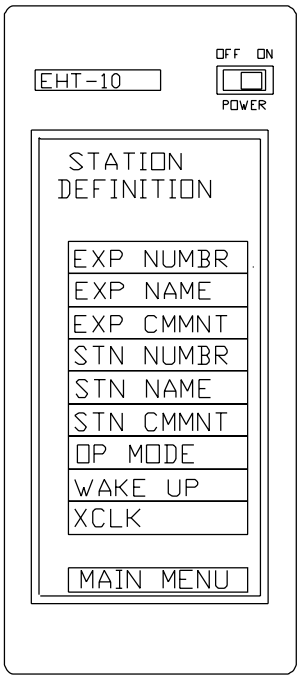

Figure 5 Station Definition Menu

* Use the selections on the Station Definition menu as needed. The hand terminal displays either an alphanumeric or numeric entry screen for each selection. Select the value that you want for each of the station parameters. After you enter the value for each parameter, FST displays the previous menu. Either use the menu displayed, press **Stat Menu** to return to the Station Definition menu, or press **Main Menu** to return to the FST Main menu.

  For more information on Station parameters, including allowable value ranges, see the *Data Recording and System Parameters* section in the *REF TEK Operations Reference Manual for the 72A Series Data Acquisition Systems.*

Having established the Station parameters in the EHT-10 unit's memory, you now need to save the parameters and send them to the DAS. For a procedure, see section 3, *Implementing the Data Recording Parameters*, in this manual. You may wait until you finish selecting other parameters for the DAS before sending them.

Selecting Operation Mode Parameters

To select the operation mode parameters, perform the following actions:

* Press **Station** on the FST Main menu. The hand terminal displays the Station Definition menu, as shown above in figure 5.

* Press **Op Mode** on the Station Definition menu. The hand terminal displays the Operate Mode Definition menu.

* Press **Power**, as needed, to toggle the value of the Power State parameter to either **CP** (continuous power) or **SL** (sleep), as desired. If you set the Power State to sleep mode, you need to set Wake-up parameters, as described below in *Selecting Wake-up Parameters.*

* Press **Recrd**, as needed, to toggle the value of the Recording Mode parameter to either **SR** (to record to a device across the DAS serial port), **RM** (to record to the DAS unit's internal RAM), or **SC** (to record to a SCSI device).

  For more information on Operation Mode parameters, including allowable value ranges, see the *Data Recording and System Parameters* section in the *REF TEK Operations Reference Manual for the 72A Series Data Acquisition Systems.*

Having established the Operation Mode parameters in the EHT-10 unit's memory, you now need to save the parameters and send them to the DAS. For a procedure, see section 3, *Implementing the Data Recording Parameters*, in this manual. You may wait until you finish selecting other parameters for the DAS before sending them.

Selecting Wake-up Parameters

If you set the Power State parameter to (SL) sleep mode, you need to define Wake-up parameters by performing the following:

* Press **Station** on the FST Main menu. The hand terminal displays the Station Definition menu, as shown above in figure 5.

* Press **Wake Up** on the Station Definition menu. The hand terminal displays the Wake Up Definition menu.

* Use the selections on the Wake Up Definition menu as needed. The hand terminal displays either an alphanumeric or numeric entry screen for each selection. Select the value that you want for each of the Wake-up parameters. After you enter the value for each parameter, FST displays the previous menu. Either use the menu displayed, press **Stat Menu** to return to the Station Definition menu, or press **Main Menu** to return to the FST Main menu.

  For more information on Wake-up parameters, including allowable value ranges, see the *Data Recording and System Parameters* section in the *REF TEK Operations Reference Manual for the 72A Series Data Acquisition Systems.*

Having established the Wake-up parameters in the EHT-10 unit's memory, you now need to save the parameters and send them to the DAS. For a procedure, see section 3, *Implementing the Data Recording Parameters*, in this manual. You may wait until you finish selecting other parameters for the DAS before sending them.

Selecting Channel Parameters

To select the channel parameters, perform the following actions:

* Press **Channel** on the FST Main menu. The hand terminal displays the Select Channels menu, as shown in figure 6.

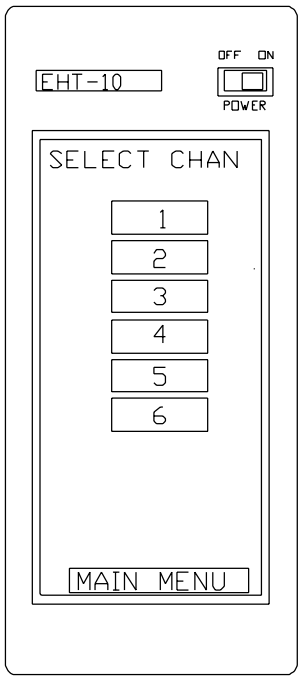

Figure 6 Select Channels Menu

* From the Select Channels menu, press the number of a channel that you wish to activate. The EHT-10 displays sub-menus that present the available parameters for the channel you've activated. Use the selections on the sub-menus as needed. The hand terminal displays either an alphanumeric or numeric entry screen for each selection. Enter the value that you want for each of the channel parameters.

After selecting the values for the parameters for a given channel, press **Change #** to return to the Select Channels menu. Repeat this step until you have activated and set parameters for all the channels you want the DAS to use.

For more information on Channels parameters, including allowable value ranges, see the *Data Recording and System Parameters* section in the *REF TEK Operations Reference Manual for the 72A Series Data Acquisition Systems.*

Having established the Channels parameters in the EHT-10 unit's memory, you now need to save the parameters and send them to the DAS. For a procedure, see section 3, *Implementing the Data Recording Parameters*, in this manual. You may wait until you finish selecting other parameters for the DAS before sending them.

Selecting Data Stream Parameters

To select the data stream parameters, perform the following actions:

* Press **Data Strm** on the FST Main menu. The hand terminal displays the Select Streams menu, as shown in figure 7.

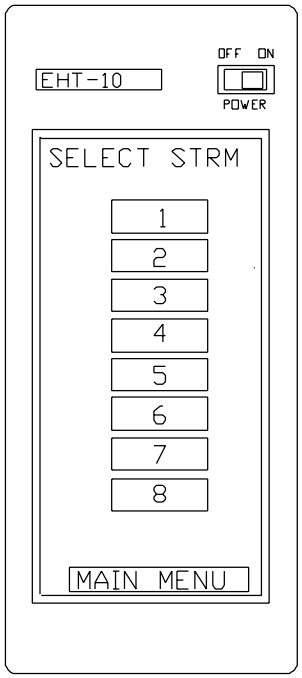

Figure 7 Select Streams Menu

* From the Select Streams menu, press the number of a data stream that you wish to activate. The EHT-10 displays sub-menus that present the available parameters for the stream you've activated. Use the selections on the sub-menus as needed. The hand terminal displays either an alphanumeric or numeric entry screen for each selection. Enter the value that you want for each data stream parameter.

