WANG

1501

CUSTOMER ENGINEERING SERVICE HANDBOOK

WORKSTATIONS

729-1100

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WORKSTATIONS

729-1100

Preface

The Workstations Service Handbook gives concise information to assist customer engineers in rapid information retrieval for the majority of workstation service needs at customer sites.

Service Handbooks have their own class codes and Cover Stock Colors as listed below:

1501 Peripherals	(Orange)
1502 2200	(Yellow)
1503 WP/OIS	(Green)
1504 VS	(Blue)
1505 Communications	(Red)

First Edition (April 1983)

Original issue

CUSTOMER ENGINEERING
PUBLICATION UPDATE BULLETIN

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This PUB: 729-1100-2

Class Code: 1501

Base Document: 729-1100

Base Document Title: Workstations Service Handbook

Previous Update(s): 729-1100-1

REASON FOR CHANGE:

Addition of updated information and corrections supplied by Field and Product Support personnel.

INSTRUCTIONS:

Remove obsoleted pages and insert enclosed new pages as follows:

	REMOVE	INSERT
1.	iii/iv, v, vi	iii thru vi
2.	W1-1 thru W1-48	W1-1 thru W1-53

Retain this PUB page, inserted directly following the original title page (or following any preceding PUB record pages), as a permanent record of revisions.

PRINTED IN U.S.A.

PROPRIETARY INFORMATION NOTICE

WORKSTATIONS
DOCUMENT REVISION STATUS

PAGE	DATE
iii through v	Changed Issue 09-30-83
vi	Changed Issue 01-15-83
W1-1 through W1-4	Changed Issue 09-30-83
W1-5	Original Issue 12-01-82
W1-6	Changed Issue 09-30-83
W1-7	Original Issue 12-01-82
W1-8 through W1-53	Changed Issue 09-30-83
W2-1 through W2-48	Changed Issue 01-15-83

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WORKSTATIONS
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TITLE **PAGE**

WP/OIS & VS SYSTEMS WORKSTATIONS

REFERENCE DOCUMENTS

2236D/DE/DW, 2336DE/DW,
2876DE/DW, & 2886DE/DW

WLI No.	Title
729-0482	SB No.80 (Model 2236D)
729-0482-1	SB No.80A
729-0550	Model 2200 System Maint Man.
729-0551	FLMG #2 Model 2200 CPUs
729-0584-A	Model 2200MVP Maint Man.
729-0903-A	2236 DW Integrated Terminal
729-1087	2336 DW Workstation
729-1025	ERGO II Display Pkg for DE/DW Terminals

DIAGNOSTIC PACKAGES/ SERVICE EQUIPMENT

2236D/DE/DW, 2336DE/DW, 2876DE/DW, & 2886DE/DW

DIAGNOSTIC PACKAGES

WLI No.	Title
732-0002C	LVP/SVP System Exerciser
702-0079	Peripheral Diagnostic
732-0012	2236DE/DW Diagnostic (DSDD)
702-0118	2236DE/DW Diagnostic (SSSD)
702-0194A	Universal Keyboard Test (SSSD)

MODEL SPECIFICATIONS

2236D/DE/DW & 2336DE/DW

Listed are keyboard-style 2200 Systems workstations that are parallel-fed, contain Z80/8080 ICs, and are connected to separate master units.

Model No.	Application/Features
2236D	2200 Systems MVP, LVP, SVP, or VP - Early interactive, two-board workstation (no display highlighting).
2236DE*	2200 MVP, LVP, SVP, or VP - Interactive terminal, does box graphics and controls all printers except 2232B flatbed plotters; replaces 2236D for VP/MVP systems.
2236DW*	2200 WP, MVP, LVP, SVP, or VP - Integrated terminal, has added software for data processing/word processing (DP/WP); has all 2236DE features plus extra keys.
2336DE*	2200 MVP, LVP, SVP, or VP - Interactive terminal, does box graphics and controls all printers except 2232B flatbed plotters; replaces 2236D or 2236DE for VP/MVP systems.
2336DW*	2200 WP, MVP, LVP, SVP, or VP - Has all 2236DW features; is low-cost version to replace 2236DW.

*All system applications except SVP use 2236MXD/2236MXE Four Port Terminal Controller.(SVP uses 210-7789 Terminal/Printer Controller or option W board 210-7486.)

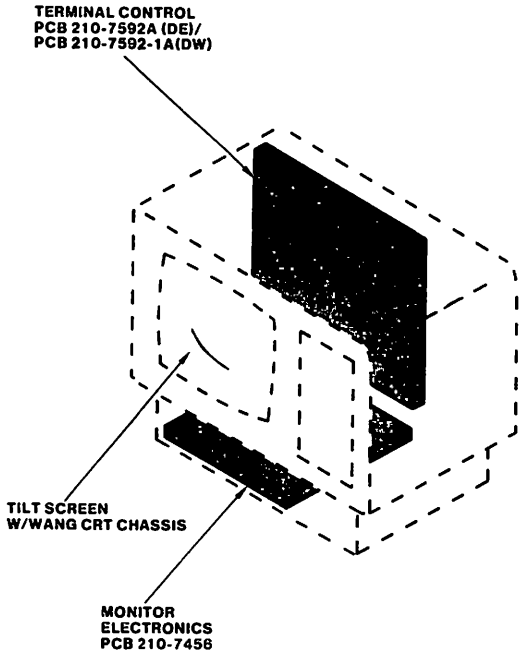
MODEL SPECIFICATIONS

2876DE/DW & 2886DE/DW

Model No.	Application/Features
2876DE/DW	2200 WP, MVP, LVP, SVP, or VP - European version with four possible expanded keyboards; is reconfigured 2236DE/DW.
2886DE	2200 MVP, LVP, SVP, or VP - Tilt screen, standard keyboard, and screen dump; uses PCB 210-7592A logic board; is reconfigured 2236DE.
2886DW	2200 WP, MVP, LVP, SVP, or VP - Supports 2200/WP software for word processing; uses PCB 210-7592-1A and has tilt screen; is reconfigured 2236DW with standard keyboard.

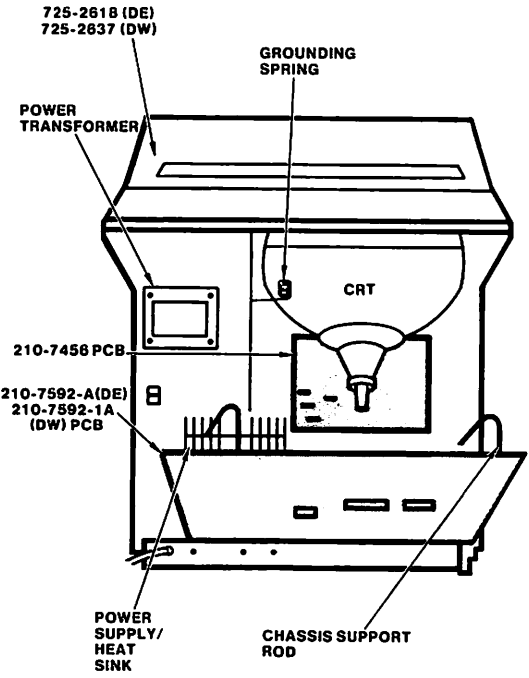
PCB COMPLEMENTS

2876DE/DW & 2886DE/DW



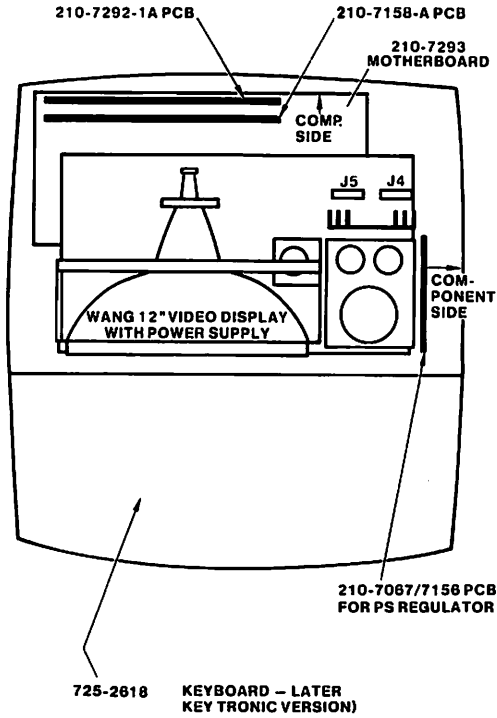
PCB COMPLEMENTS

2236DE/DW



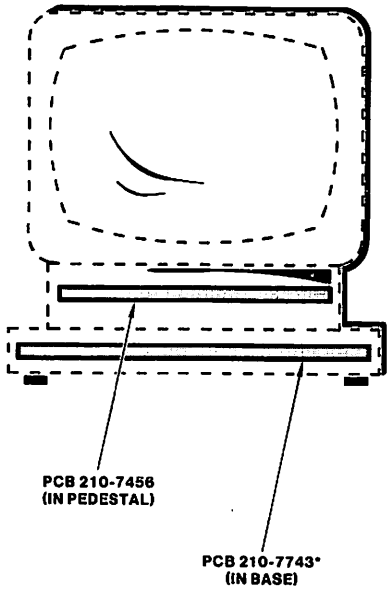
PCB COMPLEMENTS

2236D



PCB COMPLEMENTS

2336DE/DW



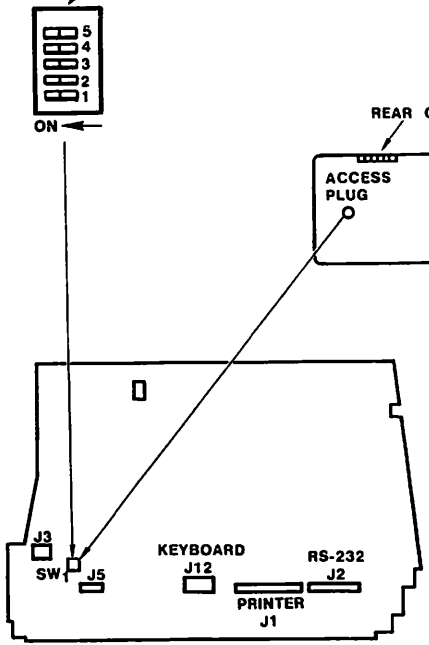
*210-7743 CANNOT BE ORDERED; ORDER 270-0753 (2336DW) OR 270-0817 (2336DE).

SWITCH SETTINGS

2236DE/DW, 2886DE/DW

PCB 210-7592A

SWITCH 1	SWITCH 2	SWITCH 3	SWITCH 4	SWITCH 5	BAUD RATE
ON	OFF	ON	ON	ON	300
ON	OFF	OFF	ON	ON	600
ON	OFF	ON	OFF	ON	1200
ON	OFF	OFF	OFF	ON	2400
ON	OFF	ON	ON	OFF	4800
ON	OFF	OFF	ON	OFF	9600
ON	OFF	ON	OFF	OFF	19,200

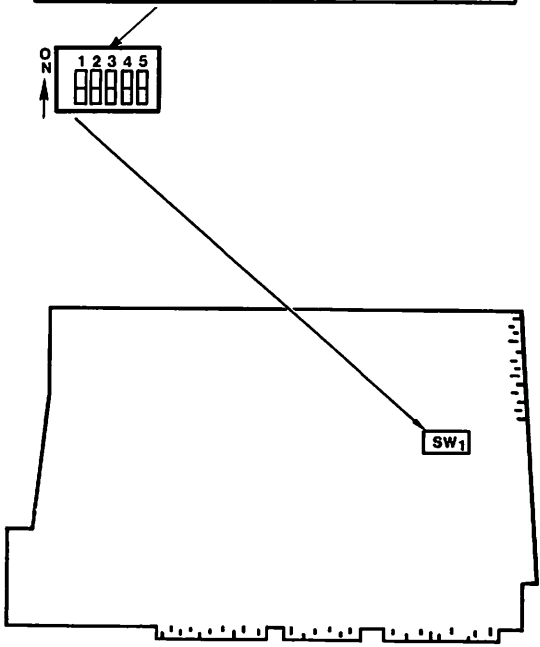


SWITCH SETTINGS

2236D

PCB 210-7292-A

SWITCH 1	SWITCH 2	SWITCH 3	SWITCH 4	SWITCH 5	BAUD RATE
ON	OFF	OFF	OFF	OFF	300
ON	OFF	OFF	OFF	ON	600
ON	OFF	OFF	ON	OFF	1200
ON	OFF	OFF	ON	ON	2400
ON	OFF	ON	OFF	OFF	4800
ON	OFF	ON	OFF	ON	9600
ON	ON	ON	OFF	ON	19200



SWITCH SETTINGS

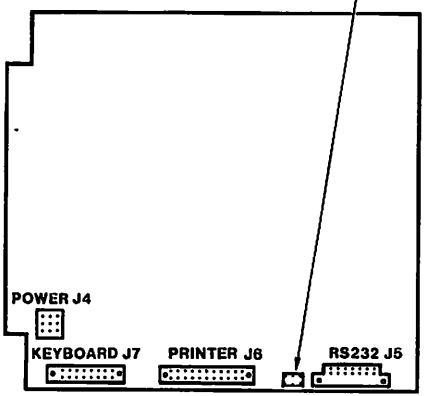
2336DE/DW

PCB 210-7743*

DOWN = ON UP = OFF

SWITCHES 1 2		SWITCHES 3-5			BAUD RATE
1 **	2 ***	3	4	5	
DOWN	UP	DOWN	DOWN	DOWN	300
DOWN	UP	UP	DOWN	DOWN	600
DOWN	UP	DOWN	UP	DOWN	1200
DOWN	UP	UP	UP	DOWN	2400
DOWN	UP	DOWN	DOWN	UP	4800
DOWN	UP	UP	DOWN	UP	9600
DOWN	UP	DOWN	UP	UP	19.200

**UP = EVEN PARITY, DOWN = ODD PARITY
***UP = 8 DATA BITS, DOWN = 7 DATA BITS



*210-7743 CANNOT BE ORDERED; ORDER 270-0753 (2336DW) OR 270-0817(2336DE).

