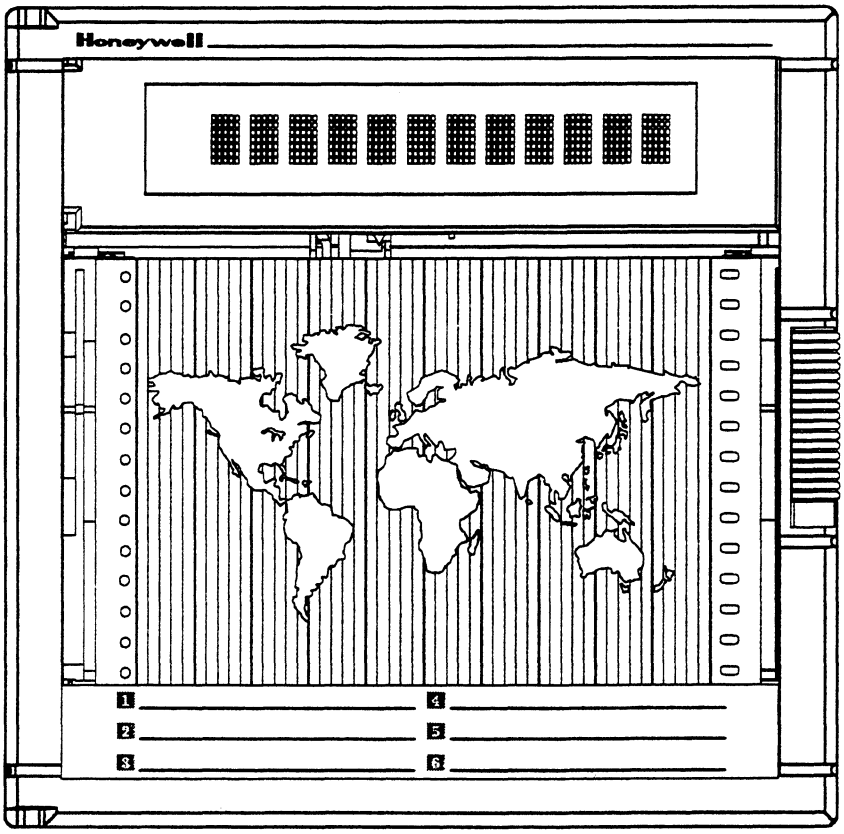
Honeywell

DPR100 C - DPR100 D

COMMUNICATION OPTION MANUAL



LEADERLINE

Better Record Your World

CERTIFIED Quality Assurance System ISO 9001

PRODUCT OF FRANCE

Ref : US1I-6149

Honeywell

DPR 100 C - DPR 100 D

COMMUNICATION OPTION MANUAL

Ref. : US1I-6149

Issue : 6

June, 1999

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- ASCII Text for daily report and autodial

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- Reading PV's, alarm.
- Overriding PV's.
- Printing messages on the paper.
- Reading and changing configuration parameters like alarm setpoints, ranges, trend speed, tagnames etc. (ASCII protocol only)

1.3 COMPATIBILITY

This Universal Communication option is compatible with recorder software issue "001AF 38A" or higher.

2.1 INSTALLING THE UNIVERSAL COMMUNICATION OPTION BOARD

1. **WARNING :** The communication option board must be imperatively inserted in the place #2, replacing the second alarm board.

   Switches configuration of the communication board :

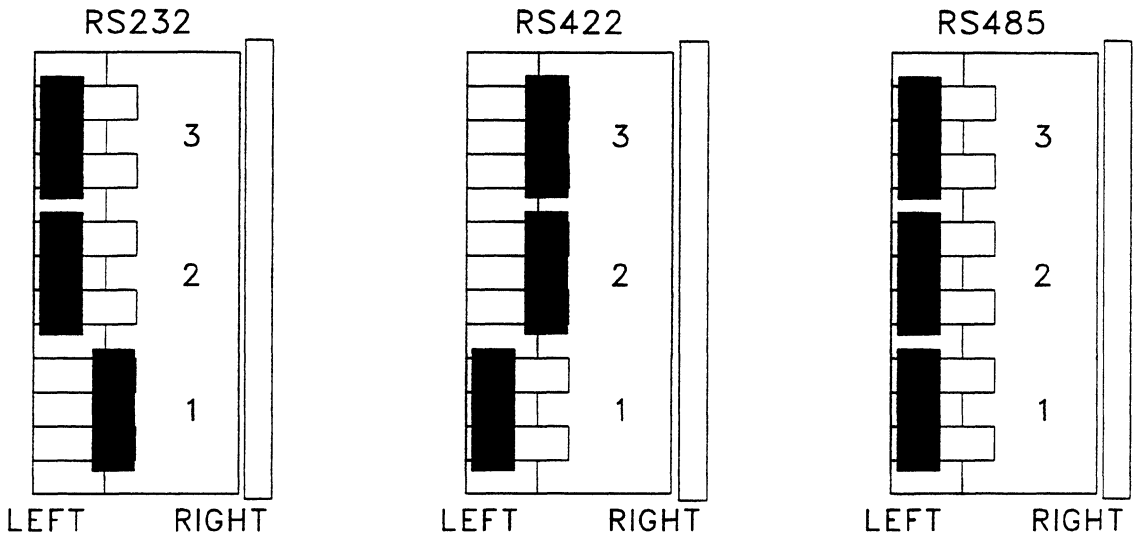


Figure 2-1 RS232 / RS422 / RS485 SWITCHES CONFIGURATION

2. Remove terminal blocks or filler strip(s). See fig. 2-2.

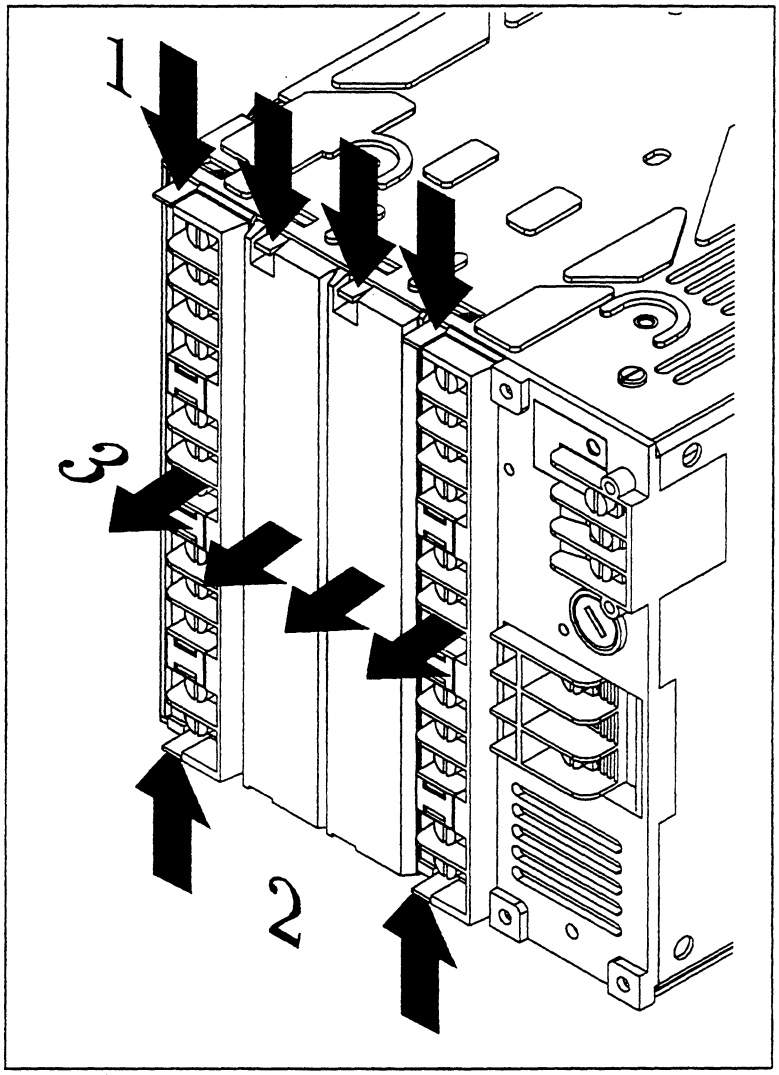


Figure 2-2

3. Loosen and remove the 2 fixing screws E on the top plate.
4. Loosen and remove the 2 fixing screws A on the right hand side plus internal nut B and bracket for illumination option. See fig. 2-3.
5. Loosen and remove the 3 fixing screws C on the left hand side plus internal nut D. See fig. 2-3.
6. Remove the top plate by rocking and lifting from the terminal blocks side.

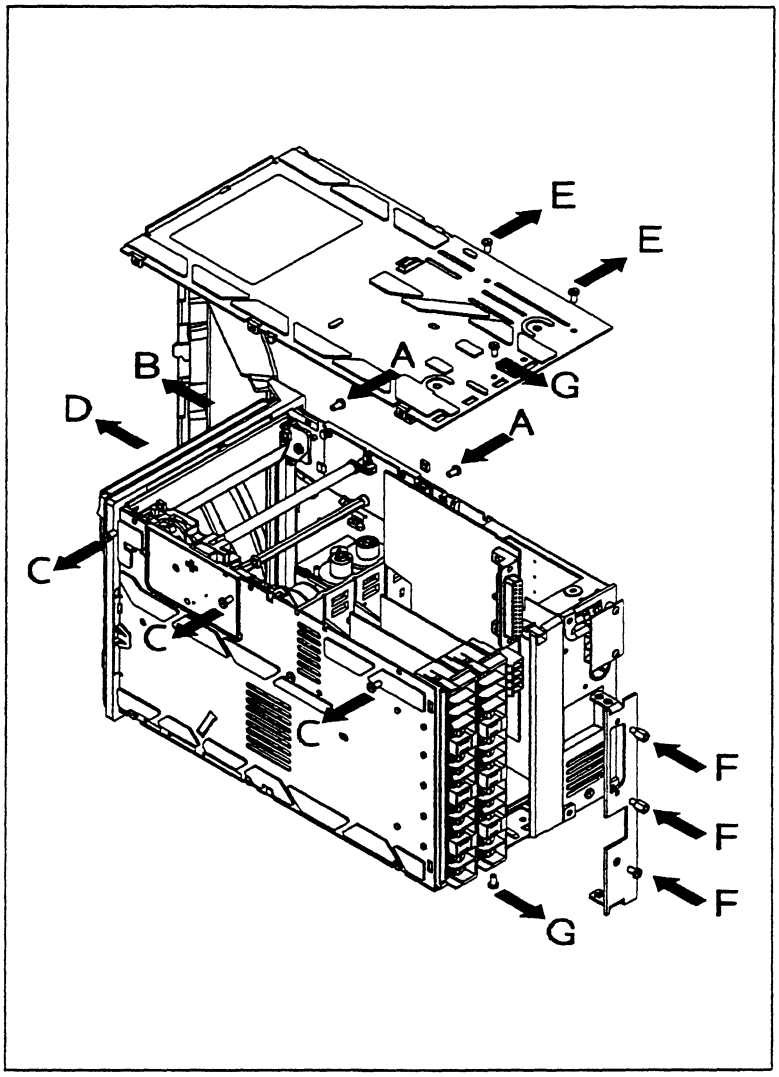


Figure 2-3

7. Present the (new) board in slot. Slide board into position using the guides. See figures 2-3 and 2-4.

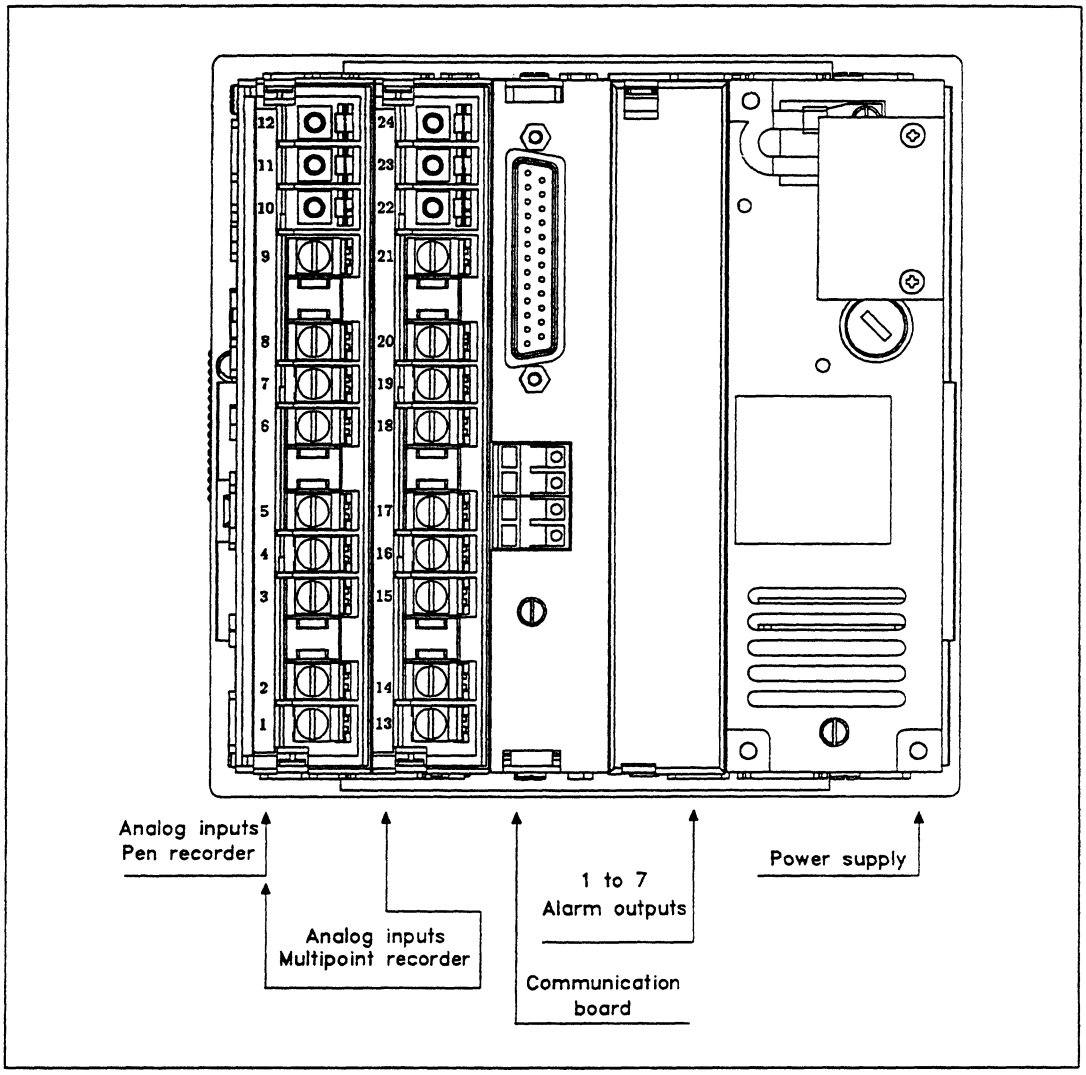


Figure 2-4

8. Ensure proper connection with bottom wiring board.
9. Refit top plate.
10. Replace and tighten the 7 screws, 2 nuts and bracket if light option.
11. Check the switches position for RS232/422/485 configuration. See figure 2-1 and table 2-1.
12. Fit together the board with its terminal block, with the 2 screws F.
13. Tighten the 2 terminal block screws G of the communication board. See figure 2-3.

2.2 WIRING CONFIGURATION

This software package has been designed to operate with three kind of serial communication standards which are : RS232, RS422 and RS485. Refer to the following chapter for the wiring configuration of each of them. For more details on the wiring, please refer to your computer product manual.

2.2.1 RS232 wiring configuration

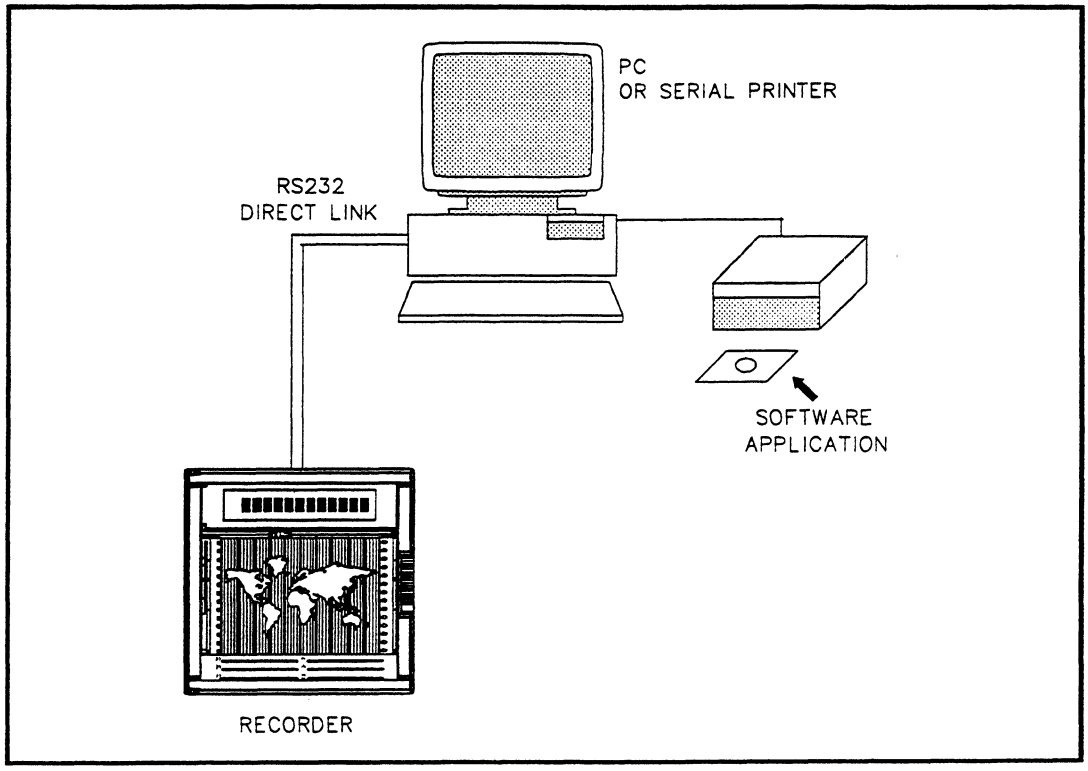


Figure 2-5 RS232 wiring configuration

2.2.2 REAR CONNECTION

The recorder has built in circuits to reduce the effects of most electrical noise. We recommend that you review the following guidelines, to minimize the noise effects.

1. Separate the communication leadwires from the line voltage, the alarm output, contactors, motors etc....
2. For a communication distance, over 1.5 meters, use a separate metal tray, or metal conduit.
3. Use wiring cable composed of twisted pair wirings, with a shield.
4. Connect the shield wire to the ground, at one end only, preferably at the recorder.
   (Use for example a wiring cable type : Belden 9271 twinax, or equivalent.)
5. We recommend to install a 120 ohms resistor between TXA and TXB, on the last recorder on the communication link.
6. The maximum capabilities are :

Type of communication.	Distances max.	# of Unit.
RS232	15 meters	1
RS422	1000 meters	15
RS485	1200 meters	31

2.2.3 RS232 with modem connection

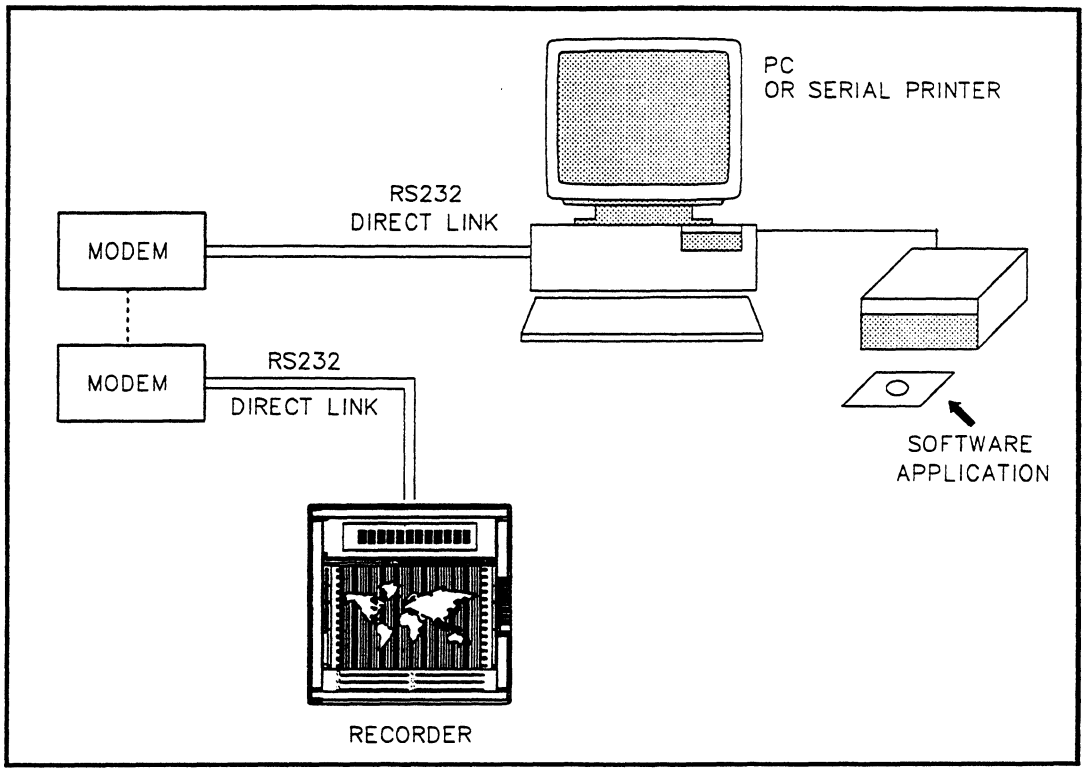


Figure 2-6 RS232 with modem connection - wiring configuration

2.2.4 RS422 (4 wires) wiring configuration

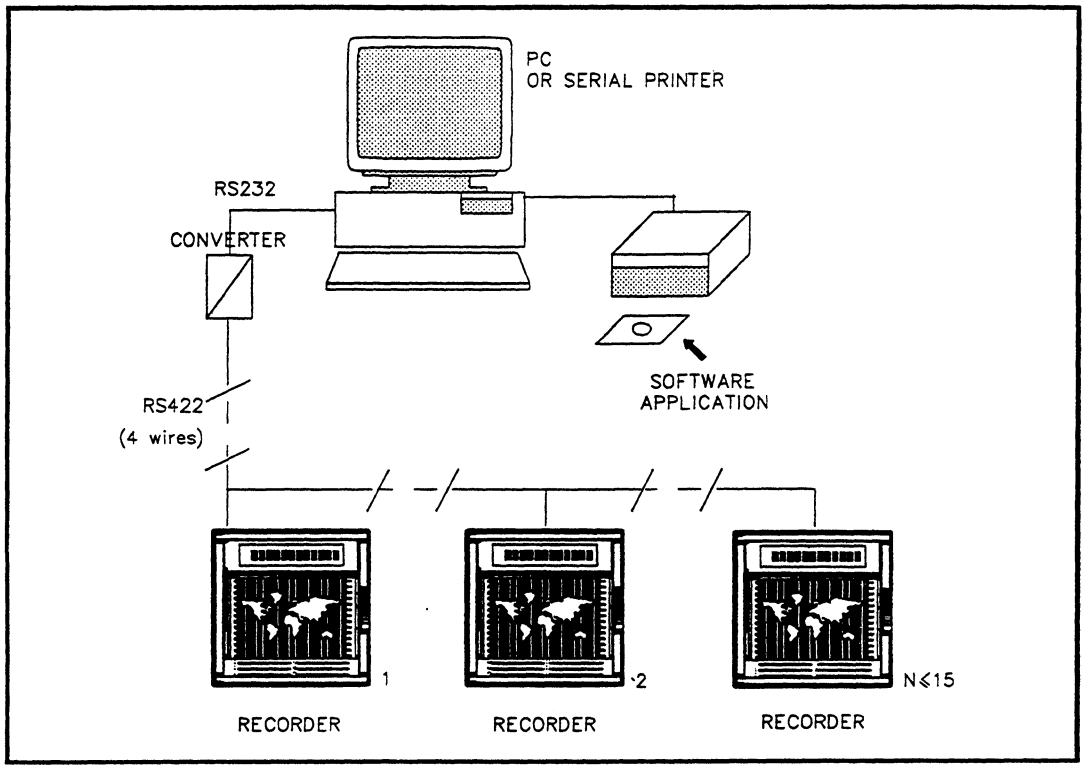


Figure 2-7 RS422 wiring configuration

2.2.5 CONNECTING THE RS422/485 LINK

The recorder with RS422/485 Communications option can be connected to your computer using one of two arrangements shown below.

Arrangement	Description
ICS plug-in I/O board	Wired directly to the RS422/485 port in your computer using an ICS plug-in I/O board which is specifically designed to interface with the IBM (or IBM compatible) PC, PC/XT, or PC/AT computer. This board is available from... ICS Computer Products, Inc. 5466 Complex Street Suite 208 San Diego, California 92123
Burr-Brown Converter	Using the RS232 port a Burr-Brown RS232 to RS422/485 converter installed between the RS232 port and the recorder. This converter is available from... Burr-Brown International Airport Industrial Park P.O. Box 11400 Tucson, Arizona 85734 Part number LDM485ST, limited distance modem

2.3 RS485 (2 wires) wiring configuration

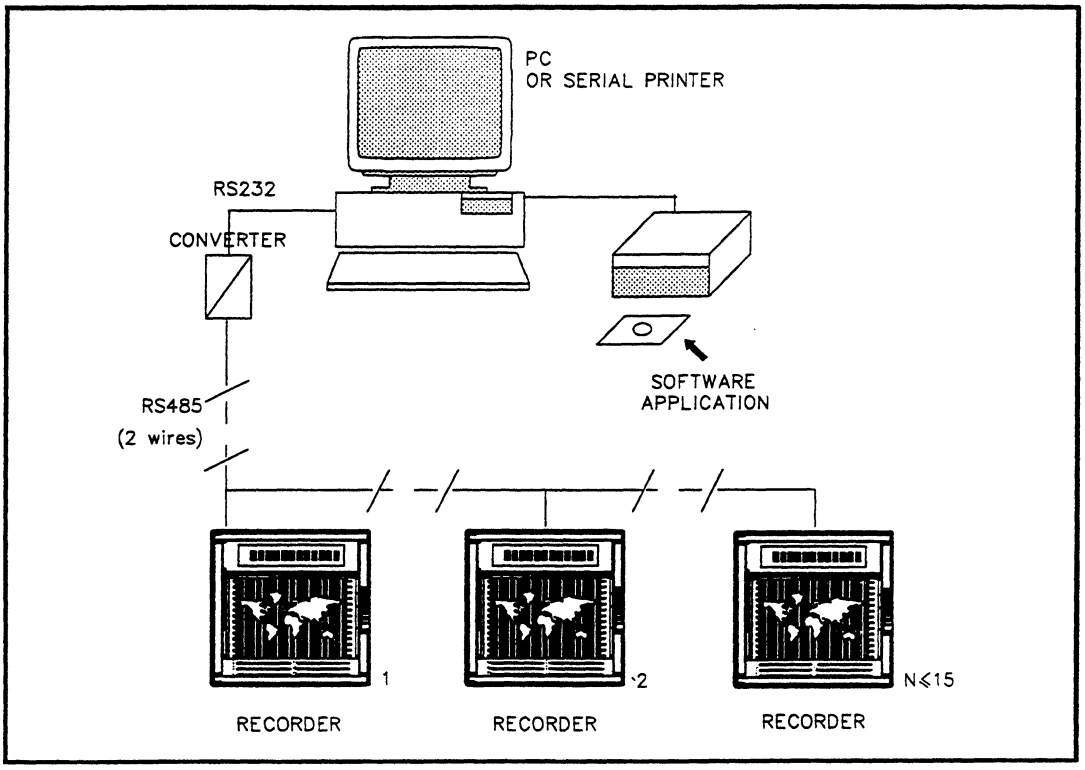


Figure 2-8 RS485 wiring configuration

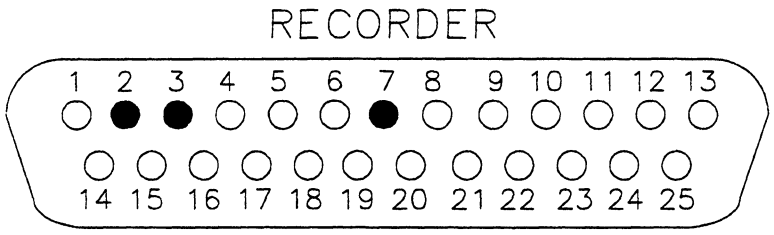
2.3.1 CONNECTING THE RS422/485 LINK

The recorder with RS422/485 Communications option can be connected to your computer using one of two arrangements shown below.

