CUSTOMER ENGINEERING

MODEL 2211M PRINTER/PLOTTER MULTIPLEXER

MAINTENANCE MANUAL

WANG
CUSTOMER ENGINEERING

MODEL 2211M PRINTER/PLOTTER MULTIPLEXER

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SECTION 1
DESCRIPTION

1.1 GENERAL

The Model 2211M Printer/Plotter Multiplexer is a modified version of the Model 2221M Printer/Plotter Multiplexer. The 2211M Multiplexer permits a single printer or plotter (except the Model 2212 and Model 2232A/B Flatbed Plotters) to be shared by up to four units: 2200A, B, C, S, T, VP, MVP [Central Processing Units (CPU's)]; 2200E [Portable Computing System (PCS)]; PCS2/2A; 2200F [Work Station (WS)]; and 2236D/DE Interactive Terminals.

NOTE:
Hereinafter, the units listed above will be referred to as "CP/WS", and "printer/plotter" will be represented by "P/P".

As of the date of this manual, Wang Laboratories does not sell the 2211M Multiplexer for the purpose of connecting it to a VS CPU; furthermore, the Home Office Customer Engineering Group does not support the VS/2211M configuration.

The 2211M Multiplexer is packaged in a chassis that contains the digital logic, channel indicators, channel-select switch, and power supply. Five 36-pin female connectors accept the P/P and CP/WS cables. Four 12-foot (3.7-meter) CP/WS interconnection cables are supplied with the multiplexer.
1.2 SPECIFICATIONS

Required Supply Voltage:

115 or 230 volts (±10%), ac, 50 or 60 hertz (±1 hertz)

Power Consumption:

25 watts

Heat Output:

85 BTU/hr

Fuse Rating:

115 volts - 6/10 amperes, 250 volts, slow-blow (WL #360-1006SB)
230 volts - 3/10 amperes, 250 volts, slow-blow (WL #360-1003SB)

Cable Description:

Ac Power Cord - 6 ft (1.8 m)
CP/WS Inter-connection Cable - 12 ft (3.7 m) (WL #220-0105)

Operating Environment:

Temperature - 50°F to 90°F (10°C to 32°C)
Relative Humidity - 30% to 80%, non-condensing

Dimensions of Chassis:

Height - 5.5 in. (13.8 cm)
Width - 8 in. (20.0 cm)
Length - 11.5 in. (28.8 cm)
Weight - 15 lbs (6.7 kg)
SECTION 2
UNPACKING AND INCOMING INSPECTION

Before unpacking the unit, visually inspect the shipping container for any indications of shipping damage (crushed edges or corners, punctures, tears, etc.). If any shipping damage is found, file an appropriate claim with the carrier involved.

Open the shipping container and remove all packing material. Remove the unit from the shipping container and place the unit on a flat, sturdy surface. Once again visually inspect the unit for damage. If any shipping damage is found, file an appropriate claim with the carrier involved and notify the WL Distribution Center (Department 90), Quality Assurance Department, Tewksbury, MA. 01876, of the nature and extent of the damage, making arrangements for equipment replacement, if necessary.

Four 12-foot (3.7-meter) CP/WS interconnection cables should be included with the unit. Inspect each cable for damage.
SECTION 3
INITIAL SETUP

A. Remove the six screws that secure the multiplexer cover to the
chassis and then remove the cover of the unit. Inspect the unit for
damaged assemblies, loose hardware and/or solder splashes.

B. Ensure that the ac line voltage and frequency provided at the
installation site is correct for the unit. (The line voltage and
frequency at which the unit is set to operate is indicated on the
unit serial number tag; refer to FIGURE 3-2.) Verify that the
voltage-select switch (ref: FIGURE 3-3) is set properly. Verify
that the multiplexer ac power ON/OFF switch is in the OFF position.
The ac power cord may now be plugged in.

C. Place the ac power switch (ref: FIGURE 3-2) to the ON position. The
POWER indicator and the channel #1 (CH 1) indicator on the front
panel should light.

D. Check +5VR with a digital voltmeter (dvm). This may be done by
placing the negative lead of the dvm on pin 7 of L1 and the positive
lead on pin 14 of L1 (ref: FIGURE 3-4). Ensure voltage is between
+4.8V and +5.2V. There is no +5VR adjustment.

E. Place the multiplexer ac power switch to the OFF position.

F. (Refer to FIGURE 3-1 and FIGURE 3-5.) Plug the I/O cable that is
attached to the printer or plotter into the jack labeled "I/O".
Using the CP/WS interconnection cables supplied (WL# 220-0105),
connect the CP/WS designated #1 to the jack labeled "CH 1"; connect
the #2 CP/WS to "CH 2", the #3 to "CH 3", and the #4 to "CH 4".

G. Place the multiplexer ac power switch to the ON position and run all
appropriate (printer or plotter) diagnostics on each system channel
(ref: Diagnostic Testing Procedures, Section 5). After each channel
has been tested, replace the cover of the unit.
FIGURE 3-3  VOLTAGE-SELECT SWITCH
SECTION 4
THEORY OF OPERATION (BLOCK LEVEL)

4.1 GENERAL

The 2211M Multiplexer controls access to the printer or plotter by means of select circuitry that is regulated by a channel-select switch. This manually operated switch determines which of the four possible CP/WS's will have exclusive access to the P/P. At power-on, the multiplexer automatically selects channel #1. Incorporated into the multiplexer electronics is a four-second channel-select delay that prevents inadvertent output from a bypassed channel while the desired channel is being selected.