Description	Load PCB 210-	Burned Prom No.	Position
	2236DE		
KBD LOOKUP #3	7592-A	378-2446-R3	L16
GRAPHICS CHAR #4	7592-A	378-2447-R1	L55
TERM MICRO NO 1	7592-A	378-4094-R4	L18
TERM MICRO NO 2	7592-A	378-4095-R4	L17
AZERTY KBD	7592	378-2620	L16
AZERTY	7592-B/7158-1D	378-2415	L56
AZERTY GRAPHICS	7592-B	378-2447-R1	L55
AZERTY TERM #1	7592-B	378-4094-R1	L18
AZERTY TERM #1	7592-B	378-4095-R1	L17
SWEDISH	7592-C/7158-1E	378-2416	L56
SWEDISH GRAPHICS	7592-C	378-2447-R1	L55
SWEDISH CHAR #4	7592-C	378-2624	L16
SWEDISH TERM #1	7592-C	378-4094-R1	L18
SWEDISH TERM #2	7592-C	378-4095-R1	L17

PROMS

2236DE

Description	Load PCB 210-	Burned Prom No.	Position
	2236DE		
UNITED KINGDOM	7592-D/7158-1G	378-2418	L56
U.K. GRAPHICS	7592-D	378-2447-R1	L55
U.K. CHAR #4	7592-D	378-2627	L16
U.K. TERM #1	7592-D	378-4094-R1	L18
U.K. TERM #2	7592-D	378-4095-R1	L17
GERMAN	7592-E/7158-1J	378-2420	L56
GER. GRAPHICS	7592-E	378-2447-R1	L55
GER. CHAR #4	7592-E	378-2629	L16
GER. TERM #1	7592-E	378-4094-R1	L18
GER. TERM #2	7592-E	378-4095-R1	L17
SWISS/GERMAN	7592-F	378-2414-R1	L56
SW/GE GRAPHICS	7592-F	378-2447-R1	L55
SW/GE CHAR	7592-F	378-2626-R1	L16
SW/GE TERM #1	7592-F	378-4094-R1	L18
SW/GE TERM #2	7592-F	378-4095-R1	L17

PROMS

2236DE

Description	Load PCB 210-	Burned Prom No.	Position
	2236DE		
SWISS/FRENCH	7592-G/7158-1C	378-2414-R1	L56
SW/FR GRAPHICS	7592-G	378-2447-R1	L55
SW/FRENCH CHAR	7592-G	378-2625	L16
W/FR TERM #1	7592-G	378-4094-R1	L18
SW/FR TERM #2	7592-G	378-4095-R1	L17
NETHERLANDS	7592-H/7158-1H	378-2419	L56
NETHERLANDS GRAPHICS	7592-H	378-2447-R1	L55
DUTCH CHAR	7592-H	378-2630	L16
NETHERLANDS TERM #1	7592-H	378-4094-R1	L18
NETHERLANDS TERM #2	7592-H	378-4095-R1	L17

PROMS

2236DE

Description	Load PCB 210-	Burned Prom No.	Position
	2236DE		
NORWEGIAN	7592-J/7158-1F	378-2417-R1	L56
NORWEGIAN GRAPH	7592-J	378-2447-R1	L55
NORWEGIAN CHAR	7592-J	378-2622	L16
NORWEG TERM #1	7592-J	378-4094-R1	L18
NORWEG TERM #2	7592-J	378-4095-R1	L17
CRYILLIC/LATIN	7592-K/7158-1B	378-2413	L56
CRY/LATIN GRAPH	7592-K	378-2447-R1	L55
CRY/LATIN CHAR	7592-K	378-2628	L16
CRY/LA TERM #1	7592-K	378-4094-R1	L18
CRY/LA TERM #2	7592-K	378-4095-R1	L17
NORWAY	7592-L	378-2417	L56
NORWAY GRAPH	7592-L	378-2447-R1	L55
DANISH CHAR	7592-L	378-2623	L16
NORWAY TERM #1	7592-L	378-4094-R1	L18
NORWAY TERM #2	7592-L	378-4095-R1	L17

PROMS

2236DE

Description	Load PCB 210-	Burned Prom No.	Position
	2236DE		
GREEK/LATIN	7592-M/7158-1K	378-2421	L56
GR/LAT GRAPH	7592-M	378-2447-R1	L55
GR/LAT CHAR	7592-M	378-2621	L16
GR/LAT TERM #1	7592-M	378-4094-R1	L18
GR/LAT TERM #2	7592-M	378-4095-R1	L17
ARABIC/LATIN	7592-N	378-2648	L56
AR/LAT GRAPH	7592-N	378-2447-R1	L55
AR/LAT CHAR	7592-N	378-2647	L16
AR/LAT TERM #1	7592-N	378-4094-R1	L18
AR/LAT TERM #2	7592-N	378-4095-R1	L17
DIAGNOSTIC BURN IN	7592-P	378-2519	3L1G
DIAG. BURN IN	7592-P	378-4143-R1	L18
AR/LAT TERM #2	7592-P	378-4144-R1	L17

PROMS

Description	Load PCB 210-	Burned Prom No.	Position
	2236DE		
KATAKANA	7592-Q/7158-1M	378-2044-R3	L56
KATAKANA GRAPH	7592-Q	378-2447-R1	L55
KATAKANA CHAR	7592-Q	378-2500	L16
KATAKANA TERM #1	7592-Q	378-4094-R1	L18
KATAKANA TERM #2	7592-Q	378-4095-R1	L17
EURO-SP GRAPH 4	7592-R	378-2447-R1	L55
EURO-SP CHAR	7592-R	378-2672	L16
EURO-SP TERM #1	7592-R	378-4094-R1	L18
EURO-SP TERM #2	7592-R	378-4095-R1	L17

Description	Load PCB 210-	Burned Prom No.	Position
	2236DE		
ICELAND #1	7592-T	378-2705-R1	L56
ICELAND GRAPH	7592-T	378-2447-R1	L55
ICELAND #2	7592-T	378-2706	L16
CANADIAN #1	7592-U	378-2715-R1	L56
CANADIAN KBD #2	7592-U	378-2716-R1	L16
	2236DW		
GRAPHICS CHAR TABLE #4	7592-1A	378-2447-R1	L55
KEYBOARD TRANSLATE	7592-1A	378-3067-R1	L16
TERMINAL MICRO NO 1	7592-1A	378-4094-R4	L18
TERMINAL MICRO NO 2	7592-1A	378-4095-R4	L17

PROMS

2236DW

Description	Load PCB 210-	Burned Prom No.	Position
	2236DW		
GRAPHICS CHAR TABLE #4	7592-1B/C/D/E	378-2447-R1	L55
KEYBOARD TRANSLATE	7592-1B	378-3068-R1	L16
KEYBOARD TRANSLATE	7592-1D/E	378-3067	L16
TERMINAL MICRO NO 1	7592-1B	378-4094-R4	L18
TERMINAL MICRO NO 2	7592-1B	378-4095-R4	L17
TERMINAL MICRO NO 1	7592-1D	378-4094-R3	L18
TERMINAL MICRO NO 2	7592-1D	378-4095-R3	L17
NORWAY-CHAR. GEN.	7592-1D	378-2417-R1	L56
NORWAY KEYBOARD	7292-1F	378-2424	L16
AZERTY KEYBOARD	7292-1E	378-2423	L16
NETHERLANDS KEYBOARD	7292-1G	378-2425	L16
SWISS/GERMAN KEYBOARD	7292-1H	378-2426	L16
SWISS/FRENCH KEYBOARD	7292-1J	378-2427	L16

PROMS

2236DW/2336DW

Description	Load PCB 210-	Burned Prom No.	Position
	2236DW		
GERMAN KEYBOARD	7292-1K	378-2729	L16
GREEK/LATIN KEYBOARD	7292-1L	378-2429	L16
SWEDISH KEYBOARD	7292-1M	378-2747	L16
UNITED KINGDOM	7292-1N	378-2748	L16
ARABIC LATIN KEYBOARD	7292-1P	378-2649	L16
TERMINAL MICRO NO 1	7592-1D/E	378-4094-R3	L18
TERMINAL MICRO NO 2	7592-1D/E	378-4095-R3	L17

PROMS

2326DW

Description	Load PCB 210-	Burned Prom No.	Position
	2326DW		
GERMAN CRT	7743	378-5044	L5
GERMAN KEYBOARD	7743	378-6071	L10
DANISH/NORWEGIAN CRT	7743	378-5042	L5
DANISH KEYBOARD	7743	378-6069	L10
SWEDISH/FINNISH CRT	7743	378-5043	L5
FINNISH KEYBOARD	7743	378-6070	L10
DUTCH CRT	7743	378-5046	L5
DUTCH KEYBOARD	7743	378-6077	L10
NORWEGIAN KEYBOARD	7743	378-6072	L10
SWISS FRENCH/GERMAN CRT	7743	378-5048	L5
SWISS FRENCH KEYBOARD	7743	378-6073	L10
SWISS GERMAN KEYBOARD	7743	378-6074	L10
SWEDISH KEYBOARD	7743	378-6075	L10

PROMS

2336DE

Description	Load PCB 210-	Burned Prom No.	Position
	2336DE		
FRENCH (AZERTY) CRT	7743	378-5040	L5
FRENCH (AZERTY) KEYBOARD	7743	378-6080	L10
CANADIAN CRT	7743	378-5041	L5
CANADIAN KEYBOARD	7743	378-6081	L10
DANISH/NORWEGIAN CRT	7743	378-5042	L5
DANISH KEYBOARD	7743	378-6082	L10
GERMAN CRT	7743	378-5044	L5
GERMAN KEYBOARD	7743	378-6084	L10
ICELANDIC CRT	7743	378-5045	L5
ICELANDIC KEYBOARD	7743	378-6085	L10
DUTCH CRT	7743	378-5046	L5
DUTCH KEYBOARD	7743	378-6093	L10
NORWEGIAN KEYBOARD	7743	378-6086	L10
SOUTH AFRICAN ENGLISH CRT	7743	378-5047	L5

PROMS

Description	Load PCB 210-	Burned Prom No.	Position
	2336DE		
SOUTH AFRICAN ENGLISH KEYBOARD	7743	378-6087	L10
SWISS FRENCH/GERMAN CRT	7743	378-5048	L5
SWISS FRENCH KEYBOARD	7743	378-6091	L10
SWISS GERMAN KEYBOARD	7743	378-6092	L10
ALL SPANISH CRT	7743	378-5049	L5
ALL SPANISH KEYBOARD	7743	378-6088	L10
SWEDISH/FINNISH CRT	7743	378-5043	L5
SWEDISH/FINNISH KEYBOARD	7743	378-6089	L10
UNITED KINGDOM CRT	7743	378-5080	L5
UNITED KINGDOM KEYBOARD	7743	378-6090	L10

Description	Load PCB 210-	Burned Prom No.	Position
	2336DW		
CHAR GEN	7743	378-5080	L5
TERM. NO. 1	7743	378-6013	L9
TERM. NO. 2	7743	378-6014	L10
FRENCH(AZERTY) CRT	7743	378-5040	L5
FRENCH (AZERTY) KEYBOARD	7743	378-6055	L10
CANADIAN CRT	7743	378-5041	L5
CANADIAN KEYBOARD	7743	378-6056	L10
DANISH/NORWEGIAN CRT	7743	378-5042	L5
DANISH KEYBOARD	7743	378-6057	L10
SWEDISH/FINNISH CRT	7743	378-5043	L5
FINNISH KEYBOARD	7743	378-6058	L10
GERMAN CRT	7743	378-5044	L5
GERMAN KEYBOARD	7743	378-6059	L10
ICELANDIC CRT	7743	378-5045	L5

PROMS

Description	Load PCB 210-	Burned Prom No.	Position
		2336DW	
ICELANDIC KEYBOARD	7743	378-6060	L10
DUTCH CRT	7743	378-5046	L5
DUTCH KEYBOARD	7743	378-6076	L10
DANISH/NORWEGIAN CRT	7743	378-5042	L5
NORWEGIAN KEYBOARD	7743	378-6061	L10
SOUTH AFRICAN ENGLISH CRT	7743	378-5047	L5
SOUTH AFRICAN ENGLISH KEYBOARD	7743	378-6062	L10
SWISS FRENCH/GERMAN CRT	7743	378-5048	L5
SWISS FRENCH KEYBOARD	7743	378-6063	L10
SWISS FRENCH/GERMAN CRT	7743	378-5048	L5
SWISS GERMAN KEYBOARD	7743	378-6064	L10
ALL SPANISH CRT	7743	378-5049	L5
SPANISH LATAM KEYBOARD	7743	378-6065	L10
SPANISH KEYBOARD	7743	378-6066	L10
SWEDISH KEYBOARD	7743	378-6067	L10
UNITED KINGDOM CRT	7743	378-5080	L5
UNITED KINGDOM KEYBOARD	7743	378-6068	L10

MAJOR FUNCTIONS ON BOARDS

2236DE/DW, 2336DW, 2876DE/DW, & 2886DE/DW

7743/7592 CPU/CRT MANAGEMENT PCB

- Z80 CPU control/timing of bus operation
- CRT memory of characters and attribute field
- Sequential display of memory sites by character and row counters — extended rows by indexing
- Initialization of programmable components for default functions
- Power-up diagnostic test sequencing
- Video display and control logic, plus interrupt control for interfacing with keyboard and PIO
- Control power-up display messages
- Combined module area (7592)— incorporates power supply and jumpers connecting logic circuits/ frequency selection; includes current fold-back, potentiometer adjustment of voltage levels, and temperature stability for voltage.