After selecting the values for the parameters for the data stream, press **Change #** to return to the Select Streams menu. Repeat this step until you have activated and set parameters for all the data streams you want the DAS to use.

For more information on Data Stream parameters, including allowable value ranges, see the *Data Stream Parameters and Data Acquisition Triggers* section in the *REF TEK Operations Reference Manual for the 72A Series Data Acquisition Systems.*

Having established the Data Stream parameters in the EHT-10 unit's memory, you now need to save the parameters and send them to the DAS. For a procedure, see section 3, *Implementing the Data Recording Parameters*, in this manual. You may wait until you finish selecting other parameters for the DAS before sending them.

Selecting Calibration Parameters

You set calibration parameters only if the DAS unit you are using supports the use of a calibration signal (as designated in the *REF TEK Technical Overview Document* for your 72A series Data Acquisition System). Units that contain an RT275 test bus card support calibration. To select the calibration parameters, perform the following actions:

* Press **Calibratn** on the FST Main menu. The hand terminal displays the Calibration Definition menu, as shown in figure 8.

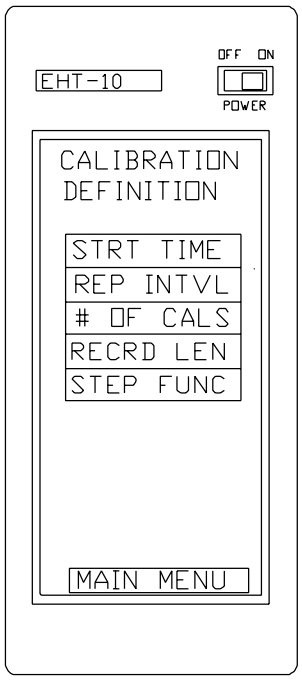

Figure 8 Calibration Definition Menu

* Use the selections on the Calibration Definition menu as needed. The hand terminal displays either an alphanumeric or numeric entry screen for each selection. Select the value that you want for each of the Calibration parameters. After you enter all the parameter values for your calibration function, press **Main Menu** to return to the FST Main menu.

  For more information on Calibration parameters, including allowable value ranges, see the section, *The Calibration Function*, in the *REF TEK Operations Reference Manual for the 72A Series Data Acquisition Systems*.

Having established the Calibration parameters in the EHT-10 unit's memory, you now need to save the parameters and send them to the DAS. For a procedure, see section 3, *Implementing the Data Recording Parameters*, in this manual. You may wait until you finish selecting other parameters for the DAS before sending them.

Selecting External Clock Parameters

If you use a Kinemetrics Omega clock with your 72A series DAS, you must provide the DAS with the position of the DAS, the current leap seconds according to coordinated universal time (UTC), and the current time within five seconds of UTC. Because an error of 186 miles in your global position entry results in a timing error of one millisecond, you must provide an accurate position to the instrument.

If your 72A series DAS does not have a clock attached, but is receiving time from a central host, you must set the DAS to use a 1 Hertz pulse that it generates internally to phase-lock to the external time. In such cases, you also must provide a parameter to correct for delays when using serial synchronization over a communications link.

Using REF TEK Field Set-up Terminal (FST) software from your EHT-10, set the External Clock parameters that you require as follows:

* Press **Station** on the FST Main menu. The hand terminal displays the Station Definition menu, as shown in figure 5, above.

* On the Station Definition menu, press **XCLK**. FST displays the External Clock Definition sub-menu. Use the selections on the External Clock Definition menu as needed. The hand terminal displays either an alphanumeric or numeric entry screen for each selection. Enter the value that you want for each of the External Clock parameters. After selecting the values for the External Clock parameters, press **Main Menu** to return to the FST Main menu.

  For more information on External Clock parameters, including allowable value ranges, see the *Data Recording and System Parameters* section in the *REF TEK Operations Reference Manual for the 72A Series Data Acquisition Systems*.

Having established the External Clock parameters in the EHT-10 unit's memory, you now need to save the parameters and send them to the DAS. For a procedure, see section 3, *Implementing the Data Recording Parameters*, in this manual.

3 Implementing the Data Recording Parameters

If you have already selected the data recording parameters for the DAS, as described in section two, you can send them to the DAS and begin data acquisition. As an alternative, you can load existing parameters from a 72A series DAS to the EHT-10, modify them as needed (following the procedures in section two), and send them to the same or another DAS. This section, which describes how to start the data recording process and use other FST communications functions, addresses the following:

* Saving FST parameters to an EHT-10 RAM disk file
* Loading parameters from an EHT-10 RAM disk file
* Sending data recording parameters to the DAS
* Receiving data recording parameters from the DAS
* Starting acquisition
* Stopping acquisition
* Setting the DAS unit's serial port configuration
* Assigning functions to the DAS unit's serial ports

Saving FST Parameters to an EHT-10 RAM Disk File

To save the parameters that you have chosen to a RAM disk file in the EHT-10, perform the following actions:

* Press **Commnctns** on the FST Main menu. The hand terminal displays the Communications Functions menu, as shown in figure 9.

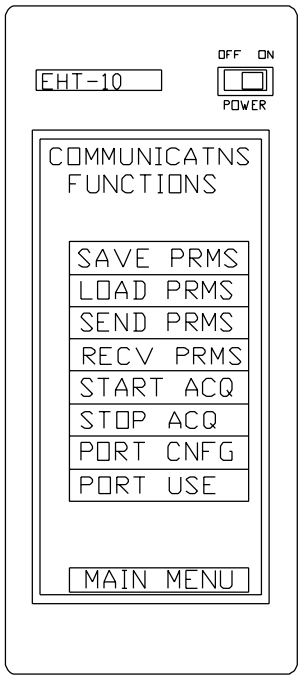

Figure 9 Communications Functions Menu

* Press **Save Prms** on the Communications Functions menu. FST displays the Saving Parameters screen. Press **Yes** to save the parameters currently in the EHT-10 unit's memory to a RAM disk file. While in progress, FST displays a message in the form "Saving *Type* Parameters" that indicates which parameters it is saving. When finished, FST returns to the Communications Functions menu.

  The EHT-10 can hold only one RAM disk file at a time; if you change parameters and save them to a RAM disk file, you will write over the parameters in the existing file. If you reset the EHT-10, you can reload parameters that you have saved to a RAM disk file. If you completely initialize the EHT-10, the RAM disk file is erased and you will need to select and save new parameters. For procedures for resetting or initializing the EHT-10, see Appendix A.

