



*computer
products corp.*

TAPEMASTER

**Application
Note**

TAPEMASTER Application Note

Copyright Computer Products Corporation
August 1981
Revision 01 8-1-81
Publication Number 2102001

REVISION INFORMATION

Revision Record

| Revision | Date | Comments |
|----------|--------|-----------------|
| 01 | 8-1-81 | Initial Release |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Revision Cross Reference

This document is revision _____ date _____

This document is valid for:

TAPEMASTER Firmware set _____

TAPEMASTER Board Number _____

Part Number _____

TABLE OF CONTENTS

- 1.0 OVERVIEW
- 2.0 TAPEMASTER START-UP CHECKLIST
- 3.0 INITIALIZATION
- 4.0 COMMAND EXECUTION
 - 4.1 CONFIGURE
 - 4.2 STATUS
 - 4.3 DIRECT READ/WRITE
- 5.0 16-BIT SYSTEMS
- 6.0 OPTIONS
 - 6.1 INTERRUPTS
 - 6.2 LINK
 - 6.3 BUS LOCK
 - 6.4 CONTINUOUS TAPE
 - 6.5 WIDTH
- 7.0 ERROR RECOVERY PROCEDURES
 - 7.1 WRITE DATA ERROR
 - 7.2 READ DATA ERROR
 - 7.3 WRITE TIME-OUT
 - 7.4 READ TIME-OUT
 - 7.5 OVERRUN
 - 7.6 BLANK TAPE READ
 - 7.7 PARITY ERROR
- 8.0 TAPEMASTER COMMAND TEST

APPENDICES

1.0 OVERVIEW

This document is intended to aid the user in the incorporation of the CPC TAPEMASTER Tape Adaptor into a Multibus-based computer system. This document does not replace the TAPEMASTER Product Specification, but is intended as a supplement to it.

Section 1 provides a brief summary of the outline of this Application Note.

Section 2 is a check list of steps to perform to cause the TAPEMASTER to execute commands in its repertoire.

Section 3,4 and 5 offer examples of various Parameter Blocks, program listings and flow charts for TAPEMASTER command execution.

Section 6 discusses the use of the TAPEMASTER control options.

Section 7 outlines error recovery procedures.

Section 8 outlines a complete TAPEMASTER Command Test.

The Appendices discuss several of the drives which the TAPEMASTER controls.

2.0 TAPEMASTER START UP CHECKLIST

The purpose of this checklist is to aid the user in establishing communications between the CPC TAPEMASTER and the host system, and causing the TAPEMASTER to be ready to accept commands from the host. Refer to the TAPEMASTER Product Specification and other sections of this document for details of the various steps below.

To incorporate the TAPEMASTER into a Multibus-based system, perform the following steps:

- I. Before applying power, set these straps on the board. Refer to the TAPEMASTER Product Specification, Appendix D. Retain the factory settings on all other jumpers.
 - A. Channel Attention/Board Reset (DIP Switch).
 - B. 8/16 bit system data bus (DIP Switch).
 - C. 8/16 bit I/O address (15-16).
 - D. Initialization Address (31-50).
 - E. Bus Arbitration (1-5, 51-53).
- II. Insure that the host system properly handles all Multibus signals associated with Bus Priority. The TAPEMASTER will operate in a serial or parallel priority system.
- III. Assert a reset to the TAPEMASTER, either by activating the INIT/ line on the Multibus, or by executing an I/O write to the TAPEMASTER Reset address.
- IV. Set up the three control blocks necessary for the Initialization sequence and issue a Channel Attention. The TAPEMASTER always executes an Initialization sequence when it receives the first Channel Attention after a reset. Initialization is executed only once.
- V. Set up any command Parameter Block, close the Gate and issue a Channel Attention. When the TAPEMASTER has completed the command, it will open the Gate. Do not proceed until this occurs.

Begin with simpler commands (Configure, NOP, Status) until the TAPEMASTER operation becomes familiar.

3.0 INITIALIZATION

Before the TAPEMASTER can execute commands properly, it must be initialized. Initialization is the procedure which assigns permanent values to some of the programmable addresses associated with command execution. It involves setting up three short blocks of data in system memory, and then issuing a Channel Attention to the TAPEMASTER. The Initialization Blocks for a host system with an 8-bit data bus are shown in Fig. 3-1.

The addresses in this example are arbitrary and are all located in the lower 64K of system memory. However, they could be located anywhere in the lower 1M byte.

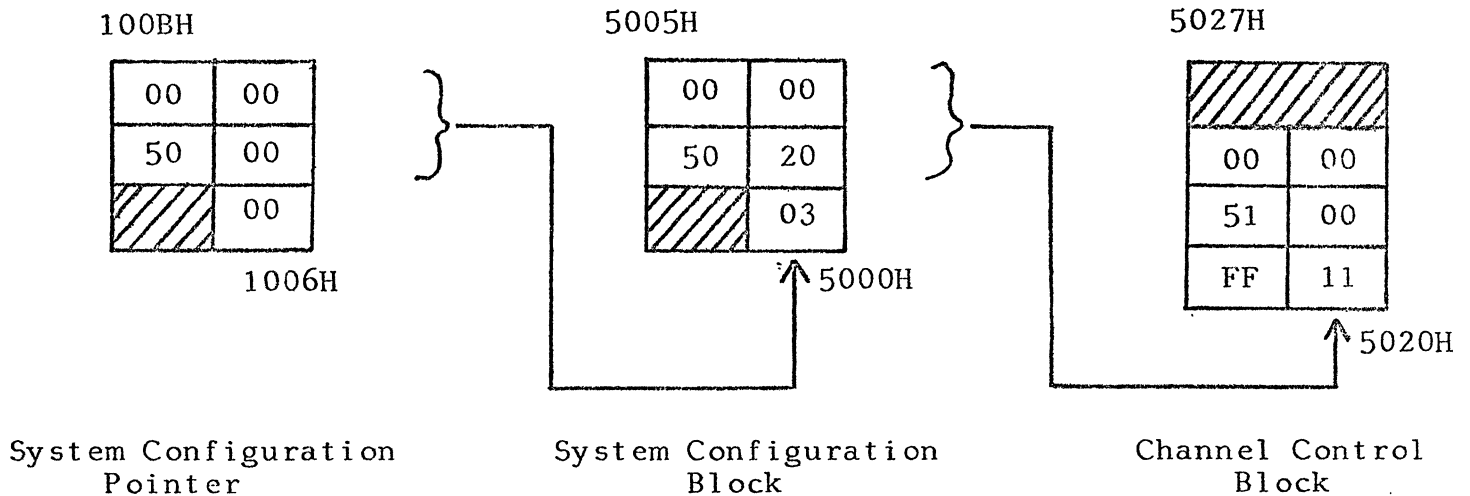


Fig. 3-1 Initialization Blocks for an 8-bit system.

The System Configuration Pointer begins at 01006H, as directed by the associated jumpers. The first byte instructs the TAPEMASTER that the physical width of the system is 8 bits (00). The last four bytes are a Pointer, specifying the location of the System Configuration Block as 05000H to 05005H.

The first byte of the System Configuration Block must be 03H for proper operation. The last four bytes specify the location of the Channel Control Block as 05020H to 05027H.

The first byte of the Channel Control Block is the Channel Control Word (CCW). The CCW is set to 11H, since no interrupts are pending. The Gate, at 05021H, is set closed. The rest of the block is unused during Initialization..

At the completion of the Initialization process, using the example values of Fig. 3-1, the following have been accomplished:

- A. The location of the Channel Control Word (CCW) is fixed at 05020H (F5020H in Fig. 3-2).
- B. The location of the Gate is fixed at 5021H (F5021H).
- C. The location of the Parameter Block (or first Parameter Block in a chain) will be specified by a pointer whose location is fixed at 5022H-5025H (F5020H-F5025H).
- D. The TAPEMASTER is ready to accept commands.

Locations 01006H-0100BH and (F)5000H-(F)5005H may now be re-used if needed. Locations (F)5020H-(F)5027H must remain dedicated to TAPEMASTER control.

Shown in Table 3-1 is an 8080/8085 program to execute the Initialization sequence of Fig. 3-1.

The steps which must be executed by the host CPU to accomplish the Initialization are outlined in Fig. 3-3.

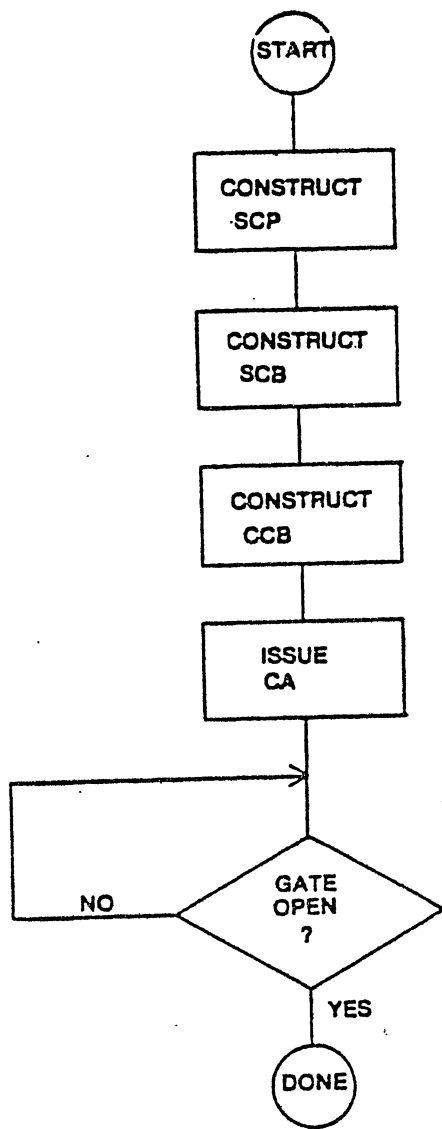


Fig. 3-3 Initialization Process

The Initialization Blocks for a host system with a 16-bit data bus are shown in Fig. 3-2. These blocks are similar to Fig. 3-1, except that a 16-bit system is specified (01006H=01). This example also indicates how the blocks may be located beyond the 64K byte range by specifying non-zero values in the Pointer Bases.

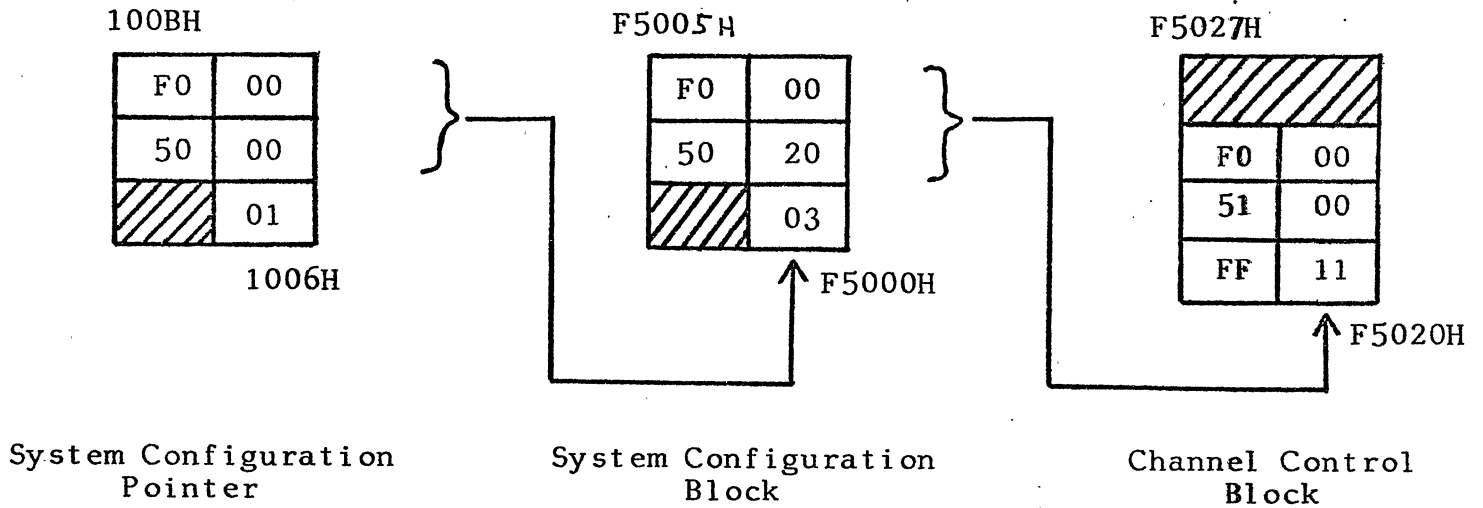


Fig. 3-2 Initialization Blocks for a 16-bit system.

