

MULTICHANNEL
RECORDER

Honeywell

DPR3000 PRODUCT MANUAL

Ref. : US1I-6093

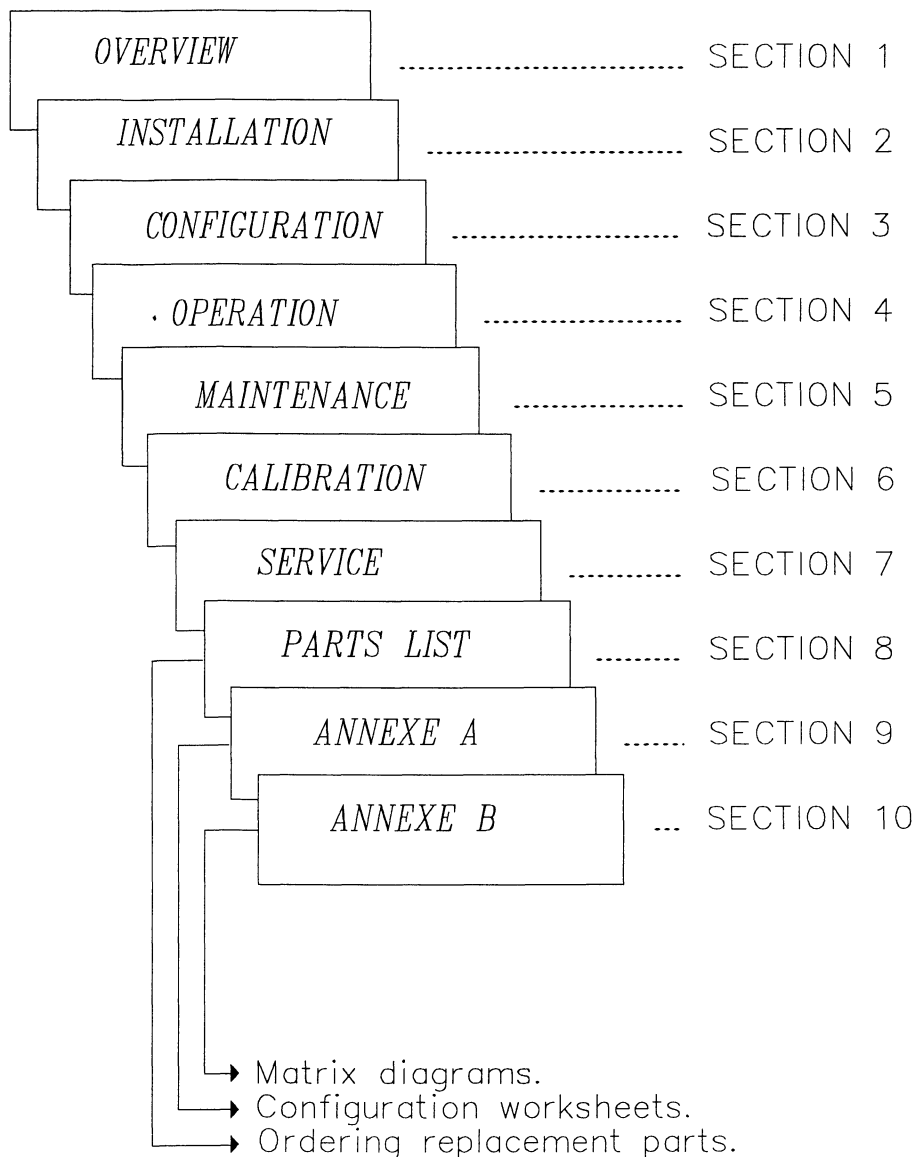
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April, 1998

MULTICHANNEL RECORDER

HOW THIS MANUAL IS ORGANIZED :

The multichannel recorder product manual consists of 10 sections numbered as shown below, and appearing on each page.



HOW THIS MANUAL IS ORGANIZED :

MULTICHANNEL RECORDER

WARRANTY :

The recorder carries a one year warranty. This warranty includes technical assistance via a toll free telephone number.

TECHNICAL ASSISTANCE :

If you encounter a problem with your recorder, review section 7, Appendix A (Trouble shooting guide) of this product manual.

If the problem persists after checking the above, you can get technical assistance by dialing the TAC Center 1-800-423-9883.

An engineer will discuss your problem with you.

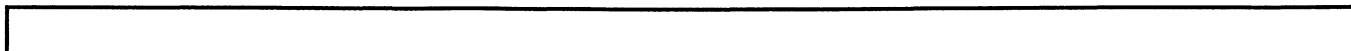
Please have a complete model number, serial number available. The model and serial numbers can be found on the chassis nameplate.

ORDERING INFORMATION :

If you want to place an order for instrumentation, call 215-641-3662, Fort Washington PA.

TABLE OF CONTENTS

Section	Page
1.1 INTRODUCTION	1-1
1.2 WARNING.	1-1
1.3 PRODUCT FEATURES	1-1
1.4 PRODUCT PERFORMANCE	1-3
1.4.1 Ranges	1-3
1.4.2 Performance.	1-5
1.4.3 Rated limits and associated drifts	1-5
1.4.4 Extreme conditions.	1-6
1.4.5 General reference data.	1-6
1.5 DIMENSIONS AND WEIGHT	1-7
1.6 HARDWARE STRUCTURE	1-8
1.6.1 Case	1-9
1.6.2 Power supply	1-9
1.6.3 Electronic card cage	1-10
1.6.4 Printer chassis.	1-12
1.6.5 Man-machine interface.	1-14
1.6.5.1 Displays	1-14
1.6.5.2 Keyboard	1-15
1.6.6 Chart cassette.	1-16
1.6.7 Print cartridge	1-18
1.7 SOFTWARE ORGANIZATION.	1-18
1.8 CONFIGURATION	1-21
1.9 OPERATING MODES	1-21
1.9.1 Run mode.	1-21
1.9.2 Configuration access mode	1-22
1.9.3 Configuration definition mode.	1-22
1.10 CHART PRESENTATION.	1-22
1.10.1 Input printing formats	1-22
1.10.2 Information printing.	1-25
1.11 "EVENT PRECURSOR" MODE.	1-26



MULTICHANNEL RECORDER

(continued)

Section	Page
1.12 TEST MODES	1-28
1.12.1 Print test	1-28
1.12.2 Teacher mode	1-29
1.13 ALARM CAPABILITY.	1-30
1.13.1 Analog alarms	1-30
1.13.2 Digital input alarms (option)	1-34
1.13.3 Alarm relays (option).	1-36
1.14 ALARM MESSAGES.	1-36
1.15 RESIDENT CALIBRATION.	1-37
1.16 CHART ACCURACY CERTIFICATION	1-38



LIST OF ILLUSTRATIONS

Number	Title	Page
1-1	External dimensions and panel cutout.	1-7
1-2	Modular construction recorder.	1-8
1-3	Power Supply.	1-9
1-4	View of electronic card cage from rear	1-10
1-5	Printer chassis withdrawn to service stop.	1-12
1-6	The chart cassette assembly	1-13
1-7	Man machine interface.	1-14
1-8	Displays and keyboard.	1-15
1-9	Chart cassette with fan fold paper	1-16
1-10	Chart cassette with roll paper	1-17
1-11	Carriage and Cartridge	1-18
1-12	Hardware and software block diagram	1-20
1-13	Example of trend format.	1-23
1-14	Example of zoning.	1-23
1-15	Example of tabular format	1-24
1-16	Example of alternate format	1-24
1-17	Example of information printing	1-25
1-18	Example of operational messages	1-26
1-19	Event precursor recorder in standby.	1-26
1-20	Event precursor printout.	1-27
1-21	Print test printout	1-28
1-22	Teacher mode printout.	1-29
1-23	Change channel record to red on alarm	1-31
1-24	Change channel chart range to chart range 2	1-31
1-25	Change chart speed to speed 2.	1-32
1-26	Print channel on alarm.	1-33
1-27	Example of digital inputs printing	1-35
1-28	Alarm messages superimposed.	1-37
1-29	Alarm messages on blank paper	1-37
1-30	Chart accuracy certification marks	1-38

LIST OF TABLES

Number	Title	Page
1-1	Ranges	1-3
1-2	Performance	1-5
1-3	Rated limits and associated drifts	1-5
1-4	Extreme conditions	1-6
1-5	General reference data	1-6
1-6	Boards distribution	1-11



1.1 INTRODUCTION

You have just received your recorder. We congratulate you on your discerning choice. The recorder has been designed to meet the highest criteria of quality and performance, and sets new standards for multichannel process recording.

This manual describes the features and functions of the recorder, and explains how to prepare, install, configure and operate it to give optimum performance in your particular application. Sections are also included which cover maintenance, service, and replacement parts, together with appendices containing useful reference data.

The aims of the "PRODUCT OVERVIEW" section of the manual are to introduce you the unique features and functions of the recorder, to review the structure of the hardware and organization of the software, and to illustrate the recorder's remarkable versatility and utility, by means of printing examples in different modes of operation.

1.2 WARNING

To avoid the risk of electrical shock which could cause personal injury, follow all safety notices in this documentation.



Protective earth terminal. Provided for connection of the protective earth supply system conductor.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not replace any component (or part) not explicitly specified as replaceable by your supplier.

Each wire must be protected with a fuse equivalent to the recorder fuse (fuse type) as well as for the fuseholder.

1.3 PRODUCT FEATURES

The recorder is a multi-microprocessor based multichannel chart recorder. The following main features are included as standard :

- ☑ Up to 32 analog inputs, organized in blocks of 4.
- ☑ Accepts all currently available sensor signals.
- ☑ 250 mm wide roll or fan fold chart.
- ☑ 6 color printing.
- ☑ Continuous line recording of analog and optional digital inputs and/or tabular printing.

MULTICHANNEL RECORDER

- ☑ 60 freely assignable alarms.
- ☑ Alphanumeric printing of date, time, chart speed, input ranges, operational and alarm messages.
- ☑ Continuous trend and message printing independent of chart speed.
- ☑ "Event precursor" capability.
- ☑ Straight forward field configuration procedure
- ☑ Battery free configuration memory
- ☑ High level of immunity to environmental "noise"

Optional features include :

- ☑ Up to 12 digital inputs organized in blocks of 6
- ☑ Up to 12 internal output relays organized in blocks of 6
- ☑ Mathematics package.
- ☑ Digital communication using one of these networks :
 - D.M.C.S.
 - Serial communication.
- ☑ Up to 8 fast scanned analog inputs organised in blocks of 4.

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

1.4 PRODUCT PERFORMANCE

1.4.1 Ranges

	TYPE OF INPUT	TOTAL RANGE		REFERENCE RANGE	
		Deg C	Deg F	Deg C	Deg F
Thermocouples	B	40 to 1820	104 to 3308	800 to 1820	1500 to 3308
	E	-200 to 990	-328 to 1814	110 to 990	170 to 1814
	J	-200 to 870	-328 to 1598	-170 to 870	-270 to 1598
	K	-200 to 1370	-328 to 2498	-170 to 1370	-270 to 2498
	N	-20 to 1300	-4 to 2372	0 to 1300	32 to 2372
	Ni-NiMo	0 to 1400	32 to 2552	0 to 1400	32 to 2552
	PR20-40	0 to 1800 *	32 to 3272*	600 to 1800 *	1100 to 3272 *
	R	-20 to 1760	-4 to 3200	100 to 1760	200 to 3200
	S	-20 to 1760	-4 to 3200	100 to 1760	200 to 3200
	T	-200 to 400	-328 to 752	-150 to 400	-240 to 752
	W-W26	-20 to 2320	-4 to 4208	500 to 2100	930 to 3810
	W5-W26	-20 to 2320	-4 to 4208	0 to 1800	32 to 3270
	KPVSAU7FE	0 to 300 Deg K *		1 to 300 Deg K *	
Pyrometer	Radiamatic RH	760 to 1880	1400 to 3416	1400 to 1870	2552 to 3398
Resistance Thermometer	Pt100 - DIN IEC and JIS	-200 to 500	-328 to 932	-200 to 500	-328 to 932
	Edison 7 Pt 120 Ohms	-20 to 270	-4 to 518	-20 to 270	-4 to 518
	Ni : 50 Ohms	-80 to 320	-112 to 608	100 to 320	212 to 608
	Ni : 508 Ohms	-50 to 250*	-58 to 482 *	100 to 250*	200 to 482 *
	Cu : 10 Ohms	-20 to 250*	-4 to 482 *	-20 to 250*	-4 to 482 *

TABLE 1-1 Ranges

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

	TYPE OF INPUT	TOTAL RANGE		REFERENCE RANGE	
		Deg C	Deg F	Deg C	Deg F
Other inputs	mV	0 to 20 0 to 50 0 to 100 -10 to 10 -50 to 50 ** -200 to 200 **			
	Volts	0 to 5 1 to 5 0 to 10 -5 to 5 ** -2 to 2 ** -20 to 20 ** -50 to 50**			
	mA	4 to 20 0 to 20			
	Ohms	0 to 200 0 to 2000 *			

TABLE 1-1 Ranges [continued]

* Refer to paragraph 1.4.2 page 1-5.

** with divider bridge.

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

1.4.2 Performance

Display accuracy and tabular process variable printing accuracy	-+/- 0.1% of total range, valid within reference range or < 0.4% for ranges marked * A field calibration allows +/- 0.05 % of total range or < 0.2 % for ranges marked * +/- 0.5 Deg C for built in cold junction compensation +/- 1 least significant digit	
Analog trace printing accuracy	Display accuracy +/- 0.2 mm (chart certification)	
Reference conditions	Temperature : 20 ± 2 Deg C 68 ± 3.6 Deg F Humidity : $65\% \pm 5\%$ RH Supply voltage : 100 to 240 Vac	Frequency : Rated frequency $\pm 1\%$ Source resistance : 0 Ohm Common mode : 0 Volt Series mode : 0 Volt

TABLE 1-2 Performance

1.4.3 Rated limits and associated drifts

PARAMETER		RATED LIMITS	INFLUENCE ON ACCURACY
Temperature		0 to 50 Deg C / 32 to 120 Deg F	<0.2% per 10 Deg C or per 18 Deg F or <0.4% for ranges marked *
Humidity		10% to 90% RH non condensing	0.2% of total range
Voltage		100 to 230 Vac (50/60 Hz)	No influence
Vibration (IEC 873)		Frequency : 0 to 70 Hz Acceleration : 0.1 g	No influence No influence
Source resistance	T/C and mV RTD and Ohms	0 to 1000 Ohms 0 to 15 Ohms (only for PT100)	1.2 μ V per 100 Ohms with burnout 0.1 Deg C per Ohm (3 balanced leads)

TABLE 1-3 Rated limits and associated drifts

MULTICHANNEL RECORDER

1. PRODUCT OVERVIEW

1.4.4 Extreme conditions

EXTREME CONDITIONS			
Operating	Temperature Humidity Vibration (IEC 873)	Frequency Acceleration	-10 to 50 Deg C / 14 to 120 Deg F 5% to 90% RH non condensing 0 to 200 Hz 0,2 g
	Fan fold paper		-10 to 40 Deg C / 14 to 100 Deg F 5% to 80% RH non condensing
Storage	Temperature Humidity		-25 to 70 Deg C / -15 to 160 Deg F 5 % to 95% RH non condensing. *

TABLE 1-4 Extreme conditions

1.4.5 General reference data

Chart Paper	Roll or fan fold (35 meters), calibrated width 250 mm Paper detection alerts end of chart		
Ink Cartridge	6 colours disposable cartridge. 5 millions dots per colour		
Power Supply	Voltage : 100 to 230 Vac Frequency : 50/60 Hz, configurable. Consumption 100 VA max.		
Safety	Complies with IEC 414, IEC 348 and CSA safety requirements for personnel protection		
Isolation	Inputs to ground	All circuits tested at 1500 Vac for continuous operation at 250 Vac (IEC 348)	
	Input to input	Functional isolation for continuous operation at 250 Vac	
Noise immunity	Meets or exceeds IEC 801	Electric discharge Electromagnetic interference Electrical fast transient Line voltage surge	801-2 level 3 801-3 level 3 801-4 level 3 801-5 level 3
Enclosure	Mounting	Panel mounting or portable case, permissible tilting angle : + 30 Deg from horizontal	
	Protection	Front face : IP54	
	Door	Cast aluminum with key lock or latch	
	Colour	Door black or Caribbean blue, case black	
Stray rejection IEC 484	Weight	28 Kg max (62 lb)	
	Series mode	67 db	1 x span peak to peak
	Common mode	100 db	250 Vac.

TABLE 1-5 General reference data

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

1.5 DIMENSIONS AND WEIGHT

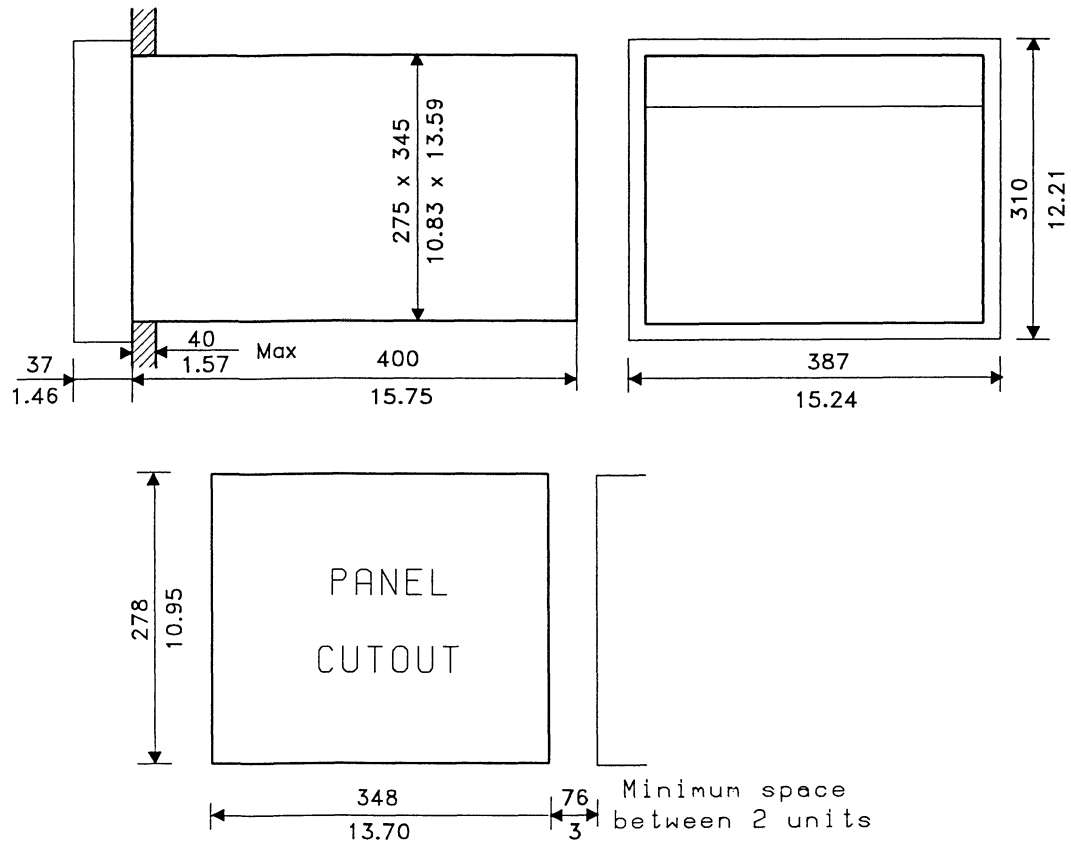


Figure 1-1 External dimensions and panel cutout

Dimensions : mm
inch

Weight : 28 kg maximum.
62 lb.

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

1.6 HARDWARE STRUCTURE

The recorder hardware is modular in design. The entire instrument can be easily dismantled into just six five major sub-assemblies plus the case, as illustrated in Figure 1-2, below.

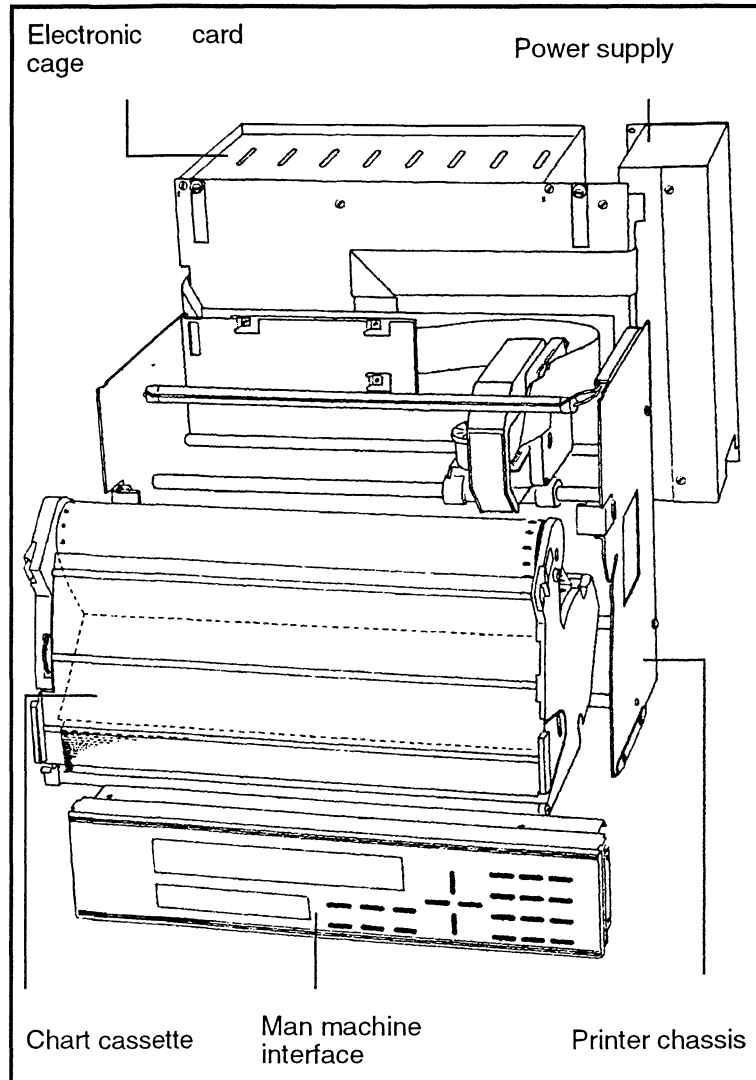


Figure 1-2 Modular construction recorder

A brief description of each sub-assembly follows.

MULTICHANNEL RECORDER

1.6.1 Case

The construction of the recorder has been designed to be very rugged to meet the requirements of an industrial environment. The case, power supply housing and electronic card cage are made of steel : the door and bezel are of cast aluminium. A rubber gasket fitted to the door ensures effective sealing for dust protection of the keyboard and printing mechanism.

1.6.2 Power supply

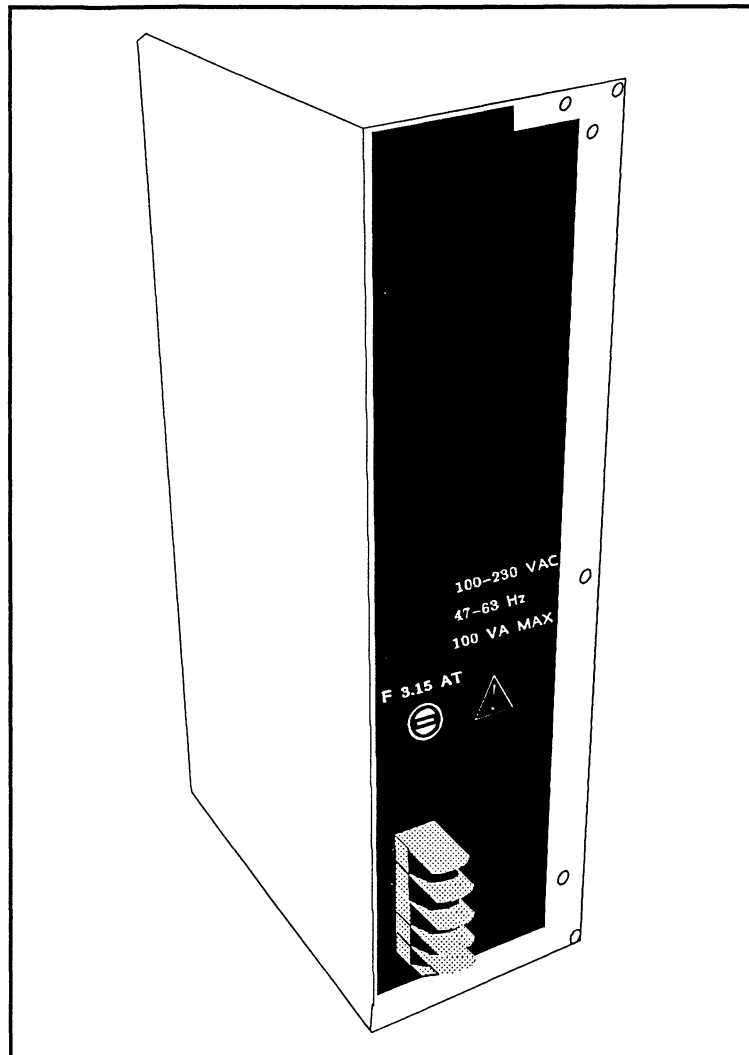


Figure 1-3 Power Supply

The power supply is an independent module with line voltage selection.

Note : ON/OFF switch is provided on portable instrument.

MULTICHANNEL RECORDER

1.6.3 Electronic card cage

The electronic card cage is located at the rear of the recorder, and has the power supply mounted at the left hand side, when viewed from the rear. The chassis serves as a receptacle for all standard and optional input and output boards, which plug into a mother board at assigned locations. Guides at the top and bottom ensure accurate and secure mounting.

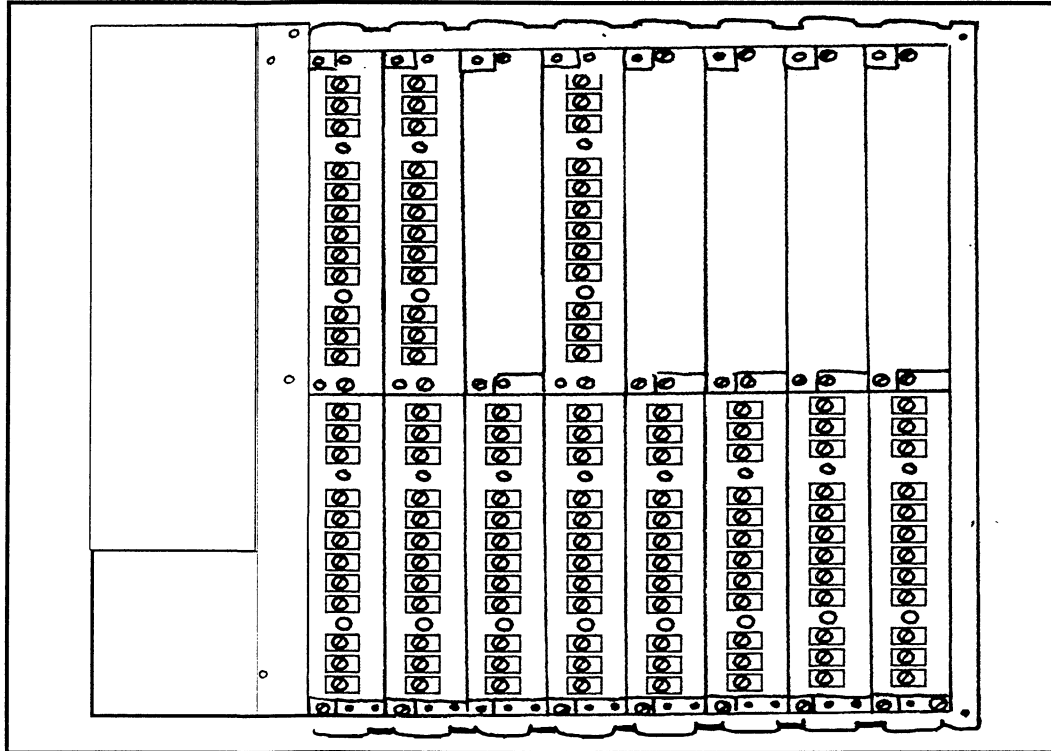


Figure 1-4 View of electronic card cage from rear

Input boards include :

- ☑ 4 channel analog input boards - maximum of 8 boards. There are 2 types ; one for RTD and resistance inputs, and another for all other sensors.
- ☑ Optional 6 channel digital input boards - maximum of 2 boards
- ☑ Optional 4 channel "fast scan" universal analog input boards - maximum of 2 boards

There are 2 types (as the standard analog ones) : one for RTD and resistance inputs and another for all other sensors.

Up to 2 fast analog input boards can be connected to your recorder (in the slot 1 and/or 2).

The fast input boards are compatible with any recorder software issue since "BC".

1.6.4 Printer chassis

The printer chassis is located at the front of the recorder, and can be withdrawn to a service stop for ease of access.

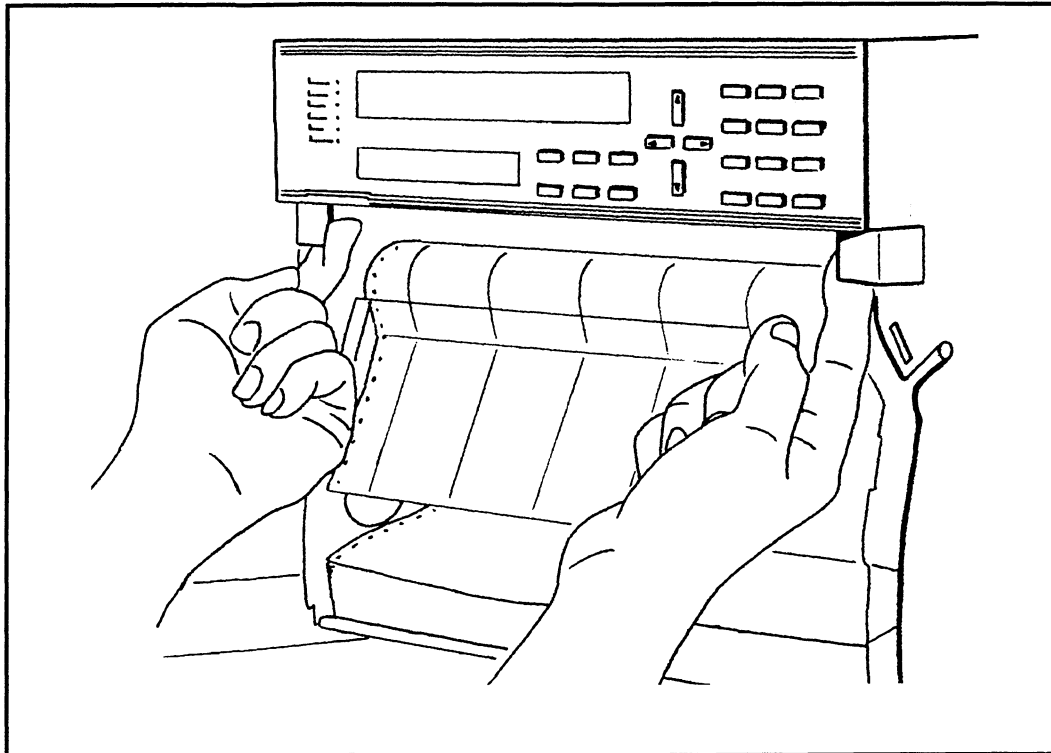


Figure 1-5 Printer chassis withdrawn to service stop

The printer chassis includes the 7-pin ballistic dot-matrix print head, the stepping motors for the print head and chart drive, and chart illumination. Normally mounted on the chassis are the man-machine interface, chart cassette and 6 color ribbon print cartridge.

Printing performance details are as follows :

- ☒ Print head life : 200 million characters
- ☒ Printing speed : up to 50 characters per second
- ☒ Carriage speed : 250 mm in 2 seconds
- ☒ Color change time : 1 second maximum

MULTICHANNEL RECORDER

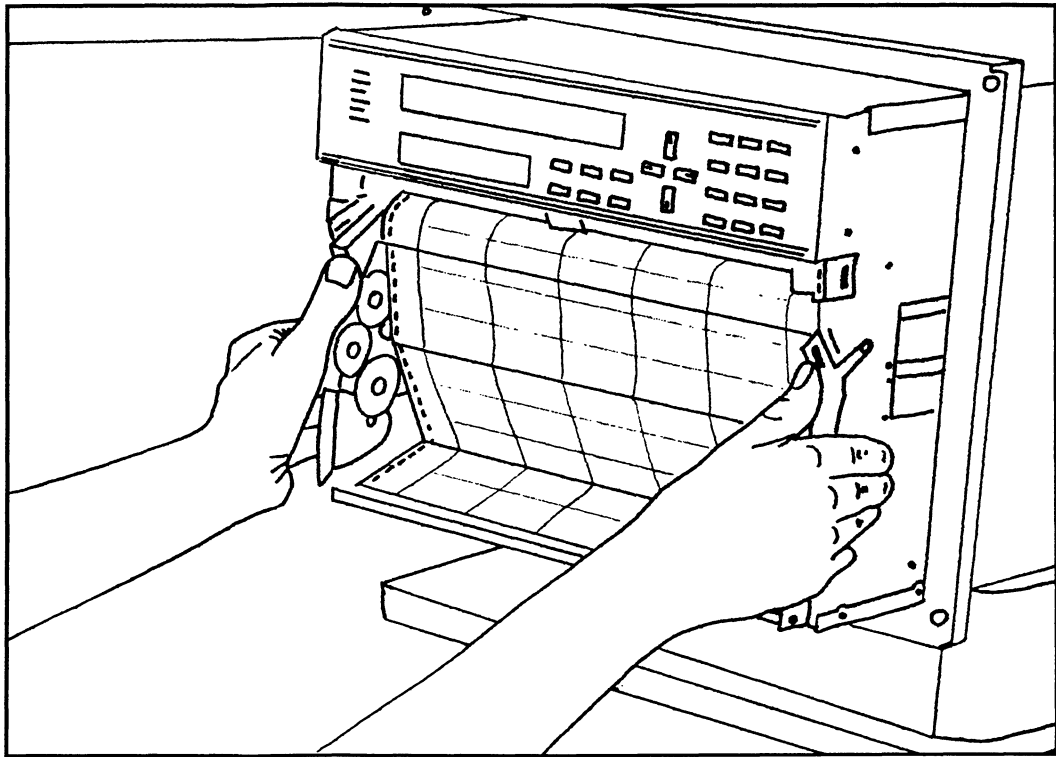


Figure 1-6 The chart cassette assembly

MULTICHANNEL RECORDER

1.6.5 Man-machine interface

The man-machine interface consists of the displays and keyboard used for configuration and operation of the recorder. A complete description of these functions is given in sections 3 and 4 of this manual.

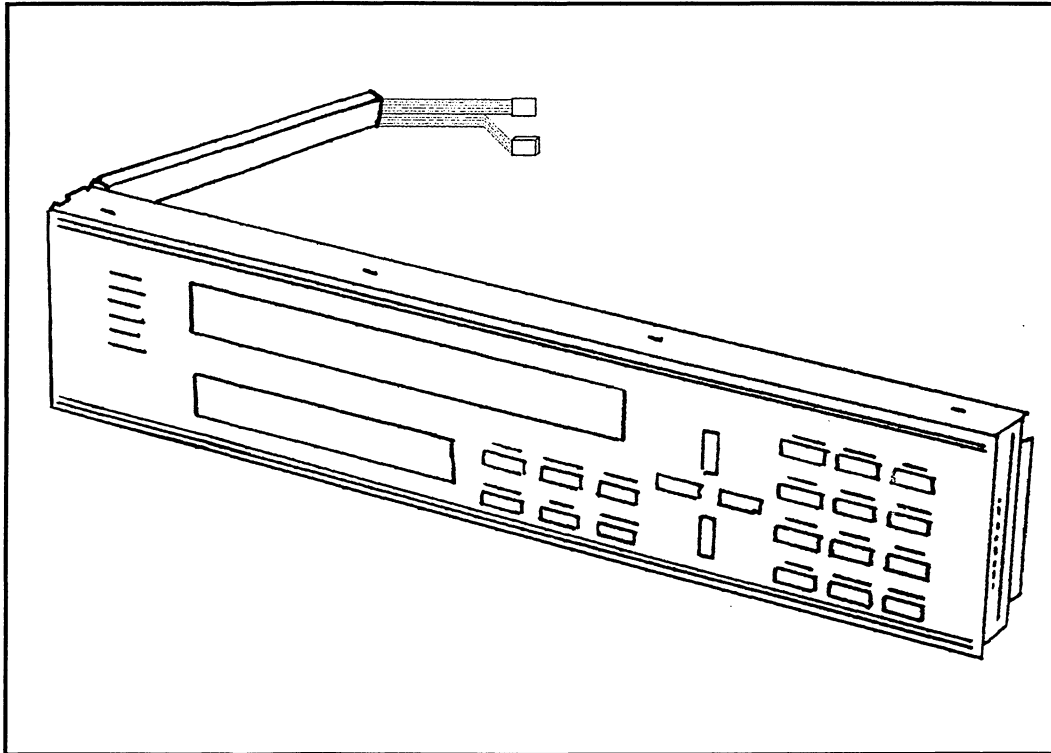


Figure 1-7 Man machine interface

1.6.5.1 Displays

The displays give clear indication of input data or operation and configuration prompts by means of 2 rows of 16 fluorescent digits having 16 segments per digit. In addition there is a vertical column of 6 light emitting diodes (L.E.D.S) which give information on the operational status of the recorder. The L.E.D.S have the captions : ALARM, MANUAL, PAPER, RECORD, COMM., and MEMORY.

MULTICHANNEL RECORDER

1.6.5.2 Keyboard

The keyboard consists of 3 groups of keys :

- ☑ 6 operator keys captioned : PRINT, DISPLAY, MANUAL, ACK.ALL, ACK. and RECORD.
- ☑ 4 "arrow" keys, arranged in the form of a joy-stick, used for parameter selection in operation and configuration.
- ☑ 12 configuration keys.

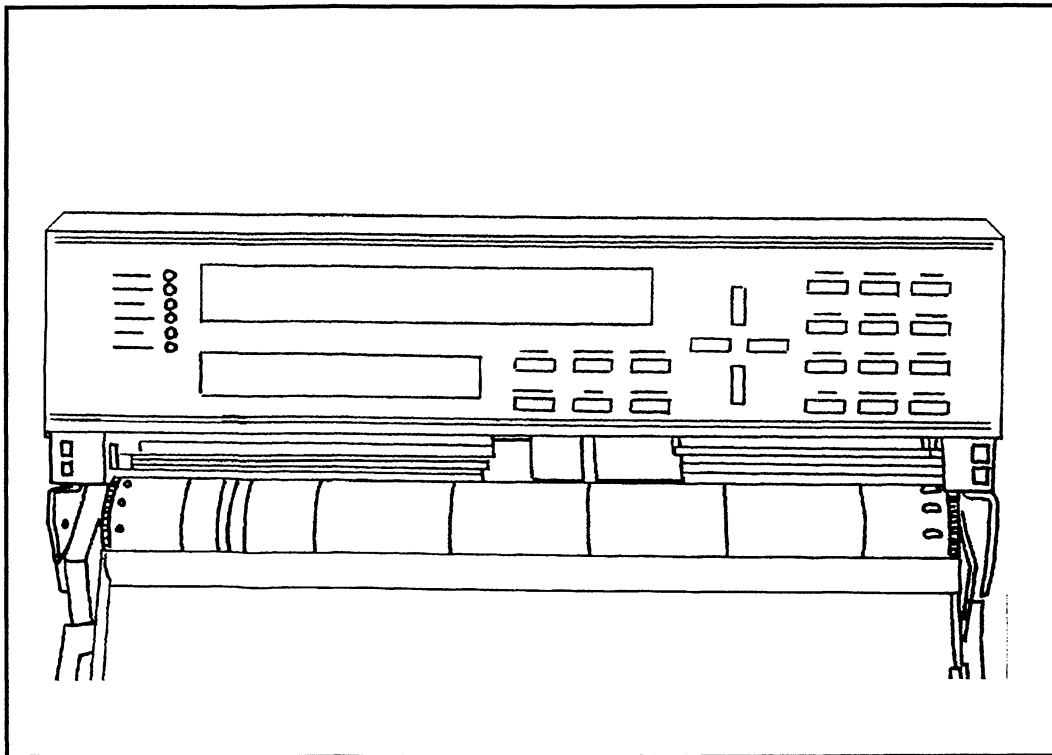


Figure 1-8 Displays and keyboard

MULTICHANNEL RECORDER

1.6.6 Chart cassette

The chart cassette is designed to accept either roll or fan-fold charts using the same mechanism. Fan-fold charts can be re-rolled after printing if required. Each type of chart has a calibrated width of 250 mm and a length of 35 meters. A paper-out detector fitted on the printer chassis, advises the operator when the chart needs replacing, by means of the LED captioned PAPER. To protect the print-head from damage, all printing is inhibited in the absence of the chart paper, or if the cassette is not fitted correctly.

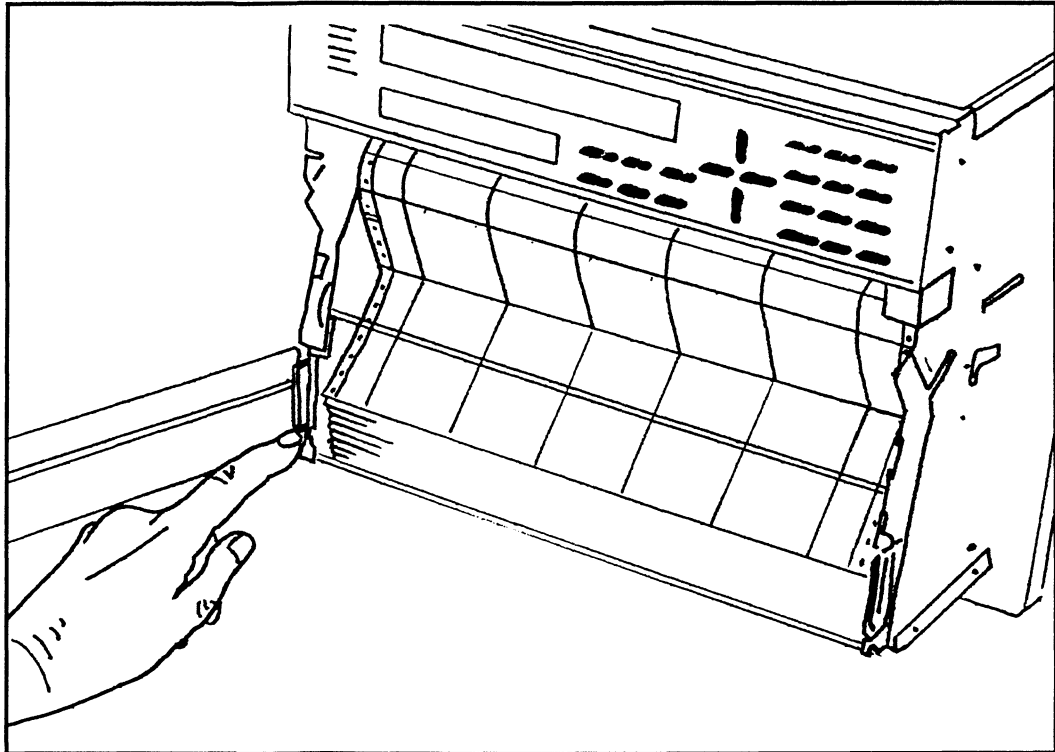


Figure 1-9 Chart cassette with fan fold paper

MULTICHANNEL RECORDER

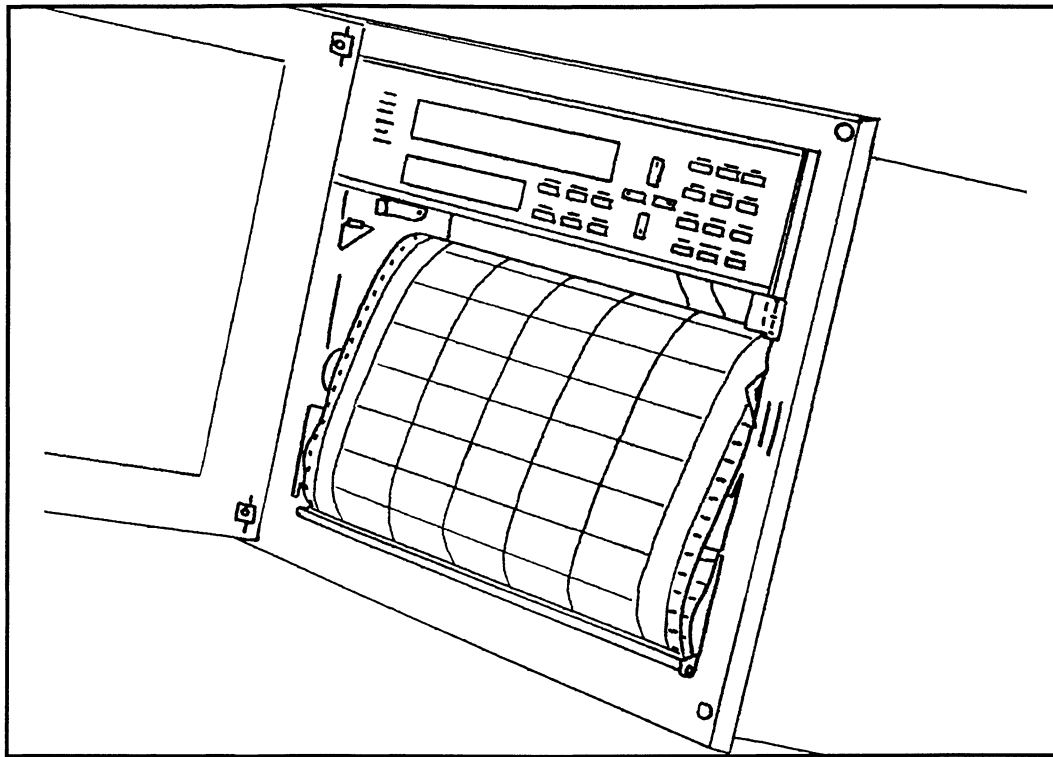


Figure 1-10 Chart cassette with roll paper

MULTICHANNEL RECORDER

1.6.7 Print cartridge

The print cartridge which has a 6-color ribbon, is mounted on the print head carriage. Color ribbon life is rated at 5 million dots per color. Changing the cartridge takes only a few seconds

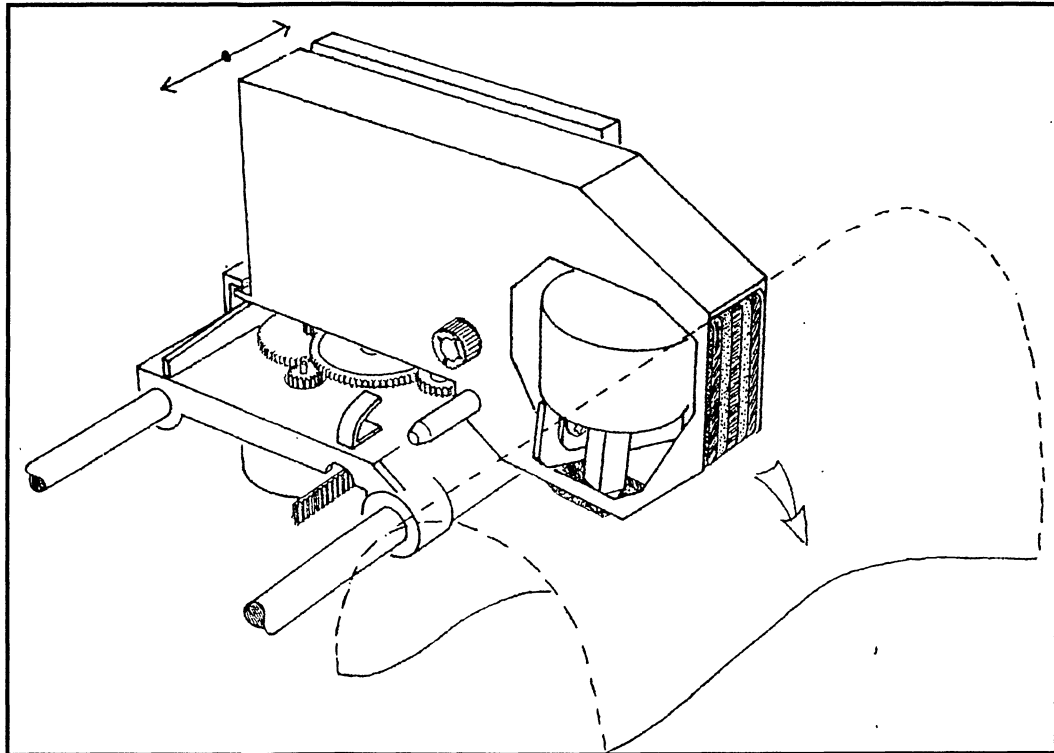


Figure 1-11 Carriage and Cartridge

MULTICHANNEL RECORDER

1.7 SOFTWARE ORGANIZATION

The recorder software is organized on a modular basis. The standard recorder has 3 dedicated microprocessor systems, one for each of the following functions :

☑ Configuration (man-machine interface)

☑ Input/output scanning

☑ Printing.

Optional modules, such as fast input, math. extension and digital communication modules, also have their own dedicated microprocessors.

Each microprocessor system operates independently, but communicates with the others, when necessary, via a ring bus. A block diagram of the software organization is given in figure 1-12

MULTICHANNEL RECORDER

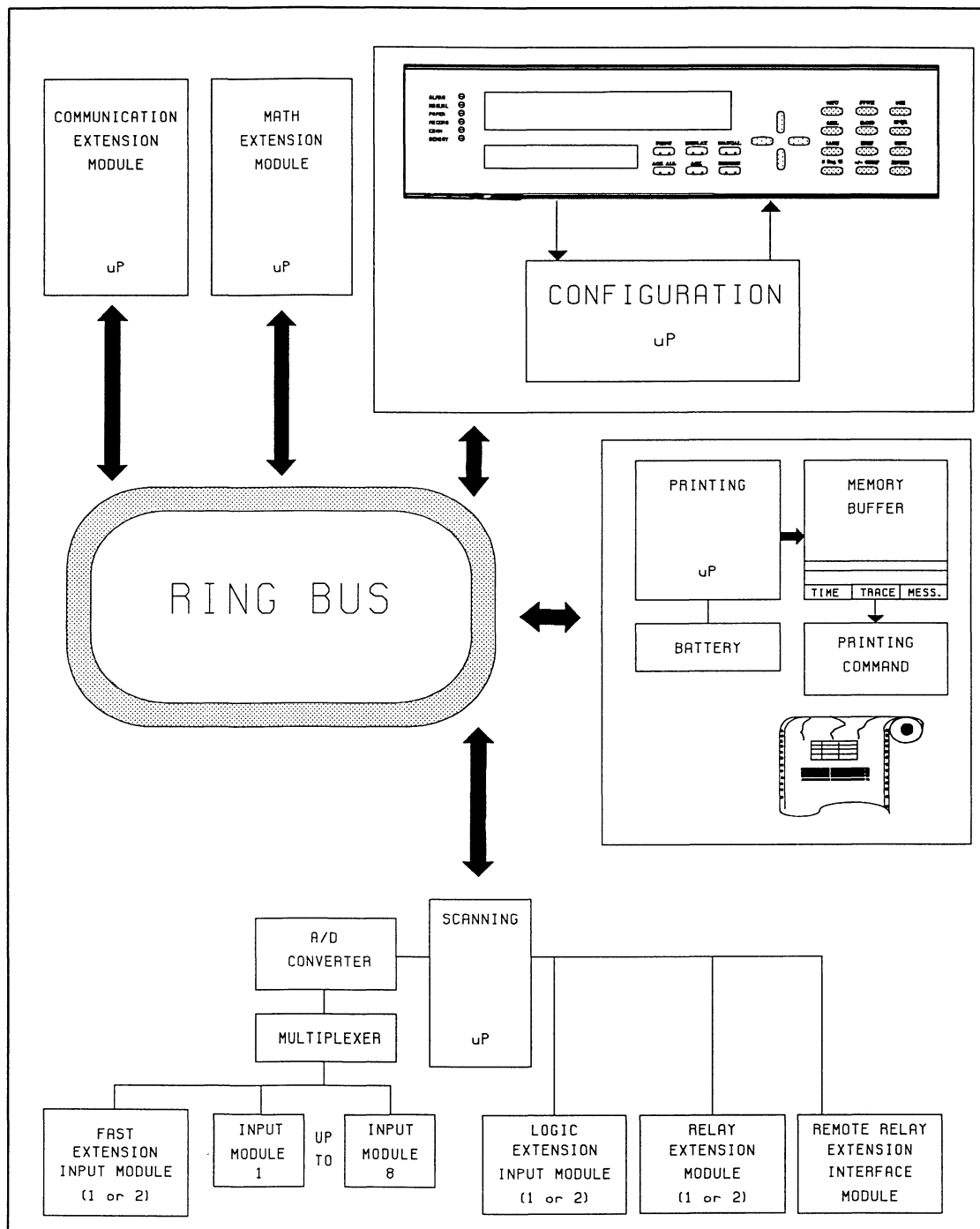


Figure 1-12 Hardware and software block diagram

1.8 CONFIGURATION

Flexibility of user configuration is achieved by organizing data into a matrix format. Plain language prompts direct you to the required data location ensuring speedy access to any item that you require to read or change.

The recorder offers a choice of five resident languages for configuration prompts, operational displays and chart messages, namely :

- ☒ English
- ☒ French
- ☒ German
- ☒ Spanish
- ☒ Italian

All configuration data is stored in battery-free non-volatile memory, so that a pre-configured recorder is ready for immediate use when power is applied. The real time clock is battery supported, and continues to run when power is off.

Software security locking prevents accidental changes to configuration data.

A hard copy printout on the chart of part or all configuration data can be produced if required.

1.9 OPERATING MODES

The recorder has three operating modes. A brief description of each is given below.

1.9.1 Run mode

Run mode is the normal operating mode of the recorder in which it scans, displays and prints the inputs, together with any operational or alarm messages, according to its configuration. When power is switched on, and after satisfactory completion of power up checks, the recorder goes automatically to run mode.

MULTICHANNEL RECORDER

1.9.2 Configuration access mode

In this mode all configuration data can be read. Although the displays are now being used to indicate configuration data rather than input data, the recorder continues with input data acquisition and printing.

Subject to authorization and security locking, it is possible to change many items of configuration data without interrupting input data acquisition and printing. Use of this operating mode is explained fully in the configuration and operation sections of this manual.

1.9.3 Configuration definition mode

This mode is used when it is necessary to change configuration data, such as that concerning analog inputs, which has a fundamental effect on recorder operations.

Whenever this mode is entered, normal acquisition and printing of input data ceases until the recorder is returned to run mode. Return to run mode is effected by pressing a single key, or will occur automatically if no key has been pressed during a 10 minute period.

As in configuration access mode, it is possible to apply software security locks to prevent accidental changes of configuration.

Use of this operating mode is explained fully in the configuration section of this manual.

1.10 CHART PRESENTATION

The recorder is much more than just a multichannel trend recorder. It offers a choice of printing formats for input data, and in addition prints information and messages for use at the time by the operator, and as part of the historical record.

1.10.1 Input printing formats

A choice of three formats is available for printing of input values ; trend, tabular or alternate. In trend format analog, and optional digital, inputs are recorded as continuous traces. A powerful software algorithm ensures that all trend traces are correctly related to time data, eliminating the time offset experienced with multi-pen recorders. The algorithm calculates, if necessary, intermediate values between successive input scans so as to create continuous line records for all inputs, including square wave signals, as the following chart example illustrates.

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

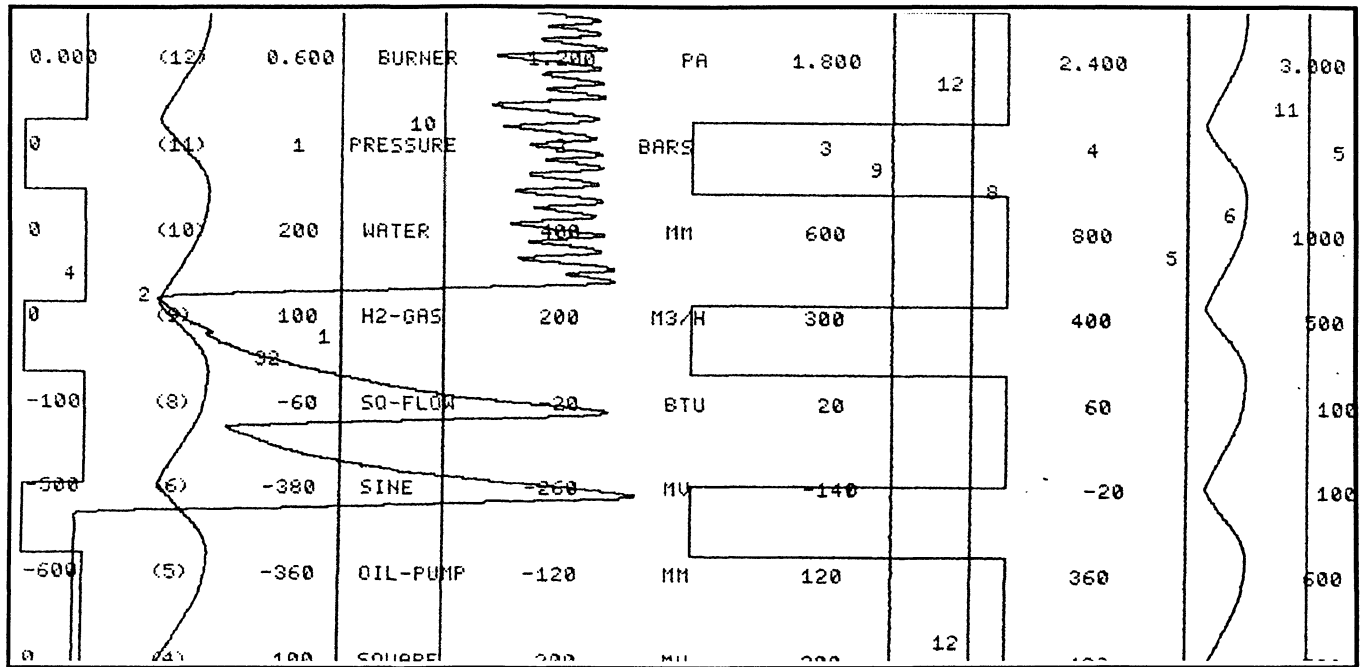


Figure 1-13 Example of trend format

If desired, the chart range width may be limited to less than the 250 mm calibrated width of the paper. This feature is useful if you wish to segregate records into zones, or prevent overprinting of similar values of input signals using the same chart range. The only limitation is that the width of the chart range cannot be less than 20 % of the chart. This feature is illustrated in the following example of chart record.

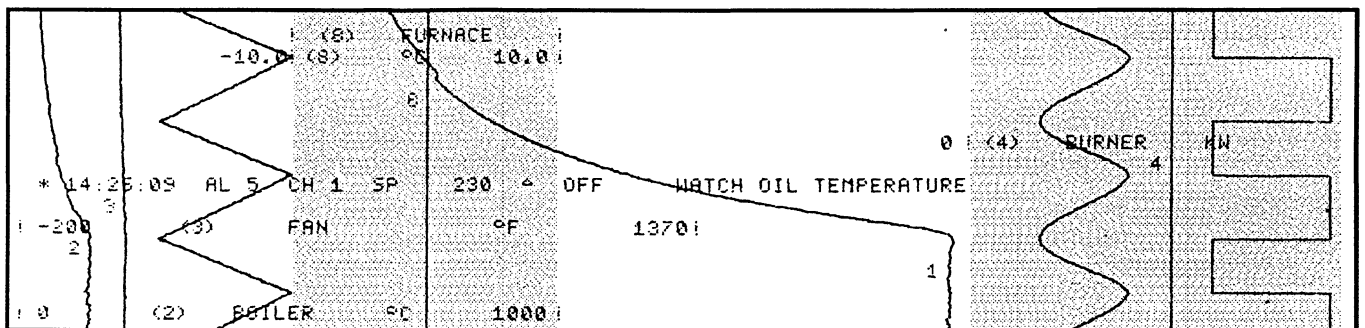


Figure 1-14 Example of zoning

Whilst operating in trend format the operator may instruct the recorder via the keyboard to print a snapshot of input values in tabular mode, at any time.

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

In tabular format analog input values, and digital input status, are printed at pre-configured intervals as alphanumeric data.

CH21	-229.4	°C	-	CH28	0.5	M3	-	CH29	21.9	°C	-	CH30	21.8	MV	-
CH9	324	M3/H	-	CH10	314.3	MM	-	CH11	4.800	BARS	-	CH12	2.121	PA	-
CH5	441.1	MM	-	CH6	31.9	MV	-	CH7	15.87	MV	-	CH8	46.8	BTU	-
CH1	472.4	°C	-	CH2	15.73	°C	-	CH3	31.9	MV	-	CH4	23.06	MV	-
- 13:00:00 29 SEP 1989 10 MINUTES PAPER : 21															
CH31	19.3	BARS	-	CH32	211.9	°C	-	CH29	21.9	°C	-	CH30	21.8	MV	-
CH21	-229.4	°C	-	CH28	0.5	M3	-	CH11	4.800	BARS	-	CH12	2.121	PA	-
CH9	324	M3/H	-	CH10	314.3	MM	-	CH7	16.25	MV	-	CH8	46.8	BTU	-
CH5	441.1	MM	-	CH6	32.6	MV	-	CH3	32.6	MV	-	CH4	23.06	MV	-
CH1	472.4	°C	-	CH2	16.09	°C	-	- 12:50:00 29 SEP 1989 10 MINUTES PAPER : 21							

Figure 1-15 Example of tabular format

In alternate format the recorder normally records inputs in trend mode, but interposes a tabular printout periodically.

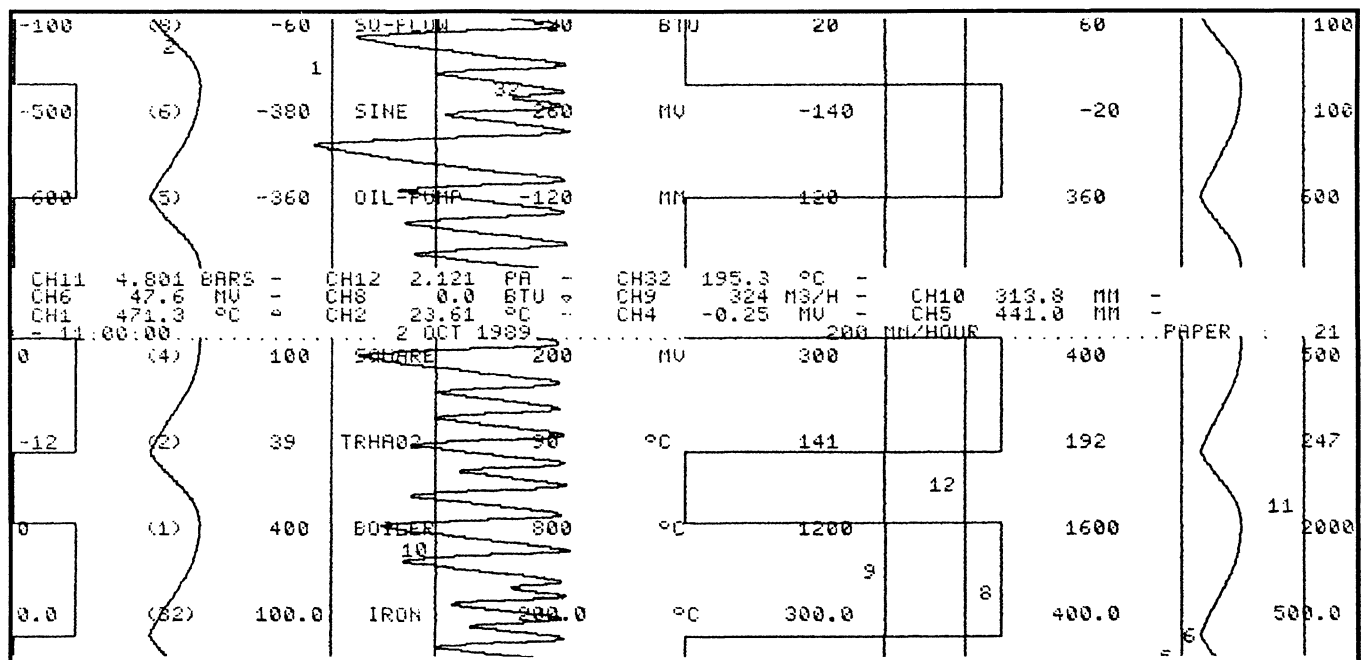


Figure 1-16 Example of alternate format

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

1.10.2 Information printing

The recorder prints a comprehensive set of information on the chart at regular intervals. This information is arranged to fit within the window of chart length always visible to the operator, as follows :

Regular information

- ☒ Time, date, chart speed and paper number, with a time datum reference line.
- ☒ Chart range of consecutive active channels.
- ☒ Tabular input data (if in alternate printing format)
- ☒ Channel number of consecutive active channels

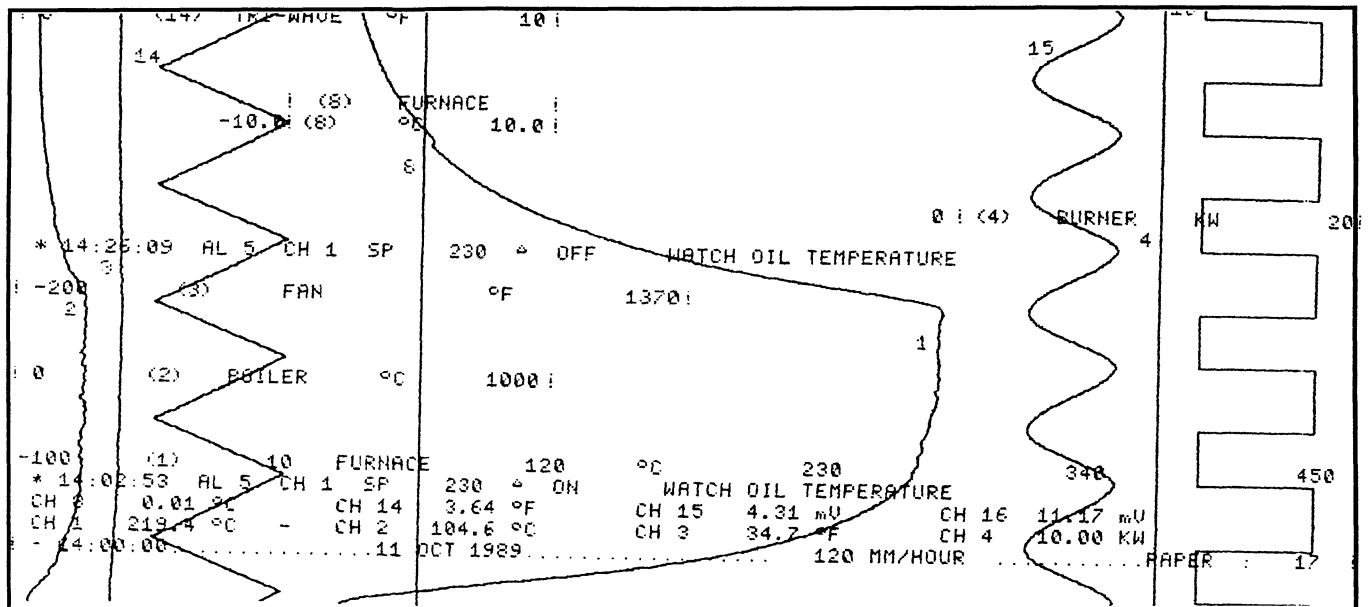


Figure 1-17 Example of information printing

Other important information is printed as it occurs, including :

- ☒ Operational changes, such as changes to chart speed or print interval.
- ☒ Alarm messages, both when alarm occurs and clears
- ☒ Messages via digital communication option.

Examples of operational messages are shown in the chart record below.

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

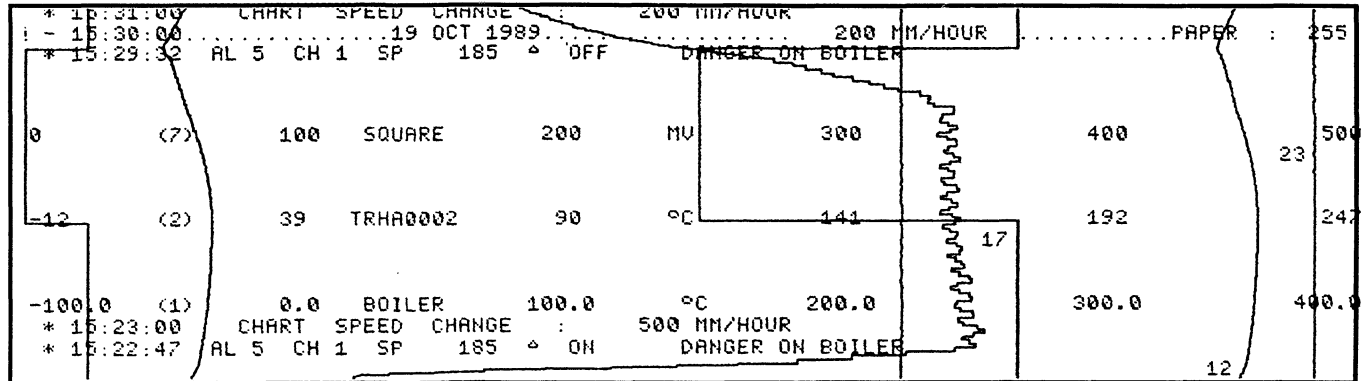


Figure 1-18 Example of operational messages

More information on alarm messages is given in paragraph 1.14

1.11 "EVENT PRECURSOR" MODE

In this mode the recorder scans the inputs as usual, stores the processed data in a buffer memory, but does not print input data unless triggered by one of the following :

- ☒ An analog input alarm configured to trigger printing.
- ☒ A digital input alarm configured to trigger printing (option).
- ☒ A remote command via a communication interface (option)

* Note : When the event precursor mode is asked, the recorder stops automatically the printing operation. Do not push the **RECORD** key to stop the printing.

Until triggered the recorder operates in standby. To indicate that it is functioning correctly it prints time, date and "IN EVENT PRECURSOR MODE".

```
* 16:00:00..... 6 OCT 1989..... IN EVENT PRECURSOR MODE
* 15:00:00..... 6 OCT 1989..... IN EVENT PRECURSOR MODE
* 14:00:00..... 6 OCT 1989..... IN EVENT PRECURSOR MODE
* 13:00:00..... 6 OCT 1989..... IN EVENT PRECURSOR MODE
* 12:00:00..... 6 OCT 1989..... IN EVENT PRECURSOR MODE
* 11:00:00..... 6 OCT 1989..... IN EVENT PRECURSOR MODE
* 10:04:00..... 6 OCT 1989..... IN EVENT PRECURSOR MODE
* 10:04:00..... 6 OCT 1989..... IN EVENT PRECURSOR MODE
```

Figure 1-19 Event precursor recorder in standby

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

When triggered, the recorder prints the contents of its buffer memory, giving input values and messages for the period leading up to the triggering event, and for a similar time interval thereafter. Typical memory contents consists of 1 hour of trend format trace for 12 inputs at 50 mm/hour chart speed prior to the triggering event.

When configuring the recorder for "Event Precursor" mode, you have the choice of returning to "standby" after printout, or continuing to print as though in continuous printing mode.

