CUSTOMER ENGINEERING
SERVICE HANDBOOK

2200 SYSTEMS WORKSTATIONS

MODELS:
2236DE/DW
2336DE/DW
2876DE/DW
2886DE/DW
CUSTOMER ENGINEERING
SERVICE HANDBOOK

2200 SYSTEMS WORKSTATIONS

MODELS: 2236DE
2336DE/DW
2576DE/DW
2896DE/DW

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Preface

This Service Handbook provides concise information for Customer Engineers servicing 2200 Systems Workstations at customer sites.

Second Edition (September 1986)

This edition of 741-1641 technically updates the previous edition of the 2200 Systems Workstations Service Handbook, part no. 741-1641.

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# MODEL DIFFERENCES

## 2236D/DE/DW & 2336D

<table>
<thead>
<tr>
<th>Model</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>2236D</td>
<td>MVP, LVP, SVP, VP Interactive, two-board workstation with fan; no display highlighting or built-in power-up diagnostics. All enclosed in one unit.</td>
</tr>
<tr>
<td>2236DE</td>
<td>MVP, LVP, SVP, VP Interactive workstation (no fan included); power-up diagnostics; does box graphics and controls all printers except 2232B flatbed plotters; replaces 2236D for VP and MVP systems. All enclosed in one unit.</td>
</tr>
<tr>
<td>2236DW</td>
<td>MVP, LVP, SVP, VP Integrated-workstation (no fan included); power-up diagnostics; has added software for data processing/word processing; has all 2236DE features plus extra keys. All enclosed in one unit.</td>
</tr>
<tr>
<td>2336D</td>
<td>MVP, LVP, SVP, VP Interactive workstation (no fan included); power-up diagnostics; does box graphics and controls all printers except 2232B flatbed plotters; replaces 2236D and 2236DE for VP and MVP systems. All enclosed in one unit.</td>
</tr>
</tbody>
</table>

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1) All system applications except SVP use 2236MXD/2236MXE Four-Port Terminal Controller; or the 212-5012 Triplex Controller for terminal support. The SVP system uses 210-7789-A Terminal/Printer Controller or option W board, part no. 210-7846-A. The VP supports only 1 terminal. If 1 terminal is used, the 212-5012 Triplex Controller would be required.  

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# 2200 Systems Workstations

## Model Differences

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

<table>
<thead>
<tr>
<th>Model</th>
<th>2200 System Application</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>2336DW</td>
<td>MVP, LVP, SVP, VP</td>
<td>Has all 2336DW features; is low-cost version that replaces 2236DW.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ERGO DESIGN W/ DETACHED KEYBOARD.</td>
</tr>
<tr>
<td>2876DE/DW</td>
<td>MVP, LVP, SVP, VP</td>
<td>European version with choice of four expanded keyboards; is reconfigured 2236DE/DW.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ERGO DESIGN W/ DETACHED KEYBOARD.</td>
</tr>
<tr>
<td>2886DE</td>
<td>MVP, LVP, SVP, VP</td>
<td>Reconfigured 2236DE; has tilt screen, standard keyboard, and screen dump.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAME DESC AS 2236F ERGO DESIGN W/ DETACHED KEYBOARD.</td>
</tr>
<tr>
<td>2886DW</td>
<td>MVP, LVP, SVP, VP</td>
<td>Reconfigured 2236DW with standard keyboard; has tilt screen and supports 2200/WP software for word processing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAME DESC AS 2236D ERGO DESIGN W/ DETACHED KEYBOARD.</td>
</tr>
</tbody>
</table>

"All system applications are for 2336MXD/2336MXE Four-Port Terminal Controller use.

The SVP system uses 210-7789-A Terminal/Printer Controller or option W board, part no. 210-7846-A.

The VP supports only 1 terminal. If using a 2236/2336/2380-TP TERMINAL, A 2236-1 TRAILER CONTROLLER (TERMPRINTEDR/DRT) WOULD BE REQUIRED.

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PCB COMPLEMENTS

2876DE/DW, 2886DE/DW

NOTES:

A U.S. only; other suffixes for other countries.

WHERE'S THE KEYBOARD
2326DE 725-2627
2886DE 725-2618

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2200 SYSTEMS WORKSTATIONS

PCB COMPLEMENTS

2236D

NOTES:
"U.S. ONLY; OTHER SUFFIXES FOR OTHER COUNTRIES.