| | | | | | |
|-------|---------|---|---|--|--|
| 00400 | ; | ***** | | | |
| 00500 | ; | ***** | | | |
| 00600 | ; | TAPE WRITE ROUTINE. | | | |
| 00700 | ; | | | | |
| 00800 | ; | ***** | | | |
| 00900 | ; | ***** | | | |
| 01000 | ; | | | | |
| 01100 | ; | DATA EQUATES | | | |
| 01200 | ; | | | | |
| 5020 | 01300 | CCP EQU 5020H | ; | CHANNEL CONTROL BLOCK ADDRESS. | |
| 008A | 01400 | CATADR EQU 8AH | ; | CHANNEL ATTENTION ADDRESS. | |
| 5100 | 01500 | PB EQU 5100H | ; | PARAMETER BLOCK ADDRESS. | |
| 5100 | 01600 | COMAND EQU PB + 0 | ; | COMMAND FIELD ADDRESS OF PARAMETER BLOCK. | |
| 5104 | 01700 | CONTRL EQU PB + 4 | ; | CONTROL FIELD ADDRESS OF PARAMETER BLOCK. | |
| 5106 | 01800 | RETCNT EQU PB + 6 | ; | RETURN COUNT FIELD ADR. OF PARAMETER BLOCK. | |
| 5108 | 01900 | BFRSZE EQU PB + 8 | ; | BUFFER SIZE FIELD ADR. OF PARAMETER BLOCK. | |
| 510A | 02000 | RECORD EQU PB + 10 | ; | RECORDS FIELD ADDRESS OF PARAMETER BLOCK. | |
| 510C | 02100 | SRCOST EQU PB + 12 | ; | SOURCE/DESTINATION FIELD ADR. OF PARAM. BLOCK. | |
| 5110 | 02200 | STATUS EQU PB + 16 | ; | STATUS FIELD ADDRESS OF PARAMETER BLOCK. | |
| 5112 | 02300 | INTLNK EQU PB + 18 | ; | INTERRUPT/LINK FIELD ADR. OF PARAM. BLOCK. | |
| 02400 | ; | | | | |
| 02500 | ; | ASSUME WRITE BUFFER LOCATED AT 7000H. | | | |
| 02600 | ; | ASSUME BLOCK SIZE IS 2000H. | | | |
| 02700 | ; | | | | |
| 02900 | ORG | 100H | | | |
| 0100 | 02900 | TWRITE: | | | |
| 03000 | ; | | | | |
| 03100 | ; | CONSTRUCT PARAMETER BLOCK. | | | |
| 03200 | ; | | | | |
| 0100 | 21 0000 | LXI H,0 | ; | HL = VALUE TO STORE IN VARIOUS PH FIELDS. | |
| 03400 | ; | | | | |
| 03500 | ; | CLEAR UPPER WORD OF FIELDS THAT ARE OF TYPE 'POINTER'. | | | |
| 03600 | ; | | | | |
| 0103 | 22 5102 | SHLD COMAND + 2 | ; | UPPER WORD OF COMMAND FIELD. | |
| 0106 | 22 510E | SHLD SRCOST + 2 | ; | UPPER WORD OF SOURCE/DESTINATION FIELD. | |
| 0109 | 22 5114 | SHLD INTLNK + 2 | ; | UPPER WORD OF INTERRUPT/LINK FIELD. | |
| 03700 | ; | | | | |
| 04000 | ; | | | | |
| 04100 | ; | CLEAR FIELDS THAT AREN'T USED OR A ZERO VALUE IS APPROPRIATE. | | | |
| 04200 | ; | | | | |
| 010C | 22 5104 | SHLD CONTRL | ; | CONTROL FIELD (NO OPTIONS SELECTED). | |
| 010F | 22 5106 | SHLD RETCNT | ; | RETURN COUNT FIELD - OUTPUT ONLY. | |
| 0112 | 22 510A | SHLD RECORD | ; | RECORD FIELD - NOT USED ON TAPE WRITE. | |
| 0115 | 22 5110 | SHLD STATUS | ; | STATUS FIELD - OUTPUT ONLY. | |
| 0118 | 22 5112 | SHLD INTLNK | ; | INTERRUPT/LINK - NOT USED (NOTE 0 IN CONTROL FIELD). | |
| 04800 | ; | | | | |
| 04900 | ; | BUILD FIELDS WITH NON-ZERO VALUES. | | | |
| 05000 | ; | | | | |
| 011H | 21 0030 | LXI H,30H | | | |
| 011E | 22 5100 | SHLD COMAND | ; | COMMAND FIELD := DIRECT WRITE. | |
| 05300 | ; | | | | |
| 0121 | 21 2000 | LXI H,2000H | | | |
| 0124 | 22 510H | SHLD BFRSZE | ; | BUFFER SIZE FIELD := 2000H. | |
| 05600 | ; | | | | |
| 0127 | 21 7000 | LXI H,7000H | | | |

| | | | | | |
|-------|---------|---|---|---|--|
| 012A | 22 510C | SHLD SRCOST | ; | SOURCE/DEST. FIELD := 7000H. | |
| 05900 | ; | | | | |
| 06000 | ; | WAIT FOR GATE = OPEN. | | | |
| 06100 | ; | | | | |
| 0120 | 21 5021 | LXI H,CCB + 1 | ; | HL = GATE ADDRESS. | |
| 0130 | 7E | OGATE1: | | | |
| 0130 | 7E | MOV A,H | ; | A = GATE. | |
| 0131 | FE 00 | CPI 0 | ; | TEST FOR GATE = OPEN (= 0). | |
| 0133 | C2 0130 | JNZ OGATE1 | ; | NZ: NOT OPEN - LOOP UNTIL IS OPEN. | |
| 06700 | ; | | | | |
| 06800 | ; | CLOSE GATE. | | | |
| 06900 | ; | | | | |
| 0136 | 36 FF | MVI M,FFH | ; | GATE := CLOSED (OFFH). | |
| 07100 | ; | | | | |
| 07200 | ; | BUILD PARAMETER BLOCK POINTER IN CCB. | | | |
| 07300 | ; | | | | |
| 0138 | 21 5100 | LXI H,PB | ; | HL = ADDRESS OF PARAMETER BLOCK. | |
| 013H | 22 5022 | SHLD CCB + 2 | ; | OFFSET OF PB POINTER := PB ADDRESS. | |
| 013E | 21 0000 | LXI H,0 | | | |
| 0141 | 22 5024 | SHLD CCB + 4 | ; | BASE OF PB POINTER := 0000H. | |
| 07800 | ; | | | | |
| 07900 | ; | ISSUE CHANNEL ATTENTION. | | | |
| 08000 | ; | | | | |
| 0144 | 03 8A | OUT CATADR | ; | CHANNEL ATTENTION = I/O WRITE TO CHAN. ATTN. ADR. | |
| 08200 | ; | | | | |
| 08300 | ; | WAIT FOR COMMAND TO FINISH (GATE = OPEN). | | | |
| 08400 | ; | | | | |
| 0146 | 21 5021 | LXI H,CCB + 1 | ; | HL = GATE ADDRESS. | |
| 0149 | 7E | OGATE2: | | | |
| 014A | FE 00 | MOV A,H | ; | A = GATE. | |
| 014C | C2 0149 | CPI 0 | ; | TEST FOR GATE = OPEN (= 0). | |
| 08900 | ; | JNZ OGATE2 | ; | NZ: GATE CLOSED - LOOP UNTILL OPEN. | |
| 09000 | ; | | | | |
| 09100 | ; | GET COMMAND STATUS FROM PARAMETER BLOCK. | | | |
| 09200 | ; | | | | |
| 014F | 3A 5111 | LDA STATUS + 1 | ; | A = COMMAND (NOT DRIVE) STATUS. | |
| 09300 | ; | | | | |
| 09500 | ; | RETURN TO CALLING PROGRAM TO INTERPRET STATUS (STATUS IN A REG.). | | | |
| 09600 | ; | | | | |
| 0152 | C9 | RET | | | |
| 09700 | ; | | | | |
| 09800 | END | TWRITE | | | |

Table 4-1. Tape Write Program

| | | | | | | | | | | |
|--|--|-------|---|-----------------------------------|---|---|---|---|--|----|
| | | 00010 | : | ***** | | | | | | 1 |
| | | 00020 | : | ***** | | | | | | 2 |
| | | 00030 | : | INITIALIZATION OF CPC TAPEMASTER. | | | | | | 3 |
| | | 00040 | : | ***** | | | | | | 4 |
| | | 00050 | : | ***** | | | | | | 5 |
| | | 00060 | : | ***** | | | | | | 6 |
| | | 00070 | : | ***** | | | | | | 7 |
| | | 00080 | : | DATA EQUATES | | | | | | 8 |
| | | 00090 | : | ***** | | | | | | 9 |
| | | 1006 | : | 00100 SCP EQU 01006H | : | SYSTEM CONFIGURATION POINTER. | | | | 10 |
| | | 5000 | : | 00110 SCR EQU 5000H | : | SYSTEM CONFIGURATION BLOCK. | | | | 11 |
| | | 5020 | : | 00120 CCB EQU 5020H | : | CHANNEL CONTROL BLOCK. | | | | 12 |
| | | 5100 | : | 00130 PB EQU 5100H | : | PARAMETER BLOCK ADDRESS. | | | | 13 |
| | | 00FA | : | 00140 CATADR EQU 8AH | : | CHANNEL ATTENTION ADDRESS. | | | | 14 |
| | | | : | 00150 | : | ***** | | | | 15 |
| | | | : | 00160 | : | ***** | | | | 16 |
| | | | : | 00170 | : | ***** | | | | 17 |
| | | | : | 00180 | : | ORG 100H | | | | 18 |
| | | 0100' | : | 00190 TMINIT: | : | TAPEMASTER INITIALIZATION ROUTINE. | | | | 19 |
| | | | : | 00200 | : | ***** | | | | 20 |
| | | | : | 00210 | : | ISSUE BOARD RESET. | | | | 21 |
| | | | : | 00220 | : | ***** | | | | 22 |
| | | 0100' | : | 00230 | : | OUT CATADR + 1 | : | RESET = I/O WRITE TO ODD I/O ADDRESS OF TAPEMASTER. | | 23 |
| | | | : | 00240 | : | ***** | | | | 24 |
| | | | : | 00250 | : | CONSTRUCT SYSTEM CONFIGURATION POINTER. | | | | 25 |
| | | | : | 00260 | : | ***** | | | | 26 |
| | | 0102' | : | 00270 | : | LXI H,0 | : | HL = VALUE TO PUT INTO VARIOUS FIELDS. | | 27 |
| | | 0105' | : | 00280 | : | SHLD SCP | : | SYSBUS := 8 BITS WIDE. | | 28 |
| | | 0108' | : | 00290 | : | SHLD SCP + 4 | : | BASE OF SCB POINTER := 0000H. | | 29 |
| | | 010A' | : | 00300 | : | LXI H,SCB | : | ***** | | 30 |
| | | 010E' | : | 00310 | : | SHLD SCP + 2 | : | OFFSET OF SCB POINTER := SCB ADDRESS. | | 31 |
| | | | : | 00320 | : | ***** | | | | 32 |
| | | | : | 00330 | : | CONSTRUCT SYSTEM CONFIGURATION BLOCK. | | | | 33 |
| | | | : | 00340 | : | ***** | | | | 34 |
| | | 0111' | : | 00350 | : | LXI H,3 | : | ***** | | 35 |
| | | 0114' | : | 00360 | : | SHLD SCB | : | SET SYSTEM CONFIGURATION BLOCK CONSTANT. | | 36 |
| | | 0117' | : | 00370 | : | MVI L,0 | : | ***** | | 37 |
| | | 0119' | : | 00380 | : | SHLD SCB + 4 | : | BASE OF CCB POINTER := 0000H. | | 38 |
| | | 011C' | : | 00390 | : | LXI H,CCB | : | ***** | | 39 |
| | | 011F' | : | 00400 | : | SHLD SCB + 2 | : | OFFSET OF CCB POINTER := CCB ADDRESS. | | 40 |
| | | | : | 00410 | : | ***** | | | | 41 |
| | | | : | 00420 | : | CONSTRUCT CHANNEL CONTROL BLOCK. | | | | 42 |
| | | | : | 00430 | : | ***** | | | | 43 |
| | | 0122' | : | 00440 | : | LXI H,OFF11H | : | ***** | | 44 |
| | | 0125' | : | 00450 | : | SHLD CCB | : | CCW := NORMAL OPERATION; GATE := CLOSED. | | 45 |
| | | 0128' | : | 00460 | : | LXI H,PH | : | ***** | | 46 |
| | | 012H' | : | 00470 | : | SHLD CCB + 2 | : | OFFSET OF PARAMETER BLOCK POINTER := PARAM. BLK. ADR. | | 47 |
| | | 012F' | : | 00480 | : | LXI H,0 | : | BASE OF PARAMETER BLOCK POINTER := 0000H. | | 48 |
| | | 0131' | : | 00490 | : | SHLD CCB + 4 | : | ***** | | 49 |
| | | | : | 00500 | : | ***** | | | | 50 |
| | | | : | 00510 | : | ISSUE CHANNEL ATTENTION. | | | | 51 |
| | | | : | 00520 | : | ***** | | | | 52 |
| | | 0134' | : | 00530 | : | OUT CATADR | : | ***** | | 53 |
| | | | : | 00540 | : | ***** | | | | 54 |