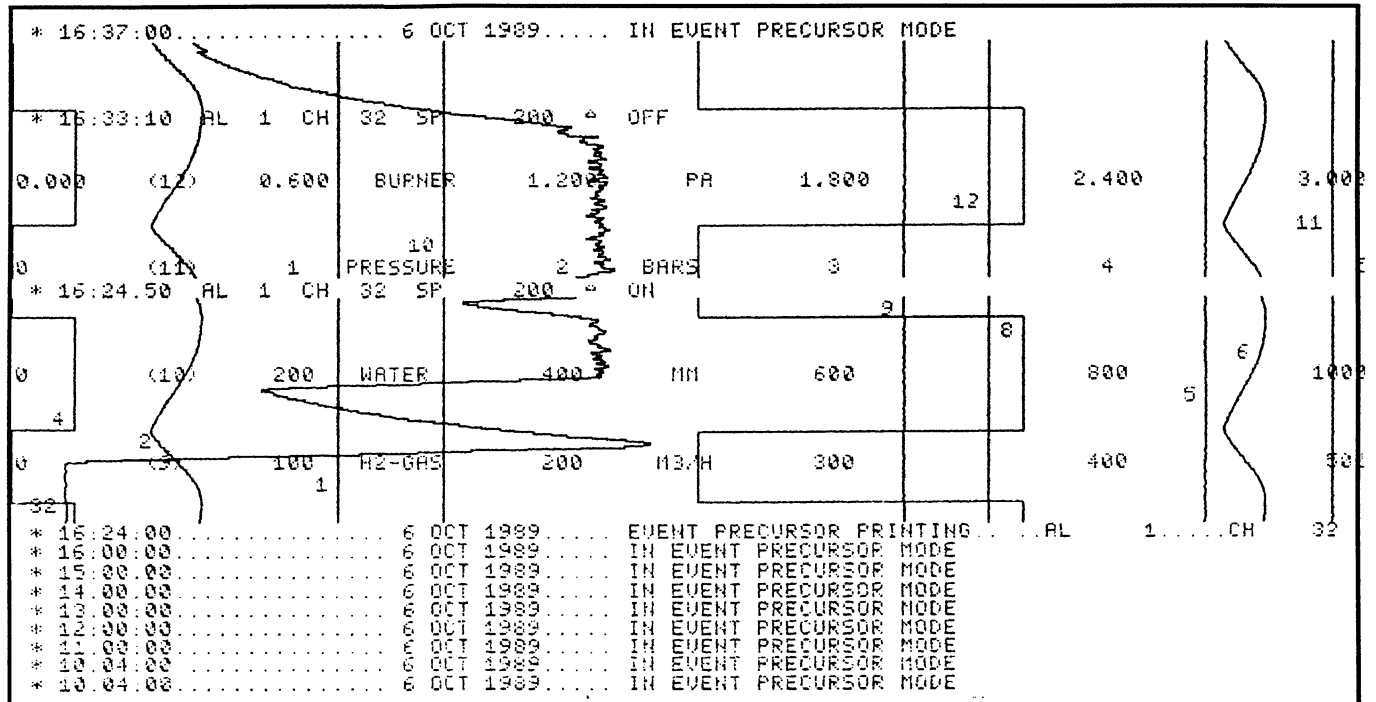


Figure 1-20 Event precursor printout

MULTICHANNEL RECORDER

Two independent test routines are available for verifying recorder printing performance, as follows.

This routine is intended to test the function of the dot-matrix ballistic printhead and associated drive commands.

Figure 1-21 Print test printout

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

1.12.2 Teacher mode

This routine produces a record of graphic traces and alphanumeric information which is independent of connected inputs. Graphic traces include triangular and square waves. This function provides visual confirmation that mechanical parts, and most of the electronics and software are functioning correctly.

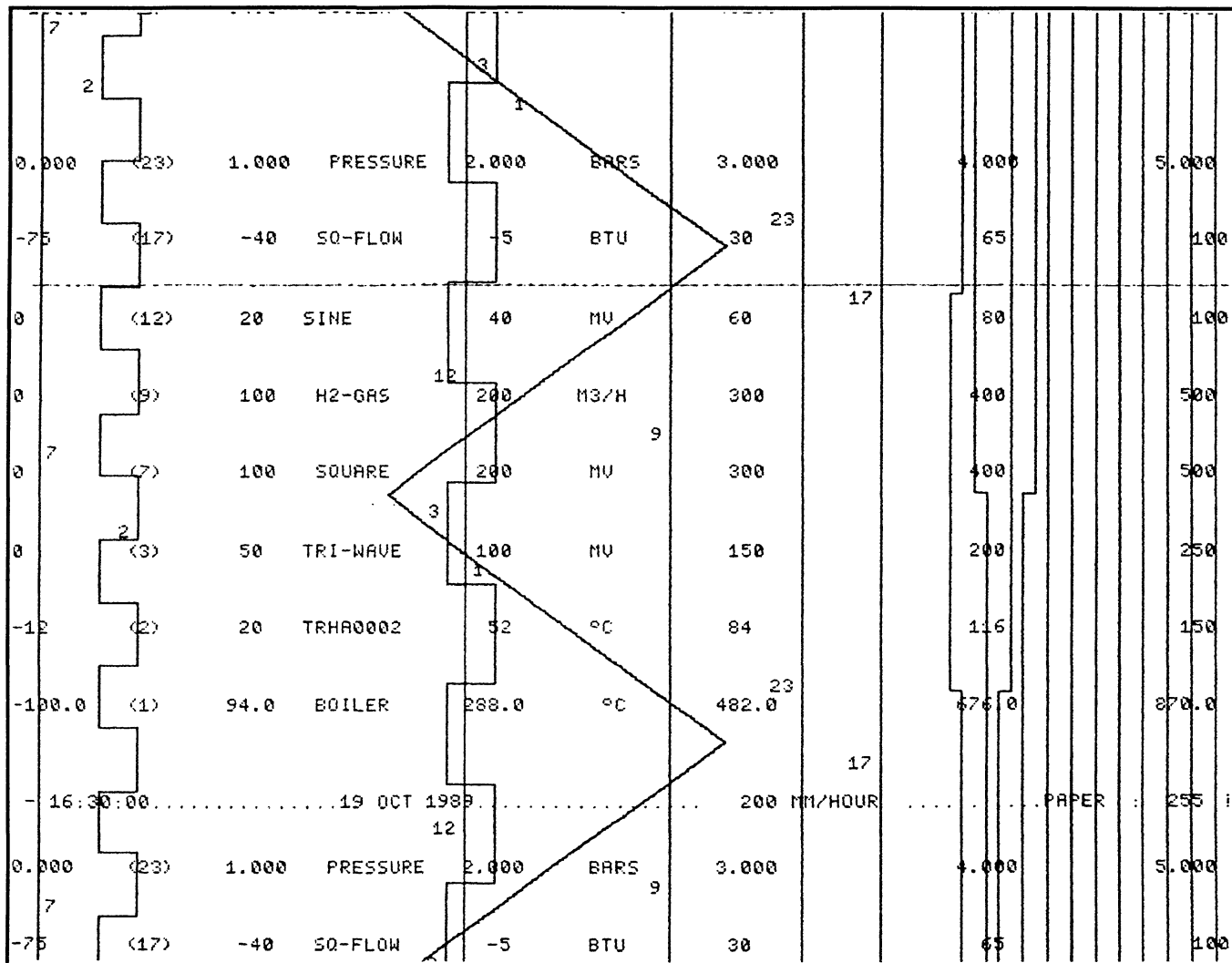


Figure 1-22 Teacher mode printout

1.13 ALARM CAPABILITY

1.13.1 Analog alarms

The recorder includes, as standard, a flexible alarm package consisting of 60 alarm setpoints which may be assigned to any analog input channels. They may be configured to operate as :

- ☒ High or low value.
- ☒ Rising and/or falling rate of change.
- ☒ Differential between 2 channels.

Alarms are available for display in normal running mode, and each may be configured to permit or inhibit acknowledgment by the operator.

They may also be configured to have an effect on printing operation, as follows :

- ☒ Change channel record to red on alarm.
- ☒ Change channel chart range to range 2.
- ☒ Change recorder chart speed or print interval to speed or interval 2.
- ☒ Print channel on alarm.
- ☒ Print a message.
- ☒ Trigger "Event Precursor" printing.

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

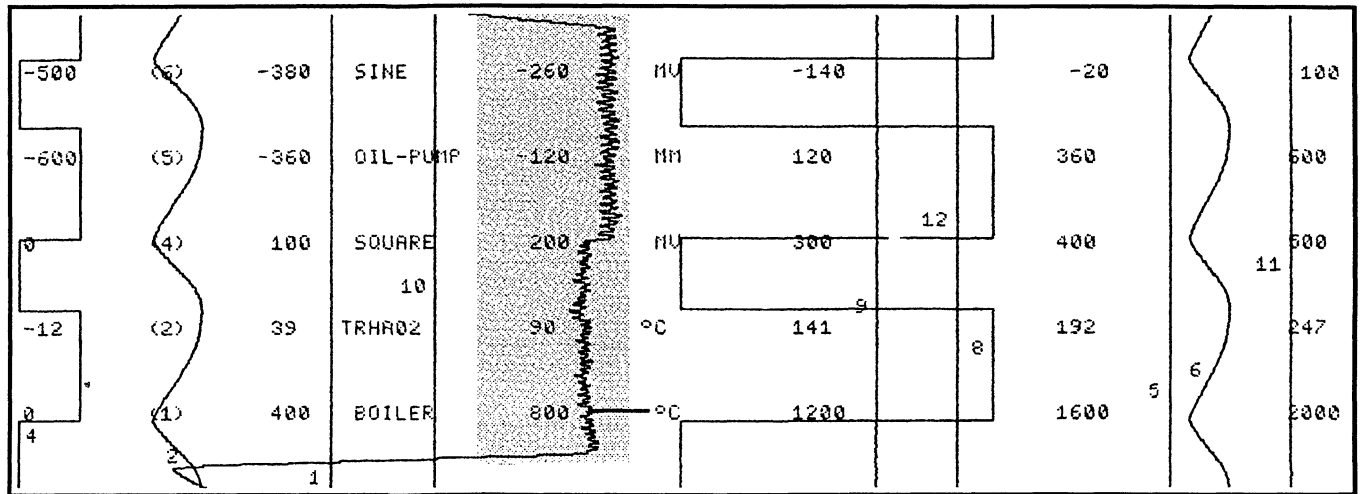


Figure 1-23 Change channel record to red on alarm

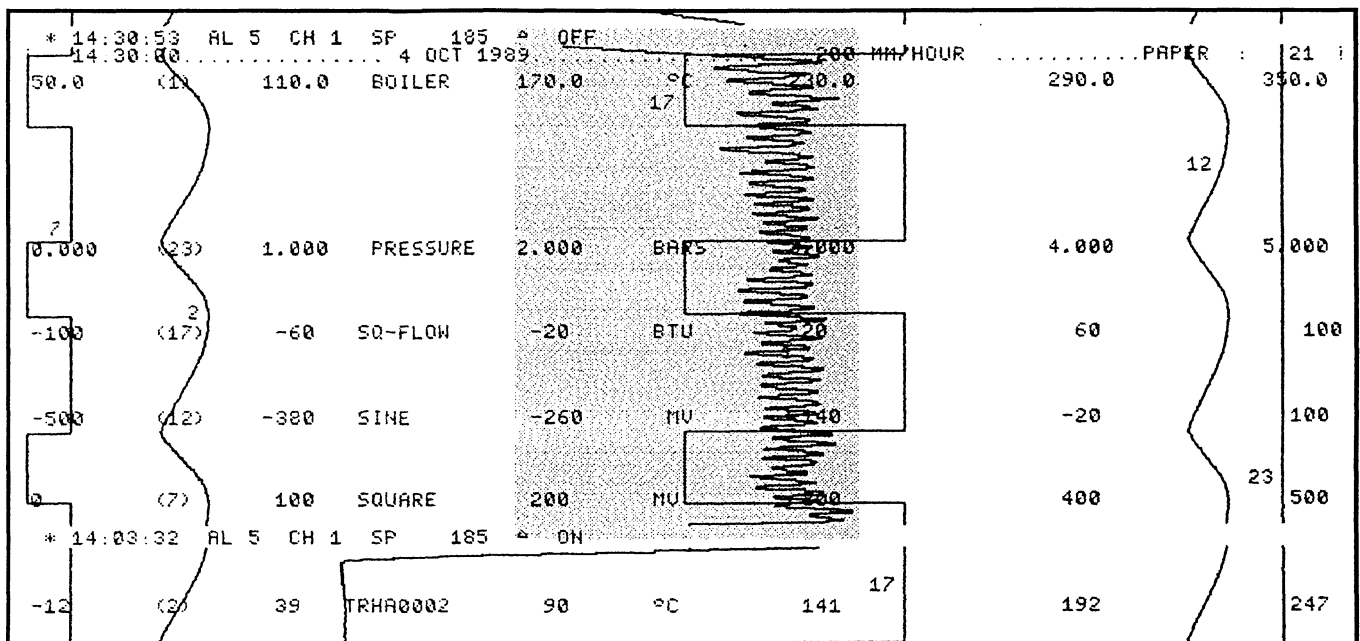


Figure 1-24 Change channel chart range to chart range 2

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

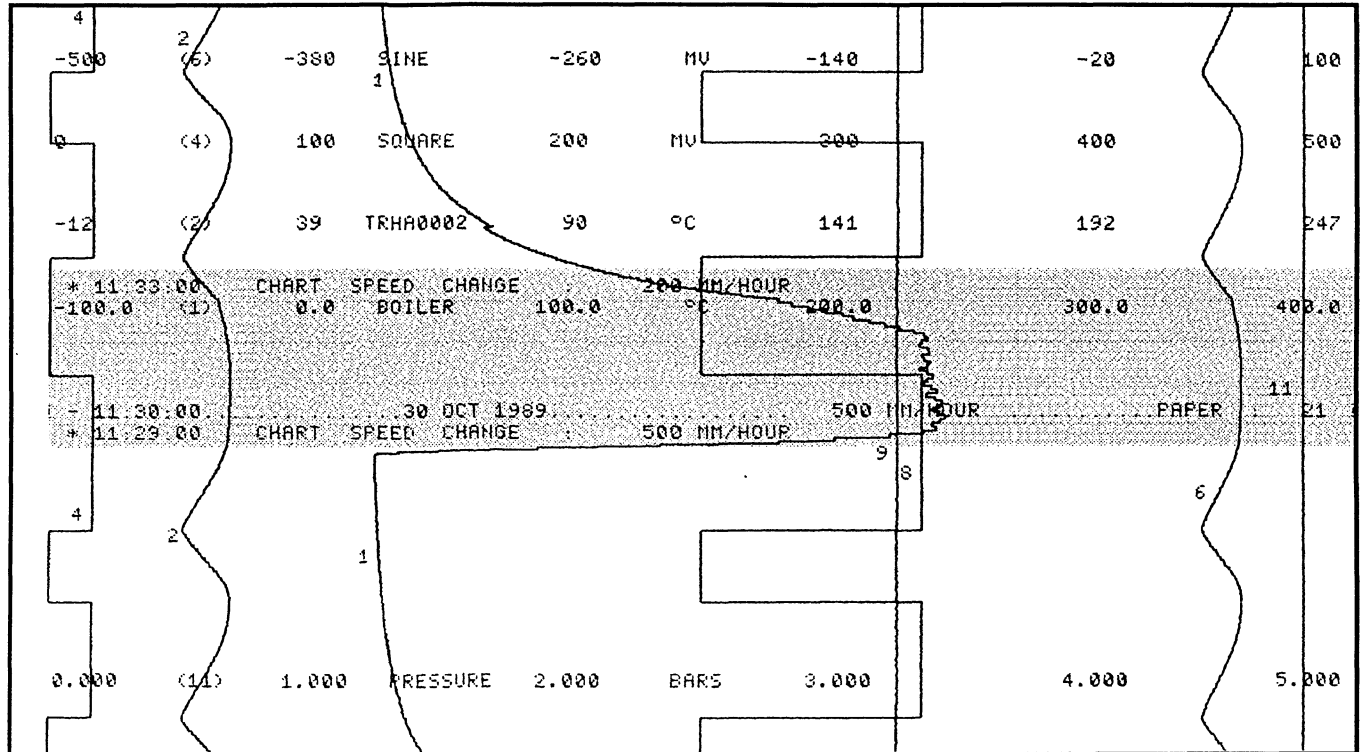


Figure 1-25 Change chart speed to speed 2

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

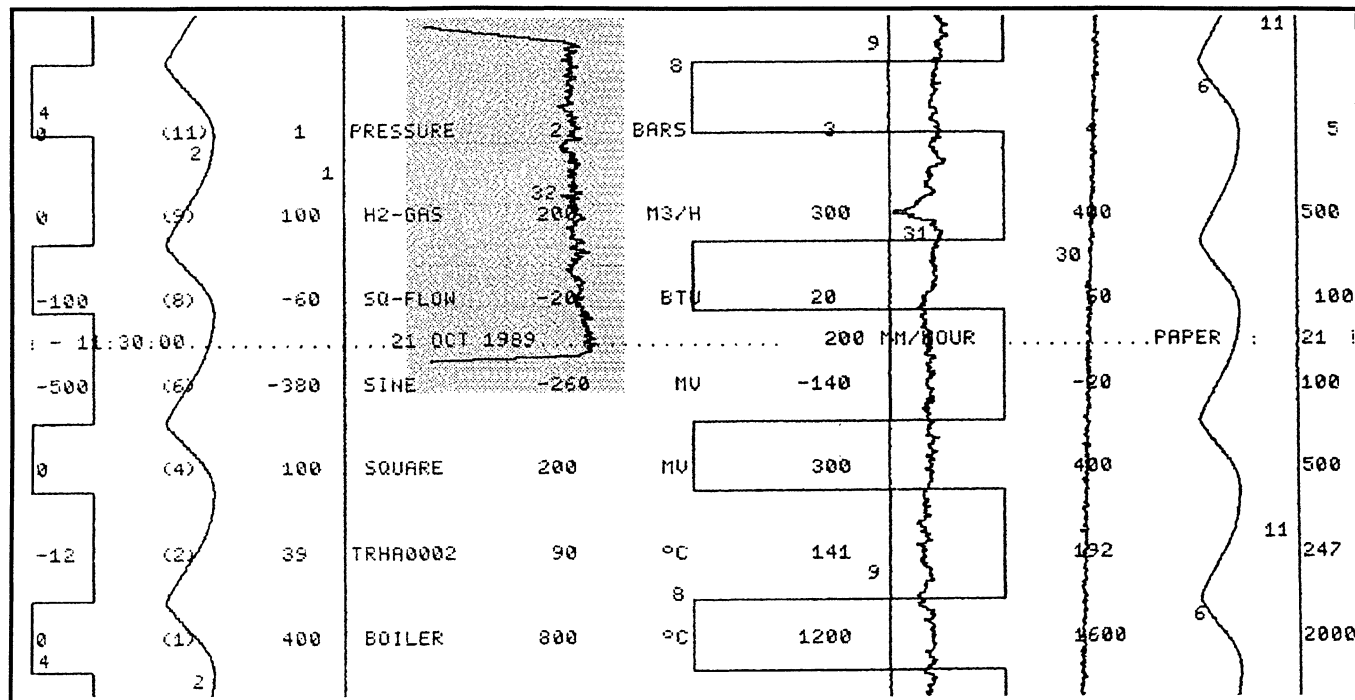


Figure 1-26 Print channel on alarm

1.13.2 Digital input alarms (option)

If the digital input option is installed, one additional alarm may be assigned to each digital input. They may be configured to operate as :

- ☒ High or low status.
- ☒ Change of status.
- ☒ Differential status between 2 inputs.

If required they may also be configured to have an effect on printing operation, as follows :

- ☒ Print all analog channels on alarm.
- ☒ Change recorder chart speed or print interval to speed or interval 2.
- ☒ Change all analog channels to chart range 2.
- ☒ Change printing format to tabular mode.
- ☒ Inhibit all printing.
- ☒ Print a message.
- ☒ Trigger "Event Precursor" printing.

Characteristics :

- ☒ Open circuit voltage : 12 V (-10%, +5%).
- ☒ Short circuit current : 2.5 mA max.
- ☒ Maximum contact impedance : 200 Ω .

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

Isolation :

Inputs on the same card are not isolated from each other. Each card has an isolation of 60 Vac between its inputs and :

- ☒ Ground.
- ☒ The rest of the product.
- ☒ Inputs on another logic card.

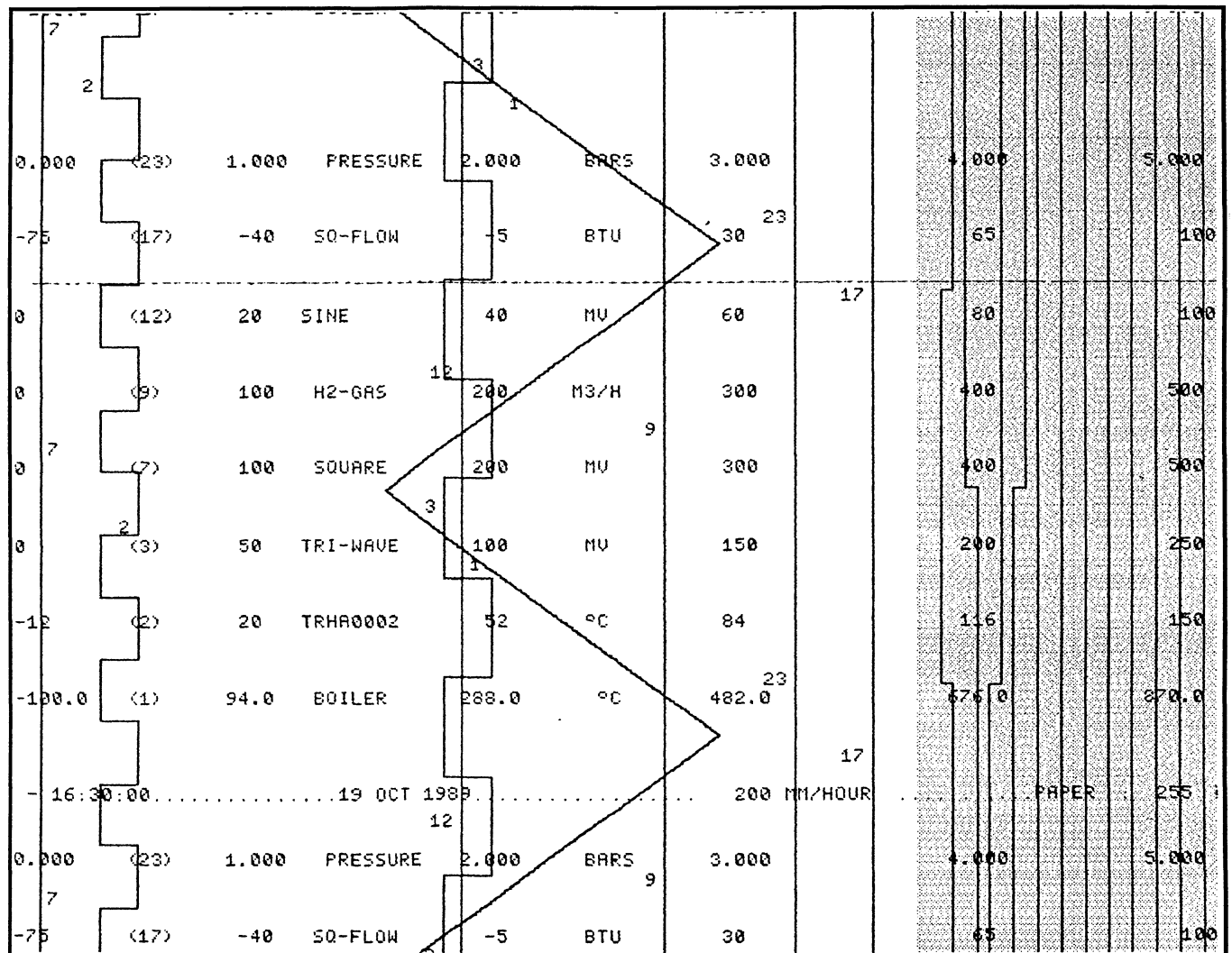


Figure 1-27 Example of digital inputs printing

1.13.3 Alarm relays (option)

The standard recorder is supplied without alarm relays, in which case the effects of the alarms described above are confined to displays and printing operations.

Output relays are SPST, field configurable as normally open or normally closed, rated 5 A at 220 Vac resistive load. Relay contacts will withstand 1 million operations at 5 A and unity power factor.

Warning : To ensure fail-safe operation relay coils are factory configured energized when the alarm is off.

1.14 ALARM MESSAGES

Reference has been made in previous paragraphs to the information printing capability of the recorder. You may also configure the recorder to print on alarm either a standard message or a specific message.

A standard alarm message consists of time, alarm number, analog channel or digital input number, alarm setpoint value (analog), alarm type symbol and "ON". When the alarm clears a similar message is printed, but ending in "OFF".

A specific message may be configured to follow the standard message. This message may be any one of 20 pre-configured messages, each of up to 30 alphanumeric characters. Each message can be printed in any of the six colors available, permitting you to assign the same message to more than one alarm, and yet avoid ambiguity by the use of different colors.

1. PRODUCT OVERVIEW

MULTICHANNEL RECORDER

A further configuration choice decides whether messages will be superimposed on trend traces, as in the following chart example :

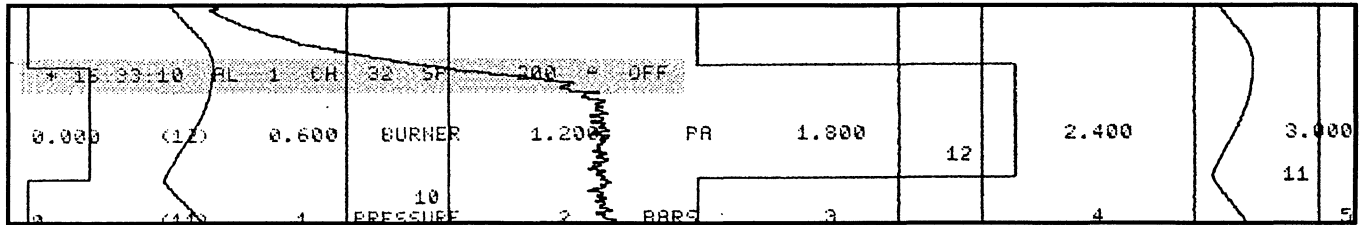


Figure 1-28 Alarm messages superimposed

or printed on blank paper, the trend records becoming discontinuous, but without loss of data, as in the following chart example :

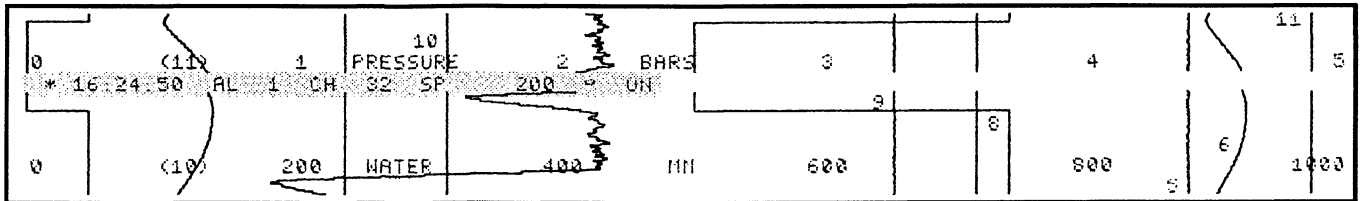


Figure 1-29 Alarm messages on blank paper

A third choice is to print as in figure 1-28 when the message buffer memory is low, but switch to printing on blank paper if the message buffer fills. This selection makes the printer microprocessor decide on the best format at any moment to ensure that no messages are unprinted.

When operating in tabular mode messages are never superimposed on tabular data.

1.15 RESIDENT CALIBRATION

The recorder is supplied with resident factory calibration stored in non-volatile memory for each available input actuation. Normally there is no need for periodic field calibration. However, should you wish to verify the calibration, refer to section 6, "CALIBRATION".

For details of digital display accuracies, under reference conditions, refer to paragraph 1.4.2 page 1-5.

MULTICHANNEL RECORDER

1.16 CHART ACCURACY CERTIFICATION

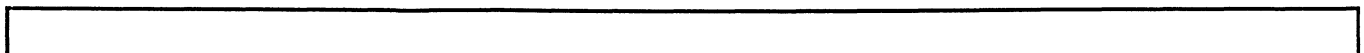
On traditional recorders printing accuracy is seldom specified because it is too greatly affected by ambient temperature and relative humidity, paper positioning, mechanical linkages and hysteresis. The recorder eliminates these inaccuracies by printing accuracy certification marks at 0% and 100% of the chart with every time and date message. The positions of these marks can be adjusted, if necessary, via the keyboard, as described in section 6, "CALIBRATION". If extreme conditions of relative humidity should occur subsequently, the certification marks provide a mean of correcting chart records.

- 12:06:00.....16 OCT 1989.....	100 MM/HOURPAPER	: 21
		CAL 100%	
- 12:04:00.....16 OCT 1989.....	100 MM/HOURPAPER	: 21
		CAL 100%	
CAL 0%			
CAL 0%			
- 12:01:00.....16 OCT 1989.....	100 MM/HOURPAPER	: 21

Figure 1-30 Chart accuracy certification marks

**MULTICHANNEL
RECORDER****TABLE OF CONTENTS**

Section	Page
2.1 INTRODUCTION.	2-1
2.2 IDENTIFYING THE RECORDER MODEL.	2-1
2.3 PREPARATION.	2-6
2.3.1 The back-up battery	2-6
2.3.2 Fuse location	2-8
2.4 MOUNTING AND WIRING	2-9
2.4.1 Mounting the recorder in a panel.	2-10
2.4.2 Guidelines for external wiring.	2-12
2.4.3 External wiring connections.	2-14
2.4.3.1 A.C. Supply.	2-15
2.4.3.2 Analog input signals.	2-19
2.4.3.3 Digital input signals.	2-22
2.4.3.4 Relay outputs.	2-23
2.5 INSTALLATION OF PRINT RIBBON CARTRIDGE AND CHART.	2-25
2.5.1 Installing the print ribbon cartridge.	2-25
2.5.2 Installing the chart.	2-28
2.5.2.1 Fan-fold chart.	2-29
2.5.2.2 Roll chart.	2-37
2.6 APPLYING POWER.	2-40

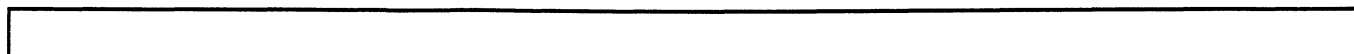


LIST OF ILLUSTRATIONS

Number	Title	Page
2-1	Rear of recorder with terminal cover off	2-6
2-2	Rear of recorder showing battery switch location	2-7
2-3	Battery switch position.	2-7
2-4	Fuse location.	2-8
2-5	Panel Cut Out dimensions	2-10
2-6	Location of shipping screws	2-11
2-7	Installing the mounting brackets	2-12
2-8	Rear terminals.	2-14
2-9	View of the power supply wiring for a panel mounting case	2-15
2-10	AC supply wiring for a panel mounting case	2-16
2-11	View of the power supply wiring for a portable case	2-17
2-12	Wiring the IEC plug.	2-18
2-13	Analog input signal wiring.	2-19
2-14	Analog input card (T/C, mA, mV, Volt)	2-20
2-15	Divider network	2-21
2-16	Digital input signal wiring.	2-22
2-17	Relay output wiring.	2-23
2-18	Alarm relay board.	2-24
2-19	Withdrawing printer chassis to stop	2-25
2-20	Print carriage at mid travel.	2-26
2-21	Aligning cartridge with print head.	2-27
2-22	Releasing the two catches	2-28
2-23	Placing the fan-fold chart in the upper compartment.	2-29
2-24	Pushing the fan-fold chart to rear of compartment.	2-30
2-25	Releasing the transparent platen.	2-31
2-26	Swinging the chart platen forward.	2-32
2-27	Feeding the chart into the lower compartment.	2-33
2-28	Closing the platen.	2-34
2-29	Closing the chart cassette assembly.	2-35
2-30	Fan-fold chart flow.	2-36
2-31	Locating the roll chart	2-37
2-32	Feeding the roll chart	2-38
2-33	Locating the re-roll spindle.	2-39
2-34	Roll chart flow	2-40

LIST OF TABLES

Number	Title	Page
2-1	Model selection guide	2-1
2-2	Model selection guide	2-4
2-3	Rated environmental limits	2-9
2-4	External wiring	2-13
2-5	mV and V input resistor divider networks	2-21



MULTICHANNEL RECORDER

2. INSTALLATION

2.1 INTRODUCTION

This section provides information for mounting, preparing and wiring the recorder for configuration and operation.

The recorder is shipped completely assembled, with hardware for panel mounting.

If you have not unpacked the recorder, be sure to inspect its shipping carton for damage. Then remove the recorder, inspect it for any obvious shipping damage, and report any damage to the carrier. Check that panel mounting hardware, a chart, a print cartridge and a bag of fuses are included in the package.

2.2 IDENTIFYING THE RECORDER MODEL

Make sure that the model number shown on the nameplate agrees with the model you have ordered. The model number may be interpreted from the following selection guide :

Spec. ENO1-2004	Description	Model								
Key Number 2 Digits	Recorder 4 to 32 channels	D3 D4								

TABLE 1	DESCRIPTION	s p e c i f y	AVAILABILITY CHANNEL NUMBERS							
			1	5	9	13	17	21	25	29
			to 4	to 8	to 12	to 16	to 20	to 24	to 28	to 32
Inputs Selection 8(digits)	S L O T 1	- None	X							
		- 4 "fast" inputs T/C, mV, mA (c)	X							
		- 4 "fast" inputs RTD (c)	X							
		- 4 Inputs T/C-mV-V.Rad-mA (b)	X							
		- 4 RTD Pt 100 (IEC-JIS)	X							
	S L O T 2	- None		X						
		- 4 "fast" inputs T/C, mV, mA (c)		X						
		- 4 "fast" inputs RTD (c)		X						
		- 4 Inputs T/C-mV-V.Rad-mA (b)		X						
		- 4 RTD Pt 100 (IEC-JIS)		X						

TABLE 2-1 Model selection guide

MULTICHANNEL RECORDER

2. INSTALLATION

TABLE 1		DESCRIPTION	s p e c i f y	AVAILABILITY CHANNEL NUMBERS							
				1 to 4	5 to 8	9 to 12	13 to 16	17 to 20	21 to 24	25 to 28	29 to 32
(c)	S L O T 3	- None - 4 Inputs T/C-mV-V.Rad-mA (b) - 4 RTD Pt 100 (IEC-JIS)	0 3 4			X X X					
	S L O T 4	- None - 4 Inputs T/C-mV-V.Rad-mA (b) - 4 RTD Pt 100 (IEC-JIS)	0 3 4				X X X				
	S L O T 5	- None - 4 Inputs T/C-mV-V.Rad-mA (b) - 4 RTD Pt 100 (IEC-JIS)	0 3 4					X X X			
	S L O T 6	- None - 4 Inputs T/C-mV-V.Rad-mA (b) - 4 RTD Pt 100 (IEC-JIS)	0 3 4						X X X		
	S L O T 7	- None - 4 Inputs T/C-mV-V.Rad-mA (b) (f) - 4 RTD Pt 100 (IEC-JIS) (f)	0 3 4							X X X	

TABLE 2-1 Model selection guide [continued]

2. INSTALLATION

MULTICHANNEL RECORDER

TABLE 1		DESCRIPTION	s p e c i f y	AVAILABILITY CHANNEL NUMBERS							
				1 to 4	5 to 8	9 to 12	13 to 16	17 to 20	21 to 24	25 to 28	29 to 32
(c)	S L O T 8	- None	0								X
		- 4 Inputs T/C-mV-V.Rad-mA (b) (f)	3								X
		- 4 RTD Pt 100 (IEC-JIS) (f)	4								X

TABLE 2-1 Model selection guide [continued]

Note : (b) For mA inputs, please order separately the 250 ohms resistor. (See accessories table in section 8 "PARTS LIST")

(c) For internal data management reasons, the use of 2 fast analog input boards limits to 4 the number of standard analog input boards operating, and slots 7 and 8 are ignored in that case. See table in Chapter 1, OVERVIEW, paragraph "Electronic card cage".

(f) If fast scanning input is selected in Slot 1 only, all other slots can be used for standard input boards. If fast scanning input is selected in Slot 1 and Slot 2, no board can be fitted in Slot 7 and Slot 8.

2. INSTALLATION

MULTICHANNEL RECORDER

TABLE	DESCRIPTION	SPECIFY	AVAILABILITY
Table 2 Alarms output (1 letter)	- No alarm	0	X
	- 6 built in relay	A	X
	- 12 built in relay	B	X
Table 3 Logic input (1 digit)	- None	0	X
	- 6 logic inputs	1	X
	- 12 logic inputs	2	X
Table 4 Communi- cation	- None	0	X
	- DMCS	A	X
	- Universal ASCII (RS422-485-232) (g)	B	X
	- Modbus RTU (RS232-422-485)	C	X
Table 5 Extension	- None	0	X
	- Mathematical module	1	X
Table 6 Options (2 letters)	- Dark grey door with latch	0K	X
	- Dark grey door with key lock	0L	X
	- Dark grey door with key lock and plastic window	0M	X
	- Black door with latch	00	X
	- Black door with keylock	0A	X
	- Portable case (e)	0B	X
	- Caribbean blue door with latch	0C	X
	- Caribbean blue door with keylock	0D	X
	- Caribbean blue door with keylock and plastic window	0H	X
	- Y.H. style - Black door with latch	0E	X
	- Y.H. style - Black door with key	0F	X
	- Y.H. style - portable case - Black door	0G	X
	- C.S.A. Approval Unit	CS	X
	- Customer configuration (d)	CF	X
	- Calibration test report (i)	TR	X

TABLE 2-2 Model selection guide

2. INSTALLATION

MULTICHANNEL RECORDER

TABLE	DESCRIPTION	SPECIFY	AVAILABILITY
Table 7 Literature	Product Manual		
	- English EN1I-6093	EN	X
	- French FR1I-6093	FR	X
	- German GE1I-6093	GE	X
	- Italian IT1I-6093	IT	X
	- Spanish SP1I-6093	SP	X
	- Swedish SW1I-6093	SW	X
	- English (U.S. format) US1I-6093	US	X
Table 8 Specials	None	000	X
	ST Number	XXX	(k)

TABLE 2-2 Model selection guide [continued]

- Note : (e) Portable case, mains switch and IEC mains plug connector. Door color has to be specified separately.
(g) Application software available, order from accessories list. (See section 8 "PARTS LIST")
Modbus RTU Comm in special.
(k) Refer to special instrument list or contact factory for new requirement.
(d) Customer must complete "Configuration worksheet" and attach it with his order.
(i) If this is required on a specific input range, please order also the option "CF".

2.3 PREPARATION

Before installing the recorder, or applying power to it for the first time, you must prepare it for operation by performing these tasks :

- ☒ Checking the line voltage selection and fuse
- ☒ Installation of the print cartridge and chart, as described in paragraph 2.5.
- ☒ Removing the shipping stops on the print transport.

2.3.1 The back-up battery

If the unit has to stay without power for a long time (more than 3 months), please disconnect the battery by using the following procedure.

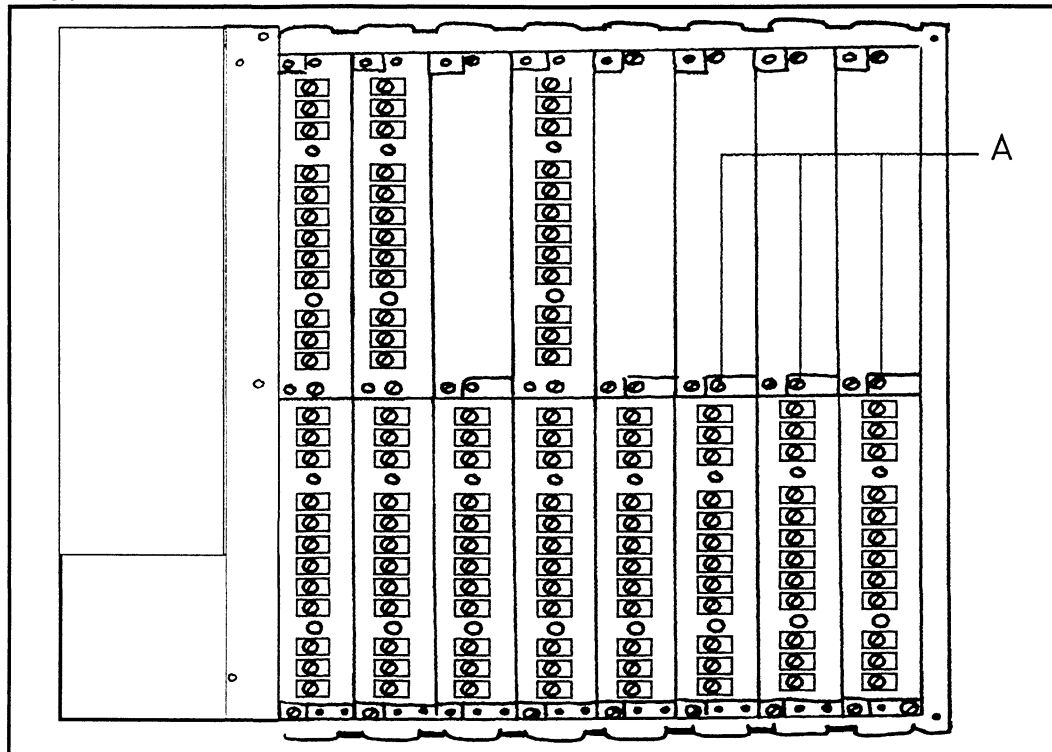


Figure 2-1 Rear of recorder with terminal cover off

Unscrew the terminal cover at the rear of the recorder. Then unscrew the three rear terminal blocks or covers, according to the model supplied, at the upper right corner (Ref A). Remove the terminal blocks and the circuit boards to which they were attached.

The unit is delivered from the factory with the back-up battery connected.

MULTICHANNEL RECORDER

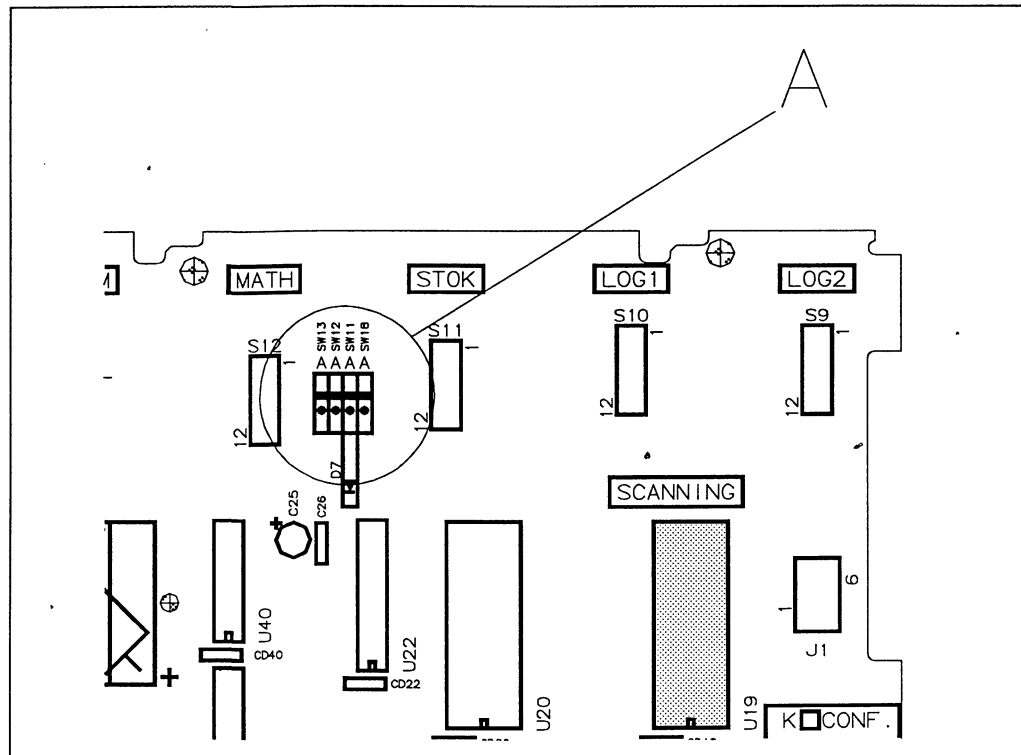


Figure 2-2 Rear of recorder showing battery switch location

Behind these circuit boards (or covers), on the main circuit board, you will find the SW18 switch (ref.A). See figure 2-2. This switch enables or disables the back-up battery for the real time clock. During storage the battery should be disconnected by moving the switch to the OFF position as shown in figure 2-3.

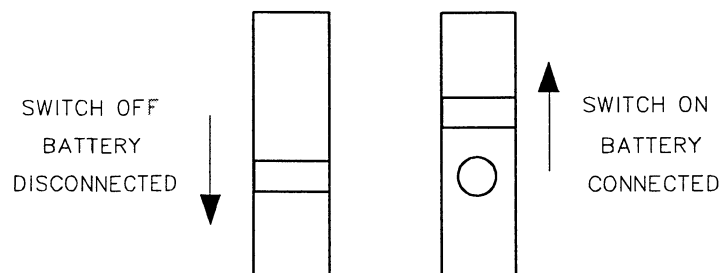


Figure 2-3 Battery switch position.

2.3.2 Fuse location

The fuse is located in a screw-on quarter turn support.

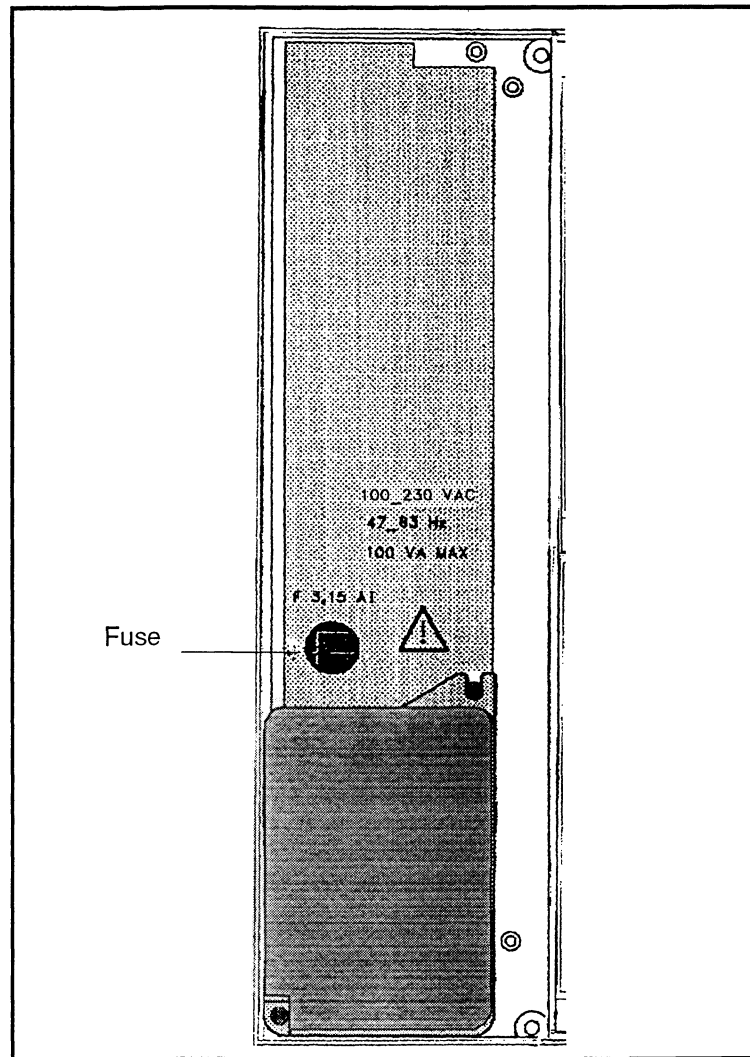


Figure 2-4 Fuse location

Rem : Refer to chapter 8 for the fuse ordering.

Each wire must be protected with a fuse equivalent to the recorder fuse (fuse type) as well as for a fuse holder.

2.4 MOUNTING AND WIRING

Before you prepare the recorder we recommend that you compare the environmental conditions at the location where it is to be mounted with the values given in table 2-3 below. Environmental conditions that exceed the stated limits may have an adverse effect on the recorder's performance.

PARAMETER		RATED LIMITS	INFLUENCE ON ACCURACY
Temperature		0 to 50 Deg C / 32 to 120 Deg F	<0.2% per 10 Deg C or per 18 Deg F or <0.4% for ranges marked *
Humidity		10% to 90% RH non condensing	0.2% of total range
Voltage		100 to 230 Vac (50/60 Hz)	No influence
Vibration (IEC 873)		Frequency : 0 to 70 Hz Acceleration : 0.1 g	No influence No influence
Source resistance	T/C and mV RTD and Ohms	0 to 1000 Ohms 0 to 15 Ohms (only for PT100)	1.2 μ V per 100 Ohms with burnout 0.1 Deg C per Ohm (3 balanced leads)

EXTREME CONDITIONS			
Operating	Temperature Humidity Vibration (IEC 873)	Frequency Acceleration	-10 to 50 Deg C / 14 to 120 Deg F 5% to 90% RH non condensing 0 to 200 Hz 0,2 g
	Fan fold paper		-10 to 40 Deg C / 14 to 100 Deg F 5% to 80% RH non condensing
Storage	Temperature Humidity		-25 to 70 Deg C / -15 to 160 Deg F 5 % to 95% RH non condensing. *

TABLE 2-3 Rated environmental limits

* Refer to paragraph "ranges" in section 1, "OVERVIEW".

In addition, locate the recorder as far as possible from high level interference sources such as :

- ☒ Radio transmitters.
- ☒ Large contactors.
- ☒ Motor starters.
- ☒ Power transformers.
- ☒ Phase angle fired silicon controlled rectifiers.

Note : For a better noise immunity towards the power supply frequency please verify that the frequency configuration is correct : see Chapter 3, CONFIGURATION, paragraph " frequency 50/60 Hz".

2.4.1 Mounting the recorder in a panel

Make a cutout in the panel to the dimensions given in Figure 2-5 below.

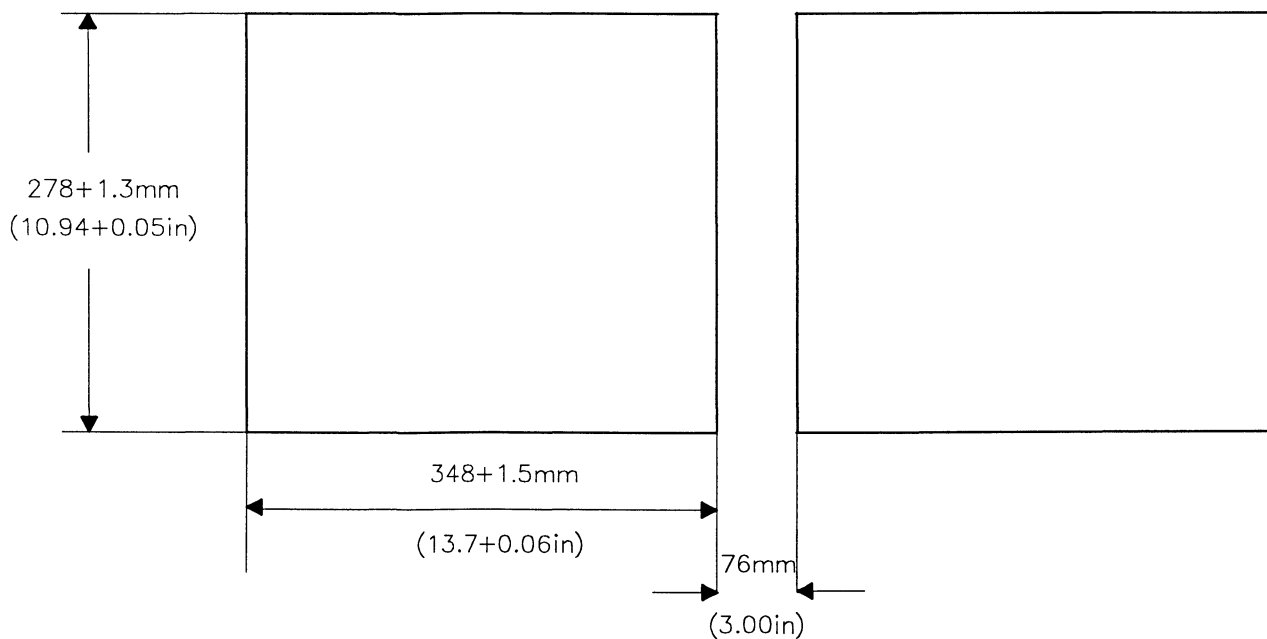


Figure 2-5 Panel Cut Out dimensions

MULTICHANNEL RECORDER

2. INSTALLATION

Ensure that there will be at least 25 mm (1 inch) on each side and at the rear of the case to permit free circulation of air, and that the minimum distance between 2 cutouts is 76 mm (3.00 inch).

Remove the 2 shipping screws, one on each side of the case, that secured which the printer chassis during shipment. See Figure 2-6.

Remove the 2 clips on each side of the Print Carriage securing the carriage during shipment.

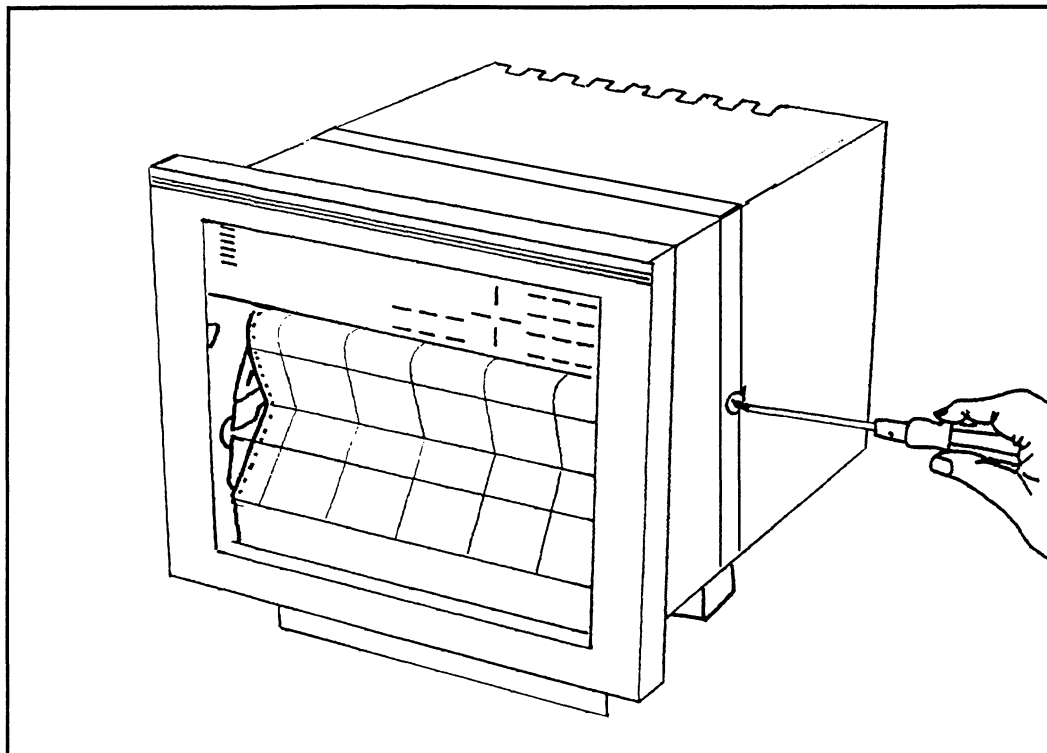


Figure 2-6 Location of shipping screws

We recommend that you tape the warning note to the recorder window until preparation is completed.

From the front of the panel, slide the recorder through the cutout as far as it will go. At the rear of the panel install one of the mounting brackets on the side of the case and lightly tighten its screw. Install the second bracket on the other side of the case and lightly tighten its screw. Now tighten both mounting bracket screws firmly to secure the recorder case against the panel. See Figure 2-7.

MULTICHANNEL RECORDER

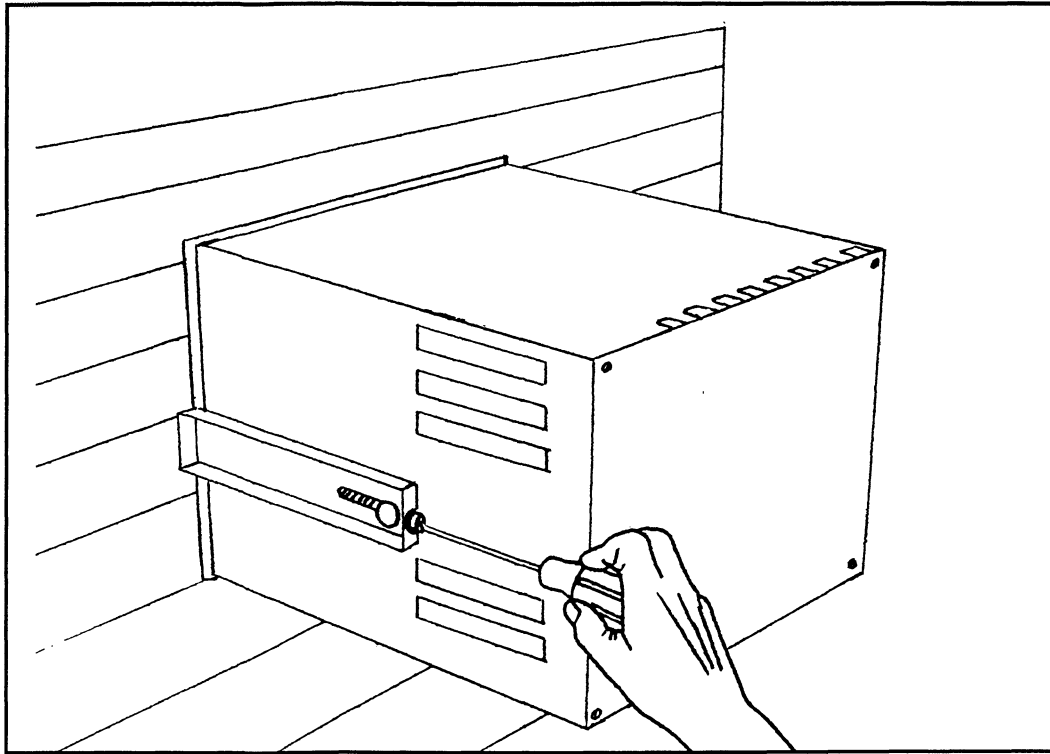


Figure 2-7 Installing the mounting brackets

Retain the shipping screws and the shipment carton for future use.

Caution : The chassis must be locked in position for reshipment.

2.4.2 Guidelines for external wiring

Although the recorder has built in circuits to reduce the effects of most electrical noise, we recommend that you review the following guidelines for other measures which you can take to minimize these effects by correct routing and connection of external wiring.

Electrical noise consists of unwanted electrical signals in the input and output wires of an instrument. When noise is superimposed on valid electrical signals it can impair instrument performance.

2. INSTALLATION

MULTICHANNEL RECORDER

- Shielding. For distances over 1.5 meters (5 feet), use a separate metal tray or conduit for each bundle of wires requiring shielding. See table 2-4 below. Tray covers must be in continuous contact with the side rails of the trays. When separate trays are impracticable, combine bundles as shown in table 2-4, using twisted wires with a metal outer braid as noted. This practice is not as effective as using separate trays or conduits. Connect the wire shield to ground, at one end only, preferably at the recorder.
- Routing. Wires carrying unlike signals should be crossed at 90° angle, with maximum spacing.
- Power wires. Keep the line and neutral wires together in the same conduit or tray.
- Resistance temperature detector (RTD) wires. Use three twisted wires of equal length and cross-section, with an overall metal shield. The maximum resistance of each wire is 15 ohms.
- Ground wire. For the ground connection use insulated wire with a minimum gauge of 1.3 mm. Attach the wire firmly to an earth ground such as a metal stake driven into the ground.

SIGNAL CARRIED	BUNDLE NUMBER	CAN BE COMBINED WITH BUNDLE	TWISTED WIRES REQUIRED	SHIELDING REQUIRED
Power	1	4,6	no	no
Process variable	2	none	yes	yes
Digital inputs	3	5	yes	yes
Line voltage to alarm relay	4	6,1	no	no
Line voltage to alarm relay	5	3	yes	yes
Ground	6	1,4	no	yes
Communication	7	8	yes	yes
Relay box	8	7	yes	yes

TABLE 2-4 External wiring

2. INSTALLATION

MULTICHANNEL RECORDER

2.4.3 External wiring connections

Note : All wiring must conform to local codes and regulations.

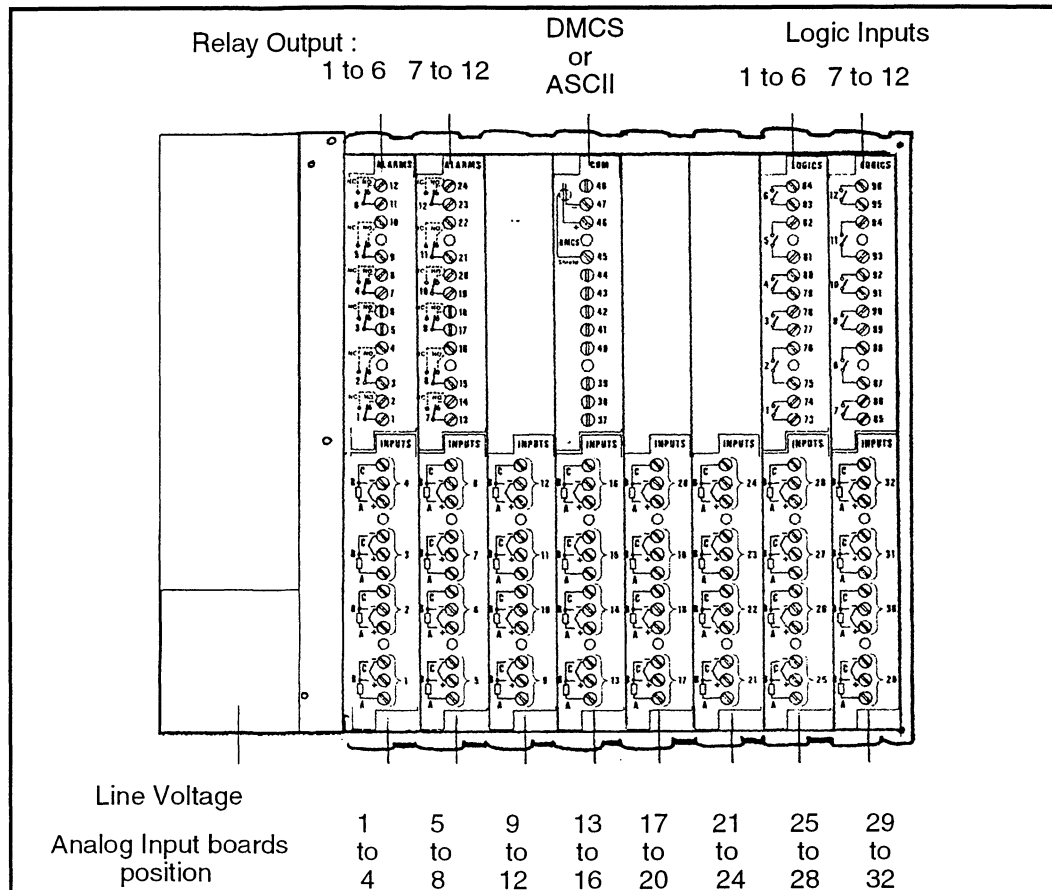


Figure 2-8 Rear terminals

2.4.3.1 A.C. Supply

2.4.3.1.1 Panel mounting case

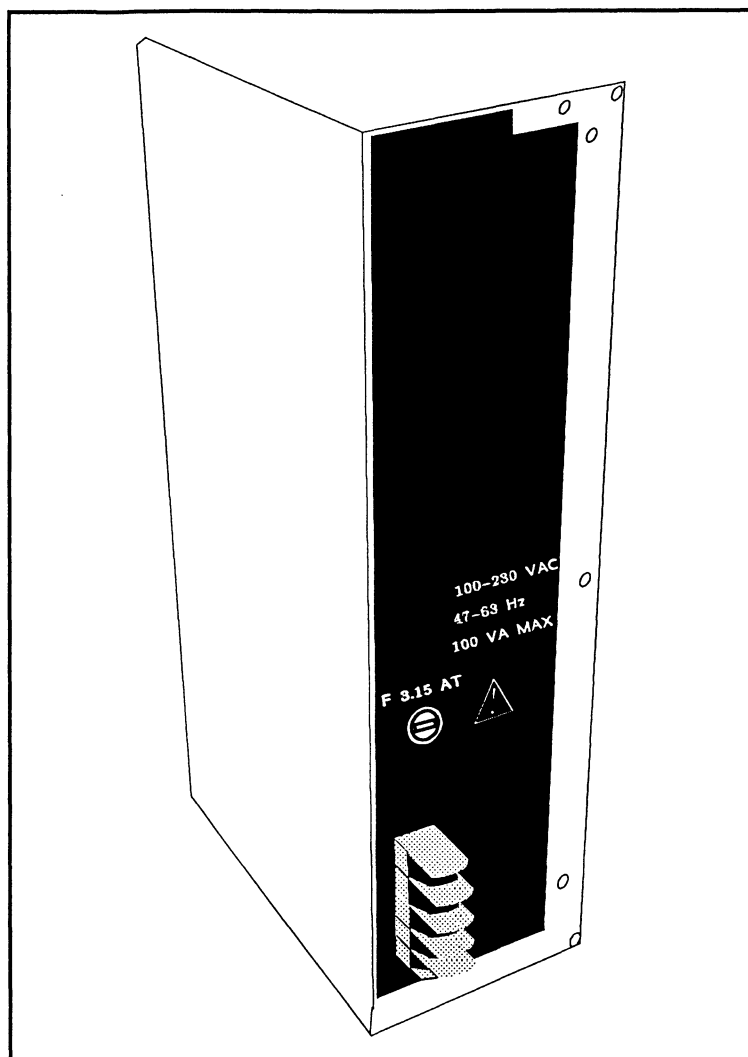


Figure 2-9 View of the power supply wiring for a panel mounting case

Connect the AC supply as shown in figure 2-10

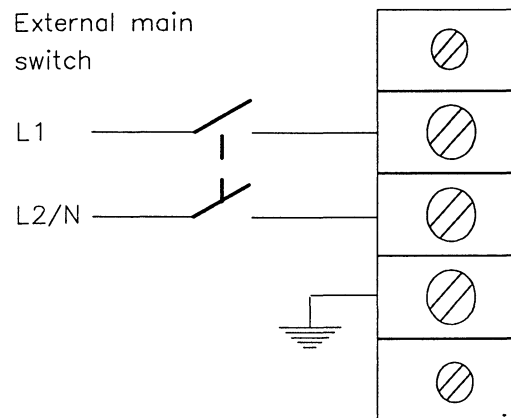


Figure 2-10 AC supply wiring for a panel mounting case

MULTICHANNEL RECORDER

2.4.3.1.2 Portable case

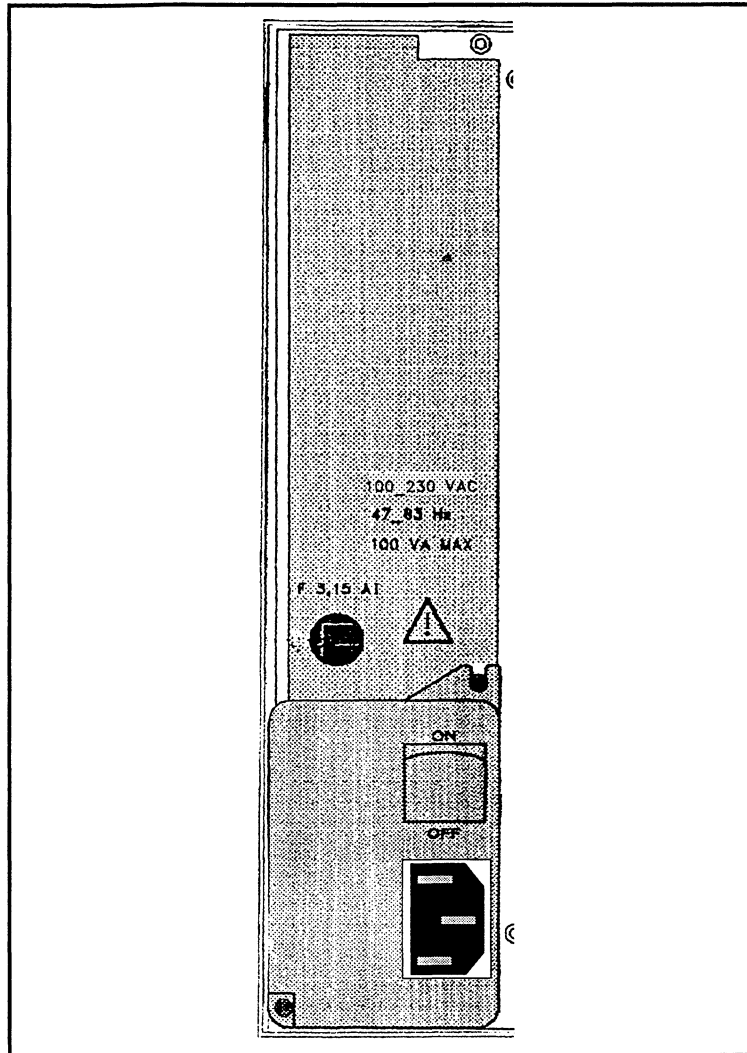


Figure 2-11 View of the power supply wiring for a portable case

MULTICHANNEL RECORDER

Wire the IEC plug as shown in Figure 2-12.

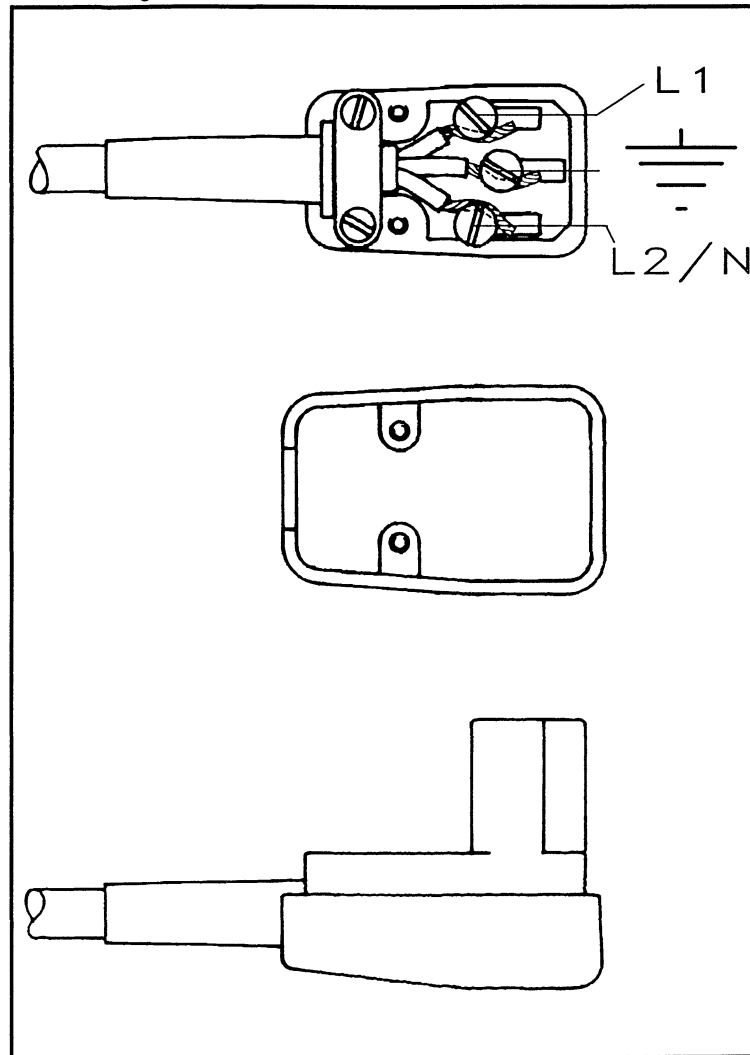


Figure 2-12 Wiring the IEC plug

Connect the IEC plug to the power supply.

2.4.3.2 Analog input signals

Connect the analog input wiring for channels 1 to 4 as shown in Figure 2-13, for the relevant sensor type. Make sure that the actuation agrees with the analog input board type installed in the recorder.

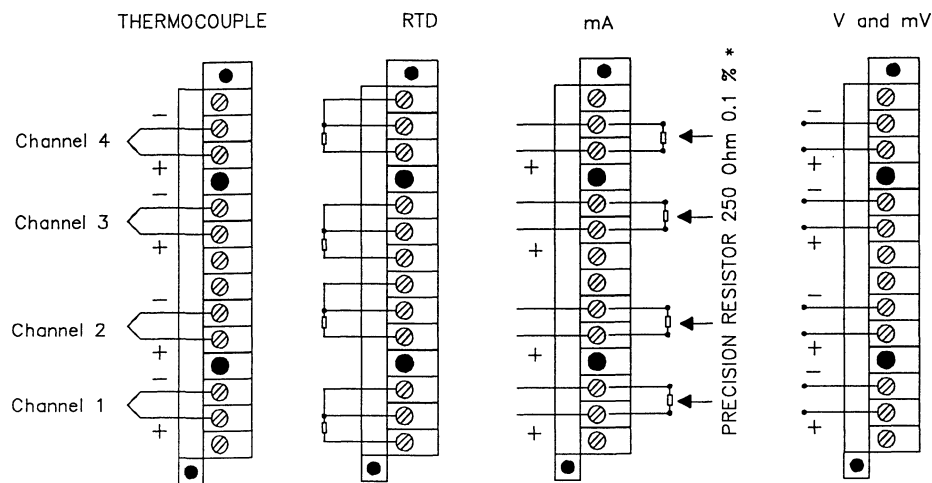


Figure 2-13 Analog input signal wiring

* Ref. 46181080-504

Repeat the above procedure for all analog input channels supplied.

