

**IMMEDIATE
SERVICE
NOTICE**

NO. 121

DATE: 9/13/76

ITEM(S) / PRODUCT(S):

PERIPHERALS #9
MOTOROLA 12 INCH DISPLAY UNITS
(2216, 2226)

An unknown quantity of Motorola 12 inch video display units currently being used in customers' systems have a potential problem. When the display is turned OFF, the raster collapses into a bright spot in the center of the screen. This may destroy the phosphor of the CRT and is evidenced by a burn spot at screen center.

This problem is avoided by adding two components to the Motorola PC board as follows: (Reference page 8-28, 2200 Maintenance Manual)

1. Solder a 120 Ω , 1/2 watt resistor (WL #331-2012) to the positive (+) lead of a 500 μ f, 50 WVDC electrolytic capacitor (WL #300-3053).
2. Solder the free end of the resistor to the 30 volt etch connected to pin 7 of the Motorola PC board.
3. Solder the negative lead of the electrolytic capacitor to the etch connecting to the base of transistor Q3.


If a unit is found to have a burned spot in the screen center, replace the unit with an updated unit per normal service procedures.

WANG

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 <p style="text-align: center;">IMMEDIATE SERVICE NOTICE</p>	NO. 133	DATE: 3/2/77
	CATEGORY GENERAL #3	
	SUBJECT DEFECTIVE CASSETTE BATCHES	

Tape cassettes date coded 7010 or 7011 were found to be wound upside-down during assembly. To determine whether this problem exists in your area, look at the tape surface. If the surface is shiny-side up, the tape is upside down in the cassette and should be replaced. The shiny surface is the Mylar[®] backing; the dull surface is the ferrous oxide recording surface.

Part numbers of these cassettes are as follows:

75' Cassette WL #174-1251	}	for:
160' Cassette WL #174-1250		
13' Cassette WL #177-0113	}	500/600/700 Calculator Systems
25' Cassette WL #177-0112		
50' Cassette WL #177-0110		

In small quantities (3 or less), replace customer cassettes from service stock. In larger quantities, order replacement cassettes through standard sales channels.

EDITED BY CUSTOMER ENGINEERING DIVISION

III.D.O.

September 29, 1977

ADDITION OF BLANKING CIRCUIT (7258)

TO

WANG CRT ELECTRONIC BOARDS

(7256)=12" MONITOR AND (7256-1)=9" MONITOR

A. GENERAL

The Wang CRT electronics 7256 (12") and 7256-1 (9") have been modified by the addition of a blanking circuit (7258). This circuit is contained on a small board which is attached to the CRT electronics board by four wires (3 top of board jumper type leads and 1 resistor leg extension feed-thru type lead).

B. REASON AND EXPLANATION OF MODIFICATION

The 7258 circuit provides both a blanking function and an improvement to the video driver circuit.

Previous problems were associated with poor contrast such as the vertical line at the right of the screen.

This modification "blanks" the CRT during all times when the video information is not present.

In addition, other corrective measures are accomplished during this modification to resolve the vertical line problem.

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C. INCORPORATION

This modification will be incorporated in the future artwork (etch lay-out) and the complete board assemblies will be reidentified as 7456 and 7456-1 respectively. Therefore, the 7256 and the 7456 boards will be directly interchangeable as will the 7256-1 with the 7456-1.

D. EXISTING VARIATIONS

Table 1 in conjunction with Figures 1A and 1B indicate the distinctions between the basic 7256 and 7256-1 boards. There are six basic component differences; their differences are indicated by table 1 and their board locations shown in Figures 1A and 1B.

TABLE 1
COMPONENT VARIATION CHART
FOR
WANG CRT ELECTRONIC BOARDS
7256 (12") AND 7256-1 (9")

COMPONENT IDENTITY	WANG CRT ELEC. BOARD 7256 12" MONITOR (FIGURE 1A)	WANG CRT ELEC. BOARD 7256-1 9" MONITOR (FIGURE 1B)
Z2	320-0053 width coil EX4062-1	320-0056 width coil EX4204
Z3	320-0051 linearity coil EX4063	320-0058 linearity coil EX4222
C18	300-2247 .47 micro-fd 100V mylar	300-2418 2.2 micro-fd 100V metal mylar
C30	300-2412 .033 micro-fd 400V metal mylar	300-2417 .015 micro-fd 400V metal mylar
C31	300-2413 4.0 micro-fd 100V metal mylar	300-2418 2.2 micro-fd 100V metal mylar
R19	330-3068 6.8K 1/4W	330-4027 27K 1/4W

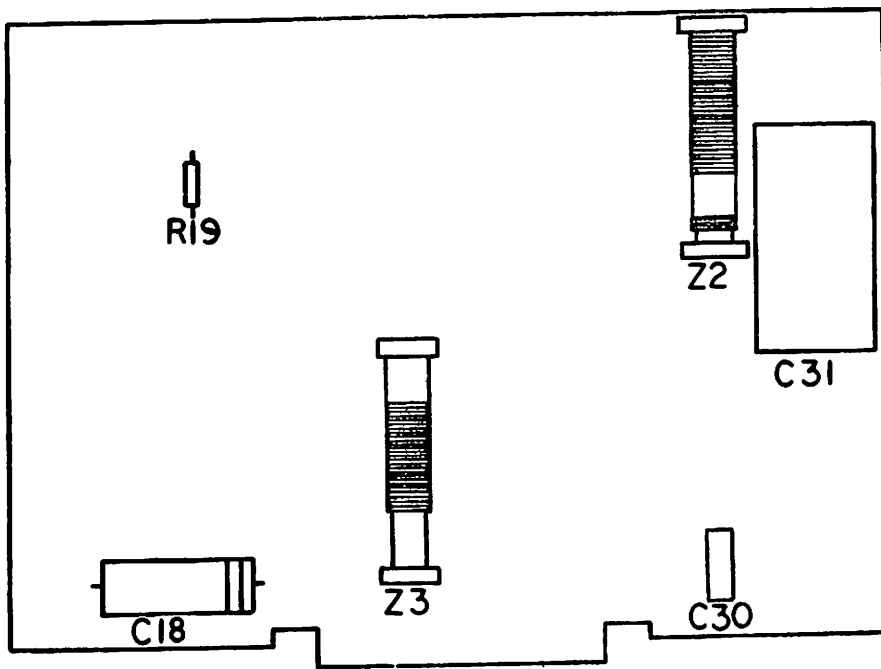


FIGURE 1A. TWELVE INCH MONITOR - PCB 7256

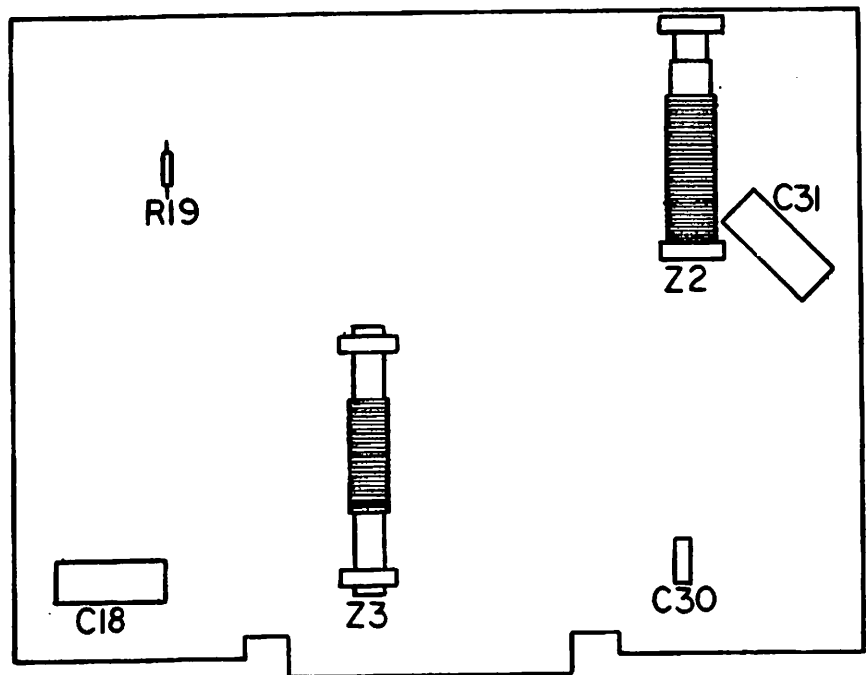


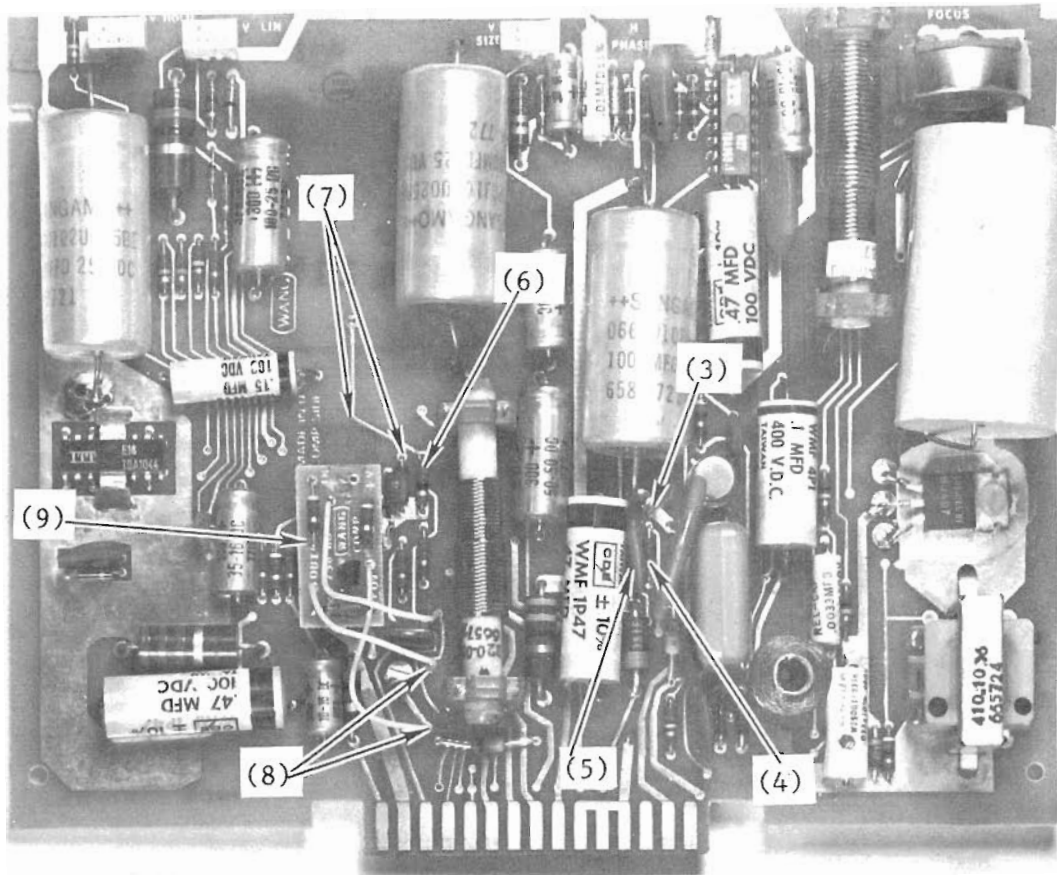
FIGURE 1B. NINE INCH MONITOR - PCB 7256-1

FIGURE 1. ELECTRONIC BOARD LAY-OUT CONFIGURATION - (Differences)

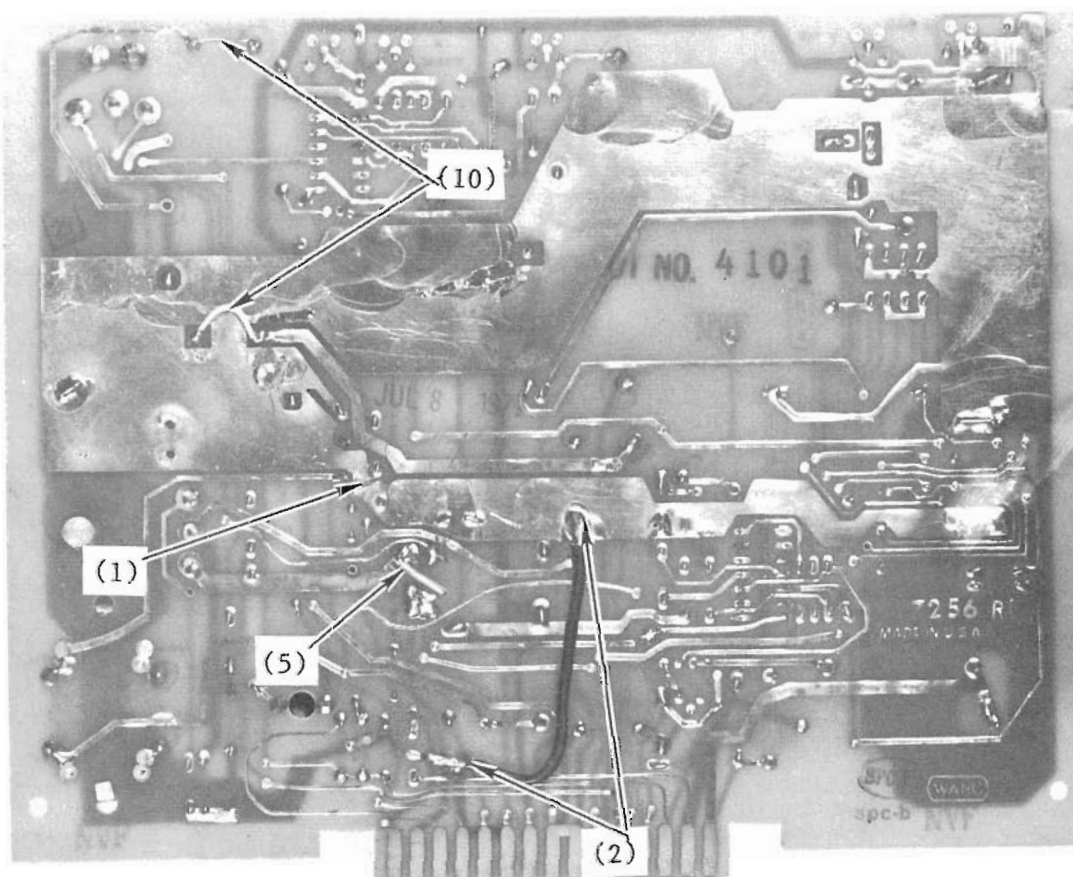
E. FIELD MODIFICATION PROCEDURE

The following procedure specifies the steps necessary to incorporate the blanking circuit onto the twelve inch (7256) and the nine inch (7256-1) monitors.