| | | | | | | | | | | |
|--|--|-------|---|-------|---|-------------------------|---|-----------------------------|--|----|
| | | | : | 00550 | : | WAIT FOR GATE TO OPEN. | | | | 1 |
| | | | : | 00560 | : | ***** | | | | 2 |
| | | 0136' | : | 00570 | : | LXI H,CCB + 1 | : | HL = ADDRESS OF GATE. | | 3 |
| | | 0139' | : | 00580 | : | ORGATE: | | ***** | | 4 |
| | | 0139' | : | 00590 | : | MOV A,A | : | A = GATE. | | 5 |
| | | 013A' | : | 00600 | : | CPI 0 | : | TEST FOR GATE = OPEN (= 0). | | 6 |
| | | 013C' | : | 00610 | : | JNZ ORGATE | : | NZ: NOT OPEN - TRY AGAIN. | | 7 |
| | | | : | 00620 | : | ***** | | | | 8 |
| | | | : | 00630 | : | ***** | | | | 9 |
| | | | : | 00640 | : | RETURN TO USER PROGRAM. | | | | 10 |
| | | | : | 00650 | : | ***** | | | | 11 |
| | | 013F' | : | 00660 | : | RET | : | ***** | | 12 |
| | | | : | 00670 | : | ***** | | | | 13 |
| | | | : | 00680 | : | END TMINIT | : | ***** | | 14 |
| | | | : | | : | ***** | | | | 15 |
| | | | : | | : | ***** | | | | 16 |
| | | | : | | : | ***** | | | | 17 |
| | | | : | | : | ***** | | | | 18 |
| | | | : | | : | ***** | | | | 19 |
| | | | : | | : | ***** | | | | 20 |
| | | | : | | : | ***** | | | | 21 |
| | | | : | | : | ***** | | | | 22 |
| | | | : | | : | ***** | | | | 23 |
| | | | : | | : | ***** | | | | 24 |
| | | | : | | : | ***** | | | | 25 |
| | | | : | | : | ***** | | | | 26 |
| | | | : | | : | ***** | | | | 27 |
| | | | : | | : | ***** | | | | 28 |
| | | | : | | : | ***** | | | | 29 |
| | | | : | | : | ***** | | | | 30 |
| | | | : | | : | ***** | | | | 31 |
| | | | : | | : | ***** | | | | 32 |
| | | | : | | : | ***** | | | | 33 |
| | | | : | | : | ***** | | | | 34 |

Table 3-1. Initialization Program

4.0 After Initialization, the TAPEMASTER is ready to accept commands. The general sequence of events to begin execution of commands are outlined in Fig. 4-1. Table 4-1 is an 8080/8085 program to execute this sequence for a Tape/Write command outlined in section 4.3. Other commands would be similar.

The remaining paragraphs of this section present examples of several TAPEMASTER commands. It is assumed that the host system has an 8-bit data bus. Section 5 describes how these examples would differ for a 16-bit system.

For the sake of uniformity, all the examples in this section utilize only the lower 64K of system memory (Pointer Base=0000H), for Parameter Blocks and data blocks. However, they may be located anywhere in the lower 1M byte. If the Page Register is loaded with an appropriate value, all data blocks may then be located anywhere in the 16M byte addressing range of the TAPEMASTER.

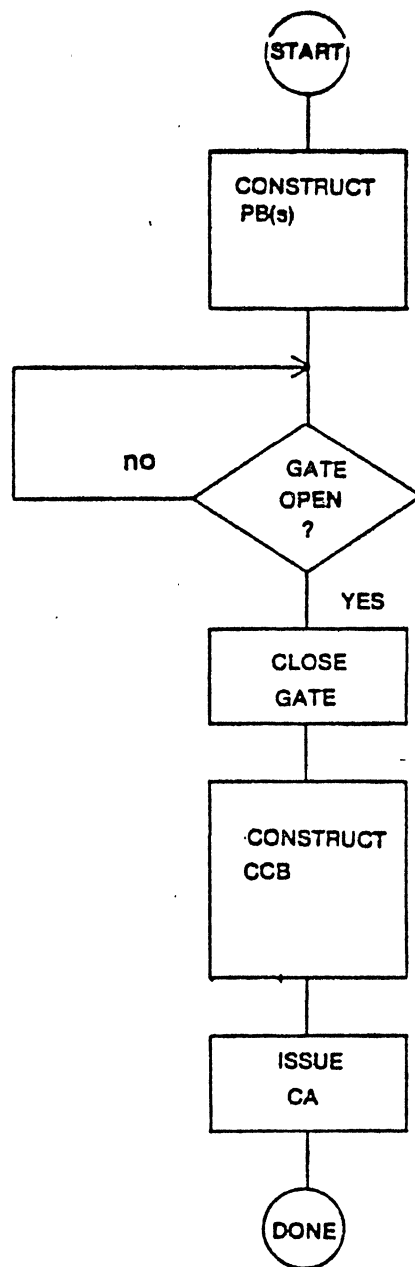


Fig. 4-1 General Command Sequence

4.1 CONFIGURE

After Initialization, any command may be executed first. The Configure command is a logical choice to execute first, because it executes a brief micro-diagnostic, and also returns information of use to the system.

The associated Parameter Block for a Configure command (Fig. 4-2) occupies 22 bytes from 05100H to 05115H in system memory. The Pointer to this Parameter Block is located in the Channel Control Block. If the Parameter Block location is to be moved, the Pointer may be changed after the processor has control of the TAPEMASTER (closes an open Gate), and before issuing a Channel Attention.

Besides the command field, which is all zeros for a Configure command, the only other Parameter Block entry required as input is the Control field. In this example, Control is all zeros. This indicates that no interrupt is to be generated at the completion of the command, and no other Parameter Block is linked. The remaining bits, such as Tape Select, Reverse, etc., are ignored since they do not apply.

After the Configure command has been executed and the Gate opened by the TAPEMASTER, the Parameter Block will have been updated by the TAPEMASTER as in Fig. 4-3a. There are two updates to be noted. First, the Command Status byte contains a COH. Referring to the TAPEMASTER Product Specification, this indicates that the Parameter Block was entered (E bit set) and successfully completed (C bit set and zero error code).

The second update in the Parameter Block is the Return Count field. The TAPEMASTER in this example has determined that it contains 16K bytes of static RAM which may be used during buffered operations. This value (4000H) is returned in the Return Count field.

Fig 4-3b shows an example of how the Parameter Block might be updated in the case of an error. The Command Status byte (05011H) indicates the Parameter Block was entered (E bit set) but not completed (C bit not set when the Gate was opened). The 5-bit error code indicates that a 0EH error occurred. Referring to Appendix C of the Product Specification, this error indicates that the TAPEMASTER received an error when calculating a checksum on the firmware.

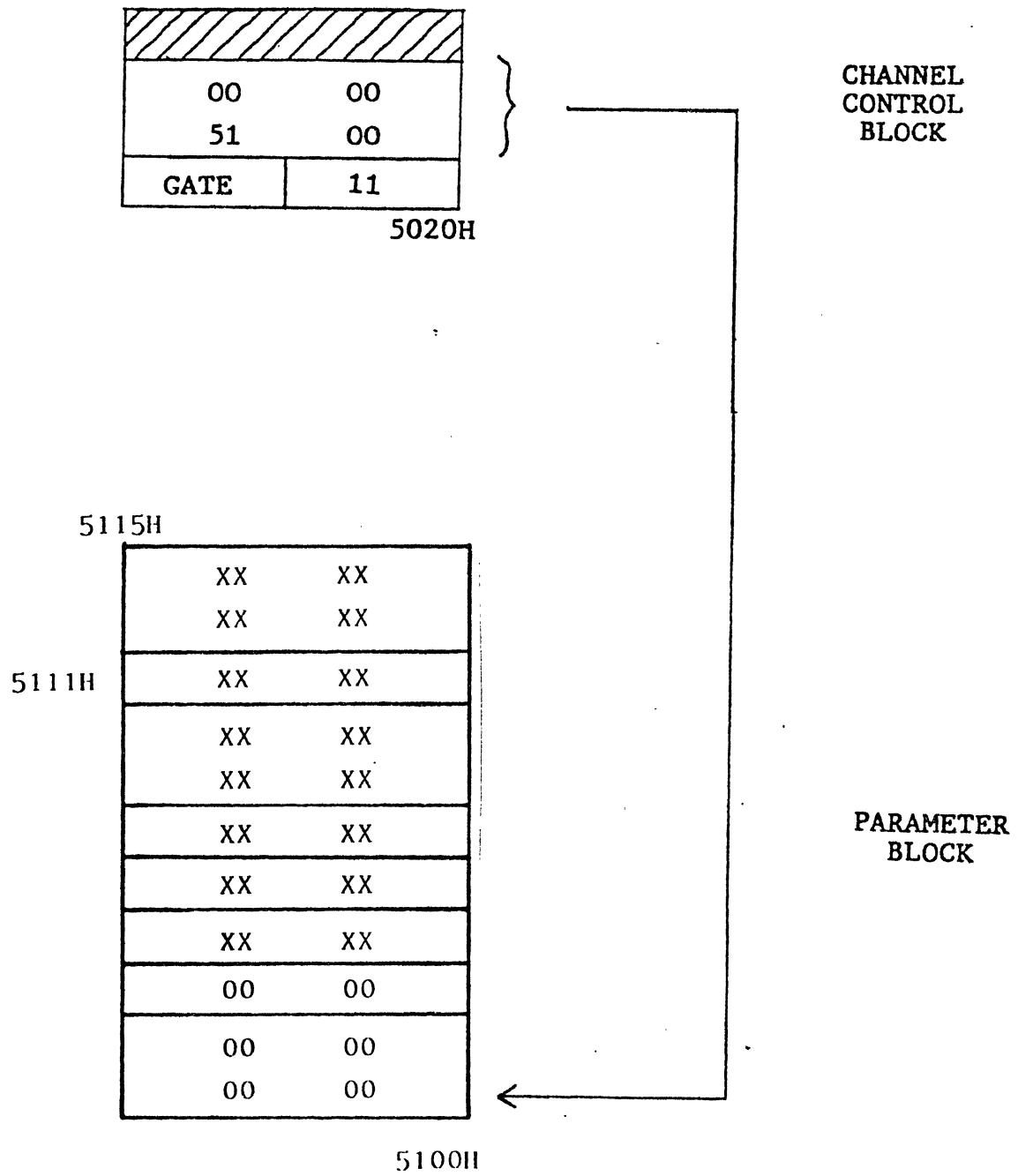


Fig. 4-2 Configure Command

4.2 STATUS

The Status command (28H) is the most basic command to execute. The Parameter Block for Status is shown in Fig. 4-4. After the TAPEMASTER has executed the command it will update the Parameter Block as shown.

