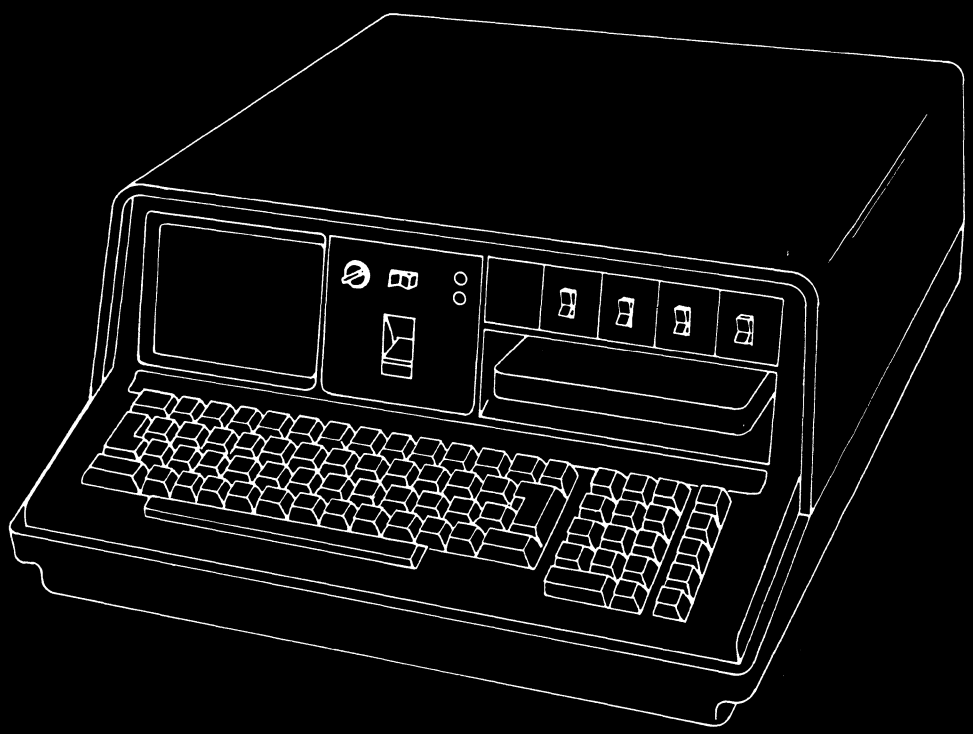
IBM

IBM 5100
Maintenance Analysis Procedures

5100



IBM 5100 Portable Computer Maintenance Analysis Procedures

PN 1608314
EC 829670

Second Edition (March 1976)

Changes are continually made to the specifications herein. This manual is under EC control and will be updated with each engineering change applied to the machine this manual accompanies.

Do not use this manual to service other machines as they can have features not included in this manual, or they can be at a different EC level.

PN 1608314
EC 829670

Contents

PN 2451194
EC 829670

Logic Card Part Numbers

Part Name	Location	PN	Card EC	Date	Description
I/O cable driver assembly	A2	1608491	829518		—
Expansion feature	B2	1606996[1] 1607004[2]	829487 829506		—
APL ROS 3	C2	1607114	829537		—
BASIC ROS	C4	1606960	828835		—
APL ROS 1	D2	1606990	828934		—
APL ROS 2	D4	1606986	828883		—
ROS adapter	E2	1607132	829623		—
Base I/O	F2	1606964[4] 1607000[4] 1606998[4] 1607122[4]	828846 829489 829488 829558		Relocated parts on the card
Controller	G2	656990[5] 1607118[5]	828800 829547		—
I/O and diagnostic	H2	1607112[6] 1607126[6]	829535 829571		—
APL supervisor	H4	1607110	829531		—
Display	J2	656942 1607120	825550 829554		Relocated parts on the card
R/W storage	K2-N4	8235549[3] 8238327[3]	553353 553802		—
Board, A1	—	1608552	829494		—
Tape control	—	8527645	825629		—
Auxiliary tape adapter	—	1606988[4] 1607134[4]	828912 829653		—
5103 printer adapter	—	1607002	829492		80 cps 5103
5103 printer adapter	—	1607124	829560		120 cps 5103

[1] Part 1606996 has Communications Adapter and Serial I/O Adapter Logic.
[2] Part 1607004 has Communications Adapter Logic only.
[3] Part 8235549 and Part 8238327 are logically the same and can be intermixed on the same 5100 system.
[4] These logic cards are interchangeable, within the given location.
[5] For replacement purposes, use Part 1607118.
[6] Use 1607126 when a 120 cps 5103 printer is attached.

The IBM 5100 Portable Computer Maintenance Library consists of MAPs (maintenance analysis procedures), a maintenance information manual, and parts catalog.

The MAPs and the maintenance information manual are unique maintenance documents and are, therefore, covered in this description.

The MAPs are EC controlled and will be updated as necessary to provide you with the latest information possible to diagnose 5100 Portable Computer problems. The maintenance information manual will be updated simultaneously with the MAPs using TNLs and revisions. It is important that the MAPs and maintenance information be at compatible levels.

MAPs

The MAPs guide you through the service call using step-by-step procedures that require you to follow trace lines when responding to questions or when leaving or entering a page. The MAPs use a logical approach for isolating the possible causes of machine problems and point you to that part of the 5100 Portable Computer that requires adjustment or replacement.

Two types of MAPs are used in the IBM 5100 Portable Computer Maintenance Library. First, there are the hard copy (printed) MAPs within the MLM binder. These MAPs are contained in a separate removable binder.

The second type is MDI (maintenance and diagnostics integrated) and is located on the diagnostic tape cartridge. These MAPs are shown on the display screen. Paging through these MAPs is accomplished automatically when you respond to the questions on the display.

MAP ORGANIZATION

Start MAP

This is the starting point for each service call. From here you will be guided to the failing FRU (field replaceable unit) in the 5100 Portable Computer or to other MAPs that further identify the problem.

Bring Up and Process Check MAPs

The start MAP sends you to the bring up or process check MAPs when the 5100 Portable Computer fails to become READY or when the PROCESS CHECK light is on. Control unit failures are generally found by these MAPs.

IBM 5100 Portable Computer Device MAPs

These MAPs find failures in the 5100 Portable Computer basic devices. When a failure occurs in the keyboard, display, tape, or power supply, the start MAP sends you directly to that device MAP to find the failing FRU.

When multiple symptoms are present and the PROCESS CHECK light is one of them, always give priority to the PROCESS CHECK light.

IBM 5103 Printer Device MAPs

These MAPs provide instructions on how to load the MDI for the printer. The start MAP directs you to this MAP.

IBM 5106 Auxiliary Tape Unit Device MAPs

These MAPs provide instructions on how to load the MDI for the auxiliary tape unit. The start MAP directs you here.

MDI MAPs

MDI MAPs are read from the display screen. These MAPs can be used only when the 5100 Portable Computer basic functions are operational. The 5100 features (printer, communications adapter/serial I/O adapter, and auxiliary tape) and the tape write function use this MAP technique. A description of MDI and how to use it is found in the *Diagnostic Aids* section.

Machine Checkout

The start MAP directs you to the machine checkout MAP to further define 5100 Portable Computer failures. Once the failure is isolated, you are directed to other MAPs to locate the failing FRU.

USING THE MAPS

When using the MAPs, you must:

READ CAREFULLY. The MAPs can help you find the problem only if you follow instructions and answer questions accurately.

FOLLOW THE SEQUENCE. Proceed step-by-step at all times. At times, the MAP instructions might seem irrelevant. However, they can be important in determining the correct error indications.

FOLLOW INSTRUCTIONS. Instructions must be carried out exactly in the order given. Questions are based on instructions immediately preceding the questions. Do not change the conditions established by the instructions before answering the questions.

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MAP EXAMPLES

MAP name and number—referenced from start MAP.

KEYBOARD MAP 0600

Entry and exit points—shows all entry and exit points to and from this MAP.

PAGE 1 OF 8

ENTRY POINTS

FROM MAP NUMBER	ENTER THIS MAP: ENTRY POINT	PAGE NUMBER	STEP NUMBER
0200	A	1	001
0300	A	1	001
0845	A	1	001
0900	A	1	001

EXIT POINTS

EXIT THIS MAP: PAGE NUMBER	STEP NUMBER	TO: MAP NUMBER	ENTRY POINT
8	081	0420	A
2	006	0700	A

001
(Entry Point A)

Step number

Can you make the machine fail?
Y N

Y—yes *N*—no

002
(Entry Point B)

Entry point—indicates a possible starting point in this MAP.

Keyboard intermittent failures procedure

Perform the following actions, one on each call until the problem is corrected:

1. Clean the keyboard PC board
(refer to 251)
Reseat the keyboard cable at both ends.
Date / /

Date—indicates the last date you performed this step.

2. Replace the keyboard PC board
(refer to 251)
Date / /

3. Replace the all keys assembly
(refer to 251)
Date / /

4. Replace the F2 (base I/O) card.
Date / /

003
Is the PROCESS CHECK light on?
Y N

8 2
C D

Off page referencing—identifies the page and trace where this MAP leg continues.

D
2

KEYBOARD MAP

PAGE 2 OF 8

004
-Calibrate the CE meter (refer to 270).
-For the probe points
(refer to 204).
-Measure +8.5 vdc and +5.0 vdc at the keyboard PC board with reference to gnd on the A1 board.

Are both voltages in tolerance (+7.8 vdc to +9.3 vdc) and (+4.6 vdc to +5.5 vdc)?
Y N

005
-Measure +8.5 vdc and +5.0 vdc at the A1 board.
(refer to 255).

Are both voltages in tolerance (+7.8 vdc to +9.3 vdc) and (+4.6 vdc to +5.5 vdc)?
Y N

006
Go to MAP 0700, Entry Point A.

007
Go to Page 5, Step 037, Entry Point C.

008
-Press the Q key then the P key.

Did anything (P, Q, *, ?, invalid key, etc) appear on the display?
Y N

009
-Probe F2-S05 (-keyboard lockout).
(refer to the appendix, the general logic probe).

Is the UP light on?
Y N

010
Defective keyboard pc board (refer to 251).
Check/replace keyboard cable (refer to 255).

4 3
E F

07JUL75 PN 1608391
EC 828851 PEC ------

MAP 0600-2

On page referencing—indicates the trace and page where this MAP leg came from.

Reference number—refers to a location graphic, maintenance procedure, chart, and other pertinent information in the maintenance section.

Question—answer either yes or no. Continue from your answer to the next question or instruction.

External exit point—indicates the MAP and entry point to go t

Internal exit point—indicates the page, step, and entry point to go to within this MAP.

Instruction—establishes conditions for answering the next question.

Action—possible fixes for the failure. Replace, repair, or adjust in the order given.

Date—date of MAP release

Part number—MAP part number

Engineering change number—previous level

Engineering change number—current level

MAP page number

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ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
0300	A	1	001
0900	A	1	001

EXIT POINTS

EXIT THIS MAP		TO	
PAGE NUMBER	STEP NUMBER	MAP NUMBER	ENTRY POINT
3	018	0300	B
3	014	0400	A
3	013	0400	D
3	016	0400	D
4	024	0420	A
4	019	0420	A
4	021	0420	A
4	022	0500	A
3	011	0500	A
4	020	0500	A
3	018	0500	A
3	018	0510	A
3	018	0600	A
3	018	0810	A
3	018	0830	A
3	018	0850	A
3	018	0900	A

001
MAP 0200, Entry point A is on page 2.

(CONTINUED, NEXT COL)

START MAP

(Entry Point A)

-Record customer supplied information including error codes, if any.

Note: when the map leads to a defective card, measure the voltages at the location before replacing the card. If any voltages are found to be out of tolerance go to map 0700 , entry point A (refer to 271).

-Place the 5100 in its service position (refer to 212).
-Set the BRIGHTNESS control to the center of its range.
-Switch the L32-64-R32 switch to 64.
-Press the bottom of the REVERSE DISPLAY switch.
-Switch the DISPLAY REGISTERS switch to NORMAL.
-Check that the RUN switch under the covers is on
(refer to 200).

Is the problem associated with an installed RPQ feature?
Y N

002
Is the PROCESS CHECK light on?
Y N

003
Do you think the problem is too intermittent for effective use of the MAPs?
Y N

004
-Power up. Wait 30 seconds.
Or press RESTART .

Is the 5 inch display dark for all positions of the BRIGHTNESS control?
Y N

4 A 4 B 4 C 4 D 2 E

E 2

005
To test the indicator lights:

-Press and hold the RESTART switch.

Are both the PROCESS CHECK light and the IN PROCESS light on?
Y N

006
Defective H2 (I/O and diag) card.
Defective PROCESS CHECK light.
Defective IN PROCESS light.
Defective RESTART switch.
Check/replace display and control panel cable (refer to 210, 241).

007
-Release the RESTART switch. Wait 10 seconds.

Is the PROCESS CHECK light on?
Y N

008
The 5 inch display raster is grossly distorted if it is absent, is rolling, has a black rather than a white background, is greatly reduced in size, is tilted, not centered, or departs significantly from a rectangular shape (as viewed in the DISPLAY REGISTERS switch position).

Is the 5 inch display raster grossly distorted?
Y N

009
-Press RESTART. wait 10 seconds.

Did either LOAD 0 or CLEAR WS (with no misspelling) appear on one and only one line of the 5 inch display?
Y N

4 F 4 G 3 H 3 J

START MAP

010

-Switch the RUN switch under the covers to not run.
(refer to 200).
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
Refer to 248, hex registers display.

Do all 1024 positions contain legible, well-formed, non-blank characters?

Y N

011

-Switch the DISPLAY REGISTERS switch to NORMAL.
-Switch the RUN switch under the covers to run.

Go to MAP 0500, Entry Point A.

012

Are all of the characters displayed hex characters? (that is 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E or F.)

Y N

013

-Switch the RUN switch under the covers to run.

Go to MAP 0400, Entry Point D.

014

-Switch the DISPLAY REGISTERS switch to NORMAL.
-Switch the RUN switch under the covers to run.

Go to MAP 0400, Entry Point A.

015

Are the top 13 lines of the display entirely blank?

Y N

016

Go to MAP 0400, Entry Point D.

017

Is the PROCESS CHECK light on?

Y N

018

-Use the customer information recorded earlier and the customer error chart to determine the probable failure area.

Exit to the appropriate MAP :

-Internal Tape Unit

Go to MAP 0300, Entry Point B.

-Display

Go to MAP 0500, Entry Point A.

- TV Monitor

Go to MAP 0510, Entry Point A.

-Keyboard

Go to MAP 0600, Entry Point A.

-5103 Printer

Go to MAP 0810, Entry Point A.

-Communications/Serial I/O

Go to MAP 0830, Entry Point A.

-5106 Auxiliary Tape Unit

(CONTINUED, NEXT COL)

C 2 D 2 F 2 G 2 K 3 **START MAP**

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(CONTINUED)

Go to MAP 0850, Entry Point A.

-Otherwise go to the machine check out MAP

Go to MAP 0900, Entry Point A.

019
Go to MAP 0420, Entry Point A.

020
Go to MAP 0500, Entry Point A.

021
Go to MAP 0420, Entry Point A.

022
Go to MAP 0500, Entry Point A.

023
Refer to the Intermittent Troubleshooting Guide in the Diagnostic Aids section of the 5100 MIM.

A 2 B 2

024
Go to MAP 0420, Entry Point A.

025
Go to the RPQ Features Reference Section (MAP 0950).

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
0200	B	2	007
0860	A	1	001
0861	A	1	001
0900	A	1	001

EXIT POINTS

EXIT THIS MAP		TO	
PAGE NUMBER	STEP NUMBER	MAP NUMBER	ENTRY POINT
3	022	0200	A
2	010	0420	A
3	014	0420	A
45	509	0420	A
45	507	0600	A
42	477	0700	A
37	413	0700	A
38	423	0700	A
38	429	0700	A
28	280	0700	A
12	111	0700	A
2	009	0900	A
3	013	0900	A
3	016	0900	A
9	082	0900	A
44	505	0900	A

001
(Entry Point A)

Is the PROCESS CHECK light on?
Y N

002
The tape read diagnostic program displays an error on the display if an error is found. An error is displayed in the following format near the top of the display:

ERROR XXX E 80 GOTO MAP 0300.

Is an error displayed?
Y N

4
5 4 2
A B C

0300

003

The characters DCP2 are displayed when the tape read diagnostic is done.

Are the characters DCP2 displayed?

Y N

004

The instruction PRESS EXECUTE,R,OR L might be displayed near the bottom of the display. Ignore this instruction if it is displayed.

Are instructions (other than PRESS EXECUTE,R,OR L) or questions displayed?

Y N

005

Please observe again for:

1. PROCESS CHECK Light on.
2. Error displayed.
3. Instructions or questions displayed.

Do you have any of the above conditions?

Y N

006

Have you passed this step before?

Y N

3 D — 3 E — 3 F — 3 G — 2 H

007

(Entry Point B)

-If there is a cartridge in the tape drive, remove it.
-Press RESTART and wait 10 seconds.

Use the keys in the numeric key section of the keyboard (refer to 250 for the location of the numeric key section).

-Hold CMD and press HOLD .
-Hold CMD and press - (minus)

You have now loaded DCP1 (diagnostic control program 1. Refer to section 3, diagnostic aids). If the DCP1 program load is ok, the characters DCP1 are displayed.

Are the characters DCP1 displayed?

Y N

008

Is the PROCESS CHECK light on?

Y N

009

Go to MAP 0900, Entry Point A.

010

Go to MAP 0420, Entry Point A.

3 J

011
Use the keys in the numeric key section.

-Hold CMD and press * (BASIC multiply key).
OR
-Hold CMD and press x (APL multiply key).

You have now put the DCP1 program in diagnostic mode.
If the diagnostic mode load is ok, the characters DIAG DCP1 are displayed (refer to section 3, diagnostic aids).

Are the characters DIAG DCP1 displayed?
Y N

012

Is the PROCESS CHECK light on?
Y N

013
Go to MAP 0900, Entry Point A.

014
Go to MAP 0420, Entry Point A.

015
Use the keys in the numeric key section.

-Press C
-Hold CMD and press 1
-Press EXECUTE

You have loaded and are running the tape read diagnostic (refer to section 3, diagnostic aids).

-Follow the instructions displayed to run the diagnostic. If the PROCESS CHECK light comes on or the characters DCP2 are displayed:
Go to Page 1, Step 001, Entry Point A.

016
Go to MAP 0900, Entry Point A.

017
Go to Page 1, Step 001, Entry Point A.

018
An error instruction is displayed in the following format:

GOTO MAP 0300 ERROR XXX .

Is your answer to the displayed question an error instruction?
Y N

019
Do not press EXECUTE ,R ,or L unless asked to. Follow the instructions displayed on this display.

NOTE: After you follow the instructions on this display another display might appear. Ignore this next display.

Go to Page 1, Step 001, Entry Point A.

020
Go to Page 4, Step 024, Entry Point G.

021

Are you diagnosing an internal tape drive problem?
Y N

022
Go to MAP 0200, Entry Point A.

023
Run the tape write diagnostic program by following the instructions displayed.

0300

024

(Entry Point G)

These errors are valid only for the tape read diagnostic program. Scan through the errors until you find the error that is displayed on the display. Then take the Y leg to find the correct page number.