1. Open/cut the ground etch in accordance with Figure 2, (1).
2. Add jumper for grounding in accordance with Figure 2, (2).
3. On the component side of the board, open/cut the ground etch between C13 and C20 in accordance with Figure 2, (3).
4. Change R26 from 470K to 1.2M (330-6012) in accordance with Figure 2, (4).
5. Adjacent to R26, drill two holes to mount a .02 micro-fd 600V capacitor (300-1912) in accordance with Figure 2, (5).
 - a) One lead of the capacitor will be tied to R26.
 - b) One lead of the capacitor will be tied to +0V.
6. Change R4 from 120 ohm to 22 ohm (300-1022) in accordance with Figure 2, (6).
7. Remove R11 and C4 in accordance with Figure 2, (7).
8. Remove R9 in accordance with Figure 2, (8). The removal of R9 also provides the mounting pads for two of the leads coming from the blanking circuit board (7258).
9. Add the blanking circuit board (7258) in accordance with Figure 2, (9) and Figure 3.



COMPONENT SIDE



ETCH SIDE

FIGURE 2. FIELD MODIFICATIONS FOR PCB's 7256 & 7256-1

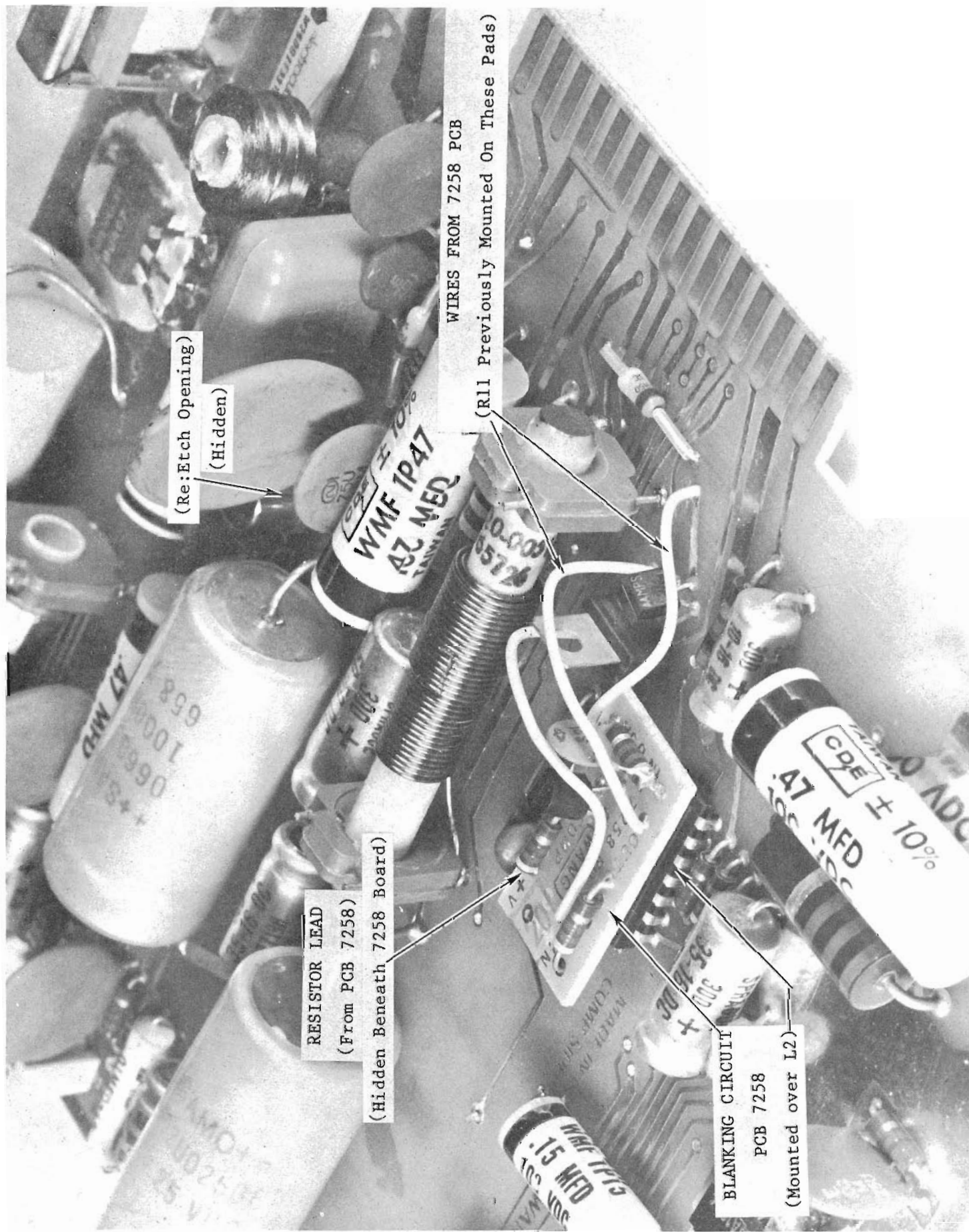


FIGURE 3. FIELD MODIFICATION FOR ALJING BLANKING CIRCUIT (PCB 7258)

NOTE:

STEP F IS GIVEN AS INFORMATION ONLY. ALL BOARDS
WILL HAVE THIS JUMPER INSTALLED AT THE TIME OF
PRODUCTION.

F. PCB 7256-1 (9" MONITOR) Z2 JUMPER ADDITION

1. During manufacture, the coil lead was attached to the wrong post;
therefore, Z2 was not connected between C31 and Z3.
2. Visually insure the insertion of a jumper from one coil post to
the other (at each end of the Z2 coil) in accordance with Figure
2, (10).

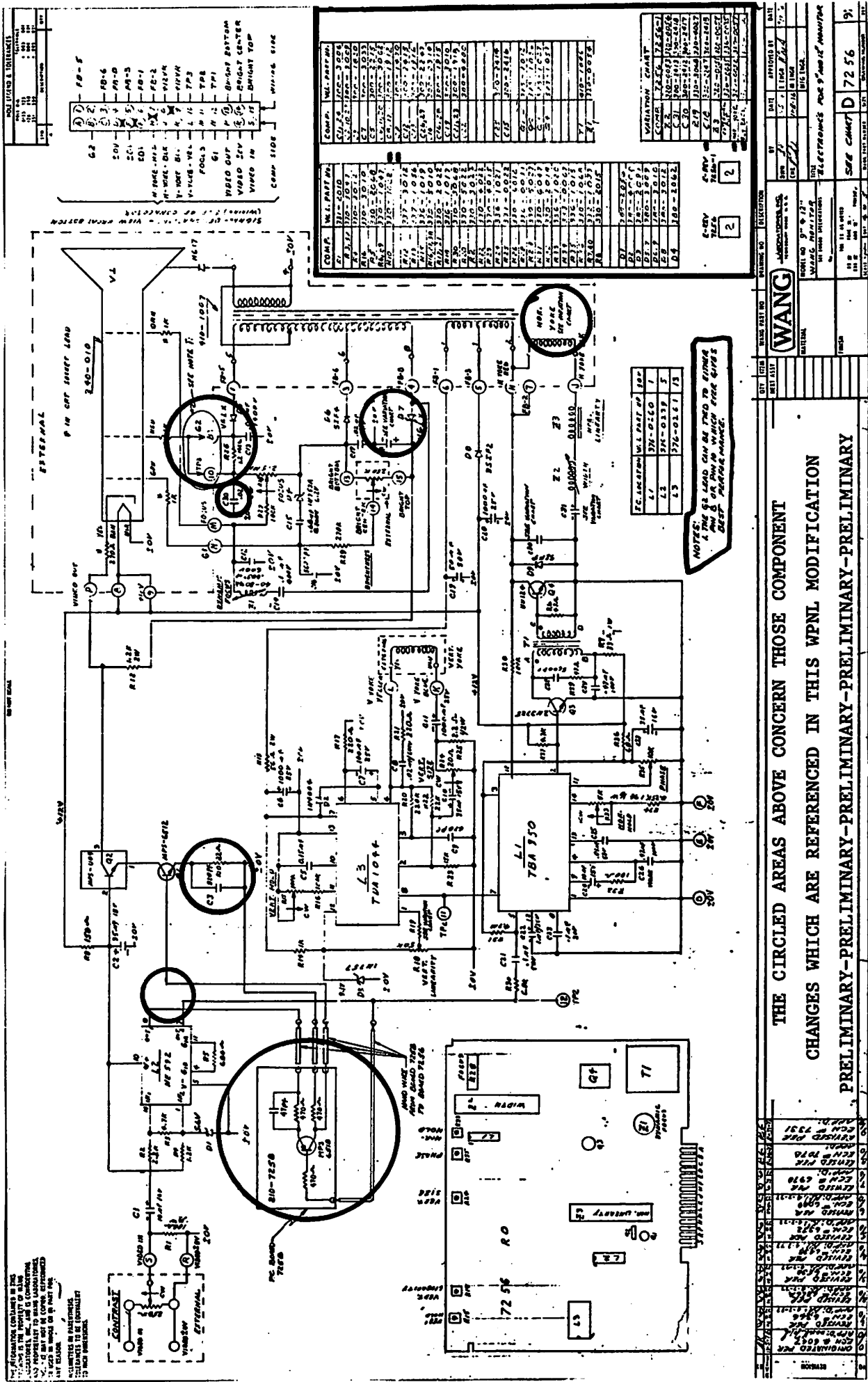


FIGURE 4. SCHEMATIC FOR 9 and 12 INCH MONITORS
(Blanking & Corrective Modifications)

EDITED BY CUSTOMER ENGINEERING DIVISION

2200 SYSTEM DIAGNOSTIC OPERATING BULLETIN

October 20, 1977

This Service Bulletin describes recent changes to all 2200 System diagnostic programs on cassette, diskette, and minidiskette. Prior to this Service Bulletin, many diagnostic programs were without part numbers, and operating procedures were scattered throughout several publications.

This Service Bulletin now provides a convenient collection of all available 2200 System Diagnostic programs and operating procedures. Additionally, all 2200 Diagnostic programs now have part numbers, so that reordering is easy.

Section I of this Service Bulletin is a list of diagnostic programs by product. The products are in numerical order, and each product section describes where the diagnostic program can be found (cassette, diskette and/or minidiskette). Many products have diagnostic programs on all three types of media.

Section II lists the diagnostic programs by part number, with a list of products for which those diagnostic programs can be used. Operating instructions are included.

Section II also indicates the latest diagnostic revisions. As each 701-XXXX number is updated or changed, a letter will be added to the part number. Each revision increases the letter designation. For instance, the first 2200 Peripheral Diskette was designated 701-2180.

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13-210A

The first REVISION changed this to 701-2180A, the second to 701-2180B, and so on. Section III provides these revision levels so that you may be sure you are using the most recent diagnostic program.

Section III is a Diagnostic Program Discrepancy form. Although every effort was made to ensure each diagnostic program was documented properly and can be used in the configuration described, there may be errors or incomplete operating instructions. Whenever you find a discrepancy, please fill out the attached form and send it to Customer Engineering Division, Attn: Computer Support Department, at the Home Office. This is the best way to update these programs to provide you with the best possible diagnostic tests.

SECTION I
DIAGNOSTIC PROGRAMS BY PRODUCT

1. 2200A CPU

Cassette 701-0379. Refer to section 2.1.

- 1) REWIND Cassette
- 2) Key LOAD, EXECUTE
- 3) Key RUN, EXECUTE
- 4) When instructions are displayed, enter the appropriate numbers.
- 5) Observe results.

2. 2200B CPU

Cassette 701-0379. Refer to section 2.1.

- 1) REWIND Cassette
- 2) Key LOAD, EXECUTE
- 3) Key RUN, EXECUTE
- 4) When instructions are displayed, enter the appropriate numbers.
- 5) Observe results.

3. 2200C CPU

Cassette 701-0379. Refer to section 2.1.

- 1) REWIND Cassette
- 2) Key LOAD, EXECUTE
- 3) Key RUN, EXECUTE
- 4) When instructions are displayed, enter the appropriate numbers.
- 5) Observe results.

4. 2200E CPU

Cassette 701-0379. Use 2200T program on this cassette. Refer to section 2.1.

- 1) REWIND Cassette
- 2) Key LOAD, EXECUTE

- 3) Key RUN, EXECUTE
- 4) When instructions are displayed, enter the appropriate numbers.
- 5) Observe results.

5. 2200F CPU

- a) Diskette 701-2261 for multiplexed disk systems. Refer to section 2.11.
 - 1) Insert diskette, Key LOAD DCF "START", EXECUTE.
 - 2) Key RUN, EXECUTE.
 - 3) When instructions are displayed, enter the appropriate numbers.
 - 4) Observe results.
- b) Cassette 701-0379 may be used if Cassette Interface 190-0713 (210-7068) is available (use 2200T program). Refer to section 2.1.
 - 1) REWIND Cassette
 - 2) Key LOAD, EXECUTE
 - 3) Key RUN, EXECUTE
 - 4) When instructions are displayed, enter the appropriate numbers.
 - 5) Observe results.

6. 2200S CPU

Cassette 701-0379. Refer to section 2.1.

- 1) REWIND Cassette
- 2) Key LOAD, EXECUTE
- 3) Key RUN, EXECUTE
- 4) When instructions are displayed, enter the appropriate numbers.
- 5) Observe results.

7. 2200T CPU

- a) Diskette 701-2261. Refer to section 2.11.
 - 1) Insert diskette, Key LOAD DCF "START", EXECUTE.
 - 2) Key RUN, EXECUTE.

- 3) When instructions are displayed, enter the appropriate numbers.
- 4) Observe results.
- b) Cassette 701-0379. Refer to section 2.1.
 - 1) REWIND Cassette
 - 2) Key LOAD, EXECUTE
 - 3) Key RUN, EXECUTE
 - 4) When instructions are displayed, enter the appropriate numbers.
 - 5) Observe results.

8. 2200VP CPU

- a) Machine microcode diagnostics, use diskette 701-2108X (current software release). Refer to 2200VP Maintenance Manual, Volume I.
- b) Machine microcode diagnostics, use minidiskette 701-8069X (current software release). Refer to 2200 VP Maintenance Manual, Volume I.
- c) BASIC-2 Language Diagnostic, use diskette 701-2261. Refer to section 2.11.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When instructions are displayed, enter the appropriate numbers.
 - 5) Observe results.
- d) Minidiskette 701-8080 for BASIC-2 Language Diagnostic. Refer to section 2.11.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.

9. 2200 PCS-II

Minidiskette 701-8000. Refer to section 2.12.

- 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
- 2) Key LOAD DCF "START", EXECUTE.
- 3) Key RUN, EXECUTE.
- 4) When menu is displayed, follow instructions.

10. 2201 Output Writer

a) Cassette 701-0419: Printers #2. Refer to section 2.2.

