8 The Runtime System

This chapter describes the operation of the PC-30 Runtime system. It includes start-up and exit instructions, descriptions of help subwindows, function keys, and information on various functions and operations used during Runtime sessions.

8.1 What the Runtime System Does

The Runtime system includes its own real-time multitasking operating system that allows simultaneous execution of control, graphics, alarming, trending, data logging, file transfer, and I/O drivers. Its purpose is to execute strategies you create in the PC-30 Strategy Builder.

The Runtime system behaves in different ways, depending on the choices you make when you create the strategy and corresponding displays. Its overall behavior is determined by the parameters you enter into the System Configuration submenu in the Strategy Builder. (Refer to the *SYS CNFG* section in Chapter 4: *The Strategy Builder*.) Some of the system parameters can be changed during Runtime and some cannot.

Security levels are also set for specific functions in the System Configuration submenu and determine how much accessibility operators have during Runtime. Many standard functions can be invoked at any time during Runtime. You enter commands and data using the keyboard or the mouse, which is on functional when enabled in the Strategy Builder.

☞ The following files are used by the Runtime system:

Strategy Files

<strategy>.CFG
<strategy>.DB
<strategy>.CI
<strategy>.CA
<strategy>.MDB
<strategy>.XDB

Device Driver Files (for each installed driver)

<driver>.MNU
<driver>.DES
<driver>.DRV

Display Files

BOOT.GSP (boot-up display)
*.GSP (system subwindow files)
<*file name*>.GRP (user-created displays)

Option Files

<option>.OPT

4/23/93

RG-GA3-030-005

8.1.1 EMS & XMS Runtime Support

PC-30 provides support for expanded memory (EMS) and extended memory (XMS) during Runtime sessions. The EMS support is designed to function with EMS memory managers that conform to the LIM 4.0 format. XMS support is provided for XMS memory managers conforming to Microsoft Corporation's DOS Version 2.0 specification.

PC-30 automatically recognizes the presence of any installed expanded and/or upper and extended memory and incorporates it into Runtime operations, making more system memory available for the applications that require it. The amount of system memory that is made available depends on what PC-30 is capable of placing into expanded and/or upper and extended memory.

Certain buffers, drivers, and options are placed into expanded and extended memory. Buffers that can be loaded into expanded memory during Runtime include:

- Trend buffer
- Alarm buffer
- History Replay buffer
- Connection buffer

PC-30 detects upper and extended memory during the Runtime start-up, implements XMS and uses it to store the following items:

- Strategy database
- Subwindow display
- Other miscellaneous items

☞ PC-30 integrates the available expanded memory into frames and pages that are swapped during the various Runtime operations. During the Runtime start-up operation, available upper and extended (high) memory is detected and its size is reported on the screen.

Each EMS frame consists of four 16K pages, allowing 64K of EMS memory for each frame. The number of EMS frames available to the Runtime system depends on the amount of EMS memory in your system. During the Runtime start-up process, a message appears indicating the number of EMS frames available and the address of the first page.

4/23/93

☞ Refer to Appendix F: *EMS and XMS Memory Support* for more information on the incorporation and use within EMS and XMS memory.

8.1.2 Shared File Support

Beginning with Runtime version 5.0, Runtime files can be shared across a network. This feature is used in conjunction with the DOS SHARE.EXE utility which allows files to be viewed by a remote application while Runtime still has the file(s) open. Shared Runtime files include alarm logs, history files, trend data, etc.

The Runtime files logged to a shared node can be viewed by the PC-30 List and History Replay functions as well as text editors that support shared file access (e.g. LIST and EDIT). Refer to the *Shared File Support* section of Chapter 3: *Before You Begin* for more information regarding the features and limitations of file sharing.

RG-GA3-030-005

Important! The DOS file sharing-utility (SHARE.EXE) must be installed on the PC executing PC-30 Runtime version 5.0. If the file-sharing utility is not installed, Runtime will abort execution during initialization. Refer to the DOS Technical Manual for information on installing SHARE.EXE.

Hint *The SHARE.EXE file-sharing utility remains active on the PC until the PC is turned off. Hence, SHARE.EXE must be invoked every time the PC is turned on. It is suggested that SHARE.EXE be put in the AUTOEXEC.BAT file of the PC executing PC-30 Runtime.*

8.1.3 Runtime Open Files

The number of open files that Runtime can maintain at any one time is determined by the FILES= statement in the PC's CONFIG.SYS file. These files include alarm logs, history files, trend data, etc. The minimum and maximum number of open files is 55 and 250 respectively. Refer to the *Modifying or Setting up a CONFIG.SYS File* in Chapter 2 for information regarding the FILES= statement.

8.2 Requirements

Before you can use the Runtime system, you must have a completed strategy (a set of application-specific displays is optional). To monitor or control a process effectively, you should understand the overall process and know what the goals and responsibilities are.

The displays designed by the developer within the Display Builder help the operator understand and interface to the process. The operator may also need some additional written or verbal guidelines from the developer.

4/23/93

The installation requirements for the Runtime system are included in the standard Installation operation. These installation procedures are described in Chapter 2: *Installation*. Be sure you complete the necessary installation requirements before starting Runtime operation.

Reminder The DOS SHARE.EXE file-sharing utility must be installed on the PC executing PC-30 Runtime.

RG-GA3-030-005

8.3 Runtime Basics

This section describes the basic start-up and operating procedures necessary to begin using the Runtime system. Details on each of the individual functions and operations available in the Runtime system are described later in this chapter.

8.3.1 Starting a Runtime Session

Starting the Runtime system is performed from the DOS prompt in the directory that contains the strategy to be executed.

To initiate a Runtime session, perform the following steps:

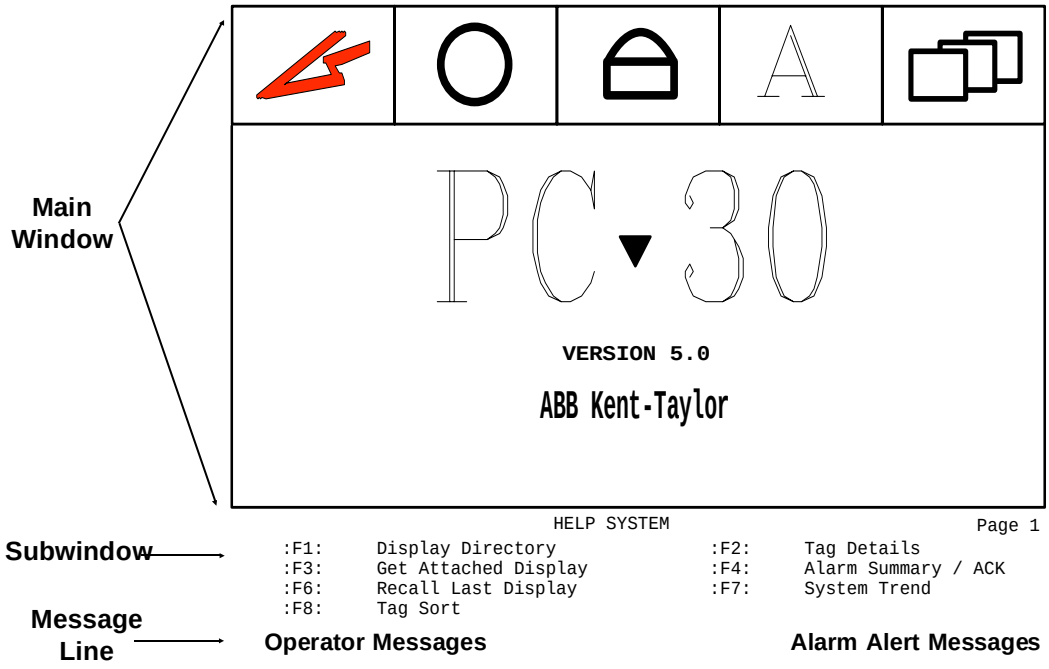
1. Use the DOS CD\ (**C**hange **D**irectory) command to move into the directory that contains the strategy to be executed.
2. At the DOS prompt, type:

   Type: `runtime` <*strategy*>↵

   where *strategy* is the name of the strategy created in the Strategy Builder.
3. The Runtime boot-up display appears as shown in Figure 8.1.

The first page of the Help subwindows also appears on the screen if the **Startup Subwindow** field in the SYS CNFG System Parameters submenu is *enabled* (default setting).

Setting this field to DISABLED inhibits this subwindow. The Help subwindow can be invoked by pressing the **[?]** key.



4/23/93

Figure 8.1 *Default boot-up display (BOOT.GSP)*

RG-GA3-030-005

Note The boot-up display that you see may be different from that shown in the Figure 8.1, since the design of a start-up display can be altered specifically for your application. Additionally, the contents of the Help subwindows can be altered (with the KEYHELP utility) to reflect any key assignment changes made via Key Macros.

Runtime Command Line

When invoking the Runtime environment for strategy execution, you can specify additional arguments that instruct PC-30 to perform various operations. As mentioned in the previous section, the syntax for the Runtime command line is:

runtime <*strategy***>**↵

where *strategy* is the name of the strategy you created in the Strategy Builder.

The Runtime system also supports these additional arguments that can be included in the Runtime command line:

runtime <*strategy***> [start-up display] [-keyboard override]**

where the meaning of each argument is defined in the following paragraphs:

strategy

The *strategy* argument is required at all times in conjunction with the runtime command. This argument indicates the name of the control strategy to be executed in the Runtime environment.

[start-up display]

The *start-up display* argument allows you to indicate the name of a specific display (GRP file) to be used as the Runtime boot screen instead of the standard BOOT.GSP display. The display file name entered in this argument should not include the .GRP extension.

[-keyboard override]

The *-keyboard override* argument allows you to force PC-30 to expect your keyboard to function as a specific keyboard type. Normally, PC-30 automatically determines the type of system keyboard during the Runtime start-up procedure. This argument should only be necessary for computers that have incompatible keyboards when using previous Runtime versions.

4/23/93

For example, if you had an 83/84 key keyboard and wanted to bring up a the display file START.GRP as the boot screen for a strategy named PROCESS, you would enter the following command from at the DOS prompt:

Type: `runtime process start -x` ↵

Non-Standard Keyboard Support

During the Runtime start-up procedure, PC-30 implements a routine that looks for the type of keyboard hardware being used and automatically configures itself for that type of keyboard activity during the Runtime session.

RG-GA3-030-005

In unusual instances where your system's keyboard does not respond within the Runtime environment, you can force PC-30 to look at your keyboard as a standard keyboard type. This is accomplished using the [-keyboard override] argument in the Runtime command line.

☞ The syntax of the **[-keyboard override]** argument is:

-<k>	**for 83/84 key keyboards (XT's)**
-e<k>	**for 101/102 key keyboards (AT's and above)**

where ***k*** is replaced by the type of computer being used. The valid entries for ***k*** is shown below.

P	**PC**
X	**PC-XT**
A	**PC-AT**
3	**PS/2 Model 30**
5	**PS/2 Model 50**

For example, if you had a 101/102 key type keyboard connected to a PS/2 Model 30 and need to force PC-30 to look at it that way when executing the BATCH strategy, you would enter the following Runtime command line at the DOS prompt:

Type: `runtime batch -e3`↵

Caution This argument should only be necessary for computers that have incompatible keyboards when using previous Runtime versions. All other computers should not specify this override argument unless instructed by Technical Support.

8.3.2 Security Levels

The functions and operations that are available during each Runtime session are controlled by security levels. Various operations require specific security levels to be enabled before they can be performed, e.g. entering process values into Data Entry fields, toggling strategy blocks between Auto and Manual modes, etc.

☞ The *PASS WORD* section in Chapter 4: *The Strategy Builder* describes the functions and operations that can be performed by each security level. It also describes how to setup individual users with assigned security levels that they must enable before they can perform security protected operations during Runtime.

4/23/93

After the Runtime system is booted, the operator using the system should enable his/her security level before attempting to perform any Runtime functions. The **[Alt-P]** Password-Security subwindow shown in Figure 8.2 allows each operator to enable his/her assigned security level.

To logon and thus enable the assigned security level, perform the following steps:

1. Press the **[Alt-P]** key combination to access the Password-Security subwindow (Figure 8.2).

RG-GA3-030-005

Figure 8.2 *Password-Security subwindow*

2. Using the **[Tab]** key (the **[Shift-Tab]** key combination allows you to move backwards) or the mouse, select the **Password to LOGON** field then type in your Runtime password.

3. When your password is entered successfully, your name appears in the **Current Owner** field and your security level appears in the **Current Security Level** field. For more information on security levels, refer to the *PASS WORD* section in Chapter 4: *The Strategy Builder*.

Note Your password must be entered exactly as it was initially recorded with the same upper and lowercase letters. If your security level is not enabled, the **Default** security level defined for the strategy is the only level enabled.

Once you successfully log on, you can change your default security level and your password by typing the desired settings into the **Security Level** and **New Password** fields respectively. The default security level can be changed to a level no higher than your assigned level. Save your new password or security level by pressing the standard **[Alt-C]** (or **[Alt-N]**) key combination to checkpoint the database.

Note The **Node Name** field in the Password-Security subwindow (Figure 8.2) allows you to logon/logoff remote nodes on a PC-30 Network system. Refer to the Network option's User's Guide for additional information on node security.

8.3.3 Exiting Runtime

When you finish working in Runtime, your method of exiting depends on your security level.

You can exit directly to DOS if your security level is 3 (engineer) by pressing the standard **[Alt-E]** key combination. A prompt appears in the subwindow asking for confirmation to exit. Pressing the **[Y]** key followed by pressing the **[Enter]** key. If you do not desire to exit the Runtime system at this time, continue with your next Runtime operation.

If your security level is less than 3, you cannot exit from the Runtime system. Only users logged on with a security level of 3 (engineer) terminate a Runtime session.

Each time a user logs on or off, the event is recorded in the Alarm/Event Summary.

4/23/93

RG-GA3-030-005

8.3.4 Viewing Window Areas

Three window areas, as shown in Figure 8.1, are available for viewing information during Runtime sessions. They are:

Main Window

The Main Window is the primary display area and is used for application-specific displays, directories, trend displays, etc.

Subwindow

The Subwindow area shows different kinds of displays, some of which you use to control Main Window displays. The subwindow also shows the algorithm parameters for each block in the database when the Details for a specific block are requested.

Message Line

The Message Line is used for displaying various text messages during a Runtime session. The Message Line consists of two parts: the Operator Message area and the Alarm Alert Message area. Operator Messages are displayed on the left side of the Message Line, Alarm Alert Messages are displayed on the right.

During a Runtime session, various operations involved with the process being executed are performed in these areas. When performing an operation in the Main Window or Subwindow areas, the active cursor should be in that area before attempting the desired operation. The location of the active cursor is usually indicated by a highlighted field in either the Main Window or Subwindow areas.

8.3.5 Entering Data

PC-30 provides several different methods for entering data into the process during a Runtime session. Various procedures can be used to access the fields that allow data to be entered into the process. The following paragraphs describe these operations.

Note It is possible with the use of Key Macro key assignments that the operation of the keystrokes defined below are different than their description. Refer to the respective *Key Macro* sections in both Chapter 4: *The Strategy Builder* and Chapter 7: *The Display Builder* for information on how Key Macros can effect Runtime key assignments.

4/23/93

[Home] Key

Press the **[Home]** key to move the active cursor from the subwindow to the main display and back.

[PgUp] & [PgDn] Keys

Use the **[PgUp]** and **[PgDn]** keys to page through any multiple-page screens or subwindows. These include such system screens as the Alarm/Event Summary in the Main Window or any Algorithm Parameter subwindow in the Subwindow area.

RG-GA3-030-005

[Tab] & [Shift-Tab] Keys

Use the **[Tab]** and **[Shift-Tab]** keys to move the active cursor between *pick fields* in any display, between data entry fields in an Algorithm Parameter subwindow, and from one item to another in listing displayed in the Main Window, such as the Tag Sort, Historian List, or Display Directory. The **[Tab]** key allows you to move forward through selections, the **[Shift-Tab]** key allows you to move backward.

When enabled, a mouse can be used in place of the **[Tab]** key, see the *Using the Mouse* section in this chapter for more information on Runtime mouse operations. Unless altered by Strategy or Display Key Macros, clicking on a pick field or subwindow field with the center mouse key downloads the value of that field's process variable to the database. This is equivalent to pressing the **[Enter]** key while the field is selected (highlighted).

Note If a parameter in an Algorithm Parameter subwindow is configured as external, any data entered into that field is not entered into the database.

[Enter] Key

The **[Enter]** key downloads the data type into the system into the real-time database. Type the data into subwindow fields, and data entries and initialized data entry fields in displays.

For subwindows, all changes are downloaded into the database when you press the **[Enter]** key. For displays, only the field the active cursor is positioned on can have its data downloaded when you press the **[Enter]** key. You can download all of the data in a display's fields simultaneously by pressing the standard **[Alt-D]** key.

8.3.6 Using the Mouse

A mouse can be used during Runtime if its functionality is enabled in the Strategy Builder's Options icons for the strategy being executed. The mouse can be used in any Main Window display or subwindow to select a pick field.

4/23/93

Based on the **Cursor Off Delay** parameter set in the Mouse Option submenu, the mouse cursor stays on the Runtime screen while it is actively moving. If the mouse cursor remains idle for a length of time specified in this **Cursor Off Delay** parameter, it disappears until the next time it is moved. Refer to the *Enabling the Runtime Mouse* section of Chapter 4: *The Strategy Builder* for more information on how to enable the Runtime mouse for individual strategies.

8.3.7 Accessing On-Line Help

The PC-30 Runtime system provides Help subwindows that define the standard key assignments available. These key assignments are based upon the standard Key Macro assignments that are initially set for all Runtime operations. If Strategy- and/or Display-based Key Macros are incorporated into a strategy or display, the assignments made by those Key Macros override those displayed in the standard Help subwindows.

RG-GA3-030-005

You can generate custom Help subwindows via the KEYHELP utility provided with PC-30. This utility allows you to define your own Help subwindows that are displayed when the On-line Help system is called. Your customized Help subwindows can be configured to reflect any Strategy- and/or Display-based Key Macros that are in effect.

Standard Help Subwindows

The Help subwindows provides a quick on-line reference for functions and operations that can be performed in the Runtime system. You can display Page 1 of the Help subwindows any time by pressing the **[?]** key. Figure 8.3 shows the six pages of the standard Help subwindows.

Note Depending on the location of the "?" character on your keyboard, it is assumed that you will probably have to press the **[Shift-/]** key combination to get "?" functionality.

While the active cursor is in the Subwindow area and a Help subwindow is currently visible, the other Help pages can be scrolled through by pressing the **[PgDn]** and **[PgUp]** keys.

Page 1 lists the top-level function keys. You can use the functions attached to many of these keys any time. Certain functions, however, are only operational in certain circumstances. Page 2 defines the keys which control cursor movement, display paging, and data entry. Pages 3-6 define the standard system trace keys and other miscellaneous functions that you invoke with Alt-key combinations.

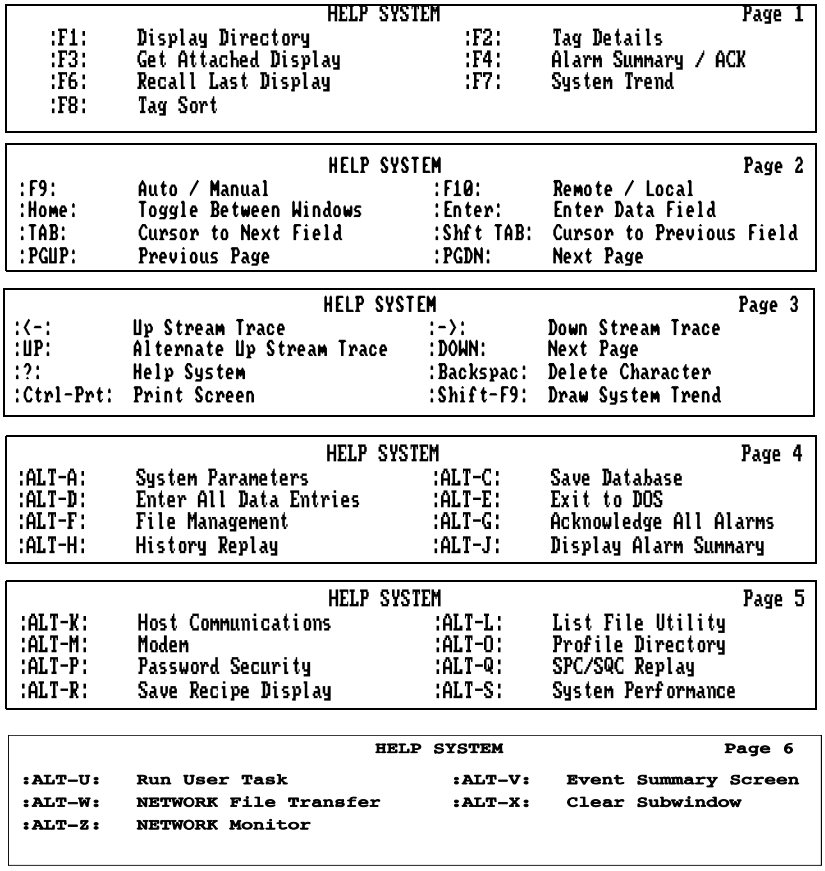


Figure 8.3 *Standard Help subwindows*

The standard assignment of the arrow cursor keys (←,↑,→,↓) are used for tracing only while the active cursor is in an Algorithm Parameters subwindow. At other times, depending on Key Macro assignments, the arrow keys can be used for such operations as invoking application-specific displays.

4/23/93

RG-GA3-030-005

KEYHELP Help Subwindows

Strategy- and Display-based Key Macros can be used to redefine the standard key assignments provided in the Help subwindows.

With the KEYHELP utility, you can define a new set of Help subwindows that depict your key assignments. These new Help subwindows are invoked by the same **[?]** operation used by the standard Help system during Runtime. PC-30 provides the standard KEYHELP subwindows (HELP1.GSP through HELP6.GSP) that define the keyboard functions corresponding to the standard key assignments described in Table 8.1.

The table below shows the KEYHELP Source File used to generate the Standard Help subwindows in Figure 8.3.