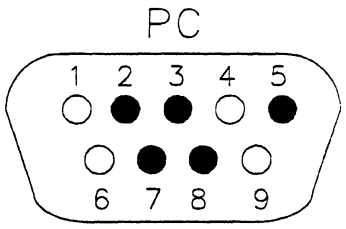
Arrangement	Description
ICS plug-in I/O board	Wired directly to the RS422/485 port in your computer using an ICS plug-in I/O board which is specifically designed to interface with the IBM (or IBM compatible) PC, PC/XT, or PC/AT computer. This board is available from... ICS Computer Products, Inc. 5466 Complex Street Suite 208 San Diego, California 92123
Burr-Brown Converter	Using the RS232 port a Burr-Brown RS232 to RS422/485 converter installed between the RS232 port and the recorder. This converter is available from... Burr-Brown International Airport Industrial Park P.O. Box 11400 Tucson, Arizona 85734 Part number LDM485ST, limited distance modem

2.4 RS232 INTERFACE CONNECTOR

2.4.1 With DB9 connector.



DB25

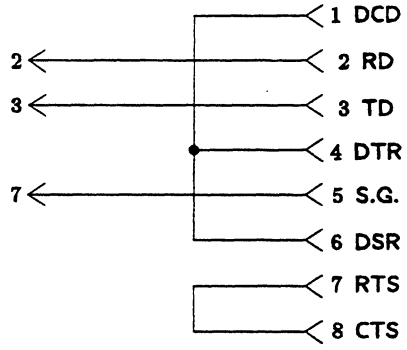


DTE connector face
contact numbering
DB9

Interface connector pin arrangement and signal functions.

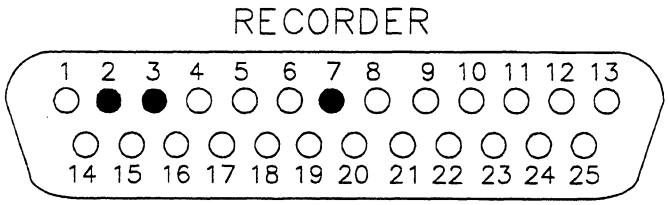
RECORDER	PC
Pin n°	Pin n°
2	2
3	3
5	4
7	5
20	6
20	8

Note : Check compatibility with your PC as far as no standard for DB9 connector exists yet.

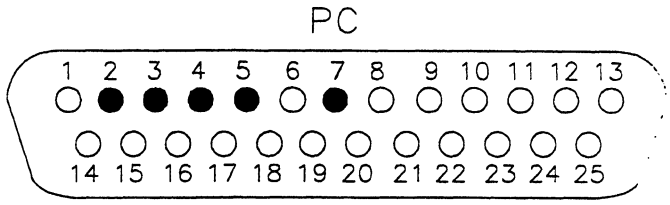


2.4.2 With DB25 connector.

Interface connector pin arrangement and signal functions.

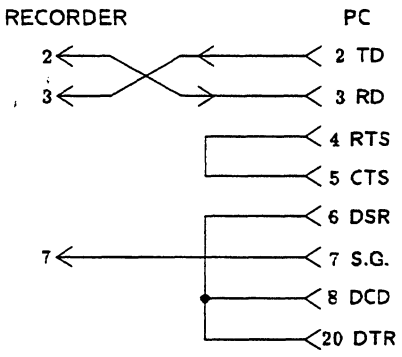


DB25



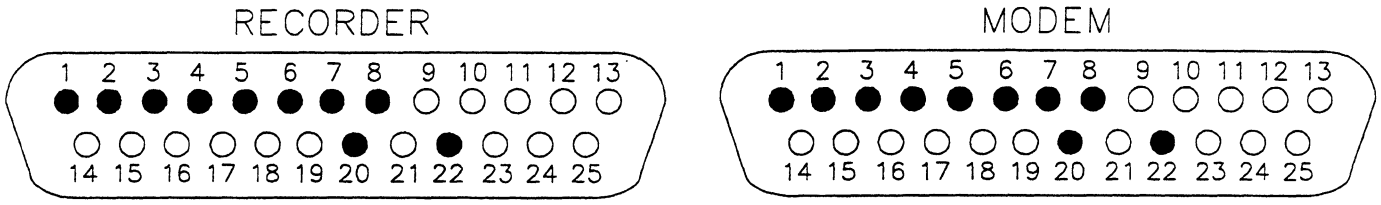
DTE connector face
contact numbering
DB25

RECORDER	PC		
Pin n°	Pin n°	Direction	Description
3	2	to recorder	transmitted DATA
2	3	from recorder	received DATA
-	4	from DTE	request to send
-	5	to DTE	clear to send
7	7	-	ground



Cable connector to recorder is male.
Cable connector to PC is female.

With **MODEM** connection (DB25) :



DB25

DTE connector face contact numbering DB25

The cable must have male connectors on both ends.

RECORDER	MODEM
Pin n°	Pin n°
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
20	20
22	22

Examples of modem references :

- Hayes compatible
- RTS - CTS flow control

2.5 RS422 / RS485 INTERFACE CONNECTIONS

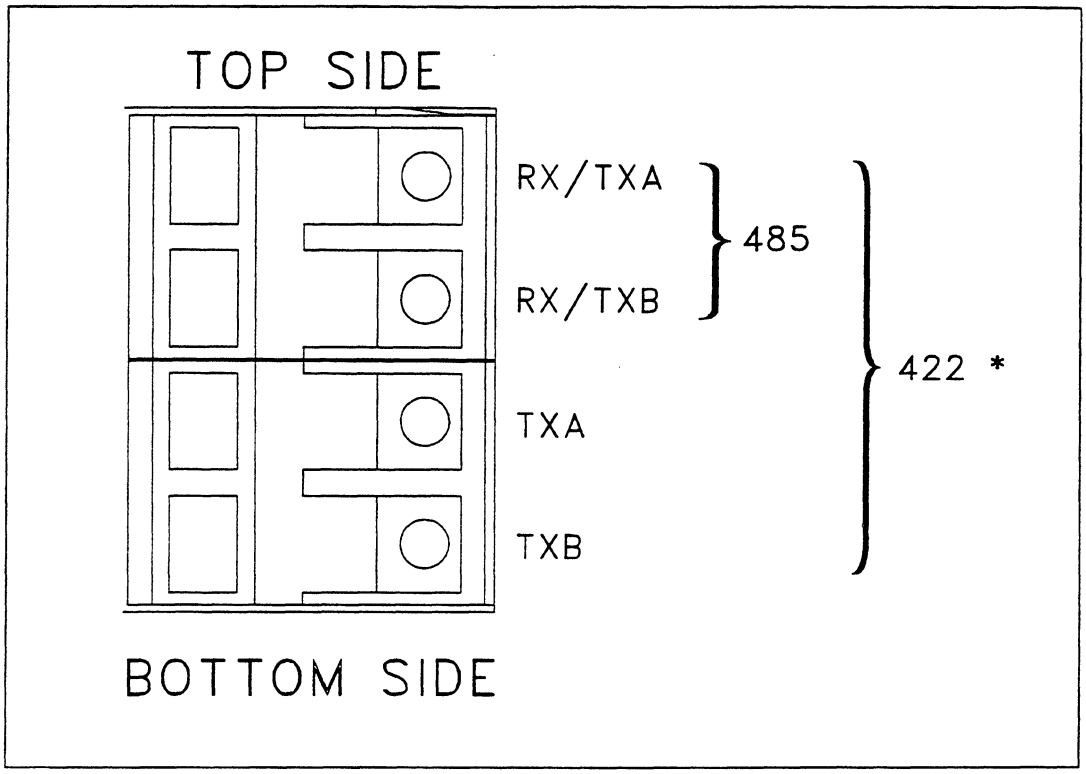


Table 2-1 Communication signal wiring

* Data is transmitted from the recorder to the computer on the TXB and TXA terminals when configured for RS422. Data is received by the recorder on terminals RX/TXB and RX/TXA when configured for RS422.

Note that the terminal A (Figure 2-9) is internally connected to the recorder earth.

3.1 CONFIGURATION DATA

SUB - MATRIX → **COMM**

PARAMETERS →
- PROTOCOLE
- CONNECT.
- ADDRESS
- BAUDS
- BITS
- PARITY
- STOP
- SHEDTIME
- PHONE ID
- PHONE #
- AUTODIAL

SUB- MATRIX	PARAMETER	CLASSIFICATION
COMM	PROTOCOL	♦

DEFINITION : Selection of protocol.

HOW TO MODIFY IT : Select a new value.

POSSIBLE VALUES :

RTU
ASCII
MODEM

SUB- MATRIX	PARAMETER	CLASSIFICATION
COMM	CONNECT	♦

DEFINITION : Type of connection.

HOW TO MODIFY IT : Select a new value.

POSSIBLE VALUES :

RS232
RS422
RS485

WARNING : **Must be the same as the hardware selection.**

SUB- MATRIX	PARAMETER	CLASSIFICATION
COMM	ADDRESS	♦♦

DEFINITION : Address of the recorder on the network.

HOW TO MODIFY IT : Enter a numeric value.

POSSIBLE VALUES : **[1 .. 99]**

SUB- MATRIX	PARAMETER	CLASSIFICATION
COMM	BAUDS	♦

DEFINITION : Baud rate of the communication line.

HOW TO MODIFY IT : Select a new value.

POSSIBLE VALUES :

110	**1200**	**19200**
150	**2400**	**38400**
300	**4800**	
600	**9600**	

SUB- MATRIX	PARAMETER	CLASSIFICATION
COMM	BITS	◆

DEFINITION : Number of bits per character.

HOW TO MODIFY IT : **NOT POSSIBLE**

SUB- MATRIX	PARAMETER	CLASSIFICATION
COMM	PARITY	◆

DEFINITION : Parity of character

HOW TO MODIFY IT : Select a new value.

POSSIBLE VALUES :
ODD
EVEN
NONE

NOTE : **ONLY FOR ASCII COMMUNICATION**

SUB- MATRIX	PARAMETER	CLASSIFICATION
COMM	**S T O P**	♦

DEFINITION : Number of stop bits.

HOW TO MODIFY IT : **NOT POSSIBLE**

SUB- MATRIX	PARAMETER	CLASSIFICATION
COMM	**S H E D T I M E**	♦

DEFINITION : If no communication during shedtime then activate shed time event.

HOW TO MODIFY IT : Enter a numeric value.

POSSIBLE VALUES : **[0 .. 3000] seconds**

NOTE : When the device receives a message, it resets the shed timer to shed time value. If the timer expires before the next message, the shed time event is activated.

0 second means NO SHED.

The configuration of the shed time event parameter in the EVENT sub-matrix allows you the following possible choices : event message display and/or relay activation or nothing.

SUB- MATRIX	PARAMETER	CLASSIFICATION
COMM	PHONE ID	◆

DEFINITION : Phone identification name in case of modem application.

HOW TO MODIFY IT : Enter a text. (12 digits)

SUB- MATRIX	DISPLAY	CLASSIFICATION
COMM	PHONE#	◆

DEFINITION : Phone number to compose for autodial (modem application)

HOW TO MODIFY IT : Enter a text. (18 digits)

POSSIBLE VALUES : Example : "1933,16112345678"
The phone number may include a "," sign for foreign calls.

NOTE : After a call if phone line is engaged or if there is no answer, the recorder redials up to 4 times. After these retries, if there is no response, the operation is canceled.

SUB- MATRIX	PARAMETER	CLASSIFICATION
COMM	AUTODIAL	♦

DEFINITION : No phone call, call on AL1, call on AL2 ..12, DI1 .. DI4, EV1 .. EV6, any alarm-digital or event.

HOW TO MODIFY IT : Select a new value.

SUB - MATRIX → **REPORT**

PARAMETERS → START AT

→ PARAGRPH

→ FREQENCY

SUB- MATRIX	PARAMETER	CLASSIFICATION
REPORT	START AT	♦

DEFINITION : Start time of first daily report.

HOW TO MODIFY IT : Enter a new value for hour.

Then press [ENTER]

Enter a new value for minutes.

Then press [ENTER]

SUB- MATRIX	PARAMETER	CLASSIFICATION
REPORT	**P A R A G R P H**	♦

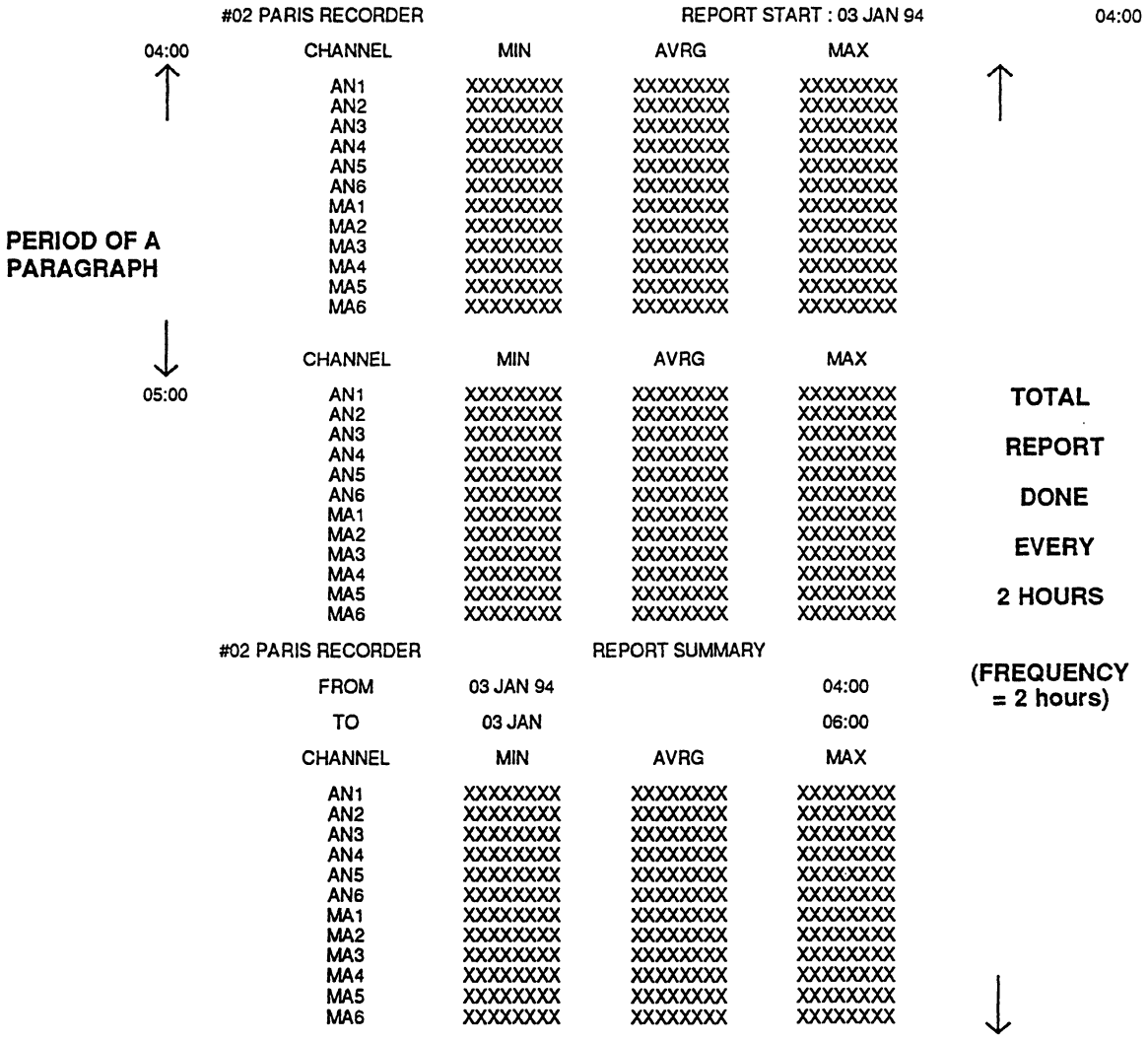
DEFINITION : Corresponds to the computation period of a PARAGRAPH relative to minimum average and maximum values for each analog input and math results.

HOW TO MODIFY IT : Select a new value.

POSSIBLE VALUES : **1/4 - 1/2 - 1 - 2 - 8 - 24 - 168 hours (7 days)**

EXAMPLE OF REPORT FOR :

START AT = 4:00
PARAGRPH = 1 hour
FREQENCY = 2 hours



SUB- MATRIX	PARAMETER	CLASSIFICATION
REPORT	FREQENCY	♦

DEFINITION : Frequency of report generation. ***= basic report time ?***

HOW TO MODIFY IT : Select a new value.

POSSIBLE VALUES : **1/4 - 1/2 - 1 - 2 - 8 - 24 - 168 hours (7 days) - never**
Must be within 1 and 24 times PARAGRPH value.

3.2 SERVICE

SUB- MATRIX	PARAMETER	CLASSIFICATION
COMM	COM TEST	♦

DEFINITION : Allows the user to test the communication option board.

HOW TO USE/EXECUTE IT : **Recorder configuration :**
- Configure CONNECT parameter to RS232.
- In the RS232 connector, connect reception to transmission pin.

In the COMMUNICATION SERVICE sub-matrix, press [ENTER] , "CONFIRM" is flashing, press [ENTER] , the test starts.

The message "WAIT PLEASED" is flashing and after several seconds, one of these messages is displayed :
- TEST PASSED : Transmission with communication board is correct.
- TEST FAILED : Problem in Rx, Tx pins connection or in the communication board.
- NO RESPONSE : Problem between the recorder mother board and the communication board. Check the connection with the communication board.

Press [SETUP] twice to come back to main menu.

4.1 MODBUS RTU PROTOCOL

4.1.1 General

A data communication system protocol controls the language structure or message format common to all devices on a network. The protocol determines how the master and slave establish and break off contact, how the sender and receiver are identified, how the messages are exchanged in an orderly manner, and how errors are detected. The protocol controls the query and response cycle which takes place between master and slave devices as shown in figure 4-1.

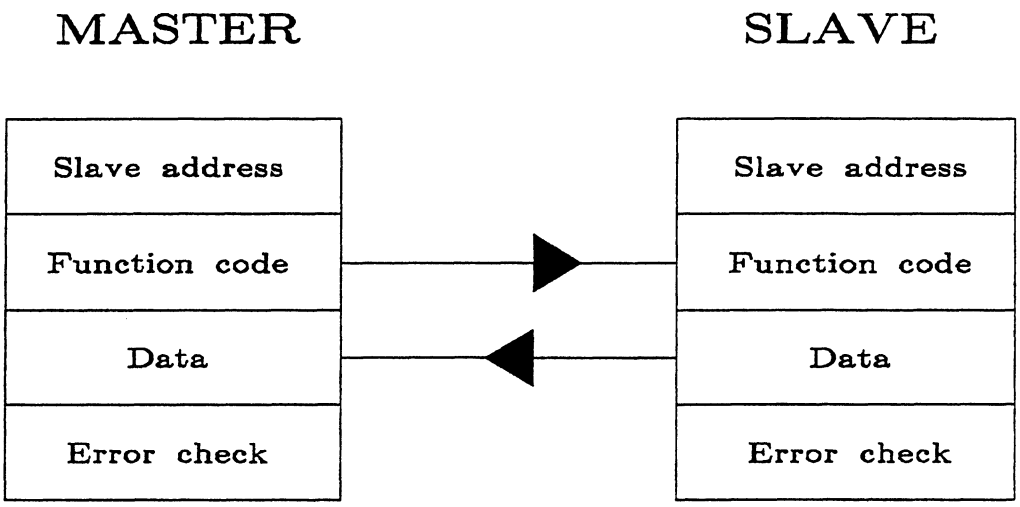


Figure 4-1 Master slave exchanges

Only the master initiates the transaction. Transactions are either a query / response type (only a single slave is addressed).

Certain characteristics of the MODBUS protocol are fixed, such as frame format, frame sequences, handling of communication errors and exception conditions, and the performed functions.

Other characteristics are user selectable. These include a choice of transmission medium and baud rate.

When the message reaches the MODBUS slave interface, it enters this addressed device through a similar "port". The addressed device removes the envelope, reads the message, and, if no errors have occurred, performs the requested task. Then it replaces the message into the saved envelope and "returns to sender". The information in the response message is :
- the slave address
- the action performed
- data required as a result of the action
- a mean of checking for errors.

4.1.1.1 Mode of transmission : RTU (remote terminal unit)

The mode of transmission is the structure of the data within a message, and the coding system used to transmit the data.

Characteristic :
Number of bits/character :

- start bits	1
- data bits (least significant first)	8
- no parity	
- stop bit	1

REM : In the MODBUS RTU mode, message characters must be transmitted in a continuous stream.
Data bits are transmitted and received LSB first.

4.1.1.2 Error detection

A CRC (cyclic redundancy check) error check sequence is calculated on each message and added to the frame before transmission. The receiving unit recalculates the CRC and compares it to the transmitted CRC.

When the character redundancy check detects a communication error, processing of the message stops. A PLC slave will not act on or respond to the message. (The same result occurs if a non-existent slave address is used).

When a communication error occurs, the message is unreliable. The PLC slave cannot know for sure if this message was intended for it. So the CPU might be answering a message which was not it's message to begin with. It is therefore essential to program the Modbus master to consider that a communication error has occurred if there is no response in a reasonable time. The length of this time period depends upon baud rate, the type of message, and the scan time of the PLC slave. Once this time is determined, the master may be programmed to automatically retransmit the message.

4.1.1.2.1 CRC-16 (Cyclic Redundancy Check) error check sequence

The CRC-16 error check sequence is implemented as described in the following paragraph :

The message (data bits only, disregarding start / stop bits) is considered as one continuous binary number whose most significant bit (MSB) is transmitted first. The message is pre-multiplied by x16 (shifted left 16 bits), then divided by (x16+x15+x2+1) expressed as a binary number (11000000000000101). The integer quotient digits are ignored and the 16-bit remainder (initialized to all ones at the start to avoid the case of all zeros being an accepted message) is appended to the message (MSB first) as the two CRC check bytes. The resulting message including CRC, when divided by the same polynomial (x16+x15+x2+1) at the receiver will give a zero remainder if no error has occurred. (The receiving unit recalculates the CRC and compares it to the transmitted CRC). All arithmetic is performed modulo two (no carries). An example of CRC-16 error check for message HEX. 207 (address 2, function 7 or a status request to slave number 2) is given in table 4-1.

The device used to serialize the data for transmission will send the conventional LSB or right-most bit of each character first. In generating the CRC, the first bit transmitted is defined as the MSB of the dividend. For convenience then, and since there are no carries used in arithmetic, let's assume while computing the CRC that the MSB is on the right. To be consistent, the byte order of the generating polynomial is dropped since it affects only the quotient and not the remainder. This yields 1010 0000 0000 0001 (HEX. A001). Note that this reversal of the bit order will have no affect whatever on the interpretation or bit order of characters external to the CRC calculations.

The step by step procedure to form the CRC-16 check bytes is as follow :

- Load a 16-bit register with all 1's.
- Exclusive OR the first 8-bit byte with the high order of the 16-bit register, putting the result in the 16-bit register.
- Shift the 16-bit register one bit to the right.
- a. If the bit shifted out to the right (flag) is one, exclusive OR the generated polynomial (1010 0000 0000 0001) with the 16-bit register.
  b. If the bit shifted out to the right is a zero, return to step 3.
- Repeat step 3 and 4 until 8 shifts have been performed.
- Exclusive OR the next 8-bit byte with the 16-bit register.
- Repeat step 3 through 6 until all bytes of the message have been exclusive OR with the 16-bit register and shifted 8 times.
- The contents of the 16-bit register are the 2 byte CRC error check and is added to the message most significant bits first.

	REGISTER 16-BITS			MSB	INDIC.
exclusive or	1111	1111	1111	1111	
0			0000	0010	
shift 1 polynomial	1111 0111 1010	1111 1111 0000	1111 1111 0000	1101 1110 0001	1

Table 4-1 CRC-16 generation

	REGISTER 16-BITS			MSB	INDIC.
shift 2 polynomial	1101 0110 1010	1111 1111 0000	1111 1111 0000	1111 1111 0001	1
shift 3 shift 4 polynomial	1100 0110 0011 1010	1111 0111 0011 0000	1111 1111 1111 0000	1110 1111 1111 0001	0 1
shift 5	1001 0100	0011 1001	1111 1111	1110 1111	0
shift 6 polynomial	0010 1010	0100 0000	1111 0000	1111 0001	1
shift 7 shift 8 polynomial	1000 0100 0010 1010	0100 0010 0001 0000	1111 0111 0011 0000	1110 1111 1111 0001	0 1
07	1000	0001	0011 0000	1110 0111	
shift 1 polynomial	1000 0100 1010	0001 0000 0000	0011 1001 0000	1001 1100 0001	1
shift 2 polynomial	1110 0111 1010	0000 0000 0000	1001 0100 0000	1101 1110 0001	1
shift 3 polynomial	1101 0110 1010	0000 1000 0000	0010 0010 0000	1111 0111 0001	1
shift 4 shift 5 polynomial	1100 0110 0011 1010	1000 0100 0010 0000	0010 0001 0000 0000	0110 0011 1001 0001	0 1
shift 6 shift 7 shift 8	1001 0100 0010 0001	0010 1001 0100 0010	0000 0000 1000 0100	1000 0100 0010 0001	0 0 0
	HEX 12		HEX 41		

TRANSMITTED MESSAGE WITH CRC-16 (Message shifted to right to transmit)							
12		41		07		02	
0001	0010	0100	0001	0000	0111	0000	0010
Last byte transmitted		TRANSMISSION ORDER				First byte transmitted	

Table 4-1 CRC-16 generation (suite)

4.1.1.3 Modbus protocol

4.1.1.3.1 Remote Terminal Unit (RTU) framing

Frame synchronization can be maintained in MODBUS RTU transmission mode only by simulating a synchronous message. The receiving device monitors the elapse time between receipt of characters. If three and one-half character times elapse without a new character or completion of the frame, then the device ignores the frame and assumes that the next received byte will be an address. See table 4-2

3.5 character transfer time minimum	ADDRESS	FUNCTION	DATA	CHECK	3.5 character transfer time minimum
	8 BITS	8 BITS	N x 8 BITS	16 BITS	

Table 4-2 MODBUS RTU frame format

4.1.1.3.2 Address field

The address field immediately follows the beginning of frame and consists of 8-bit (MODBUS RTU). These bits indicate the user assigned address of the slave device that is to receive the message sent by the attached master.

Each slave must be assigned a unique address and only the addressed slave will respond to a query that contains its address. When the slave sends a response, the slave address informs the master which slave is communicating.

The address value must be comprised between 1 and 99.

4.1.1.3.3 Function field

The function code field tells the addressed slaves what function to perform. The table 4-3 lists the function codes, their meaning and the action they initiate.

CODE	MEANING	ACTION
04	READ REGISTERS	Obtain current binary value in one or more register
06	PRESET SINGLE REGISTER	Place a specific value into a register
08	LOOPBACK DIAGNOSTIC TEST	Diagnostic test message sent to slave to evaluate communication process
16 (10 H)	PRESET MULTIPLE REGISTERS	Place specific binary values into a series of consecutive holding registers.
20 (14 H)	READ GENERAL REFERENCE	Reads information contained in memory files
21 (15 H)	WRITE GENERAL REFERENCE	Changes information contained in memory files

Table 4-3 Function codes used by the recorder

The high order bit in this field is set by the slave device to indicate that other than a normal response is being transmitted to the master device. (See section 4.1.2 for a description of exception response). This bit remains zero if the message is a query or a normal response message.

4.1.1.3.4 Data field

The data field contains information needed by the slave to perform the specific function or it contains data collected by the slave in response to a query. This information may be values, address references, or limits. For example, the function code tells the slave to read a register, and the data field is needed to indicate which register to start at and how many to read. The embedded address and data information varies with the type and capacity of PC associated with the slave.

4.1.1.3.4.1 Error check field

The field allows the master and slave devices to check a message for errors in transmission. Sometimes, because of electrical noise or other interference, a message may be changed slightly while it is on its way from one unit to another. The error detection assures that the slave or master does not react to messages that have changed during transmission. This increases the safety and the efficiency of the Modbus system.