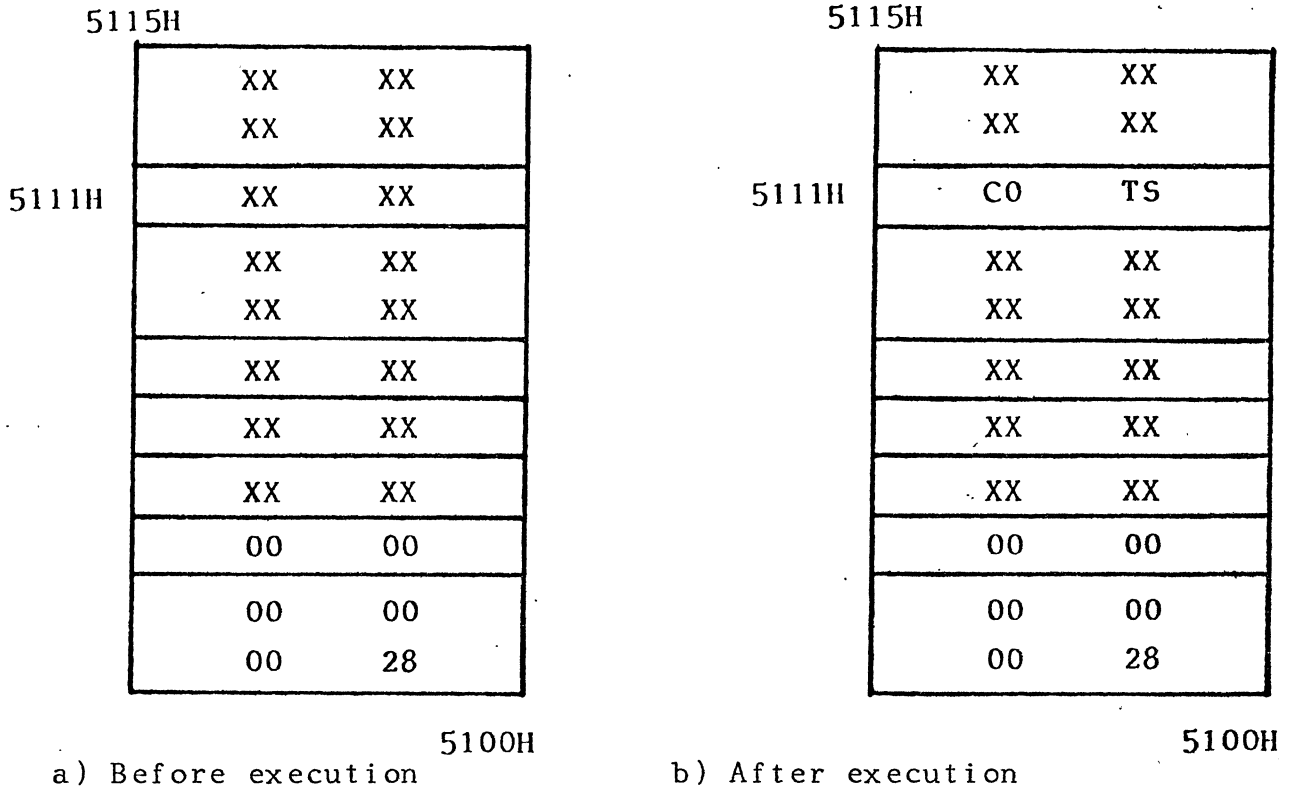


Fig. 4-4 Status Parameter Block

The upper byte of Status (5111H) contains a C0H. Referring to the TAPEMASTER Product Specification, this indicates that the Parameter Block was entered (E bit set), and successfully completed (C bit set and no error code). TS represents Tape Status. In general, all Tape commands will return Tape Status.

5115H

5111H

| | |
|----|----|
| XX | XX |
| XX | XX |
| C0 | T5 |
| XX | XX |
| XX | XX |
| XX | XX |
| XX | XX |
| 40 | 00 |
| 00 | 00 |
| 00 | 00 |
| 00 | 00 |

5100H

a) Correct Completion

5115H

5111H

| | |
|----|----|
| XX | XX |
| XX | XX |
| 8E | XX |
| XX | XX |
| XX | XX |
| XX | XX |
| XX | XX |
| XX | XX |
| 00 | 00 |
| 00 | 00 |
| 00 | 00 |

5100H

b) Error Completion

Fig. 4-3 Configure Completion Status

4.3 DIRECT READ/WRITE

The Parameter Block for a Direct Read is shown in Fig. 4-5.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| <p>5115H</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><td>XX</td><td>XX</td></tr> <tr><td>XX</td><td>XX</td></tr> <tr><td>XX</td><td>XX</td></tr> <tr><td>00</td><td>00</td></tr> <tr><td>70</td><td>00</td></tr> <tr><td>XX</td><td>XX</td></tr> <tr><td>20</td><td>00</td></tr> <tr><td>XX</td><td>XX</td></tr> <tr><td>00</td><td>00</td></tr> <tr><td>00</td><td>00</td></tr> <tr><td>00</td><td>2C</td></tr> </table> <p style="text-align: center;">5100H</p> | XX | XX | XX | XX | XX | XX | 00 | 00 | 70 | 00 | XX | XX | 20 | 00 | XX | XX | 00 | 00 | 00 | 00 | 00 | 2C | <p>5115H</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><td>XX</td><td>XX</td></tr> <tr><td>XX</td><td>XX</td></tr> <tr><td>C0</td><td>TS</td></tr> <tr><td>00</td><td>00</td></tr> <tr><td>70</td><td>00</td></tr> <tr><td>20</td><td>00</td></tr> <tr><td>20</td><td>00</td></tr> <tr><td>20</td><td>00</td></tr> <tr><td>00</td><td>00</td></tr> <tr><td>00</td><td>00</td></tr> <tr><td>00</td><td>2C</td></tr> </table> <p style="text-align: center;">5100H</p> | XX | XX | XX | XX | C0 | TS | 00 | 00 | 70 | 00 | 20 | 00 | 20 | 00 | 20 | 00 | 00 | 00 | 00 | 00 | 00 | 2C |
| XX | XX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| XX | XX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| XX | XX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| XX | XX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| XX | XX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00 | 2C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| XX | XX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| XX | XX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C0 | TS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00 | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00 | 2C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

a) Before execution

b) After execution

Fig. 4-5 Tape Read

This Parameter Block instructs the TAPEMASTER to read the next record on the tape, which has an expected length of 8192 bytes (2000H), and store it in system memory, starting at address 07000H.

After the TAPEMASTER completes the command and opens the Gate, the Parameter Block will have been updated as shown in Fig. 4-5b. Besides the Status bytes, two entries have been updated. The Return Count field (05106-05107H) indicates that 2000H bytes were actually transferred. The Records/Overrun field (0510A-0510BH) indicates that the block size on the tape was 2000H bytes, as expected.

The Parameter Block for a Tape Write command would be similar. The Records/Overrun field is not used for Tape Write.

5.0 PARAMETER BLOCKS FOR 16-BIT SYSTEMS

Most of the examples presented in section 4 have assumed a Multi-bus system using an 8-bit data bus. Only minor changes to these examples are required so that they apply to a 16-bit host.

First, the Initialization must specify that the host has a 16-bit data bus, by setting byte 1 of System Configuration Pointer to 01H. This is shown in Fig. 3-2.

Secondly, in all Parameter Blocks requiring data transfer, the Width bit in the Control word should be set. This informs the TAPEMASTER that the logical width of the system bus is 16 bits. The TAPEMASTER will automatically optimize the number of memory references by executing word (16-bit) reads and writes whenever possible. For example, if a read data buffer begins on odd address, the TAPEMASTER will execute one byte read, and then continue with word reads.

If the Width bit is not set in the Control Word, the TAPEMASTER will perform all byte operations.

6.0 OPTIONS

In the preceding examples, none of the Parameter Blocks used any of the TAPEMASTER options. This section covers their use. Most options are selected in the Control Word entry in the Parameter Block.

6.1 INTERRUPTS

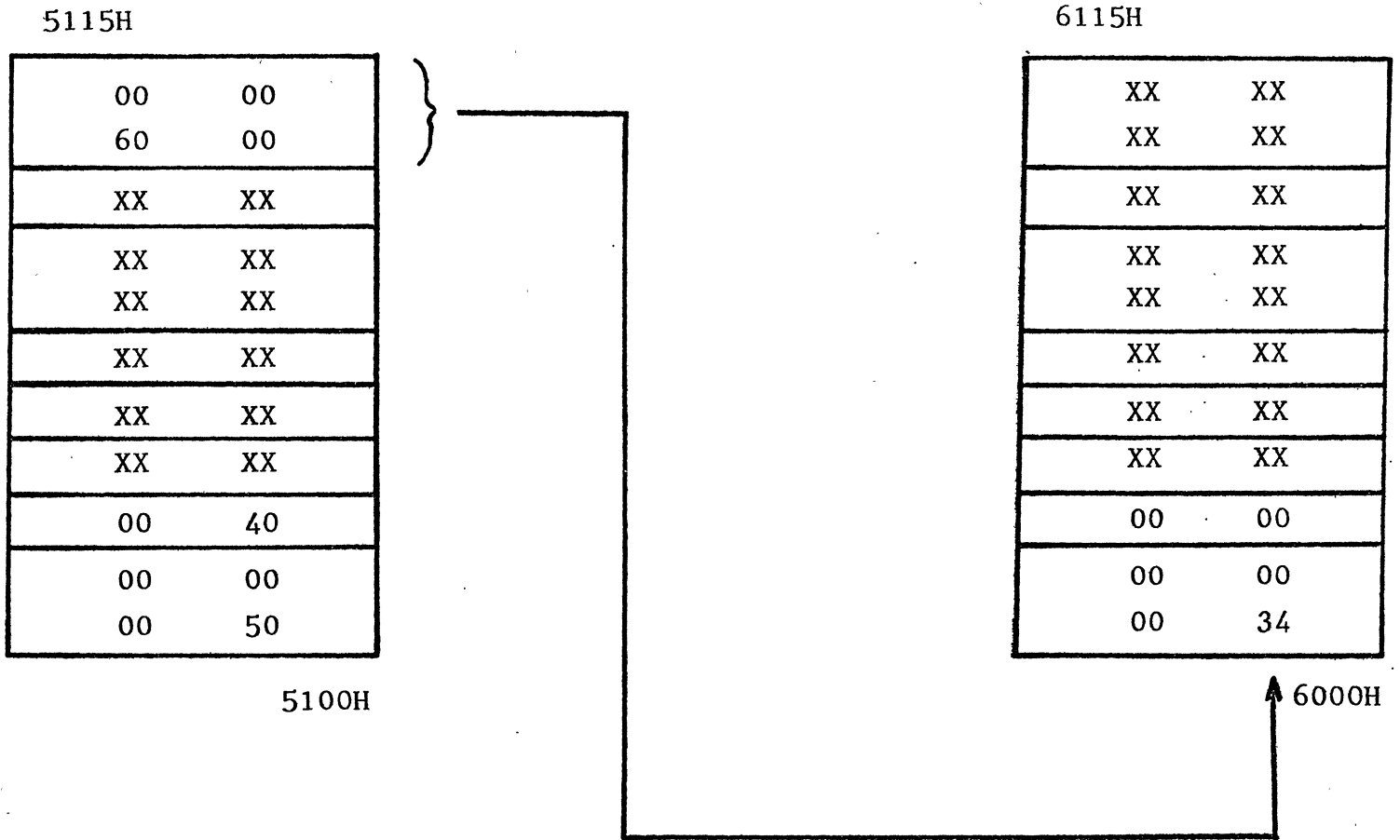
As discussed in the TAPEMASTER Product Specification, the user may choose to have an interrupt generated at the completion of a command. In general, non-vectored interrupts would be used for single-processor systems, or multi-processor systems in which interrupts are controlled by one processor. In multi-processor, position-independent systems, the Mailbox interrupt would be more useful.

When a non-vectored Multibus interrupt is activated by the TAPEMASTER, it will remain active until cleared by a subsequent command. This is accomplished by setting the Channel Control Word (at location 05020H in our example) to 09H, before issuing the Channel Attention for the next command.

6.2 LINK

The TAPEMASTER allows several commands to be executed in succession by linking them together. Linking and interrupts may not be used in the same Parameter Block--Link takes priority.

Fig 6-1 illustrates a Link operation. The Parameter Block of Fig 6-1a is an Erase command. Upon completion of this command, the TAPEMASTER will check the "L" bit to see if another command is linked. Since the "L" bit is set, it picks up a pointer from Interrupt/Link (locations 05112H-05115H in this example), and executes the Rewind Parameter Block at 06000H.



(a) ERASE

(b) REWIND

Fig 6-1 Linking Commands

The Gate will not be opened between commands, but only after the last command is completed, or an unrecoverable error is detected.

6.3 BUS LOCK

When the TAPEMASTER transfers a byte or word of data to or from memory, it activates a DMA request, receives a DMA grant, transfers the data, and then gives up the bus if necessary until the next transfer. If the Bus Lock option is selected, the TAPEMASTER will make only one DMA request. When it receives the DMA grant, it maintains control of the Multibus until all its data has been transferred, and then gives up the bus. The Bus Lock option eliminates the handshaking between bytes.

