

CONTROL DATA[®]
6400/6500/6600
COMPUTER SYSTEM

INSTANT SMM

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CORPORATION

MAINTENANCE
SYSTEMS ENGINEERING

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PREFACE

SMM is a maintenance system designed solely for running tests on 6X00 computers and associated peripheral devices. This manual contains deadstart settings, console commands, standard parameters, standard error codes and standard test operation under other operating systems. It does not contain detailed hardware or software descriptions.

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SYSTEM DISPLAY {CPC}
COMMANDS

KEYBOARD ENTRIES

XY. {CR}

Sets X display on left screen
Sets Y display on right screen
Choices for X,Y=A,B,C,D,E,F,G {see
Displays}

XN,A. {CR}

Sets field N of display X to display 10
words of memory from address A.
X may be C,D or E.
N may be 0,1,2,3 or 4
N=4 sets all fields

A,V. {CR}

Stores value V in address A+RA
or enter: LA,V. {CR} to left justify
entry

A+V. {CR}

Stores value V in address A+RA and up-
dates A by 1

A,N,V. {CR} or A+N,V.

Stores value V in byte N of address A+RA.
N may be 1,2,3,4 or 5 if display E
is in use.
N may be 1,2,3 or 4 if display C or D is in
use.

ENRA,V. {CR}

Replaces RA with value V.

ENP,V. {CR}

Replaces P with value V.

ENYZ,V. {CR}

Enters value V into register YZ. Y may
be A,B or X; Z may be 0-7.

ENXY,Z,V. {CR}

Enters value V into byte Z of X register Y.
Y may be 0-7; Z may be 1-5.

ENFL,V. {CR}

Replaces FL with value V.

ENBKP,V. {CR} or BKP,V. {CR}

Sets breakpoint address to value V. If BKP is used the CPU is started after the entry.

TEST. {CR}

Sets up test mode where the P register is continually monitored for breakpoint address.

RUN. {CR}

Sets up RUN mode where the CPU runs until BKP is reached. If BKP is reached, the CPU is exchanged out and the BKP address is restored.

ENEM,V. {CR}

Sets EM to value V.

ENRAX,V. {CR}

Sets RAX to value V.

ENFLX,V. {CR}

Sets FLX to value V.

ENMA,V. {CR}

Sets MA to value V.

EXCH,V. {CR}

Sets exchange address to value V. RA is not added to V.

GO. {CR}

Causes loader operation to continue after stopping on an error condition.

X.GO. {CR}

Causes PPX to start running after it has stopped.

X.MNE. {CR} or X.MNE,CCEE. {CR}

Causes loader to load program MNE. If CCEE is used, the channel and equipment is stored for PP tests or CCEE = RA for CPU tests.

LBC,V. {CR} or LBC,V,CCE. {CR}

Loads binary cards from reader to CM address RA+V until EOF. If the reader is not on channel 12, equipment 4, use the CCE entry. CC=channel, E=equipment 4, 5, 6 or 7.

L8DC,V.{CR} or L8DC,V,CCE. {CR}

Loads 80 column binary cards from reader to CM address RA+V until EOF. Use the CCE entry, if the reader is not on channel 12, equipment 4. E may be 4, 5, 6 or 7.

MTP,V. {CR}

Transfers program at CM address {RA+V+1} to the next available PPU. Upper byte of V must be non-zero.

SMP,V. {CR}

Value V is stored in Dead Start panel word 13 and SMM tape is dead started.

X.HOLD. {CR}

Gives display control to PPX. CAUTION - if PPX is not displaying, system communication will be lost.

DROP. {CR}

Sets PP10 {CPC} to dead start conditions.

X.DROP. {CR}

Sets PPX to idle conditions.

SET,FWA,LWA,V. {CR}

Sets all bytes to value V from location FWA+RA up to and including location LWA+RA.

DCNX. {CR}

Disconnects channel X.

FCNX. {CR}

Sends a release function to device on channel X.

MCHX. {CR}

Master clear the `bbbl` on channel X.

ACNX. {CR}

Activates channel X.

X.STOP. {CR}

Causes PPX to stop on its next pass through its display loop.

X.DIS. {CR}

Gives display control to PPX. If PPX is not using the display at least once every 500 msec., display control is returned to CPC.

T1. {CR}

Loads a test list of 1-8 programs. Normally set to load DF1, DT2, MTT, LPT, CP1, CR1, DS1, and EXC.

T1, MN1, MN2, MN3, MN4, MN5, MN6, MN7, MN8. {CR}

Alters the T1 entry to load the tests specified by MNX. From 1-8 tests may be called, providing there is available PPU's.

AUTO. {CR}

Initiates the SMM system for multi-programming use.

SPECIAL FIRST CHARACTER ENTRIES

- + Advances all memory displays by 40_g locations.
- Decrements all memory displays by 40_g locations.
- * Toggles CPU controls from CPU0 to CPU1 - 6500's only.
- {CR} Sets repeat entry flag.
- {Backspace} Stops CPU currently running and selected.
- {Space} Starts CPU currently selected.

SYSTEM DISPLAYS

- A Both input and output exchange packages are displayed when CPU is stopped. Only input package is displayed when CPU is running.
- B Displays input exchange package.
- C 4 fields of 10 CM words each are displayed. Words are displayed in 4 groups of 15 bit bytes. Instruction code conversions appear opposite octals.
- D Same format as 'C' display without code conversion.
- E 4 fields of 10 CM words each in 5 groups of 12 bit bytes are displayed. Display code conversions appear opposite octals.
- F Fake display {used to speed up CPU tests}.
- G AUTO mode PPU system display.

DEAD START SETTINGS

TO LOAD 80 COLUMN BINARY CARDS

<u>Address</u>	<u>Contents</u>	<u>Description</u>
0001	75CC	Deactivate channel CC.
0002	77CC	Connect card reader E.
0003	E000	
0004	77CC	Select binary mode.
0005	0001	
0006	77CC	Select bbb1 to read.
0007	1500	
0010	2000	Load word count.
0011	77b0	
0012	74CC	Activate channel CC.
0013	71CC	Input to address 0.
0014	0000	

TAPE DEADSTART ON CHANNEL 4, 5, 6 or 7

A deadstart card must be obtained by assembling and punching program {PTL} on the SMM program library. PTL assumes card reader on channel 12, tape on channel 7, equipment 5, unit 0. PTL must be modified if this is not the case.

<u>Address</u>	<u>Contents</u>	<u>Description</u>
0001	75CC	Disconnect channel CC.
0002	77CC	Connect equipment E.
0003	E000	
0004	77CC	Set binary mode.
0005	0001	
0006	77CC	Read
0007	1400	
0010	74CC	Activate CC.
0011	71CC	Input to 7bbb.
0012	7bbb	
0013	SSSS	SMM parameters.
0014	MMMM	SMM/MACE parameters.

E may be 4, 5, 6, or 7.

LOAD BINARY CARDS

<u>Address</u>	<u>Contents</u>	<u>Description</u>
0001	75CC	Disconnect channel CC.
0002	77CC	Connect reader E.
0003	E000	
0004	77CC	Set bb81 to read.
0005	1400	
0006	74CC	Activate channel CC.
0007	71CC	Input to address 7666.
0010	7666	
0011	XXXX	
0012	XXXX	
0013	XXXX	
0014	XXXX	

Card 1 of the deck must be removed and replaced with a special loader card. The deck must terminate by a card with a b789 punch in column 1. The special loader card may be obtained by assembly of a program called DSCL on the SMM program library tape. Use a COMPASS {I=COMPILE,B=PUNCHB} card after the program library call card.

