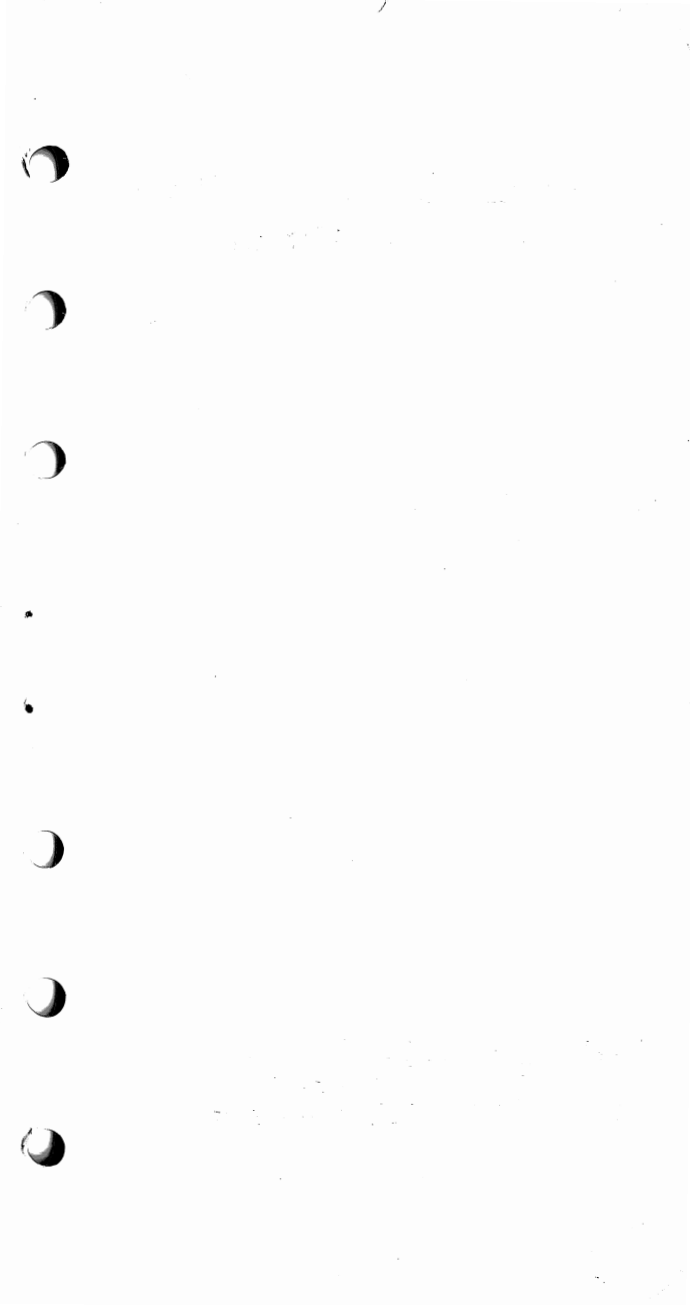


RON McALLEN



IBM[®] Field Engineering

**Diagnostic Section
Reference Manual**



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Reference Manual

Address comments concerning the contents of this publication to:
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Endicott, New York 13760

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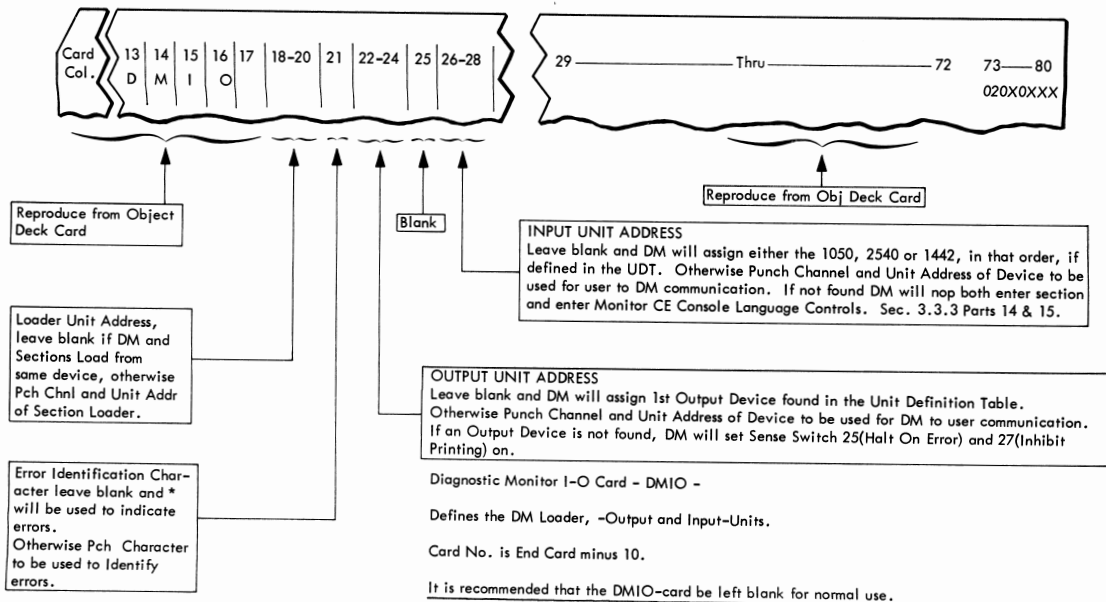
<u>PROGRAM NAME/DESCRIPTION</u>	<u>ID #</u>	<u>PAGE</u>
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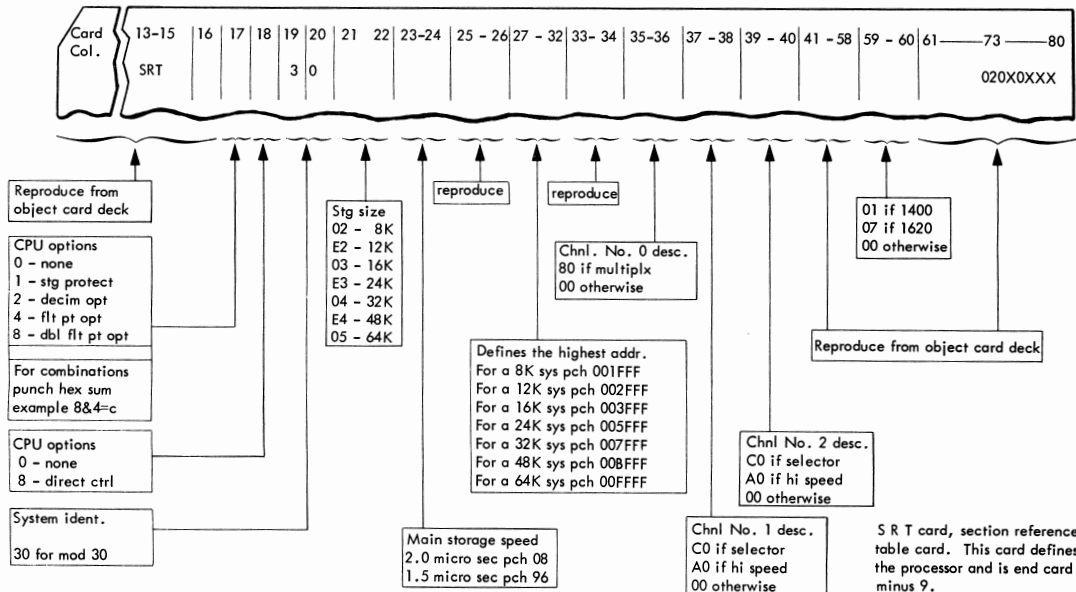


DMA4 combines the following function into one control program:

1. Prog. Loader including search capabilities.
2. Uniform error messages.
3. Uniform CE controls.
4. Condenses system configuration definitions into one program instead of once for each program.

Operation	Short Descr. Page	Users Guide Para.	Remarks
Preparing of the Configuration cards	2, 3 & 4	1.0 & 3.0	UDT-Summary Chart must be completed. For Machine Configuration see Machine History.
DMA4 Operators Flow Charts	7 & 8		
Switch setting for Console Interrupt Message	6	3.3 & 3.4	Use of the CE Console Overlay may be a help.
Output Messages Initialize Output Message of DMA4 Restart Procedure	10 9	3.5 3.2	Refer also to Appendix A section 2.1.3.
Cycling	6		Refer to "Cycle Active" and "Cycle Select" on page 6 .





Card Col.	13	14	15	16	17	18	19	20	21	22	23	24	25	32	33	40	41	48	49	56	57	64	65	72	73	74	75	76	77	78	79	80
	U	D	T	8					0															0	2	0	X	0	X	X	X	

Reproduce from object deck cards

Unit program code see section 1.3

Optional feature digit 1 see section 1.3

Optional feature digit 2 see section 1.3

Zero-0-

Channel and unit address
columns 17-24 make up 1st UDT entry
information for UDT entries may be obtained from
the unit definition table summary chart.
see section 1.0

2nd UDT entry 3rd UDT entry 4th UDT entry 5th UDT entry 6th UDT entry 7th UDT entry

Any unused entries may be left blank

Reproduce from object deck cards

These are the 8 cards preceding the end card.

- Unit Definition Cards - UDT -
- Define I-O equipment attached to system.
- There are 8 UDT-cards (UDT1 thru UDT8)
- Card No. UDT1 end card minus 8, No. of UDT8 is end card minus 1.
- Use information from unit definition table in section 1.0 of users guide (Volume 40).
- If desired, one entry per card can be made. For each 2311, two entries must be defined- First entry with unit code 60; second entry with unit code 61.
- If R/W TAU is installed, tapes must be defined as unit type 50 for all functional tape tests, and as unit type 51 for R/W TAU test (F529). See section 3.1 of F529 program description for details.



Function of Monitor Sense Switches

SENSE SW. NO.	FUNCTION	BYTE & BIT
20	OFF - DM Will Continue After Loading Each Prog-Sect. ON - DM Will Halt After Loading Each Prog-Sect.	01A2 Bit-4
21	ON - Output Short Format For The Standard Error Msg. OFF - Output Long Format For The Standard Error Msgs. See Section 3.5.3 For Explanation Of Long And Short Format	01A2 Bit-5
24	OFF - Print All Prog-Sect. Start And Terminate Msgs. ON - Inhibit Printing Of Start And Terminate Msgs.	01A3 Bit-0
25	OFF - Do Not Halt After Error Printout ON - Halt After Error Printout	01A3 Bit-1
26	OFF - Normal ON - Cycle CE Run Request	01A3 Bit-2
27	OFF - Allow All Printing ON - Inhibit All Printing	01A3 Bit-3
28	OFF - Do Not Cycle Program Section In Storage ON - Cycle Program Section In Storage	01A3 Bit-4
30	OFF - Print All Error Messages ON - Inhibit Printing Of Error Message	01A3 Bit-6
31	OFF - Normal DMA4 Output Message Format ON - 8K System - No Effect 16K Or Larger Systems - DMA4 (Version 4 Or Later) Will X-Fer Control To DMA4 Message Editor To Expand And Edit DMA4 Output Messages.	01A3 Bit-7

Switch Setting for Console Interrupt Message

Message	SWITCH				Comments
	F	G	H	J	
Normal	0				Exit from the WAIT state.
Load From	8	X	X	X	Diagnostic Search No. in GHJ specifies the first section to be executed.
Load To	9	X	X	X	Diagnostic Search No. in GHJ specifies the last section to be executed.
Execute	1				Initiate loading of Diagnostic Sections under control of Load From and Load To parameters.
SS Off Monitor	2	7	X	X	Clear Monitor Sense Switch defined in H and J. For Function of SS see Page 12, or users guide section 3. 4.
SS Off Section	2	8	X	X	Clear Section Sense Switch defined in H and J. For Function of SS see individual section description.
SS On Monitor	3	7	X	X	Set Monitor Sense Switch defined in H and J. For Function of SS see page 12 or users guide section 3. 4.
SS On Section	3	8	X	X	Set Section Sense Switch defined in H and J. For Function of SS see individual section description.
Cycle Active	5	5			Causes the active routine to be cycled.
Cycle Select	5	6	X	X	Causes cycling the routine specified in H and J.
Print Section	6	X	X	X	Gives a 100 Hex (256 decimal) Memory Dump of Diagnostic section starting at location specified by G, H, J plus Register 15. Pressing Interrupt again will terminate the Dump at any line.
Print Monitor	7	X	X	X	Same as Print Section except no base register used.
Output Unit	4	X	X	X	Changes CE output device to the device as defined in G, H, J.
Enter Section	E	X	X	X	Allows X-fering up to 40 bytes from the input device to the diagnostic section starting at the location specified by G, H, J plus Register 15. If 1052 is input device entering may be terminated before 40 bytes (80 Hex characters) by entering EOB. Take care to enter an even number of Hex characters. If a card reader is the input device, all 40 bytes must be entered.
Enter Monitor	F	X	X	X	Same as Enter Section except no base register used.
Initialize	D				Causes DMA4 to terminate any operation.

Example to Cycle Routine 06 After Program Loading

START CYCLING

SET SWITCH F TO 5
 SET SWITCH G TO 6
 SET SWITCH H TO 0
 SET SWITCH J TO 6

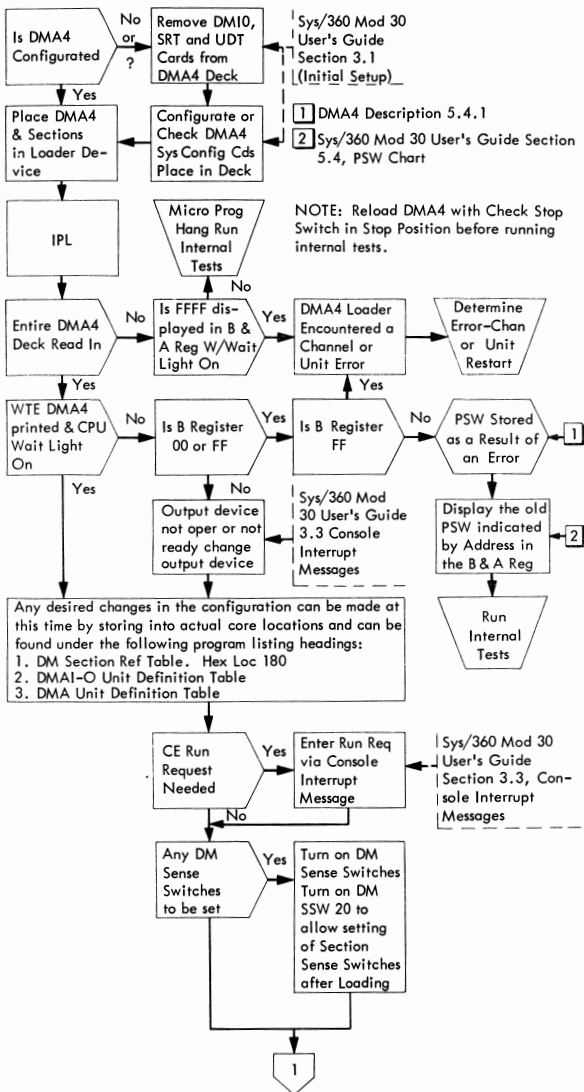
CYCLE SELECT
 ROUTINE NO.

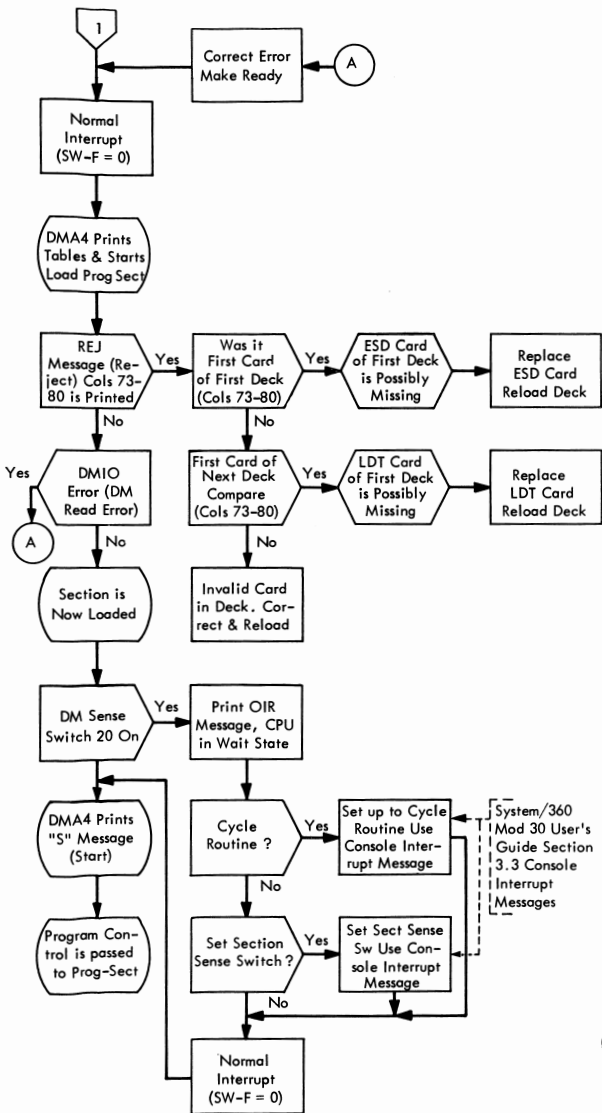
DEPRESS INTERRUPT

TERMINATE CYCLING

SET SWITCH F TO 5
 SET SWITCH G TO 6
 SET SWITCH H TO 0
 SET SWITCH J TO 0

DEPRESS INTERRUPT





DIAGNOSTIC MONITOR - DMA4 - ID 3020-4
DMA4 Restart Procedures

Operator
Desires to
Restart

1. DMA4 may hangup for any of several reasons with no apparent way out.
2. If the following chart is followed, the need for reloading DMA4 will be minimized.

1 Depress Sys
Reset
2 Start Key
Once

NOTE: The DMA4 restart PSW is located at location 0 and allows the operator to return to a predetermined point.

Restart Prog
Section in
Storage

Yes

Depress Start
Key

Prog Section
in Storage is
Restarted

Initialize DM

Yes

Switch F
to D
(Initialize)

1. External
Interrupt
2. Start

DM will print
(WTE DMA4)
and enter Wait
State

Restart Run
Request

Yes

Switch F
to 1
(Execute)

1. External
Interrupt
2. Start

DM will in-
italize, Load
Prog Specified
by Load From

Terminate
Prog Section
in Storage

Yes

Switch F
to 0
(Normal)

1. External
Interrupt
2. Start

DMA4 will
Print T*, Load
Next Program
Section

Set Sense
Switch
(DM or Sect)

Yes

Switch F
to 3
(Set Sense Sw)

1. External
Interrupt
2. Start

DMA4 will
Set Sense Sw,
Restart Prog
Sect in Stor

Clear Sense
Switch
(DM or Sect)

Yes

Switch F
to 2
Clear Sense Sw

1. External
Interrupt
2. Start

DMA4 will
clear Sense Sw,
Restart Prog
Sect in Stor

Modify Run
Request

Yes

Switch F
to 8 or 9
(Load From)
Load To)

1. External
Interrupt
2. Start

Modify
Search Param-
eters, Go to
Wait State

Any Other
Console
Interrupt
Messages

Yes

Switch F
To Console
Interrupt
Message

1. External
Interrupt
2. Start

Execute Con-
sole Message
Restart Prog
Sect in Stor

Def. Def. No.	Messages in Alphabetic Order	Type of Message	Description
1	* PZZZL RR LLLLLL	Section Called	Svc D1 or D2 error message
2	* PZZZL RR LLLLLL CUU	Section Called	Svc D3 error message
3	*DIO DMA4 Y CCCCC---- CCC CUU	Error	Monitor I-O Error
4	*EIE PZZZL RR EEEEEEEEEEEEEEE	Error	External interrupt error other than console interrupt. Timer may cause EIE msg. which is not an error.
5	HLT		Accompanies error msgs. when halt on error is indicated.
6	HLT PZZZL RR SSSSSSSSSSSSSSS	Control	Svc DA halt request.
7	*IOE PZZZL RR CCCCC----CCC CUU	Error	Program section I-O error
8	*ISC DMA4 Y SSSSSSSSSSSSSSS	Error	Invalid supervisory call interrupt error in DM.
9	*ISC PZZZL RR SSSSSSSSSSSSSSS	Error	Invalid supervisory call interrupt error in sec.
10	*MCK DMA4 Y MMMMMMMMMMMMMMMMM	Error	Machine check interrupt error in monitor
11	*MCK PZZZL RR MMMMMMMMMMMMMMMMM	Error	Machine check interrupt error in section

OUTPUT MESSAGE=for more detailed information consult appropriate description.
 Type: "Error" and "Control" see DMA4 description.
 Type: "Section Called" see Section description.

Det. Def. No.	Messages in Alphabetic Order	Type of Message	Description
12	OIR PZZZL	Control	Operator intervention requested or required.
13	*PGM DMA4 Y PZZZL	Error	Prog. Intr. error in DM.
14	*PGM PZZZL RR PZZZL	Error	Prog. Intr. error in sec.
15	PNF DMA4 Y OZZOZZ	Control	Program not found.
16	REJ PZZZL XXXXXXX	Control	Section rejected.
17	REL PZZZL	Control	Reload
18	RNV PZZZL	Control	Requested unit type not found.
19	S PZZZL	Control	Start of section.
20	SDO PZZZL RR LLLLLL CUU	Section Called	Svc d0 operational ID line. CUU is optional.
21	*SDO PZZZL RR LLLLLL CUU	Section Called	Svc d0 error ID line. CUU is optional.
22	T	Control	Terminate. End of section.
23	T*	Control	Abnormal temination.
24	*UIO PZZZL RR CCCCC---CCC CUU	Error	Unassigned I-O interrupt error.