6.4 CONTINUOUS TAPE

The Continuous Tape option applies only to the Cipher Microstreamer. If this option is selected, the TAPEMASTER will cause the tape to continue moving after a Write command, in anticipation of another Write, avoiding the repositioning cycle. This will result in longer than normal inter-record gaps (but still ANSI-compatible) and lower tape utilization. However, multiple record writes will be faster as the tape would normally reposition after each record.

The Continuous Tape option should only be used when a Write is being performed, and the following tape is blank (such as during a disk dump operation). It is the responsibility of the user not to leave the tape moving after the last command.

6.5 WIDTH

The "W" bit in the Control Word indicates the logical width of the system bus (1=16 bits, 0=8 bits). In most cases this will be the same as the physical width selected during the Initialization.

The logical bus width cannot be larger than the physical width.

7.0 ERROR RECOVERY

This section outlines the procedures to be executed by the user to recover from various error conditions.

7.1 WRITE DATA ERROR

If a data error is detected by the drive during a read after write operation, it will notify the TAPEMASTER. The TAPEMASTER will in turn space back one record and attempt to rewrite the record. If the record cannot be written successfully after several retries, the TAPEMASTER will exit with an error code of 0AH. The user should then execute a Space Reverse one record, erase a section of the tape using the Erase Fixed Length command, and attempt to rewrite the record.

7.2 READ DATA ERROR

If an error is detected during a Read command, the TAPEMASTER will automatically attempt several retries. If the record remains unrecoverable, the TAPEMASTER will exit with an error code of 0AH. The user may attempt more read operations by spacing one record in reverse and attempting to read the record again.

7.3 WRITE TIME-OUT

A Time out error code (0FH) during a Write operation indicates that the TAPEMASTER did not receive the expected number of write strobes from the drive. The TAPEMASTER will not automatically retry in this situation. The user should rewrite the record "down tape" using the procedure of section 7.1.

7.4 READ TIMER-OUT

A Time out error code (0FH) during a Read operation indicates that the TAPEMASTER did not receive the expected number of read strobes. The TAPEMASTER will not automatically retry this situation. The user may attempt to read the record over by using the procedure of section 7.2.

7.5 OVERRUN

Overrun errors indicate a failure of the system to receive or supply data at the necessary rate. The user may retry after spacing reverse one record.

7.6 BLANK TAPE READ

A Read on a blank tape will result in either a Blank Tape Error (07H) or a Data Busy Time-out (05H), depending upon the formatter and the density.

7.7 PARITY ERROR

A Parity Error (ODH) indicates that the data received by the TAPE-MASTER during a Read operation had incorrect parity. Recovery should be as in section 7.2. The TAPEMASTER does not retry automatically after a parity error.

8.0 COMMAND TEST

This section outlines the steps necessary to execute a brief TAPE-MASTER command test. It is not intended as a thorough test of all TAPEMASTER functions, but only as an example which may be easily implemented by the user.

On the following pages is the 8080/8085 source code listing for the command test. This program is designed to run on an INTEL 80/20 CPU board. With minor modifications, it may be run on any 8080 or 8085-based system.

The object code for the Command Test may be ordered from Computer Products Corporation. It is available in PROM, magnetic tape, or CP/M-compatible diskette.

```
*****
;*
;*          COMPUTER PRODUCTS CORPORATION
;*          2415 ANNAPOLIS LANE
;*          PLYMOUTH, MN 55441
;*
;*
;*  TITLE: TMCONFID
;*  REVISION: 1.9
;*  DATE: 08/11/81
;*  AUTHOR: B. MUREN
;*
;*  PROGRAM SUMMARY:
;*  THIS PROGRAM IS A CONFIDENCE TEST FOR THE TAPEMASTER TAPE
;*  CONTROLLER. THE PROGRAM TESTS A MAJORITY OF THE COMMANDS
;*  AVAILABLE TO THE TAPEMASTER.
;*
;*  THE PROGRAM RUNS UNDER THE CP/M OPERATING SYSTEM AND MAKES USE
;*  OF JUST ONE SYSTEM CALL - FUNCTION 9, TO DISPLAY THE VARIOUS
;*  MESSAGES.
;*
;*  THIS PROGRAM CAN ALSO BE RELOCATED TO RUN OUT OF ROM (I.E.
;*  USING AN ON-BOARD MONITOR). THE FOLLOWING EQUATES MAY OR MAY
;*  NOT NEED CHANGING TO DO THE RELOCATION:
;*
;*      'TPA'   FOR PROGRAM LOCATION
;*      'BUFFER' FOR MAIN TEST BUFFER LOCATION
;*      'SCP'   FOR SYSTEM CONFIGURATION POINTER LOCATION
;*      'CCB'   FOR CHANNEL CONTROL BLOCK LOCATION
;*      'PB'    FOR PARAMTER BLOCK LOCATION
;*
;*
;*  HARDWARE REQUIRED:
;*
;*  THIS PROGRAM WAS DEVELOPED (THOUGH NOT LIMITED TO) ON THE
;*  FOLLOWING:
;*
;*          1SBC 80/20-4 CPU
;*          1SBC 204 FLOPPY CONTROLLER
;*          62K MULTIBUS RAM
;*
;*****
```

```

0000  TITLE  TAPEMASTER CONFIDENCE TEST.
      ASEG
      ;
      ; SYSTEM EQUATES
      ;
003E  MSIZE EQU 62 ; MEMORY SIZE.
0005  NODISK EQU 5 ; NUMBER OF DISKS.
AR00  BIAS EQU (MSIZE-20)*1024 ;
DC00  CCP EQU 3400H + BIAS ;
E400  BDOS EQU CCP + 800H ;
F200  BIOS EQU CCP + 1600H ; BASIC I/O SYSTEM ADDRESS.
0011  BCALLS EQU 17 ; NUMBER OF JUMPS IN BIOS JUMP TABLE.
0000  BOOT EQU 0 ; WARM BOOT ADDRESS.
0005  CPM EQU 5 ; CP/M SYSTEM CALLS ADDRESS.
0100  TPA EQU 0100H ; BASE OF TRANSIENT PROGRAM AREA.
      ;
      ;
      ; TAPEMASTER EQUATES
      ;
FFF6  SCP EQU 0FFF6H
FFF0  SCH EQU SCH-6
D300  CCB EQU 0D300H ; CHANNEL CONTROL BLOCK.
D301  GATE EQU CCB + 1
D306  PB EQU CCB + 6 ; PARAMTER BLOCK.
D306  COMAND EQU PB ; COMMAND FIELD.
D30A  CONTRL EQU PB + 4 ; CONTROL FIELD.
D30C  TRACK EQU PB + 6 ; TRACK FIELD(DISK).
D30C  COUNT EQU PB + 6 ; BYTE COUNT(TAPE).
D30E  SECTOR EQU PB + 8 ; SECTOR FIELD(DISK).
D30E  HFRSZE EQU PB + 8 ; BUFFER SIZE FIELD(TAPE).
D310  RECORD EQU PB + 10 ; RECORDS FIELD.
D312  SRCDEST EQU PB + 12 ; SOURCE/DESTINATION FIELD.
D316  STATUS EQU PB + 16 ; STATUS FIELD.
D318  INTLNK EQU PB + 18 ; INTERRUPT/LINK FIELD.
D31C  ENDDHD EQU PB + 22 ; END HEAD FIELD(BACKUP).
D31D  ENDSCT EQU PB + 23 ; END SECTOR FIELD(BACKUP).
D31E  ENDTRK EQU PB + 24 ; END TRACK FIELD(BACKUP).
D320  THROTL EQU PB + 26 ; THROTTLE FIELD(BLOCK MOVE).
008A  CA EQU 08AH ; CHANNEL ATTENTION ADDRESS.
000A  LF EQU 0AH
000D  CR EQU 0DH
0024  EOF EQU '!'
1000  BUFFER EQU 1000H
      ;
      ;
      ;
0100  ORG TPA ; INITIAL PROGRAM ENTRY POINT.
0100  LXI SP,TPA-2 ; INITIALIZE STACK POINTER.
0103  JMP MAIN
PAGE
    
```

.....

DATA TRANSFER ERROR..LOOKUP TABLE..THIS TABLE IS INDEXED
(BY TAPEMASTER COMMAND OP CODE) TO FIND ADDRESS OF ERROR
MESSAGE FOR RESPECTIVE COMMAND.

XFERR:

| | | | | |
|------|------|----|--------|-----------------|
| 0106 | | DW | EROR17 | ; BREAD ERROR. |
| 0106 | 025E | DW | 0 | |
| 0108 | 0000 | DW | 0 | |
| 010A | 026D | DW | EROR18 | ; BWRITE ERROR. |
| 010C | 0000 | DW | 0 | |
| 010E | 027D | DW | EROR19 | ; BEDIT ERROR. |
| 0110 | 0000 | DW | 0 | |
| 0112 | 028A | DW | EROR23 | ; DUMMY. |
| 0114 | 0000 | DW | 0 | |
| 0116 | 028A | DW | EROR23 | ; DUMMY. |
| 0118 | 0000 | DW | 0 | |
| 011A | 028A | DW | EROR23 | ; DUMMY. |
| 011C | 0000 | DW | 0 | |
| 011E | 028A | DW | EROR23 | ; DUMMY. |
| 0120 | 0000 | DW | 0 | |
| 0122 | 028C | DW | EROR20 | ; DREAD ERROR. |
| 0124 | 0000 | DW | 0 | |
| 0126 | 029B | DW | EROR21 | ; DWRITE ERROR. |
| 0128 | 0000 | DW | 0 | |
| 012A | 028A | DW | EROR23 | ; DUMMY. |
| 012C | 0000 | DW | 0 | |
| 012E | 028A | DW | EROR23 | ; DUMMY. |
| 0130 | 0000 | DW | 0 | |
| 0132 | 02AB | DW | EROR22 | ; DEDIT ERROR. |

.....

ERROR MESSAGE TABLE.

| | | | |
|------|-------------|------------|--------------------------------|
| 0134 | 43 4F 4E 46 | ERROR1: DB | 'CONFIGURE ERROR.',CR,LF,EOF |
| 0138 | 49 47 55 52 | | |
| 013C | 45 20 45 52 | | |
| 0140 | 52 4F 52 2E | | |
| 0144 | 0D 0A 24 | | |
| 0147 | 44 52 49 56 | ERROR2: DB | 'DRIVE RESET ERROR.',CR,LF,EOF |
| 014B | 45 20 52 45 | | |
| 014F | 53 45 54 20 | | |
| 0153 | 45 52 52 4F | | |
| 0157 | 52 2E 0D 0A | | |
| 015B | 24 | | |
| 015C | 53 45 54 20 | ERROR3: DB | 'SET PAGE ERROR.',CR,LF,EOF |
| 0160 | 50 41 47 45 | | |
| 0164 | 20 45 52 52 | | |
| 0168 | 4F 52 2E 0D | | |
| 016C | 0A 24 | | |
| 016E | 4E 4F 50 20 | ERROR4: DB | 'NOP. ERROR.',CR,LF,EOF |
| 0172 | 45 52 52 4F | | |
| 0176 | 52 2E 0D 0A | | |
| 017A | 24 | | |

