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	Communications with the IBM Model 30	M30/S-7

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ABSTRACT and CONTENTS

Specifies standard means of communication between processes and the Model 30 via a standard interface process M30COM.

Introduction

The standard procedure for communications with a device on the M30 will be basically as follows: The process concerned will first call a utility to 'open' the device it wishes to use. Data from this call (which the utility will pass to M30COM via the file M30Q) will be the process's complete name, the complete name of a file to be used for communications with M30COM, and the number of the device to be opened. M30COM will check to see that the device is available, and if it is, then it will initialize part of itself accordingly and return via M30Q an interrupt number. The utility will return this number to the calling process, which should use it thenceforward for communication with M30COM.

From then on, data will be passed between M30COM and the user process via a ring buffer within the first page of the user communication file. The user will interrupt M30COM when he has requests to be serviced, and M30COM will interrupt the user (if he so requests) as the requested actions are completed. Requests may be for action (with/without data transfer between the M30 and the communications file) on the open device, or for messages (with/without reply) for the operator.

I. Opening a device

The first page of M30Q contains a small slot for opening requests (figure 1). The entry in this table is 17 words long; space for a unique device number, the complete process name and a complete file name. The user should call a utility which will be provided to make his entry, open M30COM and fire interrupt 10 at it. M30COM will respond to the utility with a specified interrupt once it has picked up the request. Word 2 of the request entry, which the utility will return to the user, originally contained the device number, and will now either contain an interrupt number, or -1 if the device was not available. If the device was not available, the utility will FRETURN, otherwise it will RETURN the interrupt number. If an interrupt number is returned, the user is cleared to access the device, using that interrupt to inform M30COM of its requests.

M30Q Page Ø

0 LOCK	software lock
1 bit 0 FLAG	done flag, set by M30COM when it has picked up the opening request
bits 1-23 INTN	interrupt number to be used by M30COM to interrupt the calling utility
2 DNUM	Device number (interrupt number or -1 after)
3-9 PRONAME	complete process name
10-16 FILE	complete file name (includes USN, DKA, NAME, TYPE in that order)

Figure 1

II. Communications with M30COM after a device is open

The first page of the users communication file, hereinafter referred to as COMF, must contain a ring buffer, which will be used to pass requests to M30COM. The first four words of this page must be the reader pointer, the writer pointer, the bottom, and the top of the buffer in that order. Moreover, the buffer as defined by BOTTOM and TOP must lie wholly within this page, BOTTOM $\leq$ RP $\leq$ TOP and BOTTOM $\leq$ WP $\leq$ TOP at all times. Entries in this queue are 8 words long, consisting of an operation specification, starting address, word count, direct data, and space for error information (figure 2). Each entry specifies whether or not the process is to be interrupted on completion of the operation to be performed. When the process has one or more entries to be passed to M30COM, it should fire the the interrupt provided when it opened the device at M30COM. M30COM will pick up requests starting at the reader pointer, and continuing until it hits the writer pointer. M30COM will then carry out the requests in the order given. Every time it finishes a request which specified an interruption on completion it will update the reader pointer and interrupt the user process. It will also do this when it has finished the entire block of requests, whether or not the last entry specified an interrupt. If at any time a persistent error occurs during the servicing of a request, the error flag will be set in the entry which generated the error, the

reader pointer will be set to the first entry after that entry (i.e., ready to continue with the first unserviced request), and the user process will be interrupted. One of the requests may be to close the device, in which case that request will be treated as the last request, no further transfer will take place, and the device will become available to another process.