Note : To obtain a better accuracy for all the inputs, it is recommended to take one of these two precautionary measures with the non used RTD inputs :

1. Short-circuit these non used inputs.

or

2. Configure these inputs to "no entry" (in the "analog input" matrix, "Sensor" parameter). See chapter 3, CONFIGURATION.

MULTICHANNEL RECORDER

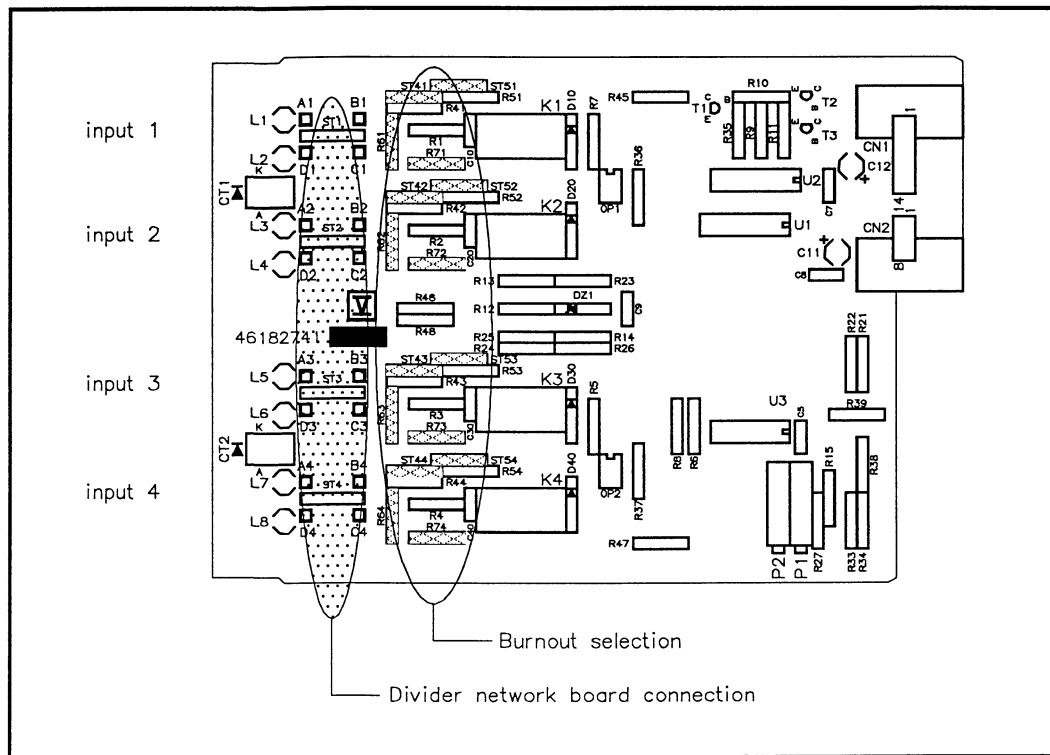


Figure 2-14 Analog input card (T/C, mA, mV, Volt)

2.4.3.2.1 Burnout selection

All the inputs are factory configured to have upscale burnout detection.

If you need to change this configuration :

- ☒ Undo the terminal cover plate and remove the input board, see paragraph "printed circuit boards" in section 7, SERVICE.
 - a. For no burnout detection : remove the R6x and R7x resistors.
 - b. For downscale burnout detection : Cut the ST4x and ST5x straps.

MULTICHANNEL RECORDER

2.4.3.2.2 Divider networks

1. Select the channel (x) on which you want to install the divider network (1 to 4).
2. Cut and remove the correspondent St(x) strap
3. Remove the R6x and R7x resistors.
4. Cut and remove the Cx0 capacitor.
5. Insert the divider network, see table 2-5 for reference, on the analog input card, over the desired input. Use the references (A,B,C,D) for the orientation and solder the divider card. See Figures 2-14 and 2-17.

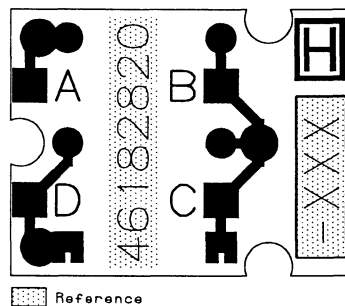


Figure 2-15 Divider network

RANGE	RESISTOR NETWORK KIT NUMBER
-50 to +50 mV *	46182820-501
-200 to +200 mV *	46182820-502
-2 to +2 Volts	46182820-503
-5 to +5 Volts	46182820-504
-20 to +20 Volts	46182820-505
-50 to +50 Volts	46182820-506

TABLE 2-5 mV and V input resistor divider networks

* The use of these divider network items requires to adjust the range calibration (this adjustment must be done in case of new divider kit installation or in case of A/D converter replacement).

MULTICHANNEL RECORDER

Proceed as follow :

1. Place a short-circuit between the inputs + and - corresponding to the divider network. Refer to chapter 2.4.3.2 for terminal location.
2. Configure the divider network channel to the corresponding range in the "analog input" submatrix : refer to chapter 3, CONFIGURATION, paragraph "analog inputs".
3. Note the displayed PV value.
4. In the "analog input" submatrix, configure the "low value" and the "high value" to the nominal value minus the PV value read in 3.
5. Remove the short-circuit, the range calibration is now adjusted.

Example : for -50 / +50 mV range

- Displayed value (with short-circuit) = -1.02 mV
- In the "analog input" submatrix, configure :
 - low value = $-50 - (-1.02) = -48.98$ mV
 - high value = $+50 - (-1.02) = +51.02$ mV

2.4.3.3 Digital input signals

If an optional digital input board is installed, connect the wiring as shown in Figure 2-16.

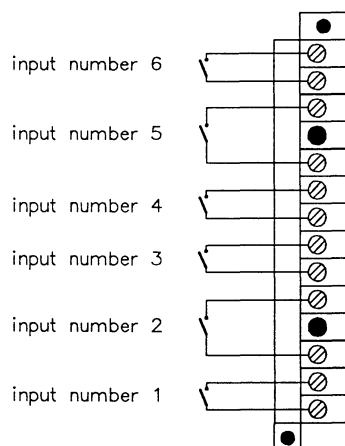


Figure 2-16 Digital input signal wiring.

If 2 digital input boards are fitted, repeat the above procedure for the second board.

MULTICHANNEL RECORDER

Note : Use dry contacts, voltage free, designed to switch 2mA at 12 V.

2.4.3.4 Relay outputs

If an optional relay board is installed, connect the wiring as shown in Figure 2-17 .

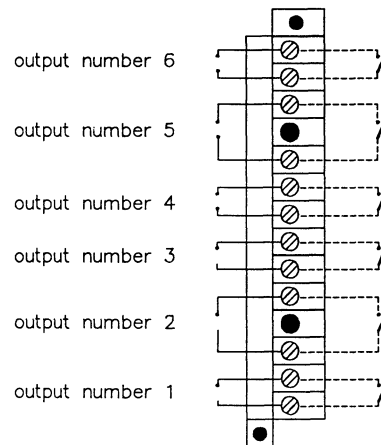


Figure 2-17 Relay output wiring.

If two relay boards are fitted, repeat the above procedure for the second board.

MULTICHANNEL RECORDER

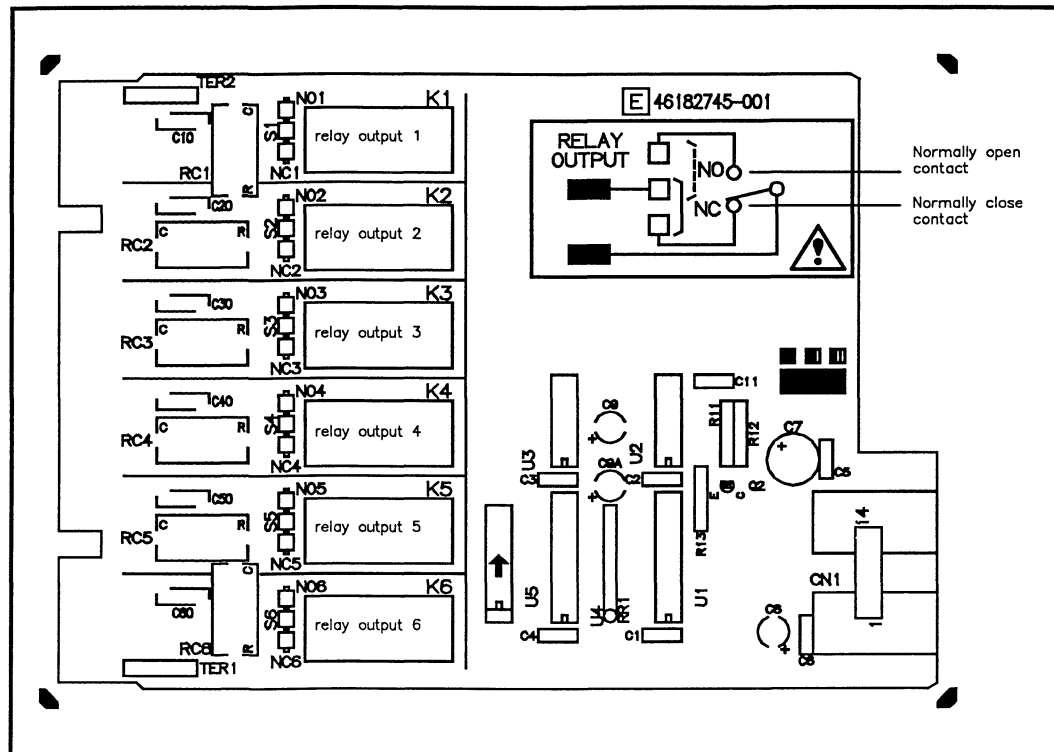


Figure 2-18 Alarm relay board

All the relays are factory configured **de-energized** in alarm. The contacts are factory configured **normally closed** by a strap per output on the alarm relay board.

If you need to invert this function :

- ☒ Undo the terminal cover plate and remove the relay board, see paragraph "printed circuit boards" in section 7, SERVICE.
- ☒ Move the strap from the location NC (for normally closed) to the location NO (for normally open)

2.5 INSTALLATION OF PRINT RIBBON CARTRIDGE AND CHART

The printer chassis has been designed to give easy access for cartridge positioning and chart loading, without the need to completely remove the chassis from the case.

2.5.1 Installing the print ribbon cartridge

Open the recorder door, and use the printer chassis release handles to withdraw the chassis as far as the service stop. See figure 2-19.

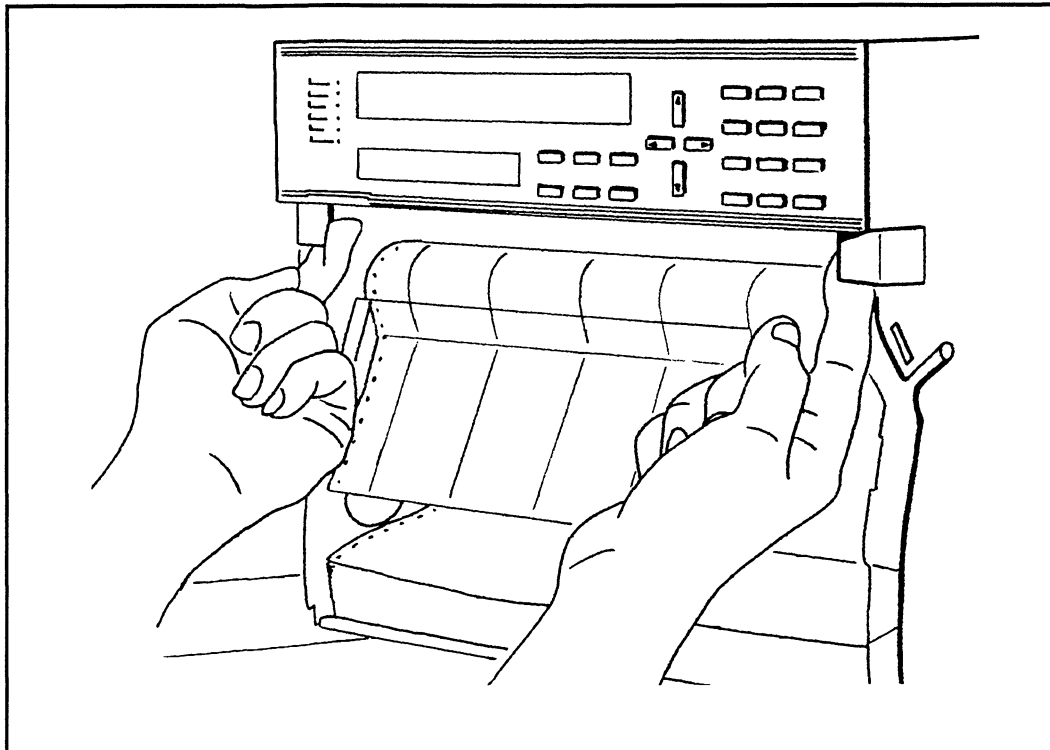


Figure 2-19 Withdrawing printer chassis to stop

MULTICHANNEL RECORDER

If the recorder is powered, swing the top of the chart cassette out, as shown in Figure 2-23. The print carriage will position itself at the right position and stop printing. If the recorder is not powered use the carriage drive belt to position the carriage at about mid travel. See Figure 2-20.

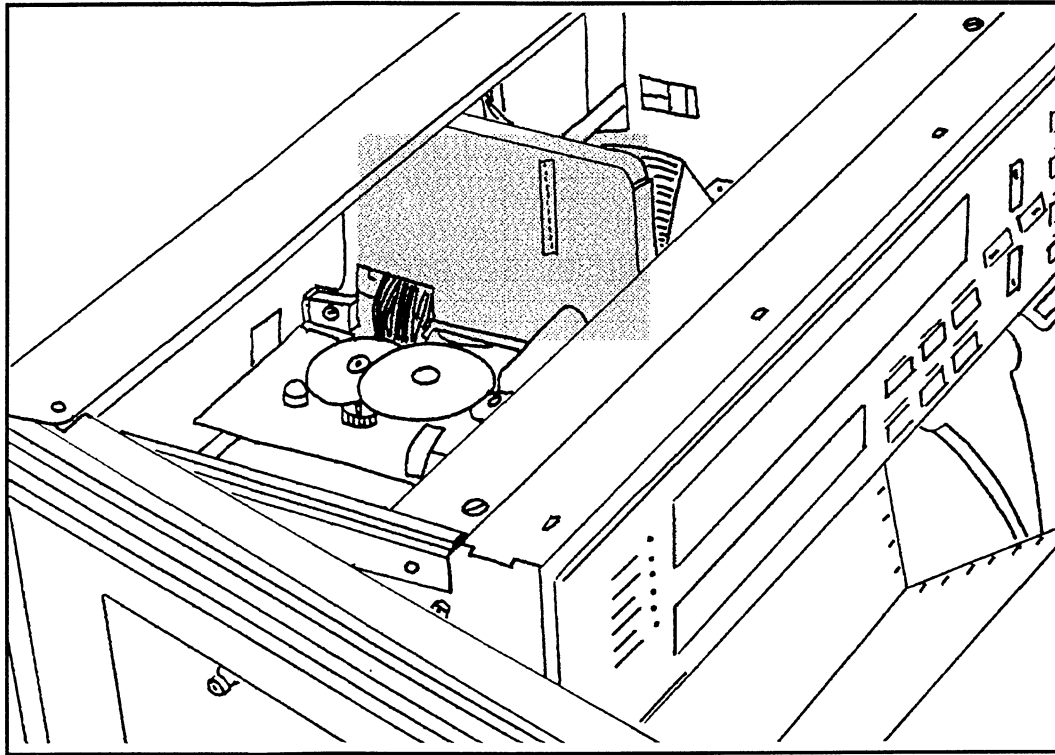


Figure 2-20 Print carriage at mid travel

MULTICHANNEL RECORDER

Remove the ribbon cartridge from its protective bag. Align the tab at the rear of the cartridge with the guide on the carriage, and the aperture and hollow cog-wheel with the guide rod and drive shaft. See Figure 2-21.

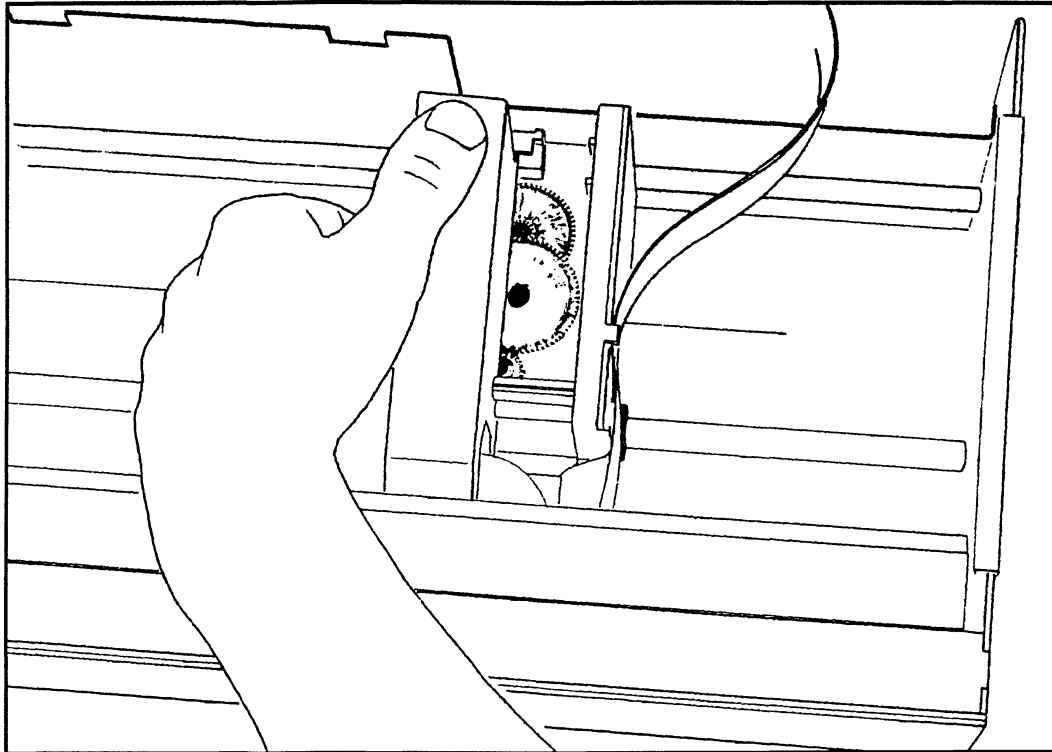


Figure 2-21 Aligning cartridge with print head

Push the cartridge fully home beyond the thrust. Note that changing a cartridge on an operating recorder can be accomplished without loss of recorded data, thanks to the buffer memory.

2.5.2 Installing the chart

Withdraw the printer chassis to the service stop. See Figure 2-19 to paragraph 2.5.1. Now release the two catches at the top of the chart cassette, as shown in Figure 2-22 below, and allow the cassette assembly to pivot outward to its stop, as shown in Figure 2-23.

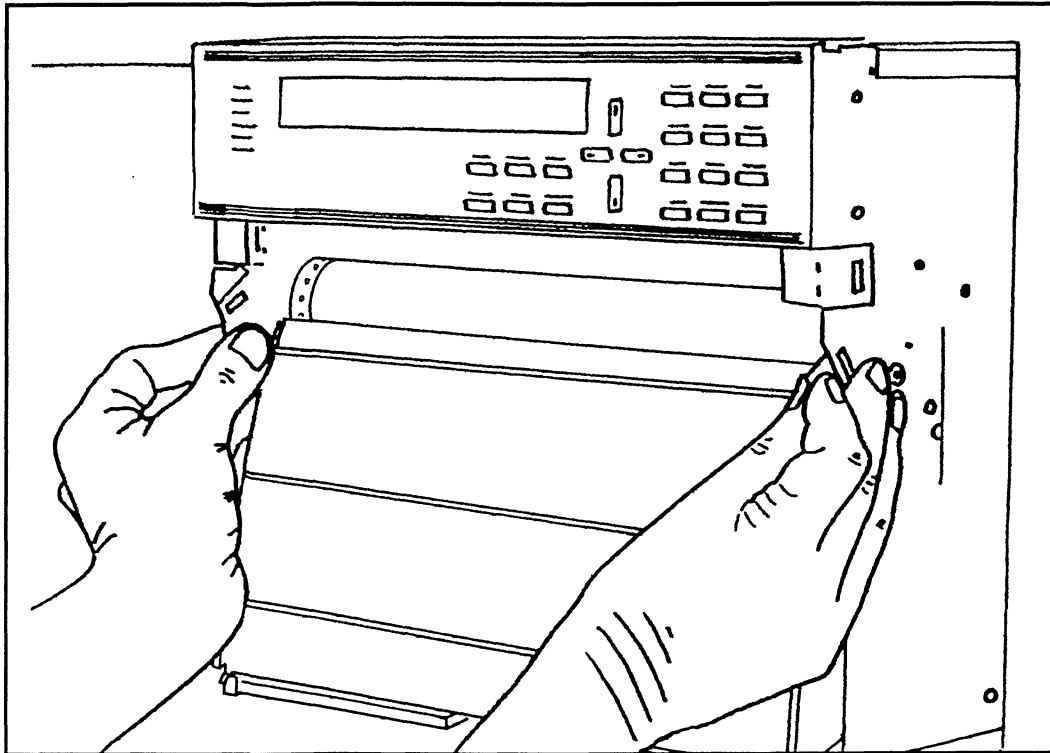


Figure 2-22 Releasing the two catches

If you use roll charts, go to paragraph 2.5.2.2. If you use fan-fold charts, continue at the next paragraph.

Note : This recorder is to be used with paper, which has been carefully designed to ensure the proper functioning of the recorder. Use of other paper could result in blocked print head, smudging or jamming.

MULTICHANNEL RECORDER

2.5.2.1 Fan-fold chart

Ease the folds of paper to permit the chart to flow, and place the chart at the rear of the upper compartment of the assembly, printing side up. See Figure 2-23.

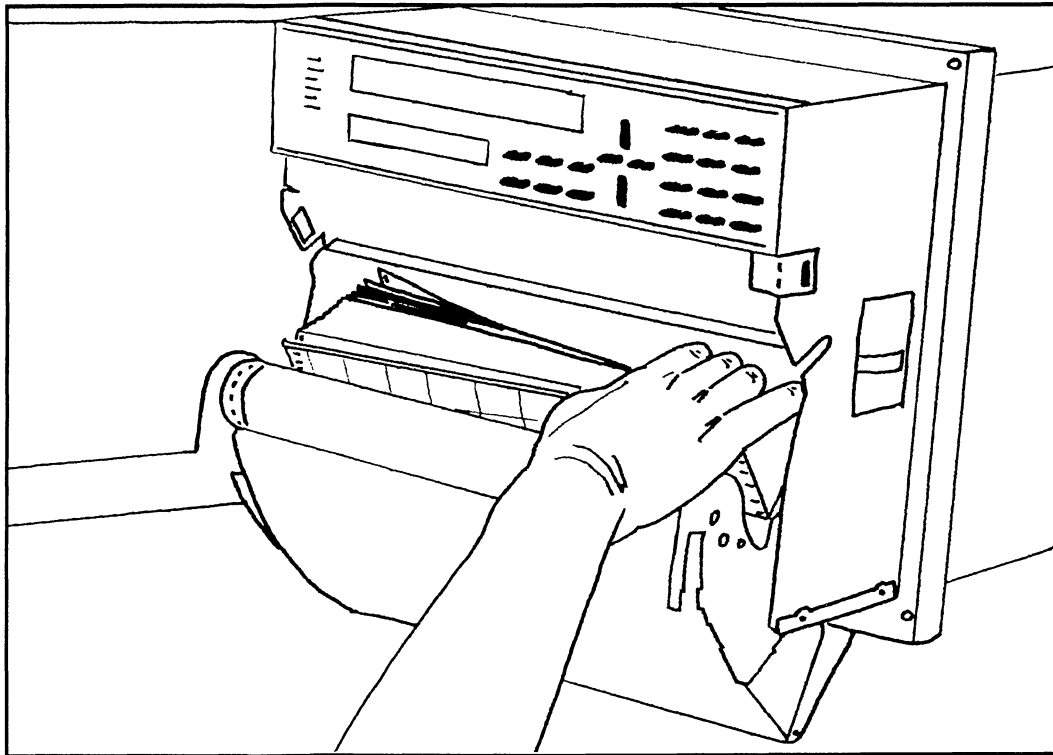


Figure 2-23 Placing the fan-fold chart in the upper compartment

MULTICHANNEL RECORDER

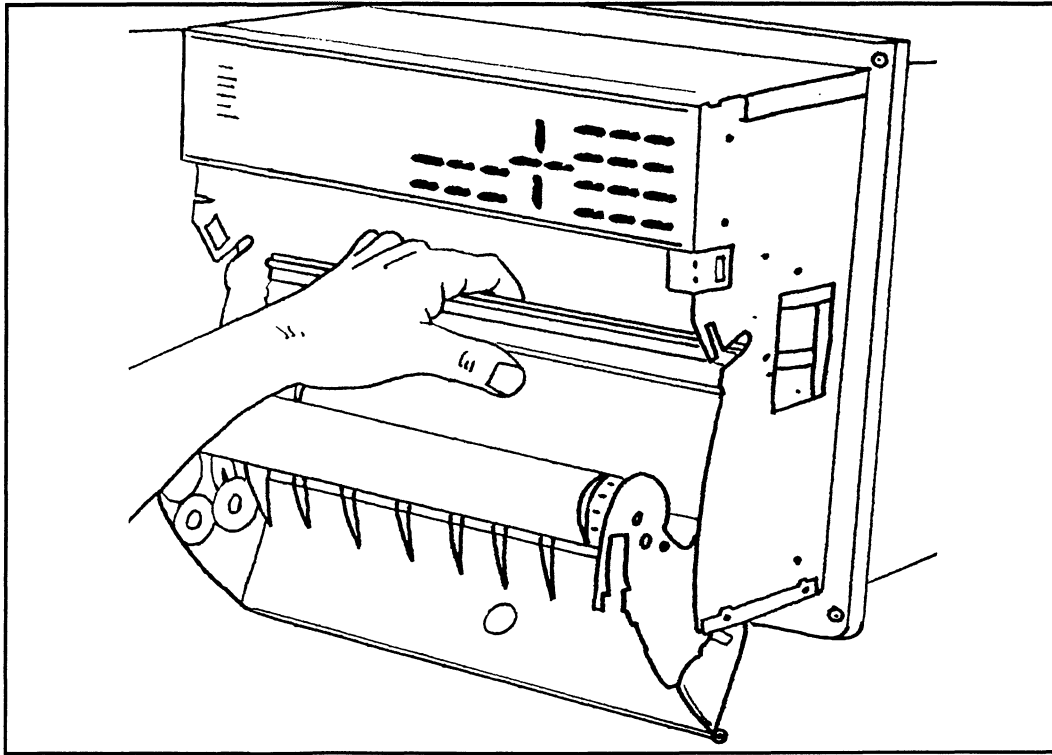


Figure 2-24 Pushing the fan-fold chart to rear of compartment

MULTICHANNEL RECORDER

To release the transparent platen, press the lever at the left hand side lower corner as shown in Figure 2-25.

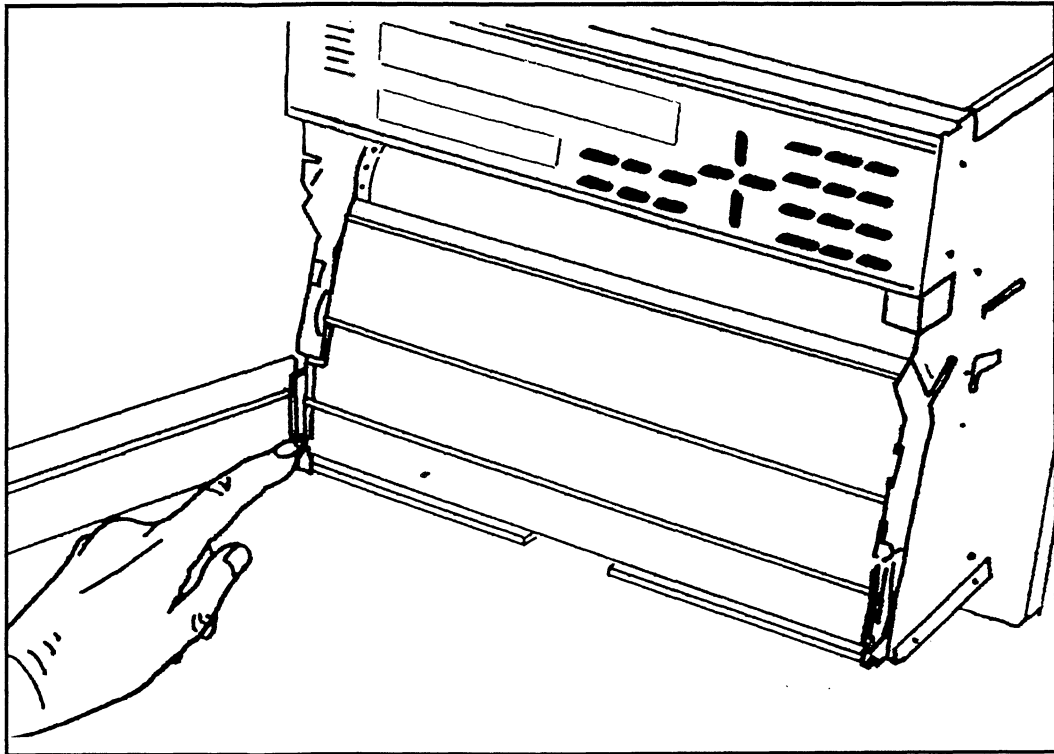


Figure 2-25 Releasing the transparent platen

MULTICHANNEL RECORDER

Grip the sides of the transparent chart platen assembly near the bottom edges, and swing the platen forward as shown in Figure 2-26 until the support arm at the right hand side engages.

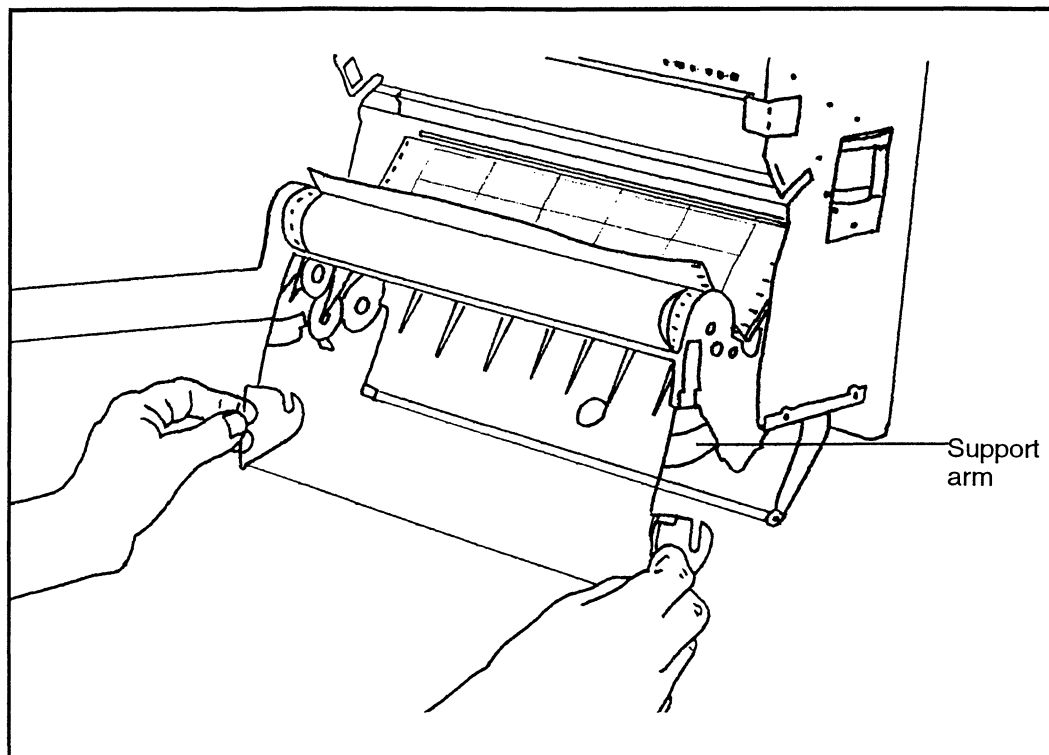


Figure 2-26 Swinging the chart platen forward

MULTICHANNEL RECORDER

Tear or fold the end of the chart into a V-shape. Feed at least 5 folds of the paper through the slot between the chart drive drum and the top of the transparent chart platen, at the same time positioning the holes in the paper over the chart drive drum sprockets. See Figure 2-27. Correctly locate the folds of paper at the rear of the lower compartment.

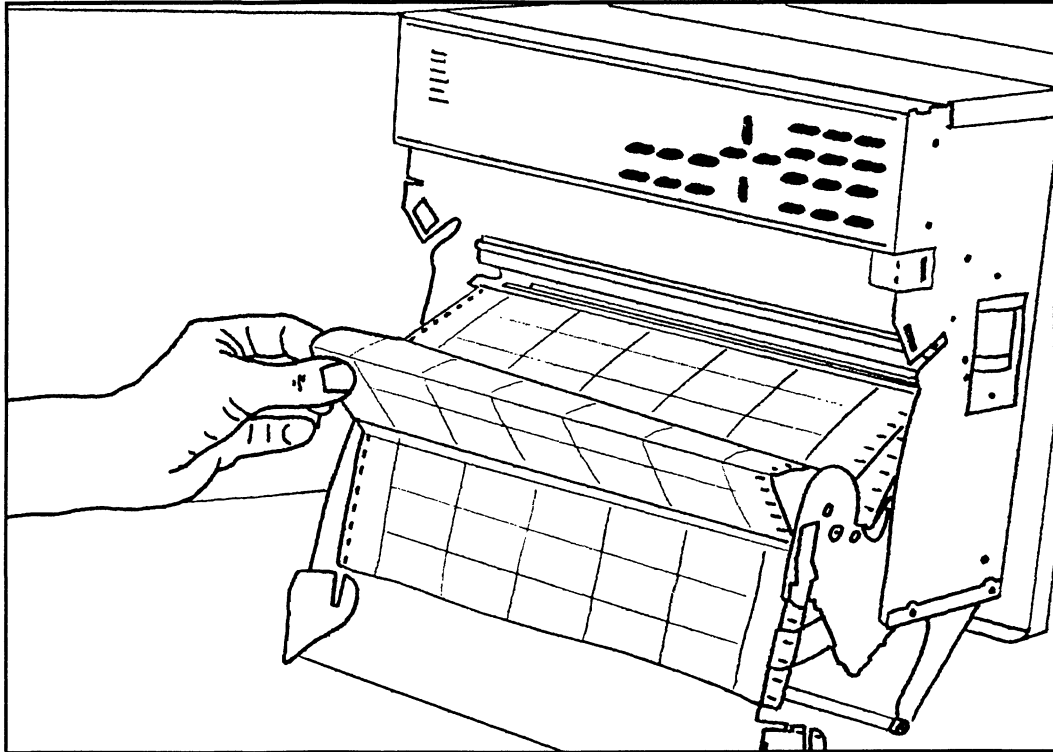


Figure 2-27 Feeding the chart into the lower compartment

MULTICHANNEL RECORDER

To close the platen, gently press the catch on the right hand side as shown in Figure 2-28. Ensure that the platen is closed - it should click into position.

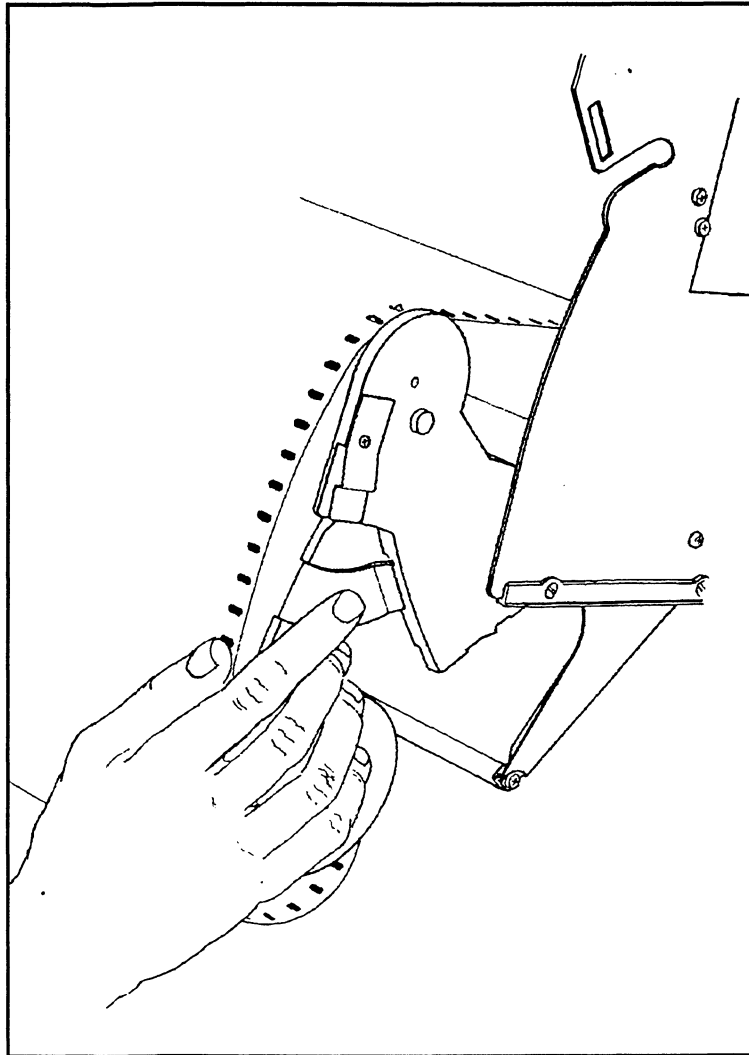


Figure 2-28 Closing the platen

MULTICHANNEL RECORDER

Swing the upper compartment of the chart cassette into its working position ensuring that all the drive sprockets are fully engaged in the chart holes, and that the cassette is securely closed, as shown in Figure 2-29.

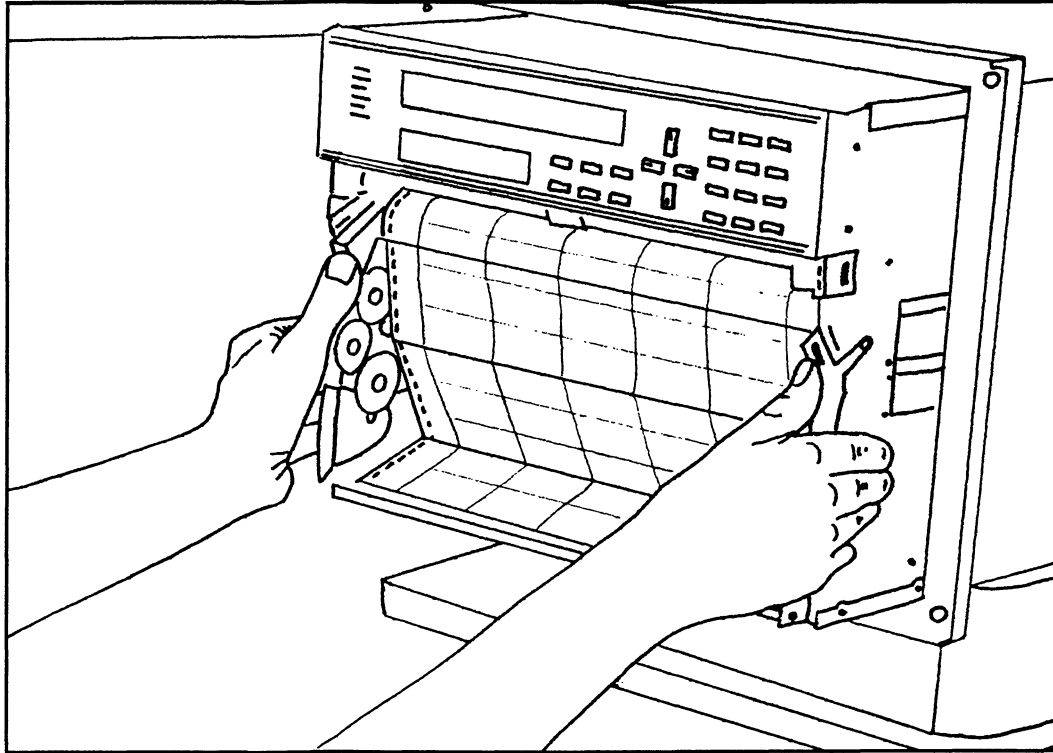


Figure 2-29 Closing the chart cassette assembly

If the recorder is powered, make sure that the "PAPER" LED is extinguished. If the LED remains lit and the

OUT OF PAPER

prompt message flashes, check again very carefully that the cassette assembly and chart are correctly installed.

Note : If the recorder has remained more than one day without driving its paper, advance the chart by at least 3 folds of paper, and verify that the folds are correctly positioned in the lower compartment.

MULTICHANNEL RECORDER

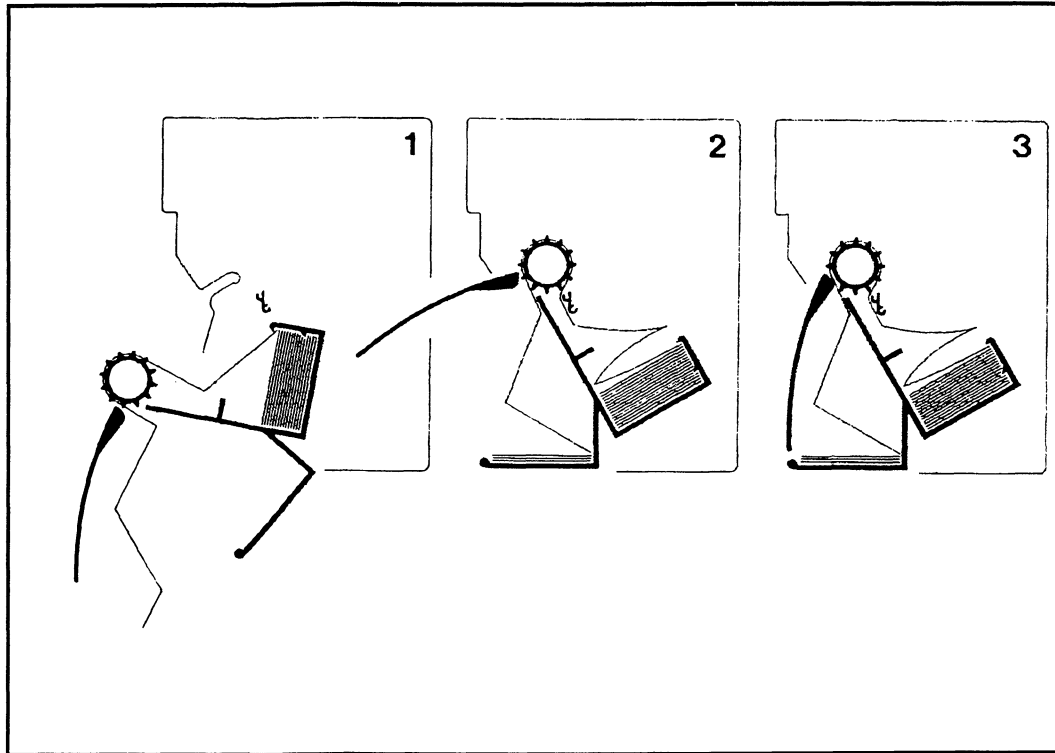


Figure 2-30 Fan-fold chart flow

**MULTICHANNEL
RECORDER****2.5.2.2 Roll chart**

Place the chart at the rear of the upper compartment of the assembly. See Figure 2-31.

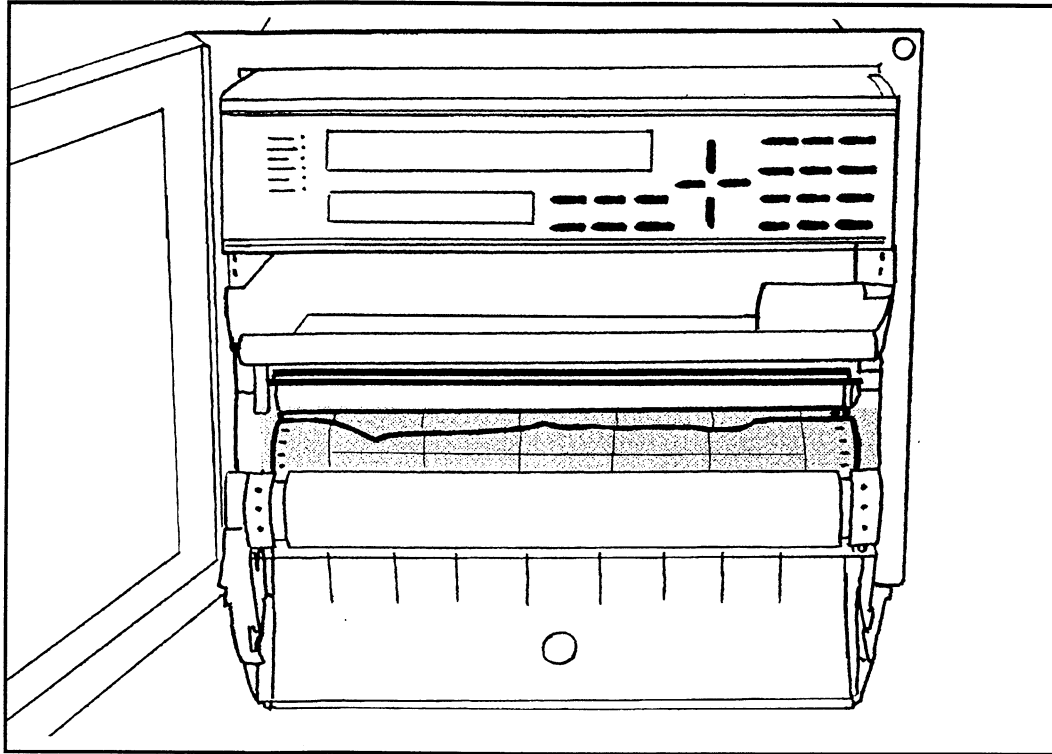


Figure 2-31 Locating the roll chart

MULTICHANNEL RECORDER

Release the transparent platen by pressing the lever at the left hand side lower corner. See Figure 2-24 page 2-30. Grip the sides of the transparent chart platen assembly near the bottom edges, and swing the platen forward, as shown in Figure 2-26 for fan-fold charts. Tape the pointed end of the chart to the center of the tube. Position the holes in the paper over the chart drive drum sprockets, and feed the paper down the outside of the transparent platen. See Figure 2-32.

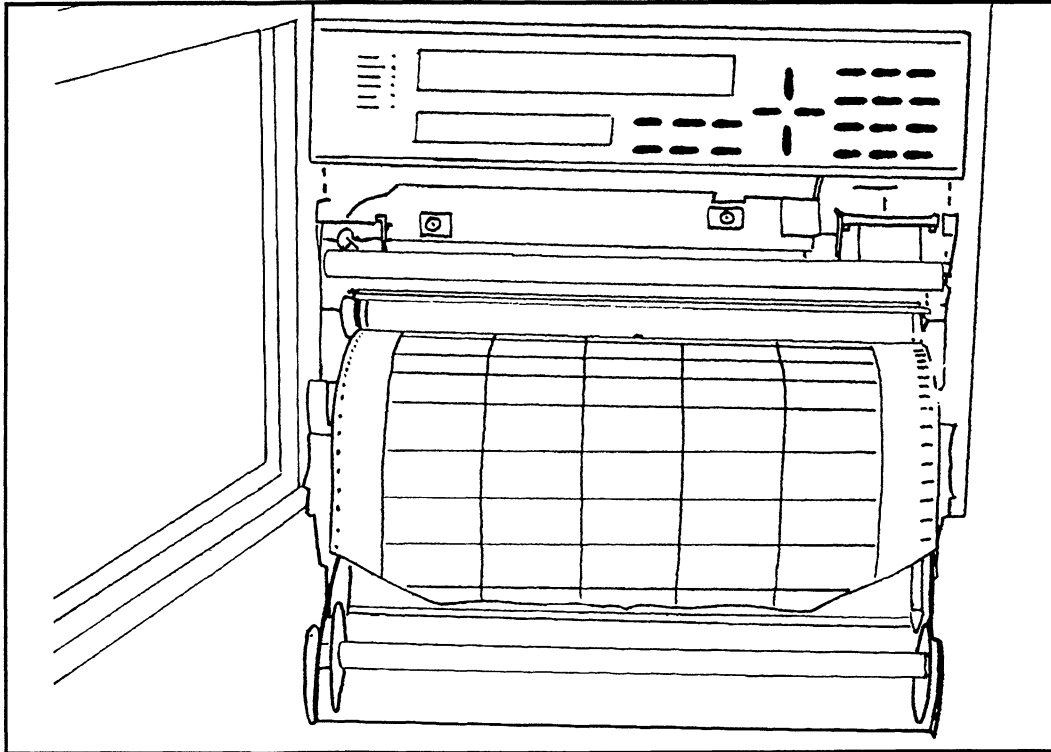


Figure 2-32 Feeding the roll chart

Attach the chart to the re-roll spindle with adhesive tape. Locate the ends of the re-roll spindle in the slots at either side of the bottom of the platen, with the toothed wheel on the left hand side, as shown in Figure 2-33.

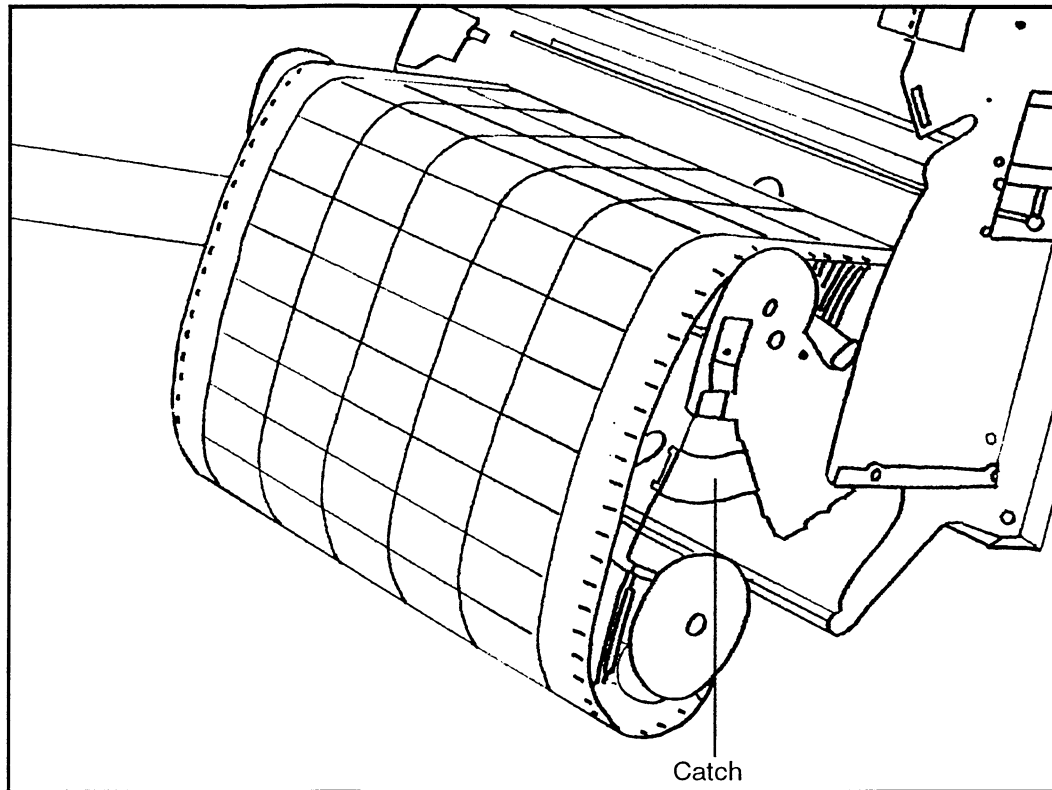


Figure 2-33 Locating the re-roll spindle

Gently press the catch on the right hand side of the platen and close the lower compartment ensuring that it is secure. Rotate the white plastic gear wheel at the left of the platen in a downward direction to check for correct chart feed and tensioning. Swing the upper compartment back into its working position, ensuring that it is secure, (as shown in Figure 2-29 for fan-fold charts). If the recorder is powered, make sure that the "PAPER" LED is extinguished. If the LED remains lit and the

OUT OF PAPER

prompt message flashes, check again very carefully that the cassette assembly and chart are correctly installed.

Push the printer chassis fully into the case, and ensure that it has latched. Then close the door. Your recorder is now ready for configuration and operation.

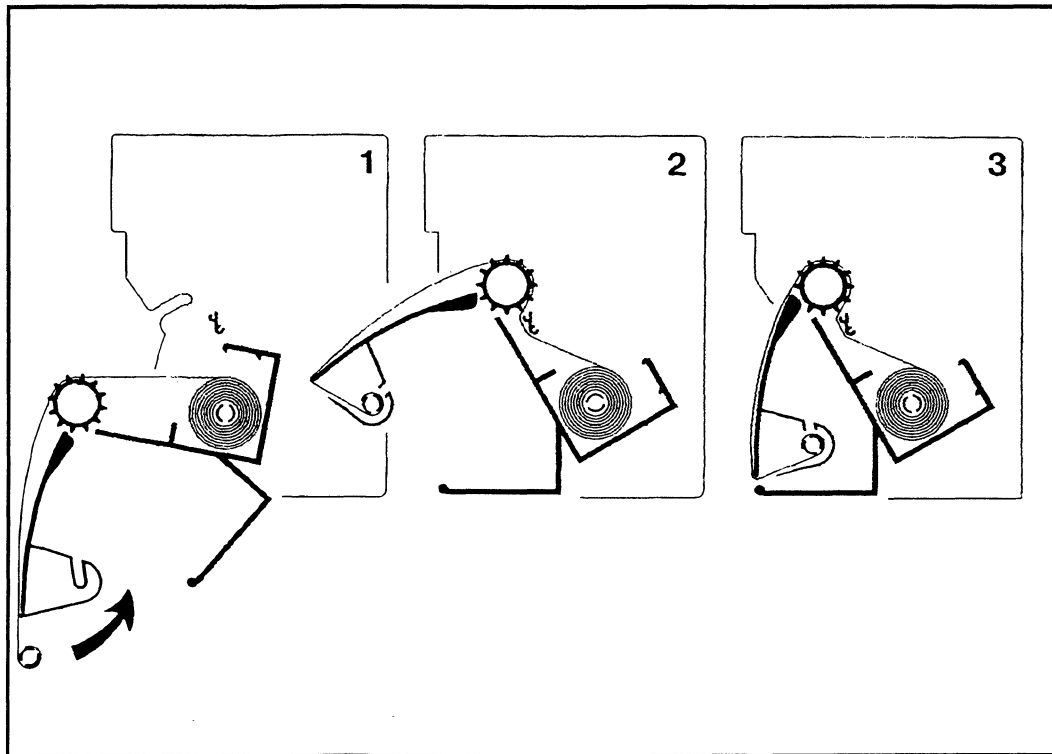
**MULTICHANNEL
RECORDER**

Figure 2-34 Roll chart flow

2.6 APPLYING POWER

For details of the sequence of displays given by the recorder when power is switched on, refer to section 4 "OPERATION".

TABLE OF CONTENTS

Section	Page
3.1 INTRODUCTION	3-1
3.2 ORGANIZATION OF CONFIGURATION DATA	3-1
3.2.1 Introduction.	3-1
3.2.2 The main matrix.	3-1
3.2.3 The sub-matrices.	3-2
3.2.4 Access to a sub-matrix	3-3
3.2.5 Moving within a sub-matrix	3-3
3.2.6 Moving from one sub-matrix to another	3-4
3.2.7 Returning to normal display mode.	3-4
3.3 DETERMINING CONFIGURATION DATA.	3-7
3.3.1 Analog inputs.	3-7
3.3.1.1 Sensors	3-8
3.3.1.2 Actuation.	3-11
3.3.1.3 Emissivity.	3-17
3.3.1.4 Filter.	3-17
3.3.1.5 Decimal point (display).	3-18
3.3.1.6 Low value (display)	3-18
3.3.1.7 High value (display).	3-19
3.3.1.8 Math. option.	3-19
3.3.1.9 Channel A	3-20
3.3.1.10 Channel B	3-21
3.3.1.11 Zero adj.	3-21
3.3.2 Chart	3-22
3.3.2.1 Tag name	3-22
3.3.2.2 Units.	3-23
3.3.2.3 Decimal point range 1	3-23
3.3.2.4 0% Chart range 1	3-24
3.3.2.5 100% Chart range 1	3-24
3.3.2.6 Color range 1.	3-25
3.3.2.7 Decimal point range 2	3-25
3.3.2.8 0% chart range 2	3-26
3.3.2.9 100% chart range 2.	3-26
3.3.2.10 Color range 2.	3-26
3.3.2.11 Left edge %	3-27
3.3.2.12 Right edge %	3-27
3.3.2.13 Trace	3-28
3.3.2.14 Enabled.	3-28
3.3.3 Analog alarms	3-29

(continued)

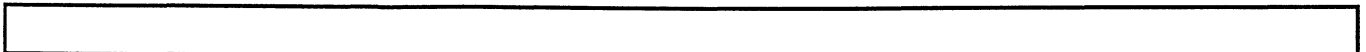
Section	Page
3.3.3.1	Decimal point for setpoint 3-29
3.3.3.2	Set point value 3-30
3.3.3.3	Hysteresis 3-30
3.3.3.4	Chart channel. 3-31
3.3.3.5	Relay number. 3-31
3.3.3.6	Type 3-32
3.3.3.7	Channel differential 3-33
3.3.3.8	Message 3-33
3.3.3.9	Message color 3-34
3.3.3.10	Print action. 3-34
3.3.3.11	Red on alarm 3-35
3.3.3.12	Alarm acknowledge.. . . . 3-36
3.3.4	Digital inputs (option). 3-36
3.3.4.1	Color 3-37
3.3.4.2	Left edge % 3-38
3.3.4.3	Right edge % 3-38
3.3.4.4	Enabled. 3-39
3.3.4.5	Relay number. 3-39
3.3.4.6	Type 3-40
3.3.4.7	Digital input differential 3-40
3.3.4.8	Message 3-41
3.3.4.9	Message color 3-41
3.3.4.10	Print action. 3-42
3.3.4.11	Red on alarm 3-43
3.3.4.12	Alarm acknowledge 3-43
3.3.5	Messages 3-44
3.3.5.1	Messages 3-44
3.3.6	Printer 3-45
3.3.6.1	Recording mode 3-45
3.3.6.2	Print mode. 3-46
3.3.6.3	Message trace 3-47
3.3.6.4	Units of speed 3-48
3.3.6.5	Speed 1 3-48
3.3.6.6	Speed 2 3-49
3.3.6.7	Speed in use 3-49
3.3.6.8	Interval 1 3-49
3.3.6.9	Interval 2 3-50
3.3.6.10	Calibration 0 - chart. 3-50
3.3.6.11	Calibration 100 - chart. 3-50
3.3.6.12	Print test 3-51

(continued)

Section	Page
3.3.7 Miscellaneous	3-51
3.3.7.1 Paper number	3-52
3.3.7.2 Language	3-52
3.3.7.3 Print configuration	3-53
3.3.7.4 Options.. . . .	3-53
3.3.7.5 Date/Time.. . . .	3-53
3.3.7.6 Teacher mode	3-54
3.3.7.7 Version	3-55
3.3.7.8 Reboot	3-55
3.3.7.9 Frequency 50/60 Hz.. . . .	3-56
3.3.7.10 Password.	3-56
3.4 READING AND WRITING CONFIGURATION DATA.	3-58
3.4.1 Entering configuration mode.	3-58
3.4.2 Reading configuration data.	3-59
3.4.3 Writing configuration data.	3-60
3.4.3.1 Parameters for which the recorder offers a choice	3-62
3.4.3.2 Parameters for which the recorder requires a numerical value.	3-63
3.4.3.3 Parameters for which the recorder requires alphanumeric text.	3-65
3.4.4 Leaving configuration mode	3-67
3.4.5 How to modify a configuration parameter - quick guide	3-67
3.4.6 Configuration data entry procedure flowchart.	3-70
3.5 COPYING CONFIGURATION DATA	3-71
3.5.1 Introduction	3-71
3.5.2 Entering copy mode	3-72
3.5.2.1 Sub-matrix "analog inputs".	3-73
3.5.2.2 Sub-matrices "chart", "analog alarms" "digital inputs" and "messages"	3-73
3.5.3 Establishing the source of data to be copied	3-74
3.5.4 Establishing the destination of the data	3-74
3.5.5 Copying procedure	3-75
3.5.6 Verifying copied data.	3-77
3.5.7 Leaving copy mode.	3-78
3.6 LOCKING/UNLOCKING CONFIGURATION DATA	3-78
3.6.1 Introduction	3-78
3.6.2 Locking a sub-matrix.	3-78
3.6.3 Unlocking a sub-matrix	3-81
3.6.4 Leaving lock/unlock mode.	3-81

(continued)

Section	Page
3.7 PRINTING CONFIGURATION DATA	3-81
3.7.1 Introduction	3-81
3.7.2 Printing the complete configuration	3-81
3.7.3 Printing configuration data from a sub-matrix	3-83
3.7.3.1 Printing all the configuration data in the submatrix	3-85
3.7.3.2 Printing a number of consecutive lines of data	3-86
3.7.3.3 Printing a single line of data.	3-87
3.7.4 Printing from another sub-matrix.	3-88
3.7.5 Leaving print mode.	3-88
3.8 SETTING DATE AND/OR TIME	3-89



LIST OF ILLUSTRATIONS

Number	Title	Page
3-1	Matrix organization	3-5
3-2	Configuration prompt hierarchy	3-69
3-3	Configuration Data Entry Procedure Flowchart	3-70
3-4	Establishing destination of data being copied.	3-75

**MULTICHANNEL
RECORDER**





3.1 INTRODUCTION

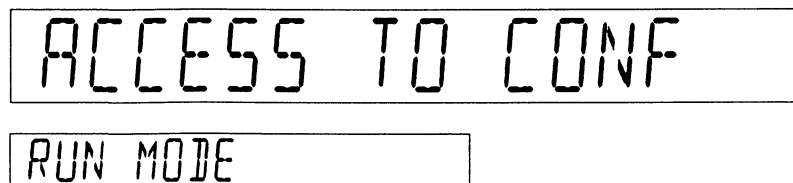
The recorder is an extremely versatile reporting instrument. This section of the product manual explains how to define which of the available functions the recorder is required to perform to suit a particular application. Configuration is the term used to refer to the sequence of keystroke operations necessary to select and enter appropriate configuration data. You will find that the procedure for configuring the recorder is quite straight forward, but if you are configuring the instrument for the first time, we would strongly recommend that you read through this section carefully, and in the order in which it is written.

3.2 ORGANIZATION OF CONFIGURATION DATA**3.2.1 Introduction**

A clear understanding of the way in which configuration data is organized by the recorder is vital if any operation to do with reading, writing, copying and printing data is to be carried out with optimum speed and precision. Configuration data is organized in a series of matrices. There are seven matrices in the basic model - a main matrix and six submatrices. When options are included there will be up to three additional sub-matrices.

3.2.2 The main matrix

The main matrix consists of up to nine vertical columns according to model, and four horizontal lines, as shown in figure 3-1 page 3-5 or B.1. in section 10, "APPENDIX B". Access to the main matrix from normal running mode is obtained by pressing the  **CONF**  key. When the key is pressed the displays read, momentarily :



```
ACCESS TO CONF
RUN MODE
```

followed quickly by :



```
READ/WRITE
ANALOG INPUTS
```

Note that, at present, the recorder is still in "RUN MODE", and continues with input data acquisition and printing, but of course the data is no longer being displayed.

Once inside the main matrix it is possible to move in any direction within the matrix by means of the four "ARROW" keys. Because, in effect, the top line of the matrix is connected to the bottom line, and the left hand column to the right hand column, it is possible to move in any of the four directions at any time. There are no boundaries.

Benefits of using a matrix arrangement include :

- ☑ Only four keys are required to get to any location.
- ☑ The keyboard is simple and easy to use.
- ☑ It is possible to choose the shortest, and therefore the quickest, route between any two locations.

3.2.3 The sub-matrices

The headings of the columns of the main matrix are also the titles of the sub-matrices, namely :

Standard sub-matrices

Analog inputs
Chart
Analog alarms
Messages
Printer
Miscellaneous

Optional sub-matrices

Digital Inputs
Communication } separate releases
Mathematics } separate releases

Note that the titles of the optional sub-matrices will appear only if the relevant option boards are installed.



By referring to Figures B.2 to B.10 in section 10, "APPENDIX B", at the rear of this manual you will see that each sub-matrix consists of a logical group of configuration parameters. The general arrangement is similar to that of the main matrix, but each sub-matrix has a different number of columns and lines.


Finding your way around each matrix is similar to map reading. Many maps are arranged in a grid pattern to ease the task of locating a particular street or building. Likewise each sub-matrix uses grid references to identify data locations. Vertical columns are identified by letters, starting with the letter A for the left hand column. Horizontal lines are identified by numbers, beginning with 1 for the bottom line. Thus A1 is the reference for the bottom left hand location in a sub-matrix.


Understanding and correct use of these references greatly facilitates operations such as copying (see chapter 3.5) and printing (see chapter 3.7).

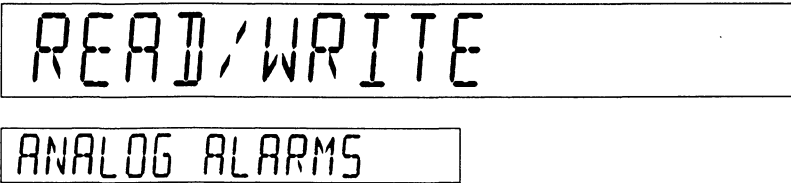
MULTICHANNEL RECORDER


3.2.4 Access to a sub-matrix

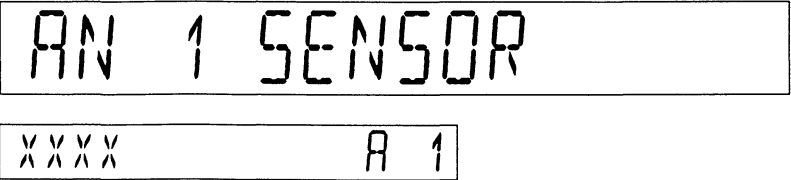
Access to any of the sub-matrices is always obtained via the main matrix. After entering the main matrix, as described earlier, use the  or  keys until the title of the required sub-matrix is shown in the lower display. For example if the present displays are :



but you require access to the sub-matrix for analog alarms, press  twice. The displays will now read :



After finding the required sub-matrix title simply press . The displays will change again, their contents differing according to the sub-matrix selected. The common factor for all sub-matrices will be the reference A1 at the right of the lower display. This tells you that the data displayed is that which is situated in the bottom left location of the sub-matrix. For example if you have selected the analog inputs sub-matrix the displays will read :





If you wish you may refer to Figure B.2 in section 10, "APPENDIX B", for confirmation.





3.2.5 Moving within a sub-matrix

Movement within a sub-matrix is achieved in a similar way to that described earlier for the main matrix. Simply use the four arrow keys to move as rapidly as possible from the present location to the desired location.

MULTICHANNEL RECORDER

Note that the  key moves the display to a higher line number and the  key to lower line number.

3.2.6 Moving from one sub-matrix to another

Moving from one sub-matrix to another is possible only via the main matrix. Press  to return to the main matrix. Once back in the main matrix use the  or  keys to obtain the required sub-matrix title in the lower display and then press .

3.2.7 Returning to normal display mode


To return to normal display mode from the main matrix, or from any of the sub-matrices, simply press .

Figure 3-1, on the next page provides, in diagram form, a summary of this chapter.

MATRIX ORGANIZATION

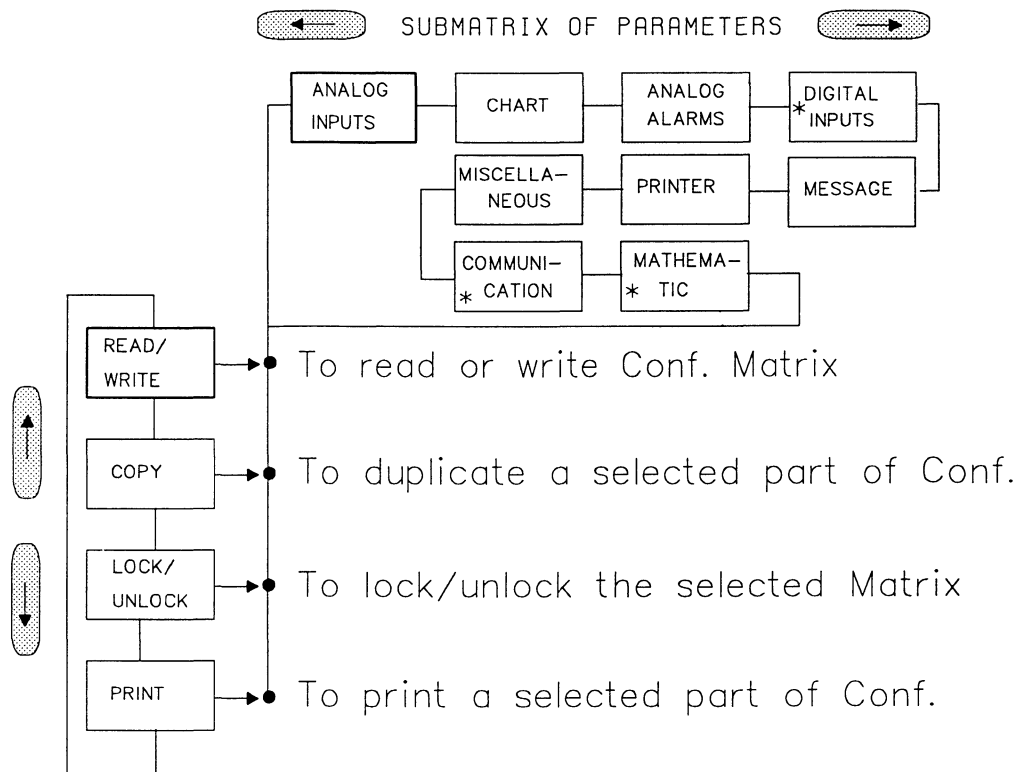
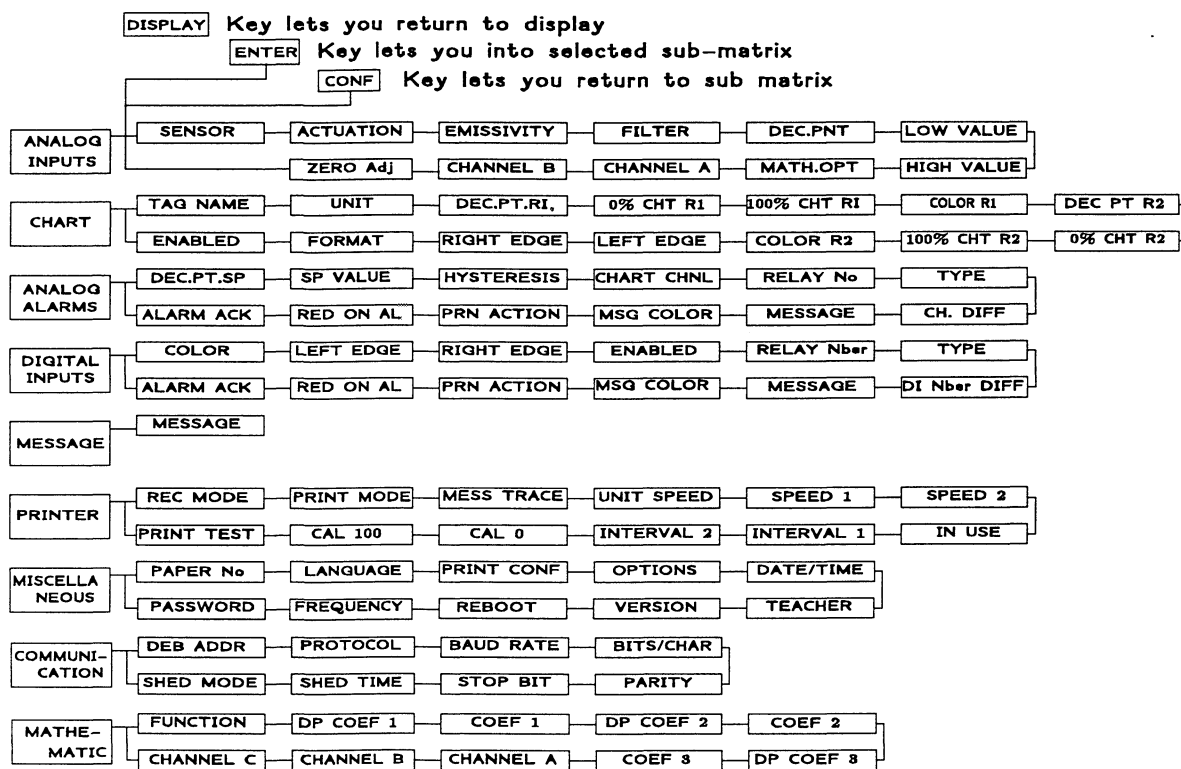


Figure 3-1 Matrix organization

CONFIGURATION PROMPT HIERARCHY



3.3 DETERMINING CONFIGURATION DATA

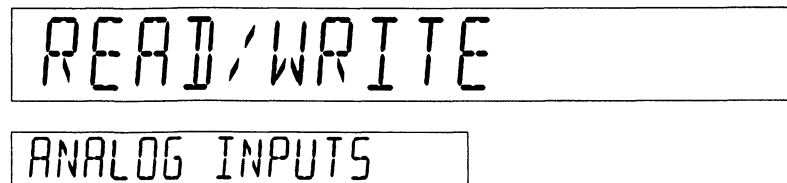
Before entering configuration data into the recorder you must determine the data required, according to the functions available on your particular model and your specific application. Refer to section 2, "INSTALLATION" to identify the specification of your recorder.