  Pressing **No** from the Saving Parameters screen cancels the save command and causes FST to display the Communications Functions menu.

Loading Parameters from an EHT-10 RAM Disk File

To load the parameters in the EHT-10 unit's RAM disk file into current memory, perform the following actions:

* Press **Commnctns** on the FST Main menu. The hand terminal displays the Communications Functions menu, as shown in figure 9, above.

* Press **Load Prms** on the Communications Functions menu. FST displays the Loading Parameters screen. Press **Yes** to load the parameters from the RAM disk file into the EHT-10 unit's current memory. While in progress, FST displays a message in the form "Loading *Type* Parameters" that indicates which parameters it is loading. When finished, FST returns to the Communications Functions menu.

  Pressing **No** from the Loading Parameters screen cancels the load command and causes FST to display the Communications Functions menu.

Sending Data Recording Parameters to the DAS

To send the data recording parameters that are currently in the EHT-10 unit's memory to a 72A series DAS, perform the following:

* Press **Commnctns** on the FST Main menu. The hand terminal displays the Communications Functions menu, as shown in figure 9, above.

* Press **Send Prms** on the Communications Functions menu. While in progress, FST displays a message in the form "Upload In Progress, Sending *Type* Parameters" that indicates which parameters it is sending. If the DAS is in SCSI recording mode, it sends messages to the EHT-10 that indicate the status of its SCSI processes. When finished, FST displays a message that reads "Implementing Parameters Finished." Press **Continue** to return to the Communications Functions menu.

Note: If you are using the EHT-10 unit's line printer attachment, it will automatically print the parameters as they are sent to the DAS.

Receiving Data Recording Parameters from the DAS

To load the data recording parameters that are currently in a 72A series DAS into the EHT-10 unit's memory, perform the following:

* Press **Commnctns** on the FST Main menu. The hand terminal displays the Communications Functions menu, as shown in figure 9, above.

* Press **Recv Prms** from the Communications Functions menu. While in progress, FST displays a message in the form "Download In Progress, Requesting *Type* Parameters" that indicates which parameters it is receiving. When finished, FST displays the Communications Functions menu.

Note: If you are using the EHT-10 unit's line printer attachment, it will automatically print the parameters as they are received from the DAS.

Starting Acquisition

To begin acquisition with the DAS, perform the following:

* Press **Commnctns** on the FST Main menu. The hand terminal displays the Communications Functions menu, as shown in figure 9, above.

* Press **Start Acq** on the Communications Functions menu. FST displays a numeric entry screen for a delay in minutes; enter any value from 0 up to 99 minutes. FST then displays an entry screen for a delay in seconds; enter any value from 0 to 59 seconds. FST then displays a prompt reading, "Are You Sure?" Press **Yes** to send the Start Acquisition command to the DAS. After it receives the command, the DAS will wait for the amount of time you indicated before starting data acquisition.

  After it sends the Start Acquisition to the DAS, FST automatically requests DAS status information. For explanations of the status messages returned by the DAS, see the subsection, *Requesting DAS Status Information*, in *Using FST Utilities.*

Stopping Acquisition

At any time, you can send a command to the DAS to stop data acquisition immediately. To stop acquisition by the DAS, perform the following:

* Press **Commnctns** on the FST Main menu. The hand terminal displays the Communications Functions menu, as shown in figure 9, above.

* Press **Stop Acq** on the Communications Functions menu. FST displays a prompt reading, "Are You Sure?" Press **Yes** to send the Stop Acquisition command to the DAS. The DAS stops acquisition immediately. If the DAS is in SCSI mode, it transfers all recorded data to the designated SCSI device.

Setting the DAS Unit's Serial Port Configuration

To change the communications configurations of the DAS unit's ports, perform the following actions:

* Press **Commnctns** on the FST Main menu. The hand terminal displays the Communications Functions menu, as shown in figure 9, above.

* Press **Port Cnfg** on the Communications Functions menu. FST displays the Select Port screen. Press either **2** (Radio Port), **3** (Modem Port), or **4** (High-speed Serial Port). FST then presents sub-menus that allow you to set values for Baud Rate, Parity, Data Bits, and Stop Bits. After you have selected the values, FST displays a prompt reading, "Are You Sure?" Press **Yes** to send the new configuration values for the selected port to the DAS. Continue this step until you have set the configurations for all three ports, as needed.

  Note: The EHT-10 running the FST software is always connected to the DAS unit's terminal port (port 1). DAS software always sets the communications configuration for the terminal port to 9600 baud, odd parity, 8 data bits, and 1 stop bit. You cannot change the terminal port's configuration.

For more information on the communications ports, see the *Operations and Maintenance Overview* section in the *REF TEK Operations Reference Manual for the 72A Series Data Acquisition Systems*.

Having selected the port configurations, you now need to send them to the DAS, as described above in *Sending Data Recording Parameters to the DAS*.

Assigning Functions to the DAS Unit's Serial Ports

The 72A series DAS provides the following specialized functions:

* Status/diagnostic output
* Port redirection
* Serial recording port selection

Use these functions only when necessary, and always with care.

When you select a serial port for status and diagnostic output, the DAS sends internal diagnostic messages to that port. You can use a dumb terminal to view these messages. When this feature is enabled, the DAS unit's data collection throughput decreases. To maintain efficient data collection throughput, the DAS automatically disables the status/diagnostics feature when performing its start acquisition sequence. You can manually re-enable the function after the DAS starts acquisition. The status/diagnostics feature is primarily a debugging tool for DAS software development.

Note: Do not select the DAS unit's terminal port as the status/diagnostics port while running FST (the EHT-10 is connected to that port). Also, do not select a port that is connected to a PC running REF TEK Field Set-up Controller (FSC) software as the status/diagnostics port.

The port redirection feature allows the DAS to redirect messages from one port to another. When an input port receives a command, the DAS routes responses to the output port rather than the input port. This feature is used by systems that are operated remotely over a radio link using different transmit and receive rates and two separate serial ports.

You select a serial recording port only when the DAS unit is running in serial recording (SR) mode. The DAS uses the port you select for serial recording. The output port selected for the port redirection feature will frequently be the same port as the serial recording port.

To disable any of these special functions, set the port to port 0 (Null port). To perform any or all of these functions, perform the following actions:

* Press **Commnctns** on the FST Main menu. The hand terminal displays the Communications Functions menu, as shown in figure 9, above.

* Press **Port Use** on the Communications Functions menu. FST displays the Port Use screen, as shown in figure 10.