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2200 SYSTEMS WORKSTATIONS

PCB COMPLEMENTS

2236DE/DW

KEYBOARD
725-2815 (DE)
725-2837 (DW)

POWER TRANSFORMER

TERMINAL ELECTRONICS
210-7592-AIDEW
210-7585-1A
IDW1/POC9

POWER SUPPLY
HEAT SINK

CRT

CHASSIS SUPPORT ROD

NOTES
1) US ONLY; OTHER SUPPLIES FOR OTHER COUNTRIES.

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2200 SYSTEMS WORKSTATIONS

PCB COMPLEMENTS

2336DE/DW

NOTES: 9745-4
216-7743 CANNOT BE ORDERED ORDER 270-0753 (2336DE) OR 270-0817 (2336DE).

NOR PANEL ASSEMBLY

154-9794 A 725-2637 DW KEYBOARD
725-2618 DE KEYBOARD

NOR PANEL ASSEMBLY

WHEELS - THE KEYBOARD
SWITCH SETTINGS/JUMPERS

2236DE/DW, 2836DE/DW

TERMINAL ELECTRONICS PCB
WLI NO. 210-7592-A/-1A

DATA TRANSMISSION RATE (BPS)

ON SFF
2200 SYSTEMS WORKSTATIONS

SWITCH SETTINGS/JUMPERS

2236D

CPU TERMINAL PCB
WLI NO. 210-7292-1A

EREV 4 or above
DATA
TRANSMISSION RATE (BPS)

3000  X  ON  ON  OFF  OFF  OFF
600  X  ON  ON  OFF  OFF  OFF
1200  X  ON  ON  OFF  OFF  OFF
2400  X  ON  ON  OFF  OFF  OFF
4800  X  N/A
9600  X  ON  ON  ON  OFF  OFF
19200  OR  ON  ON  ON  OFF  OFF

E-REV 3 or lower

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SWITCH SETTINGS/JUMPERS

REAR PANEL ASSEMBLY
WLI NO. 270-0753 (DW)/270-0817 (DE)

--- Diagram of Rear Panel Assembly ---

RS232 (left)

--- Diagram of Switch Settings/Jumpers ---

DATA TRANSMISSION RATE (BPS)

--- Notes ---

1) Rear panel assembly includes Terminal Controller PCB (210-7743-A); 210-7743-A PCB may not be ordered separately; order the assembly.

741-1641-A
### ERROR CODES

#### 2236DE/DW, 2336DE/DW

#### 2236DE/DW; POWER-UP DIAGNOSTICS

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Possible Problem(s)/Corrective Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Audio alarm activated, pound sign (#) appears on terminal screen.</td>
<td>Check for proper baud rate switch settings on terminal Electronics PCB (210-7592-A/-1A) replace Terminal Electronics PCB -- 210-7592-A (DE); 210-7592-1A (DW).</td>
</tr>
</tbody>
</table>

#### 2336DE/DW; POWER-UP DIAGNOSTICS

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Possible Problem(s)/Corrective Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Audio alarm activated, error power-up message appears on terminal screen.</td>
<td>Defective Terminal Controller PCB (210-7743-A) -- replace 270-0753 (DW)/270-0817 (DE) rear panel assembly. (210-7743-A may not be ordered; assembly must be replaced.)</td>
</tr>
</tbody>
</table>

---

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ERROR CODES

2200 KEYBOARD SELF-TEST

During execution of keyboard self-test, the character on keycap of alphabetical or numerical key should appear on CRT screen. For non-alphabetical/numerical keys, refer to following table for character that should show on screen when key is pressed.