TAPE DEADSTART ON CHANNEL 12 OR 13

<u>Address</u>	<u>Contents</u>	<u>Description</u>
0001	75CC	Deactivate channel CC.
0002	77CC	Connect tape.
0003	E00U	Equipment E Unit U
0004	77CC	Rewind tape
0005	0010	
0006	77CC	Set 6681 to read
0007	1400	
0010	74CC	Activate channel
0011	71CC	Input to address 6606
0012	6606	
0013	SSSS	SMM Parameters
0014	MMMM	SMM/MACE parameters

SMM Parameters

SSSS = 0000	Load MACE
= 0010	Load SMM from tape
= XXXZ	Disc load {Z=device 1-4, XXX=track}*see MMMM for word 14=CCUE, see below for Z
= 4XXZ	Load SMM and suppress CM features
= XX20	Load ENS Mode I or II {XX}
= 0040	Load dump routine
MMMM = 0000	Request storage device
= 0YXX	Load MACE on device XX, if Y=4, use CPU1.
= 10XX	Recovery on device XX.
* = CCUE	Chan, unit, equipment of disc for SMM. If bit 11 is set, SMM will write the en- tire SMM tape on disc device Z starting with XXX of word 13 on channel CC, equipment E, unit U. If bit 11 is clear, SMM will load on disc device Z starting from XXX on channel CC, equipment E, unit U.
	Z = device code {1-4}
	1 - load on 808
	2 - load on 6603
	3 - load on 813/814
	4 - load on 853/854

PS COMMANDS

KEYBOARD ENTRIES

02YYW20XX {CR}

Sets display field YY to display 100_8 words of PP memory from address XX. YY may be 0, 4, 10 or 14.

0221W0222 {CR}

Activates the breakpoint option in PS. Locations 76 and 77 must be set equal to the breakpoint address before this command is executed.

0221WXXXX {CR}

Start executing the test at address XXXX.

YYYY+XXXX {CR}

Stores XXXX at address YYYY and adds 1 to YYYY. If the {+} sign is not present, YYYY will not be incremented by 1.

SPECIAL FIRST CHARACTER ENTRIES

- D Returns display control to CPC.
- S Stops test and displays PP memory on right screen.
- R Restart test over.
- {blank} Clears {+} key used for incrementing P address.
- {space} Starts test running again.

EXC COMMANDS

KEYBOARD ENTRIES FOR EXC

TL, MN1, MN2, MN3, MN4. {CR}

Load from 2 to 4 tests specified by MNX.

CP1. {CR} {b500's only}

Sets up EXC for running CPU1 instead of CPU0.

Note: This entry must be made before the TL entry if CPU1 is to be used.

EX, Z. {CR}

Sets exchange rate Z in EXC. Z may be 0-7777.

D

Releases display to CPC {system display}.

Note: When running EXC with overlay programs {DF8, DF4, DR5, LP1, etc.} one of the following procedures should be used: Do not initially load EXC.

1. If only 1 overlay program is to be run, load it into PP1 only and then load and run EXC.
2. If CM size allows a setting of RA=100000, enter ENRA,100000.{CR} and then load and run EXC. This will allow any number of overlay programs to run.
3. Load all overlay programs sequentially from PP1. Set RA to X0000, where X = the last PP loaded. Then load and run EXC.

CENTRAL MEMORY TABLES

TABLES

<u>CM Address</u>	<u>Contents</u>
0	Zero
1	CPU type and number of banks of memory.
2	Field length and RA.
10	PPU-1 Input register.
11	PPU-1 Output register.
12-17	PPU-1 Message buffer
20-27	PPU-2 Communication area
30-37	PPU-3 Communication area
40-47	PPU-4 Communication area
50-57	PPU-5 Communication area
60-67	PPU-6 Communication area
70-77	PPU-7 Communication area
100-107	PPU-8 {CPC} Communication area
110-117	PPU-9 Communication area
120-127	PPU-10 Communication area
130-137	PPU-11 Communication area
140-147	PPU-12 Communication area
150-157	PPU-13 Communication area
160-167	PPU-14 Communication area
170-177	PPU-15 Communication area
200-207	PPU-16 Communication area
210-217	PPU-17 Communication area
220-227	PPU-18 Communication area
230-237	PPU-19 Communication area
240	CPC display communication flag
241	0000 00CC E00U 1524 0000

↑ display code MT
 ↑ tape unit number
 ↑ tape equipment number
 ↑ tape channel number

300-337	Channel reservation table--a non-zero value in the upper byte indicates that channel is being used. Location 300=Ch. 0, 301=Ch. 1, etc.
400-577	CPU0 exchange area
600-777	CPU1 exchange area
1000-100000	PPU1-7 and PPU9 program overlay table. 1000-7777=PP1, 11000-20000=PP2, 21000-30000=PP3, etc.

PPU SERVICE ROUTINES

PSP
KEYBOARD ENTRIES

MXXX {CR}

Changes display M to begin at address XXXX. M may be A, B, C or D.

EXXX {CR}

Changes A display to XXXX, B display to XXXX+100, etc.

X

Increments X display by 100. X may be A, B, C or D.

E

Increments the entire right screen fields by 400.

F

Removes or restores display.

G

Execute program starting at contents of 45.

S

Stop running program.

⌘

Set or clear sequence storing.

CM {CR}

Clear PPU memory locations 0-37 and 3000-7777.

PPX {CR}

Transfer PSP to PPX.

PMX,Y {CR}

Read 200 words from PPX at address Y,
and display on A and B fields.

RBCE,Y,X {CR}

Read X binary cards from card reader
channel C, equipment E, to address Y.

PBCE,Y,X {CR}

Punch X binary cards from Y on card
punch channel C, equipment E.

CCXY,WZ {CR}

Copy cards until double EOF from card
reader channel X, equipment Y to card
punch channel W, equipment Z.

WCX,Y,W {CR}

Write W central memory words from PP
address X to CM address Y.

RCX,Y,W {CR}

Read central memory {same as WC}.

WPX,N,P {CR}

Store N number of words of pattern P
starting at address X.

To loop on a program and retain display,
jump to address 0236 at the end of your
program.

To execute program once and retain display,
jump back to address 0232 at the end of
your program.

PST
KEYBOARD ENTRIES

S	Stops execution of program.
G	Restarts program that has been stopped.
+	Increments store address by one.
-	Decrements store address by one.
CC	Returns display to CPC.
ON	Forces memory display during program execution.
OFF	Turns off memory display.
DCNX	Disconnects channel X.
MCX	Master clears channel X.
CRXXYY	Sets card reader to channel XX and equipment YY.
CPXXYY	Sets channel XX and equipment YY for the card punch.
LPXXYY	Sets channel XX and equipment YY for the line printer.

If a program is started by entering address 21 with the starting address, the program will remain running when display control is given back to CPC by a 'CC' entry.

PSX

PSX is a 3000 peripheral service routine designed to allow the C.E. to make alpha keyboard entries to accomplish various I/O tasks. Runs under either SMM stand-alone or AUTO mode.