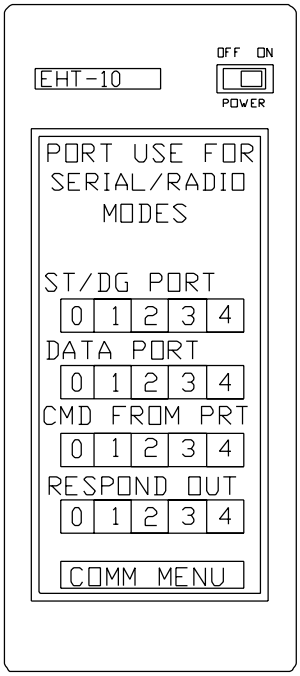

Figure 10 Port Use Menu

* Set each field on the Port Use menu to the desired port. In the Port Use Menu, the numeric values correspond to DAS communications ports as follows:

0	Null Port (Disable)
1	Terminal Port
2	Radio Port
3	Modem Port
4	High-speed Serial Port

The fields on the Port Use menu correspond to the special functions described previously, as follows:

Field	Description / Special Function
ST / DG Port	The port providing status / diagnostic output.
Data Port	The port used for serial recording.
Cmd From Prt	The port selected to receive input, used with the port redirection feature.
Respond Out	The output port for responses to input received, used with the port redirection feature.

Having selected the ports for the special functions, you now need to send the port use settings to the DAS, as described above in *Sending Data Recording Parameters to the DAS*.

4 Using FST Utilities

While using FST to control a 72A series Data Acquisition System, you can select many utility commands that obtain information from the DAS, manipulate data files, and otherwise modify unit functions. This section, describing the use of the commands on the FST program's Utility Functions menu, addresses the following:

* Requesting DAS unit ID and software version numbers
* Requesting DAS status information
* Requesting external clock status information
* Viewing event trigger calculations
* Requesting SCSI device status information
* Using the event directory
* Resetting the DAS unit
* Providing power to a SCSI device
* Stopping power to a SCSI device
* Checking a SCSI recording disk
* Checking a SCSI recording tape
* Formatting a recording disk
* Formatting a recording tape
* Copying data from the primary recording disk to another disk
* Copying data from the primary recording disk to a recording tape
* Copying data from the primary recording disk across the modem port
* Copying data from DAS RAM to a SCSI recording disk
* Copying data from DAS RAM to a SCSI recording tape
* Copying data from DAS RAM across the modem port
* Clearing the DAS unit's RAM
* Initializing the DAS unit

Requesting DAS Unit ID and Software Version Numbers

To obtain the DAS unit's ID number and the version numbers for all the internal control software for the DAS perform the following actions:

* Press **Utilities** on the FST Main menu. The hand terminal displays part A of the Utilities Functions menu, as shown in figure 11.

* Press **Versn Nos** on the Utilities Function menu. The hand terminal displays the Version Numbers screen, as shown in figure 12.

  When you are finished viewing the Version Numbers screen, press **Continue** to return to the Utility Functions menu.

Figure 11 Utilities Functions Menu (Part A)

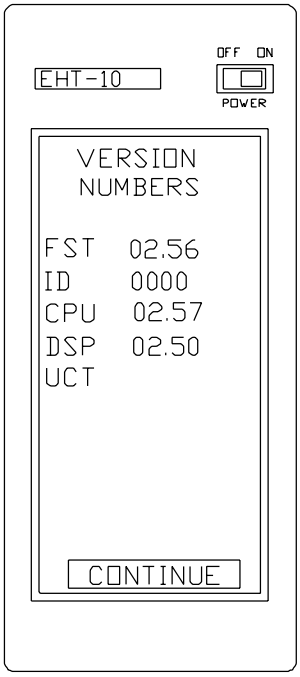

Figure 12 Version Numbers Screen

Requesting DAS Status Information

To obtain status information from the DAS unit, perform the following actions:

* Press **Utilities** on the FST Main menu. The hand terminal displays part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **DAS State** to the Utilities Function menu. The hand terminal displays the DAS Status screen, as shown in figure 13. You can obtain additional information on the data stream parameters in the DAS by pressing **Streams** at the bottom of the screen.

  When you are finished viewing the DAS Status screen, press **Util Menu** to return to the Utility Functions menu.

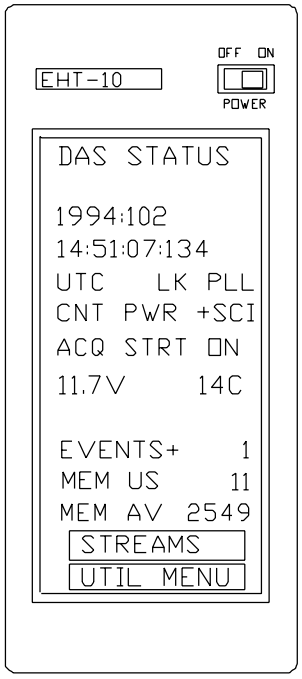

Figure 13 DAS Status Screen

FST updates the status information on the DAS Status screen approximately once every five seconds. The DAS Status screen provides information on different aspects of DAS operations, as follows:

* Time
* External clock information
* Power state
* Recording mode
* Acquisition state (requested and actual)
* Battery voltage
* Internal DAS temperature
* DAS recording status

Time

The DAS Status window reflects the unit's time in the form *YYYY*:*JJJ*:*HH*:*MM*:*SS*.*TTT*. This time includes the year (*YYYY*), Julian day (*JJJ*), hour (*HH*), minute (*MM*), second (*SS*), and thousandths of second (*TTT*).

External Clock Information

The DAS Status screen displays information on any external clock used with the DAS (this information is shown in figure 13 as UTC LK PLL). This line provides external clock type, external clock status, and internal phase lock loop status.

FST displays the external clock type in one of the following forms:

* NO UTC CLOCK	The DAS is not using an external clock.
* OMGA	The external clock is a Kinemetrics Omega.
* UTC	The external clock is some other type (such as GPS, GOES, or WWVB).

FST displays "ULK" when the clock is unlocked or "LK" when the clock is locked. FST also displays the status of the internal phase lock loop in one of the following forms:

* PLN	The DAS is not phase-locking; it is running freely.
* PLU	The DAS is attempting to phase-lock.
* PLL	The DAS is phase-locked to the external clock.

Power State

The DAS Status screen displays information on the supply of power to the DAS (shown as CNT PWR on figure 13). FST displays the power state information in one of the following forms:

* CNT PWR	The DAS is in continuous power (CP) mode.
* AWAKE	The DAS is in sleep (SL) mode, but is currently operating during a wake-up period.
* ASLEEP	The DAS is in sleep (SL) mode and is powered-up, but is not currently operating in a wake-up period.