| | | | |
|------|-------------|-------------|--------------------------------------|
| 017B | 53 54 41 54 | ERROR5: DB | 'STATUS COMMAND ERROR.',CR,LF,EOF |
| 017F | 55 53 20 43 | | |
| 0183 | 4F 4D 4D 41 | | |
| 0187 | 4E 44 20 45 | | |
| 018B | 52 52 4F 52 | | |
| 018F | 2E 0D 0A 24 | | |
| 0193 | 54 41 50 45 | ERROR6: DB | 'TAPE TYPE ERROR.',CR,LF,EOF |
| 0197 | 20 54 59 50 | | |
| 019B | 45 20 45 52 | | |
| 019F | 52 4F 52 2E | | |
| 01A3 | 0D 0A 24 | | |
| 01A6 | 52 45 57 49 | ERROR7: DB | 'REWIND ERROR.',CR,LF,EOF |
| 01AA | 4E 44 20 45 | | |
| 01AE | 52 52 4F 52 | | |
| 01B2 | 2E 0D 0A 24 | | |
| 01B6 | 45 52 41 53 | ERROR8: DB | 'ERASE ERROR.',CR,LF,EOF |
| 01BA | 45 20 45 52 | | |
| 01BE | 52 4F 52 2E | | |
| 01C2 | 0D 0A 24 | | |
| 01C5 | 57 52 49 54 | ERROR9: DB | 'WRITE FM ERROR.',CR,LF,EOF |
| 01C9 | 45 20 46 4D | | |
| 01CD | 20 45 52 52 | | |
| 01D1 | 4F 52 2E 0D | | |
| 01D5 | 0A 24 | | |
| 01D7 | 53 45 41 52 | ERROR10: DB | 'SEARCH FM ERROR.',CR,LF,EOF |
| 01DB | 43 48 20 46 | | |
| 01DF | 4D 20 45 52 | | |
| 01E3 | 52 4F 52 2E | | |
| 01E7 | 0D 0A 24 | | |
| 01EA | 52 45 41 44 | ERROR11: DB | 'READ FOREIGN TAPE ERROR.',CR,LF,EOF |
| 01EE | 20 46 4F 52 | | |
| 01F2 | 45 49 47 4E | | |
| 01F6 | 20 54 41 50 | | |
| 01FA | 45 20 45 52 | | |
| 01FE | 52 4F 52 2E | | |
| 0202 | 0D 0A 24 | | |
| 0205 | 4D 4F 54 49 | ERROR12: DB | 'MOTION ERROR.',CR,LF,EOF |
| 0209 | 4F 4E 20 45 | | |
| 020D | 52 52 4F 52 | | |
| 0211 | 2E 0D 0A 24 | | |
| 0215 | 53 54 52 45 | ERROR13: DB | 'STREAMING ERROR.',CR,LF,EOF |
| 0219 | 41 4D 49 4E | | |
| 021D | 47 20 45 52 | | |
| 0221 | 52 4F 52 2E | | |
| 0225 | 0D 0A 24 | | |
| 022B | 56 45 52 49 | ERROR14: DB | 'VERIFY ERROR.',CR,LF,EOF |
| 022C | 46 59 20 45 | | |
| 0230 | 52 52 4F 52 | | |
| 0234 | 2E 0D 0A 24 | | |
| 0238 | 42 4C 4F 43 | ERROR15: DB | 'BLOCK MOVE ERROR.',CR,LF,EOF |
| 023C | 4B 20 4D 4F | | |
| 0240 | 56 45 20 45 | | |
| 0244 | 52 52 4F 52 | | |
| 0248 | 2E 0D 0A 24 | | |
| 024C | 45 5B 43 4B | ERROR16: DB | 'EXCHANGE ERROR.',CR,LF,EOF |
| 0250 | 41 4E 47 45 | | |

0254 20 45 52 52

0258 4F 52 2E 0D

025C 0A 24

025E 42 52 45 41

ERROR17: DB 'BREAD ERROR.',CR,LF,EOF

0262 44 20 45 52

0266 52 4F 52 2E

026A 0D 0A 24

026D 42 57 52 49

ERROR18: DB 'BWRITE ERROR.',CR,LF,EOF

0271 54 45 20 45

0275 52 52 4F 52

0279 2E 0D 0A 24

027D 42 45 44 49

ERROR19: DB 'BEDIT ERROR.',CR,LF,EOF

0281 54 20 45 52

0285 52 4F 52 2E

0289 0D 0A 24

028C 44 52 45 41

ERROR20: DB 'BREAD ERROR.',CR,LF,EOF

0290 44 20 45 52

0294 52 4F 52 2E

0298 0D 0A 24

029B 44 57 52 49

ERROR21: DB 'BWRITE ERROR.',CR,LF,EOF

029F 54 45 20 45

02A3 52 52 4F 52

02A7 2E 0D 0A 24

02AB 44 45 44 49

ERROR22: DB 'BEDIT ERROR.',CR,LF,EOF

02AF 54 20 45 52

02B3 52 4F 52 2E

02B7 0D 0A 24

02BA 44 55 4D 4D

ERROR23: DB 'DUMMY ERROR.',CR,LF,EOF

02BE 59 20 45 52

02C2 52 4F 52 2E

02C6 0D 0A 24

02C9 54 49 4D 45

ERROR24: DB 'TIME OUT ERROR.',CR,LF,EOF

02CD 20 4F 55 54

02D1 20 45 52 52

02D5 4F 52 2E 0D

02D9 0A 24

PAGE

.....

;

MAIN PROGRAM

MAIN:

```
CALL INITIAL ; INITIALIZE TAPMASTER.
CALL CONFIG ; CONFIGURE TM.
CALL USKRES ; RESET DRIVE.
CALL NOPS ; NOP COMMAND.
CALL TPTYPE ; TAPE TYPE COMMAND.
CALL TPSTAT ; TAPE STATUS.
CALL REWIND ; REWIND TAPE.
```

MAIN10:

```
CALL ERASE ; ERASE TAPE.
CALL REWIND ; REWIND TAPE.
LHLD BDBUFF ; HL = BUFFER SIZE.
XCHG DE ; DE = BUFFER SIZE.
LXI H,BUFFER ; HL = BUFFER ADDRESS.
MVI B,0 ; B = STARTING PATTERN.
CALL PATTERN ; GENERATE PATTERN.
CALL DWRITE ; DIRECT TAPE WRITE.
CALL FILEMK ; WRITE FILEMARK.
LHLD BDBUFF ; HL = BUFFER SIZE.
XCHG DE ; DE = BUFFER SIZE.
LXI H,BUFFER ; HL = BUFFER ADDRESS.
MVI B,1 ; B = STARTING PATTERN.
CALL PATTERN ; GENERATE PATTERN.
CALL BWRITE ; BUFFERED TAPE WRITE.
CALL REWIND ; REWIND TAPE.
CALL BREAD ; BUFFERED TAPE READ.
LHLD BDBUFF ; HL = BUFFER SIZE.
XCHG DE ; DE = BUFFER SIZE.
LXI H,BUFFER ; HL = BUFFER ADDRESS.
MVI B,0 ; B = STARTING PATTERN.
CALL VERIFY ; VERIFY RECORD READ.
LXI D,0 ; DE = CONTROL FIELD FOR SEARCH.
CALL SEARCH ; SEARCH FOR FILEMARK.
CALL DREAD ; DIRECT TAPE READ.
LHLD BDBUFF ; HL = BUFFER SIZE.
XCHG DE ; DE = BUFFER SIZE.
LXI H,BUFFER ; HL = BUFFER ADDRESS.
MVI B,1 ; B = STARTING PATTERN.
CALL VERIFY ; VERIFY RECORD READ.
LHLD BDBUFF ; HL = BUFFER SIZE.
XCHG DE ; DE = BUFFER SIZE.
LXI H,BUFFER ; HL = BUFFER ADDRESS.
MVI B,4 ; B = STARTING PATTERN.
CALL PATTERN ; GENERATE TEST PATTERN.
CALL DWRITE ; DIRECT WRITE.
CALL FILEMK
CALL FILEMK
LXI H,2 ; HL = RECORDS.
LXI D,400H ; DE = CTRL.
CALL SPACE
LXI H,1 ; HL = RECORDS.
```

```
020H
020H CD 0404
020E CD 046A
02E1 CD 048F
02E4 CD 04BF
02E7 CD 04EF
02EA CD 04D7
02ED CD 0507
02F0
02F0 CD 051F
02F3 CD 0507
02F6 2A 048D
02F9 EB
02FA 21 1000
02FD 06 00
02FF CD 0831
0302 CD 0586
0305 CD 053D
0308 2A 048D
030B EB
030C 21 1000
030F 06 01
0311 CD 0831
0314 CD 05C5
0317 CD 0507
031A CD 05C0
031D 2A 048D
0320 EB
0321 21 1000
0324 06 00
0326 CD 083E
0329 11 0000
032C CD 055B
032F CD 05B1
0332 2A 048D
0335 EB
0336 21 1000
0339 06 01
033B CD 083E
033E 2A 048D
0341 EB
0342 21 1000
0345 06 04
0347 CD 0831
034A CD 0586
034D CD 053D
0350 CD 053D
0353 21 0002
0356 11 0400
0359 CD 0560
035C 21 0001
```



```

035F 11 0400      LXI    D,400H      ; DE = CONTROL.
0362 CD 0560      CALL   SPACE       ; SPACE COMMAND.
0365 CD 0561      CALL   DREAD       ; DIRECT READ.
0368 2A 0480      LHLU  BDBUFF      ; HL = BUFFER SIZE.
036F EB          XCHG
036C 21 1000      LXI    H,BUFFER   ; HL = BUFFER ADDRESS.
036F 06 04        MVI    B,4        ; STARTING PATTERN.
0371 CD 083E      CALL   VERIFY     ; VERIFY RECORD JUST READ.
0374 21 0001      LXI    H,1        ; HL = RECORDS.
0377 11 0400      LXI    D,400H    ; DE = CONTROL.
037A CD 0560      CALL   SPACE       ; SPACE COMMAND.
037D 2A 0480      LHLU  BDBUFF      ; HL = BUFFER SIZE.
0380 EB          XCHG
0381 21 1000      LXI    H,BUFFER   ; HL = BUFFER ADDRESS.
0384 06 03        MVI    B,3        ; B = STARTING PATTERN.
0386 CD 0831      CALL   PATTERN    ; GENERATE PATTERN.
0389 CD 0588      CALL   DEDIT      ; DIRECT EDIT.
038C 11 0400      LXI    D,400H    ; CONTROL = REVERSE.
038F CD 0565      CALL   SPACFM     ; SPACE TO FILEMARK.
0392 21 0001      LXI    H,1        ; RECORDS TO SPACE.
0395 11 0000      LXI    D,0        ; CONTROL.
0398 CD 0560      CALL   SPACE
039B CD 0561      CALL   DREAD      ; DIRECT TAPE READ.
039E 2A 0480      LHLU  BDBUFF      ; HL = BUFFER SIZE.
03A1 EB          XCHG
03A2 21 1000      LXI    H,BUFFER   ; HL = BUFFER ADDRESS.
03A5 06 03        MVI    B,3        ; B = STARTING PATTERN.
03A7 CD 083E      CALL   VERIFY     ; VERIFY RECORD READ.
03AA CD 0561      CALL   DREAD      ; DIRECT READ.
03AD 21 0001      LXI    H,1        ; HL = RECORDS.
03B0 11 0400      LXI    D,400H    ; DE = CONTROL.
03B3 CD 0560      CALL   SPACE       ; SPACE COMMAND.
03B6 2A 0480      LHLU  BDBUFF      ; HL = BUFFER SIZE.
03B9 EB          XCHG
03BA 21 1000      LXI    H,BUFFER   ; HL = BUFFER.
03BD 06 04        MVI    B,4        ; B = STARTING PATTERN.
03BF CD 0831      CALL   PATTERN    ; GENERATE PATTERN.
03C2 CD 05CA      CALL   BEDIT      ; BUFFERED EDIT COMMAND.
03C5 11 0400      LXI    D,400H    ; CONTROL = REVERSE.
03C8 CD 0565      CALL   SPACFM     ; SPACE TO FILEMARK.
03CB 21 0001      LXI    H,1        ; RECORDS TO SPACE.
03CE 11 0000      LXI    D,0        ; CONTROL.
03D1 CD 0560      CALL   SPACE
03D4 CD 05C0      CALL   BREAD      ; BUFFERED TAPE READ.
03D7 2A 0480      LHLU  BDBUFF      ; HL = BUFFER SIZE.
03DA EB          XCHG
03DB 21 1000      LXI    H,BUFFER   ; HL = BUFFER ADDRESS.
03DE 06 04        MVI    B,4        ; B = STARTING PATTERN.
03E0 CD 083E      CALL   VERIFY     ; VERIFY RECORD READ.
03E3 CD 0507      CALL   REWIND     ; REWIND TAPE.
03E6 CD 058C      CALL   RDRGN      ; READ FOREIGN TAPE.
03E9 21 0002      LXI    H,2        ; RECORDS = 2.
03EC 11 0000      LXI    D,0        ; DE = 0.
03EF CD 056A      CALL   MSEARCH    ; SEARCH FOR MULTIPLE FILEMARKS.
03F2 CD 0625      CALL   SWRITE     ; STREAMING WRITES.
03F5 CD 0691      CALL   SREAD      ; STREAMING READS.

```

| | | | | |
|------|---------|------|--------|---------------------|
| 03FB | CD 072A | CALL | BLOCKM | ; BLOCK MOVE. |
| 03FB | CD 0781 | CALL | EXCHNG | ; EXCHANGE COMMAND. |
| 03FE | CD 0507 | CALL | REWIND | ; REWIND TAPE. |
| 0401 | C3 02E0 | JMP | MAIN10 | ; START TEST OVER. |

PAGE

.....

COMMAND SUBROUTINES.

.....

INITAL - THIS ROUTINE INITIALIZES THE TAPEMASTER.

