DISTRIBUTION SHEET

To	From	Page 1 of 1
DISTRIBUTION	PUREX PLANT ENGINEERING W BUD BLACKABY, S5-51, 373-4627	Date 12-5-94 12/8/94
Project Title/Work Order		EDT No. 158149
PUREX CANYON EXHAUST FAN BEARING TEMPERATURE MONITORING SYSTEM DORIC 245 DATALOGGER PROGRAMMING 2A-90-00526		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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RW BAILEY	S5-66	1			
CD WOLLAM	S6-17	1			
DH SHUFORD	S5-65	1			
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ENGINEERING DATA TRANSMITTAL

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2	1	Cog.Eng.RA GREGONIS	RA Gregonis	9/1/94	S5-75	RW BAILEY	Ronald W Bailey	9/7/94	S5-66	1	1
2	1	Cog. Mgr.RN DALE			S5-51	JS HERTZEL	J.S. Hertzel	9-13-94	S5-66	3	1
1	1	QA CA COLVIN	C A Colvin	9/12/94	S6-20	CD WOLLAM	C.D. Wollam	9/14/94	S6-17	3	4
1	1	Safety TG MILLER	Thomas G Miller		S5-65	DH SHUFORD	D H Shuford	9/15/94	S5-65	3	1
-	-	Env. N/A				RL HOBART	R L Hobart		S6-19	3	1
1	1	DE NELSON	D E Nelson		S5-59	JP HAYFIELD	J P Hayfield		S6-18	3	4
2	1	W BUD BLACKABY	W B Blackaby		S5-51	OSTI (2)			L8-07		

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SUPPORTING DOCUMENT

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Name: W BUD BLACKABY

Signature: W B Blackaby

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7. Abstract

SUPPORTING DOCUMENT TO DEFINE DATA LOGGER PROGRAMMING

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PUREX CANYON EXHAUST FAN BEARING TEMPERATURE MONITORING SYSTEM

DORIC 245

DATALOGGER PROGRAMMING

AUTHOR: W BUD BLACKABY

PUREX PLANT ENGINEERING

SEPT. 6, 1994

DATLOGPR.GM

INDEX

1.0 INTRODUCTION

A micro-processor based datalogger is used to monitor, display, and log seventeen RTD temperature channels. Five bearings are monitored for each of the three electric motor-fan assemblies and two bearings are monitored on the steam turbine unit. Several alarms per data channel (a High alarm at 236 degrees and a High High alarm at 246 degrees F.) will alert the operation's staff to increasing abnormal bearing temperatures.

This procedure is cross-referenced to the manufacturers' manual. All programming steps will have the following footnote: Mpg x-xx. The "Mpg" refers to the "Manual page", with "x" as the section number and "xx"as the page number in that section. When more information is needed, such as pictures or details, then the manual section and page number is provided.

Every programming function, command or auxiliary command listed in this document is identified by alphanumeric code:

Pxx = Program number xx to be key punched on the datalogger front panel

PxxT = Program number xx to be key punched on the remote Terminal (when used) keyboard using the "EQUIVALENT REMOTE TERMINAL KEY ENTRIES" Table B-1 referenced in Appendix B

+ DATA LOGGER KEYSWITCH MUST BE IN PRGM POSITION

\+ Programming steps using the datalogger front panel touch keypad which will enter a program into memory.

++ TERM 1 ENABLED AND CONNECTED TO REMOTE TERMINAL

++ Programming steps using the remote PC enhanced terminal keyboard which will enter a program into memory.

2.0 DATALOGGER MAINFRAME SET-UP

********** CAUTION **********

PRIOR TO PERFORMING SET-UP ENSURE THE DATALOGGER KEYSWITCH IS IN THE OFF POSITION AND THE VIDEO DISPLAY TERMINAL IS IN THE OFF POSITION.

2.1 CONFIGURATION SWITCH SET-UP.

The configuration switches are used to establish the mainframe operating parameters. Three miniture DIPSWITCH assemblies are mounted in a vertical stack on a printed circuit on the interior side of the front swing out panel. Each DIPSWITCH assenbly has four switch units. The dipswitches are numbered fron left to right starting with the upper switch unit. Thus, the upper switch would be numbered 1 to 4, the middle switch, 5 to 8 and the lower switch , 9-12. (Mpg 3-32)

See Appendix A, Figure A-1 for switch position identification.

Set switches to position shown in Table 1 below:

TABLE 1

SWITCH NO.	-- STATUS --		COMMENTS
1	closed	---	Low sensitivity xxx.x degree F
2	---	open	Timing, 1,2 digit from 0-59 min.
3	---	open	Temperature in degrees F.
4	closed	---	R.J. Diode compensation off
5	closed	---	Term. 1 serial I/O port enabled
6	---	open	Serial I/O port enable/disable lock
7,8	not used		Unused
9	closed	---	Diagnostics enabled
10	not used		Unused
11	closed	___	} Reset select, non-harsh EMI,RFI
12	closed	___	} environment

2.2 Set active/passive configuration switches as shown below:

The switches are located behind cover plate on mainframe rear cover. (Mpg 4-42,43)

	---REC---	---XMIT---
COMM.1	C1 Passive	C3 Passive
COMM.2	C1 Passive	C3 Passive

2.3 Alarm relay driver card configuration (Mpg 5-12,13)

2.3.1 Remove the alarm relay driver card from the datalogger and locate switch S3.

2.3.2 Set switch S3-1 to the CARD #1 position

2.3.3 For automatic annunciator reset; set switch S3-3 to the ANNUNCIATOR SEQUENCE, J1 RELAYS, ISA A-4-5.

2.3.4 Re-install the alarm relay driver card in SLOT F.

3.0 DATALOGGER and VIDEO DISPLAY/TERMINAL INTERCONNECTIONS

OBSERVE FIGURE A-5 FOR WIRING AND TEST ARRANGEMENT BETWEEN THE REMOTE RTD FEM AND DATALOGGER AND VIDEO DISPLAY/TERMINAL AND DATALOGGER. REFER TO FIGURES 2 THRU 4 FOR CABLE DESIGN, AND RESISTOR NETWORK TO SIMULATE AN RTD OPERATING THROUGH A TEMPERATURE RANGE OF 32 DEGREES F. TO 250 DEGREES F.

(A FEM is a Front End Module; i.e. a multiplexer)

3.1 Install a **FEM I/O ADAPTER CARD** in slot #5 (data points 1-20) (Mpg 1-2)

3.2 Install temporary test resistors across the **RTD FEM** input channels 2-20. Use 100 to 120 ohms, +/- 5%. 1/8 to 1/2 watt.

3.3 Install a temporary test resistor network with potentiometer across data point 1 of the **RTD FEM.** See Appendix A, Fig.A-2.

3.2 Connect the **FEM I/O** test cable to the **RTD FEM** and then to the **FEM I/O ADAPTER CARD** installe in **SLOT F.**

(see Appendix A, Fig. A-3 for design of test cable)

********** CAUTION **********

PRIOR TO PERFORMING STEP 3.3 OBSERVE TEST CABLE CONNECTORS CAREFULLY. INSTALL THE CONNECTOR IDENTIFIED AS "DATALOGGER" INTO J6 (TERM. 1) RECEPTACLE ON DATALOGGER.

3.3 Connect a RS-232C test cable from datalogger connector **J6** to **SERIAL PORT 1** on the video display unit. (See Appendix A, A-4) See Mpg 3-24 and 3-27

4.0 INTRODUCTION TO GENERAL OPERATING PROCEDURES

Commands generally are keystroked from left to right across the front panel and follow the same format as you would express them in English. A simple command sentence is made of two parts, a verb followed by the object or complement.

Every panel command begins with **[CLEAR]** and ends with **[RUN]**.