Recording Mode

The DAS Status screen displays the recording mode the DAS is using in one of the following forms:

* RAM	The DAS is recording to DAS RAM only.

* SCI	The DAS is recording to a SCSI device such as a disk or tape drive. The screen also includes a plus sign (+) when automatic transfer to SCSI is enabled; the screen includes a minus sign (-) whenever an error condition has caused the DAS to disable automatic SCSI transfer.
* SER	The DAS is recording to a device (such as a peripheral or modem) across its serial port.

Acquisition State

The DAS Status screen provides information on the current state of data acquisition (shown as ACQ STRT ON on figure 13).

FST displays the actual state of data acquisition as being either ON or OFF. FST displays requested acquisition state in one of the following forms:

* ACQ STOP	The DAS has received the command to stop acquisition.
* ACQ START	The DAS has received the command to start acquisition.

Battery Voltage

The DAS Status screen displays a value for battery voltage (shown as 11.7V on figure 13), if the DAS contains an RT344 power supply board. FST displays a value of 00.0 for battery voltage when you request DAS status from a DAS that lacks an RT344 board. FST displays voltage changes in minimum increments of 0.1 volts.

Internal DAS Temperature

The DAS Status screen displays a value for internal temperature (shown as 14.2C on figure 13), if the DAS contains an RT344 power supply board. FST displays a value of 000 for internal temperature when you request DAS status from a DAS that lacks an RT344 board. FST usually displays temperature changes in increments of 2° C, although FST will infrequently display a change of 1° C.

Data Recording Status

Near the bottom of the DAS Status screen, FST displays three lines of DAS recording status information, as follows:

* EVNTS	The number on this line indicates the number of events recorded since the DAS last started acquisition. If the DAS is currently recording an event (other than a continuous event), FST displays a plus sign (+).
* MEM US	The number on this line shows how many of the unit's memory blocks contain event data.
* MEM AV	The number on this line shows how many of the DAS unit's memory blocks are still available for event data.

Requesting External Clock Status Information

To view a screen that displays external clock information, perform the following:

* Press **Utilities** on the FST Main menu. The hand terminal displays part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **XCLK Stat** on the Utilities Function menu. The hand terminal displays the External Clock Status screen. When you are finished viewing the External Clock Status screen, press **Util Menu** to return to the Utility Functions menu.

Viewing Event Trigger Calculations

To view a screen that displays event trigger calculations (for a specified stream and channel), perform the following:

* Press **Utilities** on the FST Main menu. The hand terminal displays part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Evt Calcs** on the Utilities Function menu. The hand terminal displays the Event Calc Status screen. Push the numeric boxes on this screen until you have selected both the data stream and channel for which you want to view the calculations. Note that FST displays valid calculations only for a channel that is included as a trigger channel of an active data stream that uses an event trigger, and only when the DAS has started acquisition. Press **Continue** to send the request for status to the DAS.

  FST displays the Event Calculations screen. When you are finished viewing the event calculations, press **Util Menu** to return to the Utility Functions menu.

Requesting SCSI Device Status Information

To view a screen that displays status information for a primary SCSI device connected to the DAS, perform the following actions:

* Press **Utilities** on the FST Main menu. The hand terminal displays part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **SCSI Stat** on the Utilities Functions menu. FST displays a screen that provides usage statistics for the DAS unit's primary SCSI device (always designated SCSI ID 1). FST may take up to thirty seconds before displaying the SCSI information. When you are finished viewing the SCSI status information, press **Util Menu** to return to the Utility Functions menu.

Using the Event Directory

The FST program can display a directory of event data entries that are currently in the DAS unit's RAM. FST requests this directory from the DAS each time you select the command to view it. To view the event directory, perform the following actions:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Evt Direc** on the Utilities Functions menu. FST displays a message reading "Requesting Directory Information," then displays the event directory, as shown in figure 14.

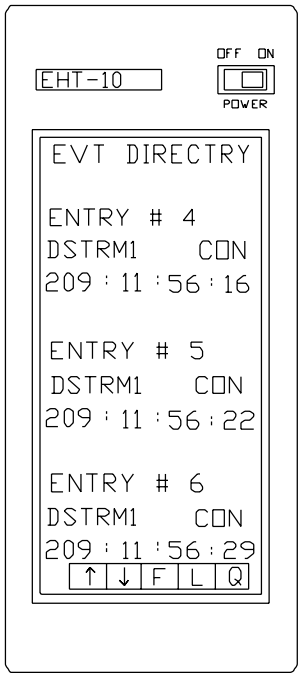

Figure 14 Event Directory Screen

The fields at the bottom of the event directory screen perform the following functions:

Field	Description
↓	Allows you to scroll down; FST will display additional event directory entries. The event directory screen displays this field only when additional entries are available.
↑	Allows you to scroll up; FST will display previous event directory entries. The event directory screen does not display this field on the first screen of entries.
F	Returns to the first screen of entries.
L	Advances to the last screen of entries.
Q	Quit; returns to the Utilities Functions menu.

Resetting the DAS Unit

To cause a software reset of the DAS, which interrupts data acquisition and restarts software execution, perform the following actions:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Sys Reset** on the Utility Functions menu. FST displays a prompt reading, "Are You Sure?" Press **Yes** to send the command to reset the DAS. FST displays the message, "System Reset Command Sent." Press **Continue** to return to the Utilities Functions menu.

Providing Power to a SCSI Device

Cause the DAS to supply power to an external SCSI device by performing the following actions:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15.

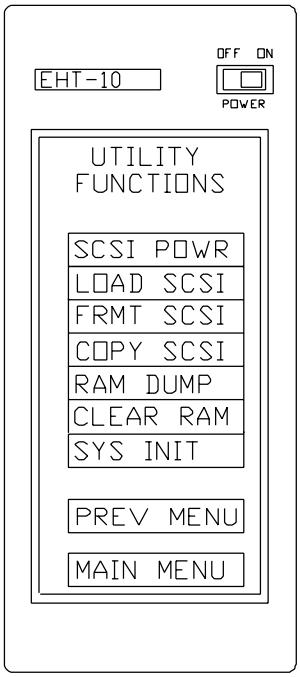

Figure 15 Utilities Functions Menu (Part B)

* Press **SCSI Powr** on the Utilities Functions menu. FST displays the SCSI Power screen.

* Press **On**; the SCSI device responds by powering up.

Stopping Power to a SCSI Device

Stop the supply of power from the DAS to an external SCSI device by performing the following actions:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **SCSI Powr** on the Utilities Functions menu. FST displays the SCSI Power screen.