Error 001?
Y N

025

Error 002?
Y N

026

Error 003?
Y N

027

Error 004?
Y N

028

Error 005?
Y N

4 4 4 4 4
5 4 4 4 3 4
K L M N P Q

029

Error 006?
Y N

030

Error 007?
Y N

031

Error 008?
Y N

032

Error 009?
Y N

033

Error 010?
Y N

4 4 4 4 4
3 3 3 3 3 5
R S T U V W

034

Error 011?
Y N

035

Error 012?
Y N

036

Error 013?
Y N

037

Error 014?
Y N

038

Error 901?
Y N

039

Error 903?
Y N

040

Error 906?
Y N

041

Error 907?
Y N

042

Error 909?
Y N

043

Error 912?
Y N

044

Error 915?
Y N

045

Error 918?
Y N

046

Error 921?
Y N

047

Error 924?
Y N

048

Error 927?
Y N

049

Error 930?
Y N

050

Error 933?
Y N

051

Error 936?
Y N

052

Error 937?
Y N

053

Error 938?
Y N

39AK 36AL 35AM 35AN 34AP 6AQ

33AR 32AS 31AT 30AU 29AV 7AW

054

Error 939?
Y N

055

Error 940?
Y N

056

Error 943?
Y N

057

Error 946?
Y N

058

Error 947?
Y N

29AX 25AY 25AZ 24BA 24BB 7BC

059

Error 948?
Y N

060

Error 949?
Y N

061

Error 950?
Y N

062

Error 951?
Y N

063

Error 952?
Y N

23BD 22BE 22BF 19BG 17BH 8BJ

TAPE READ MAP

B J 7

064

Error 953?
Y N

065

Error 954?
Y N

066

Error 957?
Y N

067

Error 958?
Y N

068

Error 960?
Y N

16BK 16BL 15BM 14BN 14BP 8BQ

B Q 8

069

Error 963?
Y N

070

Error 966?
Y N

071

Error 970?
Y N

072

Error 973?
Y N

073

Error 982?
Y N

14BR 13BS 13BT 12BU 12BV 9BW

074

Error 983?
Y N

075

Error 985?
Y N

076

Error 986?
Y N

077

Error 987?
Y N

078

Error 988?
Y N

1 2 B X → 11BX
1 1 B Y → 11BY
1 1 B Z → 11BZ
1 1 C A → 11CA
1 1 C B → 11CB
9 C C → 9CC

079

Error 989?
Y N

080

Error 994?
Y N

081

Error 995?
Y N

082
Incorrect error number.

Go to MAP 0900, Entry Point A.

083
ERROR 995--WRAP ERROR .
No wrap of data through tape control card.

Defective F2 (base I/O) card.
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

084
ERROR 994--READ DATA ERROR .
Incorrect data detected.

-Attach a jumper between tape control card pin U06 (-write enable and tape control card pin U08 (gnd) (refer to 227).
-Press EXECUTE

Is ERROR 995 displayed on the display?
Y N

1 0 C D → 10CD
1 0 C E → 10CE
1 0 C F → 10CF

TAPE READ MAP

085
NOTE: REMOVE JUMPER.

Defective tape control card (refer to 202).
Defective read/write head (refer to 202).
Dirty tape head.
Service check/adjust the cartridge stop blocks (refer to 224).
Check/replace the tape internal cable (refer to 202).

086
NOTE: REMOVE JUMPER.

Defective F2 (base I/O) card.
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

087
ERROR 989--READ DATA ERROR .
No sync byte detected on tape channel 0 (format track) or on tape channel 1 (data track).

(refer to the appendix, the general logic probe).
-Probe F2-J06 (-read data).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

088
-Loop on this test (press L on the keyboard).

Are both lights on?
Y N

089

Is the UP light on?
Y N

1 1 1 1
0 0 0 0
C C C C
G H J K

090
Defective F2 (base I/O) card.
Check/replace the tape drive cable (refer to 202).

091
-Probe tape control card pin S09 (-read data).

Is the DOWN light on?
Y N

092
Defective tape control card (refer to 202).

093
Check/replace the tape drive cable (refer to 202).

094
Defective tape control card (refer to 202).
Defective F2 (base I/O) card.
Check/replace the tape drive cable (refer to 202).
Defective read/write head (refer to 202).
Dirty tape head.
Service check/adjust the cartridge stop blocks (refer to 224).
Check/replace the tape internal cable (refer to 202).

095
-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).

Is the DOWN light on?
Y N

1 1
1 1
C C
L M

TAPE READ MAP

096

Is the UP light on?
Y N

097
Defective F2 (base I/O) card.

098
Defective tape control card (refer to 202).

099
-Disconnect the tape drive cable from the board (refer to 228).

Is the DOWN light on?
Y N

100

Is the UP light on?
Y N

101
Defective F2 (base I/O) card.

102
Check/replace the tape drive cable (refer to 202).

103
Defective F2 (base I/O) card.

104
ERROR 988--READ DATA ERROR .
No sync byte detected on tape channel 1 (data track).

Defective tape control card (refer to 202).
Defective read/write head (refer to 202).
Dirty tape head.
Service check/adjust the cartridge stop blocks (refer to 224).

105
ERROR 987--READ DATA ERROR .
No sync byte detected on tape channel 0 (format track).

Defective tape control card (refer to 202).
Defective read/write head (refer to 202).
Dirty tape head.
Service check/adjust the cartridge stop blocks (refer to 224).

106
ERROR 986--READ DATA ERROR .
No interrupt detected on tape channel 1 (data track).

Defective tape control card (refer to 202).
Defective read/write head (refer to 202).
Check/replace the tape internal cable (refer to 202).

107
ERROR 985--READ DATA ERROR .
No interrupt detected on tape channel 0 (format track).

Defective tape control card (refer to 202).
Defective read/write head (refer to 202).
Check/replace the tape internal cable (refer to 202).

0300

0300

108

ERROR 983--READ DATA ERROR ,
No interrupt detected on either tape channel 0 (format track) or on tape channel 1 (data track).

-Calibrate the CE meter (refer to 270).
-Measure -5 vdc between N2-P08 (gnd) and tape control card pin S06 (-5 vdc).

Is the voltage in tolerance (-4.6 vdc to -5.5 vdc)?
Y N

109

-Measure -5 vdc between N2-P08 (gnd) and E6-D02 (-5 vdc).

Is the voltage in tolerance (-4.6 vdc to -5.5 vdc)?
Y N

110

-Measure -5 vdc between N2-P08 (gnd) and C1-E11 (-5 vdc).

Is the voltage in tolerance (-4.6 vdc to -5.5 vdc)?
Y N

111

The -5 vdc from the power supply is not in tolerence.

Go to MAP 0700, Entry Point A.

112

Repair the open connection from C1-E11 to E6-D02 .

113

Check/replace the tape drive cable (refer to 202).

114

Defective tape control card (refer to 202).

115

ERROR 982--STATUS ERROR .
BOT Status active once, but it is not active now.

Defective F2 (base I/O) card.
Defective tape control card (refer to 202).
Defective tape LED-PTX assembly (refer to 202).
Check/replace the tape drive cable (refer to 202).
Check/replace the tape internal cable (refer to 202).

116

ERROR 973--STATUS ERROR .
Tape might be moving too slowly.

Service check/adjust the motor pulley (refer to 226).
Service check/adjust the cartridge stop blocks (refer to 224).
Inspect the jackshaft housing and the spindle for binds (refer to 202).
Service check/adjust the magnet gaps (refer to 222).
Defective tape motor assembly (refer to 202).
Defective diagnostic tape cartridge.
Defective spindle-select arm assembly (refer to 202).
Defective jackshaft housing assembly (refer to 202).

117
ERROR 970--STATUS ERROR .
Unexpected beginning or end of tape status active.

-Observe which reel of the tape cartridge has the most tape on it.

Does the right reel have more tape on it than the left reel?
Y N

118
-Press C to call the tape repositioning option.
-Next press B to call the reverse tape repositioning routine.

Go to Page 1, Step 001, Entry Point A.

119
-Press C to call the tape repositioning option.
-Next press F to call the forward tape repositioning routine.

Go to Page 1, Step 001, Entry Point A.

120
ERROR 966--STATUS ERROR .
BOT Status cannot be cleared (status bit 7 was 0, should have been 1).

-If you are not sure of the answer to the next question, answer it N.

Is the tape moving too slow?
Y N

121
-Run the tape speed test by pressing EXECUTE on the keyboard.

Is ERROR 973 now displayed on the display?
Y N

122
Defective F2 (base I/O) card.

123
Service check/adjust the motor pulley (refer to 226).
Service check/adjust the cartridge stop blocks (refer to 224).
Inspect the jackshaft housing and the spindle for binds (refer to 202).
Service check/adjust the magnet gaps (refer to 222).
Defective tape motor assembly (refer to 202).
Defective diagnostic tape cartridge.
Defective spindle-select arm assembly (refer to 202).
Defective jackshaft housing assembly (refer to 202).

124
Tape might be moving too slowly.

Service check/adjust the motor pulley (refer to 226).
Service check/adjust the cartridge stop blocks (refer to 224).
Inspect the jackshaft housing and the spindle for binds (refer to 202).
Service check/adjust the magnet gaps (refer to 222).
Defective tape motor assembly (refer to 202).
Defective diagnostic tape cartridge.
Defective spindle-select arm assembly (refer to 202).
Defective jackshaft housing assembly (refer to 202).

125
ERROR 963--STATUS ERROR .
Load point hole (BOT status) can not be found (status bit 7 was 1, should have been 0).

Service check/adjust the cartridge stop blocks (refer to 224).
Defective tape LED-PTX assembly (refer to 202).
Defective tape control card (refer to 202).
Defective diagnostic tape cartridge.

126
ERROR 960--STATUS ERROR .
BOT Status is not active (status bit 7 was 1, should have been 0).

-Jumper tape control card pin B08 (gnd) to tape control card pin D10 (+ BOT PTX collector) (refer to 227).
-Retry the test (press R on the keyboard).

This section of the tape read diagnostic program just ran again.

Is ERROR 960 still displayed?
Y N

127
NOTE: REMOVE JUMPER.

Defective tape LED-PTX assembly (refer to 202).
Check/replace the tape internal cable (refer to 202).

128
(refer to the appendix, the general logic probe).
-Probe tape control card pin SO4 (-BOT) .

Is the DOWN light on?
Y N

129
NOTE: REMOVE JUMPER.

Defective tape control card (refer to 202).

130
-Probe F2-U10 (-BOT) .

Is the DOWN light on?
Y N

131
NOTE: REMOVE JUMPER.

Check/replace the tape drive cable (refer to 202).

132
NOTE: REMOVE JUMPER.

Defective F2 (base I/O) card.

133
ERROR 958--STATUS ERROR .
EOT Status cannot be cleared (status bit 0 was 1, should have been 0).

-If you are not sure of the answer to the next question, answer it N.

Is the tape moving too slow?
Y N

134
-Run the tape speed test by pressing EXECUTE on the keyboard.

Is ERROR 973 now displayed?
Y N

135
Defective F2 (base I/O) card.

136
Service check/adjust the motor pulley (refer to 226).
Service check/adjust the cartridge stop blocks (refer to 224).
Inspect the jackshaft housing and the spindle for binds (refer to 202).
Service check/adjust the magnet gaps (refer to 222).
Defective tape motor assembly (refer to 202).
Defective diagnostic tape cartridge.
Defective spindle-select arm assembly (refer to 202).
Defective jackshaft housing assembly (refer to 202).

137
Tape might be moving too slowly.

Service check/adjust the motor pulley (refer to 226).
Service check/adjust the cartridge stop blocks (refer to 224).
Inspect the jackshaft housing and the spindle for binds (refer to 202).
Service check/adjust the magnet gaps (refer to 222).
Defective tape motor assembly (refer to 202).
Defective diagnostic tape cartridge.
Defective spindle-select arm assembly (refer to 202).
Defective jackshaft housing assembly (refer to 202).

138
ERROR 957--STATUS ERROR .
EOT Status is not active (status bit 0 was 0, should have been 1).

-Attach a jumper between tape control card pin B08 (gnd) to tape control card pin B10 (+ EOT PTX collector) (refer to 227).
(refer to the appendix, the general logic probe).
-Probe F2-J02 (-EOT) .

Is the DOWN light on?
Y N

139
-Probe tape control card pin S02 (-EOT) .

Is the DOWN light on?
Y N

140
NOTE: REMOVE JUMPER.

Defective tape control card (refer to 202).

141
NOTE: REMOVE JUMPER.

Check/replace the tape drive cable (refer to 202).

142
-Retry the test (press R on the keyboard).

Is the message THE PROGRAM IS LOOKING FOR BEGINNING OR END OF TAPE. displayed on the display?
Y N

143
NOTE: REMOVE JUMPER.

Defective tape LED-PTX assembly (refer to 202).
Check/replace the tape internal cable (refer to 202).

1
6
C
U

144
NOTE: REMOVE JUMPER.

Defective F2 (base I/O) card.

145
ERROR 954--STATUS ERROR .
Neither BOT nor EOT status is active (status bit 0 was 0, should have been 1 and status bit 7 was 1, should have been 0).

-If you are not sure of the answer to the next question, answer it N.

Is the tape moving too slow?
Y N

146

Did the tape run off either reel?
Y N

147
-Retry the test (press R on the keyboard).

Wait for another error to be displayed on the display.

Go to Page 1, Step 001, Entry Point A.

148
Service check/adjust the cartridge stop blocks (refer to 224).
Defective tape LED-PTX assembly (refer to 202).
Check/replace the tape internal cable (refer to 202).
Defective diagnostic tape cartridge.

149
Tape might be moving too slowly.

Service check/adjust the motor pulley (refer to 226).
Service check/adjust the cartridge stop blocks (refer to 224).
Inspect the jackshaft housing and the spindle for binds (refer to 202).
Service check/adjust the magnet gaps (refer to 222).
Defective tape motor assembly (refer to 202).
Defective diagnostic tape cartridge.
Defective spindle-select arm assembly (refer to 202).
Defective jackshaft housing assembly (refer to 202).

150
ERROR 953--COMMAND ERROR .
Unwanted tape motion.

There might be foreign material in the select magnet gaps (refer to 202).
Defective brake arm or brake arm spring (refer to 202).
Service check/adjust the magnet gaps (refer to 222).
Service check/adjust the jackshaft housing (refer to 223).

151

ERROR 952--COMMAND ERROR .
Loss of clockwise (reverse) tape direction control.

-If you do not remember the answer to the next question, press R and then C to try the test again.

Did the tape reels move at all after you pressed C ?

Y N

152

-If there is a cartridge in the tape drive, remove it.
-While looking into the front of the tape drive push the spindle (refer to 202) to the right. Do not push on the rubber part of the spindle.

While the spindle is pushed to the right, the tape motor should rotate the spindle.

Does the spindle rotate?

Y N

153

There might be foreign material in the select magnet gaps (refer to 202).
Service check/adjust the jackshaft housing (refer to 223).
Service check/adjust the magnet gaps (refer to 222).
Defective spindle-select arm assembly (refer to 202).

154

-Insert the diagnostic cartridge into the tape drive.

****
* CAUTION *
****
TAPE MAY RUN OFF THE REEL IF THE JUMPER IS LEFT ON TOO LONG.

-Momentarily attach a jumper between tape control card pin D12 (-reverse magnet drive) and tape control card pin U08 (gnd) (refer to 227).

Did the tape move clockwise (reverse)?

Y N

155

-Calibrate the CE meter (refer to 270).

-Measure +12 vdc between tape control card pin D13 (+12 vdc) and tape control card U08 (gnd).

Is the voltage in tolerance (+11.0 vdc to +13.2 vdc)?

Y N

156

Go to Page 37, Step 409, Entry Point C.

157

-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
-Measure the resistance between tape control card pin D12 and D13 .

Is the resistance 25 to 40 ohms?

Y N

158

Defective select magnet (reverse) (refer to 202).
Check/replace the tape internal cable (refer to 202).

0300

159
There might be foreign material in the select magnet gaps (refer to 202).
Service check/adjust the jackshaft housing (refer to 223).
Service check/adjust the magnet gaps (refer to 222).
Defective spindle-select arm assembly (refer to 202).

160
Defective tape control card (refer to 202).

161
(Entry Point H)

-If you do not remember the answer to the next question, press R and then C to try the test again.

Did the tape reels move counterclockwise (forward) rather than clockwise (reverse)?
Y N

162
-If you do not remember the answer to the next question, press R and then C to try the test again.

Did the tape reels move very slowly or slow down after starting?
Y N

163
You have indicated by your answers that the tape reels moved clockwise for about 2 seconds. That is what should happen for this test. You might not have an error.

-Retry the test (press R on the keyboard).

Go to Page 1, Step 001, Entry Point A.

164
There might be foreign material in the select magnet gaps (refer to 202).

165
(refer to the appendix, the general logic probe).
-Probe tape control card pin U04 (-forward) (refer to 227).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

166
Defective tape control card (refer to 202).

167
-Remove the F2 (base I/O) card from the board.

Is the DOWN light on?
Y N

168

Is the UP light on?
Y N

169
Defective tape control card (refer to 202).

170
Defective F2 (base I/O) card.

171
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

172

ERROR 951--COMMAND ERROR .
Loss of counterclockwise (forward) tape direction control.

If you do not remember the answer to the next question watch for tape motion as you put the cartridge in again. Quickly remove the cartridge if the tape moves.

Did the tape move as soon as you put the cartridge in?
Y N

173
-If you do not remember the answer to the next question, press R and then C to try the test again.

Did the tape reels move at all after you pressed C ?
Y N

174
-If there is a cartridge in the tape drive, remove it.
-Look into the front of the tape drive , watch for spindle (refer to 202) rotation after pressing R and then C on the keyboard.

Does the spindle rotate?
Y N

175
-While looking into the front of the tape drive push the spindle (refer to 202) to the left. Do not push on the rubber part of the spindle.

While the spindle is pushed to the left, the tape motor should rotate the spindle.

Does the spindle rotate?
Y N

22DC 21DD 21DE 20DF 19DG

176

-Open the covers and see if the motor is running.

Is the motor running?
Y N

177
-Power down.
-Unplug AC cable.
-Disconnect the power supply ac power connector J1 at the ac power box (refer to 207).
-Disconnect the tape motor ac power connector J3 at the ac power box (refer to 207).
-Connect the tape motor ac power connector to where the power supply ac power connector was.
-Plug in AC cable.
-Power up. Wait 30 seconds.

Does the tape motor run now?
Y N

178
-Power down.
-Unplug AC cable.
-Replace ac power connectors in their proper locations (tape motor connector at J3 and ac power supply connector at J1 ; refer to 207).
Defective tape motor assembly (refer to 202).

179
-Power down.
-Unplug AC cable.
- Replace ac power connectors in their proper locations (tape motor connector at J3 and ac power supply connector at J1 ; refer to 207).
Test/replace ac wiring(refer to 273).

20DH

0300

180

Is the jackshaft rotating (refer to 202)?

Y N

181

Inspect the jackshaft for frozen bearings.
Defective belt (refer to 202).
Service check/adjust the motor pulley (refer to 226).
Defective jackshaft housing assembly (refer to 202).

182

There might be foreign material in the select magnet gaps (refer to 202).
Service check/adjust the jackshaft housing (refer to 223).
Service check/adjust the magnet gaps (refer to 222).
Defective jackshaft housing assembly (refer to 202).
Defective spindle-select arm assembly (refer to 202).

183

-Insert the diagnostic cartridge into the tape drive.

****
* CAUTION *
****
TAPE MAY RUN OFF THE REEL IF THE JUMPER IS LEFT ON TOO LONG .

-Momentarily attach a jumper between tape control card pin B12 (-forward magnet drive) and tape control card pin U08 (gnd) (refer to 227).

Did the tape move counterclockwise (forward)?

Y N

2 2
0 0
D D
J K

184

-Calibrate the CE meter (refer to 270).
-Measure +12 vdc between tape control card pin B13 (+12 vdc) and tape control card pin U08 (gnd).

Is the voltage in tolerance (+11.0 vdc to +13.2 vdc)?

Y N

185

Go to Page 37, Step 409, Entry Point C.

186

-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
-Measure the resistance between tape control card pin B12 and B13 .