<table>
<thead>
<tr>
<th>Key</th>
<th>Display Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF '0'</td>
<td>e (return)</td>
</tr>
<tr>
<td>SF '1'</td>
<td>e</td>
</tr>
<tr>
<td>SF '2'</td>
<td>e (erase)</td>
</tr>
<tr>
<td>SF '3'</td>
<td>e</td>
</tr>
<tr>
<td>SF '4'</td>
<td>e</td>
</tr>
<tr>
<td>SF '5'</td>
<td>e (beep)</td>
</tr>
<tr>
<td>SF '6'</td>
<td>e (no space)</td>
</tr>
<tr>
<td>SF '7'</td>
<td>e (double space)</td>
</tr>
<tr>
<td>SF '8'</td>
<td>e (down diagonal right)</td>
</tr>
<tr>
<td>SF '9'</td>
<td>e (up diagonal right)</td>
</tr>
<tr>
<td>SF '10'</td>
<td>e (return)</td>
</tr>
<tr>
<td>SF '11'</td>
<td>e (highlight)</td>
</tr>
<tr>
<td>SF '12'</td>
<td>e (highlight removed)</td>
</tr>
<tr>
<td>SF '13'</td>
<td></td>
</tr>
<tr>
<td>SF '14'</td>
<td></td>
</tr>
<tr>
<td>SF '15'</td>
<td></td>
</tr>
<tr>
<td>SF '16'</td>
<td></td>
</tr>
<tr>
<td>SF '17'</td>
<td></td>
</tr>
<tr>
<td>SF '18'</td>
<td></td>
</tr>
<tr>
<td>SF '19'</td>
<td></td>
</tr>
<tr>
<td>SF '20'</td>
<td></td>
</tr>
<tr>
<td>SF '21'</td>
<td></td>
</tr>
<tr>
<td>SF '22'</td>
<td></td>
</tr>
<tr>
<td>SF '23'</td>
<td></td>
</tr>
<tr>
<td>SF '24'</td>
<td></td>
</tr>
<tr>
<td>SF '25'</td>
<td></td>
</tr>
<tr>
<td>SF '26'</td>
<td></td>
</tr>
</tbody>
</table>

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ERROR CODES

2236DE/DW

2200 KEYBOARD SELF-TEST (CONT)

2236DE/DW DISPLAY CHARACTERS FOR NON-ALPHABETICAL/NON-NUMERICAL KEYS (CONT)

<table>
<thead>
<tr>
<th>Key</th>
<th>Display Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF '27</td>
<td>6e</td>
</tr>
<tr>
<td>SF '28</td>
<td>6d</td>
</tr>
<tr>
<td>SF '29</td>
<td>6a</td>
</tr>
<tr>
<td>SF '30</td>
<td>60</td>
</tr>
<tr>
<td>SF '31</td>
<td>6u</td>
</tr>
<tr>
<td>ERASE</td>
<td>6e</td>
</tr>
<tr>
<td>CONTINUE</td>
<td>6e</td>
</tr>
<tr>
<td>CLEAR</td>
<td>6e</td>
</tr>
<tr>
<td>EDIT</td>
<td>6c</td>
</tr>
<tr>
<td>LOAD</td>
<td>6c</td>
</tr>
<tr>
<td>FN</td>
<td>6c</td>
</tr>
<tr>
<td>RUN</td>
<td>6c</td>
</tr>
<tr>
<td>UNDERSCORE</td>
<td>6c</td>
</tr>
</tbody>
</table>

2236DW

<table>
<thead>
<tr>
<th>Key</th>
<th>Display Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSERT</td>
<td>6j</td>
</tr>
<tr>
<td>PREV SCRN</td>
<td>6b</td>
</tr>
<tr>
<td>HALT</td>
<td>6h</td>
</tr>
<tr>
<td>ERASE</td>
<td>6h</td>
</tr>
<tr>
<td>D TAB</td>
<td>6h</td>
</tr>
<tr>
<td>CANCEL</td>
<td>6h</td>
</tr>
<tr>
<td>EAST ARROW</td>
<td>6e</td>
</tr>
<tr>
<td>SOUTH ARROW</td>
<td>6e</td>
</tr>
<tr>
<td>DELETE</td>
<td>6e</td>
</tr>
<tr>
<td>NEXT SCRN</td>
<td>6c</td>
</tr>
<tr>
<td>CONTINUE</td>
<td>6c</td>
</tr>
<tr>
<td>RECALL</td>
<td>6o</td>
</tr>
<tr>
<td>RESET</td>
<td>6x</td>
</tr>
<tr>
<td>WEST ARROW</td>
<td>6m</td>
</tr>
<tr>
<td>NORTH ARROW</td>
<td>6f</td>
</tr>
</tbody>
</table>

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CRT +12-VOLT CHECK

Pins 8, 9 (wiring side) = +12V, ± 0.2V

CRT +12-VOLT ADJUSTMENT

115/230 VAC SWITCH ASSEMBLY

+12 ± 0.2V ADJUST

GREEN
WHITE
BLUE

ORANGE
ADJUSTMENT PCB 210-7256/7456

TO MONITOR ELECTRONICS
PCB 210-7256/7456

NOTES:
- +12-VOLT TEST POINTS
  Located at pins 8, 9
  (wiring side) of
  210-7256/7456.
POWER SUPPLY REGULATOR PCB (210-7067)
VOLTAGE CHECKS/ADJUSTMENTS