Det. Def. No.	Messages in Alphabetic Order	Type of Message	Description																																	
25	WTE DMA4 Y	Control	Wait message																																	
<p><u>Definitions of information in table</u></p> <table> <tr> <td>PZZZL</td> <td>-Program Section Identification</td> <td></td> </tr> <tr> <td>RR</td> <td>-Routine Number</td> <td></td> </tr> <tr> <td>CUU</td> <td>-Channel and Unit Address Involved in I-O Interrupt</td> <td></td> </tr> <tr> <td>LLLLL</td> <td>-Location Within Program Section Requesting Message</td> <td></td> </tr> <tr> <td>SS--SS</td> <td>-Svc Old PSW</td> <td rowspan="4">}</td> </tr> <tr> <td>MM--MM</td> <td>-Machine Check Old PSW</td> </tr> <tr> <td>EE--EE</td> <td>-External Old PSW</td> </tr> <tr> <td>PP--PP</td> <td>-Program Old PSW</td> </tr> <tr> <td>CC--CC</td> <td>-Channel Status Word</td> <td>See Chart Section 5.4</td> </tr> <tr> <td>XX--XX</td> <td>-Card Columns 73-80</td> <td></td> </tr> <tr> <td>ZZZ</td> <td>-Search Numbers</td> <td></td> </tr> <tr> <td>Y</td> <td>-Monitor Revision Level</td> <td></td> </tr> </table>				PZZZL	-Program Section Identification		RR	-Routine Number		CUU	-Channel and Unit Address Involved in I-O Interrupt		LLLLL	-Location Within Program Section Requesting Message		SS--SS	-Svc Old PSW	}	MM--MM	-Machine Check Old PSW	EE--EE	-External Old PSW	PP--PP	-Program Old PSW	CC--CC	-Channel Status Word	See Chart Section 5.4	XX--XX	-Card Columns 73-80		ZZZ	-Search Numbers		Y	-Monitor Revision Level	
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PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
310A	<p data-bbox="285 153 533 177"><u>DMA4 Message Editor</u></p> <p data-bbox="285 210 1081 260">This program acts as an extension of DMA4, to provide expanded printout capability.</p> <p data-bbox="285 265 813 289">The editor resides in HEX location 3000 - 3FFF.</p> <p data-bbox="285 294 1068 343">Whenever DM SSW 31 is ON, and the editor is present in storage, DMA4 will branch to the editor after printing of any standard DM message.</p> <p data-bbox="285 349 1051 398">Then it collects additional information and prints out the information in a format which is more easily interpreted.</p> <p data-bbox="285 427 1099 584">Notes: 1. 310A is loaded in the same fashion as any Diagnostic Section, but the most logical sequence is to load after DMA4.</p> <p data-bbox="382 508 1054 584">2. The program automatically turns on DM Sense Switch 31. Editing may be deleted at any time by turning DM Sense off, via normal methods.</p>	40	<p data-bbox="1238 164 1727 214">Can only be used on 2030 with 16 K or higher storage capacity.</p> <p data-bbox="1238 275 1707 325">Program operates only with DMA4 revision <u>level 4</u> or higher.</p> <p data-bbox="1238 355 1773 674">Storage Test 3390 revision level 0 and 1, and all 1400 and 1620 compatibility diagnostics, will destroy the editor. When this occurs, a program Check Error will occur whenever DM attempts to branch to the editor. This condition can be recognized by a series of unedited *PGM messages. It is important, therefore, that DM Sense Switch 31 be turned off, while such programs are running, and that the editor program be reloaded at their conclusion. Revision level 2 or higher of Storage Test 3390 provides for automatic handling of these requirements.</p>

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F060-0	<p>This program provides a highly flexible, short program loop to enable the C. E. to scope an I/O Device failure. After the program is IPL-loaded, the machine will go into WAIT state. The desired parameters must be entered at this time from the console switches, in the following manner:</p> <p><u>HEX Addr.</u> <u>Parameters</u></p> <p>180 & 181 Unit address of <u>output printer</u>. Enter FFFF if not available. 182 & 183 Unit address of <u>test device</u>. 184 1st CCW Command Code. 185 1st CCW Flags. 186 2nd CCW Command Code. 187 2nd CCW Flags. 188 3rd CCW Command Code. 189 3rd CCW Flags. 18A 4th CCW Command Code. 18B 4th CCW Flags. 18C 5th CCW Command Code. 18D 5th CCW Flags. 18E 6th CCW Command Code. 18F 6th CCW Flags. 190 7th CCW Command Code. 191 7th CCW Flags. 192 8th CCW Command Code. 193 8th CCW Flags. 194 9th CCW Command Code. 195 9th CCW Flags.</p>		<p>This program will run the following devices:</p> <p>1052 Typewriter 2540 Rd/Pch 1403 Printer 1442 Rd/Pch 1443 Printer 2400 Tape Drives 7340 Hypertape Drives</p>

I/O SCOPING ROUTINE

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS																		
F060-0	<p>(continued)</p> <p><u>HEX Addr.</u> <u>Parameters</u></p> <p>196 10th CCW Command Code.</p> <p>197 10th CCW Flags.</p> <p>1A0 & 1A1 Program Sense Switches</p> <table border="1" data-bbox="272 332 1097 681"> <thead> <tr> <th>Switch</th> <th>Location</th> <th>Meaning if ON (Set to 1)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Byte 1A0 Bit 0</td> <td>Print error data. See section 5.5 - program turns OFF Sense Switch 0 if an output printer is not available.</td> </tr> <tr> <td>1</td> <td>Byte 1A0 Bit 1</td> <td>Stop on error. See section 5.5 In case of errors, if Switch 1 ON, the program will perform a branch to itself at the symbolic location HANG 3. To continue, depress External INTERRUPT.</td> </tr> <tr> <td>2</td> <td>Byte 1A0 Bit 2</td> <td>Execute I/O Loop 2. See section 5.3.</td> </tr> <tr> <td>3</td> <td>Byte 1A0 Bit 3</td> <td>Execute I/O Loop 3. See section 5.4. To execute I/O Loop 1, Sense Switches 2 and 3 must be <u>OFF</u>.</td> </tr> <tr> <td>4</td> <td>Byte 1A0 Bit 4</td> <td>Compare Data. Read section 5.6 before setting this switch on.</td> </tr> </tbody> </table> <p>1A2 & 1A3 Count (HEX value). See section 3.2.6/ 1A4 & 1A5 Data (optional). See section 3.2.5</p> <p>Bits 4-7 of flag byte must be 0.</p> <p>Parameters may also be IPL'd if you pre-punch card number 5 in the hex format with the desired parameters. Columns 1-16, 41-48, and 61-80</p>	Switch	Location	Meaning if ON (Set to 1)	0	Byte 1A0 Bit 0	Print error data. See section 5.5 - program turns OFF Sense Switch 0 if an output printer is not available.	1	Byte 1A0 Bit 1	Stop on error. See section 5.5 In case of errors, if Switch 1 ON, the program will perform a branch to itself at the symbolic location HANG 3. To continue, depress External INTERRUPT.	2	Byte 1A0 Bit 2	Execute I/O Loop 2. See section 5.3.	3	Byte 1A0 Bit 3	Execute I/O Loop 3. See section 5.4. To execute I/O Loop 1, Sense Switches 2 and 3 must be <u>OFF</u> .	4	Byte 1A0 Bit 4	Compare Data. Read section 5.6 before setting this switch on.		
Switch	Location	Meaning if ON (Set to 1)																			
0	Byte 1A0 Bit 0	Print error data. See section 5.5 - program turns OFF Sense Switch 0 if an output printer is not available.																			
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4	Byte 1A0 Bit 4	Compare Data. Read section 5.6 before setting this switch on.																			

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F060-0	<p>(continued)</p> <p>contain constant data and <u>must</u> be duplicated. See program listing for instructions on pre-punched parameters.</p> <p>After parameters have been entered, hit INTERRUPT key to continue program.</p>		

I/O SCOPING ROUTINE (continued)

Three I/O loops are provided under sense switch control.

1. I/O Loop 1 Shortest Loop, no error checking and Interrupts disabled.

Loop 1 is the shortest and is entered if Sense Switch 2 and 3 are both off. It does no error checking and I/O Interrupts are disabled. The Data Compare Option is available.

Loop 1 looks something like this:

```
G012    SIO    0 (RC)
        TIO    0(RC)
        BC     7, *-4      BR UNTIL AVAILABLE
        BC     15, G012
```

2. I/O Loop 2 Error checking with Interrupts disabled.

Loop 2 is entered if Sense Switch 2 is on. If a unit check or incorrect condition code occurs, an error indication might be given. See comments on Error Routine in section 5.5. The Data Compare Option is available in this loop. I/O Interrupts are disabled.

Loop 2 looks something like this:

```
G013    SIO    0(RC)
        BC     XX, ERCHK   BR if Unit Check or Incorrect Condition
                               Code.
        TIO    0(RC)
        BC     XX, ERCHK   BR if Unit Check or Incorrect Condition
                               Code.
        TIO    0(RC)
        BC     7, *-4      BR UNTIL AVAILABLE
        BC     15, G013
```

3. I/O Loop 3 Error Checking with Interrupts enabled.

Loop 3 is entered if Sense Switch 3 is on. If a unit check occurs, an error indication might be given. See section 5.5. The Data Compare Option is available in this loop. I/O Interrupts are enabled.

Loop 3 looks something like this:

```
G014    SIO    0(RC)
        BC     15, *      WAIT FOR INTERRUPT
        BC     XX, ERCHK   BR IF UNIT CHECK
        BC     XX, G014    BR IF DEVICE END
        BC     15, *      WAIT FOR INTERRUPT
        BC     15, G014
```

RESTART PROCEDURE

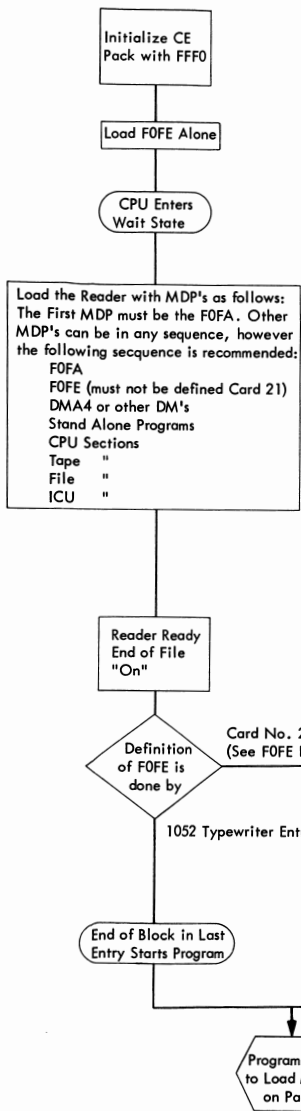
The program origins at hex address 300 and may be restarted by setting I. C. to that address.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS																		
F0FA-1	<p><u>IPL-Loader for the 2311 CE Disk Pack.</u> The purpose of this program is to load a diagnostic monitor or a stand alone diagnostic program from the 2311 disk file using a CE disk pack formatted by the Disk File Diagnostic Utility Program F0FE and to transfer control to the DM or stand alone program loaded.</p>	2841 A01	<p><u>IPL Load from Pack:</u> After F0FA is completely loaded, system goes to WAIT state. At this time store in core position 0180 the last 2 positions of Search No. . . (For example: DMA4 - ID 3020, store HEX "20".) Depress Console Interrupt. F0FA will load the indicated MDP (Example above = DMA4).</p>																		
F0FE-1	<p><u>Generates 2311 CE Disk Pack with MOST Diagnostic Monitors and Sections Programs.</u> See Handling Chart for generation procedures.</p> <p>System Definition may be accomplished by either of following methods:</p> <ol style="list-style-type: none"> Card (No. 021 of Deck) Columns 1 - 17 and 39 - 80 must be an exact duplicate of the one provided. Columns 18 - 38 must be pre-punched as follows: <table border="0" data-bbox="338 657 1052 984"> <thead> <tr> <th><u>Card Column</u></th> <th><u>Punch</u></th> </tr> </thead> <tbody> <tr> <td>18</td> <td>C-if input device is card reader</td> </tr> <tr> <td>19-22</td> <td>T-if input device is an 80C tape</td> </tr> <tr> <td>19-22</td> <td>4 digit address of input device (right-justified with leading zeroes inserted as necessary) - See 3.1</td> </tr> <tr> <td>23</td> <td>Blank</td> </tr> <tr> <td>24</td> <td>F</td> </tr> <tr> <td>25-28</td> <td>4 digit file address</td> </tr> <tr> <td>29</td> <td>Blank</td> </tr> <tr> <td>30</td> <td>P-if hard copy device is a printer Y-if hard copy device is a 1052</td> </tr> </tbody> </table>	<u>Card Column</u>	<u>Punch</u>	18	C-if input device is card reader	19-22	T-if input device is an 80C tape	19-22	4 digit address of input device (right-justified with leading zeroes inserted as necessary) - See 3.1	23	Blank	24	F	25-28	4 digit file address	29	Blank	30	P-if hard copy device is a printer Y-if hard copy device is a 1052	2841 A01	<p>F0FE is a stand alone program. Minimum of Mainstorage = 16 K.</p> <p>Note: 1. The sequence of the ID No. of the MDP's is not controlled while loading on disk. 2. Remove any blank cards between decks.</p> <p>ESP initialization is required on a new Pack or re-generating an old one. It is <u>not</u> required for updating an old Pack.</p>
<u>Card Column</u>	<u>Punch</u>																				
18	C-if input device is card reader																				
19-22	T-if input device is an 80C tape																				
19-22	4 digit address of input device (right-justified with leading zeroes inserted as necessary) - See 3.1																				
23	Blank																				
24	F																				
25-28	4 digit file address																				
29	Blank																				
30	P-if hard copy device is a printer Y-if hard copy device is a 1052																				

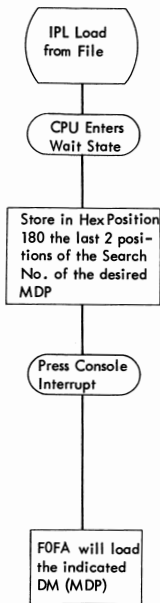
PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS																
F0FE-1	<p>(continued)</p> <p>31-34 4 digit hard copy device address 35 Blank 36-38 Punch YES if ESD initialization is required Punch NO if ESD initialization is <u>not</u> required.</p> <p>If card 0021 of the F0FE program deck is punched in the above format, system definition may be accomplished by pressing Interrupt after F0FE is loaded and CPU is in WAIT state.</p> <p>2. <u>1052 Typewriter Entry (Procedure 2)</u> When the CPU enters WAIT state during loading, press Request on the 1052 and follow the printouts.</p> <p><u>Input Device</u></p> <table data-bbox="415 554 1043 714"> <thead> <tr> <th><u>Char. #</u></th> <th><u>Type</u></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>C - if input device is card reader T - if input device is an 80C tape</td> </tr> <tr> <td>2-5</td> <td>4 digit address of input device right - justified with leading zeroes inserted as necessary</td> </tr> <tr> <td>6</td> <td>End-of-block (alternate code 5)</td> </tr> </tbody> </table> <p><u>Disk Address</u></p> <table data-bbox="415 771 753 875"> <thead> <tr> <th><u>Char. #</u></th> <th><u>Type</u></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>F</td> </tr> <tr> <td>2-5</td> <td>4 digit file address</td> </tr> <tr> <td>6</td> <td>End-of-block</td> </tr> </tbody> </table>	<u>Char. #</u>	<u>Type</u>	1	C - if input device is card reader T - if input device is an 80C tape	2-5	4 digit address of input device right - justified with leading zeroes inserted as necessary	6	End-of-block (alternate code 5)	<u>Char. #</u>	<u>Type</u>	1	F	2-5	4 digit file address	6	End-of-block	2841 A01	
<u>Char. #</u>	<u>Type</u>																		
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<u>Char. #</u>	<u>Type</u>																		
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2-5	4 digit file address																		
6	End-of-block																		

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS														
F0FE-1	<p>(continued)</p> <p><u>Printer Address</u></p> <table data-bbox="347 290 1062 424"> <thead> <tr> <th><u>Char. #</u></th> <th><u>Type</u></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>P - if hard copy device is a printer other than 1052 Y - if hard copy device is 1052</td> </tr> <tr> <td>2-5</td> <td>4 digit address of hard copy device</td> </tr> <tr> <td>6</td> <td>End-of-block</td> </tr> </tbody> </table> <p><u>ESD Initialization</u></p> <table data-bbox="347 476 1101 642"> <thead> <tr> <th><u>Char. #</u></th> <th><u>Type</u></th> </tr> </thead> <tbody> <tr> <td>1-3</td> <td>YES - if you are generating a new pack (one that previously contained no diagnostics) NO - if you wish to add or replace programs on a file which has already been generated by this program.</td> </tr> <tr> <td>Last</td> <td>End-of-block</td> </tr> </tbody> </table>	<u>Char. #</u>	<u>Type</u>	1	P - if hard copy device is a printer other than 1052 Y - if hard copy device is 1052	2-5	4 digit address of hard copy device	6	End-of-block	<u>Char. #</u>	<u>Type</u>	1-3	YES - if you are generating a new pack (one that previously contained no diagnostics) NO - if you wish to add or replace programs on a file which has already been generated by this program.	Last	End-of-block	2841 A01	
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6	End-of-block																
<u>Char. #</u>	<u>Type</u>																
1-3	YES - if you are generating a new pack (one that previously contained no diagnostics) NO - if you wish to add or replace programs on a file which has already been generated by this program.																
Last	End-of-block																

DIAGNOSTIC DISK GENERATION F0FE
HANDLING FLOW CHART



MDP's RESIDENT ON DISK F0FA
HANDLING FLOW CHART



PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
F0FF	<p data-bbox="291 215 1122 298"><u>Diagnostic Utility Program.</u> Provide generating and maintaining System/360 diagnostics on magnetic tape. Print control messages, a map of programs on tape, error messages, and</p> <p data-bbox="291 324 1064 376">In order to use a master tape generated by F0FF Versions 0 or 1 as the "old master" tape, the tape must first be processed by F0FD.</p>	40	<p data-bbox="1242 210 1750 313">This is a stand alone, self loading program. Input may be introduced through a card reader, a tape, or in an applicable instance a 1052. See handling chart.</p> <p data-bbox="1242 344 1740 396">Output tape and work tape may be 9 track tape drive or 7 track with data convert.</p> <p data-bbox="1242 427 1727 500">Program requires at least two tape drives if core size is 32K or greater, three drives if smaller.</p>

Punching of a System Definition Card

Definition: If a definition card is used, it must be prepunched and IPL-loaded with the deck. This card is OFF40039 in the program deck. Columns 1-17 and 53-80 must be an exact duplicate of the one provided. Columns 18-52 must be key-punched as follows:

Card Col.	Punch
18	C - if control card device is card reader Y - if control card device is a 1052 T - if control card device is a tape
19-22	4 digit address of control card device (right-justified with leading zeroes inserted as necessary) - see Note 1.
23	Blank
24	Blank - if data card device is same as control card device C - if data card device is a card reader and not the same as control card device T - if data card device is a tape and not the same as control card device
25-28	Blank - if data card device is same as control card device, or, 4 digit address of data card device, if it is different from control card device.
29	Blank
30	T
31-34	4-digit address of old master tape - or, if doing a generate 4-digit address of new mater tape
35	Blank
36	T
37-40	4-digit address of new master tape
41	Blank
42	P - if hard copy device is a printer Y - if hard copy device is a 1052
43-46	4-digit address of printer or 1052
47	Blank
48	T
49-52	4-digit address of scratch tape 32K or more of storage is available. If this card has been prepunched and is in the deck, press INTERRUPT when the CPU enters WAIT state.

Control cards for update functions are always loaded from CONTROL CARD DEVICE. Program decks (or 80-character tapes) may be loaded from a separate device, or DATA CARD DEVICE, if desired.

Punching of Function Control Records

These control cards determine which update or utility functions are to be performed. The tape update No. for a diagnostic section is identical to the search No.

MSG FORMAT										FUNCTION CONTROL RECORDS	
1	2	3	4	5	6	7	8	9	10		
*	G	E	N								Blocks the records from input and writes them onto the new master tape.
	D	U	P								Duplicates the blocked tape from old master to new master tape.
*	A	D	D	X	X	X					Duplicates old master to new master tape until XXX program is reached. Then it blocks the program to be added from input (for example reader) and writes them onto the new master tape.
*	D	E	L	X	X	X	-	Y	Y	Y	Deletes the program referenced in XXX. If -YYY is also punched, delete will continue until program YYY.
*	A	L	T	X	X	X					Duplicates old master to new master tape until program XXX is reached. Then the informations from the reader will be written to alter the referenced program on a byte basis. The alter data may be standard TXT or REP cards, or if the data is to be entered from a 1052, an RPL message may be used as data.
*	F	S	T								Places a program from input to the beginning of the new master tape. The functions are the same as an ADD but without duplicating.
*	R	A	R	X	X	X	,	Y	Y	Y	, ZZZ, etc., Rearranges selected program sections from their present position on the master tape to the "CE BLOCK" which immediately follows the IPL programs.
*	S	Y	S								Takes the information from DMIO, SRT, SDT, CMT, and UDT cards placed in the input device and updates each diagnostic monitor during the duplication onto the new master tape. DMA4/30 will be duplicated to the new master with no configuring taking place. The Alter or Change procedure must be used to configure DMA4/30.
*	S	Y	S	E	N	D					The SYS-Operation should be terminated with a SYSEND card.
*	C	H	G	X	X	X					Changes or replaces an entire program with a program from the data card device. Results are unpredictable if the CE Block is changed.
*	M	E	R	G	0	X	X	X	,	0	XXX, etc. Merges up to six diagnostic tapes in F0FF format into a single new master tape.
*	C	T	8	0	X	X	X				Card to tape utility. Transfers cards, punched with valid punching, to tape as 80 character records. 7-8 punch in column one will write a tape mark.
	L	I	S	T							List program utility. Lists programs appearing on the blocked tape. Information listed includes: program ID, Search No., Part Number, and EC level.

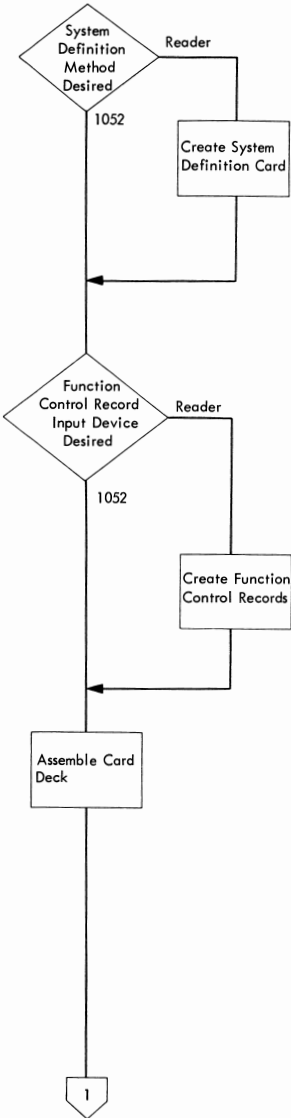
Punching of Function Control Records (continued)

MSG FORMAT										FUNCTION CONTROL RECORDS	
1	2	3	4	5	6	7	8	9	10		
P	N	C	H	0	X	X	X	,	Y		YY, YYY, Etc. Punch Program/s Utility. Punches Object Decks from a F0FF format tape. The object deck may not be an exact duplicate of the original deck. Up to 16 programs may be specified.
P	R	N	T	X	X	X	,	Y	Y		Y, etc. Print a Program Utility. Produces a printout of a program as it appears on the diagnostic tape.
T	E	R	M								Terminate Program. Terminates all utility or update/utility operations of tape utility program F0FF.