KEYBOARD ENTRIES

Entry	Function
RQCXX.	Sets up PSX to use channel XX. This must be the first I/O entry word.
RLCXX.	Releases channel XX to SMM for use by another PPU.
FCHX.	Functions the channel/bb8] with function X.
CONX.	Connects equipment on requested channel. X=connect code. {A}=bb8] status.
FNCX.	Functions equipment with function X. {A}=bb8] status.
OUTX.	Outputs X number of words from location 7000. X may be 1-1000. {A}=equipment status.
INPX.	Inputs X number of words to location 6000. 1500 read mode is used. X may be 1-1000. {A} = equipment status.
INRX.	Inputs X number of words to location 6000. 1400 read mode is used. X may be 1-1000. {A} = equipment status.
EST.	Takes equipment status and displays on left screen E=XXXX. {A}= equipment status.
CST.	Takes bb8] status and displays on left screen C=XXXX. {A}=bb8] status.
IO.	Transfers input buffer to output buffer area.
PXXXX.	Sets P address of PPU to XXXX.
MFXX.	Sets right screen memory display field F to XX times 100. F may be A, B, C or D.
ENT>F>L>X.	Sets X in PP memory from location F to location L.
XXXX.	Sets XXXX in PP memory at current P address.
D	Release display to SMM {CPC}.

G	Start program {which is in test mode} and make one pass starting from location 5000.
SPACE	Start program {which is in test mode} from location 5000 and run until S key is depressed.
S	Stop program running in test mode.
T	Set test mode.
{CR}	Set repeat entry flag.
Blank {55}	Clear test mode flag and reset P address to 5000.

OPERATION

If test mode is not set all I/O entries are executed as they are entered.

bb&l status {C}, {E} equipment status and the current {P} address are displayed at all times.

If test mode is set all I/O entries are stored in the current P address area {5000-5777} and not executed until a G or a space is entered. P is automatically updated for each entry made. Octal entries {XXXX.} may be mixed with I/O entries or they may be the only entries used.

Locations 20-b7 and locations 5000-5777 are reserved for operator use.

Locations 6000-6777 are reserved for the input buffer. If no input operation is to be performed this area may be used to store a program.

Locations 7000-7777 are reserved for the output buffer. If no output operation is to be performed this area may be used to store a program.

EXAMPLE

One wishes to read cards from card reader on channel 12, equipment 4 and punch the card on card punch channel 12, equipment 5 and output the card on line printer channel 11, equipment 6. Enter the following:

Entry	Description
T	Set test mode.
RQC12.	Sets up PSX to use channel 12.
CON4000.	Connects card reader.
FNC1.	Sends function 1 to card reader.
INP120.	Inputs 1 card.
I0.	Transfers input buffer to output buffer.
CON5000.	Connects card punch.
FNC1.	Sends function 1 to card punch.
OUT120.	Outputs 1 card.
RLC12.	Releases channel 12 to SMM.
RQC11.	Sets up PSX to use channel 11.
CON6000.	Connects line printer.
OUT104.	Outputs 1 line {1 card}.
RLC11.	Releases channel 11 to SMM.
SPACE	Starts program running until S key is depressed.

To use MODE I connect and function, set location 1500=0020. To wait not busy before sending a function to the equipment, set location 1663=XXXX. Where XXXX = the wait count in seconds.

Any channel error encountered while doing an I/O operation will be displayed in the standard PSIO format.

If a channel error exists, during a run in test mode, you may start the program over by a °G° or space or continue on by releasing the display to CPC and typing X.G0. Where X=PPU that PSX is running in.

The SCOPE/MACE version of PSX operates in the same fashion as the SMM version with the following exceptions:

Only the display may be assigned to the control point. °D° entry will release the display to the system. Any channel error will abort PSX. If peripherals are to be used, they must first be turned off, also the entry °RQCX.° must be used before the program and °RLCX.° must be the last entry.

PSX may be called in by job cards or DIS. No central memory is used.

CPU TESTS

CTL

CTL is divided into two test phases, a quick look and a command test.

PART ONE {CTLQL}

Exchange package can be changed in the normal manner.

KEYBOARD ENTRIES

SSE or CSE	Set or clear error stop
SSS or CSS	Set or clear section stop
SST or CST	Set or clear test stop
SSC or CSC	Set or clear conditional stop
SRS or CRS	Repeat section
SRT or CRT	Repeat test
SRC or CRC	Repeat conditions
T	Set or release TEST MODE {eliminates the display}
BC	Bypass CTLQL and begin CTLCM
SPACE	Resume test
CPUD/CPU1	Select CPUD/CPU1 {6500's}
D0,XXXX	Change display field 0
D1,XXXX	Change display field 1
D2,XXXX	Change display field 2

PART TWO {CTLCM}

Uses same entries as Part 1 except for:

SRU or CRU	Repeat unit or sequence
SSU or CSU	Set or clear unit stop

KEYBOARD ENTRIES FOR RUN MODES

RUN	Stops only on selected stops
BKP,X.	Normal breakpoint at X.
BKPC,X	Exchanges from the output package to the next breakpoint address X.
TST,X	Runs to X and restarts with input exchange package.
EXCH,X	Changes input exchange address to X {only 1260 and 1300 can be used}

RAN

Random instruction CPU test, with a ten word instruction loop.

Field length	1200
Error halt	567
Address of failing register	263
Failing fast loop	403
Slow loop starts at	615
Slow loop answers	1000
Fast loop answers	1020
Register results	1040
Pass counter	266
Error counter	265
Compare Difference	260
Fast loop result	261
Slow loop result	262
Fast loop pass counter	232

To Loop After Error Occurs:

```
267,1. {CR}
ENB1,0. {CR}
ENP,173. {CR}
SPACE
```

To continue after error

```
267,0. {CR}
ENP,224. {CR}
SPACE
```

FST

C DISPLAY

Uses same instructions and operands as RAN, but has optimized generating and error checking routines.

Field length	500
Error halt	213
Failing fast loop	250
Slowloop starts at	371
Slow loop results	300
Fast loop results	320
Compare Difference	270
Slow loop result	271
Fast loop result	272
Address of slow loop result	273
Address of fast loop result	274
Error count	275
Pass count	276
Repeat flag	277

To Loop After Error:

ENP,214. {CR}
SPACE

To continue after error

ENP,214. {CR}
277,0. {CR}
SPACE

The number of times the fast loop is run, can be changed from 40, by changing:

Loc. 51 = 7170X XXXXX 46000 36623
where XXXXX is the new count.

An option exists which allows fast generation of random numbers. To use, enter pass count of error in location 276 {right justified}, and ENP,226. Start FST and it will generate the instructions for that pass and then loop on those instructions. To continue with further pass counts, clear location 277.

ALS

This is a random instruction program whose primary purpose is to check the stack and the scoreboard. The main program is contained in addresses 03-15. It consists of return jumps to various subroutines.

03	RJ to random number generator
04	Instruction sequence scanner
05	Set up register for fast loop
06	Execute fast loop
07	Store results
10	Set up register for slow loop
11	Execute slow loop
12	Store answers
13	Check answers
14	Loop repeat checker
15	Pass counter
224	Error stop
403-407	Instruction sequence
414	Pass counter
415	Error counter

1000-1017 Initial register contents
 1020-1037 Answer difference
 1040-1057 Fast loop answers
 1060-1077 Slow loop answers

To Loop on Error:

ENP,225.{CR}
 SPACE

To Restart after Error:

ENP,227. {CR}
 SPACE

CT3

Random instruction test with simulation.
 Under SMM the error option must be set to a 1
 or 2. {Address 5}

PARAMETERS

<u>Address</u>	<u>Significance</u>
2=00-00	Use program supplied number to generate random numbers.
=XX-XX	Use XX-XX as the number to generate random numbers.
3=00-00	Use central simulator {SMM}.
=00-01	Use PP simulator {MACE,SCOPE}.
4=00-00	Use 5 as the length of the random loop.
=00-XX	Use 00-XX as the length of the random loop {1-??}.
5=00-00	Dump errors in dayfile.
=00-01	Stop on error.
=00-02	Loop on failure.
6=00-00	Run once through the loop and check for failures.
=00-01	Run a double pass through loop {to check bb00 stack} before answers are checked.
7=00-00	Do not use this option.
=00-XX	CT3 will generate instructions for pass XX and then loop on them.