INITAL:

```

0404 11 044A LXI D,INITMS
0407 0E 09 MVI C,9
0409 CD 0005 CALL CPM ; DISPLAY MESSAGE
; BUILD SCP, SCB, CCB.
040C 21 0000 LXI H,0
040F 22 FFF6 SHLD SCP
0412 22 FFFA SHLD SCP+4
0415 22 FFF4 SHLD SCB+4
0418 22 D304 SHLD CCB+4
041B 2E 03 MVI L,3
041D 22 FFF0 SHLD SCB
0420 21 FFF0 LXI H,SCB
0423 22 FFF8 SHLD SCP+2
0426 21 D300 LXI H,CCB
0429 22 FFE2 SHLD SCB+2
042C 21 D306 LXI H,PB
042F 22 D302 SHLD CCB+2
0432 21 FF11 LXI H,OFF11H ; CLOSE GATE.
0435 22 D300 SHLD CCB
0438 03 8A OUT CA ; ISSUE CHANNEL ATTENTION.
043A CD 0706 CALL UPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
; CLEAR PARAMTER BLOCK.
043D 06 1C MVI B,28
043F 21 D306 LXI H,PB
0442 AF XRA A
0443 INIT10:
0443 77 MOV M,A
0444 05 DCR B
0445 23 INX H
0446 C2 0443 JNZ INIT10
0449 C9 RET

```

INITMS: DB CR,LF,'TAPEMASTER CONFIDENCE TEST.',CR,LF,EOF

```

044A 0D 0A 54 41
044E 50 45 4D 41
0452 53 54 45 52
0456 20 43 4E 4E
045A 46 49 44 45
045E 4E 43 45 20
0462 54 45 53 54
0466 2E 0D 0A 24

```

.....

CONFIG - CONFIGURES THE TAPEMASTER - THE AMOUNT OF ON-BOARD RAM IS RETURNED IN THE 'RETURN COUNT' FIELD OF THE PB.

;

046A
 046A AF
 046B 32 D306
 046E 21 4000
 0471 22 D312
 0474 CD 07D6
 0477 2F
 0478 32 D301
 047B D3 BA
 047D CD 07D6
 0480 11 0134
 0483 CD 0808
 0486 2A D30C
 0489 22 048D
 048C C9

CONFIG:

```

XRA A
STA COMAND ; SET COMMAND IN PB.
LXI H,4000H
SHLD SRCDEST ; SET SOURCE/DEST FIELD IN PB.
CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
CMA
STA GATE ; CLOSE GATE
OUT CA ; ISSUE CHANNEL ATTENTION.
CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
LXI D,ERROR1
CALL CHKSTS ; CHECK COMMAND STATUS FOR UCOH.
LHLD COUNT ; GET RAM SIZE OF TAPEMASTER.
SHLD BDBUFF ; SAVE IT.
RET
    
```

048D 0000

```

BDBUFF: DW 0 ; TAPEMASTER BUFFER SIZE.
;
;
;
    
```

DSKRES: EXECUTES A DRIVE RESET COMMAND.

DSKRES:

```

MVI A,90H
STA COMAND ; SET COMMAND IN PB.
CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
CMA
STA GATE ; CLOSE GATE.
OUT CA ; ISSUE CHANNEL ATTENTION.
CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
LXI D,ERROR2
CALL CHKSTS ; CHECK COMMAND STATUS.
RET
    
```

048F
 048F 3E 90
 0491 32 D306
 0494 CD 07D6
 0497 2F
 0498 32 D301
 049B D3 BA
 049D CD 07D6
 04A0 11 0147
 04A3 CD 0808
 04A6 C9

SETPAG - EXECUTES THE SET PAGE REGISTER COMMAND.
 PAGE REGISTER := 0.

SETPAG:

```

MVI A,8 ; SET PAGE REGISTER.
STA COMAND ; SET COMMAND IN PB.
CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
CMA
STA GATE ; CLOSE GATE
OUT CA ; ISSUE CHANNEL ATTENTION.
CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
LXI D,ERROR3
CALL CHKSTS ; CHECK COMMAND STATUS FOR UCOH.
RET
    
```

04A7
 04A7 3E 08
 04A9 32 D306
 04AC CD 07D6
 04AF 2F
 04B0 32 D301
 04B3 D3 BA
 04B5 CD 07D6
 04B8 11 015C
 04BB CD 0808
 04BE C9

NOPS - EXECUTES THE NOP COMMAND.

NOPS:

```

MVI A,20H
STA COMAND ; SET COMMAND IN PB.
CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
    
```

04BF
 04BF 3F 20
 04C1 32 D306
 04C4 CD 07D6

```

04C7 2F      :
04C8 32 0301 STA      GATE      ; CLOSE GATE.
04CB 03 8A   OUT      CA        ; ISSUE CHANNEL ATTENTION.
04CD CD 07D6 CALL     OPEN05     ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
04D0 11 016E LXI      D,ERROR4
04D3 CD 080B CALL     CHKSTS     ; CHECK COMMAND STATUS FOR 0C0H.
04D6 C9      RET
    
```

```

;
;
; TPSTAT - EXECUTES THE TAPE STATUS COMMAND.
;
    
```

```

04D7 TPSTAT:
04D7 3F 28   MVI      A,28H
04D9 32 0306 STA      COMAND     ; SET COMMAND IN PB.
04DC CD 07D6 CALL     OPEN05     ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
04DF 2F      CMA
04E0 32 0301 STA      GATE      ; CLOSE GATE.
04E3 03 8A   OUT      CA        ; ISSUE CHANNEL ATTENTION.
04E5 CD 07D6 CALL     OPEN05     ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
04E8 11 017B LXI      D,ERROR5
04EB CD 080B CALL     CHKSTS     ; CHECK COMMAND STATUS FOR 0C0H.
04EE C9      RET
    
```

```

;
;
; TPTYPE - EXECUTES THE TAPE TYPE COMMAND.
;
    
```

```

04EF TPTYPE:
04EF 3E 74   MVI      A,74H
04F1 32 0306 STA      COMAND     ; SET COMMAND IN PB.
04F4 CD 07D6 CALL     OPEN05     ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
04F7 2F      CMA
04F8 32 0301 STA      GATE      ; CLOSE GATE.
04FB 03 8A   OUT      CA        ; ISSUE CHANNEL ATTENTION.
04FD CD 07D6 CALL     OPEN05     ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
0500 11 0193 LXI      D,ERROR6
0503 CD 080B CALL     CHKSTS     ; CHECK COMMAND STATUS FOR 0C0H.
0506 C9      RET
    
```

```

;
;
; REWIND - EXECUTES THE TAPE REWIND COMMAND.
;
    
```

```

0507 REWIND:
0507 3E 34   MVI      A,34H
0509 32 0306 STA      COMAND     ; SET COMMAND IN PB.
050C CD 07E0 CALL     OPEN45
050F 2F      CMA
0510 32 0301 STA      GATE      ; CLOSE GATE.
0513 03 8A   OUT      CA        ; ISSUE CHANNEL ATTENTION.
0515 CD 07E0 CALL     OPEN45     ; WAIT FOR GATE = OPEN (45 SEC MAX).
0518 11 01A6 LXI      D,ERROR7
051B CD 080B CALL     CHKSTS     ; CHECK COMMAND STATUS FOR 0C0H.
051E C9      RET
    
```

```

;
;
; ERASE - EXECUTES THE ERASE TAPE COMMAND.
;
    
```

```

051F.. ERASE:
051F 3E 50 MVI A,50H
0521 32 D306 STA COMAND ; SET COMMAND IN PB.
0524 21 0800 LXI H,800H
0527 22 D30A SHLD CNTRL ; SET CONTROL FIELD OF PB.
052A CD 07D6 CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
052D 2F CMA
052E 32 D301 STA GATE ; CLOSE GATE.
0531 D3 8A OUT CA ; ISSUE CHANNEL ATTENTION.
0533 CD 07E0 CALL OPEN45 ; WAIT FOR GATE = OPEN (45 SEC MAX).
0536 11 01B6 LXI D,ERROR8
0539 CD 080B CALL CHKSTS ; CHECK COMMAND STATUS FOR OCOH.
053C C9 RET

```

;;

;

FILEMK - EXECUTES THE WRITE FILEMARK COMMAND.

;

FILEMK:

```

053D
053D 3E 40 MVI A,40H
053F 32 D306 STA COMAND ; SET COMMAND IN PB.
0542 21 0800 LXI H,800H
0545 22 D30A SHLD CNTRL ; SET CONTROL FIELD OF PB.
0548 CD 07D6 CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
054B 2F CMA
054C 32 D301 STA GATE ; CLOSE GATE.
054F D3 8A OUT CA ; ISSUE CHANNEL ATTENTION.
0551 CD 07D6 CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
0554 11 01C5 LXI D,ERROR9
0557 CD 080B CALL CHKSTS ; CHECK COMMAND STATUS FOR OCOH.
055A C9 RET

```

PAGE

RDFRGN = EXECUTES THE READ FOREIGN TAPE COMMAND.

RDFRGN:

```

058C      MVI      A,ICH
058E      STA      COMAND      ; SET COMMAND IN PB.
0591      LXI      H,800H
0594      SHLD     CONTRL      ; SET CONTROL FIELD OF PB.
0597      CALL     OPEN05      ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
059A      CMA
059H      STA      GATE        ; CLOSE GATE.
059E      OUT      CA          ; ISSUE CHANNEL ATTENTION.
05A0      CALL     OPEN05      ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
05A3      LXI      D,ERR01
05A6      CALL     CHKSTS      ; CHECK COMMAND STATUS FOR OCCH.
05A9      LHL     COUNT
05AC      XCHG
05AD      LHL     RECORD
05B0      RET

```

PAGE

.....

THE FOLLOWING COMMANDS:

- DREAD (DIRECT READ)
- DWRITE (DIRECT WRITE)
- DEDIT (DIRECT EDIT)
- BREAD (BUFFERED READ)
- BWRITE (BUFFERED WRITE)
- BEDIT (BUFFERED EDIT)

ALL USE A COMMON EXECUTION ROUTINE CALLED 'DAXFER' (FOR DATA TRANSFER).

```

05B1      DREAD:
05B1      3E 2C      MVI      A,2CH
05B3      C3 05CF      JMP      DAXFER

```

```

05B6      DWRITE:
05B6      3E 30      MVI      A,30H
05B8      C3 05CF      JMP      DAXFER

```

```

05BH      DEDIT:
05BH      3E 3C      MVI      A,3CH
05BD      C3 05CF      JMP      DAXFER

```

```

05C0      BREAD:
05C0      3E 10      MVI      A,10H
05C2      C3 05CF      JMP      DAXFER

```

```

05C5      BWRITE:
05C5      3E 14      MVI      A,14H
05C7      C3 05CF      JMP      DAXFER

```

```

05CA      BEDIT:
05CA      3E 18      MVI      A,18H
05CC      C3 05CF      JMP      DAXFER

```

```

05CF      DAXFER:
05CF      32 0306      STA      COMAND      ; SET COMMAND IN PB.
05D2      21 0880      LXI      H,880H
05D5      22 030A      SHLD   CONTRL      ; SET CONTROL FIELD OF PB.
05D8      2A 048D      LHL    BDBUFF
05DB      22 030E      SHLD   BFRSZE      ; SET BUFFER SIZE FIELD OF PB.
05DE      21 1000      LXI      H,BUFFER
05E1      22 0312      SHLD   SRCDST      ; SET SOURCE/DEST FIELD IN PB.
05E4      CD 07D6      CALL   OPEN05      ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
05E7      2F          CMA
05E8      32 0301      STA      GATE
05EB      03 8A          OUT     CA          ; ISSUE CHANNEL ATTENTION.
05ED      CD 07D6      CALL   OPEN05      ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
05F0      CD 0814      CALL   CHKDST      ; CHECK COMMAND FOR PROPER COMPLETION.
05F3      C9          RET

```

;;

;
; STREAMING_COMMAND EQUATES
;

```

1000 SGATE1 EQU BUFFER
1002 SCT1 EQU SGATE1+2
1004 SPTR1 EQU SGATE1+4
1008 SDATA1 EQU SGATE1+8
1108 SGATE2 EQU SDATA1+100H
110A SCT2 EQU SGATE2+2
110C SPTR2 EQU SGATE2+4
1110 SDAIA2 EQU SGATE2+8
1210 SGATE3 EQU SDATA2+100H
1212 SCT3 EQU SGATE3+2
1214 SPTR3 EQU SGATE3+4
1218 SDATA3 EQU SGATE3+8
    
```