MAJOR FUNCTIONS ON BOARDS

2236DE/DW, 2336DE/DW, 2676DE/DW, & 2886DE/DW

7456/7256 CRT PCB

- Drives CRT and manipulates horizontal and vertical yoke functions:
  - Horizontal hold
  - Vertical hold
  - Vertical size
  - Vertical linearity
  - Horizontal deflection
  - Horizontal phasing
  - Brightness/contrast
  - Focus quality
  - Dynamic focus
  - Horizontal linearity

MAJOR FUNCTIONS ON BOARDS

2236D

7292 CPU/CRT MANAGEMENT PCB (EARLY TWO BOARD MODELS)

- 8080 CPU control/timing of bus operation
- Sequential display of memory sites by character and row counters — extended rows by indexing
- Initialization of programmable components for default functions
- Power-up diagnostic test sequencing

7158 CRT MANAGEMENT PCB (EARLY TWO BOARD MODELS)

- CRT memory of characters and attribute field
- Video display and control logic, plus interrupt control for interfacing with keyboard and PIO

MAJOR FUNCTIONS ON BOARDS

2236D

7067/7156-1 PCB POWER SUPPLY REGULATOR

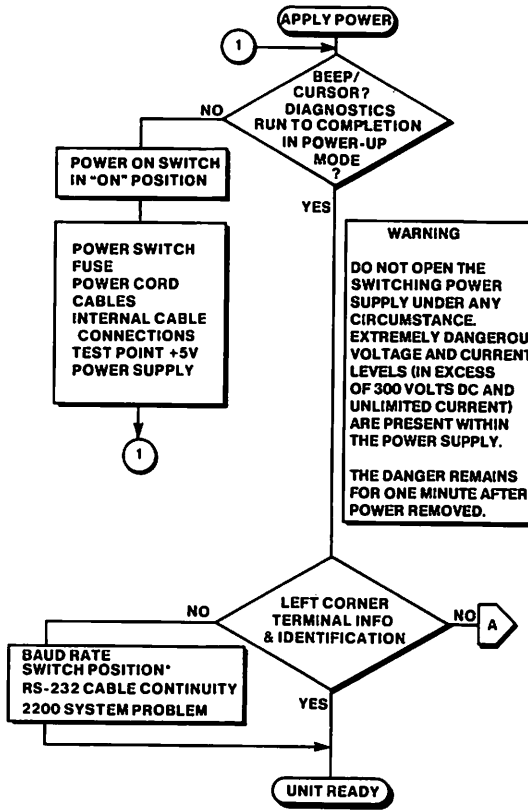
- Current fold-back protection (7156-1 only)
- Potentiometer adjustment of voltage levels
- Temperature stability for voltage

7456/7258 CRT DRIVER CARD (MONITOR ELECTRONICS)

- Drives CRT and manipulates horizontal and vertical yoke functions:
  - Horizontal hold
  - Vertical hold
  - Vertical size
  - Vertical linearity
  - Horizontal deflection
  - Horizontal phasing
  - Brightness/contrast
  - Focus quality
  - Dynamic focus
  - Horizontal linearity

"TIME"(OPERATION) FLOWCHART

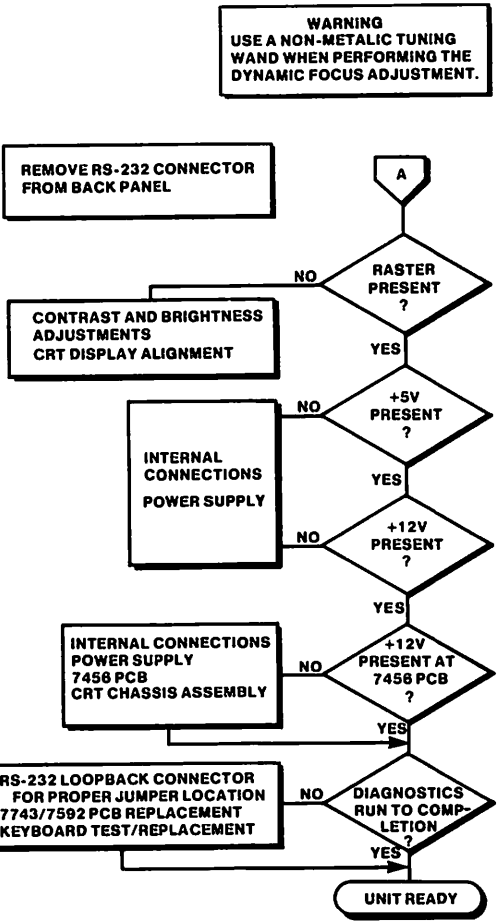
2236D/DE/DW, 2336DE/DW, 2876DE/DW, & 2886DE/DW



*POUND SIGN (#) OR DASH (-) WHEN ANY KEY DEPRESSED MEANS IMPROPER BAUD RATE OR CONTROLLER MALFUNCTION

"TIME"(OPERATION) FLOWCHART

2236D/DE/DW, 2336DE/DW, 2876DE/DW, & 2886DE/DW



ERROR CODES

2336DE/DW

PCB 210-7743

Power-up, burn-in, and keyboard tests at Rev 4 level are performed with baud rate switches 3, 4, and 5 in up position and WLI No. 220-0286 loop-back connector installed (Mode 3). Terminal transfers control to system after power-up test.

Status Display	Problem
01	Z80 register A and/or I failure
02	UART power-up failure
03	VTAC power-up failure
04	PIO power-up failure
05	Z80 register short/open
06*	First PROM check sum failure
07*	Second PROM check sum failure
08	Main/attribute RAM short/ open on data or addressing line
09	Counter-timer circuit (CTC) READ/ WRITE failure during serial input/output

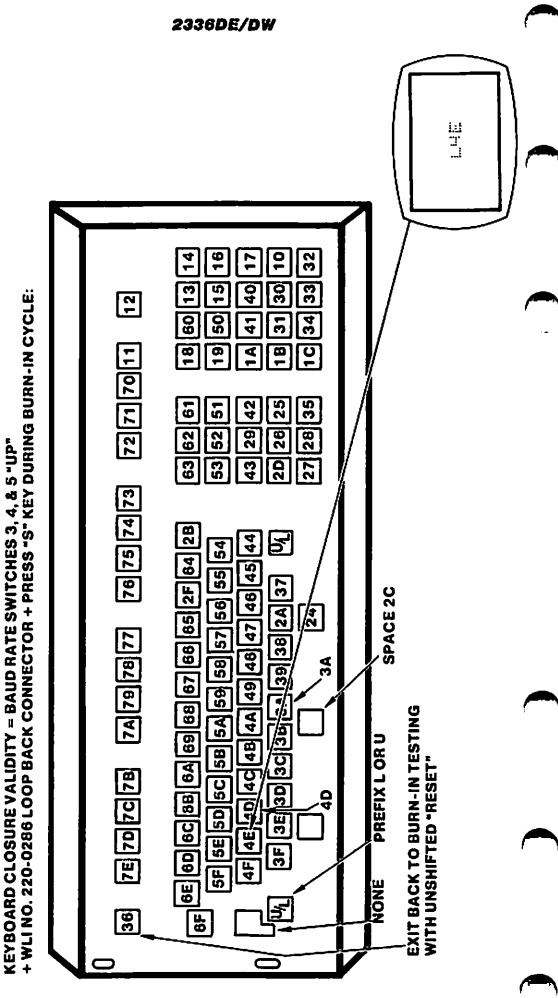
*PROM failure is signaled by continuous beeping and display of error code.

ERROR CODES

PCB 210-7743 (CONT)

Status Display	Problem
09	CTC timer counter failure
09	CTC did not interrupt
09	CTC vertical sweep sync failure
10	UART transmit not ready
11	UART receive not ready
12	UART transmit error
13	UART receive not ready
14	UART error
15	UART data error
16	UART CTC transmission ready counter failure
17	UART CTC receive ready counter failure
18	UART no overrun error
19	UART overrun not cleared

ERROR CODES


2336DE/DW
KEYBOARD CLOSURE VALIDITY = BAUD RATE SWITCHES 3, 4, & 5 "UP"
+ WLI NO. 220-0286 LOOP BACK CONNECTOR + PRESS "S" KEY DURING BURN-IN CYCLE:
NONE
PREFIX L OR U
SPACE 2C
EXIT BACK TO BURN-IN TESTING
WITH UNSHIFTED "RESET"
L4E

ERROR CODES

2236DE/DW

PCB 7592A ERROR CODES

NOTE

Problems with Z80, PROMs, or address decoding logic could blank the hex display and prevent test diagnosis. After tests are complete without problem, display shows "0", and control passes to main microcode.

Hex LED Display	Definition	Problem
0	Z80/PROM Malfunction	Address Decoding Logic
1	Z80 Mode Problem	Reset and Conditional Jump
2	Z80 Malfunction	Register/Processor
3	Memory	Memory Selection
4	Bus Failure	Data Bus
5	Bus Failure	Address Bus
6	Memory	RAM
7	Memory	CRT RAM
8	Not Used	
9	Logic	PROM
A	Keyboard	Keyboard Table PROM
B	Interrupt	Vertical Retrace Interrupt

LATEST PCB E-REV LEVELS

2236D/DE/DW, 2336DE/DW, 2876DE/DW, & 2886DE/DW

WLI No.	Highest Revision Levels											
	1	2	3	4	5	6	7	8	9	10	11	12
210-7592*					X							
210-7743**			X									
210-7456					X							
210-7456-1					X							
210-7292-1					X							
210-7158					X							
210-7067						X						

* Uses PROMs 378-3067-1, 378-4094, and 378-4095 (Rev. 4). See PROMS.

** Uses PROMs 378-6013 and 378-6014 (Rev. 5). See PROMS.

ADJUSTMENTS AND RELATED TEST POINTS

2236D/DE/DW, 2336DE/DW, 2876DE/DW, & 2886DE/DW

PRELIMINARY CHECKS

- Verify MASTER software/hardware by exercising other workstations.
- Check for proper channel operation by substituting ports on MXD (and by unit substitution for triple controllers).
- Troubleshoot workstation operation with applicable diagnostics (see ERROR CODES).

ADJUSTMENTS AND RELATED TEST POINTS

2236DE/DW, 2336DE/DW, 2886DE/DW, 2876DE/DW

ACCESS

WARNING
.High voltage present

- Check/adjust workstation power supply:

  - Model 2236 access:
    Remove three Phillips screws located under keyboard plastic strip (keyboard plate removal). Unfasten each Phillips screw on left/right side of cover (cover lifts up*).

  - Model 2336 access:
    Remove two Phillips screws at left and right side rear of cover.

  - Models 2876 and 2886 access:
    After two screws in back top are removed, top slides back.

* Prior to removing cover, outline CRT area with grease pencil if video display adjustments expected. (See "GENERAL CRT ALIGNMENT.")

ADJUSTMENTS AND RELATED TEST POINTS

2236DE/DW, 2336DE/DW, 2886DE/DW, 2876DE/DW

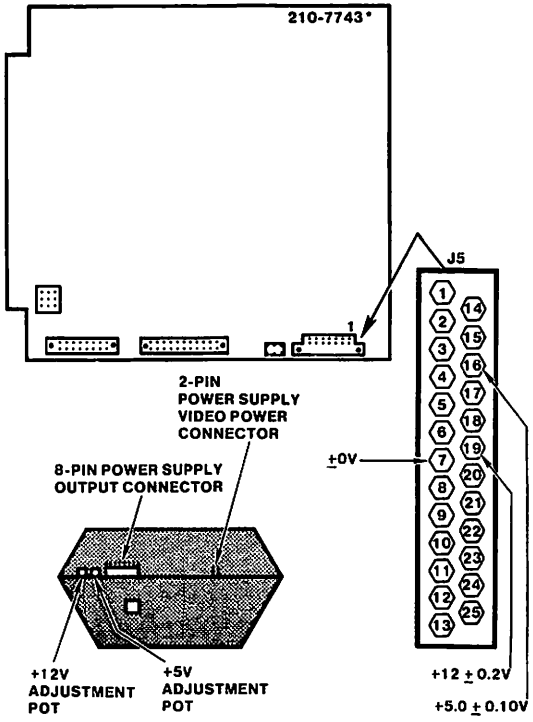
ACCESS (CONT)

- Measure/adjust voltages for logic input to display:
  - Model 2336 PCB 7743 for CRT access: Place unit on its side, remove four Phillips screws/rubber feet from base, and then pull off metal screening and PCB 7743.
  - Pulling PCB 7743 gently away from base allows access to 9-pin power supply connector and 3-pin video connector.
- Verify proper character display/video display alignment:
  - Display board access is from under CRT.
  - Model 2336 PCB 7456 access: Remove front panel from pedestal of module — two screws.

ADJUSTMENTS AND RELATED TEST POINTS

2336DE/DW

PCB 210-7743 & SWITCHING POWER SUPPLY VOLTAGE CHECKS/ADJUSTMENTS



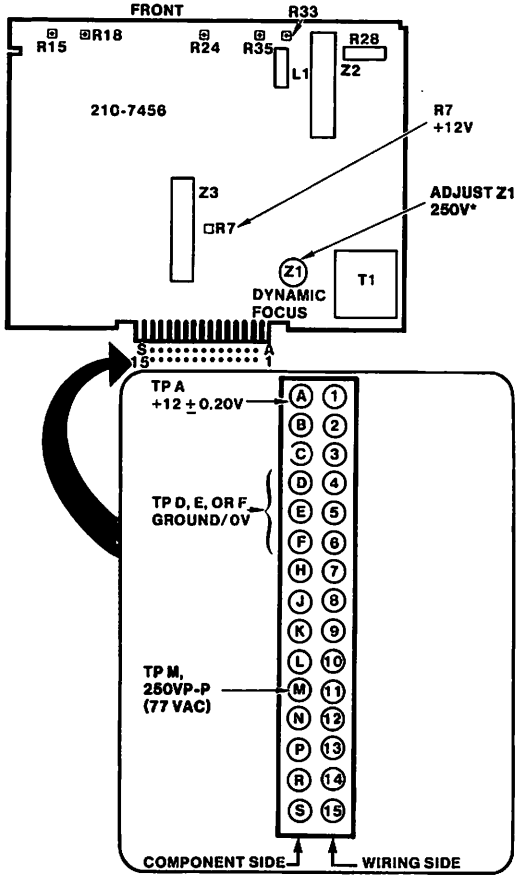
WARNING
DO NOT OPEN SWITCHING POWER SUPPLY BOX

*Order 270-0753 (2336DW) or 270-0817 (2336DE).