10=00-00	Do not optimize.
=00-01	Optimize result registers in the random loop.
11=00-00	Execute random loop 1 before generating new operands.
=00-XX	Test random loop XX times {1-??}.
12=00-00	Use all instructions in random loop.
=00-01	Use only instructions in locations 13-4b.
=00-02	Do not use instructions in 13-4b.
13-4b	Contains fm code of the instructions to be used or not used {b bits only}.
600	Failing loop
7b0	Register difference
7b1	Simulated register difference
7b2	Machine result register
7b3	Address of simulator result
7b4	Address of machine result
7b5	Error counter
7b6	Pass counter
1000-1017	Simulated results
1020-1037	Machine results
1040-1057	Operands used by random loop
1060-1077	PP simulator results
2304-2345	Write buffer area
234b	Error stop

To Loop on Error {if loop on error not set}:

```
ENP,2347. {CR}
SPACE
```

Go generate a third set of answers using the PP simulator:

```
ENP,2352. {CR}
RCP.
```

To continue after error:

```
ENP,2350. {CR}
RCP. or SPACE
```

EJT

KEYBOARD ENTRIES

{Parameters are set by entering SXX and cleared by a CXX}

SE	Stop on error
SC	Stop on section condition
SS	Stop at end of section
ST	Stop at end of test
RC	Repeat condition
RS	Repeat section
PO	Test CPU0
PI	Test CPU1
bb	Section 4 break in at 3,4,5 and 6 microsecs.
T	Set or clear memory display.
TT	Returns from PPU display to central display.
N,XXXXXX	Change display field N to XXXXXX. N may be from 0-4, XXXXXX must be 6 digits. {There is no facility for changing central memory or the ex- change package.}

CENTRAL MEMORY TESTS

MM1 - MM3

MM1, M1R, M1A, and M1B test central memory from the CPU. MM1 is the basic test, M1R has all the PPU's doing phased reads of central memory. M1A is the 32K equivalent of MM1, and M1B is the 32K equivalent of M1R.

MM3, M3R, M3A, and M3B are essentially the same as MM1-M1B except they are some what more rigorous and more lengthy.

KEYBOARD ENTRIES

SE	Stop on error.
SP	Stop at end of pattern.
RP	Repeat current pattern.
SB	Stop at end of bank.
RB	Repeat current bank.
ST	Stop at end of test.
CXX	Clear the above selections.
BK	Add banks to be tested.
CBK	Delete banks.
BK&	Sets all banks to be tested.
CBK&	Clears all banks.
SPACE	Continue test.
/	Return to PS {to restart the test, do a 0221X1000. To return to where the test was, do a 0221W2060.
AB	Terminates testing of current bank and goes to next bank.

Displays {left Scope}

BANK	Current bank being tested.
PASS	Number of passes for current bank.
BIT	Bit number 0-59. 00-11 leftmost module. 48-59 rightmost module.
NO OF ERRORS	Octal count of cumulative errors for this bank.
COMMON ADD BITS	Mask showing which address bits have been the same for all errors on the plane.
LAST ADD.	The address at which the last error occurred for each bit, {the address within the bank}.
CORRECT BIT	1 = Dropping bit 0 = Picking the bit

M65

CPU central memory test {32K, 65K or 131K}.
Sections 1, 2 and 3 are the front line tests.
Section 4 is a good quick look test.

KEYBOARD ENTRIES

PPXX	Add PP-XX to list of selected PPU's.
CPPXX	Remove PP-XX from list.
PPA or PPB	Select all PPU's.
CPPA or CPPB	Deselect all PPU's.
SE	Stop on error
SP	Stop at end of pattern.
SS	Stop at end of section.
SB	Stop at end of bank.
ST	Stop at end of test.
RP	Repeat current pattern.
RS	Repeat section.
RE	Record errors on 501 {1002=CCEE}.
RB	Repeat bank.
RT	Repeat test.
CXX	Clear XX selection {XX may be any of the above 10 entries}.
SPACE	Continue
Carriage Return	Exit to or from PPI {PS}.
=	Exit to PPI, or return.
/	Restart test.
*	Exit to CM display or return.
CPU	No CPU selected {section 7 only}.
CPUX	Select CPUX {X may be 0 or 1}.
CPUXY	CPUX is control CPU, Y is slave CPU.

ECS

KEYBOARD ENTRIES

SXX	Run section XX.
SES or RES	Set or clear error stop.
SSS or RSS	Set or clear section stop.
STS or RTS	Set or clear test stop.
SRC or RRC	Set or clear repeat condition.
SRS or RRS	Set or clear repeat section.
SRT or RRT	Set or clear repeat test.
T	Set or clear test mode.

The exchange package and CM are changed the
same as in CPC.

DISPLAYS

- ◊A◊ Displays input and output exchange packages. Exchange in is always done with contents of Input exchange package. Display A should not be used in normal run.
- ◊B◊ One exchange package is displayed, and all exchanges are done from these.
- ◊C◊ and Memory displays.
- ◊D◊
- ◊E◊ Data error display.
- ◊F◊ Data error display with the ECS address broken down.

SIGNIFICANT ADDRESSES

Address

- 03=40-00 Stop on error, until errors total = 32.
 - =CCEE Channel and equipment number of line printer for error dump.
 - 04≠00 Ignore read abort/parity errors
 - 06=133333 Diode stress test.
 - 10=377376777 = Section select bits {bit 0 = Sec. 0, etc.}
- Section 0 = ECS,RA,FL,REG. test
 - 1 = CM addressing
 - 2 = CM,RA,FL register test
 - 3 = XD register test
 - 4 = Adder test
 - 5 = ECS P register
 - 6 = Abort bits
 - 7 = ECS word count register
 - 8 = Exit mode conditions
 - 9 = PP read/write and exchange during ECS transfers
 - 10 = ECS addressing
 - 11 = 0's test
 - 12 = 1's pattern
 - 13 = Alternating 1's and 0's word lines
 - 14 = Alternating words of 0's and 1's
 - 15 = 5252 pattern
 - 16 = 2525 pattern
 - 17 = Operator's pattern
 - 18 = Odd/even parity
 - 19 = Even/odd parity
 - 20 = Unbalanced sense lines pattern A

	21 = Unbalanced lines pattern B
	22 = Not used
	23 = Global register test
	24 = Random test
	25 = Random address
	26 = Diode stress test
11=40-00 =XXXX	Test all banks of ECS. Test banks that correspond to bits set.
12=XXXX	Number of banks in system.
13=00 ≠00	Check data in sections 10-26. Do not check data in sections 10-26.
14≠00	Write only flag for sections 10-21.
15≠00	Read only flag for sections 10-21.
44-47	Operator's pattern for Section 17.
50-57	Mask for data checking. To ignore checking a sense line, set the corresponding mask bit to zero.
74	Number of times new ECS addresses and word counts will be generated for each generation of data.
75	Number of times to loop in section 26.
100-177	ECS flaw table.
4100-4277	Error buffer.
4300-14277	Input data buffer.
14300-24277	Output data buffer.

CM6

CPU test of central memory. Will run on SCOPE or MACE. Because of the instruction stack, the test is more effective on a 6600. Use the 'FF' displays under SMM.