Next, make a copy of the configuration worksheets given in Appendix A at the back of this manual, and use it to create a written record of the data to be entered. You will find that time spent doing this is well worth while as it will simplify and expedite the subsequent procedure of entering the data into the recorder's memory.

In the previous chapter it was explained that configuration data is organized into sub-matrices. A complete list of the selections available in each sub-matrix is given in the following pages, together with application notes, to assist you in making your choice.

3.3.1 Analog inputs

Starting displays :



In the analog inputs sub-matrix you must establish, for each analog input, the sensor type, actuation, display range and other related parameters.

For the recorder, sensors are classified into 5 main categories, namely :

- ☒ Resistance temperature detectors (RTD's).
- ☒ Thermocouples.
- ☒ Radiation pyrometers.
- ☒ Transmitters whose output is linear with a process variable; for example, pressure.
- ☒ Transmitters whose output is non-linear with respect to the process variable; for example, temperature.

The recorder normally uses a different analog input board for RTD and resistance inputs, from that used for other sensors. At power-up the recorder checks which type of board is fitted in each location, and during configuration, offers an applicable choice of sensors. Each input board accepts 4 analog input channels all of which must be compatible.

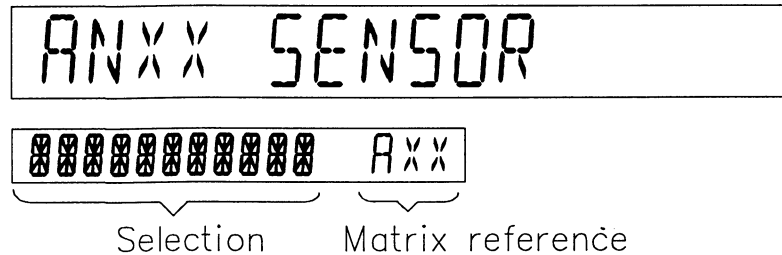
3. CONFIGURATION

MULTICHANNEL RECORDER

Note : that you can also make this check by using the function "options" in the MISC matrix. (See paragraph 3.3.7.4).

3.3.1.1 Sensors

Starting displays :



The lower display indicates the last configured sensor type, and the sub-matrix location reference.

(a) RTD and resistance input boards

<u>Selection</u>	<u>Application</u>
NO ENTRY	No sensor connected
SPECIAL	Special sensor connected
RTD / OHMS	Sensor is a directly connected RTD or variable resistance
TR 0/200 Ω	Sensor is a temperature to resistance transmitter whose output range of 0 to 200 Ohm is <u>not linear</u> with temperature.
TR 0/2000 Ω	Sensor is a temperature to resistance transmitter whose output range of 0 to 2000 Ohm is <u>not linear</u> with temperature.
COMM INPUT	The input signal is to be supplied via the optional communication interface

3. CONFIGURATION

MULTICHANNEL RECORDER

(b) Thermocouple, pyrometer, mV, V and mA input boards.

Selection

Application

NO ENTRY

No sensor connected.

SPECIAL

Special sensor connected. Must be required by a special order.

THERMOCOUPLE

Sensor is a directly connected thermocouple for which internal cold junction compensation is required

THER NO COMP

Thermocouple sensor is directly connected to a remote temperature compensation box fixed at 50 °C (if you use an other temperature, refer to calibration procedure to modify 0% and 100% of Display)

LINEAR

Sensor is a transmitter whose output is linear with process variable.

Note : includes linear temperature transmitters and differential pressure transmitters in flow loops.

PYROMETER

Sensor is a directly connected radiation pyrometer. Pyrometer emissivity can be adjusted per channel by configuration.

TR 0/20 mV

Sensor is a temperature transmitter whose signal range of 0 to 20 mV is not linear with temperature.

TR -10/10 mV

As above, but with signal range of -10 to +10 mV

TR 0/50 mV

As above, but with signal range of 0 to 50 mV.

3. CONFIGURATION

MULTICHANNEL RECORDER

Selection

Application

TR -50/50 mV

As above, but with signal range of -50 to +50 mV.

TR 0/100 mV

As above, but with signal range of 0 to 100 mV.

TR -200/200 mV

As above, but with signal range of -200 to +200mV.

TR 1/5 V

As above, but with signal range of 1 to 5 Volts

TR -2/2 V

As above, but with signal range of -2 to +2Volts.

TR 0/5 V

As above, but with signal range of 0 to 5 Volts.

TR -5/5 V

As above, but with signal range of -5 to +5Volts.

TR 0/10 V

As above, but with signal range of 0 to 10 Volts.

3. CONFIGURATION

MULTICHANNEL RECORDER

Selection

Application

TR -20/20 V

As above, but with signal range of -20 to +20Volts.

TR -50/50 V

As above, but with signal range of -50 to +50Volts.

TR 0/20 mA

As above, but with signal range of 0 to 20 mA.

TR 4/20 mA

As above, but with signal range of 4-20 mA.

COMM INPUT

The input signal is to be supplied via the (optional) communication interface.

3.3.1.2 Actuation

Starting display : (Ref Bxx)

ANXX ACTUATION

XXXXXXXXXXXXXXXXXX

Actuation, for all directly connected temperature sensors and non-linear temperature transmitters, defines the linearisation routine that will be applied by the recorder to the input signal to produce a display and chart record that is linear with temperature. For linear transmitters actuation simply defines the range and electrical units of the transmitter output signal.

3. CONFIGURATION

MULTICHANNEL RECORDER

The choice of actuations offered by the recorder during configuration will depend upon the sensor selected in the previous pages.

CAUTION : For non linear temperature transmitter 1 to 5 VDC or 4 to 20 mA or 0 to 5 VDC or 0 to 20 mA. The transmitter signal must be identical to the linearisation routine of display selection on the Recorder.

(a) RTD/OHMS Sensors.

<u>Selection</u>	<u>Application</u>
PT IEC 100 Ω 0 $^{\circ}$ C	Platinum 100 Ohms RTD to IEC Standard. Display limits -200 to 500 $^{\circ}$ C.
PT IEC 100 Ω 32 $^{\circ}$ F	Platinum 100 Ohms RTD to IEC Standard. Display limits -328 to 932 $^{\circ}$ F.
PT J 100 Ω 0 $^{\circ}$ C	Platinum 100 Ohms RTD to JIS Standard. Display limits -200 to 500 $^{\circ}$ C.
PT J 100 Ω 32 $^{\circ}$ F	Platinum 100 Ohms RTD to JIS Standard. Display limits -328 to 932 $^{\circ}$ F.
EDIS/7 120 Ω 0 $^{\circ}$ C	Edison No 7 platinum 120 Ohms RTD. Display limits -20 to 270 $^{\circ}$ C.
EDIS/7 120 Ω 32 $^{\circ}$ F	Edison No 7 platinum 120 Ohms RTD. Display limits -4 to 518 $^{\circ}$ F.
EDIS/2 50 Ω 0 $^{\circ}$ C	Nickel 50 Ohms RTD. Display limits -80 to 320 $^{\circ}$ C.
EDIS/2 50 Ω 32 $^{\circ}$ F	Nickel 50 Ohms RTD. Display limits -112 to 608 $^{\circ}$ F.
CU GE 10P 25 $^{\circ}$ C	Copper 10 Ohms RTD. Display limits -20 to 250 $^{\circ}$ C.
CU GE 10P 77 $^{\circ}$ F	Copper 10 Ohms RTD. Display limits -4 to 482 $^{\circ}$ F.
NI 508 Ω 0 $^{\circ}$ C	Nickel 508 Ohms RTD. Display limits -50 to 250 $^{\circ}$ C.

3. CONFIGURATION

MULTICHANNEL RECORDER

Selection

NI 508 Ω 32 $^{\circ}$ F

0/200 Ω

0/2000 Ω

Application

Nickel 508 Ohms RTD. Display limits -58 to 482 $^{\circ}$ F.

Resistance input with range 0 to 200 Ohms.

Resistance input with range 0 to 2000 Ohms.

(b) THERMOCOUPLE Sensors.

Selection

B 40 / 1820 $^{\circ}$ C

B 104 / 3308 $^{\circ}$ F

E -200 / 990 $^{\circ}$ C

E -328 / 1814 $^{\circ}$ F

J -200 / 870 $^{\circ}$ C

J -328 / 1598 $^{\circ}$ F

K -200 / 1370 $^{\circ}$ C

K -328 / 2498 $^{\circ}$ F

Application

Type B thermocouple. Display limits 40 to 1820 $^{\circ}$ C.

Type B thermocouple. Display limits 104 to 3308 $^{\circ}$ F.

Type E thermocouple. Display limits -200 to 990 $^{\circ}$ C.

Type E thermocouple. Display limits -328 to 1814 $^{\circ}$ F.

Type J thermocouple. Display limits -200 to 870 $^{\circ}$ C.

Type J thermocouple. Display limits -328 to 1598 $^{\circ}$ F.

Type K thermocouple. Display limits -200 to 1370 $^{\circ}$ C.

Type K thermocouple. Display limits -328 to 2498 $^{\circ}$ F.

3. CONFIGURATION

MULTICHANNEL RECORDER

Selection

Application

R -20/1760°C

Type R thermocouple. Display limits -20 to 1760 °C.

R -4/3200°F

Type R thermocouple. Display limits -4 to 3200 °F.

S -20/1760°C

Type S thermocouple. Display limits -20 to 1760 °C.

S -4/3200°F

Type S thermocouple. Display limits -4 to 3200 °F.

T -200/400 °C

Type T thermocouple. Display limits -200 to 400 °C.

T -328/752 °F

Type T thermocouple. Display limits -328 to 752 °F.

NIMO 0/1400°C

Ni/Ni Mo. thermocouple. Display limits 0 to 1400 °C.

NIMO 32/2552°F

Ni/Ni Mo. thermocouple. Display limits 32 to 2552 °F.

W5W26 -20/2320°C

W5/W26 thermocouple. Display limits -20 to 2320 °C.

W5W26 -4/4208°F

W5/W26 thermocouple. Display limits -4 to 4208 °F.

W W26 -20/2320°C

W/W26 thermocouple. Display limits -20 to 2320 °C.

W W26 -4/4208°F

W/W26 thermocouple. Display limits -4 to 4208 °F.

3. CONFIGURATION

MULTICHANNEL RECORDER

Selection

NISI -20/1300°C

NISI -4/2372°F

PR2040 0/1800°C

PR2040 32/3272°F

KPV 0/300 K

Application

Nicrosil / Nisil thermocouple. Display limits -20 to 1300 °C.

Nicrosil / Nisil thermocouple. Display limits -4 to 2372 °F.

PR20/40 thermocouple. Display limits 0 to 1800 °C.

PR20/40 thermocouple. Display limits 32 to 3272 °F.

KPVSAU7FE thermocouple. Display limits 0 to 300 °K.

(c) THER NO COMP Sensors.

Selection

As in (b) above

Application.

As in (b) above.

(d) LINEAR Sensors.

Selection

0/20 mV

-10/10 mV

0/50 mV

-50/50 mV

0/100 mV

Application

Linear transmitter 0 to 20 mV

Linear transmitter -10 to 10 mV

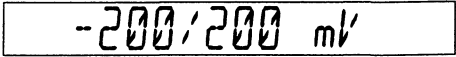
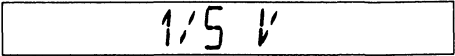
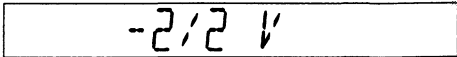
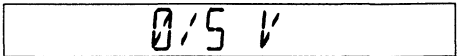
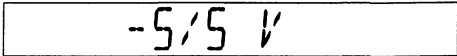
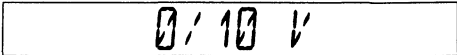
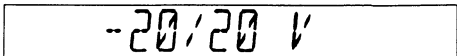
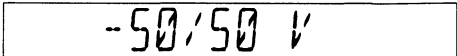
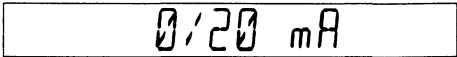
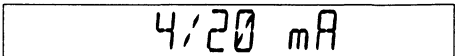
Linear transmitter 0 to 50 mV

Linear transmitter -50 to 50 mV

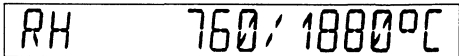

Linear transmitter 0 to 100 mV*

3. CONFIGURATION

MULTICHANNEL RECORDER

<u>Selection</u>	<u>Application</u>
	Linear transmitter -200 to 200 mV*
	Linear transmitter 1 to 5 V
	Linear transmitter -2 to 2 V*
	Linear transmitter 0 to 5 V
	Linear transmitter -5 to 5 V*
	Linear transmitter -10 to 10 V
	Linear transmitter -20 to 20 V*
	Linear transmitter -50 to 50 V*
	Linear transmitter 0 to 20 mA
	Linear transmitter 4 to 20 mA

* Range actuations : require installation of divider bridge on input board. Refer Section 2, "INSTALLATION", chapter "Analog input signals"(e) PYROMETER Sensors

<u>Selection</u>	<u>Application</u>
	Type RH radiation pyrometer. Display limits 760 to 1880 Deg C.
	Type RH radiation pyrometer. Display limits 1400 to 3416 Deg F.

(f) For all non-linear temperature to resistance, mV, V or mA transmitters

<u>Selection</u>	<u>Application</u>
All actuations in paragraphs (a), (b) and (e) above are available for selection.	Primary sensor input to transmitter is thermocouple, RTD, resistance or pyrometer.

MULTICHANNEL RECORDER

3.3.1.3 Emissivity

Starting displays :

ANXX EMISSIVITY

XXXXXXXXXX [XX

Note : This selection is relevant only if the primary sensor is a radiation pyrometer.

<u>Selection</u>	<u>Application</u>
Any numerical value from 50 to 150	Choose a value of gain to suit the emissivity of the object on to which the pyrometer will be sighted. Choose 100 if the emissivity factor is not known at present.

3.3.1.4 Filter

Starting displays :

ANXX FILTER

XXXXXXXXXX DXX

You may wish to apply a filter to noisy signals. However if pulses, square waves or other rapidly changing inputs are to be displayed and recorded without damping, choose 0 filter value.

The value of the input displayed or recorded will be calculated from :
(Filter value x preceding measurement)
+ [(100 - filter value) x latest filtered measurement]

<u>Selection</u>	<u>Application</u>
Any numerical value from 0 to 99.	See above.

Warning : All the alarms configured on a filtered analog input are affected by the filter delay. Be carefull with the filter action for the channels on which a "change rate" alarm is configured : the filter can suppress the alarm action.

MULTICHANNEL RECORDER

3.3.1.5 Decimal point (display)

Starting displays :

ANXX DEC PNT
XXXXXXXXXX E XX

If a temperature sensor or actuation has been selected for the channel the recorder will have automatically selected the appropriate position for the display decimal point.

For linear and non-linear transmitters the decimal point position must be related to the display scale low and high values to be selected later. Do not choose more decimal places than can be displayed with acceptable accuracy.

Selection

Decimal place

0000
0.000
00.00
000.0

No decimal place *
Three decimal places
Two decimal places
One decimal place

* Note that "no decimal place" position can be refused by the recorder if the most significant digit of the parameters : "low value" or "high value" is not zero.

3.3.1.6 Low value (display)

Starting displays :

ANXX LOW VALUE
XXXXXXXXXX F XX

If a temperature sensor or actuation has been selected in paragraphs 3.3.1.1 or 3.3.1.2 the recorder will have automatically entered the low range limit for the actuation.

Caution : do not change this value for all directly connected temperature sensors, as this would adversely affect the linearisation.

For linear and non-linear transmitters choose the value in engineering units, including temperature, which corresponds to the low range limit of the transmitter.

Selection :

MULTICHANNEL RECORDER

Any numerical value from -9999 to 9999 without decimal place.

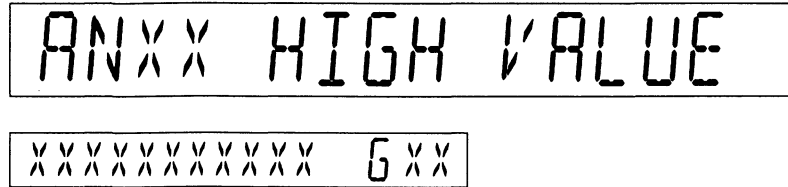
Any numerical value from -3275.0 to +3275.0 with one decimal place.

Any numerical value from -327.50 to +327.50 with two decimal places.

Any numerical value from -32.750 to +32.750 with three decimal places.

3.3.1.7 High value (display)

Starting displays :



ANXX HIGH VALUE

XXXXXXXXXX GXX

If a temperature sensor or actuation was selected in paragraphs 3.3.1.1 or 3.3.1.2 the recorder will have automatically entered the high range limit for the actuation.

Caution : do not change this value for all directly connected temperature sensors, as this would adversely affect the linearization.

For linear and non linear transmitters choose the value in engineering units, including temperature, which corresponds with the high range limit of the transmitter.

Selection :

Any numerical value from -9999 to 9999 without decimal place.

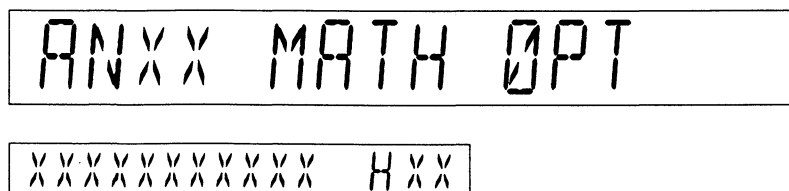
Any numerical value from -3275.0 to +3275.0 with one decimal place.

Any numerical value from -327.50 to +327.50 with two decimal places.

Any numerical value from -32.750 to +32.750 with three decimal places.

3.3.1.8 Math. option

Starting displays :



ANXX MATH OPT

XXXXXXXXXX HXX

Some math. functions are included in the recorder as standard. Further math. functions are available if your

MULTICHANNEL
RECORDER

3. CONFIGURATION

recorder is fitted with the optional math. extension module.

Selection	Application
NONE	No math function.
SQRT	Flow transmitters whose output signal is proportional to differential pressure. Note : The square root function is only applicable to linear transmitter or linear resistance inputs.
CHA - CHB	Display and chart record to be proportional to difference between any 2 defined channels. Note : This selection will be inhibited unless you have previously configured the numbers of CHA and CHB in the following two paragraphs.

Note : If the result of the calculations A-B is sent to a channel configured as "no entry", this channel will be refreshed every 5 seconds, regardless of the scanning speed of the channels A and B.

3.3.1.9 Channel A

Starting displays :

ANXX CHANNEL A

XXXXXXXXXX IXX

This selection is relevant only if you wish to choose CHA-CHB as a math. option in the preceding paragraph. Otherwise choose 0.

Selection	Application
Any numerical value from 0 to 32	Choose the number of channel A for the math option CHA - CHB

3.3.1.10 Channel B

Starting displays :

ANXX CHANNEL B
XXXXXXXXXX JXX

This selection is relevant only if you wish to choose CHA-CHB as math. option in paragraph 3.3.1.8. Otherwise choose 0.

Selection

Application

Any numerical value from 0 to 32

Choose the number of channel B for the math option
CHA - CHB

3.3.1.11 Zero adj.

Starting displays :

ANXX ZERO ADJ
XXXXXXXXX KXX

This selection is relevant only if you wish to modify the calibration of the product.

Otherwise choose 0 Value = Factory Calibration.

**MULTICHANNEL
RECORDER****3.3.2 Chart**

Starting displays :

READ/WRITE

CHART

In the chart sub-matrix you must establish, for each analog input, parameters which determine the chart ranges, units of measurement, printing color, and print zone width, together with a channel tag name. You can configure 2 different chart ranges, decimal point positions, and printing colors for each analog input. If you wish to print the channel only on alarm, or red on alarm, you will find these selections in the analog alarms and digital inputs sub-matrices.

Refer to section 1 "PRODUCT OVERVIEW" for examples of chart records to remind yourself of the recorder's printing capabilities.

3.3.2.1 Tag name

Starting displays :

CHXX TAG NAME

XXXXXXXX AXX

The lower display indicates the last configured channel tag name, and the sub-matrix location reference.

You may establish a unique 8-character tag name for each input channel. This will be printed on the chart each time the channel range is printed, and also may be selected for display beneath the channel input value.

Refer to section 1, "PRODUCT OVERVIEW" for an example of a chart record with tag names, and to section 4, "OPERATION" for information on selecting to display tag names.

SelectionApplication

Maximum of 8 alphanumeric characters.

See above.

3.3.2.2 Units

Starting displays :

CHXX UNIT
XXXX BXX

You may choose up to 4 alphanumeric characters to represent the units of measurement for the channel input. These will be printed on the chart each time the channel range is printed, and will be displayed with the channel input value. Note that temperature units are not automatically entered for temperatures sensors or actuations.

Selection

Application

Maximum of 4 alphanumeric characters.

See above.

3.3.2.3 Decimal point range 1

Starting displays :

CHXX DEC PNT R 1
XXXX CXX

The decimal point position must be related to the low and high chart range values to be selected later. It does not have to be the same as that chosen for the display scale, nor that to be chosen for chart range 2. However do not choose more decimal places than can be recorded with acceptable accuracy. For temperature measurements a maximum of 1 decimal place is recommended.

Selection

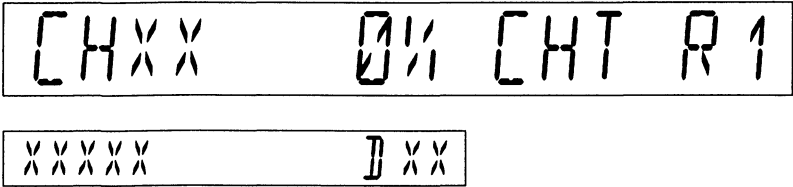
Decimal place

0000
0.000
00.00
000.0

No decimal place *
Three decimal places
Two decimal places
One decimal place

3.3.2.4 0% Chart range 1

Starting displays :



This parameter defines the lower limit of chart range 1 for the input channel. The value chosen should be related to, but need not be the same as, the low value for the display scale chosen in paragraph 3.3.1.6. For example the chart range may be less than the display scale to give better resolution. For temperature sensors or actuators do not choose a value below the low range limit of the actuation.

Selection

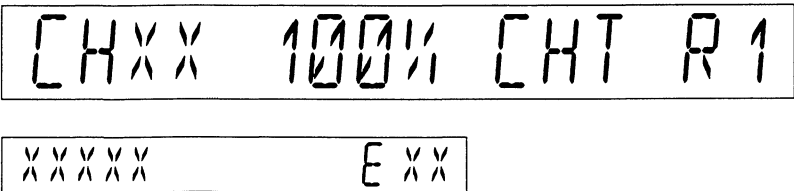
Application

Any numerical value from -9999 to 9999.

See above.

3.3.2.5 100% Chart range 1

Starting displays :



This parameter defines the upper limit of chart range 1 for the input channel. The value chosen should be related to, but need not be the same as, the high value for the display scale chosen in paragraph 3.3.1.7. For example the chart range may be less than the display scale to give better resolution. For temperature sensors or actuators do not choose a value greater than the high range limit of the actuation.

Selection

Application

Any numerical value from -9999 to 9999.

See above.

MULTICHANNEL
RECORDER

3.3.2.6 Color range 1

Starting displays :

CHXX	COLOR	R 1
XXXXXXXXXX	F XX	

Six colors are available for printing trend or tabular records. Choose any color, but not red if you intend to select the print red on alarm function later.

<u>Selection</u>	<u>Application</u>
BLACK	See above
BLUE	
PURPLE	
GREEN	
BROWN	
RED	

3.3.2.7 Decimal point range 2

Starting displays :

CHXX	DEC PNT	R 2
XXXX	G XX	

**MULTICHANNEL
RECORDER****3.3.2.8 0% chart range 2**

Starting displays :

CHXX	0%	CHT	R2
XXXXX		HXX	

3.3.2.9 100% chart range 2

Starting displays :

CHXX	100%	CHT	R2
XXXXX		IXX	

3.3.2.10 Color range 2

Starting displays :

CHXX	COLOR		R2
XXXXXXXXXXXX		JXX	

For each of the above 4 parameters the selections are identical to those for chart range 1. Refer to paragraphs 3.3.2.3 to 3.3.2.6

Chart range 2 may be identical to chart range 1, or wider, but not wider than temperature actuation limits, or narrower (for better resolution). The print color may be the same or different. Your choice will depend partly upon alarm actions to be configured later. Refer to section 1, "PRODUCT OVERVIEW", for further information, and examples of chart records.

3.3.2.11 Left edge %

Starting displays :

CHXX LEFT EDGE
XXXX KXX

The selections in this paragraph and the next, permit you to establish data which will limit the width of the chart range to less than the calibrated width of the paper. This feature is useful if you wish to segregate records into zones, or prevent over printing of similar values of input signals using the same chart range. The only limitation is that the width of the chart range shall not be less than 20% of chart. Refer to section 1, "PRODUCT OVERVIEW", for an example of a chart record using zoning.

Selection

Application

Any numerical value from 0 to 80

Choose the value in percent of chart width at which 0% of chart range is to be printed. Choose 0 if 0% chart range is to be at the left hand edge of the chart.

3.3.2.12 Right edge %

Starting displays :

CHXX RIGHT EDGE
XXXX LXX

Refer to the previous paragraph for an explanation of this parameter.

Selection

Application

Any numerical value from 20 to 100

Choose the value in percent of chart width at which 100% of chart range is to be printed. Choose 100 if 100% chart range is to be printed at the right hand edge of the chart.

3.3.2.13 Trace

These traces to be printed in solid or dotted lines to help distinguish two traces at the same colour.

Starting displays :

CHXX TRACE
XXXXXXXXXX MXX

Selection

Application

SOLID

Resolution 0.2 mm.
Trace is printed in a solid line

DOTTED

Resolution 0.8 mm.
Trace is printed in a dotted line.

3.3.2.14 Enabled

Starting displays :

CHXX ENABLED
XXXXXXXXXX NXX

Under this heading you must select whether the input channel will be displayed only, or displayed normally but printed on alarm, or recorded normally on either range 1 or 2. Instructions for configuring for print on alarm are given in paragraphs 3.3.3.10 and 3.3.4.10. Examples of chart records showing the application of the print on alarm function may be found in section 1, "PRODUCT OVERVIEW".

Selection

Application

NOT PRINT

Displayed but not recorded.

WITH R1

Normally recorded on range 1.

WITH R2

Normally recorded on range 2.

3. CONFIGURATION

MULTICHANNEL RECORDER

Selection

ON AL R1

ON AL R2

Application

Normally only displayed, but recorded on range 1 when an alarm exists.

Normally only displayed, but recorded on range 2 when an alarm exists.

3.3.3 Analog alarms

Starting displays :

READ/WRITE

ANALOG ALARMS

The recorder has available 60 alarms (scanning period : 5 sec.) which are freely assignable to any analog input channel. In the analog alarms sub-matrix you must establish, for each alarm, parameters such as alarm setpoint value, hysteresis and type. You must also identify the input channel and output relay number, (if fitted), to which the alarm will be applied. You may also require the alarm to have an effect on print action, or cause a message to be printed on the chart. For a fuller explanation of the application of alarms, together with an example of a chart record, refer to Section 1, "PRODUCT OVERVIEW".

3.3.3.1 Decimal point for setpoint

Starting displays :

ALXX DEC PNT SP

XXXXXXXXXX AXX

The lower display indicates the last configured selection, and the sub-matrix location reference.

The decimal point position must be related to the decimal point position for the input channel display scale established in paragraph 3.3.1.5. You may wish to configure fewer decimal places, but there is no benefit from

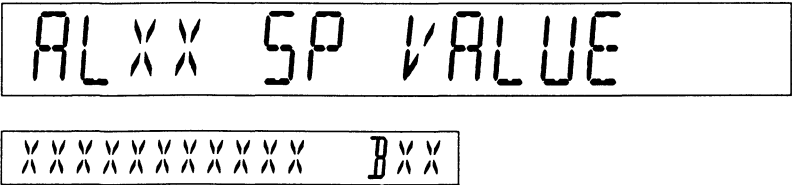
MULTICHANNEL
RECORDER

configuring more.

<u>Selection</u>	<u>Decimal place</u>
0000	No decimal place *
0.000	Three decimal places
00.00	Two decimal places
000.0	One decimal place

3.3.3.2 Set point value

Starting displays :

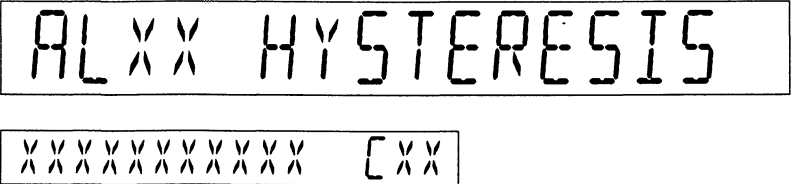


The alarm setpoint value will be compared with the measured value of the analog input channel to be established in paragraph 3.3.3.4, to determine whether an alarm condition exists. The value chosen must therefore lie within the low and high limits of the input sensor and/or actuation established in paragraphs 3.3.1.1 and 3.3.1.2.

<u>Selection</u>	<u>Application</u>
Any numerical value from -9999 to 9999.	See above.

3.3.3.3 Hysteresis

Starting displays :



The value chosen will establish the switching hysteresis of the alarm and output relay, (if fitted). Alarms switch "on" at the configured setpoint value. The value at which an alarm will switch "off" depends upon the hysteresis. The hysteresis value chosen will be added to low alarm setpoints, or subtracted from high alarm setpoints, to determine the value of the input channel at which an alarm will clear. Note that for the recorder alarm hysteresis

is expressed in absolute units, and not in percent.

Selection

Application

Any numerical value from 0 to 9999.

See above.

3.3.3.4 Chart channel

Starting displays :

ALXX CHART CHNL

XXXXXXXXXX DXX

This parameter identifies the analog input channel whose measured value will be compared with the alarm setpoint to determine whether an alarm condition exists.

Selection

Application

Any numerical value from 0 to 32

See above

Note : selecting 0 de-activates the alarm

3.3.3.5 Relay number

Starting displays :

ALXX RELAY NO

XXXXXXXXXX EXX

The basic recorder is supplied without relays, in which case selection of a relay number has no effect. If your recorder has been fitted with optional internal relay board(s), or with an interface to external relay box(es), you must use this parameter to identify which relay, if any, should drive whilst an alarm exists. For further information on alarm applications refer to section 1, "PRODUCT OVERVIEW".

Selection

Application

Any numerical value from 0 to 60

See above.

Select 0 if no relay is to be driven, or no internal or external relays are available.

MULTICHANNEL RECORDER

3.3.3.6 Type

Starting displays :

ALXX TYPE
XXXXXXXXXXXX FXX

This parameter is used to identify the alarm type. You must select from none, high, low, rate of change or channel difference alarms, as explained below. Note that if a filter is used all alarms operate on filtered values.

<u>Selection</u>	<u>Application</u>
NONE	No action. Select "none" for all unused alarms.
EVENT HIGH ▲	Alarm to occur when the value of the analog input equals or exceeds the alarm setpoint.
EVENT LOW ▼	Alarm to occur when the value of the analog input equals or is below the alarm setpoint.
CHANGE RATE↑ *	Alarm to occur if the difference between the preceding and latest values of the analog input exceeds the alarm setpoint, for a <u>rising</u> input. Alarm SP = (PVt - PV(t-1))/Scanning period
CHANGE RATE↓ *	Alarm to occur if the difference between the preceding and latest values of the analog input exceeds the alarm setpoint, for a <u>falling</u> input.
CHANGE RATE *	Alarm to occur if the difference between the preceding and latest values of the analog input exceeds the alarm setpoint whether the input is <u>rising or falling</u> .
DIFFERENTIAL	Alarm to occur if the absolute difference between the values of the specified channel and that of a second channel, to be defined in next paragraph, exceeds the alarm setpoint.

* The standard scanning period is 5 seconds.

3.3.3.7 Channel differential

Starting displays :

```

ALXX CH N° DIFF
XXXXXXXXXXXX GXX
  
```

This parameter identifies the second channel whose input is to be compared with the chart channel established in paragraph 3.3.3.4 to determine whether a differential alarm exists. Select 0 for all alarm types in the preceding paragraph other than DIFFERENTIAL.

<u>Selection</u>	<u>Application</u>
Any numerical value from 0 to 32	See above

3.3.3.8 Message

Starting displays :

```

ALXX MESSAGE
XXXXXXXXXXXX HXX
  
```

You may wish to have a standard or specific message printed when an alarm occurs. Use this parameter to identify the number of the message. Refer to paragraph 3.3.5 for information on message configuration, and section 1, "PRODUCT OVERVIEW" for examples of alarm message printing. If you do not require a message to be printed on alarm, select 0. If you require a standard message, select 21.

<u>Selection</u>	<u>Application</u>
Any numerical value from 0 to 21.	See above

MULTICHANNEL RECORDER

3.3.3.9 Message color

Starting displays :

```
ALXX MSG COLOR
XXXXXXXXXXXX IXX
```

Choose one of the six available colors for the printing of the message selected in the previous paragraph. If the same message is to be used for more than one alarm use different colors to assist identification of the alarm by the operator.

<u>Selection</u>	<u>Application</u>
BLACK	See above
BLUE	
PURPLE	
GREEN	
BROWN	
RED	

3.3.3.10 Print action

Starting displays :

```
ALXX PRN ACTION
XXXXXXXXXXXX JXX
```

This parameter determines what effect, if any, the occurrence of an alarm will have on printing. You may require the alarm to cause "Print on alarm ", speed change, range change, or the triggering of "Event Precursor" printing. For further information on alarm applications, and for a full description of "Event Precursor" mode, refer

3. CONFIGURATION

MULTICHANNEL RECORDER

to Section 1, "PRODUCT OVERVIEW".

<u>Selection</u>	<u>Application</u>
NONE	No effect on printing.
PRN ON AL *	Print the channel on alarm : If "ON AL R1" (or 2) was selected for the analog input channel in the "Chart" matrix. See paragraph 3.3.2.14.
CHG SPD/TAB2	Change to chart speed : print interval 1 (or 2) on alarm.
CHG RANGE 2 *	Change to chart range 2 on alarm : If "WITH R1" was selected in the "Chart" matrix. See paragraph 3.3.2.14.
TRIG EV PR	Triggering of "Event Precursor" printing to occur when alarm occurs : If "PRSR PR" was selected in the "Printer" matrix. See paragraph 3.3.6.1. The printing triggered by the "Event precursor" is followed by continuous recording (the configuration changes automatically to "REAL PR")
TRIG EV PR/S	Triggering of "Event Precursor" printing to occur when alarm occurs : If "PRSR PR" was selected in the "Printer" matrix. See paragraph 3.3.6.1. The printing triggered by the "Event precursor" is followed by return to standby.

* Note : A message will indicate this on the paper automatically.

3.3.3.11 Red on alarm

Starting displays :

ALXX RED ON AL

XXXXXXXXXXXX KXX

This parameter offers you the choice of having the configured chart channel trend record or tabular printout remain in the same color, or change to red, while an 3-43 alarm exists. Refer to section 1, "PRODUCT

MULTICHANNEL RECORDER

OVERVIEW", for an example of a chart printout using red on alarm function.

<u>Selection</u>	<u>Application</u>
<input type="text" value="NO"/>	No color change on alarm.
<input type="text" value="YES"/>	Change to red on alarm.

3.3.3.12 Alarm acknowledge.

Starting displays :

ALXX ALARM ACK

XXXXXXXXXXXX LXX

This parameter offers you the choice of permitting the operator to acknowledge the occurrence of the alarm or not. The procedure for acknowledging alarms is explained in Section 4, "OPERATION".

Note that acknowledging an alarm de-activate any configured internal or external relay, even if the alarm condition still exists, unless the same relay is also driven by another alarm.

<u>Selection</u>	<u>Application</u>
<input type="text" value="NO"/>	Alarm not to be acknowledgeable.
<input type="text" value="YES"/>	Alarm to be acknowledgeable.

3.3.4 Digital inputs (option)

Starting displays :

READ/WRITE

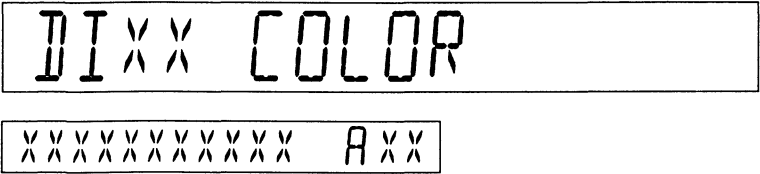
DIGITAL

MULTICHANNEL
RECORDER

This sub-matrix will be accessible only if your recorder has been supplied with one or two optional digital input boards, permitting up to 6 digital inputs per board. If you do have the digital input option, then for each digital input you must configure parameters which will determine if and how the digital input will be recorded. You may also assign alarms to digital inputs, and choose what effect, if any, the occurrence of an alarm will have on printing . For further information on digital inputs, with examples of chart records, refer to section 1, "PRODUCT OVERVIEW".

3.3.4.1 Color

Starting displays :



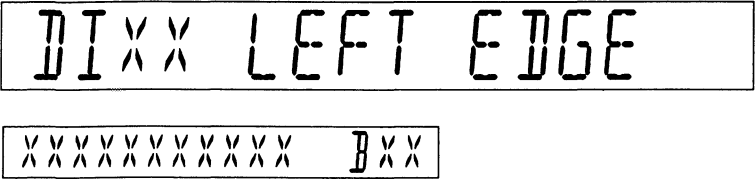
The lower display indicates the last configured selection, and the sub-matrix location reference.

If you intend to configure the digital input status to be printed graphically in a similar way to a traditional event pen, use this parameter to establish a print color. Do not select red if you intend to configure red on alarm in paragraph 3.3.4.11.

<u>Selection</u>	<u>Application</u>
BLACK	
BLUE	
PURPLE	
GREEN	
BROWN	
RED	

3.3.4.2 Left edge %

Starting displays :

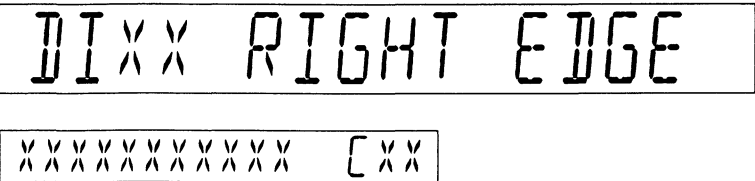


If you intend to configure the digital input status to be printed graphically, use this paragraph and the next to establish the percent of chart width at which the graphic trace is to appear when the input is low (off) and high (on), respectively. This feature permits you to segregate digital input traces into different zones for better clarity. Refer to section 1 "PRODUCT OVERVIEW", for an example of a chart printout of digital inputs.

Selection	Explanation
Any value from 0% to 100%.	Choose the value in percent of chart width at which the graphic trace is to be printed when the digital input is low (off).

3.3.4.3 Right edge %

Starting displays :

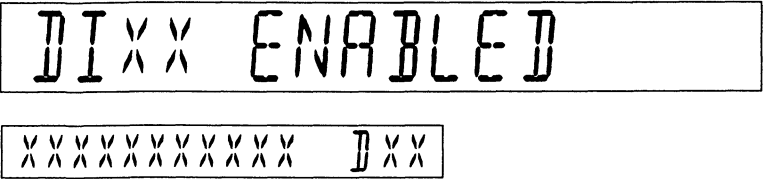


Refer to the previous paragraph for an explanation of this parameter.

Selection	Explanation
Any value from 0% to 100%.	Choose the value in percent of chart width at which the graphic trace is to be printed when the digit input is high (on) Note : do not choose the same value as in the previous paragraph, unless you intend to configure red on alarm in paragraph 3.3.7.11.

3.3.4.4 Enabled

Starting displays :

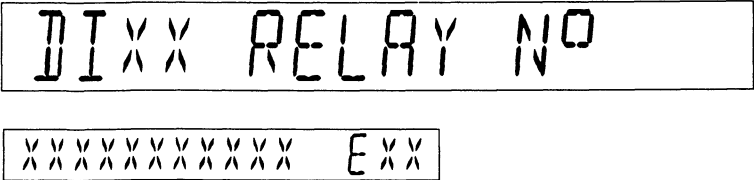


Use this parameter to choose whether or not to print the digital input graphically.

Selection	Application
NOT PRINT	Displayed but not recorded
TRACE	Displayed and recorded

3.3.4.5 Relay number

Starting displays :



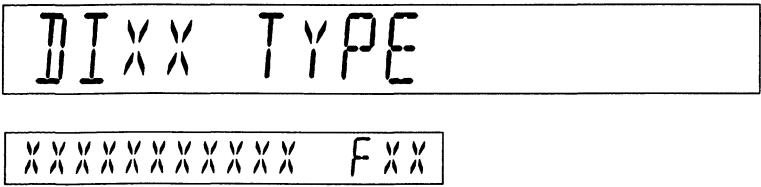
The basic recorder is supplied without relays, in which case selection of a relay number has no effect. If your recorder has been fitted with optional internal relay board(s), or with an interface to external relay box(es), you may use this parameter to identify which relay, if any, should be driven when an alarm exists. For further information on alarm applications refer to section 1, "PRODUCT OVERVIEW".

Selection	Explanation
Any numerical value from 0 to 60.	See above. Select 0 if no relay is to be driven.

MULTICHANNEL
RECORDER

3.3.4.6 Type

Starting displays :

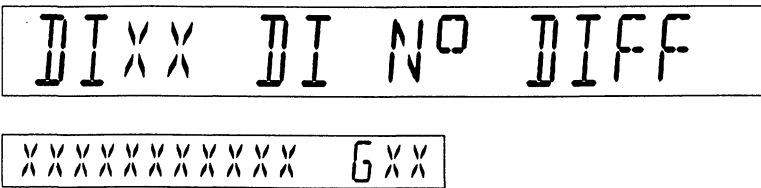


This parameter is used to identify the alarm type. You must select from none, high, low, rate of change or differential between two digital inputs, as explained below.

<u>Selection</u>	<u>Application</u>
NONE	No event action.
EVENT HIGH Δ	Event to occur when the digital input changes to on (high).
EVENT LOW ∇	Event to occur when the digital input changes to off (low).
CHANGE RATE \nearrow	Event to occur when the digital input changes from off to on.
CHANGE RATE \searrow	Event to occur when the digital input changes from on to off.
CHANGE RATE \updownarrow	Event to occur when the digital input changes in either direction.
DIFFERENTIAL	Event to occur when the digital input changes to a different state from another specified digital input. See next paragraph.

3.3.4.7 Digital input differential

Starting displays :



MULTICHANNEL RECORDER

This parameter identifies the digital input number whose status is to be compared with the digital input being configured, to determine whether a differential alarm exists. Select 0 for all alarm types in the preceding paragraph other than DIFFERENTIAL.

<u>Selection</u>	<u>Explanation</u>
Any numerical value from 0 to 12.	See above.

3.3.4.8 Message

Starting displays :

DIXX MESSAGE

XXXXXXXXXXXX HXX

You may wish to have a standard or specific message printed when an alarm occurs. Use this parameter to identify the number of the message. Refer to paragraph 3.3.5 for information on message configuration, and to section 1, "PRODUCT OVERVIEW", for examples of alarm message printing. If you do not require a message to be printed select 0. If you require a standard message, select 21.

<u>Selection</u>	<u>Explanation</u>
Any numerical value from 0 to 21.	See above.

3.3.4.9 Message color

Starting displays :

DIXX MSG COLOR

XXXXXXXXXXXX IXX

Choose one of the available colors for the printing of the message selected in the previous paragraph. If the same message is to be printed for more than one alarm, use different colors to assist identification of the

MULTICHANNEL
RECORDER

alarm by the operator.

<u>Selection</u>
BLACK
BLUE
PURPLE
GREEN
BROWN
RED

Application

See above

3.3.4.10 Print action

Starting displays :

DI XX PRN ACTION
XXXXXXXXXXXX JXX

This parameter determines what effect, if any, the occurrence of an alarm will have on printing. You may require the alarm to cause print on alarm, speed change, range change or the triggering of "Event Precursor" printing.

For further information on alarm application, and for a full description of "Event Precursor" mode, refer to section 1, "PRODUCT OVERVIEW".

<u>Selection</u>
NONE
PRN ON AL
CHG SPD/TAB2
CHG RANGE 2

Application

No effect on printing

All analog input channels configured print on alarm in paragraph 3.3.2.14, to be printed when an event exists.

Change to chart speed (print interval) 2 required when an event exists.

All analog input channels to change to chart range 2 when an event exists.

3. CONFIGURATION

MULTICHANNEL RECORDER

TRIG EV PR

Triggering of "Event Precursor" printing to occur when event occurs, followed by continuous recording.

TRIG EV PR/S

Triggering of "Event Precursor" printing to occur when event occurs, followed by return to stand by.

INHIBIT PRN

All printing will cease when an event exists.

PRN NUMERIC

Printing to be in tabular format when an event exists.

3.3.4.11 Red on alarm

Starting displays :

DI XX RED ON AL

XXXXXXXXXXXX KXX

This parameter offers you the choice of having the digital input record remain in the same color, or change to red whilst the alarm exists. Refer to section 1, "PRODUCT OVERVIEW", for an example of a chart printout using red on alarm function.

Selection

Application

NO

No color change on alarm.

YES

Change to red on alarm.

3.3.4.12 Alarm acknowledge

Starting displays :

DI XX ALARM ACK

XXXXXXXXXXXX LXX

MULTICHANNEL RECORDER

This parameter offers you the choice of permitting the operator to acknowledge the occurrence of the alarm, or not. The procedure for acknowledging alarms is explained in section 4, "OPERATION". Note that acknowledging an alarm de-energizes any specified internal or external relay, even if the alarm condition still exists, unless the same relay is held energized by another alarm.

Selection

Application

NO

Alarm not to be acknowledgeable.

YES

Alarm to be acknowledgeable.

3.3.5 Messages

Starting displays :

READ/WRITE

MESSAGE

The recorder may be configured so that a message will be printed when an alarm occurs, and a similar message when it ceases. Refer to paragraphs 3.3.3.8 and 3.3.4.8 for the procedure. You may configure for no message, standard message or specific message. The standard message is given the number 21, and consists of time, alarm number, channel or digital input number, alarm setpoint value for analog inputs, alarm type, and "ON" or "OFF", depending upon whether the alarm has just occurred or cleared.

In this sub-matrix, you may establish the text of up to 20 specific messages, each consisting of up to 30 alphanumeric characters, which will be printed in addition to the standard message. For further information on the use of messages with an example of message printing, refer to section 1, "PRODUCT OVERVIEW"

3.3.5.1 Messages

Starting displays :

ME 1 MESSAGE

XXXXXXXXXXXX A 1

3. CONFIGURATION

MULTICHANNEL RECORDER

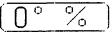

Use message numbers 1 to 20 to establish your specific messages. Message number 21 is allocated to the standard message but cannot be accessed.

Selection

Application

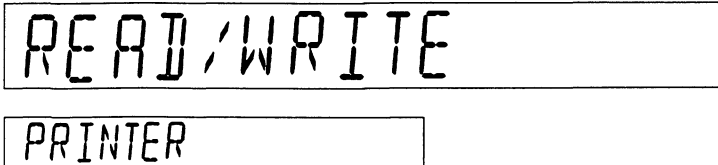
Up to 30 alphanumeric characters.

See above, and previous paragraph.

Note : Access special characters not directly accessible on the keyboard by pressing the  and  keys until the desired character is displayed.

3.3.6 Printer

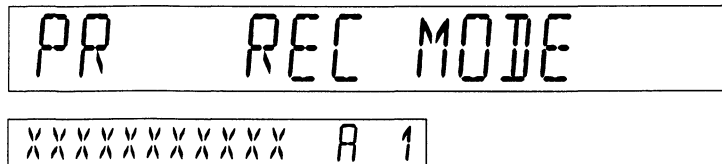
Starting displays :



In the printer sub-matrix you must establish configuration data which affect such parameters as recorder mode, printing mode, chart speeds and units, and tabular print intervals. For a full description of recording and printing modes, together with examples of chart printing, refer to section 1, "PRODUCT OVERVIEW".

3.3.6.1 Recording mode

Starting displays :

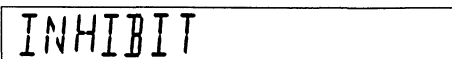


The lower display indicates the last configured recording mode, and the sub-matrix location reference.

Under this heading you may choose to inhibit all printing, to print continuously in high definition trace (use of recorder buffer memory), to print continuously in real time with data scanning (no storage into buffer) or to operate the recorder in "Event Precursor" mode. For a full description of "Event Precursor" mode, together with examples of chart records, refer to section 1, "PRODUCT OVERVIEW".

Selection

Application



No printing required

3. CONFIGURATION

MULTICHANNEL RECORDER

Selection

PRINT

REAL PR

PR SR PR

Application

Continuous printing required in high definition traces

Printing required in real time.

Recorder required to operate in "Event Precursor" mode.

3.3.6.2 Print mode

Starting displays :

PR PRINT MODE

XXXXXXXXXX B 1

Under this heading you must choose whether recording will normally be in trend mode, tabular mode, or a combination of the two. Refer to Section 1, "PRODUCT OVERVIEW", for examples of chart records in these different print modes.

Selection

TREND

Application

All inputs to be recorded as trends.

TABULAR

All inputs to be recorded in tabular format.

ALTERNATE

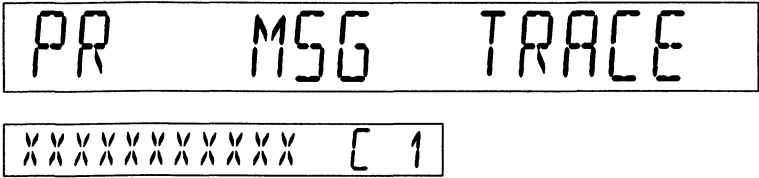
All inputs to be recorded normally as trends, but a tabular printout will be interposed as defined below :

Chart speed (mm/h)	Printout interval (mm)	Chart speed (inch/h)	Printout interval (inch)	Tabular periodicity (min.)
10	120	0.4	4.8	720
20	120	0.8	4.8	360
40	160	1.6	6.4	240
60	120	2.4	4.8	120
80	160	3.2	6.4	120
150	150	6	6.0	60
300	150	12	6.0	30
500	166.7	15	5.0	20
1000	166.7	30	5.0	10
1500	125	60	5.0	5

MULTICHANNEL
RECORDER

3.3.6.3 Message trace

Starting displays :



Under this heading you must choose whether messages will be superimposed on trend records, or printed on blank paper between discontinuous trends. The implications of each selection are fully explained below, but you may wish to refer to examples of chart records with message printing in Section 1, "PRODUCT OVERVIEW", before making your choice. Note that this Section is irrelevant if you chose tabular mode in the previous paragraph, as messages are never superimposed on tabular data.

Selection

Application

BLANK

Message printing to have priority. Messages to be printed as they occur, on blank paper. Trend records will be discontinuous, but no data will be lost.

TRACE

Message printing to be superimposed on continuous trend records Note ; In some circumstances messages to be printed may accumulate in buffer memory. If so, messages for alarms that have occurred and cleared may not be printed.

MIXED

Message printing to be normally superimposed on trend records. If messages accumulate in memory, they will be printed on blank paper so that they are not lost.

3. CONFIGURATION

MULTICHANNEL RECORDER

3.3.6.4 Units of speed

Starting displays :

PR UNIT SPEED
XXXXXXXXXXXX D 1

Choose whether you require the chart speed units to be m.m/hour or inch/hour.

Selection

Application

MM/HOUR

Chart speed units to be m.m/hour.

INCH/HOUR

Chart speed units to be inch/hour.

3.3.6.5 Speed 1

Starting displays :

PR SPEED 1
XXXXXXXXXXXX E 1

Choose the numerical value required for chart speed 1, when printing in trend or alternate modes (see paragraph 3.3.6.2). The range of values available depends upon the chart speed units chosen in the previous paragraph.

(a) m.m/hour speed units

(b) inch/hour speed units

Selection

Selection

Any numerical value from 1 to 1500.

Any numerical value from 1.0 to 60.0.

MULTICHANNEL RECORDER

3.3.6.6 Speed 2

Starting displays :

```
PR    SPEED  2
XXXXXXXXXXXX F 1
```

Choose the numerical value required for chart speed 2, when printing in trend or alternate modes. The range of values available is the same as for speed 1. See above.

3.3.6.7 Speed in use

Starting displays :

```
PR    IN USE
XXXXXXXXXXXX G 1
```

Choose whether the chart will normally run at speed 1 or 2.

Selection

Application

```
SPD/TAB 1
```

Chart speed/print interval to be normally number 1.

```
SPD/TAB 2
```

Chart speed/print interval to be normally number 2.

3.3.6.8 Interval 1

Starting displays :

```
PR    INTERVAL 1
XXXXXXXXXXXX H 1
```

MULTICHANNEL RECORDER

Choose the numerical value, in minutes, required for tabular print interval 1, when printing in tabular mode (See paragraph 3.3.6.2).

Selection

Any value from 1 mn. to 1440 mn.

Explanation

Sets time interval between successive tabular printouts.

3.3.6.9 Interval 2

Starting displays :

```
PR    INTERVAL 2
XXXXXXXXXXXX I 1
```

Choose the numerical value, in minutes, required for tabular print interval 2, when printing in tabular mode. The range of values available is as for interval 1. See above paragraph.

3.3.6.10 Calibration 0 - chart

Starting displays :

```
PR    CAL 0
XXXXXXXXXXXX J 1
```

This parameter is used for chart calibration, which is a service function, and is explained in Section 6, "CALIBRATION".

3.3.6.11 Calibration 100 - chart

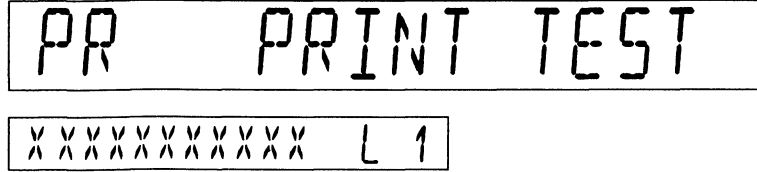
Starting displays :

```
PR    CAL 100
XXXXXXXXXXXX K 1
```

This parameter is used for chart calibration, which is a service function and is explained in section 6, "CALIBRATION".

**MULTICHANNEL
RECORDER****3.3.6.12 Print test**

Starting displays :

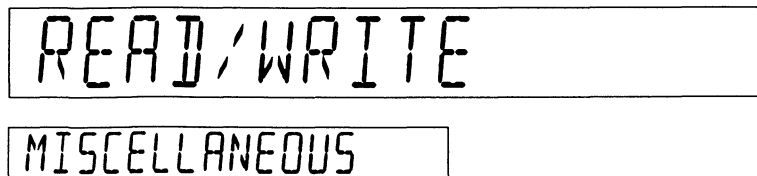


The first display shows 'PR PRINT TEST' in a large, spaced-out font. The second display shows 'XXXXXXXXXX L 1' in a smaller font, with the 'L' and '1' being larger than the preceding characters.

This parameter is used for testing the operation of the printer, which is a service function, and is explained in section 7, "SERVICE".

3.3.7 Miscellaneous

Starting displays :



The first display shows 'READ/WRITE' in a large, spaced-out font. The second display shows 'MISCELLANEOUS' in a smaller font.

In the miscellaneous sub-matrix there are only three parameters which require configuration to be established at this time, namely paper number, language and password. When entering configuration data, you may also wish to set the date and time, the procedure for which is explained in chapter 3.8, "SETTING DATE AND TIME".

Before or after entering configuration data you may wish to obtain a printout of configuration in memory. The procedure is explained in chapter 3.7, "PRINTING CONFIGURATION DATA".

Other parameters include "teacher mode", the purpose of which is explained in Section 1, "PRODUCT OVERVIEW".

Finally there are a number of parameters which are used when servicing the recorder and are explained in section 7, "SERVICE".

MULTICHANNEL RECORDER

3.3.7.1 Paper number

Starting displays :

MI PAPER NO
XXXXXXXXXXXX A 1

Under this heading you may choose a number which will be printed at intervals on the chart to assist in identifying later, the source of the chart record. Use different numbers for each recorder on your plant.

Selection

Application

Any numerical value from 1 to 255.

See above

3.3.7.2 Language

Starting displays :

MI LANGUAGE
XXXXXXXXXXXX B 1

Under this heading you must choose the language to be used for configuration prompts, operator information and operational messages. Specific alarm messages are not translated, and should be entered in the language of your choice.

Selection

Application

ENGLISH

See above

FRANCAIS

DEUTSCH

ESPAÑOL

MULTICHANNEL RECORDER

Selection

Application

ITALIANO

3.3.7.3 Print configuration

Starting displays :

MI PRINT CONF
XXXXXXXXXXXX C 1

Under this heading an immediate and total printout of configuration data may be obtained. The procedure is given in chapter 3.7 "PRINTING CONFIGURATION DATA".

3.3.7.4 Options

Starting displays :

MI OPTIONS
XXXXXXXXXXXX D 1

This is a read only function, used to display successively the number and type of input and output boards fitted to the recorder.

3.3.7.5 Date/Time

Starting displays : (Ref E 1)

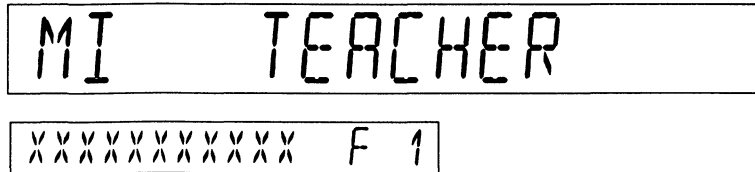
MI DATE/TIME
XXXXXXXXXXXXXXXXXXXX

MULTICHANNEL RECORDER

Under this heading the date and time for the internal real time clock may be entered or corrected. The procedure is explained in chapter 3.8, "SETTING DATE AND/OR TIME".

3.3.7.6 Teacher mode

Starting displays :



The image shows two digital display screens. The top screen displays 'MI TEACHER' in a large, blocky font. The bottom screen displays 'XXXXXXXXXX F 1' in a smaller, blocky font.

Under this heading you may select a routine that produces a record of trend traces and alphanumeric information which is independent of connected inputs. A more detailed description of teacher mode, with an example of chart record, is given in Section 1, "PRODUCT OVERVIEW".

NO

YES

Caution : Selection of teacher mode inhibits the recorder from normal input data acquisition and printing.

3.3.7.7 Version

Starting displays :

MI VERSION

XXXXXXXXXXXX G 1

This is a read only function which displays the software version number, for service use.

3.3.7.8 Reboot

Starting displays :

MI REBOOT

XXXXXXXXXXXX H 1

This function is for service use should it be necessary to cause the recorder to perform the complete power-up test sequence without cycling the power off and on. Refer to Section 7, "SERVICE", for further information.

MULTICHANNEL RECORDER

3.3.7.9 Frequency 50/60 Hz

Starting displays :

MI FREQUENCY
XXXXXXXXXXXX I 1

This parameters offers you the choice of having 50 or 60 Hertz to have a better noise rejection of the power supply frequency.

50 HERTZ IXX
60 HERTZ IXX

3.3.7.10 Password

Starting displays :

MI PASSWORD
J1

The password entered will be asked by the recorder each time you want to lock or unlock a matrix, or change the password.

Press **ENTER** to change the password

Displays read : (see note 1)

MI PASSWORD
XXXX OLD

The first digit is flashing

Enter the four-character current password, then

MULTICHANNEL RECORDER

Press **ENTER**

If the password is wrong , the recorder returns to normal scanning mode.

If the password is correct,

Displays read

MI PASSWORD

XXXX NEW

Where XXXX is the current password

Enter the four-character new password, and/or then

Press **ENTER**

The password "0000" indicates that there is no password function : the matrices can be locked/unlocked without password.

Note :

1. The recorder is delivered without password and this step is not displayed.
2. If you have forgotten the password, please contact your local office.

MULTICHANNEL RECORDER


3.4 READING AND WRITING CONFIGURATION DATA

Now that you have determined the configuration data which you require, it is necessary to enter it into the recorder's memory. Before attempting this task be sure that you understand the way in which configuration data is organized by the recorder. If you have not read chapter 3.2, "Organization of configured data", do so now.

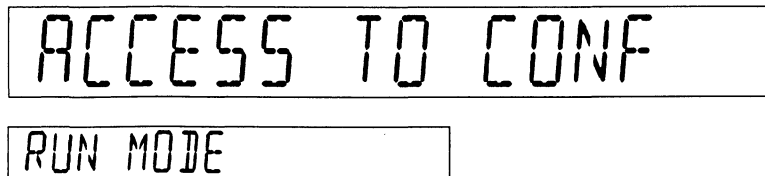
You must also ensure that your recorder has been installed and prepared for use in accordance with section 2 of this manual, that the power up checks have been completed satisfactorily and that the instrument is ready for use.

3.4.1 Entering configuration mode

Access to configuration mode is via the main matrix. Proceed as follows :

Press  **CONF**

Displays read momentarily :



ACCESS TO CONF
RUN MODE

then :



READ/WRITE
ANALOG INPUTS

The former display tells you that you have access to configuration mode but, at present, the recorder is continuing with process data acquisition and printing.

Spend a few moments using the four "arrow" keys to find your way around the main matrix. Refer to Figure B1 in Section 10, "APPENDIX B", if necessary. Observe that the titles of the four horizontal lines of the matrix are given sequentially in the upper display, and are as follows.

READ/WRITE

COPY

LOCK/UNLOCK

PRINT

Copying, locking/unlocking and printing of configuration data are explained in chapter 3.5, 3.6 and 3.7 respectively. This chapter is concerned solely with reading and writing data.

3.4.2 Reading configuration data

Configuration data may be read at any time. Reading is neither prevented by locking the sub-matrices, nor does it inhibit the recorder from normal acquisition and printing of input data. However the displays will not be available to show input data when configuration data is being read.

Although data can be read from the sub-matrices in any order, these notes assume that reading will commence in the analog inputs sub-matrix. Use the arrow keys to restore the displays to :

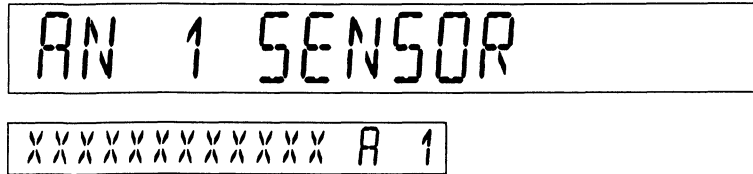
READ/WRITE

ANALOG INPUTS

Press **ENTER**

Displays read :

MULTICHANNEL RECORDER


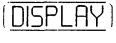


AN 1 SENSOR

XXXXXXXXXXXX A 1

where xxxx represents the last configuration data.



Now that you have entered the sub-matrix, you can use the four arrow keys to enable you to read configuration data from any location. Notice that the location reference is given at the right hand of the lower display.

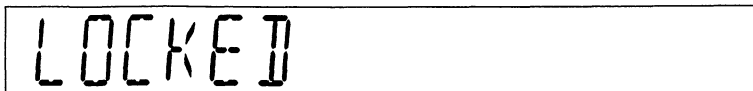
After you have read the data in one sub-matrix you can return to the main matrix by pressing  , and from there go to other sub-matrices, or return to normal running mode by pressing  .

3.4.3 Writing configuration data

If the recorder is being configured for the first time it is strongly recommended that all data be determined beforehand, and written on a copy of the configuration worksheet given in appendix A at the rear of this manual. If you have not already determined the configuration data which you require, work through chapter 3.3, "Determining configuration data" now. It is also recommended that you obtain a full printout of existing configuration. Refer to chapter 3.7, "Printing configuration data" for the procedure.

The procedure for changing data in a sub-matrix location is so simple and straightforward that is not necessary to give you instructions for changing every individual item in every sub-matrix. The important thing is to remember and apply the guidelines set out in the following notes. You may also refer to the configuration flow chart Figure 3-3 on pages 3-70 and 3-71.

The procedure for locating an item of data which you require to change is exactly the same as described in section 3.4.2, "Reading configuration data". Once the item of data has been located, press the  key. If on pressing the  key the upper display reads momentarily :



LOCKED

It will be necessary to unlock the sub-matrix. Refer to chapter 3.6, "Locking and unlocking configuration data" for the procedure.

3. CONFIGURATION

MULTICHANNEL RECORDER

One of the many advantages of the recorder is that the majority of the configuration parameters can be changed without interrupting normal data acquisition and printing. However all items in the analog inputs and miscellaneous sub-matrices, and some items in other sub-matrices, cannot be changed without the recorder being taken out of normal running mode. All such parameters will be identified if on pressing the displays read :

GO TO CONF MODE
YES_ 1 NO_ 0

If it is not acceptable to interrupt normal running mode, press the key.

If you decide to respond "yes" by pressing the key, be aware that normal running mode will not be resumed until the key is pressed, even if you proceed to change parameters which would not usually require an interruption to normal running.

Having located the item to be changed, unlocked the sub-matrix and entered "CONF MODE" as necessary, the next step is to press the key. The data item in the lower display will now commence flashing, to indicate that it may be changed.

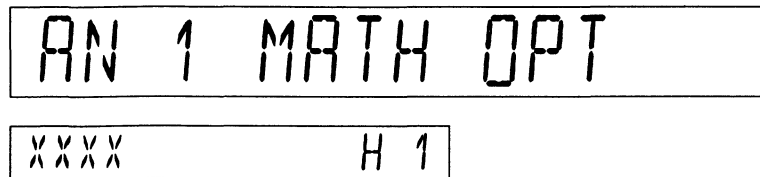
If you decide not to change it, simply press the key again. The item will cease flashing and will be retained in the recorder's memory.

To change the data, follow the appropriate procedure from the three given hereafter.

MULTICHANNEL RECORDER

3.4.3.1 Parameters for which the recorder offers a choice

An example of a parameter of this type is found in location H1 of the analog inputs sub-matrix. On locating this item, the displays read :

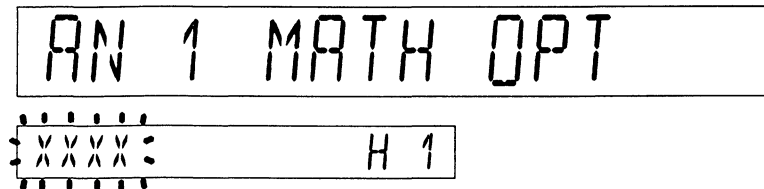


AN 1 MATH OPT
XXXX H 1

where xxxx represents the last configuration.

Press

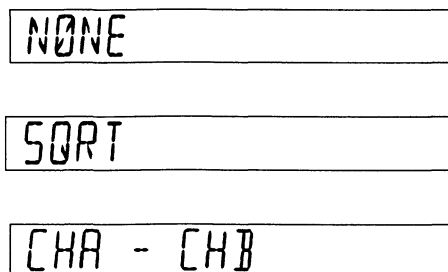
Displays read :



AN 1 MATH OPT
XXXXX H 1

where the data is now flashing.

Use the key to scroll through the selection available, which for this example is :



NONE
SQRT
CHA - CHB

Make your choice and press the key. The lower display will stop flashing to indicate that the new data has been entered into the recorder's memory.

MULTICHANNEL RECORDER

3.4.3.2 Parameters for which the recorder requires a numerical value

An example of a parameter requiring the entry of a numerical value can also be found in the analog inputs sub-matrix. Use the keys to obtain location F1.

Displays read :

AN 1 LOW VALUE
XXXX F 1

where XXXX represents the last configuration.

In this example the data represents the minimum value of the display scale for the sensor connected to channel 1. You may choose any numerical value between -9999 and 9999. See chapter 3.3, "Determining configuration data" and paragraph 3.3.1.6 for a fuller explanation.

Press **ENTER**

Displays read :

AN 1 LOW VALUE
XXXX F 1

where the most significant digit is now flashing.

Suppose, for example that you wish to enter the value -150. Proceed as follows :

Press **+ CONF** if the sign requires changing, then :

Press **0 ° %**

Lower display reads :

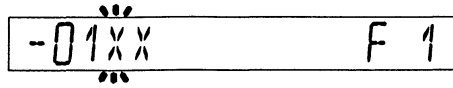
-0 XXX F 1

where the second digit is flashing

Press **1 A B C**

MULTICHANNEL RECORDER

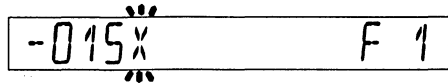
Lower display reads :



where the third digit is flashing.

Press **5 M N 0**

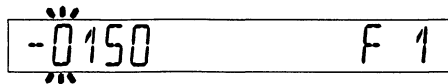
Lower display reads :



where the fourth digit is flashing.

Press **0 ° ‰**

Lower display reads :

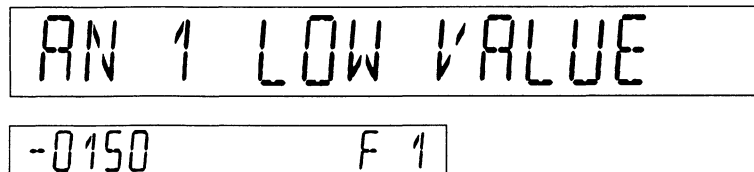


where the first digit is flashing.

If you have made any mistakes you may proceed to change them, but if the display is correct;

Press **ENTER**

Displays read :



where the display has stopped flashing to show that the new data has been entered.

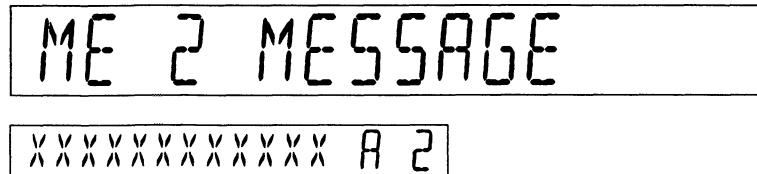
Note : If the decimal point is incorrectly located, its position can be changed by going to location E1.

MULTICHANNEL RECORDER

3.4.3.3 Parameters for which the recorder requires alphanumeric text

An example of a parameter requiring the entry of alphanumeric text can be found in the "messages" sub-matrix. Use the keyboard as described earlier in this chapter to find and enter the messages sub-matrix at location A2.

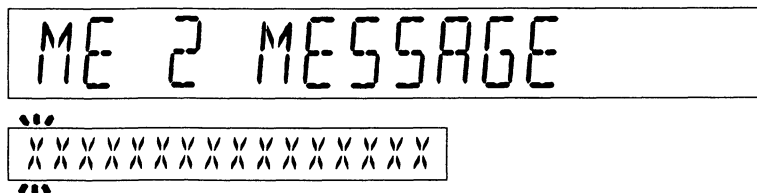
Displays read :



where XXXX represents the last configured data

Press **ENTER**

Displays read :



where the first character is flashing.