ADJUSTMENTS AND RELATED TEST POINTS

2336DE/DW

PCB 210-7456 VOLTAGE CHECKS/ADJUSTMENTS

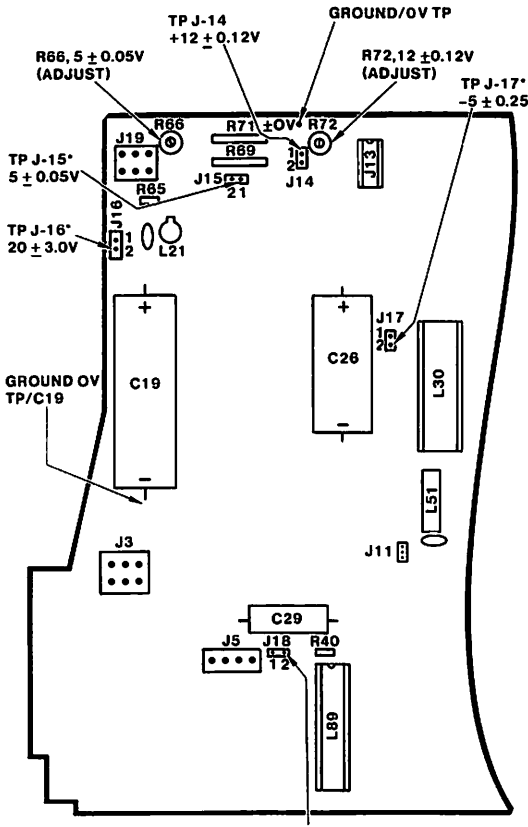


*USE NON-METALLIC STANDARD TUNING WAND

ADJUSTMENTS AND RELATED TEST POINTS

2236DE/DW, 2886DE/DW, & 2876DE/DW

PCB 210-7592/-1A/-A
VOLTAGE CHECKS/ADJUSTMENTS

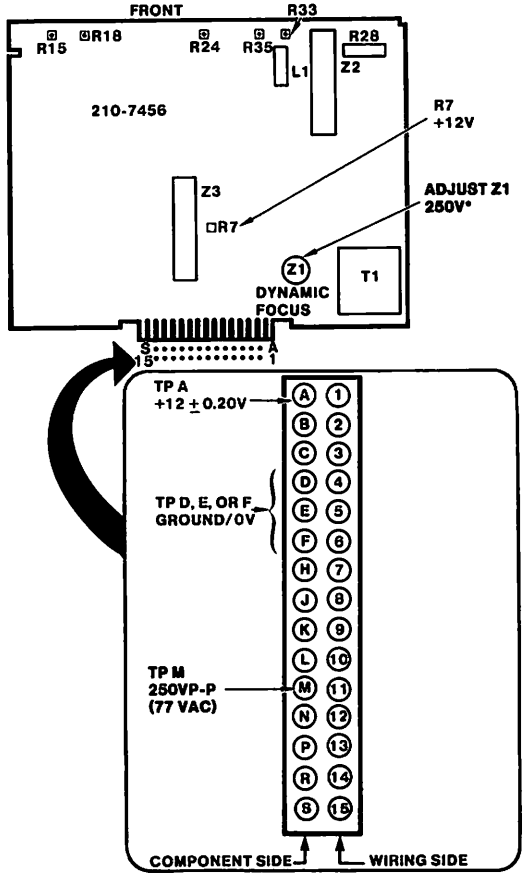


*JUMPERS MUST BE REMOVED PRIOR TO MAKING TESTS/ ADJUSTMENTS.

ADJUSTMENTS AND RELATED TEST POINTS

2336DE/DW, 2236DE/DW, 2886DE/DW, & 2876DE/DW

PCB 7456 VOLTAGE CHECKS/ADJUSTMENTS



*USE NON-METALLIC STANDARD TUNING WAND

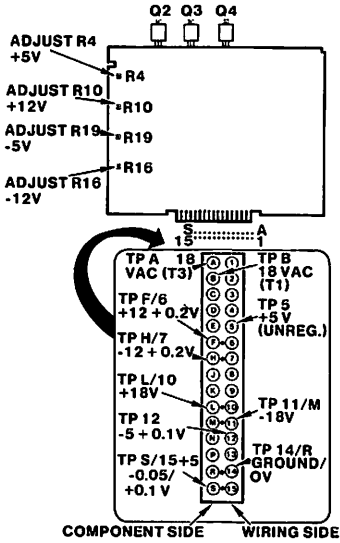
ADJUSTMENTS AND RELATED TEST POINTS

2236D/2226

PCB 7067 VOLTAGE CHECKS/ADJUSTMENTS

NOTE

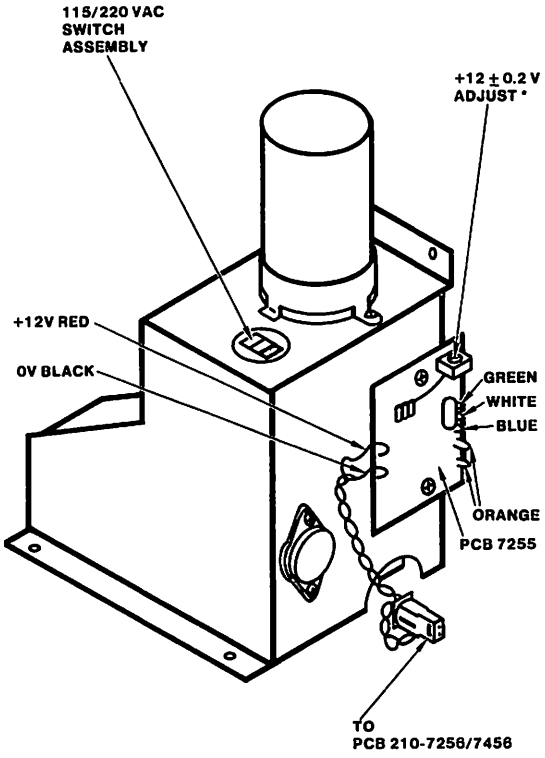
Model 2236D has separate power supply; the supply for 2236DE and 2236DW is part of PCB 210-7456. Model 2336DW uses switching power supply, positioned on PCB 7456.



ADJUSTMENTS AND RELATED TEST POINTS

2236D/2226

EARLY CRT DRIVER VOLTAGE CHECKS/ADJUSTMENTS



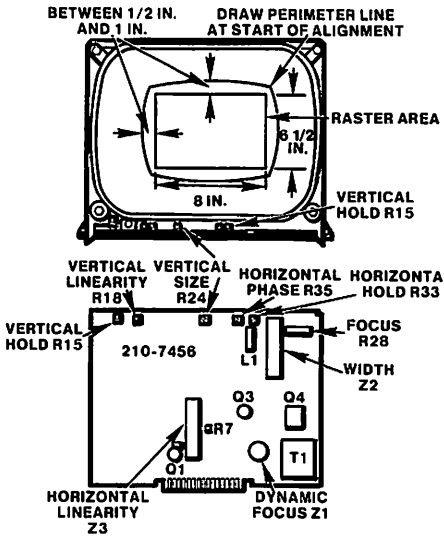
*TEST POINTS AT PINS 8, 9 WIRING SIDE OF PCB 210-7256/7456

ADJUSTMENTS AND RELATED TEST POINTS

2236D/DE/DW, 2336DE/DW, 2876DE/DW, & 2886DE/DW

GENERAL CRT ALIGNMENT

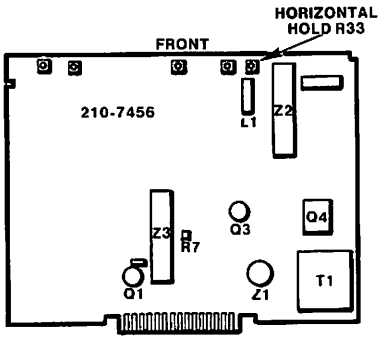
- Generate full screenload of "HO" (24 lines of 80 characters).
- Set trimpot R33 horizontal hold and trimpot R15 vertical hold to midpoint of stable display range.



ADJUSTMENTS AND RELATED TEST POINTS

2236D/DE/DW, 2336DE/DW, 2876DE/DW, & 2886DE/DW

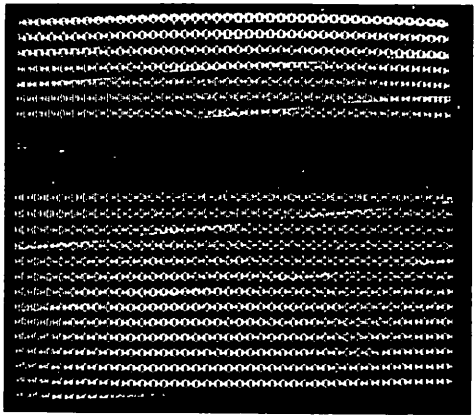
GENERAL CRT ALIGNMENT (CONT)

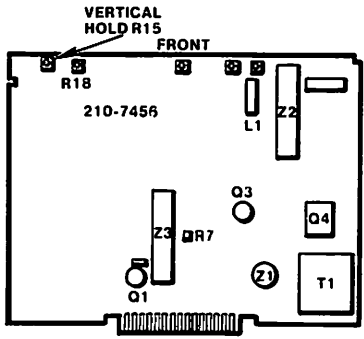


ADJUSTMENTS AND RELATED TEST POINTS

2236D/DE/DW, 2336DE/DW, 2876DE/DW, & 2886DE/DW

GENERAL CRT ALIGNMENT (CONT)

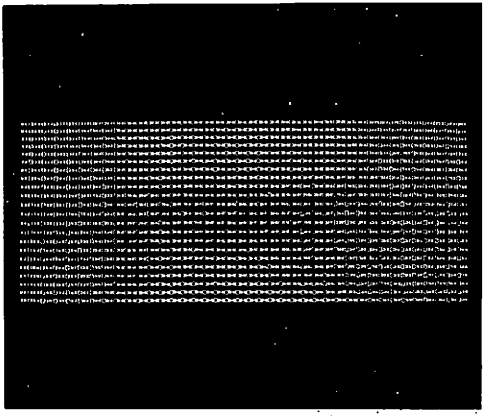


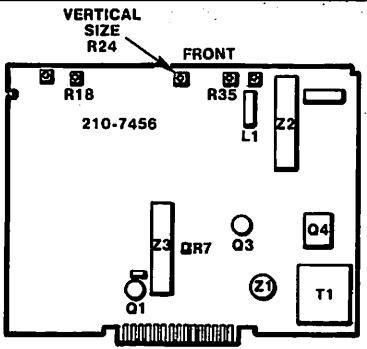


ADJUSTMENTS AND RELATED TEST POINTS

2236D/DE/DW, 2336DE/DW, 2876DE/DW, & 2886DE/DW

GENERAL CRT ALIGNMENT (CONT)

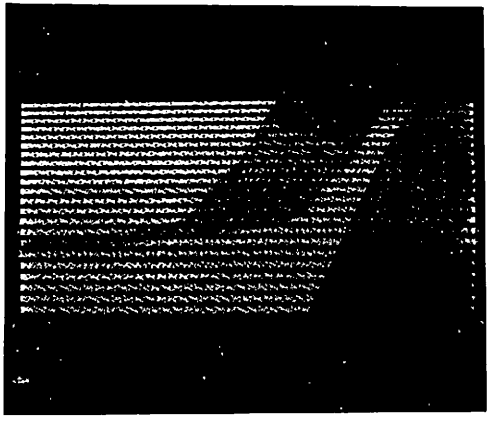


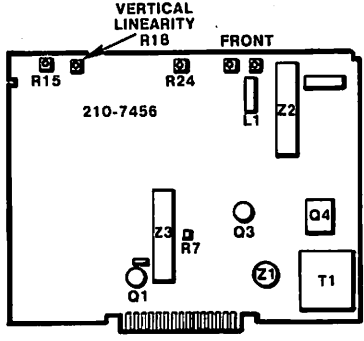


ADJUSTMENTS AND RELATED TEST POINTS

2236D/DE/DW, 2336DE/DW, 2876DE/DW, & 2886DE/DW

GENERAL CRT ALIGNMENT (CONT)

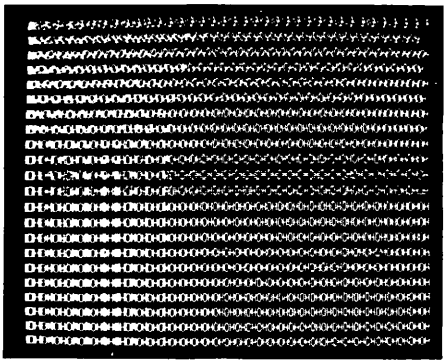


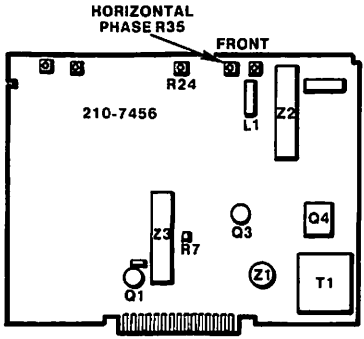


ADJUSTMENTS AND RELATED TEST POINTS

2236D/DE/DW, 2336DE/DW, 2876DE/DW, & 2886DE/DW

GENERAL CRT ALIGNMENT (CONT)





COMMONLY USED PARTS

2236DE/DW, 2336DE/DW, 2876DW, & 2886DE/DW

MODULAR/SUBASSEMBLY REPLACEMENT

WLI No.	Description	Comments
725-2618	Standard Keyboard	2236DE/2886DE
725-2637	Standard Keyboard	2236DW/2886DW
725-2651	International Keybd	2236DE
725-2652	International Keybd	2236DW/2876DW
270-0826 (was-0633)	Tilting 12 in. Monitor	2886DE/DW
210-7456	CRT Electronics Bd	2336DW & 2886DE/DW
210-7592A	Terminal Control Bd	2236DE/2886DE
210-7592-1A	Terminal Control Bd	2236DW/2886DW
270-0753	Terminal Control Bd w/Back Panel*	2336DW

*Terminal Control Board alone is 210-7743.