Is the resistance 25 to 40 ohms?

Y N

187

Defective select magnet (forward) (refer to 202).
Check/replace the tape internal cable (refer to 202).

188

There might be foreign material in the select magnet gaps (refer to 202).
Service check/adjust the jackshaft housing (refer to 223).
Service check/adjust the magnet gaps (refer to 222).
Defective spindle-select arm assembly (refer to 202).

189

Defective tape control card (refer to 202).

190
Service check/adjust the cartridge stop blocks (refer to 224).
Service check/adjust the locking wheels (refer to 225).
Defective spindle-select arm assembly (refer to 202).
Defective diagnostic tape cartridge.

191
-If you do not remember the answer to the next question, press R and then C to try the test again.

Did the tape motion last about 2 seconds?
Y N

192
Defective brake arm or brake arm spring (refer to 202).
Defective F2 (base I/O) card.

193
-If you do not remember the answer to the next question, press R and then C to try the test again.

Did the tape reels move clockwise (reverse) rather than counterclockwise (forward).
Y N

194
-If you do not remember the answer to the next question, press R and then C to try the test again.

Did the tape reels move very slowly or slow down after starting?
Y N

195
You have indicated by your answers that the tape reels moved counterclockwise for about 2 seconds. That is what should happen for this test. You might not have an error.

-Retry the test (press R on the keyboard).

Go to Page 1, Step 001, Entry Point A.

196
Service check/adjust the motor pulley (refer to 226).
Inspect the jackshaft and spindle for binds (refer to 202).
There might be foreign material in the select magnet gaps (refer to 202).
Defective tape motor assembly (refer to 202).
Defective spindle-select arm assembly (refer to 202).
Defective jackshaft housing assembly (refer to 202).
Defective diagnostic tape cartridge.

197
(refer to the appendix, the general logic probe).
-Probe tape control card pin U04 (-forward)

Is the UP light on?
Y N

198
Defective tape control card (refer to 202).

199
-Probe F2-J04 (-forward).

Is the UP light on?
Y N

200
Check/replace the tape drive cable (refer to 202).

201
Defective F2 (base I/O) card.

202
There might be foreign material in the select magnet gaps (refer to 202).
Defective brake arm or brake arm spring (refer to 202).
Service check/adjust the magnet gaps (refer to 222).
Service check/adjust the jackshaft housing (refer to 223).

203
ERROR 950--STATUS ERROR .
EOT Status is always active (status bit 0 was 1, should have been 0).

-Remove the cartridge from the tape drive.

Has the tape run off either reel?
Y N

204
The tape is positioned on the end of tape (EOT) mark.

-Manually move the tape so the EOT mark (hole in tape) is past the mirror (refer to 229).
-Replace the cartridge in the tape drive.
-Retry the test (press R on the keyboard).

205
-Thread the tape back on the reel (refer to 230).
-Replace the cartridge in the tape drive.
-Retry the test (press R on the keyboard).

206
(Entry Point F)
ERROR 949--STATUS ERROR .
File protect status should not be active (status bit 6 was 1, should have been 0).

-Remove the cartridge from the tape drive.
-Determine if the problem is electrical or mechanical by manually pressing the file protect switch. (the file protect switch can be seen by looking into the front of the tape drive. It is the leftmost switch. Refer to 202).
-While manually pressing the file protect switch:
-Retry the test (press R on the keyboard).

Pressing R caused this section of the tape diagnostic to run again.

Is error 949 still displayed on the display?
Y N

207
The file protect switch operates electrically.

Service check/adjust the switch assembly (refer to 221).
Service check/adjust the cartridge stop blocks (refer to 224).
Defective tape switch assembly (refer to 202).
Defective diagnostic tape cartridge.

208
The problem is an electrical problem not an adjustment problem.

-Replace the cartridge in the tape drive.
(refer to the appendix, the general logic probe).
-Probe tape control card pin D07 (+file protect) (refer to 227).

Is the DOWN light on?
Y N

209
Defective tape switch assembly (refer to 202).
Check/replace the tape internal cable (refer to 202).

210
-Probe tape control card pin U13 (+file protect).

Is the DOWN light on?
Y N

211
Defective tape control card (refer to 202).

212
-Probe F2-P04 (+file protect).

Is the DOWN light on?
Y N

213
Check/replace the tape drive cable (refer to 202).

214
Defective F2 (base I/O) card.

215
(Entry Point E)
ERROR 948--STATUS ERROR .
Cartridge in place status not active (status bit 3 was 0, should have been 1).

-Remove the cartridge from the tape drive.
-Determine if the problem is electrical or mechanical by manually pressing the cartridge in place switch. The cartridge in place switch can be seen by looking into the front of the tape drive, it is the rightmost switch (refer to 202).
-While manually pressing the cartridge in place switch:
-Retry the test (press R on the keyboard).

Pressing R causes this section of the tape read diagnotic program to run again.

Is ERROR 948 still displayed?
Y N

216
The cartridge in place switch operates electrically.

Service check/adjust the switch assembly (refer to 221).
Service check/adjust the cartridge stop blocks (refer to 224).
Defective tape switch assembly (refer to 202).
Defective diagnostic tape cartridge.

217
The problem is an electrical problem not an adjustment problem.

-Replace the cartridge in the tape drive.
(refer to the appendix, the general logic probe).
-Probe tape control card B08 (gnd) (refer to 227).

Is the DOWN light on?
Y N

218
Defective tape control card (refer to 202).

0300

219
-Probe tape control card pin B07 (-cartridge in place).

Is the DOWN light on?
Y N

220
Defective tape switch assembly (refer to 202).
Check/replace the tape internal cable (refer to 202).

221
-Probe tape control card pin S12 (-cartridge in place).

Is the DOWN light on?
Y N

222
Defective tape control card (refer to 202).

223
-Probe F2-M03 (-cartridge in place).

Is the DOWN light on?
Y N

224
Check/replace the tape drive cable (refer to 202).

225
Defective F2 (base I/O) card.

226
ERROR 947--WRAP ERROR .
No data detected for wrap through the tape control card.

Defective tape control card (refer to 202).
Defective F2 (base I/O) card.
Check/replace the tape drive cable (refer to 202).

227
ERROR 946--WRAP ERROR .
Missing interrupt for wrap through tape head.

(refer to the appendix, the general logic probe).
-Probe tape control card pin U09 (-channel select).

Is the DOWN light on?
Y N

228
-Loop on this test (press L on the keyboard).
-Probe tape control card pin U09 (-channel select).

Are both lights on?
Y N

229

Is the UP light on?
Y N

230
Defective F2 (base I/O) card.
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

231
-Probe F2-G13 (-channel select).
-Leave the probe on the pin.

Is the UP light on?
Y N

232
Check/replace the tape drive cable (refer to 202).

233
Defective F2 (base I/O) card.

234
Defective tape control card (refer to 202).
Defective read/write head (refer to 202).

235
-Remove the F2 (base I/O) card from the board.

-Probe tape control card pin U09 (-channel select).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

236

Is the UP light on?
Y N

237
Defective tape control card (refer to 202).

238
Defective F2 (base I/O) card.

239
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

240
ERROR 943--WRAP ERROR .
Extra data detected for wrap through the tape control card.

(refer to the appendix, the general logic probe).
-Probe tape control card pin S05 (-diagnostic mode) (refer to 227).

Is the UP light on?
Y N

241
Defective tape control card (refer to 202).

242
-Probe F2-G04 (-diagnostic mode).

Is the UP light on?
Y N

243
Check/replace the tape drive cable (refer to 202).

244
Defective F2 (base I/O) card.

245
ERROR 940--WRAP ERROR .
No interrupt detected for wrap through tape control card.

(refer to the appendix, the general logic probe).
-Probe tape control card pin U02 (+tape clock) (refer to 227).

Are both lights on?
Y N

246
-Probe tape control card pin U02 (+tape clock).

Is the DOWN light on?
Y N

247
-Probe F2-S09 (+tape clock).
-Leave the probe on the pin.

Is the UP light on?
Y N

248
Check/replace the tape drive cable (refer to 202).

249
Defective F2 (base I/O) card.

250
-Remove the F2 (base I/O) card from the board.
-Probe tape control card pin U02 (+tape clock).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

251

Is the UP light on?
Y N

252
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

253
Defective F2 (base I/O) card.

254
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

255
-Probe tape control card pin U06 (-write enable).

Is the DOWN light on?
Y N

256
-Loop on this test (press L on the keyboard).
-Probe tape control card pin U06 (-write enable).

Are both lights on?
Y N

257

Is the UP light on?
Y N

258
Defective F2 (base I/O) card.
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

259
-Probe F2-G03 (-write enable).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

260
Defective F2 (base I/O) card.

261
Check/replace the tape drive cable (refer to 202).

262

-Probe F2-G08 (-read clock).

Are both lights on?

Y N

263

-Probe F2-G08 (-read clock).

Is the DOWN light on?

Y N

264

-Probe F2-G08 (-read clock).

-Leave the probe on the pin.

Is the UP light on?

Y N

265

Defective F2 (base I/O) card.

266

-Probe tape control card pin S10 (-read clock).

Is the DOWN light on?

Y N

267

Defective F2 (base I/O) card.

Defective tape control card (refer to 202).

Check/replace the tape drive cable (refer to 202).

268

Check/replace the tape drive cable (refer to 202).

269

-If there is a cartridge in the tape drive, remove it.

-Remove tape control card (refer to 202).

-Probe F2-G08 (-read clock).

-Leave the probe on the pin.

Is the DOWN light on?

Y N

270

Is the UP light on?

Y N

271

Defective F2 (base I/O) card.

Check/replace the tape drive cable (refer to 202).

272

Defective tape control card (refer to 202).

273

-Disconnect the tape drive cable from the board (refer to 228).

Is the DOWN light on?

Y N

274

Check/replace the tape drive cable (refer to 202).

275

Defective F2 (base I/O) card.

0300

276

-Calibrate the CE meter (refer to 270).
-Measure -12 vdc between tape control card pin U08 (gnd) and tape control card pin S13 (-12 vdc) (refer to 227).

Is the voltage in tolerance (-11.0 vdc to -13.2 vdc)?

Y N

277

-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
-Measure -12 vdc between tape control card pin U08 (gnd) and tape control card pin S13 (-12 vdc).

Is the voltage in tolerance (-11.0 vdc to -13.2 vdc)?

Y N

278

-Install the tape control card (refer to 202).
-Measure -12 vdc between N2-P08 (gnd) and G6-A02 (-12 vdc).

Is the voltage in tolerance (-11.0 vdc to -13.2 vdc)?

Y N

279

-Measure -12 vdc between N2-P08 (gnd) and C1-E13 (-12 vdc).

Is the voltage in tolerance (-11.0 vdc to -13.2 vdc)?

Y N

280

The -12 vdc from the power supply is not in tolerence.

Go to MAP 0700, Entry Point A.

281

Repair open connection from C1-E13 to G6-A02 .

282

Check/replace the tape drive cable (refer to 202).

283

Defective tape control card (refer to 202).

284

-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
Test the continunity of a wire in the tape internal cable (probe on the cable not on the card) by testing for continuity from tape control card pin B09 (raw data) to tape control card pin D09 (raw data) (refer to 227).

Is there continuity between the pins?

Y N

285

Defective tape control card (refer to 202).
Check/replace the tape internal cable (refer to 202).

286

Defective tape control card (refer to 202).
Defective F2 (base I/O) card.
Check/replace the tape drive cable (refer to 202).
Defective read/write head (refer to 202).
Check/replace the tape internal cable (refer to 202).

28SEP76 PN 1608386
EC 829670 PEC 828851

287
-Remove the F2 (base I/O) card from the board.
-Probe tape control card pin U06 (-write enable).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

288

Is the UP light on?
Y N

289
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

290
Defective F2 (base I/O) card.

291
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

292
ERROR 939--INTERRUPT ERROR .
Incorrect interrupt response.

(refer to the appendix, the general logic probe).
-Probe tape control card pin S05 (-diagnostic mode) (refer to 227).

Is the DOWN light on?
Y N

293
Defective tape control card (refer to 202).
Defective F2 (base I/O) card.

294
-Remove the F2 (base I/O) card from the board.
-Probe tape control card pin S05 (-diagnostic mode).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

295

Is the UP light on?
Y N

296
Defective tape control card (refer to 202).

297
Defective F2 (base I/O) card.

298
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

299
ERROR 938--STATUS ERROR .
Select magnet active status for reverse operation should be active (status bit 2 was 1, should have been 0).

(refer to the appendix, the general logic probe).
-Probe F2-P11 (-select magnet active)

Is the UP light on?
Y N

300
Defective F2 (base I/O) card.

301
-Probe tape control card pin U12 (-select magnet active) (refer to 227).

Is the UP light on?
Y N

302
Check/replace the tape drive cable (refer to 202).

303
-Probe tape control card pin D12 (-reverse select magnet).

Is the UP light on?
Y N

304
Defective tape control card (refer to 202).

305
-Probe tape control card pin U05 (-run).

Is the UP light on?
Y N

306
Defective tape control card (refer to 202).

307
-Probe F2-M13 (-run).

Is the UP light on?
Y N

308
Check/replace the tape drive cable (refer to 202).

309
Defective F2 (base I/O) card.

310
ERROR 937--STATUS ERROR .
Select magnet active status for forward operation should be active (status bit 2 was 1, should have been 0).

(refer to the appendix, the general logic probe).
-Probe F2-P11 (-select magnet active)

Is the UP light on?
Y N

311
Defective F2 (base I/O) card.

312
-Probe tape control card pin U12 (-select magnet active) (refer to 227).

Is the UP light on?
Y N

313
Check/replace the tape drive cable (refer to 202).

314
-Probe tape control card pin B12 (-forward select magnet).

Is the UP light on?
Y N

315
Defective tape control card (refer to 202).

316
-Probe tape control card pin U05 (-run).

Is the UP light on?
Y N

317
Defective tape control card (refer to 202).

318
-Probe F2-M13 (-run).

Is the UP light on?
Y N

319
Check/replace the tape drive cable (refer to 202).

320
Defective F2 (base I/O) card.

321
ERROR 936--STATUS ERROR .
Select magnet active status was active, should not have been active(status bit 2 was 1, should have been 0).

(refer to the appendix, the general logic probe).
-Probe F2-P11 (-select magnet active)

Is the DOWN light on?
Y N

322
Defective F2 (base I/O) card.

323
-Probe tape control card pin U05 (-run) (refer to 227).

Is the DOWN light on?
Y N

324
-Probe tape control card pin B13 (+12 vdc).

Is the UP light on?
Y N

325
Defective tape control card (refer to 202).

326
-Probe tape control card pin B12 (-forward select magnet).

Is the UP light on?
Y N

327
Defective tape control card (refer to 202).
Defective select magnet (forward) (refer to 202).
Check/replace the tape internal cable (refer to 202).

328
-Probe tape control card pin D13 (+12 vdc).

Is the UP light on?
Y N

329
Defective tape control card (refer to 202).

330
-Probe tape control card pin D12 (-reverse select magnet).

Is the UP light on?
Y N

331
Defective tape control card (refer to 202).
Defective select magnet (reverse) (refer to 202).
Check/replace the tape internal cable (refer to 202).

332
-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
-Probe F2-P11 (-select magnet active).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

EK31 EM31 EN31

333

Is the UP light on?
Y N

334
Defective F2 (base I/O) card.

335
Defective tape control card (refer to 202).

336
-Disconnect the tape drive cable from the board (refer to 228).

Is the DOWN light on?
Y N

337
Check/replace the tape drive cable (refer to 202).

338
Defective F2 (base I/O) card.

339
-Remove the F2 (base I/O) card from the board.
-Probe tape control card pin U05 (-run).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

340

Is the UP light on?
Y N

341
Defective tape control card (refer to 202).

32EP 32EQ

AS6 EP32 EQ32

342
Defective F2 (base I/O) card.

343
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

344
ERROR 933--STATUS ERROR .
Erase active status for tape track channel 1 should be active (status bit 4 was 0, should have been 1).

(refer to the appendix, the general logic probe).
-Probe F2-U09 (-erase inactive).

Is the DOWN light on?
Y N

345
Defective F2 (base I/O) card.

346
-Probe tape control card pin U11 (-channel 1 erase) (refer to 227).

Is the UP light on?
Y N

347
-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
-Probe F2-U09 (-erase inactive).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

33ER 33ES 33ET

348

Is the UP light on?
Y N

349
Defective F2 (base I/O) card.

350
Defective tape control card (refer to 202).

351
-Disconnect the tape drive cable from the board (refer to 228).

Is the DOWN light on?
Y N

352
Check/replace the tape drive cable (refer to 202).

353
Defective F2 (base I/O) card.

354
-Probe F2-S08 (-channel 1 erase).

Is the UP light on?
Y N

355
Check/replace the tape drive cable (refer to 202).

356
Defective F2 (base I/O) card.

357
ERROR 930--STATUS ERROR .
Erase active status for tape channel 0 should be active (status bit 4 was 0, should have been 1).

(refer to the appendix, the general logic probe).
-Probe F2-U09 (-erase inactive).

Is the DOWN light on?
Y N

358
Defective F2 (base I/O) card.

359
-Probe tape control card pin U10 (-channel 0 erase) (refer to 227).

Is the UP light on?
Y N

360
-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
-Probe F2-U09 (-erase inactive).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

361

Is the UP light on?
Y N

362
Defective F2 (base I/O) card.

363
Defective tape control card (refer to 202).

364
-Disconnect the tape drive cable from the board (refer to 228).

Is the DOWN light on?
Y N

365
Check/replace the tape drive cable (refer to 202).

366
Defective F2 (base I/O) card.

367
-Probe F2-J07 (-channel 0 erase).

Is the UP light on?
Y N

368
Check/replace the tape drive cable (refer to 202).

369
Defective F2 (base I/O) card.

370
ERROR 927--STATUS ERROR .
Status indicates that the tape drive is in erase mode when it should not be (status bit 4 was 1 ,should be 0).

(refer to the appendix, the general logic probe).
-Probe F2-U09 (-erase inactive)

Is the UP light on?
Y N

371
Defective F2 (base I/O) card.

34EW

EW34

372
-Probe tape control card pin S03 (-erase inactive) (refer to 227).

Is the UP light on?
Y N

373
Check/replace the tape drive cable (refer to 202).

374
-Probe tape control card pin U10 (-channel 0 erase) and pin U11 (-channel 1 erase).

Is the DOWN light on for either pin?
Y N

375
Defective tape control card (refer to 202).
Check/replace the tape internal cable (refer to 202).

376
-Remove the F2 (base I/O) card from the board.
-Probe tape control card pin U10 (-channel 0 erase) and pin U11 (-channel 1 erase).

Is the DOWN light on for either pin?
Y N

377
-Probe tape control card pin U10 (-channel 0 erase) and pin U11 (-channel 1 erase).

Is the UP light on for both probe points?
Y N

378
Defective tape control card (refer to 202).

379
Defective F2 (base I/O) card.

35EX

380
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

381
ERROR 924--STATUS ERROR .
EOT Status was active but should not have been active (status bit 0 was 1, should have been 0).

(refer to the appendix, the general logic probe).
-Probe F2-JO2 (-end of tape).

Is the DOWN light on?
Y N

382
Defective F2 (base I/O) card.

383
-Calibrate the CE meter (refer to 270).
-Measure greater than +1 vdc between tape control card pin B10 (+ EOT PTX collector) and tape control card pin U08 (gnd) (refer to 227).

Is the voltage greater than 1 vdc?
Y N

384
Defective tape control card (refer to 202).
Defective tape LED-PTX assembly (refer to 202).
Check/replace the tape internal cable (refer to 202).

385
-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
-Probe F2-J02 (-end of tape).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

35 35 EE YZ

386

Is the UP light on?
Y N

387
Defective F2 (base I/O) card.

388
Defective tape control card (refer to 202).

389
-Disconnect the tape drive cable from the board (refer to 228).