Table 8.1 Standard KEYHELP Source File

```
[F1] = (:F1:,Display Directory).; Display User Diagrams
[F2] = (:F2:,Tag Details).; Get Tag Details
[F3] = (:F3:,Get Attached Display).; Get Attached
       Display
[F4] = (:F4:,Alarm Summary / ACK).; Alarm Summary
[F6] = (:F6:,Recall Last Display).; Recall Last Display
[F7] = (:F7:,System Trend).; System Trend
[F8] = (:F8:,Tag Sort). ; Tag Sort
[F9] = (:F9:,Auto / Manual).
[F10] = (:F10:,Remote / Local).
[HOME] = (:Home:,Toggle Between Windows).
[CR] = (:Enter:,Enter Data Field).
[TAB] = (:TAB:,Cursor to Next Field).
[Shift-TAB] = (:Shft TAB:,Cursor to Previous Field).
[PgUp] = (:PGUP:,Previous Page).
```

Table 8.1 Standard KEYHELP Source File (cont.)

```
[PgDn]  = (:PGDN:,Next Page).
[LEFT] = (::,Up Stream Trace).
[RIGHT] = (:-:,Down Stream Trace).
[UP] = (:UP:,Alternate Up Stream Trace).
[DOWN] = (:DOWN:,Next Page).
[?] = (:?:,Help System).
[Backspace] = (:Backspac:,Delete Character).
[Ctrl-PrtSc] = (:Ctrl-Prt:,Print Screen).
[Shift-F9] = (:Shift-F9:,Draw System Trend).
[Alt-A] = (:Alt-A:,System Parameters).
[Alt-C] = (:Alt-C:,Save Database).
[Alt-D] = (:Alt-D:,Enter All Data Entries).
[Alt-E] = (:Alt-E:,Exit to DOS).
[Alt-F] = (:Alt-F:,File Management).
[Alt-G] = (:Alt-G:,Acknowledge All Alarms).
[Alt-H] = (:Alt-H:,History Replay).
[Alt-J] = (:Alt-J:;Display Alarm Summary).
[Alt-K] = (:Alt-K:,Host Communications).
[Alt-L] = (:Alt-L:, List File Utility).
[Alt-M] = (:Alt-M:,Modem).
[Alt-O] = (:Alt-O:,Profile Directory).
[Alt-P] = (:Alt-P:,Password Security).
[Alt-Q] = (:Alt-Q:,SPC/SQC Replay).
[Alt-R] = (:Alt-R:,Save Recipe Display).
[Alt-S] = (:Alt-S:,System Performance).
[Alt-U] = (:Alt-U:,Run User Task).
[Alt-V] = (:Alt-V:,Display Event Summary).
[Alt-W] = (:Alt-W:,Network File Transfer).
[Alt-X] = (:Alt-X:,Clear Subwindow).
[Alt-Z] = (:Alt-Z:,Network Monitor).
```

4/23/93

RG-GA3-030-005

KEYHELP Source File Definitions

Custom Help subwindows are defined in a KEYHELP source file using any off-line text editor or word processor capable of handling ASCII files. This source file must be stored in an ASCII text format and have a .HLS extension. The KEYHELP source file contains a listing of the individual **key name**, **display key name**, and its **description**.

Once the KEYHELP source file is created, it must be compiled into a library file using the KEYHELP utility. The KEYHELP source file consists of a series of statements that define the key name of each keystroke, how the key displays in the Help subwindow, a description of that key assignment, and any optional comments. All of the key names that can be used in the source file statements are defined in *Table 4.7: User Definable Keys* in Chapter 4: *The Strategy Builder*. The syntax of KEYHELP statements is:

[<key name>] = (<display key name>,<description>).<;comment>

where ***key name*** is the actual key or key combination that was assigned from a Key Macro assignment. This entry must match the exact syntax (upper and lower case) of the key definition found in User Definable Keys in Chapter 4: *The Strategy Builder* and it must be enclosed in square brackets ([ ]).

The ***display key name*** entry is a text string of up to 10 characters that will be displayed in the Help subwindow and is used to indicate the key or key-combination that is assigned a function. The *display key name,description* pair must be enclosed within parenthesis ( ).

The ***description*** entry is a string of up to 25 characters that display next to its corresponding *display key name* and describes what function/operation the *display key name* performs. The *display key name,description* pair must be enclosed within parenthesis ( ).

The ***comment*** entry is any comment string you want to enter into a source file statement to describe what the definition is accomplishing.

The KEYHELP source file can contain an unlimited number of statements in which each successive eight lines is placed into a single window. The first 8 statement lines make up page 1 of the Help subwindows, the second 8 lines make up page 2 of the Help subwindow, and so on. A *display key name* entry cannot exceed 10 characters and the *description* cannot exceed 25 characters. Each source file statement must be terminated by a period (.).

The KEYHELP source file can contain comments. Comments are preceded by a semicolon (;) and can contain any alphanumeric characters. The length of any single comment is limited to a single line. When comments are placed on the same line as a statement, they must appear after the terminating period. The syntax for a comment string is:

<;alphanumeric comment>

or

[<key name>] = (<display key name>,<description>).<;comment>

4/23/93

RG-GA3-030-005

KEYHELP Operation

The KEYHELP utility accepts the ASCII-formatted .HLS source file argument and compiles it into a format that is understood by PC-30. After KEYHELP successfully compiles the source file, it generates the customized .GSP and .HLP Help subwindow files.

Hint *When you complete your KEYHELP source file (.HLS), copy it into the PC-30 system directory before compiling it with the KEYHELP utility. This ensures that the generated .GSP and .HLP files are found by PC-30 during Runtime start-up.*

To compile a KEYHELP source file from the DOS prompt, type:

Type: KEYHELP <*source file name*>↵

where the *source file name* is the name of the .HLS ASCII source file to be compiled. After KEYMAC successfully compiles the .HLS source file, a screen similar to the one shown in Figure 8.4 displays. KEYHELP generates the new Help subwindow files, HELP*n*.GSP, where ***n*** is the number of pages of Help subwindows available.

```
C:\PC30>keyhelp funchlp

PC-30 Control Series HELP System Compiler 3.20
Copyright 1988 - 1989, by Iconics, Inc. all rights reserved.


    **********  Using HELP1.GSP  **********
[F1]= (   :F1:,Display Directory).
[F2]= (   :F2:,Tag Details).
[F3]= (   :F3:,Get Attached Display).
[F4]= (   :F4:,Alarm-Event Summary / ACK).
[F6]= (   :F6:,Recall Last Display).
[F7]= (   :F7:,System Trend).
[F8]= (   :F8:,Tag Sort).

    **********  Using HELP2.GSP  **********


    **** Created 2 Help GSP files ****

C:\PC30>
```

Figure 8.4 *A sample KEYHELP compilation screen*

Note During compilation, the KEYHELP utility also generates corresponding .HLP files. These files currently are not used by PC-30, but they should be maintained for later Help system enhancement support.

4/23/93

RG-GA3-030-005

Reminder The .HLS KEYHELP source file must be in an ASCII text format. If you are using a word processor to generate your .HLS file, make sure it can generate (convert) files into an ASCII format. Files that are not in an ASCII format do not compile properly with the KEYHELP utility. Refer to your word processor's documentation to determine how it generates ASCII text files.

The last line in your KEYHELP source file must contain a "CR" character (created by pressing the **[Enter]** key) at the end of the line. Failure to place the "CR" character at the end of the last line results in an error when you attempt to compile the source file.

Hint *Use the DOS* **TYPE** *command to determine if the .HLS file is in an ASCII format. If normal alphanumeric characters (for example, K, p, 4, &, /, etc.) are displayed on the screen, the file is in ASCII format. If control and/or graphic characters appear on the screen, the file is not in ASCII format and will not compile with* **KEYHELP** *properly. From the DOS prompt:*

Type: type **<***file name***>.HLS**

KEYHELP Error Messages

The following list contains the possible error messages and their causes that are posted by the KEYHELP utility.

',' expected

KEYHELP expects the **display key name** and its **description** to be separated by a comma (,).

'.' expected

A statement was encountered that did not contain the required period (.) terminator. All KEYHELP statements are required to end with a period (.). If a comment is included in a statement line, the comment cannot be placed before the statement's period.

'=' expected

KEYHELP encountered a parenthesis before the equal sign (=) equator. KEYHELP requires the equal sign (=) to be used to equate a **key name** to its **display key name** and **description**.

'['expected

KEYHELP encountered a phrase it determined was a **key name** that did not begin with an open bracket ([). All **key name** specifications must be enclosed by square brackets. Only the key names listed in the *User Definable Keys* in Chapter 4: *The Strategy Builder* can be used in the key name definition part of a statement.

4/23/93
RG-GA3-030-005

8.3.8 Using the Function Keys

The standard function key assignments listed in the standard Help subwindows enable you to perform frequently used PC-30 operations with a simple keystroke. Some keys have more than one function and require that you press the **[Alt]** key in combination with an function key to perform the desired operation.

Some combinations, like **[Shift-]** function key combinations, may perform different operations based upon the task or subwindow it is being exercised on. Table 8.2 defines the standard function keys and key combinations are standard throughout the Runtime system (provided they are not overridden by Key Macro assignments):

Table 8.2 Standard function key operations

Key	Function	Use
F1	Call up the directory of displays	Anytime
	Call up a specific display	When the Directory Display is on the screen and you tab to the **Display Name** field
F2	Call up an Algorithm subwindow menu	Anytime
	Call up an Algorithm subwindow	When the active cursor is on a data field in a display or on any Alarm
F3	Call up the display attached to a block in the strategy	When the active cursor is in an Algorithm subwindow or on a PPT
F4	Call up the Alarm/Event Summary	Anytime (when the Alarm/Event Summary is not already displayed)

Key	Function	Use
F4	Acknowledge a specific alarm	When the active cursor is on an alarm line in the Alarm/Event Summary
F4	Acknowledge the most recent alarm	When the summary is being displayed and the cursor is in the subwindow area
F6	Recall the last application-specific display	Anytime
F7	Call up the Trend or Plot window	Anytime
F8	Call up the Tag Sort window	Anytime
F9	Toggle Auto/Manual (output)	Whenever an algorithm subwindow is displayed or while the active cursor is on a PPT
F10	Toggle Remote/Local (set point)	Whenever an algorithm subwindow is displayed if a remote set point was enabled for the algorithm (in the Strategy Builder) or while the active cursor is on an appropriate PPT
Alt-A	System Parameters subwindow	Anytime
Alt-C	Checkpoint (save) the database	Anytime
Alt-D	Download all Data Entry values	Anytime
Alt-E	Exit Runtime	Anytime (requires the correct password level)
Alt-F	File Management subwindow	Anytime

4/23/93

RG-GA3-030-005

Key	Function	Use
Alt-G	Acknowledge all alarms	Anytime
Alt-H	History Replay subwindow	Anytime
Alt-J	Display Alarm Summary	Anytime
Alt-K	Host Communication subwindow	Anytime provided the option has been installed
Alt-L	List File Utility	Anytime
Alt-M	Modem Communications subwindow	Anytime provided the option has been installed
Alt-O	Profile Directory	Anytime provided the Setpoint Profiler option has been installed
Alt-P	Call Up the Password Security window	Anytime
Alt-Q	SPC/SQC subwindow	Anytime provided the option has been installed
Alt-R	Save recipe display to disk	Anytime provided an operator display is in the Main Window
Alt-S	System Performance subwindow	Anytime
Alt-U	Execute the User Task	Anytime provided the option has been installed and configured
Alt-V	Display Event Summary	Anytime
Alt-W	Network File Transfer subwindow	Anytime provided the option has been installed
Alt-X	Clear Subwindow area	Anytime
Alt-Z	Network Monitor subwindow	Anytime provided the option has been installed

8.3.9 Displaying Multipage Directories

Long directories can be displayed in a multiple-page format during Runtime. Using the appropriate function keys, you can invoke a directory screen that identifies the files available for the respective operation, e.g. **[F1]** for a Display directory, **[F8]** to display a Tag Sort directory, etc. If there are more files than can fit in a single directory screen, the directory can be scrolled a page at a time. Press the **[PgDn]** key to view the next directory screen and press the **[PgUp]** key to view a previous directory screen.

4/23/93

8.3.10 Runtime Screen Saver

Beginning with PC-30 Runtime version 5.0, a screen saver can be enabled for the Runtime system. The Runtime screen saver causes the screen to "black out" when there is no keyboard or mouse activity for a user specifiable amount of time. When the screen saver activates, any mouse or keyboard action restores the screen that was displayed when the screen saver activated. The screen saver is enabled and configured in the SYS algorithm block configuration menu in the Strategy Builder.

8.4 Operation of the Runtime System

RG-GA3-030-005

Once the **`runtime`** <*strategy*> command line is executed from the DOS prompt, the *strategy* included in this command line begins its execution. While the strategy is executing, any of the functions and/or operations available within PC-30 can be performed (provided the strategy lends itself to each particular function or operation). The sections that follow describe the necessary procedures and options involved when performing the functions and operations in the Runtime system. Some functions and operations have several methods for accomplishing the same task. If so, each method is identified and described.

8.5 System Parameters

During strategy configuration in the Strategy Builder, the strategy developer specifies a number of parameters that affect the overall behavior of the strategy during Runtime. These parameters are described in the *SEL Function, System Configuration* section in Chapter 4: *The Strategy Builder*.

You can change some of these parameters during Runtime, using the System Parameters subwindows shown in Figure 8.5.

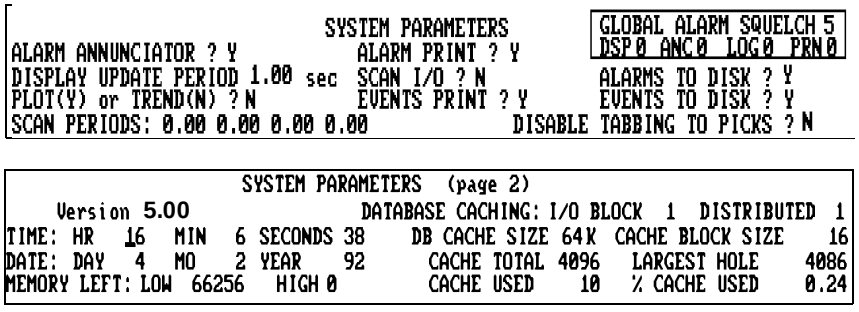


Figure 8.5 *System Parameters subwindows*

To invoke and make changes to the available Runtime system parameters perform the following steps.

1. Press the **[Alt-A]** key combination to display the System Parameters subwindow. If necessary, use the **[Home]** key to move the active cursor into the Subwindow area.

2. Make your change by tabbing to the appropriate field and typing the new data into the field.

3. Press the **[Enter]** key to save the entered data.

☞ The System Parameters subwindows contains the following fields:

Page 1

Alarm Annunciator

This parameter controls the system's alarm annunciator (speaker). Entering **Y** enables alarms to be sounded over the computer's speaker where higher pitched tones are generated for higher priority alarms. Entering **N** disables the annunciator.

4/23/93

Alarm Print?

This parameter determines whether alarms are printed to the configured printer as they occur. Enter **Y** to print alarms on the alarm printer, which is specified in the Strategy Builder through the System Configuration – ALRM CNFG's **Alarm Printer Port** parameter. Entering **N** inhibits the printing of alarms.

Global Squelch Level

This field corresponds to the **Alarm Squelch Level** set in the ALRM CNFG Logger Parameters submenu (Strategy Builder). This parameter lets you define a level of suppression for all process alarms. This acts as the "master" squelch level for all alarms. The value (0 to 9) entered in this field determines which alarms are suppressed. All alarms with a priority less than the squelch level are *not* displayed, sounded, printed, or logged to disk.

RG-GA3-030-005

Sub-squelch levels also exist for alarm annunciating, printing, displaying, and logging to disk. The alarm priority must be greater than or equal to the **Global Alarm Squelch** level *and* greater than or equal to the sub-squelch level for the particular action (printing, displaying, etc.) in order for the action to take place. The sub-squelch level fields are described below.

Display Squelch (DSP)

This squelch level determines if the alarm will appear on the Alarm/Event Summary screen.

Disk Squelch (LOG)

This squelch value determines if the alarm will appear in the alarm log file. This only applies if the **Alarms to Disk ?** parameter is set to **Y**.

Printer Squelch (PRN)

This squelch value determines if the alarm will be sent to the printer. This only applies if the **Alarm Print ?** parameter is set to **Y**.

Annunciator Squelch (ANC)

This squelch value determines if the alarm will sound. This only applies if the **Alarm Annunciator ?** parameter is set to **Y**.

Screen Update Period

This parameter lets you override the default Display Update Period setting defined in the SYS CNFG submenu in the Strategy Builder. You may set this period at preset values of **.1**, **.25**, **.5**, **1**, **2**, **3**, **4**, or **5 seconds**. Longer times leave more computing resources for disk-related operations and give less information to the operator.

Scan I/O

This is a display-only field that displays **Y** or **N**. On Demand displays as **N**. The I/O Scanner must be turned on (Y) in the Strategy Builder's SYS CNFG submenu in order to access any I/O hardware installed. With the scanner turned off (N), you can run a strategy in simulation mode for test purposes.

It is possible to turn on the I/O Scanner previously turned off automatically based upon a digital event. During the configuration of the strategy in the Strategy Builder, the developing engineer needs to incorporate a SYS block into the strategy. By connecting the controlling digital variable to the SYS block's **SCAN** input, when that digital goes true (logical 1) the SYS block turns the I/O Scanner on.

4/23/93

Alarms to Disk?

This parameter indicates whether alarms are logged to a disk file. This field accepts a value of **Y** or **N**. If **Y**, alarms are written to files on the hard drive. The file LOG*nn*.TXT is created, where *nn* is a number from 0 to 99. The file is closed either when Runtime is exited or if this function (and **Events to Disk**) is turned off by entering a **N** in this field. The next time alarm logging starts, the LOGnn.TXT file number increments. Note that the alarm file name can be changed from LOG in the Strategy Builder's ALRM CNFG File Parameters submenu.

RG-GA3-030-005

Plot (Y) or Trend (N) ?

This parameter allows you to specify how the PC-30 **System Trend** function is displayed. Enter **Y** for Plot mode or **N** for Trend mode.

Events Print?

This parameter allows you to specify in Operator Events items to be logged, along with alarms, to the configured alarm printer. Enter **Y** to print operator events to the alarm printer (defined in the Strategy Builder's ALRM CNFG submenu) or **N** to inhibit event printing.

Events to Disk?

This parameter allows you to specify if Operator Events are logged along with alarms to the disk file. Enter **Y** or **N**. Events are logged to the same file as alarms, LOGnn.TXT (or the file defined in the Strategy Builder's ALRM CNFG submenu).

Scan Periods

This is the interval at which PC-30 scans the four serial ports for I/O communications. These values are initially set up in the Strategy Builder's COMM CNFG submenu. (Note that the communication scan time set in COMM CNFG should be set to scan twice as fast as the fastest device block (i.e. block processor) or I/O block scan rate associated with it.) Defining different scan period values during Runtime requires that the respective serial port be set to INSTALLED in the COMM CNFG submenu in the Strategy Builder.

The furthest field to the left represents the COM1: scan period field, COM2: is to the right of COM1:, and so on. The valid values for these four scan period parameters are 0.05 through 99 seconds. Out-of-range entries are automatically rounded to the nearest legal value.

Disable Tabbing to Picks?

This parameter lets you define whether pick fields can be tabbed to in operator displays or system subwindows. Enter Y to disable tabbing to pick fields (process points cannot be accessed). Enter N to enable pick field tabbing, thus allowing the operator to tab to (select) a process point and access the process variable within that process point.

Page 2

4/23/93

Version

The version of PC-30 Runtime presently operating.

Time

This parameter allows you to enter a new time setting for the Runtime session. The fields available consist of: **Hr**, enter the 24-hour value (0 to 23) **Min**, enter the minutes value (0 to 59) **Seconds**, enter the seconds value (0 to 59).

Date

This parameter allows you to enter a new date setting for the Runtime session. The fields consist of: **Day**; enter the desired calendar day (1 to 31), **Mo**; enter the desired calendar month (1 to 12), **Year**; enter the desired calendar year.

RG-GA3-030-005

Memory Left:

This parameter actually includes two fields: **LOW** and **HIGH** which display how much corresponding RAM memory is available for Runtime operations. The **LOW** field displays how much conventional memory is available. The **HIGH** field displays how much upper and high memory is available.

Database Caching

The following parameters for the Database Caching feature are implemented in PC-30 Version 4.0 and higher. For more information on any of these parameters, refer to the *Database Caching* section in Chapter 3. All of these parameters are view-only; you cannot change them from here.

I/O Block Caching

Shows the status of the I/O Block Caching System Configuration parameter. 0 = OFF / 1 = ON

Distributed

Shows the status of the Distributed Block Caching System Configuration parameter. 0 = OFF / 1 = ON

DB Cache Size

Shows the current System Configuration setting for the total cache buffer size (in Kbytes).

Cache Block Size

Shows the current System Configuration setting for the total cache block size (in bytes).

Cache Total

Shows the current total amount of the cache buffer in use.

Largest Hole

Depending on the **Cache Block Size** setting, more or less memory segmentation occurs, leaving holes in the Cache memory buffer. Largest hole size gives you an indication of how efficiently the buffer is being used. The Units of

size are in Cache Blocks. For example, if the largest hole value is 10 and Cache Block Size is 16 bytes, the largest hole is 160 bytes (refer to *Database Caching* in Chapter 3).

Cache Used

Shows the actual amount of cache buffer memory in use.

% Cache Used

Shows the current percentage (% of total) of the cache buffer in use.

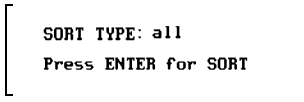
4/23/93

8.6 Tag Sort Function

The Tag Sort function provides a sorted display of block tag names from the strategy that is currently being executed. Figure 8.7 shows an example of a what a typical Tag Sort Display looks like.

Perform the following steps to use the Tag Sort function. (These steps assume that you invoked the Runtime system and a strategy is being executed.)

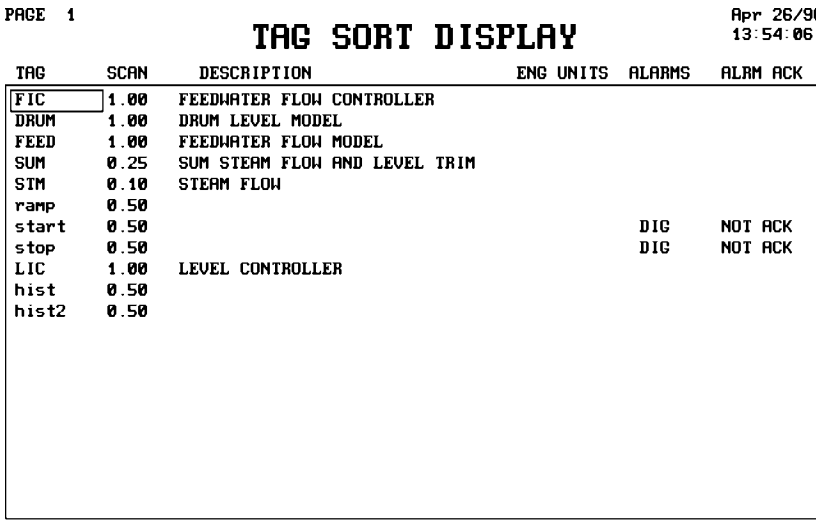
1. Press the **[F8]** key. The Tag Sort Menu subwindow appears in the Subwindow area of the screen as shown in Figure 8.6.



RG-GA3-030-005

Figure 8.6 *Tag Sort Menu subwindow*

2. Use the **[Tab]** key (or the mouse if it is enabled) to move the cursor from one field to the next. If necessary, press the **[Home]** key to place the active cursor in the Subwindow area.