4.1 HOW TO CORRECT KEY ENTRY MISTAKES (Mpg 4-5)

If you press a key by mistake, press the **[RESET]** key to clear the key entry. With each press of the **[RESET]** key, the last keystroke entry will be cleared until, if necessary, the entire command is erased. The **[ENTER]** keystroke cannot be cleared by the **[RESET]** key. To clear the **[ENTER]** keystroke press the **[CLEAR]** key and then re-enter the complete command sequence.

If an invalid command is attempted, the display readout will show one of two things: (1) flashing key entry (or entries), or (2) error code.

Observe the flashing display to determine that portion of the command that is in error. Press **[RESET]** to clear the error display. Then complete the command with the correct entry; or press **[CLEAR]** and start over.

Entry errors or fault conditions are indicated by an error code message on the display readout, i.e. "error 10". See Appendix B, Table B - 6.

4.2 HOW TO CANCEL COMMANDS (Mpg 4-6)

To cancel a command that has already been accepted by the datalogger (RUN already pressed) a reset command must be entered. See 13.0, **RESET COMMANDS**, page 26.

4.3 SPECIAL FRONT PANEL KEYS

4.3.1 The HYPHEN key

The hyphen key [-] is a multi-purpose key. It may be used as a negative sign when assigned to a number value, i.e. [-] [1] [5] is the value "negative fifteen". It also serves as a separator between first and last numbers of a specified number range. For example:

[POINT] [1] [-] [10] (specifies points 1 - 10)

The [-] key is also used to seperate various parts of commands such as those used in serial port programming.

Additionally, [-] key is used to supply certain command variations such as; unskipping of points and abbreviated program listings.

4.3.2 The ENTER key

The **[ENTER]** key is used in commands as a group delimiter (separator) to separate up to four contiguous groups of numbers or four separate numbers. For example:

[2] [-] [10] [ENTER] [15] [-] [21] (specifies points 2-10 and 15-21).

4.3.3 The HI and LO (Incrementing/decrementing) keys

The **[HI]** and **[LO]** keys increment or decrement point data on the display readout. Point data can be either point value or point programming. With a single point on display, press the **[HI]** key to increment the display to the next point. Hold the **[HI]** key depressed and the display will continue to increment automatically. Similarly, the display may be decremented by pressing the **[LO]** key.

4.4 COMMAND STRUCTURE

Operating and programming the datalogger is accomplished by the use of five major **COMMAND TYPES:** (1) PROGRAM COMMANDS, (2) DISPLAY COMMANDS, (3) LIST COMMANDS, (4) LOG COMMANDS, AND (4) RESET COMMANDS.

The first key depressed after **[CLEAR]** determines the command type. Virtually any entries made from the touch panel keyboard can be made from a remote terminal connected to the datalogger. The exceptions are the DISPLAY and PAPER keys.

4.5 TYPICAL COMMAND STRUCTURE

A typical command sequence contains specific key entries and variable numerical entries. Specific key entries, as labeled on the front panel, are shown in blocked, bold capital letters. Press the keys as shown, sequentially, from left to right.

[CLEAR] [PRGM] [CLOCK] [RUN]

The variable numerical entries are shown in small letters. Numerical entries do not require leading zeros.

[time interval]	Enter the desired time interval. The exact time interval depends upon the setting of configuration switch #2. (Mpg 3-32)
[24-hour time]	Enter the current time using 4 digits (0000 hours to 2400 hours)
[day-of-year]	Enter current day-of-year (1-365).
[point no(s)]	Enter desired point number(s) (1-500).
[function no(s)]	Enter desired function(s) (1-63).

4.6 USER JOBS (Mpg4-9)

A user job is a process or task that the datalogger is instructed to perform. To DISPLAY data, LOG data, or perform CONTACT STATUS MONITORING is an example of some of the user jobs listed in Appendix B, Table B-2. The datalogger is capable of handling a maximum of 15 user jobs simultaneously.

4.7 STANDARD PROGRAM COMMANDS

Program commands set information into your datalogger. These include (but are not limited to) day calendar/24-hour clock, function assignments to data points, skip/unskip status of data points, log header data, and enabling/disabling program capability of serial I/O ports.

The front panel keyswitch must be set fully clockwise to the **PRGM** position in order to enter any program commands from the front panel keyboard. The keyswitch, in the **PRGM** position and/or an enabled remote terminal, are identified as "program enabled devices" and must be used to enter or cancel (reset) program commands. This method protects the programs stored in memory from accidental loss or corruption.

5.0 SYSTEM POWER-UP (Mpg 4-3)

5.1 Insert key into **KEYSWITCH** and turn to **PRGM**.

The following actions should occur:

* Flashing display readout "doric 245".
* A printout will give the date and time power was turned off and the date and time power was turned on.
* An asterisk will be printed between the day-of-the year and the 24-hour time.
* The **POWER** and **PRGM** LED'S are on.

5.2 **STOP FLASHING** display by pressing these keys in sequence:

+ P1 **[CLEAR] [RUN]**

++ P1T ^C**[RETURN]**

5.3 To **CLEAR ASTERISK** printed between the date and time on log or list printouts (used to indicate a power outage) depress the following keys in sequence:

\+ P2 **[CLEAR] [PRGM] [CLOCK] [RUN]**

++ P2T **^CPGCK[RETURN]**

6.0 PROGRAMMING OF THE SERIAL I/O PORTS (FUNCTION 100)

While using the data logger or programming the data logger it is often necessary to list or log data or programs and to use the internal printer and/or the serial ports. The serial ports, when used, also have programmable parameters. Function 100 programs are used to select the proper parameters to match a computer or remote terminal's serial port parameters.

A serial port can be selected using the "device code" and then programmed individually. A "device code" consisting of the numbers, one through four is used to identify these units. See Table - 2 below. Mpg 4-41,42 for programmable parameters. See Appendix B, Tables; B-3, B-4, and B-5 for parameters and their program numbers or values.

TABLE - 2

DEVICE CODE	DESCRIPTION	CONNECTOR
1	PRINTER (datalogger)	--
2	TERM. 1, SERIAL PORT 1	J6
3	NOT USED	--
4	TERM. 2, SERIAL PORT 2	J7

6.1 PROGRAM **SERIAL I/O PORTS** to **DEFAULT VALUES** (Mpg 4-51,52).
Note that the device codes shown in command **P3** below; "[24]" identifies device #2 and device #4 and may be input through the keyboard in this manner.

See Appendix B, Table B-3 for a listing of the DEFAULT values for the 22 programmable parameters.

Press the keys in the sequence shown below:

[CLEAR] [PRGM] [FUNC] [100] [-] [device code(s)] **[RUN]**

\+ P3 **[CLEAR] [PRGM] [FUNC] [100] [-] [24] [RUN]**

++ P3T **^CPGFN100-24[RETURN]**

6.2 PROGRAMMING A **PARTICULAR SERIAL I/O PORT PARAMETER** (Mpg 4-52)
To selectively reprogram, using FUNCTION 100, the default values of any one of the 22 programmable parameters associated with either of the serial ports a close look at Appendix B, Tables B-3, B-4, and B-5 is necessary.
Parameter one **[1]** is the serial I/O port enable/disable control. Performing program **P3** above enables both serial port #1 and serial port #2 because: (see Table B-3)

* Device code **[24]**, selecting serial ports 1 and 2 was used and
* The default value for parameter **[1]** is a "1" which is an enable for operation of both serial ports.