- 1) REWIND Cassette.
- 2) Key LOAD, EXECUTE.
- 3) Key RUN, EXECUTE.
- 4) When Menu is displayed, Key SF'01.

b) Diskette 701-2180: Peripherals. Refer to section 2.10.

- 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
- 2) Key LOAD DCF "START", EXECUTE.
- 3) Key RUN, EXECUTE.
- 4) When Menu is displayed, Key SF'01.
- 5) When next Menu is displayed, Key SF'01.

c) Minidiskette 701-8001: Peripherals. Refer to section 2.13.

- 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
- 2) Key LOAD DCF "START", EXECUTE.
- 3) Key RUN, EXECUTE.
- 4) When Menu is displayed, Key SF'01.
- 5) When next Menu is displayed, Key SF'01.

11. 2202 Plotting Output Writer

a) Cassette 701-0421: Plotters. Refer to section 2.4.

- 1) REWIND Cassette.
- 2) Key LOAD, EXECUTE.
- 3) Key RUN, EXECUTE.
- 4) When Menu is displayed, Key SF'01.

- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'02.
- c) Minidiskette 701-8001: Peripherals. Refer to section 2.13.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'02.

12. 2203 Paper Tape Reader

- a) Cassette 701-0422 I/O #2. Refer to section 2.5.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
 - 5) When next Menu is displayed, Key SF'01.

13. 2207 and 2207A RS-232-C Interfaces.

- a) Cassette 701-0424: TC. Refer to section 2.7.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01 or 02.

- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'02.
 - 5) When next Menu is displayed, Key SF'01 or 02.

14. 2209 9 Track Tape Drive

Diskette 701-2180: Peripherals. Refer to section 2.10.

- 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
- 2) Key LOAD DCF "START", EXECUTE.
- 3) Key RUN, EXECUTE.
- 4) When Menu is displayed, Key SF'03.
- 5) When next Menu is displayed, Key SF'02.

15. 2209A 1600 BPI Tape Drive

Not available at this time.

16. 2210 User Terminal (Keyboard, Video Display, Minidiskette)

- a) Keyboard - Test by inspection.
- b) Minidiskette and CRT - Use minidiskette 701-8000, disk and CRT programs. Refer to section 2.12.

17. 2212 Analog Flatbed Plotter

- a) Cassette 701-0421: Plotters. Refer to section 2.4.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'02.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.

- 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'03.
 - c) Minidiskette 701-8001: Peripherals. Refer to section 2.13.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'03.
18. 2214 Marked Sense Card Reader
- a) Cassette 701-0422: I/O #2. Refer to section 2.5.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'02.
19. 2215 Keyboard
Test by inspection.
20. 2216 Video Display
Test by inspection.
21. 2217/2218 Cassette Tape Drive
Test by LOADING and SAVING a cassette, then CLEAR, LOAD same cassette.
22. 2220 User Terminal (Keyboard, Video Display, Cassete Tape Drive)
Test all functions by inspection.
23. 2221 Matrix Printer (Centronics)
- a) Cassette 701-0420: Printer #1. Refer to section 2.3.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.

- 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'04.
24. 2221W Matrix Printer (Wang)
- a) Cassette 701-0420: Printer #1. Refer to section 2.3.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'05.
 - c) Minidiskette 701-8001: Peripherals. Refer to section 2.13.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'02.
 - 5) When next Menu is displayed, Key SF'01.
25. 2222 Keyboard
- Test by inspection.
26. 2223 Keyboard
- Test by inspection.

27. 2224 Multiplexer

- a) Cassette 701-0425: Disk. Refer to section 2.8.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, enter appropriate number for test.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
 - 5) When next Menu is displayed, Key SF'09, enter appropriate number for test.

28. 2226 User Terminal (Keyboard, Video Display)

Test by inspection.

29. 2227 Asynchronous TC

- a) Cassette 701-0424: TC. Refer to section 2.7.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'02.
 - 5) When next Menu is displayed, Key SF'03.

30. 2227B/OP 62 TC

- a) Cassette 701-0424: TC. Refer to section 2.7.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'04, 05 or 06.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'02.
 - 5) When next Menu is displayed, Key SF'05, 06, or 07.
- c) Minidiskette 701-8001: Peripherals. Refer to section 2.13.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'05.
 - 5) When next Menu is displayed, Key SF'01, 02 or 03.

31. 2228B/OP 62B Bisync TC

- a) Cassette 701-0424: TC. Refer to section 2.7.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'04, 05 or 06.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'02.
 - 5) When next Menu is displayed, Key SF'04, 05, 06 or 07.

- c) Minidiskette 701-8001: Peripherals. Refer to section 2.13.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'05.
 - 5) When next Menu is displayed, Key SF'01, 02 or 03.

32. 2230 Disk Systems

- a) Cassette 701-0425: Disk. Refer to section 2.8.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, enter 2, 3 or 4 for test.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
 - 5) When next Menu is displayed, Key SF'08.

33. 2230MXA/B Multiplexer

- a) Cassette 701-0425: Disk. Refer to section 2.8.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, enter 2, 3 or 4 for test.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'09.
 - 5) When next Menu is displayed, enter appropriate number for test.

34. 2231 Matrix Printer (Centronics)

- a) Cassette 701-0420: Printer #1. Refer to section 2.3.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'06.

35. 2231W Matrix Printer (Wang)

- a) Cassette 701-0420: Printer #1. Refer to section 2.3.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'04.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'07 or 08.
- c) Minidiskette 701-8001: Peripherals. Refer to section 2.13.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'02.
 - 5) When next Menu is displayed, Key SF'02 or 03.

36. 2232 Digital Flatbed Plotter

- a) Cassette 701-0421: Plotter. Refer to section 2.4.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'08.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'09.
- c) Minidiskette 701-8001: Peripherals. Refer to section 2.13.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'04.

37. 2234/34A Hopper-Feed Card Reader

- a) Cassette 701-0422: I/O #2. Refer to section 2.5.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03 or 04.

38. 2236 Interactive Terminal

Diskette 701-2180: Peripherals. Refer to section 2.10.

39. 2240 Dual Drive Memorex Disk System

- a) Cassette 701-0425: Disk Systems. Refer to section 2.8.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.

- 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, enter 7 or 8 for test.
 - b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
 - 5) When next Menu is displayed, Key SF'08, then enter 7 or 8 for test.
40. 2241 Thermal Head Printer
- a) Cassette 701-0420: Printer #1. Refer to section 2.3.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'05.
41. 2242 Single Drive Memorex Disk System and 2243 Triple Drive Memorex Disk System
- a) Cassette 701-0425: Disk Systems. Refer to section 2.8.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, enter 9 or 10 for test.
 - b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
 - 5) When next Menu is displayed, Key SF'08, then enter 9 or 10 for test.

42. 2244/44A Hopper-Feed Card Reader

- a) Cassette 701-0422: I/O #2. Refer to section 2.5.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03 or 04.

43. 2250 8-Bit Parallel I/O Interface

- a) Cassette 701-0423: I/O #1. Refer to section 2.6.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
 - 5) When next Menu is displayed, Key SF'03.
- c) Minidiskette 701-8001: Peripherals (OP 67). Refer to section 2.13.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'04.
 - 5) When next Menu is displayed, Key SF'01.

44. 2251 Matrix Printer

- a) Cassette 701-0419: Printer #2. Refer to section 2.2.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'05.

45. 2252A Scanning Input Interface

- a) Cassette 701-0423: I/O #1. Refer to section 2.6.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'02 or 03.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
 - 5) When next Menu is displayed, Key SF'04 or 05.

46. 2254 IEEE Bus Interface

- a) Cassette 701-0423: I/O #1. Refer to section 2.6.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'04.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
 - 5) When next Menu is displayed, Key SF'06.
- c) Minidiskette 701-8001: Peripherals (OP 65). Refer to section 2.13.
 - 1) Insert diskette. Key SELECT DISK XYZ, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
 - 5) When next Menu is displayed, Key SF'01.

47. 2260 10Mbyte and 2260-2 20Mbyte Disk Systems

- a) Cassette 701-0425: Disk Systems. Refer to section 2.8.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, enter 5 or 6 for test.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03..
 - 5) When next Menu is displayed, Key SF'08, then enter 5 or 6 for test.

48. 2261 Matrix Printer (Centronics)

- a) Cassette 701-0420: Printer #1. Refer to section 2.3.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'06.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'04.

49. 2261W Matrix Printer (Wang)

Not available at this time. Use 2221W Program.

50. 2262 Digitizer

Diskette 701-2180: Peripherals. Refer to section 2.10.

- 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.

- 2) Key LOAD DCF "START", EXECUTE.
- 3) Key RUN, EXECUTE.
- 4) When Menu is displayed, Key SF'03.
- 5) When next Menu is displayed, Key SF'07.

51. 2263 High Speed Line Printer

Not available at this time. Use 2221W Program.

52. 2270-1, 2270-2, 2270-3 Diskette Systems

- a) Cassette 701-0425: Disk Systems. Refer to section 2.8.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, enter 8, 9 or 10 for test.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
 - 5) When next Menu is displayed, Key SF'08, then enter 8, 9 or 10 for test.

53. 2271 Bidirectional Output Writer

- a) Cassette 701-0419: Printer #2. Refer to section 2.2.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'03.
- b) Diskette 701-2180: Peripherals. Use 2281 program.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'01.

- c) Minidiskette 701-8001: Peripherals. Use 2281 Program.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'02.
 - 5) When next Menu is displayed, Key SF'04.

54. 2272 Digital Drum Plotter

- a) Cassette 701-0421: Plotters. Refer to section 2.4.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'09 or 10.
- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'10 or 11.
- c) Minidiskette 701-8001: Peripherals. Refer to section 2.13.
 - 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'02.
 - 5) When next Menu is displayed, Key SF'05 or 06.

55. 2281 Daisy Wheel Output Writer

- a) Cassette 701-0419: Printer #2. Refer to section 2.2.
 - 1) REWIND Cassette.
 - 2) Key LOAD, EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'04.

- b) Diskette 701-2180: Peripherals. Refer to section 2.10.
- 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'01.
 - 5) When next Menu is displayed, Key SF'02.
- c) Minidiskette 701-8001: Peripherals. Refer to section 2.13.
- 1) Insert diskette. Key SELECT DISK XYY, EXECUTE, where X=3 or B, YY = device address of diskette.
 - 2) Key LOAD DCF "START", EXECUTE.
 - 3) Key RUN, EXECUTE.
 - 4) When Menu is displayed, Key SF'02.
 - 5) When next Menu is displayed, Key SF'04.

56. 2282 Graphics Terminal
Not available at this time.

57. OP61 - See 2201

58. OP62 - See 2227B

59. OP62B - See 2228B

60. OP65 - See 2254

61. OP67 - See 2250

SECTION II

DIAGNOSTIC PACKAGES

2.1 Cassette 701-0379: 2200 BASIC Diagnostic

1. CPU Diagnostics 2200A, 2200B, 2200C, 2200S, 2200T, 2200E, and 2200F.
2. Diagnostics tests all possible functions that can be performed by the CPU.
3. Operating Instructions:
 - a) Key LOAD, EXECUTE.
 - b) Key RUN, EXECUTE.
 - c) Enter corresponding # for desired CPU:
 - 1) 1 for 2200A.
 - 2) 2 for 2200S.
 - 3) 3 for 2200B.
 - 4) 4 for 2200C.
 - 5) 5 for 2200T.
4. As the diagnostic is running, it will display the function performed and if any errors were encountered during this operation. Program will continue even if errors were encountered. At the end of the test, an error list will be generated. The diagnostic program is in a loop, so when the error list is generated, the diagnostic will automatically start over, to terminate key reset.

2.2 Cassette 701-0419: Printer #1 Diagnostics. 2201, 2251, 2271, and 2281

1. Tests on all printers checks mechanical movements of carriage return, line feed, and print head movement. Also checks logic that shows if the right solenoids are being strobed for the corresponding characters.

2. Operating Instructions:

- a) Key LOAD, EXECUTE.
- b) Key RUN, EXECUTE.
- c) Key desired special function key for appropriate printer/printers.
 - 1) SF'1 for 2201.
 - 2) SF'2 for 2251.
 - 3) SF'3 for 2271.
 - 4) SF'4 for 2281.
- d) Enter # of times test is to be executed.
- e) Key EXECUTE.

3. The only error analysis check is a visual one. The printer will print out all characters associated with that printer and will perform all mechanical movements required of that printer during operation (i.e., carriage return, line feed, tab). When a mechanical test is performed, a message will be printed acknowledging that the operation has been done.

A visual check has to be performed on the numerics and alphanumerics to see if the solenoids and print wire heads are all working properly.

2.3 Cassette 701-0420: Printer #2 Diagnostics. 2221, 2221W, 2231, 2231W, 2241, and 2261

SF'01 for 2221	SF'04 for 2231W
SF'02 for 2221W	SF'05 for 2241
SF'03 for 2231	SF'06 for 2261

Refer to 2.2 for operating instructions.

2.4 Cassette 701-0421: Plotter Diagnostics. 2202, 2212, 2232, and 2272

- 1. All electrical signals and mechanical movement of the arms, pens, and carriage of the plotters are performed.

2. Operating Instructions:
 - a) Key LOAD, EXECUTE.
 - b) Key RUN, EXECUTE.
 - c) Key desired special function key for appropriate diagnostic.
 - 1) SF'1 for 2202.
 - 2) SF'2 for 2212.
 - 3) SF'8 for 2232.
 - 4) SF'9 for 2272-1.
 - 5) SF'10 for 2272-2.
3. As the plotter goes through the test, if a circle is to be drawn, a message on the screen will say a circle is being drawn and the only check there is, is a visual check that a circle is being drawn, etc. Some plotters will have special function keys of various plots to be drawn which can be selected.

2.5 Cassette 701-0422: I/O #1 Diagnostics. 2203, 2234/44, 2234A/44A, and 2214

1. All diagnostics tests check each product thoroughly, doing operations that are necessary for the operation of the product. All mechanical movement and electrical signals are tested to their fullest extent.
2. Operating Instructions:
 - a) Key LOAD, EXECUTE.
 - b) Key RUN, EXECUTE.
 - c) Key desired special function key for appropriate product.
 - 1) SF'1 for 2203.
 - 2) SF'2 for 2214.
 - 3) SF'3 for 2234/44.
 - 4) SF'4 for 2234A/44A.
3. As errors are encountered in the test, the test will immediately stop and an error message will display indicating the problem with the product.