Suppose, for example, that you wish to enter the text.
" FURNACE No 3 AT 450 DEG.C"

Remember the message length must not exceed 30 characters.

Proceed as follows :

Press **2 DEF** , three times to select letter "F"

Lower display reads :

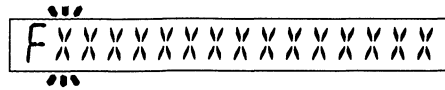


where the first character is flashing

Press **▶**

MULTICHANNEL RECORDER

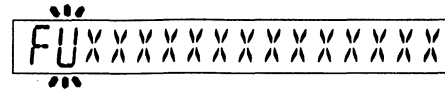
Lower display reads :



where the second character is flashing.

Press **7STU** three times to select letter "U"

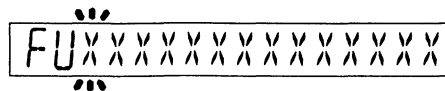
Lower display reads :



where the second character is flashing.

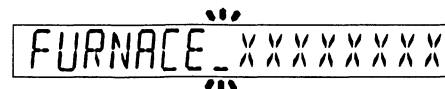
Press **▶**

Lower display reads :



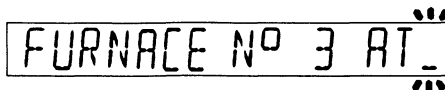
where the third character is flashing.

Continue this procedure until the first word is completed. To create a space between words press the **0** key until the lower display reads :



where the eight character is flashing.

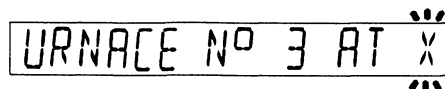
Press **▶** and continue to develop the message until all 16 characters in the lower display are correct and the display reads :



where the last character is flashing.

Press **▶**

Lower display reads :



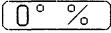
where the character in the last position is flashing.

Continue to build up the message until it is completed and lower display reads :

0 3 AT 450 DEGCX




where the last character is flashing.

Make sure that no spurious text from previously configured messages is left in the remaining spaces.

Delete any unrequired characters by using the  key to create blank spaces, as you did between the words of your message. When you reach the limit of 30 characters the lower display will read :

FURNACE N° 3 AT

where the first character is flashing.

You may scroll through the message using the  or  key if you wish to check that it is correct, then press .

Lower display reads :

FURNACE N° 3 A 2

with no digits flashing, showing that your message has been entered into the recorder's memory.

In building up this message you will have noticed that each alphanumeric key has to be pressed up to four times to obtain the desired character. Scrolling is from the left hand letter towards the right, with the numerical digit selected last. For parameters calling for only numerical data the letter characters on the keys are inhibited.



3.4.4 Leaving configuration mode

Simply press the  key to return to normal running mode.

An identification message will be printed after leaving the "configuration mode" to indicate a return to a normal running mode.

3.4.5 How to modify a configuration parameter - quick guide

(i) Press  CONF

(ii) Use  or  to obtain required sub-matrix.

(iii) Press **ENTER**

(iv) Use arrow keys to locate required parameter. (refer to Figure 3-2 - Configuration prompt hierarchy)

(v) Press **ENTER**

(vi) If "locked", unlock sub-matrix. (refer to chapter 3.6 "Locking/unlocking configuration data")

(vii) Change data.

(viii) Press **ENTER**

(ix) Re-lock sub-matrix, if necessary. (refer to chapter 3.6 "Locking/unlocking configuration data")

(x) Press **DISPLAY**

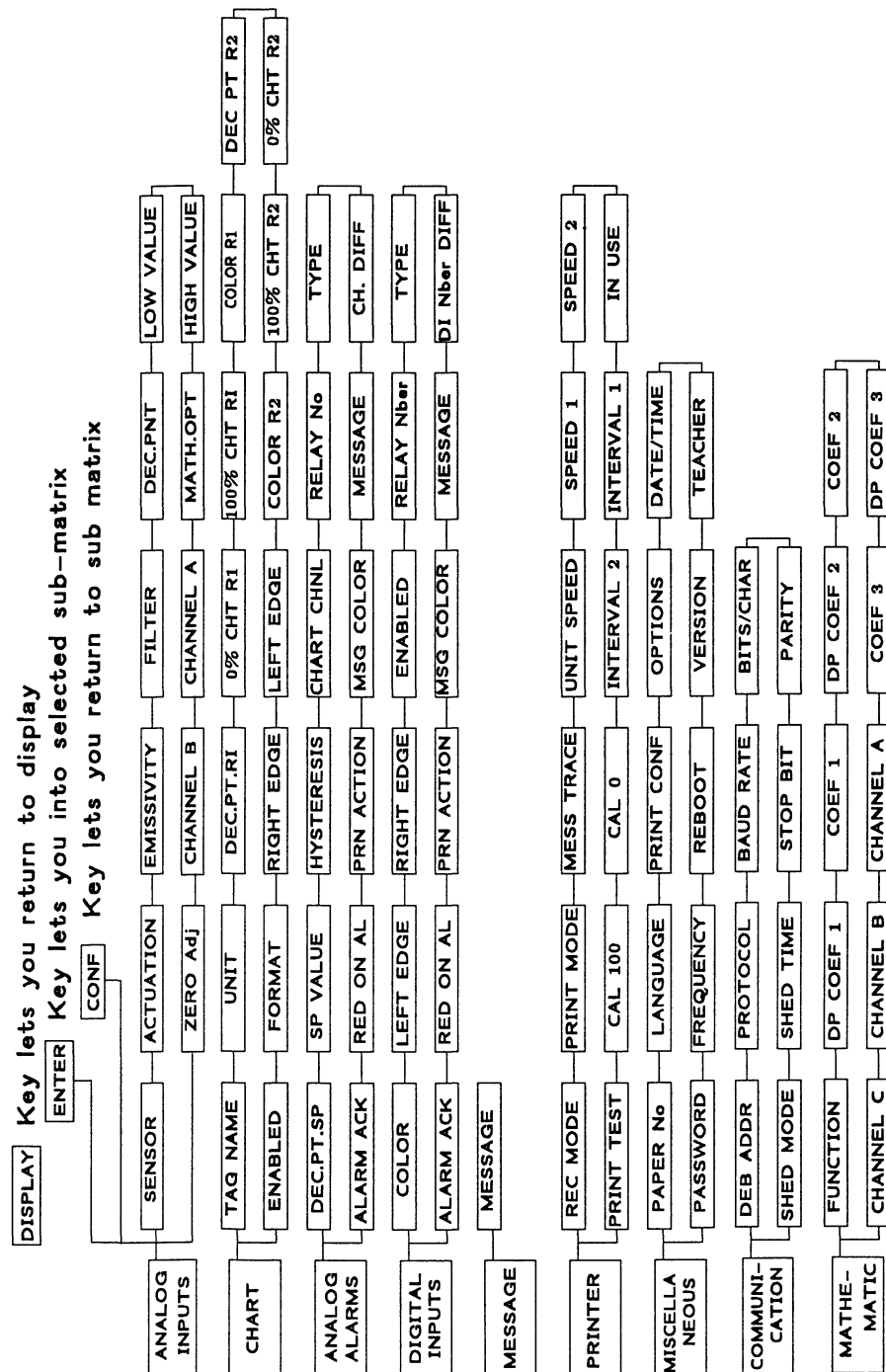


Figure 3-2 Configuration prompt hierarchy

3.4.6 Configuration data entry procedure flowchart

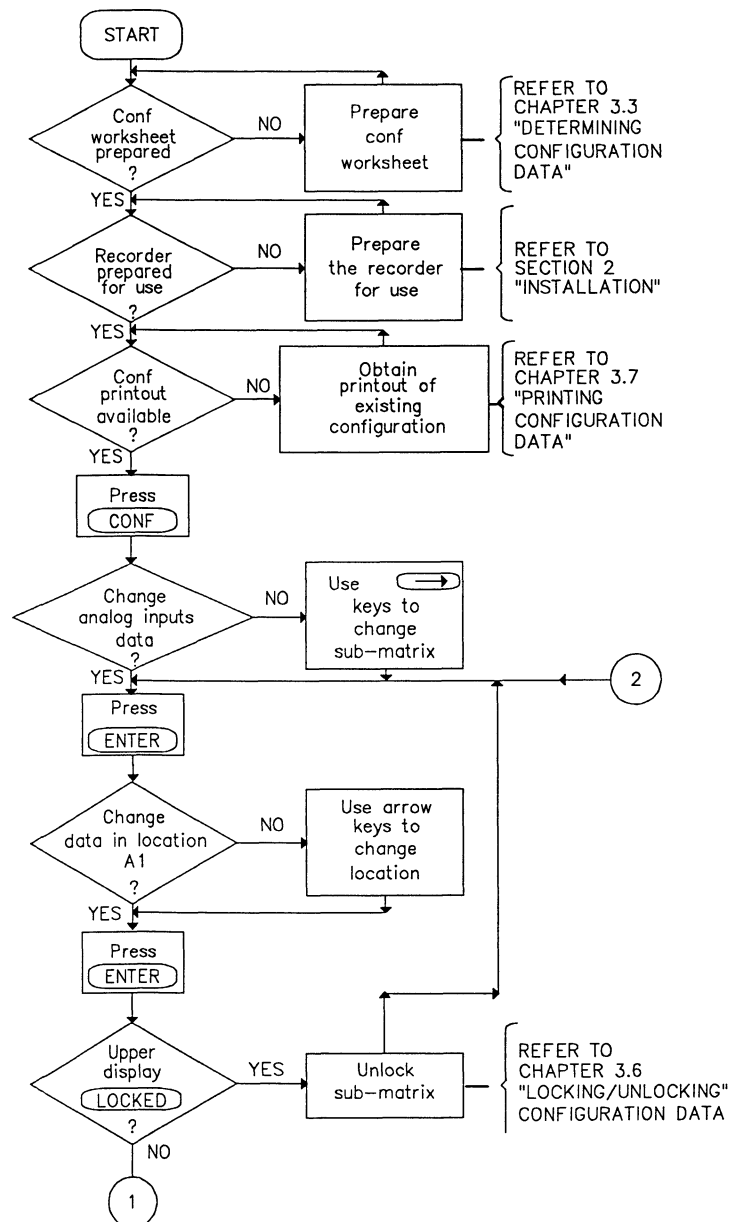
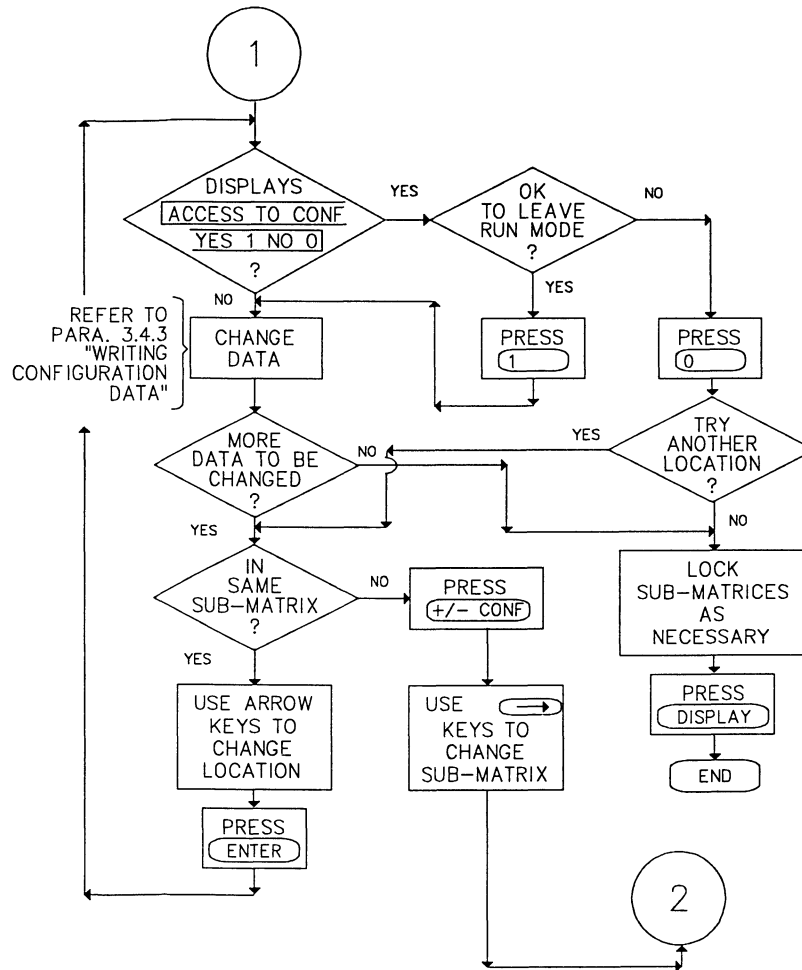


Figure 3-3 Configuration Data Entry Procedure Flowchart
(continued on next page)

Figure 3.3 (continued)




3.5 COPYING CONFIGURATION DATA

3.5.1 Introduction

The copy function may be used to reduce the time required to configure the recorder in applications for which identical data is to be entered in more than one line of a sub-matrix. For example, more than one channel may be connected to similar sensors with similar ranges. Of course, to make use of the copy function the data to be copied must first have been written into one line of the sub-matrix. Refer to chapter 3.4 for the procedure.

3.5.2 Entering copy mode

The procedure for entering copy mode, assuming that the recorder is in normal running mode, is as follow :

Press  **CONF**

Displays read :



ACCESS TO CONF

RUN MODE

then :

READ/WRITE

ANALOG INPUTS

If you wish to use the copy function in a sub-matrix other than analog inputs press the  or  key as many times as necessary to obtain the sub-matrix required.

Note that the copy function for the printer and miscellaneous sub-matrices is denied, as both have only a single line and copying is irrelevant.

Press  once

Displays read :

COPY

ANALOG INPUTS

Press  **ENTER**

If the upper display reads :

LOCKED

MULTICHANNEL RECORDER

copying cannot take place until the sub-matrix is unlocked. Refer to chapter 3.6 for the procedure.

3.5.2.1 Sub-matrix "analog inputs"

After pressing
the displays will read :

GO TO CONF MODE
YES_ 1 NO_ 0

Caution : This display warns you that normal data acquisition and printing will cease if your response is yes.

Press to proceed with copying,

or to abandon copying.

If is pressed

The display will read :

COPY FROM
A 1: A 1

where the first A1 is flashing.

3.5.2.2 Sub-matrices "chart", "analog alarms" "digital inputs" and "messages"

After pressing

The displays will read immediately :

COPY FROM
A 1: A 1

where the first A1 is flashing.

**MULTICHANNEL
RECORDER****3.5.3 Establishing the source of data to be copied**

The legend A1 in the lower display is an example of a sub-matrix location reference as described in chapter 3.2. If you have not previously read this chapter do so now.

These references are used to identify both the source of data to be copied and the location(s) to which it is to be written. Note that it is possible to copy one complete line of data, part of a line (provided that the data are in consecutive locations), or a single item of data. The extent of the data to be copied is defined by setting the references in the lower display to correspond with the first and last data locations.

For example, if you require to copy the data for sensor, actuation, filter, decimal point, low display value, and high display value from channel 4, the data source location references are A4 and G4. Note that this block of data includes emissivity, but this is relevant only if the sensor is a pyrometer.

3.5.4 Establishing the destination of the data

The block of data from the source line may be copied into the corresponding locations of another single line, or a number of consecutive lines. The destination of the data is defined by setting the references in the lower display to the lower left hand and upper right hand destination references of the block of locations into which the data is to be copied. For example, if the data is to be copied into channels 19 to 22 inclusive the block is defined by references A19 and G22. See Fig 3-4.

3. CONFIGURATION

MULTICHANNEL RECORDER

		A	B	C	D	E	F	G	
ROW	COL	SENSOR	ACTUATION	EMISSION	FILTER	DECIMAL POINT	LOW VALUE	HIGH VALUE	
23	CH 23								
22	CH 22	A22	B22	C22	D22	E22	F22	G22	
21	CH 21	A21							
20	CH 20	A20							
19	CH 19	A19	B19	C19	D19	E19	F19	G19	
18	CH 18								



 – Block of destination locations
  – Locations whose references define the complete block of destinations


Figure 3-4 Establishing destination of data being copied.


Note that if the source data is to be copied into a single line, for example channel 19 only, the destination is defined by references A19 and G19.

3.5.5 Copying procedure


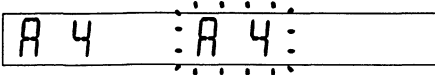
Proceed as follows :

(i) Change the left hand A1 to A4

Press  3 times, then


Press 

Displays read :

**MULTICHANNEL
RECORDER**A rectangular LCD display showing the text "COPY FROM" in a large, blocky, monospaced font.A rectangular LCD display showing "A 4" on the left and "A 4" on the right. Above each "A 4" are three small dots, indicating a flashing status.

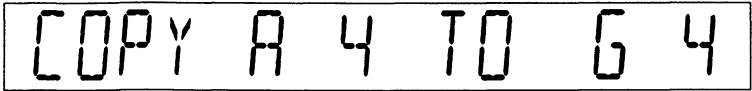
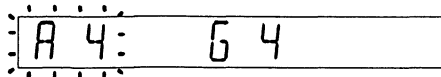
where the right hand A4 is flashing.

(ii) Change the right hand A4 to G4

Press  6 times, then


Press 


Displays read :

A rectangular LCD display showing the text "COPY A 4 TO G 4" in a large, blocky, monospaced font.A rectangular LCD display showing "A 4" on the left and "G 4" on the right. Above each "A 4" and "G 4" are three small dots, indicating a flashing status.

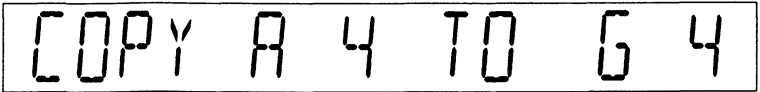
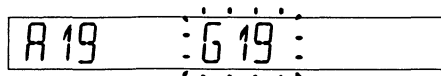
where the left hand location is flashing

(iii) Change the left hand A4 to A19

Press  15 times, then


Press 


Displays read :

A rectangular LCD display showing the text "COPY A 4 TO G 4" in a large, blocky, monospaced font.A rectangular LCD display showing "A 19" on the left and "G 19" on the right. Above each "A 19" and "G 19" are three small dots, indicating a flashing status.

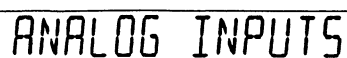
where the right hand location is flashing

(iv) Change G19 to G22

Press  3 times, then

Press 

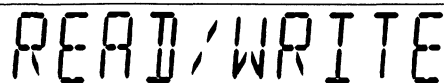
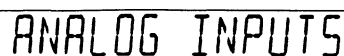
Displays read :


**MULTICHANNEL
RECORDER**COPYANALOG INPUTS**3.5.6 Verifying copied data**

If you wish to verify that the data has been copied,

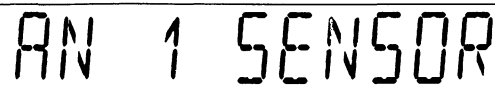
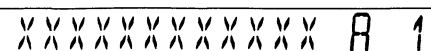
Press  once

Displays read :

READ/WRITEANALOG INPUTS




Press 

Displays read :

AN 1 SENSORXXXXXXXXXXXXX A 1

Now use the arrow keys to scroll through the sub-matrix to the appropriate locations to check that the data has been copied.

Alternatively you can obtain a printout of the copied data.
Refer to chapter 3.7 - "PRINTING CONFIGURATION DATA" - for the procedure.

If you wish to copy within other sub-matrices press  to return to the main matrix, then press the  or  key as necessary to obtain access to the sub-matrix required.

3.5.7 Leaving copy mode

To leave copy mode simply press **DISPLAY**.

An identification message will be printed after leaving the "configuration mode " to indicate a return to normal running mode.

3.6 LOCKING/UNLOCKING CONFIGURATION DATA

3.6.1 Introduction

If you wish to prevent unauthorized access to configuration it is possible to lock the data. The locking procedure is applied to individual sub-matrices, permitting you to lock some and not others, if desired.

It is possible to read the configured data in a sub-matrix after it has been locked. However if an attempt is made to change data in a locked sub-matrix by pressing the **ENTER** key, the display will read momentarily :

LOCKED

to advise the operator that writing is not permitted. Of course, if authorized changes to configuration data need to be made, it is possible to unlock the sub-matrix for this purpose. See paragraph 3.6.3.

3.6.2 Locking a sub-matrix

Assuming that the recorder is in normal running mode :

Press **+- CONF**

Displays read :

ACCESS TO CONF
RUN MODE



then

MULTICHANNEL RECORDER

3. CONFIGURATION

READ/WRITE

ANALOG INPUTS

If you wish to lock a sub-matrix other than analog inputs press the  or  as necessary to obtain the sub-matrix required.

Press  twice.

Displays read :

LOCK/UNLOCK

ANALOG INPUTS

Press 

Displays read :


ANALOG INPUTS

UNLOCKED

Press 

Displays read : (see note 1)

ANALOG INPUTS

PASSWORD XXXX

The first digit is flashing

Enter the four-character password, then

Press 

If the password is wrong, the recorder returns to normal scanning mode.


3. CONFIGURATION

MULTICHANNEL RECORDER

If the password is correct,
Displays read :

ANALOG INPUTS
UNLOCKED

where the lower display is flashing.

Press 

Displays read :

ANALOG INPUTS
LOCKED

where the lower display is flashing.



Press 

Displays read :

ANALOG INPUTS
LOCKED

where the lower display has ceased flashing to indicate that the data in the sub-matrix is now locked.

If you wish to lock another sub-matrix press  to return to the main matrix. Then press the

 or  key as necessary to obtain the sub-matrix required.

Note :

1. If the recorder is configured without any password (password parameter equal to '0000'), this step is not displayed). Note that the recorder is delivered without password.
2. If you have forgotten the password, please contact your local office

3.6.3 Unlocking a sub-matrix

The procedure for unlocking a sub-matrix, assuming that the recorder is in normal running mode, is identical to that in paragraph 3.6.2, except that on entering the sub-matrix the lower display will read :

LOCKED

and on completion of the procedure it will read :

UNLOCKED

3.6.4 Leaving lock/unlock mode

To leave lock/unlock mode and return to normal running mode simply press **DISPLAY** .

3.7 PRINTING CONFIGURATION DATA**3.7.1 Introduction**

The recorder has the capability to print its configuration data. Two alternative procedures are available. The first procedure should be followed when a complete printout is required. This is useful before commencing to enter data if it assists in identifying items that need to be changed. It is also invaluable after completion of data entry as a record of configured data which is easily accessible without having to use the recorder's displays. If for any reason, part or all of the configured data should be subsequently corrupted or lost, the availability of a previously printed and current record will assist greatly with accurate and speedy re-entry.

The second procedure should be followed when a print-out of all or part of a sub-matrix is required. This is useful during configuration as confirmation that data is being entered correctly, but may be used at any time when only a limited printout is needed. Note that data acquisition and printing ceases whilst the recorder is printing configuration data in part or whole.

3.7.2 Printing the complete configuration

The following procedure will produce a printout of all configuration data held in all sub-matrices. The data is printed in reverse order to produce a record that reads in a logical order from top to bottom when completed. Note that once printing has begun it cannot be interrupted except by switching off the power.

Assuming that the recorder is in normal running mode, proceed as follows :

Press **↑↓CONF**

**MULTICHANNEL
RECORDER**

3. CONFIGURATION

Displays read :


ACCESS TO CONF

RUN MODE

then


READ/WRITE

ANALOG INPUTS

Press  as many times as necessary until displays read :

READ/WRITE

MISCELLANEOUS


Press 

Press  twice :

Displays read :

MI PRINT CONF

NO C 1

Press 

If the upper display reads, momentarily :

LOCKED

MULTICHANNEL RECORDER

printing cannot take place until the sub-matrix is unlocked. Refer to chapter 3.6 for the procedure. If the sub-matrix is unlocked, after pressing

Displays read :

GO TO CONF MODE
YES_ 1 NO_ 0

Caution : This display warns you that normal data acquisition and printing will cease if your response is "yes".

Press to proceed or to abandon printing.

Assuming that you wish to proceed :

Press

Displays read :

MI PRINT CONF
NO C 1

Use the key to select "YES or NO".

Press

If the selection is "YES", the recorder will commence printing immediately. When the printout is complete the recorder will return to normal running mode automatically.

3.7.3 Printing configuration data from a sub-matrix

The following procedure will produce a printout of all or part of the configuration data in a single sub-matrix. Assuming that the recorder is in normal running mode, proceed as follows :

Press

3. CONFIGURATION

MULTICHANNEL RECORDER

Displays read :



ACCESS TO CONF
RUN MODE


then

READ/WRITE
ANALOG INPUTS

Press  once
Displays read :


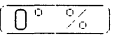
PRINT
ANALOG INPUTS


If you wish to print from a sub-matrix other than "analog inputs", Press  or  as many times as is necessary to obtain access.

Press 
Displays read :

GO TO CONF MODE
YES_ 1 NO_ 0

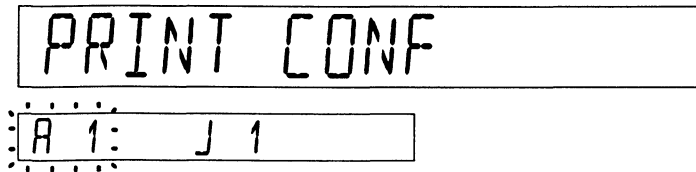
Caution : This display warns that normal data acquisition and printing will cease if your response is "yes".

Press  to proceed, or  to abandon printing. Assuming that you wish to proceed :

Press 

**MULTICHANNEL
RECORDER**

Displays read :



PRINT CONF

A 1 : J 1

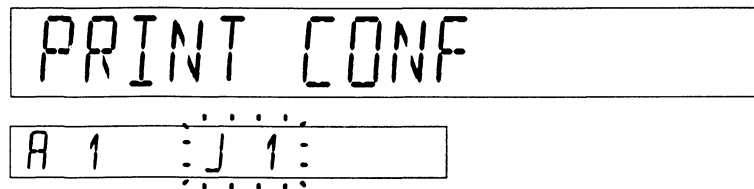
where the left hand A1 is flashing.

The legends A1 and J1 in the lower display are examples of sub-matrix location references as described in chapter 3.2. If you have not previously read this chapter do so now. These references are used to identify the limits of the data which you require to print. Note that, unlike copying mode, it is not possible to print only part of a single row of data. You may choose to print :

- (i) all the configuration data in the sub-matrix.
- (ii) any number of consecutive lines of data.
- (iii) a single line of data.

3.7.3.1 Printing all the configuration data in the submatrixPress **ENTER**

Displays read :



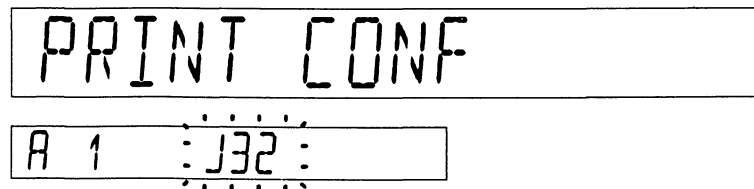
PRINT CONF

A 1 : J 1

where the right hand characters are flashing.

Press  once

Displays read :



PRINT CONF

A 1 : J 32

MULTICHANNEL RECORDER

where the right hand characters are flashing.

Press **ENTER**

The recorder will commence printing immediately.

When printing is completed.

Displays read :

PRINT
ANALOG INPUTS

3.7.3.2 Printing a number of consecutive lines of data

Before pressing **ENTER**, determine the number of the first and the last of the consecutive lines which you require to print. Use the relevant sub-matrix diagram in Appendix B at the rear of this manual to assist you, if necessary. For example to print lines 19 to 22 inclusive from the analog inputs sub-matrix it will be necessary to set the location references in the lower display to read :

A 19 J 22

Press **↑** 18 times

Displays read :

PRINT CONF
A 19 : J 1

where the left hand characters are flashing.

Press **ENTER**

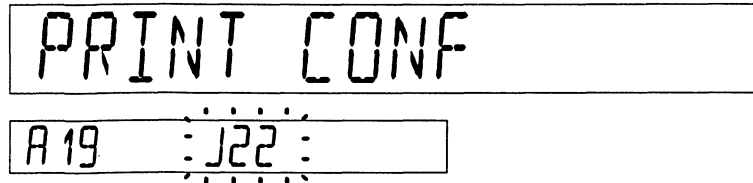
Displays read :

PRINT CONF
A 19 : J 19 :

where the right hand characters are flashing.

Press  3 times


Displays read :



PRINT CONF

A19 J22

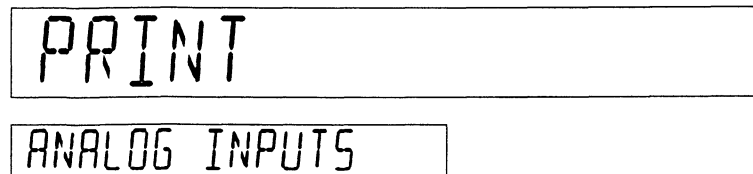
where the right hand characters are flashing

Press 

The recorder will commence printing immediately.

When printing is completed ;

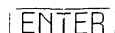
Displays read :

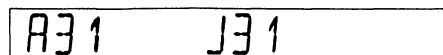


PRINT

ANALOG INPUTS

3.7.3.3 Printing a single line of data

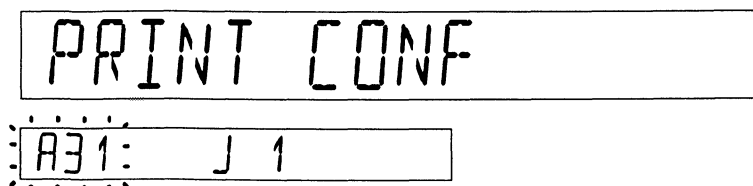
Before pressing  determine the number of the line which you require to print. For example suppose that you wish to print line 31. It will be necessary to set the location references in the lower display to read :



A31 J31

Press  twice

Displays read :



PRINT CONF

A31 J 1

where the left hand characters are flashing

Press **ENTER**

Displays read :

PRINT CONF

A31 : J31 :

where the right hand characters are flashing

Press **ENTER**

The recorder will commence printing immediately.

When printing is completed :

Displays read :

PRINT

ANALOG INPUTS

3.7.4 Printing from another sub-matrix

If you now require to print all or part of another sub-matrix press the **▶** or **◀** key as necessary to obtain access. Then repeat the relevant procedure given in paragraph 3.7.3 . Remember that the number of the both columns and lines, and hence the range of location references available, varies from one sub-matrix to another. Refer to the sub-matrix diagrams, in Appendix B at the rear of this manual, for the necessary information.

3.7.5 Leaving print mode

To leave print mode and return to normal running mode simply press **DISPLAY**

An identification message will be printed after leaving the "configuration mode" to indicate a return to normal running mode.

Note : If you want to stop the print out of configuration, you can simulate a " Paper out" by swinging the chart cassette assembly forward.

**MULTICHANNEL
RECORDER****3.8 SETTING DATE AND/OR TIME**

The recorder has a real time clock which is fully programmed including leap years. The clock circuit has battery back-up when line power is off. However should it be necessary to set the date and/or time at commissioning, or after replacement of the back-up battery, proceed as follows :

Press

Displays read :

ACCESS TO CONF

RUN MODE

then

READ/WRITE

ANALOG INPUTS

Press as many times as necessary until displays read :

READ/WRITE

MISCELLANEOUS

Press

Displays read :

MI PAPER NO

XXX A1

where XXX in the lower display is the configured number for the paper.

3. CONFIGURATION

MULTICHANNEL RECORDER

Press  4 times
Displays read


MI DATE/TIME
DY MON YR HRRMN

where DY is the configured day, MON is an abbreviation for the month, YR is the last 2 digits of the year, HR is the hours (24 hour clock) and MN is the minutes.

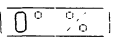

Press  .
If the upper display reads :

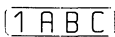
LOCKED

the date and time cannot be changed until the sub-matrix is unlocked. Refer to chapter 3.6 for the unlocking procedure.

If the sub-matrix is unlocked, after pressing  ,
Displays read :

GO TO CONF MODE
YES_ 1 NO_ 0

Caution : This display warns you that if your response is "yes", normal input data acquisition and printing will cease. Press  if you decide to abandon changing date or time, or  to continue.

Assuming that you proceed by pressing  ,
Displays read :

MI DATE/TIME
DY MON YR HRRMN

where the left hand digit of the lower display is flashing to indicate that it can be changed.

MULTICHANNEL RECORDER

3. CONFIGURATION

If every item in the display requires changing, for example to 24 DEC 89 23h59, proceed as follows :

Press **2DEF**

Lower display reads :

2^{..}Y MON YR HRhMN

where the second digit is flashing.

Press **4JKL**

Lower display reads :

24^{..} MON YR HRhMN

where the first digit is flashing

If the day is correct :

Press **ENTER**

Lower display reads :

24 :MON: YR HRhMN

where the month abbreviation is flashing.

Press **▶** until

Lower display reads :

24 :DEC: YR HRhMN

where the month abbreviation is flashing

If correct press **ENTER**

Lower display reads :

24 DEC Y^{..}R HRhMN

where the first digit of the year is flashing.

To change the year, hours and minutes proceed as for changing the day. When the lower display reads :

24 DEC 89 23h59^{..}

3. CONFIGURATION

MULTICHANNEL RECORDER

where the first digit of the minutes display is flashing.

Press **ENTER**

Lower display reads :

24 DEC 89 23h59

where flashing has stopped, confirming that the new date and time have been entered into the recorder's memory.

If only a part of the date and time display require changing, press **ENTER** until the first digit of the item to be changed, or the month abbreviation, is flashing, and then re-enter the item as described above.

To return to normal running mode simply press **DISPLAY**

TABLE OF CONTENTS

Section	Page
4.1 INTRODUCTION.	4-1
4.2 IDENTIFYING THE RECORDER MODEL	4-1
4.3 APPLYING POWER.	4-1
4.3.1 Power up display sequence	4-1
4.3.1.1 Display test	4-1
4.3.1.2 Recorder autotest.	4-2
4.3.1.3 Option search.	4-2
4.3.1.4 Initialization	4-3
4.3.1.5 Normal display	4-3
4.4 OBTAINING A CONFIGURATION SUMMARY	4-3
4.5 INTERPRETING L.E.D. DISPLAYS	4-4
4.5.1 Alarm L.E.D.	4-4
4.5.2 Manual L.E.D.	4-4
4.5.3 Paper L.E.D.	4-4
4.5.4 Record L.E.D.	4-5
4.5.5 Comm. L.E.D.	4-5
4.5.6 Memory L.E.D.. . . .	4-5
4.6 SELECTING AND INTERPRETING NORMAL MODE DISPLAYS	4-5
4.6.1 Analog input scanning mode.	4-5
4.6.2 Display hold mode	4-6
4.6.3 Alternative display formats	4-8
4.6.3.1 Analog inputs with date and time	4-9
4.6.3.2 Analog inputs with chart speed/print interval.	4-10
4.6.3.3 Analog inputs with channel tag name	4-11
4.6.3.4 Analog inputs with digital inputs option.	4-11
4.6.3.5 Alarms display with alarm status.	4-12
4.6.3.6 Alarms display of acknowledgeable alarms.	4-13
4.6.3.7 Analog inputs with alarm status	4-13
4.7 INTERPRETING THE CHART RECORD.	4-14
4.8 OPERATOR INITIATED ACTIONS	4-14
4.8.1 Hold or scan analog input display.	4-14
4.8.2 Change display format.	4-15
4.8.3 Hold, run or advance chart.	4-15

(continued)

Section	Page
4.8.4 Acknowledge alarms	4-16
4.8.5 Trigger tabular printout	4-17
4.8.6 Read configuration data.	4-17
4.9 GLOSSARY OF OPERATING DISPLAY MESSAGES	4-18



4.1 INTRODUCTION

This section describes the various actions which an operator can initiate through the keyboard, and explains how to interpret the displays in the different modes of operation available.

4.2 IDENTIFYING THE RECORDER MODEL

Make sure that the model number shown on the nameplate agrees with the model you have ordered. Refer to paragraph "identifying the recorder model" in section 2 "Installation", for a selection guide which interprets the model number.

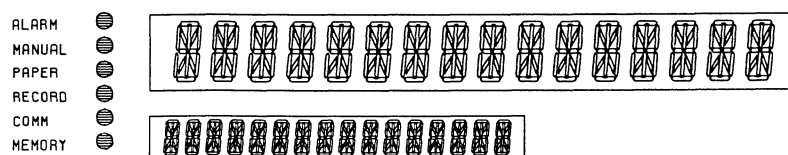
4.3 APPLYING POWER

This section tells you the sequence of displays given by the recorder when power is switched on. Before applying power make sure that your model has been prepared for use and installed in accordance with the instructions given in section 2 "Installation".

4.3.1 Power up display sequence

Switch power on and watch the displays for the following sequence.

4.3.1.1 Display test



All displays and LED's light for about 10 seconds.

4.3.1.2 Recorder autotest

The upper display reads :

TESTING

The lower display is blank. After about 10 seconds, the upper display will read momentarily :

NO ERROR

Confirming that the recorder has satisfactorily completed its autotest.

4.3.1.3 Option search

The upper display reads momentarily :

SEARCH OPTIONS

Indicating that the reporter is making an inventory of all installed input, output and option boards. It will then proceed to display sequentially details of the boards fitted, commencing with analog input board number 1. For example :

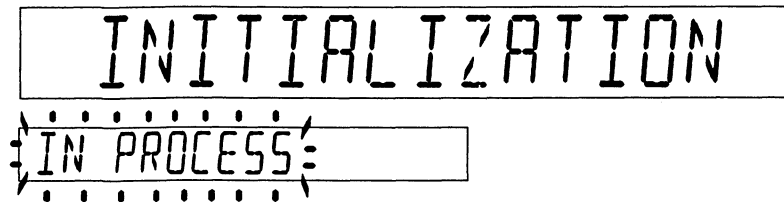
ANALOG BOARD 1
T/C

indicates that the first analog board is suitable for thermocouple, mV, V and mA inputs.

Make sure that the results of the search agree with the model number. Refer to paragraph "Identifying the recorder model" in section 2 "Preparation and installation".

4.3.1.4 Initialization

The upper display reads :



INITIALIZATION
IN PROCESS

This message indicates that the recorder has satisfactorily completed its power up checks, and is now reading and processing input data for display and recording.

4.3.1.5 Normal display

On completion of initialization the recorder will commence normal displays of input data. If there are no acknowledgeable alarms, the upper display will indicate input channel data, and the lower display will indicate alarm status. For more detailed information on these displays and how to interpret them refer to chapter 4.6.

If there are acknowledgeable alarms, the display will change rapidly to indicate the most recent acknowledgeable alarm. This gives the operator the opportunity to acknowledge the displayed alarm, or all acknowledgeable alarms, if required. For further information on acknowledging alarms, refer to paragraph 4.8.4.

4.4 OBTAINING A CONFIGURATION SUMMARY

You will find that having available a printed configuration summary will assist greatly in understanding and interpreting displays and chart records. The procedure for obtaining a complete or partial printout of the existing configuration is explained in chapter "Printing configuration data" in section 3, "Configuration". However to be aware that during printing of configuration the recorder will cease normal input data acquisition and printing.

4.5 INTERPRETING L.E.D. DISPLAYS

Situated to the left of the two 16 digit alphanumeric displays are LEDS arranged as shown below

LED COLOUR		
ALARM	●	RED
MANUAL	●	GREEN
PAPER	●	RED
RECORD	●	GREEN
COMM	●	GREEN
MEMORY	●	GREEN

These LEDS provide the operator with information regarding the operating status of the recorder, or give a prompt to take corrective action.

4.5.1 Alarm L.E.D.

The alarm LED when lit indicates the existence of an alarm.

4.5.2 Manual L.E.D.

The manual LED when lit indicates that the recorder is operating in display hold mode. Refer to paragraph 4.6.2 for an explanation of hold mode, and instructions for entering and leaving it.

4.5.3 Paper L.E.D.

The paper LED when lit indicates that :
the chart paper is finished ; the

OUT OF PAPER

prompt message flashes on the lower display at the same time.

- a new chart must be fitted without delay if loss of recorded data is to be avoided.

Refer to paragraph "installing the chart" in section 2, "Installation" for instructions on chart installation. Note that the paper LED will be lit if the chart cassette assembly is not located correctly. Open the door of the recorder and check whether the cassette has been pushed fully home. Refer to Figures in paragraph "installing the chart" in section 2, "Installation" for a diagram showing correct chart cassette installation.

4.5.4 Record L.E.D.

The record LED when lit indicates that the recorder is configured for normal recording. The LED will not be lit if the chart hold or advance function is in use, or if printing is inhibited by configuration. Would printing be inhibited by a digital input, the LED keeps lighting.

4.5.5 Comm. L.E.D.

The comm. LED when lit indicates that a digital communication option board is fitted.

4.5.6 Memory L.E.D.

The memory LED when lit indicates that the recorder is configured for "Event precursor" mode.

4.6 SELECTING AND INTERPRETING NORMAL MODE DISPLAYS

The recorder gives the operator a selection of display formats in normal running mode. On completion of the power up sequence described in paragraph 4.3 the display will be in analog input scanning mode, or indicating the most recent acknowledgeable alarm.

4.6.1 Analog input scanning mode

In this mode the upper display indicates successively the value of each analog input. For example :

XX	YYYY	UNIT	ZZ	T
----	------	------	----	---

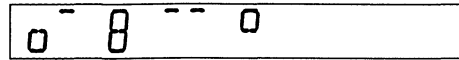
where :

- ☑ XX is the channel number
- ☑ YYYY is the input value
- ☑ UNIT is the units of measurement
- ☑ ZZ is the number of the most recent active channel alarm
- ☑ T is the symbol for the alarm type


**MULTICHANNEL
RECORDER**

The lower display indicates alarm status for each active analog input channel.

For example :



Where :  or  indicates channel in alarm.

 or  indicates channel not in alarm.

The upper half of each digit relates, from left to right, to channels 1 to 16, and the lower half, from left to right, to 17 to 32 respectively. In the example, the display indicates channels 2, 6 and 7 active but not in alarm, and channels 4, 9, 17 and 20 active and in alarm.

Note : If on completion of the power up sequence there is one (or more) acknowledgeable alarm in an "on" condition, the displays will change rapidly to show the details of the latest acknowledgeable alarm. This gives the operator the opportunity to acknowledge the displayed alarm or all acknowledgeable alarms if required. Refer to paragraph 4.6.3.6 for information on how to interpret these displays, and to paragraph 4.8.4 for the procedure to acknowledge alarms.

To change the displays to analog input scanning mode simply press **DISPLAY** .

4.6.2 Display hold mode

In critical conditions you may choose to cause the upper display to cease input scanning and indicate continuously the value of a particular input channel. This will give you in effect a single channel indicator, with the display updated at normal scanning interval. Note that the recorder will continue with normal data acquisition and printing of all inputs ; you are simply 'locking' the display into a single channel.

There are two possible procedures which you may follow to achieve hold mode on a particular channel.

MULTICHANNEL RECORDER

4. OPERATION

Procedure 1

Wait until the normal scanning sequence reaches the channel to be held, and press **MANUAL**. The upper display will read, momentarily :





MANUAL DISPLAY

and will then cease to scan.

Procedure 2

Press **MANUAL** immediately. As in procedure 1, the upper display will read momentarily :

MANUAL DISPLAY

and will then cease to scan. However the display is now locked onto the channel being displayed at the time. If this is not the channel you require use the  or  to scroll to it. Each time you press the  or  key the upper display will indicate momentarily :

XX CHANNEL HOLD

where XX is the channel number to which the hold function is being transferred. Note that neither of the above procedures affects the lower display. Whilst in hold mode the red L.E.D. beside the caption "MANUAL" is lit, to advise the operator that the inputs are not being scanned.

To return to display scanning mode press **MANUAL**. The upper display will read momentarily :

SCAN DISPLAY



and after which the red LED is extinguished and normal scanning of inputs is resumed, commencing with the next channel.

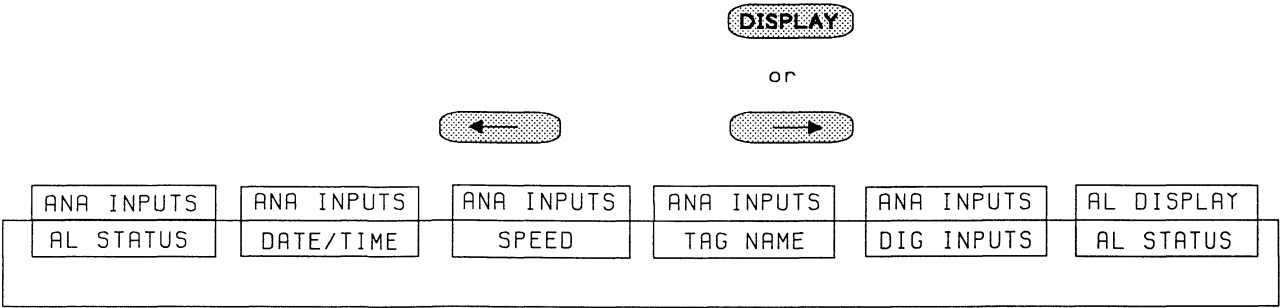
MULTICHANNEL
RECORDER

4.6.3 Alternative display formats

As stated at the beginning of this chapter, on completion of the power up sequence, the displays will be in the analog input scanning mode (unless there is one or more acknowledgeable alarm in an alarm condition). The displays and their interpretation are described in paragraph 4.6.1. Other display formats are available as described below.

Overview of the display formats



Press  or .



If an acknowledgeable alarm occurs, an additional display will appear :


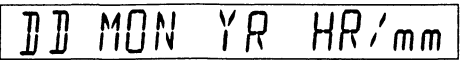
AL DISPLAY
ACKNOWLEDGE

**MULTICHANNEL
RECORDER****4.6.3.1 Analog inputs with date and time**

Press  or  .
Displays read :

ANALOG INPUTDATE/TIME

Then :

XY YYYUNIT ZZTDD MON YR HR/mm

When the upper display is unchanged, and in the lower display :

- ☒ DD is the number of the day.
- ☒ MON is an abbreviation for the month.
- ☒ YR is the last two digits of the year.
- ☒ HR is the hour (24 hour clock).
- ☒ mm is the minutes.

Note that if the date and time display is incorrect it may be changed. Refer to chapter "Setting date and/or time", in section 3, "Configuration" for the procedure.

4.6.3.2 Analog inputs with chart speed/print interval

Press  or **DISPLAY** (again). Displays read :

ANALOG INPUT

SPEED

then :

XX YYYUNIT ZZT

SPEED A SSSSUU/H

if the recorder is operating in trend or alternate print modes, (refer to paragraph "Input printing formats" in section 1, "Overview" for full description). The lower display is interpreted as follows :

- ☑ A. is the number of the present chart speed (1 or 2).
- ☑ SSSS is the numerical value of the chart speed.
- ☑ UU is the units of speed (mm or in)

If the recorder is operating in tabular print mode the lower display will read :

TAB B IIII MN

- ☑ Where B is the number of the present print interval (1 or 2).
- ☑ IIII is the numerical value of the print interval in minutes.

MULTICHANNEL RECORDER

4.6.3.3 Analog inputs with channel tag name

Press  or  (again). Displays read :

ANALOG INPUT

TAG NAME

then :

XX YYYYY UNIT ZZT

AAAAAAAA

where AAAAAAA in the lower display is the configured tag name for the channel in the upper display.

4.6.3.4 Analog inputs with digital inputs option

Press  or  (again). Displays read :

ANALOG INPUT

DIGITAL INPUT

Then for example :

XX YYYYYUNIT ZZT

-- -- -- --
- - - - -

MULTICHANNEL RECORDER

4. OPERATION

where the horizontal bars in the lower display indicate the status of the optional digital inputs as on (high) or off (low). The bars in each digit, from left to right, relate to digital inputs 1 to 12 respectively. Note that if only one digital input card is fitted, only the first six digits will be lit. If no digital input card is fitted the lower display will read :

NONE

4.6.3.5 Alarms display with alarm status

Press  or  (again). Displays read :

ALARMS DISPLAY

CHANNEL IN ALARM

Then for example :

ALXXC-RLYY5-CHZZ

0-8--0

where in the upper display :

☑ XX is the alarm number (for analog input alarms only).

☑ C is the alarm status :



(on),



(off).

☑ YY is the relay number.

☑ S is the relay status :



(on),



(off).

☑ ZZ is the analog or digital number of each configured alarm in succession.

The lower display indicates the alarm status of each analog input channel, as explained in paragraph 4.6.1.

4.6.3.6 Alarms display of acknowledgeable alarms

Note : This display is inhibited if there are either no alarms configured as acknowledgeable, or all acknowledgeable alarms have been acknowledged. Assuming that the display is not inhibited,

Press **DISPLAY** (again).

Displays read :

ALARMS DISPLAY
ACKNOWLEDGED

Then for example :

ALXxC-RLYY5-CHZZ
ALARM ACK

where the upper display indicates details of each configured alarm in succession, as described in the preceding paragraph. The procedure for acknowledging alarms is given in paragraph 4.8.4.

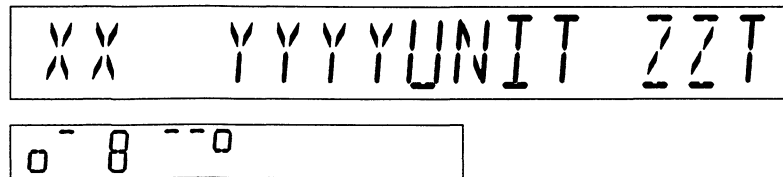
4.6.3.7 Analog inputs with alarm status

Press **▶** or **DISPLAY**


Displays read :

ANALOG INPUT
CHANNEL IN ALARM

Then for example :



as described in paragraph 4.6.1.

Note that the use of the  key reverses the sequence in which the various formats are selected.

While the above explanation has described the selection of alternative formats in display scanning mode, it is equally possible to select these formats in display hold mode.
Refer to page 4-8.

4.7 INTERPRETING THE CHART RECORD

For a detailed description of recording modes and alphanumeric messages together with examples of chart records refer to section 1 "Product overview".

4.8 OPERATOR INITIATED ACTIONS

During normal running of the recorder the operator may initiate any of the following actions :

- ☒ Hold or scan analog input display.
- ☒ Change display format.
- ☒ Hold, run or advance chart.
- ☒ Acknowledge alarms.
- ☒ Obtain a tabular printout of input data.
- ☒ Read configuration data.

These actions are described in the following paragraphs.

4.8.1 Hold or scan analog input display

Refer to paragraph 4.6.2.

**MULTICHANNEL
RECORDER****4.8.2 Change display format**

Refer to paragraph 4.6.3.

4.8.3 Hold, run or advance chart

To stop the chart being driven press **RECORD**
The upper display will read momentarily :

CHART HOLD

and then return to the previous display. The record LED will be extinguished to remind the operator that recording of input data has been suspended.

CAUTION : This key fills out the data in memory.


Only when the chart is in hold mode it is possible to advance it manually. Press and hold 
The upper display will read :

CHART ADVANCE

and the chart will move forwards. It is not possible to reverse the chart.

To return to normal chart drive press **RECORD** again. The upper display will read momentarily :

CHART RUN

and then return to the previous display. The "RECORD" LED will be lit to indicate that recording of input data has been resumed.

4.8.4 Acknowledge alarms

When analog or digital alarms are configured, they are defined as not acknowledgeable, or acknowledgeable. Refer to both paragraphs "Alarm acknowledge" in section 3, Configuration. This present paragraph is relevant only if one or more alarms have been configured acknowledgeable.

Acknowledgeable alarms may be acknowledged individually or collectively.

To acknowledge an individual alarm, select the display format "alarms display of acknowledgeable alarms" described in paragraph 4.6.3.6. When the display reaches the alarm number required, press the key.

The lower display will read momentarily :

ALARM RESET

and the alarm will disappear from this display format until it re-occurs. Note that it will continue to be displayed in the format "alarms display with alarm status" described in paragraph 4.6.3.5, but the relay status symbol will have changed from :

☐ (on) to ☐ (off), unless the same relay is driven by another alarm.


To acknowledge all acknowledgeable alarms, press the key, in any display format. The lower display will read momentarily

ACKNOWLEDGED


The display format "alarms display of acknowledgeable alarms" will become inhibited until an acknowledgeable alarm re-occurs, but all alarms will continue to be displayed in the format "alarms display with alarm status". The relay status symbol for all acknowledgeable alarms will have changed from :

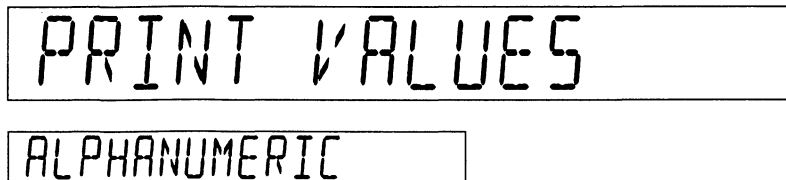
☐ (on) to ☐ (off)

unless any of them is driven by another non-acknowledgeable alarm.

Note that on occurrence of an acknowledgeable alarm, the display format is immediately switched to "alarms display of acknowledgeable alarms" as described in paragraph 4.6.3.6. This gives the operator an immediate warning that the alarm has occurred, and the opportunity to acknowledge it, or to return normal scanning mode by pressing  to scan all active acknowledgeable alarm in historical sequence.

4.8.5 Trigger tabular printout

It is possible to obtain a one time tabular printout on demand by pressing  .
The displays will read momentarily



The image shows two digital displays. The top display shows the text 'PRINT VALUES' in a large, blocky, monospaced font. The bottom display shows the text 'ALPHANUMERIC' in a smaller, similar font.

and then resume previous displays.

The recorder will print, in red, an information message consisting of time, date and "PRINT ONCE NUMERIC PV". It will then print in tabular format the latest values of all inputs, after which it will return to its previous operating mode.

4.8.6 Read configuration data

Configuration data may be read at any time. Reading is not prevented by locking configuration, nor does reading inhibit the recorder from normal acquisition and printing of input data. Refer to chapter "Reading and writing configuration data" in section 3 "Configuration".

Caution : Do not attempt to make any unauthorized changes to configuration data.

4.9 GLOSSARY OF OPERATING DISPLAY MESSAGES

ACCESS TO CONF

The recorder is going to configuration access mode.

ACKNOWLEDGED

The display format is being changed to indicate acknowledgeable alarms, or all acknowledgeable alarms have been acknowledged

ALARM ACK

The alarm displayed in the upper display is acknowledgeable.

ALARM RESET

The acknowledgeable alarm previously in the upper display has been acknowledged .

ALARMS DISPLAY

Upper display selected to show details of configured alarms or acknowledgeable alarms.

CHANNEL IN ALARM

Lower display selected to show status of channel alarms.

ALPHANUMERIC

Tabular printout requested by operator.

ANALOG BOARD 1

Input board for channels, 1 to 4 is fitted.

ANALOG BOARD 8

Input board for channels 29 to 32 is fitted.

ANALOG INPUT

Upper display selected to show analog input values.

CHART ADVANCE

Chart is being advanced by operator key command

CHART HOLD

Chart drive is being stopped by operator key command

4. OPERATION

MULTICHANNEL RECORDER

CHART RUN	Chart drive is being restored by operator key command
COMM OPTION	Communication interface board (option) is fitted.
CONNECTED	The option board shown in upper display is fitted.
DATE/TIME	Lower display selected to show date and time
DIGITAL INPUT 1	Input board for digital inputs 1 to 6 fitted.
DIGITAL INPUT 2	Input for digital inputs 7 to 12 fitted.
DIGITAL INPUT	Lower display selected to show digital input status.
INITIALIZATION	The recorder is initializing its database.
MANUAL DISPLAY	Upper display selected to hold on chosen analog input channel.
MATH OPTION	Math. extension (option) board is fitted.
NO ERROR	Power up autotest completed satisfactorily.
NONE	No digital inputs connected or no acknowledgeable alarms exist.
PRINT VALUES	Tabular printout requested by operator.

MULTICHANNEL RECORDER

4. OPERATION

RTD

The analog input board is for RTD and resistance inputs.

RELAY BOARD 1

Output relay board (option) for relays 1 to 6 is fitted.

RELAY BOARD 2

Output relay board (option) for relays 7 to 12 is fitted.

RELAY INTERFACE

Output relay interface board for external relay boxe(s) (option) is fitted.

RUN MODE

The recorder is continuing to scan and record inputs.

SCAN DISPLAY

Upper display restored to normal scanning of input channels.

SEARCH OPTIONS

The recorder is making a search of all input, output and option boards installed.

SPEED

Lower display selected to show chart speed / print interval.

TAG NAME

Lower display selected to show tag name of channel whose input value is in upper display.

T/C

The analog input board is for T/C, mV, V and mA inputs.

TESTING

The recorder is performing its power up autotest.

XX CHANNEL HOLD

The display hold function is being transferred to the displayed channel number.

OUT OF PAPER

When flashing it indicates that the chart paper is finished.

TABLE OF CONTENTS

Section	Page
5.1 INTRODUCTION.	5-1
5.2 REPLACING THE COLORED RIBBON CARTRIDGE	5-1
5.3 REPLACING THE CHART	5-2
5.4 CLEANING THE ROD AND LUBRICATING THE CARRIAGE BUSHINGS	5-3

LIST OF ILLUSTRATIONS

Number	Title	Page
5-1	Removing used colored ribbon cartridge	5-1
5-2	Mounting the new colored ribbon cartridge	5-2

MULTICHANNEL RECORDER

5.1 INTRODUCTION

The recorder has been designed to be as free from routine maintenance as possible. Some procedures however are unavoidable. These include replacement of expendable items such as the colored ribbon cartridge and charts.

All necessary maintenance procedures are described in this section of the manual.

5.2 REPLACING THE COLORED RIBBON CARTRIDGE

To replace the colored ribbon cartridge follow the procedure given in paragraph "Installing the ribbon cartridge" of section 2, "INSTALLATION".

Removal of the used cartridge is accomplished by pressing down on the plastic retaining clip (A) on the print carriage whilst the cartridge is being withdrawn to the left, as shown in fig 5-1 and 5-2. On and after the date code 04/96, pull out the cartridge with the help of the blue pull handle (B). See Figure 5-1

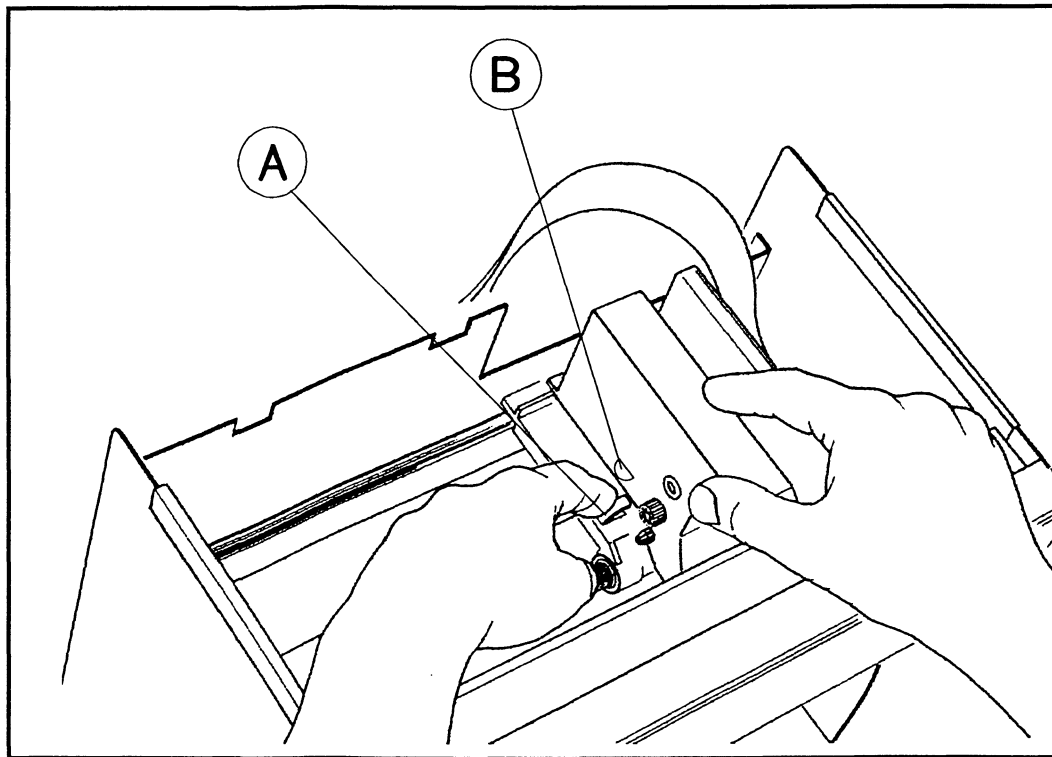


Figure 5-1 Removing used colored ribbon cartridge

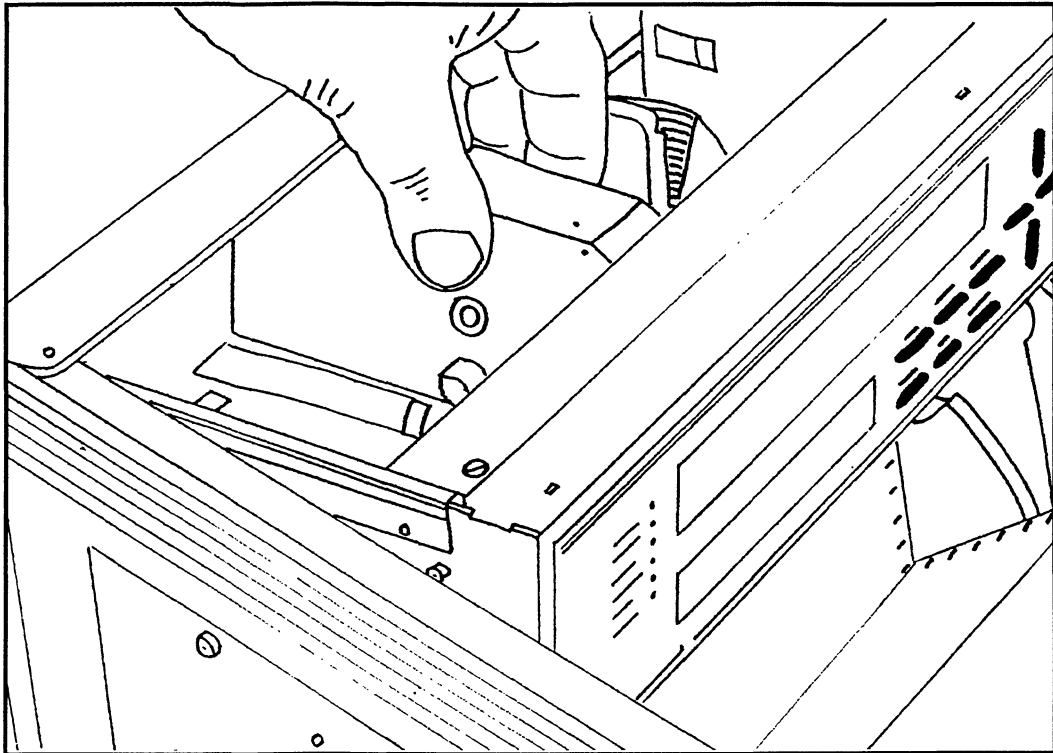


Figure 5-2 Mounting the new colored ribbon cartridge

Before replacing the new cartridge, clean the print carriage rods with a dry cotton cloth (without any lubricant).

5.3 REPLACING THE CHART

To replace either a fan-fold or roll chart follow the procedure given in paragraph "Installing the chart" of section 2, "PREPARATION AND INSTALLATION".

Every time you change the chart, clean the compartment to remove paper dust.

After installing the new chart, check and adjust, if necessary, the chart certification as explained in section 6 "CALIBRATION".

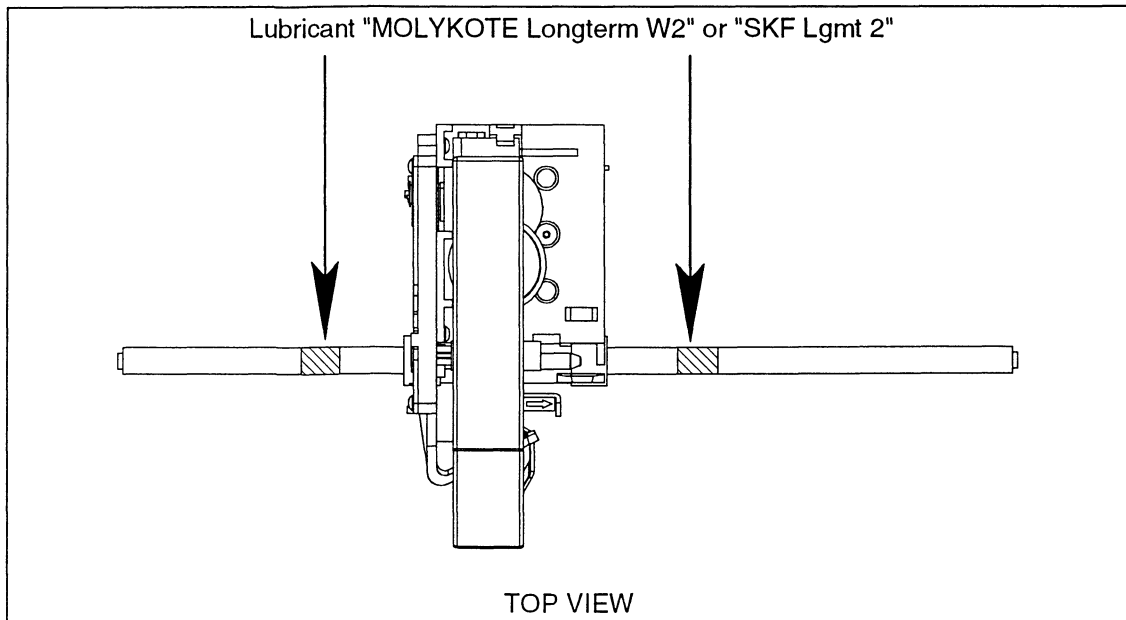
5.4 CLEANING THE ROD AND LUBRICATING THE CARRIAGE BUSHINGS

The print carriage bushings are factory lubricated and should not normally require further maintenance.

However, in a dusty environment, you should have to clean the print carriage rod periodically.

Also, whenever the print carriage rod is found sticky or dirty, you have to clean it.

The procedure for cleaning and lubricating is explained below:



1. Power off the recorder.
2. Clean the rod with a dry, lint free cotton cloth.
3. Move the carriage to the center of the rod.
4. Apply a thin ring of grease around the rod, at each side of the carriage (as shown above).
5. Move the carriage from right to left four or five times.
6. Wipe off any excess grease from the rod with a dry, lint free cotton cloth.

CAUTION: Never use any solvent to clean the rod.

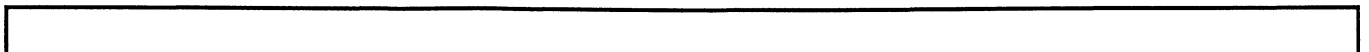
Please, use only lubricant "MOLYKOTE Longterm W2" or "SKF Lgmt 2" which may be ordered as part number: "Lubricant kit 46210096-501".

NOTE: The color ribbon axis (50 mm long), which keeps maintained the color ribbon, must be cleaned with a dry cotton cloth each time you replace the color ribbon.

**MULTICHANNEL
RECORDER**

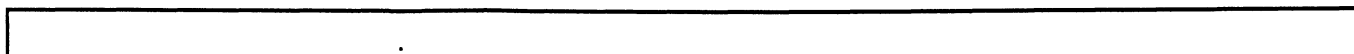
TABLE OF CONTENTS

Section	Page
6.1 INTRODUCTION.	6-1
6.2 CHECKING ANALOG INPUT CALIBRATION.	6-1
6.3 CHART ACCURACY CERTIFICATION.	6-8



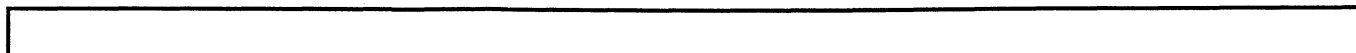
LIST OF ILLUSTRATIONS

Number	Title	Page
6-1	Thermocouple input with internal cold junction compensation - Ice bath method.	6-2
6-2	Copper wire connections	6-2
6-3	Extension wire connections	6-3
6-4	Thermocouple input without internal cold junction compensation	6-3
6-5	RTD connections.	6-4
6-6	mV and V input connections	6-4
6-7	mA input connections.	6-5
6-8	Example of correct chart calibration	6-8



LIST OF TABLES

Number	Title	Page
6-1	mV and Volts input resistor divider networks.	6-5



MULTICHANNEL
RECORDER

6. CALIBRATION



6.1 INTRODUCTION

The recorder is supplied with resident factory calibration data stored in non-volatile memory for each available input actuation. This calibration data is not affected by hardware changes and therefore re-calibration of the recorder is not necessary.

Details of digital display accuracies under reference conditions are given in section 1, "PRODUCT OVERVIEW". If for any reason you require to check the display accuracy of analog input signals use the procedure given in chapter 6.2.

6.2 CHECKING ANALOG INPUT CALIBRATION

It should not normally be necessary to check all input channels-just one example of each actuation type-as the analog to digital converter is common to them all. Equipment required is as follows :

- Signal generators with accuracy better than 0.05 % for use as volt/millivolt, milliampere and resistance signal sources as applicable.
- Digital thermometers with an accuracy of (+,-) 0.25 degree C ((+,-) 0.5 degree F) for measuring temperature at input terminals if using copper wire, or signal source terminals if using extension wire.
- Medium flat-bladed screwdriver.
- Thermocouple e.m.f versus temperature tables, RTD resistance versus temperature tables, and "Radiomatic" mV versus temperature tables as applicable.

Proceed as follow :

- i. With the power off remove the terminal cover plate at the rear of the recorder.
- ii. Disconnect the field wiring from the terminal block for the input channel to be checked. Caution : field wiring may be at line voltage potential.
- iii. Leave field wiring connected to other channels to be checked, or short-circuit the input terminals, to prevent upscale or downscale drive due to sensor burnout.
- iv. Connect the appropriate signal source to the input terminals using the relevant diagram below.