4.2 POWER-ON (Reference FIGURE 4-1.)

Power-on sets the channel-selection counter (L3), which is made up of two 7473-type flip/flops wired to count from '0' to '3' in binary, to the 'clear' state (00₂). This action lights the CH 1 indicator, and channel #1 is selected for printer access. (See following Channel Selection theory.)

4.3 CHANNEL-SELECTION (Reference FIGURE 4-1.)

When the channel-select switch is depressed, the select flip/flop (L13) 'sets', and then 'resets' when the switch is released. The pulse provided by the select flip/flop output (pin 6) clocks the channel-selection counter. A count of '1' causes the LED decoder (L2) to illuminate the CH 2 indicator. At the same time, the outputs from the channel-selection counter allow the eight data bits, the data strobe bit, and the prime bit from CP/WS #2 to pass through multiplexers (L4,7,8,9,15) to the printer. The channel-selection counter outputs also allow the P/P status bits to pass through de-multiplexers (L5,6,16) to CP/WS #2.
Operation for other CP/WS channels is similar to that described above— with a channel-selection counter output of 00₂ selecting channel #1, 1₀₂ selecting channel #3, and 1₁₂, channel #4.

4.4 PROTECT-DELAY (Reference FIGURE 4-1.)

When the channel-select switch is depressed, the protect-delay circuitry (L17, 18) produces a 4-second pulse. This pulse disables all multiplexer and de-multiplexer outputs for that 4-second protect interval. This design feature ensures no inadvertent output from a bypassed channel while the desired channel is being selected. Four seconds after the desired channel is selected, the 2211M Multiplexer will enable the data and status lines to the P/P.

4.5 SIGNAL MNEMONICS

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<td>Clock from P/P; buffered clock to CP/WS</td>
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<td>D1 - D8</td>
<td>Data lines from CP/WS; buffered data lines to P/P</td>
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<td>Data strobe from CP/WS; buffered data strobe to P/P</td>
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<td>FAULT</td>
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<td>FAULT₁₀₄</td>
<td>Fault status to CP/WS</td>
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<td>Paper out status from P/P; buffered paper out status to CP/WS</td>
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<td>PRIME</td>
<td>Prime line from CP/WS; buffered prime line to P/P</td>
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<tr>
<td>SL</td>
<td>Select line from CP/WS; buffered select line to P/P</td>
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FIGURE 4-1  BLOCK DIAGRAM
SECTION 5
DIAGNOSTIC TESTING PROCEDURES

5.1 PRELIMINARY CHECK

After power is applied and channel #1 is selected, depress the channel-select switch and the CH 2 LED should light. Depress the channel-select switch a second time; the CH 3 LED should light. Depress the channel-select switch once more; the CH 4 LED should light. Depressing the channel-select switch one final time should cause the CH 1 LED to relight, thus completing the channel-select count-sequence/cycle.

5.2 PRINTER/PLOTTER DIAGNOSTIC

A standard 2200 printer or plotter diagnostic should be run on each system channel. Reference the appropriate CP/WS manual(s) for P/P diagnostic operating procedures.

The P/P diagnostic may be run on all four system channels simultaneously. Programs in the CP/WS's that are not selected by the 2211M Multiplexer will "hang-up" when they attempt to access the P/P. When a waiting ("hung") unit is selected, the selected unit will transfer data to the P/P. (Index the channel-select switch as required.) The multiplexer will not allow CP/WS-to-P/P data transfer until four seconds have elapsed from the time the channel-select switch is depressed, thus enabling a given channel. If the channel-select switch is depressed while the P/P is operating, the output will immediately be interrupted (data may be lost), and four seconds later the new channel will transfer data to the P/P. The CP/WS that was utilizing the P/P will not display an error message; that CP/WS will "hang", attempting to access the P/P. When the interrupted channel is re-selected, that CP/WS regains access to the P/P, and transfers the next line of data to the P/P.
SECTION 6
TROUBLESHOOTING

The Single-Board Printer Exerciser (WL #190-0704) may be attached to each 2211M Multiplexer CP/WS jack to aid in troubleshooting a defective system.
SECTION 7
BILL OF MATERIALS

The 2211M Multiplexer Bill of Materials starts on the next page. At the end of this section (page 7-8), there is a photograph of the interior of the unit with all major assemblies and components pointed out.
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SECTION 8
SCHEMATICS

The following schematics are contained in this section:

<table>
<thead>
<tr>
<th>Description</th>
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<tr>
<td>2211M Power Supply</td>
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<tr>
<td>210-7430 Electronics</td>
<td>D7430</td>
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United States

Alabama
Birmingham
Mobile

Alaska
Anchorage

Arizona
Phoenix
Tucson

California
Culver City
Fountain Valley
Fresno
Inglewood
Sacramento
San Diego
San Francisco
Santa Clara
Ventura

Colorado
Englewood

Connecticut
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Stamford
Wethersfield

District of Columbia
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Hialeah
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Orlando
Tampa

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Hawaii
Honolulu

Idaho
Idaho Falls

Illinois
Chicago
Morton
Park Ridge
Rock Island
Rome

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Indianapolis
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Des Moines

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(CPEC) S.A.
Panama City

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Singapore

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Gothenburg
Malmo

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Zurich
Basel
Geneva

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Zug

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Lowell, Mass.

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Wang Laboratories, GmbH
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