4.1.2 Exception responses

Programming or operation errors are those involving illegal data in a message, no response from a slave for example. These errors result in an exception response from either the master computer software (Modbus Communication Handler) or the slave, depending on the type of error. The exception response codes are listed in table 4-4. When a slave detects one of these errors, it sends a response message to the master consisting of slave address, function code, error code and error check fields. To indicate that the response is a notification of an error, the high order bit of the function code is set to 1.

CODE	NAME	MEANING
01	ILLEGAL FUNCTION	The message function received is not an allowable action for addressed slave.
02	ILLEGAL DATA ADDRESS	The address referenced in the data field is not an allowable address for the addressed slave location.
03	ILLEGAL DATA VALUE	The value referenced in the data field is not allowable in the addressed slave location.
06	BUSY, REJECTED MESSAGE	The message was received without error, but the slave is engaged in processing a long duration program command. Retransmit later.

Table 4-4 Exception response codes

4.1.3 Detailed explanation of used Modbus functions.

4.1.3.1 Read registers (code 04)

☞ QUERY

Function code 04 obtains the contents of one or more register(s). The registers cannot be written by this function. They are numbered from zero up.

ADDRESS	FUNCTION	DATA START REGISTER HO	DATA START REGISTER LO
02	04	02	00

	DATA NUMBER OF REG HO	DATA NUMBER OF REG LO	ERROR CHECK FIELD
	00	02	7040

Always equal to zero for this application

Table 4-5 Read register (Query)

☞ RESPONSE

The addressed slave responds with its address and the function code followed by the information field. The information field contains 1 byte describing the quantity of data byte to be returned. The contents of the registers requested (DATA) are 2 bytes each, with the binary content right justified within each pair of characters. The first byte includes the high order bits and the second, the low order bits.

ADDRESS	FUNCTION	BYTE COUNT	DATA REGISTER 1	
02	04	04	42	50

	DATA REGISTER 2		ERROR CHECK FIELD
	00	00	DCED

Table 4-6 Read register (Response)

4.1.3.2 Loopback test (Code 08)

☞ QUERY

The loopback test allows to evaluate the communication process. This test does not affect the content of the controller.

The loopback test requests a simple return of the query message. (Diagnostic code 0000)

ADDRESS	FUNCTION	DATA DIAGNOSTIC CODE HO	DATA DIAGNOSTIC CODE LO	
01	08	00	00	

	DATA	DATA	CRC
	2E	3E	7C7B

☞ RESPONSE

The loopback test response is a simple return of the query message. (Diagnostic code 0000)

ADDRESS	FUNCTION	DATA DIAGNOSTIC CODE HO	DATA DIAGNOSTIC CODE LO	
01	08	00	00	

	DATA	DATA	CRC
	2E	3E	7C7B

4.1.3.3 Preset single register (code 06)

☞ QUERY

Function 06 allows the user to modify the contents of a register. Unused high order bits must be set to 0.

ADDRESS	FUNCTION	REGISTER NUMBER HO	REGISTER NUMBER LO	
02	06	0A	01	

	DATA VALUE HO	DATA VALUE LO	ERROR CHECK FIELD
	00	01	1A21

Table 4-7 Preset single register (Query)

☞ RESPONSE

The normal response to a preset single register request is to retransmit the query message after the register has been altered.

ADDRESS	FUNCTION	REGISTER NUMBER HO	REGISTER NUMBER LO	
02	06	0A	01	

	DATA	DATA	ERROR CHECK FIELD
	00	01	1A21

Table 4-8 Preset single register (Response)

4.1.3.4 Preset multiple registers (code 16)

☞ QUERY

The master sends the address of the first register to be written (2 bytes), the number of data bytes transmitted (1 byte), the data bytes and the error check byte.

ADDRESS	FUNCTION	REGISTER ADDRESS HO	REGISTER ADDRESS LO	
02	10	10	02	

QUANTITY OF REGISTERS		BYTE COUNT	HO DATA	HO DATA
00	02	04	42	97

Always equal to zero for this application

	HO DATA	LO DATA	ERROR CHECK FIELD
	33	33	4183

Table 4-9 Preset multiple register (Query)

☞ RESPONSE

The normal response to a function 16 query is to echo the address, function code, starting address and number of registers to be loaded.

ADDRESS	FUNCTION	HO ADDRESS	LO ADDRESS	
02	10	10	02	

	QUANTITY		ERROR CHECK FIELD
	00	02	E4FB

Table 4-10 Preset multiple register (Response)

4.1.3.5 Read general reference (code 20)

☞ QUERY

Several sub-requests can be included in one message. Each sub-request reads a contiguous group of registers.

ADDRESS	FUNCTION	BYTE CNT	
B	B	B	

SUB-REQUEST			
REF TYPE	FILE NO	REQ ADDR	REG CNT
B	W	W	W

↓

SUB-REQUEST				
REF TYPE	FILE NO	REQ ADDR	REG CNT	ERROR CHECK FIELD
B	W	W	W	W(CRC)

Table 4-11 Read general reference query message format

Byte count :

The total number of bytes in the read general reference response message, excluding the address, function code, byte count, and the error check fields ; that is all occurrences of the following : sub-response byte count, reference type, and the first through the nth register in each sub-response.

Data byte count :

The data byte count is the number of data bytes of the sub-response including the reference type but not including itself. A floating point-sub response has four bytes of data and one byte representing the reference type making the data byte count equal to five.

Reference type :

Equal to zero for this application

☞ RESPONSE

One read general reference query message can result in one or more sub-responses. The addressed slaves responds with its own address, the function code, and the total byte count of one or more sub-responses. Each sub-response contains the byte count of that sub-response, its reference type, and the response data. The error check field follows the last sub-response.

			SUB-RESPONSE				
ADDR	FUNC	BYTE CNT	SUB RESP BYTE CNT	REF TYPE	1ST REG DATA	2ND REG DATA	→ NTH REG DATA
B	B	B	B	B	HL BB	HL BB	HL BB

↓

SUB-RESPONSE					
SUB RESP BYTE CNT	REF TYPE	1ST REG DATA	2ND REG DATA	→ NTH REG DATA	ERROR CHECK FIELD
B	B	HL BB	HL BB	HL BB	W(CRC)

Table 4-12 Read general reference response message format

Response byte count :
The number of bytes in each separate sub-response.

Reference type :
Must be equal to zero for this application

Error check :
The cyclic redundancy check if using RTU transmission.

4.1.3.6 Write general reference (Code 21)

☞ QUERY

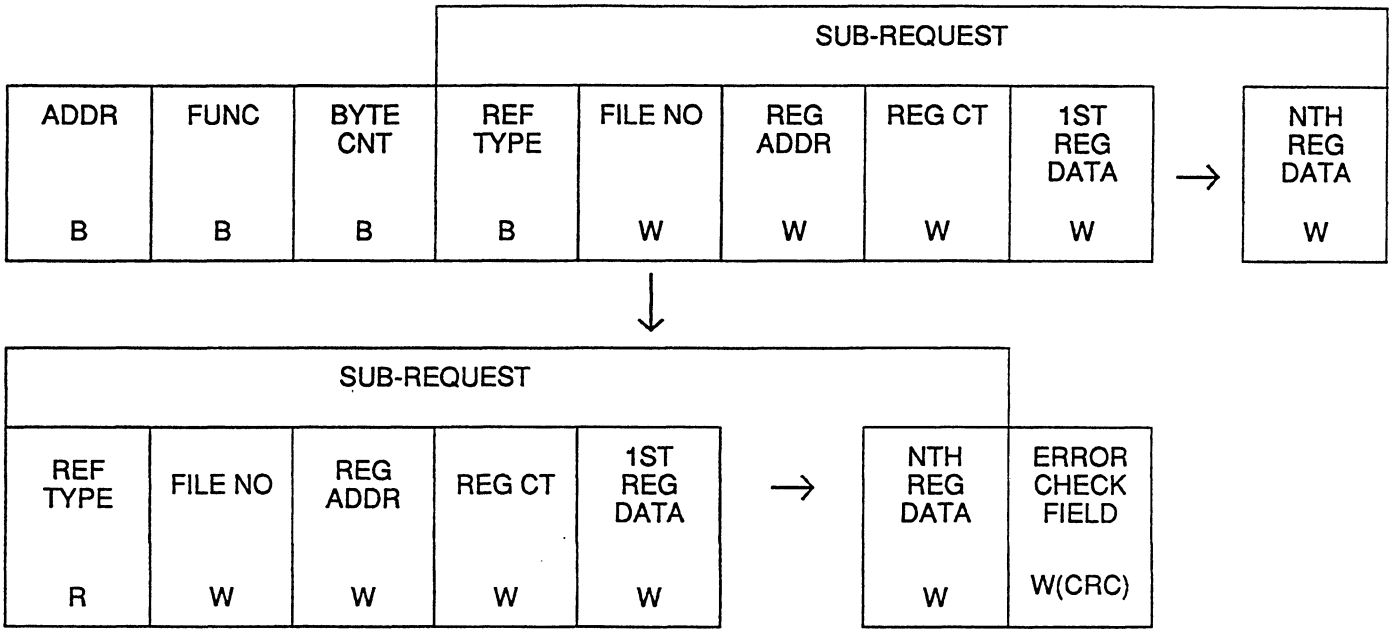


Table 4-13 Write general reference query message format

Example :

			SUB-REQUEST								
ADDR	FUNC	BYTE CNT	REF TYPE	FILE NO	REG ADDR	REG CT	1ST REG DATA	2ND REG DATA	3RD REG DATA	4TH REG DATA	CRC
01	15	0F	00	0000	0002	0004	003C	005E	0071	0071	87F1

Byte count :

The total number of bytes in the write general reference message, excluding the address, function code, byte count, and the error check fields ; that is all occurrences of the following : reference type, file number, register address, register count, and the first through the last register in the write general reference query message.

☞ RESPONSE

The normal response to a write general reference query message is the retransmission of the write request.

			SUB-REQUEST							
ADDR	FUNC	BYTE CNT	REF TYPE	FILE NO	REG ADDR	REG CT	1ST REG DATA	2ND REG DATA	3RD REG DATA	4TH REG DATA
B	B	B	B	W	W	W	W	W	W	W

↓

SUB-REQUEST							
REF TYPE	FILE NO	REG ADDR	REG CT	1ST REG DATA	2ND REG DATA	3RD REG DATA	ERROR CHECK FIELD
B	W	W	W	W	W	W	CRC

Table 4-14 Write general reference response message

Reference type :
Equal to zero for this application.

File number :
Equal to zero for this application.

Starting register address :
The address of the first register in which information is to be entered or changed.

Register count :
The number of registers in which information will be entered or changed.

5. RTU PARAMETERS

5.1 LOOPBACK

This frame tests the communication system to know if the communication with the recorder is correct. Variations in the response may indicate faults in the modbus system. The information field contains 2 bytes for the designation of diagnostic code followed by 2 bytes for the information field.

- Function code : 08
- Data diagnostic code : 0000 (Return query data)
- Data field : A5 37 for example

EXAMPLE :

01	08	00	00	A5	37	DA8D

- Request : Loopback test return query data
- Device address : 01

01	08	00	00	A5	37	DA8D

- Response : Loopback test return query data response

5.2 READ PROCESS VARIABLES

- Function : Read (code 04H)
- Address range : 1800 to 185B HEX
- Number of values : 92

ADDRESS	TRANSMITTED REGISTERS	
1800	ANALOG 1 float IEEE MSB	
1801	ANALOG 1 float IEEE LSB	
1802	ANALOG 2 float IEEE MSB	
1803	ANALOG 2 float IEEE LSB	
1804	ANALOG 3 float IEEE MSB	(REG N)
1805	ANALOG 3 float IEEE LSB	(REG N+1)
1806	ANALOG 4 float IEEE MSB	.
1807	ANALOG 4 float IEEE LSB	.
.		See appendix E for IEEE information.
.		
185A	MATH RESULT 6 float IEEE MSB	
185B	MATH RESULT 6 float IEEE LSB	

ADDRESSES ORGANIZATION	
1800 - 180A	ANALOG 1 (1800) - ANALOG 6 (180A)
180C - 1816	Reserved
1818 - 1822	COM 1 (1818) - COM 6 (1822)
1824 - 183E	Reserved
1840 - 1846	DIGITAL 1 (1840) - DIGITAL 4 (1846)
1848 - 184E	Reserved
1850 - 185A	MATH A RESULT 1 (1850) - MATH RESULT 6 (185A)
185C - 187E	Reserved

WARNING : - The register address has to be EVEN. It is impossible to read only LSB of variable.
- The number of registers has to be EVEN and different from 0. Otherwise an invalid address error code will be returned.

EXAMPLE :

01	04	18	02	00	02	D6AB

- Request : Read analog 2 value
- Device address : 01
- Number of registers : 0002
- Register start address : 1802

01	04	04	42	5D	47	AE	CC62

- Response : Analog 2 = 55.32 decimal

5.3 SEND COMMUNICATION PV VALUES

- Function : Write (code 10H)
- Address range : 1000 to 100B H
- Number of registers : 0C

ADDRESS	TRANSMITTED REGISTERS	
1000	Write COM 1 - float IEEE MSB	
1001	Write COM 1 - float IEEE LSB	
1002	Write COM 2 - float IEEE MSB	
1003	Write COM 2 - float IEEE LSB	
1004	Write COM 3 - float IEEE MSB	(REG N)
1005	Write COM 3 - float IEEE LSB	(REG N+1)
1006		.
1007		.
1008	Write COM 5 - float IEEE MSB	See appendix E for IEEE information.
1009	Write COM 5 - float IEEE LSB	
100A	Write COM 6 - float IEEE MSB	
100B	Write COM 6 - float IEEE LSB	

WARNING : - The register address has to be EVEN. It is impossible to read only LSB of variable.
- The number of registers has to be EVEN and different from 0. Otherwise an invalid address error code will be returned.

EXAMPLE :

01	10	10	02	00	04	08	42	82	3D	71	

	41	46	14	7B	94E0

- Request : Force COM 2 to 65.12 (42823D71 H)
  Force COM 3 to 12.38 (4146147B H)
- Device address : 01
- Number of registers : 0004
- Register start address : 1002

01	10	10	02	00	04	64CA

- Response : Performed operation

5.4 PRINT A MESSAGE

- Function : Write (code 10H)
- Address range : 0300 to 030F
- Number of values : 30 characters (See Appendix A)

ADDRESS	TRANSMITTED REGISTERS	
0300	1st character	2nd character
0301	3rd character	4th character
0302	5th character	6th character
0303	7th character	8th character
.	.	
.	.	
.	.	
030F	29th character	30th character

Notes : 1 - The minimum time between two print messages depends on the chart speed :
Chart speed < 100 mm/h : minimum time (in minutes) = 150 / chart speed (in mm/h)
Chart speed ≥ 100 mm/h : minimum time = 1 mn 50 s
2 - This message is printed on blank paper.

WARNING :

- If the minimum time between 2 messages is not respected, the message will not be printed.
- The authorized characters are given in appendix A.
- Starting address must be 0300 H otherwise an invalid address error code will be returned.

The maximal length of the message definable by the user is fixed to 30 characters. The message will be printed in the following format :
C : User - text
Example : "C : This is a user-message"
The character @ is used to place the date or time of the recorder in the user-message :
- By default, the message will be printed on blank.
- @d will be replaced by the current date.
- @h will be replaced by the current time.
- @e : the message will be printed on trace.

- Register number has to be EVEN otherwise an invalid address error code will be returned.

EXAMPLE 1 :

01	10	03	00	00	04	08	30	31	32	33	34	

	35	36	37	D830

- Request : Send message "c : 12345678"
- Device address : 01
- Number of registers : 04
- Register start address : 0300

01	10	03	00	00	04	C18E

- Response : Performed operation

EXAMPLE 2 :

01	10	03	00	00	05	0A	40	64	20	40	68	

	20	44	44	44	44	77CA

- Request : Send message "c : 22 MAR 94 14:50 DDDD" on blank
- Device address : 01
- Number of registers : 05
- Register start address : 0300

01	10	03	00	00	05	004E

- Response : Performed operation

EXAMPLE 3 :

01	10	03	00	00	05	0A	40	64	20	40	68	

	20	44	44	40	65	B512

- Request : Send message "c : 22 MAR 94 14:50 DD" on trace
- Device address : 01
- Number of registers : 05
- Register start address : 0300

01	10	03	00	00	04	C18E

- Response : Performed operation

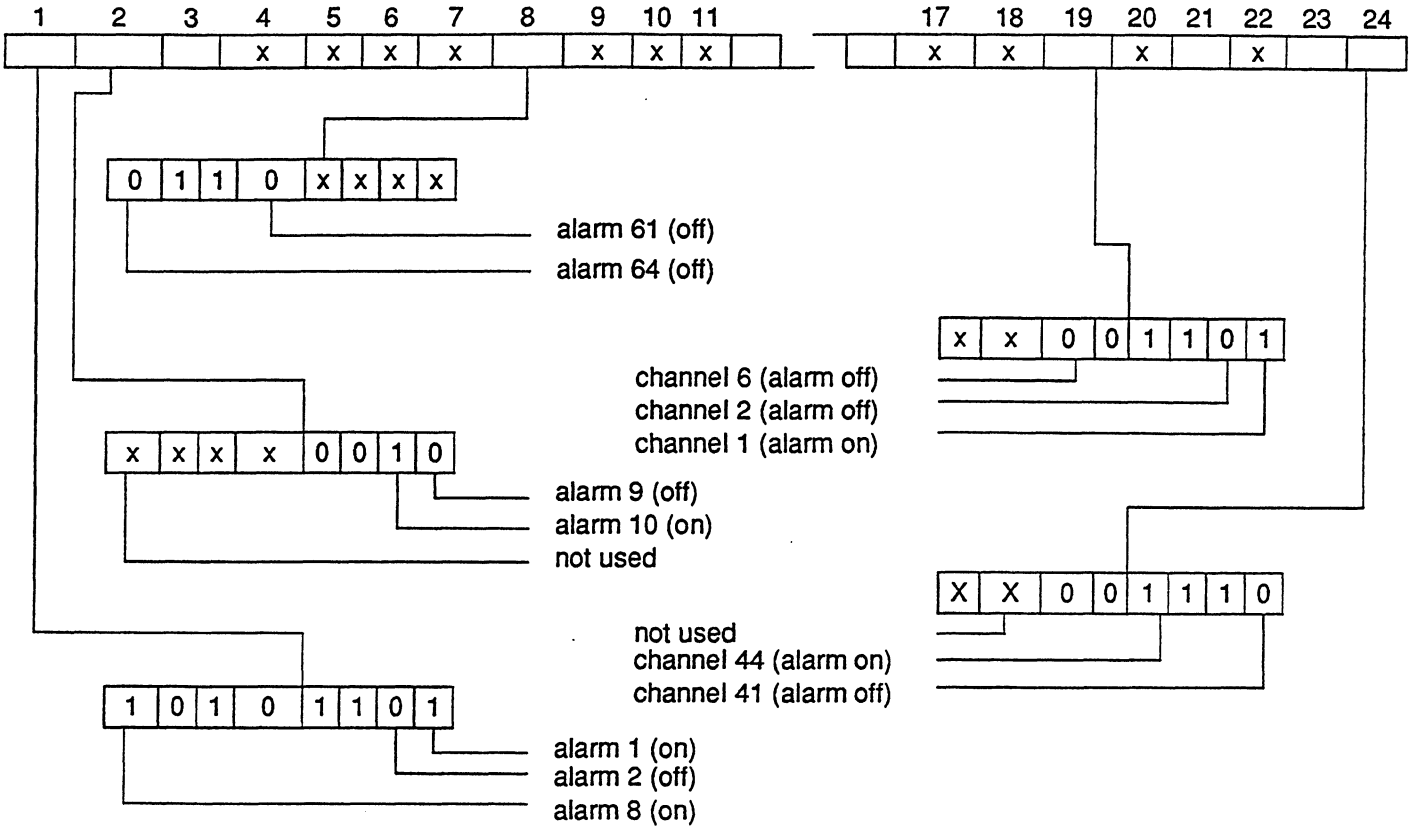
5.5 ALARM STATUS

1. Indicates the alarm status ON or OFF
2. Indicates the number of channels in alarm
   Alarm 1 - 12 : Analog alarms (1 - 60)

- Function : read only (code 04 H)
- Address range : 0100 to 010C
- Number of registers : 12
- Bytes : 1 - 2 number of alarm and alarm status
  3 : event status
  4 - 7 : reserved
  8 : digital alarm status
  9 - 18 : reserved
  19 : analog channel in alarm
  20 : reserved
  21 : com. channel in alarm
  22 : reserved
  23 : digital channel in alarm
  24 : maths channel in alarm
  bit 0 = alarm off
  bit 1 = alarm on

ADDRESS	TRANSMITTED REGISTERS	
0100	byte 1	byte 2
0101	byte 3	byte 4
0102	byte 5	byte 6
0103	byte 7	byte 8
0104	byte 9	byte 10
0105	byte 11	byte 12
.		
.		
010B	byte 23	byte 24

☞ Byte meaning :



EXAMPLE :

01	04	01	00	00	02	7037

☞ Request : Which alarm from 1 to 32 is ON ?
☞ Device address : 01
☞ Number of registers : 0002
☞ Register start address : 0100

01	04	04	0F	03	31	00	1D00

☞ Response

0F : 0000 1111 : Alarms 1 to 4 are ON
03 : 0000 0011 : Alarms 9 and 10 are ON
31 : 0011 0001 : EV1, EV5 and EV6 are ON
00 : 0000 0000 : reserved

5.6 PRINT PV'S

This frame starts the printout of the current PV'S on the paper. This frame is fixed (if different, an invalid error code will be returned).

- Function code : 06 (write)
- Register number : 0A 01
- Register value : 00 01

EXAMPLE :

01	06	0A	01	00	01	1A12

- Request : Print the current PV's on the paper.
- Device address : 01
- Register start address : 0A01

01	06	0A	01	00	01	1A12

- Response : Performed operation

5.7 BATCH NUMBER

This frame requests the current batch number and is fixed. Different parameters will induce an invalid error code.

- Function code : 04 (read)
- Register start address : 0200
- Register number : 0002

ADDRESSES	
0200	Batch float IEEE MSB
0201	Batch float IEEE LSB

EXAMPLE :

01	04	02	00	00	02	7073

- Request : What is the batch number value ?
- Device address : 01
- Number of registers : 0002
- Register address : 0200

01	04	04	42	90	00	00	EFD1

- Response
  - Byte count : 04
  - Batch number value : 42 90 00 00 H = 72 D

5.8 PRINTER STATUS

This frame requests informations concerning the printer status and is fixed. Different parameters will induce an invalid error code.

- Function code : 04 (read)
- Register start address : 0800
- Number of registers : 0004

ADDRESSES	TRANSMITTED REGISTERS	
0800	NOT USED - Reserved	Cassette state
0801	Speed used	Printer mode
0802	Remaining paper length float IEEE MSB	
0803	Remaining paper length float IEEE LSB	

BYTE MEANING :

Byte :	0	Reserved	
	1	Cassette state	Value : 00 = cassette out 01 = cassette in
	2	Paper speed	Value : 00 = speed 1 used 01 = speed 2 used
	3	Printer mode	Value : 00 = printer inhibit 01 = print mode 02 = precursor mode with STBY 03 = precursor mode without STBY
	4 - 7	Remaining paper	Value : 4 bytes in mm Value of remaining paper length IEEE format

EXAMPLE :

01	04	08	00	00	04	F3A9

- Request : Informations about the printer ?
- Device address : 01
- Number of registers : 0004
- Register address : 0800

01	04	08	00	01	01	01	46	AE	92	00	1115

- Response
  - 00 : reserved
  - 01 : no cassette in
  - 01 : speed 1 used
  - 01 : print mode
  - Remaining paper length : 22.3 m

5.9 RELAY STATES

This frame is used for the current relay states (relays 1 to 6). The first byte of the response is reserved. The frame is fixed. Different parameters will induce an invalid error code.

- Function code : 04 (read)
- Register address 0C00
- Number of registers 0001

ADDRESS	TRANSMITTED REGISTERS	
0C00	Reserved	Relays (1 to 6)

EXAMPLE :

01	04	0C	00	00	01	329A

- Request : Which relays are active ?
- Device address : 01
- Number of registers : 00 01
- Register address : 0C 00

01	04	02	00	35	7927

- Response : 35 : 00110101 : relays 1, 3, 5, 6 active

5.10 READ ALARM SETPOINT

This parameter allows to read the alarm setpoints of the recorder. Different parameters will induce an invalid error code.

- Function code : Read (14 H)
- Reference type : 00
- Number of files : 00 00
- Register address (must be even) : 00 00 to 00 16
- Register count : 00 02

ADDRESSES		
Register address		
00 00	Alarm 1 setpoint float IEEE MSB	
00 01	Alarm 1 setpoint float IEEE LSB	
00 02	Alarm 2 setpoint float IEEE MSB	
00 03	Alarm 2 setpoint float IEEE LSB	
00 04	Alarm 3 setpoint float IEEE MSB	(REG N)
00 05	Alarm 3 setpoint float IEEE LSB	(REG N+1)
00 06	Alarm 4 setpoint float IEEE MSB	
00 07	Alarm 4 setpoint float IEEE LSB	
00 08	Alarm 5 setpoint float IEEE MSB	See appendix E
00 09	Alarm 5 setpoint float IEEE LSB	for IEEE information.
00 0A	Alarm 6 setpoint float IEEE MSB	
00 0B	Alarm 6 setpoint float IEEE LSB	
00 0C	Alarm 7 setpoint float IEEE MSB	
00 0D	Alarm 7 setpoint float IEEE LSB	
00 0E	Alarm 8 setpoint float IEEE MSB	
00 0F	Alarm 8 setpoint float IEEE LSB	
00 10	Alarm 9 setpoint float IEEE MSB	
00 11	Alarm 9 setpoint float IEEE LSB	
00 12	Alarm 10 setpoint float IEEE MSB	
00 13	Alarm 10 setpoint float IEEE LSB	
00 14	Alarm 11 setpoint float IEEE MSB	
00 15	Alarm 11 setpoint float IEEE LSB	
00 16	Alarm 12 setpoint float IEEE MSB	
00 17	Alarm 12 setpoint float IEEE LSB	

EXAMPLE :

01	14	07	00	00	00	00	08	00	02	9F27

- Request : Read alarm 5 setpoint
- Device address : 01
- Number of registers : 0002
- Register address : 0008

01	14	06	05	00	41	DA	CC	CD	C098

- Response : Alarm 5 = 11223344 H = 27.35 D

5.11 WRITE ALARM SETPOINTS

This frame is used to modify the alarm setpoints in the recorder configuration. Different parameters will induce an invalid error code.

- Function code : 15 H (Write)
- Reference type : 00
- Number of files : 00 00
- Register count : 00 02 (An alarm setpoint is updated)
- Register address range (must be even) : 00 00 to 00 16

WARNING : See CONFIGURATION LOCK parameter, before any use of the WRITE ALARM SETPOINT parameter.
See also END CONF WRITE.

ADDRESSES		
Register address		
00 00	Alarm 1 setpoint float IEEE MSB	
00 01	Alarm 1 setpoint float IEEE LSB	
00 02	Alarm 2 setpoint float IEEE MSB	
00 03	Alarm 2 setpoint float IEEE LSB	
00 04	Alarm 3 setpoint float IEEE MSB	(REG N)
00 05	Alarm 3 setpoint float IEEE LSB	(REG N+1)
00 06	Alarm 4 setpoint float IEEE MSB	
00 07	Alarm 4 setpoint float IEEE LSB	
00 08	Alarm 5 setpoint float IEEE MSB	See appendix E
00 09	Alarm 5 setpoint float IEEE LSB	for IEEE information.
00 0A	Alarm 6 setpoint float IEEE MSB	
00 0B	Alarm 6 setpoint float IEEE LSB	
00 0C	Alarm 7 setpoint float IEEE MSB	
00 0D	Alarm 7 setpoint float IEEE LSB	
00 0E	Alarm 8 setpoint float IEEE MSB	
00 0F	Alarm 8 setpoint float IEEE LSB	
00 10	Alarm 9 setpoint float IEEE MSB	
00 11	Alarm 9 setpoint float IEEE LSB	
00 12	Alarm 10 setpoint float IEEE MSB	
00 13	Alarm 10 setpoint float IEEE LSB	
00 14	Alarm 11 setpoint float IEEE MSB	
00 15	Alarm 11 setpoint float IEEE LSB	
00 16	Alarm 12 setpoint float IEEE MSB	
00 17	Alarm 12 setpoint float IEEE LSB	

EXAMPLE :

01	15	0B	00	00	00	00	08	00	02	41	09	

	99	9A	A28B

- Request : Write alarm 5 setpoint = 8.6 (4109999A H)
- Device address : 01
- Number of registers : 0002
- Register address : 0008

01	15	0B	00	00	00	00	08	00	02	41	09	

	99	9A	A28B

- Response : The normal response to a write general reference query message is the retransmission of the write request.