PAGE 1 Apr 26/9
13:54:06

TAG SORT DISPLAY

TAG	SCAN	DESCRIPTION	ENG UNITS	ALARMS	ALRM ACK
FIC	1.00	FEEDWATER FLOW CONTROLLER			
DRUM	1.00	DRUM LEVEL MODEL			
FEED	1.00	FEEDWATER FLOW MODEL			
SUM	0.25	SUM STEAM FLOW AND LEVEL TRIM			
STM	0.10	STEAM FLOW			
ramp	0.50				
start	0.50			DIG	NOT ACK
stop	0.50			DIG	NOT ACK
LIC	1.00	LEVEL CONTROLLER			
hist	0.50				
hist2	0.50				

Figure 8.7 *Tag Sort Display sample*

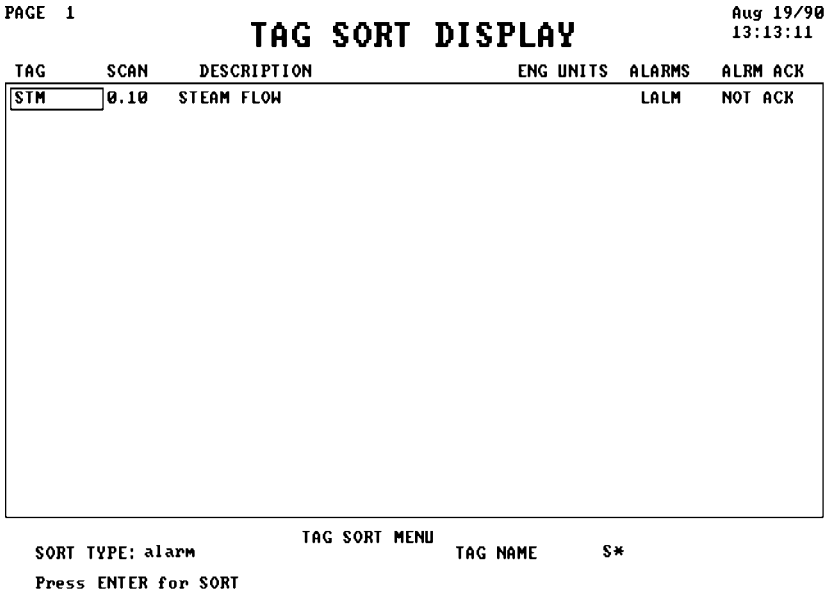
3. With the **SORT TYPE** field selected (highlighted), specify the algorithm type that you want to display. You can enter one of the following:

- "all" to display all algorithm types
- "alarm" to display all blocks currently in alarm
- a specific algorithm type, such as PID, ADD, AIN, etc.

4. With the **TAG NAME** field selected, specify which tags to display according to their defined tag names, e.g. all tags beginning with the letter F, etc.
You can use an asterisk (*) as a wildcard character, just as you do in DOS. For example, * displays all tag names, S* displays all tag names beginning with S, and DRUM* displays all tag names beginning with DRUM.

5. After both the **SORT TYPE** and **TAG NAME** fields are defined, press the **[Enter]** key to display the Tag Sort Display for block tag names that match those specifications.

   Figure 8.8 shows a display of all tags in alarm beginning with the letter "S".



4/23/93

Figure 8.8 *Tag Sort Display example with S* tags in alarm*

RG-GA3-030-005

Hint *While a Tag Sort Display is in the Main Window, it is possible, with the proper security level enabled, to produce the Tag Details subwindow for any Tag entry by selecting the desired tag with the active cursor then pressing the* **[F2]** *key.*

8.6.1 Intelligent I/O Blocks

The Tag Sort Function operates differently for Intelligent I/O device blocks. An intelligent I/O block contains input and output points.

To use the Tag Sort Function for Intelligent I/O blocks, perform the following steps:

1. Press the **[F8]** key. The Tag Sort Menu subwindow appears in the Subwindow area of the screen as shown in Figure 8.7.

2. Use the **[Tab]** key (or the mouse if it is enabled) to move the cursor from one field to the next. If necessary, press the **[Home]** key to place the active cursor in the Subwindow area.

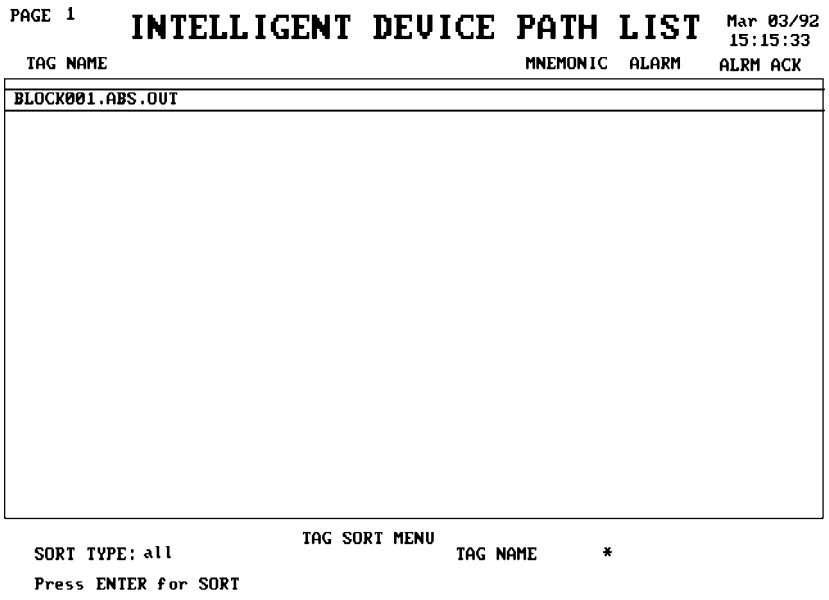
3. With the **SORT TYPE** field selected (highlighted), specify the algorithm type that you want to display. You can enter one of the following:

   - "all" to display all algorithm types
   - "alarm" to display all blocks currently in alarm
   - a specific algorithm type, such as PID, ADD, AIN, etc.

4. With the **TAG NAME** field selected, specify which tags to display according to their defined tag names, e.g. all tags beginning with the letter F, etc.
   You can use an asterisk (*) as a wildcard character, just as you do in DOS. For example, * displays all tag names, S* displays all tag names beginning with S, and DRUM* displays all tag names beginning with DRUM.

5. After both the **SORT TYPE** and **TAG NAME** fields are defined, press the **[Enter]** key to display the Tag Sort Display for block tag names that match those specifications.

6. Highlight a tag name and press **[F2]**. The Intelligent I/O Device Path List screen displays (Figure 8.9). This screen lists the I/O point(s) written or read to for an Intelligent I/O device.



4/23/93

RG-GA3-030-005

Figure 8.9 *Intelligent Device Path List screen*

7. Press **[F2]** and a subwindow displays at the bottom of the screen. This subwindow displays the path name and various parameters for the Intelligent I/O block.

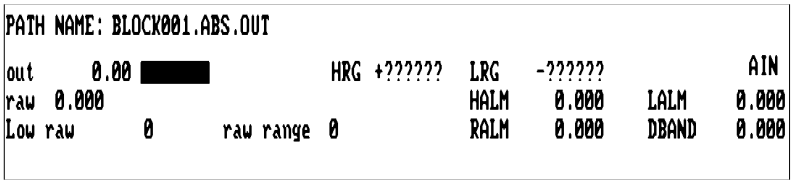


Figure 8.10 *Intelligent I/O Path Name subwindow*

8.7 Algorithm Subwindows

An Algorithm subwindow (invoked by the Tag Details function) displays the current values of parameters and variables within any block in your strategy. These subwindows also provide data entry fields which allow you to change variable/parameter values in the database. Because of the possible conditions that could occur by inadvertently changing process values, Algorithm subwindows are protected by security levels.

Depending on the security level that is currently enabled, various levels of subwindows can be displayed. With level 0 (View-only) and level 1 (Operator) enabled, Algorithm subwindows cannot be displayed. Certain algorithm blocks have more than one page of subwindows. If your system is set to security level 2 (Technician), you can only enter values into the first page of each Algorithm subwindow. At security level 3 (Engineer), you can enter values on all pages. Refer to Chapter 6: *Algorithms* for a description of each parameter and variable displayed in its Algorithm subwindow(s).

Figure 8.11 shows an example of the first page of the PID algorithm's Tag Details subwindow. This example illustrates the common characteristics of Algorithm subwindows that are invoked via the Tag Details function.

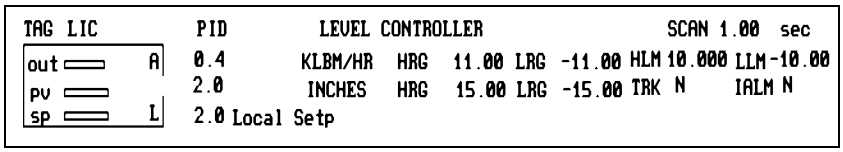


Figure 8.11 *Sample PID algorithm subwindow*

4/23/93

8.7.1 Algorithm Subwindow Contents

Algorithm subwindows include both data entry and process point fields for parameters and variables within the respective block. The data entry fields are highlighted on the screen with a solid box. Data entry fields are not dynamic; they display the parameter values at the moment the subwindow was invoked or the last value entered, if any.

The process point fields appear as text against a black background. These fields are for display only and cannot be tabbed to and changed. Some data display fields contain static data, such as the description field, while others contain live data, such as the **out** field.

RG-GA3-030-005

☞ If a parameter is configured as external (set to E in the block's configuration menu in the Strategy Builder) then the data entry field for that parameter/variable is not active in the subwindow. You can enter data into its field in the subwindow, but it will not be downloaded into the database.

Most Algorithm subwindows include a bar graph faceplate that shows the output, input(s), and set point (for controller algorithms) as percentage of span values. The field to the right of the output bar indicates whether the block's output is in Auto mode (A) or Manual mode (M). For a Control algorithms, e.g. PID, PD, INTG, DGAP, etc., the field to the right of the setpoint bar indicates whether the setpoint source is remote (R) or local (L).

8.7.2 Invoking Algorithm Subwindows

There a several methods available during Runtime to invoke an Algorithm subwindow. Each method is described in the following paragraphs.

METHOD ❶

If the active cursor is not in a tag name field or data field in a Main Window display, press the **[F2]** key. The prompt shown in Figure 8.12 appears in the Subwindow area. Type the desired tag name in the TAG field and press the **[Enter]** key.

Figure 8.12 *Algorithm subwindow TAG prompt*

METHOD ❷

With another block's Algorithm subwindow already displayed, use the **[Tab]** key (the **[Shift-Tab]** key to move backward) or the mouse, select (highlight) the **TAG** field. Type the tag name of the block to be displayed and press the **[Enter]** key.

METHOD ❸

Use the **[Tab]** key (the **[Shift-Tab]** key to move backward) or the mouse to select (highlight) a data entry or process point field in a Main Window display. (Tabbing to pick fields may be disabled in the Strategy Builder.) Press the **[F2]** key. The Algorithm subwindow associated with the variable connected to the corresponding field is displayed.

4/23/93

METHOD ❹

With one of the system displays shown below in the Main Window, use the **[Tab]** key or the mouse, to select (highlight) the desired tag then press the **[F2]** key. The corresponding Algorithm subwindow for the selected tag is displayed.

- Tag Sort Display
- Alarm/Event Summary
- Trend and Plot List
- Historian List

METHOD ❺

Using the trace method, you can overwrite the currently displayed Algorithm subwindow with the subwindow for the next block to which it is connected upstream or downstream. In the event that multiple connections are made to a block's output, the trace method displays the Algorithm subwindow of the first connection made.

RG-GA3-030-005

To Display	Press
a downstream block's algorithm subwindow to which the algorithm is sending output	→ key
an upstream measurement block's algorithm subwindow	← key
an upstream setpoint block's algorithm subwindow	↑ key

8.7.3 Entering/ Changing Subwindow Data

For most algorithms, the block's output can be accessed by first toggling between Auto and Manual modes. You can only enter data in the data entry field when the block is in Manual mode. The field to the right of the output bar indicates the current mode (A or M).

When entering analog values into a data entry field, the number may exceed the field size (7 characters). If a number greater than 9999999 is entered in a field, Runtime attempts to display the number in scientific notation. If there is not enough space for scientific notation, the entry appears as ??????? meaning the number too large for Runtime to handle.

☞ While the active cursor is in a block's Algorithm subwindow, you can toggle the block's output mode (Auto/Manual) by pressing the **[F9]** key. Auto/Manual mode for an algorithm block can also be toggled by selecting a pick field in the main window for the desired block and then pressing the **[F9]** key.

Note A process point and data entry field associated with the each block's OUT variable appear to the right of the out bar graph, (see Figure 8.11 shown previously).

Setpoint modes for Control algorithms, e.g. PID, PD, INTG, DGAP, etc., can be toggled between Remote (R) and Local (L) modes by pressing the **[F10]** key while the active cursor is either in the block's Algorithm subwindow or on pick field in the Main Window that is attached to the corresponding block. When the block is in Local mode, you can enter setpoint values into the corresponding data entry field. When in Remote mode, setpoint values are controlled by the process.

Remote/Local toggling can only be performed while the block in question has its **REM SETP** parameter in the Strategy Builder's configuration menu is set to **Y**.

4/23/93

8.8 Checkpointing Database Changes

During Runtime, changes in process variable values and/or system parameters can be saved (checkpointed) at any time by pressing the **[Alt-C]** key combination (or **[Alt-N]**). This operation causes PC-30 to create a new database file that has the same strategy name, but the extension .NEW is used instead of .DB. This checkpointed database is used if your computer should lose power or some other system failure occurs and a "warm start" is necessary. Refer to the *SYS CNFG* section of Chapter 4: *The Strategy Builder* for information on warm starts.

During strategy development in the Strategy Builder, the strategy developer can also specify to checkpoint (save) the database periodically or have the checkpoint operation trigger automatically based on a digital event. Both methods of checkpointing are accomplished by incorporating a CKPT block into the strategy. Refer to *CKPT* block section in Chapter 6: *Algorithms* for additional information on automatic checkpointing of the Runtime database.

RG-GA3-030-005

8.9 Operator Displays

Using the Display Builder, the process developer can design an unlimited number of graphic displays for a specific application. Often the developer designs a main display to illustrate the overall process and a series of other displays to illustrate important details and/or operations associated with the process. Figure 8.13 shows a sample display.

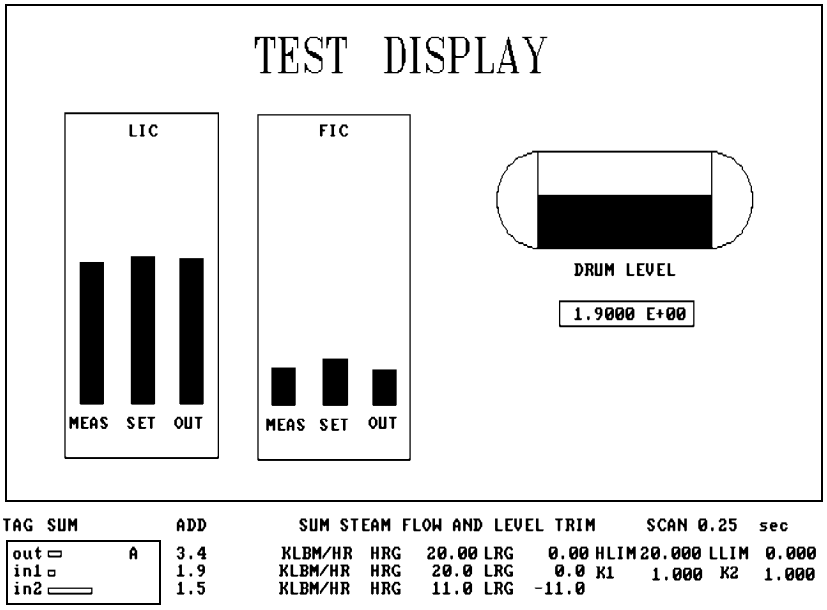


Figure 8.13 *Sample display*

Displays can be invoked automatically by the system, based on external digital events or time. The design engineer specifies how these displays are invoked using a DISP block in the Strategy Builder. The DISP block is also capable of executing a Named Macro from a Key Macro library configured into the strategy being executed. Refer to the *DISP* section in Chapter 6: *Algorithms* for more information on how to configure the DISP block for automatic display calling. The *Automatic Execution of Named Macros* section in Chapter 4: *The Strategy Builder* provides additional information on how the DISP block can be configured to execute a Named Macro.

4/23/93

8.9.1 Invoking Displays

The operator can also invoke any graphic display using several different methods. These methods are described in the following paragraphs. The last two methods described are contingent on decisions that the developing engineer makes when using the Strategy or Display Builder.

METHOD ❶

The most common procedure used for selecting and invoking operator graphic displays is the Display Directory screen. Pressing the standard **[F1]** key at anytime during a Runtime session invokes the Display Directory screen. A sample Display Directory screen is shown in Figure 8.14.

RG-GA3-030-005

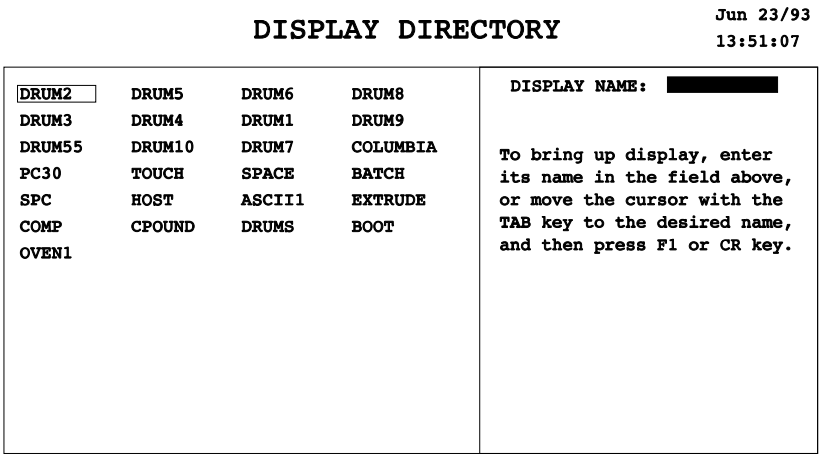


Figure 8.14 *Display Directory screen*

With this display in the Main Window area, you can either type in a display file name from the keyboard into **DISPLAY NAME** field, or you can select a display file from the directory by pressing the **[Tab]** key until the desired file is highlighted (the **[Shift-Tab]** key to moves the cursor backward). With the desired file highlighted, press the **[F1]** key again and that display is placed in the Main Window.

METHOD ❷

When a series of graphic displays are shown in the Main Window, you can recall the last display by pressing the **[F6]** key.

METHOD ❸

Using the Strategy Builder, the design engineer can attach a display to any block in the strategy by entering the desired .GRP display file name into the **DISPLAY** field in that block's configuration menu. During Runtime, an operator can invoke this attached display by pressing the **[F3]** key while the active cursor is:

- in an Algorithm subwindow for the block
- on the block's tag name in a: Tag Sort Display, Alarm/Event Summary, Trend and Plot List, or Historian List
- on a process point or data entry field for any variable contained in the block (in any other display)

4/23/93

METHOD ❹

Using the either Strategy- or Display-based Key Macros, the developing engineer can use a Key Macro assignment to define any valid key or key combination to invoke a particular display during Runtime. The **DISPLAY** Key Macro Operator Interface Command is used to define any .GRP display file to a valid key or key combination. The **NEXT_PAGE** and **PREV_PAGE** commands are used to assign display files to the **[PgDn]** and **[PgUp]** keys respectively. When this method is used, the engineer should provide the operator with a window, either as part of a display or as a reference sheet that explains the display file assignments.

RG-GA3-030-005

8.9.2 Process Point & Data Entry Fields

A display can include Process Point (PPT), Data Entry (DE), Initialized Data Entry (IDE), and Dynamic Data Entry (DDE) fields as shown in Figure 8.15. DE and IDE fields are highlighted with a box when the are selected with the active cursor in the Main Window.

A PPT field is updated periodically (every .1 to five seconds, depending on your configured **Display Update Period** parameter). This field is also referred to as a "pick field" in some of the subwindows.

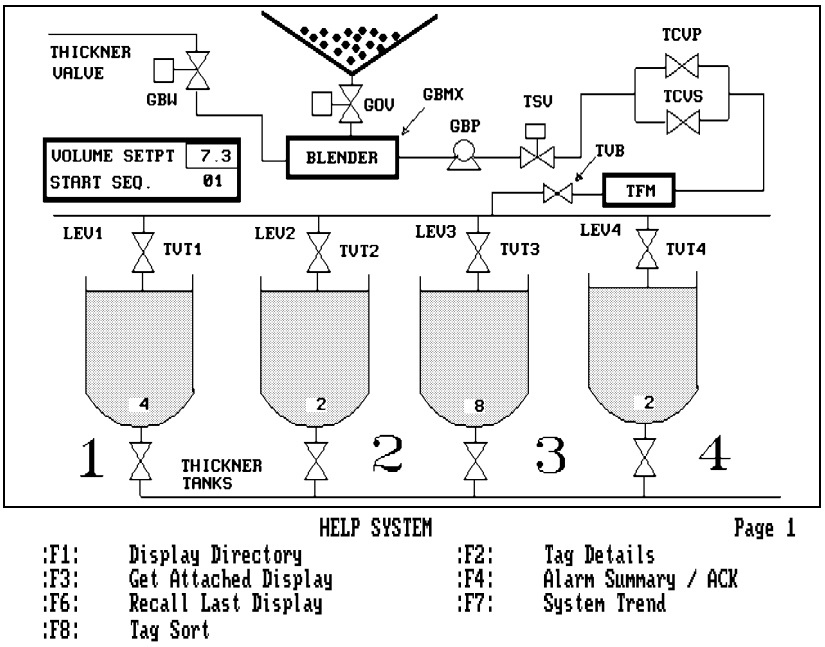


Figure 8.15 *Data Fields in a display*

A DE field is not updated while it is in the Main Window. It displays the value of a variable at the time the display was invoked (or the last value entered, if any). An IDE is similar, except that the value of its variable is initialized in the Display Builder. That initialized value is downloaded to its connected process variable when the **[Alt-D]** key combination is pressed while the display containing the IDE appears in the Main Window.

4/23/93

Note IDE values are only downloaded to their connected process variable when the **[Alt-D]** key combination is pressed while the IDE display is in the Main Window. A DISP block can be used to cause the contents of all DE and IDE fields in a display to be automatically downloaded when it (the DISP) block invokes the display.

If a variable's value changes during the Runtime session and a display containing an IDE connected to that variable is placed in the Main Window, the value contained in the IDE field may not represent the actual value of the process variable it is connected to . You may want to place a PPT along with the DE and/or IDE field(s) to monitor actual variable values.

RG-GA3-030-005

The DDE field combines the function of both the DE and PPT field into one field. As long as the active cursor is not positioned on the DDE field, the DDE periodically updates and displays the current value of its connected process variable. When the active cursor is on a DDE field, its value is not updated, but

data entry can be performed by typing the desired value then pressing the **[Enter]** key.

With a Security Level 0 (View-only) enabled, these fields cannot be changed. Level 1 (Operator) and Level 2 (Technician) can change DE fields. Only Level 3 (Engineer) can change and IDE field.

You can move the active cursor to any DE, IDE, DDE, PPT, or State Field (SF) in a display successively pressing the **[Tab]** key until the desired field is selected. The **[Shift-Tab]** key combination can also be used to move the active cursor backward. When the active cursor moves to a DE or IDE field, the field is highlighted in red, indicating that data entry can take place. When the cursor moves to a PPT, the field is outlined with a yellow box.

In the Strategy Builder, the engineer can disable the ability to tab process points so that the cursor moves only between DE and IDE fields, making it easier to enter data quickly. This can also be done during Runtime on the second page of the **[Alt-A]** System Parameters subwindows.

To enter data into a DE, IDE, or DDE field, tab to the field so that it is highlighted in red, type in the data from the keyboard, and press the **[Enter]** key. To enter all of the data that appears in every DE, IDE, and DDE in a display simultaneously, type in all the data into their respective fields and press the **[ALT-D]** key combination. All data is downloaded into the database.