COMMONLY USED PARTS

2236D, 2336DE/DW

MODULAR/SUBASSEMBLY REPLACEMENT

WLI No.	Description	Comments
210-7292-1A	CPU Terminal Bd	2236B/D
210-7158-A	CRT Control Bd	2236D
210-7293	Motherboard	2236D
210-7156	Pwr Supply Regulator	2236D
270-0734	Switching Pwr Supply	2336DW
270-0373	12in. Monitor	Common Unit
320-0302	Speaker, 2 in.	Common Unit
360-1016SB	1.5A Fuse	Common Unit

REFERENCE DOCUMENTS

5526/A, 5536-1/2/3/4

WLI No.	Title
729-0521	WPNL 77 Archiving W/S Service
729-0522	WPNL 81 (5536-1/2/3/4 W/S)
729-0651	Model 928 FL Maint Man.
729-0653	Model 928 FL Maint Man. #3

2246C/S/R

WLI No.	Title
729-0865	Archiving WS Maint Man.
729-0506	2246R Remote Standalone W/S Man. (03-0089)
729-0516	CSNL 131 (2246C/S)

DIAGNOSTIC PACKAGES

5526/A, 5536-1/2/3/4, 2246R

NOTE

Diagnostics Ordering Address: WANG LABORATORIES SOFTWARE/LITERATURE CONTROL CENTER, BUILDING 4-1, MS 2428, 836 NORTH STREET, TEWKSBURY, MA. 01876

WLI No.	Title
	5526/A
702-0008	WP 20/25/30 System Diagnostic for Two-Board Workstation
732-0002B	Terminal Diagnostic (also for all OIS workstations)
	5536-1/2/3/4
702-0033	5536-1/2/3/4 Two-Board, On-Line Diagnostic
702-0032	5536-1/2/3/4 Two-Board, Off-Line Diagnostic
702-0008B	OIS 130 System Diagnostic for Serial, Two-Board Workstation
	2246R
378-4212R2	2246R Power-Up Diagnostic Rev. 5111

SERVICE EQUIPMENT

5526I A, 5536-1I2I3I4, 2246CIS/R

WLI No.	Description
726-0119	Digital Multimeter
726-4414	High Voltage Adjusting Tool
340-0015	Hex LEDs
420-1040	External Loopback Connector

MODEL SPECIFICATIONS

5526/A, 5536-1/2/3/4

Listed are keyboard style OIS, WP, and VS Systems workstations that are SERIAL FED, that contain ONBOARD Z80/8080 ICs, and that are connected to SEPARATE MASTER UNITS. Models covered by this section include: 5536-1/2/3/4, 5526/A, and 2246C/S/R (AWS).

Model No.	Application/Features
5526A	OIS 105-1, 115, 125A, & 130A Systems Workstation. Also used on early WP (3 board workstation w/telecommunications, PCB 7230).
5526 (928)	Model 5526 is early 3 board version for Model 928/Systems 10, 20, 25, & 30.
5536-1*	16K Workstation for WP only, includes horizontal scroll (2 board, serial workstation).
5536-2*	32K WP Systems 20, 25, & 30 w/TC Workstations and OIS Systems 125, 130, 140, & 145
5536-3*	48K OIS Systems 125, 130, 140, & 145.
5536-4	64K Most Recent Systems. (All OIS & ALLIANCE Systems).

NOTE

TC-5536-1/2/3/4 models have telecommunications capability.

*Circuit boards are interchangeable among 5536-1/2/3 and archiving models, but are not interchangeable with 3 board (5526/A) models. However, PCB 7541 (Model 5536TC) can be used for Model 5526TC.

MODEL SPECIFICATIONS

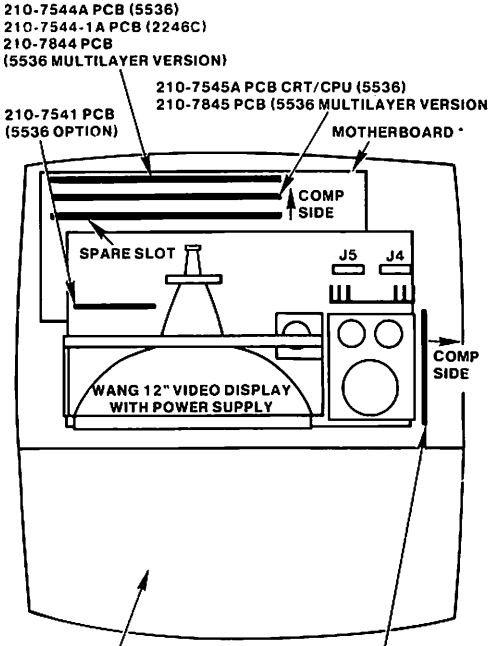
2246C/P/S-1/2/3, 2246R

Model No.	Application/Features
2246P/S-1/2/3	VS Systems, early 3 board
2246C/S -1/2/3*	Combined(C) or Serial(S) Workstation, w/22V07 input/output port (IOP). C version has 32K random access memory; S is 16K. (C is older, two-board workstation; S is newer, two-board workstation.)
2246R	Remote Workstation w/ 22V06 IOP, 16K random access memory, and built-in communications controller/ parallel printer interface.

*Models 2246S-1 or -2 or -3 identify 029 keyboard with standard numeric keypad, standard keyboard with reversed numeric keypad, or 029 keyboard with reversed numeric keypad, respectively.

PCB COMPLEMENTS

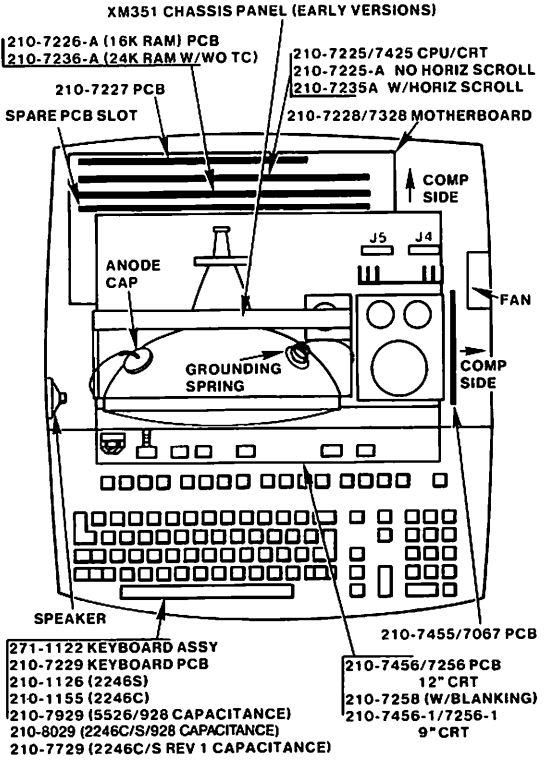
5536-1/2/3/4 & 2246C/S
(Two-Board)



* 210-5542 PCB MOTHERBOARD (5536)
210-7542 PCB (5536 NEWER VERSIONS/VS)
210-7542-2 PCB (5536 W/TC OPTION)

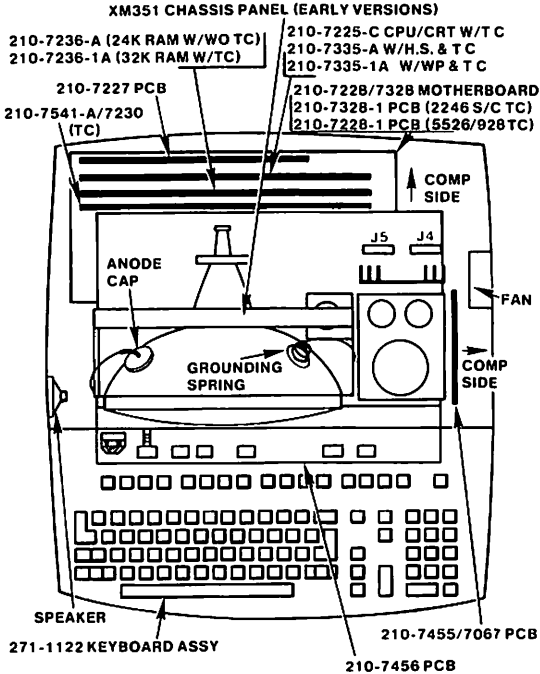
PCB COMPLEMENTS

5526 (928) AND 2246C/S
(Three-Board)



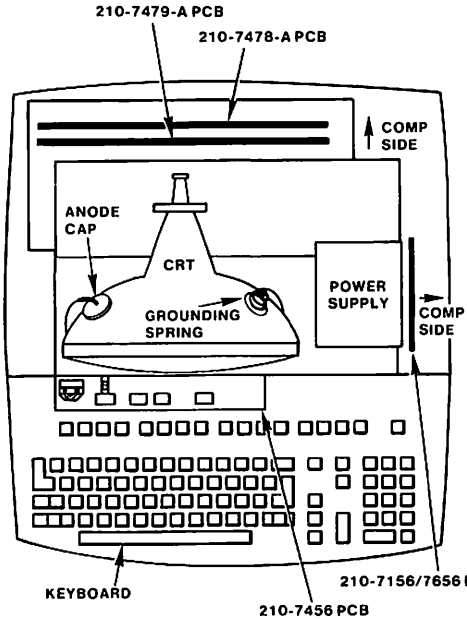
PCB COMPLEMENTS

5526A AND 2246S
(Three-Board)



PCB COMPLEMENTS

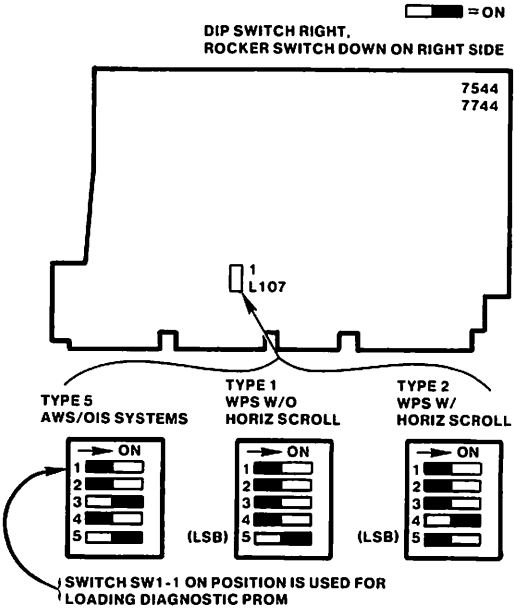
2246R



SWITCH SETTINGS

5536-1/2/3/4

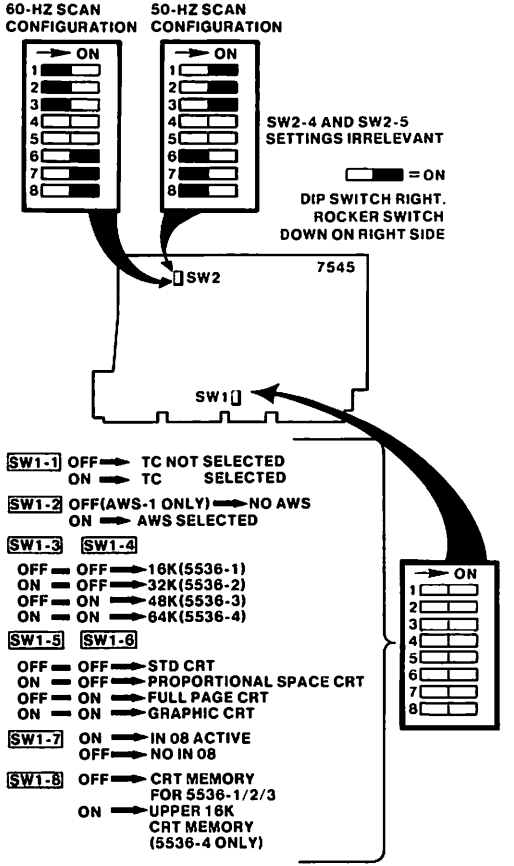
DATA LINK PCB 210-7544A/-1A/-2A/-3A & 210-7744A/-1A/-2A/-3A



SWITCH SETTINGS

5536-1/2/3/4

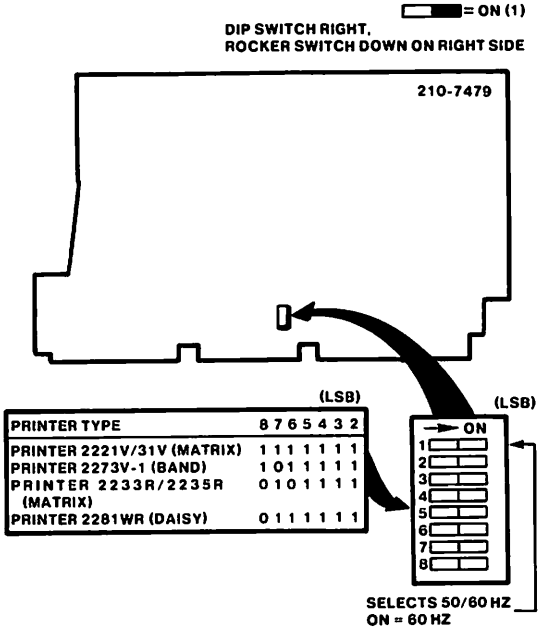
CPU/CRT PCB 210-7545A (WP/OIS/ALLIANCE)