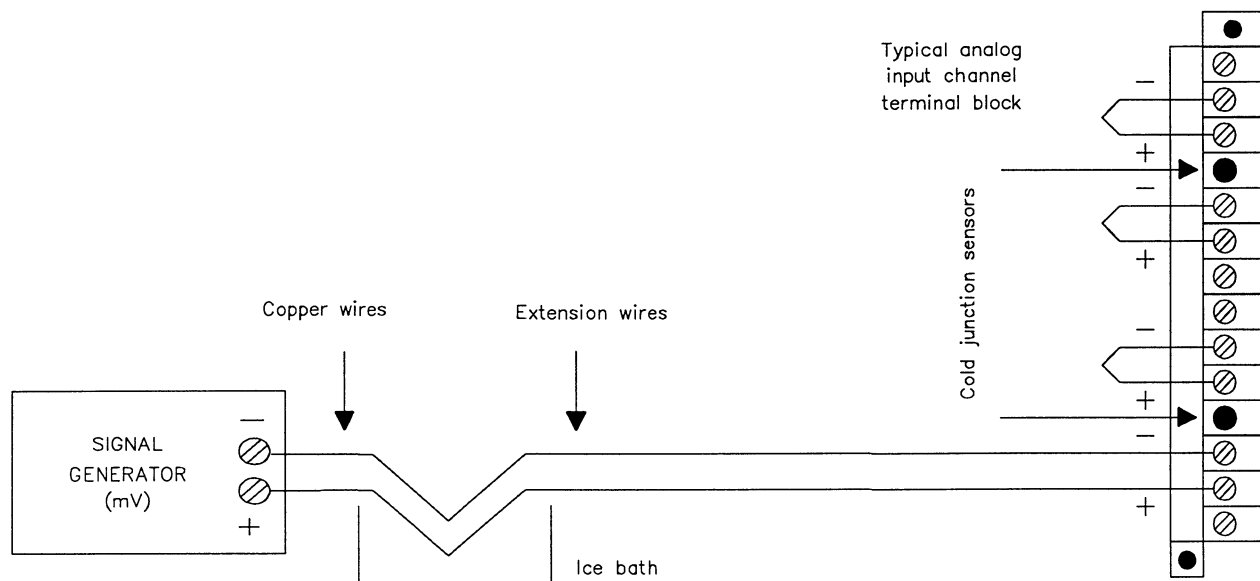


Figure 6-1 Thermocouple input with internal cold junction compensation - Ice bath method

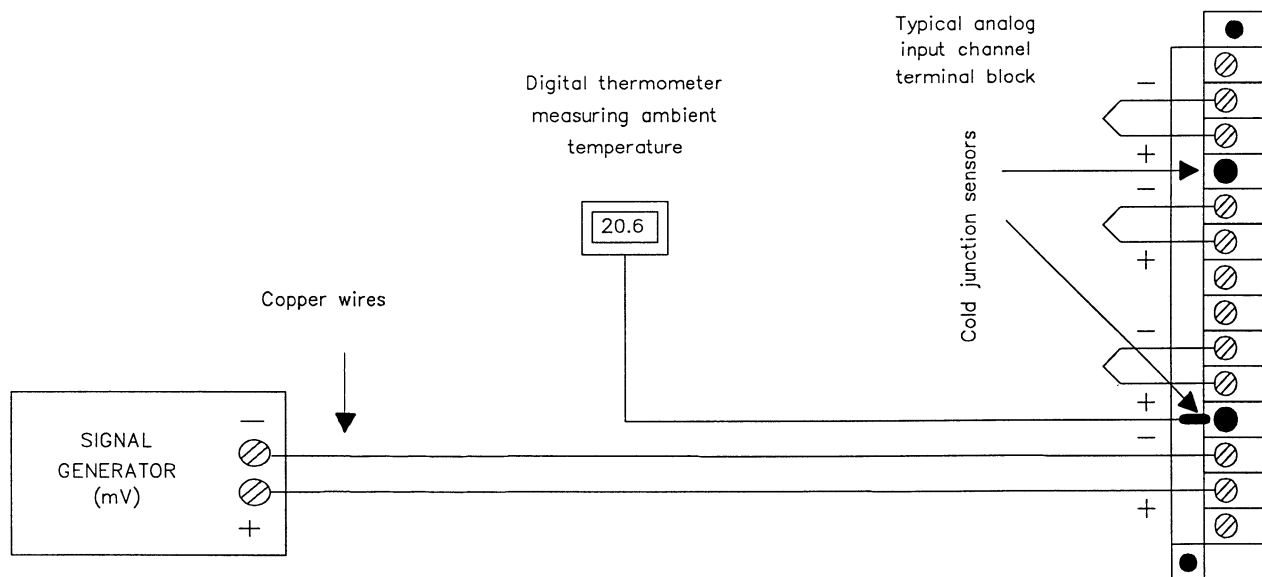


Figure 6-2 Copper wire connections

MULTICHANNEL RECORDER

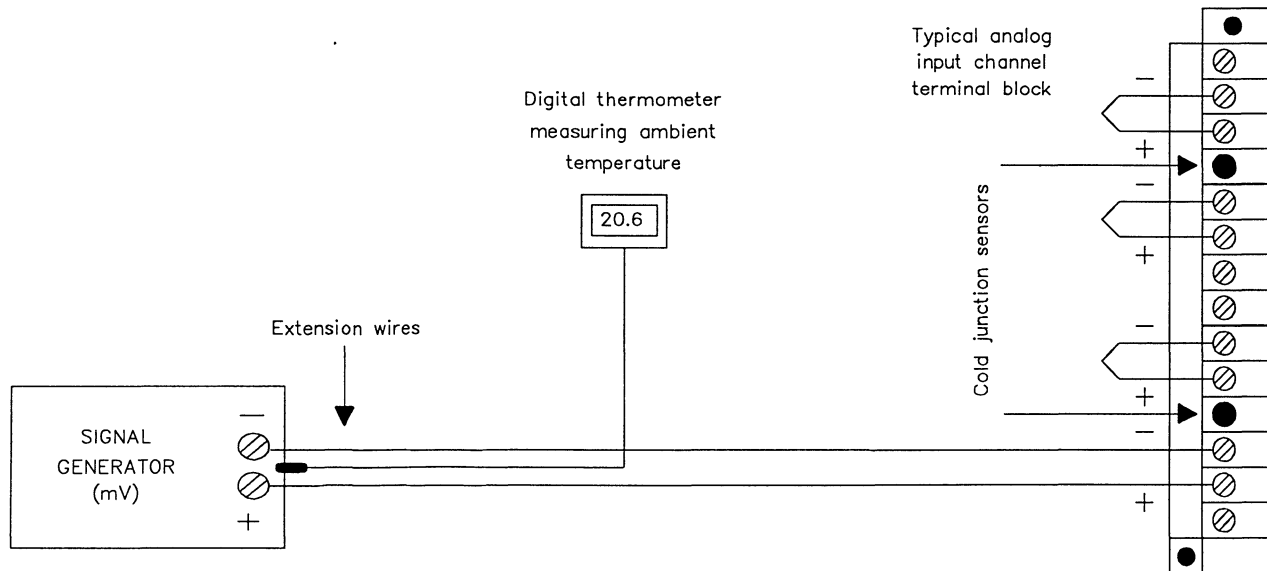


Figure 6-3 Extension wire connections

Note : For both Fig 6-2 and 6-3 the mV equivalent of the measured temperature must be subtracted from the low and the high temperature mV input signals.

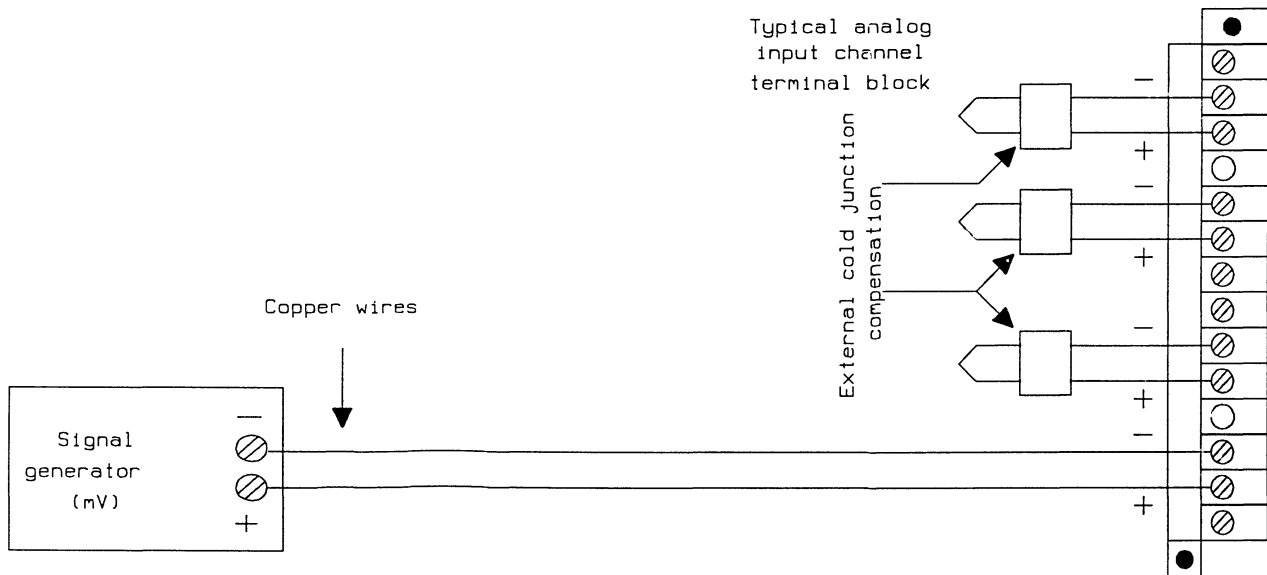


Figure 6-4 Thermocouple input without internal cold junction compensation

MULTICHANNEL RECORDER

6. CALIBRATION

Note : The signal is shifted 50 degrees to be compatible with the standard external cold junction compensation boxes.

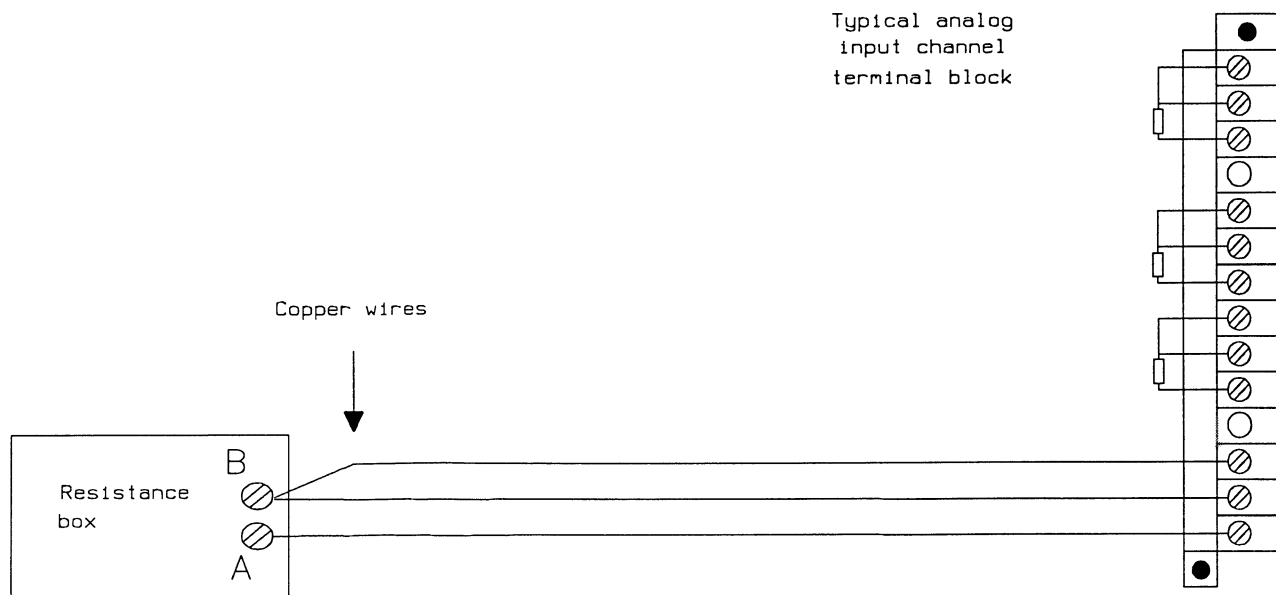


Figure 6-5 RTD connections

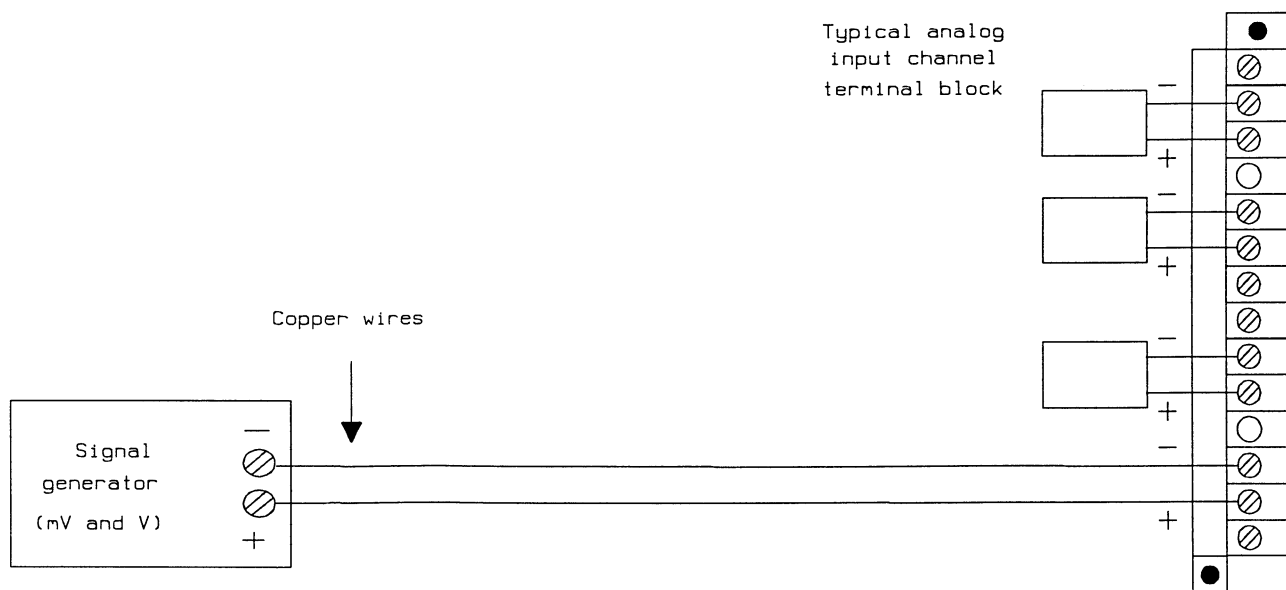


Figure 6-6 mV and V input connections

6. CALIBRATION

MULTICHANNEL RECORDER

Caution : The correct potential divider network for the following input mV and volts ranges MUST be fitted or serious damage to the recorder will occur.

RANGE	RESISTOR NETWORK KIT NUMBER
-50 to +50 mV *	46182820-501
-200 to +200 mV *	46182820-502
-2 to +2 Volts	46182820-503
-5 to +5 Volts	46182820-504
-20 to +20 Volts	46182820-505
-50 to +50 Volts	46182820-506

TABLE 6-1 mV and Volts input resistor divider networks.

*Refer to Section 2 "INSTALLATION" , paragraph "Divider networks".

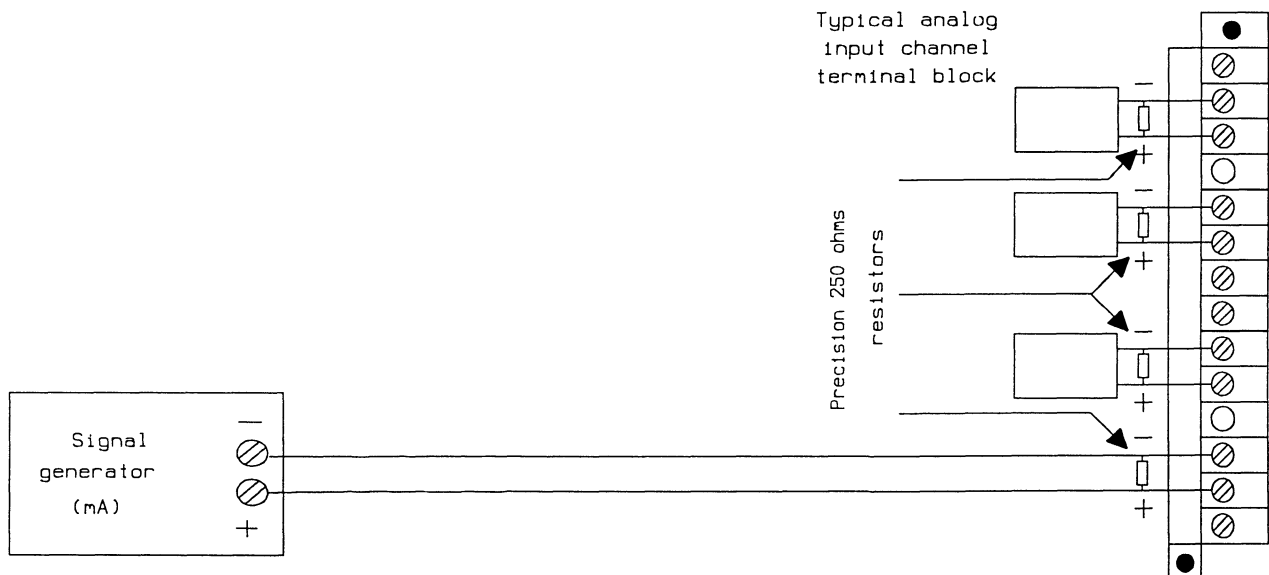


Figure 6-7 mA input connections

- v. Switch the power on and wait for 30 minutes to allow the recorder to warm-up.

- vi. Calculate and apply suitable calibration check input signals, allowing for cold junction temperature when necessary. It is not essential to calibrate at range limits.

If when checking calibration the display accuracy appears to be outside the specified tolerance for the actuation, made a careful check of the following :

- ☒ - Input channel is configured correctly for actuation (and cold junction compensation, if thermocouple):
- ☒ - Allowance has been made for thermal drift from reference temperature as stated in section 1 "PRODUCT OVERVIEW".
- ☒ - The calibration source has an accuracy at least twice as good as the actuation being checked, and has itself been tested against a trace able standard.
- ☒ - The cold junction temperature, if applicable, has been checked at the correct location, and with an accurate temperature sensor.
- ☒ - Wiring between the calibration source and the recorder is of the right type , especially if extension wire is being used, and is connected correctly at both ends. Refer to section 2, "INSTALLATION", for details of input wiring connections.
- ☒ - Calibration data has been obtained from the correct emf versus temperature tables for thermocouples, resistance versus temperature tables for resistance temperature detectors (RTDS), or mV versus temperature tables for radiation pyrometers. Double check all calculations.

If the recorder display accuracy is significantly outside specified tolerances, it may be due to a faulty analog to digital converter board. Refer to section 7 "SERVICE" for the procedure to replace this component. It is possible to trim the display reading after completion of configuration for example, to compensate for a known offset in a sensor signal, or to make the recorder display agree with a controller connected to the same process. Such trimming is effected by making small changes to the configured low value and/or high value in the analog inputs sub-matrix. Refer to section 3 "CONFIGURATION" for the procedure.

Caution : Do not make large changes to configured low and high values for temperature actuations as this would adversely affect the applied linearization.

In situations where small changes to calibration are necessary, the following procedure may be applied :

Calibration Procedure

- The calibration must be performed after a warm up time of 30 minutes.
 - The unit must first be configured according to the application. (Refer to Section 3 "CONFIGURATION".)
 - The display has to be placed in manual on the applicable channel.
1. Set input generator to deliver a signal corresponding to low scale (0%).
 2. Allow generator to stabilize for 1 minute, then read displayed value. Gradually increase the generator's signal until the least significant digit increases by 1 unit. Try to adjust generator signal to the switching point so the last digit is instable between these two values. i.e. if low point equals -456.0, adjust the generator to get -456.0. After generator stabilizes (1 minute) increase its signal until reading is -455.9. Adjust generator output as close as possible to the switching point. Ideally the displayed value will oscillate up and down between -455.9 and -456.0.
Calculate the error :
 $\Delta T_{LOW} = \text{Midpoint between display values} - \text{Generator Low value.}$
In the example, the midpoint value = -455.95.
 3. Set input generator to deliver a signal corresponding to full scale (100%).
 4. Record the display value after 1 minute stabilization proceed as indicated in point 2.
Calculate the error :
 $\Delta T_{HIGH} = \text{Midpoint between display values} - \text{Generator High value.}$
 5. Place your recorder in configuration mode. Select Read/Write with Submatrix analog inputs (Refer Section 3 page 3-62 "Reading and Writing Configuration Data").
 6. Display the configuration parameter "Zero Adj.'.
Read the configured value.
 7. Press Enter. Low display is flashing.
Modify Display value = to old value minus ΔT_{LOW} .
Then press Enter.
 8. If High Display value has to be modified, set the configuration parameter "High value".
Read the configured High value.
 9. Modify this value by subtracting ΔT_{HIGH}
New PV High value = High displayed Range value - ΔT_{HIGH}

MULTICHANNEL RECORDER

Repeat operation 1, and 3 to verify the new calibration point.

If there is any error, repeat above procedure

6.3 CHART ACCURACY CERTIFICATION

The recorder prints vertical calibration marks with every time and date message. When correctly calibrated, these vertical marks will be printed on the extreme left hand and right hand chart division lines, as in the chart example in Figure 6-8 below.

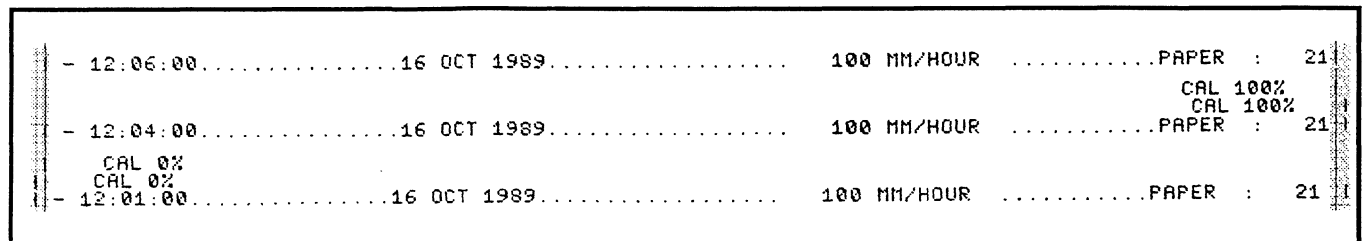


Figure 6-8 Example of correct chart calibration

If the chart calibration is incorrect, proceed as follows :

Press **[+ - CONF]**

Display read :

ACCESS TO CONF

RUN MODE


then :

READ/WRITE

ANALOG INPUTS

MULTICHANNEL RECORDER

6. CALIBRATION

Press  until displays read :

READ/WRITE


PRINTER

Press  Displays read :

PR REC MODE

XXXXXXXX A 1

where XXXXXXXX is the last configured recorder mode.

Press  9 times (See note 1 page 6-11).

Displays read :


PR CAL 0

0 J 1

Press .

If the upper display reads momentarily :

LOCKED

the sub-matrix is locked and the chart calibration data cannot be changed. For the procedure to unlock the sub-matrix refer to chapter 3.6 "LOCKING/UNLOCKING CONFIGURATION DATA". When the sub-matrix is unlocked, after pressing 

Displays read :

GO TO CONF MODE
YES_ 1 NO_ 0

Caution : This display warns you that normal acquisition and printing of input data will cease if your response is yes. Press to abandon chart calibration, or press if you intend to proceed.

Assuming that you wish to proceed, press .

Displays read :

PR CAL 0
00 J 1

where the lower left hand digit is flashing.

To move the calibration mark to the right, enter a positive number, or to move it to the left, enter a negative number. The numerical value should be about 14 for each 2.5 mm chart division of shift required. When you press , the recorder will print the new 0% calibration mark, together with the message "CAL 0%". See Figure 6-8

Repeat the procedure as necessary until 0% calibration is correct, then press once.
Displays read :

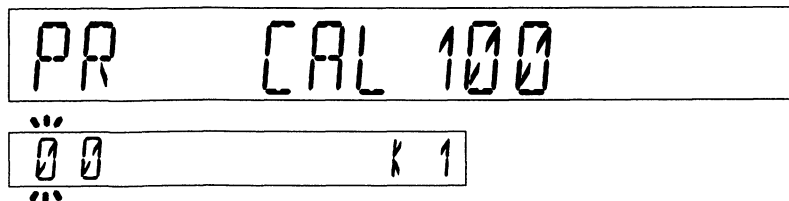
PR CAL 100
0 K 1

6. CALIBRATION

MULTICHANNEL RECORDER

Press **ENTER** .

Displays read :



where the left hand digit is flashing.

Proceed exactly as described above for 0% calibration. Each time you enter a numerical value the recorder will print the new 100% calibration mark, together with the message "CAL 100%". See Figure 6-8

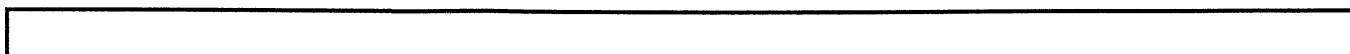
To return to normal running mode after completion of chart calibration simply press **DISPLAY** . Remember to relock the sub-matrix, if necessary.

Notes :

- 1 - Calibration of each mark does not affect the other, and it is not necessary to recalibrate both if one is already correct.
- 2 - Changes in relative humidity and ambient temperature which occur after chart calibration will inevitably affect the relative positions of the calibration marks and the 0% and 100% chart divisions. As chart expansion or contraction is from left to right, the effect will be greater at 100%.

TABLE OF CONTENTS

Section	Page
7.1 INTRODUCTION.	7-1
7.2 TEST ROUTINES	7-1
7.2.1 Reboot.	7-1
7.2.2 Print test.	7-4
7.2.3 Teacher mode	7-8
7.3 FAILURE SYMPTOMS AND TROUBLESHOOTING PROCEDURES	7-13
7.3.1 Symptom- The recorder is inoperative	7-13
7.3.2 Symptom- Chart is inoperative	7-13
7.3.3 Symptom- Print carriage is inoperative	7-14
7.3.4 Symptom- Print head is inoperative	7-15
7.3.5 Symptom- Printing incorrect color	7-15
7.3.6 Symptom- Man-Machine interface is inoperative	7-16
7.3.7 Symptom- Chart illumination failed.	7-17
7.3.8 Symptom- Display and/or records of analog inputs outside specified accuracy tolerance	7-17
7.3.9 Alarm relay is inoperative or does not have the desired effect	7-18
7.3.10 Wrong date/time	7-18
7.4 COMPONENT REPLACEMENT.	7-19
7.4.1 Print head assembly.	7-19
7.4.2 Input, output, alarm relay and A/D converter circuit boards.	7-28
7.4.3 Chart illumination	7-31
7.4.4 Ribbon drive motor	7-35
7.4.5 Color change motor	7-40
7.4.6 Carriage drive motor	7-41
7.4.7 Chart drive motor	7-44
7.4.8 Carriage drive belt	7-46
7.4.9 Chart re-roll tension belt	7-47
7.4.10 Power supply module.	7-51
7.4.11 Man machine interface.	7-57
7.4.12 Printer chassis assembly.	7-60
7.4.13 Mother board assembly (CPU)	7-62
7.5 FIELD ADDITION OF INPUT, OUTPUT AND OPTION BOARDS.	7-63

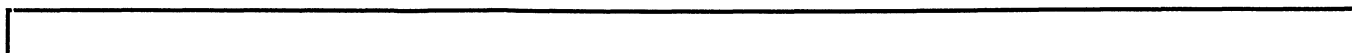


LIST OF ILLUSTRATIONS

Number	Title	Page
7-1	Print test printout.	7-7
7-2	Teacher mode printout.	7-12
7-3	Withdrawing printer chassis to stop.	7-19
7-4	Print carriage at mid travel	7-20
7-5	Removing the ribbon cartridge.	7-21
7-6	Pressing both the chart cassette catches	7-22
7-7	Swinging the chart cassette assembly forward	7-23
7-8	Unclipping the print head ribbon cable.	7-24
7-9	Location of print head mounting screws.	7-25
7-10	Removing the print head and ribbon cable.	7-26
7-11	Setting the print head gap.	7-27
7-12	Rear of the recorder showing terminal cover plate	7-28
7-13	Layout of input, output and option boards	7-29
7-14	Rear terminal blocks and cover plates.	7-30
7-15	Removing the reflector fixing screws.	7-31
7-16	Chart illumination assembly.	7-32
7-17	Removing the fluorescent tube connector sockets.	7-33
7-18	Disconnecting the fluorescent tube	7-34
7-19	Printer chassis cable connection.	7-35
7-20	Releasing the chassis service stop catches.	7-36
7-21	Removing ribbon drive motor fixing screws	7-37
7-22	Carriage motor intercabling circuit board	7-38
7-23	Disconnecting ribbon advance motor wiring. (top view)	7-39
7-24	Removing color change motor fixing screws.	7-40
7-25	Disconnecting the carriage drive motor and belt	7-41
7-26	Chassis intercabling circuit board	7-42
7-27	Adjusting the drive belt tension.	7-43
7-28	Removing the chart drive motor fixing screws.	7-44
7-29	Chart drive motor connections to circuit board	7-45
7-30	Detaching the belt from the drive motor pinion	7-46
7-31	Removing the left side plate from the cassette	7-47
7-32	Removing the two screws securing the train protection plate.	7-48
7-33	Removing the gear train protection plate	7-49
7-34	Installing the new tension belt	7-50
7-35	Removing electronic chassis fixing screws	7-51
7-36	Rear of recorder showing terminal cover plate	7-52
7-37	Removing the electronic chassis fixing screws at the rear	7-53
7-38	Pushing the electronic chassis forward	7-54
7-39	Removing the power supply fixing screws	7-55
7-40	Disconnecting the power supply earth wiring	7-56

(continued)

Number	Title	Page
7-41	Disconnecting the M.M.I. from the chassis	7-57
7-42	Rear of M.M.I. showing fluorescent tube assembly	7-58
7-43	Removing the M.M.I. module fixing screws.	7-59
7-44	Removing the fluorescent tube cables.	7-61
7-45	Removing the mother board fixing screws	7-62



LIST OF TABLES

Number	Title	Page
7-1	The recorder is inoperative	7-13
7-2	Chart is inoperative	7-13
7-3	Print carriage is inoperative.	7-14
7-4	Print head is inoperative	7-15
7-5	Printing incorrect color	7-15
7-6	Man machine interface is inoperative	7-16
7-7	Chart illumination failed	7-17
7-8	Display and/or record of analog inputs outside specified accuracy tolerance	7-17
7-9	Alarm relay is inoperative or have not the desired effect	7-18
7-10	Wrong date/time	7-18



7.1 INTRODUCTION

This section of the manual offers troubleshooting procedures for hardware related failure symptoms. Procedures are also given for parts replacement and field addition of input, output and option boards.

You should be aware that the recorder's performance can be affected adversely by installation and application as well as by hardware problems. Read Section 2 "INSTALLATION", to make sure that the recorder has been installed correctly. Chapter "mounting and wiring" in particular gives information on environmental limits, and guidelines for external wiring to minimize the effects of electrical noise.

Another factor which may be the cause of apparent malfunction is incorrect configuration. You can check configuration using the displays, as explained in Section 3 "CONFIGURATION" chapter "reading and writing the configuration data", or obtain a printout of configuration data using the procedure in chapter "Printing configuration data".

Do remember to make use of the test routines provided, especially if displays or printing problems are suspected. These are explained in chapter 7.2.

7.2 TEST ROUTINES

The recorder incorporates a number of test routines which are intended to simplify fault finding and troubleshooting, as described below.


7.2.1 Reboot

This routine may be used to cause the recorder to perform its complete sequence of power-up checks, without having to disconnect the power. The sequence of power-up checks includes :

- ☒ Display test (all the digits and leds are lit).
- ☒ Recorder autotest.
- ☒ Search of installed input, output and option boards.
- ☒ Initialization of database.

**MULTICHANNEL
RECORDER**

The procedure is as follows :

Press  CONF


Displays read :

ACCESS TO CONF

RUN MODE

READ/WRITE

ANALOG INPUTS

Press  until displays read :

READ/WRITE

MISCELLANEOUS

Press  ENTER

Displays read :

MI PAPER NO

XXX

A 1

MULTICHANNEL RECORDER

Press  twice.

Displays read :

MI REBOOT

NO H 1

Press .

If upper display reads, momentarily :

LOCKED

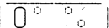

the reboot routine cannot be implemented until the sub-matrix is unlocked. Refer to Section 3 "CONFIGURATION" and chapter 3.6 for the procedure.


If the sub-matrix is unlocked, after pressing , displays read :

GO TO CONF MODE

YES_ 1 NO_ 0


This display warns you that if your response is "yes", normal input data acquisition and printing will cease.

Press  to abandon re-booting recorder, or  to continue.

Assuming that you proceed by pressing  :


Displays read :

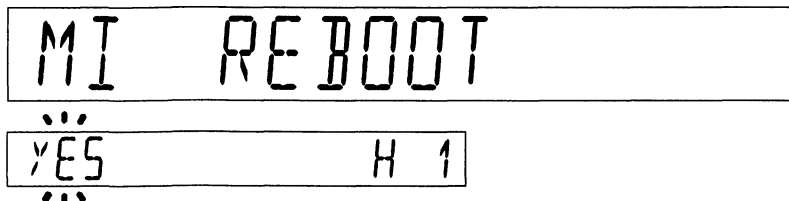
MI REBOOT

 NO H 1

where the word "NO" in the lower display is flashing.

MULTICHANNEL
RECORDER

Press  .
Displays read :




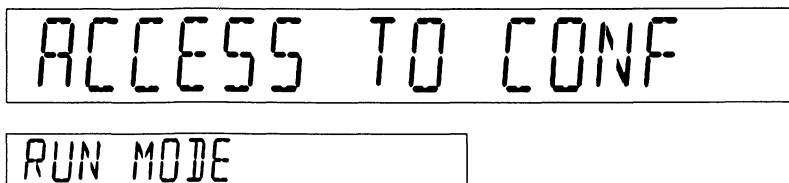
where the word "YES" in the lower display is flashing. Press  .

The recorder should immediately commence its sequence of power-up checks, after completion of which it should return directly to normal running mode.


The complete sequence of power-up displays is described in Section 4 "OPERATION" and paragraph 4.3.1 "Power up display sequence".

7.2.2 Print test


This routine may be used to check the functioning of the 7-pin ballistic print head and associated hardware and software. The procedure is as follows : Press  .
Displays read :



Then :



MULTICHANNEL
RECORDER

Press  until displays read :

READ/WRITE

PRINTER

Press 

Displays read :

PR REC MODE

XXXXXXXX A 1

Press  once

Displays read :

PR PRINT TEST

NO L 1

Press 

If upper display reads momentarily :

LOCKED

the print test cannot be implemented until the sub-matrix is unlocked. Refer to Section 3 "CONFIGURATION" and chapter "locking/unlocking configuration data" for the procedure.

MULTICHANNEL RECORDER

If the sub-matrix is unlocked, after pressing **ENTER**, displays read :

GO TO CONF MODE
YES_ 1 NO_ 0

This display warns you that if your response is "YES" normal input data acquisition and printing will cease.

Press **0°%** to abandon print test, or **1ABC** to continue.

Assuming that you proceed by pressing **1ABC**

Displays read :

PR PRINT TEST
NO L 1

where the word "NO" in the lower display is flashing.

Press **▶**

Displays read :

PR PRINT TEST
YES L 1

where the word "YES" in the lower display is flashing.

Press **ENTER**.

The word "YES" will cease to flash confirming that it has been entered in the recorder's memory.

The recorder should start immediately its print test routine.

Description:

- The objective is to obtain at least four strings where the lower dashes from 0 to 4 are in good color, and the upper dashes from 4 to 0 are also in good color.

- By careful examination of the print test record, it should be possible to check whether:

- All 7 pins in the print head are firing.
- The print carriage drive is operative.
- The colored ribbon cartridge is in good condition.
- The color change drive is operative.



**MULTICHANNEL
RECORDER**

- To leave print test routine, it is necessary to repeat the above procedure, changing the configuration word "YES" to "NO". Remember to re-lock the sub-matrix if necessary.
- To increase the lower dashes number to obtain a better color, move the print head on the printer carriage to the left. The value (in 1/10 mm) is proportional to the graduations (dashes number).
- To increase the upper dashes number to obtain a better color, move the print head on the printer carriage to the right. The value (in 1/10 mm) is proportional to the graduations (dashes number).

Warning: Ensure the print head is in vertical position and the gap adjusted to 0.6 mm (0.023 inch) between the print head and the top roller of the chart cassette.

- Restart the print test routine to verify the new mechanical color adjustment. Readjust if necessary.


Compare any failure symptoms with those given in paragraph 7.3, "Failure symptoms and troubleshooting procedures", and take the necessary corrective action.

7.2.3 Teacher mode

This routine produces a record of trends and alphanumeric informations which is independent of connected inputs. Trend records include, triangular and square waves. This function provides visible confirmation that mechanical parts, and most of the electronics and software are functioning correctly.

MULTICHANNEL
RECORDER

To enter teacher mode proceed as follows :

Press  .

Displays read :


ACCESS TO CONF

RUN MODE

Then

READ/WRITE

ANALOG INPUTS

Press  until displays read :

READ/WRITE

MISCELLANEOUS

Press  .

Displays read :

MI PAPER NO

XXX

A 1

**MULTICHANNEL
RECORDER**

Press  5 times.

Displays read :

MI TEACHER

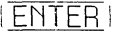
NO F 1

Press .

If upper display reads momentarily :

LOCKED

then teacher mode cannot be entered until the sub-matrix is unlocked. Refer to Section 3 "CONFIGURATION", and chapter "locking/unlocking configuration data" for the procedure.

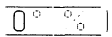

If the sub-matrix is unlocked, after pressing .

Displays read :

GO TO CONF MODE

YES_ 1 NO_ 0

This display warns you that if your response is "YES", normal input data acquisition and printing will cease.

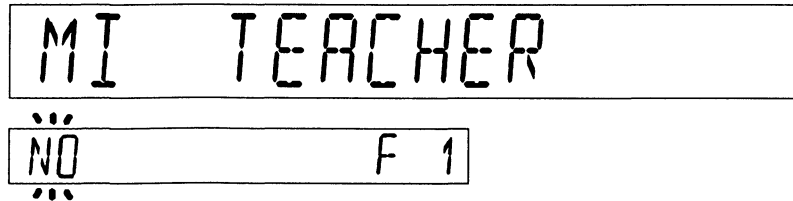
Press  to abandon selection of teacher mode, or  to continue.

MULTICHANNEL RECORDER

7. SERVICE

Assuming that you proceed by pressing **1 A B C**

Displays read :



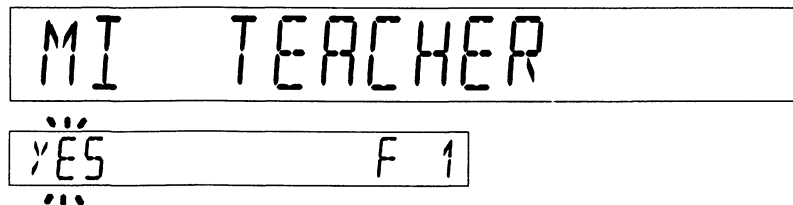
MI TEACHER

NO F 1

Where the word "NO" in the lower display is flashing.

Press **▶**

Displays read :



MI TEACHER

YES F 1

where the word "YES" in the lower display is flashing.

Press **ENTER**

The word "YES" will cease to flash confirming that it has been entered in the recorder's memory.

Press **DISPLAY** to return to normal running mode. The recorder should immediately commence operating in teacher mode, producing a chart record similar to that in Figure 7-2.

MULTICHANNEL RECORDER

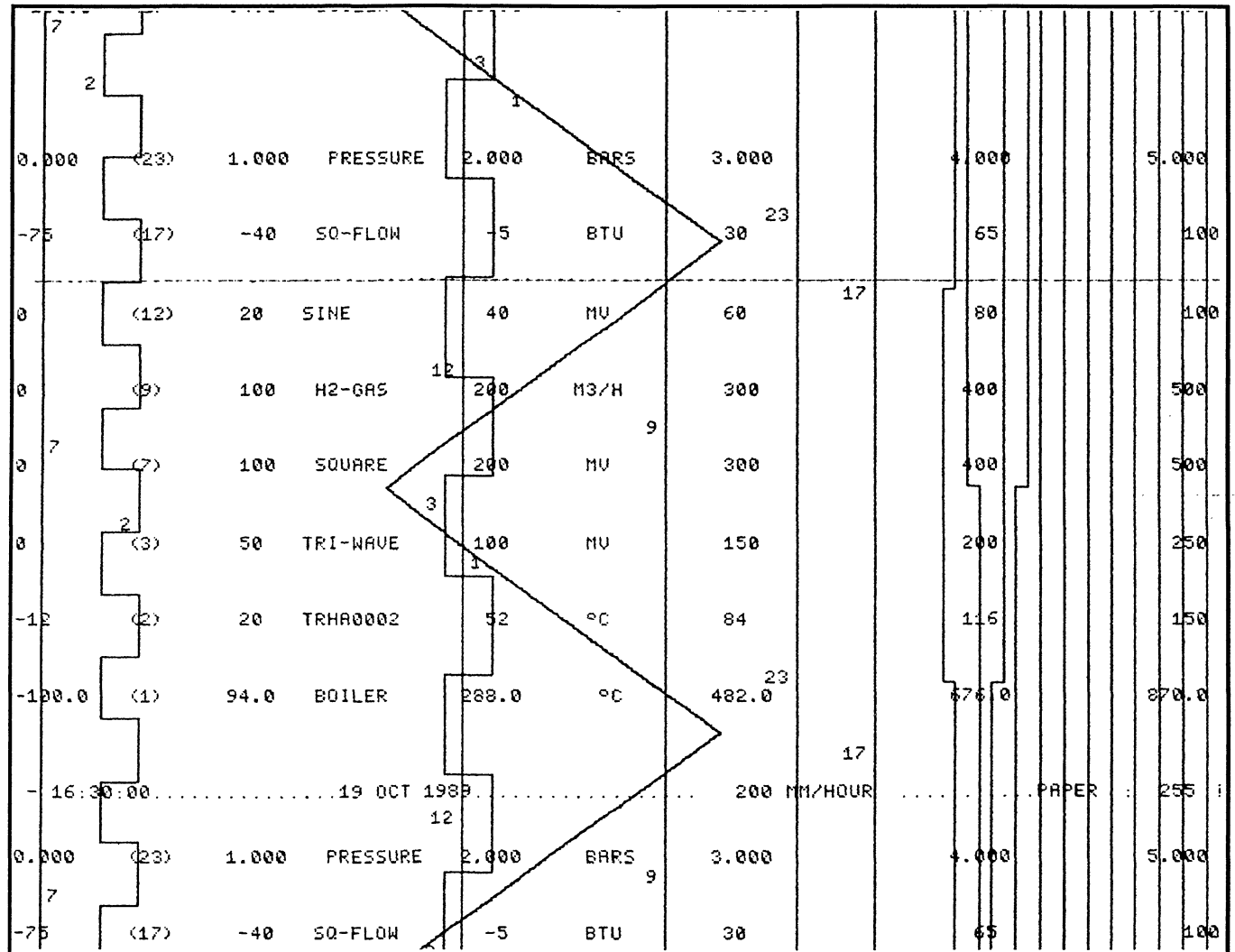


Figure 7-2 Teacher mode printout

Notes :

1. If no printing takes place, check that the recorder is not in chart hold mode, by pressing the **RECORD** key. Refer to Section 4 "OPERATION" and paragraph "hold, run or advance chart". If there is still no printing refer to chapter 7.3 "Failure symptoms and troubleshooting procedures", and take any necessary corrective action.

2. It may also be necessary to reconfigure chart ranges and analog alarms to exploit teacher mode fully. Refer to Section 3, "CONFIGURATION".

To leave teacher mode it is necessary to repeat the above procedure, changing the configuration word "YES" to "NO". Remember to re-lock the sub-matrix if necessary.

**MULTICHANNEL
RECORDER****7.3 FAILURE SYMPTOMS AND TROUBLESHOOTING PROCEDURES**

Failure symptoms that can be recognized by their effect on the recorder's performance. Compare the symptoms of your recorder with those listed below to identify the possible cause, and the corrective action to be taken.

7.3.1 Symptom- The recorder is inoperative

POSSIBLE CAUSE	CORRECTIVE ACTION
Loss of line power	Use an a.c. voltmeter to check whether power is being applied to the supply terminals L1 and L2/N
Blown line fuse	Replace line fuse F1. Ensure that fuse rating is correct for supply voltage
Wiring disconnected	Check the connections of M.M.I. cables, intercabling board and power supply cables. See Figure 7-26
Power supply module failed	Replace power supply module. Refer to chapter 7.4.10 for procedure

TABLE 7-1 The recorder is inoperative

7.3.2 Symptom- Chart is inoperative

POSSIBLE CAUSE	CORRECTIVE ACTION
Recorder in "chart hold" mode	The "record" led is off : Press the "record" key
Recorder is configured for print inhibit or is waiting in event precursor mode	Check "recording mode" configuration in printer sub-matrix
Print inhibit is activated by digital input	Check "print action" configuration in digital inputs sub-matrix, and status of digital inputs
All channels configured for "not print"	Press the "print" key to verify which channels are enabled. Check "enabled" configuration in chart sub-matrix
All channels configured for "print on alarm"	Check "enabled" configuration in chart sub-matrix, and status of alarms
Chart paper used up	Install new chart. See section 2 "INSTALLATION"

TABLE 7-2 Chart is inoperative

**MULTICHANNEL
RECORDER**

POSSIBLE CAUSE	CORRECTIVE ACTION
Chart is incorrectly installed	Install chart correctly. Refer to section 2 "INSTALLATION"
Chart is torn	Advance chart beyond torn section
Wiring disconnected at rear of printer chassis	Check wiring connections. See Fig 7-19 in chapter 7.4.4.
Paper out detector switch failed	Replace paper out detector switch
Chart drive gear train damaged	Replace chart cassette assembly
Power supply failed	Replace power supply module. Refer to chapter 7.4.10 for procedure
Chart drive logic failed	Replace mother board. Refer to chapter 7.4.10 for procedure

TABLE 7-2 Chart is inoperative [continued]

7.3.3 Symptom- Print carriage is inoperative

POSSIBLE CAUSE	CORRECTIVE ACTION
Carriage drive belt broken or missing	Replace carriage drive belt. Refer to chapter 7.4.8 for procedure
Carriage drive belt tension incorrect	Check/adjust drive belt tension. Refer to chapter 7.4.8 for procedure
Wiring disconnected at rear of print chassis	Check wiring connections. See Fig 7-19 in chapter 7.4.4
Carriage drive motor failed	Replace carriage drive motor. Refer to chapter 7.4.6. for procedure
Power supply failed	Replace power supply module. Refer to chapter 7.4.10 for procedure
Carriage drive motor logic failed	Replace mother board. Refer to chapter 7.4.10 for procedure

TABLE 7-3 Print carriage is inoperative

**MULTICHANNEL
RECORDER****7.3.4 Symptom- Print head is inoperative**

POSSIBLE CAUSE	CORRECTIVE ACTION
Ribbon cartridge missing	Fit ribbon cartridge. Refer to section 2 "INSTALLATION" for procedure
Ribbon cartridge worn out	Replace ribbon cartridge. Refer to section 5 "MAINTENANCE" for procedure
Wiring disconnected at rear of printer chassis	Check wiring connections. See Fig 7-19 in chapter 7.4.4
Ribbon drive motor failed	Replace ribbon drive motor. Refer to chapter 7.4.4 for procedure
Print head failed	Replace print head assembly. Refer to chapter 7.4.1 for procedure
Power supply failed	Replace power supply module. Refer to chapter 7.4.10 for procedure
Print head logic failed	Replace mother board. Refer to chapter 7.4.10 for procedure
Ribbon drive motor logic failed	Replace mother board. Refer to chapter 7.4.10 for procedure

TABLE 7-4 Print head is inoperative

Note : Before replacing any components, run the print test routine the procedure for which is given in chapter 7.2.2.

7.3.5 Symptom- Printing incorrect color

POSSIBLE CAUSE	CORRECTIVE ACTION
Ribbon cartridge incorrectly installed	Check ribbon cartridge installation. Refer to section 2 "INSTALLATION"
Wiring disconnected at rear of printer chassis	Check wiring connections. See Fig 7-19 in chapter 7.4.4
Color change motor failed	Replace color change motor. Refer to chapter 7.4.5. for procedure

TABLE 7-5 Printing incorrect color

**MULTICHANNEL
RECORDER**

POSSIBLE CAUSE	CORRECTIVE ACTION
Power supply failed	Replace power supply module. Refer to chapter 7.4.10. for procedure
Channel using the "red on alarm" function	Check "red on alarm" configuration in analog alarms and digital inputs sub-matrices
Color change motor logic failed	Replace mother board. Refer to chapter 7.4.10 for procedure
Color mixed or incorrect	Start the print test routine. Refer to chapter 7.2.2. for procedure

TABLE 7-5 Printing incorrect colour [continued]

7.3.6 Symptom- Man-Machine interface is inoperative

POSSIBLE CAUSE	CORRECTIVE ACTION
Wiring disconnected at rear of printer chassis	Check wiring connections. See Fig 7-19 in chapter 7.4.4
Power supply failed	Replace power supply module. Refer to chapter 7.4.10. for procedure
Man-machine interface failed	Replace man-machine interface. Refer to chapter 7.4.11. for procedure
No indication	Check "dip" switch on mother board for proper setting for math and communication board

TABLE 7-6 Man machine interface is inoperative

**MULTICHANNEL
RECORDER****7.3.7 Symptom- Chart illumination failed**

POSSIBLE CAUSE	CORRECTIVE ACTION
Wiring disconnected at rear of printer chassis.	Check wiring connections. See Fig 7-19 in chapter 7.4.4.
Fluorescent tube connectors not properly seated.	Check fluorescent tube connectors. Refer to chapter 7.4.3. for procedure.
Fluorescent tube failed.	Replace fluorescent tube. Refer to chapter 7.4.3. for procedure.
Power supply failed.	Replace power supply module. Refer to chapter 7.4.10. for procedure.

TABLE 7-7 Chart illumination failed

7.3.8 Symptom- Display and/or records of analog inputs outside specified accuracy tolerance

POSSIBLE CAUSE	CORRECTIVE ACTION
Open circuit	Check sensor, leads and input terminals
Analog input card faulty	Replace analog input card. Refer to chapter 7.4.2 for procedure
Recorder not configured with the correct power supply frequency	Check "frequency" (50/60 Hz) in miscellaneous submatrix
Recorder configured for wrong sensor or actuation	Check "sensor" and "actuation" configuration in analog inputs submatrix
Environmental conditions outside rated limits	Ensure that ambient temperature and relative humidity are within limits given in section 2 "INSTALLATION"
Analog to digital converter card faulty	Replace analog to digital converter. Refer to chapter 7.4.2. for procedure
Recorder in "teacher mode"	Check "teacher" configuration in miscellaneous submatrix
"Range" not correct	Check "range" configuration in miscellaneous submatrix
Value coming from external communication or mathematic function	Check the configuration in communication and mathematic submatrices

TABLE 7-8 Display and/or record of analog inputs outside specified accuracy tolerance

7.3.9 Alarm relay is inoperative or does not have the desired effect

POSSIBLE CAUSE	CORRECTIVE ACTION
Alarm relay board failed	Replace the board. Refer to chapter 7.4.2 for procedure
Configuration not correct	Check the jumper selection on relay board Check the "relay" parameter in the analog alarm and digital input submatrices

TABLE 7-9 Alarm relay is inoperative or have not the desired effect

7.3.10 Wrong date/time

POSSIBLE CAUSE	CORRECTIVE ACTION
Battery switch off	Check the switch position. Refer to section 2 : INSTALLATION, chapter "enabling the back-up battery" and reconfigure the date and time in miscellaneous submatrix
Battery discharged	Change the component (contact your local office)

TABLE 7-10 Wrong date/time

**MULTICHANNEL
RECORDER****7.4 COMPONENT REPLACEMENT****7.4.1 Print head assembly**

With the power off, open the recorder door and use the printer chassis release catches to withdraw the chassis as far as the service stop. See Figure 7-3.

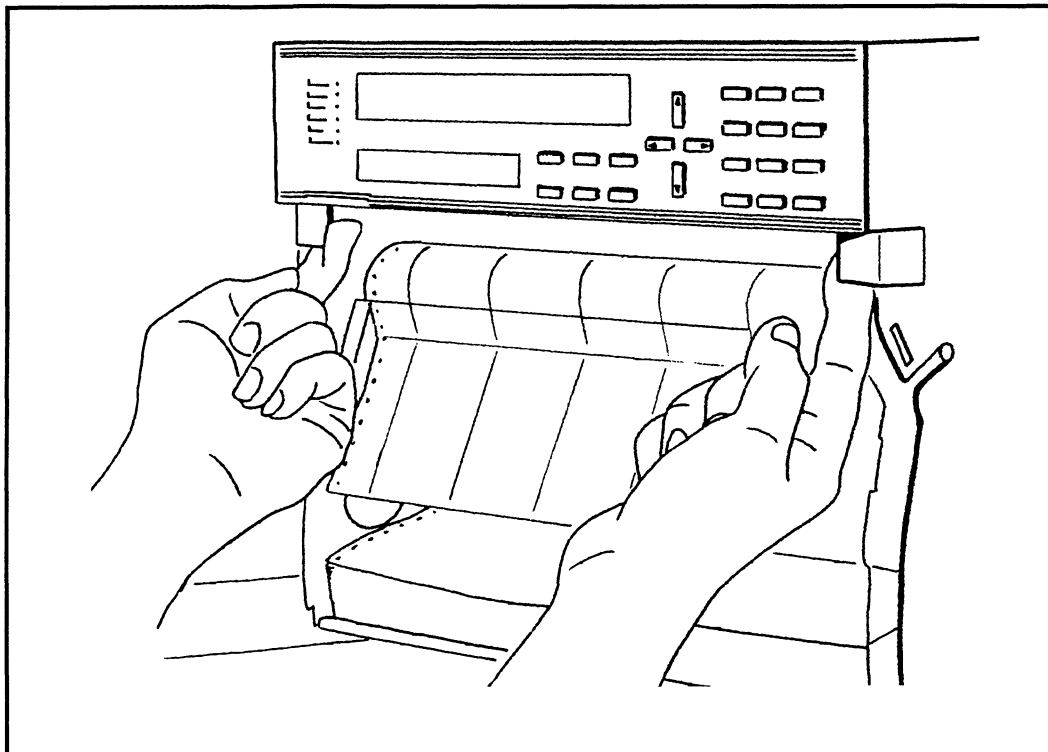


Figure 7-3 Withdrawing printer chassis to stop

**MULTICHANNEL
RECORDER**

Use the drive belt to position the print carriage at about mid-travel.
Remove the ribbon cartridge by depressing the plastic retaining (A) clip, and withdrawing the cartridge to the left.
On and after the date code 04/96, pull out the cartridge with the help of the blue pull handle (B).
See Figure 7-5

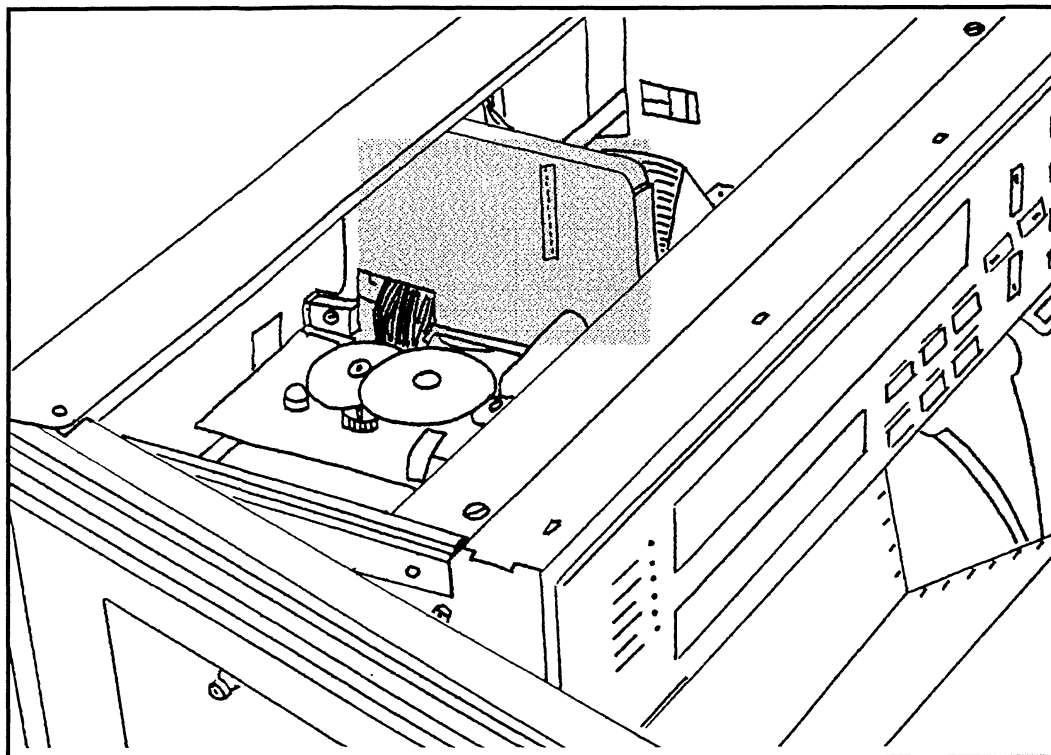


Figure 7-4 Print carriage at mid travel

**MULTICHANNEL
RECORDER**

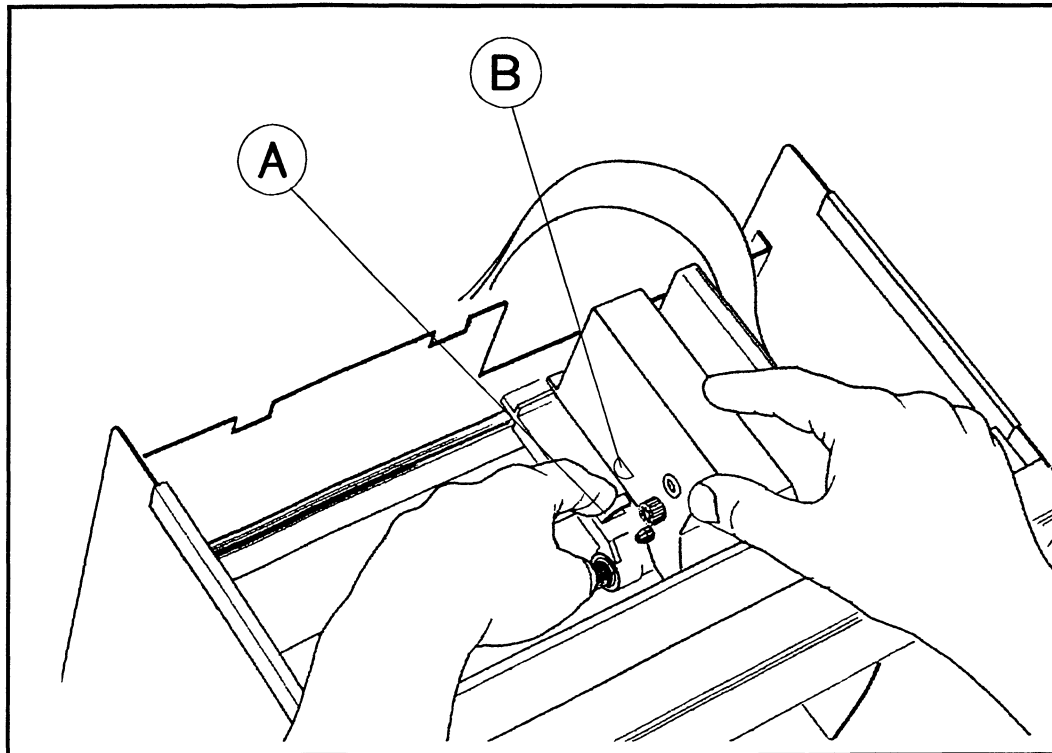


Figure 7-5 Removing the ribbon cartridge

**MULTICHANNEL
RECORDER**

Press both chart cassette catches and gently pivot the assembly forward to its stop as shown in Figure 7-6.

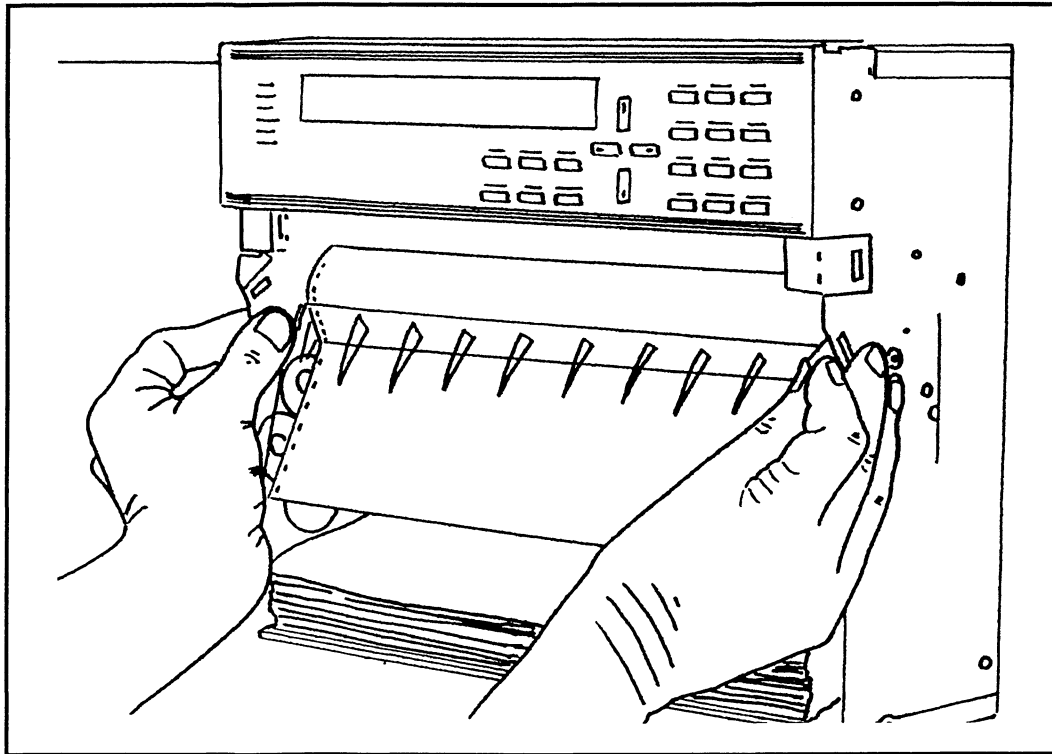


Figure 7-6 Pressing both the chart cassette catches

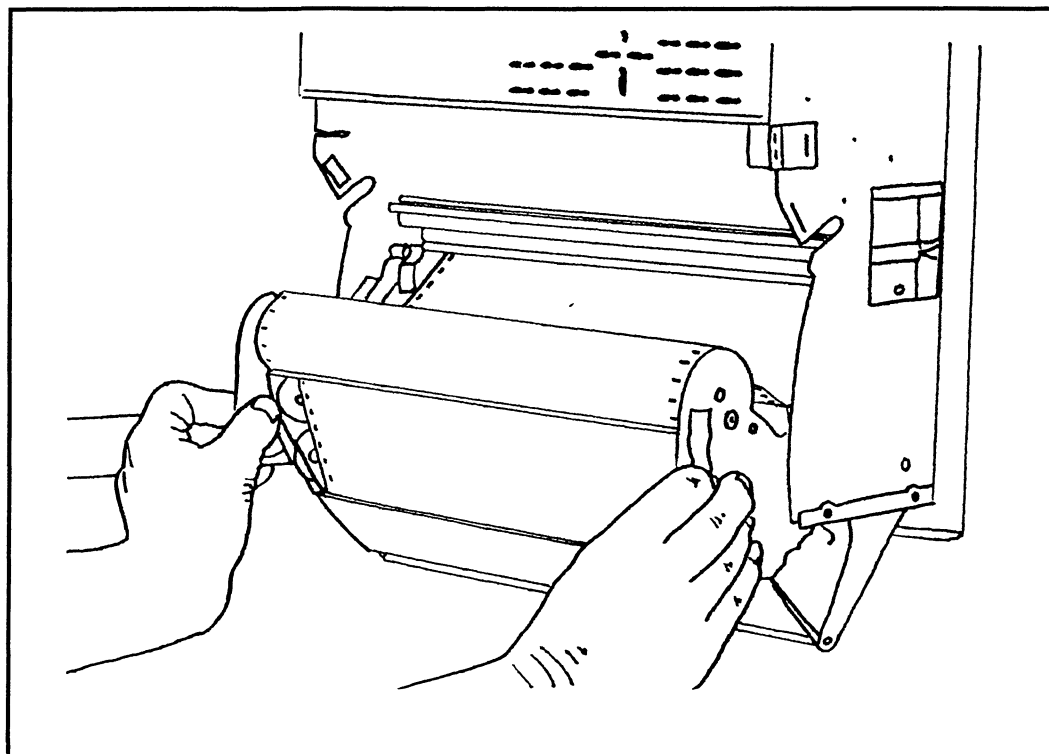
**MULTICHANNEL
RECORDER**

Figure 7-7 Swinging the chart cassette assembly forward

Now grasp the sides and bottom of the cassette assembly firmly in both hands and pivot it up and then outward at the bottom until it can be withdrawn completely from the chassis.

**MULTICHANNEL
RECORDER**

Unclip the print head ribbon cable from the right hand side of the print carriage, as shown in Figure 7-8 .

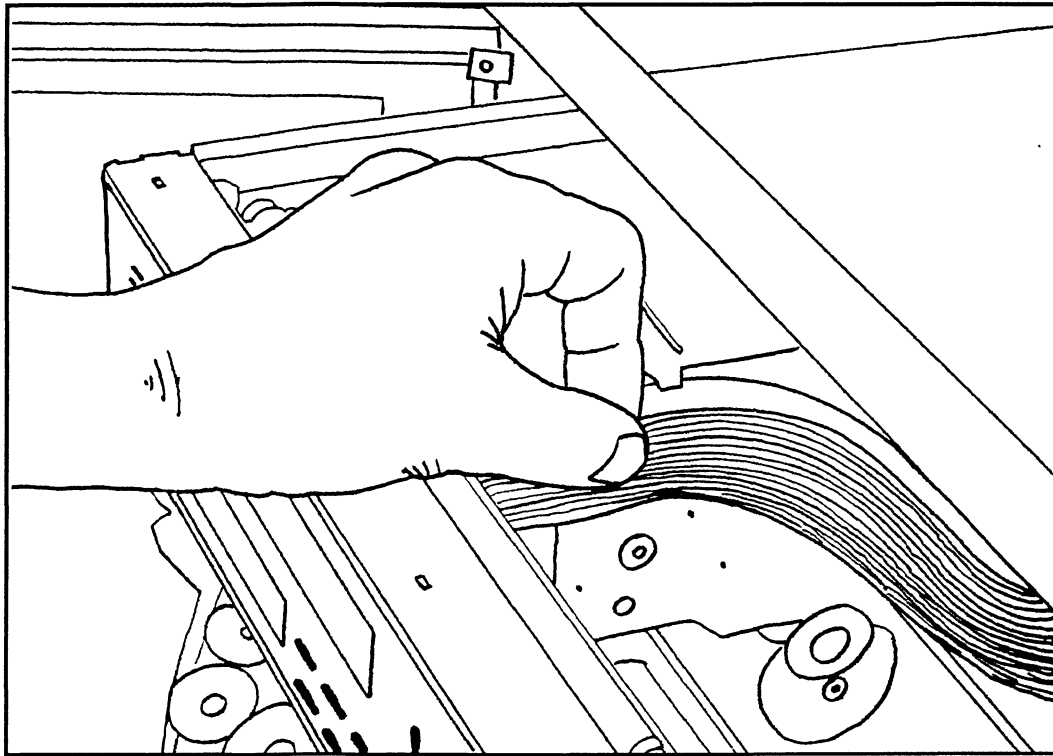


Figure 7-8 Unclipping the print head ribbon cable

**MULTICHANNEL
RECORDER**

Carefully remove the two screws securing the printhead to its mounting bracket, and lift the printhead, complete with its ribbon cable, upwards and away from the print carriage. Refer to Figures 7-9 and 7-10.

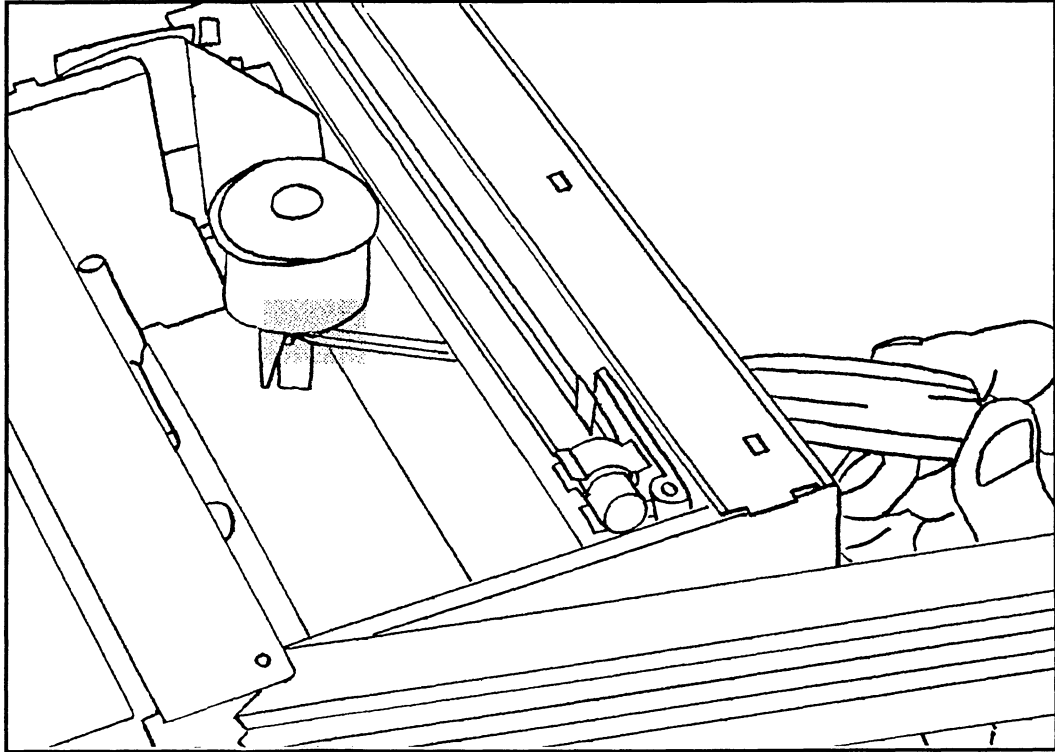


Figure 7-9 Location of print head mounting screws

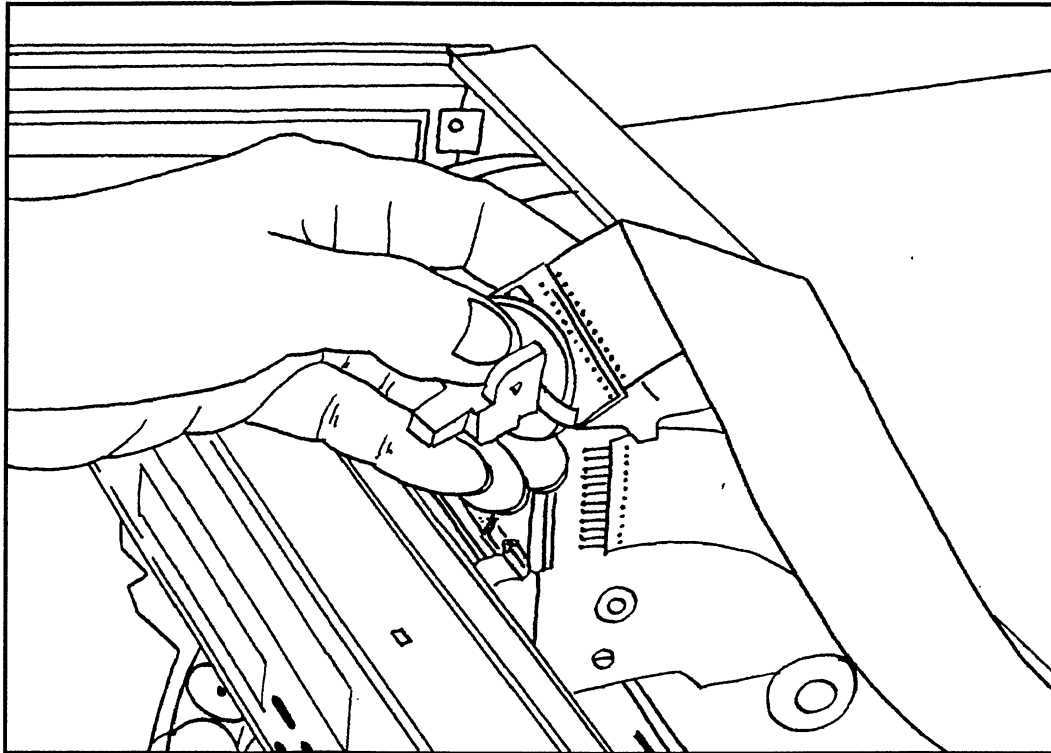


Figure 7-10 Removing the print head and ribbon cable

Unsolder the 12 ribbon cable connections. Then change the print head part 46182821-001. Resolder the ribbon cable connections in the original sequence. Attach the new print head to its mounting bracket with the fixing screws lightly tightened. Clip the ribbon cable onto the print carriage, and replace the chart cassette and ribbon cartridge.