WARNING : Before any configuration change, it's required to send the "LOCK CONFIGURATION" frame.

5.12 CONFIGURATION LOCK

This frame allows to lock or unlock the configuration. With a lock-set on the recorder, configuration parameters can not be modified when using keyboard or jack connection. For this reason , the "LOCK" frame is required before any configuration changes.

- Function code : 06 (write)
- Register value : 0001
- Register number : 2E 00 unlock the configuration access
  2E 01 lock the configuration access

EXAMPLE :

01	06	2E	01	00	01	10E2

- Request : Lock configuration access request
- Device address : 01
- Register address : 2E01

01	06	2E	01	00	01	10E2

- Response : Performed operation

WARNING : When you reboot your recorder, the lock will not be active.

5.13 END CONF WRITE

This frame allows the user to indicate to the recorder that all the configuration changes are made. This action has to be executed after the frame "Write - alarm setpoints" and this frame is fixed. Different parameters will induce an invalid error code.

- Function code : 06 (write)
- Register number : 06 01
- Register value : 00 01

EXAMPLE :

01	06	06	01	00	01	1942

- Request : Indicate to the recorder that all the configuration changes are made.
- Device address : 01
- Register start address : 0601

01	06	06	01	00	01	1942

- Response : Performed operation

6. ASCII FUNCTIONS

6.1 INTERFACE FUNCTIONS

• Transmission system	: asynchronous transmission system with start-stop bits.
• Start bit	: 1 bit
• Stop bit	: 1 bit
• Parity	: even, odd, no parity
• Bit per character	: 8 bits including parity
• Baud rate	: 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 elements per second
• Electrical signal characteristics	: E.I.A (Electronic Industries Association) - standard RS232C, RS422 and RS485.

6.2 PROTOCOL

The protocol used for the universal communication option is based on the modified transparent mode protocol. This permits the recorder to be connected on the same serial multi-drop link RS422/RS485 as the regulator.

6.3 ASCII CODE SET

The universal communication option uses the American Standard Code for Information Interchange (ASCII).

The characters used are :

- Upper case, alphabetic characters (A - F), for hexadecimal values
- Numeric characters (0 - 9)
- Certain symbols such as comma (,), carriage return, line feed.
- Only for the information field of the loopback protocol are all ASCII characters allowed.

6.4 LOOPBACK

The loopback protocol is provided for link tests. With this message exchange you can test the communication link between your computer and the recorder. The host computer sends a serie of ASCII characters to the recorder, and the recorder will return the characters it received to the host computer.

6.5 CHECKSUM

There is an optional transaction called "checksum" which is used to increase security on the link. Used with any message exchange, it enables both your computer and your recorder to detect messages that have been corrupted by line noise.

6.6 MESSAGE EXCHANGE

Each communication takes place as a message exchange : your computer sends a request message (ASCII characters), and then waits for the resulting response (ASCII characters) from the device involved. Your computer is the host, it initiates the message exchange. The recorder is a response only device. When you send a READ request, the recorder responds with the data requested. When you send a WRITE request the recorder responds with a message advising whether the operation is performed or not.

6.6.1 Request messages

Request messages are composed of standard fields, separated by commas. Each field contains a specific kind of information which must be entered in the specified order to obtain a valid request message.

6.6.1.1 Station address

A two digit device address - from 01 to 99 - identifies the specific device you are addressing. You must assign a unique station address to each device on the link.

6.6.1.2 Protocol field

A four digit number selects whether or not you are going to use a Checksum Protocol with your message exchange.

- 4204 selects checksum protocol
- 0204 ignores checksum protocol

When a message contains other values in the protocol field, the recorder will not respond at all even if the address is correct.

6.6.1.3 Function type field

A two digit character indicates which kind of operation will be performed.

- 01 READ from variable
- 02 WRITE to variable
- 03 READ of configuration data
- 04 WRITE to configuration data
- 8A loopback message

6.6.1.4 Parameter type field

Two hexadecimal characters indicate which parameter will be accessed. For loopback protocol this field does not exist (see examples).

6.6.1.5 Data type field

A one character field specifies the format or data type of the data field.

- 0 : hexadecimal values in data field
- D : ASCII characters in data field (loopback only)

6.6.1.6 Number field

Two digit hexadecimal characters contain the number of values which have to be read or written. This number depends on the number of values and the data-field length of each parameter.

Restrictions for this number :

1. Minimum value is 01.
2. The number must be smaller or equal to the maximum number of values.
3. The number multiplied by the data field length must be smaller or equal to 36.

The above condition should be met to obtain a valid request.

6.6.1.7 Starting index field

A two characters hexadecimal field contains the number of the first value which has to be read or written.

The starting index depends on the number in the previous number field, the number of values and the data field length for the specific parameter.

Restrictions for the index number :

1. The index number should be smaller or equal to maximum number of values.
2. The minimum value is 01
3. The sum of the starting index and number must be smaller or equal to the maximum number of values + 1.

6.6.1.8 Data field

This field with variable length contains only data in case of a WRITE request. The fields with two hexadecimal ASCII characters are separated by commas.

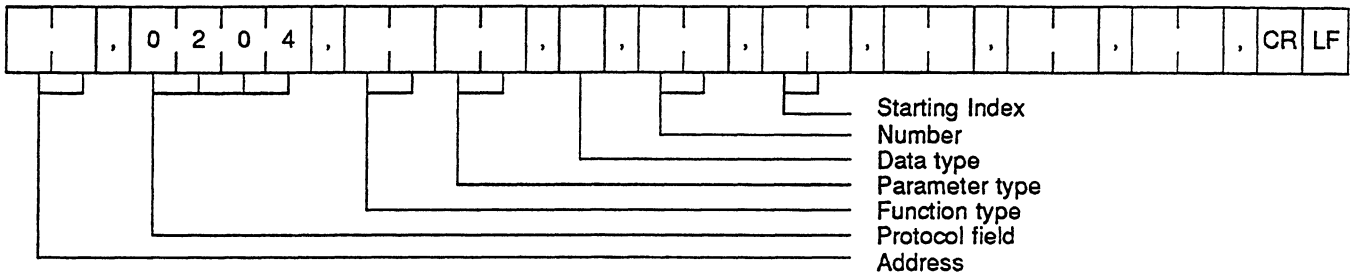
6.6.1.9 Checksum field

This field is a one byte hexadecimal value (two ASCII characters) representing the binary sum of all previous characters. This field has to be present when a checksum protocol is selected in the protocol field.

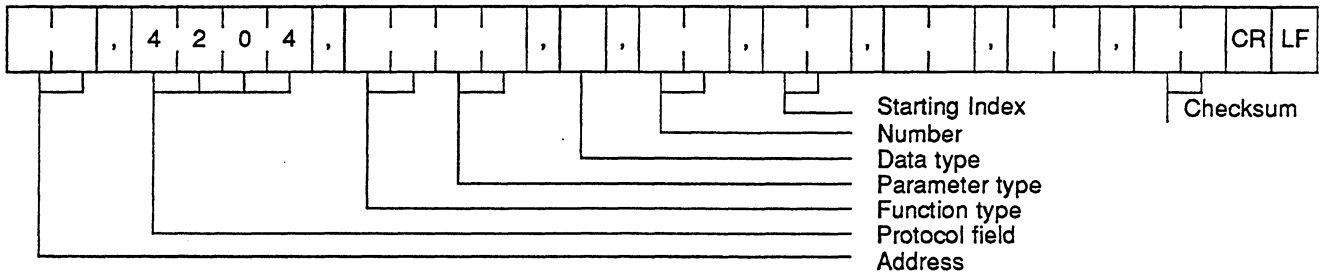
6.6.1.10 Carriage return/line feed

Terminates a message.

6.6.1.11 General request message without checksum



6.6.1.12 General request message with checksum



6.6.2 Response message

The response message returns data in case of a READ operation and tells your computer the present status or value of the operation initiated by the request message.

6.6.2.1 Request message status code

A two digit code indicates whether or not the present request message was successfully processed.

- 00 operation performed
- 01 invalid request
- 02 invalid format
- 04 invalid checksum, parity or framing error
- 05 invalid mode

Refer to Appendix D, "TROUBLESHOOTING" for resolving invalid requests.

6.6.2.2 Device status

A two digit code indicates whether or not the addressed recorder is working correctly and has performed the requested operation.

- 00 recorder is working correctly
- 01 problem detected

6.6.2.3 Device mode

A two digit code indicates the mode of the recorder.

- 00 reserved
- 01 run mode
- 02 reserved
- 03 DEF BY RECORDER
- 04 DEF BY COM
- 05 COMM DOWNLOAD MODE
- 06 CAL PAP MODE
- 07 PRINT CONF MODE

6.6.2.4 Data field

Contains information in case of loopback or READ request. The different two ASCII characters are separated by a comma. For more information see each parameter type.

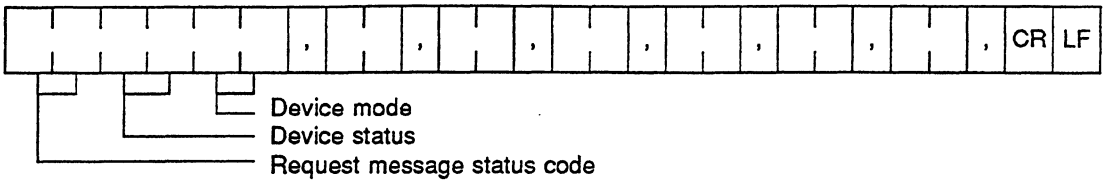
6.6.2.5 Checksum field (optional)

This field is a one byte hexadecimal value (two ASCII characters) representing the binary sum of all previous characters. This field is only present in the response when the protocol field in the request contained 4204.

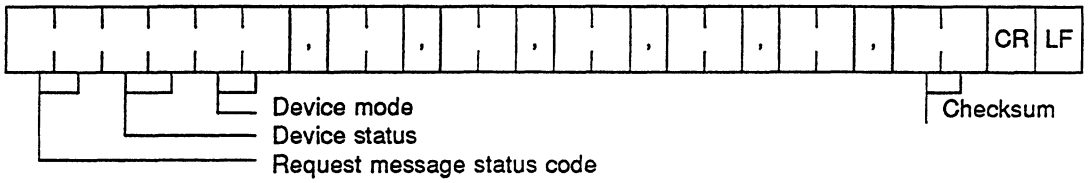
6.6.2.6 Carriage return/line feed

Terminates a message.

6.6.2.7 General response message without checksum protocol



6.6.2.8 General response message with checksum protocol

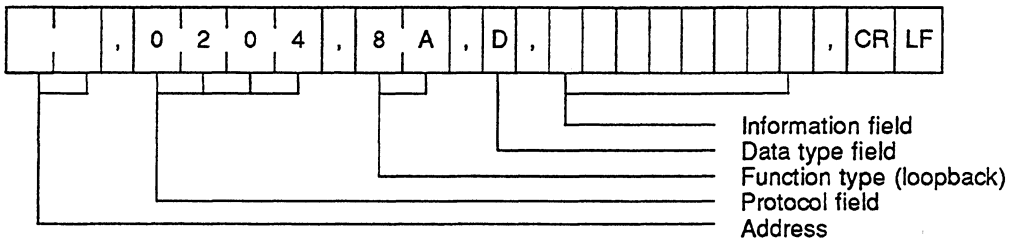


6.7 LOOPBACK REQUEST AND RESPONSE

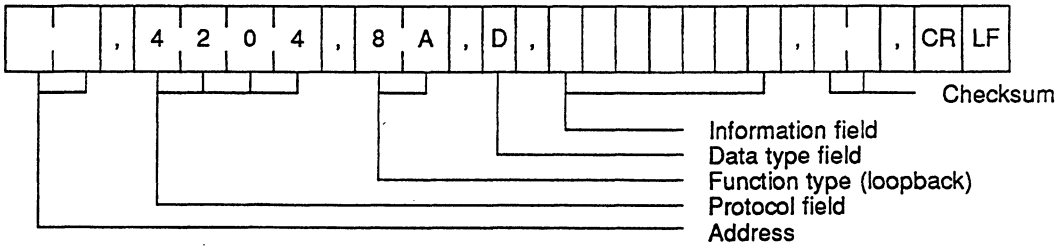
The loopback protocol can be used with or without the checksum protocol. In the information field all ASCII characters are allowed, except the character CR (carriage return). The length of the information field is variable but maximum of 100 characters.

6.7.1 Loopback request

6.7.1.1 Loopback request message without checksum

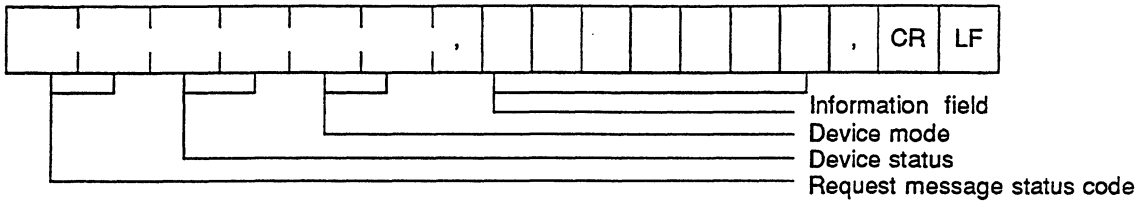


6.7.1.2 Loopback request message with checksum

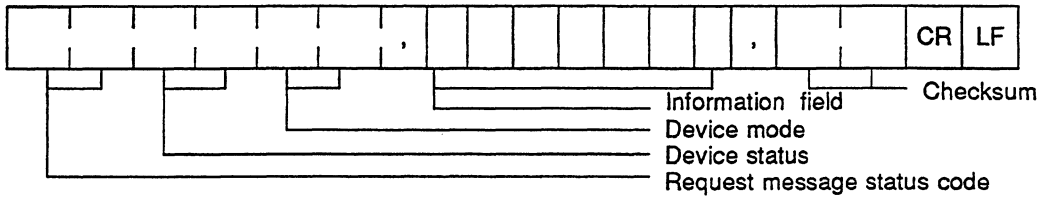


6.7.2 Loopback response

6.7.2.1 Loopback response message without checksum protocol



6.7.2.2 Loopback response message with checksum protocol



6.8 CHECKSUM PROTOCOL (for data security)

The optional checksum protocol is used to increase security on the communication link. This protocol enables both your computer and your recorder to detect messages that have been interrupted by line noise.

6.8.1 Using checksum protocol

You can use the checksum protocol with any message exchange. The recorder uses the protocol to check the transmission of request messages. Your computer uses the protocol to check the transmission of response messages when a message exchange includes the checksum protocol.

- Your recorder can tell, with high probability, if the ASCII code in the request message has changed during transmission from your computer.
- Your computer can tell, with high probability, if the ASCII code in the response message has changed during transmission from the recorder.

To use the checksum protocol, you change the format of the request message as shown in chapter 6.6.1.12.

1. You use a 4204 in request protocol field.
2. You insert 2 hexadecimal characters that represents the checksum that you have calculated from the ASCII codes in the request message as explained in 6.8.2.

6.8.2 Procedure for calculating the checksum

1. Take the binary sum, ignoring carry forwards generated by the most significant bits, of the ASCII codes for each of the message's characters, ignoring parity, up to but not including the checksum field and the CR and LF characters. The final sum should not be an 8-bit binary number.
   See Appendix A for ASCII conversion table.

2. Convert the four least significant bits of this sum to the equivalent hexadecimal digit. This becomes the least significant digit in the checksum field.
3. Convert the four most significant bits of this sum to the equivalent hexadecimal digit. This becomes the most significant digit in the checksum field.

0	5	,	4	2	0	4	,	0	1	0	B	,	0	,	0	2	,	0	8	,	0	4	CR	LF

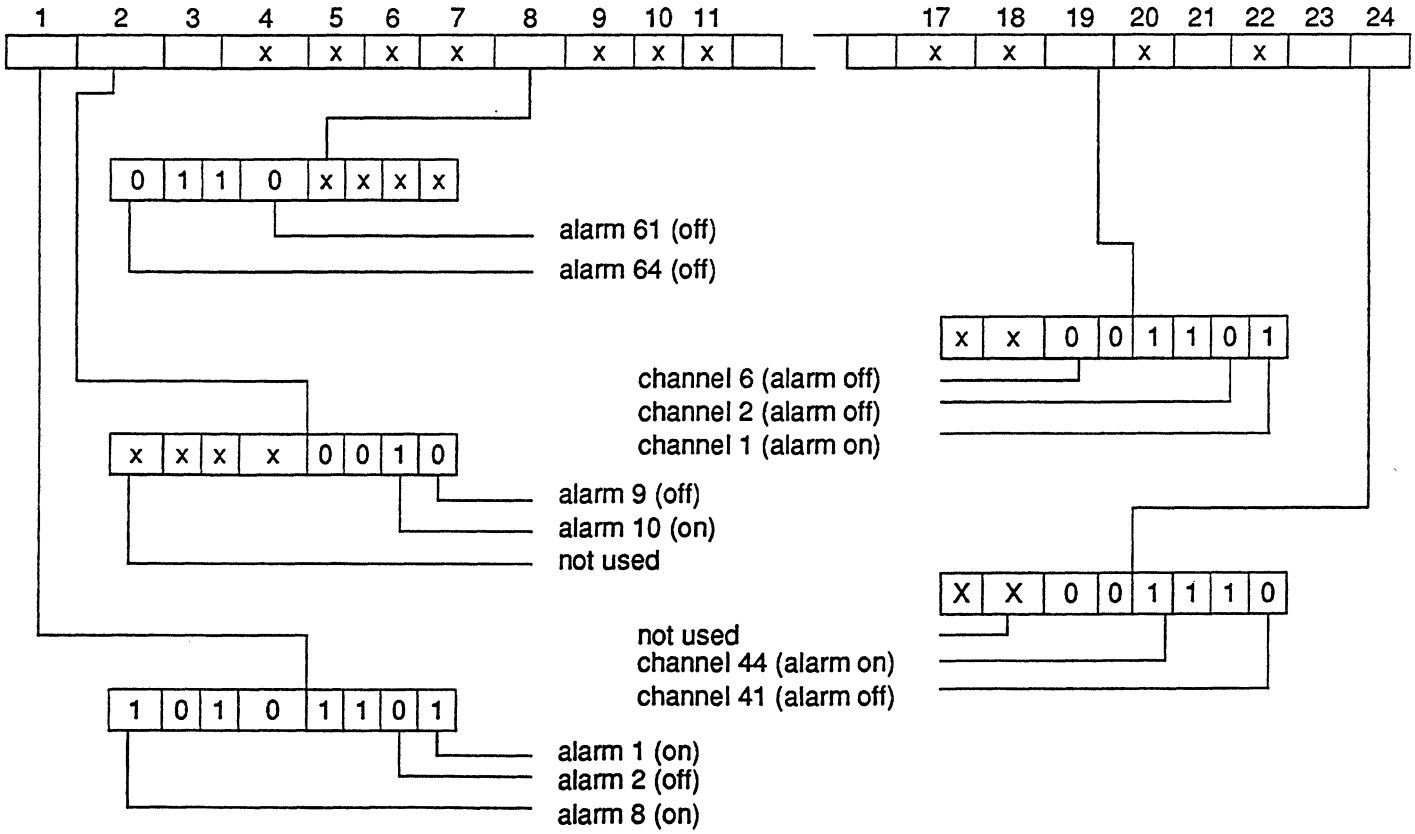
0	30
5	35
,	2C
4	34
2	32
0	30
4	34
,	2C
0	30
1	31
0	30
B	42
,	2C
0	30
,	2C
0	30
2	32
,	2C
0	30
8	38
,	2C +
	4 04 -> 04 Hexadecimal

7.1 ALARM STATUS

1. Indicates the alarm status ON or OFF
2. Indicates the number of channels in alarm

Alarm 1 - 12 : Analog alarms (1 - 12)
Alarm 61 - 64 : Digital inputs (1 - 4)
Alarm 17 - 22 : Event 1 - 6
Channel 1 - 6 : Analog inputs (1 - 6)
Channel 33 - 36 : Digital inputs (1 - 4)
Channel 17 - 22 : Com 1 - 6
Channel 41 - 46 : Maths 1 - 6
Channel 47 - 56 : Reserved

- Parameter code : 01
- Function code : 01 read only
- Number of values : 24
- Data field length : 01 byte
- Data field : "x" = unused
  bit 0 = alarm off
  bit 1 = alarm on
- Byte numbers :



Example :

0	4	,	0	2	0	4	,	0	1	0	1	,	0	,	0	3	,	0	1	,	CR	LF

- Request : Which alarm from 1 to 24 ?
- Address : 04
- Number of values : 03
- Starting index : 01

0	0	0	0	0	1	,	A	D	,	0	2	,	0	0	,	CR	LF

- Response : - Operation performed
  - Mode is run-mode
  - Alarms 1, 3, 4, 6, 8, 10 ON

7.2 PRINT TEXT

Permits the user to print a message of 30 characters maximum on the paper. The characters authorized are given in appendix A.

Warning :

1. The minimum time between two print messages depends on the chart speed :
   Chart speed < 100 mm/h : minimum time (in minutes) = 150 / chart speed (in mm/h)
   Chart speed ≥ 100 mm/h : minimum time = 1 mn 50 s
2. The maximal length of the message definable by the user is fixed to 30 characters. The message will be printed in the following format :

   C : User - text
   Example : "C : This is a user-message"
   The character @ is used to place the date or time of the recorder in the user-message :
   - By default, the message will be printed on blank.
   - @d will be replaced by the current date.
   - @h will be replaced by the current time.
   - @e : the message will be printed on trace.

- Parameter code : 03
- Function code : 02 write only
- Number of values : 01
- Data field length : < 30 bytes
- Data field : Hexadecimal representation of the ASCII value of the character corresponding the table in appendix A. (See also example)

Example

0	2	,	0	2	0	4	,	0	2	0	3	,	0	,	0	1	,	0	1	,	4	0	,	6	4	,	2	0	,	4	0	,

6	8	,	2	0	,	3	5	,	3	5	,	3	5	,	2	0	,	4	0	,	6	5	CR	LF

- Request : Print "22 MAR 94 14:50 555 " on trace
- Address : 02
- Number of values : 01
- Starting index : 01

0	0	0	0	0	1	,	CR	LF

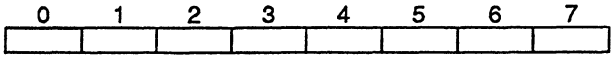
- Response : - Operation performed
  - Mode is run-mode

7.3 PRINTER STATUS

Indicates the status of the printer

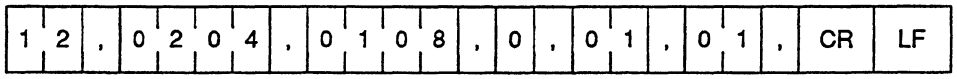
- Parameter code : 08
- Function code : 01 Read only
- Number of values : 01
- Data field length : 08 bytes
- Data field :

Byte numbers :

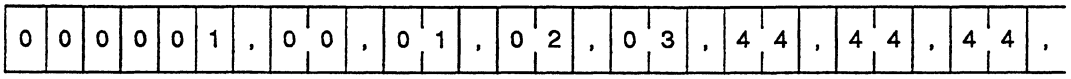


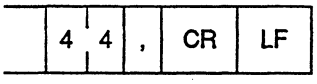
Byte :	0	Reserved	
	1	Cassette state	Value : 00 = cassette out 01 = cassette in
	2	Paper speed	Value : 00 = speed 1 used 01 = speed 2 used
	3	Printer mode	Value : 00 = printer inhibit 01 = print mode 02 = precursor mode with STBY 03 = precursor mode without STBY
	4 - 7	Remaining paper	Value : 4 bytes in mm Value of remaining paper length IEEE format

Example :



- Request : What is the printer status ?
- Address : 12
- Number of values : 01
- Starting index : 01





- Response : - No cassette in
  - Speed 2 used
  - Precursor mode without STBY
  - Value of remaining paper length : 44 44 44 44 hexadecimal = 785.066 decimal

7.4 PRINT NUMERIC PV'S (Snapshot Log)

Printout of the current PV'S on the paper.

Warning :

1. The minimum time between two print numeric PV's request is 1 minute.
2. When the time of printing the numeric PV's is greater than the time between 2 requests, the request may be ignored.

- Parameter code : 10 (0A hexadecimal)
- Function code : 02 write only
- Number of values : 01
- Data field length : 01 byte
- Data field : Value :
  01 = print numeric PV's

Example :

0	7	,	0	2	0	4	,	0	2	0	A	,	0	,	0	1	,	0	1	,	0	1	,	CR	LF

- Request : Print numeric PV's
- Address : 07
- Number of values : 01
- Starting index : 01

0	0	0	0	0	1	,	CR	LF

- Response : - Operation performed
  - Mode is run-mode

7.5 PROCESS VALUE

Analog, digital, com, maths input process values

- Parameter code : 24 (18 hexadecimal)
- Function code : 01 read only
- Number of values : 46
- Data field length : 04 bytes
- Data field : Hexadecimal representation of floating (IEEE)
  Number 1 - 6 : Analog inputs 1 - 6
  Number 33 - 36 : Digital inputs 1 - 14
  Number 13 -18 : Com 1 - 6
  Number 41 - 46 : Maths 1 - 6
  Number 53 - 64 : Reserved

Example :

0	1	,	0	2	0	4	,	0	1	1	8	,	0	,	0	2	,	0	2	,	CR	LF

- Request : Process values of channel 2 to 3 ?
- Address : 01
- Number of values : 02
- Starting index : 02

0	0	0	0	0	1	,	4	4	,	A	8	,	4	9	,	4	5	,	4	4	,	5	5	,	6	6	,	7	7	,	CR	LF

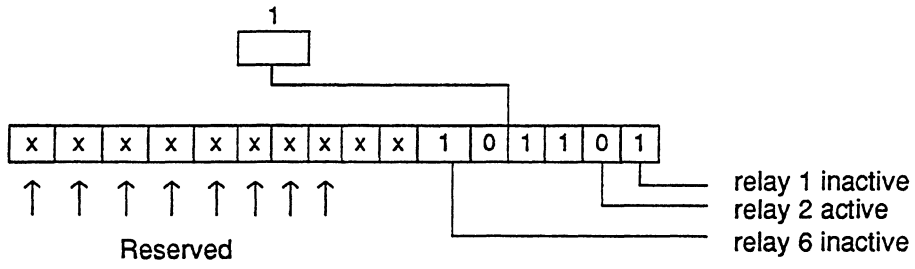
- Response : - Operation performed
  - Mode is run-mode
  - PV for channel 2 is : 1346.29
  - PV for channel 3 is : 853.60

Warning : When a channel is in no-entry then the value should be ignored.

7.6 RELAY STATUS

Status of relays on relay-board when present.

- Parameter code : 12 (0C hexadecimal)
- Function code : 01 read only
- Number of values : 01
- Data field length : 02 bytes
- Data field : Value :
  0 = relay active (ON)
  1 = relay not active (OFF)
- Byte numbers :



Example :

0	1	,	0	2	0	4	,	0	1	0	C	,	0	,	0	1	,	0	1	,	CR	LF

- Request : Status of relays 1 to 6
- Address : 01
- Number of values : 01
- Starting index : 01

0	0	0	0	0	1	,	0	0	,	2	D	,	CR	LF

- Response : - Operation performed
  - Mode is run-mode
  - Relay 1, 3, 4 and 6 active (ON)
  - Remark : response always returns status of all possible relays even when the relay boards are not fitted.

7.7 SEND COMMUNICATION PV TO RECORDER

Permits the overriding of an analog channel. To override a channel you must, for the appropriate channel, select comm. input in the column sensor of the matrix analog inputs.

- Parameter code : 16 (10 hexadecimal)
- Function code : 02 write only
- Number of values : 6
- Data field length : 04 bytes (IEEE)
- Data field info : Hexadecimal representation of floating (IEEE)

Example :

0	8	,	0	2	0	4	,	0	2	1	0	,	0	,	0	2	,	0	2	,	4	0	,	0	0	,	4	1	,	4	0	,

0	0	,	4	3	,	2	2	,	2	3	,	CR	LF

- Request : Override channel 2 and 3
- Address : 08
- Number of values : 02
- Starting index : 02

0	0	0	0	0	1	,	CR	LF

- Response : - Operation performed
  - Mode is run-mode

7.8 BATCH NUMBER

Read the batch number.