Recipe Displays

The developing engineer can create recipe displays that include IDE fields. These IDE fields contain values for specific process variables that setup the recipe. During Runtime, the recipe data is downloaded by invoking the recipe display and pressing the **[Alt-D]** key combination as described above. PC-30 downloads all IDE (and any other variable values in display data fields) and executes the strategy based on those values.

If your system has Security Level 3 (Engineer) enabled, the operator can also change the values in IDE fields. When IDE initialized values are changed they can be saved to the current display file or to a new display file. Pressing **[Alt-R]** causes PC-30 to prompt you for the name of the file (diagram) to save the recipe display to. The current display file name is shown in this prompt. Either accept the current name or type in a new one from the keyboard and press the **[Enter]** key.

Recipe displays can also be invoked automatically if the engineer configured one or more DISP blocks in the Strategy Builder. When a display is invoked in this way, the data in IDE fields may or may not be downloaded into the database automatically, depending on whether the DISP block's corresponding **RECIPE** parameter has been set to **Y** (yes).

A SYS block can also be incorporated into a strategy to control the downloading of display data into the database. By connecting a digital into the SYS block's DNLD variable, when this digital goes true (logical 1) all data field values in the current display are downloaded into the database. Refer to the *DISP* and *SYS* sections in Chapter 6: *Algorithms* for details on how to setup the DISP and SYS blocks for automatic recipe downloading.

4/23/93

RG-GA3-030-005

8.10 Alarms and Operator Events

PC-30 provides an immediate alert of individual alarms that occur by placing an alarm message at the Message Line in the lower right corner of the Runtime screen. The Alarm/Event Summary screen, invoked by pressing the **[F4]** key, provides a listing of all alarm conditions as well as operator events, such as changing the value of a parameter.

Many parameters that affect how Runtime handles alarms and events are set in the Strategy Builder (ALRM CNFG) and can be changed during Runtime using the **[Alt-A]** System Parameters subwindows. Refer to the *System Parameters* section in this chapter for more information on alarm/event parameters.

8.10.1 Alarms

Runtime reads certain process variables (data points) based on how the **I/O Scanner** parameter is configured in the Strategy Builder SYS CNFG menu (OFF, ON, ON DEMAND). Points that are not read cannot have alarming performed on them. Therefore, points that require alarming should have their respective blocks **FULL SCAN** parameter set to **Y** so that point values will always be read during Runtime.

When using the PC-30 database caching feature, I/O points can be polled for alarms provided the Alarm Cache option is enabled in the strategy. This option only applies to I/O points that are connected to device blocks. The scan rate for polling cached points is specified when the Alarm Cache option is configured and is set independently of the I/O Scanner and block scan rate. Refer to the *Enabling PC-30 options* section in Chapter 4: *The Strategy Builder* for more information regarding the operation and configuration of the Alarm Cache option.

You can inhibit all system alarms automatically based upon a digital event. During the configuration of the strategy in the Strategy Builder, incorporate a SYS block in the strategy. Connect the controlling digital variable to the SYS block's **INHB** input variable. When that digital goes true (logical 1) the SYS block inhibits all system alarms.

Alarm Squelch Level

The alarm squelch level is initially set in the ALRM CNFG Logger Parameters submenu (Strategy Builder) and can be changed in the **[Alt-A]** System Parameters subwindow. The squelch level (0 to 9) determines which alarms are suppressed. All alarms with a priority less than the squelch level are not displayed, sounded, printed, or logged to disk.

Sub-squelch levels for alarm displaying, annunciating, printing, and logging to disk also exist. These are configured in the ALRM CNFG submenus of the Strategy Builder and can be changed in the **[Alt-A]** System Parameters subwindow during Runtime. If an alarm has a priority that is greater that the **Alarm Squelch Level** but is less than the sub-squelch level for a particular function, that function is *not* executed.

Alarm Alert Messages

As soon as an alarm occurs, PC-30 displays the alert message similar to the one shown in Figure 8.16. This message remains on the screen until the alarm is either acknowledged or another alarm occurs.

4/23/93

RG-GA3-030-005

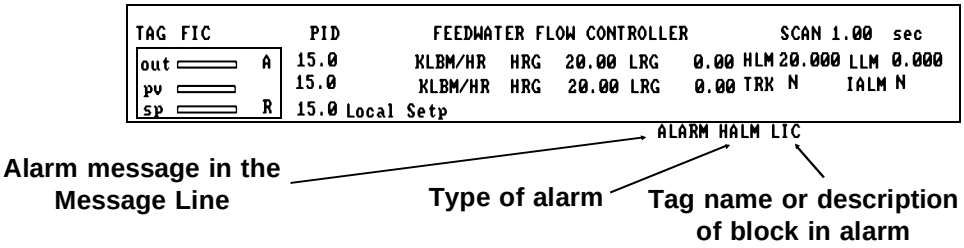


Figure 8.16 *Sample Alarm Alert Message*

Alarm Annunciators

If the annunciator is enabled (via the Strategy Builder's ALRM CNFG Annunciator Parameters submenu), the computer generates alarm tones with its speaker. The tone of the annunciator corresponds to the alarm's priority. The higher the alarm priority, the higher the pitch of the alarm. To silence an alarm, press any key on the keyboard. You can toggle the annunciator on and off through the **ALARM ANNUNCIATOR** field in the **[Alt-A]** System Parameters subwindows.

It is possible to disable the alarm annunciator automatically based upon a digital event. During the configuration of the strategy in the Strategy Builder, the developing engineer needs to incorporate a SYS block. By connecting the controlling digital variable to the SYS block's **ANNC** input variable, when that digital goes true (logical 1) the SYS block disables the alarm annunciator if it is turned on.

8.10.2 Operator Events

The **Operator Events** parameter in the ALRM CNFG Event Configuration submenu (in the Strategy Builder) controls how operator events are handled during Runtime. As long as **Operator Events** is enabled in the Strategy Builder, operator events are displayed to the Alarm/Event Summary screens (**[F4]**) during Runtime. In addition, events can be directed to a printer and/or to disk by means of the Strategy Builder ALRM CNFG Event Configuration submenu or the **[Alt-A]** System Parameters subwindows.

4/23/93

With operator events reporting enabled at the Strategy Builder level, the following actions or occurrences during Runtime classify as operator events:

- acknowledging alarms
- changing a block's output from Auto to Manual and vice versa
- changing a block's setpoint from Remote to Local and vice versa
- changing a block's output, setpoint, and most other parameters
- changing the default security level
- logging on and logging off
- exiting to DOS

☞ Digital alarms generated by the DIN, PDIN, PDIO, AND, NAND, OR, NOR, NOT, XOR, and CNT blocks can be configured to display as events during Runtime. This is specified in the **ALM->EVT** field in the respective block's configuration menu. If this field is set to Y, digital alarms show up as events *only*. Therefore, alarming functions (annunciating, acknowledging, etc.) cannot be performed on these digital alarms.

RG-GA3-030-005

8.10.3 Alarm/Event Summary

Each time an alarm or operator event occurs during the execution of a strategy, a corresponding message is displayed in the Message Line on the Runtime screen. In addition to the a message being posted on the screen, each alarm/event that occurs generates an entry identifying the alarm/event in the Alarm/ Event Summary.

All alarms and events can be viewed by invoking the Alarm/Event Summary screen (Figure 8.17). This is done by pressing the **[F4]** key at any time during a Runtime session. Pressing the **[F4]** key causes Page 1 of the Alarm/Event Summary to appear in the Main Window with the active cursor on the first entry in the list. You can advance the active cursor by pressing the **[Tab]** key.

The top bar of the Alarm/Event Summary screen displays the current time and date in the upper right corner. The upper left corner displays the date of the alarm or event selected by the active cursor.

The page number is also displayed in the upper left corner of the screen. If more than one page of entries exist on the screen, additional pages can be viewed by using the **[PgDn]** and **[PgUp]** keys. The number of Alarm/Event pages that are reserved by Runtime is specified by the **Number of Alarm Pages** parameter in the ALRM CNFG Logger Parameters submenu (Strategy Builder).

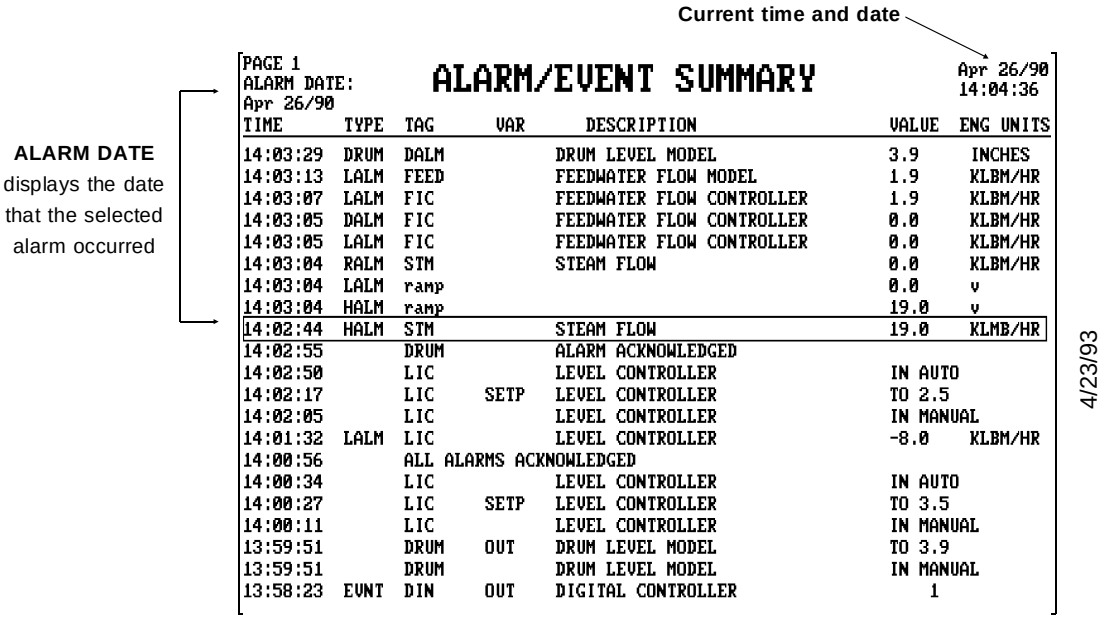


Figure 8.17 *Sample Alarm/Event Summary screen*

The Alarm/Event Summary screen provides various information about each entry. This information includes:

TIME	The time the alarm/event occurred
TYPE	The type of alarm/event.
TAG	The tag name of the block with the alarm/event.
VAR	The variable involved with the alarm/event.
DESCRIPTION	The description text entered in the block's configuration menu.
VALUE	The variable's value at the time of the alarm/event.
ENG UNIT	The value of the **UNITS** parameter entered in the block's configuration menu.

RG-GA3-030-005

The alarm/event types that can be posted in the Alarm/Event Summary **TYPE** field include:

- DIG — digital alarm
- FAIL — I/O hardware failure
- HALM — high alarm
- LARM — low alarm
- RALM — rate alarm
- DALM — deviation alarm
- EXT — external alarm
- EVNT — digital alarm configured to be recognized as an event
- NORM — displayed when a point comes out of alarm (optional)

Each entry in the Alarm/Event Summary is color coded to indicated each entry's status. The colors of each alarm condition can be configured to however you desire in the Strategy Builder's ALRM CNFG Color Configuration submenu. The following list contains default settings for Alarm/Event Summary entries:

Cyan	Operator event
Red	Active and unacknowledged alarm
Yellow	Active and acknowledged alarm
Green	Return from Alarm: an alarm that is inactive now but was never acknowledged

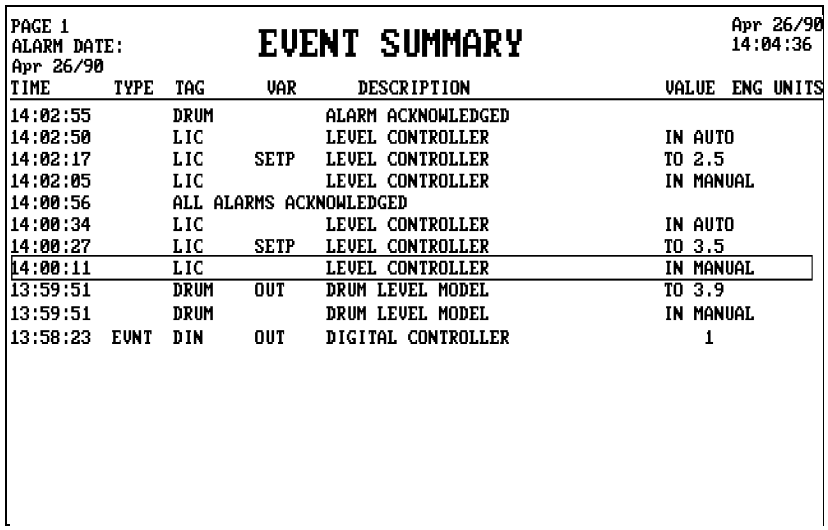
If the **Return to Normal** parameter in the Strategy Builder ALRM CNFG Display Parameters submenu is enabled, a NORM message will appear in the **TYPE** field of the Alarm/Event Summary screens when a point returns from alarm. This action occurs in conjunction with the color change.

Alarm Only/Event Only Viewing

PC-30 has Key Macro commands that allow you to view events or alarms exclusively. Pressing **[Alt-V]** at any time during Runtime executes the SYSTEM(EVNT_ONLY) command which invokes the Event Summary screen (Figure 8.18) that lists events only. Pressing **[Alt-J]** at any time during Runtime executes the SYSTEM(ALRM_ONLY) command which displays the Alarm Summary screen (Figure 8.19). This screen lists alarms only.

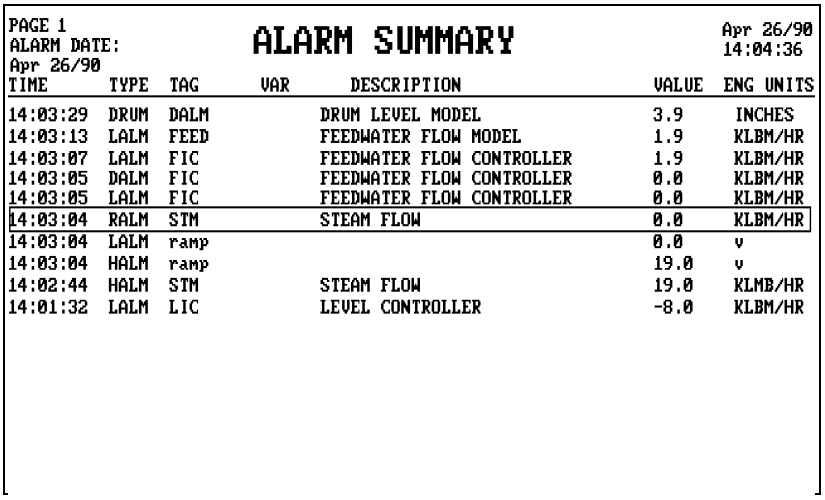
The Alarm Summary and Event Summary screens follow the same conventions as the Alarm/Event Summary screen, i.e. color coded conditions, display fields (TIME, TYPE, TAG, etc.).

4/23/93



RG-GA3-030-005

Figure 8.18 *Event Summary screen*



PAGE 1
ALARM DATE:
Apr 26/90

ALARM SUMMARY

Apr 26/90
14:04:36

TIME	TYPE	TAG	VAR	DESCRIPTION	VALUE	ENG UNITS
14:03:29	DRUM	DALM		DRUM LEVEL MODEL	3.9	INCHES
14:03:13	LALM	FEED		FEEDWATER FLOW MODEL	1.9	KLBM/HR
14:03:07	LALM	FIC		FEEDWATER FLOW CONTROLLER	1.9	KLBM/HR
14:03:05	DALM	FIC		FEEDWATER FLOW CONTROLLER	0.0	KLBM/HR
14:03:05	LALM	FIC		FEEDWATER FLOW CONTROLLER	0.0	KLBM/HR
14:03:04	RALM	STM		STEAM FLOW	0.0	KLBM/HR
14:03:04	LALM	ramp			0.0	v
14:03:04	HALM	ramp			19.0	v
14:02:44	HALM	STM		STEAM FLOW	19.0	KLMB/HR
14:01:32	LALM	LIC		LEVEL CONTROLLER	-8.0	KLBM/HR

Figure 8.19 *Alarm Summary screen*

Runtime

8.10.4 Acknowledging Alarms

The operation of acknowledging alarms provides a method of recording that someone was notified of an alarm condition and acknowledged it or rectified the condition. You can acknowledge alarms in two different ways: individually or globally.

To acknowledge an individual alarm(s), perform the steps below:

1. Press the **[F4]** key any time during the Runtime session. An Alarm/Event Summary screen similar to the one shown previously in Figure 8.17 displays in the Main Window.

2. Press the **[Tab]** key (or use the mouse) until the desired alarm is selected. (You may need to press the **[Home]** key to get the active cursor into the Main Window area.)

3. With the desired alarm selected, press the **[F4]** key again. The alarm is acknowledged. This procedure also acknowledges all previous alarms for the same tag name.

   When you acknowledge an alarm, some of the alarm lines may change color or be cleared from the summary screen based on:

   - A red alarm line changes to yellow, indicating an active but acknowledged alarm.
   - A yellow alarm line stays yellow as long as the alarm is active. When the alarm condition returns to normal, the yellow line is cleared.
   - A green alarm line is cleared from the summary if this alarm is from the same source as the alarm that you acknowledge.

4/23/93

Note The colors specified above are based on the default color assignments. You can change the color specifications for alarms and events in the Strategy Builder's ALRM CNFG Color Configuration submenu.

You can have all alarms globally acknowledged automatically based upon a digital event. During the configuration of the strategy in the Strategy Builder, the developing engineer needs to incorporate a SYS block. By connecting the controlling digital variable to the SYS block's **ACK** input, when that digital goes true (logical 1) the SYS block globally acknowledges all system alarms. The following blocks show graphical connections for **ACK** input: AIN, DIN, PAIN, PAIO, PDIN, and PDIO blocks.

RG-GA3-030-005

It is also possible to acknowledge all alarms without invoking the Alarm/Event Summary screen. Press the **[Alt-G]** key at any time during a Runtime session to acknowledge all active alarms.

8.10.5 Printing Alarms and Events

Using the System Configuration's ALRM CNFG and SYS CNFG submenus in the Strategy Builder, the developing engineer specifies whether alarms, events, or both are to be printed during Runtime. Alarms are directed to the printer port specified in the **Alarm Printer Port** parameter field. Operator events are directed (when enabled in the ALRM CNFG Event Configuration submenu) to the same printer type as specified in the SYS CNFG **Graphics Printer** field.

The following configuration causes alarms only to print to LPT2:, and events only to print to LPT1:.

SYS CNFG - System Parameters
System Printer Port = LPT1:

ALRM CNFG - Printer Parameters
Alarm Printer = ON
Alarm Printer Port = LPT2:

ALRM CNFG - Event Configuration
Log to Printer = YES
Operator Events = ENABLED

During Runtime, you can start and stop the printing of alarms, events or both using the corresponding parameter fields in the **[Alt-A]** System Parameters subwindows. You cannot change the physical printer ports; that can only be done in the ALRM CNFG Printer Parameters submenu in the Strategy Builder.

☞ Because a printed alarm cannot show color changes, a NORM message displays in the TYPE field of an alarm statement when a point comes out of an alarm that was never acknowledged. Alarm acknowledgments appear as events when printed.

8.10.6 Logging Alarms and Events to Disk

Using the System Configuration's ALRM CNFG submenus in the Strategy Builder, the developing engineer specifies if alarms, events, or both are to be logged to disk during Runtime. Logging of individual alarms can also be inhibited based on the alarm's priority setting. This is done by using the Disk Squelch sub-squelch level. For more information on sub-squelch levels, refer to the *System Parameters* section earlier in this chapter.

4/23/93

The log files are generated in the directory path that is specified in the **File Path** field of the ALRM CNFG File Parameters submenu (Strategy Builder). If no directory path is specified, log files are generated in the directory that contains the Runtime system.

Alarms and/or events are saved in multiple files. These files are named <filename>*nn*.TXT, where *nn* represents a number from 00 to 99. The <filename> is specified in the **Alarm Event File** field of the ALRM CNFG File Parameters submenu. If no file name is specified, LOG is used as the default name. Log files are closed when one of the following occur:

RG-GA3-030-005

- Exit the Runtime system
- Enter **N** in both the **ALARMS TO DISK ?** and **EVENTS TO DISK ?** fields in the **[Alt-A]** System Parameters subwindows. A new log file opens when either field is reset to **Y**.

- The file has logged the maximum number of alarm/event pages specified by the **Alarm Pgs/Log File** field in the ALRM CNFG File Parameters submenu. A new log file opens on the next alarm or event.

When new log file opens, the message "**OPENING FILE <filename>nn.TXT**" appears in the lower left corner of the Runtime screen and the *nn* file number increments by 1. When the number of alarm files reaches the maximum number specified in the **Number Alarm Files** field of the ALRM CNFG File Parameters submenu, the *nn* file number resets to 00 and the file number sequence continues in the normal fashion.

Note When the *nn* file number resets to 00, Runtime begins overwriting alarm files beginning with the oldest (<filename>00.TXT).

During Runtime, you can start and stop alarm/event logging independently by using the corresponding parameter fields in the **[Alt-A]** System Parameters subwindows. However, you cannot change the log file name or directory path that the alarms/events are logged to. The file name and path specification can only be configured in the Strategy Builder. (ALRM CNFG submenus).

8.11 Trending Data

The PC-30 System Trend function allows trended data to be displayed in either a trend or plot format. The System Trend function collects data in memory for up to 20 variables simultaneously. You can graphically display the data in real time for up to five variables at a time. You can also define the number of decimal places to the right of a decimal place, as well as, display the name of an algorithm block being trended. Trending is useful for monitoring critical process variables or control loop tuning.

4/23/93

Initially, the list of process variables to be trended is defined in the Strategy Builder's TRND LIST submenu. During Runtime, you can create or change this list and specify which variables display any time. You can also specify one of three different trend periods which determine that rate at which the trended variables are sampled. With the **System Trend** function's Zoom operation, any of the trended points (variables) can be closely examined by expanding the trend's display scale. The **System Trend** function also provides the ability to take Snapshots of the current trend which can then be saved to disk.

Trend Windows, constructed from the Display Builder's **DYN** function, can be included in graphic displays. These dynamic windows are similar to the full-screen Trend Display described in this section but provide a short-term alternative to trended data and once configured in the Display Builder, cannot be altered in any way during Runtime.

RG-GA3-030-005

The Plot mode portion of the System Trend function displays the same trended data in a different format: up to four variables on the Y-axis against one variable on the X-axis. You specify to display data in either the trend or the plot format in the System Parameters subwindow.

8.11.1 Configuring the Trend Display

The System Trend function provides a full-screen Trend Display for the graphic illustration of trend variable data. The first step in invoking a Trend Display is the selection of the variables (up to 5) to be graphed in the Trend Display. This is initiated in the Trend Menu subwindow.

To invoke the Trend Menu subwindow, press the **[F7]** key at any time during a Runtime session. Figure 8.20 shows the Trend Menu subwindow.