* Press **Off**; the SCSI device responds by powering down.

Note: Do not turn off SCSI power while the DAS is performing a SCSI transfer.

Checking a SCSI Recording Disk

To verify that the primary recording disk (ID#1) is formatted, perform the following:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **Load SCSI** on the Utilities Functions menu. FST displays the SCSI Load entry screen.

* Press **Disk**.

Checking a SCSI Recording Tape

To verify that the primary recording tape (ID#6) is formatted, perform the following:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **Load SCSI** on the Utilities Functions menu. FST displays the SCSI Load entry screen.

* Press **Tape**.

Formatting a Recording Disk

Before using a recording disk with a REF TEK 72A series DAS, you must format it to accept the REF TEK recording format. To format a disk, perform the following:

* Ensure that the disk drive to be formatted is connected to the DAS, that power to any other disk is disabled, and that the disk to be formatted is configured in hardware as ID #1 (contact Refraction Technology if you have questions).

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **Frmt SCSI** on the Utilities Functions menu. FST displays the SCSI Format screen.

* Press **Disk**. FST displays a prompt reading "Are You Sure?" Press **Yes** to send the format command. Press **No** to return to the Utilities Functions menu.

Formatting a Recording Tape

Before using a recording tape with a REF TEK 72A series DAS, you must format it to accept the REF TEK recording format. To format a tape, perform the following:

* Ensure that the tape drive is connected to the DAS and that it is configured in hardware as ID #6 (contact Refraction Technology if you have questions).

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **Frmt SCSI** on the Utilities Functions menu. FST displays the SCSI Format screen.

* Press **Tape**. FST displays a prompt reading "Are You Sure?" Press **Yes** to send the format command. Press **No** to return to the Utilities Functions menu.

Copying Data from the Primary Recording Disk to Another Disk

If you have established the necessary hardware connections, you can copy all the data in the primary recording disk to another recording disk by performing the following:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **Copy SCSI** on the Utilities Functions menu. FST displays the Copy screen.

* Press **Disk** on the Copy screen. FST displays a prompt reading "Are You Sure?" Press **Yes** to send the command to copy from disk to disk.

Copying Data from the Primary Recording Disk to a Recording Tape

If you have established the necessary hardware connections, you can copy all the data in the primary recording disk to a recording tape by performing the following:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **Copy SCSI** on the Utilities Functions menu. FST displays the Copy screen.

* Press **Tape** on the Copy screen. FST displays a prompt reading "Are You Sure?" Press **Yes** to send the command to copy from disk to disk.

Copying Data from the Primary Recording Disk Across the Modem Port

If you have established the necessary hardware connections, you can copy all the data in the primary recording disk to a recording device across the unit's modem port by performing the following:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **Copy SCSI** on the Utilities Functions menu. FST displays the Copy screen.

* Press **Modem** on the Copy screen. FST displays a prompt reading "Are You Sure?" Press **Yes** to send the command to copy from disk to another device across the DAS unit's modem port.

Copying Data from DAS RAM to a SCSI Recording Disk

To copy all the data in the DAS unit's RAM to a SCSI recording disk (across the unit's SCSI bus), perform the following:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **RAM Dump** on the Utilities Functions menu. FST displays the Dump RAM screen.

* Press **Disk** on the Dump RAM screen to send the command to copy from the DAS unit's RAM to disk.

Copying Data from DAS RAM to a SCSI Recording Tape

To copy all the data in the DAS unit's RAM to a SCSI recording tape (across the unit's SCSI bus), perform the following:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **RAM Dump** on the Utilities Functions menu. FST displays the Dump RAM screen.

* Press **Tape** on the Dump RAM screen to send the command to copy from the DAS unit's RAM to tape.

Copying Data from DAS RAM Across the Modem Port

To copy all the data in the DAS unit's RAM to a recording device across the unit's modem port, perform the following:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **RAM Dump** on the Utilities Functions menu. FST displays the Dump RAM screen.

* Press **Modem** from the Dump RAM screen to send the command to copy from the DAS unit's RAM to a device across the modem port.

Clearing the DAS unit's RAM

To clear all the event data and state-of-health information currently in the DAS unit's memory, perform the following:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **Clear RAM** on the Utility Functions menu. FST displays a prompt reading "Are You Sure?" Press **Yes** to send the command to the DAS.

Because erasing event data and SOH information does not affect the parameters in DAS memory, future DAS operations will perform in accordance with those parameters.

Initializing the DAS Unit

To initialize the DAS, perform the following actions:

* Press **Utilities** on the FST Main menu. The hand terminal displays Part A of the Utilities Functions menu, as shown in figure 11, above.

* Press **Next Menu** on the Utilities Functions menu. FST displays part B of the Utilities Functions screen, as shown in figure 15, above.

* Press **Sys Init** on the Utility Functions menu. FST displays an alphanumeric entry screen and requires that you enter a password. Type **IRIS** and press the enter key to send the send the initialization command to the DAS.

The initialization command restarts the DAS power cycle, erases all parameters and acquired data in the DAS unit's RAM, verifies RAM, and reset the microprocessor. Because the command erases all the data recording parameters in the DAS, you must send new parameters from the EHT-10 with FST before resuming acquisition.

5 Using Miscellaneous FST Functions

The Field Set-up Terminal program provides miscellaneous functions to perform diagnostics, monitor data, and set time. This section provides procedures to use these miscellaneous functions, as follows:

* Modifying channel gains
* Actively controlling preamplifier and sensor relays
* Viewing data graphically
* Setting DAS time

Modifying Channel Gains

When you set parameters for channels, as explained in section two of this manual, you set the preamplifier gains. You may want to adjust the gain that you've selected for any given channel after you have implemented the parameters in the DAS. The FST software allows you to change these gains without sending parameters again.

To manually adjust the gains in the DAS, perform the following actions:

* Press **Diagnosts** on the FST Main menu. The hand terminal displays the Diagnostics Functions menu, as shown in figure 16.

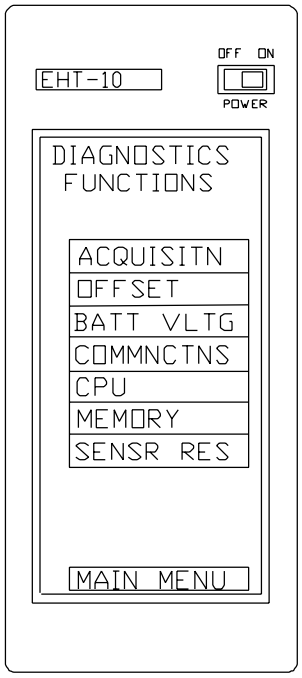

Figure 16 Diagnostics Functions Menu

* Press **Acquisitn** on the Diagnostics Functions menu. The hand terminal displays the Acquisition Diagnostic screen, as shown in figure 17.