Is the DOWN light on?
Y N

390
Check/replace the tape drive cable (refer to 202).

391
Defective F2 (base I/O) card.

392
ERROR 921--STATUS ERROR .
BOT Status is active but should not have been active (status bit 7 was 0, should have been 1).

(refer to the appendix, the general logic probe).
-Probe F2-U10 (-beginning of tape).

Is the DOWN light on?
Y N

393
Defective F2 (base I/O) card.

394
-Calibrate the CE meter (refer to 270).

-Measure greater than 1 vdc between tape control card pin D10 (+ BOT PTX collector) and tape control card pin U08 (gnd) (refer to 227).

Is the voltage greater than 1 vdc?
Y N

395
Defective tape control card (refer to 202).
Defective tape LED-PTX assembly (refer to 202).
Check/replace the tape internal cable (refer to 202).

396
-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
-Probe F2-U10 (-beginning of tape).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

397

Is the UP light on?
Y N

398
Defective F2 (base I/O) card.

399
Defective tape control card (refer to 202).

400
-Disconnect the tape drive cable from the board (refer to 228).

Is the DOWN light on?
Y N

36FB C

401
Check/replace the tape drive cable (refer to 202).

402
Defective F2 (base I/O) card.

403
ERROR 918--STATUS ERROR .
Status indicates the the LED used for detecting BOT-EOT is not on (status bit 5 was 0, should have been 1).

NOTE: ALL PROBES OR METER TESTS FOR THIS ERROR REQUIRE THAT THE GROUND WIRE OF THE PROBE OR METER BE ATTACHED TO N2-p08 (GND) .

(refer to the appendix, the general logic probe).
-Probe F2-J13 (- LED and erase ok).

Is the UP light on?
Y N

404
Defective F2 (base I/O) card.

405
-Probe tape control card pin S07 (- LED and erase ok) (refer to 227).

Is the UP light on?
Y N

406
Check/replace the tape drive cable (refer to 202).

37FD

407
-Calibrate the CE meter (refer to 270).
-Measure greater than +8 vdc between tape control card pin B11 (+ LED conducting) and N2-P08 (gnd).

Is the voltage greater than +8 vdc?
Y N

408
-Measure +12 vdc between tape control card pin D11 (+12 vdc) and N2-P08 (gnd).

Is the voltage in tolerance (+11.0 vdc to +13.2 vdc)?
Y N

409
(Entry Point C)
-Measure +12 vdc between tape control card pin S11 (+12 vdc) and N2-P08 (gnd).

Is the voltage in tolerance (+11.0 vdc to +13.2 vdc)?
Y N

410
-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
-Measure +12 vdc between tape control card pin S11 (+12 vdc) and N2-P08 (gnd).

Is the voltage in tolerance (+11.0 vdc to +13.2 vdc)?
Y N

411
-Install the tape control card (refer to 202).
-Measure +12 vdc between F6-D02 (+12 vdc) and N2-P08 (gnd).

Is the voltage in tolerance (+11.0 vdc to +13.2 vdc)?
Y N

412
-Measure +12 vdc between C1-D13 (+12 vdc) and N2-P08 (gnd).

Is the voltage in tolerance (+11.0 vdc to +13.2 vdc)?
Y N

413
+12 vdc is not in tolerance.

Go to MAP 0700, Entry Point A.

414
Repair the open connection between C1-D13 and F6-D02 .

415
Check/replace the tape drive cable (refer to 202).

416
Defective tape control card (refer to 202).

417
Defective tape control card (refer to 202).

418
Defective tape LED-PTX assembly (refer to 202).
Check/replace the tape internal cable (refer to 202).

419

-Measure +5 vdc between tape control card pin U03 (+5 vdc) and N2-P08 (gnd).

Is the voltage in tolerance (+4.6 vdc to +5.5 vdc)?

Y N

420

-If there is a cartridge in the tape drive, remove it.

-Remove tape control card (refer to 202).

-Measure +5 vdc between tape control card pin U03 (+5 vdc) and N2-P08 (gnd).

Is the voltage in tolerance (+4.6 vdc to +5.5 vdc)?

Y N

421

-Install the tape control card (refer to 202).

-Measure +5 vdc between E6-A04 (+5 vdc) and N2-P08 (gnd).

Is the voltage in tolerance (+4.6 vdc to +5.5 vdc)?

Y N

422

-Measure +5 vdc between G2-U03 (+5 vdc) and N2-P08 (gnd).

Is the voltage in tolerance (+4.6 vdc to +5.5 vdc)?

Y N

423

+5 vdc is not in tolerance

Go to MAP 0700, Entry Point A.

424

Repair the open connection between G2-U03 and E6-A04

425

Check/replace the tape drive cable (refer to 202).

426

Defective tape control card (refer to 202).

427

-Measure 0 vdc between tape control card pin U08 (gnd) and N2-P08 (gnd).

Is the ground voltage in tolerance (0.0 vdc to 0.3 vdc)?

Y N

428

-Measure for 0 vdc between F6-A02 (gnd) and N2-P08 (gnd).

Is the ground voltage in tolerance (0.0 vdc to 0.3 vdc)?

Y N

429

Ground voltage is not in tolerance.

Go to MAP 0700, Entry Point A.

430

Go to Page 38, Step 431, Entry Point D.

431

(Entry Point D)

-If there is a cartridge in the tape drive, remove it.

-Remove tape control card (refer to 202).

-Test for continuity from tape control card pin U08 (gnd) to N2-P08 (gnd).

Is there continuity between the pins?

Y N

432
-Install the tape control card (refer to 202).
-Test for continuity from F6-A02 (gnd) to N2-P08 (gnd).

Is there continuity between the pins?
Y N

433
Pin F6-A02 is part of the board ground plane; it must be ground. Retry this MAP :

Go to Page 2, Step 007, Entry Point B.

434
Check/replace the tape drive cable (refer to 202).

435
-Test for continuity from tape control card pin S08 (gnd) to N2-P08 (gnd).

Is there continuity between the pins?
Y N

436
-Install the tape control card (refer to 202).
-Test for continuity from F6-A04 (gnd) to N2-P08 (gnd).

Is there continuity between the pins?
Y N

437
-Test for continuity from F6-A02 (gnd) to N2-P08 (gnd).

Is there continuity between the pins?
Y N

438
Pin F6-A02 is part of the board ground plane, it must be ground.
Retry this map

Go to Page 2, Step 007, Entry Point B.

439
Repair the open connection between F6-A02 and F6-A04 .

440
Check/replace the tape drive cable (refer to 202).

441
Defective tape control card (refer to 202).

442
ERROR 915--STATUS ERROR .
File protect status should be active (status bit 6 was 0, should have been 1).

(refer to the appendix, the general logic probe).
-Probe F2-P04 (+file protect).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

443
Defective F2 (base I/O) card.

444
-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).

Is the UP light on?
Y N

0300

445
-Disconnect the tape drive cable from the board (refer to 228).

Is the UP light on?
Y N

446
Defective F2 (base I/O) card.

447
Check/replace the tape drive cable (refer to 202).

448
-Test for continuity from tape control card pin D07 (+ file protect) to pin B08 (gnd).

Is there continuity between the pins?
Y N

449
Defective tape control card (refer to 202).

450
Defective tape switch assembly (refer to 202).
Check/replace the tape internal cable (refer to 202).

451
ERROR 912--STATUS ERROR .
Cartridge in place status should not be found (bit 3 should be 0).

(refer to the appendix, the general logic probe).
-Probe F2-M03 (-cartridge in place).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

40 FW
40 FX

452
Defective F2 (base I/O) card.

453
-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).

Is the UP light on?
Y N

454
-Disconnect the tape drive cable from the board (refer to 228).

Is the UP light on?
Y N

455
Defective F2 (base I/O) card.

456
Check/replace the tape drive cable (refer to 202).

457
-Test for continuity from tape control card pin B07 (- cartridge in place) to pin B08 (gnd).

Is there continuity between the pins?
Y N

458
Defective tape control card (refer to 202).

459
Defective tape switch assembly (refer to 202).
Check/replace the tape internal cable (refer to 202).

460
ERROR 909--WRAP ERROR .
Error occurred during a test of the F2 (base I/O) card, no wrap of data.

Defective F2 (base I/O) card.

461
ERROR 907--INTERRUPT ERROR .
Incorrect interrupt response.

(refer to the appendix, the general logic probe).
-Probe F2-G08 (-read clock).

Are both lights on?
Y N

462
-Probe F2-G08 (-read clock).

Is the DOWN light on?
Y N

463
-Probe F2-P07 (-int req 2).

Is the DOWN light on?
Y N

464
Defective F2 (base I/O) card.
Defective tape control card (refer to 202).

465
Defective G2 (controller) card.

466
-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
-Probe F2-G08 (-read clock).
-Leave the probe on the pin.

Is the DOWN light on?
Y N

467

Is the UP light on?
Y N

468
Defective F2 (base I/O) card.

469
Defective tape control card (refer to 202).

470
-Disconnect the tape drive cable from the board (refer to 228).

Is the DOWN light on?
Y N

471
Check/replace the tape drive cable (refer to 202).

472
Defective F2 (base I/O) card.

473
-Calibrate the CE meter (refer to 270).
-Measure -5 vdc between N2-P08 (gnd) and tape control card pin S06 (-5 vdc).

Is the voltage in tolerance (-4.6 vdc to -5.5 vdc)?
Y N

474
-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
-Measure -5 vdc between N2-P08 (gnd) and tape control card pin S06 (-5 vdc).

Is the voltage in tolerance (-4.6 vdc to -5.5 vdc)?
Y N

475
-Install the tape control card (refer to 202).
-Measure -5 vdc between N2-P08 (gnd) and E6-D02 (-5 vdc).

Is the voltage in tolerance (-4.6 vdc to -5.5 vdc)?
Y N

476
-Measure -5 vdc between N2-P08 (gnd) and C1-E11 (-5 vdc).

Is the voltage in tolerance (-4.6 vdc to -5.5 vdc)?
Y N

477
The -5 vdc from the power supply is not in tolerence.

Go to MAP 0700, Entry Point A.

478
Repair the open connection from C1-E11 to E6-D02 .

479
Check/replace the tape drive cable (refer to 202).

480
Defective tape control card (refer to 202).

481
Defective tape control card (refer to 202).

482
Error 906--status error.
Subdevice address response status from internal tape drive not active (status bit 1 was 1, should have been 0).

Defective F2 (base I/O) card.

483
Error 903--status error
Expected ROS status from internal tape drive was not active (specical status bit 4 was 1, should have been 0).

Defective F2 (base I/O) card.

484
ERROR 901--STATUS ERROR .
Status other than FF after an all device reset.

Defective F2 (base I/O) card.

TAPE READ MAP

485
ERROR 014-- SYSTEM ERROR .
Device not selected.

Defective F2 (base I/O) card.

486
ERROR 013-- SYSTEM ERROR .
Device not attached.

Defective F2 (base I/O) card.

487
ERROR 012-- SYSTEM ERROR .
Physical end of tape.

Rewind the diagnostic tape. It might not be positioned correctly.
Defective diagnostic tape cartridge.

488
ERROR 011-- SYSTEM ERROR .
End of marked tape.

Rewind the diagnostic tape. It might not be positioned correctly.
Defective diagnostic tape cartridge.

489
ERROR 010-- SYSTEM ERROR .
End of file.

Rewind the diagnostic tape. It might not be positioned correctly.
Defective diagnostic tape cartridge.

490
ERROR 009--SYSTEM ERROR .
End of data.

Defective diagnostic tape cartridge.

491
ERROR 008-- SYSTEM ERROR .
Records/signals out of sequence (position error).

Defective diagnostic tape cartridge.
Dirty tape head.
Service check/adjust the cartridge stop blocks (refer to 224).
Defective tape control card (refer to 202).

492
ERROR 007-- SYSTEM ERROR .
Unrecoverable data error (CRC error)

Defective diagnostic tape cartridge.
Dirty tape head.
Service check/adjust the cartridge stop blocks (refer to 224).
Defective tape control card (refer to 202).

493
ERROR 006-- SYSTEM ERROR .
File protect on. Same as error 949.

Go to Page 22, Step 206, Entry Point F.

494
ERROR 005-- SYSTEM ERROR .
Cartridge not inserted. Same as error 948.

Go to Page 23, Step 215, Entry Point E.

0300

495
ERROR 004-- SYSTEM ERROR .
Timeout

-If there is a cartridge in the tape drive, remove it.
-Remove tape control card (refer to 202).
-Measure the resistance between tape control card pin BO4 (+channel 0 coil) and B05 (+channel 0 center tap) (refer to 227).

Is the resistance between 6 ohms and 15 ohms?
Y N

496
Defective read/write head (refer to 202).
Check/replace the tape internal cable (refer to 202).

497
-Measure the resistance between tape control card pin BO6 (-channel 0 coil) and B05 (+channel 0 center tap).

Is the resistance between 6 ohms and 15 ohms?
Y N

498
Defective read/write head (refer to 202).
Check/replace the tape internal cable (refer to 202).

499
-Measure the resistance between tape control card pin DO4 (+channel 1 coil) and D05 (+channel 1 center tap).

Is the resistance between 6 ohms and 15 ohms?
Y N

500
Defective read/write head (refer to 202).
Check/replace the tape internal cable (refer to 202).

501
-Measure the resistance between tape control card pin DO6 (-channel 1 coil) and D05 (+channel 1 center tap).

Is the resistance between 6 ohms and 15 ohms?
Y N

502
Defective read/write head (refer to 202).
Check/replace the tape internal cable (refer to 202).

503
Rewind the diagnostic tape. It might not be positioned correctly.
Defective diagnostic tape cartridge.
Dirty tape head.
Defective read/write head (refer to 202).
Defective tape control card (refer to 202).
Check/replace the tape internal cable (refer to 202).

504
ERROR 003-- SYSTEM ERROR .
Machine error.

Defective F2 (base I/O) card.
Defective tape control card (refer to 202).
Check/replace the tape drive cable (refer to 202).

505
ERROR 002-- SYSTEM ERROR .
Command error. Incorrect command detected:

Go to MAP 0900, Entry Point A.

506

ERROR 001-- SYSTEM ERROR .
ATTN Key pressed during tape I/O .

Did you press ATTN key during tape I/O ?
Y N

507
Go to MAP 0600, Entry Point A.

508
Go to Page 2, Step 007, Entry Point B.

509
Go to MAP 0420, Entry Point A.

BRING UP MAP 0400

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
0200	A	1	001
0200	D	1	010
0420	A	1	001
0500	A	1	001
0900	A	1	001

001
(Entry Point A)
-Switch the L32-64-R32 switch to 64.
(refer to 249, checkpoints).

Is the machine at checkpoint K?
Y N

002

Is the machine at checkpoint J?
Y N

003

Is the machine at checkpoint I?
Y N

004

Is the machine at checkpoint H?
Y N

005

Is the machine at checkpoint G?
Y N

1 1
5 4 9 6 5 1
A B C D E F

006

Is the machine at checkpoint D?
Y N

007

Is the machine at checkpoint B?
Y N

008

Is the machine at checkpoint A?
Y N

009

Is there a card in H4 (APL supervisor)?
Y N

010
(Entry Point D)
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
Refer to 248, hex registers display.

Is there an AAAA in R3L0?
Y N

4 4 4 4 3 2
G H J K L M

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EC 829523 PEC 828851

0400

011
-Ensure that the RUN switch under the covers is to RUN.
-Switch the DISPLAY REGISTERS switch to NORMAL.
-Probe H6-C02 (-run switch and not IPL).
(refer to 241 display Z3 socket locations).
(refer to the appendix, the general logic probe).

Is the UP light on?
Y N

012
-Probe H6-E02 (-display reg sw).

Is the DOWN light on?
Y N

013
-Ensure that the L32-64-R32 switch is set to 64.
-Probe J6-D04 (-right 32 sw).
Refer to 241, 210).

Is the DOWN light on?
Y N

014
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
-Switch the RUN switch under the covers to not run.

Is R0L0 0002?
Y N

015
-Switch the DISPLAY REGISTERS switch to NORMAL.
-Switch the RUN switch under the covers to run.
-Probe F2-B03 .(-por).

Is the DOWN light on?
Y N

3 3 3 3 2 2
N P Q R S T

016
(Entry Point I)
-Power down.
-Remove the storage cards L2, L4, M2, M4, N2, and N4.
-Power up. Wait 30 seconds.

Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or CLEAR WS appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?
Y N

017
Defective K2 (read/write storage) card.
Defective K4 (read/write storage) card.
Defective J2 (display) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

018
One of the the cards removed is defective. Reinstall them two at a time (L first, then M, N) to isolate to a pair. Then replace one of the pair to find the defective card.

019
-Probe F2-B03.

Remove the following cards in order until the DOWN light goes off. The last card removed is defective.
A2, B2, E2, F2.

020
-Switch the RUN switch under the covers to run.
-Probe the card select lines listed below. Record conditions other than the DOWN light on and the UP light off.

0 G2-S10 2 G2-U10
1 G2-U13 3 G2-S13.

Is the DOWN light on and the UP light off for all four probe points?
Y N

021
Are both lights on for any of the four probe points?
Y N

022
Defective G2 (controller) card.

023
-Switch the DISPLAY REGISTERS switch to NORMAL.

Go to Page 2, Step 016, Entry Point I.

024
-Switch the DISPLAY REGISTERS switch to NORMAL.

Go to Page 2, Step 016, Entry Point I.

025
Defective display L32-64-R32 switch.
Check/replace display and control panel cable (refer to 210, 241).

026
-Remove the J2 (display) card.
-Probe H6-E02.

Is the DOWN light on?
Y N

027
Defective J2 (display) card.

028
-Reinstall the J2 (display) card.

Defective DISPLAY REGISTERS switch. Refer to 210).
Check/replace display and control panel cable.
(refer to 210, 241).

029
(refer to 200).
Defective RUN switch.
Check/replace display and control panel cable.
(refer to 210, 241).

030
-Power down.
-Remove the read/write storage cards from L2, L4, M2, M4, N2 and N4.
-Power up. Wait 30 seconds.

Did either LOAD 0 or CLEAR WS (with no misspelling) appear on one and only one line of the 5 inch display?
Y N

031
Defective K2 (read/write storage) card.
Defective K4 (read/write storage) card.
Defective J2 (display) card.
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

032
One of the read/write storage cards removed is defective. Reinstall them two at a time (L first, then M , and N) to isolate to a pair. Then replace one of the pair to find the defective card.

033
-Remove the H4 (APL supervisor) card.
-Press RESTART. wait 10 seconds.

Do you get exactly the same failure?
Y N

034
Defective H4 (APL supervisor) card.

035
-Reinstall the H4 (APL supervisor) card.

Go to Page 1, Step 010, Entry Point D.

036
Bus in test for all bits up.

-Probe all the bus in bits listed below:

5	F2-G11	0	F2-P12
4	F2-M02	6	F2-P13
3	F2-M05	P	F2-S10
2	F2-P09	1	F2-U05.
7	F2-P10		

Are all bus in bits UP?
Y N

037
Probe the bus in bit that is DOWN.
Remove the following cards until the DOWN light goes off:
A2, B2, E2, F2, G2 And H2.
Then replace that card.

038
Defective G2 (controller) card.
Defective F2 (base I/O) card.

039
The op code test failed.

Defective G2 (controller) card.
Defective F2 (base I/O) card.