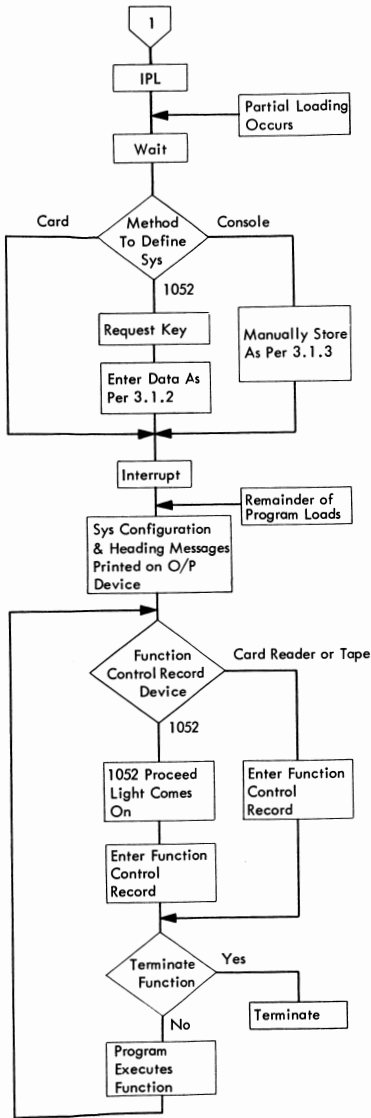
*Note

If function control records are to be read from same device as data records, these cards must be placed ahead of the program(s) affected.

TAPE UTILITY F0FF-4
HANDLING FLOW CHART



TAPE UTILITY F0FF-4 (continued)
HANDLING FLOW CHART



NOTES:

1. DMA4 must be correctly configured.
2. Check that program decks are complete (tests should have been run from cards)
3. Remove any blank cards between decks.
4. Remove card image detail cards from program section FB15.
5. Arrange decks as follows:
F0FF, DMA4, Stand-alone programs, F0FF (if it is desired to have F0FF on the system tape), and sections in search number sequence.
6. The following tests require CCROS repopulation and thus should not be written on tape:
3447 Selector Channel FLT
344A Selector Channel FLT
7. The following tests cannot be written on tape:
3F00 Compatibility program (if 3F00 version 0-6)
3FC1 8K System test
3FC2 16K System test
3FD0 Three card hex loader
3FE1 Serep

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
3201	<u>Standard CPU Op-Code Test 1, Search No. 201</u> Checks the standard set 1 of CPU Op-Codes.	42	Test runs about 30 seconds.
3202	Section 2 Search No. 202		Tests 3201 thru 32E2 are developed on a building block basis. It is suggested that they be run in sequence.
3261	<u>Standard CPU Op-Code Test 2, Search No. 261</u> Checks the standard set 2 of CPU Op-Codes.	42	
3262	Section 2 Search No. 262		
3263	Interrupts, Search No. 263		
3264	Execute, Search No. 264		
3291	<u>Floating Point Op-Code Test, Search No. 291</u>	43	Optional feature must be defined in DMA4 SRT-card
3292	Section 2 Search No. 292		
3293	Interrupts and execute, Search No. 293		
32E1	<u>Decimal Arithmetic Op-Code Test, Search No. 2E1</u> Checks the decimal set of CPU Op-Codes.	42	Optional feature must be defined in DMA4 SRT-card
32E2	Interrupt, Search No. 2E2		

Test Name	Address	ROS Control	Rate	Address Compare	Check Control	Result	Remarks
BASIC 3345	0BFF	Process	Proc.	Process	Diag.	1. WX=ABC* 2. WX=B07*	Store FF in S reg., Sys. Reset, ROAR Reset, Start. Check Reset & Start.
ROS SCAN 3349	0BF1	ROS Scan	Proc.	Process	Stop	non-stop	Sys. Reset, IJ regs.=Start Address, Roar Reset, Start
R/W STOR. Scan	0BF0	ROS Scan	Proc.	Process	Stop	non-stop	Sys. Reset, ROAR Reset, Start
Clear	0BF9	"	"	"	"	"	(same as above)
Load	0BF9	"	"	"	"	"	(same as above, except that D reg.=data byte.)
Display	0BF7	All switches on Process Position					Sys. Reset, Set IC to 1st. address to be displayed. (IJ regs.) ROAR Reset, Start. (1)
Alter 3348	0BF6	All switches on Process Position					(same as above. Use switches HJ to enter data.)
SALS SET/RESET Even Amps	0AC0	Process	S.C.	Process	Process	SALS set	Sys. Reset, ROAR Reset, Start.
	0AC2	"	"	"	"	SALS reset	(same)
Odd Amps	0AC3	"	"	"	"	SALS set	(same)
3349	0AC1	"	"	"	"	SALS reset	(same) (2)
MPX 3346	0BFE	ROS Scan	Proc.	Process	Diag.	WX=0BCD*	Repopulate ROS, Sys. Reset, Store FE in Aux. Stor. at 0000, Sys. Reset, ROAR Reset, Start.

*These stop words are level sensitive.

(1) Display will be sequential, using the START key.

(2) Check diagnostic manual for 1401 and 1620 emulator addresses.

Comment: This chart does not include all the micro-diagnostics, nor does it include variations of those indicated.

For full information on all diagnostics, consult the diagnostic library.

MICRO DIAGNOSTIC TESTS

BASIC TEST ID-3345

The purpose of the basic test is to exercise and detect malfunctions in the CPU circuits that are controlled by the micro-word, except for those functions that control R/W storage or the I/O channels.

1. NORMAL

CHECK CONTROL----- DIAGNOSTIC
ROS CONTROL----- PROCESS
ADDRESS COMPARE----- PROCESS
RATE-----PROCESS

STORE FF IN S-REG.

SYSTEM RESET

ROAR RESET

Start at ROS address 0BFF.

● Visually check

- if indicated WX registers display address 0ABC and only the machine check ALU and A-Reg lights are on, proceed to the next step.

CHECK RESET

START

indicated WX registers should display 0B07 and there should be no machine check indications.

Press start to repeat the test.

2. Looping--zero test, machine check, and CF stops operating

RUN TEST ONCE PER NORMAL PROCEDURE.

ADDRESS COMPARE----ROAR RESTART

SET SWITCHES ABCD TO 08A9.

SYSTEM RESET

ROAR RESET

START

To stop, set rate switch to single cycle.

--Note--when looping the basic test, it is normal for all machine check lights to turn on and off.

3. Looping--inhibit zero test and machine check stops

RUN TEST ONCE PER NORMAL PROCEDURE.

SYSTEM RESET

Store 80 in R-Reg.

Execute word 0B33.

ROAR RESET

Start at ROS Address 0B07.

To stop set rate switch to single cycle.

--Note--when looping the basic test, it is normal for all machine check lights to turn on and off.

4. Looping--inhibit zero test, machine check, and CF stops (no stops)

Same procedure as in 3 with ROS control at inhibit CF stop.

MULTIPLY CHANNEL TEST ID-3346

The purpose of this test is to exercise and detect malfunctions in the multiplex channel circuits, the multiplex ROS address back-up registers, the local storage select latches and various interface lines in I/O adapters.

MICRO DIAGNOSTIC TESTS (continued)

1. NORMAL

Insert the multiplex channel test CROS document cards in locations 29-0, 1 and 31-2 thru 31-5 per the listing on Page 1 of ID-3340.

RATE-----PROCESS
ADDRESS COMPARE-----PROCESS
CHECK CONTROL-----DIAGNOSTIC
ROS CONTROL-----ROS SCAN
SET SWITCHES FGHJ TO 0BFE.
SYSTEM RESET
STORE FE IN ADDRESS 0000 OF LOCAL STORAGE
SYSTEM RESET (R-Reg must be cleared)
ROAR RESET
START

- Visually check
- if indicated WX registers display Address 0BCD, the test has been successfully completed.
Press start to repeat the test.

2. Looping--zero test, machine check, and CF stops operating

RATE-----PROCESS
ADDRESS COMPARE-----PROCESS
CHECK CONTROL-----DIAGNOSTIC
ROS CONTROL-----ROS SCAN
SET SWITCHES FGHJ TO 0BFE.
SYSTEM RESET
STORE FE IN ADDRESS 0000 OF LOCAL STORAGE.
SYSTEM RESET (R-Reg must be cleared)
STORE FE IN THE G-REG (0 bit position is tested for looping).
ROAR RESET
START
To stop, set rate switch to single cycle.

3. Looping--inhibit zero test and machine check stops (cannot inhibit CF stops since test must be run in ROS scan mode)

Same procedure as in 2 except set switches FGHJ to 0BCF.

PRIORITY CONTROLS TEST ID-3347

The purpose of this test is to test the stacking latches, holding register control, and selector channel backup ROSAR.

1. NORMAL

Insert the priority controls test CROS document cards in locations 29-0, 1 and 31-2 thru 31-5 per the listing on Page 1A of ID-3340.

CHECK CONTROL-----PROCESS
ADDRESS COMPARE-----PROCESS
ROS CONTROL-----ROS SCAN
RATE-----INSTRUCTION STEP
PRESS LOAD

- Visually check
- if indicated WX registers display address 0BC7 and only the B-Reg machine check light is on, proceed to the next step.

SET IC

- Visually check
- if indicated WX registers display address 0BBE and only the A-Reg machine check light is on, proceed to the next step.

MICRO DIAGNOSTIC TESTS (continued)

START

- Visually check
- if indicated WX registers display address 0BBE and only the A-Reg machine check light is on, proceed to the next step.

START

- Visually check
- if indicated WX registers display address 0BCD and no machine checks are indicated, proceed to the next step.

START

- - program should loop continuously through all traps except force IJ. The A-Reg machine check indicator will turn on and off. To stop, set rate switch to single cycle.

DISPLAY R/W STORAGE ID-3348

The purpose of this program is to enable the display of successive positions of main storage in the R-Register by pressing start for each successive position.

1. NORMAL

RATE-----PROCESS
ADDRESS COMPARE-----PROCESS
CHECK CONTROL-----STOP
SYSTEM RESET

Set IJ Registers to the first address to be displayed--this can be done by any one of the following three methods.

- Set FGHJ switches to desired address.
ROS CONTROL-----PROCESS
PRESS IC SWITCH
- Manually store first address in IJ registers.
- Set ABCD switches to the first address to be displayed.
ROS CONTROL-----INHIBIT CF STOP
ADDRESS COMPARE--SAR STOP

ROAR RESET

Start at ROS address 0BF7 - the program stops with the contents of the first address displayed in the R-Register.

ROS CONTROL-----PROCESS

Press start to see the contents of each succeeding address displayed in the R-Register.

ALTER R/W STORAGE ID-3348

The purpose of this program is to enable the entering of data into successive positions of storage by setting the data in switches H and J and pressing start for each successive position.

1. NORMAL

Power on the terminating I/O unit of the MPX and SX channels or disconnect the channel cables at the 2030.

RATE-----PROCESS
ADDRESS COMPARE-----PROCESS
CHECK CONTROL-----STOP
ROS CONTROL-----PROCESS
SYSTEM RESET

MICRO DIAGNOSTIC TESTS (continued)

Set LJ registers to the first address to be altered--this can be accomplished by either of the following two methods.

- A. Set FGHJ switches to the first address to be altered.

Press IC switch.

- B. Manually store first address in LJ registers.

ROAR RESET

Start at ROS address 0BF6 - program will stop prior to storing the first characters.

Set switches HJ to desired characters.

Start--program will stop after storing characters in the selected first address.

Repeat the last two steps for each successive address.

2. Clear and/or Load a block of storage

Perform the above set up procedure through the step marked by the asterisk (*).

Set switches ABCD to the last address in the block.

ADDRESS COMPARE----- SAR STOP

ROS CONTROL----- INHIBIT CF STOP

Set HJ switches to 00 for clear or to desired characters for a load operation.

Start--alter program will loop and stop after the last address has been loaded.

R/W STORAGE SCAN AND/OR LOAD ID-3348

This is a multiple purpose routine providing facilities to--

- A. Scan main and auxiliary storage in address sequence.
- B. Clear and load main and auxiliary storage to the contents of the D-Register in address sequence.
- C. Scan main and auxiliary storage on alternate cycles.
- D. Clear and load main and auxiliary storage to the contents of the D-Register on alternate cycles.
- E. Clear and load the storage protect stack to the contents of the D-Register low order bits.
- F. Clear and load the storage protect stack, main storage, and auxiliary storage to the contents of the D-Register.

1. NORMAL

For any of the above routines set

RATE----- PROCESS

ADDRESS COMPARE-----PROCESS

CHECK CONTROL----- STOP OR DISABLE IF DESIRE TO INHIBIT STOPS.

ROS CONTROL----- ROS SCAN

PRESS SYSTEM RESET.

Set the D-Reg to the desired characters if utilizing a clear and load routine.

Set the G-Register to the characters 01 if utilizing a clear and load on alternate cycles routine.

MICRO DIAGNOSTIC TESTS (continued)

FUNCTION	SWS FGHJ	SWS ABCD	L-REG	I-REG	J-REG	S-REG	T-REG
Single Main Stg. Addr.	0ACC		00	M-Adr	N-Adr		
256 Main Stg. Addr.	0ACC	0ACD	01	M-Adr			
All Main Stg. Addr.	0ACC	0ACE	01			01	
Single Aux. Stg. Addr.	0AD7		00			*2	N-Adr
One Aux. Stg. Group	**0ACE	0ACF	01			*2	
All Aux. Stg.	0AD7	0AD5	01			*2	

* Set the S-Reg high character from the table below.
CPU Aux. has the highest UCW address in your machine.

UCW USED	S-REG VALUE
UCW 0	----
1	----
2	----
3	----
4	----
5	----
6	----
7	----

** Single cycle through AD7 to set X-Latches if not MPX 0

R/W STORAGE WORST CASE PATTERN LOAD OR ALTERNATE COMPLEMENT CHARACTER LOAD (2.0 MICRO SECOND STORAGE) ID-3348

This is a multiple purpose routine providing facilities to--

- A. Load worst case 0 or worst case 1 patterns for data bits and scan.
- B. Load worst case 0 or worst case 1 patterns for parity bit and scan.
- C. Load the alternate complement character for data bits and scan.

The test is not for use on a 1.5 micro second storage unit.

1. NORMAL

For any of the above routines

Insert the CROS document cards in locations 29-0, 1 and 31-2 thru 31-5 per the listing on Page 1A of ID-3340.

RATE-----PROCESS

ADDRESS COMPARE-----PROCESS

CHECK CONTROL-----STOP

ROS CONTROL-----ROS SCAN

PRESS SYSTEM RESET

Set the R-Reg to

- 1. FF for worst case 1 pattern on data
- 2. FE for worst case 1 pattern on parity bit.

Set the D-Reg to 01 for the worst case on the parity bit.

PRESS ROAR RESET.

Set FGHJ switches to

- A. 0BBB for worst case patterns on data.
- B. 0BBB for worst case patterns on parity bits.
- C. 0BBE for alternate complement character.

PRESS START

The above routines are used to load the patterns, after which the storage scan routine is automatically entered and storage is scanned until an error occurs or is stopped by manual intervention. Storage errors will generally show as storage data or B-Reg. checks. If running in the check stop mode, the machine will stop with the error data in the registers.

Restart after error ----- check reset and start.

R/W STORAGE WORST CASE DIAGNOSTIC (1.5 MICRO SECOND STORAGE)
ID-3348

This test loads and scans four worst case patterns for the 1.5 micro second storage. It is not for use on a 2.0 micro second storage unit.

1. NORMAL

Insert the R/W storage W/C diagnostic test document cards (version 996) in locations 29-0, 1 and 31-2 thru 31-5 per the listing on page 1A of ID-3340.

RATE ----- PROCESS
ADDRESS COMPARE--PROCESS
CHECK CONTROL----DIAGNOSTIC
ROS CONTROL----- ROS SCAN
SYSTEM RESET
ROAR RESET

Start at ROS address 0BBB or 0BFE.

The program will loop until stopped by an error or manual intervention.

ROS SCAN ID-3349

The ROS scan program enables the read out of every word in a CROS array to check it for proper ROS ADR, SALS, and Ctrl reg parity. It automatically bypasses feature boards which are not installed. The test is run in error stop mode to stop the system with the bad word displayed in SALS, or in disable mode to inhibit stops to allow scoping.

NOTE ----- A failure that results in a Ctrl reg check for every word in a block consisting of a multiple of 32 consecutive addresses will go undetected by this test. The block boundaries must be on A-pulse decode boundaries --000, 020, etc.

1. NORMAL (selected starting address to end of array)

RATE ----- PROCESS OR INSTRUCTION STEP TO STOP
AFTER EACH ADDRESS SCANNED.

ADDRESS COMPARE --- PROCESS

CHECK CONTROL----- STOP OR DISABLE TO INHIBIT STOPS.

SYSTEM RESET

Set IJ Regs. to the address of the first word to be scanned (if other than 0000) by either of the following methods:

1. Set switches FGHJ to the first address.

ROS CONTROL -----PROCESS

PRESS IC SWITCH

2. Manually store first address in IJ Registers.

3. If desired starting address is 1000, an alternate procedure is to set the R-Reg. to the characters 10 and leave switch F at 0.

ROS CONTROL-----ROS SCAN

ROAR RESET

Store characters in S-Reg. per the following table to select the desired micro program bit pattern. Refer to the Section 6.3, Page 5 for an explanation of the significance of the bit patterns.

00 - Many to many bits ---Destructive to contents of address
0000 in R/W main storage.

20 - Many to few bits ----Destructive to contents of address
0000 in R/W main storage

40 - Few to many bits --- Destructive to contents of first 8K of
R/W main storage.

60 - Few to few bits ---- Destructive to contents of first 8K of
R/W main storage.

00 will have been set by system reset above except when using set IC to store first addr.

Start at ROS address 0BF1

The test will run until stopped by an error or manual intervention (single cycle). ROS SALS, Ctrl reg, and ROS address lights will glow as blank words are scanned.

Restart after an error - - - check reset and start.

2. Looping through both arrays alternately

Use normal procedure to start at address 0000.

Change switch F to 1 after starting the scan. Since the program is running when switch F is changed, an A-Reg. check may occur.

If so, repeat the above procedure until the program runs without A-Reg. checks.

3. Looping between two addresses (same array)

Use normal procedures except

Set switches ABCD to the last address to be scanned.

Set address compare to ROAR Restart without reset.

ROS SAL SET-RESET ID-3349

This test consists of 4 ROS words in each array which are manually displayed to aid in the analysis of sense amplifier and sense amplifier latch failures.

1.0 NORMAL

RATE ----- SINGLE CYCLE
 ADDRESS COMPARE ----- PROCESS
 CHECK CONTROL ----- STOP
 ROS CONTROL ----- PROCESS
 SYSTEM RESET
 ROAR RESET

Start at ROS address 0AC0.

- Visually check the word display

Repeat the above procedures for addresses 0AC1, 0AC2, and 0AC3
 To complete the check for the 0-4K array. Use addresses 15B0, 15B1, 15B2, and 15B3 for 1400 emulators. Use addresses 15BC, 15BD, 15BE and 15BF for 1620 emulators.

- Set words 0AC0, 0AC3, 15B0, 15B3, 15BC and 15BF contain all bits except SAL and Ctrl reg parity bits.

Reset words 0AC1, 0AC2, 15B1, 15B2, 15BD and 15BE are blank except CN-P, SAL and Ctrl reg parity bits.
 The reset function of CN-P is not checked.

2.0 Looping on any one of the eight addresses

RATE ----- PROCESS
 ADDRESS COMPARE ----- ROAR RESTART STORAGE BYPASS
 CHECK CONTROL ----- STOP OR DISABLE TO INHIBIT
 ERROR STOPS
 ROS CONTROL ----- PROCESS
 SWITCHES ABCD AND FGJH TO THE ADDRESS TO BE LOOPED.
 SYSTEM RESET
 ROAR RESET

Start

To stop, set rate switch to single cycle.

STORAGE PROTECT TEST

This test consists of four routines (see ID-3350 for purpose and description of each routine) which check the operation of the storage protect feature. It also contains a load and complement scan for two worst case patterns in the storage protect stack.

1. NORMAL

Insert the storage protect test CROS document cards in locations 29-0, 1 and 31-2 thru 31-5 per the listing on Page 1A of ID-3340.

RATE-----PROCESS
 ADDRESS COMPARE----- PROCESS
 ROS CONTROL----- ROS SCAN
 CHECK CONTROL----- DIAGNOSTIC
 SYSTEM RESET
 ROAR RESET

Start at ROS address 0BFE.

⊙ Visually check

- If indicated WX registers display address 0BCD, the four routines have been completed successfully.

Press Start -- Loops the two worst case storage protect stack patterns alternately.

Looping of the patterns will continue until stopped by manual intervention (single cycle) or an error. If the program stops with address 0BBF displayed for the WX Registers, the characters read out of the stack did not compare with what should have been read out. The O-Reg. character is displayed in the A-Reg.

Reference to the test description (ID-3350) and CLD's (OB771, OB781, and OB911) will aid in the diagnosis.

Restart after error - - - check reset and start.

2. Looping - - - Four routines

RATE ----- PROCESS
 ADDRESS COMPARE ----- PROCESS
 ROS CONTROL----- ROS SCAN
 CHECK CONTROL----- DIAGNOSTIC
 SYSTEM RESET
 ROAR RESET

Store FF in the V-Reg.

Start at ROS address 0BFE

To stop, set rate switch to single cycle.

NOTE -- The ALU and Stor data machine check indicators will flash while looping.

3. Looping - - - On any one of the four routines

RATE-----PROCESS
 ADDRESS COMPARE----- PROCESS
 ROS CONTROL----- ROS SCAN
 CHECK CONTROL----- DIAGNOSTIC
 SYSTEM RESET
 ROAR RESET

Store FE in V-Reg. if desire loop on routine 4.

Store 08 in G-Reg.

Start at ROS Address 0BFE - - Program will stop with 0, 0, 1 displayed in the 5, 6, and 7 bit positions of the ALU display.

MICRO DIAGNOSTIC TESTS (continued)

If desire to loop on Routine 1, set the G-Reg. 1, 2, and 3 bit positions to 0, 0, 1 respectively.

Reset the S-Reg. 4 bit.

Press Start - - program loops on Routine 1.

To stop, set rate switch to single cycle.

If do not desire to loop on Routine 1, press Start. The program will stop with 0, 1, 0 displayed in 5, 6, and 7 bit positions of the ALU display.

If desire to loop on Routine 2, set the G-Reg. 1, 2, and 3 bit positions to 0, 1, 0 respectively.

Reset the S-Reg. 4 bit

Press Start - - Program loops on Routine 2.

To stop, set rate switch to single cycle.

If desire to loop on either Routine 3 or 4, continue the above procedure.

NOTE -- The ALU and stop data machine check indicators will flash while looping Routine 4.

4. Looping - - Two worst case storage protect stack patterns - alternately.

RATE-----PROCESS
ADDRESS COMPARE -----PROCESS
ROS CONTROL----- PROCESS
CHECK CONTROL----- DIAGNOSTIC
SYSTEM RESET

ROAR RESET

Store the characters CD in the R-Reg.

Start at ROS address 0BCD.

Restart after error - - check reset and start.

To stop, set rate switch to single cycle.