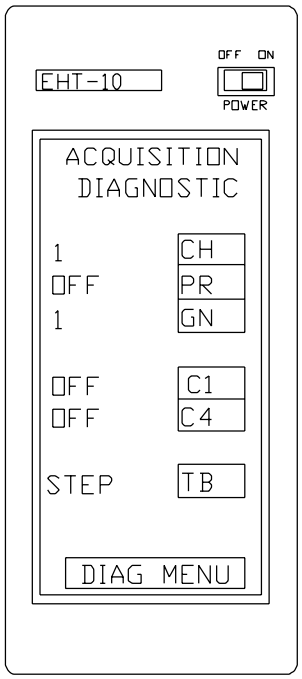

Figure 17 Acquisition Diagnostics Screen

* Press **CH** until you have selected the channel for which you want to change the gain settings.

* Press **GN** until you have selected the desired gain for that channel.

Note: Whenever you change gain settings, use only the gain values that are available for the model of DAS you are using. For a list of available gain values, see the specifications in the appropriate *REF TEK Technical Overview Document*.

Actively Controlling Preamplifier and Sensor Relays

When you set parameters for the calibration function, as explained in section two of this manual, you passively control the preamplifier and sensor relays; the DAS actually controls the relay changes during the course of normal operations.

The FST software, however, also allows you to manually set and actively implement changes to the various calibration relays. Such control is useful when you desire immediate monitor feedback, such as when manually calibrating an external sensor. Refraction Technology recommends that you use this function only if you are knowledgeable and experienced in DAS operations.

Note: The DAS unit provides calibration functions only if it contains an RT275 test bus board.

To make manual adjustments to the relays in the DAS, perform the following actions:

* Press **Diagnosts** on the FST Main menu. The hand terminal displays the Diagnostics Functions menu, as shown in figure 16, above.

* Press **C1** until you have selected the combination of settings for the calibration and 12 volt relays that you want for channels 1-3, as follows:

Cal Relay	12 Volt Relay	Result
OFF	OFF	Routes nothing to the external sensor
OFF	ON	Routes 12 volts to the external sensor
ON	OFF	Routes the calibration signal to the external sensor
ON	ON	Routes the calibration signals and 12 volts to an external sensor

* Press **C4** until you have selected the combination of calibration settings, in accordance with the previous chart, that you want for channels 4-6.

If your DAS unit contains an RT280 filter card as well as the RT275 test bus card, you can control additional calibration features by performing the following:

* Press **Diagnosts** on the FST Main menu. The hand terminal displays the Diagnostics Functions menu, as shown in figure 16, above.

* Press **CH** until you have selected the channel for which you want to change the relay settings.

* Press **PR** until you have selected the combination of settings for the preamplifier and sensor relays that you want, as follows:

Sensor Relay	Amplifier Relay	Result
OFF	OFF	Routes sensor output to the amplifier
OFF	ON	Routes calibration signal to the amplifier
ON	OFF	Routes calibration signal back to sensor
ON	ON	Routes the calibration signal to both the sensor and the amplifier

For more comprehensive information, see *The Calibration Function* section in the *REF TEK Operations Reference Manual for the 72A Series Data Acquisition Systems.*

Viewing Offsets

To view the DC offset for a given recording channel, perform the following:

* Press **Diagnosts** on the FST Main menu. The hand terminal displays the Diagnostics Functions menu, as shown in figure 16, above.

* Press **Offset** on the Diagnostic Functions menu. FST displays a numeric entry screen for a number of seconds. Enter an appropriate value. FST displays another screen. Press the number of the channel for which you want to view the offset.

  FST displays the DC offset screen for the channel selected.

  Note: Currently, the DAS transmits only 16-bit values for the Offset function. When handling 24-bit and 32-bit values, the DAS uses only the upper 16 bits of the analog-to-digital converter's output, scaling the output of 24-bit channels by eight bits (a factor of 256). For example, the Offset function reports a value of 20,479 for a full-scale signal on a 24-bit channel that produces a digital value of 5,242,879.

Viewing Data Graphically

The FST program's monitor function allows you to view a graphical trace of data in the DAS. To view data graphically, perform the following actions:

* Press **Monitor** on the FST Main menu. The hand terminal displays a numeric entry screen for the number of seconds for the length of data to be displayed graphically. Enter an appropriate value from either .1 to .9 seconds (with no leading zero) or from 1 to 99 seconds. FST displays the Select Channel To Monitor screen, as shown in figure 18.

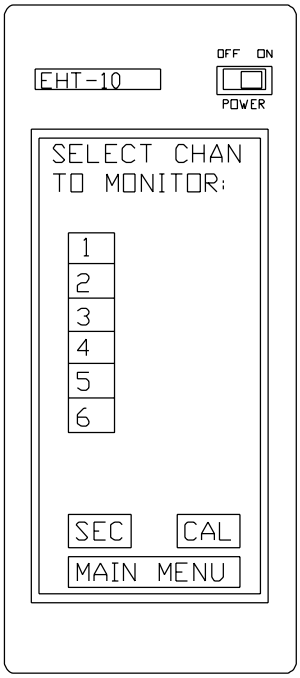

Figure 18 Select Channel To Monitor Screen

* Press the number of the channel for which you want to view the data. The hand terminal soon produces the graphic trace for the channel in accordance with the amount of time you specified.

  When you no longer want to view the trace, press **X** to return to the Select Channel to Monitor screen.

  Note: Currently, the DAS transmits only 16-bit values for the Monitor function. When handling 24-bit and 32-bit values, the DAS uses only the upper 16 bits of the analog-to-digital converter's output, scaling the output of 24-bit channels by eight bits (a factor of 256). For example, the Monitor function reports a value of 20,479 for a full-scale signal on a 24-bit channel that produces a digital value of 5,242,879.

Setting DAS Time

Each 72A series DAS maintains real time internally. To change the time for a given DAS unit, perform the following actions:

* Press **Time** on the FST Main menu. The hand terminal displays the Time menu, as shown in figure 19. The Time menu displays the unit's current time, and updates the time about once per second.