The Trend Menu subwindow allows you to perform a variety of operations with the System Trend function. Initially, you need to define which process variables to trend. Assigning trend pens is facilitated through the use of the Trend and Plot List display which lists all initially configured process variables. This operation is described later in this section.

```
TAG NAME _        VAR out        TREND MENU              TREND PEN #: 1
:SF1: ADD POINT   :SF2: REMOVE POINT  :SF3: TREND LIST    :SF4: ASSIGN PEN
:SF5: ORIGINAL    :SF6: ZOOM          :SF7: UNZOOM        :SF8: 1,6, > 30 min
:SF9: TREND      :SF10: LOAD SNAPSHOT :ALT T: SAVE SNAPSHOT  :PG KEYS: GROUP
```

Figure 8.20 *Trend Menu subwindow*

Note If Plot mode is defined, pressing the **[F7]** key causes the Plot Menu subwindow to appear instead of the Trend Menu subwindow. Plot mode can be defined by either setting the **Trend Display Mode** parameter to **X/Y** in the Strategy Builder's SYS CNFG submenu or by setting the **PLOT (Y) or TREND (N)?** parameter to **Y** in the Runtime System Parameters subwindow (**[Alt-A]**).

4/23/93

When assigning process variables to trend pens, be sure to only select variables that are functional for trending. Refer to Table 4.1 in Chapter 4: *The Strategy Builder* for a complete listing of variables (and the blocks they can be found in) that are valid for the System Trend function.

While the Trend Menu subwindow is displayed, the **TAG NAME** and **VAR** fields define the process variable that is currently being performed on. The **Trend Pen #** field defines which of the 5 trend pens (1 to 5) is being performed on.

The following paragraphs provide a brief description of the operations that can be performed from the Trend Menu subwindow. Details on these operations are provided later in this section.

RG-GA3-030-005

Add Point – [Shift-F1]

This operation adds the process variable defined in the **TAG NAME** and **VAR** fields to the list of variables available for trending. This list can be displayed by pressing the **[Shift-F3]** key combination at any time during a Runtime session.

Remove Point – [Shift-F2]

This operation removes the process variable defined in the **TAG NAME** and **VAR** fields from the list of variables available for trending. This list can be displayed by pressing the **[Shift-F3]** key combination at any time during a Runtime session.

Trend List – [Shift-F3]

This operation invokes the Trend and Plot List display. This display lists the process variables that are available for trending.

Assign Pen – [Shift-F4]

This operation assigns the pen number defined in the **TREND PEN #** field to process variable currently selected (highlighted) in the Trend and Pen List display. If the pen number in the **TREND PEN #** field already is assigned, this operation reassigns that pen number to the new variable. The Trend and Pen List display must be in the Main Window for this operation to function.

Original – [Shift-F5]

This operation restores all previous Zoom/Unzoom operations on the pen defined in the **TREND PEN #** field to its original scale.

Zoom – [Shift-F6]

This operation expands the view of trace corresponding to the pen number defined in the **TREND PEN #** field.

Unzoom – [Shift-F7]

This operation restores the Trend Display from the last Zoom operation.

1,6 > 30 – [Shift-F8]

This operation toggles the trend period in the active Trend Display between 1 minute, 6 minutes, and the user defined third trend period that is greater than 30 minutes.

4/23/93

Trend – [Shift-F9]

This operation initiates the System Trend function by invoking the Trend Display in the Main Window and starts trending the variables that were assigned pens.

Load Snapshot – [Shift-F10]

This operation allows you to select a previously saved trend snapshot for static display in the Trend Display. Only snapshots from the same strategy that is currently being executed can be displayed.

Save Snapshot – [Alt-T]

This operation saves whatever portion of the active Trend Display is currently in the Main Window to the next available snapshot file, e.g. TREND01-TREND40.DAT.

RG-GA3-030-005

Pg Keys – [PgUp], [PgDn]

These keys can be used to shift the current pen assignments in groups of 5 variables (if that many exist).

Creating the Trend List

When the strategy being executed was developed in the Strategy Builder, the developing engineer most likely defined a list of variables that could be trended in the TRND LIST submenu. To display this list of defined variables and their pen assignments (if any), press the **[Shift-F3]** key combination. The Trend and Plot List display appears on the screen. Figure 8.21 shows an example of a Trend and Plot List.

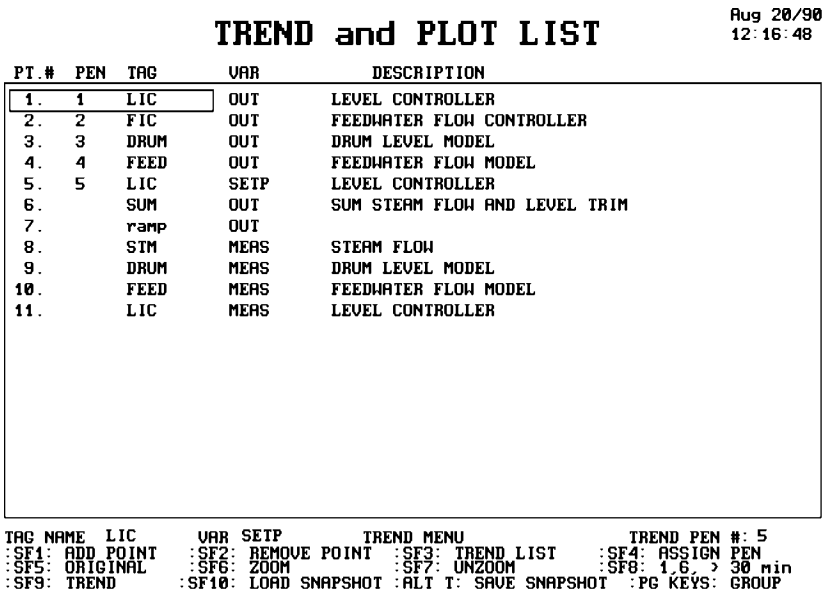


Figure 8.21 *Trend and Plot List sample*

Note You can display the Trend and Plot List by pressing the **[Shift-F3]** key combination at any time. You do not need to have the Trend Menu subwindow displayed.

While the Trend and Plot List display is in the Main Window area and the Trend Menu subwindow is also displayed at the bottom of the screen, several operations can be performed that effect the operation of the System Trend function. The following paragraphs describe the various operations that can be performed.

To add a variable to the trend list, perform the following steps:

4/23/93

1. Invoke the Trend Menu subwindow by pressing the **[F7]** key.
2. Invoke the Trend and Plot List display by pressing the **[Shift-F3]** key (optional).
3. With the active cursor in the Trend Menu subwindow, select the **TAG NAME** field (using the **[Tab]** key or the mouse) and type in from the keyboard the tag name of the strategy block that contains the desired process variable.
4. Using the **[Tab]** key or the mouse select the **VAR** field and type in from the keyboard the variable to trend. Note that this variable must be a valid trend variable from the listing in Table 4.1 in Chapter 4: *The Strategy Builder*.
5. If desired, tab to the **TREND PEN #** field and specify a pen number from 1 to 5.
6. Press the **[Shift-F1]** key combination to put the selected point on the trend list.

RG-GA3-030-005

Reminder To remove a variable from the variable list displayed in the **[Shift-F3]** Trend and Plot List, tab to the variable to be removed, and press the **[Shift-F2]** key combination.

Reassigning Trend Pens

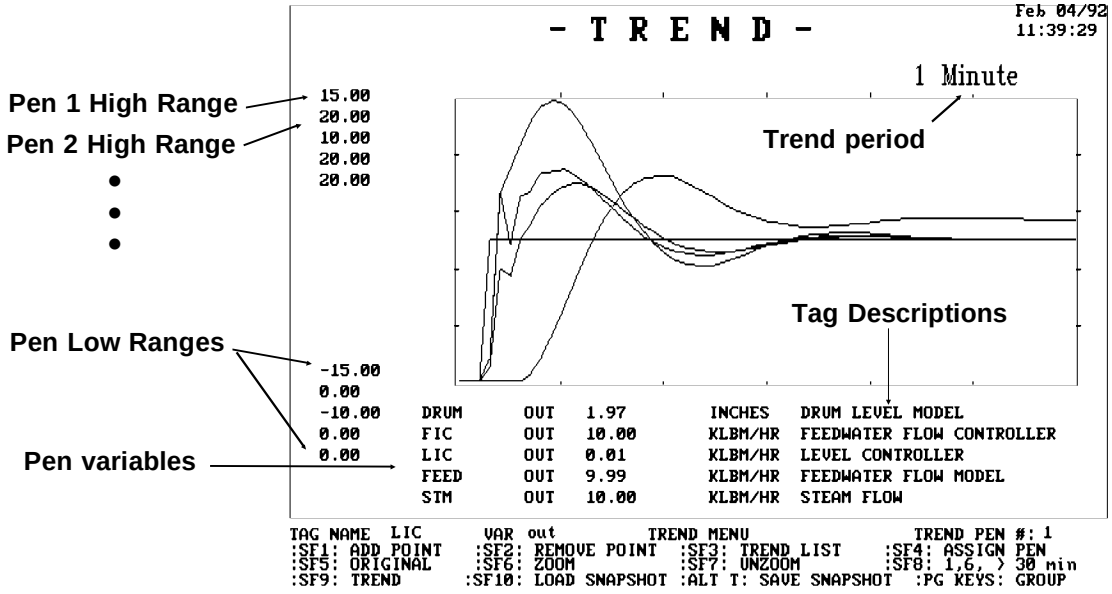
You can add or change trend pen assignments at any time. To assign a pen for a variable already on trend:

1. Invoke the Trend Menu subwindow by pressing **[F7]**.
2. Invoke the Trend and Plot List display by pressing the **[Shift-F3]** key.
3. With the active cursor in the Trend Menu subwindow, tab to the **TREND PEN #** field and type in from the keyboard the desired pen number (1-5).
4. Press the **[Home]** key to move the active cursor into the Trend and Plot List display in the Main Window. Tab to the desired variable line and press the **[Shift-F4]** key combination. The selected variable is now assigned the pen number defined in step 3.

☞ You can also reassign pens to consecutive groups of five defined trend variables by using the **[PgDn]** and **[PgUp]** keys. Pens attached to variables 1 to 5 (in any order) would be reassigned to variables 6 to 10 (in consecutive order) by pressing the **[PgDn]** key. You can reassign pens using this method even when the Trend Display is active and the Trend Menu subwindow is present in the Subwindow area.

8.11.2 Displaying the Trend

The System Trend function can be initiated at any time during a Runtime session. This is accomplished by pressing the **[Shift-F9]** key combination. A Trend Display screen similar to the one shown in Figure 8.22 appears in the Main Window area.



4/23/93

RG-GA3-030-005

Figure 8.22 *Trend Display sample*

The Trend Display is capable of showing the trend in three different time bases: one minute, six minutes, and a user-defined third time period greater than or equal to 30 minutes, as specified in the Strategy Builder's SYS CNFG Display Parameters submenu.

To toggle through these time bases, press the **[Shift-F8]** key combination while the Trend Display is active in the Main Window area.

While a trend is active PC-30 collects trend data every second. For the 1 minute trend period, each of the 61 one-second samples are displayed. For the 6 minute trend period, the 61 data points that are displayed can represent either the actual samples at six-second intervals or the average of the preceding six one-second samples. Averaging can also be performed for the longer trend period. The engineer specifies if averaging is to be performed during strategy configuration in SYS CNFG Trend Parameters submenu **Average Trend Points** field (in the Strategy Builder).

Zoom and Undo Zoom

The System Trend function allows you to expand the view (zoom) into any one of the trend pens (traces) in an active Trend Display. This provides an expanded scale view of that trend pen.

To zoom into a trend pen in an active Trend Display, perform the following steps:

1. Start the Trend by pressing the **[Shift-F9]** key combination if a Trend Display was not previously initiated.
2. Press **[F7]** to invoke the Trend Menu subwindow.
3. With the active cursor in the Trend Menu subwindow, tab to the **TREND PEN #** field and type in the pen number (1-5) to zoomed into.

4. Press the **[Shift-F6]** key combination. You can zoom into a trace many times.

Each time you invoke the zoom function, PC-30 determines the current maximum and minimum values of the selected trace. It then calculates new high and low scale values so the trace is centered in the window; this new range is approximately half the current range.

To undo the previous zoom, press the **[Shift-F7]** key combination. When you undo a zoom, the plot returns to its previous magnification, but the trace remains centered in the plotting area.

4/23/93

To undo all zooms for a particular trace, i.e. restore the original scaling, enter the pen number of the trace in the **TREND PEN#** field of the Trend Menu subwindow, and press the **[Shift-F5]** key combination.

8.11.3 Snapshots

The System Trend function's Snapshot operation lets you take a picture of an active Trend Display and save it the disk. System Trend snapshot files are named **`TREND00.DAT`**, **`TREND01.DAT`**, **`TREND02.DAT`**, etc., and are stored in the directory that the Runtime strategy was executed from. The System Trend function can save up to 40 snapshots to the disk. The 41st snapshot operation overwrites the first snapshot file (**`TREND00.DAT`**).

RG-GA3-030-005

Snapshots can be transferred to floppy disks for archiving purposes by using the **[Alt-F]** File Management subwindow. Refer to the *File Management* section later in this chapter for more in-

formation on performing file transfer operations from within the Runtime system.

Snapshots can also be triggered automatically based upon a digital event. To do this, the developing engineer must have configured a SYS block as part of the strategy. Whenever the digital input connected to the SYS block's INP parameter goes true (logical 1), a snapshot is taken. The SYS block does not generate snapshots more frequently than once a minute. Refer to the *SYS* block section in Chapter 6: *Algorithms* for additional configuration information.

Note If you take a snapshot of a system trend while an existing snapshot file (.DAT file) is being replayed, the new snapshot overwrites the .DAT file being replayed.

Loading Snapshots

The System Trend function provides the ability to load snapshots previously saved to disk and display them in the Trend Display (in replay). Since a snapshot is only a picture of a trend at a given point in time when the trend was active, replaying a snapshot produces a static image of the trend at the time the snapshot was taken.

Note When you replay a snapshot, the Runtime system must be executing the same strategy that was running when the snapshot was taken. PC-30 obtains the ranges for the variables from the strategy database.

4/23/93

To replay (view) a previously saved snapshot file, perform the following steps:

1. Press the **[Shift-F10]** key combination. The Trend and Plot Replay Menu appears in the Main Window area of the Runtime screen (Figure 8.23).

RG-GA3-030-005

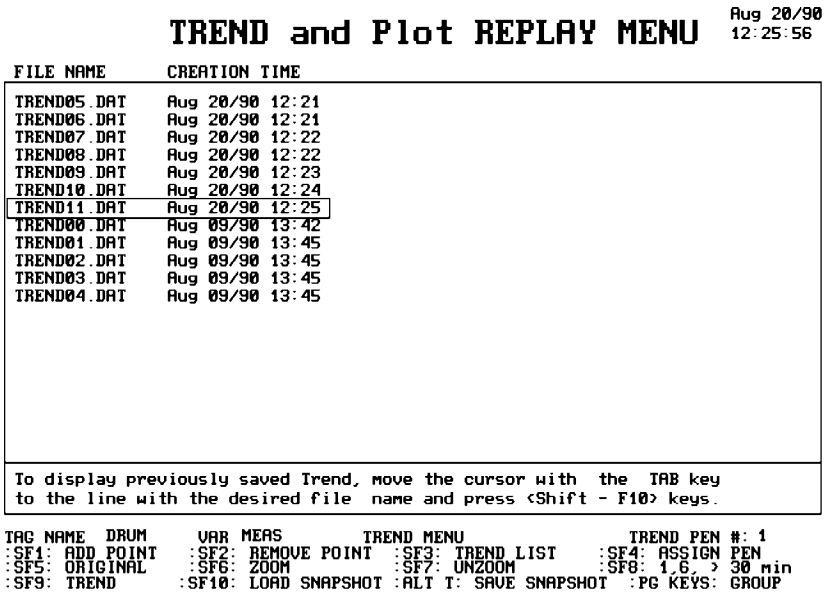


Figure 8.23 *Trend and Plot Replay Menu screen*

2. With the active cursor in the Main Window area, tab to the desired TREND*nn*.DAT file to be replayed and press the **[Shift-F10]** key combination again.

3. A Trend Display screen, similar to Figure 8.20, reappears in the Main Window. The word “replay” appears under the TREND title to indicate that this is indeed a static snapshot replay.

8.11.4 Plot Function

The System Trend's Plot function plots the same data as the Trend portion of the function but does it in a different format. While the Trend function plots up to five variables against time, the Plot function plots up to four variables on the Y-axis against one variable on the X-axis. In the System Parameters subwindow, the **PLOT (Y) TREND (N) ?** is where you specify the format (plot or trend) in which to display the data.

When Trend is selected (the System Parameter's **PLOT (Y) TREND (N) ?** field set to **N**) the **[F7]** key invokes the Trend Menu subwindow. When Plot is selected (the System Parameter's **PLOT (Y) TREND (N) ?** field set to **Y**) the **[F7]** key invokes the Plot Menu subwindow.

The Plot function also uses the Trend and Plot List to define variables and pen assignments. In a Plot Display, the variables associated with pens 2, 3, 4, and 5 are plotted against the variable to which pen 1 is attached.

The rest of this section describes the features of the Plot function that differ from the Trend function. Refer to the preceding section on the Trend function for information that is common to both.

Invoking and Using the Plot Function

Before the Plot function can be used, the System Parameter subwindow's **PLOT (Y) TREND (N) ?** field must be set to **Y**. Once the Plot function is enabled, invoke the Plot subwindow by pressing the **[F7]** key combination.

4/23/93
RG-GA3-030-005

This subwindow is similar to the Trend subwindow but includes three additional fields: **Start/Stop Time based Plot**, **Start**, and **Stop**. Figure 8.24 shows the Plot subwindow. Refer to the *Configuring the Trend Display* section earlier in this chapter for a description of the other fields in this subwindow.

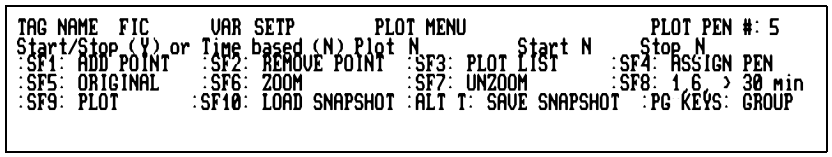


Figure 8.24 *Plot Menu subwindow*

Runtime

Using the Plot subwindow, you can create or change the Trend and Plot List and make pen assignments in the same way that you do for a Trend Display.

The Plot function has two modes, selected from the Plot subwindow: **Time-based** and **Start/Stop**. In the **Time-based** mode, you can display plots for three different time periods, just as you can for trends. Plot segments older than the time period are automatically deleted from the screen.

In the **Start/Stop** mode, the screen is cleared and plotting begins when you enter **Y** in the **Start** field and ends when you enter **Y** in the **Stop** field. **Start** and **Stop** can also be initiated automatically from the Trigger block (TRIG). The plot remains on the screen until you change the display.

In the **Start/Stop** mode, the time scales (one minute, six minutes, and greater than 30 minutes) define only the update frequency and not the time period of the plot. For example, in a six-minute plot, the screen is updated every six seconds. You can plot data for a period longer than six minutes and have more than 60 segments displayed. However, if you take a snap-

shot, only the last 61 values are stored. Figure 8.25 shows an example of a Plot Display.

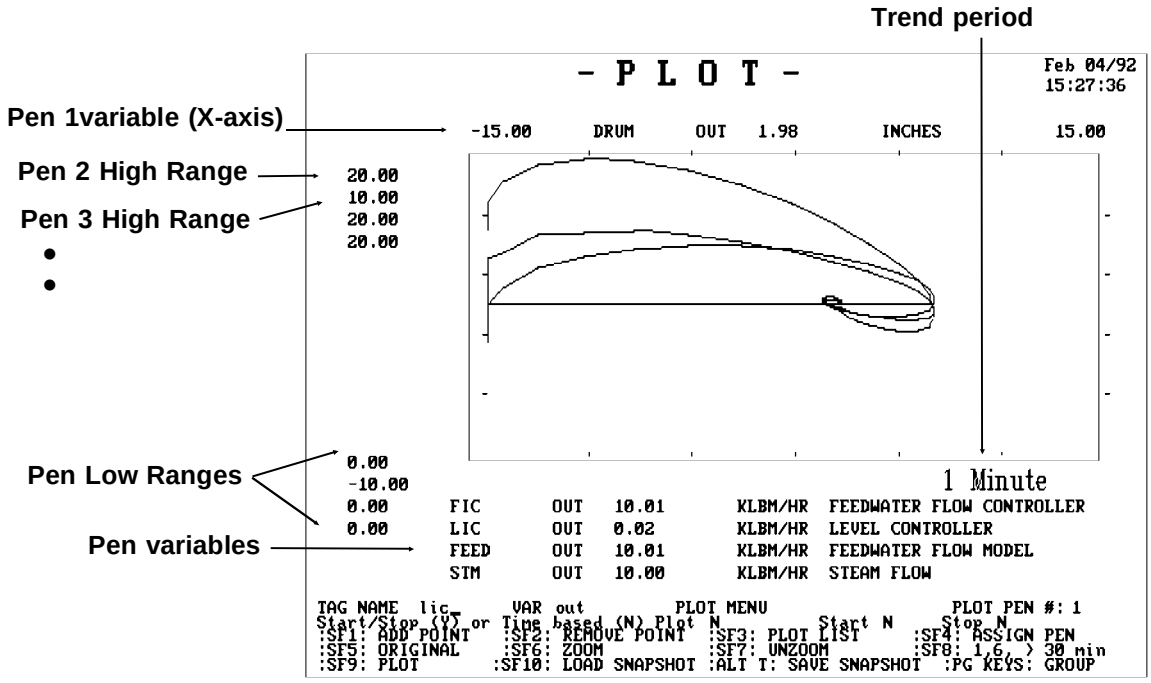


Figure 8.25 *Plot Display sample*

4/23/93

RG-GA3-030-005

8.12 Event-Driven Historian

The Event-Driven Historian collects process data in disk files for archiving, logging, or data reduction through spreadsheet software. The Event-Driven Historian is implemented using the HIST algorithm block. Each HIST block logs data to a file or multiple files at constant or dynamic rates. That is, the logging rate associated with each file can be modified based on process conditions or operator selections during Runtime.

It is also possible to attach History Windows to HIST blocks in the Display Builder. This allows you to graphically replay the history files associated with the attached HIST block within a display without having to exit from the current display. Refer to the *History Windows* section in Chapter 7: *The Display Builder* for more information on how to implement History Windows in operator displays.

8.12.1 Logging Data

Each HIST block in the strategy collects data for up to 20 process variables simultaneously. Each file that the historian generates contains data for all of the variables that you specify. The the variables to be logged are initially configured in the Strategy Builder's HIST block configuration menu. Refer to the *Specials Algorithms* section in Chapter 6: *Algorithms* for more information on configuring the HIST block.

History files are generated in the directory path specified in the **Historian Path** field of the SYS CNFG Historian Parameters menu. If no path is specified, the history files are generated in the directory containing the Runtime system. All history files have the .PRN extension and can be read into Lotus 1-2-3 and compatible spreadsheets.