ADJUST R4 (+5V)
ADJUST R18 (+12V)
ADJUST R19 (-5V)
ADJUST R16 (-12V)

POTS USUALLY ALONG TOP

P1: F/6 (+12V)
(+11.80 to +12.30 VDC)

P11
H/7: -12V (-11.80 to -12.30 VDC)

P12: -5V (-4.90 to -5.10 VDC)

P7
S/15: +5V
(+4.95 to +5.10 VDC)

WIRING SIDE
COMPONENT SIDE

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ADJUSTMENTS/TEST POINTS

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

TERMINAL ELECTRONICS PCB (210-7592-A/-1A)
VOLTAGE CHECKS/ADJUSTMENTS

WARNING
Use only one hand when working inside a powered-up electronic chassis. This precaution helps prevent receiving an electrical shock.

1. Connect common lead to 0V test point.
2. Check pin 1 of J14 for +12V ±0.12V.
3. Adjust R72 for +12V ±0.07V at pin 1, J14.
4. Check pin 1 of J15 for +5V ±0.05V.
5. Adjust R66 for +5V ±0.05V at pin 1, J15.
6. Check pin 2 of J16 for +20V ±0.1V.
7. Replace PCB if voltage at J16 outside limits.
8. Check pin 2 of J17 for -5V ±0.25V.
9. Replace PCB if voltage at J17 outside limits.
10. Check voltage across pins 1 and 2 of J18 for -12V ±0.60V.
11. Replace PCB if voltage at J18 outside limits.

NOTES:
- J14, J15, J16, J17, and J18 jumpers must be removed prior to reperforming voltage checks and adjustments.
- Voltage is not adjustable; replace PCB if voltage is not within tolerance (Non-adjustable voltages are: +20V, -5V, and -12V.)
Adjustments/Test Points

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

Monitor Electronics PCB
WLI No. 210-7456
Video Display Adjustment

Warning
Use non-metallic tool when performing checks/adjustments.

1. Generate full screenload of "HO" characters.
2. Adjust R18 (vertical linearity) for character rows of equal height.
3. Adjust R24 (vertical size) for gap of 3/4 in. (±1/4 in.) between perimeter line and top edge of raster.
4. Adjust R2 (width coil) for raster horizontal size of 7 3/4 in. (±1/4 in.).
5. Adjust R35 (horizontal phase) to center characters.
6. Adjust R28 (focus).

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TERMINAL CONTROLLER PCB (210-7743-A) AND
SWITCHING POWER SUPPLY (270-0734) VOLTAGE
CHECKS/ADJUSTMENTS

WARNING
Do not attempt to open the switching power supply. The supply contains
dangerous voltage and current levels.

NOTES:
1. TERMINAL CONTROLLER PCB (210-7743-A) IS PART OF
REAR PANEL ASSEMBLY AND MAY NOT BE ORDERED
SEPARATELY; ORDER 270-0753 (2336 DW) OR 270-0817 (2336 DE)
REAR PANEL ASSEMBLY.
1. Adjust +12V pot on switching power supply so test point A on 210-7456 shows +12V ±0.2V.
2. Use non-metallic tool to adjust Z1 (dynamic focus) for 250V p-p. Verify by monitoring test point M on 210-7456.
3. Set R33 (horizontal hold) to middle of stable display range.
4. Set R15 (vertical hold) to middle of stable display range.
5. Adjust R24 (vertical size) for vertical height of 6.5 in. (16.5cm) on 12-in. display.
6. Adjust R18 (vertical linearity) for equal height of character rows.
7. Adjust Z2 (width coil) for 8 in. (20.3 cm) horizontal deflection on 12-in. display.
8. Adjust R35 (horizontal phasing) to center characters horizontally on raster.
9. Adjust R28 (focus).

WARNING
Use non-metallic tool when performing adjustments.

ADJUSTMENTS/TEST POINTS

MONITOR ELECTRONICS PCB (210-7456) VOLTAGE CHECKS/ADJUSTMENTS AND CRT DISPLAY ALIGNMENT

2336DE/D1

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