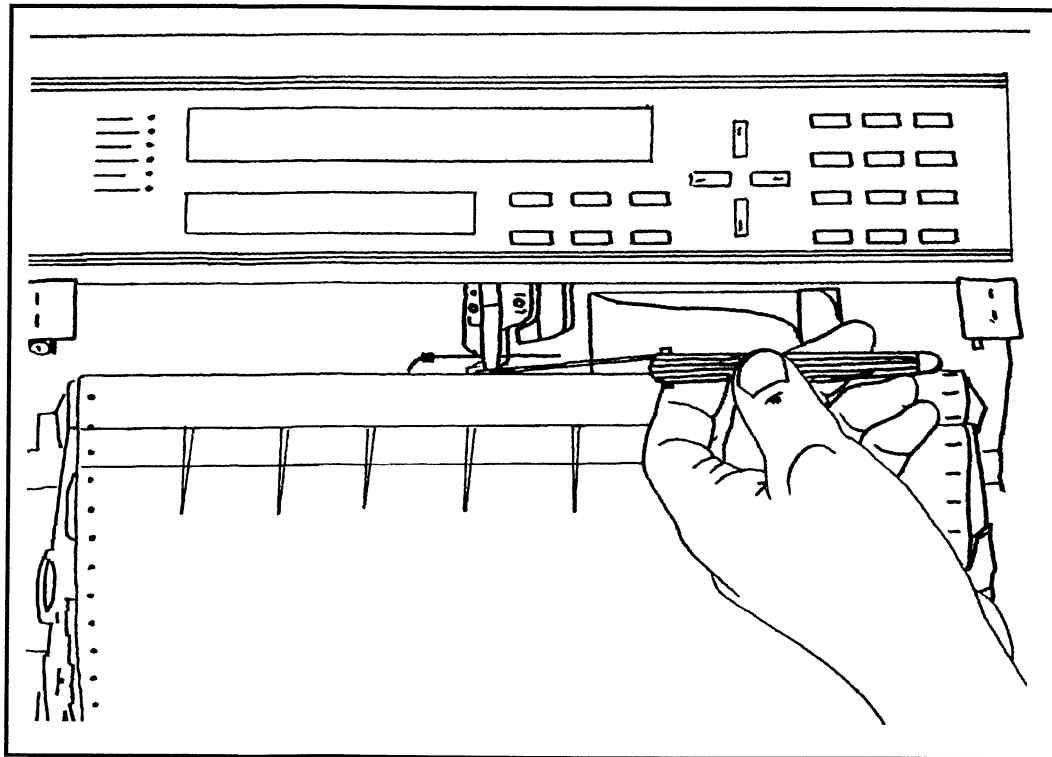


Figure 7-11 Setting the print head gap

With the print carriage at mid-travel, use a feeler gauge to set the gap between printhead and anvil to 0.65 mm (0.026 in), as shown in fig 7-11.

Finally tighten the print head fixing screws securely. Re-check the gap and re-adjust if necessary.

**MULTICHANNEL
RECORDER****7.4.2 Input, output, alarm relay and A/D converter circuit boards**

Field replacement of all input, output and option boards, together with the analog to digital converter board, can be accomplished quickly and easily. Proceed as follows :

Isolate the recorder from main power. Remove the 4 screws securing the terminal cover plate at the rear of the recorder. See Figure 7-12.

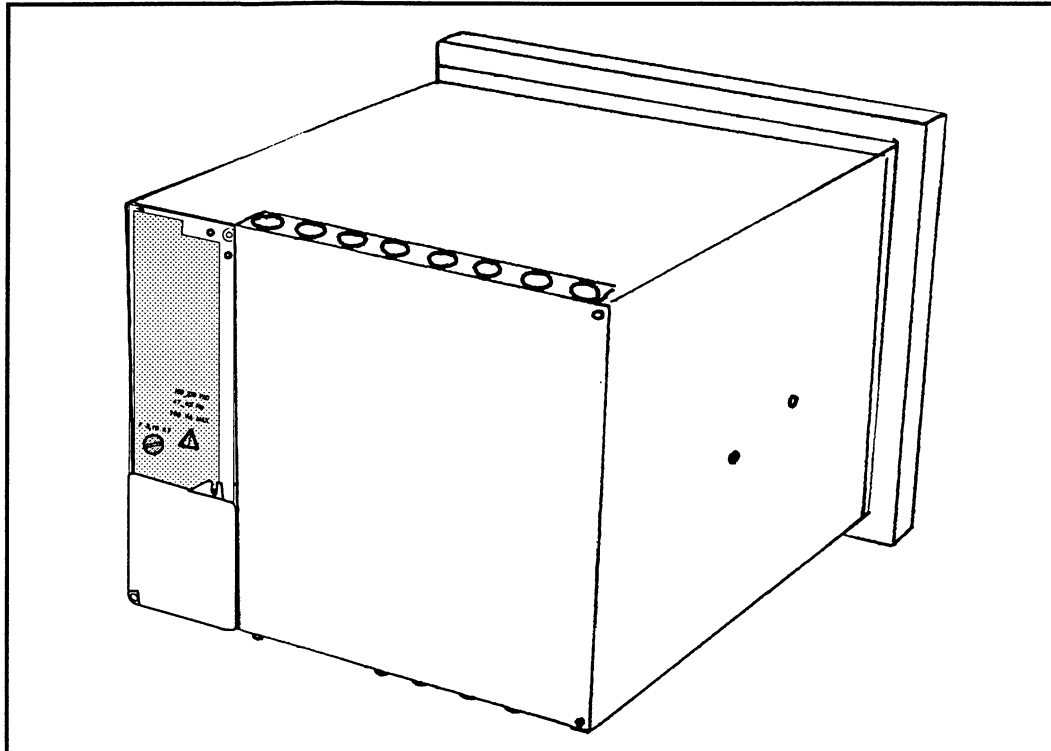


Figure 7-12 Rear of the recorder showing terminal cover plate

The layout of the boards fitted at the rear of the electronic card cage is as shown in 7-13. Note : The number and variety of boards fitted to an individual recorder depends on its model number. Refer to Section 2, "INSTALLATION" : chapter "Identifying the recorder model". Blank covers are fitted in locations where no board is installed.

MULTICHANNEL
RECORDER

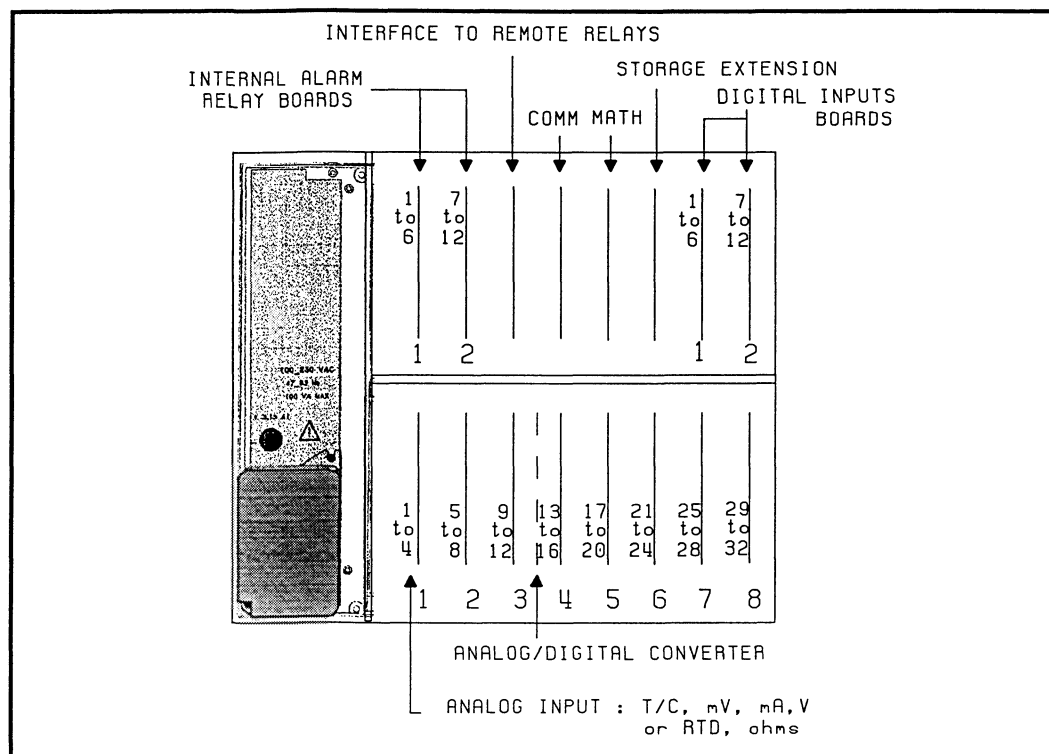


Figure 7-13 Layout of input, output and option boards

**MULTICHANNEL
RECORDER**

It is not necessary to disconnect field wiring from the board to be replaced. Simply undo the 2 screws, 1 at the top and 1 at the bottom, which secure the relevant terminal block to the electronic card cage, and remove the terminal block. Refer to Figure 7-14. Caution : Field wiring may be at line voltage potential.

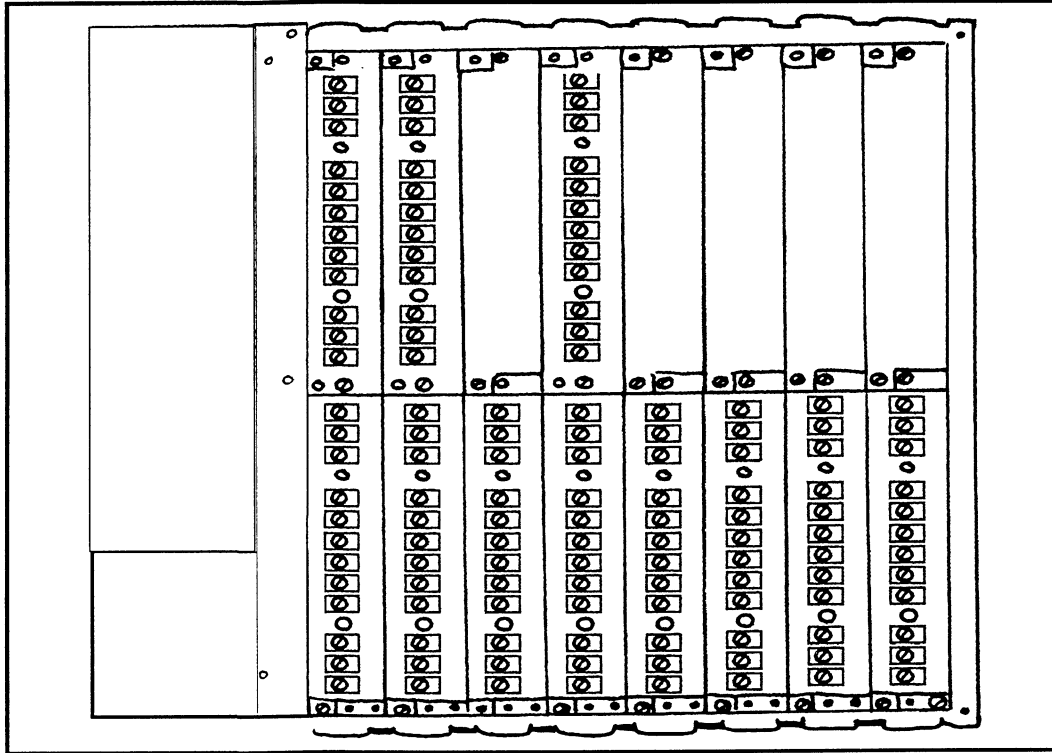


Figure 7-14 Rear terminal blocks and cover plates

Caution : Many of the option boards can be damaged by electrostatic discharge. Use a wrist-strap connected to the electronic chassis before removing the suspect board or withdrawing the replacement from its container.

Remove the faulty board and replace it with a new board having the correct part number. Refer to Section 8 "PARTS LIST". Replace the terminal block, and secure it with the 2 fixing screws. Replace the rear terminal cover plate and restore the mains power.

Note : The analog to digital converter board is located between analog input boards 3 and 4. It will be necessary to remove the terminal block for analog input board number 3 to gain access to it.

**MULTICHANNEL
RECORDER****7.4.3 Chart illumination**

With the power supply off, open the recorder door, and use the printer chassis release catches to withdraw the chassis as far as the service stop. Refer to Figure 7-3 in paragraph 7.4.1

Remove the chart cassette assembly as described in paragraph 7.4.1. Remove the 2 screws securing the reflector, as shown in Figure 7-15.

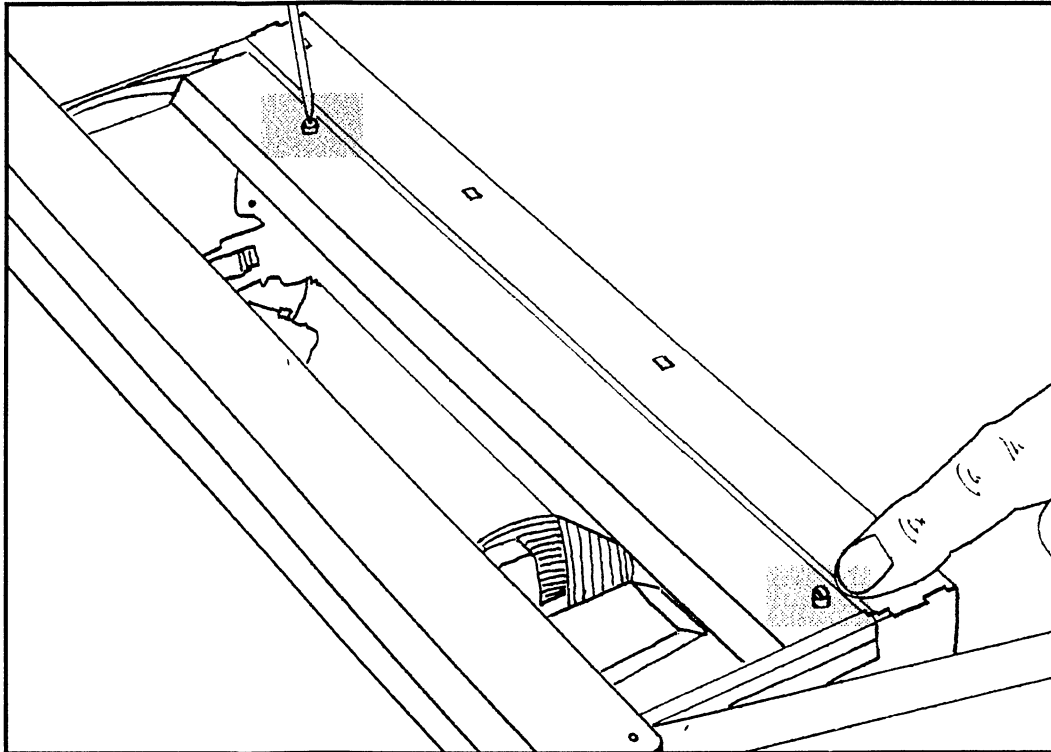


Figure 7-15 Removing the reflector fixing screws

**MULTICHANNEL
RECORDER**

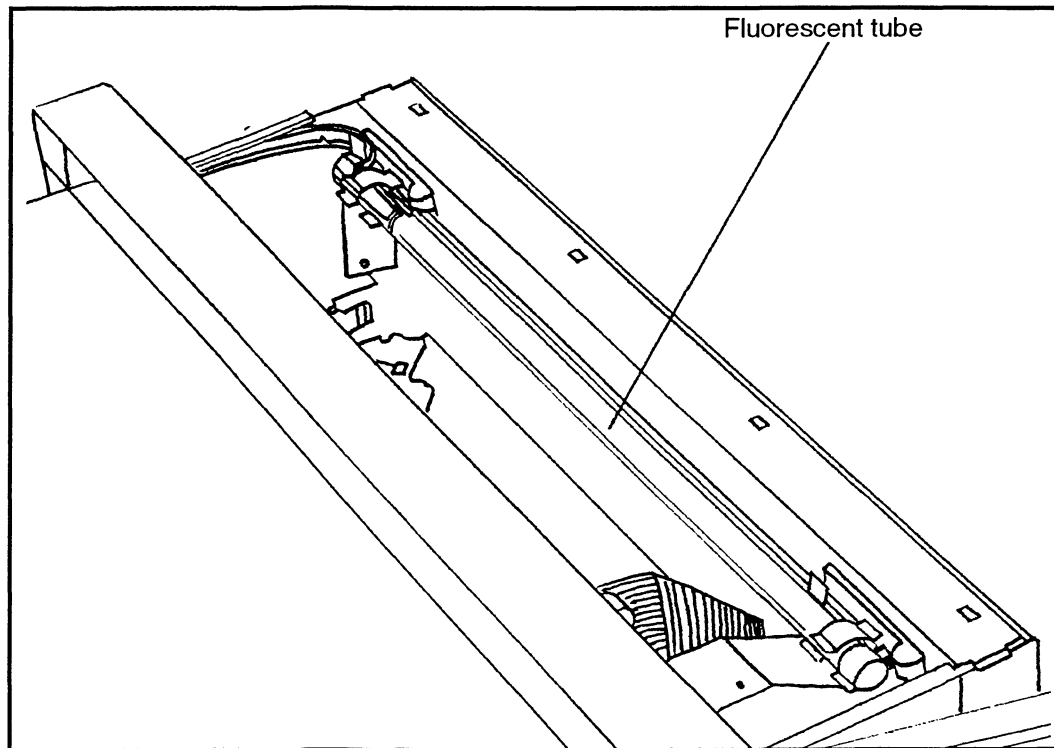


Figure 7-16 Chart illumination assembly

**MULTICHANNEL
RECORDER**

Remove the outer protective tube from its support clips shown in Figure 7-17

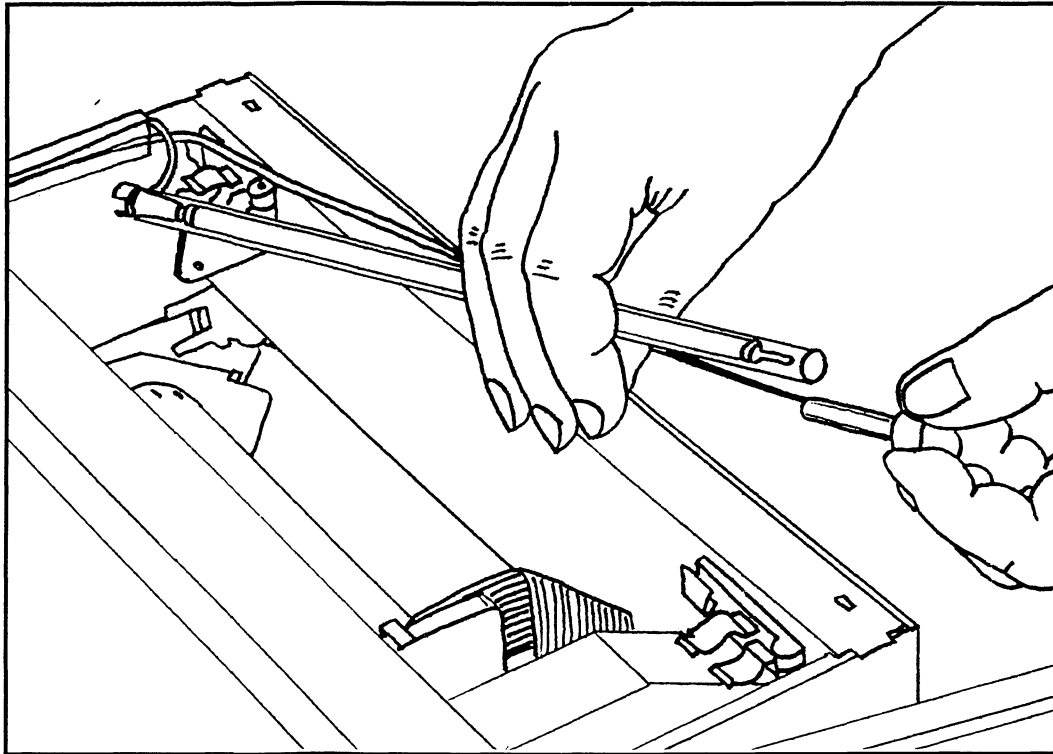


Figure 7-17 Removing the fluorescent tube connector sockets

Remove the fluorescent tube connector sockets from each end of the support tube, as shown in Figure 7-18.

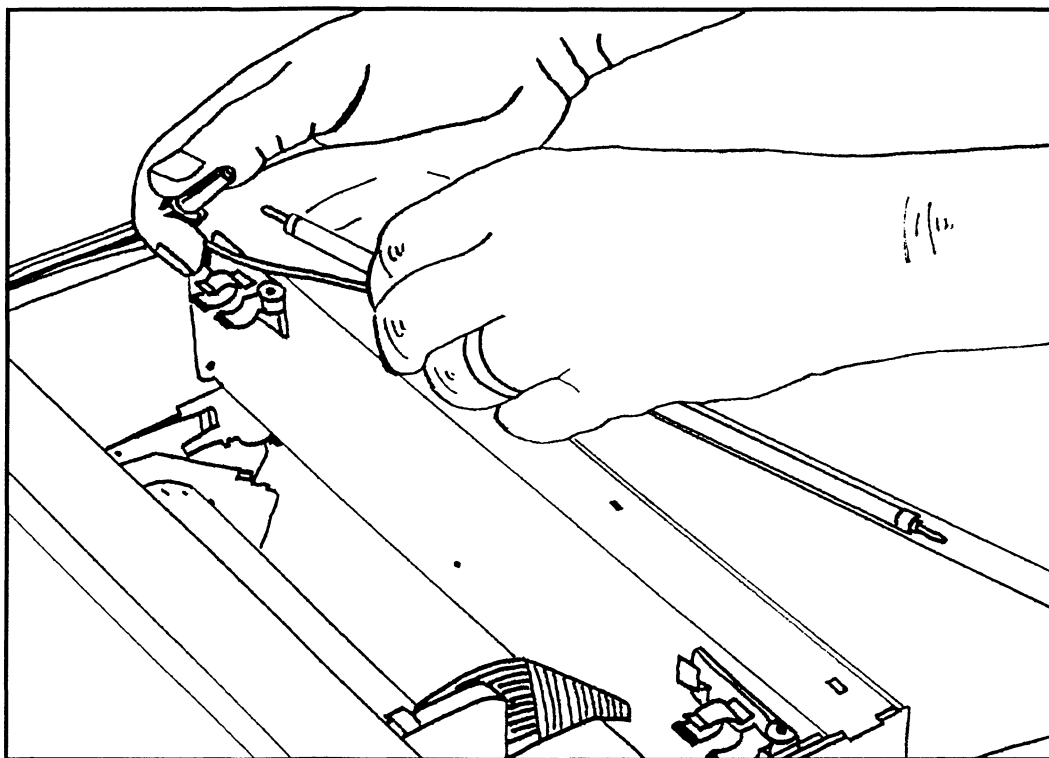


Figure 7-18 Disconnecting the fluorescent tube

Change the fluorescent tube part 46182628-501. Place the new fluorescent tube inside the protective cover, and reconnect the wiring at each end. Replace the protective tube in the support clips, ensuring that the wiring is correctly positioned. Refer back to Figure 7-16. Secure the reflector by means of its fixing screws.

Switch on the power and check for correct operation. Replace the chart cassette assembly, push the printer into the case until it locks, and close the recorder door.

**MULTICHANNEL
RECORDER****7.4.4 Ribbon drive motor**

With the power off, open the recorder door and use the printer chassis release catches to withdraw the chassis as far as the service stop. Refer to Figure 7-5 in paragraph 7.4.1. Remove the ribbon cartridge, and the chart cassette assembly as described and illustrated in paragraph 7.4.

Disconnect the 5 cables at the rear of the printer chassis. See Figure 7-19.

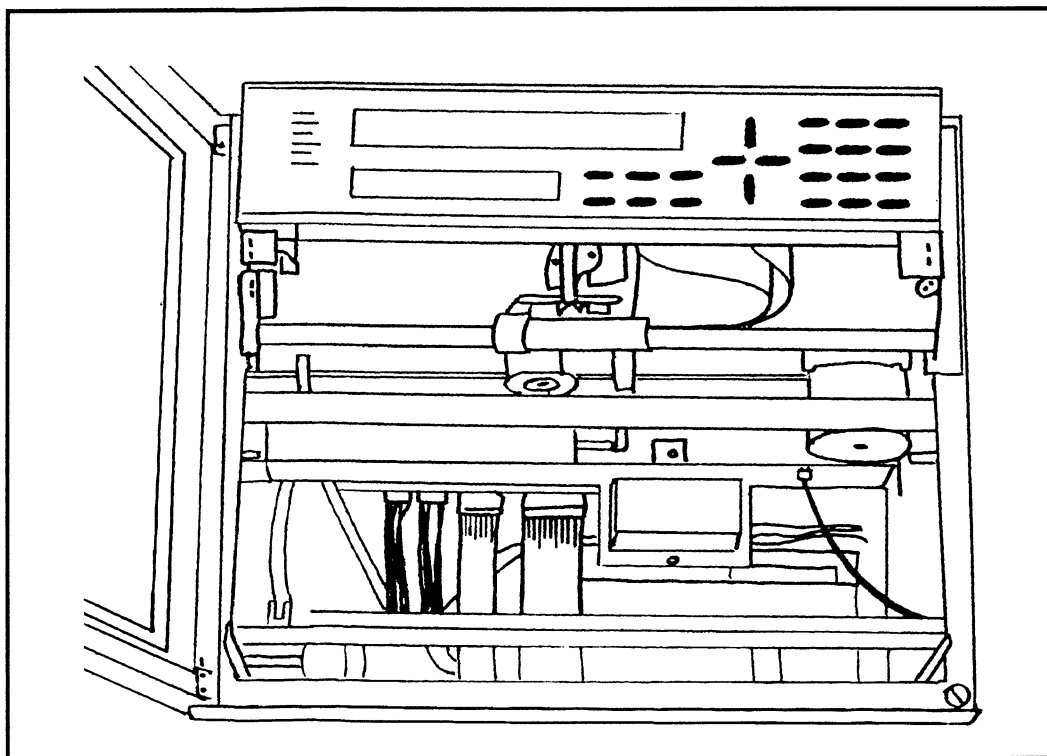


Figure 7-19 Printer chassis cable connection

**MULTICHANNEL
RECORDER**

Release the service stop catches at the upper rear of the sides of the printer chassis and withdraw the chassis completely from the case see Figure 7-20.

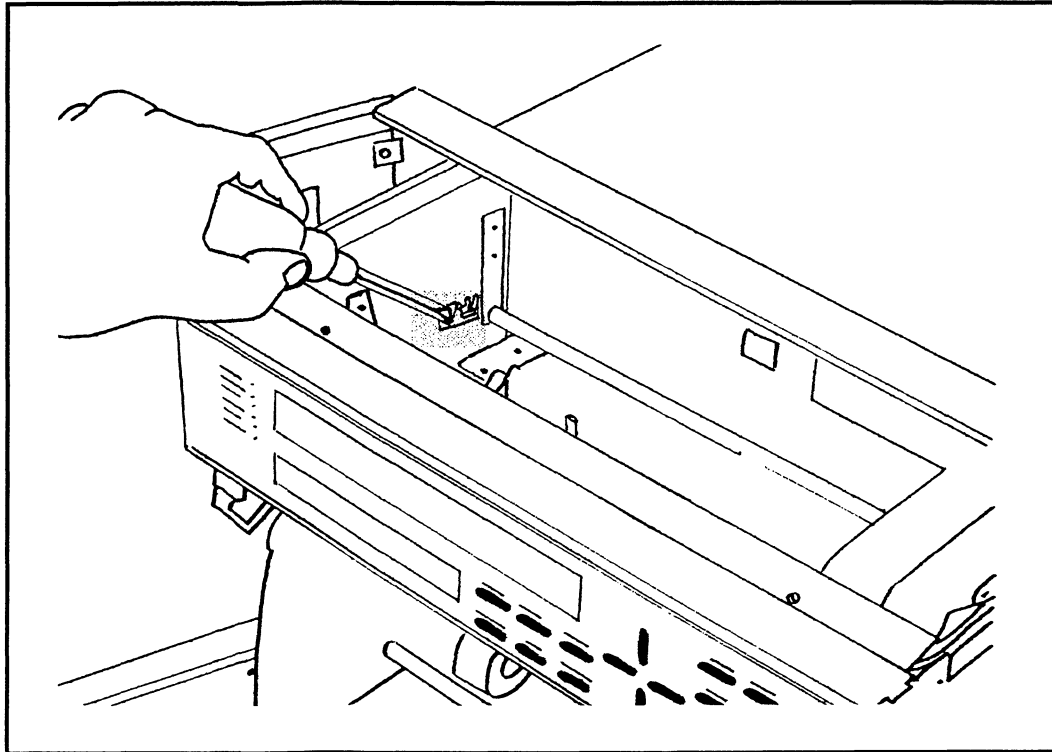


Figure 7-20 Releasing the chassis service stop catches

**MULTICHANNEL
RECORDER**

Use the drive belt to position the print carriage at the right hand side of the chassis, when viewed from the front. Remove the two screws securing the ribbon motor to the print carriage as shown in Figure 7-21.

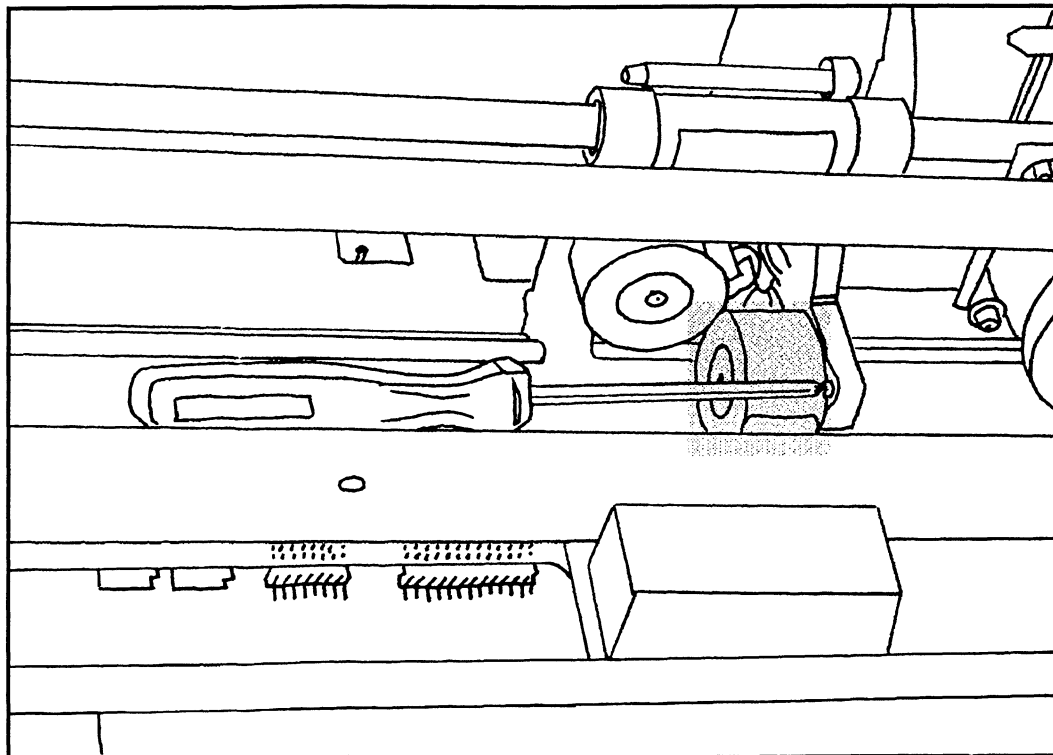


Figure 7-21 Removing ribbon drive motor fixing screws

**MULTICHANNEL
RECORDER**

Unclip both ribbon cables from the right hand side of the print carriage. Refer to figure 7-8 in paragraph 7.4.1. Then remove the 3 screws securing the carriage motors intercabling circuit board as shown in Figure 7-22.

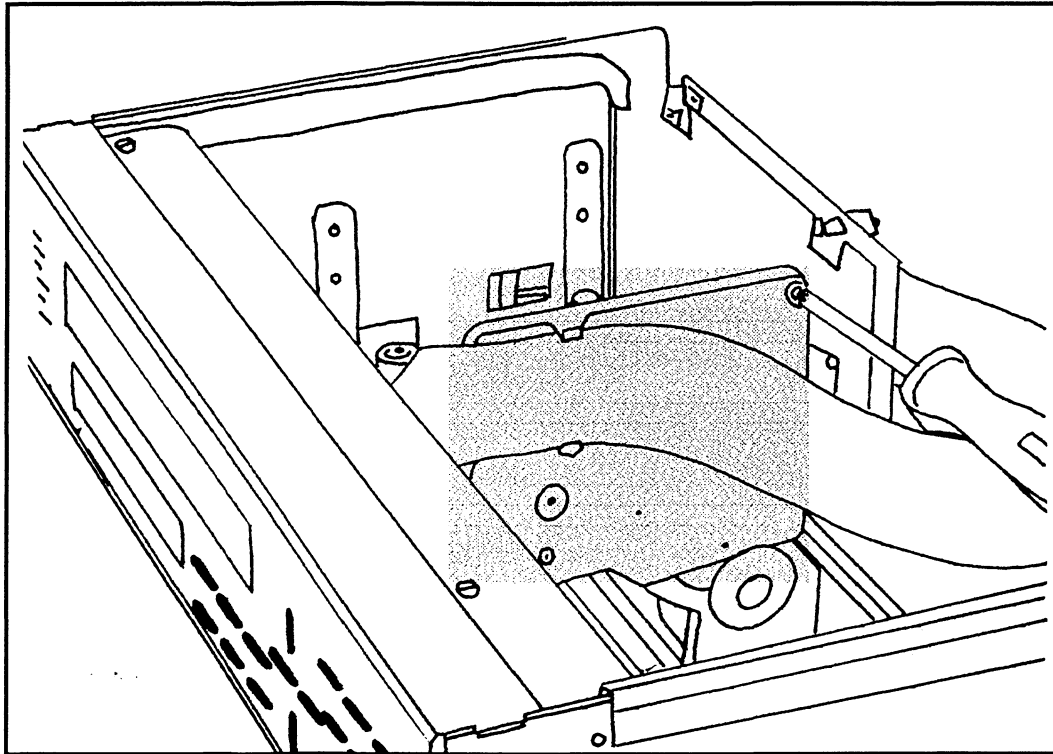


Figure 7-22 Carriage motor intercabling circuit board

Tilt the board and disconnect the ribbon advance motor wiring, (upper connector). See Figure 7-23.

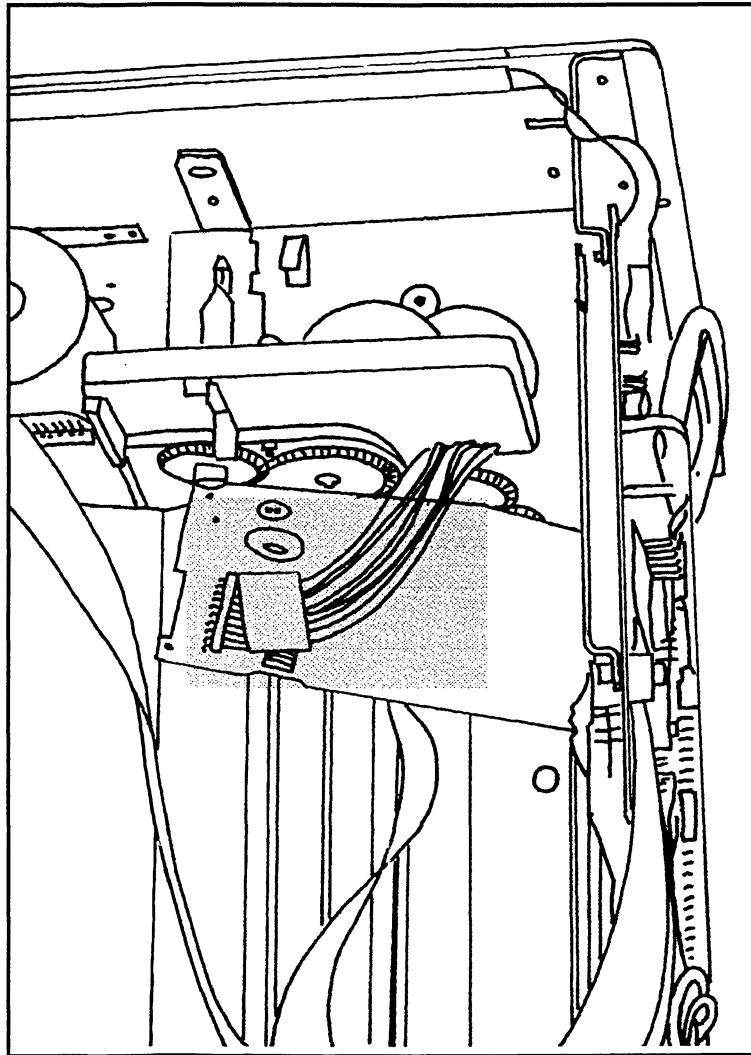


Figure 7-23 Disconnecting ribbon advance motor wiring. (top view)

Carefully remove the motor, feeding its wiring harness through the aperture in the print carriage. Change the ribbon advance motor, part 46182818-001. Pass the wiring harness through the aperture in the carriage with the red wire uppermost. Reconnect the harness to the upper connector on the circuit board, and screw the board back onto the carriage. Attach the motor to the carriage with the fixing screws.

Clip the two ribbon cables to the right hand side of the carriage, and replace the print cartridge. Return the printer chassis to the case, replace the cable connectors at the lower rear and replace the chart cassette assembly.

**MULTICHANNEL
RECORDER****7.4.5 Color change motor**

Follow the procedure described in paragraph 7.4.1 and in 7.4.4 for removing the print cartridge, chart cassette assembly and printer chassis from the case. Remove the 2 screws securing the color change motors to the print cartridge, as shown in Figure 7-24.

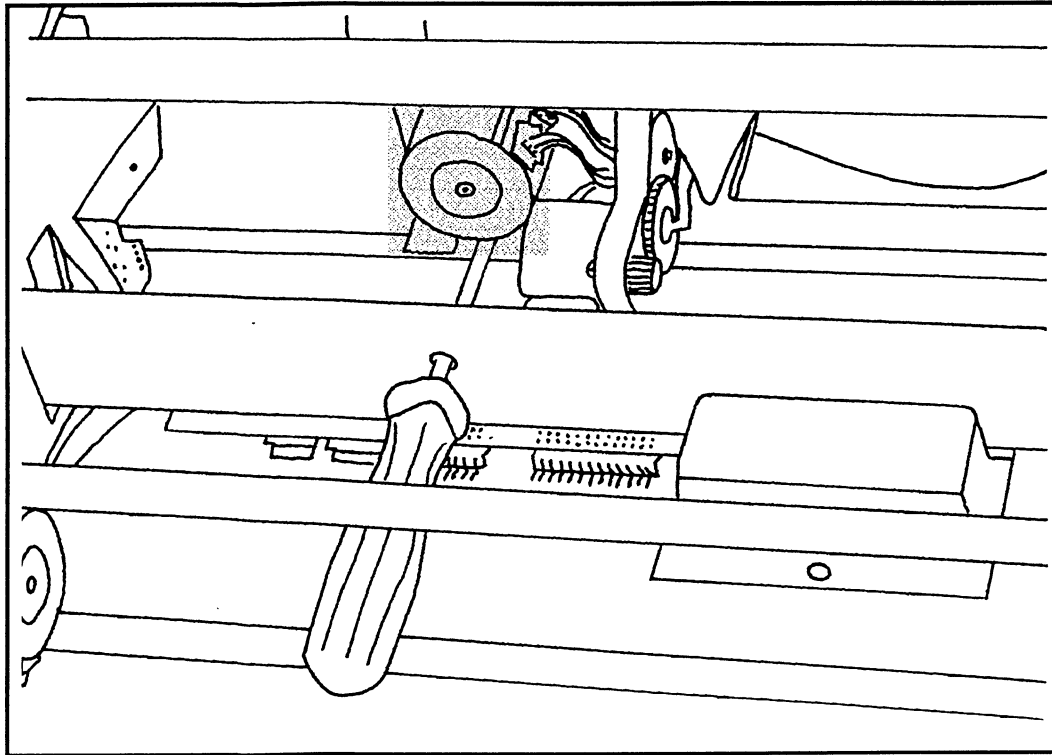


Figure 7-24 Removing color change motor fixing screws

Unclip both ribbon cables from the right hand side of the print carriage. Refer to Figure 7-8 in paragraph 7.4.1. Then remove the 3 screws securing the carriage motors intercabling circuit board. Refer to Figure 7-22 in paragraph 7.4.4. Tilt the board and disconnect the color change motor wiring (lower connector). Refer to Figure 7-23 in paragraph 7.4.4. Carefully remove the motor feeding its wiring harness through the aperture in the print carriage.

Change the color motor, part 46182817-001. Pass the wiring harness through the aperture in the carriage with the red wire uppermost. Reconnect the harness to the lower connector on the circuit board, and screw the board back onto the carriage. Attach the motor to the carriage with the fixing screws. Clip the 2 ribbon cables to the right hand side of the carriage, and replace the print cartridge. Return the printer chassis to the case, reconnect the cables at the lower rear, and replace the chart cassette assembly.

**MULTICHANNEL
RECORDER****7.4.6 Carriage drive motor**

Follow the procedures described in paragraphs 7.4.1 and 7.4.4 for removing the chart cassette assembly and printer chassis from the case. It is not necessary to remove the print cartridge. Invert the printer chassis, and remove the four mm socket screws securing the carriage drive motor. Remove the drive belt from the groove on the underside of the carriage. See Figure 7-25.

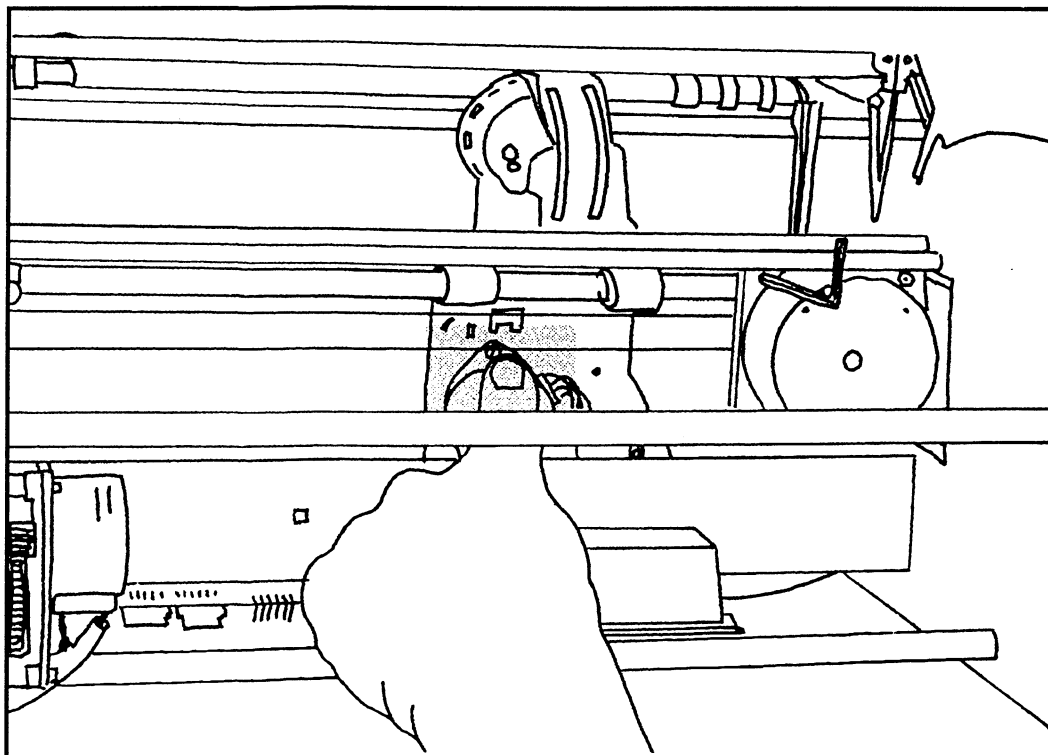


Figure 7-25 Disconnecting the carriage drive motor and belt

**MULTICHANNEL
RECORDER**

Unsolder the 4 motor wires from the intercabling circuit board at the rear of the chassis. Figure 7-26.

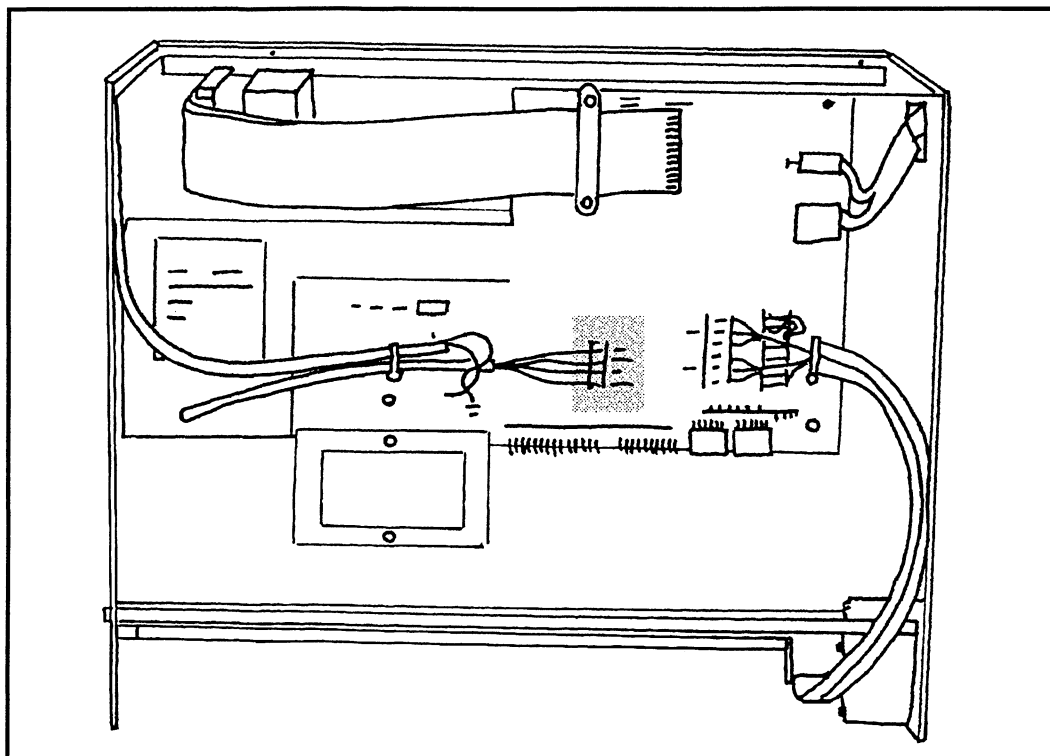


Figure 7-26 Chassis intercabling circuit board

Change the carriage drive motor part 46182819-001. Pass the toothed belt around the motor pinion and lightly tighten the 4 socket screws to attach the motor to the chassis. Insert the belt into the groove on the underside of the carriage. See Figure 7-25. Pass the four motor connecting wires through the aperture provided in the chassis, (refer to Figure 7-26), and solder them to the intercabling circuit board in accordance with the color coding. Adjust the drive belt tension to the specified value (5 N), as shown in Figure 7-27, and tighten the socket screws securely.

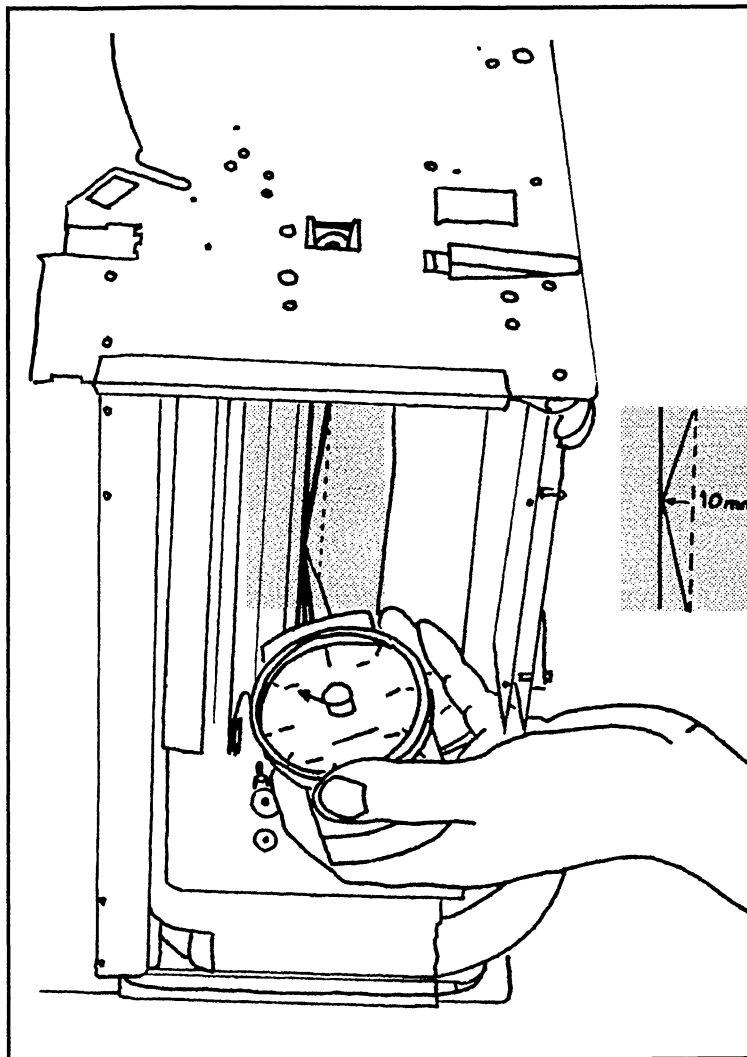


Figure 7-27 Adjusting the drive belt tension

Return the printer chassis to the case, reconnect the cables at the lower rear, and replace the chart cassette assembly.

**MULTICHANNEL
RECORDER****7.4.7 Chart drive motor**

Follow the procedures described in paragraphs 7.4.1 and 7.4.4 for removing the chart cassette assembly and printer chassis from the case. It is not necessary to remove the print cartridge. Place the chassis on its left side, when viewed from the front. Remove the 2 screws securing the chart drive motor, and cut the cable clamp. See Figure 7-28.

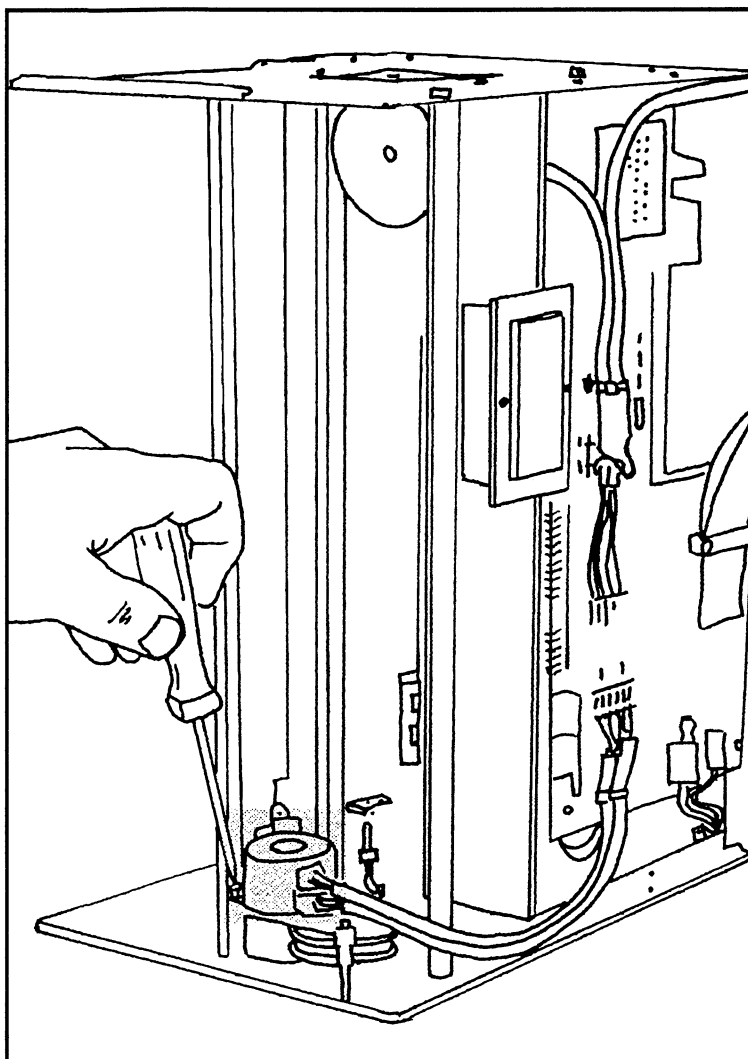


Figure 7-28 Removing the chart drive motor fixing screws

**MULTICHANNEL
RECORDER**

Unsolder the 6 motor wires from the intercabling circuit board at the rear of the chassis, after making a note of which bundle of 3 wires goes to which group of terminals. See Figure 7-29.

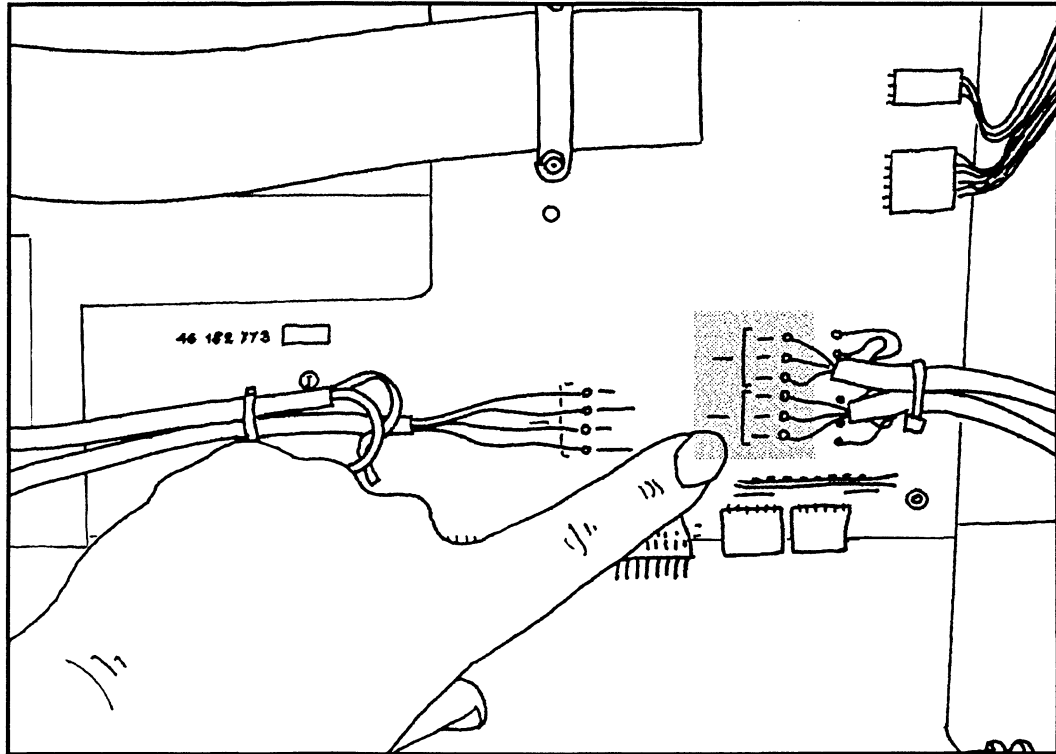


Figure 7-29 Chart drive motor connections to circuit board

Install a new chart drive motor, part 46182816-001, with the cable connections towards the rear of the chassis, and tighten the 2 fixing screws. Solder the wires to the circuit board observing the color coding, and ensuring that each bundle of 3 wires is connected to the correct group of terminals. Refer to Figure 7-29. Replace the cable clamp. Return the printer chassis to the case, reconnect the cables at the lower rear, and replace the chart cassette assembly.

7.4.8 Carriage drive belt

Follow the procedures described in paragraphs 7.4.1 and 7.4.4 for removing the chart cassette assembly and printer chassis from the case. It is not necessary to remove the print cartridge. Invert the chassis and loosen but do not remove the 4 socket screws securing the carriage drive motor, so as to reduce belt tension. Remove the belt from the groove on the underside of the carriage. Refer to Figure 7-25 in paragraph 7.4.6. Detach the belt from the drive motor pinion, as shown in Figure 7-30 and then from the pulley at the left hand side of the chassis.

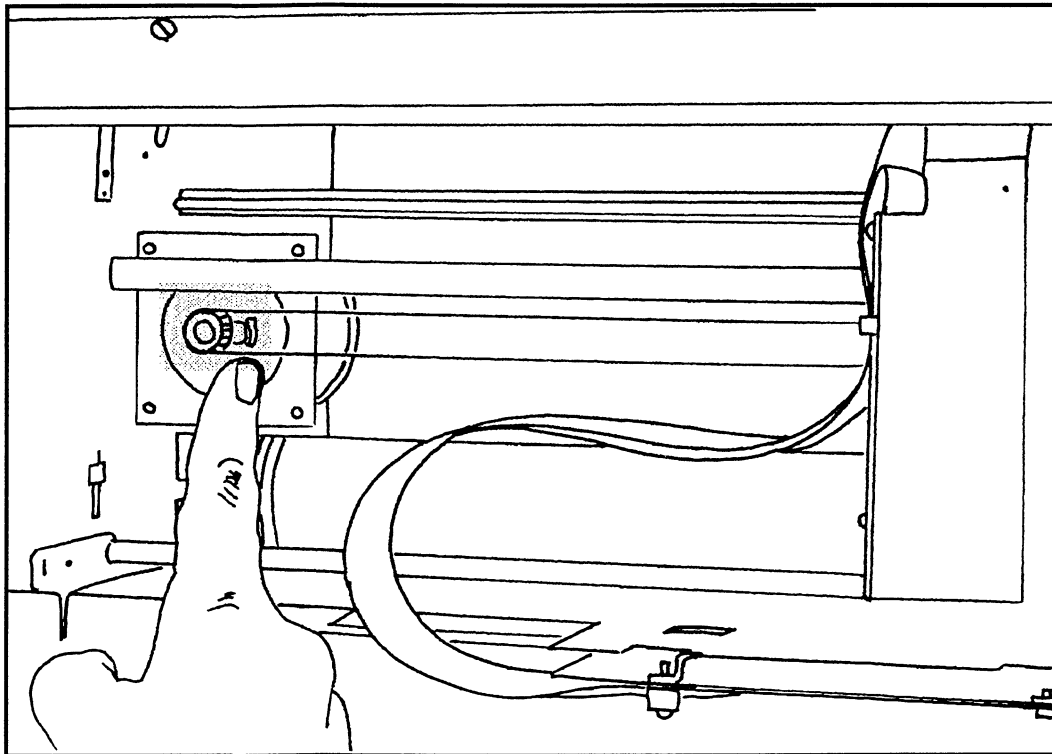


Figure 7-30 Detaching the belt from the drive motor pinion

Change the belt, part 46182815-001. Pass it first around the chassis pulley. Insert the belt into the groove on the underside of the carriage, and then pass it around the drive motor pinion. Position the carriage at the left side hand of the chassis. Adjust the drive belt tension to the specified value, as described in paragraph 7.4.6. Refer to Figure 7-27. Then tighten the 4 drive motor screws securely. Return the printer chassis to the case, reconnect the cables at the lower rear, and replace the chart cassette assembly.

**MULTICHANNEL
RECORDER****7.4.9 Chart re-roll tension belt**

Follow the procedure described in paragraph 7.4.1 for removing the chart cassette assembly. Remove the chart paper and re-roll spindle. Place the cassette on its right side, when viewed from the front. Remove the four screws securing the left side plate, as shown in Figure 7-31.

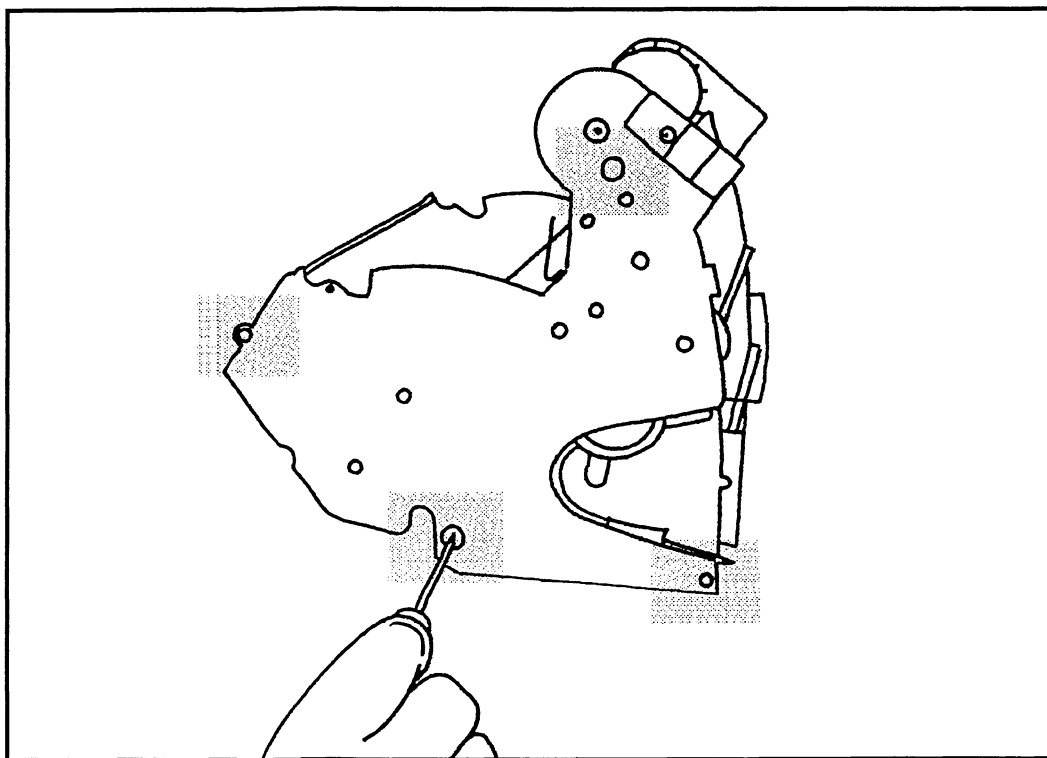


Figure 7-31 Removing the left side plate from the cassette

**MULTICHANNEL
RECORDER**

Remove the 2 screws securing the gear train protection plate, as shown in Figure 7-32.

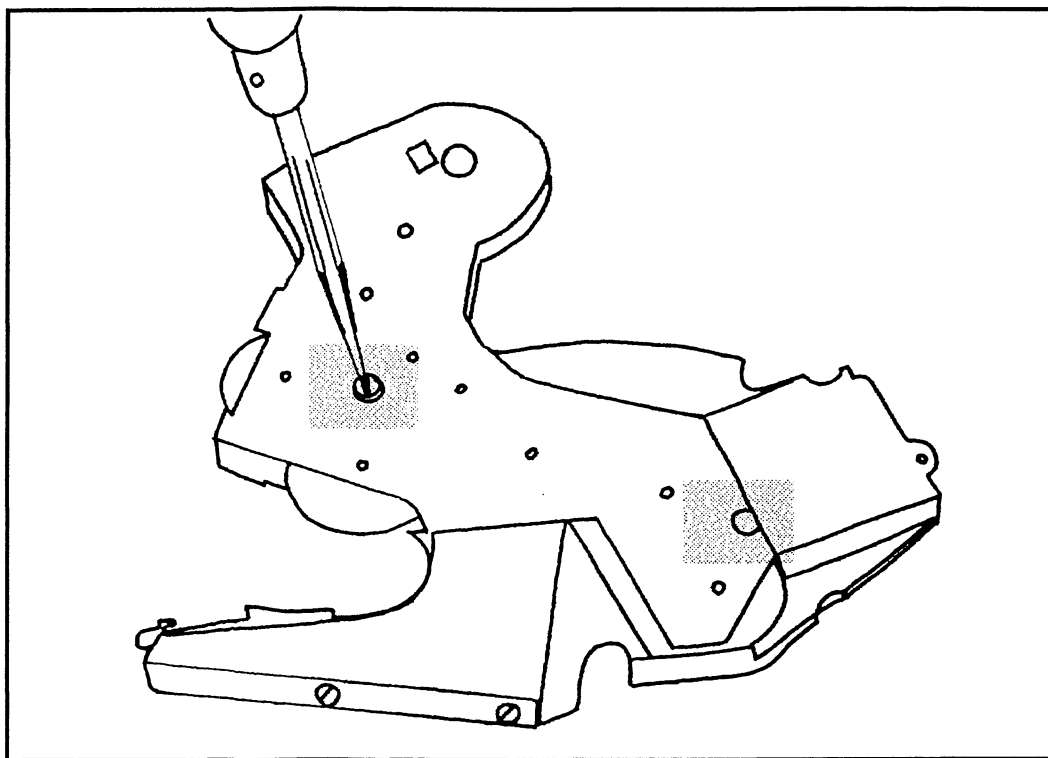


Figure 7-32 Removing the two screws securing the train protection plate

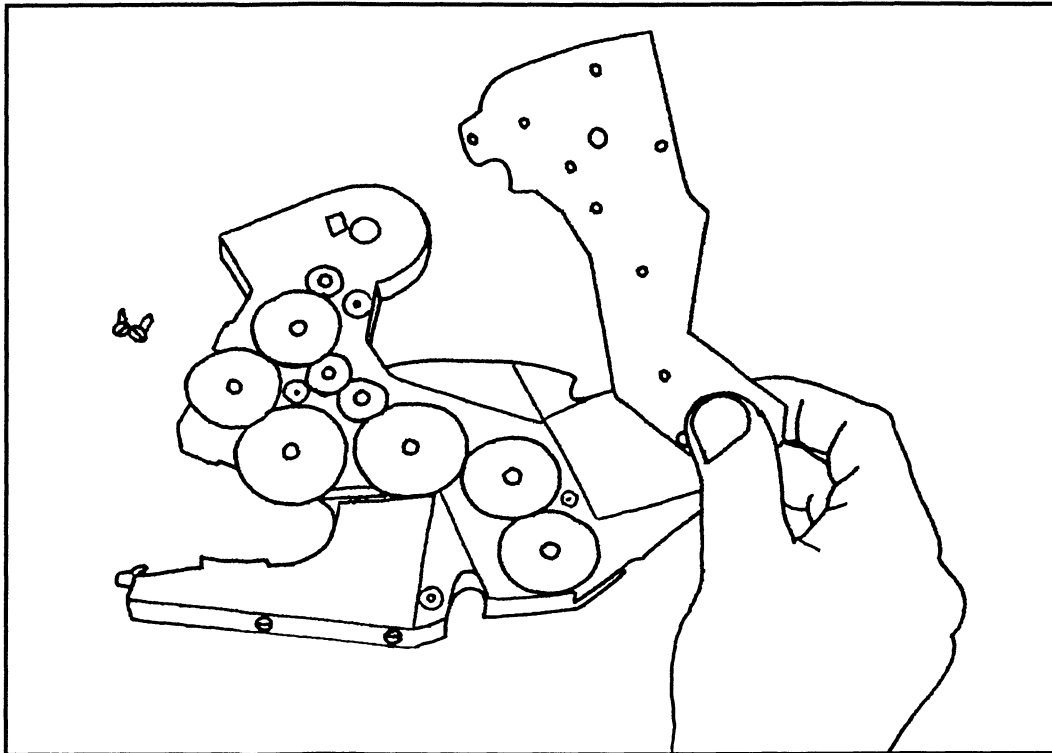


Figure 7-33 Removing the gear train protection plate

Remove the 2 gear wheels carrying the tension belt in grooves on their undersides. Install the new tension belt, part 46182835-001, on the 2 gearwheels, and locate them on their spindles. See Figure 7-33 and 7-34.

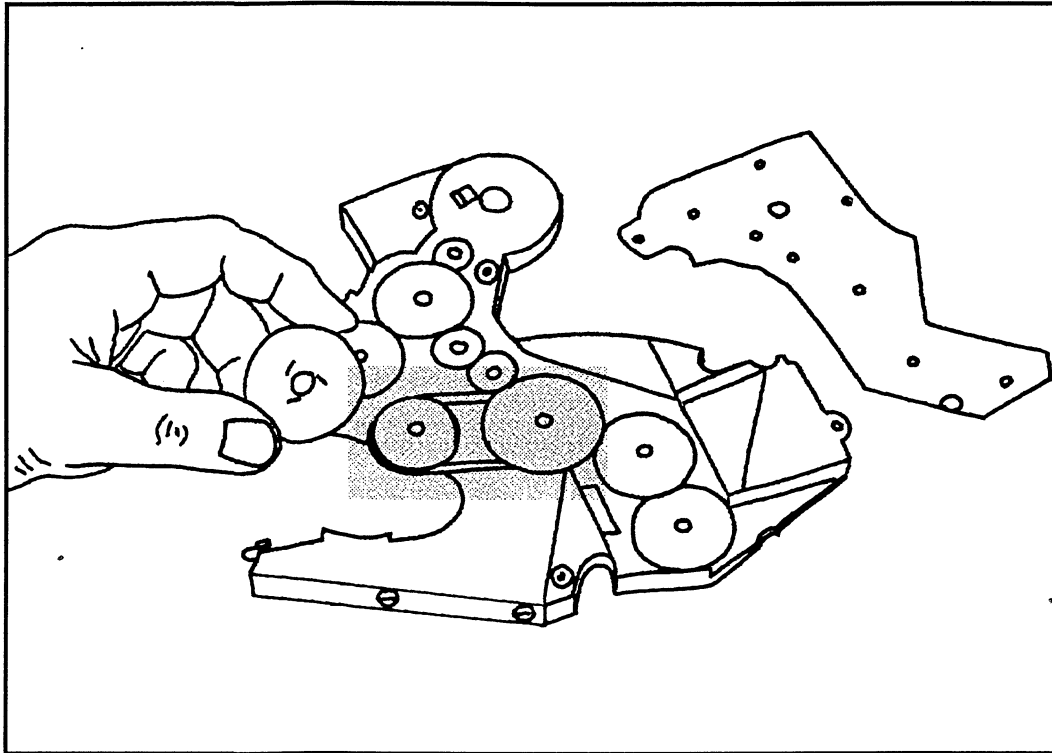


Figure 7-34 Installing the new tension belt

Attach the gear train protection plate with the 2 fixing screws, (refer to Figure 7-32), remount the side plate on the cassette, and replace the 4 screws securely. Replace the re-roll spindle and chart. Then check for correct operation of the belt and gear train by rotating the chart advance thumbwheel downwards. Finally, replace the chart cassette in the printer chassis.

**MULTICHANNEL
RECORDER****7.4.10 Power supply module**

Follow the procedures described in paragraphs 7.4.1 and 7.4.4 for removing the chart cassette assembly and printer chassis from the case.

Remove the four screws securing the electronic chassis. See figure 7-35.

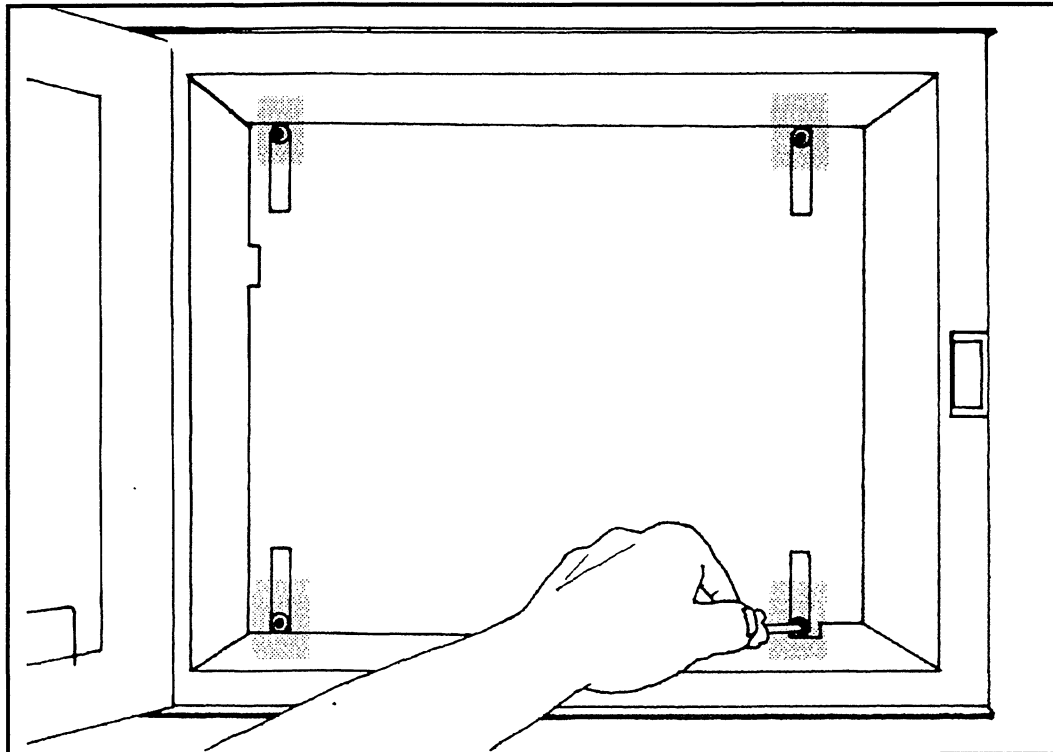


Figure 7-35 Removing electronic chassis fixing screws

**MULTICHANNEL
RECORDER**

Ensure that the power supply to the recorder has been disconnected. Remove the 4 screws securing the terminal cover plate at the rear of the recorder. See Figure 7-36. Undo the terminal block fixing screws and disconnect all the terminal blocks.