********** NOTE **********

WHEN A "1" = ENABLE, THEN A "0" = DISABLE

6.2 CONTINUED:

Program serial port #1 (device code 2),Baud rate (parameter no. [22]) to 9600 baud. Per Table B-5 the program number value is [11]. Key in program P4 below:

[CLEAR] [PRGM] [FUNC] [100] [-] [device code] [-] [parameter no.] [-] [value no.] [RUN]

\+ P4 [CLEAR] [PRGM] [FUNC] [100] [-] [2] [-] [22] [-] [11] [RUN]

++ P4T ^CPGFN100-2-22-11[RETURN]

6.3 LIST the SERIAL I/O PORT PROGRAMMING (See section 12) by depressing the following keys in sequence:

[CLEAR] [LIST] [device code(s)] [PRGM] [FUNC] [100] [RUN]

P5 [CLEAR] [LIST] [1] [PRGM] [FUNC] [100] [RUN]

P5T ^CLS1PGFN100[RUN]

********** CAUTION **********

DISABLE SERIAL PORT(S) WHEN NOT CONNECTED TO A REMOTE DEVICE TO PREVENT POSSIBLE ERROR TRANSMISSIONS

6.4 To DISABLE SERIAL I/O PORTS, TERM.1 AND TERM.2 (device codes 2 and 4) depress the following keys in sequence: (Mpg 4-54)

[CLEAR] [PRGM] [FUNC] [100] [-] [device code(s)] **[parameter no]** [-] [parameter value] **[RUN]**

\+ P6 **[CLEAR] [PRGM] [FUNC] [100] [-] [24] [-] [1] [-] [0] [RUN]**

++ P6T **^CPGFN100-24-1-0[RETURN]**

6.5 List **SERIAL I/O PORT** Programming:

[CLEAR] [LIST] [device codes] **[PRGM] [FUNC] [100] [RUN]**

P7 **[CLEAR] [LIST] [1] [PRGM] [FUNC] [100] [RUN]**

P7T **^CLS12PGFN100[RETURN]**

7.0 SET-UP OF THE VIDEO DISPLAY/TERMINAL

The Wyse WY-150/ES Terminal, with video display, has a **SET-UP MODE** which will be used to ensure that the format of the terminal matches that of the default values of the datalogger serial port (TERM.1). Refer to Appendix B, Serial I/O Port Programmable Parameters Table B - 3 to compare parameters.

7.1 Turn power on by depressing switch on right side of video unit.

7.2 To put the terminal in **SET-UP MODE** press

P8T **[SHIFT] + [SELECT]**

7.3 Select one of the set-up menus by depressing function keys:

[F1]----------[F11]

* The screen displays a group of operating parameter fields.
* Each field indicates the current setting for that parameter.
* To change a parameter setting, press the cursor keys to highlight the parameter field and **[SPACEBAR]** to select the new setting.
* To restore all setting to their factory default setting press **[ENTER]** kpd (numerical keypad) .

7.4 To **EXIT** the **SET-UP MODE**

* Press **[F12]** to obtain the set-up director screen with highlighted save option. Toggle spacebar for save option. Depress **[F12]** to exit set-up mode.
* You can press **[F12]** at any time to return to the set-up directory screen to exit set-up mode.

8.0 **PROGRAM** <u>**DAY CALENDAR AND 24-HOUR CLOCK**</u> (Mpg 4-11)

The **DATE** is entered and **DISPLAYED** as day of the year (Julian). The **TIME** is entered on a 24-hour clock. Midnight is 0000, 3.16 a.m. is 0316, noon is 1200, 1052 p.m. is 2252.

8.1 Set day calendar and 24-hour clock as follows:

\+ P8 **[CLEAR] [PRGM] [CLOCK]** [day-of-year] **[-]** [24-hour time] **[RUN]**

++ P9T ^**CPGCK**[day-of-year][-] [24-hour time] **[RETURN]**

8.2 Set day calendar only (clock remains the same):

\+ P9 **[CLEAR] [PRGM [CLOCK]** [day of year] **[-] [RUN]**

++ P10T ^**CPGCK**[day of year]-**[RETURN]**

8.3 Set 24-hour clock only (day remains the same).

\+ P10 **[CLEAR] [PRGM] [CLOCK] [24-hour time] [RUN]**

++ P11T **^CPGCK[24-hour time] [RETURN]**

8.4 Display calendar and clock on datalogger front panel:

P11 **[CLEAR] [DISPLAY] [CLOCK] [RUN]**

8.5 List calendar and clock on datalogger and on video display

P12 **[CLEAR] [LIST] [12] [CLOCK] [RUN]**

P12T **^CLS12CK[RETURN]**

9.0 **PROGRAM DATA POINT LINEARIZATION** (Mpg 4-12)

Data points 1 thru 17 are receiving temperature measurements from a remote **FEM** installed in a panel in Building 291A near the three canyon exhaust fan motor assemblies. The temperature sensors being used are 3-wire 100 ohm platinum RTDS' with a sensitivity of x = .00385 ohms/ohm/degree C.

The datalogger Function 27 will be programmed for data points 1-19. This function provides the linearization for RTD'S with a sensitivity of .00385 ohms/ohm/degree C.

Data points 18 and 19 have resistor networks installed at the FEM sensor input points to simulate a temperature of 237 degrees Fahrenheit and 248 degrees Fahrenheit respectively to test the High and High-Hight datalogger temperature alarms.

Data point 20 is programmed for FUNCTION NO. 37 which provides a self-test of the FEM, cable and datalogger.

See datalogger manual Appendix A, Table A-1.

9.1 Assign linearization Function 27 to data points 1-19 as follows:

\+ P13 **[CLEAR] [PRGM] [POINT] [1] [-] [19] [FUNC] [27] [RUN]**

++ P13T **^CPGPT1-19FN27[RETURN]**

9.2 List data point function and skip/unskip status on the datalogger printer (device code 1) and video/terminal (device code 2...output from serial port #1):

P14 **[CLEAR] [LIST] [12] [PGRM] [POINT] [1] [-] [19] [RUN]**

P14T **^CLS12PGPT1-19[RETURN]**

NOTE

When you enter command P14 and the list is required from the datalogger printer only; then a device code is not required.

When you enter command P14T and the list is required on the terminal/video display only; then a device code is not required.

When you enter command P14 and the list is required on the terminal/video display only; then a device code of (2) is used.

9.3 Display data point function and skip/unskip status:

P15 **[CLEAR] [DISPLAY] [PRGM] [POINT] [1] [-] [19] [RUN]**

9.4 Display point values:

P16 **[CLEAR] [DISPLAY] [POINT] [1] [-] [19] [RUN]**

9.5 RESET (Cancel) The display (Mpg 4-23)

\+ P17 **[CLEAR] [RESET] [DISPLAY] [RUN]**

10.0 PROGRAM SKIP/UNSKIP STATUS TO DATA POINTS (Mpg 4-13)

A skipped data point is not output on a log, and is not allowed to enter an alarm condition; it is effectively ignored.

Skipped data points are shown on the display as "PASS".

The unit is shipped with all 500 points unskipped.

The Skip function may be used to remove a data point from operation to perform maintenance or repair or to replace a sensor.

NOTE

INFORM SHIFT SUPERVISOR AND POWER OPERATORS WHEN A DATA POINT IS SKIPPED.

10.1 Program SKIP STATUS to Data Points 18 and 19 (to prevent constant alarms) and unused data points 21 through 500.

[CLEAR] [PRGM] [POINT] [point no(s)] [SKIP] [RUN]

\+ P18 **[CLEAR] [PRGM] [POINT] [18] [-] [19] [SKIP] [RUN]**

++ P15T **^CPGPT18-19SK[RETURN**

\+ P19 **[CLEAR] [PRGM] [POINT] [21] [-] [500] [SKIP] [RUN]**

++ P16T **^CPGPT21-500SK[RETURN]**

10.2 Program UNSKIP STATUS to Data Point(s) to return a skipped data point to normal operation.

\+ P20 **[CLEAR] [PRGM] [POINT] [point no(s)] [SKIP] [-] [RUN]**

++ P17T **^CPGPT[point no(s)]SK-[RETURN]**

10.3 ASSIGN FUNCTION 37 (FEM SELF-TEST TO DATA POINT 20):

FEM = Front End Module (a multiplexer)

\+ P21 **[CLEAR] [PRGM] [POINT] [20] [FUNC] [37] [RUN]**

++ P18T **^CPGPT20FN37[RETURN]**

10.3 CONTINUED:

To **DISPLAY** the FEM SELF-TEST COUNT VALUE (for a RTD FEM):

P22 **[CLEAR] [DISPLAY] [POINT] [20] [RUN]**

The display indication, with configuration switch #1 in HIGH SENSITIVITY position, should be 300 +/- 50 .