040
Interrupt test.

Is there a 1 in position 1 of line 3 of the display?
Y N

041

Is there a 2 in position 1 of line 3 of the display?
Y N

042

Is there a 3 in position 1 of line 3 of the display?
Y N

043
Defective G2 (controller) card.

044
Defective F2 (base I/O) card.
Defective G2 (controller) card.

045

Is there a card in A2 or B2?
Y N

046
Defective G2 (controller) card.
Defective F2 (base I/O) card.

047

Is there a card in B2?
Y N

048
(Entry Point E)
-Remove the A2 card.
-Press RESTART. wait 10 seconds.

Do you get exactly the same failure?
Y N

049
Defective A2 (I/O cable driver) card and cable assembly.
Defective printer B1A2 (adapter) card.
Check/replace the I/O signal/power cable from auxiliary tape drive adapter A1B1, A1B2, (signal) and A1A4 (pwr) to base machine.
Check/replace I/O signal/power cable from printer adapter B1B2, B1B3 (signal) and B1A1 (pwr) to the 5100.
Defective I/O cable terminator in auxiliary tape.
Check/replace I/O cables.

050
-Reinstall the A2 card.

Defective G2 (controller) card.
Defective F2 (base I/O) card.

051
-Remove the B2 (expansion feature) card.
-Press RESTART. wait 10 seconds.

Do you get exactly the same failure?
Y N

052
Defective B2 (expansion feature) card.

053
-Reinstall the B2 (expansion feature) card.

Go to Page 5, Step 048, Entry Point E.

054
-Remove the B2 (expansion feature) card.
-Press RESTART. wait 10 seconds.

Do you get exactly the same failure?
Y N

055
Defective B2 (expansion feature) card.

056
Defective G2 (controller) card.
Defective F2 (base I/O) card.

057

Is there a 3 in position 1 of line 3 of the display?
Y N

058
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

0400

059
-Use the hex code displayed in positions 3 and 4 of line 3 to determine the defective key (refer to 250).

Defective key module (refer to 252).
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable (refer to 255).

060

Is there a card in H4 (APL supervisor)?
Y N

061
(Entry Point C)
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
Refer to 248, hex registers display.
-Record RFL0.
-Switch the DISPLAY REGISTERS switch to NORMAL.

Is there a card in M2?
Y N

062

Is there a card in L2?
Y N

063
Defective K2 (read/write storage) card.
Defective K4 (read/write storage) card.
Defective J2 (display) card.
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

064

Is RFL0 recorded 2 steps back between 0000 and 3FFF inclusive?
Y N

065

Is the recorded RFL0 between 4000 and 7FFF inclusive?
Y N

066
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

067
-Power down.
-Exchange K4 and L4.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

068
Defective read/write storage card is now at K4.

069
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.

Is RFL0 between 4000 and 7FFF inclusive?
Y N

070
Defective read/write storage card is now at K4.

071
Defective read/write storage card is now at L2.

072
-Power down.
-Exchange the pair of cards in K with the pair of cards in L.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

073
Defective J2 (display) card.
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

074
-Power down.
-Exchange K4 and L4.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

075
Defective read/write storage card is now at K4.

076
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.

Is RFL0 between 0000 and 3FFF inclusive?
Y N

077
Defective read/write storage card is now at L2.

078
Defective read/write storage card is now at K4.

079
Is the recorded RFL0 between 0000 and 3FFF inclusive?
Y N

080
Is the recorded RFL0 between 4000 and BFFF inclusive?
Y N

081
-Power down.
-Exchange the pair of cards in N with the pair of cards in L.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

082
Defective J2 (display) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

083
(Entry Point H)
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
-Record RFL0.
-Switch the DISPLAY REGISTERS switch to NORMAL.

Is RFL0 between 4000 and BFFF inclusive?
Y N

084
Defective J2 (display) card.
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

085
Is RFL0 between 4000 and 7FFF inclusive?
Y N

086
-Power down.
-Exchange L4 and M2.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

087
Defective H2 (I/O and diag) card.
Defective J2 (display) card.
Defective G2 (controller) card.

088
(Entry Point J)
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
-Record RFL0.
-Switch the DISPLAY REGISTERS switch to NORMAL.

Is RFL0 between 4000 and 7FFF inclusive?
Y N

089

Is RFL0 between 8000 and BFFF inclusive?
Y N

090
Defective H2 (I/O and diag) card.
Defective J2 (display) card.
Defective G2 (controller) card.

091
Defective read/write storage card is now at M4.

092
Defective read/write storage card is now at L4.

093
-Power down.
-Exchange L2 and M4.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

094
Defective H2 (I/O and diag) card.
Defective J2 (display) card.
Defective G2 (controller) card.

095
Go to Page 8, Step 088, Entry Point J.

096
-Power down.
-Exchange the pair of cards in L with the pair of cards in M.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

097
Defective J2 (display) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

098
Go to Page 7, Step 083, Entry Point H.

099
-Power down.
-Exchange the pair of cards in K with the pair of cards in M.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

100
Defective J2 (display) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

101
Go to Page 7, Step 083, Entry Point H.

102
-Remove the H4 (APL supervisor) card.
-Press RESTART. wait 10 seconds.

Do you get exactly the same failure?
Y N

103
Defective H4 (APL supervisor) card.

104
-Reinstall the H4 (APL supervisor) card.

Go to Page 6, Step 061, Entry Point C.

105
The ROS content test failed.

-Record line 2 of the display.

Is there 18 in positions 1 & 2 of line 2?
Y N

106

Is there anything in positions 5 & 6 of line 2?
Y N

107
(refer to 210, display and control panel cable).
(refer to the appendix, the general logic probe).

-Probe H6-B04 (+ APL switch).

Note: when the BASIC-APL switch is switched, RESTART must be pressed to bring up the new language.

Is the UP light on?
Y N

108

Is there a 1 in position 1 of line 2?
Y N

109
Note: when the BASIC-APL switch is switched, RESTART must be pressed to bring up the new language.

Defective F2 (base I/O) card.
Defective G2 (controller) card.

110
-Probe the basic select lines:
E2-B13 (-select 1)
E2-D04 (-select 2).

Is one line UP and the other line DOWN?
Y N

111

Are both lines UP?
Y N

112
-Remove the C4 (BASIC ROS) card.

Now are E2-B13 and E2-D04 both DOWN?
Y N

113
Defective C4 (BASIC ROS) card.

114
Defective E2 (ROS adapter) card.

115
Defective E2 (ROS adapter) card.

116

Do positions 1 & 2 of line 2 contain 11, 12, 13, or 14?
Y N

117

Do positions 1 & 2 of line 2 contain 10 or 15?
Y N

118
Defective E2 (ROS adapter) card.

119
Defective E2 (ROS adapter) card.
Defective C4 (BASIC ROS) card.

120
Defective C4 (BASIC ROS) card.

121

Is there a 2 in position 1 of line 2?
Y N

122
Note: when the BASIC-APL switch is switched, RESTART must be pressed to bring up the new language.

Defective F2 (base I/O) card.
Defective G2 (controller) card.

123
-Probe the APL select lines:
E2-B09 (-select APL)
E2-B10 (-select APL)
E2-D02 (-select APL) .

Are 2 lines UP and one line DOWN?
Y N

124

Are all 3 lines UP?
Y N

125
-Remove C2, D2 and D4 (APL ROS) cards.

Now are 2 lines UP and one DOWN?
Y N

126
Defective E2 (ROS adapter) card.

127
One of C2, D2 and D4 is defective. Reinstall them one at a time. The card that causes more than one of the (-select APL) lines to be DOWN is defective.

128
The following questions all refer to positions 1 & 2 of line 2.

Is 20 displayed?
Y N

129
Is 21, 22, 23, or 24 displayed?
Y N

130
Is 25 displayed?
Y N

131
Is 26, 27, 28, or 29 displayed?
Y N

132
Is 2A displayed?
Y N

133
Defective C2 (APL ROS 3) card.

134
Defective E2 (ROS adapter) card.
Defective C2 (APL ROS 3) card.

135
Defective D4 (APL ROS 2) card.

136
Defective E2 (ROS adapter) card.
Defective D4 (APL ROS 2) card.

11AAWX

AATWX1101

137
Defective D2 (APL ROS 1) card.

138
Defective E2 (ROS adapter) card.
Defective D2 (APL ROS 1) card.

139

Is B09 the line that is DOWN?
Y N

140

Is B10 the line that is DOWN?
Y N

141

Do positions 1 & 2 of line 2 contain 2A, 2B, 2C, 2D, 2E, or 2F?
Y N

142
Defective E2 (ROS adapter) card.

143
Defective C2 (APL ROS 3) card.

144

Do positions 1 & 2 of line 2 contain 25, 26, 27, 28, or 29?
Y N

145
Defective E2 (ROS adapter) card.

146
Defective D4 (APL ROS 2) card.

12AY

147

Do positions 1 & 2 of line 2 contain 20 or 21?
Y N

148

Do positions 1 & 2 of line 2 contain 22 ,23, or 24?
Y N

149
Defective E2 (ROS adapter) card.

150
Defective D2 (APL ROS 1) card.

151
Defective E2 (ROS adapter) card.
Defective D2 (APL ROS 1) card.

152

Is there a 1 in position 1 of line 2?
Y N

153

Is there a 2 in position 1 of line 2?
Y N

154
Defective H2 (I/O and diag) card.
Defective G2 (controller) card.

1 1
3 2
A B
Z A

155
(refer to 205).

Does the machine have a BASIC-APL switch?
Y N

156
(refer to 210, display and control panel cable).
(refer to the appendix, the general logic probe).

-Probe H6-B04 (+ APL switch).

Is the DOWN light on?
Y N

157
Go to Page 13, Step 163, Entry Point F.

158
Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

159
(refer to 210, display and control panel cable).
(refer to the appendix, the general logic probe).

-Probe H6-B04 (+ APL switch).

Is the UP light on?
Y N

160

Is the BASIC-APL switch set to BASIC?
Y N

161
(refer to 210, display and control panel cable).
Defective BASIC-APL switch.

1 1
3 3
B B
B C

162

Note: when the BASIC-APL switch is switched, RESTART must be pressed to bring up the new language.

Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

163
(Entry Point F)

Is there a 0 , 1 , 2 , 3 , or 4 in position 2 of line 2?
Y N

164

Is there a 5 , 6 , 7, 8, or 9 in position 2 of line 2?
Y N

165
Defective C2 (APL ROS 3) card.
Defective E2 (ROS adapter) card.

166
Defective D4 (APL ROS 2) card.
Defective E2 (ROS adapter) card.

167
Defective D2 (APL ROS 1) card.
Defective E2 (ROS adapter) card.

168
(refer to 205).

Does the machine have a BASIC-APL switch?
Y N

169
(refer to 210, display and control panel cable).
(refer to the appendix, the general logic probe).

-Probe H6-B04 (+ APL switch).

Is the UP light on?
Y N

170
Go to Page 14, Step 176, Entry Point B.

171
Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

172
(refer to 210, display and control panel cable).
(refer to the appendix, the general logic probe).

-Probe H6-B04 (+ APL switch).

Is the DOWN light on?
Y N

173

Is the BASIC-APL switch set to APL?
Y N

174
(refer to 210, display and control panel cable).

Defective BASIC-APL switch.

0400

175

Note: when the BASIC-APL switch is switched, RESTART must be pressed to bring up the new language.

Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

176
(Entry Point B)

Is there a 6, 7, or 8 in position 2 of line 2?
Y N

177
Defective C4 (BASIC ROS) card.
Defective E2 (ROS adapter) card.

178
Defective E2 (ROS adapter) card.

179
-Remove the following cards: A2 (I/O cable driver), B2 (expansion feature), D2, D4, C2 (APL ROS 1, 2, 3), and C4 (BASIC ROS).
-Press RESTART. wait 10 seconds.

Is the machine at checkpoint I with 18 in positions 1 & 2 of line 2?
Y N

180
One of the cards removed is suspect. Reinstall them one at a time, pressing RESTART and waiting 10 seconds each time until a card causes a halt at checkpoint I with 18 in positions 1 & 2 of line 2. Record the last card reinstalled.

Is the last card that was reinstalled either A2 or B2?
Y N

181
The last card that was reinstalled is defective or
Defective E2 (ROS adapter) card.

182
The last card that was reinstalled is defective.

183
-Reinstall A2, B2, C2, C4, D2 , and D4 which were removed earlier.

Defective E2 (ROS adapter) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.

184

Is there a card in A2 or B2?
Y N

185
Defective E2 (ROS adapter) card.

186

Is there a card in A2?
Y N

187
(Entry Point G)
-Remove the B2 (expansion feature) card.

Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or CLEAR WS appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?
Y N

188
-Reinstall the B2 (expansion feature) card.

Defective E2 (ROS adapter) card.
Defective F2 (base I/O) card.

189
Defective B2 (expansion feature) card.

190
-Remove the A2 (I/O cable driver) card.

Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or CLEAR WS appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?
Y N

191
-Reinstall the A2 (I/O cable driver) card.

Is there a card in B2?
Y N

192
Defective E2 (ROS adapter) card.

193
Go to Page 15, Step 187, Entry Point G.

194
Defective A2 (I/O cable driver) card and cable assembly.

195
Defective H2 (I/O and diag) card.

PAGE 1 OF 17

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
0200	A	1	001
0300	A	1	001
0600	A	1	001
0810	A	1	001
0830	A	1	001
0850	A	1	001
0900	A	1	001

EXIT POINTS

EXIT THIS MAP		TO	
PAGE NUMBER	STEP NUMBER	MAP NUMBER	ENTRY POINT
3	021	0400	A
17	205	0500	A

001
(Entry Point A)
-Switch the RUN switch under the covers to not run.
(refer to 200).
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
Refer to 248, hex registers display.

IS THE DISPLAY BLANK OR DARK?
Y N

002
-Switch the RUN switch under the covers to run.
-Switch the DISPLAY REGISTERS switch to NORMAL.
-PROBE 'G2-U09' (-BUS IN CHECK).

Is the DOWN light on?
Y N

003
-PROBE 'G2-S08' (-RDR Check).

Is the DOWN light on or pulsing?
Y N

1 1
7 2 6 2
A B C D

004
-Probe F2-B13 (+DA check).

Is the UP light on?
Y N

005
-Probe F2-D13 (+bus out check).

Is the UP light on?
Y N

006
-Probe E2-D10 (+ DA check) and E2-B11 (+bus out check).

Are both probe points DOWN?
Y N

007
-Probe E2-D10.

Is the UP light on?
Y N

008
-Probe E2-B11.

Is the UP light on?
Y N

009
Defective E2 (ROS adapter) card.

010
Go to Page 4, Step 036, Entry Point F.

011
Go to Page 5, Step 047, Entry Point E.

012
-Probe B2-M02 (+bus out parity check) and B2-J13 (+device address check).

Is only the DOWN light on for both probe points?
Y N

013
-Probe B2-J13.

Is the UP light on?
Y N

014
-Probe B2-M02.

Is the UP light on?
Y N

015
(Entry Point D)
-Probe H2-B10 (- POR switch).

Is the DOWN light on?
Y N

016
-Probe F2-G06 (-machine check).

Is the DOWN light on?
Y N

017
Defective H2 (I/O and diag) card. Check/replace display and control panel cable (refer to 210, 241).

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018

-Switch the RUN switch under the covers to not run.
-Remove the A2 (I/O cable driver) card if there is one.
-Probe F2-G06.

Is the DOWN light on?

Y N

019

-Switch the RUN switch under the covers to run.

Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or CLEAR WS appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?

Y N

020

Is the PROCESS CHECK light on?

Y N

021

Go To Map 0400, Entry Point A.

022

-Switch the RUN switch under the covers to not run.

Go to Page 4, Step 030, Entry Point J.

023

-Reinstall the A2 card.

Is the printer the only auxiliary I/O device installed?

Y N

4 N

4 P

Q

024

Is the auxiliary tape the only auxiliary I/O device installed?

Y N

025

-Power down the printer.
-Remove the auxiliary tape I/O cable from the machine.
-Remove the printer I/O cable from the auxiliary tape and install it into the machine instead.

Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or CLEAR WS appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?

Y N

026

Defective A2 (I/O cable driver) card and cable assembly.
Defective 5103 B1A2 (adapter) card.
Check/replace I/O signal/power cable from 5103 adapter B1B2 , B1B3 (signal) and B1A1 (pwr) to the 5100.

027

Defective auxiliary tape control card.
Defective auxiliary tape C1 (adapter) card.
Defective tape motor assembly (refer to 202).
Check/replace the I/O cables
(refer to 208 and 580).
(refer to 304 of the printer MLM) .

4 R

028
Defective A2 (I/O cable driver) card and cable assembly.
Defective I/O cable terminator in the auxiliary tape.
Check/replace I/O cables
(refer to 208 and 580).

029
Defective A2 (I/O cable driver) card and cable assembly.
Defective 5103 B1A2 (adapter) card.
Check/replace I/O cables.

030
(Entry Point J)
-Remove the B2 (expansion feature) card if there is one.

-Probe F2-G06.
Is the DOWN light on?
Y N

031
-Reinstall A2 .

Defective B2 (expansion feature) card.

032
-Probe F2-G06 and remove the following cards one at at time until the DOWN light goes off.

E2 (ROS Adapter) card.
F2 (base I/O) card.
G2 (controller) card.
H2 (I/O And diag) card.

The last card removed is defective.

-Reinstall the other cards that were removed.
-Switch the RUN switch under the covers to run.

033
-Remove the H2 (I/O and diag) card.
-Probe H2-B10.

Is the DOWN light on?
Y N

034
Defective H2 (I/O and diag) card.

035
Defective RESTART switch.
Check/replace display and control panel cable (refer to 210, 241).

036
(Entry Point F)
-Probe the bus out lines below. Record the results.

F2-G05	F2-J09
F2-G09	F2-J10
F2-G10	F2-M04
F2-G12	F2-M07.
F2-J05	

Are both lights off for any of the probe points?
Y N

037
For the next several steps all of the bus out lines above are the probe points.

Are an odd number of the probe points DOWN?
Y N

038
(Entry Point B)
-Switch the RUN switch under the covers to not run.
-Remove the B2 (expansion feature) card if there is one.

Did any of the probe points change?
Y N

039
-Remove the A2 (I/O cable driver) if there is one.

Did any of the probe points change?
Y N

040
-Remove the E2 (ROS adapter) card.

Did any of the probe points change?
Y N

041
-Reinstall A2, B2, and E2 .

Defective F2 (base I/O) card.

042
-Reinstall A2 and B2 .

Defective E2 (ROS adapter) card.

043
-Reinstall B2 .

Defective A2 (I/O cable driver) card and cable assembly.

044
Defective B2 (expansion feature) card.

045
Defective H2 (I/O and diag) card.
Defective E2 (ROS adapter) card.
Defective F2 (base I/O) card.
And if installed
Defective A2 (I/O cable driver) card and cable assembly.
Defective B2 (expansion feature) card.

046
Defective F2 (base I/O) card.

047
(Entry Point E)
-Probe the device address lines below and record the results.

X-LINES	Y-LINES
F2-B07	F2-B09
F2-D02	F2-B10
F2-D07	F2-D10
F2-D09	F2-D11.

Are both lights off for any of the probe points?
Y N

048
Are one X line and one Y line UP and all the others DOWN?
Y N

049
Determine probe points for the next several steps by reading down the left to the first true statement.

Two or more Y lines are UP --probe points are any two Y lines that are UP. Refer to the list 2 steps back.

Two or more X lines are UP --probe points are any two X lines that are UP. Refer to the list 2 steps back.

All the Y lines are DOWN --probe points (Step 049 continues)

PROCESS CHECK MAP

(Step 049 continued)
are all the Y lines.
Refer to the list 2 steps back.

All the X lines are DOWN --probe points are all the X lines.
Refer to the list 2 steps back.

Go to Page 5, Step 038, Entry Point B.

050
Defective E2 (ROS adapter) card.
Defective F2 (base I/O) card.
And if installed
Defective A2 (I/O cable driver) card and cable assembly.
Defective B2 (expansion feature) card.