2.6 Cassette 701-0423 I/O #2 Diagnostics 2250, 2252, 2252A, and 2254

- a) Key LOAD, EXECUTE.
- b) Key RUN, EXECUTE.
- c) Key desired special function key for appropriate product:
 - 1) SF'01 for 2250
 - 2) SF'02 for 2252
 - 3) SF'03 for 2252A
 - 4) SF'04 for 2254

2.7 Cassette 701-0424: TC Diagnostics. 2207, 2207 with teletype, 2227, 8K 2227B/28B, 16K 2227B/28B, and 27B/28B Teletype Emulator

- 1. Diagnostics test all communication from the controllers to and from the CPUs.
- 2. Operating Instructions:
 - a) Key LOAD, EXECUTE.
 - b) Key RUN, EXECUTE.
 - c) Key desired special function key for desired diagnostic.
 - 1) SF'1 for 2207.
 - 2) SF'2 for 2207 with TTY.
 - 3) SF'3 for 2227.
 - 4) SF'4 for 8K 2227B/28B.
 - 5) SF'5 for 16K 2227B/28B.
 - 6) SF'6 for 2227B/28B TTY emulator.
- 3. Any errors that occur will immediately stop the diagnostic and display the error.

2.8 Cassette 701-0425: Disk System Diagnostics. 2210, 2230-1, 2230-2 or 2260B, 2230-3 or 2260B, 2260, 2260-2, 2240-1, 2270-2 or 2240-2, 2270-1 or 2242, 2270-3 or 2243, 2230MXA/B, and 2224 disk multiplexers

1. All disk diagnostics perform all functions associated with disks (i.e., Read, Write, Verify, Copy, Move) and does these operations many times to test the operation of the disk. All mechanical movement of heads and other mechanical parts are also exhaustively checked.
2. Operating Instructions.
 - a) Key LOAD, EXECUTE.
 - b) Key RUN, EXECUTE.
 - c) Key desired special function key for appropriate diagnostic.
3. As each operation is being checked, a record is kept and if there are any errors on certain operations it will be displayed. The associated hardware for the operation will then have to be checked.

2.9 Diskette 701-2046C: 2200 Hardware Diagnostic (Part of WCS System auto-enclosures)

Tests:

1. Memory
 - a) 4K-32K in increments of 4K.
2. CPU 2200T.
3. Printers (2201, 2221, 2221W, 2231, and 2261).
4. Disks (2230-1,-2,-3, 2260).

2.10 701-2180B

2.10.1 OUTPUT WRITERS/PRINTERS/PLOTTERS:

1. 2201, 2202, 2212, 2221/61, 2221W, and 2231, 2231W 12 pitch, 2231W 10 pitch, 2232, 2272-1, 2272-2, and 2281.
 - a) Insert diskette into drive. Key Select disk XYY.
 - b) Key LOAD DCF "START".

- c) When menu is displayed, Key SF'1.
 - d) When new menu is displayed, key corresponding SF Key of device to be tested.
 - e) Verify operation of device.
2. TC: 2207, 2207 w/TTY, 2227, 2228, 8K 2227B/28/28B, 16K 2227B/28/28B, and 27B/28/28B emulator.
- a) When menu is displayed, Key SF'2.
 - b) When new menu is displayed, Key corresponding SF Key for device to be tested.
3. I/O Devices: 2203, 2209, 2250, 2252, 2252A, 2254, 2262 Digitizer.
- a) When menu is displayed, Key SF'3.
 - b) When new menu is displayed, Key corresponding SF Key for device to be tested.
4. Disk Systems: 2210, 2260-2, 2230-1 or 2260B 1/8, 2230-2 or 2260B 1/4, 2230-3 or 2260B 1/2, 2260, 2240-1 2270-2 or 2240-2, 2270-1 or 2242, 2270-3 or 2243, and 2224 and 2230 MXA/B Disk Multiplexer.
- a) When menu is displayed, Key SF'3.
 - b) When new menu is displayed, Key SF'8.
 - c) When new menu is displayed, Key corresponding SF Key for device to be tested.

2.11 701-2261: 2200C, 2200T, 2200VP CPU Diagnostic Diskette

Tests 2200C, 2200T, 2200VP BASIC Language.

- a) Key LOAD DCF "START".
- b) Key RUN, EXECUTE.
- c) Enter appropriate number as necessary.

2.12 701-8000: PCS II Minidiskette

Tests PCS II CPU, Minidiskette, CRT, Memory.

- a) Key LOAD DCF "START", EXECUTE.
- b) Key RUN, EXECUTE.

c) Enter appropriate number for desired tests.

- 1) #1 for CPU.
- 2) #2 for Memory.
- 3) 3 for Disk.
- 4) 4 for CRT (80 x 24).
- 5) 5 for CRT (64 x 16).

2.13 701-8001A: PCSII Peripherals Minidiskette

Tests OP62, OP62B, OP65, OP67, 2201, 2202, 2212, 2232, 2221W, 2231W, 2272, 2281.

- a) Key LOAD DCF "START", EXECUTE.
- b) Key RUN, EXECUTE.
- c) When menu is displayed, key desired special function key for test:
 - 1) SF'2 for printer and plotters.
 - 2) SF'3 for OP65.
 - 3) SF'4 for OP67.
 - 4) SF'5 for OP62 & 62B.

2.14 701-8080: 2200VP BASIC Diagnostic Minidiskette

Tests 2200VP BASIC Language.

- a) Key LOAD RUN, EXECUTE.

SECTION III
DIAGNOSTIC PROGRAM DISCREPANCY REPORT

ORIGINATOR: _____ DATE: _____

OFFICE: _____

DIAGNOSTIC PART NUMBER: (INCLUDE REVISION LEVEL LETTER DESIGNATION)

Is there a documentation error? ____yes ____no

If so, please indicate the correction required (or attach the
corrected instructions). _____

Is there a programming error? ____yes ____no

If so, please describe the problem. _____

Does the program always fail? ____yes ____no

Which program? _____

Does the program never fail? ____yes ____no

Which program? _____

Any other problem? _____

Describe the system configuration, to include CPU model and memory
size: _____

Service Newsletter

NO. 82

GENERAL #19

TD-24 SOLENOID GAP ADJUSTMENT TOOL

REFERENCE DOCUMENTATION: 1200/1222 MAINTENANCE MANUAL VOLUME 2

DRAWING #D5996-94 (3 SHEETS)

NOTE:

Before attempting alignment of the Pinch Roller assembly, ensure that the Roller and Capstan Shaft are clean and in good condition.

PROCEED AS FOLLOWS (Ref: Figure, next page):

1. Loosen the lock nut on the Solenoid Arm.
2. Place Gap Gauge D-22-393 (WL #726-9606) over Left (forward) Solenoid Plunger, between Plunger washers and Solenoid Housing; use the .030 in. (.76 mm) section of the Gap Gauge.
3. The next step is to electrically actuate the Pinch Roller Solenoid and the Head-In Solenoid; however, to actuate these solenoids, it is necessary to block the light at the End-of-Tape Sensors. Place an opaque material over the lamp housings. The Forward Solenoid washers and Solenoid Housing should now bottom against the .030 in. (.76 mm) section of the Gap Gauge.
4. Adjust screw 'A' until Pinch Roller *rolls lightly* on the Capstan Shaft. Note that clockwise adjustment of 'A' moves the Roller closer to the Capstan; counterclockwise adjustment of 'A' moves the Roller away from the Capstan.
5. Push the Gap Gauge in further, until the Solenoid Plunger is bottomed against the .055 in. (1.39 mm) section of the Gauge. At this point, the Pinch Roller should *not* touch the Capstan

WANG

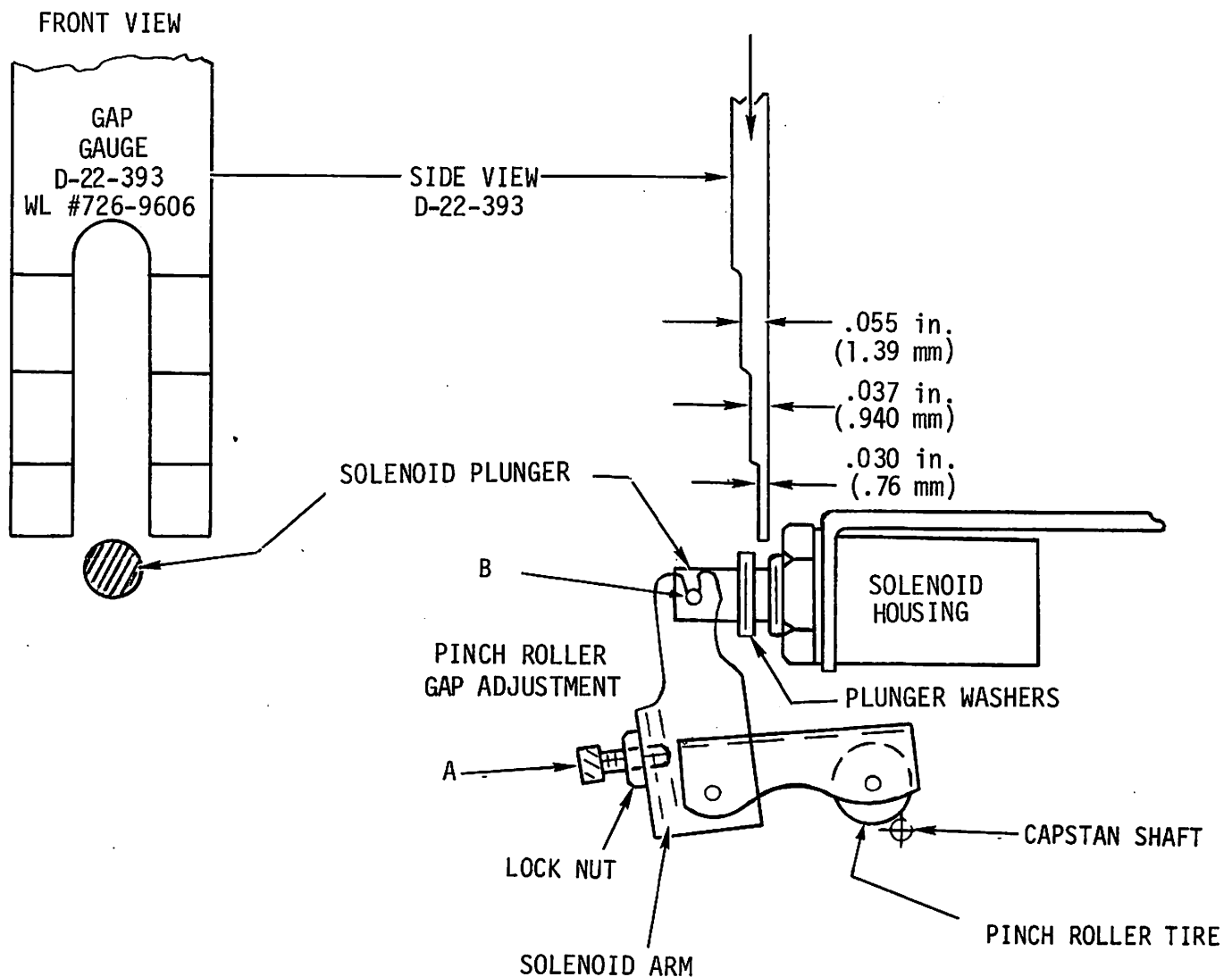
LABORATORIES, INC

836 NORTH STREET, TEWKSBURY, MASSACHUSETTS 01876, TEL (617) 851 4111, TWX 710 343 6769, TELEX 94 7421

Printed in U.S.A.
12 766

Shaft. If the Pinch Roller is still touching the Capstan Shaft, repeat steps 4 and 5 until proper conditions are satisfied.

6. Retighten the lock nut while holding screw 'A' stationary when proper adjustment has been achieved.
7. Adjust Right (reverse) Solenoid per steps 2 and 3, using the .037 in. (.940 mm) section of the Gap Gauge instead of the .030 in. (.76 mm) section. Repeat steps 4-6 for the Right (reverse) Solenoid.



Service Newsletter

NO. 88A

2200/2600 #16A

December 14, 1977

CHECKOUT PROCEDURE FOR 2200 SYSTEM HOG MODE

Service Newsletter #88 described the implementation of \$GIO 'Hog Mode' in 2200 Systems.

Service Newsletter #88 failed to describe the method of testing the \$GIO 'Hog Mode' and certain software user manuals describe the test incorrectly. For example, the ISS-3 User Manual says the statement \$GIO/310(4480,A\$) will 'hang-up' if the \$GIO ECNs are not implemented. This is incorrect; the colon will return whether the \$GIO ECNs are implemented or not.

To test the \$GIO 'Hog Mode', use the following procedure:

- 1) Key RESET on all CPUs.
- 2) Enter \$GIO/3X0(4480,A\$), EXECUTE.
- 3) Enter LIST DCF, EXECUTE from another CPU. This CPU should 'hang-up'. Key RESET.
- 4) Perform step 3 on the other CPUs, one at a time, until all CPUs are tested.
- 5) Enter \$GIO/3X0(4400,A\$), EXECUTE, on the CPU step 2 was performed on. This releases 'Hog Mode' and all CPUs should have access to the disk.
- 6) Perform steps 2-5 on all other CPUs, one at a time, until all have been tested.

If any CPU can access the disk while one CPU supposedly has the disk 'hogged' by the \$GIO statement, then that CPU's \$GIO 'Hog Mode' does NOT work. No CPU should have access to the disk until the 'hogging' CPU is either RESET or \$GIO/3X0(4400,A\$) is executed.

Also note that once \$GIO 'Hog' is set, it CANNOT be reset by a disk operation to the normal disk address. It MUST be reset by one of the above conditions.

Always be sure to check the 'Hog Mode' (both \$GIO and standard 'Hog Mode') on ANY multiplexed system, ESPECIALLY those using KFAM or ISS.

WANG

LABORATORIES, INC.

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Printed in U.S.A.
13-266

Service Newsletter

NO. 89

2200/2600 #17

MAY 19, 1977

With the increasing number of 2200 CPUs and their variations now in the field, the method of identifying these CPUs is becoming increasingly difficult. This Newsletter will help you identify the type of CPU by looking at the Model Number printed on the Model Label. The Model Label can be found on the left side of PCS/WS products and on the bottom of 2200 S/T/VP CPUs.

In the future, the WL Part Number will be used on the Model Label. This information is also included in this Newsletter. Additionally, new model numbers are being assigned to systems which are sold to the government under GSA contract. These government systems are called DDS (Digital Data Acquisition System) and are nothing more than 2200 Computer Systems sold under another name.

WANG

LABORATORIES, INC.