To restart after error:

```
ENX1,0. {CR}
ENP,341. {CR}
SPACE or RCP.
```

PARAMETERS

Address

340 = Error stop.
342 = Failing CM address.

- 343 = Contents of failing address.
- 344 = Pass count.
- 345 = Number of passes to be run before restarting.
- 346 = Number of instack loops to be made on an address. Note: An excessive number may cause unnecessary stack failures.

PPU TESTS

PMM

Test of each processor's memory and accuracy of S register.

PARAMETERS

1000=0000	Display errors at end of test, or when error table is full.
=XXX1	Display errors, but don't stop.
=XXX2	Stop on error.
=XXX4	Stop at end of section.
=XX1X	Stop at end of test.
1001=1XXX	Repeat test.
=2XXX	Repeat section.
1003=XXXX	Processor select bits. Bit 0=PP0, Bit 1=PP1, etc.
1010=0006	Section select flags. Bit 1=S register test, Bit 2=Worst pattern test.

MAP

Priority PPU read/write with or without ECS. Standard 6XXX computers can be run by clearing bit 0 of location 1500.

KEYBOARD ENTRIES

C	Display central memory.
P	Display PPU memory.
CX,AAAA	Change area of CM to be displayed. X=0-4, A=Central memory address to be displayed.
XXXX,YYYY	Put YYYY in address XXXX of PPU.

PARAMETERS

1500=XXX1	Compare time of PP-CM instructions against a fixed time.
=XXX2	Stop on error.
=XXX4	Stop end of section.
=XX1X	Stop end of test.
=XX2X	Stop after each block of instructions.
1501=1XXX	Repeat test.
=2XXX	Repeat section.
=4XXX	Repeat condition.
1502=XXXX	PPU flags for use of CM. Bit 0=PP0, bit 1=PP1, etc.

1503=4XXX	Randomly select up to 3 PPU's for priority.
=XXXX	Do selected PPU's use same scheme as in 1502.
1510=XXX1	Section 0. No CPU program. Single priority on CRD/CWD.
=XXX2	No CPU program. Single priority on CRM/CWM instructions.
=XXX4	No CPU program. Multi-PPU priority.
=XX1X	CPU program active. Same as Section 0.
=XX2X	CPU program active. Same as Section 1.
=XX4X	CPU program active. Same as Section 2.
=X1XX	ECS transfers and multi-PPU priority.

ERROR CODES

Channel Error Codes

CR	Connect Reject.
TP	Transmission Parity Error.
IE	The channel was inactive, it should have been active and empty.
FE	The channel was active and full, it should have been active and empty.
EF	The channel was active and empty, it should have been active and full.
IF	The channel was inactive, it should have been active and full.
FI	The channel was active and full, it should have been inactive.
EI	The channel was active and empty, it should have been inactive.
FR	A function was rejected. Location 1b3b contains the rejected function.
RS	Bit 11 of equipment status was set, reserved by other channel.

Standard Channel Error Display

C=xxEy, kk Cssss Ezzzz, P=aaaa

xx = Channel
y = Equipment
kk = Error code
ssss = Last 6b81 status
zzzz = Last equipment status
aaaa = Address +2 in main program which referenced the routine in which the failure was detected.

Standard Peripheral Test Error Codes

Peripheral tests should select error codes according to the following conventions:

The code will be 4 characters long depending on needs; in any case, all the error codes within a particular test will be the same length.

The C.E. will be able to tell by the hi-order character of the error code, the last I/O operation performed. This character will be:

- 0 - Connect
- 1 - Read
- 2 - Write
- 3 - Functions

The error code will be in the following format:

XXYY - Where XX is a number from 00-99, and YY is a set of letters from AA-ZZ {actual error code = YY}

List of Error Codes

- 00CR - Internal connect reject
- 01CR - External connect reject
- X0TP - Transmission parity error, X=0-3 to indicate the I/O operation being performed.
- X0T0 - Any programmed Time Out error. X=0-3 to indicate the last I/O operation. 0 may indicate the time in decimal seconds.
- 00BS - Special error code for busy status being set for too long a period of time. 00 may be used to display the time {decimal seconds}.
- 20WP - Write parity error
- 10RP - Read parity error
- XXIT - Interrupt error. XX=00-11, indicates the Interrupt status bit which was expected, but did not occur. XX=20-31, indicates the Interrupt status bit which occurred, but was unexpected. XX=a decimal number equivalent to the failing bit.
- XXCI - Cannot clear interrupt bit XX - XX=00-11 {decimal} interrupt status bit which is failing.
- XXDE - Data Error. XX=00-11, indicates the bit is missing. XX=20-31, indicates the bit is picking. Example: 08DE= indicates bit 8 is missing. 29DE= indicates bit 9 is picking. If XX is not used for the failing bit, see expected and actual data message.

- XXST - Status error. Same format as XXDE errors for normal status lines. For special status lines use XX=40-51 for missing bits and XX=60-71 for picking bits. {XX=decimal number}. If XX is not used for the failing bit, see expected and actual error message.
- XDAE - Address error. X=0-3, for the last I/O operation performed.
- XOLE - Length error. X=1 or 2 for read or write length error.
- XXFR - Function reject. X=00-?? {octal}, for the function that rejected.
- 00ET - End of test.
- XXES - End of section XX.
- XXRN - Running section XX.

Standard Error Message

Chh,Er,Us,XXAA,EYYYY,RZZZZ,PWWWW

- hh = Channel number
- r = Equipment number
- s = Unit number
- XXAA = Error code
- YYYY = Expected word for status errors, data errors or addressing errors.
- ZZZZ = Received word.
- WWWW = Address where the error occurred

Messages may contain any part of the standard message, but in all cases the error code will be present.

ERROR CODES FOR DST

01	3398 not ready.
02	External busy is set, should not be set.
03	External busy is not set, should be set.
04	Internal busy is set, should not be set.
05	Internal busy is not set, should be set.
06	Light pen interrupt is set, should not be set.
07	Light pen interrupt is not set, should be set.
10	Function keyboard interrupt is set, should not be set.
11	Function keyboard interrupt is not set, should be set.
12	Alphanumeric keyboard interrupt is set, should not be set.
13	Alphanumeric keyboard interrupt is not set, should be set.
14	Manual interrupt is set, should not be set.
15	Manual interrupt is not set, should be set.
16	Trackball interrupt is set, should not be set.
17	Trackball interrupt is not set, should be set.
20	Abnormal end of operation interrupt is set, should not be set.
21	Abnormal end of operation interrupt is not set, should be set.
22	End of operation interrupt is set, should not be set.
23	End of operation interrupt is not set, should be set.
24	Halt interrupt is set, should not be set.
25	Halt interrupt is not set, should be set.
26	Program error/memory fault interrupt is set, should not be set.
27	Program error/memory fault is not set, should be set.
31	Hardcopy not ready.
32	Hardcopy is busy, should not be.
33	Hardcopy is not busy, should be.
34	Paper in hardcopy is low.
37	Microfilm is not ready.