SWITCH SETTINGS

2246R

PCB 210-7479 CPU PRINTER SELECTION (FOR MICROCODE VERSION 4.02.10, WLI NO. 705-0028-A*)



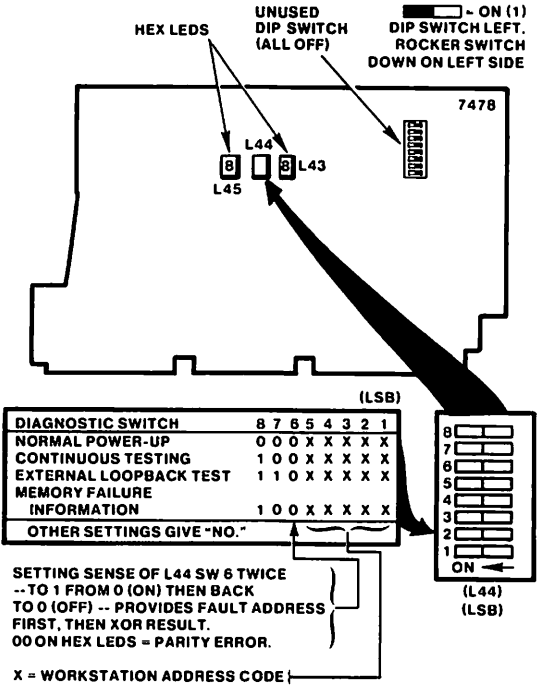
PRINTER TYPE	8	7	6	5	4	3	2
PRINTER 2221V/31V (MATRIX)	1	1	1	1	1	1	1
PRINTER 2273V-1 (BAND)	1	0	1	1	1	1	1
PRINTER 2233R/2235R (MATRIX)	0	1	0	1	1	1	1
PRINTER 2281WR (DAISY)	0	1	1	1	1	1	1

*See Model 2246R, PCB 210-7479 in ERROR CODES Section.

SWITCH SETTINGS

2246R

PCB 210-7478 TC/MEMORY



JUMPERS

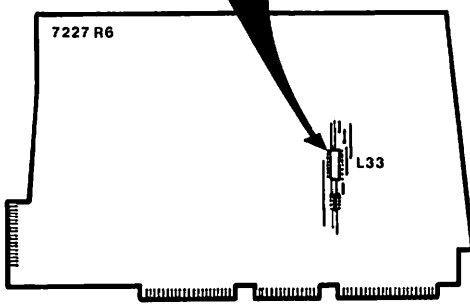
5526 (928)

DATA LINK PCB 210-7227

NOTE

Manufactured replacement boards should be supplied with correct jumpers for special features –verified by checking L33 logic levels.

DEVICE TYPE	PIN 3	PIN 6	PIN 10	PIN 13
1 STD CRT	HI	LO	LO	LO
2 HORIZ SCROLL CRT	LO	HI	LO	LO
5 32K OIS WORKSTATION	HI	LO	HI	LO



PROMS

5526 (928)

Description	Load PCB 210-	Burned Prom No.	Position
5526 STD CRT	210-7225-A/-1A	378-2030-R1	L8
5526 Spanish	210-7225-B	378-2068	L8
5526 STD CRT	210-7335 -A	378-2030-R1	L8
5526 Japan WPO W/TC	210-7335-1B	378-2230	–
5526 Spanish W/TC	210-7335-C	378-2068	–
5526 Dutch/Swedish W/TC	210-7335-E	378-2293	L8
5526 Norwegian/Danish	210-7335-F	378-2307	–
5526 STD CRT	210-7479-A	378-2030-R1	L8
5526 Latin CRT	210-7545-3A	378-2030-R1(STD)	L8
5526/Latin 114	210-7545-3A	378-2216	–
928 Scintfc Gothic	210-7545R	378-2520	–
928 CRT Char Generator	210-7545R	378-2216	–
928 OIS PAN Health #1	210-7545T	378-2552	–
928-OIS PAN Health #2	210-7545T	378-2553	–

PROMS

2246C/S/R

Description	Load PCB 210-	Burned Prom No.	Position
2246R Micro Code #1	210-7478-A	378-4128-R2	L94
2246R Micro Code #2	210-7478-A	378-4129-R6	L93
2246R Micro Code #3	210-7478-A	378-4130-R6	L92
2246R Micro Code #4	210-7478-A	378-4131-R6	L91
2246R Micro Code #5	210-7478-A	378-4132-R6	L90
2246R Micro Code #7	210-7478-A	378-4133-R6	L89
2246R Micro Code #8	210-7478-A	378-4134-R6	L88
2246R Micro Code #5	210-7478-A	378-4135-R6	L95
2246C/S/R CRT German	210-7479-B	378-2565	L52/51/12
2246C/S/R CRT Netheld	210-7479-C	378-2567	L51/52/12
2246C/S/R CRT Norway	210-7479-D	378-2569-R1	L51/52/12
2246C/S/R CRT Swedish	210-7479-E	378-2571-R1	L52/51/12
2246C/S/R CRT Portugues	210-7479-F	378-2700	L52/51/12
2246C/S/R CRT Hungarian	210-7479-G	378-2719-R1	L52/51/12
2246C/S/R CRT U.N.	210-7479-H	378-2725	L52/51/12

PROMS

2246CSR

Description	Load PCB 210-	Burned Prom No.	Position
2246C Hungarian Chip #1	210-7545X	378-2704-R1	L51
2246C/S Hungarian CRT	210-7545X/Y	378-2719-R1	L52/51/12
2246C/S/R Portuguese CRT	210-7545U	378-2703	L51
2246C/S/R CRT Prtugues	210-7545V	378-2700	L52/51/12
2246C/S/R Portuguese CRT	210-7545U	378-2700	L52/51/12
2246C/S/R CRT S.C.	210-7479-J	378-2701	L52/51/12
2246C/S/R CRT Spanish	210-7479-K	378-2755	L52/51/12
2246C/S/R CRT Polish	210-7479-L	378-2728	L52/51/12
2246C/S/R CRT Romanian	210-7479-M	378-2727	L52/51/12

PROMS

5536-1

Description	Load PCB 210-	Burned Prom No.	Position
5536-1 STD CRT	210-7225-A/-1A	378-2030-R1	L8
5536-1 Spanish	210-7225-B	378-2068	L8
5536-1 STD CRT	210-7335 -A	378-2030-R1	L8
5536-1 STD CRT	210-7479-A	378-2030-R1	L8
5536 Multi-Avon CRT #1	210-7545W	378-2717	L51
5536 Multi-Avon CRT #2	210-7545W	378-2718	L52
5536 AWS Symbols	210-7545Z	378-2726	L52
5536 AWS 114 CRT Char	210-7545-2A	378-2216	–
5536 AWS Katakana Char	210-7545-2A	378-2445-R1	L6
5536-1 Latin CRT	210-7545-3A	378-2030-R1(STD)	L8
5536-1 Latin 114	210-7545-3A	378-2216	–
5536 AWS	210-7545-4A	377-0317 (unburned)	–
5536 AWS Greek/Latin	210-7545-5A	377-0317 (unburned)	–

MAJOR FUNCTIONS ON BOARDS

5536-1/2/3/4, 2246R

7544A/7478 MEMORY AND DATA LINK

- Conditions remote read/write (for MWR signal) by master. Handles:
  -Status read
  -1 byte read
  -1 byte write
  -256 byte read
  -256 byte write
  -Restart

- Disables workstation CPU for Direct Memory Access (DMA) logic by master

- Overrides floppy disk bus for high speed data transfers

- Initiates bus request to transfer multiple device data independent of processor. Provides:
  -Memory timing
  -Command registers
  -Address registers
  -Buffered data registers
  -Memory refresh

- Interfaces to workstation memory in parallel and master in series

- Line error indicator latches for parity and interrupted transmission

- Five-stage ring counter oscillator for CRT timing

- Firmware for telecommunications and power on diagnostics (PCB 210-7478)

MAJOR FUNCTIONS ON BOARDS

5526A, 5536-1/2/3/4, 2246S/C/R

7225/7425/7545/7479 CPU/CRT MEMORY

- Z80 CPU control/timing of bus operation
- CRT memory of ASCII coded characters and four-bit attribute field for blinking, intensifying, underlining, and cursoring characters
- Sequential display of memory sites by character and row counters—extended rows by indexing
- Memory character buffer for data and refresh maintenance NOPs (no operation) during initial program load or after parity error
- Video display and control logic keyboard interfacing of 8-bit parallel (two board) key codes and interfacing by enrichment chips for serial (one/three board) key codes
- PCB 7479 contains interface circuits for communication with PCB 7478, includes data link circuit to use upper 32K of TC/Memory board RAM for DMA applications of large scale data transfers.

MAJOR FUNCTIONS ON BOARDS

5526/A, 5536-1/2/3/4, 2246S/C/R

7456/7256 CRT DRIVER CARD (MONITOR ELECTRONICS)

- Drives CRT and manipulates horizontal and vertical yoke functions:

  -horizontal hold

  -vertical hold

  -vertical size

  -vertical linearity

  -horizontal deflection

  -horizontal phasing

  -brightness/contrast

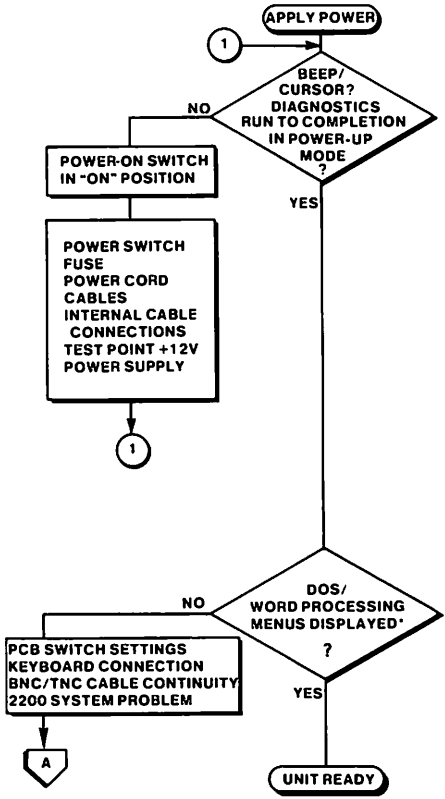
  -focus quality

7156-1/7656 PCB POWER SUPPLY REGULATOR

- Current fold-back protection
- Potentiometer adjustment of voltage levels
- Temperature stability for voltage

"TIME" (OPERATION) FLOWCHART

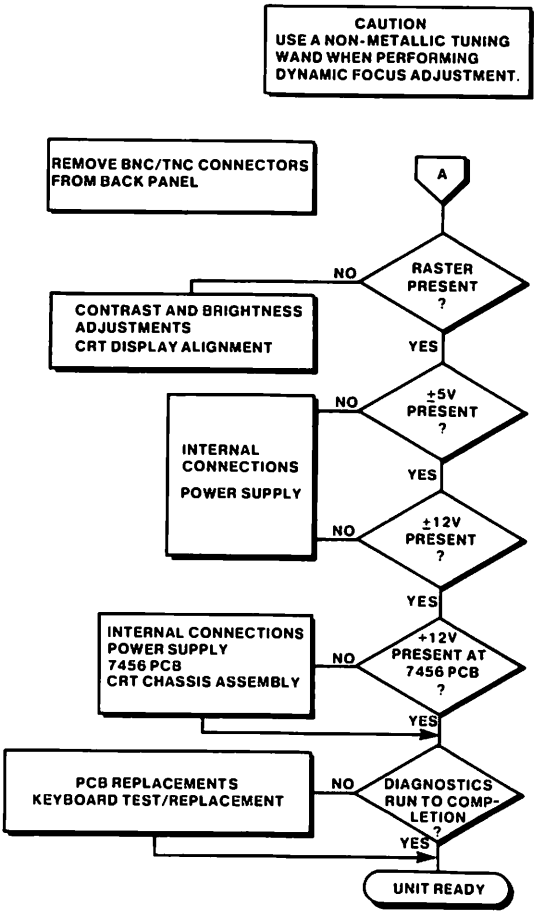
5526/A, 5536-1/2/3/4, 2246C/S



* FIRST CHECK THAT OTHER WORKSTATIONS ATTACHED TO HOST SYSTEM OPERATE PROPERLY (NO HOST SOFTWARE/HARDWARE PROBLEM)

"TIME" (OPERATION) FLOWCHART

5526/A, 5536-1/2/3/4, 2246C/S



ERROR CODES

5536-1/2/3/4

MODEL 5536

Code	Condition
0	A 00 (Skip character detected in document text)
2	Switch settings in master not set according to options chosen
4	Non-existent document
5	Document now in edit
6	Document now in use shared
7	Number of required sectors unavailable (disk full)
8	Programmer error
9	Count for "GET SPACE" less than 1/greater than 8
:	Archive disk not releasable (attached elsewhere)
;	Identical VTDC (Video Control Chip) entry, cannot catalog. System disk is in archive drive
=	Cannot set document password, VTDC is full
?	Document might be damaged
@	Count not equal to 1 or 8 in "RELEASE SPACE"

ERROR CODES

5536-1/2/3/4

MODEL 5536 (CONT)

Code	Condition
A	Transfer from slave memory to disk failed
B	Transfer to slave memory from disk failed
C	Wrong MSEM request involving disk drive
D	Too many users to share one document
E	Password protected
1	Operator intervention required (no power, disk in fault, or disk not in drive)
2	Write protected
3	CRC error on read
4	Header error
5	Equipment malfunction
6	Parity error reading slave memory
7	Data link error writing slave memory
8	I/O programming error
9	Device dropped READY during operation
:	Addressed slave not available
;	Slave dropped power during operation

ERROR CODES

2246R

PCB 210-7478

Hex LEDs must be installed. All error readings are less than 90; test takes 10 s.