MICRO DIAGNOSTIC TESTS (continued)

1620 MICRO TEST ID 3351

The 1620 micro test is mostly a branch and CS decode test which checks the new functions when in 1620 mode. Some of the micro words are in the repopulation area of the NPL CCROS to enable control over the Bus-O register and tags in. The remaining words are full time in the 1620 CCROS.

1. NORMAL

Insert the 1620 micro test CCROS document cards in locations 29-0, 29-1 and 31-2 thru 31-5 per the listings on page 1A of ID-3340.

Set the control switches and follow the procedures as indicated below -

ROS CONTROL-----ROS SCAN
CHECK-----DIAGNOSTIC
RATE-----PROCESS
ADDRESS COMPARE-----PROCESS
SYSTEM RESET
ROAR RESET
Set switches FGHJ to 0BFE
Start

● Visually check

- If 0BCD is displayed in the WX-Reg console display, the test has been successfully completed.

2. Looping with CF stops, machine check stops and zero test stops enabled.

Set the control switches and follow the procedures as indicated below -

ROS CONTROL-----ROS SCAN
CHECK-----DIAGNOSTIC
RATE-----PROCESS
ADDRESS COMPARE-----PROCESS
SYSTEM RESET
MANUALLY STORE 2E in S-Reg.
ROAR RESET
Set Switches FGHJ to 0BFE
Start

To stop the program, set the rate switch to single cycle.

SELECTOR CHANNELS 1 AND 2 FAULT LOCATING TESTS ID-3447/344A

The purpose of each test is to provide fault detection and location within the circuits of selector channel 1 or 2 as attached to the IBM System/360 Model 30. Each diagnostic consists of a combination of macro- and micro-programming.

For additional information concerning this test, consult the appropriate binder under program ID-3447 for channel 1 or ID-344A for channel 2.

PROCEDURE

1. Initialize the diagnostic monitor deck system configuration cards with at least the following information --

- storage protect availability
- main storage highest address
- DM sense switches -- all zeroes recommended
- loader device
- output device -- may not be attached to selector channel under test.

Refer to the users guide for directions on entering the information.

2. Insert in ROS the selector channel micro-program cards, version 914, in locations 29-0, 1 and 31-2 thru 31-5 per the listing on page 1 of ID-3340.
3. All console controls must be on Process -- the test light is OFF.
4. Load the test with monitor in the standard manner.
5. When the SEL CHNL FLT is loaded, monitor will print the following message --
"S 3447X" (Channel 1)
Or
"S 344AX" (Channel 2)

where 'X' is the current revision level of the test.

6. The test will print the following title message --
"SEL CHNL X FLT. REQ ROS REPOP. PROCESS MODE. "

where 'X' is Channel 1 or 2.

7. One of three cases will now occur --

- I. The diagnostic detected no failures and the following message is printed --
' ' NO ERRORS FOUND. IF DESIRED, SET CYCLE ON ROUTINE 01. ' '

At this point approximately 50 cards will have been read. Interrupt when the Wait light comes on to pass remaining cards.

- II. The diagnostic detected a selector channel failure and a message is printed in either format A or B, and format C.

Format A--

"CHANGE CARD LOCS. . ."

"L-LLLL"

.

"L-LLLL"

"END CARD LOCS. RELOAD TEST AND IF TROUBLE REMAINS,"

Change the indicated card locations one or more at a time starting at the top of the list. Reload and run the test again after each change. If the trouble has not been fixed after changing all cards, use the printout in format C.

Format B--

"FAULT DETECTED BUT NOT LOCATED."

Use the printout in format C.

Format C--

"USE DESCRIPTION PAR 4. 7 AND FOLLOWING"

"DIFFERENCE TABLE FOR FIRST FAILING TEST GROUP."

" TT C YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY
YYYYYYYY"

.

"END OF DIFFERENCE TABLE FOR FIRST FAILING TEST GROUP."

Refer to paragraph 4. 7 of the description to make use of the difference table for localizing the trouble.

- III. The diagnostic detected an unexpected condition and cannot continue. The following message is printed--

"ABORTING - CODE X SEE PAR 4. 8"

Refer to paragraph 4. 8 of the description for an explanation of the abort code.

8. Additional running options are described in the description paragraphs 3. 2 and 5. 5 of test description. The options described are --

Sense switch scope loop

Print actual results (sense switch)

Procedure to loop on first failing test

Stop-on-test-number option

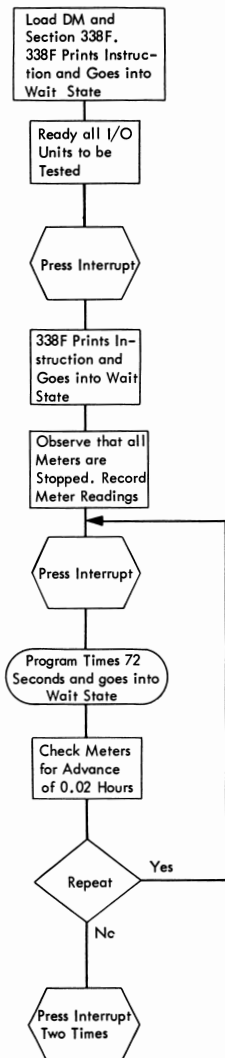
Test stepping procedure

Sar restart scope loop

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
E 381	<u>Interval Timer Accuracy Test, 60 Cycle</u> Search No. 381 Functional and Accuracy Test for Interval Timer Feature 60 Cycle	43	Optional feature
E 383	<u>Interval Timer Accuracy Test, 50 Cycle</u> Search No. 383 Functional and Accuracy Test for Interval Timer Feature 50 Cycle		Internal Timer must be installed.
01	Checks ability to set Timer correctly		Timer switch on console set to enable and feature defined in DM UDT (including 1.5 or 2.0 micro-second storage speed.)
02	Checks ability to step one time correctly using SS type instruction		
03	Checks ability to step one time correctly while using RX type instruction		
04	Checks ability to step 100 times correctly while using RX type instruction		
05	Checks ability to step 500 times correctly while using SI type instruction		
06	Checks ability to step 1000 times correctly while using RR type instruction		
07-11	Checks ability to generate External interrupts		
	Routine 7 Uses RR type instruction		
	Routine 8 Uses RX type instruction		
	Routine 9 Uses RS type instruction		
	Routine 10 Uses SI type instruction		
	Routine 11 Uses SS type instruction		

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
338F-0	<p data-bbox="291 146 639 166"><u>360 Model 30 Usage Meter Test</u></p> <p data-bbox="291 174 1068 221">Controls a 72 second timed loop for Reader, Punch, Printer, Tapes and Disk Files so that correct meter operation can be observed.</p> <p data-bbox="291 256 996 304">Usage meters on all devices being tested should advance .02 hour during pass of this test.</p>	40	<p data-bbox="1238 174 1754 381">This text is valid for 338F-0 at EC 125918. Device tested must be defined in UDT. Storage Speed is assumed 1.5 micro-second unless SRT (location 183 Hex) contains C8 for 2.0 micro-second storage. Because of operator intervention requirements, it is recommended that this program be run alone.</p>

SYSTEM/360 MODEL 30 USAGE METER TEST 338F
HANDLING FLOW CHART

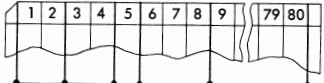


NOTE:

To further check controls for start and stop of meters:

1. Repeat
2. Make units not ready and observe that meters have stopped
3. Make units ready and observe that meters start

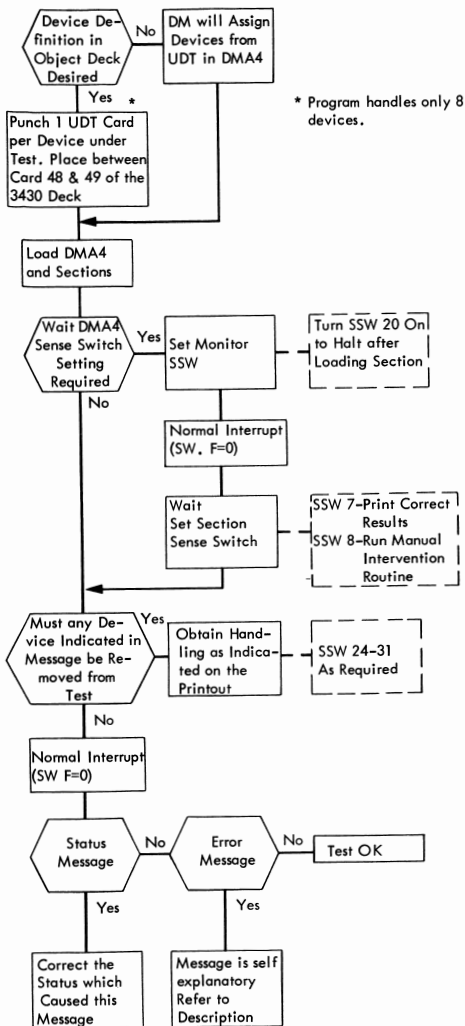
PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
3390	<u>Main Storage Half Select Beat Test, Search No. 390</u> Tests every core positions for not changing its content, while other places are loaded with ones or zeros.	42	Requirement, 16K or larger. Storage Size must be defined in SRT-card of DMA4. Sense Switch 7 On, print all errors and bypass error summary. Running time of test about 1 minute. Check Control in process.
33C9 01 02 03 04	<u>Storage Protect Feature Test, Search No. 3C9</u> Tests the ability to store and fetch all the possible patterns Tests the ability to address each cell Tests the correct operation of the Key-Compare System to cause an interrupt at the proper time. All combinations of Keys are used. Tests the Storage Protect Feature as applied to the Channel Operation.	42	Test is EC Level sensitive. To run test properly at least one I/O device on each attached Channel should be made ready. If a channel is present but has no device attached, an interface control check will result.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
3430	<u>Multiplex and Selector Channel Function Test Initializer</u> , Search No. 430 Determines devices to be used and sets up a table of parameters to be used by the following overlay sections	42	Printer carriage tape must not have 9 or 12 holes, block brushes with a blank card, or use blank tape. Test is EC Level sensitive. Sections 3431 through 343A are Overlay-Sections and must be run in sequence.
3431 11 12 13 14	<u>Overlay 1</u> , Checks not operational Conditions Test I/O, Start I/O, Halt I/O and test Channel to not operational channel Same as Routine II but to not operational Subchannel Same as Routine II but to not operation Device Test I/O and Start I/O to not ready Device	42	DM will assign addresses, or user can punch one device definition card per device used in test. Placed between card 48 and 49 of Initializer deck.
3432 21 22 23 24	<u>Overlay 2</u> , Checks I/O ops to operational devices Test I/O to clear Interrupt Same as Routine II but to available Device, Interrupts enabled Same as Routine 22 but Interrupt disabled Set System Mask to enable and to disable Interrupts	42	 <p data-bbox="1232 709 1362 844">Prog. Unit Code - ZZ - See user's guide, Sect. 1.3</p> <p data-bbox="1381 709 1477 740">Zero</p> <p data-bbox="1574 709 1651 740">Blank</p> <p data-bbox="1497 777 1738 937">Channel and unit addr may be obtained from the unit definition table summary chart. See section 1 of the user's guide.</p>
3433 31 32 33	<u>Overlay 3</u> , Checks condition codes of I/O ops to devices Same as Routine 11 but to Device holding Interrupt Same as Routine 11 but to a busy Device Status word from Test I/O, after Channel End, after Device Busy and after Device End.		

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
3434 41 42 43	<u>Overlay 4.</u> Checks condition codes of I/O ops to devices Same as Routine 11 but to device with stacked channel end Same as Routine 11 but to busy channel Test I/O, Halt I/O, Start I/O and Test Channel in Problem Program Mode	42	Interrupt stored in subchannel on MPX. Interrupt stored in channel on selector channel.
3435	Reserved for future use	42	
3436 routines 61 to 6A	<u>Overlay 6.</u> Checks SLI Flag Incorrect length short and long, on Input and Output with SLI on and off	42	
3437 71 72 73 74	<u>Overlay 7.</u> Performs Chain Command (CC) Normally, then with Transfer in channel between. Normal CC. Sense chained to sense. CSW Addr. and first byte of each sense checked for equal. CC where channel-end and device-end are separate. This routine does not use TIC. Suppress CC on WLR. CSW addr. is checked. First sense byte of second CMD checked for FF. CC not suppressed on WLR and SILI bit ON. CSW Addr. and first byte of each sense is checked for equal.	42	
3438 81 82 83	<u>Overlay 8.</u> Checks chain data addr. CCWS given together, and then with a TIC between. Checks CDA with no WLR. Checks CDA with long WLR and no SLI. Checks CDA with short WLR and no SLI.	42	

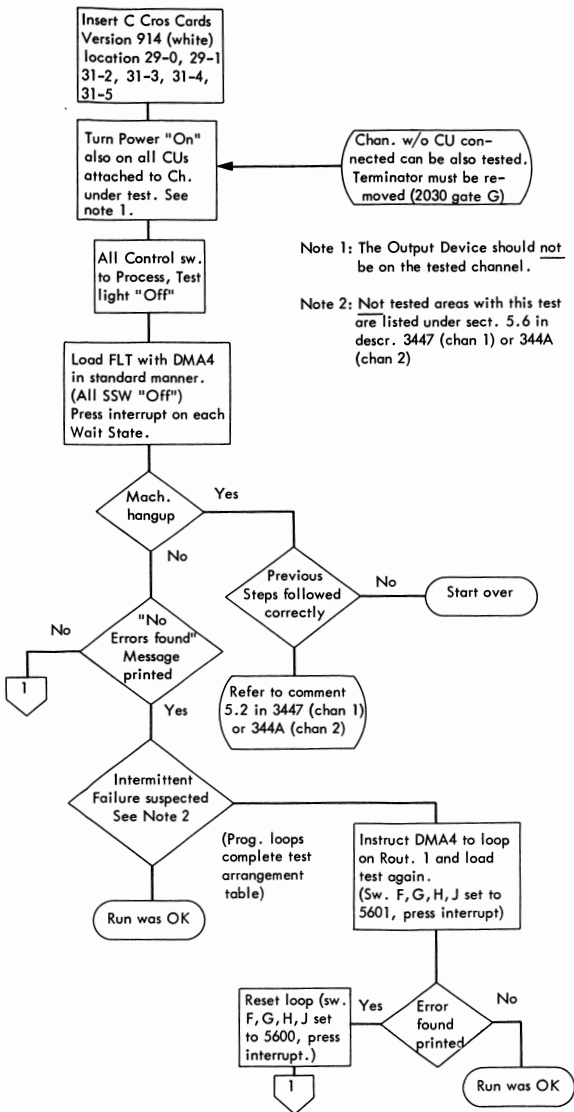
PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
3438 84 85 86 87 88 89 8A 8B	Checks CDA with long WLR, with SLI. Checks CDA with short WLR, with SLI. Checks CDA with CC. CC to Sense CCW. Checks suppression of CC on long WLR. CC to sense CCW. Checks suppression of CC on short WLR. CC to sense CCW. Checks CC not suppressed on long WLR with SLI. CC to sense CCW. Checks CC not suppressed on short WLR with SLI. CC to sense CCW. Checks priority of CDA over CC. CC to sense CCW.		
3439 91 92 93 94 95 96 97 98	<u>Overlay 9,</u> Checks Skip and PCI Flags Checks Skip in Sense Command. Checks Skip in Read Command. Checks Skip in Read with CDA. Checks PCI disable in Sense CCW. Checks PCI enable in Sense CCW. Checks PCI disable in a series of sense CCW's. Checks PCI enable in a series of sense CCW's. Checks propagation of PCI through TIC.	42	
343A A1 A2 A3 A4 A5 A6 A7 A8 A9	<u>Overlay A,</u> Checks invalid conditions and CCW count. Checks channel handling of decrementing the CCW count Checks CAW containing invalid CMD addr. Checks CCW on invalid boundry. Checks CCW with invalid format, butns in position 4-7. Checks CAW with storage protect key on system without the feature. Checks CCW with invalid command. Checks CCW with count of zero. Checks CCW with invalid format, bits in positions 37-39. Checks CCW with Data Address greater than storage capacity.		

2030 CHANNEL FUNCTION TEST ID 3430
HANDLING FLOW CHART

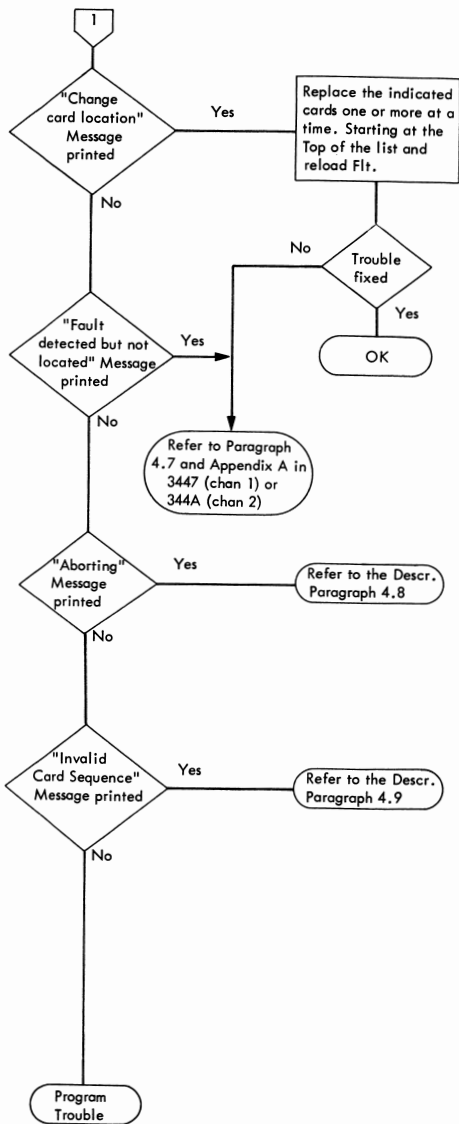


PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
	<u>Selector Channel Fault Location Tests (3447 and 344A)</u>		
3447	Selector Channel 1 circuits are tested. Areas not tested see 3447 Description Paragraph 5.6. 3447 contains the Test Description and Deck Listing.	41	Special CCROSS cards required. Version 914 (white) Loc. 29-0, 29-1, 31-2, 31-3, 31-4, 31-5. Test is EC sensitive. See paragraph 2.2 and 2.3 in Description.
3448	3448 contains the macro Program Listing		
3449	3449 describes programming to determine if a fault is present.		Test must be run with DMA4 at revision level 3, or higher.
344A	Selector Channel 2. Same as 3447	41	Same as 3447
344B	Same as 3448		
344C	Same as 3449		

SELECTOR CHANNEL FAULT LOCATION TESTS 3447 and 344A
HANDLING FLOW CHART



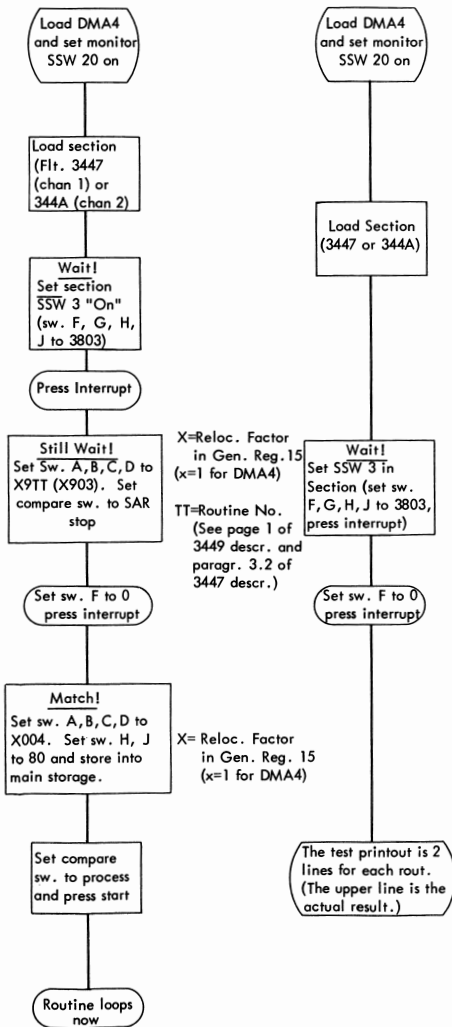
SELECTOR CHANNEL FAULT LOCATION TESTS 3447 and 344A
HANDLING FLOW CHART (continued)



SELECTOR CHANNEL FAULT LOCATION TESTS
HANDLING FLOW CHART

Procedure for Loop on Routine

Procedure to Printout Actual Results



PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F501-4	<p>1 Checks sense for data transfer</p> <p>2 Checks that erase moves tape</p> <p>3 Checks that write tape mark</p> <p>4 Checks rewind into and at load point</p> <p>5 Checks that read over tape mark will set unit exception and that no data is transferred.</p> <p>6 Writes 4 byte blocks and checks for correct read backward and forward of data written.</p> <p>7 Checks command chaining of write - write - write</p> <p>8 Backspace record over data record</p> <p>9 Backspace record over a tape mark</p> <p>10 Backspace record into load point and check for ability to set unit check</p>	Tapes/ TCU Vol II	<p>Section 501 program listing contains a description of routines, message numbers, section-routine index, plus various other descriptive material.</p> <p>The same physical unit must not be addressed through two different paths in unit assignment to a section. For example: Do not enter 180 - 280-181-281 etc. For a RD/WRT TCU on channels 1 and 2. Instead enter 180-281-182-283 etc. The sections may hang if this is not done.</p>
F502-4 EC 256591	<p>11 Backspace file over tape mark</p> <p>12 Backspace file into load point and check for unit check and control unit end</p> <p>13 Forward space record over a data record</p> <p>14 Forward space record over tape mark</p> <p>15 Forward space file over data records</p> <p>16 Check for ability to set unit check on read backward at load point, backspace record at load point and backspace file at load point.</p> <p>17 Checks repetitive backspace record and forward space record</p>		
F503-4 EC 256591	<p>18 Checks repetitive backspace file and forward space file</p>		

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F503-4 EC 256591			
19	Checks that reading a record with the first character like a tape mark is not recognized as a tape mark		Not run in PE mode
20	Checks that reading backward a record with the last character like a tape mark is not recognized as a tape mark		Not run in PE mode
21	Checks that reading backward a record with the LRC character like a tape mark is not recognized as a tape mark		Not run in PE mode
22	Checks that reading backward a record with the CRC and LRC characters like a tape mark is not recognized as a tape mark		Not run in PE mode
23	Writes and reads all data patterns from 00 to FF		
F504-4 EC 256591			
24	Checks BSR, FSR, BSF and FSF over long records		
25	Checks that gap is not too short to read a record written by write - count 5 delay - write		
26	Checks for channel end and device end when a control immediate is the last of a chain of commands		
27	Checks for condition code 0 on TIO to an idle unit		
28	Checks for condition code 3 on TIO to a non-existent channel and unit		
29	Checks for control unit busy and control unit end using erase - erase sequence		
F505-3 EC 256591			
30	Checks for condition code 2 on SIO to a busy channel		
31	Checks that TIO will clear a pending channel end - device end interrupt		
32	Checks that TIO will clear a pending control unit end - device end interrupt		