- Parameter code : 02
- Function code : 01 read only
- Number of values : 01
- Data field length : 04 bytes
- Data field : Batch number in hexadecimal representation of floating format IEEE

Example :

0	1	,	0	2	0	4	,	0	1	0	2	,	0	,	0	1	,	0	1	,	CR	LF

- Request : What is the batch number value ?
- Address : 01
- Number of values : 01
- Starting index : 01

0	0	0	0	0	1	,	4	2	,	9	0	,	0	0	,	0	0	,	CR	LF

- Response : - Operation performed
  - Mode is run-mode
  - Value = 72

7.9 CONFIGURATION LOCK

Permits locking the access to modify parameters. (Keyboard and jack)

- Parameter code : 46 (2E hexadecimal)
- Function code : 02, write only
- Number of values : 01
- Data field length : 01 byte
- Starting index : Value :
  00 = unlock configuration access
  01 = lock configuration access
- Data field : 01

Example :

0	9	,	0	2	0	4	,	0	2	2	E	,	0	,	0	1	,	0	1	,	0	1	,	CR	LF

- Request : LOCK requested
- Address : 09
- Number of values : 01
- Starting index : 01
- Data field : 01

0	0	0	0	0	1	,	0	9	,	CR	LF

- Response : - Operation performed
  - Mode is run-mode
  - Lock configured

Warning : The lock will not be active when you reboot your recorder.

Possible responses :

- 09 : Operation performed
- 0A : Operation already performed
- 0B : Access refused

Example :

0	9	,	0	2	0	4	,	0	2	2	E	,	0	,	0	1	,	0	0	,	0	1	,	CR	LF

- Request : UNLOK requested
- Address : 09
- Number of values : 01
- Starting index : 00
- Data field : 01

0	0	0	0	0	1	,	0	9	,	CR	LF

- Response : - Operation performed
  - Mode is run-mode
  - Unlock configured

7.10 END CONF WRITE

This frame allows the user to indicate to the recorder that all the configuration changes are made. This action has to be executed after the unit configuration frame and this frame is fixed. Different parameters will induce an invalid error code.

- Parameter code : 06
- Function code : 02 write only
- Number of values : 01
- Data field length : 01
- Data field : 01

Example :

0	1	,	0	2	0	4	,	0	2	0	6	,	0	,	0	1	,	0	1	,	0	1	,	CR	LF

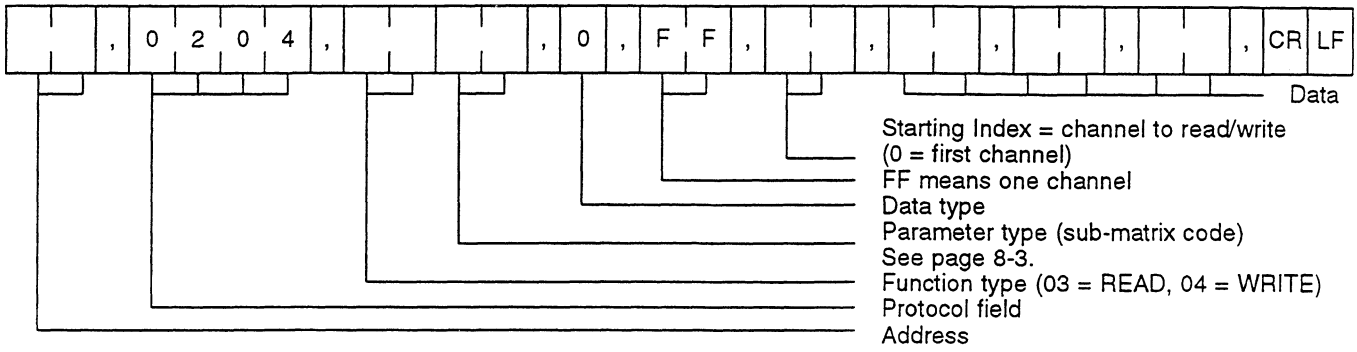
- Request : End signal of all configuration changes
- Address : 01
- Number of values : 01
- Starting index : 01

0	0	0	0	0	1	,	CR	LF

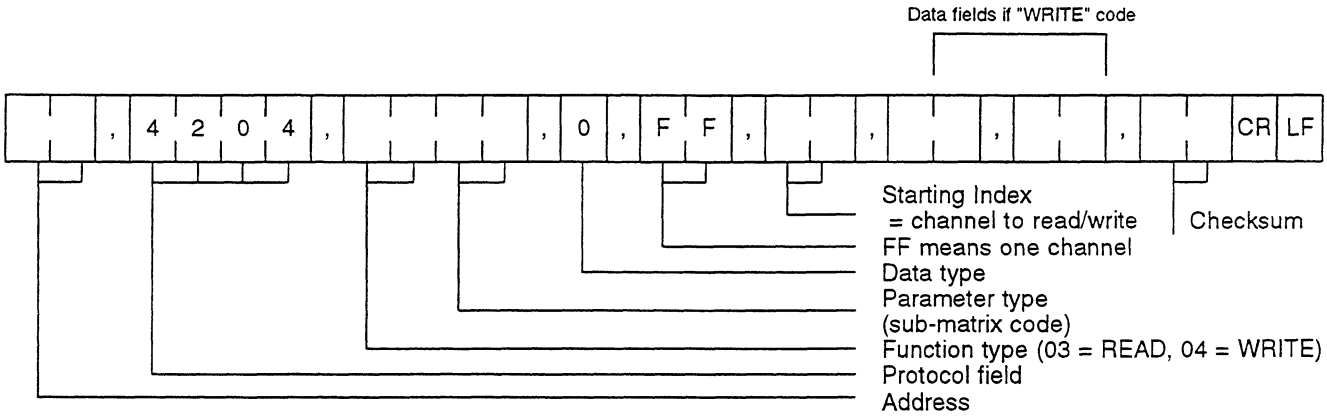
- Response : Operation performed

8.1 OVERVIEW

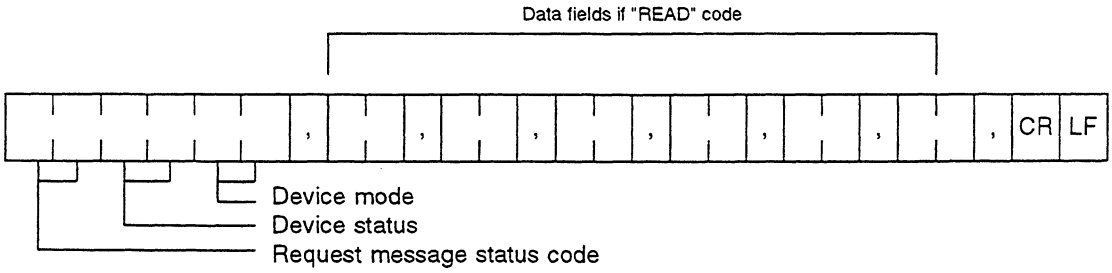
The ASCII communication allows you to READ or WRITE configuration data.
Each message allows you to exchange the complete configuration of a specified channel sub-matrix.



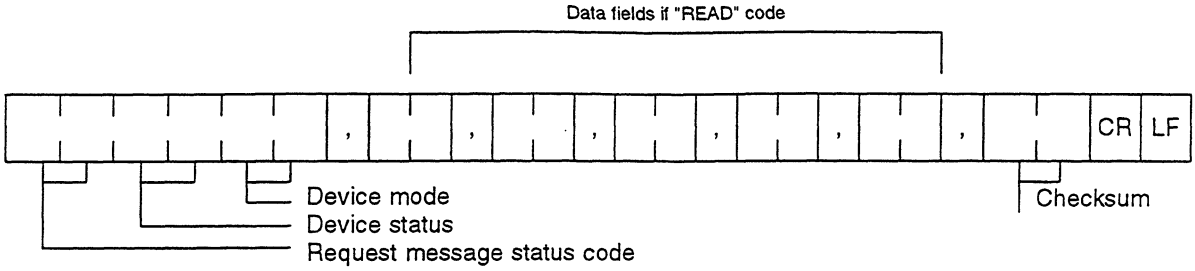
General request message without checksum



General request message with checksum



General response message without checksum



General response message with checksum

The following pages give you the code of each sub-matrix, the position of each parameter of a channel, the description of each parameter and how to interpret it.

In case of WRITE configuration, the transmission can take several seconds.

WARNING : Before any modification of configuration parameters,

- see CONFIGURATION LOCK (page 7-10 in ASCII BASIC PARAMETERS section)
- and then, see END CONF WRITE (page 7-12 in ASCII BASIC PARAMETERS section)

8.2 DETAILED CONFIGURATION EXCHANGES

SUB-MATRIX CODE

00	ANALOG ALARMS
01	ANALOG INPUTS
03	BATCH
04	CHART
05	DIGITAL INPUTS
06	EVENT
08	MATH
09	MESSAGES
0A	MISCELLANEOUS
0B	MMI
0C	PRINTER
0E	CURRENT OUTPUTS

SUB - MATRIX → **ANALOG ALARMS** 00

Position of parameters		Number of data fields
→	ACTION	1
→	AL = RED	1
→	AL TYPE	1
→	CHANNEL	1
→	CH DIFF	1
→	HYSTERES	4
→	MSG COL	1
→	MESSAG #	1
→	PRNT MSG	1
→	OCCURNCE	2
→	RELAY #	1
→	SP VALUE	4
→	UNUSED	4

SUB- MATRIX	*PARAMETER*	*CLASSIFICATION*
ALARM AN	**A C T I O N**	♦♦♦

DEFINITION : Action on printer in case of alarm (None, print on al., change range...)

HOW TO MODIFY IT : Select a new alarm code.

POSSIBLE CODES :

00 NO ACTION : No effect on printing

01 CHG SPD/TAB2 : Change to chart speed/print interval 2

02 CHG RANGE : Change to range 2 if RG USED = with R1 and to range 1 if RG USED = with R2

03 PRINT ON AL : Print the channel in alarm condition.

04 PRN INHIBIT : Stop all printing

05 TAB TRACE : Print one tabular snapshot of values superposed on traces.

06 TAB BLANK : Print one tabular snapshot of values on blank paper.

07 TRIG EV PREC : Triggers "event precursor" printing

08 PRT MATH LOG : Print one tabular snapshot of math results

SEE ALSO : **RG USED** in CHART SUB-MATRIX for PRINT ON AL

REC MODE in PRINTER SUB-MATRIX for TRIG EV PREC

SUB- MATRIX	PARAMETER	CLASSIFICATION
ALARM AN	A L = R E D	♦

DEFINITION : Specify if the trace of channel must be printed in red during alarm.

HOW TO MODIFY IT : Choose a new selection.

POSSIBLE CODES :

00 NO
01 YES

WARNING : If **AL = Red** is selected, do not configure the trace color in red as normal printing.

FOR MULTIPOINT MODEL ONLY

SUB- MATRIX	PARAMETER	CLASSIFICATION
ALARM AN	AL TYPE	♦♦♦

DEFINITION : Type of alarm (High, low, differential ...)

HOW TO MODIFY IT : Select a new alarm code.

POSSIBLE CODES :

00 NONE : Select "none" for unused alarms.

01 ALARM HIGH : alarm to occur when the value equals or exceeds the alarm setpoint.

02 ALARM LOW : alarm to occur when the value equals or is below the alarm setpoint.

03 CHG RATE H : alarm to occur if the trace increases quicker than the alarm setting (setpoint is given in eng.unit/second).

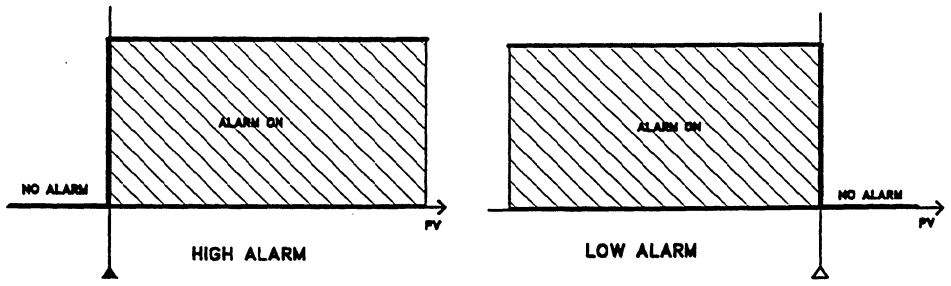
04 CHG RATE L: alarm to occur if the trace decreases quicker than the alarm setting (setpoint is given in eng.unit/second).

05 CHG RATE H, L : alarm to occur if the trace increases/decreases quicker than the alarm setting (setpoint is given in eng.unit/second).

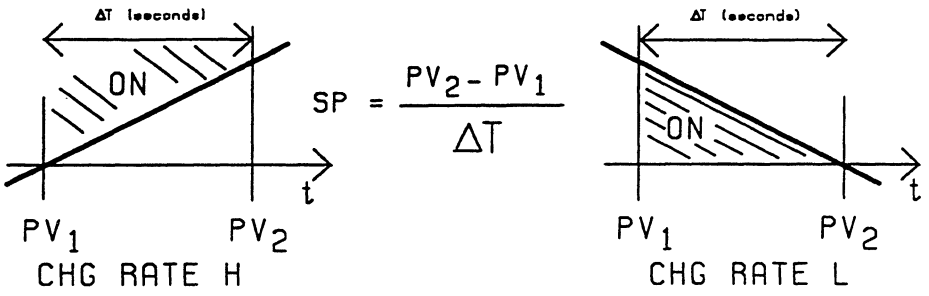
06 DIFFERENTIAL : occurs if the absolute difference between the values of the specified channel and a second channel exceeds the alarm setpoint.

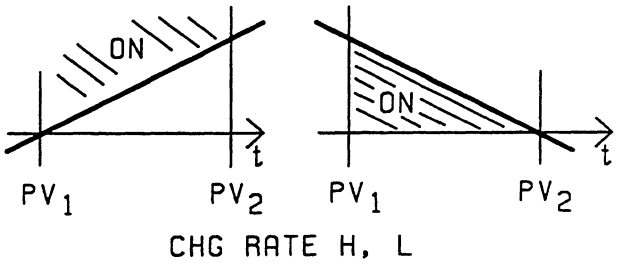
SEE ALSO : **CH DIFF** for DIFFERENTIAL in this sub-matrix.

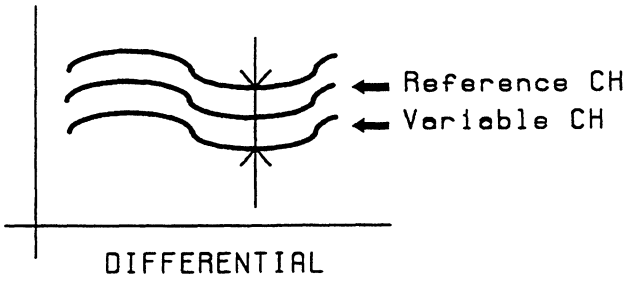
EXAMPLE :



SUB- MATRIX	PARAMETER	CLASSIFICATION
ALARM AN	AL TYPE	♦♦♦







SUB- MATRIX	PARAMETER	CLASSIFICATION
ALARM AN	CHANNEL	♦♦♦

DEFINITION : Channel on which alarm is applied. (Analog 1..6, com 1..6, math 1..6)

HOW TO MODIFY IT : Select a new code.

POSSIBLE CODES :

00 ANALOG 1
01 ANALOG 2
02 ANALOG 3
03 ANALOG 4
04 ANALOG 5
05ANALOG 6

06 COMM 1
07 COMM 2
08 COMM 3
09COMM 4
0A COMM 5
0B COMM 6

0C MATH 1
0D MATH 2
0EMATH 3
0F MATH 4
10 MATH 5
11 MATH 6

SUB- MATRIX	PARAMETER	CLASSIFICATION
ALARM AN	CH DIFF	♦

DEFINITION : Second channel to use if alarm type is differential.

HOW TO MODIFY IT : Select a new code.

POSSIBLE CODES : The same as those for alarm channel.

00 ANALOG 1
01 ANALOG 2
02 ANALOG 3
03 ANALOG 4
04 ANALOG 5
05 ANALOG 6

06 COMM 1
07 COMM 2
08 COMM 3
09 COMM 4
0A COMM 5
0B COMM 6

0C MATH 1
0D MATH 2
0E MATH 3
0F MATH 4
10 MATH 5
11 MATH 6

SUB- MATRIX	PARAMETER	CLASSIFICATION
ALARM AN	HYSTERES	♦♦

DEFINITION :

Establishes the alarm hysteresis. Alarms switch ON at set point but switch OFF value depends on the the hysteresis setting.

Hysteresis is expressed in Engineering units and is added to low alarm and subtracted from high alarm set points to establish the alarm release value.

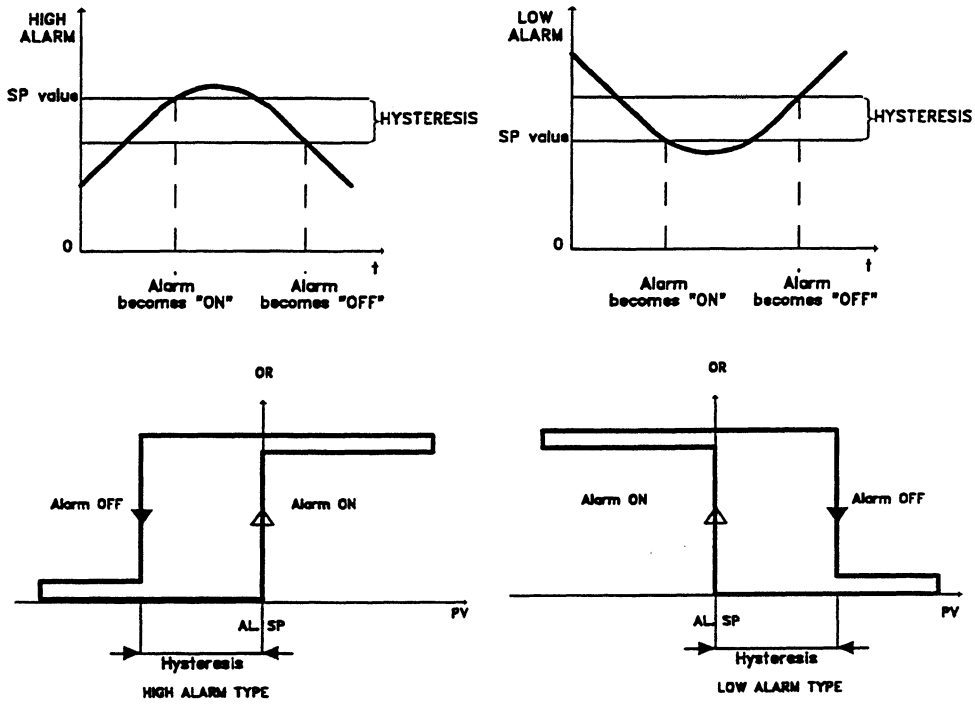
HOW TO MODIFY IT :

Define a numeric value. (IEEE)

POSSIBLE VALUES :

[0 ... 999]

EXAMPLE :



NOTE :

With CHG rate type, this parameter is expressed in Engineering units.

SUB- MATRIX	PARAMETER	CLASSIFICATION
ALARM AN	MSG COL	♦♦

DEFINITION : Color of alarm message

HOW TO MODIFY IT : Select a new code.

POSSIBLE CODES :

00 PURPLE

01 RED

02 BLACK

03 GREEN

04 BLUE

05 BROWN

WARNING : **FOR MULTIPOINT MODEL ONLY**

SUB- MATRIX	PARAMETER	CLASSIFICATION
ALARM AN	MESSAG#	♦♦♦

DEFINITION : Selection of alarm message to be printed.

HOW TO MODIFY IT : Select a new message code.

POSSIBLE CODES :

00 MESSAGE #1
01 MESSAGE #2
02 MESSAGE #3
03 MESSAGE #4
04 MESSAGE #5
05 MESSAGE #6
06 MESSAGE #7
07 MESSAGE #8
08 MESSAGE #9
09 MESSAGE #10
0A MESSAGE #11
0B MESSAGE #12

SEE ALSO : **MSG TYPE** in this sub-matrix

WARNING : Be sure the selected message is already configured. (See Matrix Message)

SUB- MATRIX	PARAMETER	CLASSIFICATION
ALARM AN	PRNT MSG	♦

DEFINITION : Defines the conditions to print the message on alarm change.

HOW TO MODIFY IT : Select a new message code.

POSSIBLE CODES :

00 NO MESSAGE : No operator message is printed but date, time and alarm message are printed.

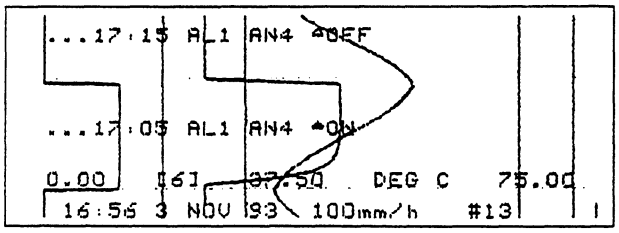
01 MESSAGE ON : Operator message is printed at alarm occurrence only.

02 MESSAGE OFF : Operator message is printed at alarm release only.

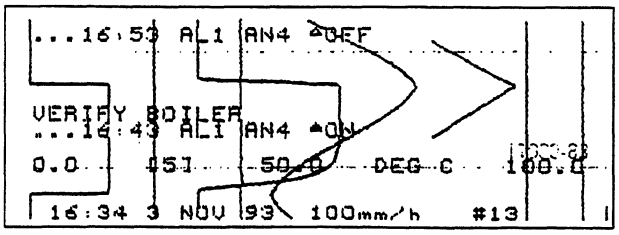
03 MSG ON, OFF : Operator message is printed at alarm activation and at alarm release.

04 NONE : No message

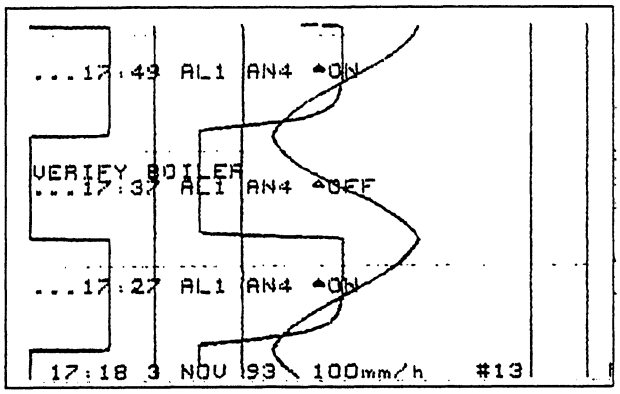
SEE ALSO : **MESSAGE** in MESSAGES SUB-MATRIX



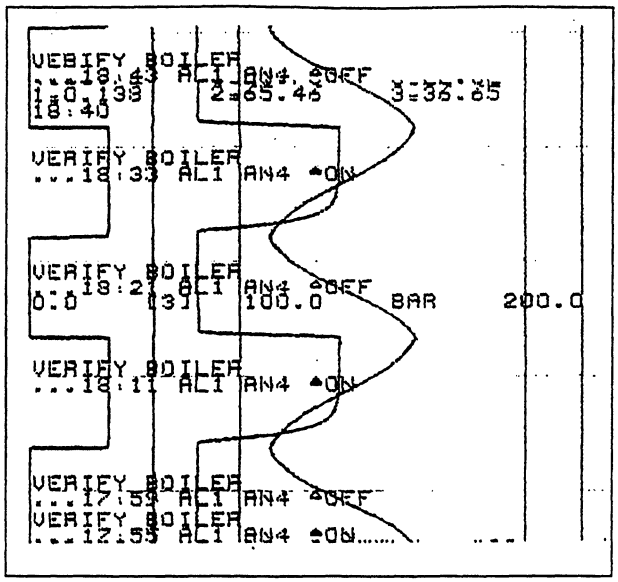
NO MESSAGE



MESSAGE ON



MESSAGE OFF



MESSAGE ON, OFF

SUB- MATRIX	PARAMETER	CLASSIFICATION
ALARM AN	OCCURNCE	♦

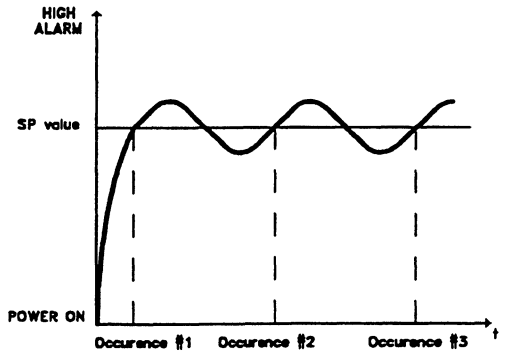
DEFINITION : Defines the number of alarm occurrences that must be discarded after power on before alarm activation can actually occur.

HOW TO MODIFY IT : Select a new code.

POSSIBLE VALUES : **[0 ... 9]**

00 0 = No alarm occurrence (ie : normal alarm activation)
01 1 = 1 alarm occurrence
02 2 = 2 alarm occurrences
.
.
.
09 9 = 9 alarm occurrences

EXAMPLE :



High alarm type configured with alarm occurrence = 1
At start up (power on) PV < SP, the alarm is inactive.
The first alarm (occurrence #1) is discarded, the second alarm is actually activated.

SUB- MATRIX	PARAMETER	CLASSIFICATION
ALARM AN	RELAY#	♦♦♦

DEFINITION : Selection of relay to activate in alarm.

HOW TO MODIFY IT : Select a new relay code.

POSSIBLE CODES :

00 NO RELAY
01 RELAY 1
02 RELAY 2
03 RELAY 3
04 RELAY 4
05 RELAY 5
06 RELAY 6
07 RELAY 7
08 RELAY 8
09 RELAY 9
0A RELAY 10
0B RELAY 11
0C RELAY 12

SUB- MATRIX	PARAMETER	CLASSIFICATION
ALARM AN	SP VALUE	♦♦♦

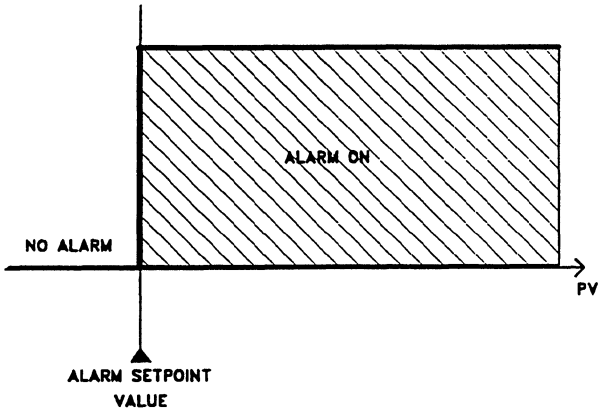
DEFINITION : The alarm switches from OFF to ON when the SP value is reached.

HOW TO MODIFY IT : Define a numeric value. (IEEE)

POSSIBLE VALUES : [-9999999 ... 9999999]

SEE ALSO : **Alarm type** in the same sub-matrix.

EXAMPLE : **High alarm type :**



SUB - MATRIX → **ANALOG INPUTS** 01

Position of parameters		Number of data fields
→	RANGE	1
→	T/C COMP	1
→	BURN OUT	1
→	FILTER	4
→	HIGH VAL	4
→	LOW VAL	4
→	STD MATH	1
→	- CH #	1
→	SENSOR	1
→	ZERO ADJUST	4
→	UNUSED	4

SUB- MATRIX	PARAMETER	CLASSIFICATION
ANALOG	RANGE	♦♦♦

DEFINITION :

DISPLAY ACTUATION RANGE
For directly connected temperature sensors and non-linear temperature transmitters, the actuation selection defines the linearisation routine used to produce a linear chart scale. For linear transmitters, the selection simply defines the transmitter's electrical range/span.

The choice of actuation offered by the recorder during configuration will depend upon the sensor selected.

HOW TO MODIFY IT :

Select a new code.

POSSIBLE CODES :

Depends on the type of sensor connected.