STATUS DISPLAY	TESTS	STATUS DISPLAY	TESTS
01 02 03	NON-MASKABLE INTERRUPT (NMI) CIRCUITRY. SLAVE STATUS. AND SPURIOUS INTERRUPT TESTS	21 22	CLOCK TIMER CIRCUIT (CTC) TEST
		31-3E	SERIAL INPUT/OUTPUT (SIO) TESTS WITH INTERNAL LOOPBACK (SW 7 - OFF)
11 12 13 1F	MOVING INVERSIONS MEMORY TEST OF 48 K OF RAM	41-4D	SIO TESTS WITH EXTERNAL LOOPBACK CONNECTOR WLI 420-1040 (SW7 - ON)
AA	NO ERROR CONDITIONS DETECTED FOR FULL TEST	51 52	CHECKSUM CHECK OF POWER-UP AND OPERATING SYSTEM PROMS

FOR ERRORS "11" TO "1F", SETTING SWITCH 6 (L44) ON WILL DISPLAY FIRST BYTE IN ERROR.

FIRST BYTE:
"40" → "7F" = BANK 1 (TC RAM)
"80" → "BF" = BANK 2 (1ST BANK OF COMMON RAM)
"00" → "3F"
"CO" → "FF" = BANK 3 (2ND BANK OF COMMON RAM)
"40" → "7F"

RESET OF SWITCH 6 (L44) DISPLAYS SECOND BYTE (ADDRESS OF RAM IN ERROR).

SECOND BYTE:			
"00"	L16	L17	L77
"01"	L18	L19	L76
"02"	L33	L34	L75
"04"	L35	L36	L74
"08"	L37	L38	L73
"10"	L53	L54	L72
"20"	L55	L56	L71
"40"	L59	L60	L70
"80"	L61	L62	L69

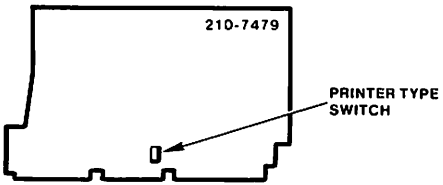
FOR EXAMPLE: STATUS DISPLAY "12" + SW 6 FIRST BYTE "82" + SW 6 SECOND BYTE "02" = L34 RAM CHIP PROBLEM

ERROR CODES

2246R

PCBS 210-7479

Board faults are found from error information using PCB 210-7478 switch 6 (L44) and hex LEDS.



STATUS DISPLAY	PROBLEM
91	BAD COLUMN PORT TO VTAC
92	BAD LINE REGISTER ON VTAC
93	MEMORY ERROR
94	MEMORY READ ERROR FOLLOWING WRITE
95	SLAVE PARITY ERROR

FOR ERRORS "93" TO "95", SETTING SWITCH 6 (L44) ON WILL DISPLAY FIRST BYTE IN ERROR.

FIRST BYTE:

"CO" → "D8" = CRT CONTROL MEMORY — 210-7479
"E0" → "F7" = CRT DISPLAY MEMORY — 210-7479
"40" → "7F" COMMON RAM — 210-7478
"00" → "3F" COMMON RAM — 210-7478

RESET OF SWITCH 6 (L44) DISPLAYS SECOND BYTE (ADDRESS OF RAM IN ERROR)

SECOND BYTE:

"00"	L17	L16	L53	L72
"01"	L19	L18	L54	L73
"02"	L34	L33	L55	L74
"04"	L36	L35	L56	L75
"08"	L38	L37	L57	L76
"10"	L54	L53	L58	L77
"20"	L56	L55	L59	L78
"40"	L60	L59	L60	L79
"80"	L62	L61	L61	L80

FOR EXAMPLE: STATUS DISPLAY "94" + SW 6 FIRST BYTE "F2" + SW 6 SECOND BYTE "02" = L55 RAM CHIP PROBLEM

LATEST PCB E-REV LEVELS

5526/A, 5636-1/2/3/4, 2246C/S/R

PCB No.	Highest Revision Levels											
	1	2	3	4	5	6	7	8	9	10	11	12
210-7544A*				X								
210-7545							X					
210-7478					X							
210-7479				X								
210-7456												X
210-7225						X						
210-7226A**		X										
210-7227			X									
210-7230-A					X							
210-7543-1A		X										

*Newer boards (210-7744) have reached Rev. E-5 level. Included as part of 7544 revision level are 7544A (16K memory), 7544-1A (32K memory), 7544-2A (48K memory), and 7544-3A (64K memory).

**PCB 210-7236-A is at level E-0 (24 K memory; 210-7236-1A is E-0 (32K memory).

ADJUSTMENTS AND RELATED TEST POINTS

5526/A, 5536-1/2/3/4, 2246C/S

PRELIMINARY CHECKS

- Verify MASTER software/hardware by exercising other workstations.
- Check for proper signal/voltage at MASTER BNC/TNC output connectors by attaching to known good workstation (or use oscilloscope to check for pulse train and 3-4V).
- Troubleshoot workstation operation with applicable diagnostics (see ERROR CODES).
- Early 5526 model workstations must be adjusted in special sequence:

  -Adjust 12 VR pot. for CRT power.

  -Set dynamic focus pot. for 250V P-P (Z1).

  -Adjust horizontal hold pot. (R33).

  -Adjust vertical hold pot. (R15).

  -Set vertical size pot. (R24).

  -Set vertical linearity pot. (R18).

  -Adjust horizontal linearity pot. (Z3).

  -Adjust horizontal phase pot. (R35).

  -Set focus pot. (R28).

ADJUSTMENTS AND RELATED TEST POINTS

5526/A, 5536-1/2/3/4, 2246C/S

GENERAL BOARD SYMPTOMS

Data Link PCBs

- Screen is blank because of continuous READ condition.
- Screen is blank because of no startup.
- LINE ERROR message during startup.
- PARITY message during startup with screen slowly blanking.
- Screen displays all "9s" (often it is bad switch/setting).

CPU and CRT Memory PCB

- Keyboard repeat keys malfunction.
- Keyboard entry absent or erratic.
- Erroneous or erratic display.
- Video synchronization problems not able to be adjusted by pots.
- Intensity and character (underscore, etc.) controls not adjustable by pots.
- Beeper/clicker malfunction not related to speaker/ speaker circuits.
- Workstation unable to select peripheral.
- Workstation not loadable by system program.

ADJUSTMENTS AND RELATED TEST POINTS

5526/A, 5536-1/2/3/4, 2246C/S/R

ACCESS

- Check/adjust workstation power supply:

  -With power off, remove left and right Phillips screws that secure cabinet. Three other Phillips screws under keyboard plastic strip are removed, and cover is lifted off (slides back and up*). Disconnect fan harness.

- Electronics PCB (210-7456) slides forward for access after keyboard removal by four Phillips screws located on cabinet mounts. (Rear mounts have shims.)

NOTE

Adhesive tin foil for static shielding of keyboard cabling must be pried off carefully with sharp knife at corners—is reuseable.

*If video display adjustments are expected, outline perimeter of screen with grease pencil before removing cover/bezel. (See GENERAL CRT ALIGNMENT.)

ADJUSTMENTS AND RELATED TEST POINTS

5526/A, 5536-1/2/3/4, 2246C/S/R

ACCESS (CONT)

- Measure/adjust voltages for logic input to display.

NOTE

Connect COMMON lead of DVM to 0V test point only; use of chassis grounds gives wrong readings.

-Early 5526 models have separate CRT power supply located adjacent to CRT and in front of fan; PCB 210-7255/7455 is attached to power supply and has +12 VR adjustment pot at top right corner.

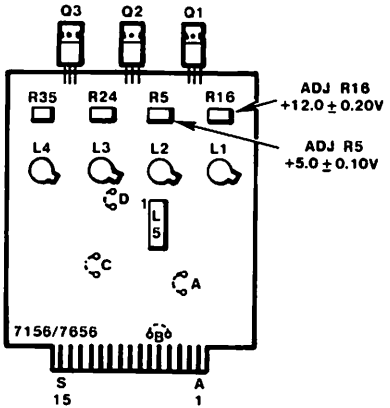
- Verify proper character display and perform video display alignment as needed.

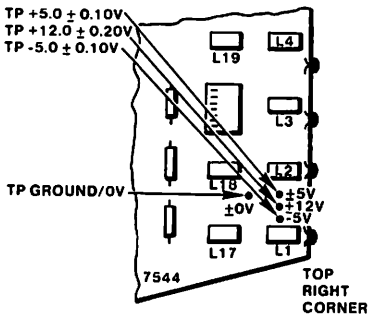
-Display board access is from under CRT.

ADJUSTMENTS AND RELATED TEST POINTS

5536-1/2/3/4 & 2246S/C
(Two Board)

PCB 7544/7544A/7544-1A VOLTAGE CHECKS/ADJUSTMENTS





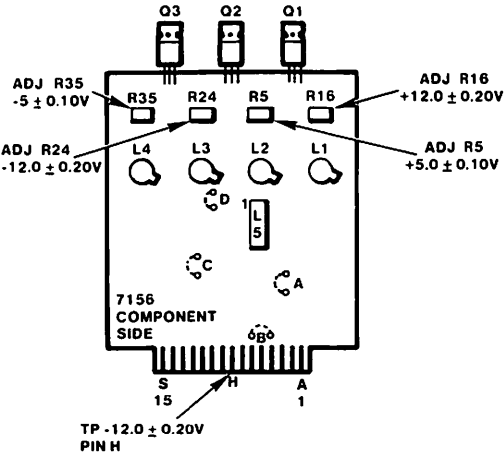
ADJUSTMENTS AND RELATED TEST POINTS

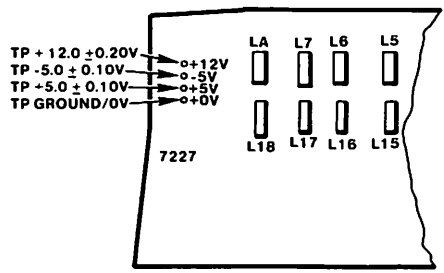
5526, 2246S/C
(Three Board)

PCB 7227 VOLTAGE CHECKS/ADJUSTMENTS

NOTE

Connect common lead of DVM to 0V test point only; use of chassis ground gives wrong readings.





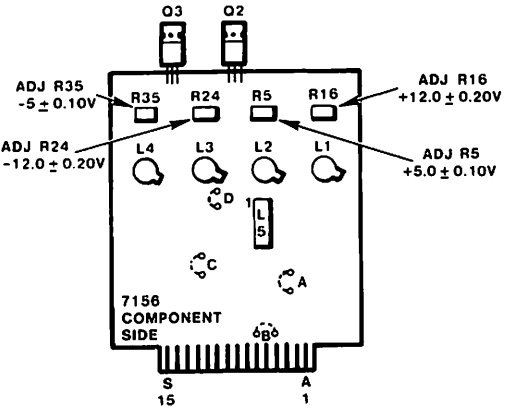
ADJUSTMENTS AND RELATED TEST POINTS

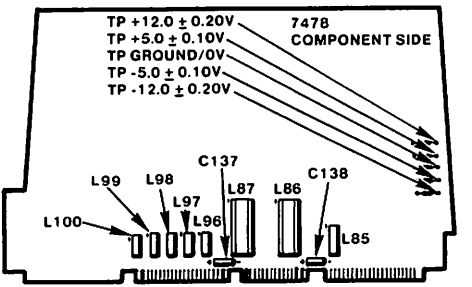
2246R

PCB 7478 VOLTAGE CHECKS/ADJUSTMENTS

NOTE

Connect common lead of DVM to 0V test point only; use of chassis grounds give wrong readings.