ONE INDUSTRIAL AVENUE, LOWELL, MASSACHUSETTS 01851, TEL. (617) 851-4111, TWX 710 343-6769, TELEX 94-7421

Printed in U.S.
13-

PORTABLE COMPUTING SYSTEMS

MODEL NUMBER	PART NUMBER	DESCRIPTION
2200 E2	177-22E2	2200E; 8K MEMORY; 64 x 16 CRT
2200 E4	177-22E4	2200E; 16K MEMORY; 64 x 16 CRT
2200 E6	177-22E6	2200E; 24K MEMORY; 64 x 16 CRT
2200 E8	177-22E8	2200E; 32K MEMORY; 64 x 16 CRT
PCSII-21A	177-2EE2-1A	PCSII; 8K MEMORY; 64 x 16 CRT; SINGLE DRIVE
PCSII-21B	177-2EE2-1B	PCSII; 8K MEMORY; 80 x 24 CRT; SINGLE DRIVE
PCSII-22A	177-2EE2-2A	PCSII; 8K MEMORY; 64 x 16 CRT; DUAL DRIVE
PCSII-22B	177-2EE2-2B	PCSII; 8K MEMORY; 80 x 24 CRT; DUAL DRIVE
PCSII-41A	177-2EE4-1A	PCSII; 16K MEMORY; 64 x 16 CRT; SINGLE DRIVE
PCSII-41B	177-2EE4-1B	PCSII; 16K MEMORY; 80 x 24 CRT; SINGLE DRIVE
PCSII-42A	177-2EE4-2A	PCSII; 16K MEMORY; 64 x 16 CRT; DUAL DRIVE
PCSII-42B	177-2EE4-2B	PCSII; 16K MEMORY; 80 x 24 CRT; DUAL DRIVE
PCSII-61A	177-2EE6-1A	PCSII; 24K MEMORY; 64 x 16 CRT; SINGLE DRIVE
PCSII-61B	177-2EE6-1B	PCSII; 24K MEMORY; 80 x 24 CRT; SINGLE DRIVE
PCSII-62A	177-2EE6-2A	PCSII; 24K MEMORY; 64 x 16 CRT; DUAL DRIVE
PCSII-62B	177-2EE6-2B	PCSII; 24K MEMORY; 80 x 24 CRT; DUAL DRIVE
PCSII-81A	177-2EE8-1A	PCSII; 32K MEMORY; 64 x 16 CRT; SINGLE DRIVE
PCSII-81B	177-2EE8-1B	PCSII; 32K MEMORY; 80 x 24 CRT; SINGLE DRIVE
PCSII-82A	177-2EE8-2A	PCSII; 32K MEMORY; 64 x 16 CRT; DUAL DRIVE
PCSII-82B	177-2EE8-2B	PCSII; 32K MEMORY; 80 x 24 CRT; DUAL DRIVE

DISK WORK STATIONS

MODEL NUMBER	PART NUMBER	DESCRIPTION
2200 F2A	177-22F2A	2200F; 8K MEMORY; 64 x 16 CRT
2200 F2B	177-22F2B	2200F; 8K MEMORY; 80 x 24 CRT
2200 F4A	177-22F4A	2200F; 16K MEMORY; 64 x 16 CRT
2200 F4B	177-22F4B	2200F; 16K MEMORY; 80 x 24 CRT
2200 F6A	177-22F6A	2200F; 24K MEMORY; 64 x 16 CRT
2200 F6B	177-22F6B	2200F; 24K MEMORY; 80 x 24 CRT
2200 F8A	177-22F8A	2200F; 32K MEMORY; 64 x 16 CRT
2200 F8B	177-22F8B	2200F; 32K MEMORY; 80 x 24 CRT

PCS/WS OPTION/CONVERSIONS

MODEL NUMBER	PART NUMBER	DESCRIPTION
OP60	177-22EF-60	KBD CLICKER/AUDIO ALARM/BNC CONN.
OP61	177-22EF-61	OUTPUT WRITER
OP62	177-22EF-62	TC
OP62B	177-22EF-62B	BISYNC TC
OP65	177-22EF-65	IEEE INTERFACE (2254 EQUIV.)
OP66	177-22EF-66	80 x 24 DISPLAY
OP67	177-22EF-67	8 BIT PARALLEL I/O (2250 EQUIV.)

2200 CPU

MODEL NUMBER	PART NUMBER	DESCRIPTION
2200-31	177-2200-31	2200S-1 CPU; 3 I/O; 4K MEMORY
2200-32	177-2200-32	2200S-2 CPU; 3 I/O; 8K MEMORY
2200-33	177-2200-33	2200S-3 CPU; 3 I/O; 12K MEMORY
2200-34	177-2200-34	2200S-4 CPU; 3 I/O; 16K MEMORY
2200-35	177-2200-35	2200S-5 CPU; 3 I/O; 20K MEMORY
2200-36	177-2200-36	2200S-6 CPU; 3 I/O; 24K MEMORY
2200-37	177-2200-37	2200S-7 CPU; 3 I/O; 28K MEMORY
2200-38	177-2200-38	2200S-8 CPU; 3 I/O; 32K MEMORY
2200-41	177-2200-41	2200T-1 CPU; 3 I/O; 4K MEMORY
2200-42	177-2200-42	2200T-2 CPU; 3 I/O; 8K MEMORY
2200-43	177-2200-43	2200T-3 CPU; 3 I/O; 12K MEMORY
2200-44	177-2200-44	2200T-4 CPU; 3 I/O; 16K MEMORY
2200-45	177-2200-45	2200T-5 CPU; 3 I/O; 20K MEMORY
2200-46	177-2200-46	2200T-6 CPU; 3 I/O; 24K MEMORY
2200-47	177-2200-47	2200T-7 CPU; 3 I/O; 28K MEMORY
2200-48	177-2200-48	2200T-8 CPU; 3 I/O; 32K MEMORY
2200-61	177-2200-61	2200S-1 CPU; 6 I/O; 4K MEMORY
2200-62	177-2200-62	2200S-2 CPU; 6 I/O; 8K MEMORY
2200-63	177-2200-63	2200S-3 CPU; 6 I/O; 12K MEMORY
2200-64	177-2200-64	2200S-4 CPU; 6 I/O; 16K MEMORY
2200-65	177-2200-65	2200S-5 CPU; 6 I/O; 20K MEMORY
2200-66	177-2200-66	2200S-6 CPU; 6 I/O; 24K MEMORY
2200-67	177-2200-67	2200S-7 CPU; 6 I/O; 28K MEMORY
2200-68	177-2200-68	2200S-8 CPU; 6 I/O; 32K MEMORY
2200-71	177-2200-71	2200T-1 CPU; 6 I/O; 4K MEMORY
2200-72	177-2200-72	2200T-2 CPU; 6 I/O; 8K MEMORY
2200-73	177-2200-73	2200T-3 CPU; 6 I/O; 12K MEMORY
2200-74	177-2200-74	2200T-4 CPU; 6 I/O; 16K MEMORY
2200-75	177-2200-75	2200T-5 CPU; 6 I/O; 20K MEMORY
2200-76	177-2200-76	2200T-6 CPU; 6 I/O; 24K MEMORY
2200-77	177-2200-77	2200T-7 CPU; 6 I/O; 28K MEMORY
2200-78	177-2200-78	2200T-8 CPU; 6 I/O; 32K MEMORY
2200-81	177-2200-81	2200S-1 CPU; 9 I/O; 4K MEMORY
2200-82	177-2200-82	2200S-2 CPU; 9 I/O; 8K MEMORY
2200-83	177-2200-83	2200S-3 CPU; 9 I/O; 12K MEMORY
2200-84	177-2200-84	2200S-4 CPU; 9 I/O; 16K MEMORY
2200-85	177-2200-85	2200S-5 CPU; 9 I/O; 20K MEMORY
2200-86	177-2200-86	2200S-6 CPU; 9 I/O; 24K MEMORY
2200-87	177-2200-87	2200S-7 CPU; 9 I/O; 28K MEMORY
2200-88	177-2200-88	2200S-8 CPU; 9 I/O; 32K MEMORY
2200-91	177-2200-91	2200T-1 CPU; 9 I/O; 4K MEMORY
2200-92	177-2200-92	2200T-2 CPU; 9 I/O; 8K MEMORY
2200-93	177-2200-93	2200T-3 CPU; 9 I/O; 12K MEMORY
2200-94	177-2200-94	2200T-4 CPU; 9 I/O; 16K MEMORY
2200-95	177-2200-95	2200T-5 CPU; 9 I/O; 20K MEMORY
2200-96	177-2200-96	2200T-6 CPU; 9 I/O; 24K MEMORY
2200-97	177-2200-97	2200T-7 CPU; 9 I/O; 28K MEMORY
2200-98	177-2200-98	2200T-8 CPU; 9 I/O; 32K MEMORY
2200VP-4	177-3000	2200VP CPU; 9 I/O; 16K MEMORY
2200VP-8	177-3002	2200VP CPU; 9 I/O; 32K MEMORY
2200VP-12	177-3004	2200VP CPU; 9 I/O; 48K MEMORY
2200VP-16	177-3006	2200VP CPU; 9 I/O; 64K MEMORY

2200 CPU OPTIONS/CONVERSIONS

MODEL NUMBER	PART NUMBER	DESCRIPTION
OP20	177-2200-20	3 ADDITIONAL I/O SLOTS
OP20A	177-2200-2A	6 ADDITIONAL I/O SLOTS
OP21	177-2200-21	MATRIX ROM FOR 2200S
OP22	177-2200-22	ADVANCED PROGRAMMING ROM FOR 2200S
OP23	177-2200-23	GENERAL I/O ROM FOR 2200S
OP24	177-2200-24	DISK/SORT ROM FOR 2200S
	177-2200-4K	4K STEP MEMORY OPTION
	177-2200-8J	8K STEP MEMORY OPTION (6707-1)
	177-2200-8K	8K STEP MEMORY OPTION (6717)
	177-2200-16	16K STEP MEMORY OPTION
	177-3008	16K STEP MEMORY UPGRADE FOR 2200VP
	177-3010	32K STEP MEMORY UPGRADE FOR 2200VP

2200 SYSTEMS SOLD UNDER GSA PURCHASE AGREEMENTS

WANG DDS-5 SERIES

MODEL NUMBER	DESCRIPTION
DDS-5	Portable Computing System with 8K Bytes, 9-inch CRT (64 x 16 Upper/Lowercase Display), Single Cassette and Keyboard (2200 E2) 110 CPS Printer, 40 Character Line (2251) <i>The above Sub-System must include one of the following interfaces:</i>
DDS-5A	RS-232-C Interface (OP62)
DDS-5B	8 Bit Parallel I/O Interface (OP67)
DDS-5C	IEEE-488-1975 (ASCII BUS) Interface (OP65)

WANG DDS-10 SERIES

MODEL NUMBER	DESCRIPTION
DDS-10	CPU with 8K Memory and 3 I/O Slots (2200S-2) 9" Console CRT/Keyboard, Tape Cassette (2220) 110 CPS Printer, 40 Character Line (2251) <i>The above Sub-System must include one of the following interfaces:</i>
DDS-10A	RS-232-C Interface (2227B)
DDS-10B	8 Bit Parallel I/O Interface (2250)
DDS-10C	IEEE-488-1975 (ASCII BUS) Interface (2254)
DDS-10D	10 Digit BCD Input Interface (2252A)
DDS-10E	4 Bit Binary Input Device designed to interface to a Baird Atomic 35U-3 Emission Spectrometer (9011)
DDS-10F	Bisynchronous Communications Controller (2228B)

WANG DDS-15 SERIES

MODEL NUMBER	DESCRIPTION
DDS-15	CPU with 8K, 6 I/O Slots, 12" CRT and Keyboard, Single Removable Diskette Drive with 262,144 bytes of storage capacity, and console desk (WCS-20) 110 CPS Printer, 40 Character Line (2251) <i>The above Sub-System must include one of the following interfaces:</i>
DDS-15A	RS-232-C Interface (2227B)
DDS-15B	8 Bit Parallel I/O Interface (2250)
DDS-15C	IEEE-488-1975 (ASCII BUS) Interface (2254)
DDS-15D	10 Digit BCD Input Interface (2252A)
DDS-15E	4 Bit Binary Input Device designed to interface to a Baird Atomic 35U-3 Emission Spectrometer (9011)
DDS-15F	Bisynchronous Communications Controller (2228B)

WANG DDS-20 SERIES

MODEL NUMBER	DESCRIPTION
DDS-20	CPU with 8K, 6 I/O Slots, 12" CRT and Keyboard, Single Removable Diskette Drive with 262,144 bytes of storage capacity, and console desk (WCS-20) 2nd Diskette Drive including another 262,144 bytes of storage capacity 110 CPS Printer, 40 Character Line (2251) <i>The above Sub-System must include one of the following interfaces:</i>
DDS-20A	RS-232-C Interface (2227B)
DDS-20B	8 Bit Parallel I/O Interface (2250)
DDS-20C	IEEE-488-1975 (ASCII BUS) Interface (2254)
DDS-20D	10 Digit BCD Input Interface (2252A)
DDS-20E	4 Bit Binary Input Device designed to interface to a Baird Atomic 35U-3 Emission Spectrometer (9011)
DDS-20F	Bisynchronous Communications Controller (2228B)

WANG DDS-25 SERIES

MODEL NUMBER	DESCRIPTION
DDS-25	CPU with 8K Memory and 3 I/O Slots with Expanded Capacity to 6 I/O Slots (2200T6) 9" Console CRT, Keyboard, Tape Cassette (2220) 110 CPS Printer, 40 Character Line (2251) Fixed Removable Disk Drive with 5 million bytes of storage capacity (2260B 1/2) <i>The above Sub-System must include one of the following interfaces:</i>
DDS-25A	RS-232-C Interface (2227B)
DDS-25B	8 Bit Parallel I/O Interface (2250)
DDS-25C	IEEE-488-1975 (ASCII BUS) Interface (2254)
DDS-25D	10 Digit BCD Input Interface (2252A)
DDS-25E	4 Bit Binary Input Device designed to interface to a Baird Atomic 35U-3 Emission Spectrometer (9011)
DDS-25F	Bisynchronous Communications Controller (2228B)

WANG DDS-30 SERIES

MODEL NUMBER	DESCRIPTION
DDS-30	<p>CPU with 16K, 6 I/O Slots, 12" CRT and Keyboard, Single Removable Diskette Drive with 262,144 bytes of storage capacity and console desk. Fixed Removable Disk Drive with 5 million bytes of storage capacity (WCS-30 less 2221W)</p> <p>110 CPS Printer, 40 Character Line (2251)</p> <p><i>The above Sub-System must include one of the following interfaces:</i></p>
DDS-30A	RS-232-C Interface (2227B)
DDS-30B	8 Bit Parallel I/O Interface (2250)
DDS-30C	IEEE-488-1975 (ASCII BUS) Interface (2254)
DDS-30D	10 Digit BCD Input Interface (2252A)
DDS-30E	4 Bit Binary Input Device designed to interface to a Baird Atomic 35U-3 Emission Spectrometer (9011)
DDS-30F	Bisynchronous Communications Controller (2228B)

WANG DDS-40 SERIES

MODEL NUMBER	DESCRIPTION
DDS-40	<p>CPU with 16K and 9 I/O (2200VP-4)</p> <p>12" Console CRT, and Keyboard (2226)</p> <p>Single Removable Diskette Drive with 262,144 bytes of storage capacity (2270)</p> <p>Fixed Removable Disk Drive with 5 million bytes of storage capacity (2260B 1/2)</p> <p>Wang Line Printer (200 CPS/132 Columns) (2221W)</p> <p>Console Desk</p> <p><i>The above Sub-System must include one of the following interfaces:</i></p>
DDS-40A	RS-232-C Interface (2227B)
DDS-40B	8 Bit Parallel I/O Interface (2250)
DDS-40C	IEEE-488-1975 (ASCII BUS) Interface (2254)
DDS-40D	10 Digit BCD Input Interface (2252A)
DDS-40E	4 Bit Binary Input Device designed to interface to a Baird Atomic 35U-3 Emission Spectrometer (9011)
DDS-40F	Bisynchronous Communications Controller (2228B)

Service Newsletter

NO. 59

2200 #12
2200 S/T ROM ICs

August 23, 1976

The ROMs used in the various 2200 S/T CPUs have been changed several times in the past few months. To clarify the various ROM loadings and functions, they are summarized below:

1. There are several ROM boards presently in use in the field. They are:

6725 - 2200S only, no options
6735A or 7025A - 2200S, no options or option 21
6735B or 7025B - 2200S with option 22
6735C or 7025C - 2200S with option 23
6735D or 7025D - 2200S with option 24, or 2200T
6735E or 7025E - 2200S with option 24 or 2200T with or without option 33 (can be used in 2200T without option 33 but must be installed in unit with option 33). Option 33 is the 80 x 24 CRT as described in SN #37, 2200 #9.