40 Microfilm is busy, should not be.
41 Microfilm is not busy, should be.
42 Film is low on microfilm recorder.

ERROR DISPLAY FORMAT FOR DST

PP STATUS ERR XX AYYYY EZZZZ

PP = Control point number
XX = Error code {00-27=normal status,
30-43=special status}
YYYY = Actual status of 3398
ZZZZ = Expected status of 3398

ERROR CODES IN DF4

00 Bad status after connect.
02 Bad status after a load address with
no seek.
03 Bad status after a seek to 101 to
check for 853 or 854.
04 Bad status after a seek to 101. No
on sector or address error.
05 Bad status after a seek to 101, on
sector did not go down.
06 Combination of 04 and 05.
07 Bad status after seek to cylinder 0000.
10 Time out occurred waiting for position
ready.
11 Bad status after release function.
12 A release changed the address register.
13 Bad status after a restore {01}.
14 Address register incorrect after a
restore {01}.
15 Address register incorrect after
sending all 1's then zeros.
17 Address register incorrect after
sending all 1's then zeros.
20 Address register incorrect after a
clear {05}.
21 Bad status after a clear {05}.
22 Address register incorrect after
sending unassigned functions.
23 Bad status after a seek.
24 Address register incorrect after a
seek.
25 Bad status after sending 1's then 0's
by load address.
26 Bad status after sending unassigned
functions.
27 Bad status after a read in EOR mode.

- 30 Time out occurred waiting for on sector to drop.
- 31 Time out occurred waiting for on sector to come up.
- 32 Bad status after a write in EOR mode.
- 33 Bad status after a buffer mode check word verify {44}.
- 34 Bad status after a return address {1}.
- 35 Bad status after a search compare {42}.
- 36 Bad status after a masked search compare {43}.
- 37 Bad status after a read check word {45}.
- 40 Bad status after a mag search {50}.
- 41 Bad status after a mag search {51}.
- 42 Bad status after a mag search {52}.
- 43 Bad status after a EOR mode check word verify {44}.
- 44 Bad status after a buffer mode read.
- 45 Bad status after a buffer mode write.
- 46 Bad status after a seek with Interrupt on Ready/Not Busy set.
- 47 Bad status after a seek with Interrupt on EOP set.
- 50 Bad status after a seek with Interrupt on End of Seek set.
- 51 Bad status after a read with Interrupt on Ready/Not Busy set.
- 52 Bad status after a write with Interrupt on Ready/Not Busy set.
- 53 Bad status after a write with Interrupt on EOP set.
- 54 Bad status after a read with Interrupt on EOP set.
- 55 Bad status after a seek with Interrupt on EDD, AEDD.
- 56 Bad status after a restore with Interrupt on Ready/Not Busy set.
- 57 Bad status after a clear interrupt on Ready/Not Busy.
- 60 Bad status after a load address with Interrupt on EDD set.
- 61 Bad status after a clear interrupt on EDD with random function.
- 62 Bad status after a checkword verify with interrupt on EDD set.
- 63 Bad status after a restore with interrupt on EDD set.
- 64 Bad status after a load address with abnormal interrupt set.
- 65 Bad status after an illegal seek with abnormal interrupt set.
- 66 Bad status after a clear interrupt on abnormal EDD with random function.

67 Bad status after an illegal seek with
 abnormal interrupt cleared.
 70 Bad status after a clear interrupt
 on End of Seek.
 71 Address register bad after a seek with
 interrupt, clear interrupt and return
 address.
 72 Address register bad after a restore
 with interrupt, on end of seek set.
 73 Address register bad after a clear
 all interrupts.
 74 Address register bad after an illegal
 seek with interrupt on seek set.
 75 Address register bad after a seek with
 cylinder count = 34, 35 or 36.
 76 Address register bad after a seek with
 cylinder count = 9, 10 or 11.
 77 Address register bad after a seek with
 cylinder count = 3, 4 or 5.
 AA Address register bad after a seek with
 cylinder count = 1, 2 or 3.
 AB Address register bad after a seek to
 cylinder 0000.
 AC Bad status doing 1 track seeks forward.
 AD Bad status doing 1 track seeks reverse.
 AE Address register bad while doing 1
 track seeks forward.
 AF Address register bad while doing 1
 track seeks reverse.
 AG Address register bad after a write of
 1 full sector.
 AH Address register bad after a read of
 1 full sector.
 AI Address register bad after a read
 checkword {45}.
 AJ Address register bad after a checkword
 verify {44}.
 AK Address register bad after a EOR write
 GT 1 sector.
 AL Address register bad after a buffer
 write GT 1 sector.
 AM Address register bad after a EOR write
 LT 1 sector.
 AN Address register bad after a buffer
 write LT one sector.
 AO Address register bad after a EOR read
 GT one sector.
 AP Address register bad after a EOR read
 LT one sector.
 AQ Address register bad after a buffer
 read GT one sector.
 AR Address register bad after a buffer
 read LT one sector.

AS Bad status after a EOR write GT one sector.
 AT Bad status after a buffer write GT one sector.
 AU Bad status after a EOR read GT one sector.
 AV Bad status after a buffer read GT one sector.
 AW Bad status after a EOR write LT one sector.
 AX Bad status after a buffer write LT one sector.
 AY Bad status after a EOR read LT one sector.
 AZ Bad status after a buffer read LT one sector.
 BA Info bad after a EOR read GT one sector.
 BB Info bad after a buffer read GT one sector.
 BC Info bad after a EOR read of one sector.
 BD Info bad after a buffer read of one sector.
 BE Channel hung active.
 BF Channel should not be inactive.
 BG Channel should not be full.
 BH Channel hung full.
 BI Reject on function. See address 0052B for last function exec.
 BJ Transmission parity error on function.
 BK Reject on read.
 BL Reject on write.
 BM Transmission parity error on write.
 BN Bad status received after a mag search {50} should not compare.
 BO Bad status received after a mag search {51} should not compare.
 BP Bad status received after a mag search {52} should not compare.
 BQ Channel should not be empty.
 BR Expected lost data status after a write.
 BS Addressing test reveals incorrect positioning.
 BT Bad status after a restore with interrupt on end-of-seek set.
 BU Info not correct at completion of off-track check in section eleven {X to N}.
 BV Channel failure occurred in the write routine.
 BW Channel failure occurred in the status routine.
 BX Channel failure occurred in the read routine.

BY Channel failure occurred in the connect routine.
 BZ Channel failure occurred in the function routine.
 CA Checkword error using random numbers. Act checkword is in 0057, exp checkword is in 0056.
 CB Actual checkword in 0057 does not match simulated checkword in 0056. But the equipment status does not show a checkword error.
 CC During a random positioning move, no on sector ever came up to allow a read and subsequent termination. The seek address is in 0050 and 0051.
 CD A status check found the status equal to 0211B. A time out was then initiated waiting for the on sector bit to drop. 0201B.
 CE A status check found the status equal to 0201B. A time out was then initiated waiting for the on sector to come up. 0211B.
 CF A status check found the status equal to 0003B. A time out was then initiated waiting for positioner ready to come up. 0201B.
 CG A checkword verify was started and a time out was initiated at the same time. Status shows a time out error occurred because the checkword verify did not terminate in time.
 CH An illegal address was sent and a time out initiated waiting for an address error 0215B. Time out error occurred first.
 CI A seek was started with end-of-op interrupt set. A time out was initiated at the same time. Status shows a time out error occurred before the interrupt. 0601B.
 CJ A status check found the status equal to 0003B. However, a seek with interrupt on end-of-seek had been initiated with a simul time out. The time out error occurred before the interrupt. 2211B.
 CK A seek was initiated and a time out started with interrupt on end-of-op, abn end-of-op, ready/not busy and end-of-seek set. But a time out error occurred before the interrupts came up. 2601B.

- CL A read was initiated and status was 0203B. A time out was then initiated waiting for status to go to 0201B for read complete. A time out error occurred first.
- CM A read was initiated and status was 0203B. A time out was then started waiting for status to go to 0241B. A time out error occurred first.
- CN A seek on same cylinder was initiated and status was 0203B. A time out was then started waiting for busy to go down. A time out error occurred first.
- CO A seek with interrupt on end-of-op was initiated and a time out was started waiting for a 0b01B or 0b11B status. A time out error occurred first.
- CQ A seek was made to the same address that the controller and disk are currently on. The status 0201B should have come up within 20 usec.