With configuration switch #1 in LOW SENSITIVITY position the display should indicate 30 +/- 5.

If the display reading is correct for point # 20, then the mainframe/FEM combination should be operating correctly.

10.4 DISPLAY POINT PROGRAMMING (function assignment and skip/unskip status) (Mpg 4-22)

SAME AS P15. (page 16) If you specify more that one point for display, the point programming with the addition of alarm programming, will be continuously displayed in sequential order until you either enter a new display command or **RESET** the display.

If only one point is on display, you can manually **INCREMENT** or **DECREMENT** the display using the **[HI]/[LO]** switches respectively.

10.5 **RESET** (cancel) the **DISPLAY** (Mpg 4-23)

SAME AS P17 (page 16)

11.0 ALARM FUNCTIONS PROGRAMMING (Mpg 5-1)

The first thing to be done is to assign alarm limit values to alarm limit locations in an Alarm Limits (look-up) Table. The Alarm Limits Table has 250 programmable locations. Each alarm limit number is completely independent of their assignments to data points.

Every limit number has three programmable parameters:

* **SKIP OR UNSKIP STATUS**
* **HIGH OR LOW SENSE**
* **SIGNED LIMIT VALUE**

Initially, the Alarm Limits Table is blank. All limit numbers (1-250) are unskipped and without values or sense levels present.

11.1 DEFINE ALARM LIMIT NUMBERS (Mpg 5-4)

Assign alarm limit values to Alarm locations 1 and 2 as follows:

[CLEAR] [PRGM] [ALARM] [limit no] [sense] [limit value] [RUN]

\+ P22 **[CLEAR] [PRGM] [ALARM] [1] [HI] [02360] [RUN]**

++ P19T **^CPGAL1HI02360[RETURN]**

\+ P23 **[CLEAR] [PRGM] [ALARM] [2] [HI] [02460] [RUN]**

++ P20T **^CPGAL2HI02460[RETURN]**

NOTE

With configuration switch # 1 set to low sensitivity this results in a readout of temperature of four places with the decimal point as shown: xxx.x degrees Fahrenheit.

The alarm limit function does not observe the decimal point and leading edge zero's are required; thus the alarm limit one (1) value of 236.0 is input as shown above in P20.

Alarm limit two (2) limit value is input in a similar fashion.

11.2 PROGRAM **SKIP STATUS** TO UNUSED ALARM LIMITS LOCATION 3 -- 250. (Mpg 5-6)

[CLEAR] [PRGM] [ALARM] [limit no's] **[SKIP] [RUN]**

\+ P24 **[CLEAR] [PRGM] [ALARM] [3] [-] [250] [SKIP] [RUN]**

++ P21T **^CPGAS3-250SK[RETURN]**

11.3 PROGRAM **UNSKIP STATUS** TO ALARM LIMITS

[CLEAR] [PRGM] [ALARM] [limit no's] **[SKIP] [-] [RUN]**

\+ P25 **[CLEAR] [PRGM] [ALARM] [3] [-] [250] [SKIP] [-] [RUN]**

++ P22T **^CPGAL** limit no's **SK-[RETURN]**

11.4 ASSIGN LIMIT NUMBER(S) TO DATA POINT(S) (Mpg 5-8,10)

A data point may have up to four limit numbers assigned. These limit number assignments are referenced as **setting numbers S1 through S4.**

Setting numbers are unique from alarm limit numbers because setting numbers include seperately assigned <u>relay numbers.</u>

Assign alarm limit numbers to data points as follows:

[CLEAR] [PRGM] [POINT] [point no(s)] **[ALARM]** [S1 limit no.] **[-]** [S2 limit no.] **[-]** [S3 limit no.] **[-]** [S4 limit no.] **[RUN]**

\+ P26 **[CLEAR] [PRGM] [POINT] [1] [-] [19] [ALARM] [1] [-] [2] [-] [1] [-] [2] [RUN]**

++ P23T **^CPGPT1-19AL1-2-1-2[RETURN]**

11.5 ASSIGN RELAYS TO DATA POINT(S) (Mpg 5-15)

The datalogger has one alarm relay driver card and one alarm relay panel. This configuration provides a **MASTER RELAY (RELAY 0)** which is not assignable and fifteen assignable relays; one through fifteen.

The **MASTER RELAY** trips/untrips with any data point transitioning in/out of alarm in the system.

Each data point has the capacity to store four relay number assignments. Each relay is assigned, by number, to **SETTING NUMBER(S)** S1 through S4 as required.

When a setting number goes into an alarm condition the assigned relay will be tripped.

Use the following command structure to assign relays to Data Point(s) setting number(s): (Mpg 5-15)

[CLEAR] [PRGM] [POINT] [point no(s)] **[ALARM] [FUNC]** [S1 relay #] **[-]** [S2 relay#] **[-]** [S3 relay #] **[-]** [S4 relay #] **[RUN]**

\+ P27 **[CLEAR] [PRGM] [POINT] [1] [-] [19] [ALARM] [FUNC] [1] [-] [2] [-] [3] [-] [4] [RUN]**

++ P24T **^CPG1-19ALFN1-2-3-4[RETURN]**

11.6 ALARM SCAN DELAY PROGRAMMING (Mpg 4-64)

The Alarm Scan Delay (ASD) is used to minimize nuisance alarms. An alarm condition, for a data point setting number limit, must remain in continuous alarm for the number of scans programmed.

The datalogger requires seven seconds to scan a 20 data point FEM. If an ASD of two (2) is programmed then the associated data points must remain in the alarm condition for a period greater than fourteen seconds (two scan periods).

Note that any data point using alarm limit locations one (1) and two (2) will have the ASD as programmed below.

The ASD programming range is from 0 (no delay) to 99 scans. A modified command for alarm limit programming is used to specify the alarm scan delay as follows:

[CLEAR] [PRGM] [ALARM] [limit no(s)] [sense] [limit value] **[CLOCK]** [number of scans] **[RUN]**

+ P28 [CLEAR] [PRGM] [ALARM] [1] [HI] [02360] [CLOCK] [2] [RUN]

++ P25T ^CPGAL1HI0236OCK2[RETURN]

+ P29 [CLEAR] [PGRM] [ALARM] [2] [HI] [02460] [CLOCK] [1] [RUN]

++ P26T ^CPGAL2HI024OCK1[RETURN]

11.7 ALARM LOGS (TRANSITION) (Mpg 5-17)

When a data point is in alarm, the **SYS ALM** indicator LED on the front panel will light up.

If the data point is displayed, the **PNT ALM** indicator LED will light up.

Program the datalogger to log (high priority) any data point upon transition into the alarm state as follows: (Mpg 5-21)

[CLEAR] [LOG] [device code(s)] **[POINT]** [point no(s)] **ALARM] [POINT] [RUN]**

\+ P30 **[CLEAR] [LOG] [1] [POINT] [1] [-] [19] [ALARM] [POINT] [RUN]**

++ P27T **^CLG1PT1-19ALPT[RETURN]**

12.0 LIST COMMANDS

LIST DAY CALENDAR/24-HOUR TIME

P29 **[CLEAR] [LIST]** [device code(s)] **[CLOCK] [RUN]**

P26T **^CLS12CK[RETURN]**

LIST USER JOBS & DEVICE ERRORS

P30 **[CLEAR] [LIST]** [device code(s)] **[PRGM] [RUN]**

P27T **^CLS12PG[RETURN]**

LIST USER JOBS WITHOUT CRC & CONFIGURATION NUMBERS

P31 **[CLEAR] [LIST]** [device code(s)] **[PRGM] [-] [RUN]**

P28T **^CLS12PG-[RETURN]**

LIST POINT PROGRAMMING FUNC/SKIP/UNSKIP

P32 **[CLEAR] [LIST]** [device code(s)] **[PRGM] [POINT]**
[point no's] **[RUN]**

P29T **^CLS12PGPT1-17[RETURN]**

LIST COMPREHENSIVE POINT PROGRAMMING

P33 **[CLEAR] [LIST]** [device code(s)] **[PRGM] [POINT]** [point no.] **[PRGM]**
[RUN]

P30T **^CLS12PGPT1-17PG[RETURN]**

LIST ALARM LIMIT NUMBER PROGRAMMING

P34 **[CLEAR] [LIST]** [device code(s)] **[PRGM] [ALARM]** [limit no.] **[RUN]**

P31T **^CLS12PGAL1-2[RETURN]**

12.0 Continued **(LIST COMMANDS)**

LIST DATA POINT(S) LIMIT & RELAY ASSIGNMENTS

P35 **[CLEAR] [LIST]** [device code(s)] **[PRGM] [POINT]** [point no.]