Data logging can be configured to start and stop based on discrete external variables connected to the HIST block. Logging can also be started manually by pressing **[Shift-F5]** while the HIST block's algorithm subwindow is displayed on the Runtime screen. Pressing **[Shift-F6]** while the subwindow is on the screen manually stops data logging.

Note Multiple HIST blocks should not be triggered simultaneously. This uses Disk Task which is relatively slow.

Append History Files

Append history files are named in the following format: <filename>.PRN. The <filename> is specified when configuring the HIST block in the Strategy Builder. If no <filename> is specified, HISTORY is used as a default name.

When logging resumes to an Append history file, the data is "appended" to the end of the file. When the file size reaches the limit specified by the **Max File Size** parameter in the SYS CNFG Historian Parameters submenu, the current file is copied to a backup file (<filename>-O.PRN) and the original file is cleared. Data logging continues from the top of the cleared file and the message "**<tagname> HIST FILE BACKED UP & RESTARTED**" appears in the lower left portion of the Runtime screen.

4/23/93

Note Any pre-existing backup history file with the same name is destroyed when the new backup is created.

Non-Append History Files

Non-Append history files are named in the following format: <filename>nnn.PRN, where *nnn* is a number from 000 to 999. The <filename> is specified when configuring the HIST block in the Strategy Builder (only the first five characters are used). If no <filename> is specified, HISTORY (HISTO) is used as a default name.

RG-GA3-030-005

When the file size reaches the limit specified by the **Max File Size** parameter in the SYS CNFG Historian Parameters submenu, or if data logging resumes after having been stopped, a new file opens and the previous file closes. The new file name

is the same as the previous file name with *nnn* file number increased by 1. The message "**<tagname> NEXT HIST FILE STARTED**" appears in the lower left portion of the Runtime screen.

When the number of history files reaches the limit specified by the **Number Hist Files** field in the SYS CNFG Historian Parameters submenu, the *nnn* file number resets to 000 and data logging continues in the normal fashion.

Note When the *nnn* file number resets to 000, Runtime begins overwriting alarm files beginning with the oldest (<filename>000.PRN).

8.12.2 Using the Event-Driven Historian

Event-Driven Historian operations and parameters are controlled in the HIST block's Runtime subwindow. To invoke the HIST block Runtime subwindow, press **[F2]** at anytime during Runtime and enter the tag name of the history block. Review the *Invoking Algorithm Subwindows* section in this chapter for more details regarding displaying algorithm block subwindows.

The HIST block algorithm subwindow is displayed in Figure 8.26. Parameters fields that can be changed during Runtime are done so by pressing the **[Tab]** key until the field becomes highlighted and entering in a new value. The parameters contained in this subwindow correspond to the parameters specified in the Strategy Builder when the HIST block is configured.

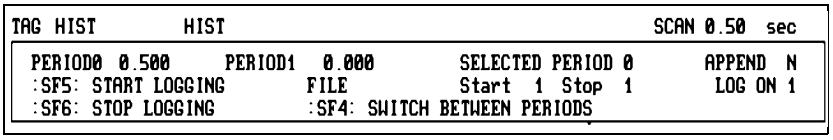


Figure 8.26 *HIST algorithm Runtime subwindow*

The following function keys are used in conjunction with the HIST block algorithm subwindow.

[Shift-F5]	Starts data logging for this HIST block
[Shift-F6]	Stops data logging for this HIST block
[Shift-F4]	Toggles between the two logging periods (**Period0** and **Period1**)

4/23/93

8.12.3 Analyzing History Files

This section describes how the history files that are generated by the PC-30 Event-Driven Historian can be read into spreadsheet programs. Files generated by the Event-Driven Historian (HIST block) are named in the Strategy Builder when the respective HIST block(s) are configured. During the configuration of the HIST block, its history file can be defined to either consist of one file that has history data appended each time its HIST block starts logging data, or a new file can be created for each logging session.

The defined history file name can be changed during Runtime in each HIST block's Algorithm subwindow. The file extension is used by all history files is .PRN.

RG-GA3-030-005

Note If a HIST block's history file name is changed in Runtime while the block is actively logging data, the file name change does not take affect until the active history file is closed, and a new logging session started.

Reading Data Into a Spreadsheet

You must do any work with Lotus 1-2-3 on an off-line computer. The Event-Driven Historian collects data on the hard drive only. To transfer history files to an alternate drive, you can use the file transfer operation of the File Management subwindow (see the *File Management* section later in this chapter).

To import data into a Lotus 1-2-3 spreadsheet:

1. Start the Lotus program and have a copy of the history data file available for importing.
2. With the Lotus program running, type a back slash (\) to invoke the command mode.
3. Enter the sequence **F** (file), **I** (import), **N** (numbers).
4. Enter the history file name.

8.13 The Runtime List File Utility

The Runtime List File Utility lets you view text files such as PC-30 Reports and Alarm Logs directly from Runtime.

While designed to view Reports and Alarm Logs, you can view any file that is in standard ASCII format.

☞ The PC-30 List File Utility supports shared file capability. The List File Utility can view a file that is currently opened in another node executing Runtime provided the file is in a shared directory. Refer to Chapter 3: *Before You Begin, Shared File Support* for a complete description of the features and limitations of file sharing.

To invoke the List File Utility, press **[ALT-L]**. The List File submenu displays at the bottom of the screen (Figure 8.27). The color of the **List Filename** field is initially red, indicating that it is activated and ready for entry.

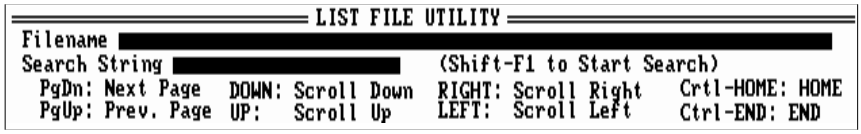


Figure 8.27 *The List File submenu*

4/23/93

Type in the full name of the file you want to view including the complete pathname. When you press the **[Enter]** key, the first 20 lines of the text file displays on the screen (Figure 8.28). Once the file is found, the List Filename field turns blue, indicating it is no longer selected for entries. If you want to reselect it, press the **[Home]** key. The field turns red again and you can type in a new filename.

Note If you make an error and the file cannot be found, an error message displays in the lower left corner of the screen, indicating the file cannot be found. Press the **[Home]** key and correct the error.

RG-GA3-030-005

The text viewer allows you the following operations:

- scroll vertically 1 line at a time - Up/Down arrows
- scroll vertically 10 lines at a time - **[PgUp]/[PgDn]**
- scroll horizontally 40 characters - right/left arrows
- go directly to the bottom of the text display - **Ctrl-End**
- go directly to the top of the text display - **Ctrl-Home**
- search for the occurrence of a text string - **Shift-F1**

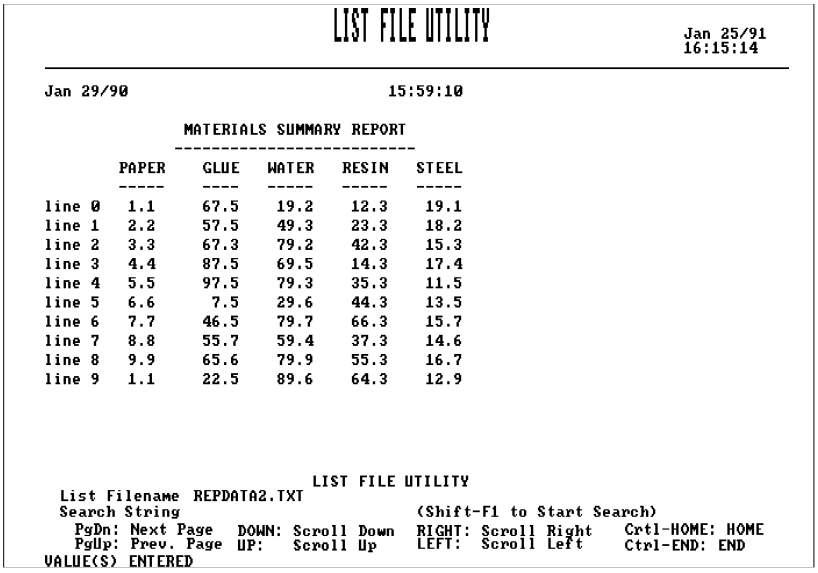


Figure 8.28 *List Function Utility Screen With a Report in View*

To search for the occurrence of a text string:

1. Press **[Home]** to select the List Filename field followed by **[Tab]** to move to the Search String field. The field turns to red, indicating that it is activated and ready for an entry.

2. Type in the text string you are searching for exactly as you expect it to appear (upper and lower case are recognized).

3. Press **[Shift-F1]**. The text line containing the string shows in red at the top of the list file screen.

4. To search again for the next occurrence of the same string, move the cursor down one line and press **[Shift-F1]** again.

8.14 Replaying History Files

During Runtime, a previously saved or currently active history file can be displayed on the screen in either tabular or graphic format. Files collected by the Event-Driven Historian can be displayed the same way.

The PC-30 History Replay supports shared file capability. The History Replay function can view a file that is currently opened in another node executing Runtime provided the file is in a shared directory. Refer to Chapter 3: *Before You Begin, Shared File Support* for a complete description of the features and limitations of file sharing.

4/23/93

Press the **[Alt-H]** key combination to invoke the History Replay subwindow (Figure 8.29). At the same time, the Main Window displays a directory of all history files that are present in the directory path specified in the **Historian File Path** field of the SYS CNFG Historian Parameters submenu. If no path was specified, the Runtime system directory is the default path. History file names displayed in cyan are closed files. A history file name displayed in red is actively acquiring data.

While the History Replay subwindow is displayed, the **FILE NAME** field is where you can either define a file name mask for history files that will be displayed in the Main Window Directory when the **[Shift-F1]** Read Directory operation is performed or define/display the actual file to be replayed.

RG-GA3-030-005

The **PRINT?** field specifies whether the history file replay occurs on the screen or the configured printer. The **GRAPHIC?** field defines whether the ensuing replay occurs in Graphic mode (when set to **Y**) or in Tabular mode (when set to **N**).

Note The printing of history replays can only be performed when the replay is configured in Tabular mode, i.e. **GRAPHIC?** set to **N**.

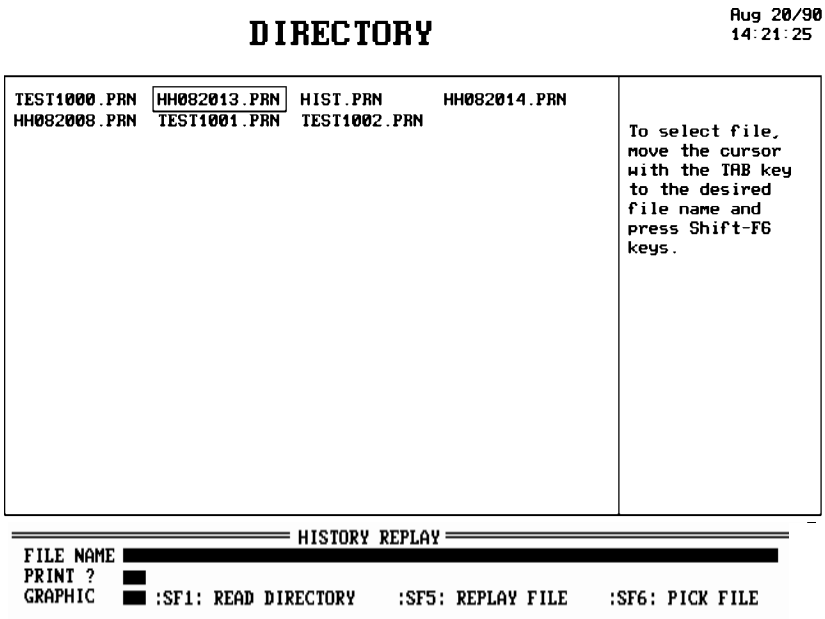


Figure 8.29 *History Replay subwindow and Directory screen*

The following paragraphs provide a brief description of the operations that can be performed from the History Replay subwindow. Details on these operations are provided later in this section.

Read Directory – [Shift-F1]

This operation reads the current directory for files and displays them in the Directory listing in the Main Window. If a file name mask was defined in the subwindow's **FILE NAME** field, it is applied to the Directory listing.

Replay File – [Shift-F5]

This operation initiates the History Replay function for the file that is defined in the Directory listing's **FILE NAME** field in the Main Window. Depending on the value in the History Replay subwindow's **GRAPHIC** field, the replay occurs in Tabular or Graphic mode.

Pick File – [Shift-F6]

This operation places the file name that is currently selected in the Main Window Directory into the **FILE NAME** field. When followed by a **[Shift-F5]** Replay File operation, this "Picked" file is the file replayed.

4/23/93

To initiate a History Replay operation, perform the following steps:

1. Select a history file to replay by using one of the following operations:

   - Type the desired history file name into the **FILE NAME** field in the History Replay subwindow.
   - If you want to choose a file from a Directory of history files, enter a file name mask containing the wild card character * and the .PRN extension in the **FILE NAME** field, e.g. *.PRN. Press the **[Shift-F1]** key combination, and all the files that match your file name mask appear in the Directory in the Main Window area.
   - Select a file from the Directory by pressing the **[Tab]** key (while the active cursor is in the Main Window) until the desired file is highlighted (the **[Shift-Tab]** key to move backward). Press the **[Shift-F6]** key combination to automatically place the highlighted file name into the **FILE NAME** field.

RG-GA3-030-005

2. In the **PRINT?** field, indicate whether the file should be directed to the METACONF configured graphics printer. A **Y** in this field directs the history replay to the graphic printer; a **N** directs the history replay to the Runtime screen.

Reminder The printing of history replays can only be performed when the replay is configured in Tabular mode, i.e. **GRAPHIC?** set to **N**.

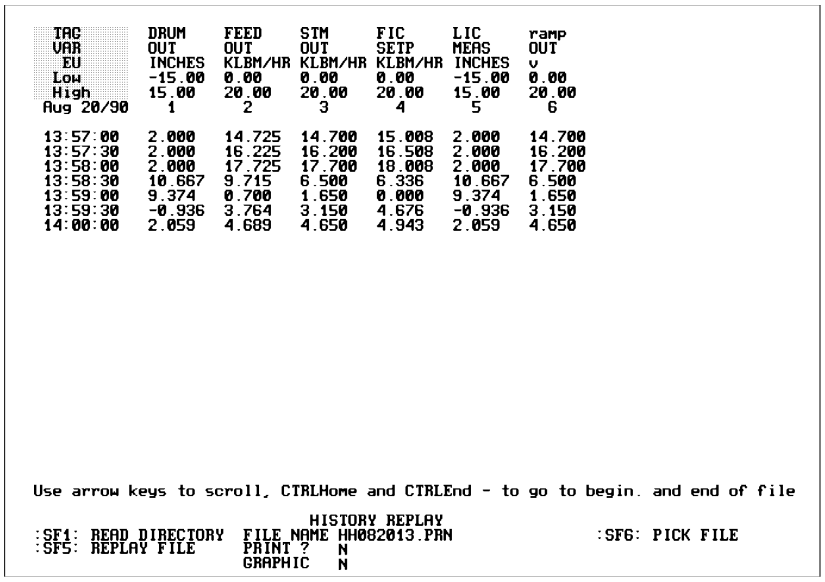
3. Tab to the **GRAPHIC?** field to specify the format in which the selected file is to be replayed: **Y** selects Graphic mode for the history replay; **N** selects Tabular mode.

4. Press the **[Shift-F5]** key combination to start the history replay.

5. If Tabular mode was selected, **GRAPHIC?** set to **N**, the tabular replay begins as described in the next section. If Graphic mode was selected**, GRAPHIC?** set to **Y**, skip to the Graphic Replay section for further instructions.

8.14.1 Tabular Replay

If Tabular mode was selected in the History Replay subwindow when the **[Shift-F5]** Replay File operation was performed and the replay was directed to the screen, **PRINT?** set to **N**, PC-30 generates the history replay. Figure 8.30 shows an example of a tabular replay. The data in this example was collected every 30 seconds for two variables.



TAG	DRUM	FEED	STM	FIC	LIC	ramp
VAR	OUT	OUT	OUT	SETP	MEAS	OUT
EU	INCHES	KLBM/HR	KLBM/HR	KLBM/HR	INCHES	v
Low	-15.00	0.00	0.00	0.00	-15.00	0.00
High	15.00	20.00	20.00	20.00	15.00	20.00
Aug 20/90	1	2	3	4	5	6
13:57:00	2.000	14.725	14.700	15.008	2.000	14.700
13:57:30	2.000	16.225	16.200	16.508	2.000	16.200
13:58:00	2.000	17.725	17.700	18.008	2.000	17.700
13:58:30	10.667	9.715	6.500	6.336	10.667	6.500
13:59:00	9.374	0.700	1.650	0.000	9.374	1.650
13:59:30	-0.936	3.764	3.150	4.676	-0.936	3.150
14:00:00	2.059	4.689	4.650	4.943	2.059	4.650

4/23/93

Figure 8.30 *Sample Tabular History Replay*

To scroll through the file, the active cursor must be in the Main Window. The **[PgUp]**, **[PgDn]**, and the up and down arrow keys (↑,↓) scroll three-quarters of a page in the indicated direction. The left and right arrow keys (←,→) scroll one-half of a page. The **[Ctrl-Home]** key scrolls to the beginning of the history file while the **[Ctrl-End]** key moves you to the end of the history file.

RG-GA3-030-005

8.14.2 Graphic Replay

If Graphic mode was selected in the History Replay subwindow when the **[Shift-F5]** Replay File operation was performed (**GRAPHIC?** set to **Y**), PC-30 generates the History Replay List shown in Figure 8.31.

This list displays all the variables that are associated with the selected history file and their respective pen assignments.

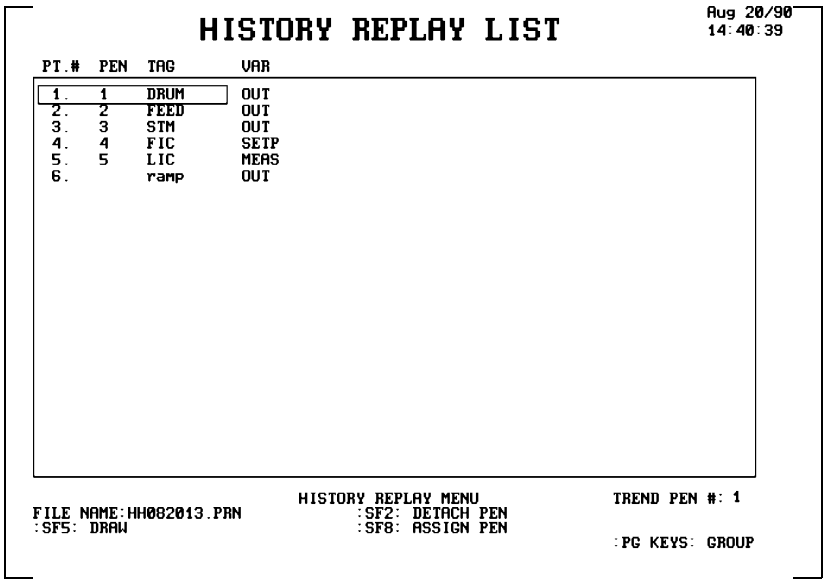


Figure 8.31 *Sample Tabular History Replay List*

Graphic replay can display up to five variables at a time. The subwindow portion of the History Replay List lets you change how the graphic replay displays by altering the pen assignments.

History Replay List Subwindow

This History Replay List subwindow appears in conjunction with History Replay List when a graphic replay operation has been initiated. The following parameters/operations are available from the History Replay List subwindow:

File Name

This is the history file currently selected for replay. If this file is incorrect, press the **[Alt-H]** key combination to display the History Replay subwindow. A new history file can be selected.

Trend Pen

This is the pen number currently being used. Pen operations in this subwindow are performed on the pen number specified in this field.

Detach Pen – [Shift-F2]

By pressing the **[Shift-F2]** key combination, the variable currently selected in the History Replay List (enclosed in a yellow box) has its assigned pen detached from the current graphic history replay. The variable is not removed from the history list, only its graphical trend is removed from the next replay. The pen can be reassigned with the **[Shift-F8] Assign Pen** function.

4/23/93

Assign Pen – [Shift-F8]

By pressing the **[Shift-F8]** key combination, the variable that is currently selected in the History Replay List (enclosed in a yellow box) is assigned the pen number that is currently specified if the **Trend Pen #** field. If the pen number in the **Trend Pen #** field is already assigned to another variable in the History Replay List, the selected variable is assigned that pen number and the variable that previously held that pen assignment is detached.

RG-GA3-030-005

Group – [PgDn/PgUp] Keys

Since graphic history replay uses the first five variables in the History Replay List, it is possible to shift the pen assignments in groups of five using the **[PgDn]** and **[PgUp]** keys. Pressing the **[PgDn]** key causes the first five variables in the History Replay List to become detached and the next five variables (6 through 10) to assume the pen 1 through 5 pen assignments. If pressed

again, pens 1 through 5 are assigned to variables 11 to 15, and so on (provided that many variables exist in the history file).

Similarly, the **[PgUp]** key can be used to shift the pen 1 through 5 assignments up in the variable list. If variables 6 through 10 are currently assigned pens 1 through 5, respectively, when the **[PgUp]** key is pressed, variables 1 through 5 assume those pen assignments.

Draw – [Shift-F5]

Pressing the **[Shift-F5]** key combination initiates the graphic replay for the variables selected (up to five) in the History Replay List. The graphic History Replay Display is drawn in the Main Window area similar to the example shown in Figure 8.32.

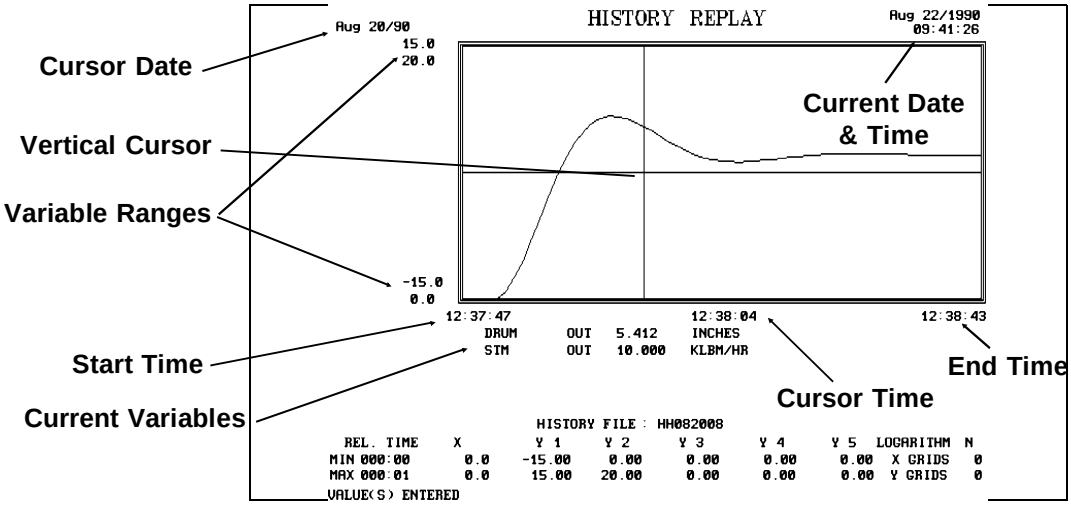


Figure 8.32 *Sample Graphic History Replay*

During a graphic history replay, if the entire history file cannot fit into the History Replay Display in the Main Window, the file is displayed so that the end of the history file is shown in the window. Large history files may cause a brief delay in the appearance of the history date and the vertical cursor.