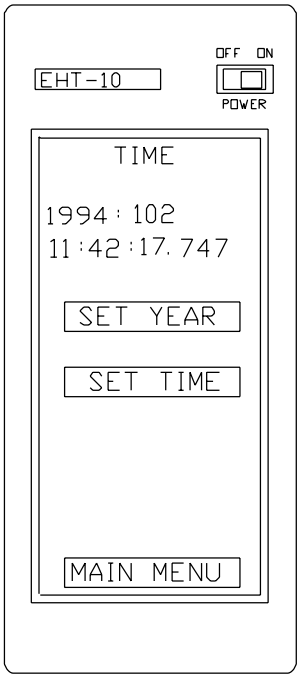

Figure 19 Time Menu

* To set the year for the DAS, press **Set Year** on the Time menu. FST displays a numeric entry screen; enter the desired value.

* To set the time for the DAS, press **Set Time** on the Time menu. FST displays a numeric entry screen; enter the desired time value. The hand terminal displays the New Time Will Be screen, as shown in figure 20.

Note: Whenever your use of the DAS requires that you set the year, set the year before setting the time. Setting the time before setting the year can cause errors in DAS time.

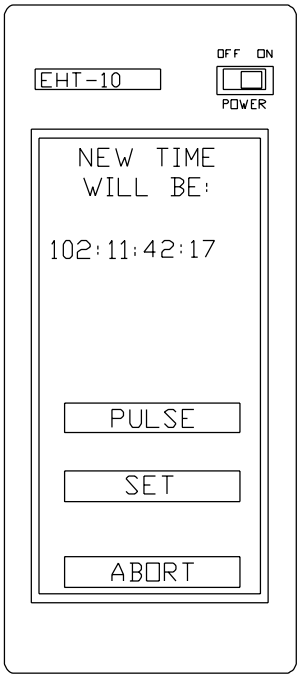

Figure 20 New Time Will Be Screen

* To immediately send the new time value to the DAS, press **Set** on the New Time Will Be screen.

To prepare the DAS to use an external pulse to set the DAS unit's time, press **Pulse** on the New Time Will Be screen. For more information on the Pulse Time feature, see the *Timekeeping* section in the *REF TEK Operations Reference Manual for the 72A Series Data Acquisition Systems.*

You can press **Abort** on the New Time Will Be screen to return to the Time menu without changing the DAS unit's time.

APPENDICES:

Appendix A provides a procedure to fully initialize your EHT-10, if necessary.

Appendix A: Initializing the EHT-10

Before shipping the EHT-10 (with FST software) to clients, Refraction Technology performs a complete initialization procedure. Upon reception of your hand terminal, you can begin using it immediately. However, if the EHT-10 ever fails completely, you must perform a complete initialization to restore unit operations. Unit failures can occur if you do not respond readily to a "Charge Battery" displayed by the unit. You must also perform the initialization whenever you replace the EPROM in the hand terminal (to use updated FST code).

To perform the initialization, perform the following actions:

* Turn off the power for the EHT-10.

* Attach an AC adapter to the unit and connect it to a 110 volt outlet.

* Place the EHT-10 unit with its screen down so that the AC adapter faces you.

* If you are replacing the unit's EPROM, perform the following steps marked by an arrow (→). If not, skip these steps and proceed to the steps marked by an asterisk (*).

→ Remove the battery compartment cover.

→ Locate the EPROM IC for the EHT-10. Hold the ends of the special ring with both hands and carefully lift the EPROM IC off the socket (the socket tends to be stiff, and too much force can damage the IC's pins).

→ Install the new EPROM IC; ensure that pin 1 of the EPROM faces toward the right side of the hand terminal. The socket for the EPROM IC allows installation of a chip with up to 32 pins. If you install an IC with 28 pins, however, install it in the far left side of the socket.

Correctly align all the pins in the socket before seating the EPROM; bent EPROM pins may prevent the EHT-10 from functioning properly by not making good contact. To ensure good contact, push down on the top of the EPROM until it sits firmly in the socket.

→ Replace the battery compartment cover.

* On the back of the hand terminal, open the small cover (about 1/4" by 1") that hides the initialization switch (SW2). Using a small stylus, press this switch.

The hand terminal screen displays a configuration (CONFIG) menu. Select **Basic** and press **Run**. The hand terminal displays another configuration menu.

* Press **Open File** and enter a value of **3** with the numeric entry panel.

* Press **Record** and enter a value of **128** with the numeric entry panel.

* Press **Buff Size** and enter a value of **1024** with the numeric entry panel; press **End**.

* Press **Disk Size**, then **Run**. Press **RAM Disk** and enter a value of **0** with the numeric entry panel. The EHT-10 displays a "Format?" message; enter **Yes** to respond. Press **End** twice. The hand terminal displays another menu.

* Press **PASSCAL.B** and then the return key field at the bottom of the screen. The EHT-10 displays a menu for gain choices. If you are using PASSCAL instruments (72A DAS, 44D NRS, etc.), select **Counts**.

  Note: The type of gain for your unit is not under software control; gain is entirely determined by the instrument's hardware. You cannot change the type of gain used by a unit by making a selection here. The type of gain you choose must match the hardware. If you are unsure of the type of gain to use with your instrument, contact Refraction Technology.

* Wait about thirty seconds for the program to load. When the initialization is complete, the hand terminal displays the FST Main menu.

* Select your parameters again, as desired, and otherwise resume operating the EHT-10 and FST control interface program.

Resetting the EHT-10

At times, you may experience difficulties with your EHT-10 that do not require a complete initialization. If you are uncertain as to the severity of the EHT-10 failure, reset the system before you resort to initialization by performing the following:

* Press the EHT-10 unit's reset button; this button is recessed into the unit's side. To press the button, use a stylus or pointed object. To avoid damaging the EHT-10, do not use a pencil lead to push the button. The hand terminal displays a menu.

* Press **PASSCAL.B** and then the return key field at the bottom of the screen. The EHT-10 displays a menu for gain choices. If you are using PASSCAL instruments (72A DAS, 44D NRS, etc.), select **Counts**.

  Note: The type of gain for your unit is not under software control; gain is entirely determined by the instrument's hardware. You cannot change the type of gain used by a unit by making a selection here. The type of gain you choose must match the hardware. If you are unsure of the type of gain to use with your instrument, contact Refraction Technology.

* Wait about thirty seconds for the program to load. When the initialization is complete, the hand terminal displays the FST Main menu.

* If you have previously saved DAS parameters to the EHT-10 unit's RAM disk file, you can load them back into the unit's memory by performing the procedures in *Loading Parameters from an EHT-10 RAM Disk File* in section three of this manual. Resume operating the EHT-10 and FST control interface program.

* If you have not previously saved DAS parameters to the EHT-10 unit's RAM Disk file, select your parameters again, as desired. Resume operating the EHT-10 and FST control interface program.