LINEAR

58 LIN 0/10 mV
59 LIN -10/10 mV
5A LIN 0/20 mV
5B LIN -20/20 mV
5C LIN 0/50 mV
5D LIN -50/50 mV
5E LIN 10/50 mV
5F LIN 0/100 mV
60 L -100/100 mV
61 LIN 0/500 mV
62 L -500/500 mV
63 LIN 0/20 mA*
64 LIN 4/20 mA*
65 LIN 0/1 V
66 LIN -1/1 V
67 LIN 0/2 V
68 LIN -2/2 V
69 LIN 0/5 V
6A LIN -5/5 V
6B LIN 1/5 V
6C LIN 0/10 V
6D LIN -10/10 V

RTD / OHMS
Pt 100 Ω et 0 °C

RTD
3C IEC-50/150 C
3D IEC -58/302 F
3E IEC 0/100 C**
3F IEC 32/212 F**
40 IEC 0/200 C
41 IEC 32/392 F
42 IEC 0/400 C
43 IEC 32/752 F
44 IEC-200/500 C
45 IEC-328/932 F
46 JIS -50/150 C
47 JIS -58/302 F
48 JIS 0/100 C**
49 JIS 32/212 F**
4A JIS 0/200 C
4B JIS 32/392 F
4C JIS 0/400 C
4D JIS 32/752 F
4E JIS -200/500 C
4F JIS -328/932 F
50 Ni 50 -80/320 C
51 Ni 50 -112/608 F
52 Ni 508 -50/250 C
53 Ni 508 -58/482 F
54 Cu 10 -20/250 C**
55 Cu 10 -4/482 F**
56 OHM 0/200
57 OHM 0/2000

THERMOCOUPLE

00 J -50/150 C
01 J -58/302 F
02 J 0/400 C
03 J 32/752 F
04 J -200/870 C
05 J-328/1598 F
06 L -50/150 C
07 L -58/302 F
08 L 0/400 C
09 L 32/752 F
0A L -200/870 C
0B L-328/1598 F
0C K 0/400 C
0D K 32/752 F
0E K 0/800 C
0F K 32/1472 F
10 K 0/1200 C
11 K 32/2192 F
12 K -200/1370 C
13 K -328/2498 F
1C R -20/1760 C
1D R -4/3200 F
1E S 0/1600C
1F S 32/2912 F
20 S -20/1760 C
21 S -4/3200 F
14 N 0/400 C
15 N 32/752 F
16 N 0/800 C
17 N 32/1472 F
18 N 0/1200 C
19 N 32/2192 F
1A N -20/1300 C
1B N -4/2372 F
22 T -50/150 C
23 T -58/302 F
24 T 0/150 C
25 T 32/302 F
26 T 50/150 C
27 T 122/302 F
28 T -200/400 C
29 T -328/752 F
2A U -50/150 C
2B U -58/302 F
2C U 0/150 C
2D U 32/302 F
2E U 50/150 C
2F U 122/302 F
30 U -200/400 C
31 U -328/752 F
32 NiMo 0/1400 C
33 NiMo32/2552 F
34 W-W26 -20/2320 C
35 W-W26 -4/4208 F
36 W5-W26 -20/2320 C
37 W5-W26 -4/4208 F
38 PR20-40 0/1800 C
39 PR20-40 32/3272 F
3A B 40/1820 C
3B B 104/3308 F

*** mA inputs for 250 Ω input resistor. ** Accuracy : 0.25 %**

SUB- MATRIX	PARAMETER	CLASSIFICATION
ANALOG	T / C COMP	♦

DEFINITION :

To affect channel number to measure the temperature of a remote compensation box. This setting eliminates the variable cold junction and implements the hot box temperature.

Application : To use an uncontrolled remote compensation box channel #.

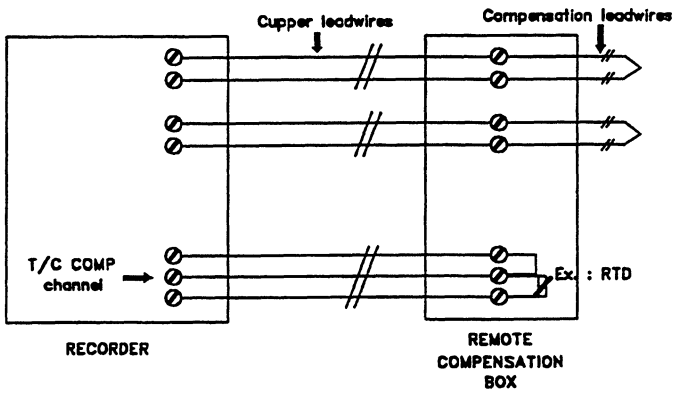
HOW TO MODIFY IT :

Select a new code.

POSSIBLE CODES :

01 ANALOG 1
02 ANALOG 2
03 ANALOG 3
04 ANALOG 4
05 ANALOG 5
06 ANALOG 6
00 NONE

EXAMPLE :



WARNING :

This temperature measurement takes the place of one analog input.
For example : a 6 channels recorder becomes 5 channels input max.

SUB- MATRIX	PARAMETER	CLASSIFICATION
ANALOG	BURN OUT	♦

DEFINITION : Allows you to define the safety backup position to activate alarms (if configured) in case of sensor burnout. The trace can go either on the right (high) or on the left (low).

HOW TO MODIFY IT : Select new code.

POSSIBLE CODES :

00 NO B.OUT : No burn out.

01 B.OUT LOW : Burn out configured low scale.

02 B.OUT HIGH : Burn out configured high scale.

NOTE : For some sensors, burn out is not configurable but fixed and display will show FIX LOW, FIX HIGH (RTD/OHMS) or FIX NONE.

SUB- MATRIX	PARAMETER	CLASSIFICATION
ANALOG	FILTER	♦

DEFINITION :

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.

HOW TO MODIFY IT :

Define a numeric value. (IEEE)

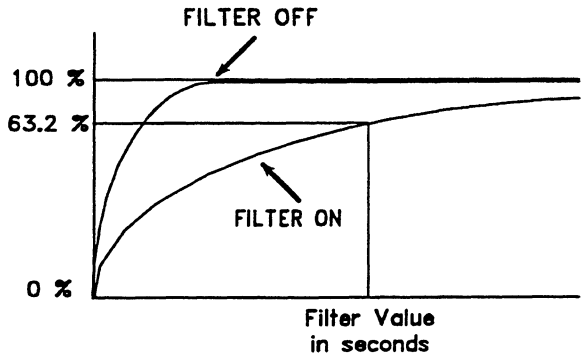
POSSIBLE VALUES :

0 to 99 seconds

0 = No filter

10 = 10 seconds

EXAMPLE :



WARNING :

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

SUB- MATRIX	PARAMETER	CLASSIFICATION
ANALOG	HIGH VAL	♦♦

DEFINITION : Engineering value corresponding to high limit of the selected input actuation range.

HOW TO MODIFY IT : Define a numeric value. (IEEE)

POSSIBLE VALUES : **[-9999 ... 9999]**

WARNING : Modification is not available for any directly connected temperature sensors, as this would adversely affect the linearization.

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

SUB- MATRIX	PARAMETER	CLASSIFICATION
ANALOG	LOW VAL	♦♦

DEFINITION : Engineering value corresponding to high limit of the selected input actuation range.

HOW TO MODIFY IT : Define a numeric value. (IEEE)

POSSIBLE VALUES : **[-9999 ... 9999]**

WARNING : Modification is not available for any directly connected temperature sensors, as this would adversely affect the linearization.

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

SUB- MATRIX	PARAMETER	CLASSIFICATION
ANALOG	**STD MATH**	♦

DEFINITION : 2 mathematical functions are included as standard in the recorder. These functions apply only to analog inputs.

HOW TO MODIFY IT : Select new math code.

POSSIBLE CODES :

00 NO OPT MATH : No math function configured.

01 SQUARE ROOT : Square root applies to analog input.

02 CHANNEL DIFF : Difference between the current analog input and the one configured in "CH#".

SEE ALSO : **-CH#** in this sub-matrix for CHANNEL DIFF.

NOTE : - For **SQUARE ROOT**, the formula is :

$$PV = \sqrt{\frac{(S - Smin)\,(HIGH\ VAL^2 - LOW\ VAL^2)}{(Smax - Smin)} + LOW\ VAL^2}$$

Smin = min sensor input value
Smax = max sensor input value
S = current sensor input value

- For **CHANNEL DIFF**, the formula is :
  $PV = PV_A - PV_B$
  A and B are any analog input.

SUB- MATRIX	PARAMETER	CLASSIFICATION
ANALOG	- C H #	♦

DEFINITION : Second channel used when OPT MATH = CH DIFF

HOW TO MODIFY IT : Select a new code.

POSSIBLE CODES :

01 ANALOG 1
02 ANALOG 2
03 ANALOG 3
04 ANALOG 4
05 ANALOG 5
06 ANALOG 6
00 NONE

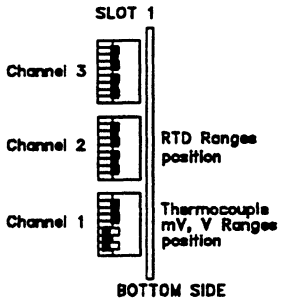
NOTE : Analog input must be already configured to be accepted by the software.

SUB- MATRIX	PARAMETER	CLASSIFICATION
ANALOG	S E N S O R	♦♦♦

DEFINITION : Basic sensor type used on each channel.

HOW TO MODIFY IT : Select a new sensor code.

POSSIBLE CODES : Depends on the switches position on the input board.



SUB- MATRIX	PARAMETER	CLASSIFICATION
ANALOG	SENSOR	♦♦♦

00 THERMOCOUPLE : Sensor is a directly connected thermocouple for which internal cold junction compensation is required.

01 EXT COMP 50 : Thermocouple sensor is directly connected to a remote temperature compensation box fixed at 50 ° C.

02 EXT COMP 60 : Thermocouple sensor is directly connected to a remote temperature compensation box fixed at 60 ° C.

03 RTD : Sensor is a directly connected RTD or variable resistance.

04 TR NL 0-5V : Sensor is a temperature transmitter signal range of 0-5V is not linear with temperature.

05 TR NL 1-5V : Sensor is a temperature transmitter signal range of 1-5V is not linear with temperature.

06 TR NL 0-20mA : Sensor is a temperature transmitter signal range of 0-20mA is not linear with temperature.

07 TR NL 4-20mA : Sensor is a temperature transmitter signal range of 4-20mA is not linear with temperature.

08 LINEAR : Sensor is a transmitter output is linear with process variable.

09 SPECIAL : Special sensor connected. Must be specified by special order.

0A NO ENTRY : No sensor connected or unused input.

SUB- MATRIX	PARAMETER	CLASSIFICATION
ANALOG	ZERO ADJ	♦

DEFINITION :

Zero adjustment means to offset/bias the calibration of the input.

Otherwise choose 0 Value = Factory Calibration
Adjustments are made directly in Engineering unit. (ex. : 5 = 5°C)

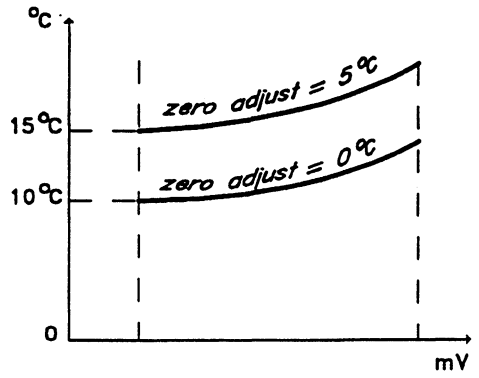
HOW TO MODIFY IT :

Define a numeric value. (IEEE)

POSSIBLE CODES :

[-99 ... 99]

EXAMPLE :



SUB - MATRIX → **BATCH** 03

Position of parameters		Number of data fields
→	LINE 1	15
→	LINE 2	15
→	LINE 3	15
→	LINE 4	15
→	RESET	1
→	START	1
→	BACKUP	1
→	BATCH #	2
→	UNUSED	4

SUB- MATRIX	PARAMETER	CLASSIFICATION
BATCH	**LINE 1**	♦

DEFINITION : Configuration of the first line of the batch message.

HOW TO MODIFY IT : Enter the text of the first line.

POSSIBLE CODES : **14 characters + "\0" (Data field for "\0" is 00)**

SEE ALSO : Lines 2, 3 and 4 in this sub-matrix.

SUB- MATRIX	PARAMETER	CLASSIFICATION
BATCH	**LINE 2**	♦

DEFINITION : Configuration of the second line of the batch message.

HOW TO MODIFY IT : Enter the text of the second line.

POSSIBLE CODES : **14 characters + "\0" (Data field for "\0" is 00)**

SEE ALSO : Lines 3 and 4 in this sub-matrix.

SUB- MATRIX	PARAMETER	CLASSIFICATION
BATCH	LINE 3	♦

DEFINITION : Configuration of the first line of the batch message.

HOW TO MODIFY IT : Enter the text of the third line.

POSSIBLE CODES : **14 characters + "\0" (Data field for "\0" is 00)**

SEE ALSO : Line 4 in this sub-matrix.

SUB- MATRIX	PARAMETER	CLASSIFICATION
BATCH	LINE 4	♦

DEFINITION : Configuration of the first line of the batch message.

HOW TO MODIFY IT : Enter the text of the fourth line.

POSSIBLE CODES : **14 characters + "\0" (Data field for "\0" is 00)**

SUB- MATRIX	PARAMETER	CLASSIFICATION
BATCH	**RESET**	♦

DEFINITION : BATCH NUMBER RESET CONDITION

The RESET condition defines when the batch number must reset.

HOW TO MODIFY IT : Select a new digital input code.

POSSIBLE CODES :

01 LOGIC 1 OPEN

02 LOGIC 2 OPEN

03 LOGIC 3 OPEN

04 LOGIC 4 OPEN

00 NO RESET

SUB- MATRIX	PARAMETER	CLASSIFICATION
BATCH	START	♦

DEFINITION : BATCH ACTIVATION CONDITION

The START condition defines when batch printing must start. The recorder pauses each time the start condition occurs and then prints the batch description and increments the batch number.

HOW TO MODIFY IT : Select a new digital input code.

POSSIBLE CODES :

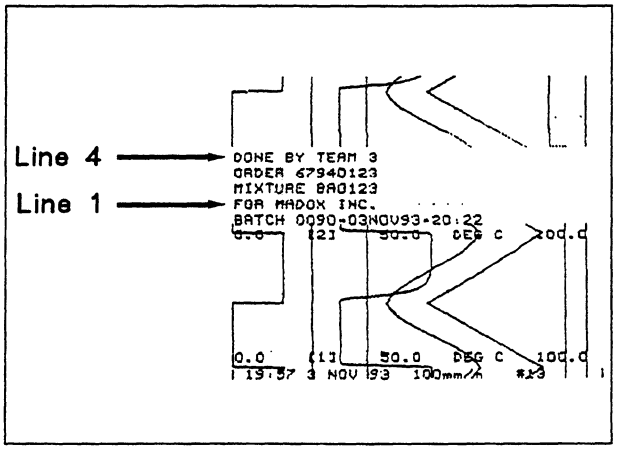
01 LOG 1 CLOSED

02 LOG 2 CLOSED

03 LOG 3 CLOSED

04 LOG 4 CLOSED

00 NONE



SUB- MATRIX	PARAMETER	CLASSIFICATION
BATCH	**B A C K U P**	♦

DEFINITION : Store the batch number in case of power interruption.

HOW TO MODIFY IT : Choose a new selection.

POSSIBLE CODES :
00 ENABLE
01 DISABLE

SUB- MATRIX	PARAMETER	CLASSIFICATION
BATCH	**B A T C H #**	♦

DEFINITION : Batch number used after a reset condition.

HOW TO MODIFY IT : Enter a new integer value. (IEEE)

POSSIBLE CODES : **[0 ... 65535]**

SUB - MATRIX → **CHART** 04

Position of parameters		Number of data fields
→	TRACE	1
→	MIN RG1	4
→	MAX RG1	4
→	MIN RG2	4
→	MAX RG2	4
→	RG1 COL	1
→	RG2 COL	1
→	TAG NAME	9
→	ENG UNIT	6
→	ZONING	1
→	RG USED	1
→	DECIMAL	1
→	UNUSED1	1
→	UNUSED2	2

SUB- MATRIX	PARAMETER	CLASSIFICATION
CHART	**T R A C E**	♦

DEFINITION : Defines the variable to print (Analog input 1...6. Comm 1...6, Math 1...6. None)

HOW TO MODIFY IT : Select a new code.

POSSIBLE CODES :

00 NO TRACE

01 ANALOG 1
02 ANALOG 2
03 ANALOG 3
04 ANALOG 4
05 ANALOG 5
06 ANALOG 6

07 COMM 1
08 COMM 2
09 COMM 3
0A COMM 4
0B COMM 5
0C COMM 6

0D MATH 1
0E MATH 2
0F MATH 3
10 MATH 4
11 MATH 5
12 MATH 6

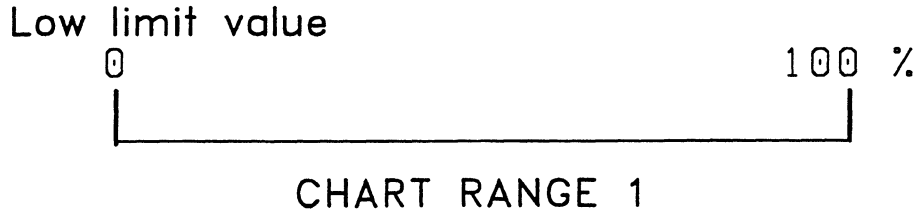
SUB- MATRIX	PARAMETER	CLASSIFICATION
CHART	MIN RG1	♦♦

DEFINITION : Lower limit of chart range 1.

HOW TO MODIFY IT : Define a numeric value. (IEEE)

POSSIBLE VALUES : Up to 5 digits for analog inputs, communication inputs.
Up to 8 digits for mathematic results.
Including negative sign and decimal points.

EXAMPLE :



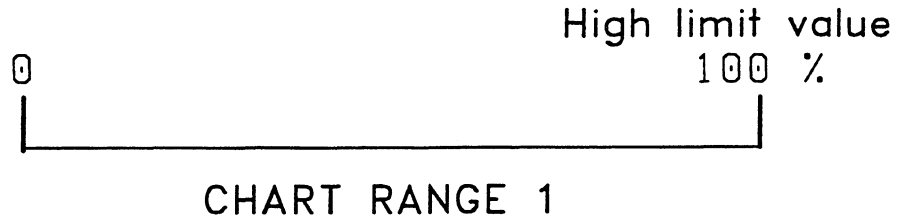
SUB- MATRIX	PARAMETER	CLASSIFICATION
CHART	**M A X R G 1**	♦

DEFINITION : Upper limit of chart range 1.

HOW TO MODIFY IT : Define a numeric value. (IEEE)

POSSIBLE VALUES : Up to 5 digits for analog inputs, communication inputs.
Up to 8 digits for mathematic results.
Including negative sign and decimal points.

EXAMPLE :



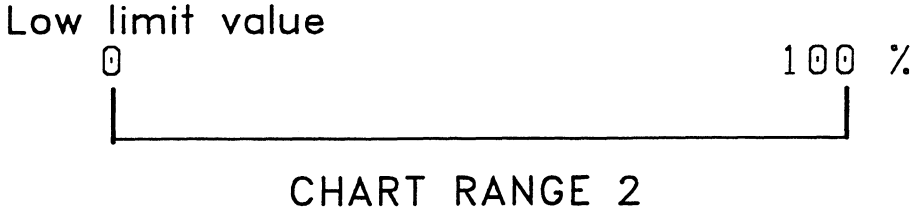
SUB- MATRIX	PARAMETER	CLASSIFICATION
CHART	MIN RG2	♦♦

DEFINITION : Lower limit of chart range 2.

HOW TO MODIFY IT : Define a numeric value. (IEEE)

POSSIBLE VALUES : Up to 5 digits for analog inputs, communication inputs.
Up to 8 digits for mathematic results.
Including negative sign and decimal points.

EXAMPLE :



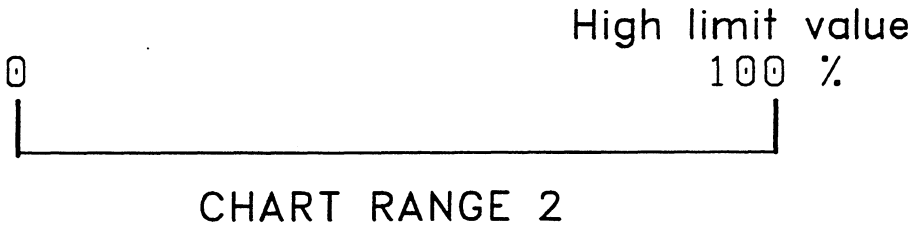
SUB- MATRIX	PARAMETER	CLASSIFICATION
CHART	MAX RG2	♦

DEFINITION : Upper limit of chart range 2.

HOW TO MODIFY IT : Define a numeric value. (IEEE)

POSSIBLE VALUES : Up to 5 digits for analog inputs, communication inputs.
Up to 8 digits for mathematic results.
Including negative sign and decimal points.

EXAMPLE :



SUB- MATRIX	PARAMETER	CLASSIFICATION
CHART	**R G 1 C O L**	♦

DEFINITION : Color of range 1

HOW TO MODIFY IT : Select a new color code.

POSSIBLE CODES :

00 PURPLE

01 RED

02 BLACK

03 GREEN

04 BLUE

05 BROWN

WARNING : **FOR MULTIPOINT MODEL ONLY**

SUB- MATRIX	PARAMETER	CLASSIFICATION
CHART	**R G 2 C O L**	♦

DEFINITION : Color of range 2

HOW TO MODIFY IT : Select a new color code.

POSSIBLE CODES :

00 PURPLE

01 RED

02 BLACK

03 GREEN

04 BLUE

05 BROWN

WARNING : **FOR MULTIPOINT MODEL ONLY**

SUB- MATRIX	PARAMETER	CLASSIFICATION
CHART	**T A G N A M E**	♦♦♦

DEFINITION : Tag of name corresponding chart channel.

HOW TO MODIFY IT : Enter a text

POSSIBLE CODES : **8 characters + "\0" (Data field for "\0" is 00)**

WARNING : If the message is larger than 8 characters, the last digit takes the place of the first one, giving a wrong tag.

SUB- MATRIX	PARAMETER	CLASSIFICATION
CHART	ENG UNIT	♦♦♦

DEFINITION : Chart channel units.

HOW TO MODIFY IT : Enter a text

POSSIBLE CODES : **5 characters + "\0" (Data field for "\0" is 00)**

EXAMPLES :
- mm/h
- µs/mn
- Deg F
- Deg C
- PST
- BAR

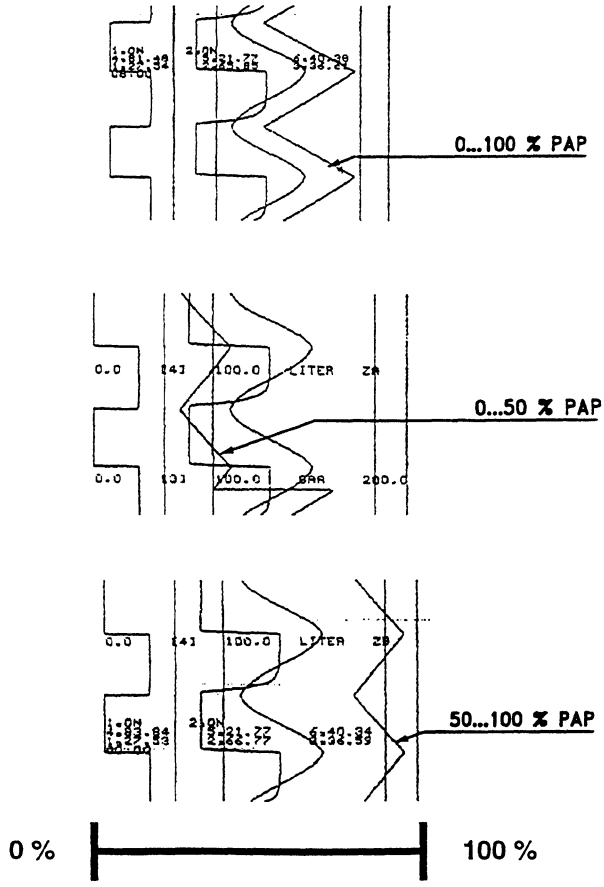
SUB- MATRIX	PARAMETER	CLASSIFICATION
CHART	ZONING	♦

DEFINITION : Defines chart zone for printing.

HOW TO MODIFY IT : Select a new code.

POSSIBLE CODES :

00 [0..100%] PAP : min ranges will correspond to the 0% position of paper, max ranges will correspond to the 100% position.
01 [0..50%] PAP : min ranges will correspond to the 0% position of paper, max ranges will correspond to the 50% position.
02 [50..100%] PAP : min ranges will correspond to the 50% position of paper, max ranges will correspond to the 100% position.



SUB- MATRIX	PARAMETER	CLASSIFICATION
CHART	**R G U S E D**	♦

DEFINITION : You may select whether the input channel will be printed normally (range 1 or 2) or on alarm (with range 1 or 2).

HOW TO MODIFY IT : Select a new code.

POSSIBLE CODES :

00 WITH R1
01 WITH R2
02 R1 ON ALARM
03 R2 ON ALARM

SEE ALSO : Action in **Alarm AN** for R1 and R2 on Alarm.

SUB - MATRIX → **DIGITAL INPUTS** 05

Position of parameters		Number of data fields
→	ACTION	1
→	RED TRAC	1
→	TYPE	1
→	CH DIFF	1
→	TRACE	1
→	TR COLOR	1
→	MSG COL	1
→	MESSAG #	1
→	PRNT MSG	1
→	RELAY #	1
→	POSITION	2
→	UNUSED	4

SUB- MATRIX	PARAMETER	CLASSIFICATION
DIGITAL	ACTION	♦♦

DEFINITION : Action on printer in case of digital input change.

HOW TO MODIFY IT : Select a new action code.

POSSIBLE CODES :

00 NO : No effect on printing

01 CHG SPD/TAB2 : Change to chart speed/print interval 2

02 CHG RANGE2 : Change to range 2 if RG USED = with R1 and to range 1 if RG USED = with R2

03 PRINT ON AL : Print all the channels of the CHART sub-matrix with the following configuration :
TRACE ≠ NO TRACE
and RG USED = R1 ON ALARM or R2 ON ALARM

04 PRN INHIBIT : Stop all printing

05 TAB TRACE : Print one tabular snapshot of values superposed on traces.

06 TAB BLANK : Print one tabular snapshot of values on blank paper.

07 TRIG EV PREC : Triggers "event precursor" printing

08 PRT MATH LOG : Print one tabular snapshot of math results

SEE ALSO : **REC MODE** in PRINTER sub-matrix for TRIG EV PREC.

RG USED in CHART sub-matrix for PRINT ON AL.

SUB- MATRIX	PARAMETER	CLASSIFICATION
DIGITAL	**R E D T R A C**	♦

DEFINITION : Specify if digital input trace must be printed in red on event.

HOW TO MODIFY IT : Select a new code.

POSSIBLE CODES :

00 NO
01 YES

WARNING : If the **RED TRAC** is selected: do not configure the trace in red as normal printing.

FOR MULTIPOINT MODEL ONLY

SUB- MATRIX	PARAMETER	CLASSIFICATION
DIGITAL	TYPE	♦♦

DEFINITION : Type of digital input.

HOW TO MODIFY IT : Select a new digital input code.

POSSIBLE CODES :

00 NONE : Select "none" for unused digital input.

01 DIG CLOSED : alarm to occur when logic input is ON (contact closed).

02 DIG OPEN : alarm to occur when logic input is OFF (contact opened).

03 CHG RATE H : alarm to occur when logic input is changing from OFF to ON.

04 CHG RATE L : alarm to occur when logic input is changing from ON to OFF.

05 CHG RATE H, L : alarm to occur when logic input is changing in either direction.

06 DIFFERENTIAL : alarm to occur when logic input changes to a different state from another specified logic input. (Function OR)

SEE ALSO : **CH DIFF** for DIFFERENTIAL in this sub-matrix.

EXAMPLE :

SUB- MATRIX	PARAMETER	CLASSIFICATION
DIGITAL	TYPE	♦♦

SUB- MATRIX	PARAMETER	CLASSIFICATION
DIGITAL	CH DIFF	♦

DEFINITION : Second digital input to use if the type is differential.

HOW TO MODIFY IT : Select a new code.

POSSIBLE CODES :

00 DIGITAL 1
01 DIGITAL 2
02 DIGITAL 3
03 DIGITAL 4

SUB- MATRIX	PARAMETER	CLASSIFICATION
DIGITAL	TRACE	♦♦

DEFINITION : Enable/disable the trace of the event.

POSSIBLE CODES :

01 ENABLE
00 DISABLE

SUB- MATRIX	PARAMETER	CLASSIFICATION
DIGITAL	**T R COLOR**	♦♦

DEFINITION : Defines color of trace.