The example shown in Figure 8.32 identifies all the areas in the History Replay Display.

4/23/93

History Replay Display

When a graphic history replay is initiated by pressing the **[Shift-F5]** key combination from the History Replay List subwindow, the following information fields are provided in the actual History Replay Display in the Main Window area:

Note Pens can be reassigned while a history replay is active by either using the **[PgUp]** and **[PgDn]** keys. If desired, pens can also be reassigned by pressing the **[Shift-F4]** to recall the History Replay List.

Cursor Date

The Cursor Date area of the History Replay Display (the upper left corner of the screen) shows the date of the history file that relates to the current position of the Vertical Cursor. If the date changes while scrolling through the history file data with the vertical cursor, i.e. from 23:59:59 to 00:00:00, the Cursor Date changes accordingly.

RG-GA3-030-005

Current Date and Time

The current DOS date and time are displayed in the upper right corner of the History Replay Display.

Vertical Cursor

The Vertical Cursor allows you to move through the data in the history file. Pressing the left and right arrow keys moves the vertical cursor through the history file data. As you move the Vertical Cursor, the values in the Current Variable fields and the Cursor Time are continually updated to reflect the Vertical Cursor's current location in the history file.

Cursor Time

The Cursor Time area of the History Replay Display continually displays the absolute time that corresponds to the current location of the Vertical Cursor in the history file. As the Vertical Cursor is moved, the Cursor Time is updated to reflect the absolute time the data was logged into the history file.

Start Time

The Start Time area of the History Replay Display shows the absolute time when the history data at the left edge of the History Replay Display was logged. If the data in the History Replay Display is shifted, e.g. by pressing the **[Ctrl-Home]** or **[Ctrl-End]** keys, or by entering new relative time Min/Max values, the **Start Time** is adjusted accordingly.

End Time

The End Time area of the History Replay Display shows the absolute time when the history data at the right edge of the History Replay Display was logged. If the data in the History Replay Display is shifted, e.g. by pressing **[Ctrl-Home]** or **[Ctrl-End]** keys, or by entering new

relative time Min/Max values, the End Time is adjusted accordingly.

Current Variables

The Current Variables area of the History Replay Display identifies the variables (up to five) currently being graphed. This area also displays each variable's value that corresponds to the position of the Vertical Cursor.

4/23/93

The variable's colors are coordinated to match the color that they are graphed in and their variable range values along the Y-axis. Variable Y1 is the top variable in the list, Y2 is below Y1, and so on down to Y5 at the bottom (if that many variables are being graphed).

The Current Variables area identifies each variable's tag name, variable name, current value (determined by the vertical cursor's location), and any engineering units configured in the block's UNITS parameter. As in the History Replay List subwindow, **[PgUp]** and **[PgDn]** keys can be used to shift between the variables that are being graphed. You can press the **[Shift-F4]** key to recall the History List display to reassign pens.

RG-GA3-030-005

Variable Ranges

The Variable Ranges area of the History Replay Display identifies the minimum and maximum range values for each of the variables (up to five) that are displayed in the current variables area of the screen. The colors used in the Variable Ranges are coordinated to match the color that the variable is graphed in and the variable's text color in the Current Variable area.

The minimum and maximum range value of each variable can be modified individually by setting the appropriate Y Min/Max value in the subwindow area of the History Replay Display. As the range values are changed for each variable, the graphing of the variable in the History Replay Display is scaled accordingly. Modifying the Y1 Min or Max value or both changes the first variable in the current variable area. Y2 changes the range values for the second variable in the current variable list, and so on.

Note When replaying an active history file (from a HIST block), the replay is displayed in the History Replay Display in such a manner so that the end of the current file is shown the middle of the History Replay Display and the current data is appended. When the current data reaches the right edge of the replay display, the display is shifted a half screen so that the end of the new data is again being graphed in the center of the History Replay Display.

Modifying the History Replay

The subwindow area that is displayed with the History Replay Display lets you modify the way history file data is displayed in the History Replay Display by doing the following:

1. To define new parameter values into a subwindow field, press the **[Home]** key so that the active cursor moves from the Vertical Cursor in the Main Window to the subwindow area. If using a mouse, point the mouse in the subwindow area.

2. Tab to the desired parameter field. A value can be typed into a field that is highlighted (displayed in red).

☞ The following parameters can be changed in subwindow that appears in conjunction with the History Replay Display:

Rel. Time

These parameters allow you to set the relative time scale for the data to be displayed along the X-axis. The format for the **Min** and **Max** relative time parameters is in hours:minutes (HHH:MM) and relates to where and how much of the history file is displayed in the History Replay Display. The default value is one hour MIN - 000:00, MAX - 001:00.

For example, entering a **Min** value of 000:10 and a **Max** value of 000:30 displays the history data starting 10 minutes into the file and ending 20 minutes later. The **Start Time** and **End Time** areas of the History Replay Display are adjusted to display the new absolute times of the history file data that is now in the History Replay Display.

4/23/93

Note The values set in the **Rel. Time** minimum and maximum parameters are retained when you exit from the History Replay Display. When you return to the graphic History Replay Display screen, the previously set **Rel. Time** parameters appear.

RG-GA3-030-005

X Min/Max

These fields are not functional for graphical history replay.

Y1 - Y5 Min/Max

These fields allow you to specify different Y-axis lower and upper (Min and Max, respectively) range values for each of the Current Variables. After a range limit is changed, the value entered is displayed in the Variable Range area of the History Replay Display and the variable's graph is scaled according to the new range. Unlike the **Rel. Time** parameters, Y1 - Y5 Min/Max parameter changes are not kept after you exit from the History Replay Display.

X Grids

This field allows you to specify the number of vertical grid lines placed along the X-axis. Valid entries are between 0 and 10,000. *The default value is 4.*

Y Grids

This field allows you to specify how many horizontal grid lines are placed along the Y-axis. Valid entries are between 0 and 10,000. *The default value is 4.*

Logarithm

This field changes the format of the History Replay Display from a linear to a logarithmic scale. An entry of **N** (no) in this field specifies a linear scale, an entry of **Y** (yes) specifies a logarithmic scale.

When a logarithmic scale is used, Y1-Y5 Min/Max values are adjusted to the nearest log interval, that is, a Y1 Max of 0.5 is rounded to 1, Y1 Min of 0.5 is rounded to 0.1, a Max of 7.5 is rounded to 10, etc.

The graphic History Replay Display has the following standard key assignments:

[Ctrl-Home]

Pressing the **[Ctrl-Home]** key combination causes the History Replay Display to start displaying the history file data from the beginning of the file. The **Start** and **End Time** areas of the display are adjusted according to the new settings.

[Ctrl-End]

Pressing the **[Ctrl-End]** key combination causes PC-30 to move the data that is displayed in the History Replay Display so that the end of the history file data appears in the middle of the display. The **Start** and **End Time** areas of the window are adjusted according to the new settings.

Up/Down Arrows ([↑]/[↓]

The up and down arrow keys are used to scroll through History Replay Display data a half page at a time according to the interval setup in the **Rel. Time** Min/Max parameters.

Left/Right Arrows ([←]/[→]

The left and right arrow keys are used to move the Vertical Cursor through the history file data in the History Replay Display. As the Vertical Cursor is moved through the history file's data, the Current Variable's data, as well as the Cursor Time and Cursor Date, are continually updated to reflect the Vertical Cursor's current location in the history file.

4/23/93

RG-GA3-030-005

[Shift-F4]

Pressing the **[Shift-F4]** key combination causes you to exit from the History Replay Display and recall the History Replay List). Pen modifications can then be made and the graphical history replay redrawn.

[PgDn] / [PgUp]

Since graphic history replay can display up to five variables in the History Replay Display, it is possible to shift the Y1-Y5 pen assignments using the **[PgUp]** and **[PgDn]** keys. Pressing the **[PgDn]** key causes the next five variables (if available) to assume the Y1 through Y5 pen assignments and are graphed accordingly. If pressed again, the next 5 variables are graphed, and so on. Similarly, the **[PgUp]** key is used to shift the Y1 through Y5 current variables up to the preceding five variables.

Note You cannot escape out of a history replay to return operation to the keyboard for further Runtime functions. You must wait until it finishes drawing on the screen.

8.15 History Windows

History windows are configured into operator displays and provide a method for displaying a specific history data file previously or currently in the process of being logged by its attached HIST block. A History Window must be previously configured in the Display Builder to function as desired during Runtime. Refer to the *History Windows* section in Chapter 7: *The Display* Builder for an explanation of how to construct and configure a History Window in a graphics display.

4/23/93

During Runtime, whenever a display is initially placed on the screen that contains a History Window, the History Window subwindow appears at the bottom of the screen. Figure 8.33 shows an example of an operator display that contains two History Windows and the subwindow that is displayed along with it.

The subwindow that appears at the bottom of the Runtime screen reflects information from its attached History Window. When there is more than one History Window in a display, the subwindow shown at the bottom of the screen corresponds to the History Window that is selected (enclosed in a yellow box) in the Main Window.

RG-GA3-030-005

If another subwindow is invoked, or other History Window subwindows are desired to be displayed, a History Window can be recalled by pressing the **[Tab]** key while the active cursor is in the Main Window area. When the desired History Window is selected, press the **[Enter]** key. The subwindow for that History Window appears at the bottom of the Runtime screen.

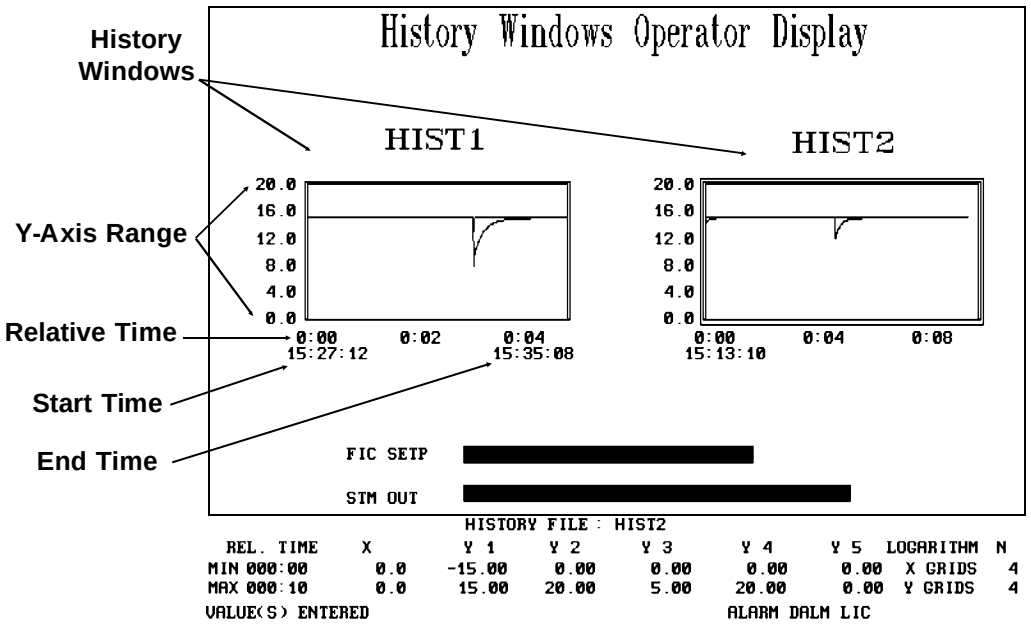


Figure 8.33 *Example of a History Windows display*

The following information is displayed about the History Window in the Main Window display area:

Y-Axis Range

This area of a History Window identifies the minimum and maximum range values for a single variable pen. This variable is configured by the **Y-Axis Range Pen** parameter during the History Window's configuration and cannot be changed during Runtime.

New range limits for other variables being graphed can be entered through their respective **Y Min/Max** parameters in the History Window's subwindow, and their graphs are scaled accordingly. Because the History Window can display up to 20 variables, all of their range limits cannot be placed into the History Window area.

Start Time

The **Start Time** area of a History Window displays the absolute time when the history data at the left edge of the History Window was logged. If the data in the History Window is shifted, e.g. by pressing the **[Ctrl-Home]** key combination or the **[Ctrl-End]** key combination, or by entering new **Rel. Time Min/Max** values, the **Start Time** is adjusted accordingly.

End Time

The **End Time** area of a History Window displays the absolute time only when the History Window is displaying history data that has reached the right edge of the window. If the data in the History Window is shifted so that it does not extend to the right edge of the History Window, an **End Time** value is not be displayed.

Relative Time

The **Relative Time** area of a History Window displays where in the history file the data being displayed is in relation to the entire file. The entries displayed in this area correspond directly to the **Rel. Time Min/Max** values that are defined in the History Window subwindow.

4/23/93
RG-GA3-030-005

History Window Plot Mode

If you configured the History Window to display the history file data in plot format, the variables are graphed on the Y-axis against a single variable on the X-axis. (In the standard History Window display, time is represented by the X-axis). Plot mode is configured by specifying an X-axis variable during the configuration of the History Window in the Display Builder.

When in plot mode, the History Window can be configured to scroll a certain percentage when data reaches the right edge of the window. For more information on History Window plotting, refer to the *History Window Connection* section in Chapter 7: *The Display Builder*.

Note Plot mode cannot be enabled during Runtime. Refer to the *History Window* section in Chapter 7: *The Display Builder* for information on how to configure a History Window for Plot mode.

8.15.1 Managing History Window Data

When the HIST block that controls a History Window is in non-append mode, i.e. the HIST block's configuration menu defines APPEND = N, and an open history file exists, the open file is displayed in the History Window when the display containing the History Window appears. If an open file does not exist, the previous history file for the specific History Window displays.

If the History Window never had data logged to its attached history file before, the data appears only when the HIST block starts logging data. The HIST block can start logging data through strategy control, i.e. START/STOP connections to the HIST block, or manually using the **[Shift-F5]** key combination from the respective HIST block's Algorithm subwindow.

If multiple history files are being generated by the HIST block (APPEND = N), the last history file that was generated is displayed in the History Window. Refer to *HIST Block* section in Chapter 6: *Algorithms* for more information on how the HIST block generates history files.

The format in which the history data is displayed can be altered by various fields that appear in the History Window subwindow.

4/23/93

History Window Subwindows

The subwindows that are part of each History Window can have values entered into them that modify how the data in its corresponding History Window is displayed. The following parameters can be changed in a History Window subwindow:

Rel. Time

These parameters allow you to set the relative time scale for the data to be displayed along the X-axis in the Relative Time area. The format for the **Min** and **Max** relative time parameters is in hours:minutes (HHH:MM) and relates to where and how much of the history file is to be displayed in the History Window. *The default value is one hour Min - 000:00, Max - 001:00.*

RG-GA3-030-005

For example, entering a **Min** value of 000:05 and a **Max** value of 000:15 displays the history data starting 5 minutes into the file and ending 10 minutes later. The **Start Time** area of the History Window is adjusted to display the new absolute time of the history file data now in the History Window.

As data is logged into the History Window and reaches the right edge of the window, the current end-point of the logged data shifts to the middle of the History Window. The time interval set by the **Rel. Time Min/Max** parameters, 10 minutes as in the example, is maintained.

X Min/Max

These parameters allow you to modify the range limits along the X-axis when the History Window is configured for Plot mode. Entering new values into either or both if these fields changes the range values along phi X-axis. Once entered, the plot scale and Start Time are adjusted as required.

Y1 - Y5 Min/Max

These fields allow you to modify the lower and upper (Min and Max, respectively) range values for each of the History Window variables. After a range limit is changed, only the variable's graph is scaled according to the new range. The range values displayed along the Y-axis are defined by the **Y-Axis Range Pen** variable in the History Window Configuration submenu (in the Display Builder) and cannot be changed during Runtime.

X Grids

This field allows you to specify how many vertical grid lines are placed along the X-axis. Valid entries are between 0 and 10,000. *The default value of 4* is set during the History Window's configuration in the Display Builder.

Y Grids

This field allows you to specify how many horizontal grid lines are placed along the Y-axis. Valid entries are between 0 and 10,000. *The default value of 4* is set during the History Window's configuration in the Display Builder.

Logarithm

This field changes the format of the History Window from a linear to a logarithmic scale. An entry of **N** (no) in this field specifies a linear scale, an entry of **Y** (yes) specifies a logarithmic scale.

When a logarithmic scale is used, Y Min/Max values are adjusted to the nearest log interval, e.g. a Y Max 0.5 is rounded to 1, a Y Min of 0.5 is rounded to 0.1, a Y Max of 7.5 is rounded to 10, etc.

4/23/93

The following standard key assignments are available during Runtime for History Windows while the History Window's sub-window is displayed at the bottom of the screen. If Key Macros are assigned to the strategy or the display that contains the History Window, these key assignments may not function as described.

RG-GA3-030-005

[Ctrl-Home]

Pressing the **[Ctrl-Home]** key combination causes the History Window to start displaying the history file data from the beginning of the file. The **Start Time** areas of the window is adjusted according to the new settings.

[Ctrl-End]

Pressing the **[Ctrl-End]** key combination causes PC-30 to move the data that is displayed in the History Replay window so that the end of the history file data appears in the middle of the window. The **Start Time** area of the window is adjusted according to the new settings.

Up/Down Arrows ([↑]/[↓]

The up and down arrow keys are used to scroll through the History Replay window data in half pages according to the interval setup in the **Rel. Time Min/Max** parameters.

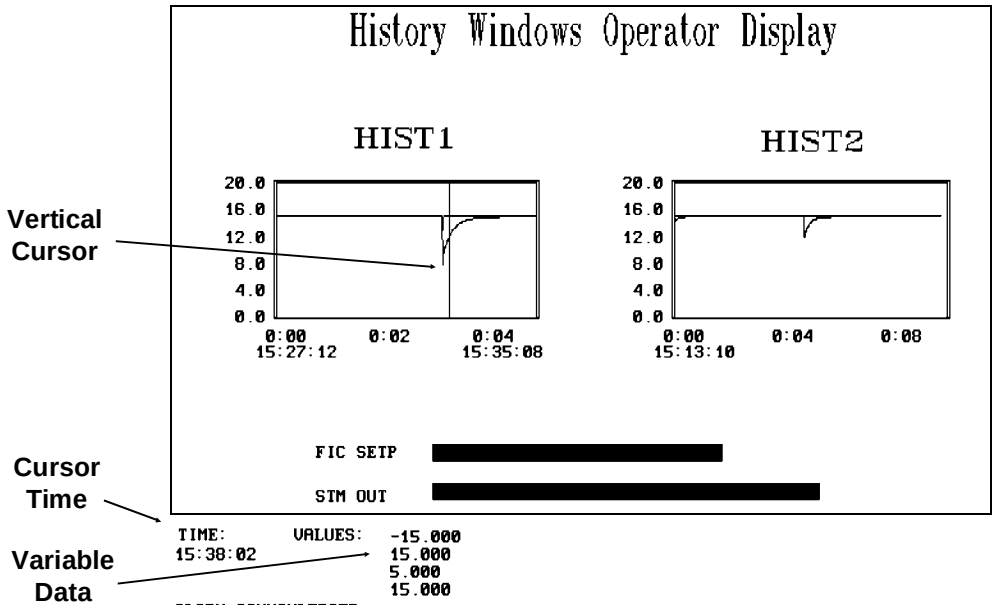
[PgDn] / [PgUp]

Pressing the **[PgDn]** key causes the next five variable **Y Min/Max** range limits to be displayed in the subwindow area. If Y1-Y5 are currently displayed, pressing the **[PgDn]** key causes Y6-Y10 to be displayed, and so on. Similarly, the **[PgUp]** key shifts the current **Y Min/Max** range limits to move to the previous five variables.

Vertical Cursor

When a History Window's subwindow is at the bottom of the screen, there is a Vertical Cursor function that can be enabled to let you display dynamic data about the currently selected History Window.

To enable the Vertical Cursor, the specific History Window must be selected with its subwindow at the bottom of the screen. Press the left or the right arrow keys ([←]/[→] to place the Vertical Cursor at the center of the History Window, and the Cursor subwindow appears at the bottom of the screen as shown in Figure 8.34.



4/23/93

Figure 8.34 *History Window with Vertical Cursor*

Note The Vertical Cursor function cannot be used in History Windows configured for Plot mode.

RG-GA3-030-005

As you press the left or right arrow key, the Vertical Cursor moves in the indicated direction through the data in the History Window.

The following data fields are available in the Vertical Cursor subwindow:

Time

This field continually displays the absolute time that corresponds to the current location of the vertical cursor in the history file. As the vertical cursor is moved, the cursor time is updated to reflect the absolute time that the data was logged into the history file.

Variable Data (Values)

These fields identify each of the variables (up to 20) being displayed in the History Window. The color of the variable's data is coordinated to match the color in which they are graphed. Variable Y1 is the top-left variable in the list, Y2 is below Y1, and so on down to Y4 at the bottom of the first column. Y5 starts at the top of the second column. Only the variables configured into the History Window are shown in the Vertical Cursor subwindow.

[PgUp] & [Esc]

Pressing either the **[PgUp]** or the **[Esc]** key disables the Vertical Cursor function and returns its original History Window subwindow to the screen. When the Vertical Cursor is disabled, its corresponding subwindow is removed from the screen.

8.16 File Management

PC-30 provides a File Management facility that allows you to perform a variety of file related operations from within the Runtime environment. This is very beneficial if you need to transfer history files, delete obsolete report files, etc., while the process is still being executed.

Using the File Management facility, you can read directories, delete files, and copy files between disks without having to exit to the DOS operating system.

4/23/93

To invoke the File Management facility's File Handling Utility subwindow (Figure 8.35), press the **[Alt-F]** key at any time during a Runtime session.

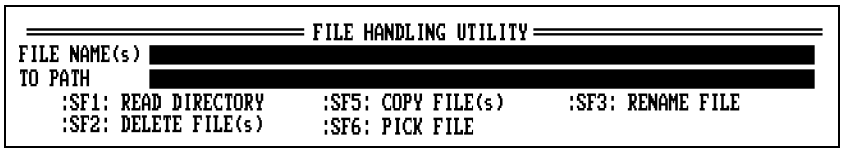


Figure 8.35 *File Handling Utility subwindow*

When this File Handling Utility subwindow appears at the bottom of the Runtime screen the following parameters/operations can be performed.

RG-GA3-030-005

File Name(s)

This field is where you define the file or files that are going to have a File Management operation performed on. The **FILE NAME(s)** field accept up to 67 DOS legal characters, including wildcard characters and drive letter pathnames, e.g. C:\HISTORY*.PRN. (Wildcards cannot be used when using the **RENAME FILE** operation.)

To Path

This field defines the path and/or file name that the file(s) specified in the **FILE NAME(s)** field are copied or renamed to. The **TO PATH** field accepts up to 67 DOS legal characters. Wildcard characters can only be used when specifying a destination for the **COPY FILE(s)** operation. (e.g. A:\DISPLAYS\T*.GRP)

The **TO PATH** field is functional for the **[Shift-F5] COPY FILE(s)** and **[Shift-F3] RENAME FILE** operations. All other File Handling Utility subwindow operations (**DELETE FILE(s)**, **PICK FILE**, etc.) are performed on files defined in the **FILE NAME(s)** field.