2. The ROM loading for the various software levels of the boards has caused some confusion. Refer to the following chart for the 7025 and 7052 loading variations:

	2200S	W/OP22	W/OP23	2200T	2200T	
	210-7025-A	210-7025-B	210-7025-C	210-7025-D	210-7025-E	
LOC	210-6735-A	210-6735-B	210-6735-C	210-6735-D	210-6735-E	LOC FOR 210-7052
L1						
L2	377-0294	377-0294	377-0294	377-0294	377-0332	L92 377-0332
L3	377-0235	377-0235	377-0235	377-0302	377-0329	L107 377-0329
L4		377-0297	377-0297	377-0297	377-0297	L44 377-0297
L5				377-0307	377-0335	L4 377-0335
L6						
L7						
L8				377-0303	377-0303	L1 377-0303
L9			377-0284	377-0284	377-0284	L41 377-0284
L10	377-0231	377-0231	377-0231	377-0298	377-0298	L104 377-0298
L11	377-0236	377-0236	377-0236	377-0236	377-0236	L89 377-0236
L12	377-0241	377-0241	377-0241	377-0241	377-0241	L66 377-0241
L13	377-0242	377-0242	377-0242	377-0242	377-0242	L68 377-0242
L14	377-0237	377-0237	377-0237	377-0237	377-0237	L91 377-0237
L15	377-0232	377-0232	377-0232	377-0299	377-0299	L106 377-0299
L16			377-0285	377-0285	377-0285	L43 377-0285
L17				377-0304	377-0304	L3 377-0304
L18						
L19						
L20				377-0306	377-0334	L2 377-0334
L21		377-0296	377-0296	377-0296	377-0296	L42 377-0296
L22	377-0234	377-0234	377-0234	377-0301	377-0328	L105 377-0328
L23	377-0293	377-0293	377-0293	377-0293	377-0331	L90 377-0331
L24						
L25	377-0243	377-0243	377-0243	377-0243	377-0243	L70 377-0243
L26	377-0292	377-0292	377-0292	377-0292	377-0330	L93 377-0330
L27	377-0233	377-0233	377-0233	377-0300	377-0327	L108 377-0327
L28		377-0295	377-0295	377-0295	377-0295	L45 377-0295
L29				377-0305	377-0333	L5 377-0333
L30						

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Printed in U.S.A
13-26

3. Finally, all 2200E, 2200F and 2200T ROMs are now software version E. The 7025E can be used in any 2200T but MUST be used in a 2200T with option 33 (80 x 24 CRT). That is, a 7025D can be replaced by a 7025E, but a 7025E cannot be replaced by a 7025D. Also, effective with 2200T serial number EM3690 and up, all 2200T CPUs have 7025E ROMs installed.
4. If the software version of a ROM board is changed, always be sure to change the identification label on that board.



**IMMEDIATE
SERVICE
NOTICE**

NO. 149

DATE: 8/24/77

CATEGORY

2200/2600 #10

SUBJECT

7256 WANG VIDEO DISPLAY ELECTRONICS

A capacitor originally specified for the 7256 board has been found not to meet specifications. The capacitor is C31, WLI #300-2413, manufactured by Electrocube. The capacitor has a vendor part number of 230B1C405K, ratings of 4 uf, 200 vdc, and measures approximately 1.3 inches long by .5 inches diameter. This part is no longer stocked, and if the same Wang part number is ordered, a 4 uf, 100V capacitor will be sent, with dimension of 2 inches long and 1 inch diameter.

If you have 7256 boards with the Electrocube capacitor, replace them with the new, larger one.

WANG

LABORATORIES, INC.

1 INDUSTRIAL AVENUE, LOWELL, MASSACHUSETTS 01851. TEL. (617) 851-4111. TWX 710 343-6769. TELEX 94-7421

Printed in U.S.A.
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10-7630

2200 MAINTENANCE MANUAL

CPU - ROM, ARITH/LOGIC CIRCUITRY, SYS. CONTRA LOGIC, I/O INTERFACE, 4K 3.4K BYTE RAM^{min}
PS - EITHER IN CPU (2200 S,T) OR SEPARATE (2200 PS FOR A,B,C CPU CLASS)
USER TERMINAL - 2215, 2222/3 KYBRD w/ 12" DIAGONAL SCRN (2216/26) 9" (2220) &
MODEL TD 24 DIGITAL TAPE CASSETTE DRIVE (2217/14)

CONSOLES - 1. 2216/17 CONSOLE - 12" VIDEO DISPLAY w/ TD-24 CASSETTE DRIVE
KYBRD SEPARATE (2215/22/23)

2. 2220 CONSOLE - 9" V. DISPLAY w/ TD 24 CASSETTE DR. & UPPER/LOWER CASE KYWORD KYBRD ^{LINE} 2223

3. 2226 CONSOLE - 12" V. DISPLAY w/ UPPER/LOWER CASE KYWORD KYBRD ^{LINE} 2223

* SERIAL TAG - REAR PANEL USUALLY - MODEL #, MEM SIZE (IF APPLICABLE), I/O SWTS, H₂, V, W

MEMORY SIZES - B-T³ = 4K-32K | MULTIPLY NO. AFT B X 4 TO GET MEM. SIZE IN K
50°-90°

2200 SPECS. - 115 or 230V, 50/60 H₂, TEMP. 65°-70° RECOMMENDED, HUMIDITY 20-80%
40-60% RH RECOMMENDED

2200 A,B,C - 4K-32K IN 4 OR 8K INCREMENTS 6-11 I/O SLOTS

2200 S,T - 8,12,16,24, or 32K 3,6, or 9 I/O SLOTS

INSTALLATION

H₂ TEMP - HIGH H₂ COMPONENT FAILURE RATE, CAUSE WARPING & DISTORTION OF DISK STORAGE

AIR COND. - MUST BE ON SEPARATE POWER LINE OR CAN CAUSE SYS ERR WHEN IN

* ~~IN COLD WEATHER HUMIDITY MAY DROP TO 10%~~ CARPET SHOULD BE NON-STATIC

IF ELEC CONDUCTIVE MAT. USED OVER CARPET TO STOP STATIC MAKE SURE CONN. TO EARTH

SYS. SHOULD HAVE OWN POWER LINE IF POSSIBLE, MUST BE NOISE FREE

V SHOULD NOT VARY MORE THAN $\pm 10\%$ IF DUES SHOULD USE CONSTANT V. TRANS.

* IF NOISE ON LINE CANNOT BE FOUND, EMI FILTER w/ CUT OFF FREQ. NEAR 10K H₂ SHOULD BE INSTALLED

POWER LINE INSTALLED IN STEEL CONDUIT & CONDUIT CONN. PROPERLY TO JCT. BOX

DISK DEVICE ADDRESS

3 DIGIT BOX # 1ST DIGIT - DEVICE TYPE

SET ON I/O CONTROLLER BRO. w/ SWITCH

- 1ST HEX DIGIT - 0 - CONSOLE INPUT/OUTPUT DEVICES & 2209 9 TRK. MAG TAPE UNIT
- 1 - TAPE CASSETTE DRIVES
 - 2 - w/LP AUTO LINE FEEDS AFT. CARRIAGE RETURN; DIGITIZERS & SOME TELECOM. SYS.
 - 3 - DISK DRIVES
 - 4 - PLOTTERS; w/TELETYPE PT UNIT TO TURN PAPER TAPE UNIT; SUPPRESSES CARRIAGE RETURN/LINE FEED, FORMAT SPACES, OR NULL CHAR.
 - 5 - 2214 CARD READER
 - 6 - 2234A/44A STACK CARD READERS

3 DIGIT DEVICE ADDR. PRINTED ON MOUNTING BRACKET OF CONTROLLER UIC. BRD

2 TYPES OF DEVICE ADDR. SW. ON CONTROL BRD. - 5 BANK & 8 BANK ROCKER TYPES

ONLY LAST 2 DIGITS SET INTO SWITCHES, 1ST DIGIT 10th CLASS OF DEVICE

SET SWITCHES 5-8, HIGH ORDER, = BINARY VALUE OF 2ND DIGIT

" 1-4, LOW ORDER, = BINARY VALUE OF 3RD DIGIT

RAM SIZE SELECTIONS - 2200A/B/C - 6309pc 2200S/T - 6709pc

6309 - 2 TYPES - 1. w/ 5 BANK ROCKER SW. 2. JUMPER WIRES IN PLACE OF SW.

6309 w/ JUMP WIRES

1 BIT	- L8 PINS	ON = 5V
2 BIT	- L8 PINS	
4 BIT	- L7 PINS	
8 BIT	- L7 PINS	OFF = 0V

4K=14, 8K=12, 12K=10, ..., 28K=2, 32K=0

6309/6709 SW. SETTINGS 4K=0, 8K=4, 12K=2, 16K=6, 20K=1, 24K=5, 28K=3, 32K=7

INSTALLATION 1. CHECK FOR DAMAGES, CHECK ALL PC BRDS SEATED PROPERLY, VERIFY SW. SETTINGS & VOLTAGES

2. CONN. PERIPH. TO CPU I/O CONTROLLER, MAKE SURE CORRECT CONTROLLER

3. PLUG MAIN POWER FROM CPC INTO 2200A/B/C PS

4. w/ ALL POWER ON SW/ OFF PLUG IN ALL AC CORDS

5. SW. CPU ON & GET READY ON VDISPLAY

6. RUN APPROPRIATE DIAGNOSTICS TO CHECK EA UNIT IN SYS., (CPU, OPTIONS, PERIPH)

& MANUAL KEYED OPERATION

2200 OPTIONS MUST BE INSTALLED BY WANG CF

2200 MAINTENANCE MANUAL

SELECT

STMT - USED TO SELECT I/O DEVICES (IMMEDIATE OR PROGRAMMABLE USE)

REQUIRES PRINT, LIST OR CO & DEVICE TYPE CODE BE CONTAINED IN STMT

LINE LENGTH CAN ALSO BE SPECIFIED

DEVICE TYPE DETERMINES WHICH INTERNAL 2200 I/O ROUTINE USED TO CONTROL

DEVICE TYPE 0 - USED W/ DEVICES WHICH DON'T AUTO EXECUTE LINE FEED AFT. CARR. RETURN

~~W/ THIS DEVICE TYPE 0, CR/LF, LP WHICH NORMALLY SINGLE SPACE FROM DEVICES SPACE~~

DEVICE TYPE 2 - USED W/ DEVICES WHICH AUTO EXECUTE LINE FEED AFT CARR. RETURN

W/ 2200 WON'T SUPPLY LINE FEED COMMAND AFT. SYS. GENERATED CARR. RET.

~~W/ THIS DEVICE TYPE 2, CR/LF, LP WHICH NORMALLY SINGLE SPACE FROM DEVICES SPACE~~

DEVICE TYPE 4 - SUPPRESSES AUTO. CARR. RET. BY 2200 AFT. PRINT, PRINTUSING, OR HEXPRINT STMT

PRIMARY ADDR. OF EA. DEVICE ARE PRESET ON I/O CONTROLS BY WANG

W/ NO PUNCT. FOLLOWING

EXAMPLES: SELECT PRINT 215 - SELECTS LP W/ DEVICE CODE OF 15

& USES LP INSTEAD OF CRT SCREEN TO OUTPUT ANYTHING RESULTING

FROM PRINT, PRINTUSING OR HEXPRINT

SELECT LIST 215 - SELECT LP W/ DEVICE CODE OF 15 &

HAS LP PRINT PROGRAM LISTING

SELECT CO 215 - SELECTS LP W/ DEVICE CODE OF 15 & LP

GETS ~~THE~~ CONSOLE OUTPUT. THIS INCLUDES ALL SYS DISPLAYS, OUTPUT

FROM STOP & END STMTS, DATA KEYED IN, OUTPUTS FROM IMMEDIATE

MODE, TRACE, & ERROR MESSAGES

LINE LENGTH - 255 CHAR MAX. TO SET LINE LENGTH TO DESIRED LENGTH INSERT DESIRED

LENGTH IN () FOLLOWING DEVICE TYPE CODE

MASTER INIT OR CLEAR SETS LINE LENGTH TO 64

* LINE COUNT = 0 ~~CAUSES LINE FEED COMMAND TO RETURN~~

OR ; AT END OF PRINT STMT CAUSES CARRIAGE RETURN

3. SYS. RESET 4. CLEAR S.M.T

* OUTPUT WHICH IS SINGLE SPACED W/ TYPE 2 WILL BE DOUBLE SPACED W/ TYPE 0.
BECAUSE BOTH CPU & LP EXECUTE LF FOLLOWING SYS. CR

6. CARR. RET. OUTPUT WHEN PRINT, PRINTUSNG, or HEXPRINT EXECUTED
HEX(00) DOES NOT RESET LINE COUNT

* W/ DEVICE ADDR. ^{PRINT} 215(80) & WHEN EXACTLY 80 CHAR. ARE IN LINE LP
EXECUTES ^{FOR BUFFER FULL} LINE FEED AFT. 80TH CHAR. ~~LINE FEED~~ & THE CPU
WILL ISSUE A LINE FEED & ~~LINE FEED~~ FOR ~~LINE FEED~~ CAUSING
DOUBLE SPACE ON LP'S W/ 80 CHAR BUFFERS
LINE COUNT = LINE LENGTH

IN LINES W/ LESS CHAR. THAN DESIGNATED & NO PUNCT. CPU CAUSES CARR. RET.
CRT CONSOLE OUTPUT - 1. ALL ERROR, STOP, & END PROC MESSAGES
DISPLAYED ALONG W/ IMMEDIATE MODE PRINT REGARDLESS OF DEVICE SELECTED FOR PRINT

2. WHEN PRINTABLE CHAR. PRINTED, CRT CURSOR MOVED 1 POSITION TO RIGHT
& LINE CHAR. COUNTER INCREMENTED. IF NON-PRINTABLE (HEX00-0F)
CURSOR WONT MOVE & LINE CHAR COUNTER NOT INCREMENTED

3. IN ZONED FORMAT PRINT ELEMENT ALWAYS PRINTED IN ITS ENTIRETY AS
IF 17 CHAR. TO BE PRINTED ZONE 4 WILL BE MOVED TO NEXT ZONE 1

* SOME DEVICES LINE FEED AFTER CARRIAGE RETURN SOME DON'T

MOST CARRIAGE RETURNS INITIATED BY SYS., BUT SOME PRINTERS
WILL CARRIAGE RETURN & LINE FEED WHEN BUFFER IS FILLED (EITHER 80 OR 132 ^{CHAR. BUFFER})

DEVICE TYPE 0 - USED TO LINE FEED FOR DEVICES WHICH DON'T AUTO LF AFT CARR. RETURN

DEVICE TYPE 2 - SUPPRESSES LINE FEED ^{FROM SYS.} USED W/ DEVICE THAT AUTO LF AFT CR

DEVICE TYPE 4 - SUPPRESSES SYS CR AFT PRT, PRTUSG, & HXPRT W/ NO TRAILING PUNCT.