Layout of Request Entry

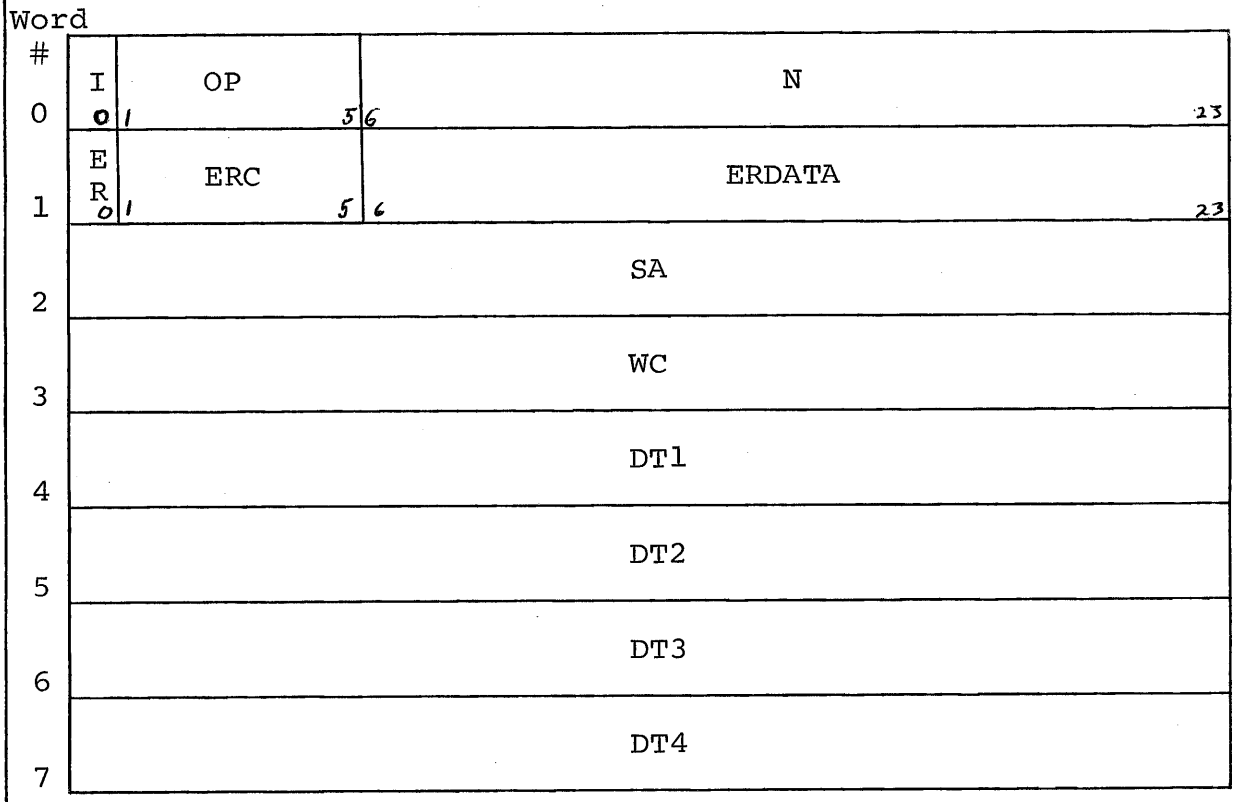

Figure 2

Word Interval	Bit Interval		Description
0	0	I	If this bit is set, the user process will be interrupted when the associated operation is completed.
	1-5	OP	Operation to be performed
	6-23	N	Immediate operand
1	0	ER	This bit is set if any persistent error occurred during the associated operation
	1-5	ERC	Device dependent error code

Word Interval	Bit Interval		Description
	6-23	ERDATA	Error diagnostic information
2		SA	Target address in COMF
3		WC	Word count for data to be transferred
4-7		DT1-4	Direct data or, on error, diagnostic information

III Detailed Description of Opcodes

(Note: the tape operations are basically analogues of the operations described in the IBM manual on the 2400 series tape units.)

1 Read

Read a block of information from tape to SA in COMF, maximum of WC words. WC will be set to the total number of words in the block read.

2 Read backward

Same as Read, but tape moves backwards. Information is stored forwards starting at SA.

3 Write

Write a block on tape from SA in COMF, length determined by WC

4 Tape motion control N times

DT1 = 0 Rewind
1 Rewind and unload } (N ignored)
2 Write Erase Gap
3 Write Tape Mark
4 Backspace Block
5 Backspace File
6 Forward Space Block
7 Forward Space File

Note for all above tape commands if N > 1 then it specifies the number of times the operation is to be performed.

5 Set modes for tape unit. The low order 5 bits of N contain the mode setting information as described in the IBM tape drive manual A22-6866, page 12.

6 Read from cards

Read N cards or until EOF on card reader. DT1 < 0, EBCDIC, else card image. WC is set to number of cards read. Cards are not packed or encoded in any way.

7 Print

Print WC words of data starting at SA in COMF. Data should be in the form of lines, first word of which specifies length of line in characters and carriage control:

rest of which is a string of N 8-bit characters,

0 < N < 133

8 Mount Print Chain N

Should be preceded by message to operator

9 Send message to operator

N < 0 expect reply. SA gives starting address in COMF, WC gives character count. DT1 gives starting address for reply, DT2 be set to the actual number of characters in the message received.

10 Close device

Closes the open device and terminates all further communications between the user process and M30COM. This operation always generates an interrupt.

11 Sense Device

Reads the sense bytes for the open device to SA in COMF, one byte per word. N < 1, first two words will contain unit status byte and channel status byte from CSW.

12 Set error correction mode

N < 0 no retries on error

N ≥ 0 normal retries will be attempted on error (default mode)

13 Acknowledge error

Tells M30COM that the user process is aware that the last request generated an error. This must be the first entry in the first request block sent after an error. (This guards against crossed signals after an error).

Note 1: All addresses (such as SA) used in communication with M30COM must be relative to word 0 page 0 of COMF.

Note 2: For all commands SA and SA+EWC-1 must lie in the same page of COMF where EWC is WC for word-oriented operations, (WC+2)/3 for character-oriented operations.

APPENDIX I

A Device Numbers

1 Card Reader

2 Printer

3 7-track drive

4 9-track drive No. 1

B Chain Numbers

1 PN

2 TN

C Carriage Control Codes

0-3 Skip 0-3 lines before printing

17-28 Skip to channel 1-12 before printing