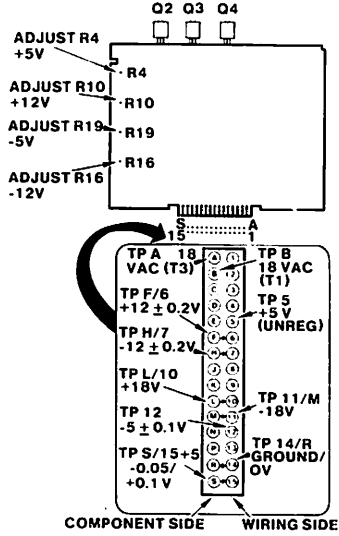




ADJUSTMENTS AND RELATED TEST POINTS

5526

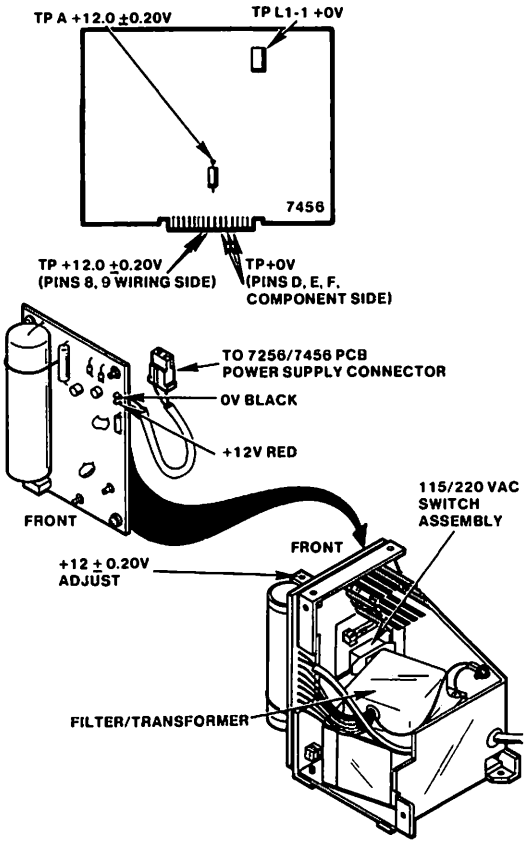
PCB 7067 POWER SUPPLY REGULATOR



ADJUSTMENTS AND RELATED TEST POINTS

5526

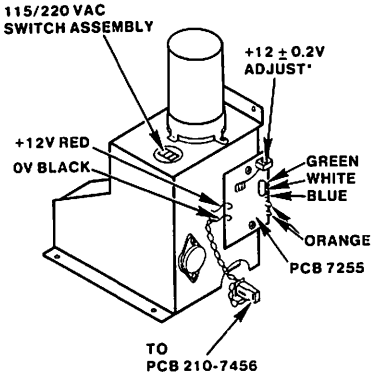
PCB 7455 & 7456 VOLTAGE SETTINGS (EARLY PS DISPLAY MODULE)*



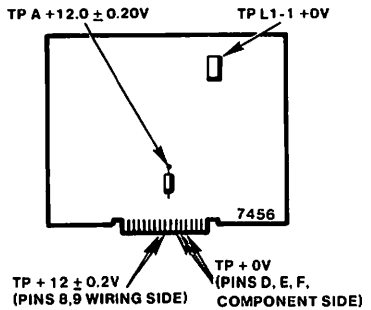
ADJUSTMENTS AND RELATED TEST POINTS

2246C/S

EARLY VS PCB 7255/7455 ON SEPARATE CRT POWER SUPPLY



* IF VOLTAGE APPROACHES 9V, CHECK FOR BAD FLYBACK TRANSFORMER/HIGH VOLTAGE DIODE.



ADJUSTMENTS AND RELATED TEST POINTS

5526/A, 5536-1/2/3/4, 2246C/S/R

GENERAL CRT ALIGNMENT

- Verify that test points for +5 VR, +12 VR, and +18 VR provide voltages within tolerance. Adjust trimpots as necessary.
- Adjust Z3 dynamic focus coil on CRT display PCBs with non-metallic standard tuning wand for 250V p-p (between pin M and 0V reference on PCB 7456/7922.
- Generate full screenload of "HO" (24 lines by 80 characters).
- Set trimpot R33 (horizontal hold) and trimpot R15 (vertical hold) to midpoint of stable display range.

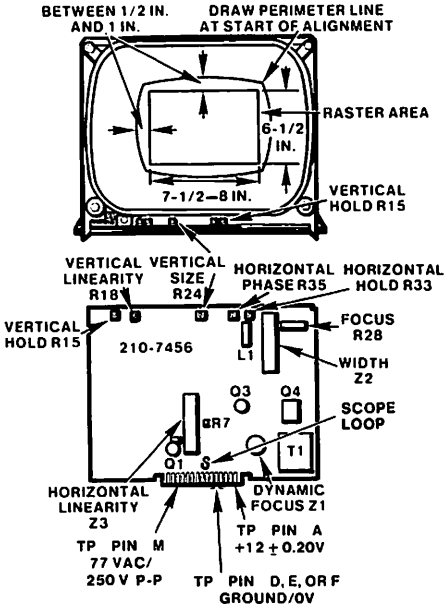
NOTE

EARLY 5526 WORKSTATIONS ARE ADJUSTED IN SPECIAL SEQUENCE:
(1) ADJUST +12 V POTENTIOMETER FOR ±0.1V (2) ADJUST DYNAMIC FOCUS POT FOR 250V PEAK-TO-PEAK AT PIN M (3) ADJUST HORIZONTAL HOLD (4) ADJUST VERTICAL HOLD (5) ADJUST VERTICAL SIZE (6) VERTICAL LINEARITY (7) HORIZONTAL LINEARITY (8) HORIZONTAL PHASE (9) FOCUS

ADJUSTMENTS AND RELATED TEST POINTS

5526/A, 5536-1/2/3/4, 2246C/S/R

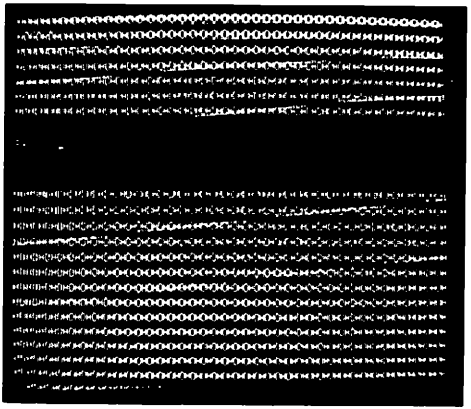
GENERAL CRT ALIGNMENT (CONT)

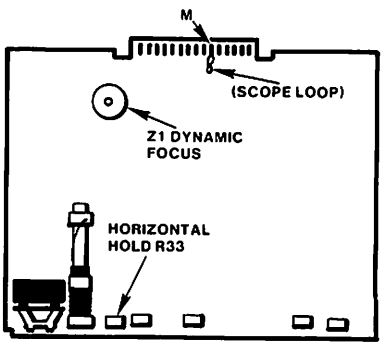


ADJUSTMENTS AND RELATED TEST POINTS

5526IA, 5536-1/2/3/4, 2246C/S/R

GENERAL CRT ALIGNMENT (CONT)



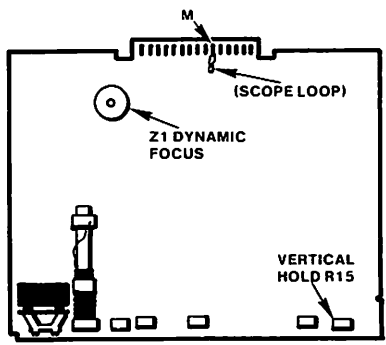


ADJUSTMENTS AND RELATED TEST POINTS

5526/A, 5536-1/2/3/4, 2246C/SIR

GENERAL CRT ALIGNMENT (CONT)

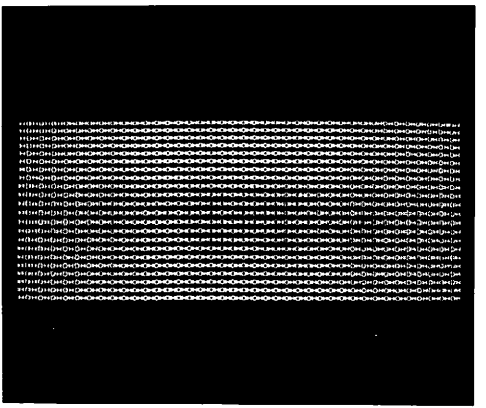
VERTICAL
HOLD R15



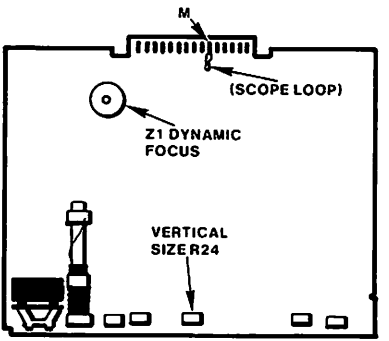
ADJUSTMENTS AND RELATED TEST POINTS

5526/A, 5536-1/234, 2246C/S/R

GENERAL CRT ALIGNMENT (CONT)



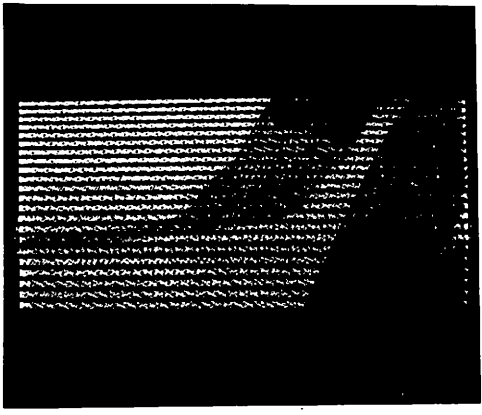
VERTICAL
SIZE
R24



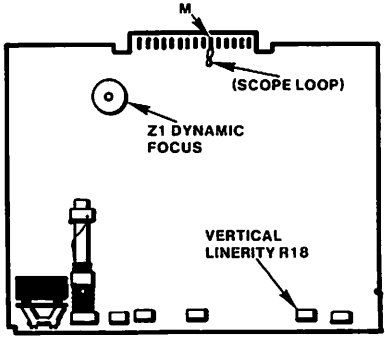
ADJUSTMENTS AND RELATED TEST POINTS

5526/A, 5536-1/2/3/4, 2246C/S/R

GENERAL CRT ALIGNMENT (CONT)



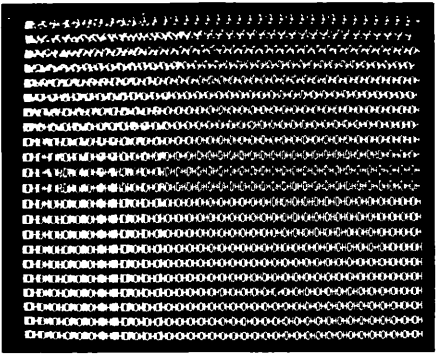
VERTICAL
LINEARITY
R18



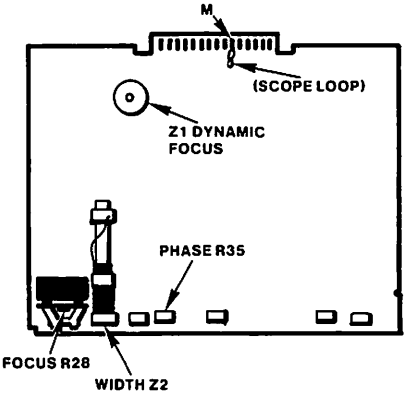
ADJUSTMENTS AND RELATED TEST POINTS

5526/A, 5536-1/2/3/4, 2246C/S/R

GENERAL CRT ALIGNMENT (CONT)



HORIZONTAL
PHASE R35 (CENTERS DISPLAY IN RASTER)



COMMONLY USED PARTS

5526/A, 5536-1/2/3/4

MODULAR/SUBASSEMBLY REPLACEMENT

WLI No.	Description	Model/ Comments
210-7544A	16K Mem PCB	5536-1
210-7544-1A	32K Mem Data Link PCB	5536-2 & TC
210-7544-2A	48K Mem Data Link PCB	5536-3 & TC
210-7544-3A	64K Mem Data Link PCB	5536-4
210-7545A	CRT/CPU PCB (Archiver)	5536-1/2/3/4 & TC
210-7545	CRT/CPU Control	5536
210-7656	Regulator PCB	5536
210-7541-A	CPU w/ TC PCB	5536
400-1001	Fan, 50 CFM	5536
270-0612	CRT PS Assy	5636/2246R
210-7456	12" CRT PCB	All Models
360-1025SB	2.5A Fuse SB	5536
210-7226-A	16K Mem PCB	5526
210-7227	Data Link PCB	5526
210-7236-1A	32K Mem PCB	5526
210-7236-A	24K Mem PCB	5526
210-7335-A	CPU/CRT Mem	5526 H.S.
210-7541-A	CPU w/ TC	5526 TC
270-0346-1	CRT PS Assy	5526
400-1009	Fan	5526
270-0746	Switching P.S.	5536 (newer)
270-0624	Hi-Current P.S.	5536 (older)
210-7917/	Motherboard	All Models

COMMONLY USED PARTS

MODULAR/SUBASSEMBLY REPLACEMENT (CONT)

WLI No.	Description	Models/ Comments
210-7228	Motherboard	5526/A
210-7542	Motherboard	5536 (newer)
210-7542-2	Motherboard	5536 (w/TC)
270-0744	Front Panel Assy	5536
270-3215	Line Filter Assy	All Models
360-1016SB	1.5A Fuse	All Models
271-1122	Keybd & BP Assy	5536/5526
360-1016Sb	1.5A Fuse SB	5536/5526
360-0000	Fuse Holder	5526
370-0004	Shift Lamp	5526
210-7156	Power Supply Reg.	2246R
210-7456	CRT Monitor w/ext. connectors	2246R
210-7478-A	TC/Memory PCB	2246R
210-7479-A	Enhanced CRT/ CPU PCB	2246R
271-1126	Keybd & BP Assy	2246R
325-0033	Toggle Sw	2246R
378-4212	Diag. PROM	2246R
220-1835	Cable Assy	Power Switch
220-3260	Cable Assy	SPS150E
271-1243	Keyboard Std.	928 (Numeric Keypad)
210-7121A	Logic PCB	2246P
210-7123	Regulator	2246P
210-7456	Monitor PCB	2246P/S
270-0362	Monitor (no PS)	2246P
271-1126	Keyboard Assy	2246P/S

COMMONLY USED PARTS

5536-1/2/3/4, 2246C/S/R

MODULAR/SUBASSEMBLY REPLACEMENT (CONT)

WLI No.	Description	Models/ Comments
210-7156	PS Regulator	2246C/S
210-7227	Data Link PCB	2246C/S
210-7236-1A	32K Mem PCB	2246C
210-7335A	CRT/CPU /PS	2246C
270-0346-1	Power Supply	2246C/S
270-0373	Monitor	2246C/S
271-1155	Keyboard Assy	2246C
210-7226A	16K Mem PCB	2246S
210-7425C	CRT PCB W/BLANKING	2246S
320-0302	Speaker, 2 in.	All Models
270-0373	12" Monitor w/PS	All Models w/210-7156 PCB
270-0372	12" Monitor w/o PS	All models w/210-7656 PCB

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