[ALARM] [RUN]

P32T **^CLS12PGPT1-17AL[RETURN]**

LIST SERIAL PORT #1 PROGRAMMING

[CLEAR] [LIST] [device code(s)] **[PRGM] [FUNC] [100] [RUN]**

P36 **[CLEAR] [LIST] [1] [PRGM] [FUNC] [100] [RUN]**

P33T **^CLS2PGFN100[RETURN]**

13.0 RESET (CANCEL) COMMANDS (keyswitch switch must be in **PRGM**)

RESET (CANCEL) LOG PROCESSES

[CLEAR] [RESET] [LOG] [RUN]

^CRSLG[RETURN]

RESET (CANCEL) USER JOB (P30, page 24)

[CLEAR] [RESET] [user job number] **[RUN]**

^CRS[user job #] **[RETURN]**

RESET (CANCEL) USER JOBS TABLE

[CLEAR] [RESET] [O] [RUN]

^CRSO[RETURN]

CANCEL THE DISPLAY PROCESS

[CLEAR] [RESET] [DISPLAY] [RUN]

CANCEL ALL LIST PROCESSES

[CLEAR] [RESET] [LIST] [RUN]

^CRSLS[RETURN]

CANCEL THE CALIBRATION MODE

[CLEAR] [RESET] [CALIB] [RUN]

^CRSCB[RETURN]

14.0 HIGH TEMPERATURE ALARM (236 DEGREES) AND HIGH HIGH TEMPERATURE (246 DEGREES) ALARM TEST.

A precision high stability resistor network has been installed in data points 18 and 19 at the RTD INPUT terminal points of the FEM.

The resistors installed for data point 18 will simulate a temperature of approximately 237 tO 238 degrees F.; just above the High temperature alarm point of 236 degrees F.

The resistors installed for data point 19 will simulate a temperature of approximately 247 to 248 degrees F.; just above the High High temperature alarm point of 246 degrees F.

Both data points 18 and 19 are normally maintained in the "skip" mode.

14.1 To test the High temperature alarm function perform the following:

[CLEAR] [DISPLAY] [POINT] [18] [RUN]

The display will indicate **PASS**; then input the following:

[CLEAR] [PRGM] [POINT] [18] [SKIP] [-] [RUN]

14.2 The following actions should occur:

* The display will indicate the simulated **HIGH** alarm temperature.
* The **SYS ALM** and the **PNT ALM** LEDS will turn on.
* The datalogger printer will print an **ALARM TRANSITION LOG** indicating the **DATA POINT**, the **ALARM LIMIT VALUE**, the simulated **TEMPERATURE VALUE**, and a **"E"** (Exceeding alarm limit).
* The day of the year and the 24-hour time will be logged.

14.3 After completion of the **HIGH** temperature alarm test; program data point 18 to **SKIP** status as follows:

[CLEAR] [PRGM] [POINT] [18] [SKIP] [RUN]

14.4 Perform the same steps above,(14.1 through 14.3) using **DATA POINT 19**, to test the **HIGH-HIGH** temperature alarm.

15.0 FAULT OR ERROR MESSAGE RESET (Mpg A-6)

An internal data logger fault can cause total or partial loss of data logger function. This type of fault is classified as "unrecoverable". If configuration switch #9 is set CLOSED/ON (Mpg 3-32) the data logger will print (log) a **FAULT MESSAGE**, consisting of two lines, when this occurs. The fault message will contain the following:

Line one: day of year and 24-hr time:

Line two: Fault xx- yy

The xx field indicates how many times the unrecoverable fault occurred and the yy field indicates a fault code number between 0 and 54. A description of fault codes is provided in Appendix B, Table B-7.

An example could be "**FAULT 1- 15**". This means that the fault occurred one time. The "15" indicates a change in the **CRC** (**C**yclical **R**edundancy **C**heck) for the corresponding calibration buffer.

Most of the unrecoverable faults are caused by faulty memory (RAM and/or ROM). On some occasions, the microprocessor or associated circuits may be involved.

15.1 RESET OR CLEARING OF A FAULT MESSAGE

A fault message cannot be cleared or reset from the front panel touch keypad. The fault message cannot be reset from a remote terminal or computer.

The fault message can be reset as follows:

********** CAUTION **********

TO RESET THE FAULT MESSAGE ALL USER PROGRAMMED FUNCTIONS STORED IN MEMORY WILL BE CLEARED. THE DATA LOGGER WILL REQUIRE A COMPLETE REPROGRAMMING.

****

15.1.1 Place keyswitch in **OFF** position.

15.1.2 Remove microprocessor/CPU printed circuit board.

15.1.3 Locate the 4.6 volt battery mounted on the component side of the circuit board. To the right of the battery an in-line strip connector of seven (7) pins is soldered to the board.

15.1.4 Short pins six (6) and seven (7) together for approximatively thirty (30) seconds. **THIS ACTION CLEARS PROGRAM MEMORY.**

15.1.5 Reinstall microprocessor/CPU printed circuit board.

15.1.6 Place keyswitch in **ON** and verify that a fault message is not printed at the end of the normal power loss message. Should the fault message re-occur, contact the Wavetek Instrument Repair Department; and Mr. Jerry Archer at (619) 495-3200.

FIGURE A-1 CONFIGURATION SWITCHES ON/OFF POSITIONS

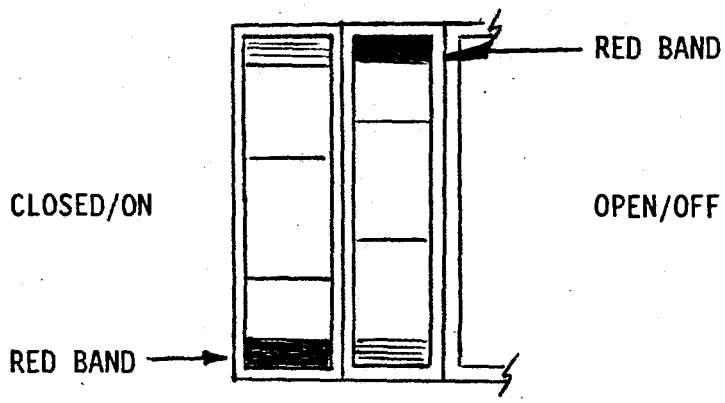
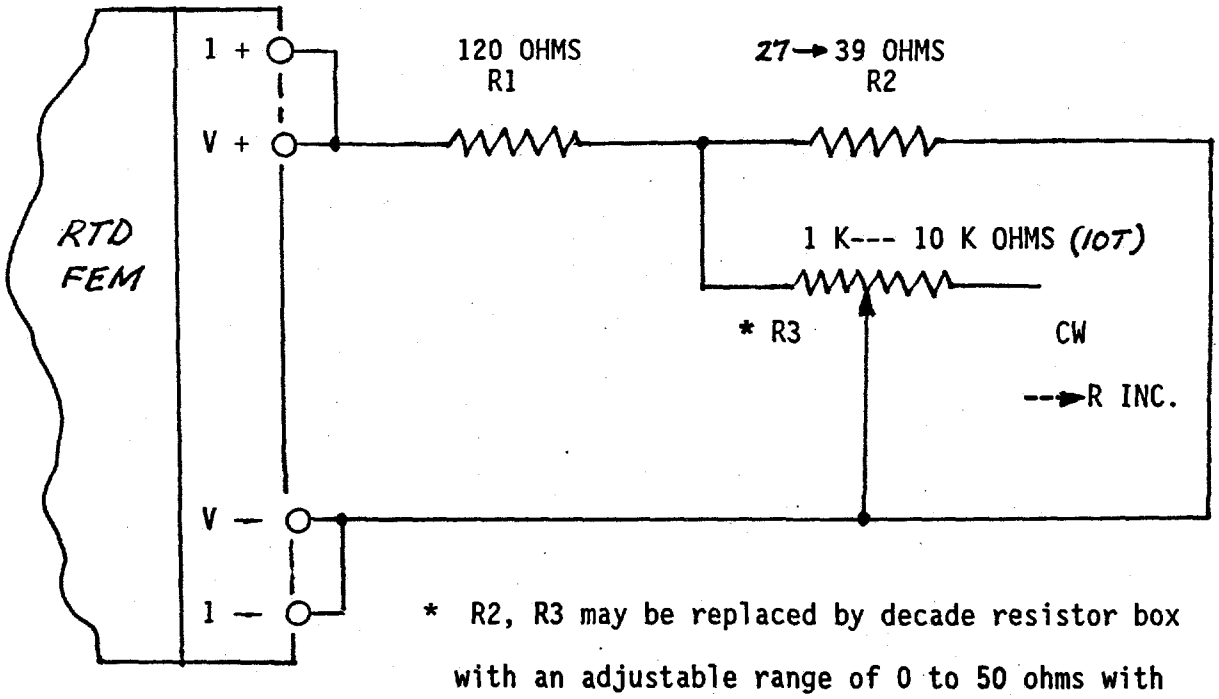