ERROR CODES FOR DFB

ERROR CODES

- 01 Channel active over two micro seconds following a function other than a read or write {FUN}.
- 02 Channel active over 60 milliseconds following a read or write function {FUN}.
- 03 Channel not active after a disconnect was issued followed by a head group select.
- 04 Illegal sector selected in other than the illegal sector check.
- 05 File not ready within 20 milliseconds following a head group function.
- 06 File ready within four {4} milliseconds following a position function.
- 07 File not ready within 200 milliseconds following a position function.
- 08 Position status error status received not equal expected.
- 09
- 10
- 11
- 12 Testing for lost data and found the channel active not deactive, after a read.

- 13 Channel not active after doing an input.
Read abort.
- 14 #A# register not equal zero after doing
a read - read abort.
- 15 Channel active after doing a deactivate
following a read.
- 16 Channel not deactivate after trying to
read an illegal sector.
- 17 Recoverable parity error on a read.
- 18 Non-recoverable parity error after three
tries on a read. Suspect bad write.
- 19 Lost data status not up on a lost data
read check.
- 20
- 21
- 22 Testing for lost data and found the
channel active not deactivate after a
write.
- 23 Channel not active after doing an output
- write abort.
- 24 A register not equal zero after doing a
write. Write abort.
- 25 Channel active after doing a deactivate
following a write.
- 26 Channel not active after doing a channel
activate for a write.
- 27
- 28
- 29 Lost data status not up on a lost data
write check.
- 30 Channel failed to deactivate on a de-
activate instruction following an input
status word.
- 31 Channel failed to connect to the file
controller on a ?XX function.
- 32 Parity error status bit up and it
should not be up.
- 33 Not ready status is up and it should
not be up.
- 34 File not connected and it should not be
up.
- 35 Lost data status is up and it should
not be up.
- 36 Expected sector status not equal actual
sector status.
- 37 Lost data status is up. Lost data error.
- 38 Stack status is incorrect.
- 39 Parity error expected but not actually
received.
- 40 Parity byte error. Expected not equal
actual.
- 41
- 42

43
 44
 45
 46
 47
 48
 49
 50 Read failed to verify after write prior to actually testing the file. This test is performed to insure correct operation prior to performing test objectives.
 51 Read failed to verify after performing required test.
 52 Parity byte error expected equals expected parity byte and actual equals actual parity byte.
 53 File failed to verify on a read after a full track write of 141 sectors each containing 1008 words.
 54
 55
 56
 57
 58
 59
 60
 61
 62 File #A# is connected and #B# connected when it shouldn't.
 63 File #A# was connected and a disconnect was issued to #A#. #B# connected within 70 microseconds following #A's# disconnect.
 64 File #A# was connected and a disconnect was issued. #B# failed to connect 130 microseconds after the disconnect was issued on #A#.
 65 File #B# is connected and #A# connected when it shouldn't have.
 66 File #B# was connected and a disconnect was issued to #B#. #A# connected within 70 microseconds following #A's# disconnect.
 67 File #B# was connected and a disconnect was issued. #A# failed to connect 130 microseconds after the disconnect was issued on #B#.
 69 Section operating parameters are beyond the test limits entered in MCP16 and MCP17.
 77 Channel was active upon entry to function routine and it wouldn't deactivate when a deactivate was issued.
 99 End of section, or finis.

STANDARD PERIPHERAL TEST PARAMETERS

PERIPHERAL TEST PARAMETERS

<u>Address</u>	<u>Contents</u>	<u>Description</u>
1000 or 1500	00XX	XX=1 Repeat sub-condition =2 Stop on error =4 Stop end of section =1X Stop end of test =2X b681 Mode I connect
1001 or 1501	X00Y	X=1 Repeat test =2 Repeat section =4 Repeat condition Y=1 Delete running message
1002 or 1502	CC0E	CC= Channel number {if bit 11 is set-PS assumes a dedicated channel} E= Equipment number
1003 or 1503	00UU	UU= Unit number
1004 or 1504	XXXX	X= Check test write-up
1005 or 1505	XXXX	X= Check test write-up
1006 or 1506	XX00	XX= b681 select code
1007 or 1507	XXXX	X= Sections 13-24
1010 or 1510	XXXX	X= Sections 1-12
1011 or 1511	XXXX	X= Sections 25-36
1012 or 1512	START	= The first executable address of the test.

PERIPHERAL TESTS

MTT

Test for 60X tape units on 3XXX controllers.

PARAMETERS

Parameters are the same as the standard ones, with the following exceptions:

- 1503 = Unit selection bits, bit 0 = unit 0, bit 1 = unit 1, etc.
- 1504 = Unit selection bits, bit 0 = unit 10, bit 1 = unit 11, etc.

If no units are selected the test runs on all available units.

- 1511 = 0000 - Run all available densities.
- = 0003 - 556 BPI only
- = 0004 - 200 BPI only
- = 0006 - 800 BPI only

SECTIONS

1. Status and function check
2. File mark test
3. BCD check
4. Binary patterns
5. Incremental record lengths
6. Variable length records
7. Skip bad spot test
8. Interrupt test
9. Read shorter record than was written
10. Read longer record than was written
11. Creep test
12. Write BCD and read binary
13. Write binary and read BCD
14. Reverse read test

Buffer area = 6772-7772

MTT is dependent upon busy status for almost all of its operations.

LPT

Test for 3659-3256/501 line printer.

PARAMETERS

Uses all standard parameters.

SECTIONS

0. Status check
1. Interrupt test
2. Spacing test
3. Ripple left
4. Ripple right
5. Hammer adjustment
6. One character in all positions
7. Variable buffer
8. Memory test
9. Format channels test

CP1

Test for 3644-3446/415 card punch.

PARAMETERS

Uses all standard parameters. Sections 0 and 11 are special cases. If section 0 is run, the first 10 cards of a previously punched deck should be placed in the input hopper below the blank cards to be punched. This is a special section to check the compare circuitry in the 415. Consult the SMM manual for running section 11.

ERROR MESSAGES

CPxxe attt STssss Ppppp

- xxe = x = Card punch channel, e = equipment
- a = BCD code in the first column of the title card for this section.
- t = card type punched.
- s = last equipment status
- p = location where the error occurred

SIGNIFICANT LOCATIONS

- 52 = The current section number
- 55 = Last equipment status
- 56 = Last 6681 status
- 64 = Current card type to be punched
- 66 = Type of card that just passed the read station
- 7270 = First word of card to be outputted
- 7460 = First word of card just punched
- 7600 = First word of card that just passed the read station

DECK STRUCTURE

The test deck contains 1248 cards divided into 128 sections. Each section is preceded by a title card and ended by two file cards. The first file card and each title card of each section are offset.

CR1

Tests 3649-3447/405 card reader. Requires test deck from CP1.

PARAMETERS

Uses standard parameters.