HOW TO MODIFY IT : Select a new color code.

POSSIBLE CODES :

00 PURPLE

01 RED

02 BLACK

03 GREEN

04 BLUE

05 BROWN

WARNING : **FOR MULTIPOINT MODEL ONLY**

SUB- MATRIX	PARAMETER	CLASSIFICATION
DIGITAL	M S G C O L	♦♦

DEFINITION : Color of the message.

HOW TO MODIFY IT : Select a new color code.

POSSIBLE CODES :

00 PURPLE

01 RED

02 BLACK

03 GREEN

04 BLUE

05 BROWN

WARNING : **FOR MULTIPOINT MODEL ONLY**

SUB- MATRIX	PARAMETER	CLASSIFICATION
DIGITAL	M E S S A G #	♦♦

DEFINITION : Selection of message to be printed.

HOW TO MODIFY IT : Select a new message code.

POSSIBLE CODES :

00 MESSAGE #1
01 MESSAGE #2
02 MESSAGE #3
03 MESSAGE #4
04 MESSAGE #5
05 MESSAGE #6
06 MESSAGE #7
07 MESSAGE #8
08 MESSAGE #9
09 MESSAGE #10
0A MESSAGE #11
0B MESSAGE #12

SEE ALSO : **MSG TYPE** in this sub-matrix

SUB- MATRIX	PARAMETER	CLASSIFICATION
DIGITAL	**P R N T M S G**	♦

DEFINITION : Defines the condition to print the message on Change.

HOW TO MODIFY IT : Select a new MSG code.

POSSIBLE CODES :

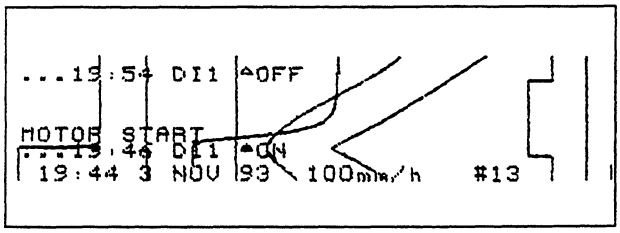
00 NO MESSAGE : No operator message is printed but date, time and alarm message are printed.

01 MESSAGE ON : Operator message is printed at digital event occurrence only.

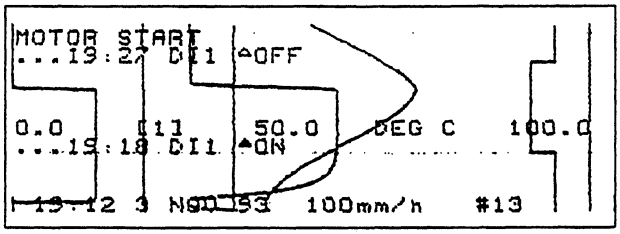
02 MESSAGE OFF : Operator message is printed at digital event release only.

03 MSG ON, OFF : Operator message is printed at digital event activation and at digital event release.

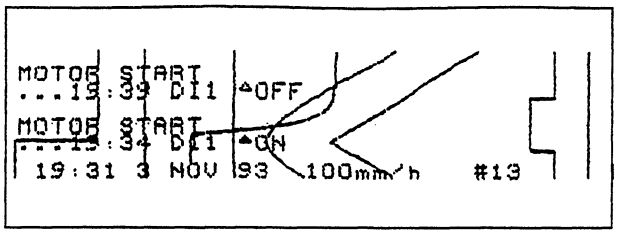
04 NONE : No message



MESSAGE ON



MESSAGE OFF



MESSAGE ON, OFF

SUB- MATRIX	*PARAMETER*	*CLASSIFICATION*
DIGITAL	**RELAY #**	♦♦

DEFINITION : Selection of relay activated.

HOW TO MODIFY IT : Select a new relay code.

POSSIBLE CODES :

00 NO RELAY
01 RELAY 1
02 RELAY 2
03 RELAY 3
04 RELAY 4
05 RELAY 5
06 RELAY 6
07 RELAY 7
08 RELAY 8
09 RELAY 9
0A RELAY 10
0B RELAY 11
0C RELAY 12

SUB- MATRIX	*PARAMETER*	*CLASSIFICATION*
DIGITAL	**POSITION**	♦

DEFINITION : Defines the trace position (open contact) on the chart. (in %)

WARNING : **FOR MULTIPOINT RECORDER ONLY**

SUB - MATRIX → **EVENT** 06

Position of parameters		Number of data fields
→	RELAY #	1
→	DISPLAY	1
→	UNUSED	2

SUB- MATRIX	PARAMETER	CLASSIFICATION
EVENT	**RELAY#**	♦

DEFINITION : Selection of relay activated in event condition.

HOW TO MODIFY IT : Select a new relay code.

POSSIBLE CODES :

00 NO RELAY
01 RELAY 1
02 RELAY 2
03 RELAY 3
04 RELAY 4
05 RELAY 5
06 RELAY 6
07 RELAY 7
08 RELAY 8
09 RELAY 9
0A RELAY 10
0B RELAY 11
0C RELAY 12

SUB- MATRIX	PARAMETER	CLASSIFICATION
EVENT	**DISPLAY**	♦

DEFINITION : Enable/disable a display warning in event occurrence.

HOW TO MODIFY IT : Choose a new selection.

POSSIBLE CODES :

01 ENABLE
00 DISABLE

NOTE : Burnout event cannot be displayed for sensors and ranges with "Fix Burnouts". (See analog matrix, Burnout parameter.)

SUB - MATRIX → **M A T H** 08

Position of parameters		Number of data fields
→	COEF A	4
→	COEF B	4
→	COEF C	4
→	FUNCTION	1
→	START	1
→	RESET	1
→	VAR A	1
→	VAR B	1
→	VAR C	1
→	BACKUP	1
→	UNUSED	4
→	UNUSED	4

SUB- MATRIX	PARAMETER	CLASSIFICATION
MATH	COEF A	♦

DEFINITION : First coefficient of a formula

HOW TO MODIFY IT : Define a numeric value. (IEEE)

POSSIBLE VALUES : Up to 5 digits including negative sign and decimal point

SUB- MATRIX	PARAMETER	CLASSIFICATION
MATH	COEF B	♦

DEFINITION : Second coefficient of a formula

HOW TO MODIFY IT : Define a numeric value. (IEEE)

POSSIBLE VALUES : Up to 5 digits including negative sign and decimal point

SUB- MATRIX	PARAMETER	CLASSIFICATION
MATH	COEF C	♦

DEFINITION : Third coefficient of a formula

HOW TO MODIFY IT : Define a numeric value. (IEEE)

POSSIBLE VALUES : Up to 5 digits including negative sign and decimal point

SUB- MATRIX	PARAMETER	CLASSIFICATION
MATH	FUNCTION	♦

DEFINITION : Selection of a formula

HOW TO MODIFY IT : Select a new value.

POSSIBLE VALUES :

Package 1	Package 2	Package 3	Package 4
	Package 1	*Package 2*	*Package 3*
No function (00)	Gas mass flow (08)	Integration (06)	Relative humidity (0C)
Addition (01)	Liquid mass flow (09)	Steam flow totalisation (0A)	Vacuum 10X (0D)
Basic math 1 (02)	Sterilization (05)	Energie consumption (0B)	Envelope (15)
Basic math 2 (03)	Totalisation (07)	Group min. (0F)	Elapsed time (16)
Square root (04)	Group average (0E)	Group max. (10)	Lap time (17)
		Group max. min. (11)	Cumulative time (18)
		Periodic max. (12)	Count down (19)
		Periodic min. (13)	Synchronize on time (1B)
		Periodic average (14)	
		Periodic pulse (1A)	

SUB- MATRIX	PARAMETER	CLASSIFICATION
MATH	**START**	♦

DEFINITION : Start condition of math computation.

HOW TO MODIFY IT : Select a new code.

POSSIBLE VALUES :

01 LOG 1 CLOSED
02 LOG 2 CLOSED
03 LOG 3 CLOSED
04 LOG 4 CLOSED
00 CONTINUOUSLY

SUB- MATRIX	PARAMETER	CLASSIFICATION
MATH	**RESET**	♦

DEFINITION : Reset condition of math computation.

HOW TO MODIFY IT : Select a new code.

POSSIBLE VALUES :

01 LOG 1 OPEN
02 LOG 2 OPEN
03 LOG 3 OPEN
04 LOG 4 OPEN
00 NO RESET

SUB- MATRIX	PARAMETER	CLASSIFICATION
MATH	V A R I A B A	♦

DEFINITION : First variable of a formula

HOW TO MODIFY IT : Select a new code.

POSSIBLE VALUES :

00 ANALOG 1
01 ANALOG 2
02 ANALOG 3
03 ANALOG 4
04 ANALOG 5
05 ANALOG 6

06 COMM 1
07 COMM 2
08 COMM 3
09 COMM 4
0A COMM 5
0B COMM 6

0C MATH 1
0D MATH 2
0E MATH 3
0F MATH 4
10 MATH 5
11 MATH 6

SUB- MATRIX	PARAMETER	CLASSIFICATION
MATH	V A R I A B B	♦

DEFINITION : Second variable of a formula

HOW TO MODIFY IT : Select a new code.

POSSIBLE VALUES :

00 ANALOG 1
01 ANALOG 2
02 ANALOG 3
03 ANALOG 4
04 ANALOG 5
05 ANALOG 6

06 COMM 1
07 COMM 2
08 COMM 3
09 COMM 4
0A COMM 5
0B COMM 6

0C MATH 1
0D MATH 2
0E MATH 3
0F MATH 4
10 MATH 5
11 MATH 6

SUB- MATRIX	PARAMETER	CLASSIFICATION
MATH	V A R I A B C	♦

DEFINITION : Third variable of a formula

HOW TO MODIFY IT : Select a new code.

POSSIBLE VALUES :

00 ANALOG 1
01 ANALOG 2
02 ANALOG 3
03 ANALOG 4
04 ANALOG 5
05 ANALOG 6

06 COMM 1
07 COMM 2
08 COMM 3
09 COMM 4
0A COMM 5
0B COMM 6

0C MATH 1
0D MATH 2
0E MATH 3
0F MATH 4
10 MATH 5
11 MATH 6

SUB- MATRIX	PARAMETER	CLASSIFICATION
MATH	B A C K U P	♦

DEFINITION : To have math result storage in case of power off.

HOW TO MODIFY IT : Select a new code.

POSSIBLE VALUES :

01 ENABLE
00 DISABLE

Number of data fields

SUB- MATRIX	*PARAMETER*	*CLASSIFICATION*
MESSAGES	**M E S S A G E**	♦♦♦

DEFINITION : To configure the messages (14 characters)

HOW TO MODIFY IT : Enter a text digit by digit with the ▲ and ▼ keys

POSSIBLE CODES : **14 characters + "\0" (Data field for "\0" is 00)**

WARNING : If the message is larger than 14 characters, the last digit takes the place of the first one, giving a wrong message.

SUB - MATRIX → **MISCELLANEOUS** 0A

Position of parameters		Number of data fields
→	DATE	3
→	FREQUNCY	1
→	LANGUAGE	1
→	IDNTIF #	2
→	PSSWRD 1	9
→	PSSWRD 2	9
→	TIME	3
→	MATH PAK	13
→	UNUSED	4

SUB- MATRIX	PARAMETER	CLASSIFICATION
MISCEL	**DATE**	♦

DEFINITION : Real time clock date.

HOW TO MODIFY IT : Enter always 3 characters.
- the first character for day : enter the numeric value
- the second character for month : enter the numeric value
- the third character for year : enter the numeric value

SUB- MATRIX	PARAMETER	CLASSIFICATION
MISCEL	**FREQUNCY**	♦

DEFINITION : To select the line frequency.

HOW TO MODIFY IT : Select a new frequency code.

POSSIBLE CODES :
00 50 Hz
01 60 Hz

NOTE : This value is important to improve serial mode rejection at power supply frequency.

In case of DC power supply, use the line frequency of the country.

SUB- MATRIX	PARAMETER	CLASSIFICATION
MISCEL	**LANGUAGE**	♦♦♦

DEFINITION : Operator information and configuration language.

HOW TO MODIFY IT : Select a new language code.

POSSIBLE CODES :

00 ENGLISH

01 FRENCH

02 GERMAN

03 SPANISH

04 ITALIAN

05 SWEDISH

SUB- MATRIX	PARAMETER	CLASSIFICATION
MISCEL	**IDNTIF #**	♦♦

DEFINITION : Identification number of the instrument which will be printed on the chart.

HOW TO MODIFY IT : Define a numeric value / integer.

POSSIBLE VALUES : **[0 ... 99]**

SUB- MATRIX	PARAMETER	CLASSIFICATION
MISCEL	P S S W R D 1	♦

DEFINITION : Used to provide a limited access to configuration.

HOW TO MODIFY IT : Enter a text.

POSSIBLE CODES : **8 digits + "\0" (Data field for "\0" is 00)**

SEE ALSO : See section 6.1 and the classification in section 7.1.

NOTE : The instrument is shipped with password #1 = nil
This gives a full access to configuration. (No protection)

WARNING : If PSSWRD #1 = PSSWRD #2,
the password will be understood as PSSWRD #2.

If PSSWRD#1 = PSSWRD#2 = a nil string, no password will be asked for configuration access.

Do not lose your password code. If yes, you have to contact your service department.

SUB- MATRIX	PARAMETER	CLASSIFICATION
MISCEL	**PSSWRD 2**	♦

DEFINITION : Used to provide full access to configuration.

HOW TO MODIFY IT : Enter a text.

POSSIBLE CODES : **8 digits + "\0" (Data field for "\0" is 00)**

SEE ALSO : See section 6.1 and the classification in section 7.1.

NOTE : The instrument is shipped with password #2 = nil
This gives a full access to configuration. (No protection)

WARNING : If PSSWRD #2 = PSSWRD #1,
the password will be understood as PSSWRD #2.

If PSSWRD#2 = PSSWRD#1 = a nil string, no password will be asked for configuration access.

Do not lose your password code. If yes, you have to contact your service department.

SUB- MATRIX	PARAMETER	CLASSIFICATION
MISCEL	**TIME**	♦

DEFINITION : Real time clock setting

HOW TO MODIFY IT : Enter always 3 characters.
- the first character for hours : enter the numeric value
- the second character for minutes : enter the numeric value
- the third character for seconds : enter the numeric value

POSSIBLE CODES : **00:00 up to 23:59**

SUB- MATRIX	PARAMETER	CLASSIFICATION
MISCEL	**MATH PAK**	♦

DEFINITION : Type of optional math package

HOW TO MODIFY IT : Enter a code.

POSSIBLE CODES : **Up to 12 digits + "\0" (Data field for "\0" is 00)**

SEE ALSO : SEE MATH USER'S MANUAL

WARNING : This code should be delivered by your service department and is specific to this recorder.

To obtain a new code, please indicate the full serial number displayed on MMI. (See the section 8 "SERVICE" on page 8-16)

SUB - MATRIX → **MMI** 0B

Position of parameters		Number of data fields
→	DISPLAY	1
→	KEY DOWN	1
→	KEY UP	1
→	KEY LEFT	1
→	KEY RIGHT	1
→	BRIGHT	1
→	UNUSED	2

SUB- MATRIX	PARAMETER	CLASSIFICATION
MMI	DISPLAY	♦♦♦

DEFINITION : Type of information to display in run mode at power on.

HOW TO MODIFY IT : Choose a new selection.

POSSIBLE CODES :

00 1BARGRAPH

01 2BARGRAPH (FOR PEN MODEL)

02 TRACE

03 TRACE AND TAG

04 ANALOG INPUT

05 MATH RESULTS (If option is present)

06 COMM INPUTS (If option is present)

07 ALARMS

08 SPEED IN USE

09 DATE AND TIME

SUB- MATRIX	PARAMETER	CLASSIFICATION
MMI	KEY DOWN ▼	♦

DEFINITION : To modify the display indication in normal operation.

HOW TO MODIFY IT : Choose a new selection.

POSSIBLE CODES :
01 ENABLE
00 DISABLE

NOTE : The possible indications are :
- Analog input
- Comm
- Math
- Chart traces
- Tag and traces
- Bargraph A
- Bargraph B **(FOR 2 OR 3 PEN MODEL ONLY)**
- Date/time
- Chart speed
- Alarm status

SUB- MATRIX	PARAMETER	CLASSIFICATION
MMI	KEY UP ▲	♦

DEFINITION : To stop the display scanning in normal operation.

HOW TO MODIFY IT : Select a new selection.

POSSIBLE CODES :
01 ENABLE
00 DISABLE

NOTE : The possible actions are :
- Scan
- Hold

SUB- MATRIX	PARAMETER	CLASSIFICATION
MMI	KEY LEFT ◁	♦

DEFINITION : To modify the printer operation.

HOW TO MODIFY IT : Choose a new selection.

POSSIBLE CODES :
01 ENABLE
00 DISABLE

NOTE : The possible actions are :
- Print date/time
- Digital print out
- Chart hold
- Chart run
- Change Speed/Tab
- Chart advance
- Reset chart length

SUB- MATRIX	PARAMETER	CLASSIFICATION
MMI	KEY RIGH ▷	♦

DEFINITION : To reset the maths functions or batch number.

HOW TO MODIFY IT : Choose a new selection.

POSSIBLE CODES :
01 ENABLE
00 DISABLE

NOTE : The possible actions are :
- Reset Math [1 ... 6]
- Reset Math All
- Reset batch number and alarm occurrence value
- Reset increment batch number and alarm occurrence value

SUB- MATRIX	PARAMETER	CLASSIFICATION
MMI	BRIGHT	♦

DEFINITION : To modify the display brightness during operation.

HOW TO MODIFY IT : Choose a new code.

POSSIBLE CODES :

00 OFF (0 %)

01 >> (20 %)

02 MEDIUM (40 %)

03 >> (60 %)

04 >> (80 %)

05 HIGH (100 %)

SUB - MATRIX → **PRINTER** 0C

Position of parameters		Number of data fields
→	REC MODE	1
→	PRT MODE	1
→	UNUSED	1
→	SPD UNIT	1
→	SPEED1	4
→	SPEED2	4
→	SPD USED	1
→	TABULAR1	1
→	TABULAR2	1
→	PRT INTV	1

SUB - MATRIX → **PRINTER** 0C

Position of parameters		Number of data fields
→	PRT RANG	1
→	PRT TIME	1
→	PRT PV	1
→	UNUSED	1
→	PEN OFFS	1
→	CHART LG	4
→	UNUSED	4

SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	**REC MODE**	♦

DEFINITION : Recording mode allows you to print normally, to stop the printer, to trigger the printer on alarm with (or without) retrun to stand-by.

HOW TO MODIFY IT : Select a new code.

POSSIBLE CODES :

00 INHIBIT

01 PRINT

FOR MULTIPOINT MODEL ONLY :

02 EVPR RT STBY : triggering of "Event precursor" when alarm occurs with return to standby.

03 EVPR RT RUN : triggering of "Event precursor" when alarm occurs followed by continuous recording.

NOTE : If EVPR is selected, the brightness of the display decreases.

Historic = chart length printed = 5 cm

Chart speed	Historic time
10	300 mn (5 h.)
50	60 mn (1 h.)
100	30 mn (1/2 h.)
250	12 mn
500	6 mn
1000	3 mn
1500	2 mn

WARNING : **EVPR RT STBY** and **EVPR RT RUN** are only active if **PRT MODE** is equal to TREND.

The selection of **INHIBIT** takes priority over **PRINT INHIBIT** requested on **ALARM** or with **BASIC ACTIONS**.

SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	**PRT MODE**	♦♦

DEFINITION : Under this heading you must choose whether recording will be in trend mode or tabular mode.

HOW TO MODIFY IT : Select a new printing mode code.

POSSIBLE CODES :

00 TREND : All channels recorded as trends.

01 TABULAR : All channels recorded in tabular format.

SEE ALSO : **REC MODE** for compatibility with **EVENT PERCURSOR.**

WARNING : **FOR MULTIPOINT MODEL ONLY**

SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	**SPD UNIT**	♦

DEFINITION : Speed unit

HOW TO MODIFY IT : Select a new code.

POSSIBLE CODES :

00 UNIT = mm/h
or
01 UNIT = inch/h

SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	SPEED1	♦♦

DEFINITION : Value of speed 1.

HOW TO MODIFY IT : Enter a numeric value based on speed unit selected. (IEEE floating point)

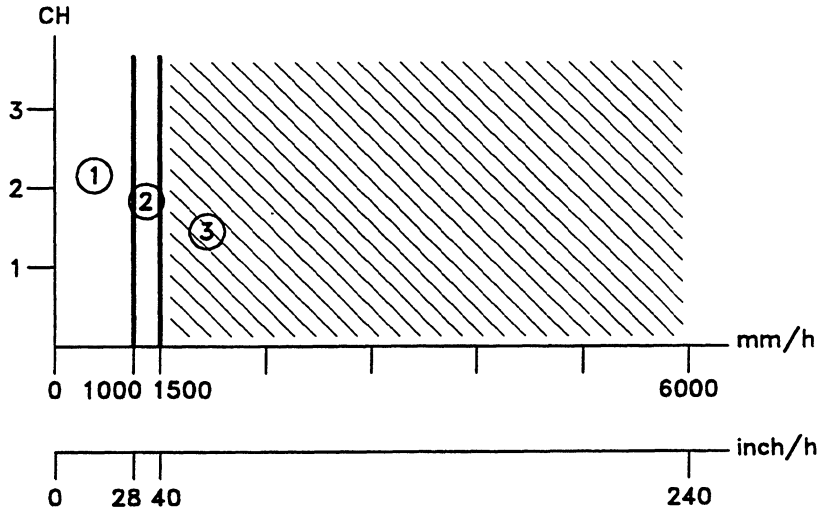
POSSIBLE VALUES :

With mm/h unit :
[1 ... 1500] for a multipoint recorder
[1 ... 6000] for a pen recorder
or
With inch/h unit :
[0.039 ... 59] for a multipoint recorder
[0.039 ... 237] for a pen recorder

Refer to **SPD UNIT** to know the speed unit in use.

WARNING : A fast chart speed may affect the printing performance :

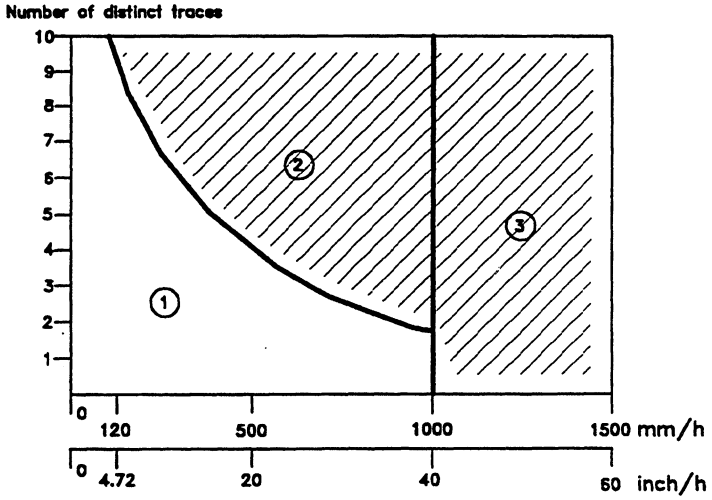
PEN RECORDER WRITING SPEED



① Fully documented chart
② Alarm information only with traces
③ Traces only

SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	**S P E E D 1**	♦♦

MULTIPOINT RECORDER WRITING SPEED



① Continuous traces in color with regular chart documentation

② Dotted traces in color with regular chart documentation

③ Dotted traces in color without periodic messages
Alarm messages are printed.

SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	**S P E E D 2**	♦

DEFINITION : Value of speed 2.

HOW TO MODIFY IT : Enter a numeric value based on speed unit selected. (IEEE floating point)

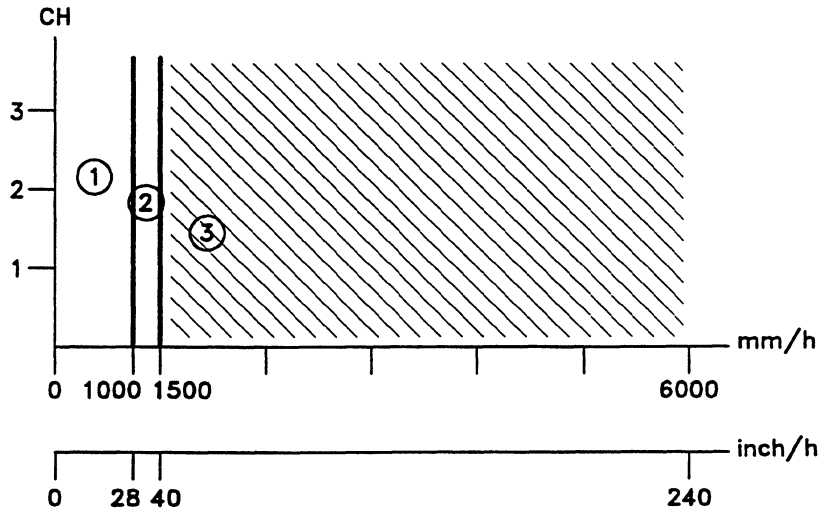
POSSIBLE VALUES :

With mm/h unit :
[1 ... 1500] for a multipoint recorder
[1 ... 6000] for a pen recorder
or
With inch/h unit :
[0.039 ... 59] for a multipoint recorder
[0.039 ... 237] for a pen recorder

Refer to **SPD UNIT** to know the speed unit in use.

WARNING : A fast chart speed may affect the printing performance :

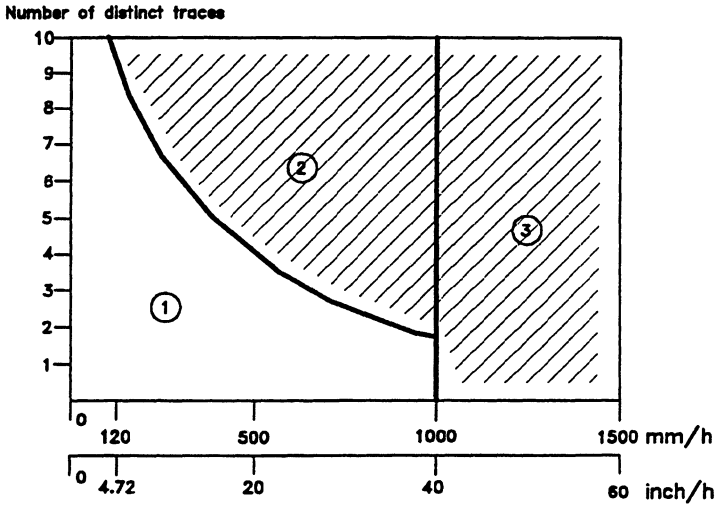
PEN RECORDER WRITING SPEED



(1) Fully documented chart
(2) Alarm information only with traces
(3) Traces only

SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	SPEED2	♦

MULTIPOINT RECORDER WRITING SPEED



① Continuous traces in color with regular chart documentation

② Dotted traces in color with regular chart documentation

③ Dotted traces in color without periodic messages
Alarm messages are printed.

SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	**SPD USED**	♦

DEFINITION : Defines speed in use.

HOW TO MODIFY IT : Select a new speed code.

POSSIBLE CODES :

00 SPEED 1 USED
01 SPEED 2 USED

NOTE : If printing mode **(PRT MODE)** is TABULAR,
SPEED 1, SPEED 2 must be understood as TABULAR 1, TABULAR 2.

SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	**TABULAR1**	♦

DEFINITION : Tab 1 prints interval. (In minute)

HOW TO MODIFY IT : Select a new time code.

POSSIBLE CODES :

00 10 mn
01 20 mn
02 30 mn
03 1 Hour
04 2 Hours
05 4 Hours
06 8 Hours
07 24 Hours

SEE ALSO : **PRT MODE** in this sub-matrix.

WARNING : **FOR MULTIPOINT MODEL ONLY**

SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	**T A B U L A R 2**	♦

DEFINITION : Tab 2 prints interval.

HOW TO MODIFY IT : Select a new time code.

POSSIBLE CODES :

00 10 mn
01 20 mn
02 30 mn
03 1 Hour
04 2 Hours
05 4 Hours
06 8 Hours
07 24 Hours

SEE ALSO : **PRT MODE** in this sub-matrix.

WARNING : **FOR MULTIPOINT MODEL ONLY**

SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	PRT INTV	♦

DEFINITION : Separation (in millimeters) of **PRT PV** interval for periodic printing.

HOW TO MODIFY IT : Select a new printing interval code.