FIGURE A-2 ALARM TEST RESISTOR NETWORK



* R2, R3 may be replaced by decade resistor box with an adjustable range of 0 to 50 ohms with a maximum resolution of .05 ohms per step.

FIGURE A-3 REMOTE FEM TO I/O ADAPTER CARD TEST CABLE

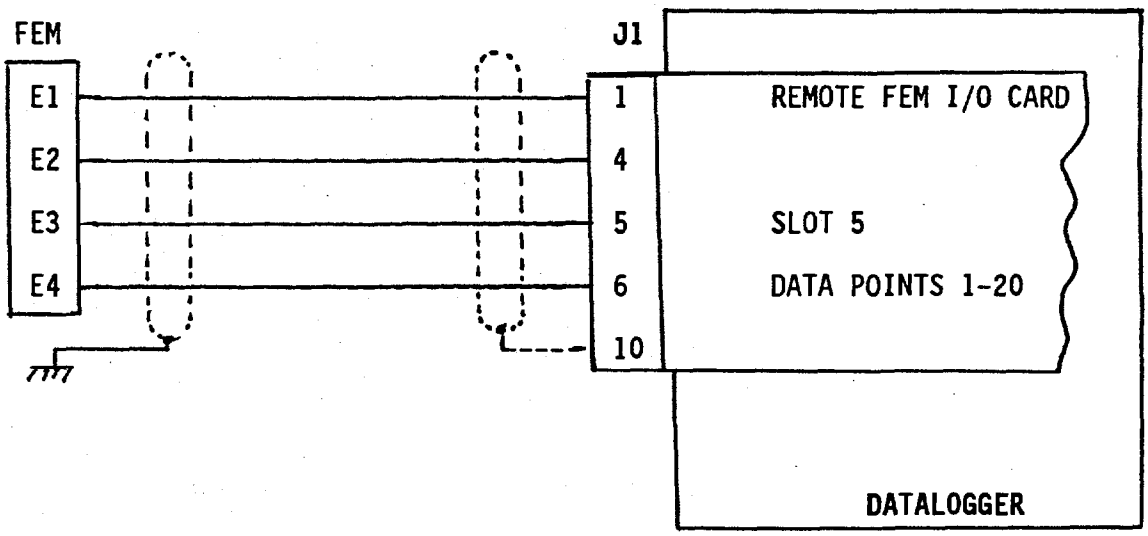


FIGURE A-4 VIDEO/TERMINAL TO DATALOGGER TEST CABLE

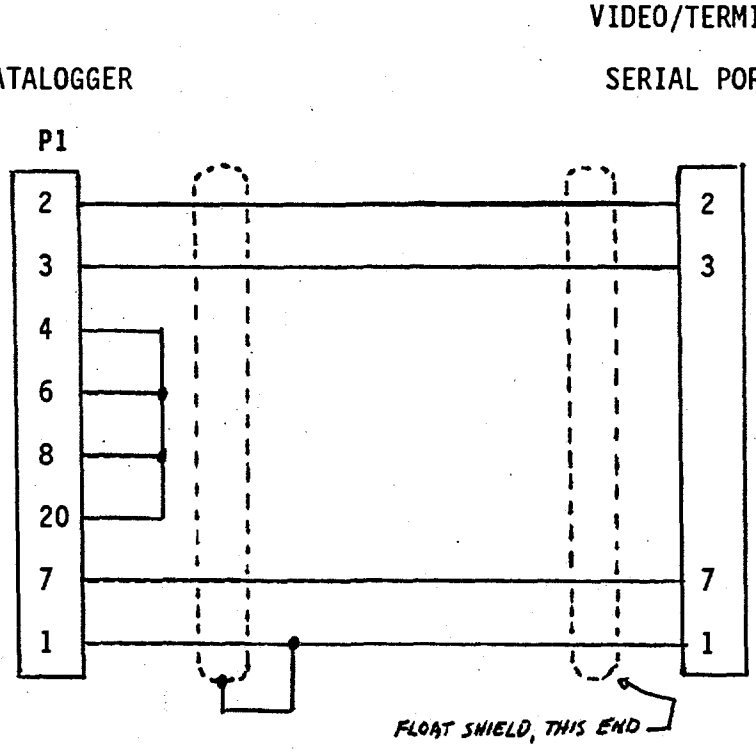


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FIGURE A-5 DATALOGGER PROGRAMMING AND TEST ARRANGEMENT

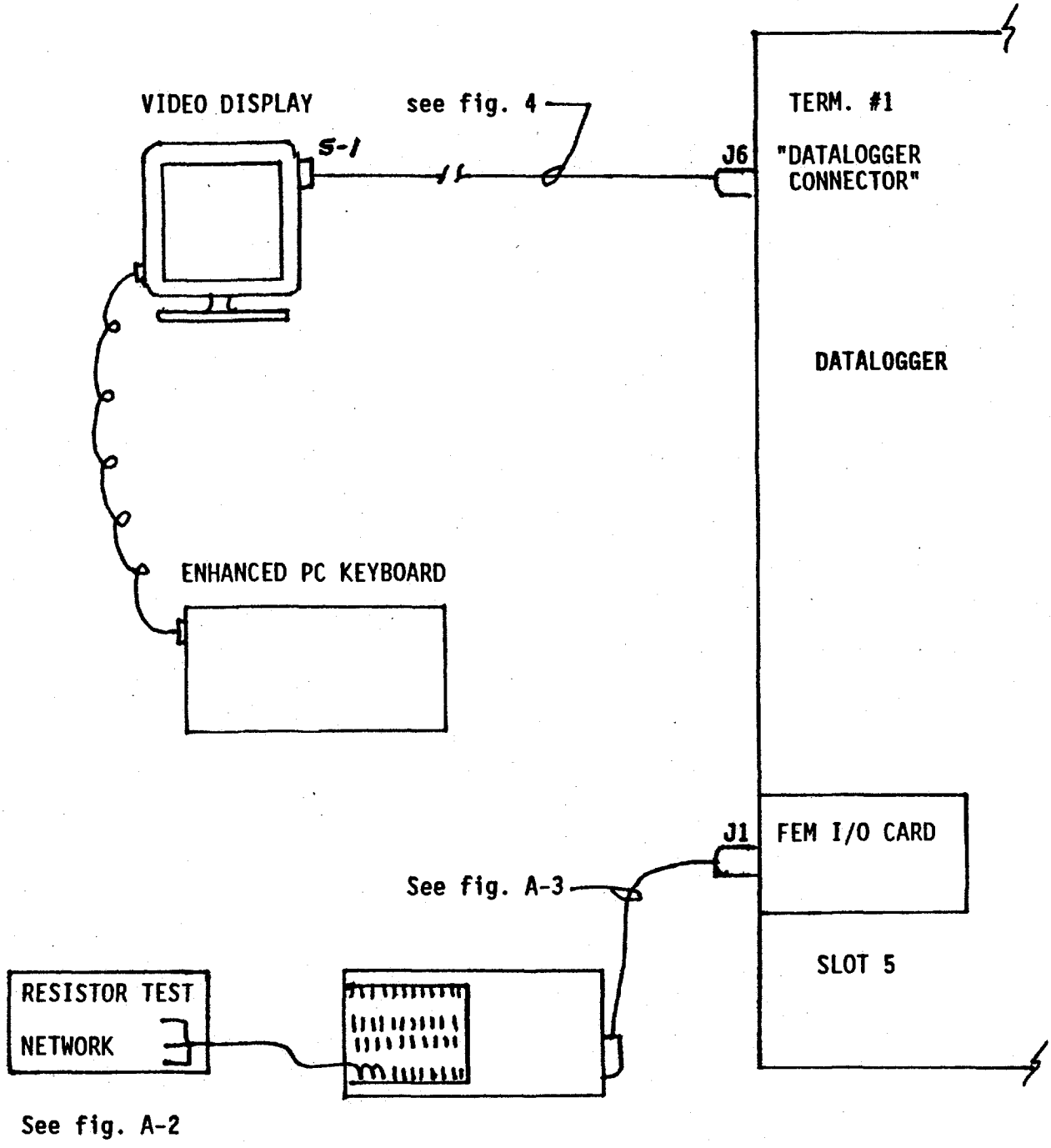

TABLE B-1 EQUIVALENT REMOTE TERMINAL KEY ENTRIES

This table will provide the operator of the remote terminal the equivalent key entries necesary to program those commands normally entered through the datalogger front touch panel keyboard.

TOUCH PANEL KEYBOARD	REMOTE TERMINAL KEYBOARD
ALARM	AL
CALEB	CB
CLEAR	CONTROL -C
CLOCK	CK
DISPLAY	NOT APPLICABLE
ENTER	, (COMMA)
FUNC	FN
HI	HI
LIST	LS
LOG	LG
LO	LO
PAPER	NOT APPLICABLE
POINT	PT
PRGM	PG
RESET	RS
RUN	RETURN
SKIP	SK
BACKSPACE	CONTROL-A or CONTROL-H
HYPHEN [-]	- (hyphen)
	" (quotation mark)

Line/block headers, trailers, and log headers are required to be enclosed in quotation marks.

TABLE B-2 USER JOBS

USER JOB	COMMENTS
DISPLAY	Display data on front panel readout
LOG	Demand log (manual)
USER-PROGRAMMED TIMED INTERVAL LOG	Maximum of 10 (periodic logs)
STANDARD TIME INTERVAL LOG	Every minute, hour, and/or day
ALARM LOG	-----
CONTACT STATUS MONITORING	-----
SEQUENCE OF EVENTS RECORDING	-----
POINT AVERAGE/GROUP AVERAGE	System needs may dictate using any given function more than once.
POINT DIFFERENCE/FLOATING	
ALARMLIMITS/RATE-OF-CHANGE	Each time a funtion is used, it counts as a user job.

TABLE B-3 SERIAL I/O PROGRAMMABLE PARAMETERS (Mpg 4-42)

The number in brackets is the number that specifies that parameter when programming the serial ports. (see Table(s) B-4, B-5)

PARAMETERS	DEFAULT STATE
[1] Serial I/O Port enable/disable	"1" = Enable, both I/O Ports
[2] Character Format	(6) = 8 bits, no parity, 1 stop bit
[3] Line Control enable/disable	"1" = Enabled
[4] Block Control enable/disable	"0" = Disabled
[5] Xon Control, Line Output	"0" = Disabled
[6] Full Duplex/Half Duplex	"1" = Full duplex
[7] Characters per Line	72 characters per line
[8] Lines per Block	"1" = 1 line per block
[9] Delay	"8" = .5 second
[10] Timeout	"150" = 10 seconds
[11] Ack character	"6" (ACK), 129 (EOS)
[12] Nak character	"21" (NAK), 129 (EOS)
[13] Stx character	"2" (STX), 129 (EOS)
[14] Etx characer	"3" (ETX), 129 (EOS)
[15] Xon character	"17" (DC1, Control-Q)
[16] Prompt character	"42" ("*" asterisk), 129(EOS)
[17] Line Header	(EOS)
[18] Line Trailer	CR, LF, delay character
[19] Block Header	(EOS)
[20] Block Trailer	(EOS)
[21] Xoff character	"19" (DC3, Control-S)
[22] Baud rate	"11" = 9600 Baud (see Table B-4)

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TABLE B-4 PROGRAMMABLE PARAMETER [2] Character Format (Mpg 4-45)