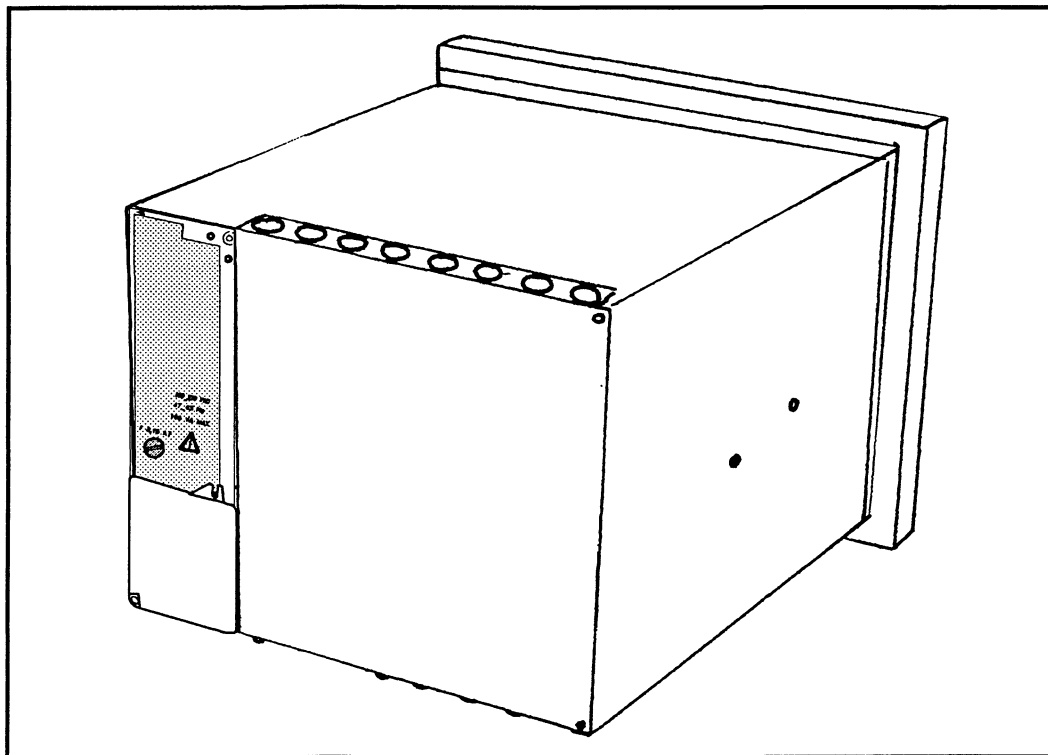


Figure 7-36 Rear of recorder showing terminal cover plate

**MULTICHANNEL
RECORDER**

Unscrew the AC supply terminal cover.

Remove the three screws securing the electronic chassis at the rear of the recorder. See figure 7-37.

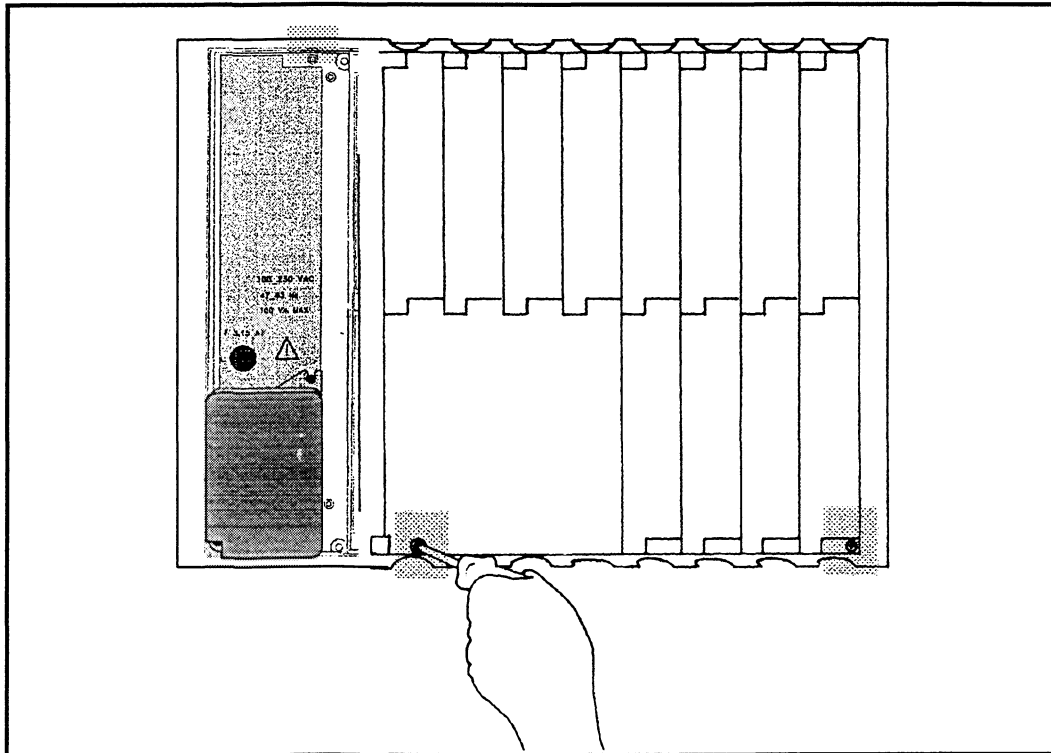


Figure 7-37 Removing the electronic chassis fixing screws at the rear

**MULTICHANNEL
RECORDER**

Pull the electronic chassis forward until it can be withdrawn completely from the case as shown in Figure 7-38.

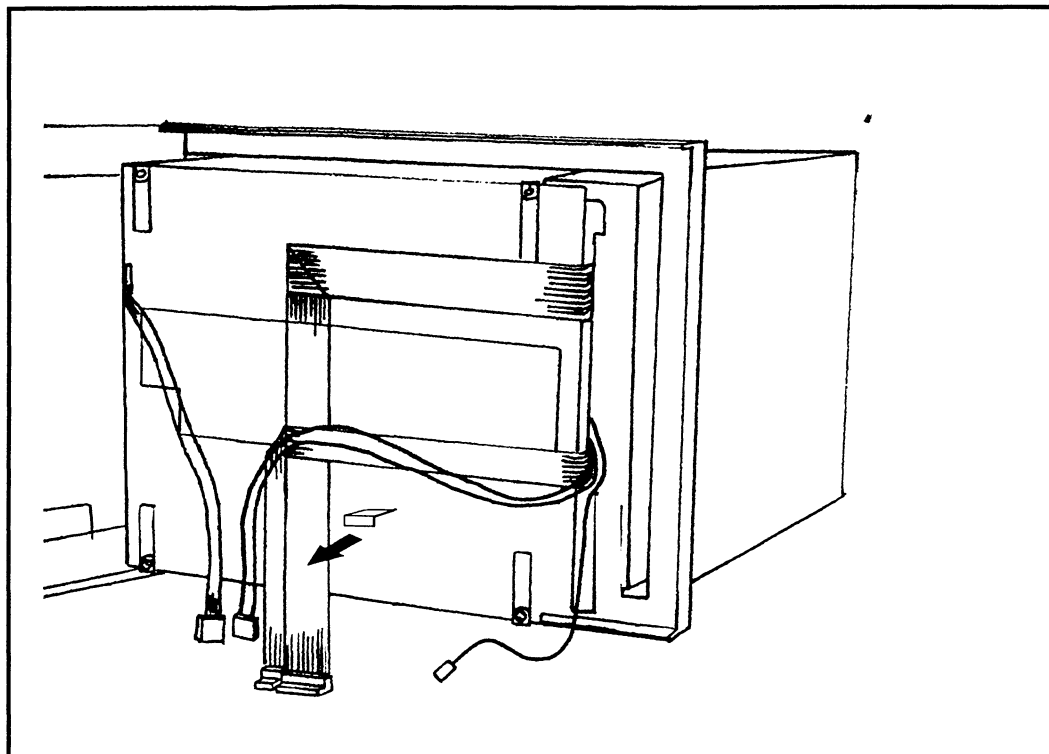


Figure 7-38 Pushing the electronic chassis forward

**MULTICHANNEL
RECORDER**

Disconnect the a.c. mains wiring from the terminal block at the lower left hand side. Remove the 3 screws at the right hand side of the power supply module which hold it in position See Figure 7-39.

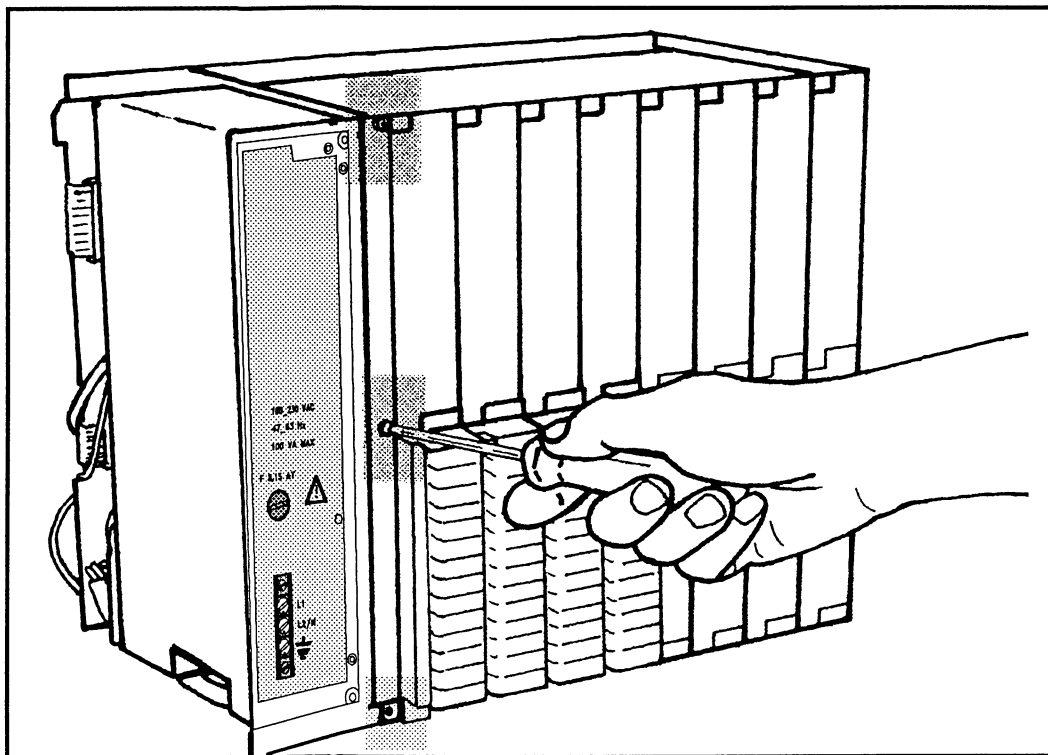


Figure 7-39 Removing the power supply fixing screws

Disconnect the wiring at the top of the power supply module, as shown in Figure 7-40

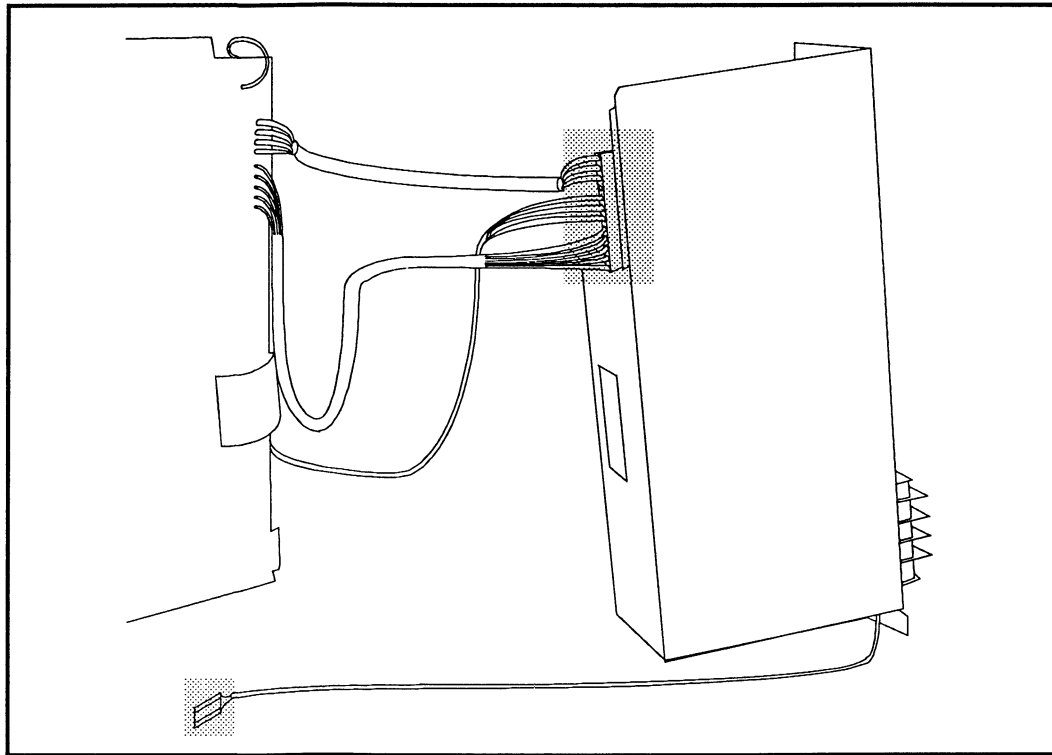


Figure 7-40 Disconnecting the power supply earth wiring

Change the power supply module, part 46182758-503. Reconnect the wiring at the top of the module, ensuring that the connectors and the wiring are positioned correctly, and replace the fixing screws.

Position the earth wiring at the left hand side of the mother board before replacing the electronic chassis in the case.

Caution : Reconnect the a.c mains wiring, and replace the rear terminal cover. Finally, restore the power supply.

**MULTICHANNEL
RECORDER****7.4.11 Man machine interface**

Follow the procedures described in paragraphs 7.4.1 and 7.4.4 for removing the chart cassette assembly and printer chassis from the case. It is not necessary to remove the print cartridge. Disconnect the man machine interface cables from the upper right of the printed circuit board at the rear of the printer chassis as illustrated in Figure 7-41 below.

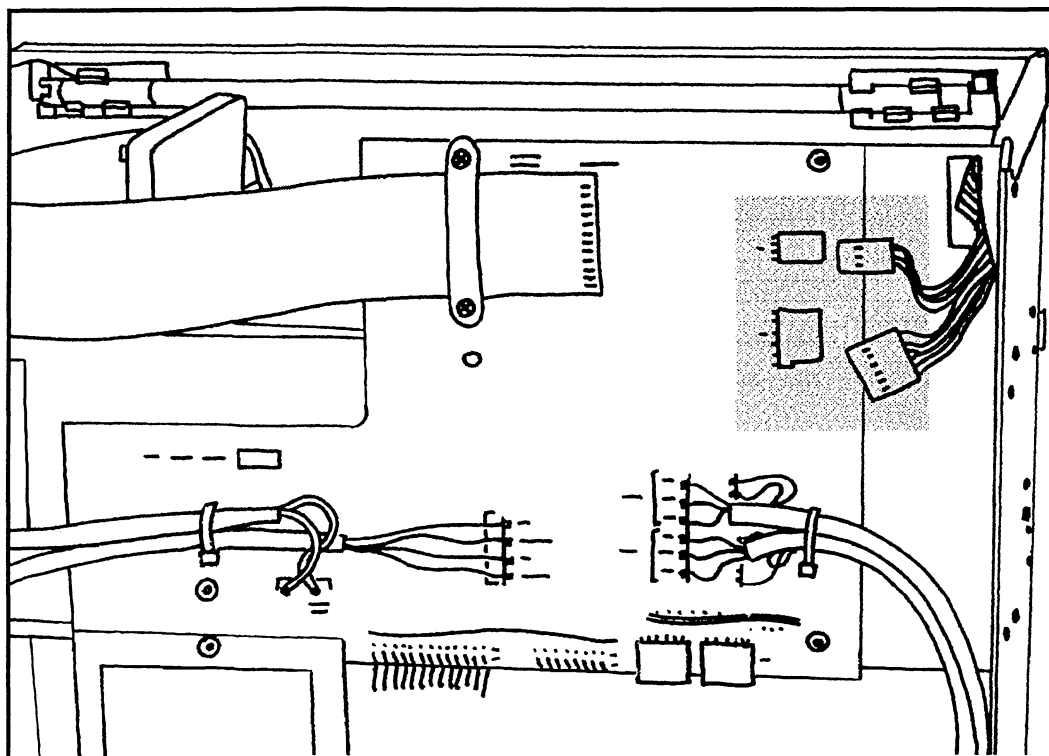


Figure 7-41 Disconnecting the M.M.I. from the chassis

**MULTICHANNEL
RECORDER**

Remove the cable clip securing the cable harness to the top left hand side of the chassis, when viewed from the front, and remove the fluorescent tube assembly from its support clips at the rear of the M.M.I. module as shown in Figure 7-42.

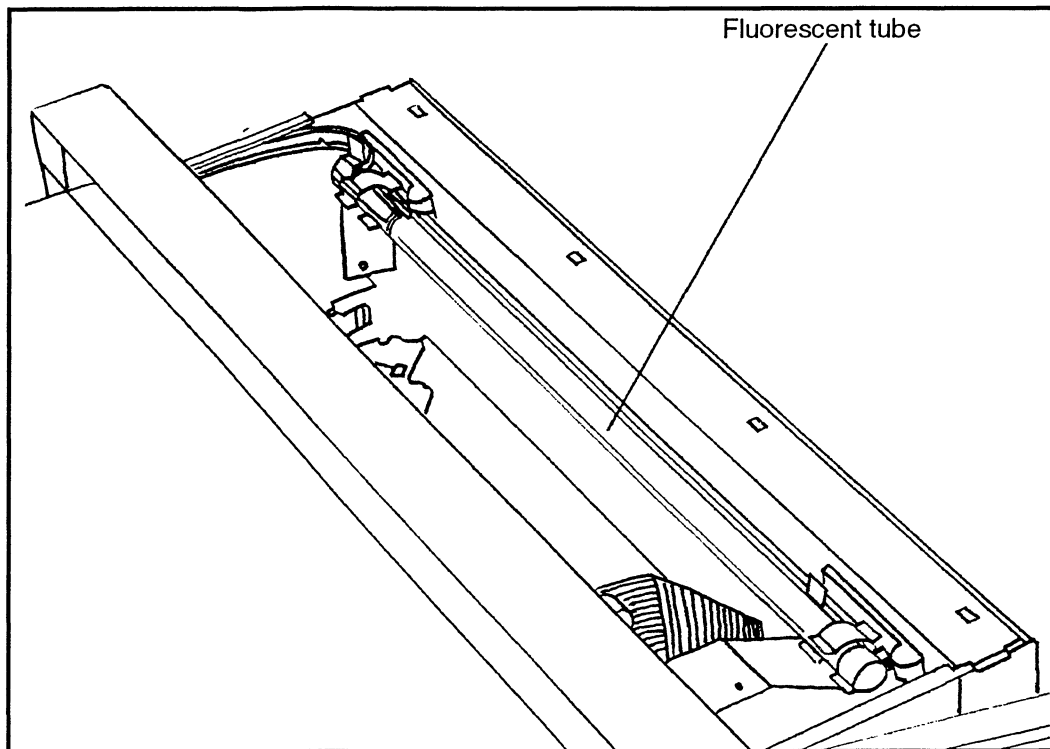


Figure 7-42 Rear of M.M.I. showing fluorescent tube assembly

**MULTICHANNEL
RECORDER**

Undo the 2 screws on each side of the chassis which secure the M.M.I. module, as shown in Figure 7-43 and carefully remove the complete module, drawing the cable harness through the aperture at the rear of the chassis.

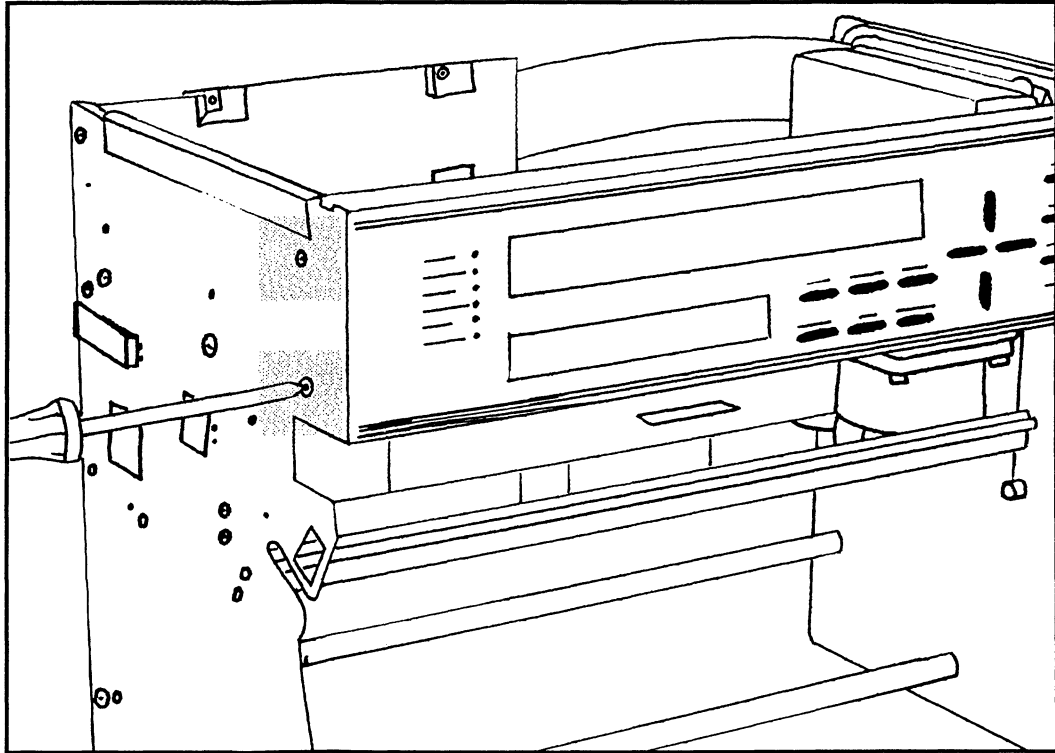


Figure 7-43 Removing the M.M.I. module fixing screws

Change the M.M.I. module, part 46182728-001. Attach the new module to the chassis with the fixing screws - 2 at each side. Pass the cable harness through the aperture at the rear of the chassis, remake the connections to the printed circuit board, and clip the harness to the inner top left hand side of the chassis, when viewed from the front. Carefully replace the fluorescent tube assembly in the support clips at the rear of the M.M.I. Return the printer chassis to the case, reconnect the cables at the lower rear and replace the chart cassette assembly.

**MULTICHANNEL
RECORDER****7.4.12 Printer chassis assembly**

With the power off, open the recorder door and use the printer chassis release catches to withdraw the chassis as far as the service stop. See Figure 7-3 page 7-19

Press both chart cassette catches and gently pivot the assembly forward to its stop as shown in Figures 7-6 and 7-7, pages 7-22 and 7-23.

Now grasp the sides and bottom of the cassette assembly firmly in both hands and pivot it up and then outward at the bottom until it can be withdrawn completely from the chassis.

Disconnect the 4 cables at the rear of the printer chassis. See Figure 7-19 page 7-35.

Disconnect the man machine interface cables from the upper right of the printed circuit board at the rear of the printer chassis as illustrated in Figure 7-41 page 7-57.

Undo the 2 screws on each side of the chassis which secure the M.M.I module, as shown in Figure 7-43 page 7-59 and carefully remove the complete module, drawing the cable harness through the aperture at the rear of the chassis.

**MULTICHANNEL
RECORDER**

Unsolder the two fluorescent tube cables from the printed circuit board. See figure 7-44 below.

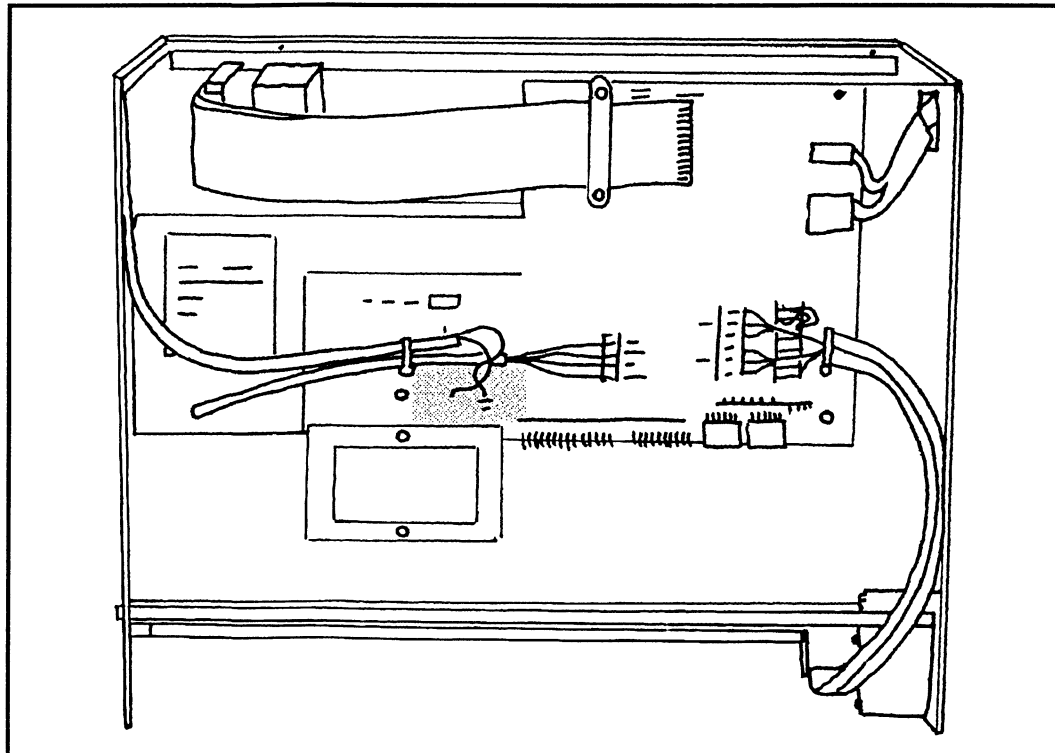


Figure 7-44 Removing the fluorescent tube cables

Attach the M.M.I. module to the new chassis assembly part 46182856-501 with the fixing screws - 2 at each side. Pass the cable harness through the aperture at the rear of the chassis, remake the M.M.I. and fluorescent tube connections to the printed circuit board, and clip the harness to the inner top left hand side of the chassis, when viewed from the front. Carefully replace the fluorescent tube assembly in the support clips at the rear of the M.M.I.

Return the printer chassis to the case, reconnect the cables at the lower rear and replace the chart cassette assembly.

Perform a "print test" operation to check the new printer : see paragraph 7.2.2 page 7-4, for the procedure.

If the printout quality is not correct, verify the gap between print head and paper (0.4 mm, or 0.016 in) as describe page 7-27

**MULTICHANNEL
RECORDER****7.4.13 Mother board assembly (CPU)**

Follow the procedure described in paragraph 7.4.10 page 7-51 for removing the power supply module.

Undo the four screws securing the mother board assembly as shown in Figure 7-45.

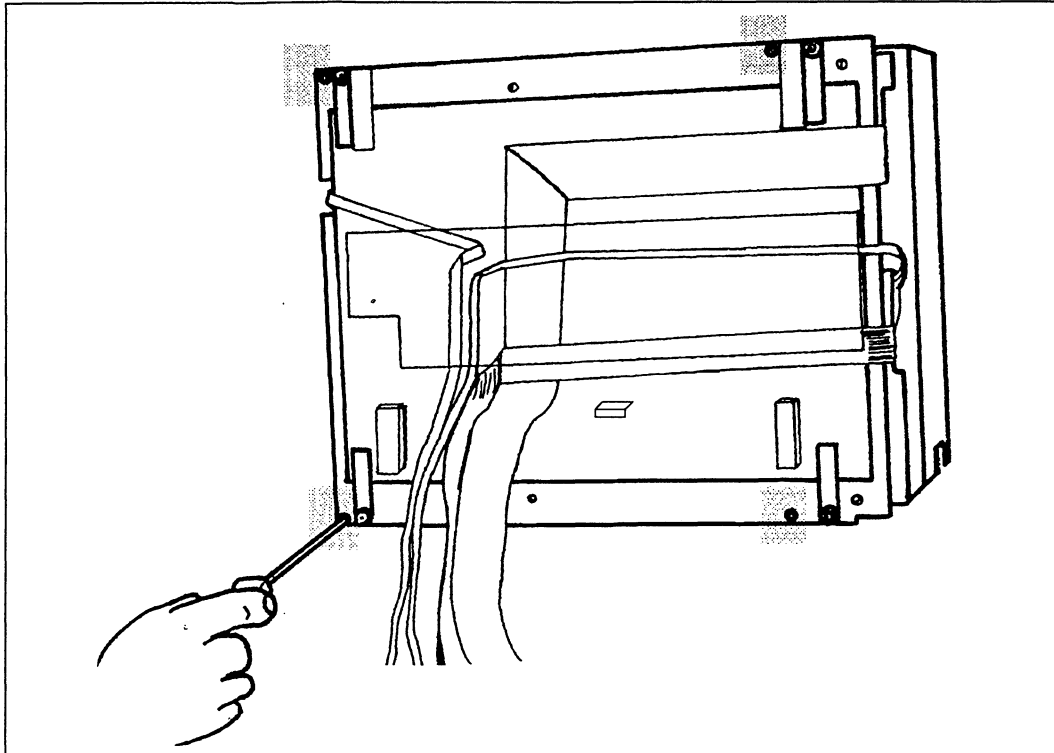


Figure 7-45 Removing the mother board fixing screws

Disconnect the two mother board cables from the power supply module, as shown in Figure 7-40.

Change the mother board assembly, part number 46182731-511. Reconnect the cables and replace the fixing screws.

Position the earth wiring at the left hand side of the mother board before replacing the electronic chassis in the case.

Caution : The mother board assembly can be damaged by electrostatic discharge. Use a wrist strap connected to earth ground before removing the suspect board, or withdrawing the replacement from its container.

**MULTICHANNEL
RECORDER****7.5 FIELD ADDITION OF INPUT, OUTPUT AND OPTION BOARDS**

The advanced software organization of the recorder greatly facilitates field enhancement of an installed recorder. Any available input, output or option boards may be added as, and when needed (see page 7-28). You will need to order the board or boards required, together with a terminal block for each one. Refer to Section 8 "PARTS LIST" for the necessary information, or consult your local sales or service branch office. The procedure for fitting the boards is very similar to that described in paragraph 7.4.2, page 7-28. Instead of removing a faulty board, it will be necessary to remove the blank cover from the relevant location. Refer to Figure 7-14 on page 7-30.

Caution : Many of the option boards can be damaged by electrostatic discharge. Use a wrist-strap connected to the electronic chassis before removing the board from its container. Carefully fit the board to the chassis. Connect field wiring to the terminal block in accordance with the relevant external wiring diagram in Section 2, "INSTALLATION". Fit the terminal block to the board, and secure it with the 2 screws previously used for the blank cover. It may also be necessary to modify the configuration of the recorder to suit its enhanced capability. Refer to Section 3, "CONFIGURATION".

**MULTICHANNEL
RECORDER**

TABLE OF CONTENTS

Section	Page
8.1 SPARE PARTS LIST	8-1

MULTICHANNEL
RECORDER

8. PARTS LIST



8. PARTS LIST

MULTICHANNEL RECORDER

8.1 SPARE PARTS LIST

DESCRIPTION	REFERENCE
MAIN SUB-ASSIES AND BOARDS	
Man machine interface	46182728-501
Power supply module	46182758-503
Printer chassis assembly	46182709-511
Chart cassette assembly	46182823-001
Mother board assembly (CPU Board)	46182731-511
Converter board assembly	46182737-501
Interconnection board	46182773-501
* Input board: T/C, mV, mA, V standard	46182741-501
* Input board: RTD, ohms standard	46182739-501
Input board: T/C, mV, mA, V fast scan.	46182741-502
Input board: RTD, Ohms fast scan.	46182739-502
* Alarm board (6 built-in-relays)	46182745-501
* Digital input board	46182743-501
Maths board	46182751-501
* DMCS output	46182851-501
* ASCII communication board with included terminal blocks and fixing screw	46182749-502
Upgrading software kit for maths function	46182906-501
Upgrading software kit: before date code 90-42	46182862-5AX
after date code 90-42	46182862-5BX
Application Software for Universal ASCII Comm.	46182889-501
PRINT HEAD, MOTORS AND BELTS	
Print head (including flat cable)	46182821-001
Color change motor	46182817-001
Ribbon drive motor	46182818-001
Carriage drive motor	46182819-001
Chart drive motor	46182816-001
Carriage drive belt	46182815-001
Chart re-roll tension belt	46182835-001
Pulley assembly	46186045-501
Plastic retainer clips	46186640-001
Print carriage PCB with ribbon cable	46186645-501
Print carriage assembly	46182913-501
Servo motor pulley	46186710-001

8. PARTS LIST**MULTICHANNEL
RECORDER**

DESCRIPTION	REFERENCE
MISCELLANEOUS	
Fluorescent tube for chart illumination	46182628-501
Illumination drive board	46182853-501
Terminal blocks for PV inputs, logic inputs, DMCS outputs	46182706-501
Terminal blocks for alarm relay board	46182706-503
Paper detection switch	46182854-001
Battery	46182069-501
Slot cover	46182784-001
Labels: Input references	46182814-001
Labels: Alarm/Logic references	46182814-003
Opto coupler kit	46186090-501
Upgrading old models MMI + software (before 90-42)	46182892-501
Chart drive gear box	46182914-501
Kit for signal simulator	46184174-003
Kit tools - TORX	46182863-510
Kit re-roll chart	46182880-501
Door keys	46180091-003
Re-roll tube (only)	46171079-004
Panel mounting kit	46182649-501
Panel mounting kit to replace strip chart recorder Model 153	46182644-501
Rack mounting (19") kit	46182883-001
Chart platten	46186160-501
Chart release tabs	46182769-501
Print head gears kit	46182899-501
Chart cassette side plate assembly	46182900-501
Main switch housing + IEC plug	46182919-501
Cable clamp (8 cables max.)	46210075-501
Kit of grease	46210096-501
DOORS	
Grey door with latch and glass window	46182923-521
Grey door with key lock and glass window	46182923-522
Grey door with latch and plastic window	46182923-503
Grey door with key lock and plastic window	46182923-523
Blue door with latch and glass window	46182923-511
Blue door with key lock and glass window	46182923-512
Black door with latch and glass window	46182923-501
Black door with key lock and glass window	46182923-502
Process identification nameplate	46182826-001
Portable case assembly	46182803-502
Case assembly	46182700-501
Kit of keys	46180091-001

8. PARTS LIST

MULTICHANNEL RECORDER

DESCRIPTION	REFERENCE
CONSUMABLES AND ACCESSORIES	
Chart roll (a)	46182708-001
Fanfold chart (a)	46182707-001
Color ribbon cartridge (b)	46182712-001
6 resistors (250) kit for mA input	46181080-504
Fuse 1 A (c)	46171328-004
Fuse 2 A (c)	46171328-010
Fuse 3.15 A (Europe standard) (c)	46182886-002
Fuse 3.15 A (U.S. standard) (c)	46182886-001
Fuse cap (Europe standard)	46182885-002
Fuse cap (U.S. standard)	46182885-001
IEC plug	46182884-001
Bridge resistor kits for range extension:	
-50 to 50 mV	46182820-501
-200 to 200 mV	46182820-502
-2 to 2 V	46182820-503
-5 to 5 V	46182820-504
-20 to 20 V	46182820-505
-50 to 50 V	46182820-506
Note: (a) order by multiple of 5 (b) order by multiple of 2 (c) order by multiple of 10	
ADDITIONAL MANUALS (Options)	
Math	EN1I-6105
DMCS communication	EN1I-6106
ASCII communication	EN1I-6114
ASCII Application Software	EN1I-6117
Modbus RTU	EN1I-6127

MULTICHANNEL
RECORDER

8. PARTS LIST

TABLE OF CONTENTS

Section		Page
9.1	CONSTRUCTION	9-1
9.2	ANALOG INPUTS : DISPLAY	9-2
9.3	CHART CONFIGURATION.....	9-4
9.4	ANALOG ALARMS	9-6
9.5	DIGITAL INPUTS	9-8
9.6	MESSAGES CONFIGURATION.....	9-9
9.7	PRINTER CONFIGURATION	9-10
9.8	MISCELLANEOUS	9-10
9.9	CONFIGURATION LOCK.....	9-10

MULTICHANNEL
RECORDER

9. APPENDIX A

Configuration Worksheet

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MULTICHANNEL RECORDER

Model Number		(Refer to model selection guide)																
D3	-								-		-		-		-		-	
		Table 1							2		3		4		5		6	

Voltage Selection	
100/230Vac <input type="checkbox"/>	Special <input type="checkbox"/> Frequency 50Hz <input type="checkbox"/> 60Hz <input type="checkbox"/>

Number of input Channels		<input type="text"/> <input type="text"/>	
Built in Relays : Number (0, 6 or 12)		<input type="text"/> <input type="text"/>	
Remote Alarm Box (not available)		<input type="text"/>	
Number of Digital Inputs (0, 6 or 12)		<input type="text"/> <input type="text"/>	
Door color	Blue <input type="text"/> Black <input type="text"/> Dark grey <input type="text"/>	Portable Case Blue door	<input type="text"/>
Door with Latch	<input type="text"/> with key <input type="text"/>	Prompt language	EN <input type="text"/> FR <input type="text"/> GE <input type="text"/> IT <input type="text"/> SP <input type="text"/>
Kit Number 46182820-	<input type="text"/> <input type="text"/> <input type="text"/>	Allocated to channel	<input type="text"/> <input type="text"/> <input type="text"/>
Range Extension	<input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/>
	<input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/>
	<input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/>
	<input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/>
	<input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/>
	<input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/>
Kit of 6 Resistors 46181080-504		Qty	<input type="text"/>
To convert mA to Volt			

MULTICHANNEL RECORDER

Configuration Worksheet

9.2 ANALOG INPUTS : DISPLAY

Chan #	Input Actuation	Range		Emis. Pyro- Rad	Dig. Filter	Lo. disp value	Hi. disp value	Math	Channel A	Channel B	Burn out (***)
		Sensor	Span								
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											

9. APPENDIX A

MULTICHANNEL RECORDER

Configuration Worksheet

	Δ	Δ	Δ	Δ	Δ			Δ	Δ	Δ	Δ
S E L E C T I O N S	- T/C	B-E-J-K-R	Span in oC	From	From			- None	Ref. #	Ref. #	None
	- T/C (*)	-S-T-E	Span in oF	50%	0%			- SQRT			Up
	No comp	NIMO		to	to			- Diff.			down
	- Linear	W5W26		150%	99%			CHA-			
	- TR.m.V	WW26						CHB			
	- TR.V	NISI	Refer to								
	- TR.mA	PR2040	product								
	- No	KPV	specification								
	- Entry	Rad Rh	EN01-2004								
	- Special	mV-V-mA									
PT/	Pt100.IEC	(*) To be used with remote temperature compensation box fixed at 50 Deg C (**) With communication option only (***) Hardware Selection on Input Cards									
- Ohms	J.Pt100										
TR/	ED.120Ω										
- Ohms	NI.50Ω										
Comm	Cu 10Ω										
(**) input	Ni 508Ω										
	OHMS										

MULTICHANNEL
RECORDER

Configuration Worksheet

9.3 CHART CONFIGURATION

Chan #	Tag name								Range 1			Range 2			Zoning		Format	Print Enable
									Lo value	Hi value	Color	Lo value	Hi value	Color	Left Edge %	Right Edge %		
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		
26																		
27																		
28																		
29																		
30																		
31																		
32																		

9. APPENDIX A

MULTICHANNEL RECORDER

Configuration Worksheet

	Δ	Δ			Δ			Δ			Δ	Δ
S E L E C T I O N S	Puts 1 letter or digit per case	Puts 1 digit or letter per case			Red Black Blue Purple Green Brown			Red Black Blue Purple Green Brown	Any value bet- ween 0 to 80%	Any value bet- ween 20 to 100%	Solid Dotted	- With Range 1 - With Range 2 - On alarm with Range 1 - On alarm with Range 2 - No print

MULTICHANNEL RECORDER

Configuration Worksheet

9.4 ANALOG ALARMS

Alarm #	SP value	Hysteresis	Channel #	Relay #	Type	Channel Diff.	Message #	Color	Print Action	Red on Alarm	Relay ack.
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
SELECTIONS	Adj. 0 up to 9999 Absolute Value	Ch. A	Note : Built in Relays 1 to 12 or use Remote Alarm Box	- None - Event High Δ - Event Low ∇ -Change Rate ↑ -Change Rate ↓ -Change Rate ⇅ - Diffe- rential PVCHA PVCHB	Ch. B	Message number	Black Blue Purple Green Brown Red	- None - PRN on AL - Change Range 2 -Trig EVPR - Trig EVPR/S - Change speed 2	Yes No	Yes No

9. APPENDIX A

MULTICHANNEL RECORDER

Configuration Worksheet

Alarm #	SP value	Hysteresis	Channel #	Relay #	Type	Channel Diff.	Message #	Color	Print Action	Red on Alarm	Relay ack.
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
43											
44											
45											
46											
47											
48											
49											
50											
51											
52											
53											
54											
55											
56											
57											
58											
59											
60											

	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
S E L E C T I O N S	Adj. 0 up to 9999 Absolute Value	Ch. A	Note : Built in Relays 1 to 12 or use Remote Alarm Box	- None - Event High Δ - Event Low ∇ -Change Rate ↑ -Change Rate ↓ -Change Rate ↑↓ - Diffe- rential PVCHA PVCHB	Ch. B	Message number	Black Blue Purple Green Brown Red	- None - PRN on AL - Change Range 2 -Trig EVPR - Trig EVPR/S - Change speed 2	Yes No	Yes No

MULTICHANNEL RECORDER

Configuration Worksheet

9.5 DIGITAL INPUTS

Input #	Trace				Relay #	Type	Diff. input B	Message #	Message Color	Print Action	Red on alarm	Relay ack.
	Color	Left edge %	Right edge %	Enable								
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												

Δ		Δ		Δ		Δ		Δ		Δ		Δ	
S E L E C T I O N S	Red Black Blue Purple Green Brown			- No Print - Trace	Note : Built in Relays 1 to 12 or use Remote Alarm Box	- None - Event High Δ - Event low ∇ - Change Rate ↑ - Change Rate ↓ - Change Rate ↑↓ - Diffe- rential A-B	Input #	Message Number	Red Black Blue Purple Green Brown	- None - PRN on AL - Change Range 2 - Trig EVPR - Trig EVPE/S - Inhibit PRN - Print Numeric PV - Change speed 2	Yes/ No	Yes/ No	

MULTICHANNEL RECORDER

Configuration Worksheet

9.6 MESSAGES CONFIGURATION

MESSAGE #	MESSAGE CHARACTERS																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
0	NONE																													
1																														
2																														
3																														
4																														
5																														
6																														
7																														
8																														
9																														
10																														
11																														
12																														
13																														
14																														
15																														
16																														
17																														
18																														
19																														
20																														
21	MESSAGE STANDARD - (Date/Hour and Alarm status)																													

9. APPENDIX A

MULTICHANNEL RECORDER

Configuration Worksheet

9.7 PRINTER CONFIGURATION

Record mode	Print mode	Message trace	Unit speed	Speed		Tabular mode	
Print <input type="checkbox"/>	Alternate <input type="checkbox"/>	Blank <input type="checkbox"/>	mm/h <input type="checkbox"/>	Select from 1 to 1500 mm/h or 0.1 to 60.0 inch/h		In minute select from 1 up to 1440	
PRCSR- PR <input type="checkbox"/>	Trend <input type="checkbox"/>	Trace <input type="checkbox"/>	Inch/h <input type="checkbox"/>	1	2	1	2
REAL PR <input type="checkbox"/>							
Inhibit <input type="checkbox"/>	Tabular <input type="checkbox"/>	Mixed <input type="checkbox"/>					

9.8 MISCELLANEOUS

Identification number
<input type="text"/>
1 up to 255

Prompt/ language
English <input type="checkbox"/>
French <input type="checkbox"/>
German <input type="checkbox"/>
Spanish <input type="checkbox"/>
Italian <input type="checkbox"/>

9.9 CONFIGURATION LOCK

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
None	Analog inputs	Chart	Analog alarm	Digital inputs	Messages	Printer	Miscellaneous	Com	Math.

NOTE : PUT A CROSS IN FRONT OF SELECTED BOX.

MAIN MENU

FAMILY

	ANALOG INPUTS	CHART	ANALOG ALARMS	DIGITAL INPUTS	MESSAGE	PRINTER	MISCELLAN.	COMMUNICAT.	MATHEMATIC
READ/WRITE									
COPY									
LOCK/UNLOCK									
PRINT									

⊗ (OPTION)

EDUCATION

PARAMETER



	A	B	C	D	E	F	G	H	I	J
	SENSOR	ACTUATION	EMISSION	FILTER	DECIMAL POINT	LOW VALUE	HIGH VALUE	MATH OPTION	CHANNEL A	CHANNEL B
32	CHANNEL 32	A32	B32	C32	D32	E32	F32	G32	H32	J32
31	CHANNEL 31	A30								J31
30	CHANNEL 30	A31								J30
29	CHANNEL 29	A29								J29
4	CHANNEL 4	A4								J4
3	CHANNEL 3	A3								J3
2	CHANNEL 2	A2								J2
1	CHANNEL 1	A1	B1	C1	D1	E1	F1	G1	H1	J1



CHANNEL



PARAMETER

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	TRC NAME	UNIT	DEC PT. R1	0% CHT R1	100% CHT R1	COLOR R1	DEC PT R2	0% CHT R2	100% CHT R2	COLOR R2	LEFT EDGE	RIGHT EDGE	TRACE	ENABLED
32	CHANNEL 32	B32	C32	D32	E32	F32	G32	H32	I32	J32	K32	L32	M32	N32
31	CHANNEL 31													N31
30	CHANNEL 30													N30
29	CHANNEL 29													N29
4	CHANNEL 04													N4
3	CHANNEL 03													N3
2	CHANNEL 02													N2
1	CHANNEL 01	B1	C1	D1	E1	F1	G1	H1	I1	J1	K1	L1	M1	N1

CHANNEL

PARAMETER

	A	B	C	D	E	F	G	H	I	J	K	L	
	DECIM. POINT SP	SP VALUE	HYSTERESIS	CHART CHNL	RELAY No.	TYPE	CHNL DIFF.	MESSAGE	MSG. COLOR	PRM ACTION	RED ON AL	ALARM ACK	
60	ALARM 60	A60	B60	C60	D60	E60	F60	G60	H60	I60	J60	K60	L60
59	ALARM 59	A59										L59	
58	ALARM 58	A58										L58	
57	ALARM 57	A57										L57	
4	ALARM 4	A4										L4	
3	ALARM 3	A3										L3	
2	ALARM 2	A2										L2	
1	ALARM 1	A1	B1	C1	D1	E1	F1	G1	H1	I1	J1	K1	L1

▲

ANALOGUE

▼

▲

ALARMS

▼

PARAMETER

	A	B	C	D	E	F	G	H	I	J	K	L
	COLOR	LEFT EDGE	RIGHT EDGE	ENABLED	RELAY	TYPE	DI No DIFF	MESSAGE	MSG COLOR	PRINT ACTIONS	RED ON AL	ACK
12	A12	B12	C12	D12	E12	F12	G12	H12	I12	J12	K12	L12
11	A11											L11
10	A10											L10
9	A9											L9
4	A4											L4
3	A3											L3
2	A2											L2
1	A1	B1	C1	D1	E1	F1	G1	H1	I1	J1	K1	L1

DIGITAL INPUTS

PARAMETER

MESSAGE 21	A21	-	RESERVED	FOR	STANDARD	MESSAGE	-
MESSAGE 20	A20						
MESSAGE 19	A19						
MESSAGE 18	A18						
MESSAGE 4	A4						
MESSAGE 3	A3						
MESSAGE 2	A2						
MESSAGE 1	A1						

MESSAGES

PARAMETER

A	B	C	D	E	F	G	H	I	J	K	L
REC MODE	PRINT MODE	MESS. TRACE	UNIT SPEED	SPEED 1	SPEED 2	IN USE	INTERVAL 1	INTERVAL 2	CAL 0	CAL 100	PRINT TEST
A1	B1	C1	D1	E1	F1	G1	H1	I1	J1	K1	L1

◀ PARAMETER ▶

A	B	C	D	E	F	G	H	I	J
PAPER NO	LANGUAGE	PRINT CONF	OPTIONS	DATE / TIME	TEACHER	VERSION	REBOOT DPR	FREQUENCY	PRSSWORD
A1	B1	C1	D1	E1	F1	G1	H1	I1	J1

PO

- (A) Saida por relé
- (B) 1 a 6
- (C) 7 a 12
- (D) DMCS ou ASCII
- (E) Entradas logicas:
- (F) 1 a 6
- (G) 7 a 12
- (J) 1 a 4
- (H) Voltagem (linha)
- (I) Posição das cartas de entradas analogicas
- (K) 5 a 8
- (L) 9 a 12
- (M) 13 a 16
- (N) 17 a 20
- (O) 21 a 24
- (P) 25 a 28
- (Q) 29 a 32

DU

- (A) Relais uitgang :
- (B) 1 tot 6
- (C) 7 tot 12
- (D) DMCS of ASCII
- (E) Logische ingangen :
- (F) 1 tot 6
- (G) 7 tot 12
- (H) Netspanning
- (I) Positie analoge ingangskaarten :
- (J) 1 tot 4
- (K) 5 tot 8
- (L) 9 tot 12
- (M) 13 tot 16
- (N) 17 tot 20
- (O) 21 tot 24
- (P) 25 tot 28
- (Q) 29 tot 32

FI

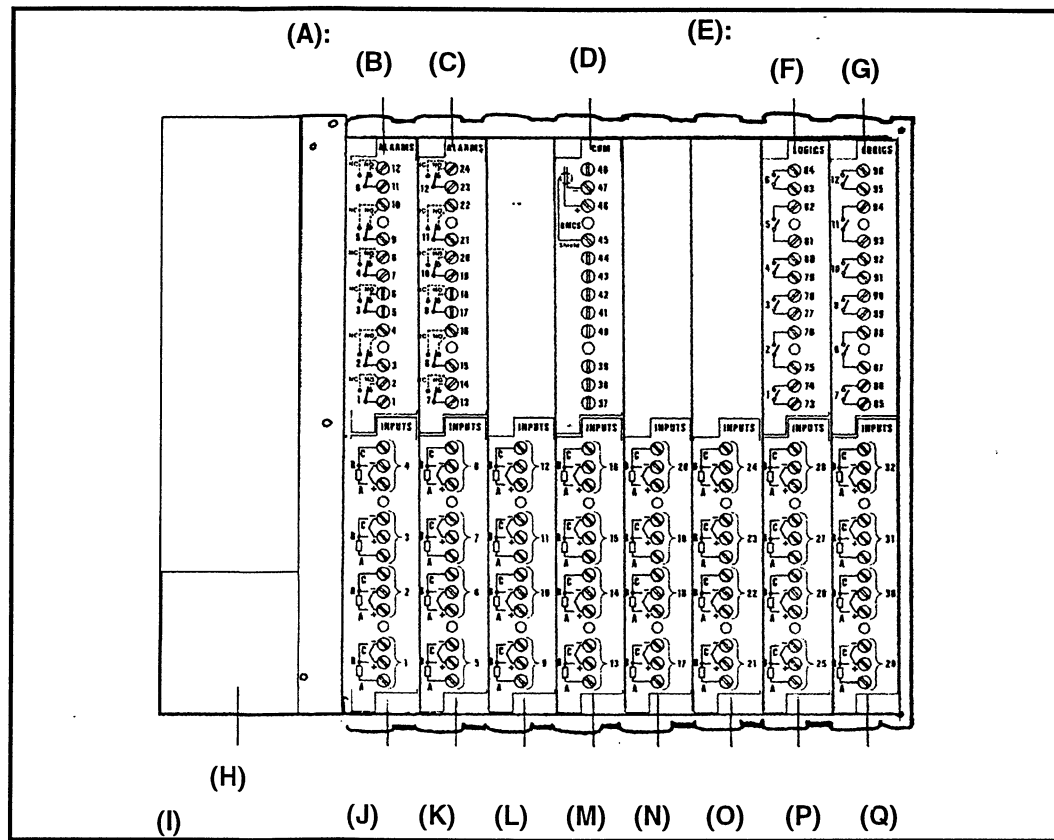
- (A) Relelähdöt:
- (B) 1 ... 6
- (C) 7 ... 12
- (D) DMCS tai ASCII
- (E) Logiikkatulot:
- (F) 1 ... 6
- (G) 7 ... 12
- (H) Verkkojännite
- (I) Analogiatulokorttien paikat
- (J) 1 ... 4
- (K) 5 ... 8
- (L) 9 ... 12
- (M) 13 ... 16
- (N) 17 ... 20
- (O) 21 ... 24
- (P) 25 ... 28
- (Q) 29 ... 32

GR

- (A) ΡΕΛΕ ΕΞΟΔΟΥ
- (B) 1 - 6
- (C) 7 - 12
- (D) DMCS / ASCII
- (E) ΛΟΓΙΚΕΣ ΕΙΣΟΔΟΙ
- (F) 1 - 6
- (G) 7 - 12
- (H) ΦΑΣΗ
- (I) ΘΕΣΗ ΚΑΡΤΕΛΛΩΝ ΕΙΣΟΔΟΥ ΑΝΑΛΟΓΙΚΩΝ ΣΗΜΑΤΩΝ
- (J) 1 - 4
- (K) 5 - 8
- (L) 9 - 12
- (M) 13 - 16
- (N) 17 - 20
- (O) 21 - 24
- (P) 25 - 28
- (Q) 29 - 32

DA

- (A) Relæ udgange
- (B) 1 til 6
- (C) 7 til 12
- (D) DMCS eller ASCII
- (E) Logiske indgange :
- (F) 1 til 6
- (G) 7 til 12
- (H) Strømforsyning
- (I) Analog indgangskorts positioner
- (J) 1 til 4
- (K) 5 til 8
- (L) 9 til 12
- (M) 13 til 16
- (N) 17 til 20
- (O) 21 til 24
- (P) 25 til 28
- (Q) 29 til 32





Para reduzir o risco de choque eléctrico que pode causar danos corporais, seguir todas as normas de segurança contidas nesta documentação.



Terminal de protecção de terra. Fornecido para ligação do condutor do sistema da protecção de terra.

- Se este equipamento for usado de modo não especificado pelo fabricante, a protecção fornecida pelo equipamento pode não ser adequada.
- Não se deve substituir qualquer componente (ou peça) que não seja explicitamente especificado como substituível pelo nosso revendedor.
- Toda a cabelagem tem que estar de acordo com as normas locais e deve ser conduzida por pessoal autorizado com experiência.
- O terminal de terra deve ser ligado antes de ser feita qualquer outra cabelagem (e desligado em último lugar).
- Deve haver um interruptor da alimentação principal junto do equipamento.
- Cada fio deve estar protegido com um fusível equivalente ao do Registador (tipo de fusível), o mesmo se aplicando ao suporte do fusível.

Especificações do Equipamento

Voltagem: 100 a 230 Vca

Frequência: 50/60 Hz

Potência ou consumo de Corrente: 100 VA max.

Condições Ambientais

Não operar o instrumento na presença de líquidos ou vapores inflamáveis. A operação de qualquer instrumento eléctrico em tal ambiente constitui um perigo para a segurança.

Humidade		50 a 90 % RH não condensado
Temperatura	Ambiente	-10 a 50°C (14 a 120°F)
	Armazenagem	-25 a 70°C (-15 a 160°F)
Vibrações	Frequência	0 a 200 Hz, 0.2 g de aceleração

Instalação do Equipamento

O Registador deve ser montado num painel para limitar o acesso do operador aos terminais traseiros (espessura máxima do painel 40 mm).

Instruções de Limpeza

Usar apenas um cotonete seco para limpar a unidade.

Substituição de Consumíveis

Fusível: Para evitar um incêndio certifique-se de que usa um fusível com especificações standard (voltagem, corrente, tipo). Antes de substituir o fusível, desligue a alimentação e desligue os fios da fonte de alimentação. Não usar fusíveis diferentes ou fazer curto circuito do suporte de fusível.



Ter vermindering van het gevaar van elektrische schokken die lichamelijk letsel kunnen veroorzaken, dient u alle veiligheidsaanwijzingen in dit dokument te volgen.



Beschermende aarde-aansluiting. Bestemd voor aansluiting van de aardingsdraad van de voeding.

- Indien de apparatuur wordt gebruikt anders dan door de fabrikant is gespecificeerd, kan de bescherming, die de apparatuur biedt ongedaan worden gemaakt.
- Alleen die onderdelen mogen worden vervangen, die door de fabrikant als uitwisselbaar zijn aangemerkt.
- Alle bedrading moet in overeenstemming zijn met de plaatselijke standaards en zijn uitgevoerd door geautoriseerd ervaren personeel.
- De aardingsdraad moet worden aangesloten vóórdat alle andere bedrading wordt aangesloten (en als laatste worden verbroken).
- Een schakelaar in de netstroomtoevoer is vereist, vlakbij het instrument.
- Elke stroomdraad moet beveiligd zijn met een zekering gelijkwaardig aan zowel de recorderzekering (zekering type) als die van de zekeringhouder.

Apparatuur voorwaarden

Aansluitspanning: 100 tot 230 V AC

Frequentie: 50/60 Hz

Toegestane belasting: 100 VA max.

Omgevingscondities

Gebruik het instrument niet in de aanwezigheid van ontvlambare vloeistoffen of dampen. Het gebruik van elk elektrisch instrument in een dergelijke omgeving vormt een gevaar voor uw veiligheid.

Relatieve vochtigheid		50 tot 90 % RH niet condenserend
Temperatuur	Omgevingsstemp.	-10 tot 50°C (14 tot 120°F)
	Opslag	-25 tot 70°C (-15 tot 160°F)
Trillingen	Frequentie	0 tot 200 Hz, versnelling 0.2 g

Montage van de recorder

De recorder moet worden gemonteerd in een paneel om de toegankelijkheid tot de achterste aansluitpunten te beperken (paneeldikte maximaal 40 mm).

Schoonmaken

Alleen een droge katoenen doek gebruiken voor het schoonmaken van het instrument.

Vervanging van verbruiksmaterialen

Zekering: ter voorkoming van brand dient u de zekering met de gespecificeerde standaard te gebruiken (stroom spanning, type). Voor u de zekering vervangt moet u de netspanning uitschakelen en de stroomtoevoer onderbreken. Gebruik geen andere zekering en sluit de zekeringhouder niet kort.



ΓΙΑ ΝΑ ΜΕΙΩΘΕΙ Ο ΚΙΝΔΥΝΟΣ ΗΛΕΚΤΡΟΠΛΗΞΙΑΣ Η ΟΠΟΙΑ ΜΠΟΡΕΙ ΝΑ ΠΡΟΚΑΛΕΣΕΙ ΤΡΑΥΜΑΤΙΣΜΟ, ΑΚΟΛΟΥΘΕΙΣΤΕ, ΟΛΕΣ ΤΙΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ ΠΟΥ ΠΑΡΑΤΙΘΕΝΤΑΙ Σ' ΑΥΤΟ ΤΟ ΦΥΛΛΑΔΙΟ.



ΠΡΟΣΤΑΤΕΥΤΙΚΗ ΓΕΙΩΣΗ. ΠΑΡΕΧΕΤΑΙ ΓΙΑ ΤΗΝ ΣΥΝΔΕΣΗ ΜΕ ΤΟ ΣΥΣΤΗΜΑ ΓΕΙΩΣΗΣ ΤΗΣ ΕΓΚΑΤΑΣΤΑΣΗΣ.

- ΑΝ Η ΣΥΣΚΕΥΗ ΧΡΗΣΙΜΟΠΟΙΗΘΕΙ ΜΕ ΤΡΟΠΟ ΠΟΥ ΔΕΝ ΣΥΜΦΩΝΕΙ ΜΕ ΤΙΣ ΟΔΗΓΙΕΣ ΤΟΥ ΚΑΤΑΣΚΕΥΑΣΤΗ ΠΙΘΑΝΟΝ ΝΑ ΜΕΙΩΘΕΙ Η ΠΡΟΣΤΑΣΙΑ ΠΟΥ ΠΡΟΣΦΕΡΕΙ.
- ΝΑ ΜΗΝ ΑΝΤΙΚΑΘΙΣΤΑΤΑΙ ΚΑΝΕΝΑ ΕΞΑΡΤΗΜΑ Η' ΤΜΗΜΑ ΤΟΥ ΟΡΓΑΝΟΥ ΠΟΥ ΔΕΝ ΑΝΑΦΕΡΕΤΑΙ ΣΑΦΩΣ ΑΠΟ ΤΟΝ ΚΑΤΑΣΚΕΥΑΣΤΗ ΩΣ ΑΝΤΑΛΛΑΞΙΜΟ.
- ΟΛΕΣ ΟΙ ΚΑΛΩΔΙΩΣΕΙΣ ΠΡΕΠΕΙ ΝΑ ΕΙΝΑΙ ΣΥΜΦΩΝΕΣ ΜΕ ΤΗΝ ΤΟΠΙΚΗ ΝΟΜΟΘΕΣΙΑ ΚΑΙ Η ΕΓΚΑΤΑΣΤΑΣΗ ΤΟΥΣ ΠΡΕΠΕΙ ΝΑ ΓΙΝΕΙ ΑΠΟ ΕΙΔΙΚΕΥΜΕΝΟ ΚΑΙ ΕΜΠΕΙΡΟ ΠΡΟΣΩΠΙΚΟ.
- Η ΓΕΙΩΣΗ ΠΡΕΠΕΙ ΝΑ ΣΥΝΔΕΘΕΙ ΠΡΙΝ ΑΠΟ ΟΠΟΙΑΔΗΠΟΤΕ ΑΛΛΗ ΚΑΛΩΔΙΩΣΗ, ΚΑΙ ΤΕΛΕΥΤΑΙΑ ΚΑΤΑ ΤΗΝ ΑΠΟΣΥΝΔΕΣΗ.
- ΕΝΑΣ ΔΙΑΚΟΠΤΗΣ ΤΗΣ ΚΥΡΙΑΣ ΠΑΡΟΧΗΣ ΑΠΑΙΤΕΙΤΑΙ ΚΟΝΤΑ ΣΤΟ ΟΡΓΑΝΟ.
- ΚΑΘΕ ΚΑΛΩΔΙΟ ΠΡΕΠΕΙ ΝΑ ΠΡΟΣΤΑΤΕΥΕΤΑΙ ΑΠΟ ΑΣΦΑΛΕΙΑ ΙΣΟΔΥΝΑΜΗ ΜΕ ΤΗΝ ΑΣΦΑΛΕΙΑ ΤΟΥ ΚΑΤΑΓΡΑΦΙΚΟΥ, ΚΑΘΩΣ ΕΠΙΣΗΣ ΚΑΙ ΜΕ ΑΣΦΑΛΕΙΟΘΗΚΗ.

ΤΕΧΝΙΚΑ ΣΤΟΙΧΕΙΑ ΟΡΓΑΝΟΥ

ΤΡΟΦΟΔΟΣΙΑ: 100 - 230 V ac

ΣΥΧΝΟΤΗΤΑ: 50/60 Hz

ΙΣΧΥΣ: 100 VA ΜΕΓΙΣΤΗ

ΣΥΝΘΗΚΕΣ ΠΕΡΙΒΑΛΛΟΝΤΟΣ

ΝΑ ΜΗΝ ΧΡΗΣΙΜΟΠΟΙΕΙΤΑΙ ΤΟ ΟΡΓΑΝΟ ΣΕ ΧΩΡΟΥΣ ΜΕ ΠΑΡΟΥΣΙΑ ΕΥΛΕΚΤΩΝ ΥΓΡΩΝ Η ΑΤΜΩΝ. ΧΡΗΣΗ ΟΠΟΙΟΥΔΗΠΟΤΕ ΗΛΕΚΤΡΙΚΟΥ ΟΡΓΑΝΟΥ ΣΕ ΤΕΤΟΙΟ ΠΕΡΙΒΑΛΛΟΝ ΑΠΟΤΕΛΕΙ ΚΙΝΔΥΝΟ ΑΤΥΧΗΜΑΤΟΣ.

ΥΓΡΑΣΙΑ

ΘΕΡΜΟΚΡΑΣΙΑ

ΤΑΛΑΝΤΩΣΗ

ΠΕΡΙΒΑΛΛΟΝΤΟΣ

ΑΠΟΘΗΚΕΥΣΗΣ

ΣΥΧΝΟΤΗΤΑ

50 - 90 % RH ΜΗ ΣΥΜΠΥΚΝΩΜΕΝΗ

- 10 / 50 DEG C (14 / 120 DEG F)

- 25 / 70 DEG C (- 15 / 160 DEG F)

0 - 200 Hz, ΕΠΙΤΑΧΥΝΣΗ 0.2 g

ΤΟΠΟΘΕΤΗΣΗ ΜΗΧΑΝΗΜΑΤΟΣ

ΤΟ ΚΑΤΑΓΡΑΦΙΚΟ ΟΡΓΑΝΟ ΠΡΕΠΕΙ ΝΑ ΤΟΠΟΘΕΤΗΘΕΙ ΣΤΗΝ ΠΡΟΣΟΨΗ ΤΟΥ ΠΙΝΑΚΑ, ΕΤΣΙ ΩΣΤΕ ΝΑ ΜΗΝ ΜΠΟΡΕΙ Ο ΧΕΙΡΙΣΤΗΣ ΝΑ ΕΧΕΙ ΠΡΟΣΒΑΣΗ ΣΤΟ ΠΙΣΩ ΜΕΡΟΣ ΜΕΓΙΣΤΟ ΠΑΧΟΣ ΠΙΝΑΚΟΣ 40 mm.

ΟΔΗΓΙΕΣ ΚΑΘΑΡΙΣΜΟΥ

ΧΡΗΣΙΜΟΠΟΙΗΣΤΕ ΜΟΝΟ ΕΝΑ ΣΤΕΓΝΟ ΒΑΜΒΑΚΕΡΟ ΥΦΑΣΜΑ ΓΙΑ ΤΟΝ ΚΑΘΑΡΙΣΜΟ ΤΟΥ ΟΡΓΑΝΟΥ.

ΑΝΤΙΚΑΤΑΣΤΑΣΗ ΑΝΑΛΩΣΙΜΟΥ ΥΛΙΚΟΥ

ΑΣΦΑΛΕΙΑ : ΠΡΟΣ ΑΠΟΦΥΓΗ ΠΥΡΚΑΙΑΣ Η ΑΣΦΑΛΕΙΑ ΘΑ ΠΡΕΠΕΙ ΝΑ ΑΝΤΙΚΑΘΙΣΤΑΤΑΙ ΜΕ ΝΕΑ, ΒΑΣΗ ΤΩΝ ΠΡΟΤΕΙΝΟΜΕΝΩΝ ΠΡΟΔΙΑΓΡΑΦΩΝ (ΤΑΣΗ, ΕΝΤΑΣΗ, ΤΥΠΟΣ). ΠΡΙΝ ΑΠΟ ΤΗΝ ΑΝΤΙΚΑΤΑΣΤΑΣΗ ΝΑ ΔΙΑΚΟΠΤΕΤΑΙ Η ΠΑΡΟΧΗ ΤΑΣΗΣ Η' ΝΑ ΑΠΟΣΥΝΔΕΕΤΑΙ Η ΚΑΛΩΔΙΩΣΗ ΠΑΡΟΧΗΣ. ΝΑ ΜΗΝ ΧΡΗΣΙΜΟΠΟΙΗΤΑΙ ΑΣΦΑΛΕΙΑ ΔΙΑΦΟΡΕΤΙΚΗ ΑΠΟ ΤΗΝ ΠΡΟΤΕΙΝΟΜΕΝΗ, ΚΑΙ ΝΑ ΜΗΝ ΒΡΑΧΥΚΥΚΛΩΝΕΤΑΙ Η ΑΣΦΑΛΕΙΟΘΗΚΗ.



Noudata tämän ohjeen kaikkia turvaohjeita välttääksesi sähkötapaturman vaaraa.



Suojamaaliitin. Kytke maadoitusjohdin tähän liittimeen.

- Jos laitetta käytetään olosuhteissa, joihin sitä ei ole suunniteltu, käyttöturvallisuus voi heikentyä.
- Älä vaihda mitään komponenttia tai osaa, jota valmistaja ei ole määritellyt käyttäjän vaihdettavaksi.
- Johdotukset on tehtävä noudattaen paikallisia määräyksiä ja tekijällä on oltava riittävä ammattitaito.
- Ensimmäiseksi on kytkettävä suojamaa-liitin (ja viimeiseksi irroittettava).
- Syöttöjännitekytkin on sijoitettava lähelle laitetta.
- Suojaa johtimet asianmukaisilla sulakkeilla.

LAITTEEN VAATIMUKSET

Syöttöjännite: 100 ... 230 V AC

Taajuus: 50/60 Hz

Tehonkulutus: 100 VA max.

KÄYTTÖOLOSUHTEET

Älä käytä laitetta paikassa jossa on syttyviä nesteitä tai kaasuja, koska laitteen käyttö aiheuttaa räjähdysvaaran.

Kosteus		50 ... 90 % RH non condensing
Lämpötila	Käyttö	-10 ... 50 ast. C (14 ... 120 ast. F)
	Varastointi	-25 ... 70 ast. C (-15 ... 160 ast. F)
Tärinä	Taajuus	0 ... 200 Hz, kiihtyvyys 1 g

LAITTEEN ASENNUS

Piirturi on asennettava paneeliin siten, että peräliittimille jää riittävästi tilaa.
(Paneelin maksimi paksuus 40 mm)

PUHDISTUSOHJEET

Käytä vain kuivaa puuvillakangasta laitteen puhdistukseen.

KULUTUSOSIEN VAIHTAMINEN

Käytä aina oikean tyyppistä sulaketta (virta, jännite, tyyppi). Katkaise syöttöjännite laitteesta ennen sulakkeen vaihtoa. Älä käytä ohjeista poikkeavaa sulaketta tai oikosulje sulakepesää.



For at undgå elektrisk stød med mulighed for personskade, skal alle sikkerhedsbestemmelser i denne manual følges nøje.



Beskyttende jordterminal. Terminalen er forberedt for og skal forbindes til beskyttelses-jordledning i henhold til stærkstrømsbekendtgørelsen (DK).

- Hvis udstyret ikke bruges som specificeret i manualen, kan den beskyttelse udstyret yder blive nedsat eller forsvinde.
- Erstat kun komponenter som udtrykkeligt er specificeret som udskiftelige i manualen.
- Al ledningsforbindelse skal følge strækstrømsbekendtgørelsen (DK) og udføres af autoriseret erfarent personel.
- Den beskyttende jordterminal skal forbindes først af alle forbindelser (og fjernes som den sidste).
- Jvf. stærkstrømsreglementet skal der installeres en afbryder til forsyningssapændingen nær udstyret.
- Hver leder skal have ekstra beskyttelse ifølge stærkstrømsbekendtgørelsen (DK).

UDSTYRS SPECIFIKATIONER

Strømforsyning : 100 til 230 V AC

Frekvens : 50/60 Hz

Effektforbrug : 100 VA max.

OMGIVELSE SPECIFIKATIONER

Placer ikke udstyret i nærheden af brandbare væsker eller dampe.

Fugtighed		50 - 90 % RH ikke kondenserende
Temperatur	Drift	-10 til 50°C (14 til 120°F)
	Opbevaring	-25 til 70°C (-15 til 160°F)
Vibrationer	Frekvens	0 til 200 Hz, acceleration 0.2 g

UDSTYRS INSTALLATION

Skriveren skal monteres i en tavle for at forhindre adgang til bagterminaler.
(Maksimal tavletykkelse 40 mm)

INSTRUKTION FOR RENGØRING

Brug kun en tør bomuldklud til rengøring af udstyret.

UDSKIFTNING AF SIKRING

Sikring : For at forebygge brand, vær sikker på at sikringen opfylder kravene til strøm, spænding og karakteristik. Sluk for spændingen før sikringen udskiftes. Brug ikke en sikring af anden type.

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