051
Defective F2 (base I/O) card.

052
Go to Page 2, Step 015, Entry Point D.

053
-Remove the H4 (APL supervisor) card if it is installed.

Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or ABCDEFGHIJK (if in APL) appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?
Y N

X Y

054
-Reinstall the H4 (APL supervisor) card.
-Power down.
-Remove read/write storage cards K2, K4, L2, L4, M2, M4, N2, and N4.
-Power up. Wait 30 seconds.

Does R3L0 contain AAAA?
Y N

055
Defective G2 (controller) card.
Defective J2 (display) card.
Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

056
One of the cards removed is defective. Reinstall them two at a time (K first, then L, M and N) to isolate to a pair. Then replace one of the pair to isolate the defective card.

057
Defective H4 (APL supervisor) card.

058
Defective G2 (controller) card.
Defective F2 (base I/O) card.

059
Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or CLEAR WS appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?
Y N

060

Are both the PROCESS CHECK light and the IN PROCESS light on while the RESTART switch is pressed?

Y N

061
Defective IN PROCESS light.
Defective RESTART switch.
Check/replace display and control panel cable (refer to 210, 241).

062

Is there a card in H4 (APL supervisor)?

Y N

063
(Entry Point C)
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
-Record RFL0.
Refer to 248, hex registers display.
-Switch the DISPLAY REGISTERS switch to NORMAL.
(refer to 249, checkpoints).

Is the machine at checkpoint H?

Y N

064

Did the machine pass checkpoint A ? If you are not sure, take the NO leg.

Y N

065
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.

Does R3L0 contain AAAA?

Y N

1AB 8AC 8AD AE AF

066
-Power down.
-Remove read/write storage cards K2, K4, L2, L4, M2, M4, N2, and N4.
-Power up. Wait 30 seconds.

Does R3L0 contain AAAA?

Y N

067
Defective G2 (controller) card.
Defective J2 (display) card.
Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

068
One of the cards removed is defective. Reinstall them two at a time (K first, then L, M and N) to isolate to a pair. Then replace one of the pair to isolate the defective card.

069
(Entry Point I)
-Power down.
-Remove the read/write storage cards from L2, L 4, M2, M4, N2, N4.
-Power up. Wait 30 seconds.

Did either LOAD 0 or CLEAR WS (with no misspelling) appear on one and only one line of the 5 inch display?

Y N

070
Defective K2 (read/write storage) card.
Defective K4 (read/write storage) card.
Defective J2 (display) card.
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

071
One of the read/write storage cards removed is defective.
Reinstall them two at a time (L first, then M, N) to isolate the defective pair. Then replace one of the pair to find the defective card.

072
Defective H2 (I/O and diag) card.
Defective G2 (controller) card.

073

Is there a card in M2?
Y N

074

Is there a card in L2?
Y N

075
Defective K2 (read/write storage) card.
Defective K4 (read/write storage) card.
Defective J2 (display) card.
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

076

Is RFL0 recorded 3 steps above between 0000 and 3FFF inclusive?
Y N

077

Is the recorded RFL0 between 4000 and 7FFF inclusive?
Y N

078
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.
Defective F2 (base I/O) card.

079
-Power down.
-Exchange K4 and L2.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

9 9 A A G H

A A J K

080
Defective read/write storage card is now at K4.

081
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.

Is RFL0 between 4000 and 7FFF inclusive?
Y N

082
Defective read/write storage card is now at K4.

083
-Power down.
-Exchange the pair of cards in K with the pair of cards in L.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

084
Defective read/write storage card is now at K4.

085
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
-Record RFL0.
-Switch the DISPLAY REGISTERS switch to NORMAL.

Is RFL0 between 4000 and 7FFF inclusive?
Y N

086
Defective read/write storage card is now at K4.

087
Defective H2 (I/O and diag) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

088
-Power down.
-Exchange the pair of cards in K with the pair of cards in L.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

089
Defective J2 (display) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

090
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.

Is RFL0 between 4000 and 7FFF inclusive?
Y N

091
Defective H2 (I/O and diag) card.
Defective J2 (display) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.

092
-Power down.
-Exchange K4 and L4.
-Power up. Wait 30 seconds.
-Switch the DISPLAY REGISTERS switch to NORMAL.

Is the machine at checkpoint H?
Y N

093
Defective read/write storage card is now at K4.

094
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.

Is RFL0 between 0000 and 3FFF inclusive?
Y N

095
Defective read/write storage card is now at L2.

096
Defective read/write storage card is now at K4.

097
Is the recorded RFL0 between 0000 and 3FFF inclusive?
Y N

098
Is the recorded RFL0 between 4000 and BFFF inclusive?
Y N

099
-Power down.
-Exchange the pair of cards in N with the pair of cards in L.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

100
Defective J2 (display) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

101
(Entry Point H)
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
-Record RFL0.

Is RFL0 between 4000 and BFFF inclusive?
Y N

102
Go to Page 7, Step 069, Entry Point I.

103
Is RFL0 between 4000 and 7FFF inclusive?
Y N

104
-Power down.
-Exchange L4 and M2.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

105
Defective H2 (I/O and diag) card.
Defective J2 (display) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

106
(Entry Point K)
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
-Record RFL0.

Is RFL0 between 4000 and 7FFF inclusive?
Y N

107

Is RFL0 between 8000 and BFFF inclusive?
Y N

AQ AR AS AT

AN9 AQ AR AS AT

108
Defective H2 (I/O and diag) card.
Defective J2 (display) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

109
Defective read/write storage card is now at M4.

110
Defective read/write storage card is now at L4.

111
-Power down.
-Exchange L2 and M4.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

112
Defective H2 (I/O and diag) card.
Defective J2 (display) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

113
Go to Step 106, Entry Point K.

114
-Power down.
-Exchange the pair of cards in L with the pair of cards in M.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

115
Defective J2 (display) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

116
Go to Page 10, Step 101, Entry Point H.

117
-Power down.
-Exchange the pair of cards in K with the pair of cards in M.
-Power up. Wait 30 seconds.

Is the machine at checkpoint H?
Y N

118
Defective J2 (display) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.
Defective H2 (I/O and diag) card.

119
Go to Page 10, Step 101, Entry Point H.

120
-Remove the H4 (APL supervisor) card.
-Press RESTART. wait 10 seconds.

Do you get exactly the same failure?
Y N

121
Defective H4 (APL supervisor) card.

122
-Reinstall the H4 (APL supervisor) card.

Go to Page 7, Step 063, Entry Point C.

123
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
Refer to 248, hex registers display.
-Record read/write storage size.

Does read/write storage size= 3FFF?
Y N

12 AV AW

124

Does read/write storage size= 7FFF?
Y N

125

Does read/write storage size= BFFF?
Y N

126
Defective H2 (I/O and diag) card.
Defective H4 (APL supervisor) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

127

Is there a card in N2?
Y N

128
Defective H2 (I/O and diag) card.
Defective H4 (APL supervisor) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

129
Defective N2 (read/write storage) card.
Defective N4 (read/write storage) card.
Defective H2 (I/O and diag) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

130

Is there a card in M2?
Y N

131
Defective H2 (I/O and diag) card.
Defective H4 (APL supervisor) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

12 AX

132
Defective M2 (read/write storage) card.
Defective M4 (read/write storage) card.
Defective H2 (I/O and diag) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

133

Is there a card in L2?
Y N

134
Defective H2 (I/O and diag) card.
Defective H4 (APL supervisor) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

135
Defective L2 (read/write storage) card.
Defective L4 (read/write storage) card.
Defective H2 (I/O and diag) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

136
(refer to 249, checkpoints).

Is the machine at checkpoint A?
Y N

137
Is the machine at checkpoint E?
Y N

138
-Switch the RUN switch under the covers to not run.
(refer to 200).
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
Refer to 248, hex registers display.

Is R0L0 less than 005E?
Y N

1 1 1
7 6 5
A A B B
Y Z A B

139

Is R0L0 in the range 0430 to 04BC?
Y N

140
(Entry Point G)
-Switch the RUN switch under the covers to run.
-Probe the device address lines and record those that are UP.

```
X1 F2-B07   X0 F2-D07
Y0 F2-B09   X2 F2-D09
Y2 F2-B10   Y1 F2-D10
X3 F2-D02   Y3 F2-D11.
```

Are exactly two of the lines UP?
Y N

141
Defective F2 (base I/O) card.
Defective G2 (controller) card.

142

Are B07 and B09 the two lines UP?
Y N

143

Are B07 and D10 or D02 and B10 the lines UP?
Y N

144

Are B09 and D09 the two lines UP?
Y N

145

Are D07 and D10 the two lines UP?
Y N

1 1 1 1 1 1
5 3 3 3 3 3
B B B B B B
C D E F G H

146
Defective G2 (controller) card.
Defective F2 (base I/O) card.

147
Defective E2 (ROS adapter) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

148
Defective B2 (expansion feature) card.
Defective G2 (controller) card.
Defective F2 (base I/O) card.

149
Defective F2 (base I/O) card.
Defective G2 (controller) card.
Defective A2 (I/O cable driver) card and cable assembly.
Defective auxiliary tape control card.
Defective auxiliary tape C1 (adapter) card.
Defective 5103 B1A2 (adapter) card.
Check/replace the I/O signal/power cable from auxiliary tape drive adapter A1B1, A1B2, (signal) and A1A4 (pwr) to base machine.
Check/replace I/O signal/power cable from printer adapter B1B2, B1B3 (signal) and B1A1 (pwr) to the 5100.
Defective I/O cable terminator in auxiliary tape.
Check/replace I/O cables.

150

Did the error occur while keying?
Y N

151
Defective F2 (base I/O) card.
Defective G2 (controller) card.
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

BJ

152
The keyboard generates odd parity which is passed to bus in.
(refer to 255).

-Press RESTART. wait 10 seconds.
-Press the 9 key on the amphameric keyboard.
-Probe G2-U09 (-bus in check).

Is the DOWN light on?
Y N

153
-Press the Z key.
-Probe G2-U09 (-bus in check).

Is the DOWN light on?
Y N

154
-Press the W key.
-Probe G2-U09 (-bus in check).

Is the DOWN light on?
Y N

155
-Press the 6 key on the alphameric keyboard.
-Probe G2-U09 (-bus in check).

Is the DOWN light on?
Y N

156
-Hold the shift key and press the Z key.
-Probe G2-U09 (-bus in check).

Is the DOWN light on?
Y N

157
-Press all keys until one gives a bus in check.
-Using the key codes chart find the hex value for the failing key (refer to 250.)
-Press and hold the failing key and probe the KEYBOARD DATA BUS (note: DOWN is a 1, UP is a 0).

5 F2-J11	6 F2-M12
2 F2-M08	4 F2-P02
7 F2-M09	3 F2-P05
P F2-M10	1 F2-U02.
0 F2-M11	

Is the data on the bus correct?
Y N

158
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable (refer to 255).

159
Defective F2 (base I/O) card.

160
-Press and hold the shift and the Z keys.
-Probe F2-M11 (-keyboard data bit 0).

Is the DOWN light on?
Y N

161
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable (refer to 255).

162
Defective F2 (base I/O) card.

163
-Press and hold the 6 key on the alphameric keyboard.
-Probe F2-P05 (-keyboard data bit 3).

Is the DOWN light on?
Y N

164
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable (refer to 255).

165
Defective F2 (base I/O) card.

166
-Probe F2-M10 (-keyboard P bit).
-Press and hold the W key.

Is the UP light on?
Y N

167
-Probe F2-M10
-Disconnect the keyboard cable at Z4.

Is the UP light on?
Y N

168
Defective F2 (base I/O) card.

169
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable (refer to 255).

170
Defective F2 (base I/O) card.

0420

171
-Press and hold the Z key.
-Probe the keyboard data bus

5 F2-J11	6 F2-M12
2 F2-M08	4 F2-P02
7 F2-M09	3 F2-P05
P F2-M10	1 F2-U02.
0 F2-M11	

Are bits 0 and 3 UP and all the rest DOWN?
Y N

172
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable (refer to 255).

173
Defective F2 (base I/O) card.

174
-Press and hold the 9 key on the alphameric keyboard.
-Probe the keyboard data bus

5 F2-J11	6 F2-M12
2 F2-M08	4 F2-P02
7 F2-M09	3 F2-P05
P F2-M10	1 F2-U02.
0 F2-M11	

Are all bits 0-7 UP and the P bit DOWN?
Y N

175

Any bit 0-7 DOWN?
Y N

176
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable (refer to 255).

BR BS

177
-Remove the Z4 (keyboard) cable.
-Probe the keyboard data bus again

5 F2-J11	6 F2-M12
2 F2-M08	4 F2-P02
7 F2-M09	3 F2-P05
P F2-M10	1 F2-U02.
0 F2-M11	

Are any bits DOWN?
Y N

178
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable (refer to 255).

179
-Connect the Z4 (keyboard) cable.

Defective F2 (base I/O) card.

180
Defective F2 (base I/O) card.
Defective G2 (controller) card.

181
-Switch the RUN switch under the covers to run.

Does R3L0 contain AAAA?
Y N

182
Go to Page 12, Step 140, Entry Point G.

183
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

184
-Switch the RUN switch under the covers to run.

Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

0420

185
Is there a 5 or an E on line 2?
Y N

186
Is there an 8 on line 2?
Y N

187
Is there a 1 on line 2?
Y N

188
Defective F2 (base I/O) card.
Defective G2 (controller) card.

189
Defective E2 (ROS adapter) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.

190
Defective B2 (expansion feature) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.

191
-Remove the A2 (I/O cable driver) card if one is installed.

Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or CLEAR WS appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?
Y N

192
Defective F2 (base I/O) card.
Defective G2 (controller) card.

BT

193
-Reinstall A2 .
-Disconnect the I/O cables to the auxiliary tape and the printer.

Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or CLEAR WS appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?
Y N

194
Defective A2 (I/O cable driver) card and cable assembly.

195
-Connect the printer ,if there is one, directly into the machine.

Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or CLEAR WS appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?
Y N

196
Defective A2 (I/O cable driver) card and cable assembly.
Defective 5103 B1A2 (adapter) card.
Check/replace I/O cables.

197
Defective F2 (base I/O) card.
Defective G2 (controller) card.
Defective A2 (I/O cable driver) card and cable assembly.
Defective auxiliary tape control card.
Defective auxiliary tape C1 (adapter) card.
CHECK/REPLACE THE 'I/O' CABLES.

198
-Probe the bus in (0-7,p) lines

5 F2-G11	0 F2-P12
4 F2-M02	6 F2-P13
3 F2-M05	P F2-S10
2 F2-P09	1 F2-U05.
7 F2-P10	

Are any lines DOWN?
Y N

199
Defective G2 (controller) card.

200
-Power down the printer.
-Disconnect the auxiliary I/O cable to the printer and the auxiliary tape drive.
-Probe the bus in line that is DOWN.

Is the DOWN light on?
Y N

201
Defective 5103 B1A2 (adapter) card.
Check/replace I/O cables.
Defective auxiliary tape control card.
Defective auxiliary tape C1 (adapter) card.

202
-Connect the auxiliary I/O cable to the printer and the auxiliary tape drive.
-Power up the printer.
-Remove the A2 (I/O cable driver) card.
-Remove the B2 (expansion feature) card.

Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or CLEAR WS appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?
Y N

203
-Reinstall the A2 and B2 cards.

Defective F2 (base I/O) card.
Defective G2 (controller) card.
Defective E2 (ROS adapter) card.

204
Reinstall the A2 and B2 cards one at a time. Press RESTART each time. The card that causes the PROCESS CHECK light to come on is defective.

205
-Switch the RUN switch under the covers to run.
-Switch the DISPLAY REGISTERS switch to NORMAL.

Go To Map 0500, Entry Point A.

PAGE 1 OF 10

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
0200	A	1	001
0420	A	1	001
0900	A	1	001

EXIT POINTS

EXIT THIS MAP		TO	
PAGE NUMBER	STEP NUMBER	MAP NUMBER	ENTRY POINT
6	061	0400	A
1	003	0700	A
2	015	0700	A
8	088	0700	A
7	072	0700	A

001
(Entry Point A)
Note: brightness, focus, heighth, width, tilt, positioning, and linearity problems may be corrected by an adjustment (refer to 240).

-Press the bottom of the REVERSE DISPLAY switch.
-Probe J2-M03 (-reverse display).
(refer to the appendix, the general logic probe).

Is the UP light on?
Y N

002
-Calibrate the CE meter (refer to 270).
-Measure the following voltages with reference to J6-C02 (gnd):

+12 vdc J6-E04
+8.5 vdc J2-J11
+5 vdc J2-D03
(refer to 272).

Are the voltages in tolerance (11.0 to 13.2 vdc, 7.9 to 9.35 vdc, and 4.6 to 5.5 vdc)?
Y N

003
Go to MAP 0700, Entry Point A.

004
-Probe J2-M03 (-reverse display).

Is the DOWN light on?
Y N

005
Defective J2 (display) card.
Defective REVERSE DISPLAY switch.
Check/replace display and control panel cable (refer to 210, 241).

006
-Remove the J2 (display) card.
-Probe J2-M03 (-reverse display).

Is the DOWN light on?
Y N

007
Defective J2 (display) card.

008
-Reinstall the J2 (display) card.

Defective REVERSE DISPLAY switch.
Check/replace display and control panel cable (refer to 210, 241).

009
-Press the top of the REVERSE DISPLAY switch.
-Probe J2-M03 (-reverse display).

Is the DOWN light on?
Y N

010
Defective REVERSE DISPLAY switch.
Check/replace display and control panel cable (refer to 210, 241).

011
-Press the bottom of the REVERSE DISPLAY switch.
-Adjust the BRIGHTNESS control to the center of its range.

Is the 5 inch display completely dark?
Y N

012
-Attach a jumper from J2-P02 (- I/O display off) to D08 (gnd).

Is there video (any black image) within the raster area of the 5 inch display?
Y N

013
(refer to 240, display raster).

Is the raster a stable white background of the correct size and shape?
Y N

014
-Remove the jumper from J2-P02.
-Calibrate the CE meter (refer to 270).

-Measure +12 vdc from J6-E04 (+12 vdc) to J6-C02 (gnd).
(refer to 241 display Z3 socket locations).

Is the voltage in tolerance (+11.0 vdc to +13.2 vdc)?
Y N

015
Go to MAP 0700, Entry Point A.

016
-Probe J2-J02 (-external vertical sync).

Are both lights on?
Y N

28SEP76 PN 1608389
EC 829670 PEC 828851

017
-Disconnect the cable from Z3.
-Probe J2-J02.

Are both lights on?
Y N

018
-Connect the Z3 (display and control panel) cable.

Defective J2 (display) card.

019
Defective display assembly.
Check/replace display and control panel cable (refer to 210, 241).

020
Defective J2 (display) card.
Defective display assembly.
Check/replace display and control panel cable (refer to 210, 241).

021
-Remove the jumper from J2-P02.
-Press the top of the REVERSE DISPLAY switch.

Is the background of the 5 inch display now black instead of white?
Y N

022
Defective J2 (display) card.

3 J

023
-Press the bottom of the REVERSE DISPLAY switch.
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.

Is there video (any black image) within the raster area of the display screen?
Y N

024
-Probe J2-P02 (- I/O display off).

Is only the DOWN light on?
Y N

025
-Probe J2-B12 (-machine video)

Are both lights on?
Y N

026
-Disconnect the cable from Z3.
-Probe J2-B12.

Are both lights on?
Y N

027
Defective J2 (display) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.

028
Defective display assembly.
Check/replace display and control panel cable (refer to 210, 241).

029
-Probe the following pins:
J2-J05 (+C2), J2-P04 (+C4).

Are both lights on for all probe points?
Y N

4 K 4 L 4 M 4 N

030
-Remove the J2 card.
-Probe J2-J05 and J2-P04 again.