Select one of eight character formats by instilling the program number, for the character format desired, at the appropiate place in the **FUNCTION 100** command.

PROGRAM NO	CHARACTER FORMAT SELECTION
(1)	7 bits, Even parity, 2 Stop bits
(2)	7 bits, Odd parity, 2 Stop bits
(3)	7 bits, Even parity, 1 Stop bit
(4)	7 bits, Odd parity, 1 Stop bit
(5)	8 bits, No parity, 2 Stop bits
(6)	8 bits, No parity, 1 Stop bit (default value)
(7)	8 bits, Even parity, 1 Stop bit
(8)	8 bits, Odd parity, 1 Stop bit

TABLE B-5 PROGRAMMABLE PARAMETER [22] BAUD RATE (Mpg 4-51)

Select one of twelve Baud rates by instilling the program number value, for the Baud rate desired, at the appropiate position in the **FUNCTION 100** command.

PRGM NO	BAUD RATE	PRGM NO	BAUD RATE
(1)	110 baud	(7)	2000 baud
(2)	134.5 baud	(8)	2400 baud
(3)	150 baud	(9)	4800 baud
(4)	300 baud	(10)	1800 baud
(5)	600 baud	(11)	9600 baud (default value)
(6)	1200 baud	(12)	19.2k baud

TABLE B-6 ERROR CODES

Entry errors or fault conditions are indicated by and error code message on the display readout, i.e. "Error 10".

01	Entries in wrong order for the command you're trying to enter
02	Command not recognized at all by data logger (invalid entry)
03	**THIS CODE IS NOT USED**
04	Invalid command ending (**RUN** expected)
05	Unable to execute command (user jobs at full capacity)
06	Invalid calibration value
07	Point not programmed for Function 17 (4-20 mA)
08	Invalid output device code
09	No such Function/Algorithm
10	Program key violation (keyswitch not in **PRGM** pokition)
11	Terminal input error (invalid entry on last line)
12	Digital Inputs option not present
13	Point Functions do not match
14	Point Function does not allow calibration
15	Too many Differences entered
16	Points already being averaged
17	Point already programmed for Function 111
18	Point not programmed for a temperature function
19	System not configured for degrees Celsius
20	Point not programmed for Function 111

APPENDIX B TABLE B-7 **FAULT/ERROR MESSAGE CODES**

ERROR #	DESCRIPTION
0	This indicates an error of unknown origin.
1	The RAM test of the stack area failed.
5	The RAM test of the operating system RAM failed.
6	The system case variable is out of bounds.
7	Parameter buffer pointer out of range or an attempt was made to free an already free parameter buffer.
8	The RAM test failed on the directory table RAM.
9	Background timers have timed out (stuck in a loop).
10	Power not stable -- fluctuates too fast for a safe restart.
15--39	The CRC of the corresponding calibration buffer has changed.
40--43	The CRC of the corresponding ROM has changed.
50	The processor detected an address error (odd boundary, etc).
52	The processor detected an illegal instruction.
53	The processor detected an attempt to divide by zero.
54	The processor detected a privilege violation.