ERROR MESSAGES

CRcce attbi INFO nn Cww,EXxxxx RCyyyy

cce = c = channel number, e = equipment
a = BCD code in column 1 of the title card for this section
t = pattern type
b = mode card was read in {B=binary, C=BCD}
i = Number representing method used to input the card.
1 = 1500 select, 71 instruction, 1 word at a time
2 = 1400 select, 71 instruction, full card input
3 = 1500 select, 71 instruction, full card input
4 = 1400 select, 71 instruction, more than full card input
5 = 1500 select, 71 instruction, one word input
n = Decimal number of errors found on this card
w = decimal word in which the first error was found
xxxx = Expected word
yyyy = Word received

CRcce attt STssss Ppppp

s = Last copied equipment status
p = Location in the program where the error occurred

SIGNIFICANT LOCATIONS

7500 = FWA of last input from reader
7640 = FWA of generated pattern for current card

DFB

Test for 6639/808 disc file.

Uses standard parameters with following exceptions: May do a 0221W1562 to restart.

1511 and 1512 = Pattern 1 and 2
1513 = 0000 - Generate random pattern
 = 0001 - Shifting zeros or ones
 = 0002 - Hold present write buffer
 = 0004 - Complement write buffer
 = 001X - Bi-pattern/single pattern
1514 = CCEE - Channel and equipment of line printer used for error dumps
1515 = XXX0 - Full data check after parity error
 = XXX1 - Check only words 1 and 2
 = XXX2 - Full data check with no parity error
 = XXX4 - No data check
 = XX1X - No error dump to 501
 = XX4X - Printer not available
 = 1XXX - No read parity check
1516 = SSEE - SS = Starting head group
 EE = Ending head group
1517 = SSEE - SS = Starting position
 EE = Ending position
1520 = OXXX - Initial sector
1521 = 0002 - Sector increment
1522 = 0144 - Final sector
1523 = 0502 - Sector word count
1524 = O0XX - Initial head group
1525 = 0001 - Head group increment
1526 = 0037 - Final head group
1527 = 0000 - Write
 = 0001 - Read
 = 0007 - Write/Read
1530 = 0000 - Initial position
1531 = 0001 - Position increment
1532 = 0037 - Final position
1540 = PPHH - Flaw table
1556 = PPHH - PP = Position
 HH = Head group

SECTIONS

1. Sector status, connect and lost data
2. Disconnect, illegal sector status
3. Parity check test
4. Head group test
5. Positioning time test
6. Head group pair test
7. Random test 1
10. Surface test 1
11. Cross talk splash test
12. Positioning test 2
13. Positioning test 3
14. Positioning test 4
15. Channel access test
16. Write/Read {manual}
17. Single sector write/read
20. Sequential write/read test
21. Random test 2
22. Parity check test
23. File addressing test
24. Surface test 2
25. Random function test

DF4

3234/81X-85X disk file/pack test.

PARAMETERS

Uses standard parameters with the following exceptions.

- 1503 = 0XXX - Run test on unit XXX.
- = 0000 - Run test on all available units.
- 1504 = 0CCC - Starting cylinder
- 1505 = 0EEE - Ending cylinder
- 1507 = XXXX - See writeup.

SECTIONS

1. Check word verify test
2. Function test
3. Interrupt test
3. Interrupt test {SMM only}
4. Positioning test
5. Data flow and head switching test
6. Buffer and EOR test
7. Search/masked search compare test
8. Checkword/lost data test

- 9. Addressing test
- 10. Maintenance section
- 11. Off-track test

CRITICAL ADDRESSES

- 0040 - Expected equipment status
- 0041 - Received equipment status
- 0042 - Expected data
- 0043 - Received data
- 0044 - FWA of read buffer
- 0045 - FWA of write buffer
- 0046 - Last returned address
- 0047 - Last returned address
- 0050 - Last address sent
- 0051 - Last address sent
- 0052 - Last function executed
- 0053 - Last executed connect
- 0054 - Size of last read buffer
- 0055 - Size of last write buffer
- 0056 - Simulated checkword
- 0057 - Actual checkword
- 0060 - FWA of current section
- 0064 - Error code {in display code}
- 1521 - Cylinder parameter for section 11
- 1522 - Expected channel status
- 1523 - Received channel status
- 1524 - Bad address table

Bad track table, 2 words/track = UCCC,DTTT,
 where U=unit, CCC=cylinder, D=device, T=
 track.

ERROR MESSAGES

All error message are preceded by:

DF4 CXX EY UZZ SAA Q

- XX = Channel number
- Y = Equipment
- ZZ = Unit
- AA = Section number
- Q = Subsection designator

ES RYYYY EXXXX CC

Equipment status error. XXXX is expected
 status and YYYYY is received status. CC=
 error code.

CS RYYYY EXXXX CC

Channel status error.

RAE RXXXXXXXX EZZZZZZZZ CC

Return address error, where X is address returned and Z is address expected.

ADE XXXXXXXX CC

Address error where X is the last address sent and is the error code.

DE RXXXX EZZZZ CC

Data error where X is the data read and Z is the data expected.

CKWD ERR CC

Actual and simulated check words do not match, but status does not show a checkword error.

It is possible to run a quick surface test by setting the starting cylinder to 0 and ending cylinder to the maximum cylinder, and running section 1.

Sections 1, 2 and 4 may be run under SCOPE without destroying any information on the disk.

ON-LINE TEST OPERATION

Most all of the standard peripheral tests will run under MACE or SCOPE.

To insert tests into a MACE system, run the following job.

```
Col. 1
JOB,P17,T100,CM60000.
REQUEST OLD.    Assign the MACE system tape
REQUEST NEW.    Assign scratch tape
REWIND{OLD,NEW}
COPYX{OLD,NEW,DIS}  If the test is already
                    on the system, use this
                    card COPYX{OLD,NEW,XXX,2}.
                    Where XXX is the test name
                    to be replaced.
COPYBR{INPUT,NEW}
COPYBF{OLD,NEW}
?Bq
  Insert a binary deck of the test to be
  added
?Bq
b?Bq
```

Tape 'new' is now the updated MACE tape.

To insert tests into a SCOPE system, run the following job.

```
Col. 1
JOB,P17,T100,CM60000.
EDITLIB.
?Bq
READY{SYSTEM}
DELETE{XXX}      Used to delete test XXX,
                  if it already exists on
                  the system.
ADD{M,INPUT,DS}
COMPLETE.
?Bq
  Insert a binary deck of the test to be
  added.
?Bq
b?Bq
```

To obtain a binary deck of a test from the SMM library tape, run the following job:

```
Col. 1
JOB,P17,T100,CM60000.
REQUEST OLDPL.    Assign the SMM update tape
UPDATE{Q}
COMPASS{I=COMPILE,B=PUNCHB} Use B=P8 or
                          PUNCH
?89              For absolute binary decks
*IDENT,SYSTEM
*DELETE,CALLPS.XXX Refer to a listing of
                    the test to find what XXX
                    line number to delete.
                    {for MACE only}
  DF.PSM EQU 1
*CALL,PSSYS
*COMPILE,YYY      YYY is the test name
b?89
```

To obtain a listing from the SMM library tape, run the following job:

```
Col. 1
JOB,P17,T100,CM60000.
REQUEST OLDPL.    Assign the SMM update tape
UPDATE{Q}
COMPASS{I=COMPILE}
?89
*COMPILE,XXX      XXX is the test name
b?89
```

Tests may be called by job cards or by the use of DIS.

Example job deck:

```
JOBM,P17,T100,CM10000.
XXX{YYYYYY,ZZZZZZ} X=test name, Y and Z=
                    sections
b?89
```

Example of DIS call:

```
Keyboard entries
?.DROP. {CR}
?.DIS. {CR} or ?.X.DIS. {CR}
X.TTT,WWWWW,YYYYYY. {CR} TTT = test name
                          W and Y = test sec-
                          tions
DROP.
?.ASSIGNXX. {CR} Assign the requested
                  equipment from the EST
                  table.
```