Are both lights on for all probe points?
Y N

031
-Remove the A2 card.
-Probe J2-J05 and J2-P04 again.

Are both lights on for all probe points?
Y N

032
Defective F2 (base I/O) card.
Defective G2 (controller) card.

033
Defective A2 (I/O cable driver) card and cable assembly.

034
Defective J2 (display) card.

035
-Remove the A2 (I/O cable driver) card.

Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or CLEAR WS appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?
Y N

4 4
P Q

036
-Reinstall A2.

Defective F2 (base I/O) card.
Defective G2 (controller) card.
Defective J2 (display) card.
Defective display assembly.
Check/replace display and control panel cable (refer to 210, 241).

037
Defective A2 (I/O cable driver) card and cable assembly.

038
Defective J2 (display) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.

039
-Switch the RUN switch under the covers to not run.
-Observe the 5 inch display.
-Switch the DISPLAY REGISTERS switch to NORMAL then back to DISPLAY REGISTERS .

Is the video different in DISPLAY REGISTERS than in NORMAL ?
Y N

040
-Switch the RUN switch under the covers to run.
-Probe J2-B06 (-hex)

With the switch in DISPLAY REGISTERS , the DOWN light should be on. In NORMAL , the UP light should be on.

Are the probe indications correct?
Y N

5 5 5
R S T

041
-Remove the J2 (display) card.
-Probe J2-B06 .

With the switch in DISPLAY REGISTERS the DOWN light should be on. In NORMAL, both lights should be off.

Are the probe indications correct?
Y N

042
-Reinstall the J2 (display) card.

Defective DISPLAY REGISTERS switch. Refer to 210).
Check/replace display and control panel cable.
(refer to 210, 241).

043
Defective J2 (display) card.

044
Defective J2 (display) card.

045
-Probe J2-P04 (+C4).

Are both lights on?
Y N

046
-Probe J2-P04.

Are both lights off?
Y N

047
-Remove the A2 (I/O cable driver) card if one is installed.
-Probe J2-P04.

Are both lights on?
Y N

048
-Reinstall A2.

Defective F2 (base I/O) card.
Defective G2 (controller) card.
Defective J2 (display) card.

049
Defective A2 (I/O cable driver) card and cable assembly.

050
Defective F2 (base I/O) card.

051
-Switch the L32-64-R32 switch to all three positions and observe the display.

Does the video change correctly as the switch is operated?
Y N

052
Defective J2 (display) card.
Defective display L32-64-R32 switch.
Check/replace display and control panel cable (refer to 210, 241).

053
-Switch the RUN switch under the covers to run.
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.

Does the failure appear as vertical lines on the display?
Y N

054
-Switch the RUN switch under the covers to not run.

Is the video on the display stable?
Y N

055
-Switch the RUN switch under the covers to run.
-Probe K6-A02 (-external vertical sync). (refer to 241 display Z3 socket locations).

Are both lights on?
Y N

056
-Disconnect the cable from Z3.
-Probe K6-A02.

Are both lights on?
Y N

057
-Connect the Z3 (display and control panel) cable.

Defective J2 (display) card.

058
Defective display assembly.
Check/replace display and control panel cable (refer to 210, 241).

7 6 A
Y Z A

059
Defective display assembly.
Check/replace display and control panel cable (refer to 210, 241).

060
-Switch the RUN switch under the covers to run.
-Switch the DISPLAY REGISTERS switch to NORMAL.

Within 10 seconds after RESTART is pressed, the following events should occur:
1. ABCDEFGH Appears on the top line of the 5 inch display.
2. ABCDEFGHI Appears on the top line.
3. The top line is blanked and either LOAD 0 or CLEAR WS appears on the display.

Do all three events listed above occur in sequence after RESTART is pressed?
Y N

061
Go to MAP 0400, Entry Point A.

062
Is there a flashing cursor displayed on the line below CLEAR WS or LOAD 0 and nowhere else?
Y N

063
-Power down.
-Remove the storage cards L2, L4, M2, M4, N2, and N4.
-Power up. Wait 30 seconds.

Is there a flashing cursor displayed on the line below CLEAR WS or LOAD 0 and nowhere else?
Y N

7 7 7
A A A
B C D

064
Defective K2 (read/write storage) card.
Defective K4 (read/write storage) card.
Defective J2 (display) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

065
One of the cards removed is defective. Reinstall them two at a time (L first, then M, N) to isolate to a pair. Then replace one of the pair to find the defective card.

066
-Enter the following characters in order:
4455@@@

Is 4455@@@ followed by a flashing cursor displayed on the line below CLEAR WS or LOAD 0 and nowhere else?
Y N

067
-Power down.
-Remove the storage cards L2, L4, M2, M4, N2, and N4 .
-Power up. Wait 30 seconds.
-Enter the following characters in order.
4455@@@

Is 4455@@@ followed by a flashing cursor displayed on the line below CLEAR WS or LOAD 0 and nowhere else?
Y N

068
One of the cards removed is defective. Reinstall them two at a time (L first, then M, N) to isolate to a pair. Then replace one of the pair to find the defective card.

069
Defective K2 (read/write storage) card.
Defective K4 (read/write storage) card.
Defective J2 (display) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

070
Defective K2 (read/write storage) card.
Defective K4 (read/write storage) card.
Defective J2 (display) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

071
-Measure +8.5 vdc at board location C1-C13 .

Is the voltage in tolerance (+7.8 vdc to +9.3 vdc)?
Y N

072
Go to MAP 0700, Entry Point A.

073
-Measure J2-J11 (+8.5 vdc) to J2-D08 (gnd).

Is the voltage in tolerance (+7.8 vdc to +9.3 vdc)?
Y N

074
The circuit is open between the power supply connector Y1 (A1 board location C1-C13) and J2-J11 .

075
Defective J2 (display) card.

076
-Probe J2-J05 (-C2 PWRD).

Are both lights on?
Y N

077
Is the DOWN light on?
Y N

078
Defective G2 (controller) card.
Defective F2 (base I/O) card.

079
-Remove the A2 (I/O cable driver) if it is installed.

Are both lights on?
Y N

080
-Remove the E2 (ROS adapter) card.

Are both lights on?
Y N

081
-Reinstall A2 and E2.

Defective J2 (display) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.

082
-Reinstall A2.

Defective E2 (ROS adapter) card.

083
Defective A2 (I/O cable driver) card and cable assembly.
Defective printer B1A2 (adapter) card.

084
Defective J2 (display) card.

085
(Entry Point B)

Check closely --- is the machine CRT filament glowing (observe through the glass at the socket end of the CRT)?
Y N

086
-Calibrate the CE meter (refer to 270).
-Measure +12 vdc from J6-E04 to J6-C02 (gnd).
(refer to 241 display Z3 socket locations).

Is the voltage in tolerance (+11.0 vdc to +13.2 vdc)?
Y N

087
-Disconnect the cable from Z3.
(refer to 209.)

Is the voltage in tolerance (+11.0 vdc to +13.2 vdc)?
Y N

088
-Connect the Z3 (display and control panel) cable.

Go to MAP 0700, Entry Point A.

089
Defective display assembly.
Check/replace display and control panel cable (refer to 210, 241).

090
Defective display assembly.
Check/replace display and control panel cable (refer to 210, 241).

091
-Probe J2-P07 (+C5).

Are both lights on?
Y N

092
(refer to 209.)

Is there a card in A2?
Y N

093
(Entry Point C)
-Remove the E2 (ROS adapter) card.
-Probe J2-P07.

Are both lights on?
Y N

094
-Reinstall the E2 (ROS adapter) card.

Defective G2 (controller) card.
Defective F2 (base I/O) card.

095
Defective E2 (ROS adapter) card.

096
-Remove the A2 (I/O cable driver) card.
-Probe J2-P07.

Are both lights on?
Y N

097
Reinstall the A2 (I/O cable driver) card.

Go to Page 9, Step 093, Entry Point C.

098
Defective A2 (I/O cable driver) card and cable assembly.

099
-Probe J2-B09 (+external horizontal drive).

Are both lights on?
Y N

100
(refer to 209.)

Is there a card in A2?
Y N

101
(Entry Point D)
-Disconnect the cable from Z3.
-Probe J2-B09.

Are both lights on?
Y N

102
-Connect the Z3 (display and control panel) cable.

Defective J2 (display) card.

103
Defective display assembly.
Check/replace display and control panel cable (refer to 210, 241).

104
-Remove the A2 (I/O cable driver) card.
-Probe J2-B09.

Are both lights on?
Y N

105
-Reinstall the A2 (I/O cable driver) card.

Go to Page 9, Step 101, Entry Point D.

106
Defective A2 (I/O cable driver) card and cable assembly.

107
-Probe J2-B12 (-machine video).

Are both lights on?
Y N

108
-Disconnect the cable from Z3.
-Probe J2-B12.

Are both lights on?
Y N

109
-Connect the Z3 (display and control panel) cable.

Defective J2 (display) card.

110
Defective BRIGHTNESS control.
Check/replace display and control panel cable (refer to 210, 241).

111
-Probe H6-E04 (-machine video).
(refer to 241 display Z3 socket locations).

Are both lights on?
Y N

112
Defective BRIGHTNESS control.
Check/replace display and control panel cable (refer to 210, 241).

113
Defective display assembly.
Check/replace display and control panel cable (refer to 210, 241).

TV MONITOR MAP 0510

PAGE 1 OF 2

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
0200	A	1	001

001
(Entry Point A)
-Turn up the BRIGHTNESS control on the TV monitor.

Is there a full raster on the TV monitor?
Y N

002
Defective TV monitor or its ac input voltage.

003
-Turn the BRIGHTNESS control down until the white background just disappears.

Is there any video on the TV monitor?
Y N

004
-Attach a jumper from J2-B13 (-machine video) to J2-J02 (+monitor video).

This forces a video signal to the TV monitor.

Is there any video on the TV monitor?
Y N

005

Is the 5 inch display dark?
Y N

006
-Disconnect the TV monitor from the machine.
-Probe the center conductor on the xxxx TV monitor socket.

Are both lights on?
Y N

007
-Remove the jumper.

Defective J2 (display) card.
Check/replace machine TV monitor cable (refer to 210).

008
-Remove the jumper.

Defective TV monitor.

009
-Disconnect the TV monitor from the machine.

Is the 5 inch display dark?
Y N

010
-Remove the jumper.

Defective TV monitor.

011
-Remove the jumper.

Defective J2 (display) card.
Check/replace machine TV monitor cable (refer to 210).

012
Defective J2 (display) card.

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013

Defective J2 (display) card.
Check/replace machine TV monitor cable (refer to 210).
Defective TV monitor.

PAGE 1 OF 8

ENTRY POINTS

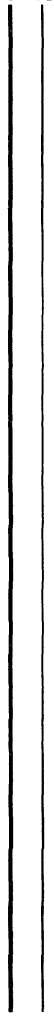
FROM MAP NUMBER	ENTER THIS MAP: ENTRY POINT	PAGE NUMBER	STEP NUMBER
0200	A	1	001
0300	A	1	001
0845	A	1	001
0900	A	1	001

EXIT POINTS

EXIT THIS MAP: PAGE NUMBER	STEP NUMBER	TO: MAP NUMBER	ENTRY POINT
8	081	0420	A
2	006	0700	A

001
(Entry Point A)

Can you make the machine fail?
Y N



2 2
A B

002
(Entry Point B)
Keyboard intermittent failures procedure.

Perform the following actions, one on each call until the problem is corrected:

1. Clean the keyboard PC board (refer to 251).
Reseat the keyboard cable at both ends.
Date / /

2. Replace the keyboard PC board (refer to 251).
Date / /

3. Replace the all keys assembly (refer to 251).
Date / /

4. Replace the F2 (base I/O) card.
Date / /

5. Replace the G2 (controller) card.
Date / /

6. Replace the H2 (I/O & diag) card.
Date / /

7. Replace the power supply.
****
* CAUTION *
****
Refer to 271, power supply removal and replacement.
Date / /

003
Is the PROCESS CHECK light on?
Y N

8 2
C D

004
-Calibrate the CE meter (refer to 270).
-For the probe points (refer to 204).
-Measure +8.5 vdc and +5.0 vdc at the keyboard PC board with reference to gnd on the A1 board.

Are both voltages in tolerance (+7.8 vdc to +9.3 vdc) and (+4.6 vdc to +5.5 vdc)?
Y N

005
-Measure +8.5 vdc and +5.0 vdc at the A1 board.
(refer to 255).

Are both voltages in tolerance (+7.8 vdc to +9.3 vdc) and (+4.6 vdc to +5.5 vdc)?
Y N

006
Go to MAP 0700, Entry Point A.

007
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable (refer to 255).

008
-Press the Q key then the P key.

Did anything (P, Q, *, ?, invalid key, etc) appear on the display?
Y N

009
-Probe F2-S05 (-keyboard lockout).
(refer to the appendix, the general logic probe).

Is the UP light on?
Y N

4 3 3
E F G

KEYBOARD MAP

010
-Disconnect the keyboard cable at Z4.
-Probe F2-S05 (-keyboard lockout).

Is the DOWN light on?
Y N

011
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

012
-Connect the keyboard cable at Z4.

Defective F2 (base I/O) card.

013
-Probe F2-U12 (-keyboard strobe).

Is the DOWN light on?
Y N

014
-Press and hold the P key.
-Probe F2-U12 (-keyboard strobe).

Is the DOWN light on?
Y N

015
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

016
-Release the P key.
-Probe F2-U06 (-interrupt req 3).

Is the DOWN light on?
Y N

4 3 3
H J K

017
-Probe F2-U06 (-interrupt req 3).
-Observe the DOWN light while sequentially pressing keys.

Does the DOWN light come on?
Y N

018
Defective F2 (base I/O) card.

019
Bit 3 is the command bit, if it is on it may be causing the problem.

-Probe F2-P05 (-keyboard data bus 3) while pressing the P key.

Is the DOWN light on?
Y N

020
Defective G2 (controller) card.
Defective F2 (base I/O) card.

021
Defective CMD key module
(refer to 252).
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

022
-Disconnect the keyboard cable at Z4.
-Probe F2-U06 (-interrupt req 3).

Is the DOWN light on?
Y N

023
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

KEYBOARD MAP

024
-Connect the keyboard cable at Z4.

Defective F2 (base I/O) card.
Defective G2 (controller) card.

025
-Remove the keyboard cable at Z4.
(refer to 209.)
-Probe F2-U12 (-keyboard strobe).

Is the UP light on?
Y N

026
-Connect the keyboard cable at Z4.

Defective F2 (base I/O) card.

027
-Connect the keyboard cable at Z4.

Defective ATTN or HOLD key module
(refer to 252).
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

028

Did QP appear on the display?
Y N

029

Did the uppercase character for the Q key display?
Y N

030

Did only one character display?
Y N

031
-Press and hold the K key.
-Press RESTART. wait 10 seconds.
(refer to 249, checkpoints).

Is the machine at checkpoint G?
Y N

032
-Release the K key.

Did either LOAD 0 or CLEAR WS (with no misspelling) appear on one and only one line of the 5 inch display?
Y N

033
Defective H2 (I/O and diag) card.

034
Defective ATTN or HOLD key module
(refer to 252).
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

035
-Release the K key.

Do positions 3 and 4 of line 3 on the display contain 30?
Y N

036
Defective H2 (I/O and diag) card.

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EC 828851 PEC -------

037
Defective CMD key module
(refer to 252).
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

038
(Entry Point C)
You are checking for keys failing to generate a strobe.

-Press the failing key.
-Probe F2-U12 (-keyboard strobe).

Is the DOWN light on?
Y N

039
Defective key module (refer to 252).
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

040
-Probe F2-P05 (-bit 3).

Is the DOWN light on?
Y N

041
Using the keyboard data chart
(refer to 250).

-Probe the keyboard data bus.

5 F2-J11	6 F2-M12
2 F2-M08	4 F2-P02
7 F2-M09	3 F2-P05
P F2-M10	1 F2-U02.
0 F2-M11	

Is the data correct for the key pressed?
Y N

5 5 5
S T U

042
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

043
The correct data is coming from the keyboard.

Defective F2 (base I/O) card.
Defective G2 (controller) card.
Defective J2 (display) card.
Defective H2 (I/O and diag) card.

044
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

045
-Press and hold the X key.
-Press RESTART .
-When the machine halts at checkpoint G, release the X key.

Do positions 3 and 4 of line 3 of the display contain 6C?
Y N

046

Do positions 3 and 4 of line 3 of the display contain EC?
Y N

047
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

6 6
V W

048
Defective left shift key module
(refer to 252).
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

049
Defective right shift key module
(refer to 252).
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

050
Refer to section 4-keyboard, typamatic function.

-Press and hold the P key.

Does the P key perform the typamatic function?
Y N

051

Do both shift keys function?
Y N

052

Do both shift keys fail?
Y N

053
Defective shift key module
(refer to 252).
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

054
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

055
-Press and hold the CMD key. Then press and hold the A key.
-Press RESTART. wait 10 seconds.
-Release the CMD and the A keys.

Did either LOAD 0 or CLEAR WS (with no misspelling) appear on one and only one line of the 5 inch display?
Y N

056
(refer to 249, checkpoints).

Is the machine at checkpoint G?
Y N

057
Defective H2 (I/O and diag) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.

058

Do positions 3 and 4 of line 3 on the display contain 3F?
Y N

059
-Press RESTART. wait 10 seconds.
-Press and hold the CMD key.
-Press and hold the P key.
-Probe F2-P05 (-keyboard bit 3).

Is the DOWN light on?
Y N

060
Defective CMD key module
(refer to 252).
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

061
Defective F2 (base I/O) card.
Defective G2 (controller) card.
Defective H2 (I/O and diag) card.

062
-Press RESTART. wait 10 seconds.
-Press and hold the space bar.

Does the typamatic function work?
Y N

063
-Press and hold the SPACE bar.
-Probe F2-U07 (+typamatic).

Is the UP light on?
Y N

064
-Remove the keyboard cable at Z4.
-Probe F2-U07 (+typamatic).

Is the DOWN light on?
Y N

065
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

066
Defective F2 (base I/O) card.

067
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

068
-Press and hold the P key for about 5 seconds.

Does the P key perform the typamatic function?
Y N

069
-Press all the keys one by one.

Does any key fail to function?
Y N

070
Go to Page 2, Step 002, Entry Point B.

071
Go to Page 5, Step 038, Entry Point C.

072
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

073
-Press the A key.

Is an A displayed?
Y N

074
Defective key module (refer to 252).

075
Defective H2 (I/O and diag) card.
Defective F2 (base I/O) card.
Defective G2 (controller) card.

076
-Probe F2-U07 (+typamatic).

Is the UP light on?
Y N

077
-Press and hold the A key
-Probe F2-U12 (-keyboard strobe).

Are both lights on?
Y N

078
Defective F2 (base I/O) card.

079
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable
(refer to 255).

080
Defective F2 (base I/O) card.

081
Go to MAP 0420, Entry Point A.

POWER MAP 0700

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ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
0300	A	1	001
0500	A	1	001
0600	A	1	001
0820	A	1	001
0821	A	1	001
0840	A	1	001
0841	A	1	001
0843	A	1	001
0846	A	1	001

001
(Entry Point A)
(refer to 273).

Is the fan running?
Y N

002
(refer to 273).

Is fuse F1 blown?
Y N

003
(refer to 273).

Is the line cord plugged in?
Y N

004
-Plug the line cord in.

2 1 1
A B C

B C
1 1

005
-Power down.

Check for an:
1. Open line cord.
2. Open power switch.
3. Open ac power filters.
4. Open in ac power box.
5. Open fan lead J2 or defective fan (refer to 273).

006
For each of the next several steps perform the following:

-Power down.
-Replace fuse F1.
-Perform the operation ,if any, listed in the step.
-Power up. Wait 30 seconds.