Read Directory – [Shift-F1]

This operation lists the files defined by the file name mask and/or path in the **FILE NAME(s)** field. The files are displayed in the Directory listing in the Main Window.

Delete File(s) – [Shift-F2]

This operation deletes the files defined in the **FILE NAME(s)** field. If a file name mask and/or path is defined in the subwindow's **FILE NAME(s)** field, it is applied to this **DELETE FILE(s)** operation.

Copy File(s) – [Shift-F5] Keys

This operation reads the file(s) defined in the **FILE NAME(s)** field and copies them to the destination defined in the **TO PATH** field.

Rename File – [Shift-F3] Keys

This operation renames a file defined in the **FILE NAME(s)** field to the name and/or path defined in the **TO PATH** field. The old file is discarded after the **RENAME FILE** operation is completed.

Pick File – [Shift-F6]

Pressing the **[Shift-F5]** key combination causes the file that is currently selected (enclosed in a yellow box) in the Main Window Directory display to be placed into the **FILE NAME(s)** field. Once the selected file is in the **FILE NAME(s)** field, other File Handling Utility subwindow operations can be performed on it.

4/23/93

8.16.1 File Directories

The File Management facility allows you to display directory listings of files from any disk's directory. This enables you to examine desired files before a file operation is performed on it (them) and without having to exit to the DOS operating system.

To display a directory listing of desired files in the Main Window, perform the following steps:

1. Press the **[Alt-F]** key combination to invoke the File Management facility's File Handling Utility subwindow.
2. Place the active cursor in the Subwindow area by pressing the **[Home]** key (if it is not already in the subwindow).
3. Tab to the **FILE NAME(s)** field and type in any legal DOS path name for the files to be displayed (up to 20 characters). The path name can include wildcard characters and a drive letter.

RG-GA3-030-005

4. Then press the **[Shift-F1]** key combination. A Directory display similar to the one shown in Figure 8.36 appears in the Main Window. This Directory display lists all files found in the path name defined in the **FILE NAME(s)** field.

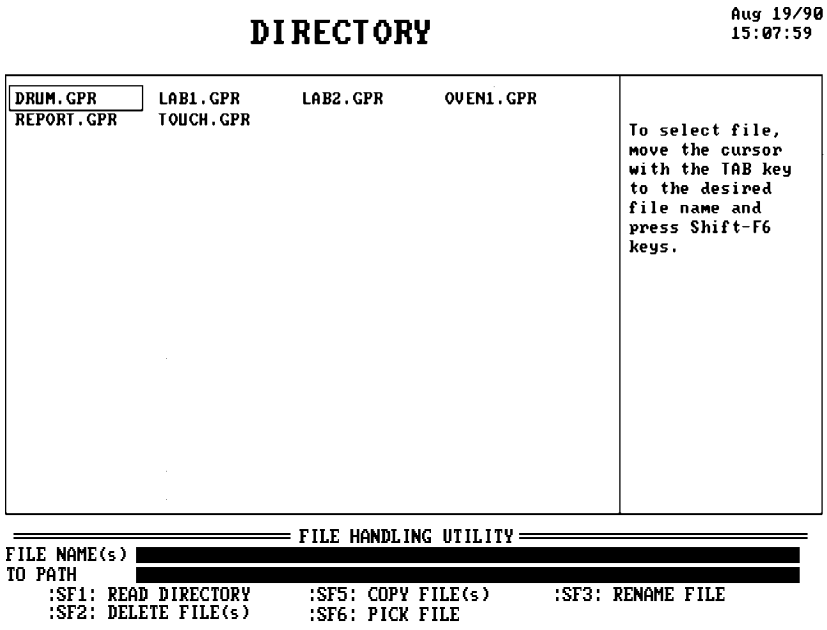


Figure 8.36 *Sample File Directory*

The following path name examples can be entered into the **FILE NAME(s)** field in order to produce specific Directory display screens.

.	All files in the current directory
\PROCESS*.GRP	All display files in the PROCESS directory
A:\LOG*.PRN	All history data files on the A: drive in the LOG subdirectory
C:\TEST*.DB	All .DB files in the C: drive's TEST subdirectory.

Once the Directory is displayed, you can select a file from it, placing the active cursor in the Main Window (**[Home]** key) by tabbing to it and pressing the **[Shift-F6]** key combination. The selected file name is entered in the **FILE NAME(s)** field in the subwindow.

8.16.2 File Management Operations

The File Management facility provides additional file base operations that can be performed while the File Handling Utility subwindow is at the bottom of the Runtime screen. This section describes those operations.

4/23/93

Deleting Files

To delete specific files from a defined source, perform the following steps:

1. Press the **[Alt-F]** key combination to invoke the File Management facility's File Handling Utility subwindow.
2. Place the active cursor in the Subwindow area by pressing the **[Home]** key (if it is not already in the subwindow).
3. Using either the keyboard, or the **[Shift-F6] PICK FILE** operation, select the **FILE NAME(s)** field and define the file(s) to be deleted (up to 67 characters).
4. Press the **[Shift-F2]** key combination. PC-30 prompts you to press **[Shift-F2]** key combination again to confirm the deletion. If confirmed, the defined file are deleted. If you decide not to perform the deletion, continue to your next Runtime operation.

RG-GA3-030-005

Copying Files

To copy specific files from a defined source to a defined destination, perform the following steps:

1. Press the **[Alt-F]** key combination to invoke the File Management facility's File Handling Utility subwindow.
2. Place the active cursor in the Subwindow area by pressing the **[Home]** key (if it is not already in the subwindow).
3. Using either the keyboard, or the **[Shift-F6] PICK FILE** operation, select the **FILE NAME(s)** field and define the source path name of the file(s) to be copied (up to 67 characters).
4. Tab to the **TO PATH** field and define the destination path name (up to 67 characters) that the source file(s) defined in the **FILE NAME(s)** field will be copied to and press the **[Shift-F5]** key combination. The copy operation performs.

Renaming Files

To rename a specific file from a defined source, perform the following steps:

1. Press the **[Alt-F]** key combination to invoke the File Management facility's File Handling Utility subwindow.
2. Place the active cursor in the Subwindow area by pressing the **[Home]** key (if it is not already in the subwindow).
3. Using either the keyboard, or the **[Shift-F6] PICK FILE** operation, select the **FILE NAME(s)** field and define the file to be renamed (up to 67 characters). No wildcards are allowed in the file specification.

4. Tab to the **TO PATH** field and define the new name and/or path for the file specified in the **FILE NAME(s)** field (up to 67 characters). No wildcards are allowed in the new file name specification. Press the **[Shift-F3]** key combination and the renaming operation is performed. The rename operation performs and the old file name is discarded.

8.17 System Performance

4/23/93

The System Performance subwindow is a view-only display that gives the operator information on the amount of time the computer is spending on each critical task. To invoke this display, press the **[Alt-S]** key combination. Figure 8.37 shows an example of a System Performance subwindow and the system tasks it identifies.

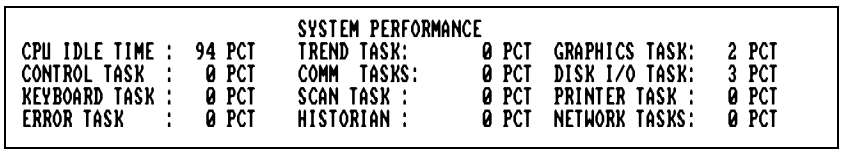


Figure 8.37 *System Performance subwindow*

8.18 Printing the Runtime Screen

RG-GA3-030-005

PC-30 allows you to print the Runtime screen image at any time by pressing **[Ctrl-PrtSc]** key combination. This operation cause the contents of the screen to be directed to the graphics printer configured with the METACONF utility.

While the screen is being printed, it is frozen and the system does not respond to operator keystrokes. To unlock the system before printing is complete, put the printer off-line and then back on-line.

It is also possible to print a Runtime screen automatically based on a digital event with the use of DISP block. The DISP block must be incorporated into the strategy during the strategy's development in the Strategy Builder. Refer to the *DISP* block section in Chapter 6: *Algorithms* for additional information on how to configure a DISP block for automatic screen printing.

Note Serial printers can be supported for the **[Ctrl-PrtSc]** function to print the contents of the Runtime screen. However, the printer driver must be modified with the Printer Toolkit before serial printer operations can take place. The Printer Toolkit is free upon request.

8.19 Links to Runtime

Almost all of the decisions made in the Configurator (Strategy and Display Builders) influence the behavior of the PC-30 software at Runtime. The following table is a summary of how certain Runtime functions are controlled by parameter choices made in the Configurator.

Table 8.4 Runtime Operations Controlled by the Strategy Builder

Runtime Effect	Strategy Builder Function
I/O Scanner (On/Off)	System Configuration / SYS CNFG submenus
Alarm Squelching	System Configuration / ALRM CNFG submenus
Alarm Annunciating	System Configuration / SYS CNFG submenus
Printer Ports (alarm & event)	System Configuration / SYS CNFG submenus
Logging Alarms/Events to Disk	System Configuration / ALRM CNFG submenus
I/O Communications Ports	System Configuration / COMM CNFG submenu
Trend/Initial List	System Configuration / TRND LIST submenu
Warm Start	System Configuration / SYS CNFG submenu
History Function	Specials / HIST algorithm configuration
Logging history files	System Configuration / SYS CNFG submenus
Exit Runtime	System Configuration / PASSWORD menu (Security level)
Switch - Auto/Manual	System Configuration / PASSWORD menu (Security level)

4/23/93

RG-GA3-030-005

Table 8.4 Runtime Operations Controlled by the Strategy Builder (con't)

Runtime Effect	Strategy Builder Function
Switch - Local/Remote	System Configuration / PASSWORD menu (Security level)
Changing Process Variables	System Configuration / PASSWORD menu (Security level)
Auto-invoke display	DISP algorithm configuration
Invoke displays attached to blocks	Block configuration
Auto snapshots of trends	SYS algorithm configuration
Screen Saver	SYS algorithm configuration
Invoke displays with keys	Creating Key Macros
Boot-up display	Runtime boot-up display
Database Caching	System Configuration / SYS CNFG submenus

8.20 Operator Messages

Runtime messages inform the operator what the Runtime system is doing in response to process conditions or the latest command input. These messages appear in the lower left corner of the screen in the Message Line area. Some messages are warnings which indicate that the intended operation cannot be done in the manner specified. They may also include ways to correct the situation. Other messages indicate serious problems.

4/23/93

ALARM ACKNOWLEDGED

This is a confirmation that an alarm condition was acknowledged. To not show this message during Runtime, you can toggle it off in the System Configuration submenu. Refer to Chapter 4: *The Strategy Builder* for more information.

BLOCK IN AUTOMATIC

This is a confirmation of a change from Manual to Auto mode.

BLOCK IN MANUAL

This is a confirmation of a change from Auto to Manual mode.

RG-GA3-030-005

BLOCK NOT IN MANUAL

An attempt was made to change a block's output value when the block was in the Auto mode. The block must be in the Manual mode to change its output value. The **[F9]** key can be used to alternate between Auto and Manual modes.

BOOT DISPLAY FILE DOES NOT EXIST!!

The initial boot-up display (BOOT.GSP) does not exist. Refer to Chapter 2: *Installation.*

CANNOT INITIALIZE HOST COMM.

An error occurred while attempting to initialize the Host Communications option software.

CANNOT OPEN FILE

The disk is bad or the file does not exist.

CANNOT READ SENSOR DB FILE (.XDB), to run this database, turn I/O off

The system was configured with the I/O scanner turned on, but no connections were made to the I/O devices. Turn the scanner off or connect to the I/O.

CANNOT READ FILE <*name*>

A file read error occurred while attempting to read the file specified in the <*name*> argument. The disk or file is damaged.

CANNOT WRITE TO FILE

A file write error occurred.

COMMAND SENT

A command was sent to the remote device.

COMMUNICATIONS RECEIVER TIMEOUT

A remote device failed to respond.

COMMUNICATIONS SCANNER OVERRUN

The remote devices are being scanned too frequently. Using the **[Alt-A]** System Parameters subwindow, increase the Scan Period parameter value for the affected serial communications port.

DATABASE SAVED

In response to the **[Alt-C]** key combination (or **[Alt-N]**) or the Checkpoint block (CKPT), the database was successfully saved.

4/23/93

DATA LOGGING STARTED

Data logging for the Shift Historian started. If data logging for the Event-Driven Historian (HIST block) begins, then the HIST block's tag name precedes this message.

DATA LOGGING STOPPED

Data logging for the Shift Historian or HIST block stopped.

DESIRED DEADTIME EXCEEDS MAX.

The Deadtime algorithm's deadtime parameter exceeds the allowable limit. Refer to Chapter 6: *Algorithms*.

RG-GA3-030-005

<*remote device*> DETECTED CHECK SUM ERROR

Indicates communications errors.

<*remote device*> DETECTED INVALID PARAMETER

Indicates communications errors.

<*remote device*> DETECTED SERIAL PARITY ERROR

Indicates communications errors.

<*remote device*> DETECTED SYNTAX ERROR

Indicates communications errors.

<*remote device*> DETECTED UNKNOWN ERROR

Indicates communications errors.

DIAGRAM SAVED

In response to the **[Alt-R]** Save Recipe Display keystroke, a display (normally a recipe type display) was updated to the disk.

DISK ERROR

The disk is bad or was not inserted into the drive.

END OF FILE

The end of a file was reached in a history replay.

ERROR -> CONNECTION FILE <*name*> INVALID or TOO BIG!

A load error occurred. A specific connection file (<name>) contains errors or is too large to be loaded by the Runtime system. This can happen in the Evaluation-only version of PC-30.

ERROR -> CONTROL DATABASE NOT FOUND!!

A load error occurred. The specified database does not exist.

ERROR ->DATABASE FILE DOES NOT EXIST

The database file (<*strategy*>.DB) for the strategy attempting to be loaded could not be found.

ERROR -> DATABASE FILE TOO BIG

The database cannot be loaded by the Evaluation-only or Basics version of PC-30.

<*Function name*> <*error type*> ERROR in F(x)

An error occurred in the F(x) block. Possible error types are: DOMAIN, SING, OVERFLOW, UNDERFLOW. For example, LOG DOMAIN ERROR IN F(x).

EXTERNAL DRIVER TYPE <*name*> INITIALIZATION ERROR CODE <*code*>

An I/O driver initialization error occurred.

EXTERNAL ENTERED VALUE

Data cannot be entered into an Data Entry type field if that field is configured as external.

FILE(s) COPIED

File Management, the copy command was performed successfully.

FILE(s) DELETED

File Management, successful deletion occurred. This message may also appear after file compression by the Shift Historian when unnecessary files are deleted.

4/23/93

RG-GA3-030-005

FILE EMPTY

An attempt was made to replay a history file that did not contain any data.

FILE(s) NOT FOUND

The Directory display or file directory gives this message if no matching files are found.

FILE UTILITY BUSY

This message appears if a request is made for a File Management operation when it has not completed the previous operation. Repeat the request a little later.

PC-30 SOFTWARE COLD START

This is the PC-30 start-up message that indicates the original version of the strategy is being used.

PC-30 SOFTWARE DONE

This message appears when the user exits from the Runtime system to DOS.

PC-30 SOFTWARE WARM START

This is the PC-30 start-up message that indicates the most recently saved version of the strategy is being used and initialization of algorithms is not being performed.

GRAPHICS DEVICE DRIVER FILE NOT FOUND!

The graphics device driver file (EGA.DEV) is missing. Refer to Chapter 2: *Installation*.

GRAPHICS FONT FILE NOT FOUND!

The text font file (CONF104.FNT) is missing. See Chapter 2: *Installation.*

HARDWARE FAILURE

This message is from the I/O algorithm detecting a hardware failure.

<*tagname*> HIST FILE BACKED UP & RESTARTED

This message appears when the append history file associated with the <tagname> HIST block reaches its maximum specified size. The current file is backed up and cleared. Logging begins at the top of the cleared file.

HOST COMMUNICATIONS TURNED OFF

This message appears in response to an attempt to use the Host Communications option that is either not configured or turned off because of errors.

INITIALIZING DATA BASE...

The Runtime loader displays this message while it is loading and initializing. This can take some time for a large control application.

INSTALL PROTECTION KEY!!!

The hardware protection key is not installed. The system shuts down in 30 minutes unless the problem is corrected. Install the copy protection key.

4/23/93

RG-GA3-030-005

INSUFFICIENT MEMORY

The combined size of the database, drivers, user program, and/or any options is too big. The Runtime loader cannot find space to load them.

INSUFFICIENT SECURITY LEVEL

The requested operator action requires a higher security level than the level that is currently enabled.

INTERNAL ERROR

These are system errors that should not normally occur. If you see this message, make note of exactly what you were doing when the error occurred, what version of software you are using, I/O device drivers being used, your hardware protection key's serial number, and contact Technical Support immediately.

INVALID ALGORITHM TYPE

A variable from certain algorithm types (such as AOUT) cannot be trended or logged.

INVALID DATABASE ID

This message usually occurs if a display appears that was created with a strategy that is not currently running. This display contains dynamic connections from objects to blocks not existing in the current strategy database.

INVALID DIAGRAM REQUEST

An attempt was made to use the **[F3]** key when no display was attached to the block.

INVALID KEY REQUEST

The key just pressed has no functional meaning in the context of the operation.

INVALID PEN NUMBER

An attempt was made to use a trend pen number beyond the legal range (1 to 5).

4/23/93

INVALID VARIABLE

Only certain variables can be trended or logged. See the description of the System Trend function. If a variable cannot be trended/logged, you can trend/log the output of the block that is the source of the variable.

I/O NOT CONNECTED, NO HARDWARE PAGE

This message appears in response to paging I/O type block subwindows if the block is not connected to the hardware.

LOADER ERROR - CANNOT FIND I/O DRIVER or USER PROGRAM <*name*>

The driver or user file specified in the system configuration does not exist in the directory used by PC-30 (typically \PC30) or the current directory. Copy the user program or I/O driver into the proper directory.

RG-GA3-030-005

LOADER ERROR - CANNOT READ FILE

There is a damaged driver, user program file, or disk.

<*name*> LOGGED ON / OFF

The PC-30 user <name> either logged on or off the system, thus enabling/disabling their security level.

<*tagname*> NEXT HIST FILE STARTED

This message displays when the next non-append history file associated with the <tagname> HIST block opens.

NO PAGE AVAILABLE

In response to the operator's request using the page or arrow keys, the system did not find another page.

NO REMOTE SETPOINT OPTION

The operator requested a remote setpoint for the block configured with no remote setpoint option.

NO SPACE ON DISK

There is not enough room left on the disk for the historian to continue data logging.

NOT A VALID HISTORY FILE

An attempt was made to replay a file which is not a history file, or the history file is corrupt.

NOT ALLOWED FOR PC-30 SOFTWARE SCADA PRODUCT!

An attempt was made to run a strategy containing an algorithm not supported by a SCADA program. Algorithms not supported include: PID, INTG, PD, AMB, DGAP, LLAG, DTIM, SHOT, RAMP, SEQ, SIM, and User algorithms.

NOT ON A PICK FIELD

This message is displayed when the **[F3]** key is pressed and the cursor is in the Main Window but not on a data field (DE, DDE, IDE, or PPT).

OPENING FILE <*filename*>.TXT

This message displays when the current alarm/event log file closes and a new file opens.

OPERATION NOT SUPPORTED

The operation being attempted is not supported by the version of PC-30 being executed.

4/23/93

PARAMETER WINDOW LOCKED

An attempt was made to access parameters in a subwindow that requires a higher security level than what is currently enabled.

PASSWORD INCORRECT

The password entered is not one of the current system passwords.

POINT ADDED TO TREND LIST

This confirms a successful addition to the Trend List.

PRINTER BUSY / OFF LINE

The printer is not responding. Check the printer.

RG-GA3-030-005

PRINTER ERROR

The printer is not responding. Check the printer and the printer cable.

PRINTER FILE NOT FOUND <*name*>

The printer driver file <name> is not in the PC-30 directory.

PRINTER OUT OF PAPER

The printer is out of paper. Load the paper and put the printer back on line.

PRINTING SCREEN, GRAPHICS LOCKED

This message remains on the screen while the screen is being printed. No other keyboard input can be made while this message is displayed.

PROTECTION KEY PROBLEM, CHECK EQUIPMENT!

The copy protection key is not properly installed or an error was detected with the attached printer. If the printer is connected to the protection key, the printer must be turned on and put on line for the key to operate properly. This error can be avoided by connecting the printer to LPT2:, COM1:, or COM2:. The error can also be avoided by connecting the printer to LPT1: and the key to LPT2:.

RECEIVE FAULT

Indicates communications errors.

REPLY MESSAGE SYNTAX ERROR

Indicates communications errors.

REPLY MESSAGE CHECKSUM ERROR

Indicates communications errors.

RESPONSE ADDRESS MISMATCH

Indicates communications errors.

RUNTIME REQUIRES SHARE.EXE TO BE INSTALLED

For Runtime version 5.0 to execute, the SHARE.EXE DOS file-sharing utility must be installed on the PC executing Runtime. Refer to the *Shared File Support* section in Chapter 3: *Before You Begin* for information on Runtime's shared file capability.

SENSOR DB FILE (.XDB) READ ERROR

There is a damaged sensor database file.

4/23/93

SET POINT IN LOCAL

The setpoint is now in Local mode.

SET POINT IN REMOTE

The setpoint is now in remote mode.

TAG NOT IN DATABASE

An unknown tag name was entered. Use the Tag Sort function **[F8]** for a list of valid tag names.

<*task name*> TASK OVERRUN

The task <*task name*> did not complete its execution within the scan period. When this occurs, the task skips one scan period. This error is a result of overloading the system. For example, if you build a control database with 100 PID loops, each with a scan period of 0.1 sec, the "**Control Task Overrun**" message appears during Runtime.

RG-GA3-030-005

THIS PC-30 PRODUCT CANNOT RUN MORE THAN 1 DRIVER !

An attempt was made to run a strategy requiring more than one I/O driver with a PC-30 -1 or SCADA-1 or Basics product.

TO CONFIRM, ENTER COMMAND AGAIN

A file deletion command was entered. Enter the command again to confirm the deletion operation.

TOO MANY OPEN FILES

This message appears if a requested operation (typically an attempt to open another file by the HIST block) would result in more files open simultaneously than permitted by the FILES= statement in the CONFIG.SYS files. The operation is not performed. Refer to Chapter 2: *Installation.*

TREND SNAPSHOT SAVED

The attempt to save a trend snapshot was successful.

TRENDED VARIABLES TABLE FULL

An attempt was made to put more than 20 variables in a trend.

UNKNOWN ERROR REPLY

An unknown error has occurred in the Runtime system. Consult Technical Support if this error keeps reoccurring.

USER FILE NOT CONFIGURED

PC-30 made a call to a user-written program that is not entered in the System Configuration's SYS CNFG System Parameters submenu for the strategy. Run the Strategy Builder and enter the user program file name into the **User Algorithm File** parameter field.

VALUE(S) ENTERED

This is an acknowledgment of data entered.

WARNING -> CANNOT OPEN OR READ SYSTEM CONFIGURATION FILE <*strategy*>.CFG!!

The Runtime system cannot find the system configuration information. Either the file <*strategy*>.CFG was damaged or deleted, or the system configuration was not done. Return to the Strategy Builder and do a system configuration.

4/23/93

RG-GA3-030-005