2200 SYSTEM USUALLY ISSUES CARRIAGE RETURN. BUT SOME LP WHEN THEIR
BUFFER IS FILLED WILL ISSUE THEIR OWN CR (BUFFERS 80 OR 132 CHAR)

* SHOULD NOT USE LINE LENGTH > CARRIAGE LENGTH OF PRINTER OR ^{OTHER} PRT

2200 - GENERATES OWN CR WHEN LINE EXCEEDS SPECIFIED LENGTH & NO CR IN PROG.

COUNTS CHAR^{SENT} AS PRINTED ON DEVICE, WHEN LINE COUNT = LINE LENGTH BEFORE

LINE COMPLETE, CR DONE, LINE COUNT SET TO 0 & REST OF CHAR. PRINTED / ON NEXT

2200 MAINTENANCE MANUAL

DEVICE TYPE 4 - SUPPRESSES CR SO LP'S WILL ONLY CR WHEN THEIR BUFFER IS FILLED w/ PRT, PRTUG, & HXPRT w/ NO TRAILING PUNCT.

* IF LINE LENGTH IS LESS THAN BUFFER SIZE, NEXT DATA PRINTED WILL BE CONTINUED ON SAME LINE w/ DT 4

SELECT SW. ON LP PUTS LP ON-LINE, PUTTING LITS OUT AGAIN LP BUFFER

DEVICE TYPE 0 - WILL DOUBLE SPACE ON MOST LP'S BECAUSE?

AFTER EA. TEXT LINE 2200 ISSUES CR/LF^{1 SPACE} AS WELL AS WHEN

LINE COUNT = LINE LENGTH

THIS CR ALSO MAKE LP LF^{2 SPACE} ON LP'S w/ AUTO LF AFT CR^{CAUSING DOUBLE SPACE}

DEVICE TYPE 4 - SUPPRESSES CR WHEN LINE COUNT = LINE^{SELECTED} LENGTH BUT NOT CR ON BUFFER FULL

YOU MAY PUT ANY COMBO OF PRINT, LIST, OR CO IN SELECT STATE AS LONG AS ~~WE~~ HAVE ^{ONLY 1} ~~DEVICES~~ ~~ADDRESS~~ FOR SAME PARAMETER ON 80 COLUMN LP

IF SELECT PRINT 215 + LENGTH OF LINE TO PRINT - 80, THEN PRINT 64 CHAR, SINGLE SPACE CR/LF, PRINT 16 REMAINING CHAR., DOUBLE SPACE 2LF & PRINT AGAIN

IF SELECT ~~LIST~~ 215 + LENGTH OF LINE TO PRINT - 80, PRINT 64 CHAR, SINGLE SPACE CR/LF, PRINT 16 REMAINING CHAR, SINGLE SPACE & PRINT NEXT LINE

2200 ADJUSTMENTS

ADJUSTMENTS, ESP. ELEC. ADJ., ONLY PERFORMED IF PARAMETER OUT OF TOLERANCE

CPU - VOLTAGE ADJ. - 1. REMOVE 2200 PS COVER FOR A, B, OR C

2. REMOVE CPU COVER & REMOVE ALL CPU PLUG IN CIRC. BRDS. EXCEPT L567pc OF 2200S4

3. PLACE L567 ON EXTENDER CARD
4. TURN PS & CPU POWER ON.
5. CHECK VOLTAGES & ADJUST WHERE NECESSARY. PUT GND LEAD TO $\pm 0V$

* NEVER ALLOW $-15VR_{PS}$ TO EXCEED $-17vdc$ OR DAMAGE CPU

PIN1, $+5VR_{M}^{EM} \pm .10vdc$	R17	15mvp-p
PIN2, $+5VRL^{OG} \pm .20vdc$	R2	15mvp-p
PIN12, $+8VR(8.5 \text{ to } 8.8vdc)$	R13	20mvp-p
PIN15, $+12VR^{+0.6} \pm .2vdc$	R30	15mvp-p
PIN52, $-12VR^{+0.2} \pm .6vdc$	R34	35mvp-p
PIN62, $-15VR^{+0.2} \pm .3vdc$	R40	25mvp-p

6. W/ SCOPE & X1 PROBE MEASURE RIPPLE & IF EXCEEDS LIMITS TROUBLESHOOT CPU

7. IF INCREASE RAM CAPACITY, ADD OPTIONS WHICH NEED MORE ROM IC'S, ADD XTRA I/O CAPABILITIES TO CPU, ALL VOLTAGES SHOULD BE RECHECKED

8. VOLTAGES ON EA. PERIPH. SHOULD ALSO BE CHECKED IF IT HAS SELF-CONTAINED PS

9. REPLACE COILS

2215 KEYBOARD - 6348 CIRC. BRD. w/ I/O CABLE IN METAL CHASSIS
6367 I/O CONTROLLER BOARD FOR 2215

2222 KEYBOARD - 6330 CIRC. BRD. w/ I/O CABLE 6367 I/O CONTROLLER BRD

2223 KEYBOARD - 6443 CIRC. BRD w/ I/O CABLE ALSO USED AS 2220 CONSOLE KYBD.
6367 I/O CONTROL BRD USED w/ A, B, OR C 6562 w/ S, T SYS. (2220)

2216 VIDEO DISPLAY - 8X10 1/2 CRT w/ CRT ELEC. PLUG-IN CIRC. BRD. (MODEL # V13A) ^{XM351 CHASSIS}

2 TYPE 2216 VD A. 1 BNC CONNECTOR, 115/220V LINE SW. BOTH ON REAR PANEL & 75 Ω R ON CIRC. BRD. ^{PLUG IN}

b. 2 BNC CONN., IN & OUTPUT ON REAR PANEL 75 Ω R FOR TERMINATION ON REAR PANEL ^{SW.}

115/220 VAC LINE SW. LOCATED ON SIDE OF CHASSIS

2ND VERSION MAY BE CASCADED BY CONN. MALE TO MALE COAXIAL CABLE FROM OUT BNC (FROM REAR LINE SW. TO LEFT) OF 1ST UNIT TO INPUT BNC OF NEXT. ONLY LAST UNIT SHOULD HAVE 75 Ω R SW. IN FOR TERM.

2200 MAINTENANCE MANUAL

2220 VIDEO DISPLAY - 5½" X 7½" CRT ON XM227 CHASSIS w/ CRT elec. BDD. V41A

COAXIAL CABLE w/ BNC CONN. USED BTWN I/O BDD & DISPLAY

6312 PLUS 6313 PIGGYBACK CONFIGURATION CIRC. BDDs. FOR 60Hz FOR I/O CONTROLLER
FOR 50Hz 6350 USED INSTEAD OF 6313 w/ 6312

KYBRD SAME AS 2223 w/ EITHER 6367(A,B, or C) OR 6562(SORT) I/O CONTROLLER

* FOR OPTIONAL UPPER & LOWER CHAR. SET, 6529 PIGGYBACK CIRC. ATTACHED TO 6312(60Hz) OR 6350(50Hz)

2217 CASSETTE DRIVE - A TD 24(60Hz) OR A TD 24-1(50Hz), INTERFACE

CIRC. BDDs, 6175, L558 & L559 & ELEC. SUBASSEMBLY CHASSIS, 6324 MOTOR

BOARD FOR L558 & L559, w/ SELF CONTAINED P.S.

USES 6316(A,B, or C) OR 6562(SORT) I/O CONTROLLER

SUPER PATCH BOARDS - 6327-1st REVISION PATCHBOARD, NOW OBSOLETE

6527- 1st SUPERPATCH, SUPERCEDES 6327

6547- LATEST A,B, or C SUPERPATCH, ELIMINATES MANY ^{INTERMITTENT} SOFTWARE & DISK PROBS. OF 6527

* 6547 MUST BE USED IN 2200 C & WILL BE USED FOR A & B

LEAVE 6527 IN EXISTING SYS. WHERE MEETS REQUIREMENTS OF SYS.

SUFFIX ID. OF SOFTWARE (ROM/PROM) CIRC. BOARDS

A- 2200 A CPU B- 2200 B CPU C- 2200 C CPU

X- SOFTWARE EXTENSION FOR 6325 B or C, PKGD ON SEPARATE PCBs 6325-BX or CX

M- MATRIX OPTION (OPT 1) FOR 2200 B/C G- GENERAL I/O (OPT 2) FOR B or C

E- EDIT (OPT 3) FOR A,B,C, S. SORT- SORT OPTION (OPT 5) FOR B or C


K- KATAKANA; JAPANESE (EXCLUSIVE w/ EDIT)

* Numbers IN PC BOARD UPDATE INDICATE SOFTWARE UPDATE

2200 S/T ROM BOARDS - 6725, 12K MAX, PHASED OUT BY 6735, 24K

~~6725- ONLY BE USED IN 2200 S or SE UNITS w/OUT SOFTWARE VARIATIONS~~

ALL WILL HAVE 6735/7025 ROM BOARDS.

6735 - HAS PROBLEMS IN MICROCODE IF HAS SOFTWARE OPTION 8 3 CHIPS 
L23 - 377-0238 TO 377-0243
MUST BE CHECKED & CHANGED: L26-377-0238 TO 377-0292, L2-377-0239 TO 377-0294

2200T SAME AS 2200C w/ OPT. 1, 2, & 5

6735 - CONTAINS IC's FOR OPT. 24 + 5 XTRA IC's FOR DISK CAPABILITY

ROM OPTIONS - OPT. 1, 21 - MATRIX ROM OPT 2, 23 - GENERAL I/O & OPT 22

OPT. 3 - EDIT ROM OPT. 5 - SORT/COMMERCIAL MATRIX ROM OPT. 24 - Disk ROM & OPT 2


OPT. 22 - ADVANCED PROGRAMMABLE & OPT. 21 JAPANESE OPT. - KATAKANA ROM

TO FIND ROM & SUPERPATCH BOARDS REQUIRED - CHART Pg. 9-5 2200 Maint.

* GENERAL GUIDELINE ON TO USE 6527 OR 6547 SUPERPATCH

6547 REQUIRED IN DISK SYS. & w/ SYS. w/ INTERMITTENT ~~PROB~~ ^{SOFTWARE} PROB.

6547-A1/A1E/B4/B4E/B6K REPLACE 6527-A1/A1E/B2/B2E/B3K & B5K RESPECTIVELY

* BEFORE INSTALLING 6547 OR 6527 SUPERPATCH 2200 A/B/OC OPTION B 

3 BOARD MUST BE CHECKED FOR PROPER 'ELEC. LEVEL': L558 - LEVEL 3

6311R1 - LEVEL 4

6316 - LEVEL 1

6527 & 6547 - MAY BE PLUGGED INTO ANY ROM BOARD SLOT ON 6322, 6522, OR 6222

* AFT. INSTALLING UPDATED ROM OR SUPERPATCH - MIGHT NEED TO RE-RECORD CUSTOMER

TAPES DUE TO CHANGE IN DATA-RESAVE FUNCT.

TO DETERMINE IF SHOULD RE-RECORD TAPES, LOAD TAPES INTO SYS. & VERIFY

IF ERROR 43 NOTED WHICH BLOCKS CAUSED, & RECONSTRUCT TAPES BY FOLLOWING


A. REQUEST 2217 FROM HOME OFFICE B. INSERT THIS 2217 (ADDR HEX 0B) IN I/O SLOT

C. LOAD 1 BLOCK OF ERRING TAPES IN SYS. w/ OLD 2217 CHECKING FOR ERROR

D. RECORD BLOCK ON NEW 2217 & WHEN BAD BLOCK FOUND, MANUALLY REENTER UNIT 2217

F. REPEAT UNTIL ALL TAPES CORRECTED

FOR OPT. 23 6708 MUST HAVE 377-0283 OR IF NONE 377-0312 WHICH DISABLES LIFT

MODEL # - GIVES TYPE A, B, C, S, RT & AMT OF MEM. 1-10 

2200 HARDWARE

INNER HARDWARE LEVEL SUBASSEMBLIES - ARITHMETIC LOGIC UNIT, DATA MEM., SEVERAL REGISTERS, & I/O BUSES

MACHINE LANGUAGE - BINARY LANGUAGE OF '1's & '0's - CONTROLS CPU

MICROCODE USED TO CONTROL CPU, CONSISTS OF MICROINSTRUCTIONS

OPERATOR CONTROL OUTER COMPUTER w/ BASIC INSTRUCT.

BASIC INTERPRETER - TRANSLATES BASIC LANGUAGE TO MICROINSTRUCTIONS

TRANSLATES 1 BASIC INSTRUCT. AT A TIME

EXECUTES MICROINSTRUCT. AT ONCE

TRANSLATES NEXT BASIC INSTRUCT. OR STATE.