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F505-3	Checks that TIO will clear a pending device end interrupt Checks that SIO will clear a pending control unit end - device end interrupt Checks that SIO will clear a pending device end interrupt Checks for set of incorrect length indicator on write Checks for set of incorrect length indicator on read		
EC 256591	Checks the suppress incorrect length bit on read Checks that the incorrect length indication will terminate a chain of write commands Checks the skip flag on read Checks for a program check when the CCW is not on a double word boundary Checks for a program check when the CCW has invalid command code Checks for a program check when the CCW has a count of zero on write Checks for a program check on read backward into location zero Checks for program check on a CAW with invalid format Checks for program check on a CCW with invalid format Checks for program check with TIC as the first command		
F507-4	Checks that the execute instruction will start I/O Checks unit addressing using combinations of Base/Displacement Checks HIO to an idle unit for condition code of 1 Checks HIO to a working unit for condition code of 2 Checks that SIO clears a channel end - device end left by HIO to a working unit		Not run on a multiplex channel Not run on a multiplex channel
EC 256591			

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F508-5 EC 256591 53	Checks data chaining and that the chain data flag will override the chain command flag		SNS SW 12 OFF Bypass on Model 30 and on Model 40 or 50 multiplex channel
F509-3 EC 256591 59	Checks 7 track mode set to 6 bit mode		SNS SW 12 ON Run on any system
60	Checks 7 track mode set to data converter on		
61	Checks 7 track mode set to translator on		
62	Checks 7 track mode set to 800 BPI density		
63	Checks 7 track mode set to 556 BPI density		
F50A-0 EC 256591 64	Checks 7 track mode set to 200 BPI density	Tapes/ TCU Vol III	
65	Checks write and read of all data in 6 bit mode - 800 BPI density - odd parity		
66	Checks write and read of all data in 6 bit mode - 800 BPI density - even parity		
67	Checks for Read/Write VRC and that low clip Reg does not drop bits		
F50B-0 EC 256591 68	Checks the read translator on read odd parity		
69	Checks the write translator on write odd parity		
70	Checks the translator on write and read even parity		

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F50C-0			
EC 256591			
71	Checks the data converter on Read		
72	Checks the data converter on Write		
73	Checks the data converter on Write and Read all data patterns		
F50D-0			
EC 256591			
74	Checks data converter on Write of 1, 2 and 3 bytes		
75	Checks data converter on Read of 1, 2 and 3 bytes		
F50E-0			
EC 256591			
76	Force data converter check on by reading a 1 character record		
77	Force data converter check on by reading a 2 character record		
78	Force data converter check on by reading a 3 character record		
79	Force command reject with mode set data converter on to a unit without the data converter		Requires unit that does not have the data converter
F50F-0			
EC 256591			
80	Writes 8K byte records to end of tape and checks tape indicator. Checks that erase, write tape mark, and write in the end of tape area will set unit exception.		SNS SW 5 OFF Bypass
	Checks that backward operation sets tape indicator OFF and that the neat erase does not turn tape indicator on		SNS SW 5 ON Run
	Rewind or rewind unload all units		SNS SW 6 OFF Bypass error print
81			SNS SW 6 ON Print error message
82	Checks write tape mark, erase and write to file protected units		SNS SW 7 OFF Rewind all units
			SNS SW 7 ON Rewind - unload all units
			SNS SW 7 OFF Bypass
			SNS SW 7 ON Write to file protected units

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F510-0 EC 256591 84	Checks reliability of data transfer and under option checks interchange <ol style="list-style-type: none"> 1. Write Pass Rewind all units and write data records one unit at a time. Count of write errors printed at end of each pass. 2. Read Pass Rewind all units and read forward all units comparing all data. Read backward all units comparing all data. Count of read errors printed at end of each read forward and read backward pass. 		See Program Listing pages 5 and 5A If dual density units available use SNS SW 3 or 4. SNS SW 3 OFF N/A SNS SW 3 ON Run in NRZI mode only SNS SW 4 OFF N/A SNS SW 4 ON Run in PE mode only SNS SW 8 OFF Normal sequence For complete test (write and read) SNS SW 8 ON Read portion only SNS SW 9 OFF No interchange SNS SW 9 ON Print "Interchange" and Halt at end of read pass. Change reels and press interrupt for repeat of read pass. SNS SW 10 OFF Print total write and read errors after each pass. SNS SW 10 On Print each write and read error plus totals for each pass SNS SW 11 OFF Print one bad compare error for each record plus total at end of pass.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F510-0 EC 256591 84			SNS SW 11 ON Print each bad compare error plus total at end of pass Note: Units must be compatible when generating tapes for interchange. When interchanging from system to system the programs used must be at the same EC Level.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F515 Rtn 1 Rtn 2 Rtn 3 Rtn 4 Rtn 5	Tests envelope and data. Check circuits. Tests ability to correct track in error on read. Checks multiple track in error. Checks each amplitude sensor for proper dropout. Checks false end or data circuits. Checks to see that each track can signal skew error.	Tape Vol II	Requires key switch (CPU CE Meter) to be in CE position to allow writing in Inhibit Parity Mode except 2415. Write Trigger VRC is expected.
F519 F51A F51B F519		Tape Vol II	These tests will run only on NRZ1 Drive.
Rtn 1 Rtn 2	Checks Inhibit Parity and lost character detection circuit. Verifies the ability of TAU to find and identify the track with missing or extra bits. Also checks ability to correct on Read Forward or Read Backward.		Requires key switch (CPU CE Meter) to be in CE position. F519 and F51B bypasses 7 Track Drive and all not ready drives. To loop on specific track, refer to page 2 of description.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F51A			
Rtn 1	Checks sense info returned by TCU on various operations		Mod 1 TCU - Sense Switch 0 must be on Mod 2 TCU - Sense Switch 0 must be off
Rtn 2	Checks to see that VRC, LRC or CRC will turn on data check.		
Rtn 3	Checks TCU, LRC, VRC error detection circuits.		See description, page 2A, for looping.
Rtn 4	Tests TCU noise detection in IBG and noise bit circuitry.		
F51B	An aid for troubleshooting the circuitry associated with generation of the CRC character.		
	NOTE: After halt (Sense Switch must be set for halt), the CRC character can be displayed on the TCU Test Panel.	Tape Vol II	Halts and prints message when a ready, not file protected, 9 track unit has been found, sense switches may be set at this point. Sense Switch 0 Off - Do not print and halt after write. On - Print and halt after write, then examine sense switch 4. Sense Switch 1 Off - Do not print and halt after read backward On - Print and halt after read backward, then examine sense switch 5. Sense Switch 2 Off - Do not print and halt after read. On - Print and halt after read, then examine sense switch 6.

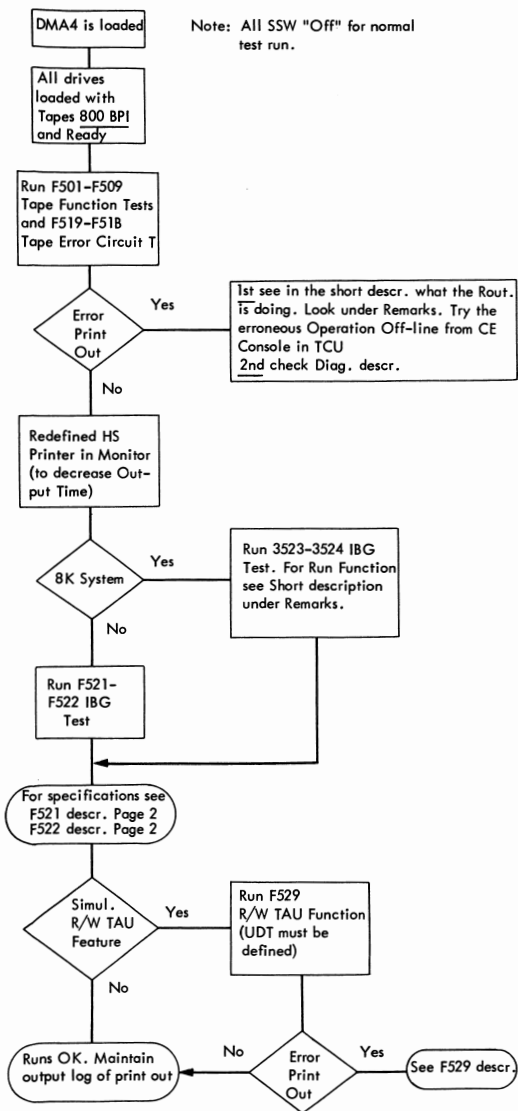
PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F51A (Cont'd)			Sense Switch 3 Off - No effect. On - Same effect as 0, 1, and 2, all on. Sense Switches 4 through 7 Control various looping functions. See Section F51B-4, page 1A.
F51C	Test the ability to Mode Set on NRZ1/PE Drives and Control Unit, and tests the skew buffer and ECC circuits of PE Drives and TAU's.	Tape Vol II	See description for details.
F54A	Tests 2816 Tape Switching Unit functions through each available control unit from a given 360.		See description for details.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2400/2800	REMARKS
F 521	<u>Interblock Gap (IBG) Test</u>		Follow printed instructions
F 522	Checks IBG's and creep		Drive must be defined correctly in the DM UDT entry See Page 1 of F 521-3 listing
3523			
3524	Motion on any Model 2400/2415 Tape Drives. Sections 3523 - 3524 are for 8K systems.		
F521-3 EC 256591	Write pass of IBG test for 7 or 9 track tape.		Diagnostic mode on CE panel must be on if tape unit is on multiplex channel. 2415 TCU has no provision to force byte mode IBG cannot be run on multiplex channel for 2415 drives
F522-3 EC 256591	Read pass of IBG test for 7 or 9 track tape.		Sense switch 1 on will run phase encoded 9 track drives - F522-3/Page 2A. For IBG limits see program listing for F521-3 Page 2 or drives in NRZI mode.
3523-2 EC 256591 3524-2 EC 256591	3523 and 3524 perform the same function as F 521 and F 522, but are for 8K systems.		Only one drive will be charted on each pass of 3524 Make tested drive not ready and again run 3524 for next drive For IBG limits see program listing for 3523-2 Page 2 or 3524-2 Page 2A

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F529-1 F52A-0	<u>Functional Test of 2404/2804</u> <u>Simultaneous TCU</u>	2403/4 2803/4 Vol II	These sections assume that standard operations have been check via both channels using the 2400/2800 Tape Function Tests.
Rtn 1	<u>Overall Reliability Check.</u> Phase 1: Check Channel A for available tape unit, rewind to load point, and ensure Read and Write can be performed properly. Phase 2: Check Channel B for available tape unit and perform same tests on Channel B.		DM UDT entry must define two tape unit entries with different channel und unit addresses.
Rtn 2	<u>Read Command Interference Test.</u> Phase 1: Tries to read on Interface B while Interface A is busy reading. Phase 2: Tries to read on Interface A while Interface B is busy reading.		
Rtn 3	<u>Write Command Interference Test.</u> Phase 1: Tries to write and read on Interface B while Interface A is busy writing. Phase 2: Tries to write and read on Interface A while Interface B is busy writing.		
Rtn 4	Check for ability to perform a TIO while other interface is reading.		
Rtn 5	Check for ability to perform a TIO while other interface is writing.		
Rtn 6	Simultaneous overlap of reading and writing.		
Rtn 99	Section exit / Multi-pass check routine.		

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F52A-0	<p data-bbox="164 280 222 298">Rtn 7</p> <p data-bbox="291 280 508 298"><u>Address Busy Test.</u></p> <p data-bbox="291 308 1083 326">Phase 1: Tries to read on Interface B while Interface A is busy writing.</p> <p data-bbox="291 336 1083 354">Phase 2: Tries to read on Interface A while Interface B is busy writing.</p> <p data-bbox="291 364 1031 407">Phase 3: Sense SIO to both interfaces using specific TU addresses. Busy condition should not occur.</p> <p data-bbox="291 417 1058 459">Phase 4: Sense SIO to both interfaces using reversed addresses from Phase 3.</p> <p data-bbox="164 495 222 512">Rtn 8</p> <p data-bbox="291 495 625 512"><u>Read TCU Lock on Error Test.</u></p> <p data-bbox="291 523 867 540">Phase 1: A Interface reads record with VRC error.</p> <p data-bbox="291 551 867 568">Phase 2: B Interface reads record with VRC error.</p>		<p data-bbox="1228 360 1534 378">Logic Reference TC 20.11.1</p> <p data-bbox="1228 415 1534 433">Logic Reference TC 20.11.1</p> <p data-bbox="1228 523 1534 540">Logic Reference TA 60.21.1</p>

TAPE MDP
HANDLING FLOW CHART



PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
FFF0-0	<p>CE Pack Initialization Utility Program</p> <ol style="list-style-type: none"> Write HA and RO record on all tracks of all cylinders except Cyl. 002-004, 071-075, and 200-202. After writing, a second pass is made to compare all HA's and RO's to insure that they were written correctly. Write a special RO on all tracks of Cyl. 001 and 199 which is required by other 2311 MDP's. <p><u>2841/2311 - Function Tests (F600 - F609)</u></p>	2841 A01	<p><u>Attention.</u> Do not run this program with the CE Pack for the first run after installation of a new file, or any time except when the file is known to be error-free.</p>
F600-5	<ol style="list-style-type: none"> Subsystem Breakdown. Defines the subsystem and detects basic errors. Sequence of operations performed is: Test Channel, Halt I/O, Test I/O, No-Op., Sense I/O, Control Seek, determine file types, Read HA, Read HA (MT), Expanded Seek, Check CE Cell/Cylinder, write and read back. 	2841	<p><u>Notes for F600-5 to F602-5:</u></p> <ol style="list-style-type: none"> <u>DMA4 Version 4</u> must be used in conjunction with this MDP. Define 2 entries for each 2311 with Unit Code 60 and 61 in Utility Table in DMA4. When using 2311 File Editor FOFE remove Card No. 002 of this MDP. Prior to EC 413146L, the description is at the front of Volume A03, not A02. Error numbers see Section 5 of Program Description.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F601-5 1. 2. 3. 4. 5. 6. 7. 8. 9. A. B.	Test Channel. Halt I/O. Checks: Device available. Interruption pending, Device busy, Device not operational, Device status zero, Channel status zero. Test I/O. Checks: Channel busy/available, Interface control check, channel data check, Control unit busy, Device end, unselected status, on-line/not ready, unsafe, buss out parity. No-op. Checks: Start I/O command sequence, initial selection and ending procedure. Sense I/O. Checks: Data transfer from 2841 to CPU. Control Seek. Checks: Gated attention, Polled enable, Suppress out, Request in. Read HA. Checks: Channel Status, Data transfer. Read RO. Checks: Device end interrupt, command not accepted. Seek eight seek arguments, ten times each. Checks: Buss lines, Data lines, File/Channel interface. Test CE Cell/Cylinder. Head advance (M/T). Checks: Head advance, cylinder end.	2841 A02	Units position of error number is condition code received. Does not check that HA read is the one expected. This is the first test that verifies correct HA found. Not run except for 2303 or 2321. No comparison on HA read vs. expected.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F602-5 1. 2. 3. 4.	Write/Read RO. Record is 100 bytes long, and all 256 bit patterns are used. Checks: Serializer/deserializer, CU busy, CUE interrupt. Write Long Records. Test determines the maximum RO allowable on this file, then writes this length 100 times. Write/Read Address Marks. Test writes RO and R1, then reads back R1 100 times. Read Address Mark. Write a full track of records with the data portion as close as possible to an address mark. Read this track 100 times.	2841 A02	
F603-2 1.	Search Commands. Checks: Search high count, Search high key, Search high or equal count and Search high or equal key. Each command is tested with five different conditions of the search field specified and the field on the file.	2841 A02	The description for F603 through F609 is inserted between F602 and F603. F603 through F609 do not use the Error Number index. All diagnostic information is in the printout.
F604-1 1.	File Protect. Checks: All bits of the File Mask byte.	2841 A02	Tests both the OK and the invalid operation.
F605-1		2841 A03	The description for F605 through F609 is in Vol. A02 ahead of F603.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F605-1 1. 2. 3.	Status Modifier Setting. Checks: Control unit busy, Control unit end, Channel end, and Device end. Unit Exception. Checks: Unit exception by writing CKD with key length equal to zero, then reading CKD. Invalid Commands. Try to execute all possible invalid commands and check that they are rejected by the 2841.		File features must be defined in I/O option byte of UDT.
F606-1 1.	Invalid Sequence. Checks: Twenty-three different invalid command sequences for rejection by the 2841.	2841 A03	
F607-1 1.	Invalid Sequence. Checks: Twenty-two additional invalid command sequences for rejection by the 2841.	2841 A03	
F608-1 1. 2. 3.	Over-run. Checks that the 2841 will set the over-run sense bit. (Mod. 30 only.) Track Condition. Checks that the 2841 will set the track condition sense bit for search count on a flagged track. Track Condition. Checks that the 2841 will set the track condition sense bit for command chaining (M/T) from an alternative track.	2841 A03	

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F608-1	<p>4. Seek Check. Checks that the 2841 will set the seek check sense bit for a seek beyond the max. cylinder boundary.</p> <p>5. Seek Check. Checks that the 2841 will set the seek check sense bit for a seek argument less than six bytes.</p> <p>6. Track Over-run. Checks that the 2841 will set the track over-run sense bit.</p> <p>7. End of cylinder. Checks that the 2841 will set the end of cylinder sense bit.</p> <p>8. No Record Found. Checks that the 2841 will set the no record found sense bit.</p>		
F609-1	<p>1. Truncated Read. Formats a track with a five-byte record; reads 4 bytes; checks that only four bytes were transferred.</p> <p>2. Multi-Track. Reads HA multi-track for one cylinder and checks that all are correct.</p>	2841 A03	
F610-2	<p>1. Test Channel. Checks primitive functions before starting file tests.</p> <p>2. Test I/O. Checks: No Select Locks, Files On-Line, Ready.</p>	2841 A03	Error numbers for F610 through F613 are in Section 4.2 of Test Description F610.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F610-2 3. 4. 5. 6. 7.	<p>No-op. Checks: Immediate Command execution, Start I/O sequence, 2841 initial selection and ending procedures.</p> <p>Sense I/O. Checks: Data transfer from 2841 to CPU.</p> <p>Command Exit. Tests for command execution without a 'hang-up' (end within 2 seconds of start)--no check of correct execution. Commands used: Control head seek, control cylinder seek, read HA, recalibrate.</p> <p>Conditions check: Attention from 2311, set difference, control unit 'hang-ups'.</p> <p>Read Home Address. Reads HA with all heads from cylinder 0, tests for five possible types of failure, and prints the results in an array. Checks: Read amplifier, head address register, HAR decode, head selection, read heads, data transfer, buss and tag lines, 2841 SER/DES clock (VFO), head adjustment.</p> <p>Recalibrate. Checks: File buss 6, Control tag, On-Line, return to zero, seek ready, seek start.</p>		
F611-2 1.	<p>Difference Counter and CAR. Checks: CAR, Difference Counter, Buss lines, Diff. Counter decode, Initial Seek latch, detent operation, Line drivers, Cylinder transducer.</p>	2841 A03	

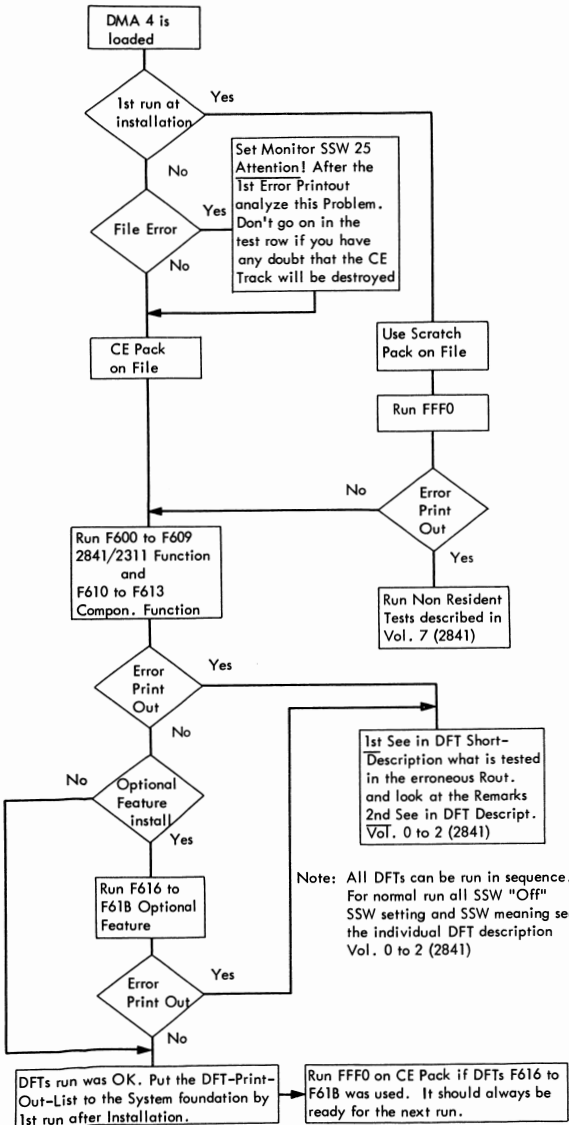
PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F613-2	<p>Optional 2311 Tests</p> <ol style="list-style-type: none"> 1. End of Normal Tests. Checks for Sense Switches 9 - 14 ON for running Optional Tests. 2. Power Off-On, CPU Running. Checks: Power-up seek cyl. 0, communication interlocks, power sequencing. 3. Meter Switch Disable - Enable. Checks: Meter switch. 4. Power On/Off Status. Checks: Not Ready, Power sequencing, transition to Ready. 5. Meter Interlock. Checks: Meter interlock on disable, meter switch. 6. Head Tracking Adjustment. Provides seeks needed in the head adjustment procedure. 7. Seek Between Any 2 Cylinders. This is not diagnostic--it is intended as a scope loop. 8. Write HA on Any One Cylinder. This is not diagnostic. It is intended as a means to restore a home address accidentally destroyed while working on the file. 9. Burst Check Records. Reads all records on all tracks checking for poorly recorded data. An option (Sense Switch 16) allows a scope loop on any record. 	2841 A03	<p>Sense Switch 9 must be ON to run.</p> <p>Sense Switch 9 must be ON to run.</p> <p>Sense Switch 9 must be ON to run.</p> <p>Sense Switch 9 must be ON to run.</p> <p>Sense Switch 10 must be ON to run.</p> <p>Sense Switch 11 must be ON to run.</p> <p>Sense Switch 12 must be ON to run.</p> <p>Sense Switch 13 must be ON to run.</p>

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F613-3 A.	Interchangeability. Checks that data written on one 2311 can be read by all other 2311's in the subsystem. <u>2841/2311 - Optional Feature Tests (F616 - F61B)</u>	2841 A03	Sense Switch 14 must be ON to run.
F616-0 1. 2.	<u>File Scan and Overflow Feature Test</u> Test search Equal Key--Data Tests search high key--Data and search high or equal key--Data. Each search is tested with five different conditions of search fields.	2841 A04	Define the feature in the I/O Option Field of the UDT Note: The description (comments, status messages, etc.) for F616 through F61B are in Description F616-* at the front of 2841 Volume A04.
F617-0 1. 2. 3. 4. 5.	<u>File Scan and Overflow Feature Test</u> Write Special CKD. Formats tracks for all the other routines. Write and Read Data with Record Overflow. Write and Read Key -- Data with Record Overflow. Read Count with Record Overflow. Write and Read Data with Record Overflow. This Routine is the same as Routine 2 except for using half a cylinder.	2841 A04	Define the feature in the I/O Option Field of the UDT.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F617-0 6.	(continued) Write and Read Key--Data with Record Overflow. This Routine is the same as Routine 3 except for using half a cylinder.	2841 A04	
7.	Read Count with Record Overflow. This Routine is the same as Routine 4 except for using half a cylinder.		
F618-1	<u>File Scan and Overflow Feature Test</u>	2841 A04	Define the feature in the I/O option field of the UDT.
1.	Inhibit seeks then read overflow record. Checks: File mask violation, overflow incomplete.		
2.	Read Overflow Record with Wrong Second head. Checks: Overflow incomplete, seek check.		
3.	Read Overflow Record from an Alternate Track. Checks: Overflow incomplete, Track Condition Check.		
4.	Scan an overflow Record. Checks: Scan data on an overflow record.		
5.	Record Overflow to End of Cylinder. Checks: Overflow incomplete, End of Cylinder.		
F619-1	<u>File Scan and Overflow Feature Test</u>	2841 A04	Define the feature in the I/O Option Field of the UDT.
1.	Overflow to a defective track and Overflow from an alternate track while reading. Checks: Sixth sense byte = X'06'.		