PRGM NO.	PAGE NO.	PROGRAM SEQUENCE	COMMENTS
1	11	[CLEAR] [RUN]	STOP FLASHING DISPLAY
2	12	[CLEAR] [PRGM] [CLOCK] [RUN]	CLEAR ASTERISK
3	12	[CLEAR] [PRGM] [FUNC] [100] [24] [RUN]	I/O PORTS DEFAULT VALUES
6	13	[CLEAR] [PRGM] [FUNC] [100] [-] [24] [-] [1] [0] [RUN]	DISABLE I/O PORT 1 & 2
8	15	[CLEAR] [PRGM] [CLOCK] [day-of-year] [-] [24-hr time] [RUN]	SET CALENDAR AND 24 HR CLOCK
13	16	[CLEAR] [PRGM] [POINT] [1] [-] [19] [FUNC] [27] [RUN]	RTD LINEARIZATION
17	17	[CLEAR] [RESET] [DISPLAY] [RUN]	RESET DISPLAY
18	17	[CLEAR] [PRGM] [POINT] [18] [-] [19] [SKIP] [RUN]	SKIP DAT-PTS 18 & 19
19	17	[CLEAR] [PRGM] [POINT] [21] [-] [500] [SKIP] [RUN]	SKIP DAT-PTS 21 -- 500
20	17	[CLEAR] [PRGM] [POINT] [18] [SKIP] [-] [RUN]	UNSKIP DAT-PT 18 FOR HI ALARM LIMIT TEST ONLY. RETURN TO SKIP AFTER COMPLETION OF TEST.
		PERFORM SEQUENCE ABOVE FOR DAT-PT [19] TO TEST HI-HI ALARM LIMIT	RETURN TO SKIP AFTER TEST.
21	18	[CLEAR] [PRGM] [POINT] [20] [FUNC] [37] [RUN]	ASSIGN FUNC 37 TO DAT-PT 20
22	19	[CLEAR] [PRGM] [ALARM] [1] [HI] [02360] [RUN]	ASSIGN TO ALARM LIMIT 1 A VALUE OF 02360 (236.0 DEGREES), HI SENSE

PRGM NO.	PAGE NO.	PROGRAM SEQUENCE	COMMENTS
23	19	[CLEAR] [PRGM] [ALARM] [2] [HI] [02460] [RUN]	ASSIGN TO ALARM LIMIT 2 A VALUE OF 02460 (246.0 DEGREES), HI SENSE
24	20	[CLEAR] [PRGM] [ALARM] [3] [-] [250] [SKIP] [RUN]	SKIP ALARM LIMITS 3---250
26	20	[CLEAR] [PRGM] [POINT] [1] [-] [19] [ALARM] [1] [-] [2] [-] [1] [-] [2] [RUN]	ASSIGN ALARM LIMIT NO'S 1 AND 2 TO S1, S2, S3, AND S4 FOR DAT-PTS 1--19.
27	21	[CLEAR] [PRGM] [POINT] [1] [-] [19] [ALARM] [FUNC] [1] [-] [2] [-] [3] [-] [4] [RUN]	ASSIGN RELAYS' 1, 2, 3, AND 4 TO DAT--PTS 1--19
28	21	[CLEAR] [PRGM] [ALARM] [1] [HI] [02360] [CLOCK] [2] [RUN]	SET ASD OF 2 SCAN DELAYS FOR ALARM LIMIT 1.
29	22	[CLEAR] [PRGM] [ALARM] [2] [HI] [02460] [CLOCK] [1] [RUN]	SET ASD OF 1 SCAN DELAY ALARM LIMIT 2.
30	23	[CLEAR] [LOG] [1] [POINT] [1] [-] [19] [ALARM] [POINT] [RUN]	LOG DAT-PT IN ALARM

APPENDIX C MOTOR/TURBINE RTD CHANNELIZATION

DATA POINT	MOTOR/TURBINE IDENTITY	RTD NUMBER	FEM MODULE IDENTITY	TERM.	I/O SLOT	COMMENTS
1	EF-V11-1	TE-V11-46-1A	UY-Z10-1-4	1	5	MOTOR OUTBOARD BEARING
2	EF-V11-1	TE-V11-46-1B	UY-Z10-1-4	2	5	MOTOR INBOARD BEARING
3	EF-V11-1	TE-V11-46-1C	UY-Z10-1-4	3	5	MOTOR CARRIER BEARING
4	EF-V11-1	TE-V11-46-1D	UY-Z10-1-4	4	5	FAN OUTBOARD BEARING
5	EF-V11-1	TE-V11-46-1E	UY-Z10-1-4	5	5	FAN INBOARD BEARING
6	EF-V11-2	TE-V11-46-2A	UY-Z10-1-4	6	5	MOTOR OUTBOARD BEARING
7	EF-V11-2	TE-V11-46-2B	UY-Z10-1-4	7	5	MOTOR INBOARD BEARING
8	EF-V11-2	TE-V11-46-2C	UY-Z10-1-4	8	5	MOTOR CARRIER BEARING
9	EF-V11-2	TE-V11-46-2D	UY-Z10-1-4	9	5	FAN OUTBOARD BEARING
10	EF-V11-2	TE-V11-46-2E	UY-Z10-1-4	10	5	FAN INBOARD BEARING

APPENDIX C MOTOR/TURBINE RTD CHANNELIZATION

DATA POINT	MOTOR/TURBINE IDENTITY	RTD NUMBER	FEM MODULE IDENTITY	TERM.	I/O SLOT	COMMENTS
11	EF-V11-3	TE-V11-46-3A	UY-Z10-1-4	11	5	MOTOR OUTBOARD BEARING
12	EF-V11-3	TE-V11-46-3B	UY-Z10-1-4	12	5	MOTOR INBOARD BEARING
13	EF-V11-3	TE-V11-46-3C	UY-Z10-1-4	13	5	MOTOR CARRIER BEARING
14	EF-V11-3	TE-V11-46-3D	UY-Z10-1-4	14	5	FAN OUTBOARD BEARING
15	EF-V11-3	TE-V11-46-3E	UY-Z10-1-4	15	5	FAN INBOARD BEARING
16	EF-V11-4	TE-V11-46-4A	UY-Z10-1-4	16	5	FAN OUTBOARD BEARING, TURBINE
17	EF-V11-4	TE-V11-46-4B	UY-Z10-1-4	17	5	FAN INBOARD BEARING, TURBINE
18	HIGH ALARM TEST RESISTOR.		UY-Z10-1-4	18	5	FOR 238 DEGREES FAHRENHEIT SIMULATION.
19	HIGH-HIGH ALARM TEST RESISTOR.		UY-Z10-1-4	19	5	FOR 248 DEGREES FAHRENHEIT SIMULATION.
20	FUNCTION 37 ASSIGNED.		NO INPUTS	20	5	FEM/DATALOGGER SELF-DIAGONISTIC.

APPENDIX D

TABLE D-1

SETTING NUMBERS, LIMIT NUMBERS, LIMIT VALUES, RELAY DATA

DATA POINT(S) 1--19

SETTING NUMBER	S-1	S-2	S-3	S-4
LIMIT NUMBER	1	2	1	2
LIMIT VALUE	236.0	246.0	236.0	246.0
RELAY NUMBER	1	2	3	4
ALARM RELAY PANEL TERMINATIONS	TB5-1	TB5-2	TB5-3	TB5-4
	TB6-1	TB6-2	TB6-3	TB6-4
ALARM LOCATION				
Power Control Rm.	---	---	H1-46	H1-53
Dispatcher's off.	M19-3	M19-2	---	---