*INTERPRETER DIFFERENT FROM COMPILERS & ASSEMBLERS

TRANSLATOR PROGRAM FOR 2200 PERMANENTLY STORED IN INSTRUCTION ROM

INSTRUCTION ROM - CONTAINS ALL MACH. LANG. INSTRUCT. NECESSARY

TO CONTROL CPU

BASIC LANGUAGE PROGRAM - SOFTWARE

TRANSLATOR PROGRAM - SOMETIMES CALLED FIRMWARE

TRANSLATOR PROGRAM - WRITTEN IN SETS OF ROUTINES, CALLED MICROROUTINE,

1 ROUTINE FOR EACH BASIC STATE

MICROINSTRUCTIONS - DONE SEQUENTIALLY BUT MAY BRANCH IF CERTAIN CONDITIONS MET

SIZE OF TRANSLATOR PRG. HELD DOWN BY DIFFERENT MICROROUTINES USING SAME SUBROUTINE

MICROINSTRUCT - CONTROL FLOW OF DATA & TYPE OF FUNCT. ALU TO PERFORM

ALU - REQUIRES 2 DATA WORD INPUTS ON A & B BUSES, & 1 RESULTANT

DATAWORD OUTPUT ON C BUS TO PERFORM FUNCT. SELECTED BY MICROINSTRUCT

OVER

REGISTERS

STATUS REG - 4 4bit REG. STATUS REG 1 - SETS RAM/ROM SELECTION, INPUT DEVICE INHIBIT, & SENSES SPEC. FUNCT. KEYS & ARITH. CARRY OPERATIONS

STATUS REG. 2 - SET TO INDICATE PHASE & PROCESSING MODE

STATUS REG. 3 - SETS MEM. ADDR. MODE, SENSES HALT/STEP, I/O DEVICE BUSY & OTHER I/O OPER.

STATUS REG. 4 - SET DURING I/O OPER.

PROGRAM CONTROL REG. - 16 BIT REG. INDIRECTLY HOLDS ADDR. OF DATA WORDS & TYPE R/W OPER WORKS w/ PC SOURCE SELECTOR WHICH ALLOWS IT TO BE SELECTED OUTPUT - DATA MEM. ADDR. REG. FOR ADDR. FOR DATA MEMORY

AUXILIARY PC REG. - 16 REG. TO TEMP. SAVE & RESTORE CONTENTS OF PC REG. WORKS w/ PROGRAM COUNTER WHICH HAS DATA SENT FROM PC REG TO AUX REG.

DATA MEMORY ADDR. REG. - RECEIVES PC REG. DATA & DEVELOPS 11 DMA BITS, MEM. SELECT (WRITE ENABLE ADDRESSES DATA WORDS (IN 8 BIT ROM) & (BRING R/W INTO RAM) PROVIDES DATA SELECTION FOR C DATA MEM. READ REG. REC. RAM C.W. ADDR. FROM REFRESH COUNTER MICRO INSTRUCT.

FILE REGISTER - 8 4bit REG. USED AS GENERAL PURPOSE W ADDR BITS R_2-R_0 R ADDR. BITS R_4-R_0 & R_{15}

INSTRUCTION COUNTER REG. - 16 BIT REG. HOLDS ADDR. OF CURRENT MICROINSTRUCT & INCREMENTS w/ MACH CLK.

SUBROUTINE STACK REG. - 16 16bit REG. HOLD CONTENTS OF IC REG DURING SUBROUTINE BR. INSTRUCT. CIRCULAR & MAY HOLD 16 BR. ADDR. ADDR. BY SSR ADDR. COUNTER

RECURSIVE SUBROUTING - OVERFLOWS SSR REG, SO PUT IN MEM & CALLED CALLED SUBROUTINE STACK

K I/O REG. - REC. & SEND DATA TO & FROM I/O DEVICES

KH REG. - 4 HI ORDER BITS KL - 4 LO ORDER BITS

C DATA MEMORY READ REGISTER - RECEIVES DATA FROM MOS MEM OR 8 BIT ROM

CH - REC'V 4 HI ORDER BITS CL - REC 4 LO ORDER BITS

CH & CL TOGETHER CONTAIN 8 BIT DATAWORD

2200 HARDWARE

MEMORY - 2 PARTS

- ① MOS Memory (RAM) - STORES DATA & PROGRAMS, ~~DATA & PROGRAMS~~
- ② 8 Bit ROM - MATH CONSTANTS, TEXT ATOMS, TIMING CONSTANTS, & CONSOLE DEVICE INFO
- ADDR. IN RAM OR ROM DERIVED FROM PC REG. BY DMA REG.

2 MODES OF RAM DATA MANIPULATION, SET BY STATUS REG 3-3

- ① Horiz. Mode - R/W 2 4bit DATAWORDS AT SAME RAM ADDR. SEQUENTIALLY
- ② Vert Mode - R/W 2 4bit DATA WORDS BY PAGE

4K BYTE MEM - 16 2048 x 1 BIT RAMs $MEM \div = 4$ BLOCKS OF 4K

ONLY 4 BITS WRITTEN IN MEM AT ONCE 2 CYC. FOR 8 BIT WORD

→ 4 BITS WRITTEN 1 BLOCK 4 RAMs 2nd 4 BITS WRITTEN IN ANOTHER BLOCK 4 RAMs

DATA MEM. ADDR DOESN'T CHANGE, WTEN SIGNAL CHANGES

READ FROM MEM. 8 BITS AT TIME INTO ²C DATA MEM. READ REG.

INSTRUCTION ROM - UP TO 64K OF 20 BIT WORDS MAKING UP BASIC INTERPRETER

SUPERPATCH - USED w/ INSTRUCT ROM TO CORRECT MICROINSTRUCT. WRITTEN INCORRECTLY

ARITHMETIC LOGIC UNIT - DOES ARITH/LOGIC FUNCT.

MICRO INSTRUCTION DECODER - DECODES CONTROL MEM. INSTRUCT. & DETERMINES IF REG INSTRUCT,

MINI INSTRUCT, OR BRANCH INSTRUCT.

MINI INSTRUCTION DECODE - DECODES MINI INSTRUCT. AS REG. TRANSFERS & EXCHANGES, SUBROUT.

RETURN & I/O CONTROL INSTRUCT.

SYS Timing - 10 MHz OSCILLATOR & 4 SHIFT REG. & MACHINE CYCLE COUNTER & DECODER

SHIFT REG. OUTPUT GATED GIVING 16 CLOCK TIMES, 100 NANO SEC APART

SYS. CLK GEN ONCE EVERY 16 CLOCK TIMES, 1.6 μ SEC

MACH. CYC. COUNTER & DECODER - INTERRUPTS CPU MACH CYC. TO REFRESH DATA MEM.

REG. CLK DECODER - ENABLES CLOCKS FOR PC, STATUS, & K REG. / MICROINSTRUCT.

B BUS MULTIPLEXER / SELECTOR - PROVIDES B BUS INPUT FROM 4 STATUS, K, & PC REG.

Bus SELECT - PROVIDES ALU w/ 8 WORD INPUT FROM FILE, C/C, R₆, OR ROM BITS R₇-R₄
ADDR. FOR A BUS FROM ROM R₇-R₄

I/O STRUCTURE

8 BIT PARALLEL I/O DATA PATH VIA K REG.

8 BIT ADDR. FOR DEVICE FROM K REG. LOADED IN AB LATCH BY CIO_{INSTRUCT} & R₇

I/O STROBE GENERATOR - TELLS WHEN TO IN OR OUT DATA w/ 3 STROBES

INSTRUCTIONS 3 TYPES

REGISTER INSTRUCTIONS, BRANCH INSTRUCT., & MINI INSTRUCT.

MMWARE - ALLOWS CALCULATIONS & DATA MANIPULATIONS THRU SOFTWARE & SETS UP & KEEPS TRACK OF POINTERS, FLAGS, BUFFERS, TABLES & STACKS NECESSARY & STORES IN DATA MEMORY FOR PROG. EXECUTION

DATA MEM. AREAS

1. SYMBOL TABLE (VSV) - DEFINED VARIABLES & THEIR VALUES
2. VALUE STACK (VS) - TEMP. HOLD VALUES DURING EXPRESSION ANALYSIS & SUB^{GR} INFO
3. OPERATOR STACK (OS) - HOLDS OPERATORS DURING EXPRESSION EVALUATION & FOR/GOSUB INFO
4. CALLED SUBROUTING STACK (CSS) STORES SUB. RETURN ADDR.
5. DUMMY VARIABLE TABLE - INFO. FOR USER DEFINED FUNCT. (DEFN)

MASTER INITIALIZATION SETS 'TRAP' ADDR. IN CONTROL MEM. FOR START OF MICROPROG.

W/MI COMPLETE, CPU ENTERS TEXT ENTRY PHASE

DURING NORM. OPER., 3 PHASES, TEXT ENTRY, VARIABLE & LINE# RESOLUTION, PROG. EXECUTION

TEXT ENTRY PHASE - ':' OR '?' IDENTIFIES

VARIABLES & LINE# RESOLUTION - TRIGGERED BY RUN COMMAND

TEXT ATOM - 8 BIT CODE w/ 8 BIT ON - LOW 7 BITS SPECIFY POSITION OF BASIC WORD
IN TEXT ATOM TABLE IN CPU'S 8 BIT ROM - REPLACES BASIC VERBS,

COMMANDS, & FUNCT. NAMES

RECALLING - ROUTING - ~~ROUTING~~ WITHIN A ~~ROUTING~~ (VAR, EXPR TERM, FUNC)

2200 HARDWARE

STORED IN VS

OPERAND - ANY NUMERIC VALUE, SPECIFIED BY NUMBER, VARIABLE, OR FUNCTION

OPERATORS - +, -, *, /, ↑ STORED IN OS

SELECT - USED TO SELECT DEVICES FOR I/O OPER.

DEVICE TYPES - 0 = PARALLEL ASCII w/ CR/LF

1 = SERIAL 2200 CASSETTE

2 = PARALLEL ASCII w/ CR BUT NO LF

3 = DISK

4 = PARALLEL ASCII w/ NO CR GENERATED AT END OF LINE

BASIC STMT WHICH CAN USE FILE NUMBER ASSIGNMENTS:

① LOAD ② SAVE ③ DATALOAD ④ DATASAVE ⑤ REWIND ⑥ BACKSPACE

⑦ DATARESAVE ⑧ DISK STATUS ⑨ & #G10, #IF ON

~~6308~~ 6307/6707 1 CHIP WILL HOLD 2048 BITS, 256 BYTES

1 CHAR, 8 BITS, 1 BYTE STORED ON 8 CHIPS

8 CHIPS, 2K, 16384 BITS, 2048 BYTES, 2K RAM

6308, 6309, 6310, 6311 - HARDWARE PCB

2 TYPES ROM - 8 BIT ROM & 20 BIT ROM

8 BIT DECODES & GIVES TO 20 BIT ROM WHERE MICROPRG. IS

KEYING IN ON KEYBOARD GOES INTO RAM

NO INITIALIZATION - CHECK VOLTAGE & EVEN IF GOOD COULD STILL BE V REGULATED

OR IF NOT 6308, 6309, 6310, 6311

L# SELECT INPUT. XXX - L# SELECT CI. XXX

RAID(1) - WILL REPRESENT NUMBER ~~BEFORE~~ > 0 BUT < 1

INT - WILL MAKE DECIMAL # AN INTEGER

Q.R. - ROM ... SYNTAX ERRORS

WORK ARRAYS FOR MATSORT
 # OF VARIABLES MUST EQUAL
 VARIABLES IN ARRAY TO BE SORTED
 & ALWAYS 2 CHAR LONG

10 DIM A\$(4)10, B\$(4)10, L\$(4)2, W\$(4)2

4 TEN CHAR VARIABLES WANT TO PUT IN ALPHABETICAL ORDER, LAST 2 ARRAYS NEEDED FOR MATSORT

20 MATSORT A\$() TO L\$(), W\$()

A\$1=2/2=6/3=P
 4=R

THE L\$() ARRAY WILL CONTAIN THE ORDER IN WHICH ALPHA CHAR APPEAR EXPLD B\$1=4/2=1/3=2/4=5

30 MATMOVE A\$() TO B\$(), L\$()

MOVES VARIABLES FROM A\$ TO B\$ IN THE ORDER OF L\$ WHICH WILL BE ALPHABETICAL

40 PRINT B\$()

ERROR 67 - DISK FORMAT ERROR - HEADS NOT STAYING CLOSED, CHECK 48V PICK
 WHICH CLOSSES HEAD & 24V TO HOLD - NOT ABLE TO READ

CHECK HEAD SOLENOID - OIL PIVOT PT. - MIGHT NEED TO FORMAT

ERROR 65 - DIABLO ONLY - NOT ^{DISK} READY - WANG BOARD MICROPROCESSOR
 PROBABLY BAD IF READY LITE ON - IF READY LITE OUT PROBABLY BOARD
 IN DIABLO CASE

ERROR 61 - DISK NOT RESPONDING CORRECTLY TO 2200 - PROBABLY I/O BOARD
 OF CPU, DISK CONTROLLER BOARD, OR MICROPROCESSOR OF DISK WANG BOARDS

ERROR 68 - WNG. REDUNDANCY CHECK - COULD NOT READ DATA CORRECTLY
 OR DATA WRITTEN WRONG - PROBABLY DISK CONTROLLER BOARD, MULTI
 PLEXER, 6311 CARD IN CPU, OR WANG CARD OF DISK

ERROR 72 - CYCLIC READ ERR. - DATA WAS EITHER NOT WRITTEN, WRITTEN
 WRONG OR READ WRONG - PROBABLY R/W BOARD, HEADS OUT OF
 ALIGNMENT, WANG BOARDS ON DISK

ERROR 72 & 67 - PROBABLY DISK ^{MECHANICAL} HARDWARE PROBLEM

ERROR LITE - "ON" WHILE READY TILL INIT (RESET ON CP) OR FORMAT

ERROR 72 - ON SCRATCH FROM LAST SECTOR

2200 HARDWARE

4

Tape CARTRIDGE - AS LOOK AT SIDE USING, TAB ON RIGHT
USED FOR WRITE PROTECT. HOLE COVERED & CAN WRITE,
HOLE UNCOVERED & WRITE PROTECTED.

DATASAVE DC END - NEED TO UPDATE USED PARAMETER

SECTORS & TAPE ARE USED IN 256 BYTE BLOCKS

FLOPPY - TAB MUST BE ON TO WRITE

MOVE (FR OR RF) - ONLY MOVES AUTO FILE CATALOGUE & DELETES SCRATCH FILE

COPY FR(0,19583) - COPY FROM DESIGNATED SECTOR EVERYTHING BUT DOESN'T DELETE

\$EXEC - ERROR 51 IF HAS OPTION 2

MATCOPY A\$() TO B\$() - ERROR 12 IF DOESN'T HAVE OPTION 5

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