Does fuse F1 blow after replacing?
Y N

007
Defective fuse F1.

008
-Disconnect the dc power cable at Y1.

Does fuse F1 blow now?
Y N

009
Go to Page 3, Step 026, Entry Point B.

010
-Disconnect the power supply ac power plug J1 at the ac power box.
(refer to 273).

Does fuse F1 blow now?
Y N

2 2
D E

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EC 829523 PEC 828851

011
Defective power supply.
****
* CAUTION *
****
Refer to 271, power supply removal and replacement.

012
-Disconnect the ac power plug J1 at the ac power box
(refer to 273).

Does fuse F1 blow now?
Y N

013
Defective tape motor assembly (refer to 202).

014
-Disconnect the fan ac plug J2 at the ac power box
(refer to 273).

Does fuse F1 blow now?
Y N

015
Defective fan assembly.

016
-Check for a short or loose connection in the ac power box
(refer to 273).

017
-Calibrate the CE meter (refer to 270).
-Measure the following loaded voltages at the A1 board:
-Record the pin location of any voltages that are out of tolerance
(refer to 272).

+5 vdc A1-D13 .
+8.5 vdc C1-C11 .
+12 vdc C1-D13 .
-12 vdc C1-E13 .

Are all voltages within tolerance?
Y N

018
-Power down.
-Disconnect any auxiliary I/O cables
(refer to 281).
-Disconnect the dc power cable at Y1
(refer to 209.)
-Power up.
-Measure the unloaded voltages at the dc power cable
(refer to 272).

Are all voltages within tolerance?
Y N

019

Is there any voltage present?
Y N

020
-Power down.
-Exchange the power supply connector J1 with the fan connector, J2
(refer to 273).
-Power up. Wait 30 seconds.

Is the fan running now?
Y N

021
Check/replace the cables in the ac power box.
(refer to 273).

022

Are the voltages present now?
Y N

023
Defective power supply.
****
* CAUTION *
****
Refer to 271, power supply removal and replacement.

024
A cable was unseated or had an open connection. Inspect for loose connections.

025
Defective power supply.
****
* CAUTION *
****
Refer to 271, power supply removal and replacement.

026
(Entry Point B)
-Power down.
-Connect the dc cable back into socket Y1.
-Disconnect all the cables to the A1 board except the dc power cable.
-Power up.
-Measure one of the out of tolerance voltages recorded above for the next several steps.

Does fuse F1 blow or does power drop?
Y N

027
Is the measured voltage out of tolerance now?
Y N

028
-Connect the Z4 (keyboard) cable.

Is the measured voltage out of tolerance now?
Y N

029
-Connect the Z2 (tape) cable.

Is the measured voltage out of tolerance now?
Y N

030
-Connect the Z3 (display and control panel) cable.

Is the measured voltage out of tolerance now?
Y N

031
-Connect the Z1 (communications adapter/serial I/O adapter) cable.

Is the measured voltage out of tolerance now?
Y N

032
-Connect the I/O cables.

Is the measured voltage out of tolerance now?
Y N

033
The problem was corrected by reseating the cables. Inspect both ends of the cables for loose foreign conductors (foil or wire ends for example).

034
-Power down.
-Remove all the cards from the auxiliary devices.
-Power up. Wait 30 seconds.

Is the measured voltage out of tolerance now?
Y N

035
One of the cards removed is defective. Reinstall them one at a time until the measured voltage goes out of tolerance. The last card reinstalled is defective.

036
Defective external I/O device or cable. Check especially for short circuits.

037
-Power down.
-Disconnect the communication cable at the data set and/or the serial I/O cable from the serial I/O device.
-Power up.

Is the measured voltage out of tolerance now?
Y N

038
Defective data set or serial I/O device.

039
Short circuit in the communication cable or serial I/O cable.

040
-Power down.
-Disconnect the cable connector on the 5 inch display.
-Power up.

Is the measured voltage out of tolerance now?
Y N

041
Defective display assembly.

042
-Check for a short circuit on the control panel switches
(refer to 210, display and control panel cable).

043
Check for a short circuit in the tape unit.
Defective tape control card (refer to 202).
Short circuit in the tape cable
(refer to 420).

044
-Power down.
-Disconnect keyboard cable at the keyboard
(refer to 204).
-Power up.

Is the measured voltage out of tolerance now?
Y N

045
Short circuit in the keyboard PC board.
(refer to 251).

046
Defective keyboard cable
(refer to 204).

047
Go to Page 5, Step 048, Entry Point C.

048
(Entry Point C)
-Power down.
-Remove all the cards from the board.
(refer to 209.)
-Power up. Wait 30 seconds.

Does fuse F1 blow or does power drop or is the voltage out of tolerance now?
Y N

049
Defective card.
Power down and power up as you reinstall the cards one at a time until the defective card is found.

050
Defective A1 board.

051
The power supply is working properly.

Are you missing a voltage at a specific device?
Y N

052
Defective A1 board.

053
-Trace the circuit from that device to the power supply
(refer to section 5, power supply voltages).

PAGE 1 OF 2

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
0200	A	1	001

EXIT POINTS

EXIT THIS MAP		TO	
PAGE NUMBER	STEP NUMBER	MAP NUMBER	ENTRY POINT
2	004	0420	A

001
(Entry Point A)
This is the entry MAP for the 5103 printer.

Is the PROCESS CHECK light on?
Y N

002
Note: if there is an auxiliary tape attached, disconnect the auxiliary tape and disconnect the printer. Connect the printer directly to the 5100. The PROCESS CHECK light might turn on. Press RESTART . Wait 10 seconds.

Use the keys on the numeric section of the keyboard:

-Hold CMD and press HOLD
-Hold CMD and press - (minus)
-For BASIC , hold CMD and press * (multiply)
-For APL , hold CMD and press x (multiply)
-Press C
-Hold CMD and press 1
-Press EXECUTE

Follow the instructions on the display until DCP2 MENU appears. Then:

-Enter 800
-Press EXECUTE

The 5103 printer MDI should now load and run. Follow the instructions on the display. When completed, return to the BASIC/APL mode by pressing RESTART .

003

Is the 5103 printer MDI loaded?

Y N

004

Go to MAP 0420, Entry Point A.

005

This procedure will reset the process check and allow you to continue with the 5103 printer MDI at the MAP number and step number on the display.

-Record the MAP number and step number now displayed.
-Press and release the RESTART switch. Wait 10 seconds.

Use the keys on the numeric section of the keyboard:

-Hold CMD and press HOLD
-Hold CMD and press - (minus)
-For BASIC , hold CMD and press * (multiply)
-For APL , hold CMD and press x (multiply)
-Press C
-Hold CMD and press 8
-Enter 0800
-Enter 0001
-Enter 0000
-Press EXECUTE . Wait for tape movement to stop.
-Enter BR0800
-Press EXECUTE
-Enter the rightmost three digits of the MAP number previously recorded.
-Press O (alpha)
-Press EXECUTE
-Wait for MDI OPTIONS to be displayed.
-Advance the cursor to STEP NO.
-Enter the three-digit step number previously recorded.
-Press EXECUTE

The 5103 printer MDI is now continuing at the step where the PROCESS CHECK light previously occured. Follow the instructions on the display.

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ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
0200	A	1	001

EXIT POINTS

EXIT THIS MAP		TO	
PAGE NUMBER	STEP NUMBER	MAP NUMBER	ENTRY POINT
1	003	0420	A

001
(Entry Point A)
This is the entry MAP for the communications adapter/ serial I/O adapter. If the PROCESS CHECK light is on, the communications/serial I/O MDI cannot be loaded.

Is the PROCESS CHECK light on?
Y N

002
Use the keys on the numeric section of the keyboard:

-Hold CMD and press HOLD
-Hold CMD and press - (minus)
-For BASIC , hold CMD and press * (multiply)
-For APL , hold CMD and press x (multiply)
-Press C
-Hold CMD and press 1
-Press EXECUTE

Follow the instructions on the display until DCP2 MENU appears. Then:

-Enter 820
-Press EXECUTE

The communications/serial I/O MDI should now load and run. Follow the instructions on the display. When completed, return to the BASIC/APL mode by pressing RESTART .

003
Go to MAP 0420, Entry Point A.

PAGE 1 OF 1

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
0200	A	1	001
0860	A	1	001

EXIT POINTS

EXIT THIS MAP		TO	
PAGE NUMBER	STEP NUMBER	MAP NUMBER	ENTRY POINT
1	003	0420	A

001
(Entry Point A)
This is the entry MAP for the auxiliary tape drive. If the PROCESS CHECK light is on, the auxiliary tape drive MDI cannot be loaded.

Is the PROCESS CHECK light on?
Y N

002
Use the keys on the numeric section of the keyboard:

-Hold CMD and press HOLD
-Hold CMD and press - (minus)
-For BASIC , hold CMD and press * (multiply)
-For APL , hold CMD and press x (multiply)
-Press C
-Hold CMD and press 1
-Press EXECUTE

Follow the instructions on the display until DCP2 MENU appears. Then:

-Enter 840
-Press EXECUTE

The auxiliary tape drive MDI should now load and run. Follow the instructions on the display. When completed, return to the BASIC/APL mode by pressing RESTART .

003
Go to MAP 0420, Entry Point A.

PAGE 1 OF 8

ENTRY POINTS

FROM	ENTER THIS MAP		
MAP NUMBER	ENTRY POINT	PAGE NUMBER	STEP NUMBER
0200	A	1	001
0300	A	1	001
0845	A	1	001

EXIT POINTS

EXIT THIS MAP		TO	
PAGE NUMBER	STEP NUMBER	MAP NUMBER	ENTRY POINT
2	004	0200	A
7	063	0300	A
2	010	0400	A
2	006	0420	A
8	075	0420	A
2	017	0420	A
5	050	0420	A
6	054	0420	A
6	058	0420	A
7	064	0420	A
2	005	0500	A
8	077	0500	A
4	038	0500	A
2	016	0600	A
3	026	0600	A
3	028	0600	A
3	030	0600	A
6	053	0600	A

001
(Entry Point A)
-Power down
-Power up.
-Remove the tape cartridge if it is in the tape drive.
-Set the BRIGHTNESS control to the center of its range.
-Switch the L32-64-R32 switch to 64.
-Press the bottom of the REVERSE DISPLAY switch.
-Switch the DISPLAY REGISTERS switch to NORMAL.

Did either LOAD 0 or CLEAR WS (with no misspelling) appear on one and only one line of the 5 inch display?

Y N

2 2
A B

002

Is the PROCESS CHECK light on?
Y N

003

Is the 5-inch display dark for all positions of the BRIGHTNESS control?
Y N

004
Go to MAP 0200, Entry Point A.

005
Go to MAP 0500, Entry Point A.

006
Go to MAP 0420, Entry Point A.

007
The machine CRT raster is grossly distorted if it is absent, is rolling, has a black rather than a white background, is greatly reduced in size, or departs significantly from a rectangular shape.

Is the machine CRT raster grossly distorted?
Y N

008
Is the IN PROCESS light on?
Y N

009

Are the top 13 lines of the display entirely blank?
Y N

010
Go to MAP 0400, Entry Point A.

011
-Press and hold the RESTART switch.

Are both the PROCESS CHECK and IN PROCESS lights on?
Y N

012
Defective PROCESS CHECK light.
Defective IN PROCESS light.
Defective RESTART switch.
Check/replace display and control panel cable (refer to 210, 241).

013
-Release the RESTART switch. Wait 10 seconds.

Is the PROCESS CHECK light on?
Y N

014
-Press each key (except the HOLD, CMD, ATTN, EXECUTE keys and the space bar. Do not try the repeat function).
-Observe the display for proper characters or functions (refer to 250 and keyboard theory section 4).

Do the keys function correctly?
Y N

015

Is the PROCESS CHECK light on?
Y N

016
Go to MAP 0600, Entry Point A.

017
Go to MAP 0420, Entry Point A.

018
-Press and hold the SPACE bar.

Does the repeat function work correctly?
Y N

019
(refer to the appendix, the general logic probe).
-Press and hold the SPACE bar.
-Probe F2-U07 (+typamatic).

Is the UP light on?
Y N

020
-Remove the keyboard cable at Z4.
-Probe F2-U07 (+typamatic).

Is the DOWN light on?
Y N

021
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable (refer to 255).

022
Defective F2 (base I/O) card.

023
Defective key module (refer to 252).
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable (refer to 255).
Defective J2 (display) card.

024
-Press and hold the P key.

Does the P key perform the typamatic function?
Y N

7 3
H J

025
-Press the backspace key to place the cursor under a character.
-Press ATTN

Did the character at the cursor location and the remaining characters on that line disappear?
Y N

026
Defective ATTN key.

Go to MAP 0600, Entry Point A.

027
-Press EXECUTE

The word ERROR should appear on the display with other characters.

Is the word ERROR on the display?
Y N

028
Defective EXECUTE key.

Go to MAP 0600, Entry Point A.

029
-Press HOLD

The cursor/character should stop flashing.

Did the flashing stop?
Y N

030
Defective HOLD key.

Go to MAP 0600, Entry Point A.

4
K

031

Does the machine have a BASIC/APL switch (refer to 205)?

Y N

032
Go to Page 4, Step 035, Entry Point B.

033
-Check the BASIC/APL switch (refer to 244).

Does the BASIC/APL switch function correctly?

Y N

034
Defective BASIC/APL switch.
Defective F2 (base I/O) card.
Check/replace display and control panel cable (refer to 210, 241).

035
(Entry Point B)
-Press RESTART
-Check the REVERSE DISPLAY switch (refer to 245).

Does the REVERSE DISPLAY switch function correctly?

Y N

036
Defective REVERSE DISPLAY switch.
Defective F2 (base I/O) card.
Defective J2 (display) card.
Check/replace display and control panel cable (refer to 210, 241).

037
-Check the DISPLAY REGISTERS switch (refer to 243).

Does the DISPLAY REGISTERS switch function correctly?

Y N

038
Defective DISPLAY REGISTERS switch.
Defective F2 (base I/O) card.
Defective J2 (display) card.
Check/replace display and control panel cable (refer to 210, 241).
Go to MAP 0500, Entry Point A.

039
-Switch the DISPLAY REGISTERS switch to NORMAL.
-Check the L32-64-R32 switch (refer to 242).

Does the L32-64-R32 switch function correctly?

Y N

040
Defective L32-64-R32 switch.
Defective F2 (base I/O) card.
Defective J2 (display) card.
Check/replace display and control panel cable (refer to 210, 241).

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041

-Switch the L32-64-R32 switch to 64.
Use the 5100 model number to identify the read/write storage size:
Model A1, B1, C1 = 16K .
Model A2, B2, C2 = 32K .
Model A3, B3, C3 = 48K .
Model A4, B4, C4 = 64K .

-Check the read/write storage size in the 5100.
-Switch the DISPLAY REGISTERS switch to DISPLAY REGISTERS.
Refer to 248, hex registers display.

Is the read/write storage size correct?
Y N

042

Is the read/write storage size 3FFF ?
Y N

043

Is the read/write storage size 7FFF ?
Y N

044
Defective N2 (read/write storage) card.
Defective N4 (read/write storage) card.
Defective G2 (controller) card.

045
Defective M2 (read/write storage) card.
Defective M4 (read/write storage) card.
Defective G2 (controller) card.

046
Defective L2 (read/write storage) card.
Defective L4 (read/write storage) card.
Defective G2 (controller) card.

047

-Switch the DISPLAY REGISTERS switch to NORMAL.
-Perform a calculation as follows (refer to section 6, language support):

-For APL, enter:
B ← 9 EXECUTE
C ← 3 EXECUTE
A ← B × C EXECUTE
A EXECUTE

-For BASIC, enter:
B=9 EXECUTE
C=3 EXECUTE
A=B*C EXECUTE

Is the answer 27?
Y N

048

Is the PROCESS CHECK light on?
Y N

049
Defective H2 (I/O and diag) card.
Defective H4 (APL supervisor) card.
Defective E2 (ROS adapter) card.
Defective D2 (APL ROS 1) card.
Defective D4 (APL ROS 2) card.
Defective C2 (APL ROS 3) card.
Defective C4 (BASIC ROS) card.

050
Go to MAP 0420, Entry Point A.

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051

Use the keys on the numeric key section of the keyboard (refer to 250).

-Hold CMD and press HOLD
-Hold CMD and press - (minus)

When DCP1 loads, the characters DCP1 should appear on the display. (you have loaded DCP1, diagnostic control program 1. Refer to section 3, diagnostic aids).

Does the DCP1 program load?
Y N

052

Is the PROCESS CHECK light on?
Y N

053
Defective CMD key.

Go to MAP 0600, Entry Point A.

054
Go to MAP 0420, Entry Point A.

055

Put the DCP1 progrram in diagnostic mode by using the keys on the numeric key section of the keyboard:

-Hold CMD and press * (BASIC multiply key)
OR
-Hold CMD and press x (APL multiply key)

The characters DIAG DCP1 should appear on the display (refer to section 3, diagnostic aids).

Do the characters DIAG DCP1 appear on the display?
Y N

6 6
Q R

056

Is the PROCESS CHECK light on?
Y N

057
Defective H2 (I/O and diag) card.
Defective H4 (APL supervisor) card.
Defective E2 (ROS adapter) card.
Defective D2 (APL ROS 1) card.
Defective D4 (APL ROS 2) card.
Defective C2 (APL ROS 3) card.
Defective C4 (BASIC ROS) card.

058
Go to MAP 0420, Entry Point A.

059

Use the keys on the numeric key section of the keyboard:

-Press C
-Hold CMD and press 1
-Press EXECUTE

You have loaded and are running the tape read diagnostic program (refer to section 3, diagnostic aids). Follow the instructions on the display. Return to this point for further instructions when DCP2 MENU is displayed.

Is DCP2 MENU on the display?
Y N

060

Is the PROCESS CHECK light on?
Y N

7 7 7
S T U

061

Did the tape read diagnostic program load?

Y N

062
Defective E2 (ROS adapter) card.
Defective F2 (base I/O) card.

063
Go to MAP 0300, Entry Point A.

064
Go to MAP 0420, Entry Point A.

065
-Press 860
-Press EXECUTE

Follow the instructions on the display then return to this point for further instructions when the MDI is completed. (you have loaded and are running the tape write diagnostic program. Refer to section 3, diagnostic aids).

Did MDI 860 run correctly?

Y N

066
Perform the actions requested by the routines.

067
-Press ATTN twice.
The DCP2 MENU should now be displayed. Select each routine one at a time until you have completed all of the routines that are applicable to the features available on your machine (refer to section 3, diagnostic aids).

```
-PRINTER                      800
-COMMUNICATIONS/SERIAL I/O    820
-AUXILIARY TAPE               840
```

Do the routines run correctly?

Y N

068
Perform the actions requested by the routines.

069
The machine checkout is complete. Remove the diagnostic tape cartridge and press RESTART .

070
(refer to the appendix, the general logic probe).
-Probe F2-U07 (+typamatic).

Is the UP light on?

Y N

071
-Press and hold the A key
-Probe F2-U12 (-keyboard strobe).

Are both lights on?

Y N

072
Defective F2 (base I/O) card.

073
Defective keyboard PC board (refer to 251).
Check/replace keyboard cable (refer to 255).

074
Defective F2 (base I/O) card.

075
Go to MAP 0420, Entry Point A.

076
Defective IN PROCESS light.
Check/replace display and control panel cable (refer to 210, 241).

077
Go to MAP 0500, Entry Point A.

This section is to provide a place to file instructions, wiring diagrams, and reference materials for any RPQ features that are installed.

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IBM

International Business Machines Corporation
General Systems Division
5775D Glenridge Drive N.E.
Atlanta, Georgia 30301
(USA Only)

IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
(International)

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