;;

;
; ISTREAM - BUILDS THE DATA BLOCKS AND 8 BYTE HEADERS FOR THE
; STREAMING COMMANDS.
;

```

05F4 ISTREAM:
05F4 LXI H,0
05F7 SHLD SPTR1+2 ; BASE OF POINTER 1.
05FA SHLD SPTR2+2 ; BASE OF POINTER 2.
05FD SHLD SPTR3+2 ; BASE OF POINTER 3.
0600 INX H
0601 SHLD SGATE1 ; GATE OF BLOCK 1.
0604 SHLD SGATE2 ; GATE OF BLOCK 2.
0607 MVI L,11H
0609 SHLD SGATE3 ; GATE OF BLOCK 3.
060C LXI H,100H
060F SHLD SCT1 ; COUNT OF BLOCK 1.
0612 SHLD SCT2 ; COUNT OF BLOCK 2.
0615 SHLD SCT3 ; COUNT OF BLOCK 3.
0618 LXI H,SGATE2
061B SHLD SPTR1 ; OFFSET OF POINTER 1
061E LXI H,SGATE3
0621 SHLD SPTR2 ; OFFSET OF POINTER 2.
0624 RET
    
```

;;

;
; SWRITE - PERFORMS THE STREAMING WRITE COMMAND.
;

```

0625 SWRITE:
0625 CD 05F4 CALL ISTREAM ; INITIALIZE BLOCKS.
; ; BUILD TEST PATTERN.
0628 LXI D,100H
062B MVI B,1
062D LXI H,SDATA1
0630 CALL PAIERN
0633 LXI D,100H
0636 MVI B,2
0638 LXI H,SDAIA2
    
```

```

063B CD 0831 CALL PATTERN
063E 11 0100 LXI D,100H
0641 06 03 MVI B,3
0643 21 1218 LXI H,SDATA3
0646 CD 0831 CALL PATTERN
;
0649 3E 64 MVI A,64H
064B 32 0306 STA COMAND ; SET COMMAND IN PB.
064E 21 0880 LXI H,880H
0651 22 030A SHLD CONTRL ; SET CONTROL FIELD OF PB.
0654 21 1000 LXI H,SGATE1
0657 22 0312 SHLD SRCUST ; SET SOURCE/DEST FIELD IN PB.
065A CD 0706 CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
065D 2F CMA
065E 32 0301 STA GATE ; CLOSE GATE.
0661 03 8A OUT CA ; ISSUE CHANNEL ATTENTION.
0663 CD 0706 CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
0666 CD 0814 CALL CHKDST ; CHECK COMMAND FOR PROPER COMPLETION.
;
0669 3A 1000 LDA SGATE1
066C E6 0F ANI 0FH
066E FE 04 CPI 4
0670 11 0215 LXI D,ERROR13
0673 C4 0856 CNZ ERROR
0676 3A 1108 LDA SGATE2
0679 E6 0F ANI 0FH
067B FE 04 CPI 4
067D 11 0215 LXI D,ERROR13
0680 C4 0856 CNZ ERROR
0683 3A 1210 LDA SGATE3
0686 E6 0F ANI 0FH
0688 FE 04 CPI 4
068A 11 0215 LXI D,ERROR13
068D C4 0856 CNZ ERROR
0690 C9 RET
;
;::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
;
; SREAD - PERFORMS THE STREAMING READS AND VERIFYS.
;
0691 SREAD:
; ASSUME THERE HAS BEEN (FROM PREVIOUS PARTS OF TEST) TWO
; PREVIOUSLY WRITTEN FILEMARKS PRIOR TO THE RECORDS TO BE READ
; IN STREAMING MODE.
0691 CD 0507 CALL REWIND
0694 21 0002 LXI H,2
0697 11 0000 LXI D,0
069A CD 056A CALL MSERCH
;
; INITIALIZE BLOCKS.
069D CD 05F4 CALL ISIREM
;
; BUILD DUMMY PATTERNS.
; (DIFFERENT THAN EXPECTED DATA.)
06A0 21 1008 LXI H,SDATA1
06A3 11 0100 LXI D,100H
06A6 06 80 MVI B,80H
06A8 CD 0831 CALL PATTERN
06AB 21 1110 LXI H,SDATA2

```

```

06A8 11 0100 LXI D,100H
06B1 06 81 MVI B,B1H
06B3 CD 0831 CALL PATTERN
06B6 21 1218 LXI H,SDATA3
06B9 11 0100 LXI D,100H
06BC 06 82 MVI B,B2H
06BE CD 0831 CALL PATTERN

;
06C1 3E 60 MVI A,60H
06C3 32 D306 STA COMAND ; SET COMMAND IN PB.
06C6 21 0880 LXI H,880H
06C9 22 D30A SHLD CONTRL ; SET CONTROL FIELD OF PB.
06CC 21 1000 LXI H,SGATE1
06CF 22 D312 SHLD SRCDST ; SET SOURCE/DEST FIELD IN PB.
06D2 CD 07D6 CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
06D5 2F CMA
06D6 32 D301 STA GATE
06D9 D3 8A OUT CA ; ISSUE CHANNEL ATTENTION.
06DB CD 07D6 CALL OPEN05 ; WAIT FOR GATE = OPEN ( 5 SEC MAX).
06DE CD 0814 CALL CHKDST ; CHECK COMMAND FOR PROPER COMPLETION.
; CHECK BLOCK GATES.

06E1 3A 1000 LDA SGATE1
06E4 E6 0F ANI 0FH
06E6 FE 04 CPI 4
06E8 11 0215 LXI D,ERROR13
06EB C4 0856 CNZ ERROR
06EE 3A 1108 LDA SGATE2
06F1 E6 0F ANI 0FH
06F3 FE 04 CPI 4
06F5 11 0215 LXI D,ERROR13
06F8 C4 0856 CNZ ERROR
06FB 3A 1210 LDA SGATE3
06FE E6 0F ANI 0FH
0700 FE 04 CPI 4
0702 11 0215 LXI D,ERROR13
0705 C4 0856 CNZ ERROR
; VERIFY FIRST BLOCK.
0708 21 1008 LXI H,SDATA1
070B 11 0100 LXI D,100H
070E 06 01 MVI B,1
0710 CD 083E CALL VERIFY
; VERIFY SECOND BLOCK.
0713 21 1110 LXI H,SDATA2
0716 11 0100 LXI D,100H
0719 06 02 MVI B,2
071B CD 083E CALL VERIFY
; VERIFY THIRD BLOCK.
071E 21 1218 LXI H,SDATA3
0721 11 0100 LXI D,100H
0724 06 03 MVI B,3
0726 CD 083E CALL VERIFY
0729 C9 RET

```

; BLOCKM - EXECUTES THE BLOCK MOVE COMMAND.

; BLOCKM:

; BUILD PATTERNS TO MOVE.

072A

072A 21 1000
072D 11 0100
0730 06 01
0732 CD 0831

LXI M,BUFFER
LXI D,100H
MVI B,1
CALL PATTERN

; BUILD DUMMY PATTERN.

0735 21 1100
0738 11 0100
073B 06 80
073D CD 0831

LXI M,BUFFER+100H
LXI D,100H
MVI B,80H
CALL PATTERN

0740 3E 80
0742 32 0306
0745 21 0000

MVI A,80H
STA COMAND ; SET COMMAND IN PB.
LXI M,0

0748 22 030A
074B 21 0100
074E 22 030C

SHLD CONTRL ; SET CONTROL FIELD OF PB.
LXI M,100H
SHLD COUNT

0751 21 1000
0754 22 030E
0757 21 0000

LXI M,BUFFER
SHLD BFRSZE ; SET BUFFER SIZE FIELD OF PB.
LXI M,0

075A 22 0310
075D 21 1100
0760 22 0312

SHLD RECORD ; SET RECORD FIELD OF PB.
LXI M,BUFFER+100H
SHLD SRCDEST ; SET SOURCE/DEST FIELD IN PB.

0763 CD 07D6
0766 2F
0767 32 0301

CALL OPEN05 ; WAIT FOR GATE = OPEN (5 SEC MAX).
CMA
STA GATE ; CLOSE GATE.

076A D3 8A
076C CD 07D6
076F 21 0238

OUT CA ; ISSUE CHANNEL ATTENTION.
CALL OPEN05 ; WAIT FOR GATE = OPEN (5 SEC MAX).
LXI M,ERROR15

0772 CD 0808

CALL CHKSTS ; CHECK COMMAND STATUS FOR 0COM.
VERIFY BLOCK MOVED.

0775 21 1100
0778 11 0100
077B 06 01
077D CD 083E
0780 C9

LXI M,BUFFER+100H
LXI D,100H
MVI B,1
CALL VERIFY
RET

; EXCHNG - SETS UP PATTERNS FOR EXCHANGE COMMAND AND
CALLS ROUTINE WHICH EXECUTES EXCHANGE COMMAND.

; EXCHNG:

; BUILD TEST PATTERN.

0781

0781 21 1000
0784 11 0100
0787 06 01
0789 CD 0831

LXI M,BUFFER
LXI D,100H
MVI B,1
CALL PATTERN

; DO EXCHANGE COMMAND.

078C CD 07A9

CALL GOEXCH

; BUILD DUMMY PATTERN.

078F 21 1000
 0792 11 0100
 0795 06 80
 0797 CD 0631

LXI H,BUFFER
 LXI D,100H
 MVI B,80H
 CALL PATTERN

EXCHANG ORIGINAL PATTERN BACK.

079A CD 07A9

CALL GOEXCH

VERIFY ORIGINAL PATTERN.

079D 21 1000
 07A0 11 0100
 07A3 06 01
 07A5 CD 063E
 07A8 C9

LXI H,BUFFER
 LXI D,100H
 MVI B,1
 CALL VERIFY
 RET

.....

; GOEXCH - EXECUTES THE EXCHANGE COMMAND.

07A9 3E 0C
 07AB 32 D306
 07AE 21 0080
 07B1 22 D30A
 07B4 21 0100
 07B7 22 030C
 07BA 22 030E
 07BD 21 1000
 07C0 22 0312
 07C3 CD 0706
 07C6 2F
 07C7 32 D301
 07CA 03 8A
 07CC CD 0706
 07CF 11 024C
 07D2 CD 0608
 07D5 C9

GOEXCH:

MVI A,0CH
 STA COMAND
 LXI H,80H
 SHLD CONTRL
 LXI H,100H
 SHLD COUNT
 SHLD HFRSZE
 LXI H,BUFFER
 SHLD SRCOST
 CALL OPEN05
 CMA
 STA GATE
 OUT CA
 CALL OPEN05
 LXI D,ERROR16
 CALL CHKSTS
 RET

; SET COMMAND IN PB.

; SET CONTROL FIELD OF PB.

; SET BUFFER SIZE FIELD OF PB.

; SET SOURCE/DEST FIELD IN PB.

; WAIT FOR GATE = OPEN (5 SEC MAX).

; CLOSE GATE.

; ISSUE CHANNEL ATTENTION.

; WAIT FOR GATE = OPEN (5 SEC MAX).

; CHECK COMMAND STATUS FOR 0C0H.

PAGE.

0808
 080B 3A D317
 080E FE C0
 0810 C4 0856
 0813 C9

CHKSTS:

LDA STATUS+1
 CPI 0C0H
 CNZ ERROR
 RET

CHKDST - CHECKS COMMAND STATUS FOR DATA TRANSFER COMMANDS (IGNORES
 RETRY BIT). IF THERE WAS AN ERROR IT USES THE COMMAND
 OP CODE TO LOOKUP THE ADDRESS OF ERROR MESSAGE.

0814
 0814 3A D317
 0817 E6 DF
 0819 FE C0
 081B C8
 081C 3A D306
 081E D6 10
 0821 21 0106
 0824 85
 0825 6F
 0826 D2 082A
 0829 24
 082A
 082A 5E
 082B 23
 082C 56
 082D (D) 0856
 0830 C9

CHKDST:

LDA STATUS+1
 ANI 0DFH
 CPI 0C0H
 RZ
 LDA COMAND
 SUI 10H
 LXI H,XFERH
 ADD L
 MOV L,A
 JNC CHKD10
 INR H

CHKD10:

MOV E,M
 INX H
 MOV D,M
 CALL ERROR
 RET

PAGE

ERROR - DISPLAYS ERROR MESSAGE. MESSAGE ADDRESS IN DE.

0856

ERROR:

0856 CF

RST 1

0857 0E 09

MVI C,9

0859 CD 0005

CALL CPM

085C C9

RET

END GO