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F619-1 2.	(continued) Overflow to a defective track and overflow from an alternate track while writing. Checks: Sixth sense byte = X'05'.	2841 A04	
F61A-1	<u>File Scan and Overflow Test</u>	2841 A04	Define the feature in the I/O Option Field of the UDT.
1.	Search Equal Key - Data on overflow record to a defective track (and from an alternate track) with scan equal to that point. Checks: Sixth sense byte is X'25'.		
2.	Search high key - data on overflow record to a defective track with scan equal to that point. Continue on alternate track with data actually high. Checks: Sixth sense byte set to X'45', then set to X'75'.		
F61B-1	<u>File Scan and Overflow Feature Test</u>	2841 A04	Define the feature in the I/O Option Field of the UDT.
1.	Search high or equal key - data on overflow record to a defective track with scan equal to that point. Continue on alternate track with data actually low. Checks: Sixth sense byte set to X'65', then to X'55'.		

FILE MDP FFF0 to F61B
HANDLING FLOW CHART

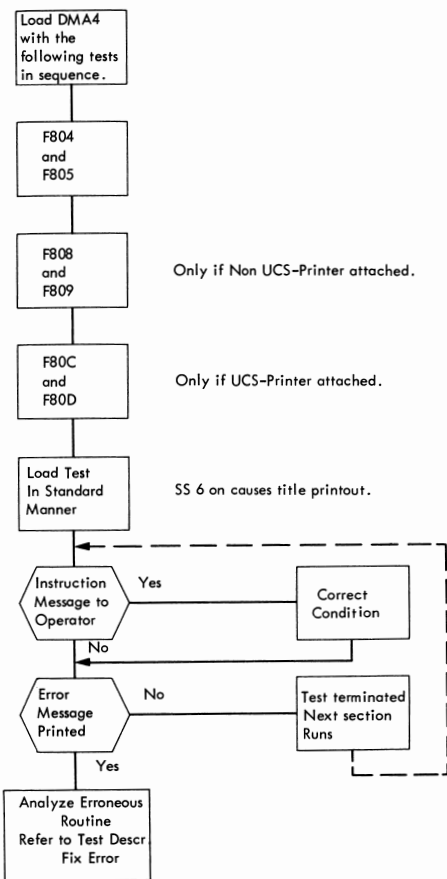


PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F804	<u>2821/2540 Reader Punch Scan. Search No. 804</u> This program isolates a solid data path failure within the 2821/2540 attachment	7	Test is EC level sensitive. Must be able to make Reader and Punch ready before running test. Punch must be made ready with at least 200 blank cards.
01	This routine circuit isolates a failure within the 2821/2540 Channel Register.		If this routine detects a channel register failure, Routines 02, 03, 04, and 05 will not be run; i. e. they will be bypassed.
02	This routine isolates a failure to one of the following areas: 1. Read/Punch-Buffer Data Register 2. Reader, Punch and Buffer Address Registers 3. Reader/Punch-Buffer Inhibit Lines and Sense Amplifiers 4. Reader Translator 5. Reader Translator Check Circuitry 6. Punch Translator 7. Punch Translator Check Circuitry		This routine overlays Routine 01. It will not be run if a channel register error is detected by Routine 01.
F805	<u>2821/2540 Reader Punch Scan (continued)</u> Reader, Punch, and Buffer Address Register Fault Location Test		This section must be loaded immediately after Section F804.
03	This routine circuit isolates a failure within the Reader, Punch, and Buffer Address Registers.		This routine overlays Routine 02. It will be run only when Routine 02 detects a Reader, Punch, or Buffer Address Register Failure; i. e. when Routine 02 indicates Error Number 001. If this routine is run, Routines 04 and 05 will be bypassed; i. e., they will not be run.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F805 04	(continued) Reader Translate Fault Location Test This routine circuit isolates a failure within the Reader Translator.	7	This routine overlays Routine 03. It will be run only when Routine 02 indicates Error 005, 007, 011, 018, 022, or No Error indication; otherwise, it will not be run.
F806 05	<u>2821/2540 Reader Punch Scan</u> (continued) Punch Translator Fault Location Test This routine circuit isolates a failure within the Punch Translator.		This section must be loaded immediately after Section F805. This routine overlays Routine 04. It will be run only when Routine 02 indicates Error 024, 025, or No Error indication; otherwise, it will not be run. This routine will also be bypassed if Routine 04 detects a Reader Translator Failure.
<p>To force any routine to run in section F804-1 use the following procedure:</p> <ol style="list-style-type: none"> 1. Monitor SSW #20 on. (stop after loading each Program Section) 2. Search section F804-1 and when in wait- turn on SSW #02. 3. Press interrupt. 4. If Routine #1 prints - press interrupt for routine #2. 5. If routine #2 indicates an error, force routine 4 & 5 by storing; <ol style="list-style-type: none"> A. to force routine #4 store an 84 in 179C (SCHNUM). Press interrupt. B. to force routine #5 store an 85 in 179C (SCHNUM). Press interrupt. 6. If routine #3 indicates an error, turn on Monitor SSW #26 and run routines 4 & 5 as described in step #5. <p>NOTE 1: If Monitor SSW #26 is on, when F804 is reloaded, routine #2 must be cycle selected at wait of routine #1.</p> <p>NOTE 2: "SCHNUM" is a symbolic name for a constant in the program. If F804 is at any level other than 1 (F804-1), determine core location from program listing. It may not be at 179C.</p>			

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F80C	<p><u>2821/1403 UCS Scan, Search No. 80C</u></p> <p>This program isolates a solid data path failure within the 2821/1403 UCS Attachment.</p>	7	<p>Test is EC level sensitive. Must be able to make Printer ready before running test. The Output Unit cannot be the Printer under test. The original contents of the UCS Buffer will be destroyed by the program. Use Section F837 to restore the UCS Buffer.</p>
01 & 02	<p>Control Program for 2821/1403 UCS Attachment</p> <p>Routines 01 and 02 isolate a failure to one of the following areas:</p> <ol style="list-style-type: none"> 1. Print Buffer Data Register 2. Print Buffer 3. Print Buffer Address Register 4. UCS Buffer Data Register 5. UCS Buffer 6. UCS Buffer Address Register 7. Compare Circuits 8. PLC Circuits 9. Error Checking Circuits when false 		<p>Routine 02 will be run only when no failures are detected by Routine 01.</p>
F80D	<p><u>2821/1403 UCS - Scan</u> (continued)</p>	7	<p>This section must be loaded immediately after Section F80C.</p>
03	<p>Print Buffer Data Register Fault Location Test</p> <p>This routine circuit isolates a solid failure within the Print Buffer Data Register.</p>		<p>This routine overlays Routines 01 and 02. It will be run only when Routine 01 indicates Error 004 or 015; otherwise, it will be bypassed.</p>
04	<p>UCS Buffer Data Register Fault Location Test</p> <p>This routine circuit isolates a solid failure within UCS Buffer Data Register.</p>		<p>This routine overlays Routine 03. It will be run only when Routine 02 indicates Error 022; otherwise, it will be bypassed.</p>

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HANDLING FLOW CHART



PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F810-2	<u>2540 Reader Function Test, Search No. 810</u>	8	
01	Response to Commands issued to the Reader in ready condition.		
02	Response to Commands issued to the Reader in busy condition.		
03	<p>Checks Valid and Invalid Commands and checks for proper Status and Sense Byte issued in the following order:</p> <ol style="list-style-type: none"> 1. Read, Feed and Stacker Select R1 2. Feed and Stacker Select R1 3. No OP 4. Sense Command with invalid Modifiers 5. RD without Feed followed by RD with Feed 6. Read Backward 7. Invalid OP-Code <p>After each Command, checks are made for proper Status and Sense</p>		
04	Response to a Read Command when an End of File Code is encountered.		Routine 4 runs only if SSW 12 ON.
05	Response to Commands issued to the Reader in Not Ready Condition.		Routine 5 runs only if SSW 13 ON.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F811	<u>Search No. 811</u>		Set 2821 to Burst Mode if used for Speed Testing.
01	Read and comparison of all EBCDIC-Characters.		The Ripple Deck punched by F821 may be used as Detail Cards.
02	Stacker Select to all Stackers. This routine runs only if SSW 11 ON.		Feed Speed is variable by setting Sense Switches.
F815	<u>2540 Reader Card Image Function Test, Search No. 815</u>	8	Detail Cards may be Cards supplied with the Diagnostic or the output of the Card Image Punch Test F825.
	The 65 cards of the Detail Card Deck are read and compared. (Cards 1-64 in card image. Card 65 with HEX 34 in Column 1.)		If connected, the Check Stop Switch of the CE Box must be OFF. The Validity Check Light will flash on at the 2540. This is normal for this test.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F820 01 02 03 04	<u>2540 Punch Function Test, Search No. 820</u> Checks response to Commands if 2540 Punch is not ready Checks response to Commands if 2540 Punch is ready Checks response to Punch and Feed Command if Punch is busy Checks response to valid and invalid Commands	8	
F821 01 02	<u>Search No. 821</u> Punching of all EBCDIC Characters into 27 cards. After each card a Diagnostic Read-CMD is given to find out columns in error. Stacker Select into all 3 Stackers with punching of numbers (for example: ones for Stacker 1.)		The punched Ripple Deck may be used for testing the Reader with Section 811 Routine 1. Feed Speed is variable by setting Sense Switches. Variable Stacker Select Pattern may be obtained by setting Sense Switch.
F823	<u>2540 Punch Feed Read Test, Search No. 823</u> After every Read or Punch Command a Diagnose Command checks for error condition.	8	1. Read and Punch 16 blank cards.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F825	<p data-bbox="285 239 788 265"><u>2540 Punch Card Image Test, Search No. 825</u></p> <p data-bbox="285 291 1078 342">Punch a 64 card Image Ripple Deck. A 65th card is punched with HEX 34 in column one (4 and 9 punches).</p>	8	<p data-bbox="1224 236 1740 311">In order to check cards just punched, the Card Image Reader Test F815 must be run with these cards, plus at least two blank cards.</p> <p data-bbox="1224 317 1765 363">If connected, the Check Stop Switch of the CE-Box must be OFF.</p> <p data-bbox="1224 368 1734 415">The Validity Check Light will flash on the 2540. This is normal on this test.</p>

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2821	REMARKS
F830-4 01 02 03 04 05 06 07 08 09 10	<u>1403 Printer Function Test 1, Search No. 830</u> Proper response on Test I/O to Ready Device. Ability to issue Sense and clear Channel and Device End Interrupt with Test I/O. Ability to clear Channel and Device End Interrupt by enabling for I/O Interrupts. Proper response on a NOP to Ready Device. Proper response to pre-condition load, block data check, and allow data check commands if UCS feature defined. Proper setting and suppressing of incorrect length indication, due to long and short records on Read and Write Commands, with and without the SLI Flag, is checked. Ability to issue Diagnostic Write. Proper response on SIO, TIO, and HIO to pending Channel End. Proper response on HIO and SIO to a pending Device End. Proper response on HIO to Ready Device. Proper response on SIO, TIO, and HIO to a Not Ready Device, and proper setting of the Intervention Required Sense Bit. Proper response on SIO, TIO, and HIO to a Not Available Device. Proper setting of Device End due to Not Ready to Ready. Proper action on an Immediate Skip if already at requested Channel. Proper resetting of Carriage Register latches by Write and Space Suppress. Ability to data chain properly. Ability to command chain properly. Ability to issue Diagnostic Check Read.	8	<p>Detailed description of the events performed to bring about all conditions being tested is located at the beginning of the program listing.</p> <p>If a hang-up condition should occur, press System Reset, the PSW Restart. The program will output the test number and all the information relating to the hang-up condition.</p> <p>Diagnostic carriage tape should be installed.</p> <p>120 position printers require a count of 132.</p> <p>Routine 07 will be bypassed unless Section Sense Switch 5 is ON.</p> <p>I/O Tester Box may be used to make Device Not Available (off-line).</p>

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
F830-4 11 12	(continued) Proper response on SIO, TIO, and HIO issued between Channel End time and Device End time. Proper response on an invalid command issued to a Pending Device End.	8	

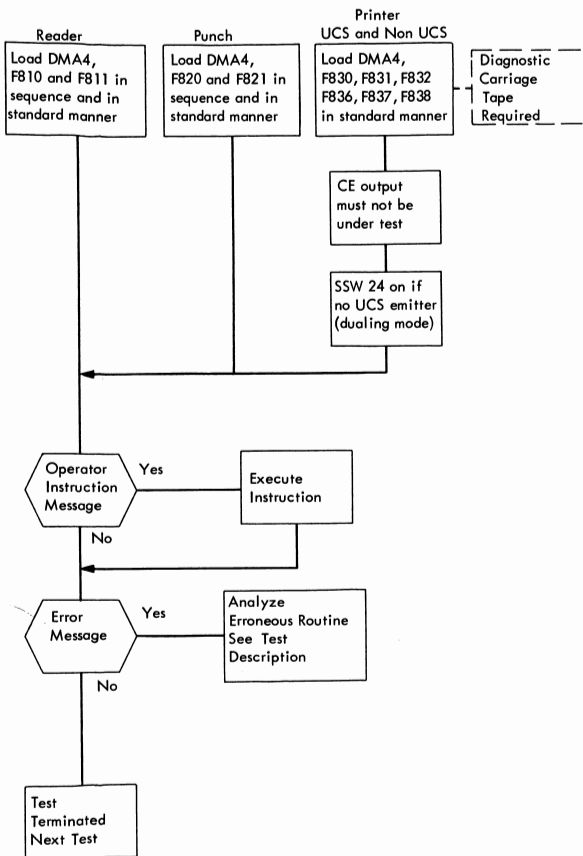
PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2821	REMARKS
F831-4	<p data-bbox="291 149 788 169"><u>1403 Printer Function Test 2, Search No. 831</u></p> <p data-bbox="185 232 1103 625"> 01 The ability to break Command Chaining with a Unit Check due to sensing a Channel 9. The ability to override Command Chaining with Data Chaining. The ability to break Command Chaining with a Unit Exception due to sensing a Channel 12. 02 The ability to break Data Chaining due to incorrect Length Record. Proper suppression of Channel Program Check by the Data Chain Flag. 03 Proper setting of Command Reject by Command Chaining to a pre-condition Load, a ElockData Check, and an Allow Data Check Command. 04 The ability to set all PLC bits. 05 The ability to set and reset the Pre-condition Load Latch, and proper effect of this latch on Chaining to allow and block Data Check Commands. 06 Proper setting of Command Reject by issuing UCS Load, with and without Folding Commands. 07 All commands invalid to the printer are issued and check for proper response. </p>	8	<p data-bbox="1228 149 1750 232">Detailed description of the events performed to bring about all conditions being tested is located at the beginning of the program listing.</p> <p data-bbox="1228 263 1779 366">If a hang-up condition occurs, press System Reset, then PSW Restart. The program will output the Test Number and information relating to the hang-up condition.</p> <p data-bbox="1228 397 1707 418">Diagnostic carriage tape should be installed.</p> <p data-bbox="1228 449 1760 522">Even 120 position printers require a count of 132. Routine 05 will be bypassed unless the UCS Feature is present.</p>

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2821	REMARKS
F832-4	<p data-bbox="295 223 794 244"><u>1403 Printer Function Test 3, Search No. 832</u></p> <p data-bbox="185 306 1089 379">01 Ability to issue UCS Load Commands, with and without folding. Proper setting of incorrect length record during UCS Load Commands with a long and a short count.</p> <p data-bbox="185 387 1078 433">02 Ability to detect Hammer Fire Checks in every position. Proper setting of Equipment Check.</p> <p data-bbox="185 441 1049 486">03 Ability to detect Data Check. Proper suppression of PLC bits in every position.</p> <p data-bbox="185 495 1116 540">04 Ability to set and reset the Block Data Check Latch, and proper suppression of Data Check by the latch.</p> <p data-bbox="185 549 1070 594">05 Ability to load UCS Buffer with a short count, and not alter unaddressed buffer positions.</p> <p data-bbox="185 602 1078 648">06 Ability to write into Data Buffer and to read it back properly. Ability to fold.</p> <p data-bbox="185 656 558 677">07 Ability to dual properly.</p>	8	<p data-bbox="1232 223 1750 296">Detailed description of the events performed to bring about all conditions being tested is located at the beginning of the program listing.</p> <p data-bbox="1232 331 1769 433">If a hang-up condition should occur, press System Reset, then PSW Restart. The program will output the Test Number and all the information relating to the hang-up condition.</p> <p data-bbox="1232 468 1711 488">Diagnostic carriage tape should be installed.</p> <p data-bbox="1232 524 1769 565">Even 120 position printers require a count of 132. This section bypassed if UCS Feature not defined.</p> <p data-bbox="1232 600 1765 642">The printer is in dualing mode if it does not have a standard AN or HN Chain.</p> <p data-bbox="1232 677 1789 698">Section SSW 24 must be on to indicate dualing mode.</p> <p data-bbox="1232 733 1731 754">Section F832 destroys contents of UCS Buffer.</p>

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2821	REMARKS
F836-3	<p data-bbox="299 150 676 170"><u>1403 Ripple Print, Search No. 836</u></p> <p data-bbox="193 233 1081 305">01 All 256 possible characters will be printed in each print position. Every slug on the chain will be printed. This routine will be run on UCS Printers only.</p> <p data-bbox="193 315 1081 357">02 All 256 possible characters will be printed in each print position. This routine will be run on basic printers only.</p>	8	<p data-bbox="1236 145 1767 243">If a hang-up condition should occur, press System Reset, then PSW Restart. The program will output the Test Number and all the information available relating to the error.</p> <p data-bbox="1236 279 1767 326">The printer is in dualing mode if it does not have a PCS Emitter.</p> <p data-bbox="1236 357 1767 409">Section Sense Switch 24 must be ON to indicate dualing mode.</p> <p data-bbox="1236 440 1767 461">Diagnostic carriage tape should be installed.</p> <p data-bbox="1236 492 1767 512">Section F836 destroys contents of UCS Buffer.</p>
F837-0	<p data-bbox="299 574 724 595"><u>UCB Restore Program, Search No. 837</u></p> <p data-bbox="299 626 1043 730">This program will restore all UCS Buffers to the Image described by Control and Data Cards. The customers' 4 card Chain Image Cards may be used. The state of the Block Data Check and Folding Latches may be controlled via Control Cards.</p>	8	

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2821	REMARKS																																																				
F838-3 01 02 03	<u>1403 Carriage Function Test, Search No. 838</u> Checks ability to sense Channel 9. Checks ability to sense Channel 12. Exercises all Forms Control Commands.	8	Test is EC Level sensitive. Section F838 expects UCS Buffer to be previously loaded. <i>96 Line Tape</i> Prior to starting this test, the carriage tape should be installed and the Carriage Restore Key depressed. This tape should be punched as follows: <table border="1" data-bbox="1226 471 1781 849"> <thead> <tr> <th><u>Tape Line</u></th> <th><u>Hole Punched</u></th> <th><u>Tape Line</u></th> <th><u>Hole Punched</u></th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td><td>49</td><td>7</td></tr> <tr><td>2</td><td>9</td><td>50</td><td>12</td></tr> <tr><td>9</td><td>2</td><td>57</td><td>8</td></tr> <tr><td>10</td><td>9</td><td>58</td><td>12</td></tr> <tr><td>17</td><td>3</td><td>65</td><td>9</td></tr> <tr><td>18</td><td>9</td><td>66</td><td>12</td></tr> <tr><td>25</td><td>4</td><td>73</td><td>10</td></tr> <tr><td>26</td><td>12</td><td>74</td><td>9</td></tr> <tr><td>33</td><td>5</td><td>81</td><td>11</td></tr> <tr><td>34</td><td>12</td><td>82</td><td>9</td></tr> <tr><td>41</td><td>6</td><td>89</td><td>12</td></tr> <tr><td>42</td><td>12</td><td>90</td><td>9</td></tr> </tbody> </table>	<u>Tape Line</u>	<u>Hole Punched</u>	<u>Tape Line</u>	<u>Hole Punched</u>	1	1	49	7	2	9	50	12	9	2	57	8	10	9	58	12	17	3	65	9	18	9	66	12	25	4	73	10	26	12	74	9	33	5	81	11	34	12	82	9	41	6	89	12	42	12	90	9
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2540-1403 FUNCTION TEST F810 to F839
HANDLING FLOW CHART



UCB must be loaded if:

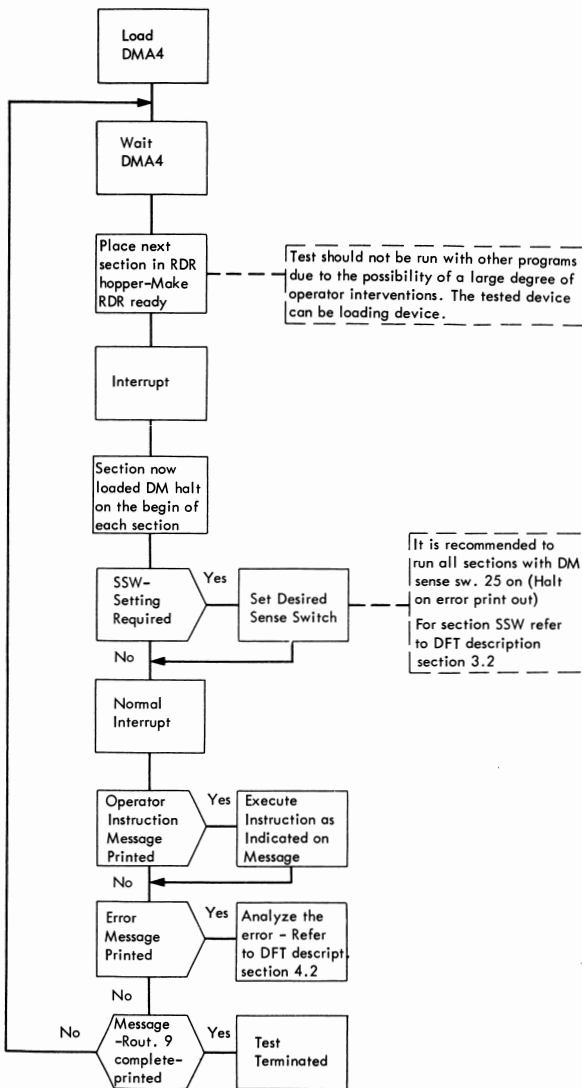
1. 2821 power is restored
2. 1403 cartridge is changed
3. To run F838 and F83F
4. Any diagnostic is to be run with the printer as its output device
5. System is returned to customer after service

How to load UCB:

1. Diagnostic Program F837 will initialize the buffer for Printers 00E, 00F, and 010 with the AN configuration. See program description for any necessary alteration.
2. With a stand alone buffer initializer. The 2821 Service Aid No. 2 shows a procedure how to punch this program.
3. By using the utility program 360P-UT-048 together with the 4 train definition cards delivered with the shipping group of the printer.