POSSIBLE CODES :

00 60 mm

01 120 mm

02 240 mm

03 480 mm

NOTE : The distance between 2 periodic chart documentation is approximate.
The software will print at the round time as closest as possible to the selected distance value.

Between the periodic printing of PV, chart ranges informations and speed/time informations may be printed if they are selected and if **PRT INTV** is larger than 60 mm.

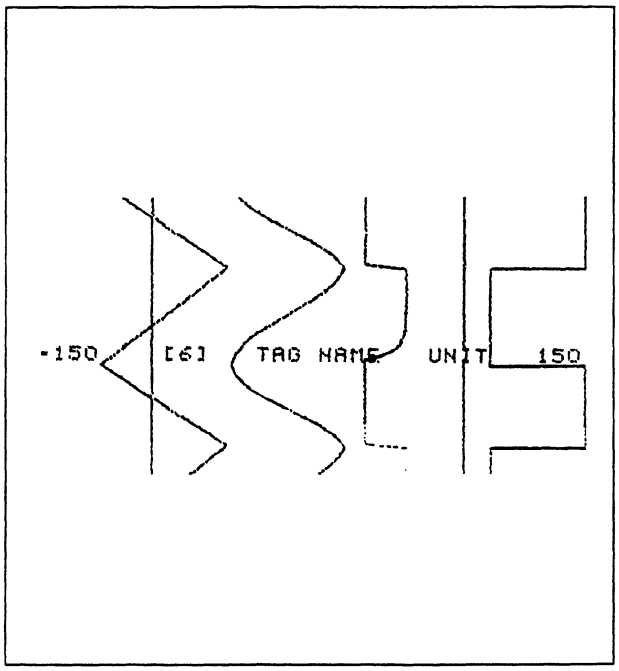
SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	**P R T R A N G**	♦

DEFINITION : Periodic printing of the chart ranges.

HOW TO MODIFY IT : Select a new selection.

POSSIBLE CODES :
01 ENABLE
00 DISABLE

SEE ALSO : **PRT INTV** in this sub-matrix.



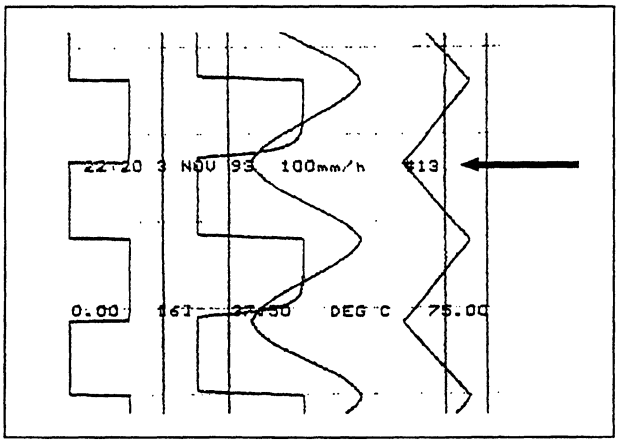
SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	**PRT TIME**	♦

DEFINITION : Periodic printing of "TIME, SPEED AND CHANNEL ID".

HOW TO MODIFY IT : Choose a new selection.

POSSIBLE CODES :
01 ENABLE
00 DISABLE

SEE ALSO : **PRT INTV** in this sub-matrix.



SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	**P R T P V**	♦

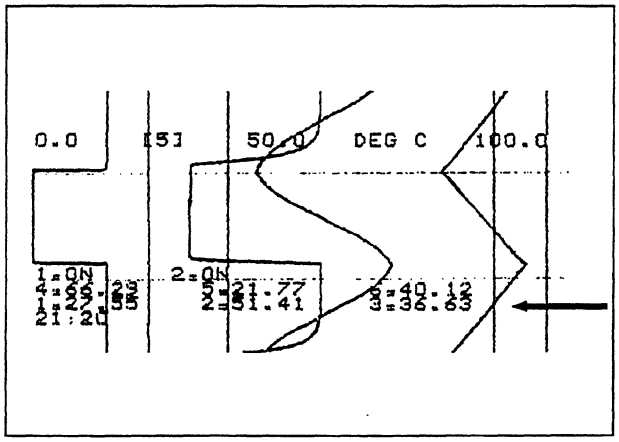
DEFINITION : Periodic printing of PV values, times and digital input status.

HOW TO MODIFY IT : Choose a new selection.

POSSIBLE CODES :

01 ENABLE
00 DISABLE

SEE ALSO : **PRT INTV** in this sub-matrix.



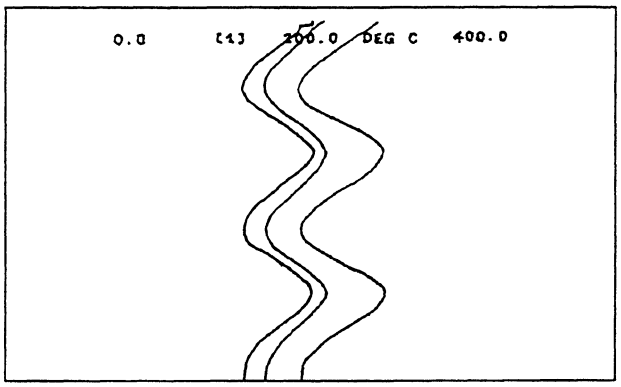
SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	**P E N O F F S**	♦

DEFINITION : Pen offset.

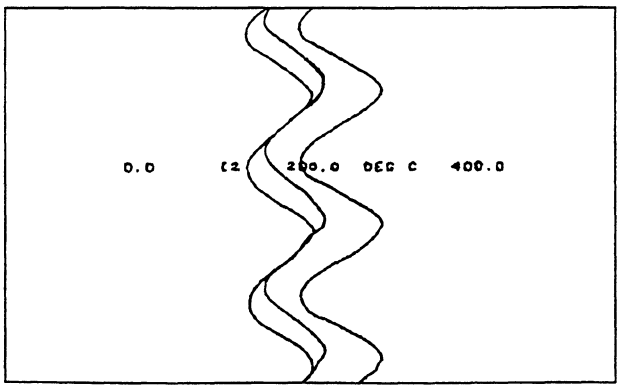
HOW TO MODIFY IT : Choose a new selection.

POSSIBLE CODES :
00 OFF
01 ON

WARNING : **FOR PEN MODEL ONLY**



With pen offset



Without pen offset

SUB- MATRIX	PARAMETER	CLASSIFICATION
PRINTER	CHART LG	♦

DEFINITION : Total chart length of the chart roll or fanfold

HOW TO MODIFY IT : Enter length of new chart. (IEEE floating point)

POSSIBLE VALUES : **[0 ... 30000] mm**
[0 ... 1181.1] inch
Refer to SPEED unit to know the unit in use.

SEE ALSO : **TYPE in EVENT matrix.**

WARNING : The basic length of a roll is 24 m.

- New chart roll length : 24 m
- New chart fanfold length : 18 m

SUB - MATRIX → **CURRENT OUTPUTS** 0E

Position of parameters		Number of data fields
→	- CH #	1
→	unused	1
→	unused	1
→	unused	1
→	unused	2
→	unused	2
→	LOW VAL	4
→	HIGH VAL	4

SUB-MATRIX	PARAMETER	CLASSIFICATION
CUR OUT	C H #	♦

DEFINITION : Defines the variable to apply on current output.
(Analog input 1...6, Comm 1...6, Math 1...6, None)

HOW TO MODIFY IT : Select a new code.

POSSIBLE CHOICES :

00 NONE

01 ANALOG 1
02 ANALOG 2
03 ANALOG 3
04 ANALOG 4
05 ANALOG 5
06 ANALOG 6

07 COMM 1
08 COMM 2
09 COMM 3
0A COMM 4
0B COMM 5
0C COMM 6

0D MATH 1
0E MATH 2
0F MATH 3
10 MATH 4
11 MATH 5
12 MATH 6

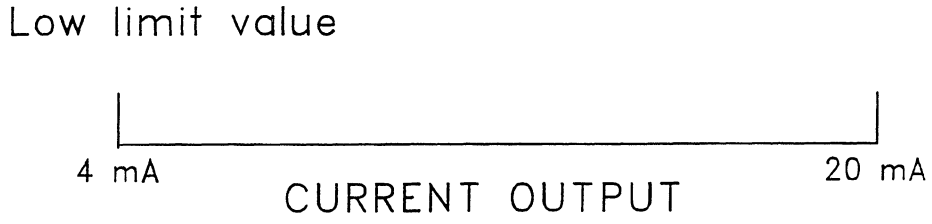
SUB-MATRIX	PARAMETER	CLASSIFICATION
CUR OUT	LOW VAL	♦

DEFINITION : Engineering value corresponding to a 4 mA output signal.

HOW TO MODIFY IT : Define a numeric value. (IEEE)

POSSIBLE VALUES : Up to 5 digits for analog inputs, communication inputs.
Up to 8 digits for mathematic results.
Including negative sign and decimal points.

EXAMPLE :



WARNING : Do not use more than 5 digits for analog inputs and communication inputs.

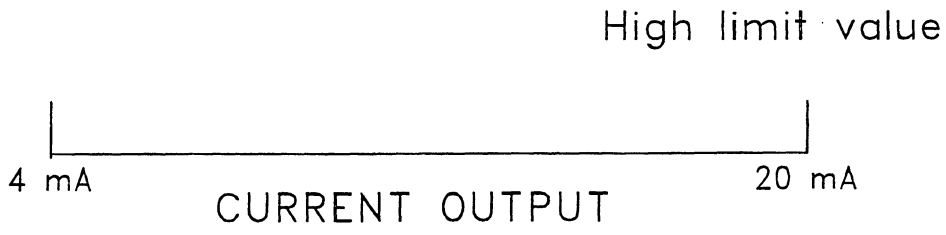
SUB-MATRIX	PARAMETER	CLASSIFICATION
CUR OUT	HIGH VAL	♦

DEFINITION : Engineering value corresponding to a 20 mA output signal.

HOW TO MODIFY IT : Define a numeric value. (IEEE)

POSSIBLE VALUES : Up to 5 digits for analog inputs, communication inputs.
Up to 8 digits for mathematic results.
Including negative sign and decimal points.

EXAMPLE :



WARNING : Do not use more than 5 digits for analog inputs and communication inputs.

9. DAILY REPORT

9.1 DEFINITION

The "daily" report is a summary of all process values and maths results.

The report can be sent periodically on the communication link with or without a MODEM and may be displayed either on a screen or on a serial printer or captured by a customer program.

The daily report corresponds to a maximum of 24 paragraphs relative to minimum, average and maximum values for each analog and maths input sampled at 1Hz.

9.2 DAILY REPORT CONFIGURATION

In the **REPORT** sub-matrix, configure the following parameters :

- **START AT :** Start time of first daily report.

- **PARAGRPH :** 1/4 - 1/2 - 1 - 2 - 8 - 24 - 168 hours

  Corresponds to the computation period of a PARAGRPH relative to minimum, average and maximum values for each analog input and maths results. (See example of report, page 9-3)

- **FREQENCY :** 1/4 - 1/2 - 1 - 2 - 8 - 24 - 168 hours (7 days) - never
  must be within 1 and 24 times PARAGRPH value.
  Never : no daily report

  Frequency of report generation.

9.3 OUTPUT FORMAT

When START TIME is reached, the communication outputs are described as follows:

- A daily report Header includes :
  - o The recorder communication address and name : #ii NAME
  - o The start date and time of the daily report : REPORT START : JJ MMM AA HH:MM
- If there is more than one paragraph, a last block is sent with data covering the whole daily report time : minimum of minima, global average and maximum of maxima for each input.

This block is preceded by :

#ii REPORT SUMMARY
FROM JJ MMM AA HH:MM
TO JJ MMM AA HH:MM

Example of report for :

START AT = 4:00
PARAGRPH = 1 hour
FREQENCY = 2 hours

Identification name

#02 PARIS RECORDER REPORT START : 03 JAN 94 04:00

CHANNEL	MIN	AVRG	MAX
From 04:00		to 05:00	
AN1	XXXXXXXX	XXXXXXXX	XXXXXXXX
AN2	XXXXXXXX	XXXXXXXX	XXXXXXXX
AN3	XXXXXXXX	XXXXXXXX	XXXXXXXX
AN4	XXXXXXXX	XXXXXXXX	XXXXXXXX
AN5	XXXXXXXX	XXXXXXXX	XXXXXXXX
AN6	XXXXXXXX	XXXXXXXX	XXXXXXXX
MA1	XXXXXXXX	XXXXXXXX	XXXXXXXX
MA2	XXXXXXXX	XXXXXXXX	XXXXXXXX
MA3	XXXXXXXX	XXXXXXXX	XXXXXXXX
MA4	XXXXXXXX	XXXXXXXX	XXXXXXXX
MA5	XXXXXXXX	XXXXXXXX	XXXXXXXX
MA6	XXXXXXXX	XXXXXXXX	XXXXXXXX

PERIOD OF A PARAGRAPH

CHANNEL	MIN	AVRG	MAX
From 05:00		to 06:00	
AN1	XXXXXXXX	XXXXXXXX	XXXXXXXX
AN2	XXXXXXXX	XXXXXXXX	XXXXXXXX
AN3	XXXXXXXX	XXXXXXXX	XXXXXXXX
AN4	XXXXXXXX	XXXXXXXX	XXXXXXXX
AN5	XXXXXXXX	XXXXXXXX	XXXXXXXX
AN6	XXXXXXXX	XXXXXXXX	XXXXXXXX
MA1	XXXXXXXX	XXXXXXXX	XXXXXXXX
MA2	XXXXXXXX	XXXXXXXX	XXXXXXXX
MA3	XXXXXXXX	XXXXXXXX	XXXXXXXX
MA4	XXXXXXXX	XXXXXXXX	XXXXXXXX
MA5	XXXXXXXX	XXXXXXXX	XXXXXXXX
MA6	XXXXXXXX	XXXXXXXX	XXXXXXXX

TOTAL REPORT DONE EVERY 2 HOURS

(FREQUENCY = 2 hours)

#02 PARIS RECORDER REPORT SUMMARY

	FROM	03 JAN 94		04:00
	TO	03 JAN		06:00
	CHANNEL	MIN	AVRG	MAX
Analog inputs	AN1	XXXXXXXX	XXXXXXXX	XXXXXXXX
	AN2	XXXXXXXX	XXXXXXXX	XXXXXXXX
	AN3	XXXXXXXX	XXXXXXXX	XXXXXXXX
	AN4	XXXXXXXX	XXXXXXXX	XXXXXXXX
	AN5	XXXXXXXX	XXXXXXXX	XXXXXXXX
	AN6	XXXXXXXX	XXXXXXXX	XXXXXXXX
Maths functions	MA1	XXXXXXXX	XXXXXXXX	XXXXXXXX
	MA2	XXXXXXXX	XXXXXXXX	XXXXXXXX
	MA3	XXXXXXXX	XXXXXXXX	XXXXXXXX
	MA4	XXXXXXXX	XXXXXXXX	XXXXXXXX
	MA5	XXXXXXXX	XXXXXXXX	XXXXXXXX
	MA6	XXXXXXXX	XXXXXXXX	XXXXXXXX

9.4 VALUES FORMAT

- All values will be right justified.

  All analog values too long for fitting on 8 digits will be displayed in engineering format.

  All maths values format too long for fitting on 8 digits will be displayed in engineering format.

  All maths values between -1 and 1 with 3 or more zeros after "." will be displayed in engineering format.

- Examples :

  AN1 = 0.0000001 displays 0
  AN1 = 100000000 displays 1E9
  AN1 = -0.000001 displays 0
  AN1 = -10000000 displays -1E8

  MA1 = 0.0001 displays 1E-4
  MA1 = 0.001 displays 0.001
  MA1 = 0.00001 displays 1E-5

- The autodial alarm message can be sent on the communication link with or without a MODEM and may be displayed either on a screen or on a serial printer or captured by a customer program.

- The message includes the same informations as the printed alarm message with the recorder communication address added.

The format is described as follows :

For analog alarm :

#aa [NAME] (1 CARRIAGE RETURN) (1 LINEFEED)
HH:MM [TYPE] ALARM ii ON CHANNEL jjjj TURNS [STATUS] { } (1 CARRIAGE RETURN) (1 LINE FEED)

- aa : 2 digits (First digit is zero, if necessary) for the address recorder.

- [NAME] : Recorder communication name.

- [TYPE] can be :

"	HIGH"
"	LOW"
"	CHG RATE HI"
"	CHG RATE LO"
"CHG RATE HI/LO"	
"	DIFFERENTIAL"

- [STATUTS] can be " ON" or "OFF".

- ii : 2 digits (first digit is zero if necessary)

- jjjj : Identifies the type of channel and the channel number.

- { } is the customer's configured message.

For digital alarm :

#aa [NAME] (1 CARRIAGE RETURN) (1 LINEFEED)
HH:MM [TYPE] DIGIT ii TURNS [STATUS] { } (1 CARRIAGE RETURN) (1 LINEFEED)

- [NAME] : Recorder communication name.
- [TYPE] can be :
  - " HIGH"
  - " LOW"
  - " CHG RATE HI"
  - " CHG RATE LO"
  - "CHG RATE HI/LO"
  - " DIFFERENTIAL"
- [STATUTS] can be " ON" or "OFF".
- ii : 2 digits (first digit is zero if necessary)
- jjjj : Identifies the type of channel and the channel number.
- { } is the customer's configured message.

For event alarm :

#aa [NAME] (1 CARRIAGE RETURN) (1 LINEFEED)
HH:MM [TYPE] EVENT ii TURNS [STATUS] { } (1 CARRIAGE RETURN) (1 LINEFEED)

- [NAME] : Recorder communication name.
- [TYPE] can be :
  - " CASSETTE OUT"
  - " LOW"
  - " BATTERY KO"
  - " ONE ALARM ON"
  - " BURNOUT"
  - " SHEDTIME"
- [STATUTS] can be " ON" or "OFF".
- ii : 2 digits (first digit is zero if necessary)
- jjjj : Identifies the type of channel and the channel number.
- { } is the customer's configured message.

11. APPENDIX A

12. APPENDIX B

12.1 PROGRAMMING EXAMPLE

When using a personal computer this program can be used to test the loopback protocol. (ASCII)
In line 50 the serial communication slot is configured as :
9600 baud even parity, 7 bits per character and 1 stop bit.

```
10      DIM TRANSMIT$ (256)
20      DIM RECEIVES$(256)
30      DEFINT A-Z
40      CLS
50      OPEN "COM1 : 9600, E, 7, 1, CS, LF" AS #1 LEN=256
60      TRANSMIT$="01,0204,8A,D,ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890,.?@#$%^&*()_+,
70      GOSUB 200
80      GOTO 70
200     PRINT TRANSMIT$
210     PRINTS #1, TRANSMIT$
220     LINE INPUT #1, RECEIVE$
230     PRINT RECEIVE$
240     RETURN
```

12. APPENDIX B

13. APPENDIX C

13.1 TROUBLESHOOTING

Communication problems can be divided in 2 parts :

1. The recorder is not responding at all. To resolve this problem you have to check :

   o The polarity +/- for the RS422/RS485 link.

   o The transmission line of the host has to be connected to the reception line of the recorder and vice versa.

   o The protocole, connection, baud rate, parity, bits per character and stop bits of the host has to be the same as configured on the recorder. Verify the communication matrix.

   o In case of RS485 (2 wires) the RTS (Request To Send) signal of the host must be enabled during transmission.

   o Make sure that you have selected the proper jumper selection for RS232/RS422/RS485 on the universal communication board.

   o Verify that the address slave is correct, that CRC is correct for RTU.

   o Make sure that the format of your request is correct. Use for example the loopback protocol. (see chapter Loopback protocol)

   o Make sure your communication board works properly, use the COMMUNICATION SERVICE sub-matrix. (see page 3-12, CONFIGURATION section)

2. The recorder responds with an error code in the request message status code.

   ASCII RESPONSES :

   01 Invalid request :
   - Request for a variable which does not exist.
   - READING from a variable which is WRITE only.
   - WRITING to a variable which is READ only.
   - Selection of a starting index which is too large.
   - Selection of a number which is too large.
   - Using invalid data in the data field (check the possible values for the appropriate parameter)

   02 Invalid format :
   - The request does not contain hexadecimal data.
   - No comma delimitted

   04 Invalid checksum, parity or framing error.
   - Make sure you have calculated the correct checksum when using 4204 in the protocol field.

- Check the quality of your communication link.

05 Invalid mode
- To write configuration parameters, the "LOCK" frame is required.
(See CONFIGURATION LOCK parameter)
- Communication between recorder mother board and communication board is temporarily impossible, the slave is engaged in process of a long duration programm command. Retransmit later.

RTU RESPONSES :

01 Illegal function :
- The function code field is incorrect.
- It can only equal to 04, 06, 08, 16, 20 or 21.

02 Illegal data address :
- The address referenced in the data field is not allowed for the function code.
- The address of floating value is odd instead of even.
- The number of registers is incorrect for the specific action. (too large or too small)

03 Illegal data value :
- The data field value is not allowed for the function code.
- The number of data byte is too large or too small.

06 Busy, rejected message
- To write configuration parameters, the "LOCK" frame is required.
(See CONFIGURATION LOCK parameter for RTU)
- Communication between recorder mother board and communication board is temporarily impossible, the slave is engaged in process of a long duration programm command. Retransmit later.

In any case, look at the manual examples.

14. APPENDIX D

14.1 IEEE 32 BIT FLOATING POINT INFORMATION

14.1.1 Introduction

The recorder supports IEEE 32 bit floating point information for several of the function codes. Each IEEE 32 bit floating point number requires two consecutive registers (four bytes) starting with the register defined as the starting register for the information.

14.1.2 Bit order

The bit order for the IEEE floating point is shown below :

- Reg N HIGH BYTE SIGN, EXP7, EXP6, EXP5, E4, E3, E2, E1
- Reg N LOW BYTE EXPO, M22, M21, M20, M19, M18, M17, M16

- Reg N+1 HIGH BYTE M15, M14, M13, M12, M11, M10, M9, M8
- Reg N+1 LOW BYTE M7, M6, M5, M4, M3, M2, M1, M0

Where :

SIGN is the sign bit
EXP7 through EXPO are exponent bits
M22 through M0 are mantissa bits

In IEEE floating point, the most significant bit of the mantissa is implied. The exponent is offset by 128 (80 hex). An exponent value equal to zero will approximate zero with the sign bit and mantissa being significant.

14.1.3 Examples

The following examples of IEEE floating point are provided for reference.

Value	IEEE FP	REG N		REG N+1	
(decimal)	MSB LSB	High	Low	High	Low
1.0	3F800000h	3fh	80h	00h	00h
2.0	40000000h	40h	00h	00h	00h
-1.0	BF800000h	BFh	80h	00h	00h
100.0	42C80000h	42h	C8h	00h	00h

14.1.4 Warning

In an IBM compatible PC, floating point values are normally stored in byte and word swapped order. In an IBM machine, the value 1.0 is stored in ascending address locations as 00h, 00h, 80h, 3fh.

14. APPENDIX D

HONEYWELL SERVICE CENTERS

ARGENTINA

HONEYWELL S.A.I.C.
BELGRANO 1156
BUENOS AIRES
ARGENTINA
Tel. : 54 1 383 9290

ASIA PACIFIC

HONEYWELL ASIA PACIFIC Inc.
Room 3213-3225
Sun Kung Kai Centre
No 30 Harbour Road
WANCHAI
HONG KONG
Tel. : 852 829 82 98

AUSTRALIA

HONEYWELL LIMITED
5 Thomas Holt Drive
North Ryde Sydney
NSW AUSTRALIA 2113
Tel. : 61 2 353 7000

AUSTRIA

HONEYWELL AUSTRIA G.m.b.H.
Handelskai 388
A1023 VIENNA
AUSTRIA
Tel. : 43 1 727 800

BELGIUM

HONEYWELL S.A.
Avenue de Schipol, 3
1140 BRUSSELS
BELGIUM
Tel. : 32 2 728 27 11

BRAZIL

HONEYWELL DO BRASIL AND CIA
Rua Jose Alves Da Chunha
Lima 172
BUTANTA
05360.050 SAO PAULO SP
BRAZIL
Tel. : 55 11 819 3755

CANADA

HONEYWELL LIMITED
THE HONEYWELL CENTRE
529 Mc Nicoll Avenue
M2H 2C9 NORTH YORK, ONTARIO
CANADA
Tel. : 416 502 5200

CZECH REPUBLIC

HONEYWELL, spol.s r.o.
Budejovicka 1
140 00 Praha 4
Czech Republic
Tel. : 42-2-6112-2777

DENMARK

HONEYWELL A/S
Lyngby Hovedgade 98
2800 LYNGBY
DENMARK
Tel. : 45 45 93 56 56

FINLAND

HONEYWELL OY
Ruukintie 8
FIN-02320 ESPOO 32
FINLAND
Tel. : 358 0 3480101

FRANCE

HONEYWELL S.A.
Bâtiment "le Mercury"
Parc technologique de St Aubin
Route de l'Orme
91190 SAINT-AUBIN
FRANCE
Tel. from France: 01 60 19 80 00
From other countries: 33 1 60 19 80 00

GERMANY

HONEYWELL AG
Kaiserleistrasse 39
Postfach 10 08 65
D-63067 OFFENBACH/MAIN
GERMANY
Tel. : 49 69 80 640

HUNGARY

HONEYWELL Kft
Volgy U 30
H-1026 BUDAPEST
HUNGARY
Tel. : 36 1 116 76 59

ITALY

HONEYWELL S.p.A.
Via P. Gobetti, 2/b
20063 Cernusco Sul Naviglio
ITALY
Tel. : 39 02 92146 1

MEXICO

HONEYWELL S.A. DE CV
AV. CONSTITUYENTES 900
COL. LOMAS ALTAS
11950 MEXICO CITY
MEXICO
Tel. : 52 5 259 1966

NETHERLANDS

HONEYWELL BV
Laaderhoogtweg 18
NL-1101 EA AMSTERDAM ZO
THE NETHERLANDS
Tel. : 31 20 56 56 911

HONEYWELL SERVICE CENTERS

NORWAY

HONEYWELL A/S
Askerveien 61
PO Box 263
N-1371 ASKER
NORWAY
Tel. : 47 66 90 20 30

PORTUGAL

HONEYWELL PORTUGAL LDA
Edificio Suecia II
Av. do Forte nr 3 - Piso 3
CARNAXIDE
2795 LINDA A VELHA
PORTUGAL
Tel. : 351 1 4172 602

REP. OF SINGAPORE

HONEYWELL PTE LTD.
BLOCK 750E CHAI CHEE ROAD
06-01 CHAI CHEE IND. PARK
1646 SINGAPORE
REP. OF SINGAPORE
Tel. : 65 2490 100

SLOVAK REPUBLIC

HONEYWELL
Trnavska 3
831 04 BRATISLAVA
SLOVAKIA
Tel. : 42 7 526 1409

SPAIN

HONEYWELL
Josefa Valcarcel, 24
PO Box 29106
28027 MADRID
SPAIN
Tel. : 34 91 32 02 112

SWITZERLAND

HONEYWELL A.G.
Hertistrasse 2
8304 WALLISELLEN
SWITZERLAND
Tel. : 41 1 839 2525

U.S.A.

HONEYWELL INC.
INDUSTRIAL CONTROLS DIV.
1100 VIRGINIA DRIVE
PA 19034-3260 FT. WASHINGTON
U.S.A.
Tel. : 215 641 3000

POLAND

HONEYWELL Ltd
Ul Augustowka 3
PL-02981 WARSAW
POLAND
Tel. : 48 2 642 25 70

REPUBLIC OF IRELAND

HONEYWELL
Unit 5
Long Mile Road
DUBLIN 12
Republic of Ireland
Tel. : 353 1 4565944

RUSSIA

HONEYWELL INC
Tryokhprundny Pereulok 11.13
SU 10 3001 MOSCOW
Tel. : 7095 29 92 531

SOUTH AFRICA

HONEYWELL LTD
34 Harry Street
Robertsham
JOHANNESBURG 2091
REPUBLIC OF SOUTH AFRICA
Tel. : 27 11 680 3440

SWEDEN

HONEYWELL A.B.
Storsatragrand 5
S-127 86 Skarholmen STOCKHOLM
SWEDEN
Tel. : 46 8 775 55 00

UNITED KINGDOM

HONEYWELL HOUSE
Arlington Business Park
BRACKNELL
Berkshire RG12 1EB
UNITED KINGDOM
Tel. : 44 344 826 000

VENEZUELA

HONEYWELL CA
APARTADO 61314
1060 CARACAS
VENEZUELA
Tel. : 58 2 239 0211