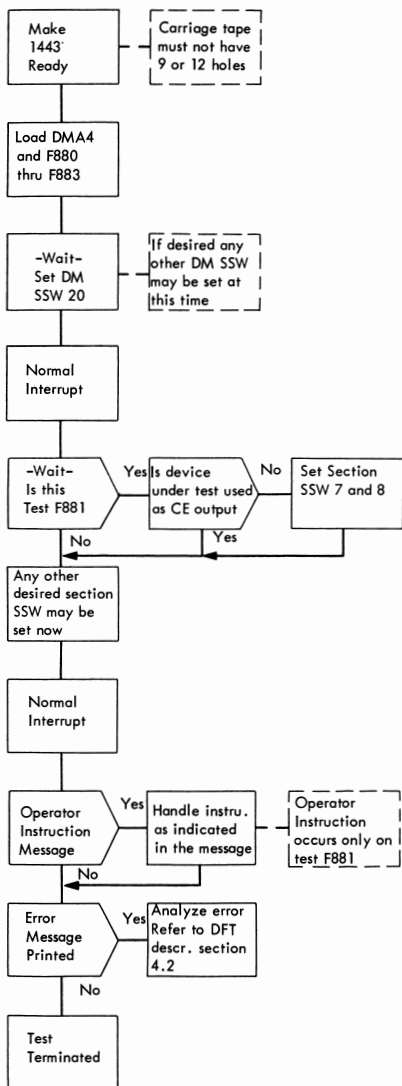
PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 1442	REMARKS
F870 01 02 03 04	<u>1442 N1 Function Test, routine 1-4</u> SIO, TIO, and Sense-CMD to 1442 not ready SIO, TIO, and Sense-CMD to 1442 ready Response from 1442 if busy End of File test		Test should not be run with other programs due to the possibility of a large degree of operator intervention. A monitor halt is given at the start of each section to set sense switches if required.
F871 05	<u>1442 N1 Function Test, routine 5</u> Reading blank cards, punching 80 columns with eject, punching 38 columns, Control-CMD with eject, Control No-OP, invalid CMD's.		Program loading device can be 1442 being tested.
F872 06 07 08	<u>1442 N1 Function Test, routine 6-8</u> Punching all 256 valid EBCDIC characters into 4 cards. 8 groups of these 4 cards (32 cards) are punched. (If SSW8 ON, a 256 card EBCDIC ripple deck will be punched). Checks for CHNL. END and DEV. END coming together after write CMD without ejecting. Processing of the last cards of EOF-Switch ON.		Cards punched on routine 6 can be used as detail-cards on routine 9. If the punched card to be read on routine 9 are a 256 card EBCDIC ripple deck, SSW8 must be set. If it is desired to read and compare any ripple cards in any order, SSW15 must be set.
F873 09	<u>1442 N1 Function Test, routine 9</u> Reads and compares Detail Cards. Any error will be printed out with the card and column number.		

1442 N1 FUNCTION TEST F870-F873
HANDLING FLOW CHART



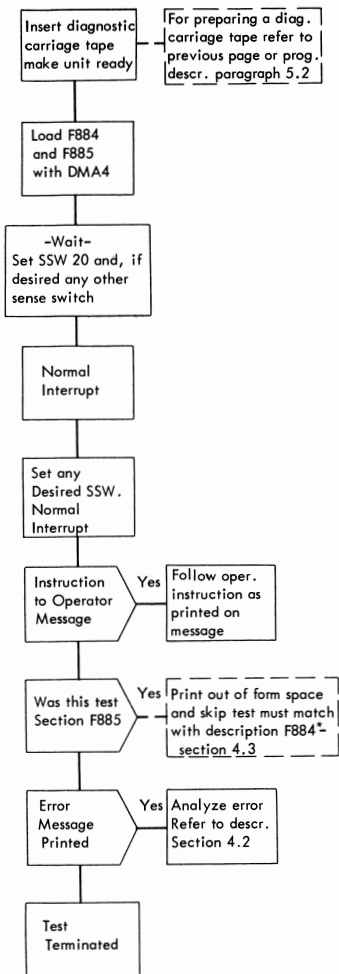
PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 1443	REMARKS
F880-1	<p><u>Pre Ripple Sense Test</u></p> <p>Executes sense start I/O to 1443 and checks all status bits, the CSW, the sense byte, and condition code which results.</p>	5	<p>It is recommended to use a carriage tape without Channel 9 or 12 holes.</p>
F881-2	<p><u>Pre Ripple Test I/O and Start I/O Test</u></p> <p>Executes Test I/O and Start I/O instructions to 1443. The Off Line and Not Ready states are checked only of sense switch 8 is ON. (See remark).</p>		<p>On F881 the Off Line and Not Ready states (SSW 8 on) cannot be tested if the device under test is the CE output unless Monitor SSW 27 is ON.</p>
F882-1	<p><u>Ripple Print Test</u></p> <p>Executes write start I/O to 1443. Prints every character in every print position. Uses single command as well as command chaining.</p>		
F883-0 1 2 3 4 5 6 7 8 9 10 11	<p><u>Channel Test</u></p> <p>Initialize</p> <p>TIO to available device - Interrupt enabled</p> <p>SIO to available device - Interrupt enabled</p> <p>Wrong length record - long on write - no SLI</p> <p>Same as 4, but with SLI</p> <p>SIO, CDA, CT - Record length, next CCW has count 0. (CDA = Chain data, CT = count)</p> <p>Write with CDA to TIC</p> <p>Write CCW with Datas on an odd byte boundary</p> <p>Write CCW with CDA to Data Addr. on an odd byte boundary</p> <p>Halt I/O to AAW-ch., subch. and 1443</p> <p>Halt I/O to selector channel with channel working.</p>		<p>On F883 routine 11 applies only to selector channel, it is bypassed if the channel address indicates a MPX-Channel.</p>

1443 PRINTER FUNCTION TEST F880-F883
HANDLING FLOW CHART



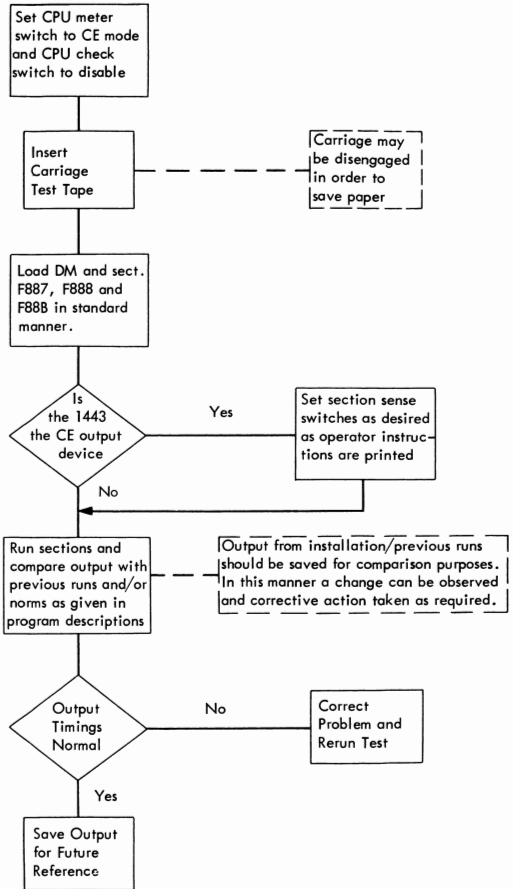
PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 1443	REMARKS																																																				
F884-1	<p><u>Sense Channel 9 and 12 Test</u></p> <p>Tests ability of sense start I/O to detect Channel 9 holes in carriage tape, and to check that Channel 12 turns on Unit Exception, and that Channel 9 turns on Unit Check. Prints and spaces 1 operation with data chaining to print test results.</p>	5	<p>Test needs a diagnostic carriage tape; see table below, or Paragr. 5.2 in F884 Description for punching this tape.</p> <p>Invalid commands will not give a Command Reject when the CPU meter switch is in CE mode. This routine must be run with meter switch in customer mode. (This does not apply on printers at EC 125859 or higher.)</p>																																																				
F885-2	<p><u>Forms Space and Skip Test</u></p> <p>1 Program tests space, skip, space suppress, and immediate operations.</p> <p>2 Tests invalid commands.</p>		<p><u>Punching of a Diagnostic Carriage Tape</u></p> <p>Tape length is 96 spaces</p> <table border="1" data-bbox="1251 539 1676 891"> <thead> <tr> <th><u>Line No.</u></th> <th><u>Hole</u></th> <th><u>Line No.</u></th> <th><u>Hole</u></th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td><td>49</td><td>7</td></tr> <tr><td>2</td><td>9</td><td>50</td><td>12</td></tr> <tr><td>9</td><td>2</td><td>57</td><td>8</td></tr> <tr><td>10</td><td>9</td><td>58</td><td>12</td></tr> <tr><td>17</td><td>3</td><td>65</td><td>9</td></tr> <tr><td>18</td><td>9</td><td>66</td><td>12</td></tr> <tr><td>25</td><td>4</td><td>73</td><td>10</td></tr> <tr><td>26</td><td>12</td><td>74</td><td>9</td></tr> <tr><td>33</td><td>5</td><td>81</td><td>11</td></tr> <tr><td>34</td><td>12</td><td>82</td><td>9</td></tr> <tr><td>41</td><td>6</td><td>89</td><td>12</td></tr> <tr><td>42</td><td>12</td><td>90</td><td>9</td></tr> </tbody> </table>	<u>Line No.</u>	<u>Hole</u>	<u>Line No.</u>	<u>Hole</u>	1	1	49	7	2	9	50	12	9	2	57	8	10	9	58	12	17	3	65	9	18	9	66	12	25	4	73	10	26	12	74	9	33	5	81	11	34	12	82	9	41	6	89	12	42	12	90	9
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1443 CARRIAGE FUNCTION TEST F884-F885
HANDLING FLOW CHART



PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 1443	REMARKS
F887-0	Checks the mechanical operation of the 1443 Printer (Printer timing for various areas of type bar motion.)		1443 must be at minimum EC 125859. CPU-Meter Switch must be in CE-mode and CPU-Check Switch must be set to disable.
F888-0	Checks the mechanical operation of the carriage emitter, brushes and print gate. Prints timing for these units.		Carriage Test Tape must be installed. Use the same tape as used with F885-2.
F88B-2	Checks reading into and out of the print buffer and checks the PCC counter.		

1443 PRINTER SCAN TESTS F887-F88B
HANDLING FLOW CHART



PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 1050	REMARKS
F900 1 2 3 4 5 6	<u>Typewriter Function Test</u> (F900 - F902) Checks TIO, SIO, Busy Condition after SIO, Sense Command and I/O Interrupt Function Checks Halt I/O, invalid command and count in CCW. Checks Carriage Return, Char., Audible Allarm, Device End and proper Status. Types all lower and upper case characters via Command and Data Chaining. Types three lines of Ripple-Print. Checks Not Ready to Ready Interrupt, Attention Interr. and Cancel Function.	43	<u>Note for F900 to F902:</u> Follow the Output Instruction. Note: To run programs 3F01 through 3F06 on a 2030 with PMS and <u>no</u> I/O compatibility features, all PMS bits must be <u>on</u> . 3F07 and up cannot be run under these circumstances.
F901 1 2 3 4 5 6 7.	Checks Print Clutch, Latching and Tripping. Tests all Tilt and Rotate Functions. Types all combined Tilt and Rotate Tests Checks Backspace Function. Special Feature. Checks Data Command Codes Checks Ribbon Shift Feature. 1052 Space Test	43	Rout. 6 for Mod. 30 only. To check End of Line, set line width to 100.
F902 1 to 8	Checks Keyboard Entry. 1st Row Lower Case through 4th Row Upper Case.	43	

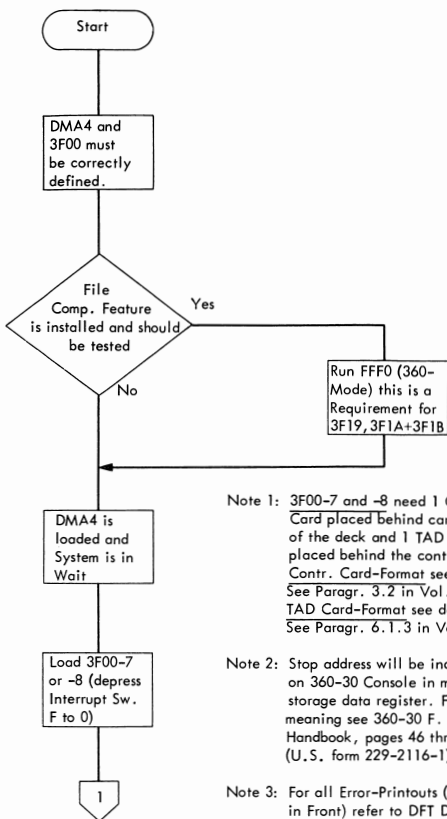
PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
3F00-7 and -8	<p>1. This is a Progr. to initialize the /360 - Storage and switch to the 1400 Micro-Progr. for simulating the 1400 - Progr.</p> <p>2. It is possible to generate a CID - Deck for Customer use.</p> <p><u>Note:</u> The Comp. MDPs (3F01 to 3F1C) should always run with 3F00, not with the CID (<u>Tad-Troubles</u>).</p>	43	<p>3F00-7 and -8 need 1 Control Card placed behind Card 78 of 3F00. See Section 3.2.1 in Descr. for punching this card. A <u>Tad-Card</u> must be placed behind the Contr. Card. See Sect. 6.1.3 in Descr. for punching the Tad-Card.</p> <p><u>Important:</u> PMS (Prog. -Mode-Switch) must only be defined for DFT's 3F01 through 3F06 DFT's for I/O Compat. (3F07 up) <u>cannot</u> run with PMS defined.</p> <p><u>Loader Input:</u> Must be Comp. controlable 1402 or 1442.</p> <p><u>Hard Copy Output:</u> Must be in Comp. controlable 1403 or 1443.</p> <p><u>Sense Switches in Section:</u> <u>SSW31 ON:</u> A CID-Deck including 3 Card Hex Loader is punched. <u>SSW7 ON:</u> A CID list is printed. <u>For other SSW</u> see Section 3.2.2 in Descr.</p>
3F01-3	Checks the 1400 Comp. CPU Functions. Features are selected by Tads, see 3F00-7/-8 Descr. Paragr. 5.1.	43	<p><u>SSW F ON</u> if the system has the Period-Comma-Inversion Feature. (Only for 3F01)</p> <p><u>Note:</u> Standard uses for Sense Sw. "B" to "G" see 3F00 Descr. Paragr. 5 & 6 (for all Comp. MDPs).</p>

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
3F02-0 to 3F05-0	3F02 to 3F05 checks also 1400 Comp. CPU-Functions. <u>Features</u> are selected by Tads, see 3F00-7/-8 Descr. Paragr. 5.2 through 5.5	43	
3F06-2	PMS (Progr. Mode Sw.) Feature is tested.	43	<p><u>Sense Switches:</u> 0, 1, 3, 7, and 24 see 3F06 Description Paragraph 3.2.</p> <p><u>Important:</u> If the system has 16K of storage, 3F00 must be set up for 4K of Compatibility Storage or less. Compatibility Storage must not extend below Storage Location 2FFF.</p> <p>3F06 must run with 3F00 (not CID) separate.</p>
3F07-2	Checks 1402/2540 Rdr. / Punch - Functions	43	3F07 should not be chained due to card manipulations.
3F08-2	Checks Punch - Feed - Read - Feature (1402/2540)	43	3F08 should not be chained due to card manipulations.
3F09-1	Checks Column - Binary - Feature (1402/2540)	43	3F09 should not be chained due to card manipulations.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS																																																				
3F0C-1	Checks the Printer Comp. Function (Print-Form) Control and Branch on Channel - Instructions (1403)	43	<p>Prior to starting this test, the carriage tape should be installed and the carriage restore key depressed. This tape should be punched as follows:</p> <table border="1" data-bbox="1232 314 1790 664"> <thead> <tr> <th><u>Tape Line</u></th> <th><u>Hole Punched</u></th> <th><u>Tape Line</u></th> <th><u>Hole Punched</u></th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td><td>49</td><td>7</td></tr> <tr><td>2</td><td>9</td><td>50</td><td>12</td></tr> <tr><td>9</td><td>2</td><td>57</td><td>8</td></tr> <tr><td>10</td><td>9</td><td>58</td><td>12</td></tr> <tr><td>17</td><td>3</td><td>65</td><td>9</td></tr> <tr><td>18</td><td>9</td><td>66</td><td>12</td></tr> <tr><td>25</td><td>4</td><td>73</td><td>10</td></tr> <tr><td>26</td><td>12</td><td>74</td><td>9</td></tr> <tr><td>33</td><td>5</td><td>81</td><td>11</td></tr> <tr><td>34</td><td>12</td><td>82</td><td>9</td></tr> <tr><td>41</td><td>6</td><td>89</td><td>12</td></tr> <tr><td>42</td><td>12</td><td>90</td><td>9</td></tr> </tbody> </table>	<u>Tape Line</u>	<u>Hole Punched</u>	<u>Tape Line</u>	<u>Hole Punched</u>	1	1	49	7	2	9	50	12	9	2	57	8	10	9	58	12	17	3	65	9	18	9	66	12	25	4	73	10	26	12	74	9	33	5	81	11	34	12	82	9	41	6	89	12	42	12	90	9
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2	9	50	12																																																				
9	2	57	8																																																				
10	9	58	12																																																				
17	3	65	9																																																				
18	9	66	12																																																				
25	4	73	10																																																				
26	12	74	9																																																				
33	5	81	11																																																				
34	12	82	9																																																				
41	6	89	12																																																				
42	12	90	9																																																				
3F10-0	Checks the 1442 Rdr. / Punch Comp. Functions	43	Follow the Output-Instructions.																																																				
3F13-1	Checks the 1443 Print - Form Control - Functions	43	3F13 needs a Diagnostic Carriage Tape like the one used for 3F0C-2.																																																				
3F16-2	Checks all Tape Comp. Functions.	43	Tapes must be defined correctly as 7 or 9 Track. Drives in Control Card of 3F00. Sense Switch Option see 3F16-2 Description Paragraph 3.2.1.																																																				

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS
3F19-3 3F1A-0 3F1B-0	Checks all 2311/1311 File Compatibility Functions. These programs contain 23 routines. Section 3F19 contains Routines 01 through 13; 3F1A contains Routines 14 and 15; 3F1B contains Routines 16 through 23. Refer to Section 5 of Program Description 3F19* for a description of each routine.	43	2311 File must be initialized by section FFF0. 3F19, 3F1A, and 3F1B must be loaded and run in the preceding sequence. Follow printouts for setting Compare Disable Switch.
3F1C-1	Checks the Console-Printer Comp. Function	43	A or H Type Ball and Comp. Keytops should be mounted.
3F1D-0 and 3F1E-0	Checks the Sterling Feature	43	World Trade only Sterling Feature must be installed.

1400 COMP. TESTS 3F00 to 3F16
HANDLING FLOW CHART



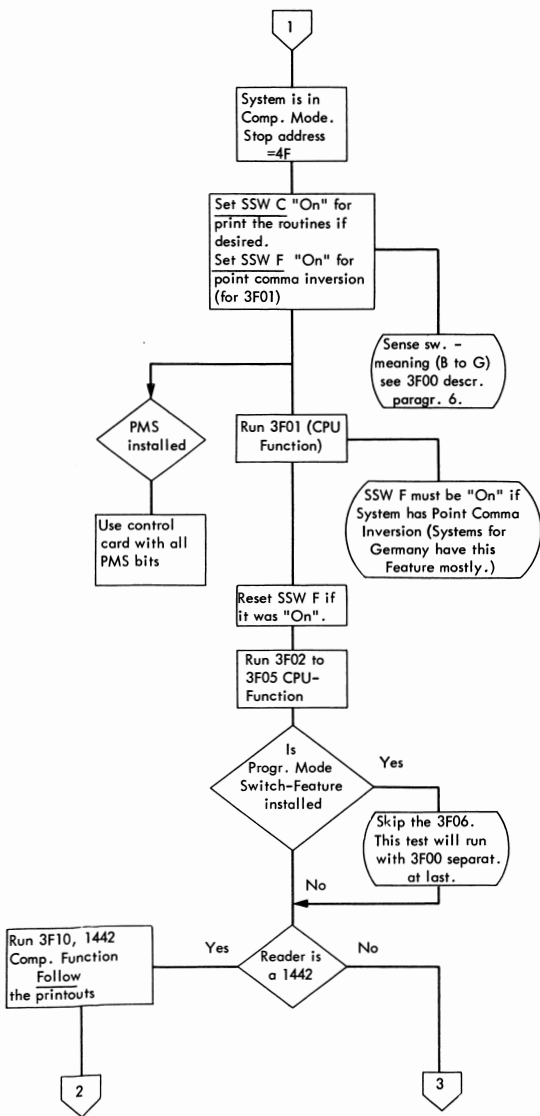
Note 1: 3F00-7 and -8 need 1 Contr. Card placed behind card 78 of the deck and 1 TAD Card placed behind the contr. card. Contr. Card-Format see descr. See Paragr. 3.2 in Vol. 43. TAD Card-Format see descr. See Paragr. 6.1.3 in Vol. 43.

Note 2: Stop address will be indicated on 360-30 Console in main storage data register. For meaning see 360-30 F. E. Handbook, pages 46 thru 49 (U.S. form 229-2116-1)

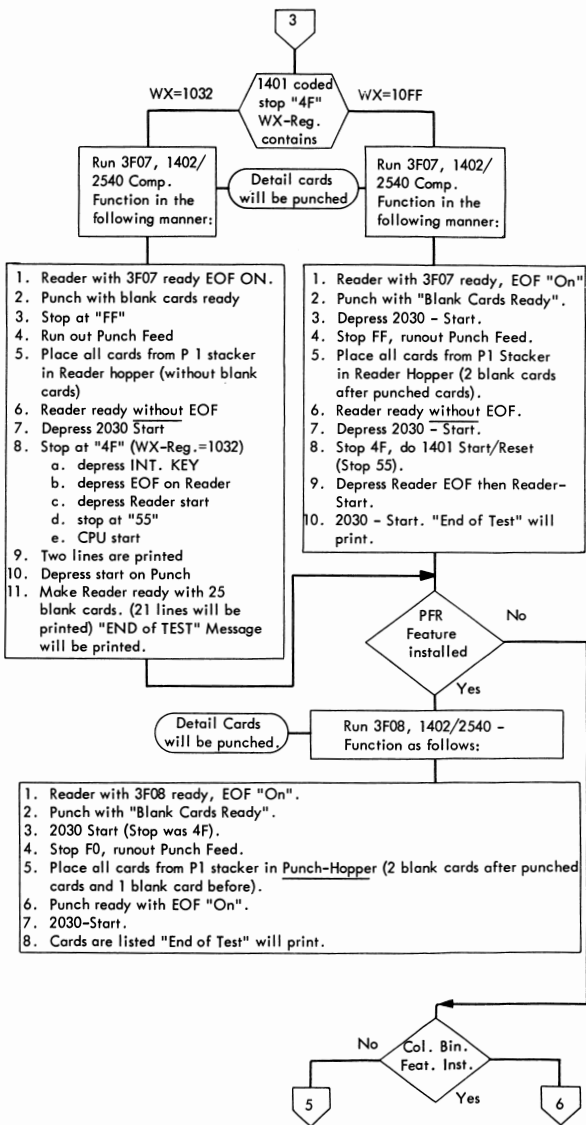
Note 3: For all Error-Printouts (Asterisk in Front) refer to DFT Descr.

Note 4: To run programs 3F01 through 3F06 on a 2030 with PMS and no I/O compatibility features, all PMS bits must be on. 3F07 and up cannot be run under these circumstances.

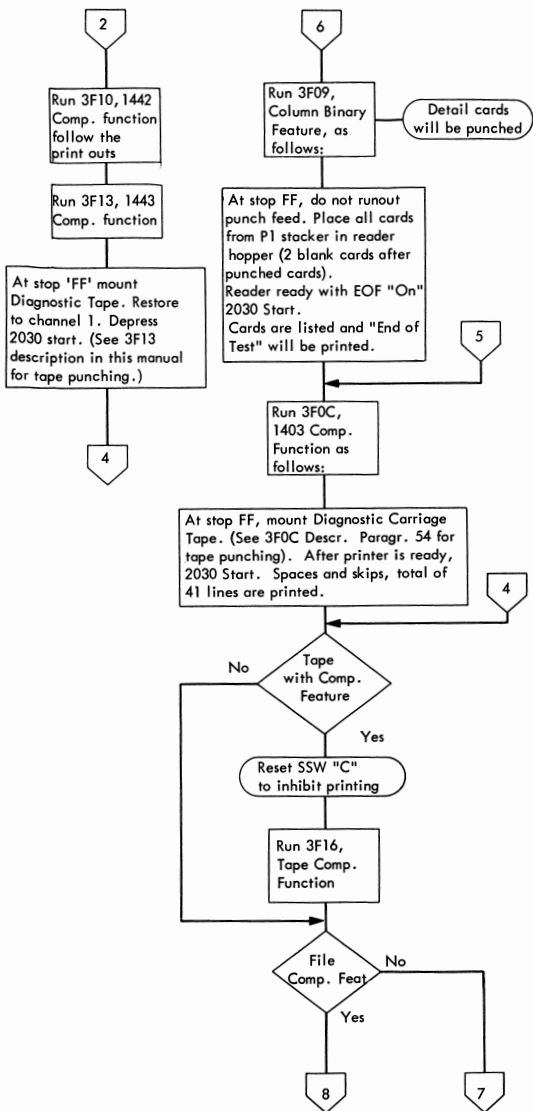
1400 COMP. TESTS 3F00 to 3F1C (continued)
HANDLING FLOW CHART



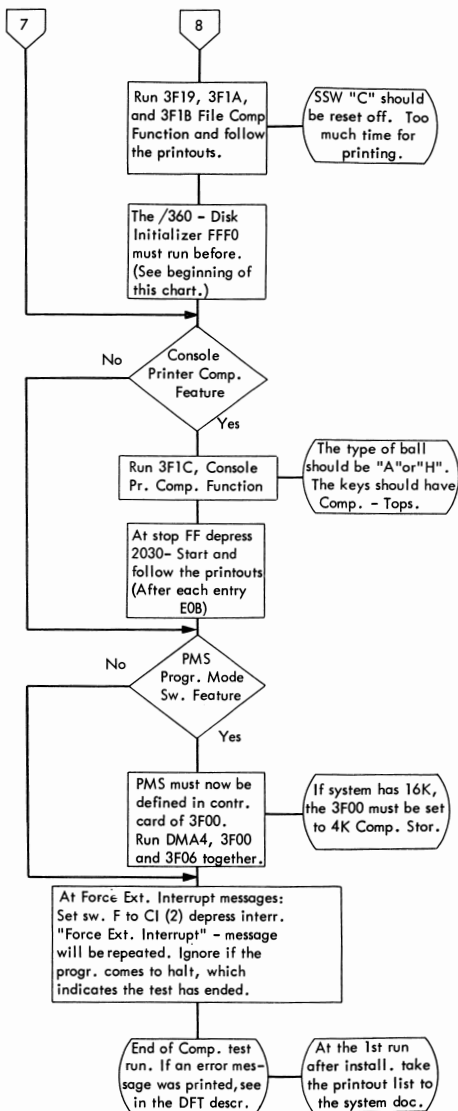
1400 COMP. TESTS 3F00 to 3F1C (continued)
HANDLING FLOW CHART



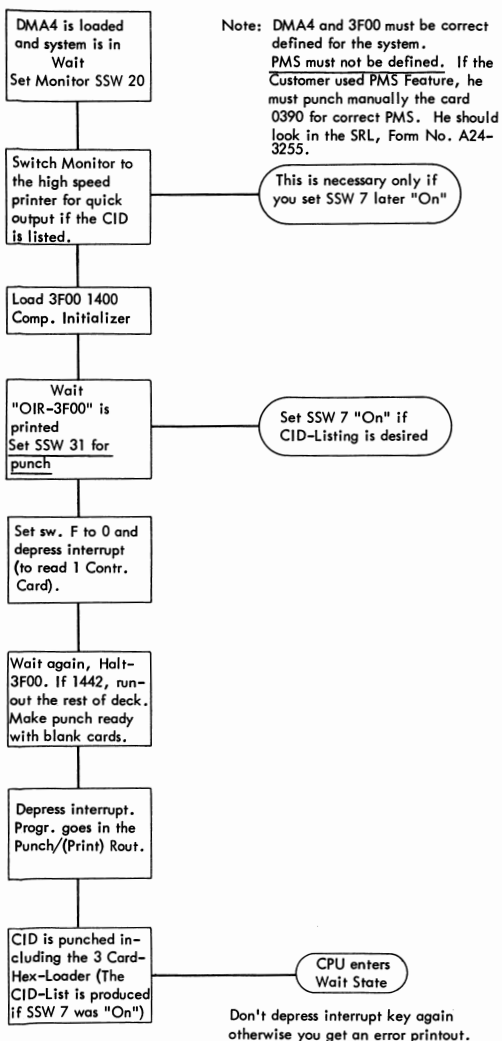
1400 COMP. TESTS 3F00 to 3F1C (continued)
HANDLING FLOW CHART



1400 COMP. TESTS 3F00 to 3F1C
HANDLING FLOW CHART



1400 - CID - GENERATION FLOW CHART
HANDLING FLOW CHART



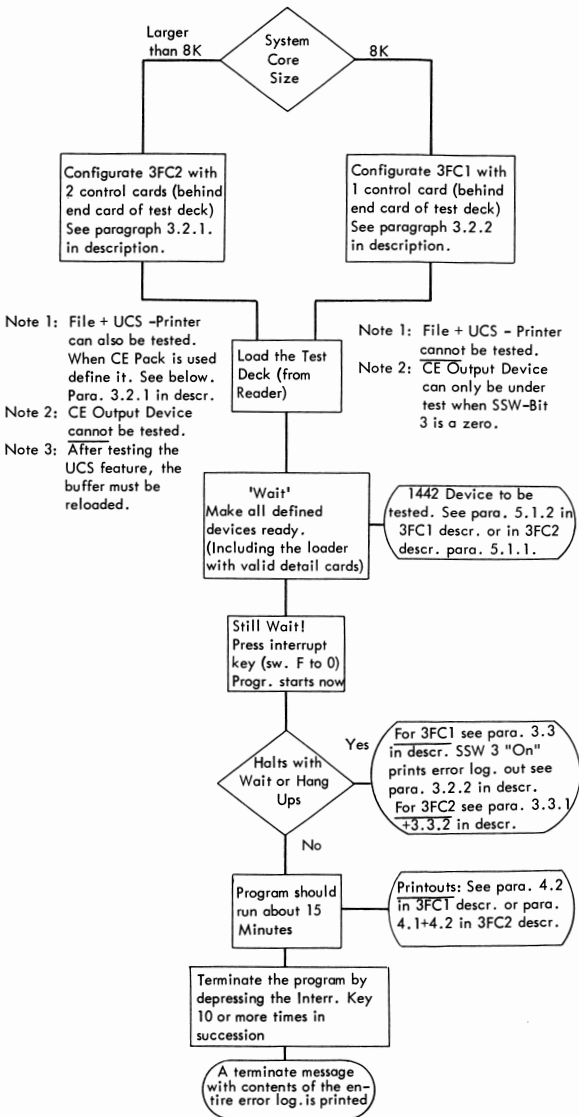
PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 1620	REMARKS
3F40-0	Initializer - Moves DMA4 to Hex Address 2000 at Test Start. Restores DMA4 at Test End or Abnormal Termination.		
3F41	Tests 1620 Non-Disk I/O Instructions		
3F42	Tests Set Flag Instructions		1. These tests do not utilize I/O Devices. Their Purpose is to test 1620 I/O instructions and the Compat. Feature. The sections of this program must be run in sequence, starting with 3F40.
3F43	Tests Microprogram Translation - 1620 to 360		
3F44	Tests Microprogram Translation - 360 to 1620		2. PSW Restart is not possible in this series of programs.
3F45	Tests I/O Translation		
3F46	Tests 1620 CPU Instructions		
3F47	Tests 1620 File Operations		
3F48	Tests 1620 File Operations		
3F49	Tests Disk Sector Operations		
3F4A	Tests Data Movement into and out of 1620 Storage for Disk Track Operations		
3F4B	Tests Data Movement into and out of 1620 Storage for Disk Track Operations		
3F4C	Tests Address Conversion		

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
3FC1-3	<p><u>2030 System Test 8K</u> Checks the whole system with all variations of I/O operations. Intermittent, timing sensitive or program oriented troubles will be detected. The test should run about 15 minutes. (Routines are described under Paragr. 5.1.1 in 3FC1 Description)</p> <p>Notes: The CE Output Device can <u>only</u> be used as a Test-Device if Sense Switch Bit 3 is zero.</p> <p>I/O Devices to be tested must have the following conditions: Printer - must be ready with a carriage tape in which at least one hole is punched in every channel. 2540 Reader - must be loaded and ready with a detail deck punched on any punch by this program. 2540 Punch - must be loaded and ready with blank cards. Number of cards used depends on length of time the test should run. 2540 1052 - if the proceed light comes on, type in 1 to 90 characters in any combination. Tape - must be ready with a NOT-FILE-PROTECTED scratch tape. 2400</p>	40	<p>3FC1 = a Stand Alone Program for an <u>8K System</u> loaded from card only. <u>File + UCS-Printer</u> cannot be tested.</p> <p><u>1 Control Card</u> appended to the deck as the last card (behind the end card) is necessary. To punch this card, see Paragraph 3.2.1 in the 3FC1 Description.</p> <p><u>SSW-Meaning</u> see list under Paragraph 3.2.2 in Description.</p> <p><u>SSW-Setting</u> is done manually, store in Main-Storage 004C, or by depressing interrupt key when system is running or by contr. card col. 1-4. See Paragr. (3.2.2) 3.2.3 in Descr.</p> <p><u>Printouts:</u> See Paragr. 4.1 in Description.</p>

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
3FC2-2	<p><u>2030 System Test 16 K</u> Checks the whole system with all variations of I/O operations. Intermittent timing sensitive or program oriented troubles will be detected. The test should run about 15 minutes. File and UCS-Printer can also be tested.</p> <p>Notes: The CE Output Device <u>cannot</u> be used as a device under test.</p> <p>I/O Devices to be tested must have the following conditions:</p> <p>Printer - must be ready with a carriage tape in which at least one hole is punched in every channel. Forms control skips can be suppressed by use of Sense Switch Bit 6.</p> <p>Reader - must be loaded and ready with a detail deck punched on any 2540 punch by this program.</p> <p>Punch - must be loaded and ready with blank cards. 2540</p> <p>1052 - must be ON-LINE.</p> <p>Tape - must be ready with a NOT-FILE-PROTECTED scratch tape.</p> <p>Disk - this program will run all 2311 files which it finds in a ready status. Two option bits in the File definitions may be combined to define a C. E. PACK on which writing is to be suppressed. Refer to Paragraph 3.2.1 in the Description</p>	40	<p>3FC2 = a Stand Alone Program for a 16K System or larger.</p> <p><u>2 Control Cards</u> appended to the deck as the last cards (behind the end card) are necessary. To punch these cards, see Paragr. 3.2.1 in Description.</p> <p><u>SSW-Meaning</u>: See list under Parag. 3.2.2 in Description.</p> <p>Mainstorage Pos. 1858 = SSW-Area.</p> <p><u>SSW-Setting</u> can be done in 3 ways:</p> <ol style="list-style-type: none"> 1. By 1. control card columns 1-4. 2. Manually stored in main-storage. 3. Pressing interrupt key when system is running. See Paragr. (3.2.2) 3.2.3 in Description. <p><u>Printouts</u>: See Paragr. 4.1 in Description.</p> <p><u>Progr.-Halts</u>: System in Wait, see Paragr. 3.3.1 in the Description.</p> <p>Note 1: In 1st Contr. Card Col. 1-18 may not contain <u>ANY</u> blanks</p>

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
3FC2-2	(continued)	40	Note 2: Version 2 will not support simultaneous TCU operation. Test the channels one at a time without tapes defined on the channel not under test.

SYSTEM TEST 3FC1 and 3FC2
HANDLING FLOW CHART



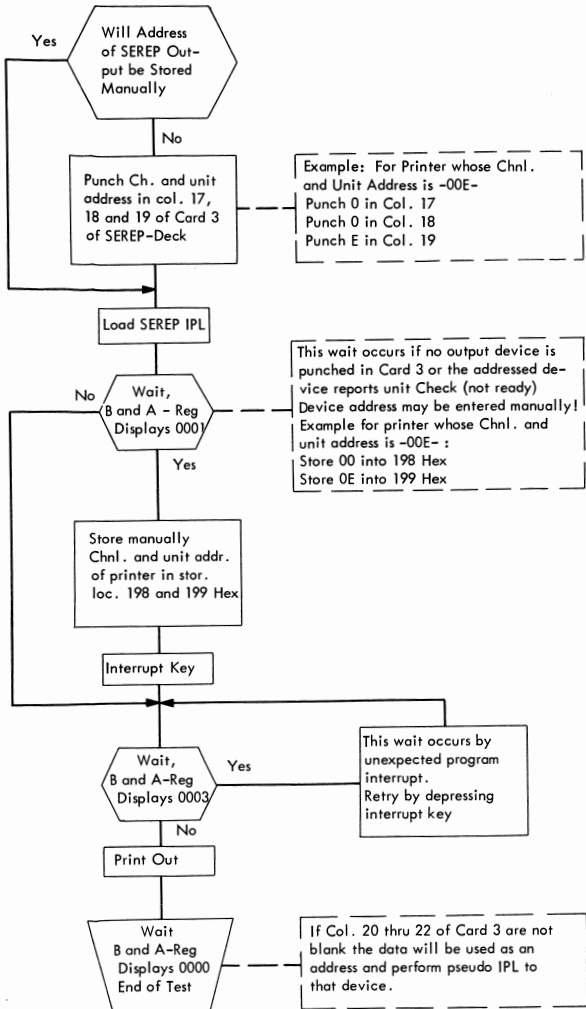
PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. #	REMARKS																				
3FD0-3	<p>This is a simple program for handling any I/O operation. The program has 5 portions:</p> <table border="0"> <tr> <td>1. 3 Card Hex Loader</td> <td>Card</td> <td>1 to</td> <td>3</td> </tr> <tr> <td>2. General I/O Exerciser</td> <td>"</td> <td>4</td> <td>11</td> </tr> <tr> <td>3. File Exerciser</td> <td>"</td> <td>12</td> <td>17</td> </tr> <tr> <td>4. Tape Exerciser</td> <td>"</td> <td>18</td> <td>24</td> </tr> <tr> <td>5. Printer Exerciser</td> <td>"</td> <td>32</td> <td></td> </tr> </table> <p>Note: All common I/O Operations can be exercised by changing the Unit Address, Command and/or Data Cards.</p> <p>Examples for handling:</p> <ol style="list-style-type: none"> 1. Load the whole progr., branch card (32) is placed last, the printer routine runs. The Device-Address, Command or data can be changed by punching the cards manually and reloading the program or changing main-storage manually. 2. Place the branch card (32) behind the Tape Routine (card 24) and load the program. Now the tape routine runs. 3. Enter a very simple program with 1050-Console by using the 3 card hex loader (3 cards only). This procedure is described in 360 Diagnostic SA No. 4. 	1. 3 Card Hex Loader	Card	1 to	3	2. General I/O Exerciser	"	4	11	3. File Exerciser	"	12	17	4. Tape Exerciser	"	18	24	5. Printer Exerciser	"	32		40	<p>In card 27 of 3FD0-2 is a wrong Device-Addr. = 010. Change this Addr. to 00E for 1403 for example.</p> <p>The 3 card hex loader uses the mainstorage 01F4 to 02D1 (hex).</p>
1. 3 Card Hex Loader	Card	1 to	3																				
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3. File Exerciser	"	12	17																				
4. Tape Exerciser	"	18	24																				
5. Printer Exerciser	"	32																					

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
3FD1-0	LSMAP provides a Formatted Printout of the 360/30 Local Storage on a printer or typewriter.	40	<p>The Output Device must be difined in Card 0004 in Col. 17, 18 and 19, or manual by Console Switches F, G, H, J and Console Interrupt Key.</p> <p>This test needs MICRO Document Cards Version 995 blue tabs inserted in Pos. 29-0, 29-1, 31-2 through 31-5.</p> <p>3FD1-0 is a Stand Alone Program that is IPL loaded.</p>

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS
3FE1	<p><u>Serep</u></p> <p>Reports the contents of the hardware and storage as they exist when Serep is loaded.</p> <p>It is used to analyze errors which have occurred on the machine.</p> <p>Provide a limited umpt of General Purpose Registers, CAW, CSW, and PSW's etc. . For example, Serep may be loaded if customers Progr. (BPS, BOS, DOS or TOS) goes in WAIT State with FFFF in A & B Reg. Serep always clears the logout area after running. It stores the following pattern into the Old Machine Check PSW:</p> <p style="text-align: center;">E2C5D9C5D7D9C6C2</p> <p>This pattern, if printed out, will show that no Machine Check has occurred since the last time Serep was run.</p> <p>Customers program may provide an interface with Serep in order to obtain a detailed print-out of error conditions.</p> <p><u>Serep with version -0 or -1</u> interrogates a byte in Hex Pos. 32.</p> <p>Note: All BPS and <u>8K</u> BOS use byte 32. The meanings of this byte are:</p> <p style="margin-left: 40px;">0F = Channel Error 1F = Device Error 3F = Not Operational</p> <p><u>Serep with version -2</u> interrogates 2 bytes in Hex Pos. 32 and 73. See Vol. 40 1st page of 3FE1-2-Progr. List for further modifications.</p>	40	Can be loaded via IPL only. Channel and Unit Address of the printer to be used by Serep must be inserted into the program or manually after WAIT.

PROG. ID ROUTINE #	WHAT IS TESTED ? (PURPOSE, DESCRIPTION)	VOL. # 2030	REMARKS																								
3FE1	<p><u>Serep</u> (continued)</p> <p>Note: 16K DOS or 16K TOS use byte 73 or 59. The meanings of these bytes are:</p> <p style="padding-left: 40px;">0F = Channel Error 2F = Channel Failure O/S 360 only 3F = Not operational For any other value SEREP assumes Machine Check.</p> <p><u>Heading Abbreviations of the Printout</u></p> <p>For PSW's:</p> <table style="margin-left: 20px;"> <tr><td>SM</td><td>System Mask</td></tr> <tr><td>K</td><td>Storage Key</td></tr> <tr><td>S</td><td>State of the System - AMWP bits</td></tr> <tr><td>CODE</td><td>Interruption Code</td></tr> <tr><td>C</td><td>Condition and Instruction Length Code</td></tr> <tr><td>M</td><td>Program Mask</td></tr> <tr><td>ADDRESS</td><td>Next Instruction Address</td></tr> </table> <p>For CSW:</p> <table style="margin-left: 20px;"> <tr><td>KEY</td><td>Storage Key for the I-O Operation</td></tr> <tr><td>CMD-ADR</td><td>Next CCW Address</td></tr> <tr><td>US</td><td>Unit Status</td></tr> <tr><td>CS</td><td>Channel Status</td></tr> <tr><td>COUNT</td><td>Residual Count from Last CCW</td></tr> </table>	SM	System Mask	K	Storage Key	S	State of the System - AMWP bits	CODE	Interruption Code	C	Condition and Instruction Length Code	M	Program Mask	ADDRESS	Next Instruction Address	KEY	Storage Key for the I-O Operation	CMD-ADR	Next CCW Address	US	Unit Status	CS	Channel Status	COUNT	Residual Count from Last CCW	40	
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SYSTEM ERROR RECORDING EDITED PRINTOUT-SEREP-3FE1
HANDLING FLOW CHART



IBM Field Engineering Diagnostic Section Reference Manual - Form No. 229-2127-0

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Circle one of the comments and explain in the space provided:

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